North Pacific Fishery Management Council

Fishery Management Options for the Alaskan EEZ in the Chukchi and Beaufort Seas of the Arctic Ocean – A Revised Discussion Paper

Prepared by
Bill Wilson
April 2007
(Revised May 2007)

Contents

I. Introduction
II. Options for Fishery Management
    A. Alternative 1 - Status quo
    B. Alternative 2 - Amend the existing Fishery Management Plans
    C. Alternative 3 - Adopt a new FMP for the Arctic
III. Next Steps
IV. References
V. Appendix
Figure 1

I. Introduction

At its October 2006 meeting, the Council asked staff to prepare a discussion paper on options for management of fisheries in the Alaskan Exclusive Economic Zone (EEZ) waters of the Arctic Ocean. The Council is interested in exploring policy options, such as a Fishery Management Plan, to conserve marine resources and manage existing or potential future commercial fisheries in this region. The Council received that report at the December meeting, and tasked staff to further develop options for fishery management in the Arctic. Specifically, the Council's motion was:

> *For waters north of Bering Strait, the Council moves to develop an analysis that would include the following alternatives:*
> 1. *Status quo for those waters.*
> 2. *Amend the existing scallop FMP, the BSAI groundfish FMP, and the BSAI king and Tanner crab FMP to prohibit commercial fishing in the Chukchi Sea.*
> 3. *Adopt a new FMP for the waters north of Bering Strait for any species not covered by an FMP (including krill and other forage species) with the following sub options:*
> a) *Close all Federal waters to commercial fishing until such time as the Council develops a policy for opening the waters to select commercial fishing practices, or*
> b) *Close all Federal waters north of Bering Strait to commercial fishing for forage species, and all waters north of a line at Point Hope to commercial fishing for all species (see Figure 1 map in staff discussion paper).*

The Council's motion was accompanied with additional notes:

1. The effect of (b) would be to allow for commercial fishing for fish species (other than forage species) in the waters between Bering Strait and Pt. Hope.
2. The policy for opening waters north of Bering Strait could be developed through a Fishery Ecosystem Plan or other mechanism as the Council deems appropriate.

3. Initial analysis should flesh out what is required under each alternative, such as what is required as part of an FMP (e.g. EFH), and whether these requirements could be deferred until such time as the Council decides to open a fishery.
4. Under each alternative, describe the requirements for deferring management to the State of Alaska, and the procedures for deferring management.

This discussion paper builds on the previous paper and responds to the Council's motion.

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the Council is authorized to conserve and manage the fishery resources of the Alaskan EEZ, including the Chukchi and Beaufort Seas. To date, no large commercial fisheries have developed in these areas, and thus the Council has not had a compelling reason to develop fishery management plans for these Arctic marine areas off Alaska.

But the environment for commercial fishery development in the Alaskan Arctic may be changing, with warming trends in ocean temperatures and changes in seasonal sea ice conditions potentially favoring the development of commercial fisheries (Newton 2005). Recent popular literature has featured this issue (e.g. Hawks 2006). The fishing industry has observed these changes in oceanographic conditions, and has suggested that changes in fishery management may be required. These are summarized in a recent report from the Marine Conservation Alliance (Warren 2006) which acknowledges the potential impacts of climate change and recommends an adaptive approach to fishery management in light of warming trends in the North Pacific.

Recently, scientists have compiled information on changes in Arctic climate, ocean conditions, sea ice cover, and permafrost and vegetation change (Richter-Menge et al. 2006), noting that sea ice has dramatically changed. Greater ice-free seasons coupled with warming waters and fish range expansion together could create conditions that lead to commercial fishery development. Species of finfish and shellfish occur in these waters that conceivably could support commercial fisheries if exploitable biomass levels are sufficient, but no information is available on stock size for any of these species. Future warming could enhance habitat conditions for some of these species, and stock surveys could be conducted to gather this information. Although at this time there are no such fisheries in the Alaskan EEZ in the Arctic Ocean, and no routine fish surveys conducted in the region, the Council is interested in exploring policy and management options to prepare for future change.

II. Options for Arctic Fishery Management

A. Alternative 1 – Status Quo

To date, the Council has exercised limited authority for managing fishery resources in U.S. EEZ waters north of Bering Strait, which in this discussion paper is considered the "Arctic". Commercial fishing in the Arctic may occur under regulations implementing the current FMPs, to the extent that an FMP has jurisdiction over the arctic region. Only vessels of the U.S. with a Federal Fisheries Permit (FFP) may participate in Council-managed fisheries. Some of the Council's FMPs partially cover fishing activities in the Arctic; some do not. Under status quo, the Council would continue to manage fisheries in the Alaskan EEZ, including limited management of some fisheries in portions of the Arctic, under the authority of current FMPs and current regulations implementing the requirements of the MSA or the FMPs. The Council has adopted five FMPs:

- Fishery Management Plan for Groundfish of the Gulf of Alaska
- Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area
- Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs

- Fishery Management Plan for the Scallop Fishery off Alaska
- Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska

Figure 1 shows boundaries of the existing FMP management sub areas that include portions of EEZ waters north of Bering Strait. The following summarizes current FMPs and their authorities over fishing in the Alaskan Arctic.

Gulf of Alaska Groundfish

The Management Area for the Gulf of Alaska (GOA) groundfish FMP is described in the FMP as "…the United States (U.S.) exclusive economic zone (EEZ) of the North Pacific Ocean, exclusive of the Bering Sea, between the eastern Aleutian Islands at 170˚ W. longitude and Dixon Entrance at 132˚40' W. longitude." The FMP covers fisheries for all stocks of finfish except salmon, steelhead, Pacific halibut, Pacific herring, and tuna. **The GOA FMP does not extend northward to encompass any portion of the offshore waters of Alaska considered to be "arctic".**

Bering Sea/Aleutian Islands Groundfish

The Management Area for the Bering Sea and Aleutian Islands (BSAI) groundfish FMP is described in the FMP as "…the United States (U.S.) exclusive economic zone (EEZ) of the Bering Sea and that portion of the North Pacific Ocean adjacent to the Aleutian Islands which is between 170˚ W. longitude and the U.S.-Russian Convention Line of 1867." The FMP further defines the northern boundary of the Bering Sea as "…the Bering Strait, defined as a straight line from Cape Prince of Whales [sic] to Cape Dezhneva, Russia." The FMP covers all stocks of finfish and marine invertebrates except salmonids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, lyre crab, Pacific halibut, and Pacific herring which are distributed or are exploited in the BSAI Management Area. **The BSAI groundfish FMP extends to Bering Strait, but does not encompass waters of the Chukchi or Beaufort Seas.**

Implementing regulations for the BSAI groundfish FMP at CFR 679.1(b) state that the BSAI Management Area means the Bering Sea and Aleutian Islands sub areas, referring to Figure 1 of part 679. The regulations define the Bering Sea sub area of the BSAI as "that portion of the EEZ contained in Statistical Areas 508, 509, 512, 513, 514, 516, 517, 518, 519, 521, 523, 524, and 530". The Chukchi Sea is designated Statistical Area 400 (excluded from the above list), and is defined as the area north of a diagonal line between 66˚ 00' N, 169˚ 42.5' W (Cape Dezhneva, Russia) and 65˚ 37.5' N, 168˚ 7.5' W (Cape Prince of Wales, Alaska) and to the limits of the U.S. EEZ as described in the current edition of NOAA chart INT 814 Bering Sea (Northern Part). Inspection of this chart suggests that only a portion of the U.S. EEZ of the Chukchi Sea is considered part of Statistical Area 400. Statistical Area 514 is the northernmost statistical area in the BSAI, but it extends only as far north as "the southern boundary of the Chukchi Sea, area 400." **Thus, the Chukchi Sea is not part of the BSAI groundfish management area, nor is the Beaufort Sea.**

King and Tanner Crab

The Management Area for the king and Tanner crab FMP is described in the FMP as "…those waters of the EEZ lying south of Point Hope (68˚21' N.), east of the U.S.-U.S.S.R. convention line of 1988, and extending south of the Aleutian Islands for 200 miles between the convention line and Scotch Cap Light (164˚44'36" W. longitude) …" Most of the fishery management authority in the king and Tanner crab FMP is deferred to the State of Alaska with Federal oversight. The FMP applies to fisheries for red king crab, blue king crab, golden (or brown) king crab, scarlet (or deep sea) king crab, Tanner (bairdi) crab, snow (or queen) (opilio) crab, grooved Tanner crab, and triangle Tanner crab. **The king and Tanner**

crab FMP does extend north of Bering Strait and thus partially encompasses waters of the Chukchi Sea.

Implementing regulations at 679.2 define the Management Area for king and Tanner crab consistent with the above description. **Thus the regulations associated with these fisheries extend partly into the Chukchi Sea, but none of the Beaufort Sea.**

Scallops

The Management Area for the scallop FMP is described in the FMP as "…all Federal waters of the Gulf of Alaska (GOA) and the Bering Sea/Aleutian Islands area (BSAI). The GOA is defined as the U.S. exclusive economic zone (EEZ) of the North Pacific Ocean, exclusive of the Bering Sea, between the eastern Aleutian Islands at 170˚ W longitude and Dixon Entrance at 132˚40' W longitude. The BSAI is defined as the U.S. EEZ south of the Bering Strait to the Alaska Peninsula and Aleutian Islands and extending south of the Aleutian Islands west of 170˚ W long." The FMP adopts State registration areas (Scallop FMP Section 4.1.1); Registration Area Q (Bristol Bay-Bering Sea) is the furthest north and its northern boundary is defined in the FMP as "…the latitude of Point Hope (68˚ 21' N. lat.)" (Scallop FMP Appendix B). The geographic description of the Management Area in the FMP differs from the description of BSAI Registration Area Q (which is referenced as being part of the Management Area in the FMP).

