AGENDA D-1(e)
DECEMBER 2005

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver
Executive Director

ESTIMATED TIME
1 HOUR

DATE: November 25, 2005

SUBJECT: Bering Sea Habitat Conservation

ACTION REQUIRED:
a) Discuss alternatives and problem statement for Bering Sea habitat conservation.
b) Update on gear research.

BACKGROUND:

a) Discuss alternatives and problem statement for Bering Sea habitat conservation

In February, the Council took action to conserve essential fish habitat (EFH) from potential adverse effects of fishing. EFH is defined as those waters used by fish for spawning, breeding, feeding, and growth to maturity. The EFH EIS concluded that fisheries do have long term effects on habitat; however these impacts were considered minimal and would not have detrimental effects on fish populations or their habitats. Nevertheless, the Council adopted several new measures to minimize the effects of fishing on EFH in the Aleutian Islands and Gulf of Alaska. The Council's motion is attached as Item D-1(e)(1).

As part of its February action, the Council moved to initiate an expanded analysis of alternatives to minimize the effects of fishing on EFH in the Bering Sea, and conduct an assessment of gear modification, that tiers off of the EFH EIS. The analysis will include the existing alternative in the document (attached as Item D-1(e)(2)), an alternative to leave the rolling closure area open, and options to the closed areas south of Nunivak Island and north of the Bogoslof Area, as well as other potential alternatives to be developed.

Towards that end, the staff has prepared the following draft "strawman" problem statement for consideration by the Council.

> *Draft 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 a range of alternative measures such as 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 species.

In October, the Advisory Panel discussed the Bering Sea habitat conservation issue. The AP recommended that the Council adopt the following 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 a range of alternative measures such as 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 species.*

Further, the AP recommends the Council request staff to develop a suite of draft alternatives for review. Alternatives from the previous EIS should be retained with the following modifications:

1. *Exclude the rotations in the area-based measures*

2. *Emphasize alternatives on gear modifications*

3. *Incorporate new data in development of the open areas-alternative.*

Development of EFH measures should be done in step with Dr. Rose's ongoing research on gear modification.

At this meeting, the Council will discuss a process to develop and finalize alternatives, as well as a timeline to prepare the analysis.

b) Update on cooperative project for gear modifications

In its final action on the EFH EIS, the Council recommended that gear modifications be explored to mitigate seafloor effects of fishing in the Bering Sea. The AFSC's Conservation Engineering project and a group of Bering Sea bottom-trawl catcher-processors have responded by initiating a cooperative project to develop and test such modifications. Field work in Fall of 2005 showed no consequential changes to catch rates of deepwater flatfish when disks were added on the trawl sweeps at 30 foot intervals. Preliminary review of acoustic images taken during the research this fall suggests that these modifications successfully raised most of the length of the sweeps off of the seafloor. This decreased contact is expected to reduce damage to the typical kinds of sessile invertebrates found on the Bering Sea shelf that provide structure on sand and mud seafloor habitats. Researchers are developing video and acoustic tools for research in 2006 to make more definitive assessments of the reduction of trawl effects (attached as Item D-1(e)(3)). Dr. Craig Rose (AFSC) will be on hand to present his findings.

EFH Final Action NPFMC February 10, 2005
Council Motion
(M/S Krygier/Rasmuson 1:20 pm
Pass Unanimously at 2:45 pm

Action 1: Describe and Identify EFH

Adopt Alternative 3—Revised General Distribution (The Council's Preliminary Preferred Alternative) as described on page ES-2 of the Preliminary Final EFH EIS – January 2005

Action 2: Adopt and Approach for Identifying HAPCs

Adopt Alternative 3—Site based Concept (The Council's Preliminary Preferred Alternative) as described on pages ES-4.

Action 3: Minimize Adverse Effects of Fishing on EFH.

Adopt a modified 5b to expand Bottom Trawl Closures in the GOA and Aleutian Islands Management Areas to protect Sponge, Coral and other important habitat for managed species.

