

Fishery Management Plan

for

Bering Sea/Aleutian Islands King and Tanner Crabs



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EXECUTIVE SUMMARY

The Fishery Management Plan (FMP) for the Commercial King and Tanner Crab Fisheries in the Bering Sea/Aleutian Islands (BSAI) was approved by the Secretary of Commerce on June 2, 1989. The FMP establishes a State/Federal cooperative management regime that defers crab management to the State of Alaska with Federal oversight. State regulations are subject to the provisions of the FMP, including its goals and objectives, the Magnuson-Stevens Act national standards, and other applicable federal laws. The FMP has been amended several times since its implementation.

Amendments to the BSAI king and Tanner crab FMP.

1. Defined overfishing
2. Established Norton Sound superexclusive area registration
3. Established a Research Plan
4. Established a moratorium on new vessels
5. Established a vessel License Limitation Program
6. Repealed the Research Plan
7. Revised overfishing definition and updated FMP (proposed)
8. Defined essential fish habitat (proposed)

The king and Tanner crab FMP is a “framework” plan, allowing for long-term management of the fishery without needing frequent amendments. Therefore, the plan is more general than other FMPs, and establishes objectives and alternative solutions instead of selecting specific management measures. Within the scope of the management goal, the FMP identifies seven management objectives and a number of relevant management measures used to meet these objectives. Several management measures may contribute to more than one objective, and several objectives may mesh in any given decision on a case-by-case basis.

FMP Management Goal

The management goal in the FMP is to maximize the overall long-term benefit to the nation of Bering Sea Aleutian Islands (BSAI) king and Tanner crab stocks by coordinated federal and state management, consistent with responsible stewardship for conservation of the crab resources and their habitats.

FMP Management Objectives

1. Biological Conservation Objective. *Ensure the long-term reproductive viability of king and Tanner crab populations.*
2. Economic and Social Objective. *Maximize economic and social benefits to the nation over time.*
3. Gear Conflict Objective. *Minimize gear conflict among fisheries.*
4. Habitat Objective. *Preserve the quality and extent of suitable habitat.*
5. Vessel Safety Objective. *Provide public access to the regulatory process for vessel safety considerations.*
6. Due Process Objective. *Ensure that access to the regulatory process and opportunity for redress are available to interested parties.*
7. Research and Management Objective. *Provide fisheries research, data collection, and analysis to ensure a sound information base for management decisions.*

FMP Management Measures

The FMP defers much of the management of the BSAI crab fisheries to the State of Alaska using the following three categories of management measures:

1. Those that are fixed in the FMP and require a FMP amendment to change;
2. Those that are framework-type measures that the state can change following criteria set out in the FMP; and
3. Those measures that are neither rigidly specified nor frameworked in the FMP.

Management measures in category 1 may be addressed through submission of a proposal to the North Pacific Fishery Management Council (NPFMC). Management measures in categories 2 and 3 may be adopted under state laws subject to the appeals process provided for in the FMP.

Management measures implemented for the BSAI king and Tanner crab fisheries, as defined by the federal crab FMP, by category.

Category 1 (Fixed in FMP)	Category 2 (Frameworked in FMP)	Category 3 (Discretion of State)
* Legal Gear	* Minimum Size Limits	* Reporting Requirements
* Permit Requirements	* Guideline Harvest Levels	* Gear Placement and Removal
* Federal Observer Requirements	* Inseason Adjustments	* Gear Storage
* Limited Access	* Districts, Subdistricts and Sections	* Gear Modifications
* Norton Sound Superexclusive Registration Area	* Fishing Seasons	* Vessel Tank Inspections
	* Sex Restrictions	* State Observer Requirements
	* Closed Waters	* Bycatch Limits (in crab fisheries)
	* Pot Limits	* Other
	* Registration Areas	

Category 1 Management Measures

Legal Gear-The FMP specifically prohibits the use of trawls and tanglenet gear for catching king and Tanner crab because of the high mortality rates that could be inflicted on nonlegal crab.

Permit Requirements-The FMP assumes that all crab fishermen are licenced and vessels are licensed and registered under the laws of the State, and as such, while fishing in the EEZ are subject to all State regulations that are consistent with the FMP, Magnuson-Stevens Act, and other applicable law. Hence, no fishing permits are required for harvesting vessels, except as required by the Moratorium and, in the future, the License Limitation Program.