Scallop fishing regulations at 679.1(h) govern "commercial fishing for scallops in the Federal waters off Alaska by vessels of the United States…" Currently, some management measures are deferred to the State of Alaska. State regulations specify that scallop fishing is permitted in specific registration areas, and, as noted above, **the northern most scallop fishing registration area is Area Q, which includes a portion of the Chukchi Sea.**

Salmon

The Management Unit for the salmon FMP is described in the FMP as "…all of the EEZ off the coast of Alaska and the salmon and fisheries that occur there. The area covered by this fishery management plan is the EEZ off the coast of Alaska…, including parts of the Gulf of Alaska, Bering Sea, Chukchi Sea, and Arctic Ocean." The FMP further divides the Management Unit into West and East Areas, with the divide at Cape Suckling (143˚53'36" W longitude). The West Area encompasses arctic waters. The FMP allows commercial fishing only in the East Area[1], and allows sport salmon fishing in both areas; the FMP covers all five species of salmon from North America – Chinook, coho, pink, sockeye, and chum. **The salmon FMP specifically prohibits commercial fishing for salmon in arctic waters.**

Implementing regulations at 679(i) state that they govern fishing for salmon by fishing vessels of the United States in the Salmon Management Area, which is defined as "…the waters of the EEZ off the coast of Alaska (see Figure 23 to part 679), including parts of the North Pacific Ocean, Bering Sea, Chukchi Sea, and Beaufort Sea." The Salmon Management Area is divided into West and East Areas in regulations. **Regulations at 679.3(f) prohibit commercial fishing for salmon in the West Area, i.e. the U.S. EEZ West of Cape Suckling, which includes waters of the Chukchi and Beaufort Seas.**

[1] Three historic commercial net fisheries are permitted in Federal waters in the West Area: in Cook Inlet, near the mouth of the Copper River, and near False Pass.

Halibut

The International Pacific Halibut Commission (IPHC) exercises jurisdiction in all maritime waters of the U.S. and Canada wherever halibut are present (Gregg Williams, IPHC, pers. comm.). The IPHC has previously received proposals for an experimental fishery in the Chukchi Sea, but no fishery has developed. The Halibut Convention of 1923 established an agreement between Canada and the U.S. for management of halibut fisheries in "Convention Waters" which were defined to mean the "territorial waters and the high seas off the western coasts of the United States of America and of Canada, including the southern as well as the western coasts of Alaska.". The Northern Pacific Halibut Act of 1982, which updated and redefined the role of the IPHC in the management of the fishery as a consequence of passage of the MSA (McCaughran and Hoag (1992), defines "Convention Waters" as "…the waters off the west coasts of Canada and the United States, including the southern as well as the western coasts of Alaska, with the respective maritime areas in which either Party exercises exclusive fisheries jurisdiction." **It is unclear based on the original Halibut Convention whether Convention Waters include the Chukchi or Beaufort Seas, but the Halibut Act definition includes waters where the U.S. has exercised exclusive fisheries jurisdiction, which implies inclusion of EEZ waters of the Chukchi and Beaufort Seas.** IPHC regulations define the northernmost edge of Regulatory Area 4E at 65˚ 34' 00" which is close to the northern boundary of the Bering Sea sub area in the BSAI groundfish FMP (Bering Strait). The northern edge of IPHC Regulatory Area 4D as specified in regulations appears to be at the intersection of its eastern boundary and the U.S.-Russia convention line.

Other Fisheries or Fisheries Not Part of Current FMPs

A fishery not explicitly covered by the Council's FMPs or their implementing regulations would be regulated by the State of Alaska as authorized by the MSA under Section 306(a) in the following circumstances. First, MSA Section 306(a)(3)(A) provides for State regulation of a fishing vessel outside State boundaries if the vessel is registered with the State and there is no FMP or other applicable Federal regulations for the fishery in which the vessel is operating. If there is an FMP, this section also provides for State regulation of fishing outside State boundaries if the State's laws and regulations are consistent with the FMP and applicable Federal regulations for the fishery in which the vessel is operating. Second, MSA Section 306(a)(3)(B) provides for State management when an FMP specifically delegates that management authority and the State's laws and regulations are consistent with that FMP. The third circumstance is applicable to fishing vessels that are not registered under the law of the State of Alaska and operate in a fishery in the EEZ for which there was no FMP in place on August 1, 1996. In this case, if the Council and the Secretary find a legitimate interest of the State in the conservation and management of such a fishery, then the State may regulate fishing until an FMP is approved and implemented.

Management under State of Alaska Laws and Regulations

The State has extended its fishing regulations to cover waters of the EEZ where a Federal FMP does not exist. State regulations apply to the adjoining EEZ waters for all groundfish species not included in an FMP or for where an FMP delegates authority to the State (5 AAC 28.010). State regulations applicable to king crab (5 AAC 34.010), Tanner crab (5 AAC 35.010), miscellaneous shellfish which includes scallops (5 AAC 38.010), and herring (5 AAC 27.010) also specifically apply to the adjacent waters of the EEZ.

Under current State statutes, all fishing in any waters of the State or the EEZ is prohibited unless specifically authorized by statute or regulation (AS 16.05.920(a)). So to the extent there are areas of the State or adjacent EEZ without fisheries allowed by regulation, those areas are closed under this statute.

Other Federal Options

Presumably, NMFS could authorize a fishery in Arctic EEZ waters by emergency rule if the Council and the agency can determine an emergency situation exists.

Summary

Under status quo, a Federal fishery in arctic waters, which is any area of the Chukchi Sea and the Beaufort Sea EEZ, north of Bering Strait, would be regulated under the authority of either the Council and NMFS or the State of Alaska. No foreign fishing is allowed. Salmon fishing in arctic waters is prohibited under the salmon FMP. A fishery for the listed species of crabs in the king and Tanner crab FMP may occur within the areas covered by this FMP, which includes the U.S. portion of the Chukchi Sea from Bering Strait to Point Hope. The scallop FMP provides for scallop fishing in Registration Area Q which extends into the U.S. portion of the Chukchi Sea northward to Point Hope. The Management Area as described in the scallop FMP extends to Bering Strait. No other Federal FMP covers arctic waters. Any fishery not covered by an existing FMP would be managed by the State. Currently the state has authorized, and has developed management regulations for, king and Tanner crabs, miscellaneous shellfish (scallops, octopus, sea urchins, clams, etc.), herring, and groundfish that include adjacent waters of the EEZ, but only as authorized in the above-listed FMPs. Any fishery in the Arctic not specifically authorized by the State would be prohibited under State statute.

B. Alternative 2 – Amend the Existing Fishery Management Plans

This option would amend the existing scallop FMP, the BSAI groundfish FMP, and the BSAI king and Tanner crabs FMP to prohibit commercial fishing in the Chukchi Sea. (The Council may wish to also include a prohibition of fishing in the Beaufort Sea as well.)

Under the current scallop FMP, authority for some management measures for the scallop fishery has been deferred to the State. All scallop fisheries are managed by the State with regulations applicable to specific scallop Registration Areas. The State's scallop Registration Area Q covers the Bering Sea and waters of the Chukchi Sea northward to a line of latitude at Point Hope. Under State regulations, any fishery north of Registration Area Q and in adjacent waters of the EEZ, which in this case would be the remainder of the Chukchi Sea north of Point Hope, currently would be regulated by the State under authority of 5 AAC 38.010. (This regulatory authority would also include EEZ waters of the Beaufort Sea.) If the Council wishes to extend coverage of that FMP to cover the entire Chukchi Sea (and Beaufort Sea), a plan amendment would be required (the process for amending an FMP is described below).

The Council's BSAI groundfish FMP covers the BSAI Management Area which includes all waters of the BSAI northward to Bering Strait. Under Federal regulations, the Chukchi Sea is designated Statistical Reporting Area 400 but this reporting area is not part of the BSAI groundfish FMP. Groundfish fishing in Arctic EEZ waters is currently closed by the State (5 AAC 38.010). If the Council wishes to extend coverage of that FMP to cover the Chukchi Sea (and Beaufort Sea), a plan amendment would be required (see below). Presumably the Chukchi Sea Statistical Reporting Area 400 could be re-defined to include all of the Chukchi and Beaufort Seas in the amended FMP. Or the amended FMP could include a new management sub area encompassing arctic EEZ waters.

The Council's king and Tanner crab FMP authorizes crab fishing in arctic EEZ waters south of a line of latitude at approximately Point Hope, Alaska. Under the crab FMP, authority for some management measures for the king and Tanner crab fisheries has been deferred to the State. The State's Northern Bering Sea Statistical Area covers waters of the Chukchi Sea northward to a line of latitude at Point Hope. Under State regulations, any EEZ crab fishery northward and outside of the Northern Bering Sea

Statistical Area, which would be the remainder of the Chukchi Sea north of Point Hope and the Beaufort Sea, currently would be regulated by the State under authority of 5 AAC 38.010. If the Council wishes to extend coverage of that FMP to cover the entire Chukchi Sea (and Beaufort Sea), a plan amendment would be required (see below).

Plan Amendment Process

Under the MSA, the Council is authorized to prepare and submit to the Secretary FMPs or any necessary FMP amendments for each fishery under its authority that requires conservation and management. Amendments to existing FMPs undergo the same review process as an FMP. NOAA Fisheries has prepared guidelines for the FMP preparation and review process (NMFS 1997); these guidelines specify procedures for preparation of the document, public review and Council adoption, final amendment review and approval, preparation of proposed regulations, and final rulemaking. Under ideal circumstances, this process can take a year or year and a half, but for more controversial or complex amendments the process can extend for years. With passage of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (PL 109-479), Congress added to the requirements for FMPs that strengthen the collection of economic data (Section 104); in response, NOAA Fisheries may provide additional guidelines on the FMP amendment process. Contents of an FMP are described later in this report.