Bering Sea: Initiate an expanded analysis for the Bering Sea, as well **as an assessment of gear modifications** that tiers off of this EFH EIS analysis to further explore possible mitigation measures in the Bering Sea. The analysis should include the existing alternative, an alternative to leave the rolling closure area open, and options to open the "red hatched" closed area south of Nunivak Island and north of the Bogoslof area, **with other alternatives to be developed.**

Aleutian Islands: Allow bottom trawling to continue in AI areas that have supported the highest catches in the past, and prohibits bottom trawling in all other portions of the AI management region to prevent future impacts to undisturbed habitats in those areas as described in a modified Option 3, as described in the attached Figure (modified ES-12) and including six Aleutian Islands Coral Gardens (as identified in Figure ES-11). The six coral gardens are closed to all bottom **contact** ~~tending~~ gear. Pelagic trawls could be used outside of the designated open areas, but only in an off-bottom mode. The existing observer program will be utilized, and a vessel monitoring system (VMS) for all fishing vessels is ~~fishing groundfish is~~ required. A comprehensive plan for research and monitoring will be developed. Option 2 opens designated areas based on areas of higher effort distribution from 1990 through 2001 as modified through input from trawl fisherman and public testimony.

Gulf of Alaska: Prohibit the use of bottom trawl for all groundfish in 10 designated areas (Figures ES-7 in the Executive Summary of the January 2005 Preliminary Final EFH EIS). At the time of the Council's five year review period, the Council will review available research information regarding the two GOA closed areas (one west [area 610] and one east [area 620] of Sanak HAPC closure to determine the efficacy of continued closure.

The Council will review these actions in five years to consider new information from on-going and future research.

AGENDA D-1(e)(2)
DECEMBER 2005

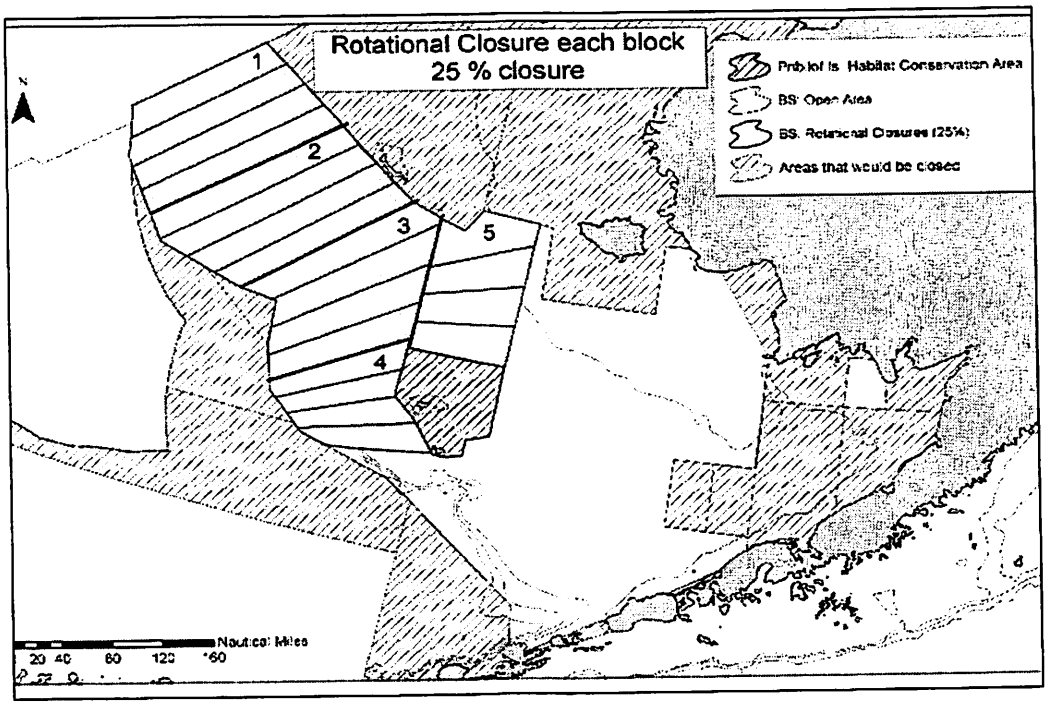
Bering Sea Habitat Conservation

In February 2005, the Council took action to initiate an expanded analysis of alternatives to minimize the effects of fishing on EFH in the Bering Sea, and conduct an assessment of gear modification, those tiers off of the EFH EIS. At that time it was suggested that an analysis would include the existing alternatives in the EIS, an alternative to leave the rolling closure area open, and options to the closed areas south of Nunivak Island and north of the Bogoslof Area, as well as other possible alternatives.

