AGENDA D-4(a-b)
OCTOBER 2006

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver
Executive Director

DATE: September 25, 2006

SUBJECT: Essential Fish Habitat

ESTIMATED TIME
4 HOURS

ACTION REQUIRED:

a) Review alternatives for the Bering Sea EFH analysis, and revise as appropriate.

b) Initial Review of the Aleutian Islands EFH area adjustment.

BACKGROUND:

The Council took action in February 2005 to conserve essential fish habitat (EFH) from potential adverse effects of fishing. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The EIS prepared for the action concluded that while fisheries do have long term effects on benthic habitat, these impacts were minimal and had no detrimental effects on fish populations. The Council adopted several new measures to minimize the effects of fishing on EFH in the Aleutian Islands and Gulf of Alaska.

Bering Sea EFH

The EFH EIS evaluated a suite of alternatives for the eastern Bering Sea (EBS). Based on that analysis, the Council determined that additional habitat protection measures in the EBS were not needed right away, and that an expanded analysis of potential mitigations measures for the EBS should be conducted prior to taking action. In December 2005, the Council discussed alternatives to conserve habitat in the EBS and finalized a 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 the potential adverse effects of fishing on EFH and to support the continued productivity of managed fish species.*

In June 2006, the Council reviewed two discussion papers regarding alternatives to minimize (to the extent practicable) the effects of fishing on EFH in the Bering Sea. The first paper addressed the framework of the analysis and provided some potential alternatives. The second paper evaluated the need for possible protection measures for St. Matthew blue king crab and Eastern Bering Sea snow crab stocks. The Council adopted alternatives and options for the analysis (Item D-4(a)). Additionally, the Council requested the crab plan team meet to consider additional protection areas for St. Matthew blue king crab and Bering Sea opilio crab, and to provide recommendations to the Council in October. The crab plan team report is provided in the notebooks under D-3(b)(1).

The Council also requested staff prepare a discussion paper on open area approaches that would include recent fishing effort distribution. The paper is attached as Item (D-4(b)). At this meeting, the Council will finalize the alternatives for open areas.

In December, the Council will focus on the gear modification alternatives. Dr. Craig Rose from the Alaska Fisheries Science Center is scheduled to report on recent research on gear modification in the Bering Sea to mitigate the effects of bottom trawl fisheries during the December 2006 meeting. The preliminary results indicate that rollers on the sweeps may increase catches of some target species and that bottom contact was reduced.

Initial review of this analysis is tentatively scheduled for February, 2007.

Aleutian Islands EFH

The Aleutian Island Habitat Conservation Area (AIHCA) was adopted as part of a suite of conservation measures to minimize the adverse effects of fishing in the Aleutian Islands subarea. The AIHCA prohibits the use of non-pelagic trawl fishing gear in designated areas of the AI to reduce the effects of fishing on corals, sponges, and hard bottom habitats, while allowing most fishing areas that have been trawled repeatedly in the past remain open.

During the June 2006 meeting, fishery participants requested that the open area boundaries be slightly modified to allow fishing in areas historically fished and to prevent bottom trawling in areas that have not been repeatedly fished. One location near Agattu Strait had been historically fished and was included into the closure area. A second location near Buldir Island was included in the portions of the AIHCA open to bottom trawling but has some documented presence of sponges which is indicative of a fragile habitat. The proposed amendment would open the Agattu area and close the Buldir area. The analysis was mailed to you two weeks ago; the executive summary is attached as Item D-4(c).

The Council had originally been scheduled to make an initial review of the analysis and take final action on the amendment at the October meeting. However, staff ran into a few snags with the data, thus complicating the analysis. A letter from NMFS further details these analytical and data issues. Given these considerations, it may be prudent to delay final action on this issue.

Bering Sea Habitat Conservation
Council Motion June 12, 2006

The Council adopts the following alternatives and options for analysis:

Alternative 1: status quo

Alternative 2: Open area approach utilizing fishing data through 2005 to define area

Option 1: Include the areas north of Bogoslof, south of Nunivak Island in the open area, and the 10 minute strip in the Red King Crab Savings Area.

Alternative 3: Require gear modifications on all bottom flatfish trawl gear to reduce seafloor contact and/or increase clearance between the gear and substrate.

Alternative 4: Open area approach utilizing fishing data through 2005 to define area, plus require gear modifications on all bottom flatfish trawl gear to reduce seafloor contact and/or increase clearance between the gear and substrate.

Option 1: include the areas north of Bogoslof and south of Nunivak Island in the open area, and the 10 minute strip in the Red King Crab Savings Area.

Additionally, the Council requests the crab plan team meet to consider additional crab protection areas for St. Matthew blue king crab and Bering Sea opilio crab, and make recommendations to the Council at the October meeting. Based on these recommendations, the Council may consider changes to the 'open area' alternatives or possible designation as HAPC in the future.

Bering Sea Open Area Approach:

In June 2006, the Council discussed potential alternatives for the Bering Sea Habitat Conservation analysis. This analysis will tier off of the EFH Environmental Impact Statement (EIS). The range of alternatives being considered includes an open area approach and modifications to flatfish trawl gear. The Council, tasked staff with developing an open area approach that would utilize fishing data through 2005, includes the areas north of Bogoslof, south of Nunivak Island in the open area, and the 10 minute strip in the Red King Crab Savings Area.

<u>Background on Open Area Approach:</u>

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 a increase in the long- term effects indices (LEI). Recall that 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 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.

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 (Figure 1) 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.

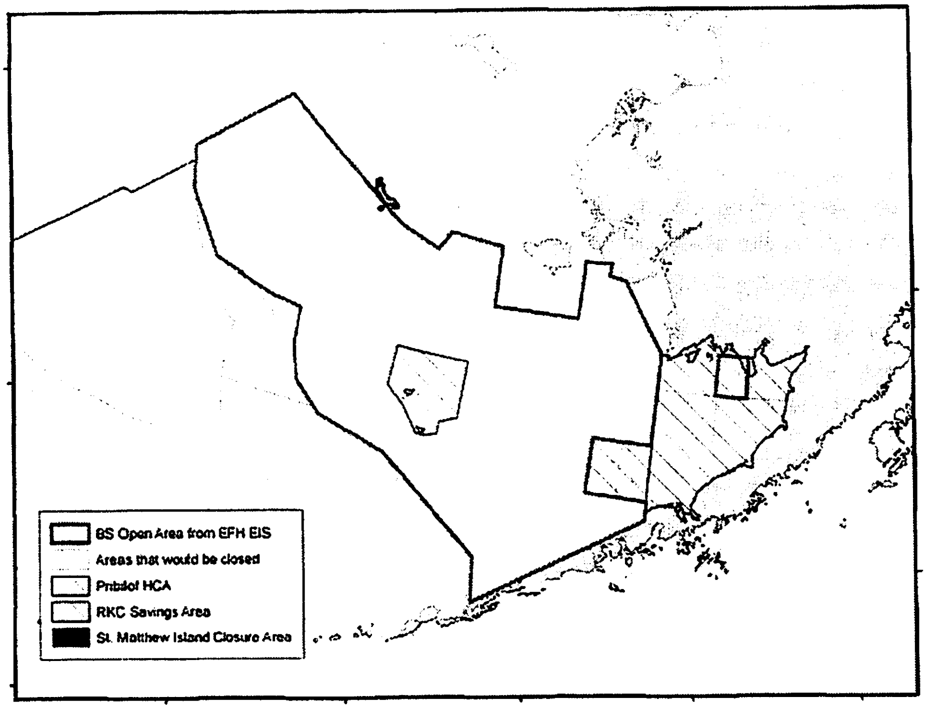


Figure 1. Open area presented in the EFH EIS, without the rotational closures, with other Bering Sea trawl closures areas depicted (Red King Crab Savings Area, Pribilof Island Habitat Conservation Area, and the State of Alaska's St. Matthew Island Closure Area).

Expanded Open Area:

To examine the effects of including the 2005 data, I created a map using a series of layers in GIS. I overlayed the previous open area analyzed in the EFH EIS with both recent (2000-2005) and historic (1990-2005) observed bottom trawl fishing effort (Figure 2 and 3).

The data indicate that the effort distribution in recent years (2000-2005) falls almost entirely within the open areas boundaries described in the EFH EIS, with the exception of a few hauls in the Bogoslof, Red King Crab Areas, and the St. Matthews area. However if the historic data (back to 1990) are included, it appears the bottom trawl effort was distributed in the northern areas as well as in the deepwater basin area.

Utilizing an editing tool in ArcGIS the bounds of the previous open area were extended to capture bottom trawl sets that occurred more than one time based on the 1990-2005 data. 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. The expanded area is represented in Figure 4 below with historic fishing effort, and is contrasted with the one analyzed in the EFH EIS in Figure 5. Recent fishing effort is represented in Figure 6 with both open areas.

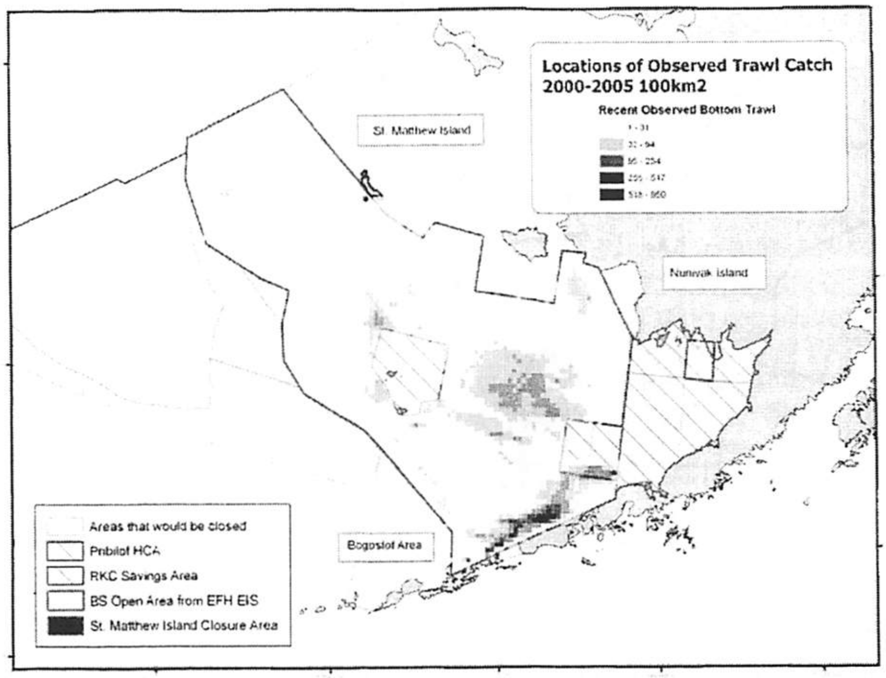


Figure 2. Open area presented in the EFH EIS, with recent fishing effort (2000-2005), with other Bering Sea trawl closures areas depicted (Red King Crab Savings Area, Pribilof Island Habitat Conservation Area, and the State of Alaska's St. Matthew Island Closure Area).

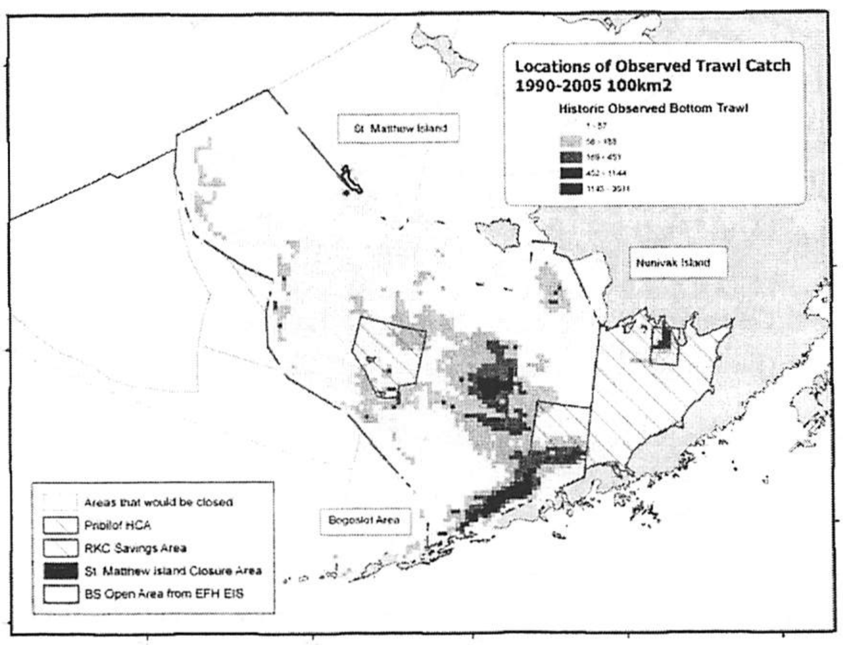


Figure 3 Open area presented in the EFH EIS, with historic fishing effort (1990-2005), with other Bering Sea trawl closures areas depicted (Red King Crab Savings Area, Pribilof Island Habitat Conservation Area, and the State of Alaska's St. Matthew Island Closure Area).

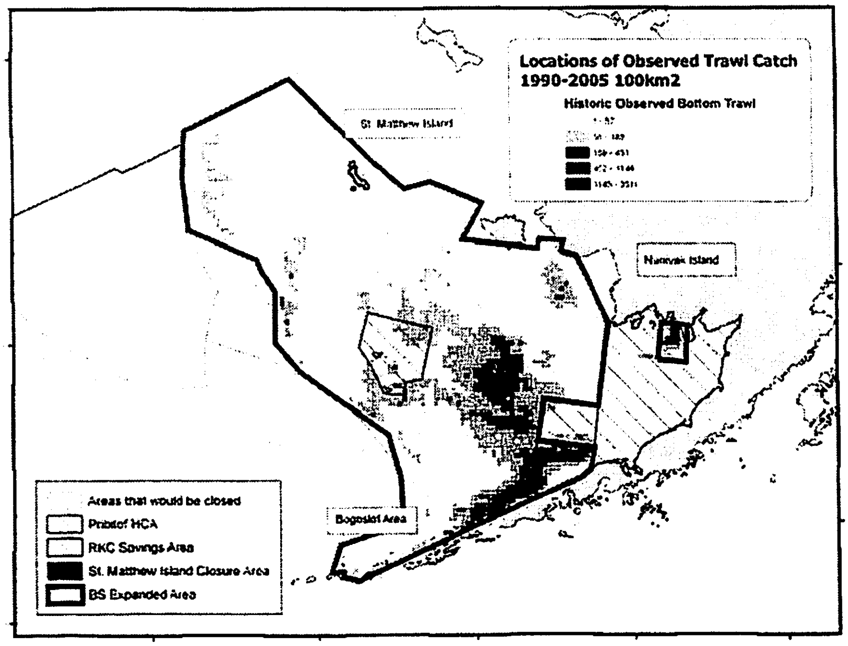


Figure 4. Expanded Open Area Approach with historic fishing effort based on observed bottom trawl locations 1990-2000 summarized by 100km² blocks with other Bering Sea trawl closures areas depicted.

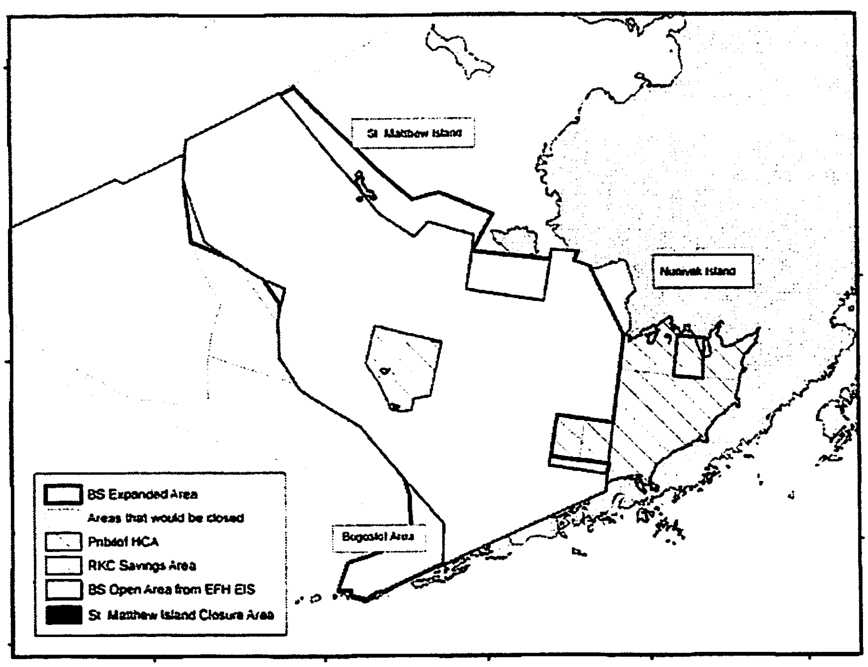


Figure 5. Expanded Open area approach contrasted with the approach presented in the EFH EIS with other Bering Sea trawl closures areas depicted.

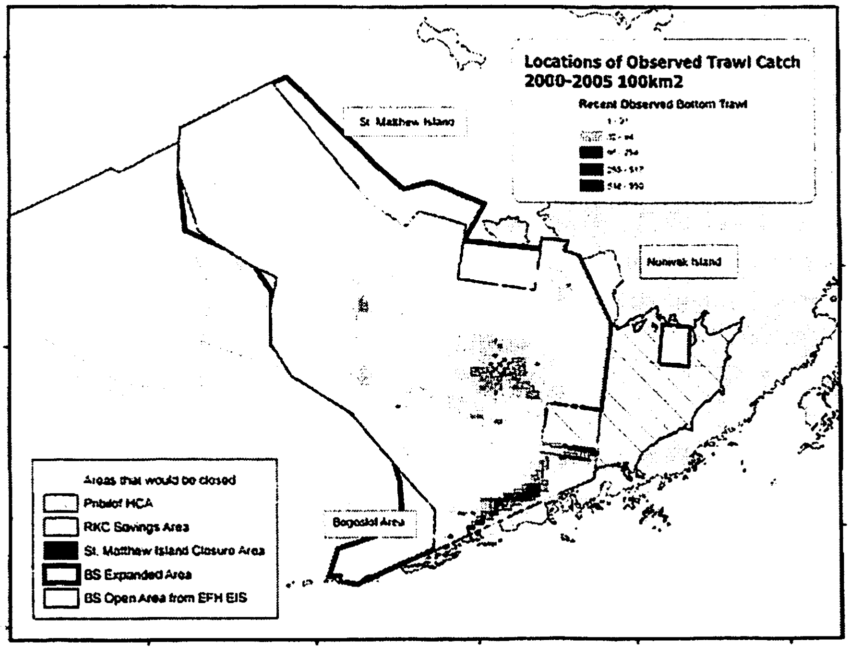


Figure 6. Expanded Open area approach, approach presented in the EFH EIS, with recent fishing effort (2000-2005), with other Bering Sea trawl closures areas depicted.

Executive Summary

The Aleutian Island Habitat Conservation Area (AIHCA) was adopted as part of a suite of conservation measures for essential fish habitat (EFH) to minimize the adverse effects of fishing in the Aleutian Islands subarea. The EFH rule became effective July 28, 2006 (71 FR 36694, June 28, 2006). The EFH action amended the Alaska fishery management plans (FMPs) to prohibit the use of certain bottom contact fishing gear in designated areas of the AI to reduce the effects of fishing on corals, sponges, and hard bottom habitats, protecting habitats from potential future disturbance without incurring significant short-term costs. The AIHCA closed most of the Aleutian Islands management areas to bottom trawling (279,114 square nautical miles). Most fishing areas that have been trawled repeatedly in the past remain open.

The designated open areas for bottom trawling were based on areas of high fishing effort from 1990 through 2003, with specific modifications based on data analysis, input from AI trawl fishermen, and with additional modifications to reduce those open areas to avoid coral habitat. These modifications were necessary because the observer data base has limitations on methods to document the actual path the fishers utilize and only records a start and end position. Open and closed areas adopted under this action are shown in Figure ES-1. The closed areas are irregular in shape and each latitude and longitude of the closure was recorded in the FMP and regulations. After the proposed rule was published careful review of the specific latitudes and longitudes of the AIHCA was reviewed by participants of the fishery. Fishery participants determined that two changes to the areas described for the AIHCA were necessary to ensure the AIHCA met the intent to allow fishing in areas historically fished and to prevent bottom trawling in areas that have not been repeatedly fished. The Council recommended NMFS analyze the recommended changes and present the analysis at the October 2006 Council meeting for consideration.