The Council previously has amended the BSAI groundfish FMP around 80 times, the king and Tanner crabs FMP about 20+ times and the scallop FMP about 10 times. The Council usually generates a problem statement for the issue being addressed by the FMP amendment, selects one or more alternative actions that would address the stated problem, and then begins a process of preparation of documents that describes the issue and potential solutions, outlines the potential effects of the action on the environment, conducts a series of public reviews at Council meetings, selects a preferred alternative, takes more public comment, and takes final action. After that process is completed it is followed by the Secretarial review and approval process and rule making.

Under this alternative, the proposed amendments to the above-described FMPs would be to prohibit commercial fishing in the Chukchi Sea. Based on discussion and public comment at the Council's December 2006 meeting, the Council's intent may be to prohibit commercial fishing in the Beaufort Sea as well. Prohibition of fishing could be viewed as a fairly simple action given the current lack of commercial fishing activities in the Chukchi and Beaufort Seas and the lack of commercially-exploitable fishery resources in this area and the apparent lack of interest from the public in developing any fishery in the Arctic (other than those already occurring). There are no known scallop resources this far north, and prohibition of scallop fishing would likely not be contentious. Similarly, the lack of exploitable groundfish biomass levels that could sustain a commercial fishery similarly would not likely be a contentious action. There has been a small red king crab fishery in the southern part of the Chukchi Sea offshore the village of Kotzebue; and if the Council decides to prohibit fishing, then that action would close this fishery. Although this is a very small fishery involving a few participants, and it has not been prosecuted continuously in recent years, the Council could choose to allow (grandfather) a small amount of commercial crab fishing in this area, under the existing State management authority, until the resource is better defined and interest in continuing this fishery is evident.

The Council would need to adopt a problem statement for each FMP amendment, and proceed through the usual FMP amendment process described above. The three FMPs could all be amended in one process, although each amendment would likely be a separate action. The public would be invited to comment on the proposed action(s) and the analyses of the effects of the action(s), and alternatives, throughout the process. Additional alternatives, and analyses, might result from public comment.

Developing the Problem Statements and Alternatives

Preparing a problem statement, or statement of purpose and need for the proposed action, is an initial part of the FMP amendment process, and is fundamental to almost all Council actions. The problem statement "sets the scene" and defines for the public the Council's view of the issue it is trying to resolve by taking the proposed action. In this case, it might not be considered a "problem" to take a more proactive approach to fishery management in the Arctic, but the Council may articulate that it indeed does see a problem in not taking such action, for a variety of reasons. The problem statement would also be a way to better define and articulate for the public the issues the Council will address in the proposed action.

An important purpose for an FMP or FMP amendment is to describe how the action would support the Council's objectives and goals for the conservation and management of fishery resources in the specified geographic area. The MSA (Section 3(12)) defines "fish" as all finfish, shellfish, other mollusks and crustaceans, and "all other forms of marine animal and plant life other than marine mammals and birds." This broad mandate would require that amendments to existing FMPs, or development of a new Arctic FMP, at a minimum provide for elements of fishery management that are appropriate to the current scientific knowledge available for those species. Given the sparse data and poor understanding of almost all Arctic marine living resources that would fall under Council management, a clear argument likely could be made for fishery closure until such knowledge is acquired.

Beyond the need to conserve Arctic fishery resources, particularly in light of the small amount of information on these resources available to the Council, the Arctic is considered by many to be particularly sensitive to human disturbance for a variety of reasons. Some would view with concern any human activity such as commercial fishing in a "sensitive" environment, at least until adequately mitigated. The Council could recognize in its problem statement that there are issues that are unique or specific to the Arctic region, and prohibiting commercial fishing could be considered an action that the Council would take in recognition of these unique attributes of this region. Some of these unique features or issues of concern are listed below.

Some Issues Relevant to Consideration of a Fishery Closure in the Alaskan Arctic EEZ

Importance of fish and other marine species as subsistence resources used by indigenous peoples. Residents of coastal Native villages seasonally harvest fish for nutritional needs. Residents of villages harvest saffron cod, whitefishes, Pacific salmon, Dolly Varden, and smelt from adjacent marine waters (MMS 2006). Commercial harvesting of these same species could adversely affect local subsistence activities and impose hardships on individuals or entire villages. Residents of villages also pursue beluga whales, bowhead whales, seals, and waterfowl in marine waters. Interruption or disturbance of these activities by fishing operations could impact the pursuit and acquisition of subsistence food required by residents of the region. Additional information is in the Appendix.

Sensitivity of the arctic marine ecosystem to disturbance. Northern marine systems are believed by some to be more fragile than more southerly regions. Arctic marine organisms may take longer to mature because of cold water, a harsher physical environment, seasonally reduced light and prolonged periods of darkness, and low seasonal productivity. Fishes and other marine organisms may find conditions more difficult for feeding, reproduction, and other activities and thus they may be more sensitive to disturbance and their populations less resilient to harvest removals. Many species only seasonally inhabit the region, departing as ice encroaches, and thus have only brief periods of time to obtain food from arctic marine habitats. Species that utilize seafloor habitats, particularly gray whales that feed on benthic organisms, may be sensitive to disturbance of seafloor prey from trawls, pots, or other gear. Commercial fishing could be considered an additional stressor to these arctic marine environments.

The marine environment of the Chukchi and Beaufort Seas has not been well surveyed, and thus there is a lack of knowledge of the distribution and abundance of fish and other marine species that inhabit this area. Surveys that have been conducted suggest that this region is characterized by its low marine species diversity yet high seasonal abundance of certain biota, particularly avian species; many of these bird species rely on marine food sources, particularly sea birds and other waterfowl that feed in the nearshore marine zones, during their short seasonal presence in the region. The ESA-listed spectacled eider and Steller's eider migrate to the Arctic each spring to breed and nest, and enroute feed in the Chukchi and Beaufort Sea marine habitats. These eiders prey on benthic invertebrates, particularly tube-dwelling amphipods. While it is unknown the extent to which eiders rely on these invertebrates, this type of prey would be sensitive to disturbance from trawling (James Lovvern, University of Wyoming, pers. comm.).

MMS (2006) summarizes available knowledge of the marine environment of the Chukchi Sea region, and points out the lack of information concerning discrete populations of arctic fishes. In the face of poor knowledge of potentially exploitable fish populations, or the marine habitats upon which they rely, it would be considered appropriate by many to prohibit commercial exploitation of these species until that knowledge is obtained.

Bowhead whales. The bowhead whale seasonally inhabits the Chukchi and Beaufort Seas, and is a listed species under the ESA. Bowheads travel into the Arctic from the Bering Sea during spring (May/June), and inhabit the eastern Beaufort Sea during summer, primarily in the Amundsen Gulf south of Banks Island, returning south and then westward along the Alaskan Beaufort Sea coast to the Chukotka Peninsula, then southward into the Bering Sea in fall (September/October). Their presence in this region would likely partly overlap any commercial fishing activity, and thus would raise ESA issues. Bowhead whales are very important in the subsistence economy and sociocultural environment of nearly all coastal villages along the Chukchi and Beaufort Sea coasts; any interference or disturbance, or perception of interference or disturbance, with bowhead whales and the whaling activity that occurs there would be a major issue to resolve. Also, bowhead whales and other marine mammals in the region, including bearded and ringed seals, have been extensively monitored in the Prudhoe Bay oil field area and are known to be sensitive to sounds emitted from vessels, barge and vessel deck machinery, propeller rotation and cavitation, winches, and other equipment noises from tug and barge, seismic survey vessel, and other vessels. Fishing vessels and their operations may emit similar types of noises that could have effects on bowhead whales, seals, or other marine mammals.

Polar bears. Polar bears are a conspicuous resident of the Arctic, and the public has become more concerned over their fate given the apparent warming trends in polar regions. Recent studies (Amstrup 2007) indicate that with general warming of the Arctic region, polar bear population dynamics may change. Polar bears require sea ice in their annual cycle of denning, hunting, and general survival. Reductions in sea ice may impact polar bears and reduce their population size. While it is unclear how commercial fishing activities may impact polar bears, disturbance in their habitat as this habitat is shrinking could have an exacerbating effect; fishery/polar bear interactions would be an issue to be addressed if fisheries were to develop, particularly if polar bears are recommended for ESA listing.

Climate change and uncertainty in resource availability. While uncertainty can be a compelling reason in and of itself for limiting commercial fishing activities in the Arctic, uncertainty coupled with climate change is probably a greater factor that clearly could exacerbate assessment of the effects of a commercial fishery in the Arctic. Uncertainty in the size of fish populations, their population dynamics, their interrelationships with other marine organisms, and their ability to sustain harvest may be a compelling reason to not pursue commercial fishing until this uncertainty is removed or reduced to acceptable levels. Add in climate change and uncertainty rises. Recent studies suggest that ocean warming may alter distribution and abundance of forage organisms, impacting millions of waterfowl, shorebirds, and cliff-

nesting seabirds that seasonally inhabit the Arctic to reproduce and fledge young (Roseneau 2007). These forage items are also likely preyed upon by fish or other marine organisms, potentially impacting the future yields of some commercially-exploited species.

To quote MMS (2006):

> The climate of the Arctic is changing. Arctic warming is altering the distribution and abundance of marine life in the Arctic. The better known fish resources (i.e., abundant species) can exhibit very large interannual fluctuations in distribution, abundance, and biomass (e.g., capelin, arctic cod, Pacific sand lance, Bering flounder). Climate change experienced in the past and apparently accelerating in arctic Alaska likely is altering the distribution and abundance of their respective populations from what was known from past surveys.

This general lack of knowledge of the seasonal ecological processes of the Arctic creates a level of uncertainty over potential effects of initiating commercial fishing in the area. Large uncertainty seems to call for conservative and precautionary measures until mitigated.