Federal Observer Requirements - Any vessel fishing for or processing king and Tanner crab in the BSAI shall be required to carry an observer if requested so by the NMFS Regional Administrator.

Limited Access - A system of limited access is a type of allocation of fishing privileges that may be used to promote economic efficiency or conservation. Beginning in 1996, a moratorium on vessels entering the BSAI crab fisheries was implemented. This moratorium will be in effect until superseded by implementation of the License Limitation System that was approved by the Secretary in 1997.

Norton Sound Superexclusive Area Registration - The FMP establishes the Norton Sound section of the Norther District king crab fishery as a superexclusive registration area. Any vessel registered and participating in this fishery would not be able to participate in other BSAI king crab fisheries.

Category 2 Management Measures

Minimum Size Limits-Under the FMP, the state can adjust size limits within the constraints of available information. Biological considerations are used to establish minimum legal size limits to ensure that conservation needs are served. Preference for larger crabs based upon market and other economic considerations is accommodated by industry rather than through regulation.

Guideline Harvest Levels - The FMP authorizes the state to set preseason guideline harvest levels (GHLs), which limit the total annual harvest of crab. Seasons or areas may be closed when the GHL is reached, or earlier or later based on current inseason information.

Inseason Adjustments - When an event occurs inseason that affects preseason predictions, or a preseason prediction proves to be incorrect, compensatory inseason adjustments must be made to keep the management system on track toward meeting the biological and economic objectives of the FMP. The FMP authorizes the state to make inseason adjustments to GHLs, to fishing period lengths, and to close areas under state regulations.

District, Subdistrict, and Section Boundaries - The FMP authorizes the state to adjust district, subdistrict, and section boundaries to manage reasonably distinct stock of crab.

Fishing Seasons- Under the FMP, fisheries should be closed during sensitive biological periods to protect crab from mortality caused by handling and stress when shells are soft, and to maximize meat recovery by delaying harvest until the shells have filled out. Fisheries conducted during sensitive biological periods should prevent any irreparable damage to the stocks.

Sex Restrictions - The FMP authorizes an experimental harvest and processing of females when a surplus is determined to be available; otherwise female crabs may not be taken. The surplus would be dependent on the number of crabs above the threshold amount used in the spawning stock calculation of optimum yield. When a surplus of crabs exists, harvest is by state permit if fishermen provide accurate documentation of harvest rates and location, and processing and marketing results are made available to the management agency.

Pot Limits - The FMP authorizes the state to use pot limits to attain the biological conservation objective and the economic and social objective of the FMP. Pot limits must be designed in a nondiscriminatory manner. Pot limits are warranted to restrict deployment of excessive amounts of gear to attain the biological conservation objective in the event of pot loss to advancing ice cover that may result in wastage. Pot limits may also be warranted to restrict excessive amounts of gear to allow a small guideline harvest level from a depressed stock to attain the economic and social objective within biological conservation constraints.

Registration Areas - The FMP adopts existing state registration areas within the BSAI fishery management unit. The management unit is divided by the state into three king crab registration areas - Bering Sea, Bristol Bay, and Aleutian Islands and one Tanner crab registration area - Westward. Registration areas may be further divided into fishing districts, subdistricts, and sections for purposes of management and reporting. State regulations require vessels to register for fishing in these areas, and may require vessels to register for specific districts within a registration area. Registration areas may be designated as either exclusive or nonexclusive. Vessels can register for any one exclusive area but cannot fish in any other exclusive area during the registration year. Vessels can fish any or all nonexclusive areas.

Closed Waters - The FMP recognizes the current state regulations that prohibit commercial fishing for king crab in waters within 10 miles of mean lower low water around St. Lawrence, King, and Little Diomed

Islands. The FMP also recognizes the state closure to protect the Norton Sound subsistence king crab fishery. The state may designate new closed water areas or expand or reduce existing state closed water areas in order to meet state subsistence requirements.

Category 3 Management Measures

Reporting Requirements - Reporting requirements for catchers and processors are important component in achieving the biological conservation, economic, social, research, and management objectives of the FMP.

Gear Placement and Removal - Placement of unbaited gear, with doors secured open on the fishing grounds before and after a season, has been allowed within certain limits.

Gear Storage - Crab pots are generally stored on land or in designated storage areas at sea.