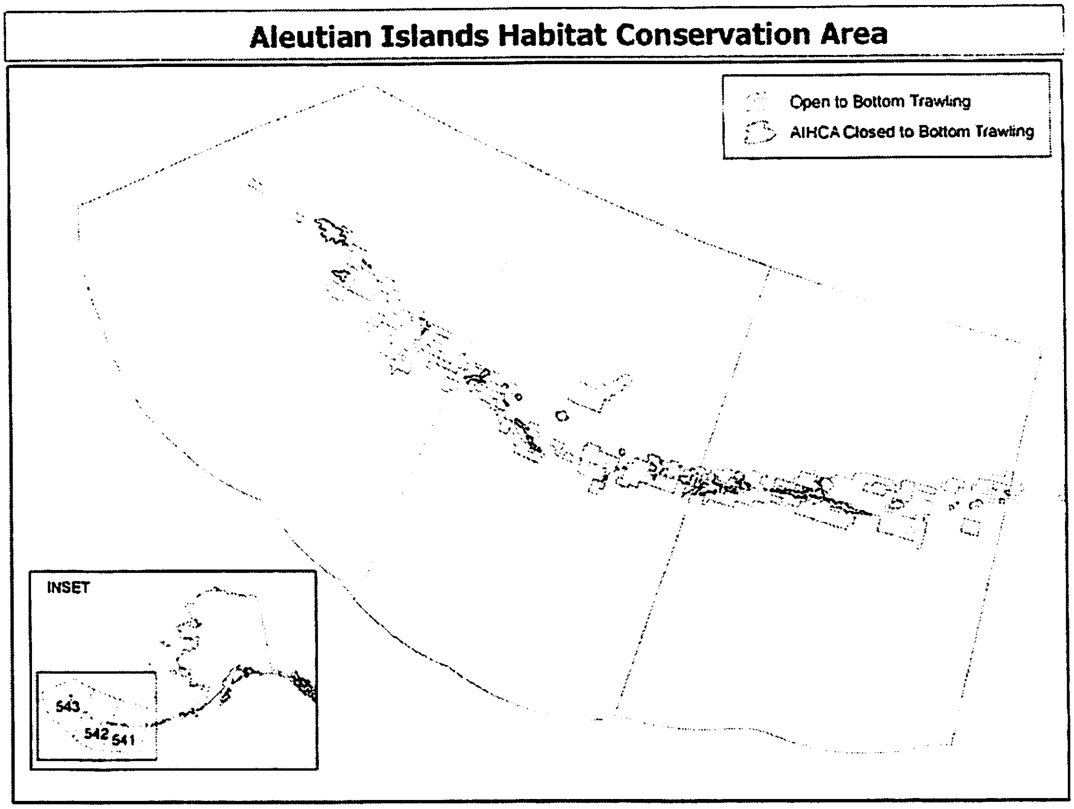
The biological and socioeconomic effects for this analysis indicated no significant impacts to the alternatives. The status quo provides EFH protection measures that provide habitat protection for vulnerable benthic habitat by bottom trawl closures. Thus Alternative 1 is not likely to result in any significant 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 boundary areas and the trade off between the open and closed areas from a biological and environmental perspective.

The proposed open area north of Aggattu Island will likely cause an insignificant impact to habitat since the area has been historically fished for years according to industry sources, and will have some economic benefit to the fishery. Some documented presence of coral is close to Aggattu Island but these coral locations do not intersect with the proposed modified open area.

The Buldir Island location outside the AIHCA which is proposed to be closed has had both documented presence of corals and sponges by the NOAA Fisheries Surveys as well as anecdotal information by fishers. This type of habitat is an example for vulnerable habitat that may be affected by fishing gear. A closure of this area would result in a slightly positive effect on habitat since no further bottom trawling would occur in the area.

Because Alternative 2 may protect areas of known coral occurrence, Alternative 2 may be more protective of habitat than Alternative 1. By prohibiting bottom trawl in locations where coral occur, Alternative 2 may result in less mortality or damage to living substrate than Alternative 1. However, data on substrates in these areas are very limited, so our conclusions are highly uncertain. Additionally, because of the larger size of the Aggattu area the total amount of sponge/coral habitat may actually be more extensive. By not damaging corals in the Buldir location, Alternative 2 may be more protective of benthic diversity and habitat suitability than Alternative 1 based on available data.

Considering all of the significance criteria for habitat effects, Alternative 2 effects are likely not substantial because of the intensity of the proposed action is limited to two relatively small locations and a small number of vessels impacts the area, and because of the trade off of open and closed areas mitigating the impacts to some extent.



ES- 1. The Aleutian Island Habitat Conservation Area (AIHCA), yellow areas, are closed to bottom trawling beginning July, 2006, implemented as part of Essential Fish Habitat mitigation action.

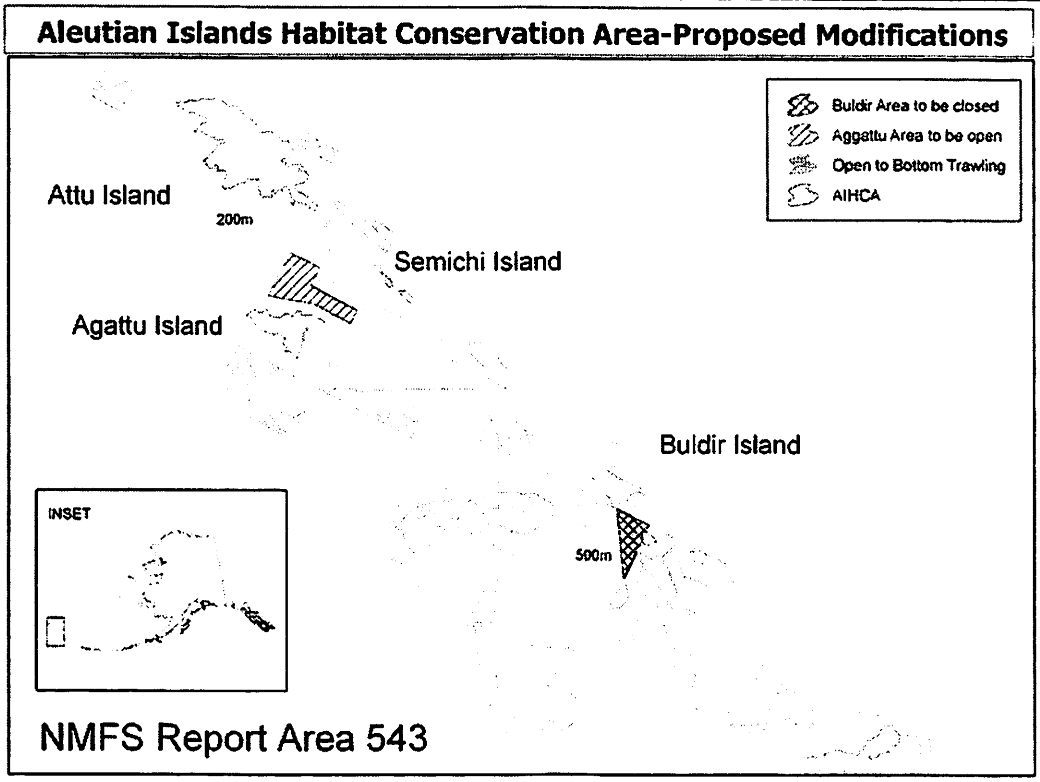
Two separate alternatives are analyzed in this EA as follows:

Alternative 1: No Action

Alternative 2: Modify the latitude and longitude definitions for open areas for the AIHCA which would effectively change the boundaries in two areas, one north of Aggattu Island and one north of Buldir Island.

Table ES-1.1-1 Name, location and area pf proposed AIHCA changes along within the Western Aleutian Islands (Alternative 2).

Proposed AIHCA Area	Latitude	Longitude	Management	NOAA Chart number	Area
North of Aggattu Island	52°40.0 N 52°40.0 N 52°40.0 N 52°30.0 N 52°31.0 N 52°33.0 N 52°33.0 N 52°36.0 N 52°36.0 N	173° 36.0 E 173° 30.0 E 173° 25.0 E 173° 25.0 E 173° 30.0 E 173° 40.0 E 173° 54.0 E 173° 54.0 E 173° 36.0 E	Remove from AIHCA closure (area will now be open)	530_1	108 nm^2 or 323 km^2
North of Buldir Island	52°24 N 52°24 N 52°12 N	175°42 E 175°54 E 175°54 E	Add to AIHCA (area will now be closed)	530_1	50 nm^2 or 149 km^2



ES- 2. Proposed modifications of the AIHCA under Alternative 2. Yellow areas are closed to bottom trawling and the green areas are closed.

UNITED STATES DEPARTMENT OF
National Oceanic and Atmospheric A(
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

AGENDA D-4(b)
Supplemental
OCTOBER 2006

September 27, 2006

Ms. Stephanie Madsen, Chair
North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, Alaska 99501-2252

Re: Aleutian Islands Habitat Conservation Area Revision

Dear Ms. Madsen:

The North Pacific Fishery Management Council (Council) has scheduled for its October 2006 meeting initial and final action on revisions to the Aleutian Islands Habitat Conservation Area (AIHCA). The draft environmental assessment/regulatory impact review/initial regulatory flexibility analysis (EA/RIR/IRFA) for this proposed action has been provided to the Council for its consideration. We recommend that the Council not take final action based on the EA/RIR/IRFA in its present form due to reasons explained below.

The Council developed the AIHCA to close areas of the Aleutian Islands that historically had not been fished with bottom trawl gear. In the analysis of areas to exclude from the AIHCA, NMFS initially identified areas of historical bottom trawl fishing by locations of observed haulbacks from 1990 to 2003. Areas with at least 200 metric tons (mt) of harvest were initially identified as historically fished areas. This information was supplemented with fishing industry plotter data to make final decisions on historically fished areas in the Aleutian Islands. This combination approach was the result of testimony from the fishing industry stating that the observer database did not accurately represent the entire range of fished areas due to incomplete observer coverage and reliance on haulback data to pinpoint fishing effort. This collaborative effort led to the AIHCA, which was supported and endorsed by agency, industry, and non-governmental organization (NGO) participants.

The proposed AIHCA revision would open the Agattu area (108 nm^2) and close the Buldir area (50 nm^2) to bottom trawl fishing. The analysis to develop the AIHCA did not identify these areas as having 200 mt of historical fishing, and the industry did not identify them as historically fished areas. In the EA/RIR/IRFA, NMFS analyzed these two small areas using observer data which includes relatively few trawls. The trawl haulback locations in the observer database are rounded to the nearest minute (approximately 1 mile), so we needed a method to confirm observed haulback locations in these small areas.

Vessel monitoring system (VMS) data have only recently become available to NMFS analysts, and we used VMS data to confirm the fishing locations for the Agattu and Buldir areas in the EA/RIR/IRFA. VMS data were not used in the development of the AIHCA, nor would that have been practical when analyzing nearly 38,000 individual fishing locations. By comparing 2001 through 2005 VMS and observed fishing data for Agattu and Buldir, we determined that errors were made in interpreting observed fishing locations in the data supporting the draft EA/RIR/IRFA. A corrected data set of observed 1990 through 2003 fishing locations will be available this week. Use of this historical data is necessary if the Council intends to use the same data, methodology, and process for modifying the AIHCA as used to develop it originally. If so, this process would require analysts to work with industry and representatives for environmental organizations to confirm historical fishing activities and to re-negotiate the boundaries of the Agattu and Buldir areas for Council consideration.

Subsequent to sending the draft EA/RIR/IRFA to the Council, we determined that the 2001 through 2005 VMS and observer data show a similar pattern of fishing activity in the Agattu and Buldir areas. The VMS and observer data show no fishing activity in the Buldir area for this time period and bottom trawl fishing in the Agattu area only during 2005.

Based on these issues, we recommend that the Council consider two options regarding this action during the October meeting:

(1) Take no further action regarding the Agattu and Buldir areas.

(2) Request completion of the analysis for consideration at a later Council meeting. To ensure that the purpose and need in the EA/RIR/IRFA is correctly stated for the action, the Council should confirm its intent. Is it a correction of the original boundaries of the AIHCA, using 1990 to 2003 data and similar methodology for identifying the boundaries? Or is the intent a modification of the AIHCA based on more recent verified fishing activity during 2001-2005? If the original methodology is used, substantial NMFS and Council staff resources could be required to work with the stakeholders and to complete the analysis.

We appreciate your consideration of these issues and look forward to working with the Council to resolve them.

Sincerely,

Sue Salveson for

Robert D. Mecum
Acting Administrator
Alaska Region

AGENDA D-4(a)
SUPPLEMENTAL
OCTOBER 2006

WWF

World Wildlife Fund

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September 25, 2006

RECEIVED
SEP 2 2006
N.P.F.M.C.

Stephanie Madsen
Chair
North Pacific Fishery Management Council
605 West 4th Street, Suite 306
Anchorage, AK 99501-2252

Dear Ms. Madsen,

This letter is in support of the Bering Sea Essential Fish Habitat Conservation Alternative being submitted to the North Pacific Fisheries Management Council (NPFMC) by Oceana. World Wildlife Fund (WWF) strongly recommends that the NPFMC include this alternative during consideration of Essential Fish Habitat (EFH) protection measures in the Bering Sea. This action would be a positive step toward the implementation of ecosystem-based management in this region.

As WWF stated in our recent letter to the NPFMC (May 30, 2006), most of the discussion regarding Essential Fish Habitat (EFH) in the Bering Sea has focused on benthic habitat. While it is vitally important that essential benthic habitat receive adequate protection, the proposed protected areas in the shelf-break canyons are also essential habitat for pelagic species such as squid, juvenile pollock and deep-sea smelt, as well as their marine mammal and seabird predators. These pelagic areas play a critical role in the overall productivity of the Bering Sea ecosystem and must also receive consideration during the EFH process. The proposed Bering Sea Essential Fish Habitat Conservation Alternative represents substantive progress in this regard.

The research and management components of this proposal recommend the appropriate use of time and area closures to manage bycatch rates of key trophic species, particularly in the sub-marine canyons in the vicinity of the Pribilof Islands. This type of spatial management is an essential component of ecosystem-based fisheries management, allowing pelagic fisheries to occur in special management areas, provided they do not have adverse impacts on key trophic species. Similar spatial management measures are already used to protect commercially targeted pelagic species such as salmon and herring that occur as bycatch in fisheries. The voluntary closure implemented in 2006 to reduce squid bycatch in the southeastern Bering Sea pollock fishery provides a positive example of how adaptive fisheries management can respond to the need for effective spatial protection of key trophic species. As the proposed EFH alternative states, protection measures must be accompanied by assessment surveys and detailed bycatch monitoring, coupled with long-term monitoring of apex predators to assess their interaction with fisheries and the implications of these relationships for ecosystem-based fisheries management.

In summary, the Bering Sea Essential Fish Habitat Conservation Alternative addresses the critical need for pelagic Essential Fish Habitat protection in the outer-shelf and shelf break domains by designating special management areas in the shelf edge canyons. Because there are currently no areas along the shelf break for use in evaluating the effect of commercial fishing in pelagic habitat, the implementation of these measures if of critical importance.

Thank you for considering the Bering Sea Essential Fish Habitat Conservation Alternative during your EFH discussion at upcoming NPFMC meeting.

Sincerely,

Margaret D. Williams
Director, Bering Sea Ecoregion Program
World Wildlife Fund

PACIFIC ENVIRONMENT

Protecting the living environment of the Pacific Rim

September 25, 2006

Stephanie Madsen
Chair
North Pacific Fishery Management Council
605 W. 4th Ave, Suite 306
Anchorage, AK 99501

Doug Mecum
Regional Administrator
NOAA Fisheries
Alaska Region
709 W. 9th St.
Juneau, Alaska 99802-1668

RECEIVED
SEP 2 5 2006
N.P.F.M.C.

RE: Agenda Item D-4 Essential Fish Habitat in the Bering Sea

Dear Ms. Madsen and Mr. Mecum:

Pacific Environment appreciates this opportunity to comment on Essential Fish Habitat protections for the Bering Sea. As a non-governmental organization, PE works to protect the living environment of the Pacific Rim by strengthening democracy, supporting grassroots activism, empowering communities, and redefining international policies. A hard copy of these comments has also been sent via U.S. mail.

As you are aware, the Bering Sea is one of the most productive marine ecosystems on the planet and, we believe, worthy of protective measures that ensure ecosystem integrity and productive fisheries for generations to come. As such, it is imperative that Essential Fish Habitat protections are responsive to the growing body of scientific literature on the effects of trawling on seafloor habitat. As such, the alternatives under consideration should include a variety of management measures, including (1) effort reduction, (2) the establishment of areas closed to fishing, and (3) modifications of gear design or restrictions in gear type.[1] As such, we do not believe that the current draft alternatives provide the public and decisionmaker with the opportunity to fully evaluate the consequences of current policies and do not offer a suite of management measures that will ultimately meet the requirements of the Magnuson-Stevens Fishery and Conservation Management Act.

The National Environmental Policy Act requires that the agency explore a broad range of alternatives and rigorously explore and evaluate "all reasonable alternatives."[2] The agency must also make diligent efforts to include the public in the NEPA process.[3] The current range of alternatives, as defined by the NPFMC's June 12, 2006 motion, are inadequate to

[1] Steele et al., National Research Council Study on the Effects of Trawling and Dredging on Seafloor Habitat. 2005. Pages 91-99 *in* P.W. Barnes and J.P. Thomas, eds. Benthic Habitats and the Effects of Fishing. American Fisheries Society, Symposium 41, Bethesda, Maryland.
[2] 40 C.F.R. 1502.14 (defining alternatives as the "heart" of the environmental impact statement).
[3] 40 C.F.R. 1506.6

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meet these statutory mandates. The NPFMC and NMFS must expand the range of alternatives to include a full complement of the above listed management measures and must explore applying these management tools to both the bottom trawl fishery, which causes a disproportionate amount of damage to seafloor habitat, and to the pollock fishery, which NMFS previously determined caused the largest impact to seafloor habitat in the Bering Sea.[4]

Furthermore, NMFS and the NPFMC have a duty to respond to concerns from those communities directly impacted by the effects of fishing on seafloor habitat. Although residents of the Pribilof Islands have been asking for a review and expansion of the Habitat Conservation Area around the islands for years, there has been no response to these requests. The arbitrary lines originally drawn to protect crab habitat simply do not serve to protect the entire complex ecosystem of the 'Galapagos of the North.' The Bering Sea slope and canyons around the Pribilof Islands are too ecologically valuable to be ignored during discussions of Bering Sea habitat protection.

Pacific Environment hereby formally requests that NMFS and the NPFMC expand the range of alternatives in the Bering Sea Essential Fish Habitat process to reflect the scientific consensus on the impacts of fishing on seafloor habitat, encompass a range of management measures, and includes protections for essential habitats that are currently unprotected. A good start would be to include alternatives recommended by the scientific community, members of the conservation community, and residents of the areas affected by the impacts of fishing. This approach should encompass freezing the footprint of the bottom trawl industry, protecting Bering Sea canyons and the slope, and ensuring that the 'pelagic' pollock fleet does not continue to impact the seafloor through bottom contact.

Thank you for consideration of these comments. I look forward to working with the NPFMC and NMFS on this issue.

Sincerely,

Whit Sheard
Alaska Program Director
Pacific Environment

[4] NMFS. 2005. Final Environmental Impact Statement for Essential Fish Habitat.

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International Bering Sea Forum

September 25, 2006

Stephanie Madsen
Chair
North Pacific Fishery Management Council
605 W. 4th Ave, Suite 306
Anchorage, AK 99501

Doug Mecum
NOAA Fisheries
Alaska Region
709 W. 9th St.
Juneau, AK 99802-1668

RE: Bering Sea Essential Fish Habitat and Marine Protected Areas (D-4)

Dear Ms. Madsen and Mr. Mecum:

Attached is a Marine Protected Areas resolution passed by the International Bering Sea Forum, an independent body of scientists, indigenous leaders, environmentalists, and family fishermen committed to sustainable management of the Bering Sea. The Forum is an independent, non-governmental body with a board that is half United States, half Russian. The Forum was founded in the belief that the Bering System ecosystem is a global treasure that is under threat from a number of factors, including overfishing, poaching, global warming, and pollution. The Third Annual Working Meeting of the International Bering Sea Forum was held May 29 - June 1, on Russia's Kamchatka peninsula.

During our discussions on ecosystem-based management and marine protected areas, it became apparent that there was a consensus that the management measures in place for the Bering Sea are not comprehensively designed to protect the full diversity of habitats, species and ecological processes upon which the ecosystem, the fishermen and residents of the communities depend. We hereby request that the NPFMC and NMFS take immediate steps to protect these important habitats.

Sincerely,

Walter B. Parker
U.S. Chairman
International Bering Sea Forum

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International Bering Sea Forum

A Resolution Calling for a Comprehensive Network of Marine Protected Areas in the Bering Sea, based upon the best available science and local traditional knowledge

In light of the fact that:

- The Bering Sea – one of the most productive seas in the world, which includes globally important habitats for many biological resources – is undergoing far-reaching environmental changes, including those caused by climate change, pollution and impacts from the prosecution of fisheries;

- The United States of America and the Russian Federation derive significant economic benefit from the Bering Sea, which produces more than 2 million tons of fish annually for the United States and 1.2 million tons for Russia;

- Pacific salmon, which depend on marine, estuarine and freshwater habitats of the Bering Sea, are a vital component of the economy, ecology and life-ways of the region;

- The health, economic well-being, and ways of life of indigenous and non-indigenous peoples in the region are connected to the Bering Sea and its natural resources; in addition, the socioeconomic development of coastal villages along the Bering Sea, on both the Russian and United States shores, is dependent on maintaining ecologically sustainable conditions in the region, especially in the rational use of fisheries;

- Among vertebrate species across the Bering Sea, 12.6% are considered to be of conservation concern;

- Ecosystem-based management is the cornerstone of North Pacific fisheries management, and a network of marine protected areas is a key component of such ecosystem-based management;

- Existing marine protected areas in the Bering Sea, although providing benefits to the ecosystem, were not systematically selected to comprehensively protect the full diversity of habitats, species and ecological processes, and is thus not designed to ensure ecosystem integrity.