Opportunity for Proactive Management Action in a Largely Undeveloped Ecosystem. While this topic may not necessarily be classified as a "problem" it may lend additional rationale for the Council's proposed action. Some view the Arctic as a region where historically there has been little perturbation or modification by human activities, and thus may afford society an opportunity to retain this unchanged character for research, monitoring, and policy development, particularly in the face of climate change. Recent literature has explored issues such as the ecological resilience of the Arctic or the ability of such an ecosystem to maintain attributes important to humans (e.g. Chapin III et al. 2006), particularly as related to climate and warming trends. While abstract to some, and prescient to others, these concepts suggest minimizing disturbance in the Arctic, at least for the foreseeable future, including fishery development, to allow time to more adequately plan and prepare for change. Stated another way, the Council would be setting a policy of not developing fisheries in this region until it obtains the scientific knowledge that would support such action.

The above may be some of the elements of a "problem statement" or "purpose and need statement" the Council could consider discussing and eventually including in the FMP amendment package for public review. The public would be afforded ample opportunities to supplement or refine the Council's purpose and need for its proposed action.

<u>Defer Management to the State of Alaska</u>

The Council could consult with the State on the Council's plans for a fishery closure in the Arctic EEZ, and prepare amendments to the three existing FMPs to defer management of commercial fishing in the Arctic to the State. The Council's policy could be to defer to the State the authority to implement its policy to prohibit commercial fishing in the Arctic. Deferral of management authority to the State is a management measure already embodied in several existing FMPs.

In the scallop FMP, the Council defers to the State:

- Setting harvest limits
- Imposing gear limitations
- Providing for crew and efficiency limits (limits on harvest efficiency)
- Setting fishing seasons
- Making in season adjustments (to harvest limits, seasons, bycatch limits, etc.)

- Establishing closed areas
- Closing seasons
- Establishing PSC and bycatch limits
- Setting observer requirements and catch sampling
- Recordkeeping

The Council retains management authority for:

- Setting OY, OFL
- Limited access management
- Describing EFH and HAPCs

In the crab FMP, the Councils defers to the State:

- Establishing reporting requirements
- Limiting fishing gear placement and removal
- Requirements for gear storage and gear modifications
- Requirements for vessel tank inspections
- Establishing bycatch limits
- Observer requirements
- Frame worked measures: minimum size requirements, GHLs, in-season adjustment, geographic management areas, seasons, sex restrictions, pot limits, registration areas, closed areas

The Council has established in the crab FMP fixed measures that cannot be changed without FMP amendment:

- Legal gear
- Permit requirements
- Observer requirements (Federal observers)
- Limited access
- Norton Sound super exclusive registration.

The BSAI groundfish FMP does not currently defer management measures to the State; the salmon FMP does.

MSA Section 306(a)(3)(B) provides for State management when an FMP specifically delegates that management authority and the State's laws and regulations are consistent with that FMP. In these cases where Federal FMPs already exist, the State may also impose regulations on a commercial fishery outside State boundaries if the State's laws and regulations are consistent with the FMP and applicable Federal regulations for the fishery in which the vessel is operating. If the Council chooses an option to defer to the State, it would amend each FMP to provide the authority to the State to close arctic EEZ waters to commercial fishing. The scallop and crab FMPs could be amended to terminate geographic areas open to commercial fishing at Bering Strait, and to close the remainder of the scallop and crab Management Sub areas north of Bering Strait. This would only defer authority to close EEZ waters to Point Hope; additional elements of the amendment package would be required to either redefine the current management sub areas to include the remainder of the Chukchi Sea and the Beaufort Sea, or create a new management sub area that would include these waters. Amending the BSAI groundfish FMP would require creating a new management sub area north of Bering Strait (or re-defining the Chukchi sub area to include this area) and deferring to the State to close that area to commercial groundfish fishing. The new Arctic management sub area could be defined to include both the Chukchi and Beaufort Seas.

Note that for fishing vessels that are not registered under the laws of the State of Alaska and operate in a fishery in the EEZ for which there was no FMP in place on August 1, 1996, if the Council and the Secretary find a legitimate interest of the State in the conservation and management of such a fishery, then the State may regulate fishing until an FMP is approved and implemented. The State has extended its fishing regulations to cover waters of the EEZ where a Federal FMP does not exist. State regulations apply to the adjoining EEZ waters for all groundfish species not included in an FMP or for where an FMP delegates authority to the State (5 AAC 28.010). State regulations applicable to king crab (5 AAC 34.010), Tanner crab (5 AAC 35.010), miscellaneous shellfish which includes scallops (5 AAC 38.010), and herring (5 AAC 27.010) also apply to the adjacent waters of the EEZ. Under current State statutes, all fishing in any waters of the State or the adjacent EEZ is prohibited unless specifically authorized by statute or regulation (AS 16.05.920(a)). As stated previously, to the extent there are areas of the State or adjacent EEZ without fisheries allowed by regulation, those areas are currently closed under this statute.

In summary, the Council could amend existing FMPs to defer to the State the authority to close all EEZ waters north of Bering Strait (and presumably this could also include the Beaufort Sea) to commercial fishing for scallops, crab, or groundfish. Note that the State has already acted under authority of the MSA to close EEZ waters north of Bering Strait where a Federal FMP does not provide specific management authority or where State authority does not authorize such fishing.

Analytical Considerations for Amending Existing FMPs

The Council will need to discuss and determine the appropriate NEPA documentation that would accompany the process of developing amendments to existing FMPs. Amending these FMPs would be considered a Federal action that would require at a minimum the preparation of an Environmental Assessment document. If the Council reaches a Finding of No Significant Impact after preparing the EA, an EIS would not be required. Since the FMP amendments would potentially entail restricting ongoing fishing activities (in the case of the crab FMP), albeit this effort very small at present,[2] this may be considered a large enough impact to warrant an EIS process since local residents could view such restrictions as precluding economic development in the future. For scallops or groundfish, however, it appears very unlikely a fishery could develop in the foreseeable future, and preparing an EA might suffice. Some may view a fishery closure in the Arctic as "beneficial" and as such may not be considered controversial and would not rise to the level of concern warranting a full EIS. The appropriate NEPA process would partly be determined by NMFS and the Council, and would also be informed by public comment.

Whether EIS or EA, the process could take upwards of one to two years to complete. This could be streamlined and shortened, however, if the nature of the action were judged to be minor and agreeable to local residents, the State, industry, NMFS and the Council, conservation interests, and the general public. Some could argue that climate change, warming of the Arctic, retreat of the annual southerly edge of seasonal sea ice, and intrusion of commercially-valuable fish or shellfish species into the Chukchi Sea (or further) could provide an opportunity for commercial fishery development that ought not be impeded. Alternately, one also could argue the rate and geographic extent to which these phenomena are unfolding and whether the rate of change observed in recent years is likely to continue, particularly given the relatively cold conditions observed in this region in the last two years. Is a return to a colder climate in store? In the face of such uncertainty, perhaps the Council may choose to be precautionary, as it often is lauded for doing, and select alternative measures for the FMP amendments, or an Arctic FMP as discussed later, such as fishing closures until the state of knowledge can "catch up".

[2] Very few (up to four individuals in past years) participate in this small red king crab fishery that occurs offshore from Kotzebue, and data on landings are confidential.

Also, this action could be considered "in line" with the Council's ecosystem-based fishery management initiatives over the past decade or more, particularly given the Council's interest in developing its first Fishery Ecosystem Plan in the Aleutian Islands. An Arctic initiative to be precautionary by declaring a Federal policy that closes the Arctic to commercial fishing until we gather enough scientific information to consider other alternatives seems to complement the precepts of ecosystem-based management. These kinds of issues would be discussed in the analysis document(s). And in the interim, the region is essentially closed to commercial fishing under State regulations. More discussion and public input may be required to better inform the Council on the appropriate analytical process to follow.

Summary

The Council could choose to initiate a process for amending existing FMPs that would specify a Federal closure of the Arctic to commercial fishing, with several options.[3] This alternative would involve amending three existing FMPs, with an accompanying NEPA analysis for each, through the normal Council and Secretarial process for approving plan amendments. A problem statement, suite of alternatives, and an accompanying analysis would proceed through a series of Council meetings and public reviews. One amendment for each of the three FMPs would extend the FMP's geographic jurisdiction to include arctic waters, and specify the Council's intent to prohibit commercial fishing for scallops, crab, and groundfish, including forage species or other species as specified in the amendment, and then proceed through Secretarial review. The process to gain an approved amendment to each FMP would likely require a year to year and a half to complete.

C. Alternative 3 – Adopt a New FMP for the Arctic

Under Alternative 3, the Council would adopt a new FMP for EEZ waters north of Bering Strait for any species not covered by an existing FMP, including krill or other forage species. The new Arctic FMP would apply to all species of fish or other potentially exploitable species of marine organism that may occur in the Arctic EEZ (see possible list of species below). The FMP would specify the measures that will be employed to manage commercial fishing in the Arctic, specifically a prohibition of commercial fishing. The Council also could specify in the FMP the conditions under which the Council would consider fishery development in the future.

As stated previously, the MSA requires Councils to develop and submit to the Secretary for approval FMPs or plan amendments for each fishery under its authority that requires conservation and management. FMPs or amendments must be consistent with National Standards (MSA 301(a)) and any advisory guidelines issued by the Secretary to assist in the development of FMPs (MSA 301(b)). Thus, congress intended that the FMP be the guiding document for conservation and management of fisheries and the marine environment of the EEZ. MSA Section 3(5) defines conservation and management to include employing measures to maintain the marine environment and to assure that a multiplicity of options will be available with respect to future uses of fishery resources and the marine environment.