A description of Alternative 5 that was analyzed in the EFH EIS is provided below

Alternative 5 (Expanded Bottom Trawl Closures in All Management Areas): Alternative 5 would prohibit the use of bottom trawls in larger designated areas of the EBS and would require trawl gear modifications in the EBS area.

Bering Sea: Prohibit the use of bottom trawls for all groundfish fisheries except within a designated "open" area, based on historic bottom trawl effort. Within the open area, there would be rotating closures to bottom trawls in five areas to the west, north, and northwest of the Pribilof Islands (Figure 1). Each of the five areas would be divided into three blocks, and one block in each area would be closed for 5 years. After 5 years, the closed block would reopen, and a different block would close for 5 years, and so forth. In addition, bottom trawls used in the remaining open areas would be required to have sweeps and footropes equipped with disks/bobbins to reduce contact area and proximity to the seafloor.



Preliminary results toward the development of trawl modifications to reduce seafloor effects on the Bering Sea shelf

Craig S. Rose, RACE Division, Alaska Fisheries Science Center, NMFS

Background

The effects of trawling on seafloor habitats have been a significant area of concern and controversy in fisheries management. The recently completed Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska identified living structure (sessile animals that provide relief on the seafloor) as the most vulnerable habitat feature on soft substrates where most fishing effort is concentrated. Fishing gear modifications were proposed as an alternative method for reducing such effects, particularly those that reduce seafloor contact across the fished area. Unfortunately, limited information on the effectiveness and feasibility of such modifications greatly restricted the analysis of this alternative.

In its EFH Final Action, the NPFMC identified an assessment of gear modifications to reduce seafloor effects of fishing as a direction to explore for EFH mitigation measures for the Bering Sea. In response, we are initiating a program to develop and evaluate such modifications in cooperation with the fishing industry. At a meeting with captains of Bering Sea flatfish trawlers, in May 2005, we identified current configurations and concepts for effective modifications. These included different groundgears (sweeps, bridles and footropes) that substantially reduce the amount of seafloor contact and/or increase the seafloor clearance below non-contact portions. It was recognized that large reductions in catch rates would be counter-productive, requiring longer towing distances to catch the same amount of fish, and would inhibit acceptance by industry. Evaluations of modification thus require assessment of both how they affect habitat features differently and any changes they cause in capture efficiency.

The 2005 field research tested the capture efficiency consequences of raising groundgear above the seafloor for most of its length. These preliminary results describe a test raising sweeps approximately three inches. Two other experiments, raising sweeps two inches and increasing footrope spacing are still being analyzed. Unfortunately, those results may be confounded with differences between the two trawl nets that were detected and corrected partway through the work.

Methods

This experiment was carried out aboard the 156 foot, chartered trawler F/V *Cape Horn*. Research was conducted in the waters of the Bering Sea between September 24 and October 6, 2004. Fishing was conducted in depths between 200 and 500 m (109 – 273 fm) on the continental slope west and north of Unimak Pass (165 – 169 degrees longitude). Specific towing locations were selected to maximize the likelihood of commercial abundances of flatfish, based on the experience of the captain of the Cape Horn.

We used a vessel with twin trawling capabilities (two identical trawls of identical design fished side-by-side between a single set of doors) to achieve a more efficient experimental design. Because the two nets encountered immediately adjacent swaths of seafloor at the same time, observed differences can be primarily ascribed to changes to the fishing gear.

We modified the sweeps by adding disks onto conventional sweeps (2 inch diameter combination wire), raising the sections between the disks approximately 3 inches (8 inch disks) above the seafloor. Total sweeps lengths were 430 ft, not including tailchains to link them to the doors or 90 ft sections of bridles immediately ahead of the nets. The disks were installed on the aft half (215 ft) of the sweeps at 30 ft intervals. Modified sweeps were paired against sweeps without disks ahead of matched trawl on the two sides of the twin trawl system.