It is hereby resolved that:

- A network of marine protected areas is necessary to ensure the long-term health of the Bering Sea and the communities that depend upon it;

International Bering Sea Forum

- This network should be based upon the best available science and local traditional knowledge about the Bering Sea ecosystem;
- The marine protected network should be linked to the degree possible with a network of freshwater protected areas for salmon;
- Immediate steps should be undertaken to protect representative critical habitats as defined by bathymetry and oceanographic processes, and a diversity of species in the Bering Sea.

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September 25, 2006

Stephanie Madsen, Chair
North Pacific Fishery Management Council
605 W. 4th Avenue
Anchorage, AK 99510

Re: Agenda Item D-4(a), Bering Sea Essential Fish Habitat

Dear Ms. Madsen,

We appreciate that the NPFMC is developing alternatives for an analysis on Bering Sea Essential Fish Habitat (EFH). The Alaska Marine Conservation Council (AMCC) recommends that the analysis include the Conservation Alternative. This alternative includes designation of a bottom trawl footprint with specific locations protected within the footprint where there are compelling benefits for sensitive habitats and the productivity of specific managed species.

It is widely accepted by scientists that bottom trawling reduces habitat complexity, alters seafloor communities and reduces productivity (NRC, 2002). Establishing a bottom trawl footprint would contain bottom trawl fleets to the primary range fishing effort. We offer the following perspective on how the Conservation Alternative addresses the NPFMC's obligation to protect essential fish habitat:

1. **Northern Boundary –**

   The northern boundary for the footprint is especially critical as the NPFMC faces new management demands associated with the reality of global climate change and its manifestations in the Bering Sea. Scientists and fishermen alike are observing northward movement of fish populations. However at the present time there is insufficient predictive capacity in stock assessment and ecosystem models to more specifically address impending changes to our fisheries and the fleets who rely on them. We don't know how fish populations will redistribute themselves in a continually warming ocean or what the implications are for the pelagic and benthic ecology of the region. Therefore, establishing a footprint today will be important for adapting management in the future. The NPFMC needs to address new climate forces and a new level of variability before allowing bottom trawl fisheries to move into largely unexploited grounds. Such an approach is important from the stand point of managing fishery impact on fish productivity, habitat and the ecosystem as a whole.

2. **Locations within the Footprint –**

   Canyons: The proposed Conservation Alternative removes the Pribilof, Zhemchug and Middle Canyons from the bottom trawl footprint. Available surveys and other research show that each canyon contains biogenic habitats including a diversity of corals, sponges and sea whips associated with productive fish populations. The canyons are essential fish habitat for a host of managed species including rockfishes, Atka mackerel, flatfishes, salmon, Pacific cod, king crab, Tanner crab and sablefish.

St. Matthew Island: While located at approximately 60 degrees, the northern boundary swings southward to protect to sensitive area around St. Matthew Island, where state waters are already closed to bottom trawling to protect gravid females important to rebuilding of the blue king crab population.

Skate nurseries: The proposed Conservation Alternative recommends closing small but significant sites where skates deposit their egg cases. Sedimentation and disturbance from mobile bottom contact gear is likely to harm the survival of embryonic skates. Skates are long-lived and part of the "other species" category, which the NPFMC has identified as needing new conservation management measures. The recent location of skate nurseries offers a direct way to protect them at a sensitive life stage.

3. **Pelagic Trawls**
   The Conservation Alternative specifically applies to bottom trawling. As long as there is assurance that pelagic trawls would not be operating on the bottom, the restriction would not apply. Therefore the displacement of any pollock effort would depend on the extent to which the gear is in contact with the bottom.

Recommendation: AMCC recommends that the NPFMC include the Conservation Alternative in the suite of alternatives selected for the Bering Sea EFH analysis. It offers a reasonable yet precautionary option by 1) designating a northern boundary for bottom trawl fisheries and 2) providing the only habitat protection to date on the Bering Sea shelf break and slope.

Sincerely,

Dorothy Childers

Dorothy Childers
Program Director

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September 25, 2006

Ms. Stephanie Madsen, Chair
North Pacific Fishery Management Council
605 W. Fourth Avenue, Suite 306
Anchorage, AK 99501-2252

Mr. Doug Mecum, Regional Administrator
NOAA Fisheries, Alaska Region
709 West Ninth Street
Juneau, AK 99802-1668

Re: Agenda Item D-4, Essential Fish Habitat, Aleutian Islands Conservation Area open area adjustment

Dear Madame Chair and Mr. Mecum:

It is our understanding that the North Pacific Fishery Management Council is considering adjustment of the boundaries of the Aleutian Islands Conservation Area in response to a proposal by the bottom trawl industry.

It is also our understanding that the issue before the Council is a unique one, a result of recording errors of fishing effort, and that any adjustment made in this instance would neither set a precedent for future adjustments nor open the door to a rolling series of additional requests. If catch locations were recorded in error in the region, then it is likely that bycatch of nontarget species, including corals, was also recorded in error. It is unfortunate that such issues were not illuminated and addressed during the EFH EIS process, prior to the Council's and Fisheries Service's historic actions in the Aleutian Islands. Any such issues should be resolved before considering re-opening the area to bottom trawling.

Should the Council consider opening the area in question, we suggest that for parity and balance, additional habitat areas be closed so that the total area of protected seafloor habitat remains unchanged, and the Council's intent to protect seafloor habitat in maintained. The area proposed by industry to be opened to bottom trawling in Agattu Strait is more than twice the area of the unfished area west of Buldir Island that industry proposes for closure. Additional candidate areas for closure could include some of the areas identified by fishermen as containing corals and complex bottom habitat. Trawl fishermen did identify some candidate sites for coral protection during the HAPC process that are not covered by any of the current bottom trawl closures (Figure 1). These areas include a 67 km^2 area west of Tanaga Island and portions of a 180 km^2 area south of Kanaga Island. As documented from NOAA trawl surveys, the Tanaga area included *Primnoa*, *Thouarella*, *Amphilaphis,* and scleractinian corals, and the Kanaga area included *Primnoa*, *Plumarella*, *Muriciedes* and *Alcyonacea* corals.

The Buldir Island area proposed to be closed by industry is also an important ecological area that would benefit from protection. Many coldwater coral species have been documented in the proposed bottom trawl closure offshore of Buldir Island, including species of *Callogorgia*, *Primnoa*, *Stylaster*, and other gorgonian corals. Additionally, south of Buldir Island, trawl surveys have documented diverse corals, including *Paragorgia*, *Stylaster*, and *Amphilaphis* species and this area may also warrant inclusion in the proposed bottom trawl closure in the Buldir Island region.

We look forward to working with you on this issue.

Sincerely,

Susan Murray
Acting Director, Pacific Region

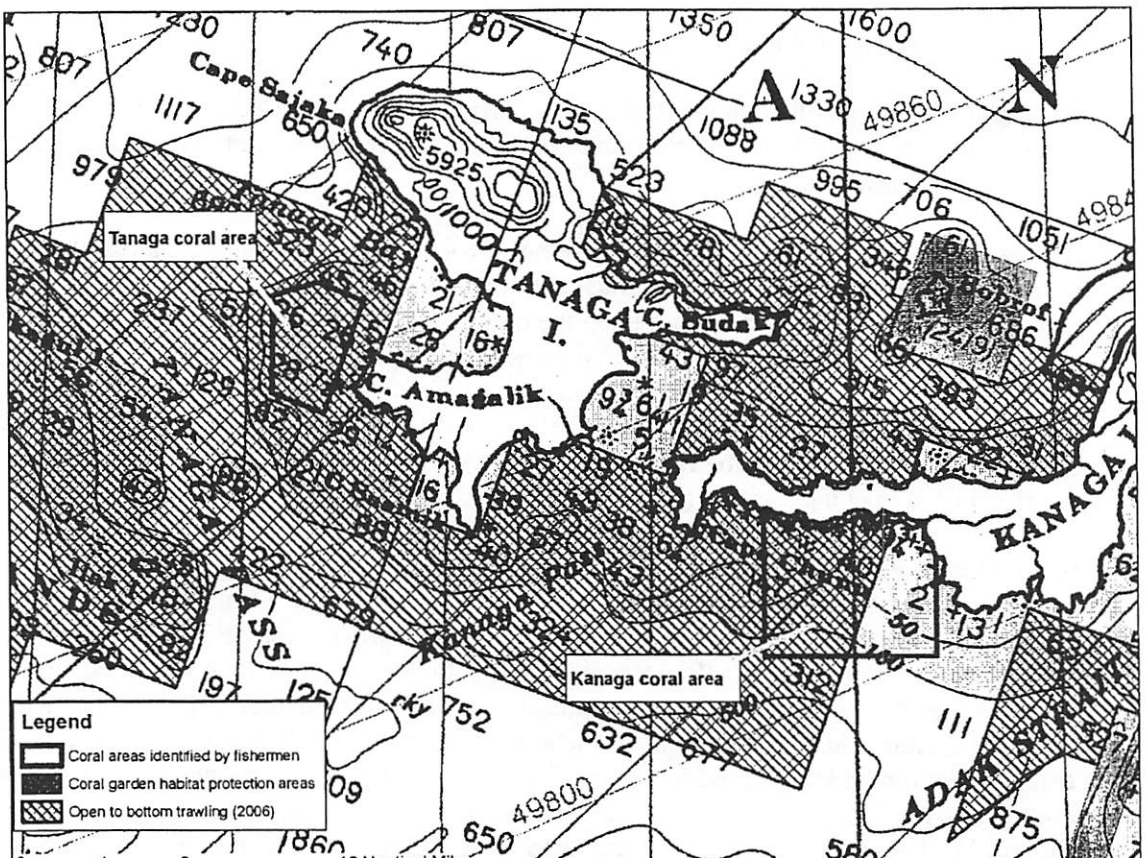

Figure 1: Tanaga and Kanaga coral areas identified by fishermen as being untrawlable and likely to contain stands of high-relief hard corals. All of the Tanaga area and most of the Kanaga area are currently located within the area open to bottom trawling in the Aleutian Islands Habitat Conservation Area.

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September 25, 2006

Ms. Stephanie Madsen, Chair
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605 W. Fourth Avenue, Suite 306
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Mr. Doug Mecum, Regional Administrator
NOAA Fisheries, Alaska Region
709 West Ninth Street
Juneau, AK 99802-1668

RE: Agenda Item D-4, Essential Fish Habitat, Bering Sea

Dear Madame Chair and Mr. Mecum:

Attached please find an option for inclusion in the draft Bering Sea Habitat National Environmental Policy Act analytical document.[1] We commend the Council's commitment to address habitat protection in the Bering Sea, and appreciate the opportunity the Council and agency are providing to the public to participate fully in the analysis process. The attached option is responsive to the Council's unanimous February 10, 2005 motion to initiate an expanded analysis of habitat conservation for the Bering Sea and is consistent with the Council's problem statement.[2]

We continue to emphasize that unless and until meaningful habitat protection measures are enacted in the Bering Sea, federal fisheries will be out of compliance with federal law. Full consideration of a reasonable range of habitat protection alternatives for the Bering Sea is a necessary first step in this effort. Our understanding of the current types of alternatives likely to be considered raises concerns that the alternatives may be inappropriately limited in scope and not fully in concert with the Council's problem statement to consider practicable and precautionary management measures to reduce the potential adverse effects of fishing on EFH. For example, protection of important essential fish habitats that are inside open areas – such as areas on the Bering Sea shelf "greenbelt" – is critical to any defensible reasonable range of alternatives. Similarly, consideration of gear modifications and research must include not only bottom trawl gear, but also gear, such as pelagic gear, that spends some portion of time in contact with the sea floor.

In light of such considerations, we propose including a sub-option 2 under Alternative 4 that would address both the Council's problem statement and the Science and Statistical Committee's recommendations.[2] This sub-option is described in detail in the attached Bering Sea Habitat Conservation Proposal (Attachment 1) and is summarized in the proposed sub-option below:

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[1] We understand that the analysis is intended to tier off of the EFH EIS. As detailed in our comments on the draft and final EFH EISs, those documents contain several legal flaws which will be perpetuated in any follow-on NEPA document.

[2] The SSC recommends that the Council should broaden consideration of alternatives to consider a wider array of potentially meaningful measures than currently envisioned. Specifically, analyses should consider these alternatives:

Alternative 4: Open area approach utilizing fishing data through 2005 to define area, plus require gear modifications on all bottom flatfish trawl gear to reduce seafloor contact and/or increase clearance between the gear and substrate.

Option 2:

Include management measures described in the Bering Sea Habitat Conservation Alternative, specifically:

1. *Freeze the footprint of mobile bottom contact gear;*
2. *Protect important habitat areas within the trawl footprint including Pribilof, Zhemchug, and Middle Canyon, crab habitat, and known skate nurseries;*
3. *Modify pelagic trawl performance standards to ensure pelagic trawl gear does not impact the seafloor; and*
4. *Conduct research and monitor, including pelagic habitat identification, bycatch monitoring, increased benthic habitat mapping, and 100% observer coverage.*

Inclusion of this option in the Bering Sea habitat analysis will assist the Council and the agency in your efforts to comply with Magnuson-Stevens Act and National Environmental Policy Act mandates.

We look forward to discussing this issue with you. We will be attending the Council meeting in Dutch Harbor and will present this alternative for your consideration during our public comments.

Sincerely,

Susan Murray
Acting Director, Pacific Region

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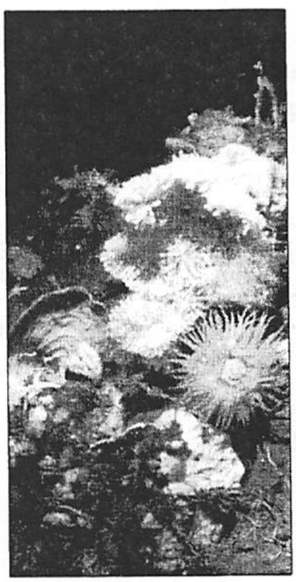
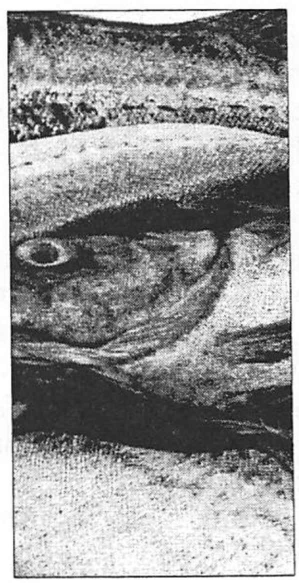
1) restricting open areas to areas traditionally fished with trawls;
2) expansion of closed areas surrounding St. Matthew Island beyond the 3 nm closure in state waters to protect blue king crab and their habitat,
3) additional closures of shelf break waters to conserve habitat in canyons (Middle, Zhemchug, and Pribilof Canyons) and known skate nurseries;
4) additional closures corresponding to special areas that may emerge from the analysis of crab life history stages; and
5) consideration of closures specifically for research to assess the importance of benthic habitat for fish production.

The SSC also supports an assessment of the effects of pelagic trawl gear on benthic habitats, as advised in a letter to the Council from the Alaska Regional Office of NMFS (June 1). (From SSC Report, NPFMC meeting, Kodiak, AK June 5-7 2006).

Bering Sea Essential Fish Habitat Conservation Alternative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*This proposal was developed by Oceana with input from many stakeholders. In particular, Audubon provided helpful information on seabirds and World Wildlife Fund contributed technical expertise to the development of the pelagic habitat and research section.

Introduction

The Bering Sea ecosystem is one of the most vibrant, dynamic, and productive ocean environments in the world. It supports an astounding variety of species, from microscopic plankton to the endangered northern right whale. The local peoples of the region rely on the life of the Bering Sea to both provide food and maintain their way of life. This sea harbors 28 species of marine mammals, 102 species of birds, 419 species of fish, and thousands of species of invertebrates. It includes species that inspire awe and wonder in people across America, such as the red-legged kittiwake, the northern fur seal, and the sperm whale. The Bering Sea is also a world renowned treasure for its enormously productive and profitable fisheries, such as king crab, Bristol Bay salmon, pollock and other groundfish. These fisheries do not exist independently in the ocean, but rather are part of a complicated and little understood food web. Continuation of these fisheries requires an intact, healthy, and productive ecosystem. Unfortunately, indiscriminate destructive fishing practices in delicate living seafloor habitat like corals, sponges, seawhip groves, and other living substrates is unnecessarily harming the Bering Sea ecosystem, undercutting the potential productivity of these fisheries, and threatening the long-term ecological sustainability of this American resource.

Over the past 30 years, large scale domestic trawl fisheries have developed in the Bering Sea, targeting pollock, cod and flatfishes. Trawl gear is made up of rollers, footropes, steel sweeper doors, tickler chains, and cod ends which drag along the seafloor and disturb benthic habitat. The yellowfin sole, rock sole, and Pacific cod fisheries are the largest bottom trawl fisheries in the Bering Sea. Additionally, since November 1999, while the Bering Sea walleye pollock fishery must exclusively use trawl gear that is defined as pelagic, this gear is often fished in contact with the seafloor. For example, it has been estimated that pollock "pelagic" trawl gear contacts the seafloor with the footrope approximately 44% of the time it is in use (Final EFH EIS, Appendix B, Table B.2-4). It has been demonstrated that trawling reduces habitat complexity, alters seafloor communities and reduces habitat productivity (NRC 2002). Research specific to the Bering Sea has found that bottom trawling reduces the diversity of seafloor life as well as reduces mean body size of benthic invertebrates (McConnaughey et al. 2000 and 2005). Bottom trawling has also been implicated in the loss of the once productive female red king crab brood stock North of Unimak Island after a historical no trawl zone was removed and chronic trawling for Pacific cod commenced (Dew and McConnaughey 2005).

The Bering Sea marine ecosystem requires meaningful habitat protection measures to maintain the health of the ecosystem and ensure our fisheries remain productive for future generations. In this proposed alternative, we 1) describe the biological richness and importance of the Bering Sea ecosystem, 2) identify key areas and types of essential fish habitat, 3) describe the threats to those areas, 4) propose a sensible alternative to protect habitat while maintaining productive fisheries that will assist the Council in their obligation to meet legal requirements under the Magnuson-Stevens Act for essential fish habitat and requirements under NEPA to consider a reasonable range of alternatives, and lastly, 5) present an analysis of the potential economic impacts of our proposed alternative.

The Bering Sea

The Bering Sea comprises a deep water basin (the Aleutian Basin) which rises through a narrow slope into the shallower water above the continental shelves. The Bering Sea ecosystem includes resources within the jurisdiction of the United States and Russia, as well as international waters in the 'Donut Hole'. The interaction between currents, sea ice, and weather make for a vigorous and productive ecosystem. The Bering Sea ecosystem is very dynamic, and has undergone marked changes within the time it has been studied by man. Commercial fishing is "perhaps the most significant in terms of its impact on the Bering Sea ecosystem" (Loughlin et al. 1999), while climatic factors have a great impact on trends in the Bering Sea ecosystem (Hare and Manuta 2000, Hunt and Stabeno 2002, Grebmeier et al. 2006) as well. Consideration and moderation of the cumulative effects of commercial fishery removals and habitat disturbance on the Bering Sea are crucial to the continued vitality of the system.

There are two known major drivers of productivity of the Bering Sea; the shelf break and seasonal sea ice. Of these, the Bering Sea shelf break is the dominant driver of primary productivity (Springer et al. 1996). This zone, where the shallower continental shelf drops off into the Aleutian basin is also known as the "Greenbelt". Nutrient upwelling from the cold waters of the Aleutian basin flowing up the slope and mixing with shallower waters of the shelf provide for constant production of phytoplankton.

Commercial fishing is big business in the Bering Sea. Some of the largest seafood companies in the world rely on the Bering Sea to produce fish and shellfish. On the U.S. side, commercial fisheries in the Bering Sea catch approximately $1 billion worth of seafood annually, while Russian Bering Sea fisheries are worth approximately $600 million annually. Much of the Eastern Bering Sea shelf and slope has been trawled. The flatfish bottom trawl fisheries have trawled extensively throughout the shelf, while the pollock pelagic trawl fishery has concentrated along the shelf/slope break. The Pacific cod trawl fishery has heavily trawled fishing grounds north of Unimak ("Cod Alley") but has also fished along the slope and has ranged as far north as St. Matthews Island. Commercial fisheries have been limited to the central and southern portions of the Bering Sea in the past, most likely due to the extent of seasonal sea ice.

Bering Sea fisheries
(2003 ex-vessel value in millions $)

- Bottom trawl
  - Flatfish ($30.6)
  - Pacific cod ($24.2)
  - Pollock ($2.8)
- Longline
  - Pacific cod ($63 1)
  - Halibut (~$)
  - Sablefish ($1.5)
- Salmon
  - Bristol Bay ($48.3)
- Mid-water trawl
  - Pollock ($297.6)
  - Pacific cod ($3.7)
- Pot
  - Pacific cod ($12.9)
  - Sablefish ($1.7)
- Crab
  - Bristol bay Red King crab ($81)
  - Bering Sea Opilio ($52)

The Bering Sea ecoregion is highly biodiverse, including numerous species of marine mammals, birds, fish, and invertebrates. There are several endemic species within the region, and humans have driven three species in the region to extinction: the Steller's sea cow (*Hydrodamalis gigas)*, the spectacled cormorant (*Phalacrocorax perspicillatus)* and the Bering Canada goose (*Branta canadensis asiatica*). Several species that use the region are listed under the federal Endangered Species Act, including the North Pacific right whale, Steller sea lion, short-tailed albatross, and the Steller's eider. In addition, the numbers of northern fur seals, harbor seals, and numerous other species are declining.