The Council's motion included reference to possibly deferring some of the requirements for developing an FMP until such time as the Council decides to open a fishery. It appears unlikely that the requirements for an FMP as specified in the MSA can be deferred. The MSA is specific about the contents of an FMP,

[3]Under status quo, the areas north of Bering Strait are closed to groundfish fishing, and areas north of Point Hope are also closed to scallop and crab fishing. The entire Arctic EEZ is already closed to salmon fishing. The Council could merely retain status quo for these fisheries and thereby effect fishing closures through existing authorities (with the option of allowing continued crab fishing between Bering Strait and the latitude of Point Hope). Doing this, however, would not be considered as proactive as a deliberate action to close these areas to commercial fishing. Such "inaction", and deference to the existing regulatory situation, may not be the Council's goal.

although presumably some of those required sections would not have to be extensive given the paucity of knowledge of fishery resources in the Arctic. Also, if the Council chooses to close the management area to fishing, the content of FMP sections relating to fishing vessels, gear, etc. could be brief.

The Council also could take an action that would be a combination of Alternatives 2 and 3. That is, the Council might choose to amend existing FMPs that partly govern Arctic waters to exclude their coverage over any waters or species north of Bering Strait. As a complementary part of that action, the Council would implement a new Arctic FMP that would be the sole governing management plan for species and habitats north of Bering Strait. This action is described below as a suboption.

Contents of a Fishery Management Plan

A new Arctic FMP would be required to contain descriptive material as set forth in the MSA. Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, shall:

> (1) contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are
>
> > (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery;
> > (B) described in this subsection or subsection (b), or both; and
> > (C) consistent with the national standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;
>
> (2) contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;
>
> (3) assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;
>
> (4) assess and specify
>
> > (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3),
> > (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing, and
> > (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;
>
> (5) specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;
>
> (6) consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery;

except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;
(7) describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;
(8) in the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;
(9) include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and describe the likely effects, if any, of the conservation and management measures on

(A) participants in the fisheries and fishing communities affected by the plan or amendment; and

(B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants;

(10) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;
(11) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority

(A) minimize bycatch; and

(B) minimize the mortality of bycatch which cannot be avoided;

(12) assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;
(13) include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors; and
(14) to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.

The above section is verbatim from the MSA as amended through October 11, 1996. Recently, the MSA was reauthorized (PL 109-479) and additional requirements for FMPs are now Federal law. These requirements include specifying economic information on fisheries, consideration of economic impacts on fishery participants from harvest restrictions or recovery benefits, and defining a mechanism for specifying catch limits so that overfishing does not occur.

A new Arctic FMP would be required to contain written sections that provide the above-described information. It could be argued that some of the above might not be applicable in the case of a generic fishing prohibition; i.e. if no fishing is allowed, then the FMP would not need to contain descriptive information on fishing vessels and gear that are deployed in the fisheries covered under the FMP, OY

calculations, bycatch reporting methodology, and overfishing levels. However, the new FMP would be required to at least provide available information on some of the above categories, particularly:

- Conservation and management measures and descriptions of existing fisheries – this section could be brief, and contain descriptions of the few fisheries that currently occur in the area; all are managed by the State and descriptions should be available in available publications
- Status of known fish stocks, and in cases where little is known, a description of that knowledge – this information is summarized in some available publications such as MMS (2006) and Hopcroft et al (In Prep) and in ADF&G management reports
- Weather and safety considerations
- Essential fish habitat – EFH descriptions already exist for those species where EFH has been defined in the BSAI groundfish, scallop, and crab FMPs. For many arctic species there is a lack of specific information on their seasonal distribution, abundance and habitat requirements; some information is available, but not likely enough to designate specific habitat types that might be considered essential for basic life processes
- Data needs – this section could be based on the information review suggested above

FMPs may also include discretionary information that the Council may wish to develop and include in the FMP. Particularly applicable may be sections on areas where fishing is prohibited or limited (depending on the preferred alternative chosen), recommended scientific research, descriptions of particularly rare or unique marine areas (such as the Boulder Patch in the nearshore central Beaufort Sea), or descriptions of special marine areas for conservation of ESA-listed species or species of particular concern. Since Arctic waters are particularly important for conservation of polar bears, bowhead whales, beluga whales, ice seals, sea ducks, other waterfowl and shorebirds, gray whales, occasionally walrus, and human subsistence users, the FMP might contain a descriptive section that provides this information as a background setting for the fishery management measures established in the FMP.

Managed Species

The species categories that could be included in this new Arctic FMP are listed below. These species are known to occur in Arctic marine waters, as documented by Mecklenberg et al. (2002) and summarized in MMS (2006), but few data are available to characterize the distribution or abundance of any of these species. Categories used below are patterned after existing Council groundfish FMPs and a review of available information on what species could be present and could offer harvest opportunities in the future, particularly if abundance increases along with the changes in climate anticipated in the Arctic:

Potential Target Species:
Arctic cod
Saffron cod
Yellowfin sole
Other Pleuronectids (flounders, plaice, dabs, turbot, sole)
Walleye pollock
Other gadids

Red king crab
Tanner crab (opilio)
Other crab species

Scallops
Other mollusks (e.g. snails, other bivalves)

Nontarget Species:
Sharks
Cephalopods

Forage Fish Species:
All planktonic or epibenthic organisms (zooplankton such as euphausiids or "krill", pelagic crustaceans, larval fishes, amphipods and isopods, other zooplankton)
Capelin
Rainbow smelt
Pacific herring
Pacific sand lance
Pholidae (gunnels)
Stichaedae (pricklebacks)
Zoarcidae (eelpouts)
Liparidae (snailfishes)
Cyclopteridae (lumpsuckers)
Agonidae (poachers)
Cottidae (sculpins)
Other sculpins
Myctophidae (lanterfishes)
Gasterosteridae (sticklebacks)
Hexagrammidae (greenling)

Prohibited Species:
Pacific salmon
Dolly Varden char
Whitefishes
Pacific halibut

The new Arctic FMP would review the status of each species or species group, the rationale for including each species in the above or other selected categories, and how each category would be managed.

As specified in the Council motion, the new Arctic FMP would exclude management of species already covered by an FMP. Crab would be included in the Arctic FMP only to the extent that crab species are not be covered under the existing crab FMP (which provides for management only to approximately Point Hope). Thus, the new FMP would cover crab fishery management in the remaining EEZ waters of the Chukchi and Beaufort Seas. No scallops are known to occur north of Bering Strait, but to the extent that scallops might extend their range northward, the existing scallop FMP covers the area to Point Hope. Thus, the new Arctic FMP would provide authority for scallop management northward of Point Hope in the remaining EEZ waters of the Chukchi and Beaufort Seas. Pacific halibut would not be part of the new Arctic FMP, nor would Pacific salmon (salmon are already covered under the salmon FMP).

Suboptions

The Council is considering two action sub options under this alternative:

(a) Close all EEZ waters north of Bering Strait to commercial fishing until the Council develops a policy for opening this area to select fishing practices.
(b) The new Arctic FMP would provide for a closure of all EEZ waters north of Bering Strait to commercial fishing for forage species and all waters north of a line at Point Hope to commercial fishing for all species.

These two options would effectively accomplish a similar objective—closure to commercial fishing of some or all Arctic EEZ waters north of Bering Strait. Under suboption (a), the Council would close Arctic EEZ waters (north of Bering Strait) to commercial fishing, and as a result close the small red king crab fishery currently prosecuted in the southern Chukchi Sea area near Kotzebue. This is a very small fishery, and is not prosecuted every year, but Council action would preclude this fishery unless provisions were made to exempt such a fishery from the closure. This sub option would require amendment of the king and Tanner crabs FMP and the scallop FMP to end the northern boundary of the management areas at Bering Strait. This measure is similar to the proposed action under Alternative 2 described above.

For suboption (a), it would be helpful to discuss Council intent in using the term "selected fishing practices". Fishing practices might be defined as use of certain types of allowable gear, methods for deployment of gear, prohibited gear types, seasonal gear restrictions, etc. The FMP would need to include specific definitions and rationale for prohibited, or allowed, fishing practices.

Suboption (b) would allow the small red king crab fishery to continue in the southern Chukchi Sea (or perhaps another crab fishery to develop), since it would be prosecuted under the existing crab FMP. Similarly, were a scallop fishery to develop, it could occur under this sub alternative through the existing scallop FMP within Scallop Registration Area Q. Areas north of the Point Hope area boundary in both the scallop and the crab FMPs would be closed under this sub option. Suboption (b) would not allow for groundfish fishing for the area south of Point Hope to Bering Strait because the current BSAI FMP does not include this area as part of the management area.[4] Suboption (b) would close the entire arctic area to any fishery for forage species.

The term "forage species" would require definition in the new FMP. Under the BSAI groundfish FMP, forage fish is defined as:

all species of the following families:

(1) Osmeridae (eulachon, capelin and other smelts),
(2) Myctophidae (lanternfishes),
(3) Bathylagidae (deep-sea smelts),
(4) Ammodytidae (Pacific sand lance),
(5) Trichodontidae (Pacific sandfish),
(6) Pholidae (gunnels),
(7) Stichaeidae (pricklebacks, warbonnets, eelblennys, cockscombs and shannys),
(8) Gonostomatidae (bristlemouths, lightfishes and anglemouths), and
(9) The Order Euphausiacea (krill).

An optional definition of forage species is provided above under the list of species that might be specifically managed under the new FMP.

Fishery Ecosystem Plan or Other Vehicle

The Council included in its motion an additional option to develop a policy for managing commercial fisheries in EEZ waters north of Bering Strait through a Fishery Ecosystem Plan (FEP) or other mechanism as the Council deems appropriate. The Council is currently writing an FEP for the Aleutian Islands, and thus has some experience developing such a document. The Aleutian Islands FEP is meant to be a policy and guidance document without management authority—that authority would remain with the FMPs. An Arctic FEP could provide similar guidance to the Council on the ecosystem processes of

[4] Regulations implementing the BSAI groundfish FMP provide for a Chukchi Sea statistical reporting area, but this area is excluded from the management area covered by this FMP.

the Arctic and the extent to which commercial fisheries might impact the ecosystem and the sustainability of its fishery resources. The newly reauthorized MSA (PL 109-479) contains provisions for Secretarial support to Councils to develop regional pilot programs that build upon concepts for ecosystem-based fishery management. To implement management measures for commercial fishing, however, the Council would work through the Arctic FMP vehicle and conform to MSA requirements and Secretarial guidelines. At this time, it is NOAA General Counsel opinion that an FEP cannot authorize fishery management regulations; only an FMP can do so.