The footropes used in this experiment had relatively small spaces for escape underneath, while still being in the range of footropes used in Bering Sea flatfish fisheries. Both footropes had 14 inch cylindrical bobbins across the center of the footrope with approximately 5 inch spacing between bobbins. The side sections of the footropes were equipped with 12 inch spheres separated by 24 inches of 8 inch diameter cylinders.

Catches by the two nets from each tow were kept separate until fully sampled. Total catch weight was determined using a motion-compensated flow scale. Species composition samples totaling at least 300 kg were drawn from throughout the tow, sorted, measured and weighed to estimate species composition and length composition of principal species.

We analyzed the data collected to estimate catch rate differences for the principal commercial groundfish species, arrowtooth flounder, flathead sole, rex sole and pollock. Initial analysis began by computing the differences between the log-transformed catches from each tow of the twin trawls. A t-test comparing zero to the mean of these indicies indicated whether the modifications significantly affected catch rates on a multiplicative scale. Means and confidence intervals were also calculated and reverse-transformed (e^x) to explore the range of likely catch ratios. Size compositions from the length data were plotted for experimental and control nets.

To better understand interactions between sweeps, seafloor and fish, a high-resolution, rapid-update imaging sonar (DIDSON), mounted in a small seafloor sled was attached to the sweeps during several tows. It was directed to image the sweeps and the seafloor it passed over.

Results

Twenty-eight tows were included in tests of sweeps modified with the eight-inch disks. Depths ranged from 230 – 450 m, although only one tow was shallower then 300 m. Light levels were between 3×10^{-9} and 2×10^{-7} micromoles of photons/m2/sec, except for the shallow tow, which ranged up to 7×10^{-7}. These levels were well below the threshold

(2 x 10^{-3} micromoles of photons/m2/sec) where pollock cease reaction to a towed net (Olla et. al. 1997). Temperature were between 3.7 and 4.3 degrees C.

Catch rates were not significantly reduced by raising most of their length out of direct contact with the seafloor (Figure 1). Surprisingly, small, but statistically significant, increases in arrowtooth flounder and pollock catches were detected.