Over 200 species of birds have been recorded in the Bering Sea ecoregion, a number of which are known to be at risk (Stenhouse & Senner 2005). Of these, seabirds make up the largest component, with over 30 different seabird species and approximately 20 million breeding individuals in the region. Many of these species are unique to the area, which provides highly productive foraging habitat, particularly along the shelf edge and in other nutrient-rich upwelling regions, such as the Pribilof, Zhemchug, and Middle canyons. The Pribilof Islands support over 80% of the world's red-legged kittiwake (*Rissa brevirostris*) population (Byrd & Williams 1993), most of which forage to the south of St. George Island in the Pribilof Canyon (Hunt et al. 1981).

The overall trend in fish biodiversity in the eastern Bering Sea is a decline, with single fish species becoming dominant (Hoff 2006). On top of this overall trend, fish biodiversity indices have been correlated strongly with regime shifts. There has been a decline within the roundfish guild, and increases within the flatfish guild. Roundfish species (which include sandlance, capelin, lumpsuckers, eelpouts, skates, sculpins and rockfish for example) have not fared well in the last 20 years.

While over 300 species of zooplankton have been described (Coyle et al. 1996), benthic invertebrates are even more diverse, with an estimated 2,000 species living on the seafloor, although the Bering Sea benthos is poorly studied (Dulepova 2002). Invertebrates that live on the seafloor comprise a large proportion of the production, biomass, and diversity in the Bering Sea. Some species, such as king and snow crabs directly support multi-million dollar fisheries. Others provide habitat and shelter for other animals. Many are prey for commercial fish species and marine mammals. Their aggregate contribution to the Bering Sea ecosystem is immeasurable, and the ecosystem undoubtedly harbors many species that are yet to be discovered. The diversity of biogenic seafloor habitat is large and includes sponges, soft and hard corals (with some large branching corals), tunicates, sea anemones, and sea whips.

While extremely productive, the Bering Sea ecosystem is clearly experiencing significant changes, likely as a result of both anthropogenic and environmental influences. The significant scale of these changes and our limited understanding of the complex dynamics of the overall system demand counsel for prudent and precautionary management.

Please see Appendix 1 for a more detailed description of the Bering Sea.

Bering Sea Essential Fish Habitat

The Bering Sea contains 5 distinct macro-habitats: coastal domain (0-50 m), middle domain (50-100 m), outer domain (100-200 m), shelf-break domain, and basin (NRC 1996). In addition, two epibenthic invertebrate community types exist in the eastern Bering Sea (Yeung and McConnaughey, in review). The community types are divided by the 50 fathom isobath into an inshore and offshore assemblage. The inshore assemblage is dominated by the seastar *Asterias amurensis,* whereas the offshore assemblage is dominated by snails, pagurid crabs, and the snow crab *Chionoecetes oplio*. Of all the habitats in the Bering Sea, the shelf-break habitat is probably the most important. This habitat, also known as 'slope' habitat, has been referred to as the 'Greenbelt' (Springer et al. 1996). The reason for the Greenbelt's productivity is the result of exchange and concentration of nutrients from offshore currents that interact with submarine canyon and slope topography. The Bering Sea slope/shelf edge contains the most underprotected habitat type in the North Pacific. No year-round or seasonal protection for habitat exists along the slope/shelf break. The following is a description of several important slope/shelf edge areas that are proposed for protection in our alternative.

Submarine Canyons

Submarine canyons are known to be areas of enhanced productivity due to topographically induced upwelling along their axes (Freeland and Denman 1982). For this reason, canyons show enhanced concentrations of macrobenthos (Haedrich et al. 1980; Sarda et al. 1994; Vetter and Dayton 1998), micronekton (Cartes et al. 1994; Macquart-Moulin and Patriti 1996), demersal fishes (Stefanescu et al. 1994), and cetaceans (Kenney and Winn 1987; Schoenherr 1991) relative to surrounding areas on the slope and shelf. In the North Pacific, rockfishes in the genus *Sebastes* often inhabit the offshore edges of banks or canyons to feed on advected prey resources such as euphausiids (Pereyra et al. 1969; Brodeur and Pearcy 1984; Chess et al. 1988; Genin et al. 1988). Submarine canyons provide habitat for larger sized rockfish that seem to prefer structures of high relief such as boulders, vertical walls, and ridges. Yoklavich et al. (2000) found high abundance of large rockfish associated with complex structural habitat in Soquel Canyon with lower size and abundance in fished areas. Because submarine canyons are typically upwelling zones, they often contain higher abundances of filter feeding invertebrates, such as corals, sponges, tunicates, and bryozoans, which contribute to the structural complexity of the seafloor.

Pribilof Canyon

Pribilof Canyon contains unique and important biogenic habitat utilized by rockfish in the Bering Sea. Brodeur (2001) documented Pacific Ocean perch (*Sebastes aleutus*) utilizing biogenic habitat in Pribilof Canyon. Concentrations of fish frequented an area within a sea whip (*Halipteris willemoesi*) grove, and fewer fish were observed within a sea whip grove where the sea whips had been knocked down. The similar orientation of the broken sea whips suggested that fishing operations, and possibly research sampling, had uprooted and disturbed the habitat (Brodeur 2001). Brodeur (2001) identified sea whip "forests" in Pribilof Canyon as important and distinctive habitat for Pacific Ocean perch in the Bering Sea. The seawhip groves and rockfish were observed at 185-240 m depth (Fig. 1). In-situ observations of Pacific Ocean perch in the canyon suggest that the fish feed on krill swarms above the groves during the day, and rest within the groves at night (Brodeur 2001). Large sea whip specimens collected in Pribilof Canyon had an estimated age of 50 years (Wilson et al. 2002).

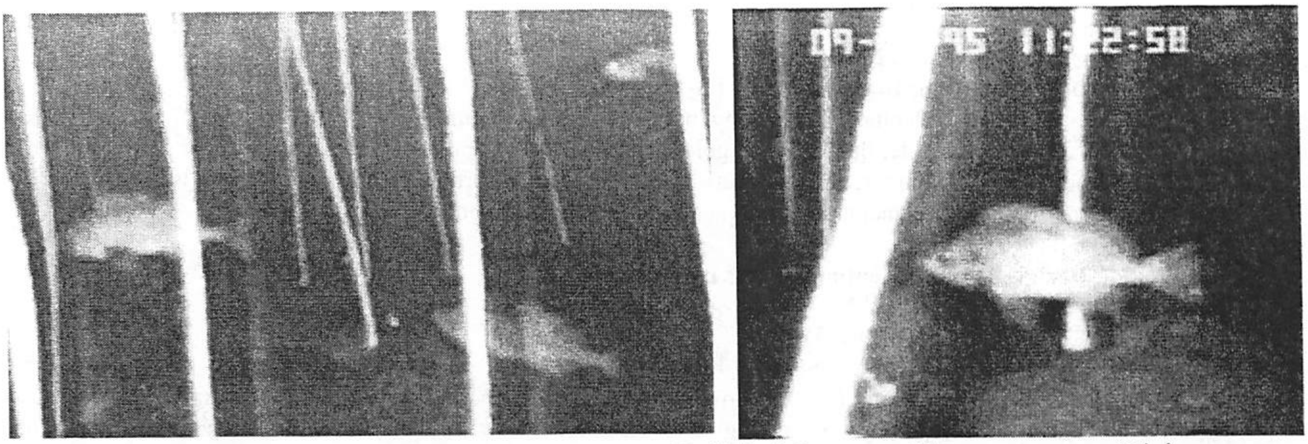


Figure 1: Pacific Ocean perch in seawhip groves of Pribilof Canyon. Photos courtesy Rick Brodeur, NMFS.

NOAA trawl surveys have identified biogenic habitat of corals and sponges in the region of Pribilof Canyon. Corals such as *Gersemia sp.*, bamboo coral, unidentified scleractinian coral, and unidentified gorgonian corals (total 139 records) have been documented during trawl surveys, and seawhip groves have been observed with submersible video. A diverse group of sponge species has been documented during trawl surveys (258 records) and include clay pipe sponge (*Aphrocallistes vastu*), barrel sponge (*Halichondria panicea*), yellow leafy sponge (*Leucosolenia blanca*), tree sponge (*Mycale loveni*), scallop sponge (*Myxilla incrustans*), unidentified hexactinellid glass sponges, and many other unidentified sponge species.

Essential Fish Habitat Designation

Pribilof Canyon does comprise EFH for many species. The species lists below are drawn from NOAA Fisheries EFH Interactive Map (http://akr-mapping.fakr.noaa.gov/Website/EFH/). The EFH Interactive Map allows users to determine the presence of EFH for species at specific lat/long points. The information below is gathered from points in several depth strata within the canyon area:

Latitude: 56° 20.017' N
Longitude: 169° 3.726' W
Depth Stratum: Outer Shelf (101-200m)
Essential Fish Habitat for the following species: Alaska plaice, arrowtooth flounder, Atka mackerel, blue king crab, capelin, Chinook salmon, chum salmon, coho salmon, dover sole, dusky rockfish, eulachon, flathead sole, golden king crab, Greenland turbot, northern rockfish, Pacific cod, Pacific Ocean perch, pink salmon, red king crab, rex sole, rock sole, sablefish, sculpin, skate, shark, shortraker and rougheye rockfish, snow crab, sockeye salmon, squid, tanner crab, thornyhead rockfish, walleye pollock, weathervane scallop.

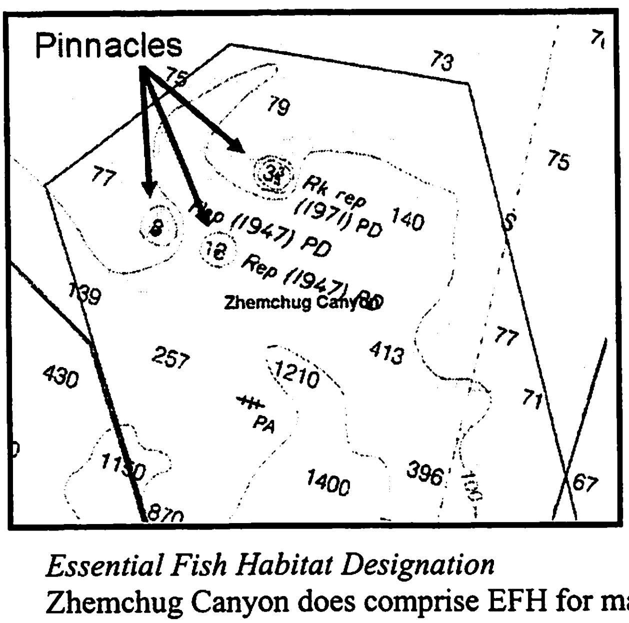
Latitude: 56° 14.507' N
Longitude: 169° 41.849' W
Depth Stratum: Upper Slope (301-500m)
Essential Fish Habitat for the following species: Arrowtooth flounder, Chinook salmon, chum salmon, coho salmon, dover sole, dusky rockfish, flathead sole, golden king crab, greenland turbot, northern rockfish, octopus, pacific cod, Pacific ocean perch, pink salmon, rex sole, sablefish, sculpin, shark, shortraker and rougheye rockfish, skate, sockeye salmon, squid, tanner crab, thornyhead rockfish, walleye pollock

Latitude: 56° 0.27' N
Longitude: 169° 12.463' W
Depth Stratum: Intermed Slope (701-1000m)
Essential Fish Habitat for the following species: Arrowtooth flounder. Chinook salmon. chum salmon. coho salmon. dover sole. flathead sole. golden king crab. greenland turbot. octopus. Pacific cod. Pacific ocean perch. pink salmon. rex sole. sablefish. sculpin. shark. shortraker and rougheye rockfish. skate. sockeye salmon. squid. tanner crab. thornyhead rockfish. walleye pollock

Bering Sea and Aleutian Islands region
Latitude: 56° 6.882' N
Longitude: 169° 6.991' W
Depth Stratum: Lower Slope (1001-3000m)
Essential Fish Habitat for the following species: Arrowtooth flounder, Chinook salmon, chum salmon, coho salmon, flathead sole, golden king crab, Greenland turbot, octopus, Pacific ocean perch, pink salmon. rex sole, sablefish, sculpin, shark, shortraker and rougheye rockfish, skate, sockeye salmon, squid, thornyhead rockfish, walleye pollock

Zhemchug Canyon

Zhemchug Canyon is the largest submarine canyon in the world (Normark and Carlson 2003). However, it is poorly studied. Some limited sampling of benthic organisms in Zhemchug Canyon has occurred during NOAA trawl surveys and by observers on commercial fishing vessels. Bubblegum coral, bamboo coral, soft corals, Hexactinellid sponges, and other sponges have been identified during NOAA trawl surveys in the canyon. Analyses of bycatch data have determined that coral and sponge bycatch during commercial fishing is concentrated along the shelf break above the canyon. 414 records of coral and bryozoan bycatch with an extrapolated weight of 5,252 kg have been recorded near the canyon, as well as 223 records of sponge bycatch with an extrapolated weight of 2,808 kg.



Zhemchug Canyon may have unique habitat around several pinnacles. According to nautical charts, three pinnacles rise up close to the surface (to within 4, 8, and 18 fathoms respectively) in the northern end of the canyon (Figure 2).

Figure 2: Pinnacles of Zhemchug Canyon. Pinnacle locations at approximately 58° 30' N 175° 9' W, 58° 30' N 175° 20' W, and 58° 38' N 175° 3' W.

Essential Fish Habitat Designation

Zhemchug Canyon does comprise EFH for many species. The species lists below are drawn from NOAA Fisheries EFH Interactive Map (http://akr-mapping.fakr.noaa.gov/Website/EFH/). The EFH Interactive Map allows users to determine the presence of EFH for species at specific lat/long points. The information below is gathered from points in several depth strata within the canyon area:

Latitude: 58° 37.167' N
Longitude: 175° 14.734' W
Depth Stratum: Upper Slope (201-300m)
Essential Fish Habitat for the following species: Alaska plaice, arrowtooth flounder, Chinook salmon, chum salmon, coho salmon, dover sole, dusky rockfish, eulachon, flathead sole, golden king crab, greenland turbot, octopus, pacific cod, Pacific ocean perch, pink salmon, rex sole, rock sole, sablefish, sculpin, shark, shortraker and rougheye rockfish, skate, sockeye salmon, squid, tanner crab, thornyhead rockfish, walleye pollock

Latitude: 57° 46.998' N
Longitude: 173° 49.925' W
Depth Stratum: Intermed Slope (501-700m)
Essential Fish Habitat for the following species: Arrowtooth flounder, Chinook salmon, chum salmon, coho salmon, dover sole, dusky rockfish, flathead sole, golden king crab, greenland turbot, northern rockfish, octopus, Pacific cod, Pacific ocean perch, pink salmon, rex sole, sablefish, sculpin, shark, shortraker and rougheye rockfish, skate, sockeye salmon, squid, tanner crab, thornyhead rockfish, walleye pollock, yelloweye rockfish

Latitude: 58° 14.098' N
Longitude: 175° 10.531' W
Depth Stratum: Lower Slope (1001-3000m)
Essential Fish Habitat for the following species: Chinook salmon, chum salmon, coho salmon, golden king crab, greenland turbot, octopus, Pacific ocean perch, pink salmon, sablefish, sculpin, shark, shortraker and rougheye rockfish, skate, sockeye salmon, squid, thornyhead rockfish, walleye pollock

Middle Canyon

Middle Canyon is the last submarine canyon along the slope to the north before entering the Russian EEZ.

Bubblegum coral, bamboo coral, and corals of the genus *Swiftia* have been recorded by NOAA trawl surveys in the canyon. Clay pipe sponge (*Aphrocallistes vastu*), tree sponge (*Mycale loveni*), cloud sponge (*Rhabdocalyptus* sp.) and other unidentified species of sponge have been documented by NOAA trawl surveys in the canyon. A nursery area for Bering skate (*Bathyraja interrupta*) has also been documented in the canyon (Jerry Hoff, AFSC, pers. com.).

Essential Fish Habitat Designation
Middle Canyon comprises EFH for many species. The species lists below are drawn from NOAA Fisheries EFH Interactive Map (http://akr-mapping.fakr.noaa.gov/Website/EFH/). The EFH Interactive Map allows users to determine the presence of EFH for species at specific lat/long points. The information below is gathered from points in several depth strata within the canyon area:

Latitude: 59° 31.892' N
Longitude: 177° 26.702' W
Depth Stratum: Outer Shelf (101-200m)
Essential Fish Habitat for the following species: Alaska plaice, arrowtooth flounder, Atka mackerel, blue king crab, capelin, Chinook salmon, chum salmon, coho salmon, dover sole, dusky rockfish, eulachon, flathead sole, golden king crab, Greenland turbot, northern rockfish, octopus, Pacific cod, Pacific Ocean perch, pink salmon, red king crab, rex sole, rock sole, sablefish, sculpin, skate, shark, shortraker and rougheye rockfish, snow crab, sockeye salmon, squid, tanner crab, thornyhead rockfish, walleye pollock, weathervane scallop.

Latitude: 59° 40.167' N
Longitude: 177° 28.1' W
Depth Stratum: Upper Slope (201-300m)
Essential Fish Habitat for the following species: Arrowtooth flounder, Chinook salmon, chum salmon, coho salmon, dover sole, dusky rockfish, eulachon, flathead sole, golden king crab, greenland turbot, octopus, pacific cod, Pacific ocean perch, pink salmon, rex sole, rock sole, sablefish, sculpin, shark, shortraker and rougheye rockfish, skate, sockeye salmon, squid, tanner crab, thornyhead rockfish, walleye pollock

Latitude: 59° 20.069' N
Longitude: 177° 50.951' W
Depth Stratum: Intermed Slope (501-700m)
Essential Fish Habitat for the following species: Arrowtooth flounder, Chinook salmon, chum salmon, coho salmon, dover sole, flathead sole, golden king crab, greenland turbot, octopus, Pacific cod, pink salmon, rock sole, sablefish, sculpin, shark, shortraker and rougheye rockfish, skate, sockeye salmon, squid, tanner crab, thornyhead rockfish, walleye pollock

Latitude: 59° 23.641' N
Longitude: 178° 25.756' W
Depth Stratum: Intermed Slope (701-1000m)
Essential Fish Habitat for the following species: Chinook salmon, chum salmon, coho salmon, dover sole, flathead sole, golden king crab, greenland turbot, octopus, Pacific cod, pink salmon, sablefish, sculpin, shark, shortraker and rougheye rockfish, skate, sockeye salmon, squid, tanner crab, thornyhead rockfish, walleye pollock

Crab Habitat

Alaska's crab species, which include some of the world's most valuable crustacean species, occupy a unique niche in the Bering Sea. Crab feed upon benthic organisms such as polychaete worms, bivalves, snails, brittlestars, starfish, anemones, crabs, and other crustaceans in the Bering Sea. Crab abundance is low compared to historical numbers; stocks of Pribilof and St. Matthew blue king crab, Pribilof red king crab, snow crab (*C. opilio*), and Tanner crab (*C. bairdi*) are either overfished or can no longer support fisheries (NMFS 2004).

Blue king crab in the vicinity of St. Matthew Island is at a fraction of their former abundance. In response, the Alaska Board of Fisheries closed all State waters around St. Matthew, Hall, and Pinnacle Islands to all fishing in March 2000 to protect blue king crabs and their habitat. Female St. Matthew blue king crabs tend to have a more limited distribution than do males (Blau 1996, Blau and Watson 1999, Vining et al. 1999) and are generally captured within 30 nm of the southern side of St. Matthew Island. Bottom trawlers have targeted Pacific cod and flatfish in the vicinity of St. Matthew Island in the past, potentially impacting blue king crabs and their habitat.

In addition, a small amount of bottom trawling for flatfish currently occurs within the Red King Crab Savings Area, which is inconsistent with the intent to protect red king crabs and their habitat.

Skate Nurseries

A unique example of essential fish habitat is the recently discovered nursery sites for several species of skates in the Bering Sea. The nursery sites are discrete locations along the Bering Sea shelf/slope break. Skates are attracted to these sites to deposit their egg cases.

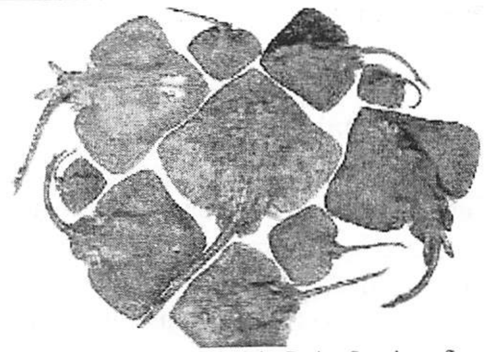


Figure 3: Skate diversity on the Bering Sea slope: five species of skate captured in a single trawl haul on the NMFS Bering sea slope survey, 2002. Species include *Bathyraja minispinosa* (whitebrow), *B. taranetzi* (mud), *B. maculata* (whiteblotched), *B. aleutica* (Aleutian), and *B. lindbergi* (Commander). From Gaichas et al. 2005

The protection of these nursery sites is important. Skates are typically long-lived and slow reproducing. Skates invest a significant amount of energy in producing large egg cases also known as "mermaid's purses". Development of embryos inside these purses in northern climes can take up to 5 or 6 years (Berestoviskii 1994). While mortality of adults was found to have the greatest influence on skate populations, Gaichas et al.(2005) also noted that any effects on the small scale nursery habitats could have disproportionate effects on skate populations.