Developing the Problem Statement and Alternatives

As described previously under the section on amending existing FMPs (Alternative 2), creating a new Arctic FMP would require writing a problem statement, and proceed through the usual Council review, public review, and Secretarial review process described above. The public would be invited to comment on the proposed action as the Council proceeds through its analysis of the effects of the action and alternatives. Additional alternatives, and analyses, might result from public comment. A description of possible issues that might be integrated into a problem statement is provided in a previous section of this paper.

Defer Management to the State of Alaska

As discussed above under this subject heading for Alternative 2, the Council could consult with the State on its plans for a fishery closure in the Arctic EEZ, and prepare an FMP that defers to the State specific management authority to implement the Council's policies. It seems this could take two forms: an FMP that has as its main management measure the closure of all commercial fishing in the Arctic; the FMP would specify that the State would manage EEZ fisheries, but only when opened and authorized by the Council through a future plan amendment. Or, the Council could prepare an FMP that defers to the State management authority over EEZ fisheries in the Arctic, and its policy for closure of these fisheries until authorized in the future; the FMP would defer to the State the authority to close commercial fishing in the Arctic. In either case, the Council could specify in the FMP its intent to consult with the State in the future and revisit the FMP and adjust management measures accordingly if new information warrants this.

Analytical Considerations for a New Arctic FMP

The Council may wish to discuss and research the appropriate NEPA documentation that would accompany the writing and eventual approval of a new Arctic FMP. Some have suggested that an EA should be sufficient, while others believe a full EIS may be required. Under the NOAA environmental review procedures for implementing NEPA, NAO 216-6, Section 6.01 states:

> Federal actions, including management plans, management plan amendments, regulatory actions, or projects which will or may cause a significant impact on the quality of the human environment, require preparation of an EIS.

In these guidelines, however, Section 6.03a states:

> NEPA documents for management plans and management plan amendments require an EA or the RPM may decide to proceed directly with an SEIS/EIS. If the RPM has doubt concerning significance, an EA will be used to determine whether a FONSI, SEIS, or an EIS is appropriate. [RPM – responsible program manager]

The issue of significance may be important in determining whether to prepare an EA or EIS. Significance is discussed in the NOAA guidelines, and includes factors such as: degree to which public health and safety is affected, unique characteristics of the geographic area, degree to which the action is controversial, risk uncertainty, the action sets a precedent for future significant actions, and degree to which the action adversely affects endangered or threatened species. A significant effect may exist even if the action is considered beneficial.

An EIS could be required if the Council were planning to adopt a new Arctic FMP that authorizes measures restricting ongoing fishing activities, or prohibits the development of a fishery on a resource that was known to exist and could sustain commercial fishing, or impacts ESA-listed species. However, this is not the situation the Council faces. A fishery closure would appear to have few if any adverse impacts that would rise to the level of concern warranting an EIS. If the development of an Arctic FMP is considered to be largely non-controversial and stakeholders agreed with the proposed measures in the FMP, then perhaps an Environmental Assessment document would suffice.

A fishing closure would seem to be a minor action given the current level of commercial fishing occurring in the Arctic EEZ at present (essentially none). The potential for fishery development seems low given the current state of knowledge of potentially valuable commercial fishery resources in this region. And it seems logical at this time to impose a closure to the development of fisheries on resources that are likely unable to sustain fishing pressure or are of unknown magnitude.

And as stated previously, one could argue that climate change, warming of the Arctic, retreat of the annual southerly edge of seasonal sea ice, and the resultant intrusion of commercially-valuable fish or shellfish species into the Arctic could provide an opportunity for commercial fishery development that ought not be impeded. But one also could argue how quickly these phenomena are unfolding and whether the rate of change observed in recent years is likely to continue, particularly given the relatively cold conditions observed in this region in the last two years. In the face of such uncertainty, it seems logical for the Council to choose to be precautionary and select a prohibition of fishing in the Arctic until the state of knowledge can justify revisiting this measure. Thus, this action may not be judged significant enough to require a full EIS. But more discussion and public input may be required to better inform the Council on the appropriate NEPA process to follow.

Conclusions

Under this alternative, the Council would adopt a new FMP for EEZ waters north of Bering Strait to manage commercial fishing for any species not covered by an existing FMP, including krill or other forage species. The Council would follow MSA requirements and NOAA guidelines for writing an FMP. The Council would specify its intent to close to commercial fishing all Arctic EEZ waters to those species specified in the FMP. Two sub options could be considered: amending the scallop and crab FMPs to close to scallop or crab fishing those EEZ waters from Bering Strait to Point Hope, or leaving the management authority in these two FMPs as is, but close the remainder of the Arctic EEZ to scallop and crab fishing in the new Arctic FMP. The latter action would include closure to any fishery for forage species north of Bering Strait. Also, while the Council may choose to develop an FEP to accompany this effort, an FEP cannot authorize fishery management regulations; perhaps the Council could accomplish its goal by adopting a more ecosystem-focused FMP.

III. Next Steps

The Council is scheduled to discuss this issue at its June 2007 meeting. The Council should consider which alternative it wishes to pursue, and which sub options it prefers. The Council also should develop an appropriate schedule for this work, and recommend the level of staff time and other resources it wishes

to commit to this process. The Council may wish to further elaborate on the alternatives it wishes to continue to explore. Other questions include: Should the FMP writing effort be guided by an Arctic Plan Team? Should the FMP be structured more like a FEP? To what extent should local residents, local governments and commissions, and other stakeholders[5] be consulted?

Alternative 3 has an option for amending the existing FMPs that partly cover the Arctic. The Council may wish to discuss the effort involved in amending FMPs versus preparing a new FMP; it may be "cleaner" for the Council to adopt a single FMP covering all EEZ waters north of Bering Strait, rather than accomplish its goal of an arctic fishing closure through multiple FMPs.

- [5] Potential stakeholders could include the State of Alaska, residents of the villages in the region, the North Slope and Northwest Arctic Boroughs, the NANA and Arctic Slope regional corporations, the Federal agencies with trust lands adjacent to Arctic marine waters (US Fish & Wildlife Service, National Park Service, Bureau of Land Management), the USGS, the Minerals Management Service, representatives of the potential commercial fishing industry, the oil and gas industry, members of the conservation community, and academia and others in the research community.

IV. References

Aagaard, K. 1984. The Beaufort Undercurrent. Pages 47-71 in P.W. Barnes, ed. The Alaskan Beaufort Sea, Ecosystems and Environments, Academic Press.

Amstrup, S.C. 2007. Polar bears – Sentinel of Arctic change. Keynote Address at Alaska Marine Science Symposium, January 21-24, 2007, Anchorage, AK. Abstract.

Chapin III, F.S., M. Hoel, S.R. Carpenter, J. Lubchenco, B. Walker, T.V. Callaghan, C. Folke, S.A. Levin, K-G Maler, C. Nilsson, S. Barrett, F. Berkes, A-S Crepin, K. Danell, T. Rosswall, D. Starrett, A. Xepapadeas, and S.A. Zimov. 2006. Building resilience and adaptation to manage arctic change. Royal Swedish Academy of Sciences 2006. Ambio 35(4):198-202.

Frost, K.J. and L.F. Lowry. 1984. Trophic relationships of vertebrate consumers in the Alaskan Beaufort Sea. In: The Alaskan Beaufort Sea, Ecosystems and Environments, P.W. Barnes et al., eds., Academic Press, p. 381-401.

Hawks, J. 2006. Groundfish: Will Barrow become the next Dutch Harbor? Pacific Fishing, November, 2006. P. 8-9.

Hopcroft, R., B. Bluhm, R. Gradinger, T. Whitledge, T. Weingartner, B. Norcross, and A. Springer. In Preparation. Arctic Ocean Synthesis: Analysis of Climate Change Impacts in the Chukchi and Beaufort Seas with Strategies for Future Research. Institute of Marine Science, University of Alaska Fairbanks. North Pacific Research Board, draft report, August 2006. 116 p.

Richter-Menge, J., J. Overland, A. Proshutinsky, V. Romanovsky, L. Bengtsson, L. Brigham, M. Dyurgerov, J.C. Gascard, S. Gerland, R. Graversen, C. Haas, M. Karcher, P. Kuhry, J. Maslanik, H. Melling, W. Maslowsky, J. Morison, D. Perovich, R. Przybylak, V. Rachold, I. Rigor, A. Shiklomanov, J. Stroeve, D. Walker, and J. Walsh. 2006. State of the Arctic Report. NOAA OAR Special Report, NOAA/OAR/PMEL, Seattle, WA, 36 p.

McCaughran, D.A. and S.H. Hoag. 1992. The 1979 Protocol to the Convention and Related Legislation. International Pacific Halibut Commission Technical Report No. 26, Seattle, Washington. 32 p.

Minerals Management Service (MMS). 2006. Chukchi Sea Planning Area Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea. Draft Environmental Impact Statement MMS 2006-060. Alaska OCS Region, Anchorage, AK. Volumes I and II.

NRC (National Research Council). 2003. Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope. Committee on Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope. The National Academies Press, Washington, D.C. 288 p.

Newton, G.B. 2005. From Arctic Ocean research to UNCLOS, Article 76, and back. Fourth Biennial Scientific Conference of ABLOS – Marine Scientific Research and the Law of the Sea, October 10-12, 2005, Monaco. Manuscript. 8 p.

ONR (Office of Naval Research). 2001. Naval Operations in an Ice-free Arctic. Final Report. Symposium on Naval Operations in an Ice-free Arctic, April 17-18, 2001. 70 p.