Vessel Tank Inspections - Vessel tank (or live-hold) and freezer inspections are required before the opening of a king or Tanner crab fishing season to meet the legal requirements of the states landing laws, provide effort information, and provide for a fair start to the fishery.

Gear Modifications - Pots are the specified legal commercial gear for capturing crab in the BSAI area. An escape mechanism is required on all pots. This mechanism will terminate a pots catching and holding ability in case the pot is lost. Escape areas may be incorporated or mesh size adjusted to allow the escape of nonlegal crabs. Various devices may be added to pots to prevent capture of other species.

Bycatch Limits - The state may implement bycatch limits of crab in crab fisheries managed under the FMP.

State Observer Requirements - The state may place observers aboard crab fishing or processing vessels to obtain catch, effort, and biological data. The state currently has a mandatory observer requirement on all catcher/processors and floating processors participating in the king, Tanner, and snow crab fisheries as a condition of obtaining a processing permit. It is important that the state observer program and any future federal observer program be coordinated.

Other - State government is not limited to only the management measures described in the FMP. Implementation of other management measures not described in the FMP must be consistent with the FMP, the Magnuson-Stevens Act, and other applicable federal laws, and may occur only after consultation with the NPFMC. Other management measures the state may implement are subject to the review and appeals procedures described in the FMP.

1.0 INTRODUCTION

The king and Tanner crab populations of Alaska have had a history of extensive commercial exploitation for 30 or more years. That history is characterized by spectacular fluctuations in crab abundance and catch, and by the development of fisheries for previously unexploited stocks.

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801, et seq.) (Magnuson-Stevens Act) requires that a fishery management plan (FMP) be prepared for any fishery that requires conservation and management. On December 7, 1984, the North Pacific Fishery Management Council (Council) adopted findings regarding fishery management policy which address the need for Federal management of fisheries off Alaska. The history of variation in the abundance of king and Tanner crabs off Alaska, and the interstate nature of the crab fleet and heavy capitalization in crab fisheries, particularly in the Bering Sea, create a situation which demands the Federal management oversight contemplated by the Magnuson Act and particularly Findings 2, 3, and 6, of the Council, as follows:

2. The fishery resources off Alaska are the property of the United States and should be managed for the benefit of everyone in the U.S. in accordance with the provisions of the Magnuson Act.
3. The common property nature of fishery resources tends to cause overcapitalization in the industry, increases the chances of resource depletion, and decreases the incentive for conservation of the resource by the users.
6. The lack of timely and adequate data has hampered Federal decision-making and management to the detriment of the resource and the economy (see page 1-4 for reasons for suspending Federal Tanner crab FMP).

Pursuant to the Magnuson-Stevens Act, the Council has responsibility for preparing FMPs and amendments to FMPs for the conservation and management of fisheries in the Exclusive Economic Zone (EEZ) off Alaska.

In January 1977, the Secretary of Commerce (Secretary) adopted and implemented a Preliminary Fishery Management Plan (PMP) for the foreign king and Tanner crab fisheries in the eastern Bering Sea (U.S. Department of Commerce, 1977). Under the PMP, no foreign fishing for king crab was allowed and restrictions were continued on the foreign Tanner crab fishery.

After this initial action, the decision was made to coordinate Federal management of crab fisheries with the State of Alaska (State). This decision was based on a desire to optimize the use of limited State and Federal resources and prevent duplication of effort by making use of the existing State management regime. The State has managed king crab fisheries inside and outside State waters since statehood in 1959. It also managed domestic Tanner crab fisheries since their inception in the Bering Sea in 1968, in the Aleutians in 1973, and jointly managed the Tanner crab fishery in the Bering Sea and Aleutian Islands (BS/AI) area and the Gulf of Alaska (GOA) from December 6, 1978, until November 1, 1986, in accordance with the FMP for the Commercial Tanner Crab Fishery off the Coast of Alaska. The Alaska Board of Fisheries (Board)¹ is currently responsible for regulating and establishing policy for management of the crab fisheries for vessels regulated under the laws of the State. The State's regulatory system provides for extensive public input, ensures necessary annual revisions, is flexible enough to accommodate changes in resource abundance and resource utilization patterns, and is familiar to crab fishermen and processors. The State has made a

¹ Hereafter the term "Board" will be used to denote the "Alaska Board of Fisheries" or its successor entities.

substantial investment in facilities, communications, information systems, vessels, equipment, experienced personnel capable of carrying out extensive crab management, and research and enforcement programs.