At least 12 species of skates live in the Bering Sea (Mecklenburg et al. 2002). Skates can be thought of as 'apex' predators as they are at a relatively high trophic level and have few natural predators other than sperm whales (Gaichas et al. 2005). Of particular concern for skates is that commercial fishing is their largest source of mortality (Gaichas et al. 2005).

Species of skates (Family Rajidae) in the Bering Sea (Mecklenburg et al. 2002)

Raja binoculata	big skate
Raja rhina	longnose skate
Bathyraja parmifera	Alaska skate
Bathyraja aleutica	Aleutian skate
Bathyraja interuupta	Bering skate
Bathyraja lindbergi	Commander skate
Bathyraja abyssicola	deepsea skate
Bathyraja maculata	whiteblotched skate
Bathyraja minispinosa	whitebrow skate
Bathyraja trachura	roughtail skate
Bathyraja taranetzi	mud skate
Bathyraja violacea	Okhotsk skate

Skates are a large component of bycatch and have also been targeted by commercial groundfish fisheries. All species of skates are managed as an FMP species group by the North Pacific Fishery Management Council. Due to their vulnerability to extirpation and overfishing, skates present a special management challenge for the NPFMC.

There are five known skate nursery sites to date located in the eastern Bering Sea (Jerry Hoff, AFSC, pers. com.). The three species known to use those sites are the Alaska Skate *Bathyraja parmifera* (2 sites), the Aleutian skate *Bathyraja aleutica* (1 site) and the Bering Skate *Bathyraja interrupta* (2 sites). The three Southern sites (the ones south of the Pribilof Islands) (Fig 8, p. 24) have been studied in detail. The two northern sites (Fig 9, p. 24) are only known from a single sample taken in 2004 from each site and protection of the northern sites therefore should be viewed as a precautionary first step pending further research. All sites are associated with the shelf-slope interface and occur on relatively flat sandy-mud bottom. They range in depth from 150-360 meters, however the Aleutian skate nursery is deep (360 meters) and the others relatively shallow (135-256 meters). Sites are predominantly single species sites although the two southern sites for the Alaska and Aleutian skates have as many as 6 species depositing egg cases in the nursery site.

Egg purses were observed lying on flat sand-mud substrate and did not appear to be associated with any epifauna or structure (Jerry Hoff, AFSC, pers.com.). However, skate egg purses require highly oxygenated water flow to nourish the embryos and as such, sedimentation and disturbance from mobile bottom contact fishing gear could adversely affect the skate nursery sites.

Pelagic Habitat

In an open ocean ecosystem, consideration of the pelagic habitat of important trophic species is essential for ecosystem-based fisheries management (Agostini 2006). Pelagic habitat is widely utilized by commercial fish species (EFH EIS, pg. D47-D81) and thus Essential Fish Habitat has been broadly defined in the Magnuson-Stevens Act to include "those **waters** and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." In addition, the presence of prey concentrated in pelagic habitat is in itself a characteristic of habitat suitability. Prey species are often concentrated by hydrographic features that define areas of pelagic habitat. These features can either be static (e.g. sub-marine canyons) or dynamic in nature (e.g. oceanic gyres and currents). In the Bering Sea, FMP-managed squid are an example of an important trophic species that aggregates in shelf edge pelagic habitat and, by their presence, define such habitat for other species.

However, despite the importance of such pelagic habitat to trophic species such as squid, meso-pelagic fish and juvenile pollock, most of the effort to assess and designate Essential Fish Habitat in the Pacific and North Pacific Councils has focused on defining critical benthic habitat (Agostini 2006). The NPFMC in 1997 prohibited directed fishing for a range of important forage fish and krill (Witherell et al. 2000); however this action did not address the habitat needs of these species. Squid, which are a fundamental forage species in the North Pacific, did not receive similar protection.

In the Bering Sea, underlying bathymetric features and the proximity of key ecological areas such as the Pribilof Islands to the shelf break influences current and tidal flows to create complex pelagic habitat (Stabeno et al. 1999). Commercial fisheries, when operating in such pelagic habitat zones, may have increased bycatch of non-target prey and increased interaction with pelagic predators. For example, squid bycatch in the Bering Sea occurs primarily in the pelagic trawl pollock fishery, and is concentrated in Zhemchug, Pribilof and Bering Canyons along the shelf break (Gaichas 2005; Fig 4). Concentration of squid bycatch in space and time presents a risk due to the unique life cycle of squid and also raises possible concern about the effects on the forage availability for Northern fur seals and Steller seal lions (Gaichas 2005). Both of these predators have been shown to prey upon squid and other pelagic forage species in the Bering Sea and Aleutian Islands (Sinclair and Zeppelin 2002, Zeppelin and Ream 2006).

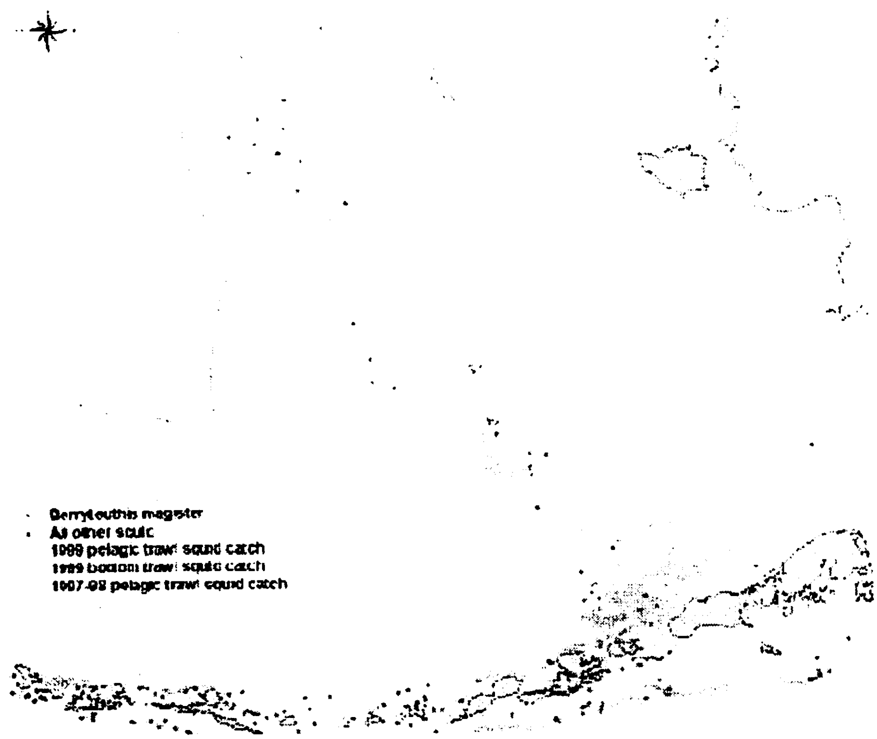


Figure 16.1-3. Distribution of squid species from bottom trawl surveys and catch, 1997-1999.

Figure 4. Distribution of squid from bottom trawl surveys and commercial bycatch, 1997-1999 (From Gaichas 2005)

Trawl Effects on Bering Sea Habitat

In general, relative to unfished habitat, areas fished with bottom trawls are expected to have reduced habitat complexity and species diversity, as well as changes in species composition. The level of habitat complexity depends on the structural components of the living and non-living benthic environment. Habitat complexity is reduced when epifauna that form structures are removed or damaged. Sedimentary bedforms are smoothed, and infauna that form burrows and pits are removed. Worldwide studies of the effects of bottom trawling have generally found that trawling reduces habitat complexity (Auster and Langton 1999). These findings have been confirmed by studies conducted in Alaska (Freese et al. 1999, McConnaughey et al. 2000, NMFS 2003, NRC 2002).

Trawling reduces structural complexity and diversity of habitat in the Bering Sea (McConnaughey et al. 2000). One of the more obvious effects is that trawling reduces the biomass of stalked, encrusting, and attached organisms from the seafloor (McConnaughey et al. 2000). Heavy trawling resulted in a patchier and less structured habitat with lower diversity of sedentary taxa (McConnaughey et al. 2000). Bottom trawling also reduces the mean body size of benthic invertebrates (McConnaughey et al. 2005).

The primary hard attachment substrates in the Bering Sea are invertebrate shells; accumulations of invertebrate shells are called "shell hash". Most of the epifauna, like *Gersemia* and sea anemones, attach to this shell hash. Shell hash, consisting mostly of bivalve shell, is the most important epibenthic substrate for juvenile blue king crab, *Paralithodes platypus*, in the Pribilof Islands area (Armstrong et al., 1985). Bottom trawling breaks up and scatters shell hash, making the habitat patchier and reducing the mean size of attached epifauna (McConnaughey et al. 2005). Empty gastropod shells are also important as attachment substrate for snail egg cases (NMFS, 1976). Empty shells, and individual and eggs of *Neptunea* sp., were all less abundant in heavily trawled areas, as were pagurid crabs that rely on empty shells for shelter (McConnaughey et al. 2000).

Commercial bottom trawling in sandy habitat on the inner Bering Shelf caused reduced macrofauna density, richness, and biomass with potential consequences for ecosystem functioning (Brown et al. 2005). In a study comparing untrawled and trawled areas of the shelf, animals that give sediments structure and stability, such as tube-dwelling amphipods, were less prevalent in the trawled area (Brown et al. 2005). In conclusion, Brown et al. (2005) found that the ecosystem in sandy habitat had been altered by chronic bottom trawling.

In soft-sediment epibenthic communities in the Gulf of Alaska, significant differences in epifauna abundance and species diversity were observed between areas open and closed to bottom trawling (Stone et al. 2005). Sea whips groves were less dense in areas open to bottom trawling. Fewer fish were observed in the sparse seawhip groves than the dense seawhip groves (Stone et al. 2005).

Pelagic trawl gear used by the pollock fishery also impacts seafloor habitat. In use, this gear is not truly pelagic as there is contact of the gear with the seafloor. Estimates of the amount of time a pelagic trawl contacts the seafloor in practice were provided by fishing organizations and used by NMFS in the EFH fishing effects model (EFH EIS Appendix B, Pg. B-11). Pelagic trawls are estimated to contact the seafloor across some substrates for 44% of the duration of a tow (Final EFH EIS, Appendix B, Table B.2-4). Pelagic trawl footropes are made of steel chain or cable. Regardless of the actual percentage of time spent on the sea floor, it is clear that a moving footrope in contact with the seafloor impacts habitat, and is particularly damaging for animals anchored on or in the sediment (NFMS, Final EFH EIS, pg. 3-166). In addition, the codend of the net can also contact the seafloor. The central estimates of impact to benthic features when this gear hits bottom are 21% reduction for infaunal prey, 16.5% reduction of epifaunal prey, 20% reduction of living structure and 20% reduction of non-living structure.

The very definition of bottom trawls and pelagic trawls gets blurred as the time spent in contact with the seafloor is not really a definer of the gear type. Also problematic are the 'trawl performance standards' which essentially define the gear type:

"For practical purposes, nonpelagic trawl gear is defined as trawl gear that results in the vessel having 20 or more crabs (*Chionecetes bairdi, C. opilio, and Paralithodes camstchaticus*) larger than 1.5 inches carapace width on board at any time. Crabs were chosen as the standard because they live only on the seabed and they provide proof that the trawl has been in contact with the bottom."... "However, these trawls may be frequently fished in contact with the seafloor, especially in shallow water (<50 fathoms).... If these trawls never touch the bottom, the pelagic trawl definition could be set at zero crab tolerance. **Because typical pelagic trawls have large mesh webbing in the lower section of the net and are affixed to chain footropes, bycatch enumerated by onboard observers might substantially**

underestimate the number of demersal fish and invertebrates that are affected because they fall through the large mesh panels instead of being captured by this gear." (NRC 2002).

Habitat-wide effects are apparent in the results of the Long-Term Effects Index, which indicates that status quo management will result in long-term reductions of benthic habitat features in the Bering Sea (NFMS, Final EFH EIS, Appendix B). Most striking in the Bering Sea is a 3-19% reduction in soft substrate living structure in across all sand/mud habitat in the Bering Sea. Habitat-wide impacts that overlap with individual species distributions are also extensive. These include:

- a 35% reduction in Bering Sea sand/mud living structure estimated to provide 25-30% of red king crab habitat
- a 15-20% reduction of living structure in Bering Sea sand/mud estimated to provide 71-68% of tanner crab habitat
- a 12-14% reduction in Bering Sea sand/mud living structure estimated to provide 56-65% of Greenland turbot habitat
- a 13-15% reduction of living structure in Bering Sea sand/mud estimated to provide 37-41% of rock sole habitat

However dire these predictions may seem, these effects are calculated over huge areas of habitat, which lessens the overall percentages of reduction of habitat features. If effects are examined more closely on a spatial scale, localized impacts are apparent and disconcerting. The habitat impacts model predicts that some areas that are trawled will become completely devoid of living structure if the current level of trawling continues.

Bycatch of epibenthic invertebrates recorded by fishery observers on trawl vessels is a direct measure of habitat impacts by commercial fisheries. However, since not all epibenthic invertebrates that interact with a trawl are retained in the net and an unknown proportion remain crushed or broken on the seafloor, estimates of habitat impacts from bycatch records are conservative. Below are estimates of average annual bycatch of habitat-forming invertebrates in Bering Sea bottom trawl fisheries:

Fishery	Coral/bryozoan bycatch (kg)	Anemone bycatch (kg)	Sponge bycatch (kg)
Yellowfin sole	8,904	5,893	43,618
Rock sole	432	25,080	181,207
Flathead sole	515	22,315	10,778
Pacific cod	3,830	12,641	72,281

(NMFS, PSEIS, adapted from Table 4.7-4)

While it is clear that bottom trawling alters benthic habitat, scientists have struggled to identify the direct cause-and-effect links to ecosystem-scale changes. However, logic dictates that anthropogenic changes to seafloor habitat have contributed to changes to the Bering Sea ecosystem. It is interesting to note that many species that are tied to the benthic food web (Figure 5 below, from Aydin et al. 2002) have declined. Populations of shrimp, Tanner crab, snow crab, king crab, and Pacific cod have all declined; many stocks to the point where commercial fisheries can no longer target the species. These species are tightly linked to epifauna and infauna (Figure 5). Both infauna and epifauna are affected by bottom trawling (McConnaughey et al. 2000, McConnaughey 2005, Brown et al. 2005). This suggests that there may be indirect effects of trawling on habitat and prey may have effects on the populations of commercially important species linked to the benthic food web.

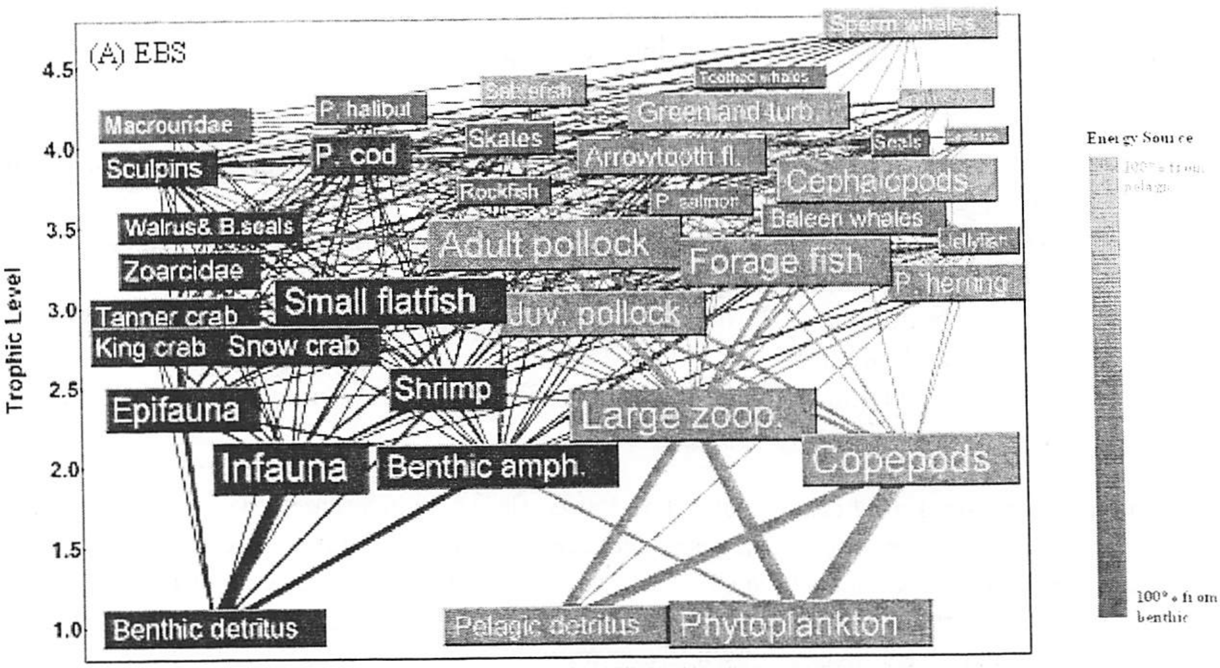


Figure 5: Eastern Bering Sea food web showing benthic and pelagic links (from Aydin et al. 2002)

Center for Independent Experts Advice

In 2004, NMFS contracted with the Center for Independent Experts to provide an outside peer review of NMFS assessment of fishing impacts to Essential Fish Habitat. The CIE panel consisted of six international scientists with expertise in stock assessment, seafloor habitat, and marine fisheries. Below are some of the recommendations from their summary report (Drinkwater 2004):

"*__A precautionary approach__ needs to be applied to the evaluation of fishing effects on EFH. This is especially important given that many of the stock collapses or severe declines around the world could have been avoided or lessened by following a precautionary approach.*" Summary Report pg. 21

*Recommendation: Apply the **precautionary approach** to the evaluation of the effects of fishing on habitat and their subsequent influence on the sustainability of commercial fish stocks especially where the model suggests the habitat is heavily reduced and/or the recovery times are long, as well as where little is known about the role of habitat in the life history stages.* Summary Report pg.18

Because of the large ***uncertainty*** *in our understanding of the processes linking habitat and life history stages of fish, in the habitat reduction model and the factors influencing stock productivity, a precautionary approach needs to be applied to the evaluation of fishing effects on EFH.* ***Research closures or other precautionary management measures should be utilized*** *to protect potential EFH while research is carried out to assess these habitats, their ecological role, and the impacts of fishing.* Summary Report pg. 24.

Additional protected areas *could be very useful in terms of potentially enhancing adjacent fisheries and ensuring healthy ecosystem functioning. Establishing protected habitat may be much easier to achieve if there are areas that are not currently fished and fishermen are involved in the process.* Summary Report pg. 21-22.

It was the unanimous opinion of the panel that adequate consideration was not given to ***localized habitat impacts.*** Summary Report pg. 20

Bering Sea Essential Fish Habitat Conservation Alternative

To protect seafloor habitats and important ecological areas of the eastern Bering Sea, this proposal combines measures to:

1. Freeze the footprint of mobile bottom contact gear;
2. Protect important habitat areas within the trawl footprint including Pribilof, Zhemchug, and Middle Canyon, crab habitat, and known skate nurseries;
3. Modify pelagic trawl performance standards to ensure pelagic trawl gear does not impact the seafloor; and
4. Research and monitor, including pelagic habitat identification, bycatch monitoring, increased benthic habitat mapping, and 100% observer coverage.

In this proposal, current time and area management closures would be maintained. Importantly, to allow for continued and vibrant fishing opportunities, this proposal maintains most areas currently fished with mobile bottom contact gear as "open". The following map displays the Bering Sea Essential Fish Habitat Conservation Alternative (Fig 6).