Roseneau, D.G. 2007. Monitoring murres and kittiwakes at Cape Lisburne, Alaska, 1976-2006. Presented at Alaska Marine Science Symposium, January 21-24, 2007, Anchorage, AK. Abstract.

Thorsteinson, L.K. and W.J. Wilson. 1995. Anadromous fish of the central Alaska Beaufort Sea. Pages 341-343 in E.T. LaRoe et al., eds. Our Living Resources. A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems. U.S. Dept of the Interior, Washington, D.C. 530 p.

UNEP/GRID-Arendal, 'Ocean currents and sea ice extent', *UNEP/GRID-Arendal Maps and Graphics Library*, Dec 97, <http://maps.grida.no/go/graphic/ocean_currents_and_sea_ice_extent> [Accessed 7 November 2006]

Weingartner, T.J. 1997. A review of the physical oceanography of the northeastern Chukchi Sea. In: Fish Ecology in Arctic North America, J.B. Reynolds, ed., American Fisheries Society Symposium 19, Bethesda, MD, p. 40-59.

Wilson, W.J. and B.J. Gallaway. 1997. Synthesis in applied fish ecology: Twenty years of studies on effects of causeway development on fish populations in the Prudhoe Bay region, Alaska. Pages 326-339 in J. Reynolds, ed. Fish Ecology in Arctic North America. American Fisheries Society Symposium 19, Bethesda, MD. 345 p.

V. APPENDIX

The following background information was presented in an earlier version of this document.

Geography and Oceanography of the Arctic Region

The Arctic Ocean has two regional seas that are adjacent to Alaska, the Chukchi Sea and the Beaufort Sea. The Chukchi Sea is an embayment of the Arctic Ocean bounded on the west by the east Siberian coast of the Russian Federation and on the east by the northwestern coast of Alaska. With an area of about 595,000 km², it extends roughly from Wrangel Island at the eastern side of the East Siberian Sea to Point Barrow and offshore to the 200 m isobath (Weingartner 1997). Along the Alaskan coast of the Chukchi Sea, Kotzebue Sound is a large embayment between Bering Strait and Point Hope. Along the Alaskan Seward Peninsula coast between Point Lay and Wainwright, a chain of nearshore barrier islands form a lagoon system that becomes estuarine during summer.

Offshore, the Chukchi Sea is relatively shallow with depths generally under 60 meters. Warm, low salinity marine water seasonally freshened by outflow from the Yukon River enters the Chukchi from the south through Bering Strait. During the open water season water movement is northward through Bering Strait into the Arctic Ocean, and circulation is partly subject to wind driven currents. The Chukchi Sea is ice covered for about 8 months, with ice retreat occurring in June and July and ice returning by October.
The Beaufort Sea, covering an area of about 476,000 km², lies offshore north of the Alaskan arctic coast and extends generally from the Point Barrow area eastward to the delta of the Mackenzie River and the west coast of Banks Island in the Canadian High Arctic. The Beaufort Sea has a narrow Continental Shelf that extends offshore 50-100 km (30 to 60 miles). The Beaufort Sea is characterized by barrier island-lagoon systems extending along shore from the western Mackenzie Delta to the Colville River. Water circulation is dominated by the southern edge of the perpetual clockwise gyre of the Canadian Basin resulting in surface movement that is generally westward with a subsurface Beaufort Undercurrent flowing in the opposite direction (Aagaard 1984). Close to shore in the open water season, surface currents are primarily wind driven, with the predominant direction to the west. However, winds can be either easterly or westerly, and thus alongshore surface currents can flow either direction. Ice covers the sea for up to 9 months.

Both the Chukchi and Beaufort Seas are strongly influenced by seasonal ice cover. Ice directly affects the distribution and annual movement patterns of marine mammals. Ice freezes to the bottom in the fall in shallow nearshore areas, and exhibits a shear zone where shorefast ice interfaces with the constantly moving offshore ice pack. Ice ridges, seafloor gouging, and other ice-related phenomena influence the benthic environment. Sea ice melting in spring nourishes primary production as the ice edge melts and retreats, opening a highly productive estuarine-like nearshore corridor in which anadromous and amphidromous fish, marine fish, shorebirds and other waterfowl flourish; many marine mammals generally remain with the ice pack as it retreats offshore.

Vessel movement in the region is restricted by ice conditions, generally allowing vessel transit during a short one to two month period each summer, although in recent years the length of the vessel transit season has been longer because of warmer water.

Productivity of the Arctic Ocean is considered to be low, probably due to long winters of low light penetration and thus lower plankton production. The Chukchi is more productive, due partly to the influx of nutrients in waters from the Pacific Ocean and Bering Sea flowing northward through Bering Strait. During summer months production increases as sea ice melts, although water stratification can limit summer vertical mixing during the open water season. In the Beaufort during summer, strong west winds may induce upwelling of cold, more nutrient rich waters inshore, and with melting of bottomfast ice,

benthic organisms move inshore and support a rich fauna of fish and birds. During winter, seasonal ice freezes to thickness of two or more meters, through which seals maintain breathing holes and holes that are access to birthing lairs under snow cover. Polar bears range throughout the Arctic Ocean, and are more common close to shore during winter months when prey and ice conditions are more favorable. Very little is known of marine fish distribution, abundance, diversity, or habitat use patterns in the winter. Anadromous and amphidromous fishes overwinter in unfrozen pockets of fresh or brackish water in rivers and river deltas.

Human Habitation and Land Status

Human habitation of the Arctic has been continuous since the last ice age, and some evidence supports an ancient influx of humans from the west across a land bridge in the Bering Strait area. Communities along the coast of the Chukchi and Beaufort Seas are closely tied to the fish, birds, and marine mammals of the ocean as well as terrestrial mammals, particularly caribou. In the Chukchi region, many villages dot the shoreline, including the large community of Kotzebue and smaller villages such as Shishmaref, Point Lay, and Wainwright. In the Beaufort Sea region, Barrow dominates as the government seat of the North Slope Borough and the largest community north of the Brooks Range. Villages along or near the Beaufort coast include Kaktovik and Nuiqsut. With discovery of petroleum deposits in the Prudhoe Bay region in 1968, an industrial community of Deadhorse formed. The oil fields of the Prudhoe Bay region extend from the Colville River and Delta eastward to the Sagavanirktok River. Population of villages in the Arctic region range from several hundred to five to seven thousand residents in Barrow and Kotzebue. Approximately 7,400 people work in the Prudhoe Bay oil fields (NRC 2003).

Land status in the Arctic Region includes a mix of local governmental, refuge, and park areas that border portions of the Chukchi and Beaufort Sea coasts. The North Slope Borough extends from the Chukchi Sea coast and along the entire Alaskan Beaufort Sea coast inland to the Brooks Range and eastward to the Canadian Border, encompassing over 228,000 km^2 (88,000 sq mi). The Northwest Arctic Borough, formed in 1986, encompasses the villages of northwest Alaska in the Kobuk and Noatak River drainages; this borough borders the Chukchi Sea from Cape Seppings in the north to just west of Cape Espenberg in the south. In the eastern Arctic, the Arctic National Wildlife Refuge covers over 7.3 million hectares (18 million acres), about 40% of which is wilderness. This refuge borders the Beaufort Sea coast from approximately the Canning River Delta to the Canadian border and is managed by the U.S. Fish & Wildlife Service. The 9.3 million hectare (23 million acre) National Petroleum Reserve Alaska, managed by the U.S. Bureau of Land Management, extends from the Brooks Range northward to the Beaufort coast. The Reserve extends along the Beaufort coast from the Colville River westward to Point Barrow and then southward, fronting the Chukchi Sea coast from Icy Cape to Wainwright. Cape Krusenstern National Monument and Bering Land Bridge National Preserve extend along large portions of the Chukchi Sea coast and are managed by the U.S. National Park Service. The most northerly parts of the Alaska Maritime National Wildlife Refuge are at Cape Lisburne and Point Hope.

The U.S. Canadian border extends north and slightly eastward in the offshore Beaufort Sea, and the demarcation between the U.S. and the Russian Federation is the International Date Line extending through the middle of Bering Strait northward at 169 degrees West longitude.

Finfish and Shellfish Species of the Arctic Ocean

Surveys of fish species present in this region have been few. Early exploration of this region by wooden sailing ships and whaling vessels included both commercial interests (whales, other marine mammals) and scientific interests and produced a few records of fish species present. In the middle of the 20th Century, exploration of the region was sponsored by the U.S. Coast Guard, National Science Foundation, and eventually by the oil and gas industry, leading to a basic understanding of marine organisms

inhabiting the region. Industrial development at Prudhoe Bay and surrounding oil fields has prompted concern over effects on coastal fishes (Thorsteinson and Wilson 1995) and several decades of fish studies have been conducted in this region (Wilson and Gallaway 1997). Recently, the University of Alaska, in cooperation with other investigators, has conducted several surveys of the region, in particular a series of cruises with Russian Scientists with support from NOAA. The North Pacific Research Board recently sponsored a synthesis of information on the Chukchi and Beaufort Sea marine ecosystem and will be available in report form soon (Hopcroft et al. In Prep).

One major species of finfish in the Beaufort is the Arctic cod, a gadid that can be seasonally abundant but may not occur in commercially exploitable quantities; data are not available to assess the stock dynamics of Arctic cod in the Arctic offshore of Alaska. The Arctic cod is distributed throughout the circumpolar north. Biomass estimates are few; one estimate is a calculation by Frost and Lowry (1984) of approximately 86,000 mt. This species is a food source for marine mammals and birds of the Arctic, and as juveniles is known to be prey for other species of fish, particularly anadromous and amphidromous fishes that occur in nearshore Beaufort and Chukchi Sea waters during the summer open water season.