The Tanner crab FMP was approved by the Secretary and published in the Federal Register on May 16, 1978, (43 FR 21170) under the authority of the Magnuson-Stevens Act. Final implementing regulations applicable to vessels of the United States were published on December 6, 1978, (43 FR 57149). Final implementing regulations applicable to vessels of foreign nations were published on December 19, 1978, (43 FR 59075, 43 FR 59292). The Tanner crab FMP was amended nine times, most recently on September 12, 1984, (49 FR 35779). To achieve its conservation and management objectives and to coordinate management effectively with the State, the FMP adopted many of the management measures employed by the State. In October 1981, the Council and the State adopted a joint statement of principles for the management of domestic king crab fisheries in the BS/AI area (see Appendix A). This agreement formed the basis for interim management during development of the BS/AI king crab FMP. A notice of availability of the FMP was published on July 19, 1984, (49 FR 29250). A final rule was published on November 14, 1984, (49 FR 44998). Although the Federal regulations implementing framework provisions of the FMP were effective December 2, 1984, actual implementation of management measures under the FMP was deferred pending acceptance of the delegation of authority by the Governor of Alaska. In a letter dated June 20, 1986, the Governor declined the delegation of authority. His principal objections to the delegation were: excessive Federal oversight, uncertainties in the regulatory approval process, unnecessary governmental duplication, and concerns for the degree to which discretionary authority of the Board would be constrained.

At its March 1986 meeting, the Council voted to suspend the implementing regulations for the Tanner crab FMP because it did not provide for management based on the best available scientific information, provide for timely coordination of management with the State, or conform to several of the Magnuson-Stevens Act's national standards. Following the March meeting, the Council published management alternatives for public comment. The three major alternatives were: (1) State management with no Federal FMP, (2) an FMP that delegates management to the State; or (3) an FMP with direct Federal management. Three overriding concerns were evident in the public comments reviewed by the Council in September. Any management arrangement must provide efficient and effective management, conservation of the crab stocks, and fair access by all user groups to management's decision-making. The Council, at its September 24-26, 1986 meeting, appointed a workgroup of both industry representatives and Council members to develop a comprehensive management approach for crab fisheries off Alaska that would address these concerns.

On November 1, 1986, the National Oceanic and Atmospheric Administration (NOAA) promulgated an emergency interim rule, at the request of the Council, to repeal the regulations implementing the Tanner crab FMP for a period of 90 days (November 1, 1986, through January 29, 1987, (51 FR 40027).

On November 20, 1986, the Council workgroup met and recommended repeal of the Tanner crab FMP and its implementing regulations. The workgroup recommended that the Council's crab plan team draft a new FMP that includes both king and Tanner crabs, limits its scope to the BS/AI area, and defers management to the State to the maximum extent possible.

At its December 1986 meeting, the Council voted to request extension of the emergency interim rule repealing regulations implementing the Tanner crab FMP for a second 90-day period (January 30 through April 29, 1987). The Council also accepted the recommendation of the Council workgroup to begin preparation of a new king and Tanner crab FMP that would replace both previous FMPs for the BS/AI area, but not address king and Tanner crab fisheries in the Gulf of Alaska for the present time. The Council also determined that the 180-day duration of the emergency interim rule was insufficient to complete a study of management options, prepare a new FMP, and complete the Secretarial review process. The Council, therefore, requested the Secretary to prepare and implement a Secretarial amendment repealing the Tanner

crab FMP and its implementing regulations, to allow time for preparation, approval, and implementation of a new FMP for king and Tanner crabs in the BS/AI area, and to prevent reinstatement of the Tanner crab FMP implementing regulations which did not conform to the Magnuson-Stevens Act national standards. A final rule was published on May 11, 1987, (52 FR 17577) implementing the Secretarial Amendment repealing the Tanner crab FMP effective April 29, 1987.

This FMP is written as a cooperative FMP in an attempt to avoid problems that were encountered in the previous Tanner and king crab FMPs. It contains a general management goal with seven management objectives identified, and relevant management measures required to meet the objectives that are presented. Several management measures may contribute to more than one objective, and several objectives may mesh in any given decision on a case-by-case basis.