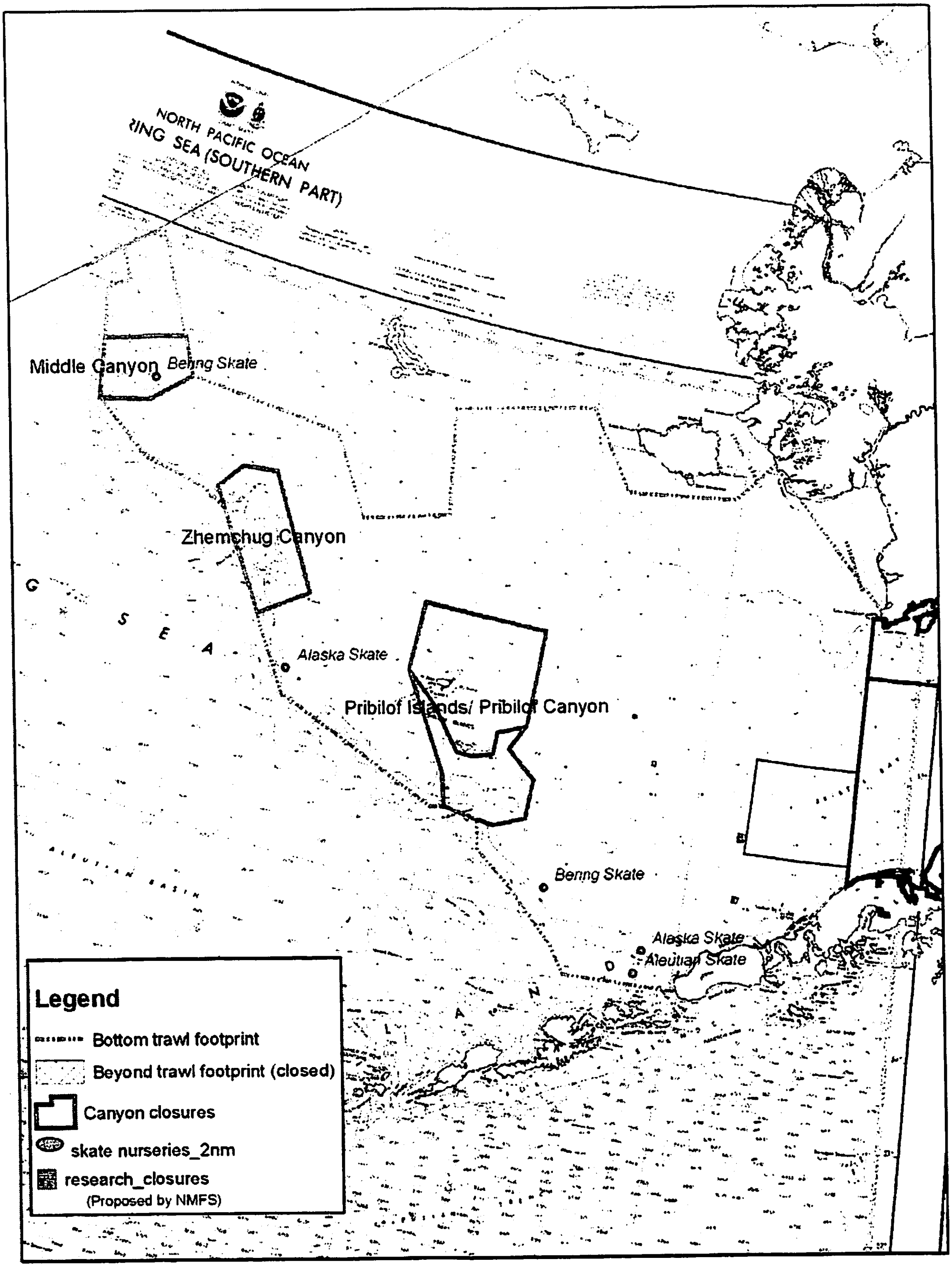


Figure 6: Map of Bering Sea Essential Fish Habitat Conservation Alternative. (Proposed habitat protection measures are in addition to any current time and area management measures.)

1) Freezing the Footprint

In February 2005, the NPFMC unanimously voted to adopt historic precautionary management measures to protect seafloor habitat in the Aleutian Islands from destructive bottom trawling by freezing the bottom trawl footprint and protecting habitat areas within the footprint. This same approach needs to be applied in the Bering Sea to protect essential fish habitat. Freezing the bottom trawl footprint in the Bering Sea protects coastal domain habitat and shelf habitat to the north. However, since no slope or slope/shelf break habitat would be protected by freezing the footprint, this approach must include protection measures for important habitat areas within the footprint. The slope/shelf break and outer shelf is trawled by the pollock and Pacific cod fleets all the way to the northern boundary of the Alaskan EEZ, as far north as 62 ° N. The bulk of flatfish trawling occurs south of St. Matthew Island, approximately 60° N on the shelf. Some exploratory flatfish fishing has occurred north of 60° N. The concept of a discrete open area approach, or "freezing the footprint" of mobile bottom contact gear would provide precautionary habitat protection for important areas such as Norton Sound, Kotzebue Sound, St. Matthew Island and St. Lawrence Island. Coastal habitat that could be protected by freezing the trawl footprint shoreward includes Kuskokwim Bay, Etolin Strait, Hazen Bay, and the area surrounding Nunivak Island.

NMFS fisheries data from 1990 to 2003 was analyzed to determine the bottom trawl footprint. This data was collected by fisheries observers and summarized in 10x10 km blocks to plot on a spatial scale. Some fisheries data was withheld from the public because the Fisheries Service asserted it was confidential. In this case, locations of fisheries catch where fewer than three boats were fishing were withheld. However, the data supplied depicted where the bulk of trawling occurred and depicted an accurate trawl footprint. The limited data of trawl effort that was withheld likely occurred on the fringes of the footprint and in areas where single or few vessels have undergone exploratory trawling.

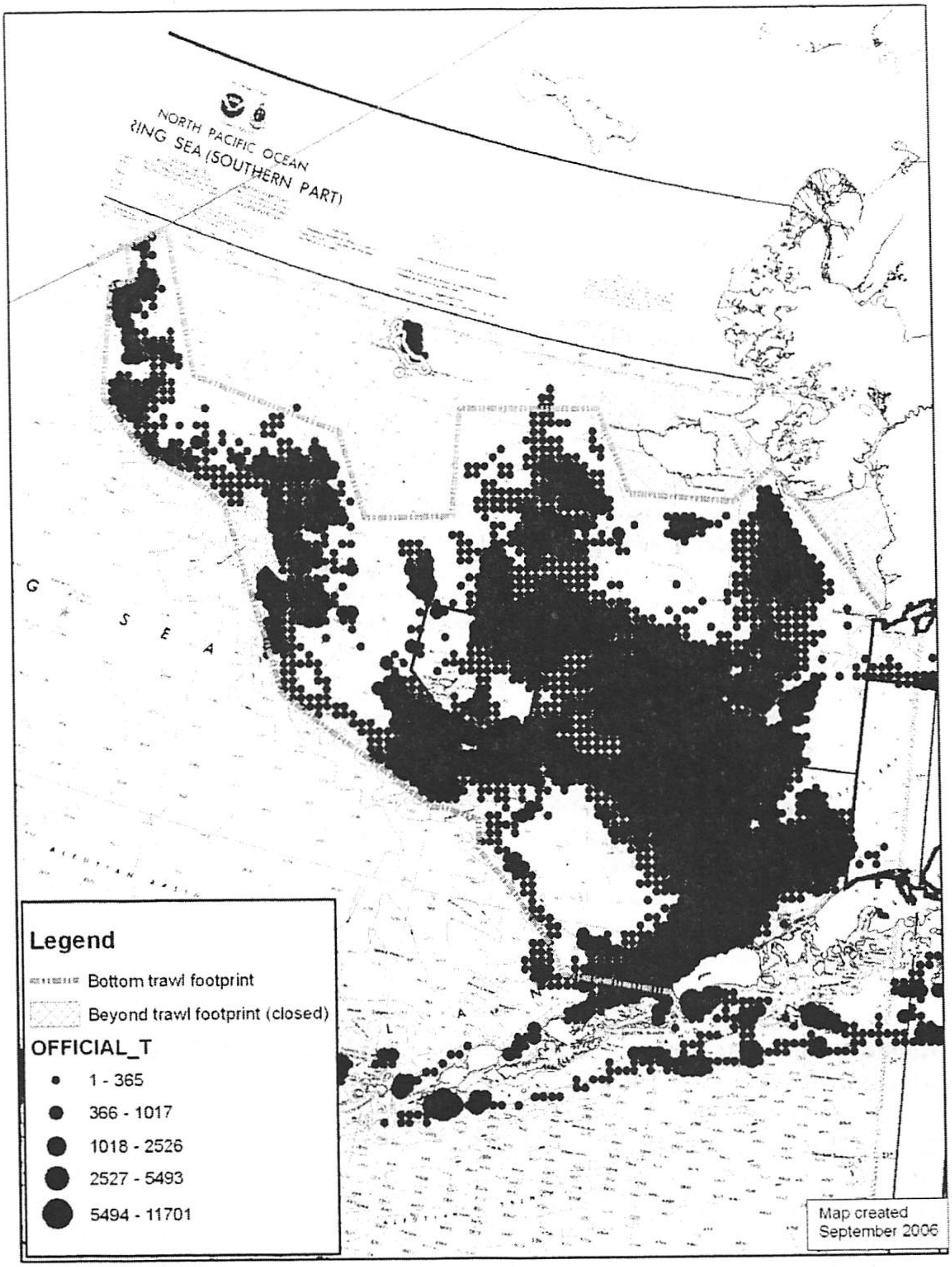


Figure 7: Map of proposed bottom trawl footprint. The region between the dashed line is proposed as the bottom trawl footprint which would be open to bottom trawling minus any current management closures and minus habitat areas within the footprint proposed for protection. Official_T represents the total catches by bottom trawl fisheries from 1990-2003. Darker shaded areas indicate areas of high catches. Some limited bottom trawl catch outliers to the north are not included in the proposed footprint.

Table 1: Bottom trawl footprint coordinates for the northern edge from the EEZ to the mainland and the southwestern edge along the slope break from the EEZ to the Alaska Peninsula.

	Longitude	Latitude
Northern Footprint Edge	179°39' 5.30" W	60° 18' 18.40" N
Northern Footprint Edge	178° 30' 19.07" W	60° 52' 56.66" N
Northern Footprint Edge	177° 17' 25.76" W	59° 53' 10.10" N
Northern Footprint Edge	176° 52' 2.01" W	59° 31' 4.42" N
Northern Footprint Edge	173° 38' 30.48" W	59° 25' 51.70" N
Northern Footprint Edge	172° 39' 10.85" W	58° 38' 30.04" N
Northern Footprint Edge	170° 56' 12.21" W	58° 54' 33.54" N
Northern Footprint Edge	171° 19' 2.97" W	60° 0' 37.38" N
Northern Footprint Edge	168° 24' 33.83" W	60° 20' 45.71" N
Northern Footprint Edge	167° 21' 21.79" W	59° 33' 4.77" N
Northern Footprint Edge	165° 8' 42.63" W	59° 39' 44.77" N
Northern Footprint Edge	164° 27' 23.83" W	60° 5' 25.10" N
Northern Footprint Edge	161° 46' 58.49" W	58° 41' 8.68" N
Southwestern Footprint Edge	179° 10' 17.12" W	60° 33' 31.11" N
Southwestern Footprint Edge	178° 47' 9.31" W	60° 14' 20.71" N
Southwestern Footprint Edge	179° 11' 11.69" W	60° 4' 54.94" N
Southwestern Footprint Edge	178° 31' 38.86" W	58° 58' 29.72" N
Southwestern Footprint Edge	177° 13' 53.40" W	58° 33' 6.97" N
Southwestern Footprint Edge	175° 55' 11.02" W	58° 27' 2.07" N
Southwestern Footprint Edge	175° 24' 53.77" W	58° 18' 48.22" N
Southwestern Footprint Edge	173° 17' 43.48" W	56° 37' 22.21" N
Southwestern Footprint Edge	170° 1' 23.42" W	55° 52' 30.73" N
Southwestern Footprint Edge	169° 44' 1.71" W	55° 54' 13.02" N
Southwestern Footprint Edge	169° 5' 29.47" W	55° 51' 51.24" N
Southwestern Footprint Edge	168° 58' 33.79" W	55° 33' 27.58" N
Southwestern Footprint Edge	168° 15' 15.90" W	55° 14' 30.82" N
Southwestern Footprint Edge	167° 17' 34.62" W	54° 43' 32.35" N
Southwestern Footprint Edge	166° 57' 43.39" W	54° 26' 26.94" N
Southwestern Footprint Edge	164° 53' 49.67" W	54° 26' 59.23" N

2) Mobile contact gear closures for important areas of essential fish habitat within the trawl footprint

Proposed Canyon and Slope/Shelf Edge Protected Areas

To protect Essential Fish Habitat in canyon and slope/shelf edge benthic habitat the following areas around Middle Canyon (6,847 km^2), Zhemchug Canyon (11,015 km^2), and Pribilof Canyon (29,487 km^2 which includes existing Pribilof Islands Habitat Conservation Area) are proposed to be closed to bottom trawling (Figure 6). Pelagic trawl gear may be used in off-bottom mode with all parts of the gear including the footrope not in contact with the seafloor.

Table 2: Bering Sea shelf edge and canyon bottom trawl closure coordinates

Name	Longitude	Latitude
Middle Canyon	178° 52' 35.86" W	59° 34' 33.35" N
Middle Canyon	177° 17' 5.21" W	59° 53' 18.01" N
Middle Canyon	176° 52' 12.36" W	59° 31' 3.98" N
Middle Canyon	177° 33' 31.90" W	59° 8' 17.45" N
Middle Canyon	178° 32' 15.87" W	58° 58' 33.25" N
Middle Canyon	178° 52' 35.86" W	59° 34' 33.35" N
Zhemchug Canyon	175° 40' 24.60" W	58° 30' 52.77" N
Zhemchug Canyon	175° 17' 47.32" W	58° 47' 53.65" N
Zhemchug Canyon	174° 36' 1.09" W	58° 51' 4.07" N
Zhemchug Canyon	173° 18' 33.35" W	57° 43' 15.06" N
Zhemchug Canyon	174° 11' 3.25" W	57° 21' 46.78" N
Zhemchug Canyon	175° 40' 24.60" W	58° 30' 52.77" N
Pribilof Islands/ Pribilof Canyon	171° 0' 31.41" W	57° 13' 42.59" N
Pribilof Islands/ Pribilof Canyon	170° 58' 47.83" W	57° 57' 34.81" N
Pribilof Islands/ Pribilof Canyon	168° 29' 46.78" W	57° 56' 57.01" N
Pribilof Islands/ Pribilof Canyon	168° 30' 10.63" W	56° 56' 21.93" N
Pribilof Islands/ Pribilof Canyon	168° 44' 57.39" W	56° 39' 31.24" N
Pribilof Islands/ Pribilof Canyon	168° 10' 28.03" W	56° 23' 40.75" N
Pribilof Islands/ Pribilof Canyon	168° 10' 53.38" W	55° 58' 43.05" N
Pribilof Islands/ Pribilof Canyon	168° 45' 25.78" W	55° 50' 11.83" N
Pribilof Islands/ Pribilof Canyon	169° 44' 44.41" W	55° 54' 27.64" N
Pribilof Islands/ Pribilof Canyon	169° 55' 57.52" W	56° 15' 40.97" N
Pribilof Islands/ Pribilof Canyon	171° 0' 31.41" W	57° 13' 42.59" N

Crab Habitat

The limited trawling near St. Matthew Island should be excluded from the trawl footprint, thereby protecting St. Matthew blue king crab habitat from trawling. Additionally, freezing the trawl footprint is important to protect snow crab habitat in the northern portion of the eastern Bering Sea. A large amount of snow crab habitat is located north of the bottom trawl footprint. Abundance of female snow crabs (*Chionoecetes opilio*) is concentrated to the north in years of low abundance (Zheng et al. 2001).

Mitigation of trawling effects on crab habitat is imperative. Trawling disturbs podding behavior (Dew & McConnaughey 2004), reduces epifaunal and infaunal crab prey (McConnaughey et al. 2000, NMFS 2004) and kills and injures crabs that interact with the trawl net (Rose 1999). The cumulative impacts of these effects on crab stocks are yet to be investigated. Preventing expansion of trawling, particularly to the north and around St. Matthew Island, is a precautionary first step to protect crab habitat.

Skate Nurseries

We proposed protective measures for skate nursery sites by prohibiting mobile bottom contact gear (bottom trawls and pelagic trawls that contact the bottom) in either a 2 nautical mile diameter block or circle around the coordinates identified in Table 3 (see also Figures 8 and 9).

Table 3: Skate nursery coordinates.

Alaska Skate *Bathyraja parmifera*	**54.83N**	**-165.63W**	**bottom depth 150 m**
Aleutian Skate *Bathyraja aleutica*	**54.58N**	**-165.71W**	**bottom depth 391 m**
Bering Skate *Bathyraja interrupta*	**55.30N**	**-167.60W**	**bottom depth 154 m**
Alaska Skate *Bathyraja parmifera*	**56.90N**	**-173.36W**	**bottom depth 213 m**
Bering Skate *Bathyraja interrupta*	**59.38N**	**-177.60W**	**bottom depth 256 m**

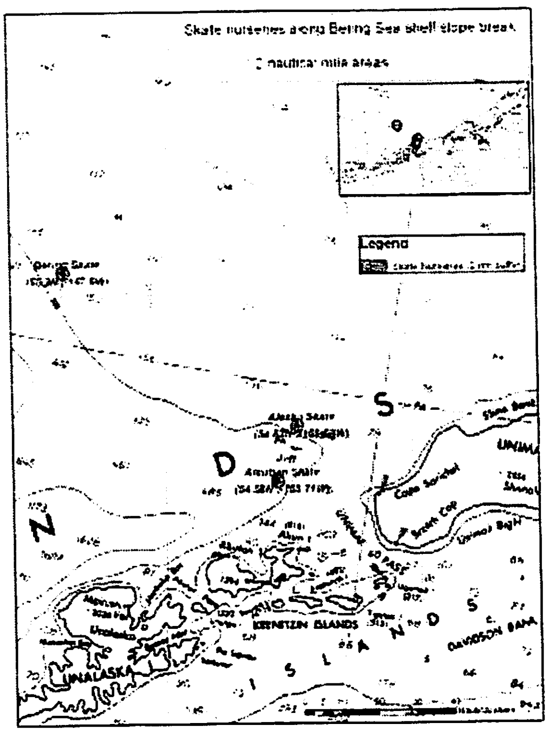


Figure 8: Proposed bottom trawl closures to protect areas identified as skate nursery areas in the southern Bering Sea.

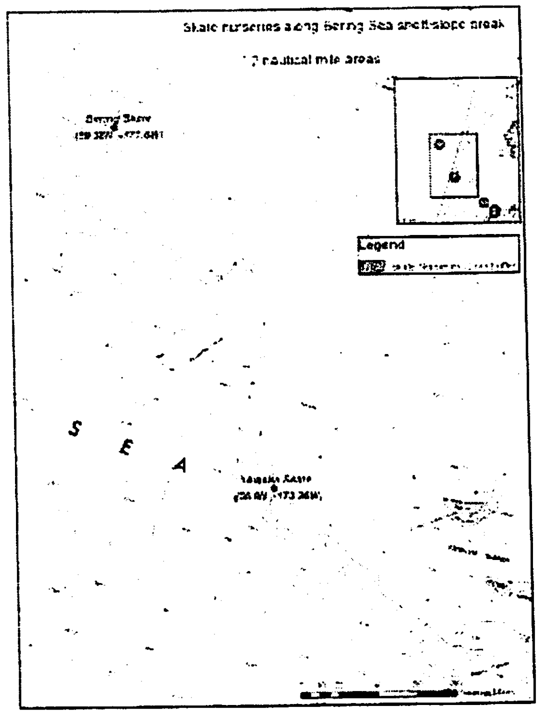


Figure 9: Proposed bottom trawl closures to protect areas identified as skate nursery areas in the northern Bering Sea. Note that scale of map is twice the scale of the preceding southern Bering Sea skate nursery map.

Pelagic Habitat

We suggest using spatial management measures to mitigate the effects of trawling on pelagic habitat, including the use of time and area closures in known bycatch 'hotspots' that frequently occur in sub-marine canyons (Gaichas 2005). We propose that bycatch of squid and other pelagic forage species be carefully monitored in the shelf edge areas and that appropriate spatial closures be implemented if bycatch rates exceed safe levels determined from the best available data and enumerated in the Fishery Management Plan. Not only should this be accomplished through immediate mitigating management measures but also through long term research and monitoring.

This type of spatial zoning of the marine environment is becoming a prime management tool for implementing ecosystem-based fisheries management (Babcock et al. 2005). When key habitat areas such as the sub-marine canyons can be consistently identified, these protected areas represent a viable alternative to protect Essential Fish Habitat for pelagic species. Such spatial management measures have been implemented to protect commercially targeted pelagic species such as salmon and herring that occur as bycatch in other fisheries. Recently, during the 2006 summer pollock fishery, the pollock co-ops voluntarily closed a 500 sq. mile area near Bering Canyon due to high squid bycatch (Pemberton 2006). Trawl closures have also been used to modify commercial fisheries interactions with the prey field of Steller sea lions around rookeries and in critical foraging habitat. While no direct spatial consideration has been made for the foraging requirements of other apex predators of concern in the Bering Sea (e.g. northern fur seals and red-legged kittiwakes) the canyon and slope/shelf edge protected areas proposed in this alternative will begin to address this need.

The designation of special management areas in the shelf edge canyons addresses the need for pelagic Essential Fish Habitat protection in the outer-shelf and shelf break domains. For example, although the ecological boundary of the open marine ecosystem surrounding the Pribilof Islands extends far beyond the current Pribilof Islands Habitat Conservation Area (Ciannelli et al. 2004), the Pribilof Islands Habitat Conservation Area does not encompass any of the pelagic or benthic habitat in the outer domain or along the shelf break. As such, there are currently no areas along the shelf break that can serve as research and management controls for evaluating the effect of commercial fishing in pelagic habitat.

3) Pelagic trawl performance standards

In order to protect bottom habitat within closed areas, we suggest that pelagic trawls – which are known to negatively impact sea floor habitat – be off bottom within closed areas. New standards that ensure pelagic trawls are truly pelagic within closed areas need to be developed and implemented. Furthermore, research and monitoring needs to be conducted on the amount of time pelagic trawls are contacting the bottom and to ascertain the full extent of pelagic gear damage to benthic habitat when that gear is touching the bottom.

4) Research and Monitoring

Research and monitoring are important aspects of any proposed conservation measures for Bering Sea habitat. We propose using the closed areas inside the footprint to study the impact of bottom trawling and pelagic trawling on marine resources. Note that for purposes of discussion, the map associated with this proposal includes those areas identified for bottom trawl research closures by NMFS in 2003. In addition to considering application of the research objectives outlined by the NMFS proposal to any closed areas resulting from this process, we also recommend that additional research and monitoring measures be implemented in the proposed shelf-break canyon closure areas to evaluate the effect of bottom trawl closures on benthic habitat and to monitor the effect of continued trawling in pelagic habitat. Initially, this effort should include a study to determine whether hydroacoustic data from the current pollock trawl survey can be used to develop area-specific biomass estimates for key trophic species such as squid.