Shellfish such as crab and shrimp occur in the Chukchi Sea, but commercially exploitable populations likely are rare north of Norton Sound and Bering Strait. A small fishery for red king crab occurs in the Kotzebue Sound area. Snail populations occur in the Chukchi Sea, although they have not been commercially exploited. Crab and epibenthic crustaceans occur in the Beaufort Sea. Very little is known about the shellfish fauna of the region.

Fisheries and Subsistence Harvest of Resources of the Chukchi and Beaufort Seas

Arctic cod have previously been harvested commercially in marine waters of the Russian Federation and some northern European countries, primarily in the northern Atlantic Ocean and the Barents and White Seas. There may be some continuing harvests of Arctic cod in the Canadian north. No commercial harvests of Arctic cod occur in U.S. waters.

Other species exploited commercially elsewhere that are present in the region include the yellowfin sole (Chukchi Sea) and in the eastern Beaufort Sea the Greenland halibut. A recent research cruise in the Chukchi Sea resulted in the capture of a few walleye pollock, representing a new range extension for this species (RUSALCA 2004 cruise, www.arctic.noaa.gov/aro/russian-american/cruise6-adult-fish.htm). Other species captured by bottom trawl in the RUSALCA 2004 cruise included saffron cod, Bering flounder, and eelpouts, sculpins, poachers, pricklebacks, and snailfish.

State of Alaska commercial fisheries in the Chukchi Sea region are centered in Kotzebue Sound where a summer and fall salmon fishery occurs annually, targeting chum salmon. A few other species of salmon are harvested incidentally as well as Dolly Varden. The Noatak and Kobuk rivers are the principal salmon habitats in this area. There is a commercial sheefish (inconnu) fishery that occurs in Hotham Inlet with a harvest quota of 25,000 pounds, but usually only a few thousand pounds are sold commercially (Jim Menard, ADF&G, pers. comm.). There is a small red king crab fishery out of Kotzebue; there were no catches this past year and minimal catches the previous year (Jim Menard, ADF&G, pers. comm.).

In the Beaufort Sea, a small commercial fishery for Arctic cisco, least cisco, and a few broad and humpback whitefish occurs annually in the delta waters of the Colville River (20,000 to 25,000 fish annually). This fishery involves gillnets placed under the river ice in brackish waters during the October and November period. These whitefish are marketed locally in the Barrow area and a few are smoked and marketed in Fairbanks. No other documented active marine or freshwater commercial fisheries occur in that area. However, there is potential for miscellaneous fisheries on a case-by-case basis through a Commissioner's permit depending on interest and size of fish stock (Fred Bue, ADF&G, pers. comm.).

Exploratory fisheries have recently been conducted in the Canadian portion of the Beaufort Sea north of the Yukon Territory. Species of interest include cod, crab, gastropods, and other fishes (Common Ground newsletter, Winter 2005, http://www.jointsecretariat.ca/JS/pdf/Winter%202005%20Vol5-2.pdf).

Little sport fishing occurs in marine waters of the region. Some sport fishing may occur in the Kotzebue Sound area, targeting Dolly Varden and salmon. Some sport fishing activity occurs in the Prudhoe Bay industrial area by oilfield workers, primarily along the Beaufort Sea coast at Prudhoe Bay; fishermen target Dolly Varden and the occasional Arctic grayling.

Subsistence fisheries occur near most coastal villages of the region or at fish camps located various distances from villages. Chum salmon and some Dolly Varden are harvested in the Kotzebue Sound region. Whitefish are more prevalent in catches in the northern area of the Chukchi Sea, and in the Beaufort subsistence fisheries focus almost exclusively on whitefish. Arctic cisco and least cisco as well as broad whitefish and a few other species are commonly harvested along the Beaufort Sea coast; about 40,000 fish are harvested annually (Thorsteinson and Wilson 1995). Most coastal subsistence fishing occurs near villages and also in the Teshekpuk Lake region.

Subsistence harvests of marine mammals, including beluga whales, occur year round, with beluga hunting more prevalent in summer open water months. Ice seals are harvested when accessible on winter sea ice.

Bowhead whaling is an important part of the subsistence and social system in local communities in both the Chukchi and Beaufort Seas. Managed by the Alaska Eskimo Whaling Commission, bowheads are hunted by whalers from ten whaling communities: Gambell, Savoonga, Wales, Little Diomede, Kivalina, Point Hope, Wainwright, Barrow, Nuiqsut, and Kaktovik. Bowheads migrate north from the Bering Sea through the Chukchi and adjacent to the Point Barrow area in spring, generally following leads in the ice. Subsistence whalers from northern Bering Sea and Chukchi Sea communities, including Barrow, target bowheads in this spring migration. The return migration occurs along the Beaufort Coast where villages of Kaktovik, Nuiqsut, and Barrow and occasionally communities further south conduct the fall hunt. Other marine mammals harvested in the region include ringed and bearded seals.

Other Arctic Ocean Activity

The waters of the Chukchi and Beaufort Seas are occasionally transited by surface and subsurface military vessels, oceanographic research vessels, and research or rescue ice breaker vessels. Seasonally, smaller personal vessels are used for inter-village travel for subsistence recreation, and commerce. The North Slope Borough's Department of Wildlife Management conducts resource surveys in the region when ice conditions allow.

Oil and gas development has occurred in the Alaskan Arctic since the 1960s, and offshore production of petroleum resources has been continuous since the late 1980s, most of which occurs in State waters. Petroleum development in the Alaskan Beaufort Sea EEZ currently is small compared with other areas in Alaska but increased seismic exploration in the Beaufort and Chukchi Seas may lead to additional production. MMS estimates of recoverable oil and gas resources suggest that continued development of offshore hydrocarbons is likely to occur in future years, both in the Chukchi and the Beaufort Seas.

MMS is currently planning an oil and gas lease sale, Number 193, in the Chukchi Sea Planning Area. A draft EIS has been released on the proposed lease sale (MMS 2006) and the associated seismic survey activities that will accompany this action. MMS has described potential impacts of the proposed lease sale in the draft EIS, and has indicated that the lease sale could occur in November 2007; individual

companies winning tracts made available in that sale could pursue exploratory or production drilling and other activities associated with oil and gas development thereafter.

The existing oil and gas fields at Prudhoe Bay and adjacent areas were developed in the early 1970s and continue to produce hydrocarbons both onshore and offshore in the Beaufort Sea. Along with this development, marine transportation systems have evolved. Ice breaking vessels and tug and barge equipment have traveled along Alaska's Arctic coasts since the development of the Prudhoe Bay oil and gas deposits. This activity will likely continue for years into the future, particularly if the State successfully proceeds with marketing the natural gas currently stored in the Prudhoe Bay regional subsurface hydrocarbon reservoirs.

Ice breaking U.S. Coast Guard (and U.S. Revenue Service) vessels have patrolled the region for over a century, and ice strengthened research vessels occasionally transit the area. Military operations under the ice cover have likely been continuous for many decades. The military has explored options for climate warming trends and increasing military activities in the region (ONR 2001). If warming trends continue, interest will increase in commercial transportation by vessels in the ice free waters of the Beaufort as this would significantly shorten transit times between the west and east coasts of Canada and the U.S.

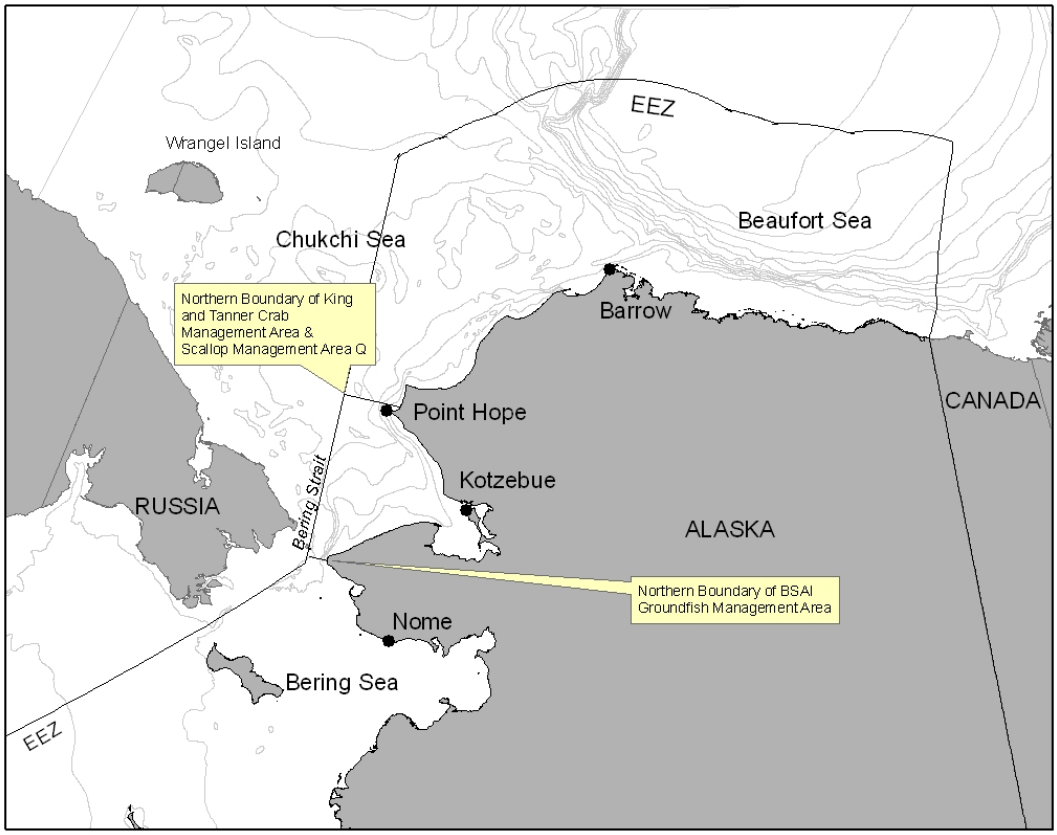

Figure 1. Arctic region with existing FMP management sub area boundaries.