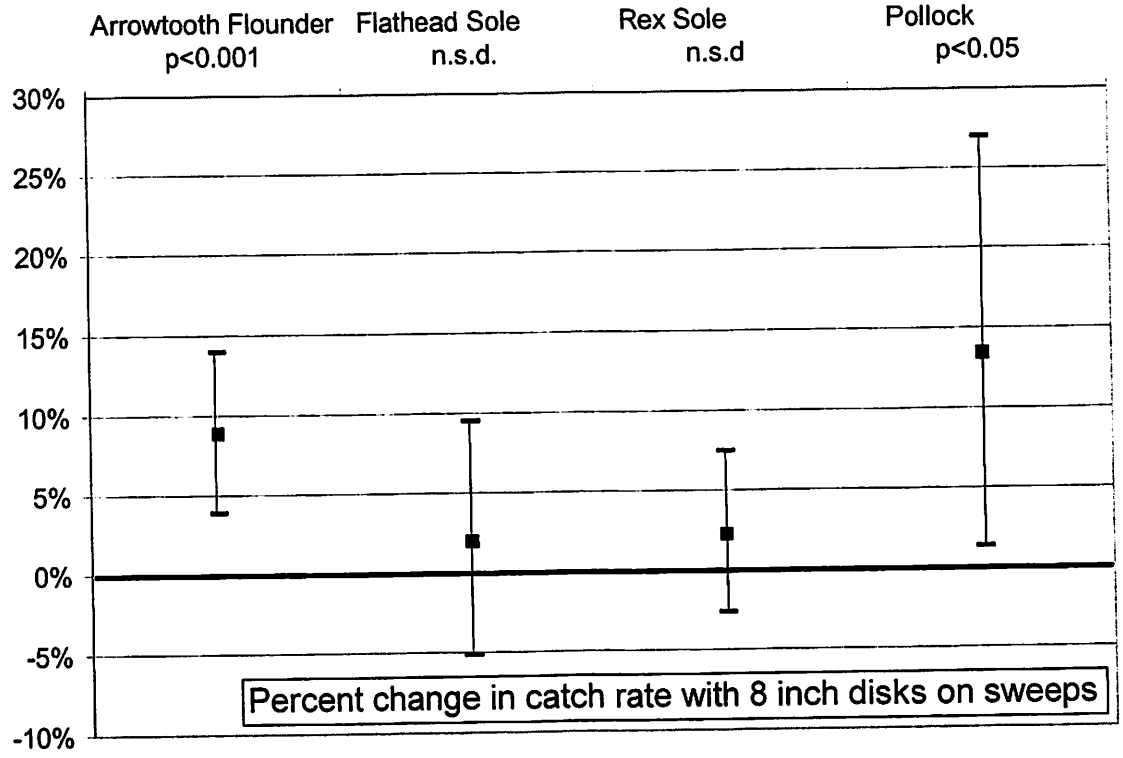


Figure 1.- Percent change in catch rates of four groundfish species when disks were installed on trawl sweeps (cables contacting the seafloor between the doors and the net) to raise most of their length out above the seafloor.

Observations of the modified sweeps with the DIDSON sonar indicated that the sections between disks did not contact the seafloor except for higher ridges and mounds. Unmodified sweeps generated sediment clouds behind them with heavier and lighter stripes parallel to the cable (Figure 2 -right). These appeared to be caused by coincident variation of harder and lighter contact along the cable as it bounced along the bottom. In contrast, while the sediment cloud from the disks spread behind the cable (Figure 2 -left), lack of such striations indicated that the other parts of the sweep did not have contact with the seafloor. Some mounds generated a separate cloud when they passed under the cable between disks.

Discussion

These preliminary results represent an initial step toward finding methods to reduce the seafloor effects of bottom trawl used in Bering Sea groundfish fisheries. The experiment indicated that catch rates would not be expected to decline if disks were used to raise sweeps off of the seafloor. The increase in catch of some species was unexpected and

requires further study to clarify its causes. One important consideration is the very low light levels, which likely prevent visually-mediated herding. The disks and associated hardware may have changed the sounds generated by the sweeps and hence herding based on that sense. An important follow-up will be to perform similar tests in the shallower sections of the Bering Sea, where light levels are much higher and where the largest bottom trawl fisheries are pursued.

The DIDSON sonar observations provided some indication that the modification raised most of the sweeps off of the seafloor. These observations alone are inadequate to assess how the effects on seafloor habitat features may be changed. We are working on a suite of video and acoustic sensors which can be used to better measure such effects on a small enough scale to isolate the effects of the sweeps from those of other trawl components.

This study demonstrated that the twin trawl system is a powerful tool for making such comparisons. Relatively few trawl tows were required to achieve reasonably precise comparisons. We learned that close attention and perhaps prior testing need to be applied to assuring that the trawls used are indeed well matched. Missing such a difference may impair the use of the other two experiments conducted on this trip.

In 2006, this project will continue with developing modification to sweeps and footropes of trawl systems. Tests will include catch experiments in shallower, sandy substrates and direct evaluations of how the modifications change how trawls affect the seafloor and its inhabitants.