The management measures are ones that have been used in managing the king and Tanner crab fisheries of the BS/AI area and have evolved over the history of the fishery. Additional analysis is encouraged in the FMP to determine if alternative management measures may be more appropriate.

This FMP attempts to avoid unnecessary duplication of effort. It defers much of the management to the State, while the most controversial measures are fixed in the FMP and require Plan amendment to change.

Federal management oversight to determine if an action is consistent with this FMP, the Magnuson-Stevens Act, and other applicable Federal law is also provided in the form of a review and appeals procedure for both State preseason and in-season actions and through formation of a Council Crab Interim Action Committee.

2.0 PROCEDURES FOR FMP IMPLEMENTATION

Implementation of this FMP requires an annual area management report discussing the current biological and economic status of the fisheries, guideline harvest level (GHL) ranges, and support for different management decisions or changes in harvest strategies as outlined on page 2-11. The Board currently receives proposals for king and/or Tanner crab regulation changes every third year, although the schedule may be modified if necessary. Management decision-making for king and Tanner crab stocks currently follows a relatively predictable schedule. The procedure for managing the fishery and how it encompasses research and fishing input is described in detail in Otto (1985) and Otto (1986) with respect to king crabs, and for this FMP, are illustrated in Figure 2.1. The precise scheduling of the various stages of this procedure may vary slightly from year to year.

The Secretary (through the Council and the National Marine Fisheries Service (NMFS) Alaska Regional Office) and the State have established the following protocol which describes the roles of the Federal and State governments:

1. The Council will develop an FMP (and future amendments) to govern management of king and Tanner crab fisheries in the EEZ of the BS/AI, prescribing objectives and any management measures found by the Secretary to be necessary for effective management. The State will promulgate regulations applicable to all vessels registered with the State governing the fisheries in the EEZ that are consistent with the FMP, Magnuson-Stevens Act, and other applicable Federal law. The FMP contains three types of management measures: (1) specific Federal management measures that require an FMP amendment to change, (2) framework type management measures, with criteria set out in the FMP that the State must follow when implementing changes in State regulations, and (3) measures that are neither rigidly specified nor frameworked in the FMP, and which may be freely adopted or modified by the State, subject to an appeals process or other Federal law (see Chapter 8).
2. Representatives from the Council, NMFS, and NOAA General Counsel will participate in the State's development of regulations for management of king and Tanner crabs in the BS/AI area, including direct participation in the Board meeting for the purpose of assisting the State in determining the extent to which proposed management measures are consistent with the FMP, Magnuson-Stevens Act, and other applicable Federal law. However, these representatives will not vote on the various management measures. The Secretary will review measures adopted by the State to determine if they are consistent with the FMP, the Magnuson-Stevens Act and its national standards in accordance with Chapters 9 and 10.
3. The Secretary will issue Federal regulations to supersede in the EEZ any State laws that are inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law. The Secretary will consider only those appeals asserting that a State law is inconsistent with the Magnuson-Stevens Act, the FMP, or other applicable Federal law (see Chapter 9).
4. The Alaska Department of Fish and Game (ADF&G) will have responsibility for developing the information upon which to base State fishing regulations, with continued assistance from NMFS. In carrying out this responsibility, ADF&G will consult actively with the NMFS (Alaska Regional Office and Northwest and Alaska Fisheries Center), NOAA General Counsel, the plan team, and other fishery management or research agencies in order to prevent duplication of effort and assure consistency with the Magnuson-Stevens Act, the FMP, and other applicable Federal law.
5. The FMP provides that the Commissioner of ADF&G, or his designee, after consultation with the NMFS Regional Administrator, or his designee, may open or close seasons or areas by means of emergency

orders (EO) authorized under State regulations. Interested persons may appeal these actions to the Secretary for a determination that the emergency orders are consistent with the Magnuson-Stevens Act, the FMP, and other applicable Federal law. If the Secretary determines that the State action is inconsistent with the above, the Secretary will issue a Federal regulation to supersede the State EO in the EEZ (see Chapter 10).

6. A special means of access to the BS/AI king and Tanner crab regulatory process for nonresidents of Alaska will be provided through an advisory committee. This Pacific Northwest Crab Industry Advisory Committee (PNCIAC) shall be sanctioned by and operate under the auspices of the Council. This is necessary because State law does not provide for the formation of a Board advisory committee located outside the State. This PNCIAC shall be recognized by the State as occupying the same consultative role on preseason and in-season management measures as all other existing State of Alaska Fish and Game Advisory Committees, no more and no less. The Council shall establish general guidelines and membership qualifications for the advisory group which shall be substantially similar to those guidelines established by the State pertaining to existing advisory committees. Within this framework the advisory committee shall establish its own by-laws and rules of procedure.