The objectives of a research plan for closures would include determining the extent that commercial fishing affects essential fish habitat and whether such alterations affect the shelter, food, species composition, and productivity of eastern Bering Sea marine life. Specific objectives of the bottom trawl research closures include comparison under contrasting (i.e. fished vs. not fished) levels of fishing, information such as habitat condition, the abundance, composition, and size of habitat forming organisms, and the local abundance of fish and prey. In addition, studgying closures will be helpful in increasing our understanding of the effects of climate change.

Other research must include research on alternative methods of catching flatfish and pollock that minimize the impacts on seafloor habitat. This could include continued research on gear modification, as well as socioeconomic studies on the effect of allocating quotas to less damaging gear types.

This alternative also includes at a minimum, 100% observer coverage and a vessel monitoring system on vessels using mobile bottom contact gear in the eastern Bering Sea, recognizing that existing programs require greater than 100% observer coverage on some vessels. In addition, since non-contact with the seafloor with pelagic trawl gear is a requirement for fishing with such gear in the closed areas, a mechanism that permits observers to assess the degree of contact of pelagic trawl with the seafloor will be necessary for management purposes.

As part of this alternative, dedicated research must continue identifying important pelagic habitat zones and species that rely on pelagic habitat. The research and management component must include the ability to use time and area closures to manage bycatch rates of key trophic species along the shelf break and particularly in the sub-marine canyons in the vicinity of the Pribilof Islands (i.e. Pribilof and Zhemchug Canyons). As our knowledge of the life history and distribution patterns of pelagic forage species improves, additional management measures should be implemented to protect these stocks. In the Pribilof and Zhemchug Canyon areas, assessment surveys and bycatch monitoring should be coupled with long-term predator monitoring studies to assess the interaction between fisheries and apex predators and how these data can be used to help implement ecosystem-based fisheries management (e.g. Boyd and Murray. 2001).

Economic Analyses

A preliminary examination of potential displaced catch was estimated by examining available observer data of average fishery catches from 1999 to 2003 in the proposed closed areas.

Pribilof Islands/ Pribilof Canyon

By prohibiting mobile bottom contact trawl gear fisheries from impacting the habitat within the Pribilof Islands/Pribilof Canyon boundary described in Figure 6 and Table 2, the following estimated catch and value of the bottom trawl fisheries would be displaced:

Table 4: Bottom trawl fishery catches and ex-vessel value potentially displaced in proposed Pribilof Islands/Pribilof Canyon bottom trawl closure

Pacific cod	mean catch (mt)	mean ex-vessel value ($)
	618	$367,462

	mean catch (mt)	mean ex-vessel value ($)
Yellowfin sole	3	$909
Rock sole	884	$267,684
Flathead sole	248	$75,119

Total		$343,712

The displacement of any effort or catch of pollock by the pollock fishery is dependent upon the extent to which the fishery is a bottom contact trawl fishery.

Table 4 (continued): Pollock trawl fishery catch and value

Pollock	Mean catch (mt)	mean ex-vessel value ($)
	68,056	$13,931,120

Zhemchug Canyon

By prohibiting mobile bottom contact trawl gear fisheries from impacting the habitat within the Zhemchug Canyon boundary described in Figure 6 and Table 2, the following estimated catch and value of the bottom trawl fisheries would be displaced:

Table 5: Bottom trawl fishery catches and ex-vessel value potentially displaced in proposed Zhemchug Canyon bottom trawl closure

	mean catch (mt)	mean ex-vessel value ($)
Pacific cod	75	$44,756

Flatfish	mean catch (mt)	mean ex-vessel value ($)
Rock sole	1.4	$432
Yellowfin sole	0	0
Flathead sole	4.7	$1,416

Total		$1,848

The displacement of any effort or catch of pollock by the pollock fishery is dependent upon the extent to which the fishery is a bottom contact trawl fishery.

Table 5 (continued): Pollock trawl fishery catch and value

Pollock	mean catch (mt)	mean ex-vessel value ($)
	18,229	$3,731,394

Middle Canyon

By prohibiting mobile bottom contact trawl gear fisheries from impacting the habitat within the Middle Canyon boundary described in Figure 6 and Table 2, the following estimated catch and value of the bottom trawl fisheries would be displaced:

Table 6: Bottom trawl fishery catches and ex-vessel value potentially displaced in proposed Middle Canyon bottom trawl closure

	mean catch (mt)	mean ex-vessel value ($)
Pacific cod	4.6	$2,713

	mean catch (mt)	mean ex-vessel value ($)
Yellowfin sole	0	$0
Rock sole	7.4	$2,250
Flathead sole	147	$44,547

Total		$46,797

The displacement of any effort or catch of pollock by the pollock fishery is dependent upon the extent to which the fishery is a bottom contact trawl fishery.

Table 6 (continued): Pollock trawl fishery catch and value

Pollock	mean catch (mt)	mean ex-vessel value ($)
	1,379	$282,376

Conclusions

The Bering Sea supports 419 fish species, 28 marine mammal species, 102 bird species, thousands of benthic invertebrate species, and hundreds of millions of dollars of commercial fisheries value. However, the rapid and intensive development of trawl fisheries in the Bering Sea has put the ecosystem at risk. Industrial bottom trawling in the Bering Sea causes serious impacts to habitat.

The Council and the Fisheries Service have the opportunity to implement a comprehensive regulatory system specifically designed to protect Bering Sea habitat and thereby exercise their responsibility as steward of our public resources. Habitat protection in the Bering Sea is necessary to maintain the integrity of the Bering Sea ecosystem while continuing to reap the benefits of its harvests. Restrictions on damaging effects of bottom trawling are mandated by the Magnuson-Stevens Act and warranted by the scientific literature on habitat.

This document describes a practicable and precautionary alternative for protecting essential fish habitat in the Bering Sea. This alternative maintains sustainable fisheries through a design that allows bottom trawling in certain areas historically important to the fleet, while providing necessary protection for areas that encompass a range of essential fish habitat types.

Appendix 1: Bering Sea Background

The Bering Sea comprises a deep water basin (the Aleutian Basin) which rises through a narrow slope into the shallower water above the continental shelves. The Bering Sea ecosystem includes resources within the jurisdiction of the United States and Russia, as well as international waters in the 'Donut Hole'. The interaction between currents, sea ice, and weather make for a vigorous and productive ecosystem. The Bering Sea ecosystem is very dynamic, and has undergone marked changes within the time it has been studied by man. Commercial fishing is "perhaps the most significant in terms of its impact on the Bering Sea ecosystem" (Loughlin et al. 1999), while climatic factors have a great impact on trends in the Bering Sea ecosystem (Hare and Manuta 2000, Hunt and Stabeno 2002, Grebmeier et al. 2006) as well. Consideration and moderation of the cumulative effects of commercial fishery removals and habitat disturbance on the Bering Sea are crucial to the continued vitality of the system.

Bering Sea Productivity

There are two known major drivers of the productivity of the Bering Sea; the shelf break and seasonal sea ice.

The Bering Sea shelf break is the dominant driver of primary productivity in the Bering Sea (Springer et al. 1996). This zone, where the shallower continental shelf drops off into the Aleutian basin is also known as the "Greenbelt". Nutrient upwelling from the cold waters of the Aleutian basin flowing up the slope and mixing with shallower waters of the shelf provide for constant production of phytoplankton.

The second driver of productivity in the Bering Sea is seasonal sea ice that, in part, triggers the spring phytoplankton bloom. The productivity associated with sea ice is under threat as global warming causes a reduction of sea ice in the Bering Sea. Seasonal melting of sea ice causes an influx of lower salinity water into the middle and other shelf areas, causing stratification and hydrographic effects which influence productivity (Schumacher et al. 1979). In addition to the hydrographic and productivity influence of melting sea ice, the ice itself also provides an attachment substrate for the growth of algae as well as interstitial ice algae.

Some evidence suggests that great changes to the Bering Sea ecosystem have already occurred. Warm water conditions in the summer of 1997 resulted in a massive bloom of low energy coccolithophorid phytoplankton (Stockwell et al. 2001). A long record of carbon isotopes, which is reflective of primary production trends of the Bering Sea, exists from historical samples of bowhead whale baleen (Schell 2000). Trends in carbon isotope ratios in whale baleen samples suggest that a 30-40% decline in average seasonal primary productivity has occurred over the last 50 years (Schell 2000). The implication is that the carrying capacity of the Bering Sea is much lower now than it has been in the past.

Bering Sea Fishery Economics

Commercial fishing is big business in the Bering Sea. Some of the largest seafood companies in the world rely on the Bering Sea to produce fish and shellfish. On the U.S. side, commercial fisheries in the Bering Sea catch $1 billion worth of seafood annually, while Russian Bering Sea fisheries are worth approximately $600 million annually.

Much of the Eastern Bering Sea shelf and slope has been trawled. The flatfish bottom trawl fisheries have trawled extensively throughout the shelf, while the pollock pelagic trawl fishery has concentrated along the shelf/slope break. The Pacific cod trawl fishery has heavily trawled fishing grounds north of Unimak ("Cod Alley") but has also fished along the slope and has ranged as far north as St. Matthews Island.

Yellowfin sole and rock sole are the primary flatfish species targeted in the Bering Sea with bottom trawl gear, and to a lesser degree, arrowtooth flounder, Alaska plaice, and flathead sole are also caught. In 2003, the Bering Sea **flatfish** bottom trawl fishery harvested 151,289 mt of flatfish (and discarding over 1/3 of this). The retained catch of flatfish in 2003 was worth $30.6 million in ex-vessel value with a product value of $66.8 million. 25 vessels participated in the fishery and the fleet is also known as the 'head-gut-fleet'. Examples of head-and-gut fleet catcher processor bottom trawl vessels targeting rock sole and yellowfin sole include F/V Rebecca Irene, Alaska Juris, Alaska Victory, Alaska Warrior, Unimak, American No.1, and Seafreeze Alaska.

Flatfish are actually quite a diverse group of fishes comprising at least 39 species in the Bering Sea, and for many species their past and present abundance remains unknown.

Slender sole (*Lyopsetta exilis*)

The **Pacific cod** bottom trawl fishery in the Bering Sea harvested 41,303 mt of cod in 2003 with an ex-vessel value of $24.2 million and product value of $43.9 million. 80 vessels participated in the fishery. Examples of bottom trawl catcher vessels (>125 ft) targeting Pacific cod include F/V Arctic Explorer, Bristol Explorer, Ocean Explorer, Arctic Explorer, Fierce Allegiance, Northern Patriot, Golden Dawn, Pacific Prince, Arcturus, Aldebaran, Anita J, and Pacific Viking. Examples of bottom trawl catcher processors (>125 ft) targeting Pacific cod include F/V Alaska Juris, Alaska Ranger, Pacific Navigator, Unimak, Northern Glacier, and Constellation. Examples of bottom trawl catcher vessels (< 125 ft) targeting Pacific cod include F/V Royal Atlantic, Seadawn, Argosy, Vesteraalen, Dominator, Intrepid Explorer, Viking Explorer, American Beauty, Columbia, Half Moon Bay, Poseidon, Legacy, Nordic Explorer, Western Dawn, Alaska Rose, Bering Rose, Traveler, Mark 1, Seeker, Golden Pisces, Pegasus, Raven, Perseverance, Lone Star, Blue Fox, and Messiah.

In 2003, the Bering Sea **pollock** fishery harvested 1,459,150 mt of pollock worth $341.5 million in ex-vessel value and $951.5 million in product value. 109 vessels participated in the fishery. Examples of vessels that participate in this fishery are the huge mothership, the 688 foot Ocean Phoenix; factory trawlers over 300 feet long including the Alaska Ocean, Excellence, Northern Eagle, Northern Hawk, Northern Jaeger, Arctic Storm, Golden Alaska, Island Enterprise; and other large factory trawlers F/V American Triumph, Pacific Glacier, Arctic Fjord, Kodiak Enterprise, American Dynasty, Highland Light, Seattle Enterprise, Ocean Rover, and many others.

An immense stock of northern shrimp (*Pandalus borealis*) off the Pribilof Islands was decimated by intense commercial fishing 50 years ago. At the time, schooling shrimp covered a huge area estimated at 120 miles long and 20-30 miles wide, and test fishery catches reached 10,000 kg/hr (Ivanov 1970).

Commercial fisheries have been limited to the central and southern portions of the Bering Sea in the past, most likely due to the extent of seasonal sea ice. Retreating sea ice may open new fishing grounds in the Northern Bering, Chukchi, and Beaufort seas. It is presently unknown whether species that are commercially desirable exist in quantities that can be sustainably and efficiently harvested in these northern areas.

Bering Sea Biodiversity

The Bering Sea ecoregion is highly biodiverse, with 419 fish species, 28 marine mammal species, and 102 bird species that live in the Bering Sea for all or part of the year. Over 300 species have been described in the zooplankton, primarily coelenterates and crustaceans (Coyle et al. 1996). Benthic invertebrates are even more diverse, with an estimated 2,000 species living on the seafloor, although Bering Sea benthos is poorly studied (Dulepova 2002). For fishes, trends in biodiversity indices for the Eastern Bering Sea have correlated strongly with regime shifts (Hoff 2006). Biodiversity trends are declining within the roundfish guild, and increasing within the flatfish guild (Hoff 2006). Roundfish species (which include sandlance, capelin, lumpsuckers, eelpouts, skates, sculpins and rockfish for example) have not fared well in the last 20 years. The overall trend is declining biodiversity and single fish species becoming dominant (Hoff 2006).

The Bering Sea ecoregion supports an extremely diverse avifauna. Over 200 species of birds have been recorded in the region, a number of which are known to be at risk (Stenhouse & Senner 2005). Seabirds make up the largest component. Over 30 different seabird species, and approximately 20 million individuals breed in the Bering Sea region. Many of these species are unique to the area, which provides highly productive foraging habitat, particularly along the shelf edge and in other nutrient-rich upwelling regions, such as the Pribilof, Zhemchug, and Middle canyons. The Pribilof Islands support over 80% of the world's Red-legged Kittiwake (*Rissa brevirostris*) population (Byrd & Williams 1993), most of which forage to the south of St. George Island in the Pribilof Canyon (Hunt et al. 1981). Bering Sea waters are so rich in zooplankton and forage fishes that they also attract non-breeding birds from all around the world. For example, tens of millions of Short-tailed Shearwaters (*Puffinus tenuirostris*) and Sooty Shearwaters (*Puffinus griseus*) spend the Austral winter in the North Pacific (Guzman & Myers 1987).

Three avian species present in the region are listed under the federal Endangered Species Act. Among the seabirds, the Short-tailed Albatross (*Phoebastria albatrus*) is considered Endangered, as fewer than 2,000 individuals exist and they breed on only two small islands in the Pacific (US Fish & Wildlife Service 2005). They are known to spend much of their time foraging in shelf break areas of the Bering Sea and Aleutian Islands (US Fish & Wildlife Service 2005). Of the 15 species of seaducks in the region, two are considered Threatened: the Spectacled Eider (*Somateria fischeri*) and Steller's Eider (*Polysticta stelleri*). Almost the entire population of Spectacled Eiders winters in polynyas and leads in the pack ice of the central Bering Sea (US Fish & Wildlife Service 1996), while Steller's Eiders winter in the marine waters of southwest Alaska (US Fish & Wildlife Service 2002).

Most of the seabird species in the region rely on small, pelagic, mid-water fishes such as capelin, sandlance, eulachon, and herring, to feed themselves and raise their young; some seabirds rely on the rich planktonic resources; and some seabirds and seaducks are dependent on benthic communities, such as small fishes, urchins and sea stars. Thus, commercial fishery techniques, such as trawling, which disturb benthic community structure and disrupt the entire marine food web, can have significant direct and/or indirect effects on marine birds at all trophic levels (Jones 1992, Montevecchi 2002).

As part of the Important Bird Area (IBA) program, a global project of BirdLife International, the National Audubon Society has identified a number of important marine areas in the Bering Sea. In particular, the Bering Sea shelf edge, which includes the Pribilof, Zhemchug, and Middle canyons, has been recognized as an IBA due to its global significance for birds (National Audubon Society 2004).

Marine mammal diversity is also high in the Bering Sea. However, some whale populations have never recovered from overexploitation by the whaling industry. The North Pacific right whale (*Eubalena japonicus*) is the most endangered whale in the world with fewer than 100 individuals in the eastern Bering Sea. The North Pacific right whale is at considerable risk of extinction (Shelden & Clapham 2006). Steller sea lions are endangered, and stocks of Northern fur seal and harbor seals are declining.

Two Bering Sea species, the Steller's sea cow (*Hydrodamalis gigas)* and spectacled cormorant (*Phalacrocorax perspicillatus)*, are extinct because of direct overexploitation by man. In addition, a small subspecies of Canada goose, the Bering Canada goose (*Branta canadensis asiatica*) is extinct due to overhunting and introduction of rats to their breeding islands.

Bering Sea Invertebrates

Invertebrates that live on the seafloor comprise a large proportion of the production, biomass, and diversity in the Bering Sea. Some species, such as king and snow crabs directly support multi-million dollar fisheries. Others provide habitat and shelter for other animals. Many are prey for commercial fish species and marine mammals. Their aggregate contribution to the Bering Sea ecosystem is immeasurable. It is likely that many species remain to be discovered.

While there has not been a comprehensive assessment, there are likely to be several dozen species of sponges living in the Eastern Bering Sea. Currently, sponges are still grossly identified by broad taxonomic categories in NMFS trawl surveys. Some of the more easily identified sponges include the tree sponge (*Mycale loveni*), which is a branching sponge that grows up to 25 cm tall. Barrel sponges (*Halichondria panicea*) can grow into large barrel-like shapes although their form is highly variable. Sponges are important in that they increase habitat complexity and diversity by providing three dimensional structure on the seafloor. Juvenile rock sole and halibut have been shown to have strong preference for habitat with biogenic structures such as sponges (Stoner & Titgen 2003). Habitat with biogenic structure such as sponges plays an important role in the ecology of small flatfishes by providing shelter and escape mechanisms from predators (Ryer et al. 2004).

The soft corals also known as 'sea raspberries' (*Gersemia* sp.) are poorly studied in Alaska. However, it is likely that the species provides habitat structure on the low-relief Bering Sea shelf. *Gersemia* does provide structural habitat for some organisms. In Puget Sound, young basket stars (*Gorgonocephalus eucnemis*) develop and feed within *Gersemia* polyps, and do not leave until large enough to capture their own prey (D. Cowles, professor, Walla Walla College). What had been recently described in Alaska as *Gersemia* is now classified as *Eunepthya*. *Eunepthya* (formerly *Gersemia*) was the most frequently encountered coral in the Bering Sea (Heifetz et al. 2000).

Large branching corals such as bamboo corals (*Isidella* sp.), red tree coral (*Primnoa* sp.) and bubblegum coral (*Paragorgia* sp.) are more rare in the eastern Bering Sea but have been documented by NMFS trawl surveys along the shelf/slope break.

Tunicates are a group of ascidians that include species also known as sea peaches, sea potatoes, sea onions and sea squirts. Sea potatoes, *Stylea rustica*, are estimated to make up 5% of the benthic invertebrate biomass in the SE Bering Sea (Jewett and Feder 1981). Sea onions, *Boltenia ovifera*, reach 30 cm in length, with a floating bulbous body attached to a long stalk anchored to the bottom. Sea onions provide habitat for other animals as other invertebrates are frequently attached to the stalks (McMurray et al. 1984, Stevens and Kittaka 1998).

Anemones are a ubiquitous member of the seafloor community and are frequently attached to hard substrate, stones or shell hash. Some species, such as *Metridium* sp., may grow up to 51 cm, but most in the Bering Sea are less than 10 cm high. Anemones can be quite long-lived; *Urticina crassicornis* is reported to live at least 60 to 80 years (O'Clair and O'Clair 1998). Some species of anemones can reattach to the substrate after being detached, and some have limited locomotion. Anemones may form dense concentrations and hence provide habitat structure and complexity. They are also known to be prey for crabs.

A selection of anemone species in the eastern Bering Sea documented from NMFS trawl surveys

reticulate anemone	*Actinauge verrillii*
rough purple sea anemone	*Paractinostola faeculenta*
clonal plumose anemone	*Metridium senile*
gigantic anemone	*Metridium farcimen*
swimming anemone	*Stomphia coccinea*
mottled anemone	*Urticina crassicornis*
white-spotted rose anemone	*Urticina lofotensis*
hot dog sea anemone	*Bathyphelia australis*
chevron-tentacled anemone	*Cribrinopsis fernaldi*
tentacle-shedding anemone	*Liponema brevicornis*

Sea pens or sea whips present in the Bering Sea include *Halipteris willemoesi*, which can grow over 1.5 meters tall. Sea whips in Pribilof Canyon were noted to provide biogenic habitat for Pacific Ocean perch (*S. aleutus*) (Brodeur 2001). Stands of sea pens provide shelter and food for many organisms including juvenile rockfish (Krieger, 1993). Fish density in sea whip groves was observed to be higher than outside sea whip groves (Stone 2005). Sea whips have been collected with fish eggs attached (unpublished data, NOAA).

At least 42 species of crabs have been documented in the eastern Bering Sea (Table 7). Several species have supported lucrative commercial fisheries, but most populations of commercially important species have declined. Large data gaps exist in the life history and habitat requirements of even the most commercially important crab species and even less is known about the diverse assemblage of crabs that are not commercially harvested.