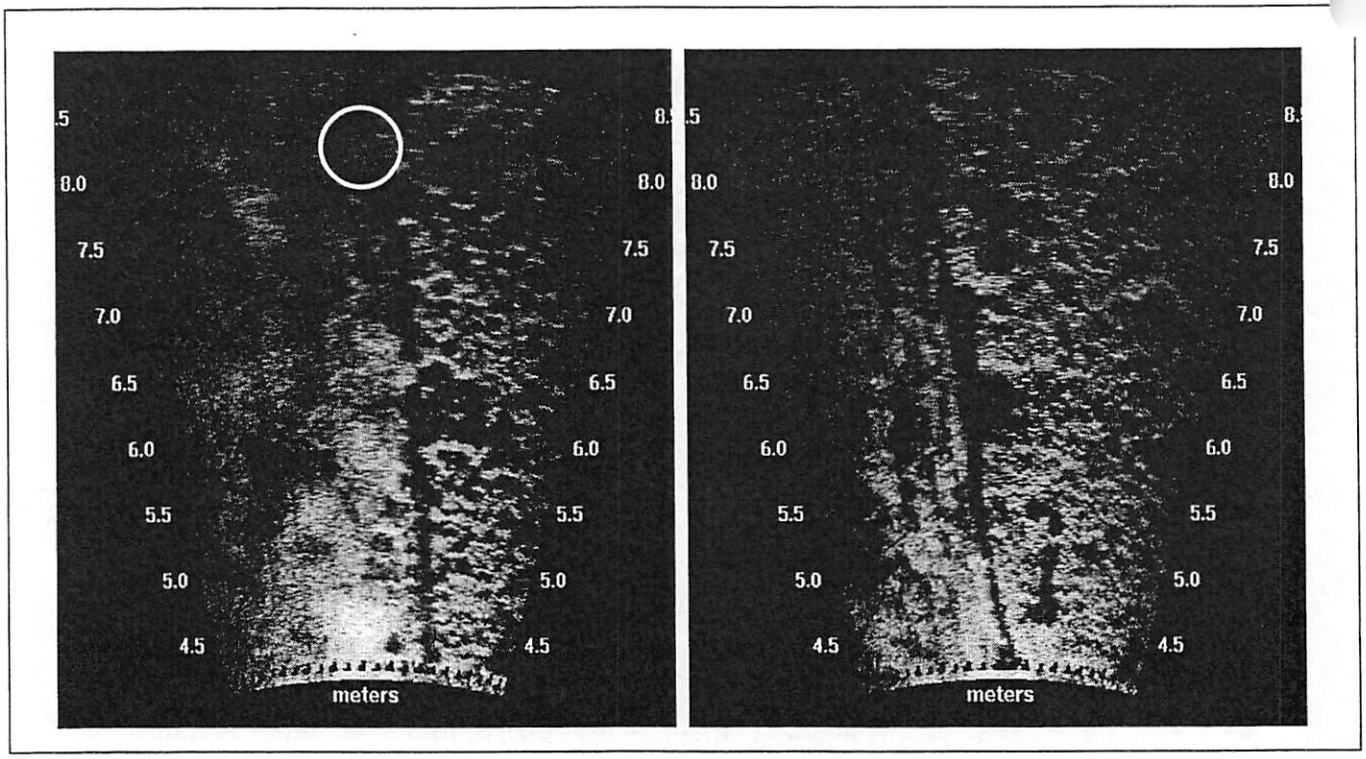


Figure 2 – Comparison of sediment cloud generated by sweeps with (left) and without (right) 8 inch disks. Circle indicates approximate location of disks.

AGENDA D-1(e)
DECEMBER 2005
Supplemental

202-833-2070

November 22, 2005 01:43 PM

Linda Farrington

4832 72nd Pl NE , ♦ Marysville, WA 982704012

Chairman David Benton
605 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252

Subject: Protect Corals and Sponges

Dear Chairman Benton:

I am concerned about the destruction of the fragile coral and sponge in the Bering Sea and North Pacific. These living coral and sponge habitats are essential nursery areas for fish. Only recently documented by science to be important to commercial fish and shellfish, these beautiful cold water corals and sponges are being demolished by destructive fishing practices. Bottom trawling is destroying these rainforests of the sea. Corals, which live for hundreds and even thousands of years, have incredibly slow growth rates and are particularly sensitive to disturbance. As these underwater forests disappear, we are losing an international treasure that won't come back for centuries.

I am writing to voice my support for cold water coral protections in Alaska. It is important to protect these coral habitats while maintaining vibrant fisheries. I support the approach taken in Alternative 5B for the Aleutian Islands and request that the Council and NMFS apply a similar approach to the Bering Sea and Gulf of Alaska. For the Bering Sea, this should include substantial protections for corals, sponges, and other important seafloor invertebrates as well as productive areas of the continental slope.