The PNCIAC shall be industry funded, but may request staff support from the Council, NMFS, and ADF&G as needed. The PNCIAC shall meet at appropriate times and places throughout the year to review and advise the State and the Council on crab management issues, stock status information, and biological and economic analyses relating to the BS/AI king and Tanner crab fisheries. In addition, the PNCIAC shall report to the Council on any relevant crab management issue by filing reports as appropriate. The Council will also review reports as appropriate from other crab advisory committees that normally report to the Board. The PNCIAC shall review and advise the State on proposed preseason management measures. During the fishing season, the PNCIAC, on the same basis as any other Board advisory committee, shall monitor ADF&G reports and data, may recommend to ADF&G the need for in-season adjustments, and may advise on decisions relating to in-season adjustments and “emergency-type” actions. The PNCIAC may request review of any relevant matter to the Crab Interim Action Committee (discussed below) and may bring petitions and appeals in its own name pursuant to Chapters 9 and 10 of this FMP, as may any other Board advisory committee.

7. A Crab Interim Action Committee (CIAC) shall be established by the Council for the purpose of providing oversight of this FMP and to provide for Council review of management measures and other relevant matters. The CIAC shall be composed of the following members:

- Regional Administrator, NMFS, or his designee
- Commissioner, ADF&G, or his designee
- Director, Washington State Department of Fisheries, or his designee

There are three types of review the CIAC may engage in:

- A. Category 1—Appeals of a Preseason Management Decision

In accordance with Chapter 9 of the FMP, any appeal of a preseason management decision that is rejected by the Board and subsequently appealed to the Secretary will be reviewed by the CIAC prior to the appeal being reviewed by the Secretary. The CIAC will have no authority to grant or reject the appeal, but shall comment upon the appeal for the benefit of the Secretary.

- B. Category 2—Appeals of an In-season Management Decision

In accordance with Chapter 10 of the FMP, the Secretary will, to the extent possible when reviewing any appeal of an in-season management decision, communicate with the CIAC in advance of making his decision whether to grant or reject the appeal in order to solicit the CIAC's comments on the management decision at issue.

C. Category 3—Other

This category includes preseason management measures, in-season adjustments, and other matters relative to this FMP that fishery participants believe warrant Council action or attention, and which fall outside the Council's normal schedule for reviewing the FMP. The CIAC will not review any management decision or action that is concurrently being reviewed through the appeals process as outlined in Chapters 9 and 10. Such requests for review shall clearly identify the management measures to be reviewed and shall contain a concise statement of the reason(s) for the request.

The CIAC shall function similarly to the Council's "Interim Action Committee." The CIAC shall consider each request for review to determine whether the management measure(s) or other relevant matter(s) is consistent with this FMP (including compliance with framework criteria), the Magnuson-Stevens Act, and other Federal law. Following its review, the CIAC will comment on the appeal in the case of Category 1 and 2 reviews; may determine no action is necessary on the Category 3 request; or, for any of the Categories, recommend the issue to the Council for full Council consideration. In all cases, the CIAC shall issue its findings in writing.

8. The State will provide written explanations of the reasons for its decisions concerning management of crab fisheries. For emergency orders, the current EO written justification provided by the State meets this requirement.
9. An annual area management report to the Board discussing current biological and economic status of the fisheries, GHL ranges, and support for different management decisions or changes in harvest strategies will be prepared by the State (ADF&G lead agency), with NMFS and crab plan team input incorporated as appropriate. This report will be available for public comment and presented to the Council on an annual basis. GHGs will be revised when new information is available. Such information will be made available to the public.
10. Federal enforcement agents (NOAA) and the U.S. Coast Guard (DOT) shall work in cooperation with the State to enforce king and Tanner crab regulations in the BS/AI area.

Figure 2.1. Annual cycle of management decision making for king and Tanner crab stocks and its interaction with fisheries and resource assessment. Regulatory proposals are addressed every three years by the Alaska Board of Fisheries.