Table 7: Crab species recorded in Eastern Bering Sea

Bering hermit	*Pagurus beringanus*
Alaskan hermit	*Pagurus ochotensis*
longfinger hermit	*Pagurus rathbuni*
longhand hermit	*Pagurus tanneri*
widehand hermit crab	*Elassochirus tenuimanus*
hairy hermit crab	*Pagurus capillatus*
purple hermit	*Elassochirus cavimanus*
Pacific red hermit	*Elassochirus gilli*
fuzzy crab	*Acantholithodes hispidus*
wrinkled crab	*Dermaturus mandti*
soft crab	*Hapalogaster grebnitzkii*
scarlet king crab	*Lithodes couesi*
golden king crab	*Lithodes aequispina*
red king crab	*Paralithodes camtschaticus*
blue king crab	*Paralithodes platypus*
Verill's Paralomis	*Paralomis verrilli*
spiny Paralomis	*Paralomis multispina*
scaled crab	*Placetron wosnessenskii*
hair crab	*Erimacrus isenbeckii*
graceful kelp crab	*Pugettia gracilis*
sharpnose crab	*Scyra acutifrons*

Dungeness crab	*Cancer magister*
pygmy cancer crab	*Cancer oregonensis*
red rock crab	*Cancer productus*
splitnose crab	*Oregonia bifurca*
graceful decorator crab	*Oregonia gracilis*
longhorn decorator crab	*Chorilia longipes*
grooved Tanner crab	*Chionoecetes tanneri*
Tanner crab	*Chionoecetes bairdi*
triangle Tanner crab	*Chionoecetes angulatus*
snow crab	*Chionoecetes opilio*
Arctic lyre crab	*Hyas coarctatus*
Pacific lyre crab	*Hyas lyratus*
helmit crab	*Telmessus cheiragonus*
sponge hermit	*Pagurus brandti*
Aleutian hermit	*Pagurus aleuticus*
splendid hermit	*Labidochirus splendescens*
knobbyhand hermit	*Pagurus confragosus*
hornyhand hermit	*Pagurus cornutus*
whiteknee hermit	*Pagurus dalli*
bluespine hermit	*Pagurus kennerlyi*
fuzzy hermit crab	*Pagurus trigonocheirus*

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D-4a

Native Village of Nightmute
c/o Nightmute Traditional Council
P.O. Box 90021
Nightmute, Alaska 99690

September 28, 2006

North Pacific Fishery Management Council
605 West 4th Avenue
Anchorage, AK 99501

Agenda Item D4(a) – Bering Sea Habitat Conservation

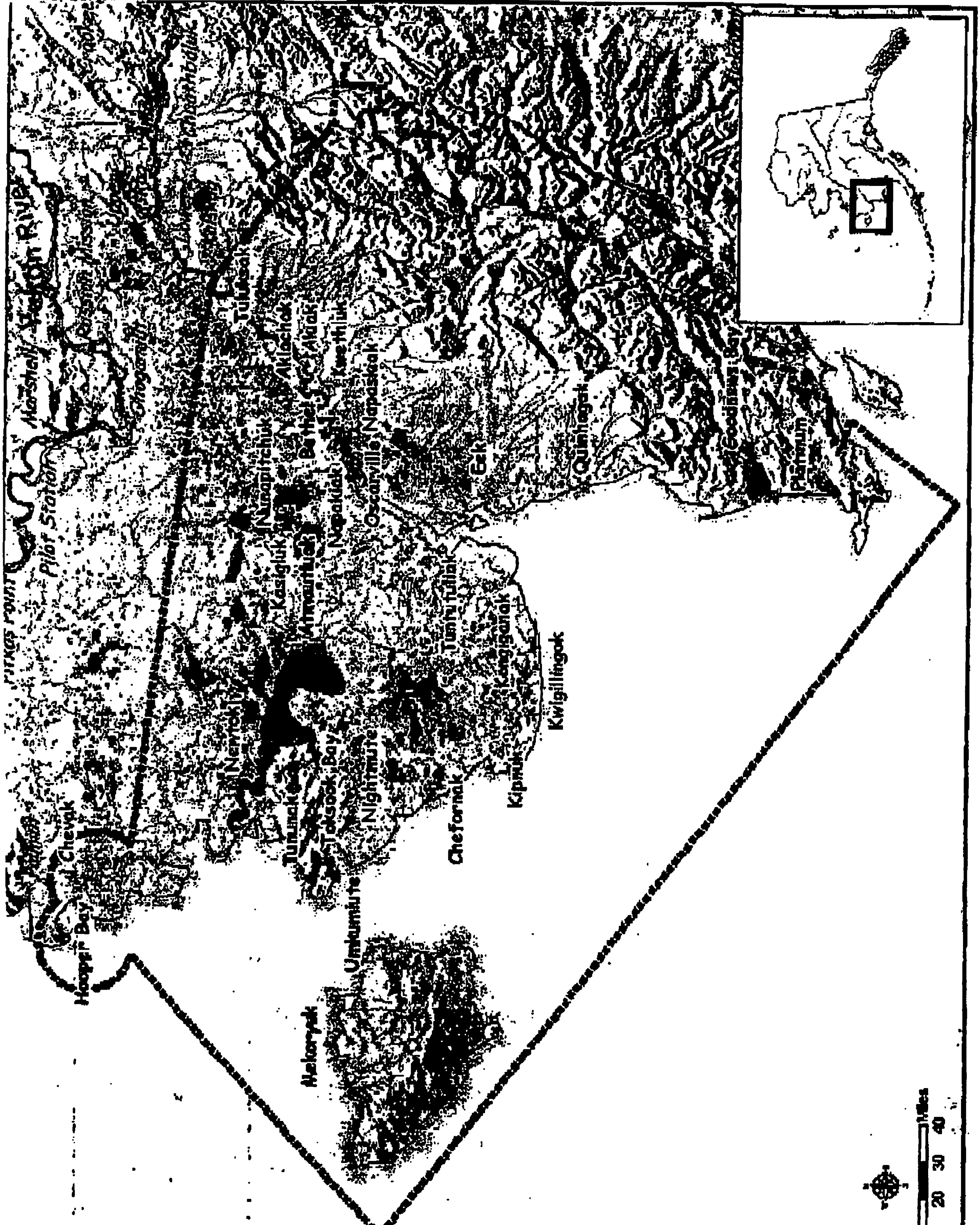
Dear Members of the North Pacific Fishery Management Council,

On September 23, 2006 Nightmute Council held meetings with the other villages from Nelson Island. One of the issues that was discussed is the bottom trawling in the vicinity of Nelson and Numakauyak Island. Nightmute and the other villages on Nelson Island have voted to not allow the access of bottom trawling in the region of the Lower Kuskokwim Resource Conservation & Development Program (RC&D). The Members and Council have agreed that having this area fished by bottom trawling will impact the subsistence and hurt the resources for our historical and economical way of life. Nelson Island has concerns about the way factory trawlers affect the ocean bottom and do not want to have the bottom of the ocean destroyed like other regions for which they fish in today. Another concern is all of the by-catch that the fisheries have destroyed or thrown over, and not used. The Yup'ik Eskimo way of life is not to waste and destroy the natural land, and waters for which they live. Not allowing bottom trawling in the region of the RC&D is what the Council Members and members from all the tribes on Nelson Island voted for.

Thank you,

Tim Armstrong

Tim Armstrong
Tribal Administrator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September 28, 2006

Stephanie Madsen
Chair
North Pacific Fishery Management Council
605 West 4th Ave, Ste 306
Anchorage, AK 99501

Dear Ms. Madsen:

The Marine Conservation Alliance (MCA) is offering the following comments on Agenda Item D-4 (a), Bering Sea EFH. The MCA is a broad-based coalition of coastal communities, fixed and mobile gear fishermen, Community Development Quota groups, vessel owners, processors, support industries and consumers directly and indirectly involved in the Alaska groundfish and shellfish fisheries off Alaska. The coalition members have joined together to support science-based policy that protects the marine environment and promotes long-term sustainability of both fishery resources and the North Pacific fishing community that depends on those resources.

I. Purpose and Schedule

MCA understands that the intent and purpose of this meeting of the Council is to identify the configuration of the "open area" alternatives for the Bering Sea. We also understand that the Council will receive a report at the December meeting from Dr. Rose on his work with gear modifications, and that the Council may select gear modification alternatives for analysis at that time. The ensuing suite of alternatives will then come together for preliminary analysis which should be available at the February meeting. If this schedule holds, then final action would be slated for April or June. MCA encourages the Council to hold to this schedule, and hopes that the EFH issues can be addressed in this time frame.

II. Scope of Alternatives and NEPA Relating to this Trailing Action

The proposed action to review and possibly develop further EFH mitigation measures in the Bering Sea comes out of the Council's EFH action of February 2005. The EFH designations and mitigation measures recommended by the Council and adopted by the Secretary were developed following an extensive public process including scoping meetings in 2001, announcement and opportunity to comment on the preliminary approaches to alternatives for EFH and HAPC in January, 2002. This was followed by numerous public meetings and work by the Council's EFH committee as well as the opportunity to comment on alternatives as they were developed by the Council over the course of several Council meetings. At several steps in this process the Council considered and incorporated advice from its Scientific and Statistical Committee (SSC) as well as suggestions from the public as it developed what became the Draft EIS.

The Draft EIS was released for public comment on January 16, 2004. Key parts of the analysis and EIS were also subjected to an outside, independent review by the Center for Independent Experts, including the model used to asses potential impacts of fishing activity on essential fish habitat. Over 33,000 comments were received on the Draft EIS. These comments and the results of the CIE review were available to the Council and the public during deliberations leading up to the February, 2005 action. At the February meeting the Council also received comments from its SSC as well as extensive public comment on the proposed action. The Final EIS and the Record of Decision (ROD) includes revisions in response to the CIE review, comments by the Council's SSC, and comments by the public.

This extensive public process was designed, and executed, to comply with the requirements of both the Magnuson-Stevens Act (MSA) and the National Environmental Policy Act (NEPA). In fact, the Council and the Secretary went beyond the requirements of both the MSA and the NEPA to ensure adequate consideration of a broad suite of alternatives, a thorough analysis of the alternatives selected including peer review of the underlying science, and providing the public with an unprecedented opportunity to participate throughout the process. The Council also went beyond the MSA's EFH mandate when it adopted precautionary mitigation measures even though the various analyses that were conducted in connection with the EIS demonstrated that no Council managed fishing activities have more than minimal and temporary adverse effects on EFH for any FMP species. The historic action by the Council in February, 2005 was broadly supported by industry, environmental groups, and the public.

It is quite clear that the Council and the Secretary have, as part of this EFH process, considered and analyzed a wide range of alternatives. This includes consideration and analysis of many of the proposals recently brought forward by various proponents. In selecting its EFH preferred alternative, the Council determined that these other alternative actions were not warranted nor in compliance with the requirements of the MSA. This determination should continue to guide the Council as it considers this trailing action.

The alternatives the Council is now considering flow directly out of that process, and it is important to keep in mind that this trailing action is intended to focus on a more narrow range of alternatives. The Council, when it announced its intent to consider additional measures for the Bering Sea, was clear that this action would tier off the EFH EIS to further explore possible mitigation measures in the Bering Sea—measures that the Council might want to take for precautionary purposes. The Problem Statement adopted by the Council in December 2005 reiterates this intent, which was followed by the Council's selection of the pending alternatives at the June 2006 meeting.

MCA encourages the Council to continue in this manner when considering alternatives for the open area concept. Adopting a new suite of expanded alternatives at this late date is not in keeping with the Council's earlier intent, would result in a significant drain on staff and resources of both the Council and NMFS, and in the end would delay additional EFH mitigation in the Bering Sea.

Most importantly, the record for the Council's EFH EIS, the record that this action flows from, indicated that no additional mitigation was necessary to meet MSA requirements. That finding was based on the best available science, and as noted above an extensive public process. The EFH analysis, the EFH EIS, and the Record of Decision (ROD) found that no Council managed fishing activities have more than minimal and temporary adverse effects on EFH for any FMP species. Thus, the EIS and the ROD found that no additional mitigation measures were required under the MSA in any of the Council's management areas including the Bering Sea.

The record supports a finding that no further action is necessary. This should come as no surprise given the extensive closures already in place in the Bering Sea as well as other management measures, including the requirement that the pollock fishery operate only with pelagic trawls. Nevertheless, the Council has indicated a desire to consider additional mitigation as part of its on-going precautionary approach to management. Recognizing the Council's intent, MCA maintains that the findings of the EIS and the ROD, taken together with the MSA requirement to mitigate fishing effects on EFH "to the extent practicable" argues strongly for maintaining a narrow range of alternatives.

MCA recognizes that the Council may feel the need to consider refinements to the alternatives that are already under consideration. However, a number of additional proposals are clearly inappropriate. For example, some proposals are for discreet areas, and as such more appropriately fit under the HAPC process identified by the Council in your February action. We would encourage the Council to reject those as alternatives under this action, and request that proposers consider submitting them for consideration under the HAPC process and schedule laid out by the Council in your previous EFH final action. Some proposals, which call for extensive fishery closures despite the findings of the EFH EIS and ROD, clearly do not comply with MSA requirements. These should be considered by the Council in this light, and not forwarded for analysis as part of this action.

<u>III. Open Area Alternatives</u>

<u>Merits of the "open area" approach for the Bering Sea bottom trawl fisheries</u>: MCA remains concerned about the basic assumption behind the "open area" approach: that locking the bottom trawl fisheries of the Bering Sea into their historical footprint will improve habitat protection for FMP species. The sand and mud substrates of the Bering Sea shelf are relatively shallow and hence subject to a high degree of natural disturbance from storm surge, tides, and in some cases ice scour. Unlike the deep water areas of the Aleutian Islands, where the open area concept was appropriate for protecting fragile high-relief coral substrates which are not adapted to disturbance, organisms that live on the seafloor of the Bering Sea shelf are well adapted to disturbance and recovery/re-colonization. Additionally, aggregations of target species in the

Aleutian Islands have generally remained in the same locations, while schools of the common flatfish species tend to range across the entire shelf. These species appear to be migrating north recently in response to warmer bottom temperatures and changes in the dispersion of feed. This phenomenon is most acute with the flatfish species. We feel there is a very real possibility that locking fisheries for these species into the areas fished since the early 1990s could prevent fishermen from following the dense concentrations of flatfish that are now increasingly common further north each year.

This presents the very real possibility that an open area could force fishing where CPUE is lower- hence more bottom trawling is needed to attain the TAC. This could actually increase the habitat effects of fishing compared to status quo. Additionally, flatfish fishermen report that bycatch rates for halibut, crab, and other PSC are relatively low in the northern areas they have fished in recent years. This may result from lower abundance of PSC species in those areas or from shorter tow times needed to fill the net in high catch rate areas. In light of this, the open area approach could not only contribute to additional effects on EFH and attainment of the PSC caps prior to attaining flatfish TACs.

Recommendations for Open Area Alternatives: Given the Council's intent to evaluate the open area concept for the Bering Sea shelf, we would like to recommend the following options be considered:

1. One of the sub-alternatives for an open area should include all of the areas that have been trawled for flatfish starting with foreign, JV, and then the domestic fishery through 2005. In addition to establishing the historical record of all the areas that have been fished with bottom trawls, this alternative will allow the Council to understand the degree of fluctuation in fishable concentrations of flatfish across the Bering Sea shelf.
2. The sub-alternative that corrects for the areas left out of the embedded open area from Bering Sea alternatives 4 and 5 from the EFH EIS should include all of the areas fished with bottom trawl gear since the early 1990s including Bogoslof, the ten-minute strip portion of the Red King Crab Savings Area, and the northern areas around Saint Matthew and Nunivak.
3. Each open area sub-alternative should contain an option for re-entry by the fishery. The analysis should include an explanation of the exact requirements, criteria, and mechanisms for allowing the fishery to access a closed area as conditions change. This should include specific criteria that will be used to evaluate whether or not the flatfish fisheries will be allowed to access areas not included in the open area, the regulatory mechanism (framework or plan amendment) that will be employed, and corresponding expected timetable for consideration and approval.

The analysis of the open area sub-alternatives needs to include a broad consideration of potential habitat benefits versus the tradeoffs for the other management objectives that the Council must consider including OY, bycatch minimization, and possible negative net effects on habitat if this alternative results in the need for an overall increase in bottom trawling as a result of forcing fishing into lower CPUE areas.

IV. Crab Protection

At the June Council meeting the Council requested the Crab Plan Team look at the EFH alternatives to determine if additional measures were needed to protect St. Matthew blue king crab and EBS snow crab. We understand that the Plan Team indicated that they did not see any need for additional crab bycatch measures at this time. This is particularly true for EBS snow crab. From what we understand from the Plan Team meeting, if the Council deems that additional crab protections may be warranted due to changing fleet distributions, the Council should focus its attention on identifying discrete areas around St. Matthew Island where concentrations of blue king crab might be affected by changes in bottom trawl effort to the north

V. Conclusion

MCA wishes to thank the Council for this opportunity to comment. From our perspective the Council has done an admirable job in identifying EFH, establishing a structure and process for consideration of HAPC, and developing precautionary mitigation measures that exceed the requirements of the MSA. In doing so, the Council has struck a careful balance between sometimes conflicting information, and has used a thoughtfully executed precautionary approach to the EFH issues. We hope to see the Council continue in this manner when considering the Bering Sea. In this light we encourage the Council to continue with its earlier intent of keeping a relatively narrow focus when selecting alternatives for consideration. As we noted earlier, some of the proposals for this action are more appropriate as HAPC, and should be considered through that process on the schedule already laid out by your February 2005 action.

Sincerely,

David Benton
Executive Director

Submitted by Lenny Corin, USFWS

D4(b)

Response to NPFMC staff request for information regarding marine birds and proposed changes to trawl areas in the Aleutians.
Prepared by Kathy Kuletz (USFWS), with Vern Byrd (AMNWR), Don Dragoo (AMNWR), Martin Renner (UW)
14 Sept 2006

The proposal would close a 149 km^2 triangle west of Buldir Is to trawling, and would open up a 323 km^2 area north of Agattu Is. The latter area is near the center of the Near Islands, including Agattu, Attu and the Semichi Islands.

Incidental take of birds in trawling operations in Alaska is low, and does not affect most of the locally occurring species. Thus direct interaction is not considered of consequence in evaluating the proposed changes. A possible exception might be vessel lights attracting auklets and storm-petrels during twilight or night during the breeding season, particularly at Buldir Is, which has large populations. However, the 3 nm buffer is already closed to trawling, and much of the remaining area around Buldir would remain open to trawling, so the benefit from the proposed closure is likely minimal. Furthermore, part of this fishery occurs in the winter, when birds are not on the island. Indirect impacts from the proposed changes would be more likely, such as habitat disturbance affecting the bird's prey.

Buldir Is has a large and diverse population of breeding seabirds, with approximately 3 million birds of 21 species, with 2 species of storm-petrels and 6 species of auklets being the most numerous. From that standpoint, closure of local waters may have some benefit, as most of these birds feed well beyond the existing 3 nm buffer. However, there are few species or numbers of birds that feed on prey that is directly affected by trawling or in areas potentially affected by trawling; most of the birds are either plankton feeders or surface or mid-water fish feeders.

The Near Islands are emergent peaks of submarine mountains extending from a large shallow shelf that is unique among the Aleutians. Seabird breeding colonies in the Near Islands total about 189,000 birds of 13 species. The area also has most of the Aleutian's common eiders (about 16,000) and a high proportion of the Aleutian's red-faced cormorants and pelagic cormorants. The relatively shallow waters over the Near Islands' shelf probably accounts for the large populations of eiders and cormorants. These birds are bottom feeders (eiders) or feed on bottom fish as well as fish in the water column (cormorants). The proposed trawl area is within foraging range for cormorants from all of the Near Islands. The eiders tend to feed in shallower water, not included in the proposed block (as best we could determine). Eiders may, however, disperse over deeper waters, and the importance of these areas to overwintering eiders is not known. In 2006, 26 eiders were fitted with satellite transmitters to follow winter movements of this (apparently) resident population, so more information is forthcoming.

Of potential concern in the Near Is area is the cormorant population, which has declined by 87% since the 1970s, and is now about 8,000 birds. The reasons for this decline are unknown, but local movement, nesting habitat, and dieoffs of adults do not appear to explain the declines, leaving long-term reduced reproductive success a possibility (Byrd and Williams 2004). The red-faced cormorant is a concern because of its restricted range. Pacific sandlance is an important prey for cormorants in the Near Is area. The importance of the specific area proposed for opening is not known for cormorants, or for their prey, but currently almost half of the Near Is shelf area is open for trawling. From that standpoint, increasing the area open to trawling on this shelf has the potential for impacting foraging habitat and prey of locally breeding birds. If more of the shelf is opened, it seems prudent to obtain information on the forage fish and foraging habits of the cormorants and the eiders.

Buldir Is currently has a 3nm buffer for STSL protection, thus the proposed additional closure would be considerably less than the area proposed for opening in the Near Islands. If the council decides to make this swap, we recommend that a larger area around Buldir Is be closed, to make the trade more equitable, and to provide more benefit to the Buldir birds. A study of the Buldir area in 1998 showed that a high density of birds occurred southeast of Buldir near Buldir Reef, and south to Tahoma Reef, as well as to the northeast of Buldir Is (Dragoo and Byrd 1999). Although it is difficult to determine from the fishing zone maps we have obtained, these areas appear to be mostly open to trawling.

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