Thank you.

Sincerely,

Linda Farrington

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November 30, 2005

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

RE: Agenda Item D-1(e): **Bering Sea Habitat Conservation/ EFH**

Dear Madame Chair:

Oceana appreciates the Council's continued focus on habitat conservation by moving forward with plans to address the Bering Sea. The action in February 2005 to protect areas of the Gulf of Alaska and to implement an open area approach in the Aleutian Islands is evidence of the Council's commitment to protect sensitive habitats while maintaining vibrant fisheries. While the Council took action via the Essential Fish Habitat Environmental Impact Statement (EFH EIS) to protect areas of the Gulf of Alaska and Aleutian Islands, the Bering Sea remains unaddressed.

The Eastern Bering Sea Large Marine Ecosystem is vast and varied, with diverse living and physical habitat features important to fish, crab, marine mammals and seabirds. Many regions of the eastern Bering Sea have also been heavily trawled. The EFH EIS identified thousands of square nautical miles of living habitats that have been highly impacted.

According to the National Research Council (2002) bottom trawling is the biggest threat to seafloor habitats. To ensure the long-term sustainability of our most productive and biodiverse ocean eco-region in Alaska, we must develop a plan to protect Bering Sea habitats while still allowing for continued fishing opportunities.

Problem Statement

At this meeting the Council is scheduled to adopt a problem statement for Bering Sea habitat conservation/ EFH. We request the Council modify the draft problem statement to reflect the importance of protecting habitat for sustainable fisheries and ecosystem functions. The current reference to "productivity of managed species" in the problem statement is not consistent with the Council's focus, actions, and discussions on ecosystem-based management.

The EFH Final Rule defines essential fish habitat in the context of sustainable fisheries and managed species' contribution to a healthy ecosystem, not simply fish productivity.[1] The issue of fish productivity severely hindered the EFH EIS. While it is known that many juvenile and adult fishes have close associations with physical and biological habitat features, science generally cannot quantify fish productivity in relation to habitat availability. Since the analysis in the EFH EIS focused on proving a link between habitat impacts and decreased fish productivity, 36% of the evaluations concluded an "unknown" impact. The Scientific and Statistical Committee (SSC) clearly articulated the problem of coupling habitat impacts with measures of fish productivity when it stated, "...linkages between habitat and productivity of FMP species are virtually impossible to establish experimentally. Based on the NRC trawling effects report and other reviews, the presumption is that mobile-bottom contact gear affects

[1] "Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity... 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem." EFH Final Rule §600.10

habitat."[2] The SSC later stated, "Given our lack of understanding of how reductions in habitat quantity may affect fish productivity, the model in its current form does not support scientifically based, quantitative conclusions regarding the effects of habitat disturbance on target species."[3]

Additionally, the independent science review by the Center of Independent Experts (CIE) emphasized that a precautionary approach is paramount to preserve both EFH and fish stocks, and that by the time productivity declines the damage to habitat may be too great to recover. Excerpts from the CIE reports include:

> 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. It is also important given that many of the species in Alaskan waters have unknown life history characteristics. In spite of this lack of knowledge these species were not listed as requiring any sort of special concern. The bar seems to be set rather high for "proving" a link between EFH and fish production and the burden of proof is clearly shifted to those who believe EFH is important.[4]

> Fish productivity represents a tertiary response to disturbance that may not yield clear answers on EFH loss until a habitat is severely degraded and productivity changes suddenly.[5]

Given the great importance of the eastern Bering Sea ecosystem, the Council's leadership in using precautionary management, and the scientific concerns and perils of linking EFH to productivity, **Oceana recommends the following problem statement.** Changes to the draft statement are indicated in *italics*.

> 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 a range of alternative measures such as 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 to support *sustainable fisheries and a healthy ecosystem.*

We look forward to working with the Council to develop an adequate range of alternatives to address Bering Sea habitat conservation.

Sincerely,

Jim Ayers
Vice President, Pacific

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[2] NPFMC SSC, February 2003.
[3] NPFMC SSC, October 2004.
[4] CIE, Summary Report at 21.
[5] CIE, Snelgrove at 2.