3.0 FINDING OF CONSISTENCY OF EXISTING STATE REGULATIONS WITH THE FMP, THE MAGNUSON-STEVENSON ACT, AND OTHER APPLICABLE FEDERAL LAW

Prior to implementation of the FMP, state laws and regulations are subject to mandatory review by the Secretary. Between the date the Secretary approves this FMP and the next regularly scheduled meeting of the Board concerning crab management, any member of the public may petition any existing regulation to the State and, if unsuccessful, to the Secretary, in accordance with the procedure set forth in Chapter 9 herein. If the Secretary finds, on the basis of an appeal, or as a result of mandatory review, that any existing State law or regulation is inconsistent with the Magnuson-Stevens Act, the FMP, or applicable Federal law, he will publish Federal rules in the FEDERAL REGISTER superseding the State laws or regulations in the EEZ.

4.0 DEFINITIONS OF TERMS

The following terms are used extensively throughout this FMP:

Maximum sustainable yield (MSY) is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. MSY was estimated from the best information available. Several BSAI crab stocks have insufficient scientific data to estimate biological reference points and stock dynamics are inadequately understood.

MSY control rule means a harvest strategy which, if implemented, would be expected to result in a long-term average catch approximating MSY. The MSY control rule for king and Tanner crabs is the mature biomass of a stock under prevailing environmental conditions, or proxy there of, exploited at a fishing mortality rate equal to a conservative estimate of natural mortality.

MSY stock size is the average size of the stock, measured in terms of mature biomass, or a proxy there of, under prevailing environmental conditions. It is the stock size that would be achieved under the MSY control rule. It is also the minimum standard for a rebuilding target when remedial management action is required.

Maximum fishing mortality threshold is defined by the MSY control rule, and is expressed as the fishing mortality rate. The MSY fishing mortality rate $F_{msy} = M$, a conservative natural mortality value set equal to 0.20 for all species of king crab, and 0.30 for all *Chionoecetes* species.

Minimum stock size threshold, is whichever is greater: one half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock or stock complex were exploited at the maximum fishing mortality threshold. The minimum stock size threshold is expressed in terms of mature biomass.

Optimum Yield (OY) The term ‘optimum’, with respect to the yield from a fishery, means the amount of crab which --

- (a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
- (b) is prescribed as such on the basis of maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and
- (c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Registration year is defined as June 28 through June 27 for king crab, and August 1 through July 31 for Tanner crab.

Guideline harvest level (GHL) means the preseason estimated level of allowable fish harvest which will not jeopardize the sustained yield of the fish stocks. A GHL may be expressed as a range of allowable harvests for a species or species group of crab for each registration area, district, subdistrict, or section.

Overfishing is defined as any rate of fishing mortality in excess of F_{msy} for king and Tanner crab stocks in the Bering Sea/Aleutian Islands management area.

Registration (statistical) area. State regulations define a registration area as all the waters within the registration area which are territorial waters of Alaska; and an adjacent exclusive economic zone comprised of all the waters adjacent to a crab registration area and seaward to a boundary line drawn in such a manner that each point on the line is 200 nautical miles from the baseline from which the territorial sea is measured.

Commercial fishing means the taking, fishing for, or possession of fish, shellfish, or other fishery resources with the intent of disposing of them for profit, or by sale, barter, trade, or in commercial channels.

Subsistence Uses means the noncommercial, customary and traditional uses of wild, renewable resources by resident domiciled in a rural area of the state for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation, for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption, and for the customary trade, barter, or sharing for personal or family consumption.

5.0 DESCRIPTION OF FISHERY MANAGEMENT UNIT

This FMP applies to commercial fisheries for red king crab Paralithodes camtschaticus, blue king crab P. platypus, golden (or brown) king crab Lithodes aequispinus, scarlet (or deep sea) king crab Lithodes couesi, and Tanner crab Chionoecetes bairdi, snow (or queen) crab C. opilio, grooved Tanner crab, C. tanneri, and triangle Tanner crab C. angulatus in the BS/AI area. The common and scientific names used in this FMP are those included in Williams et al. (1988), appropriately amended, with secondary common names sometimes used in the fishery included in parentheses. Members of the genus Chionoecetes are often collectively referred to as Tanner crabs; where confusion might arise the name bairdi Tanner crab is used to distinguish the species. Through 1989, commercial landings had only been reported for red, blue, and golden king crab; and Tanner, snow and hybrids of these two species. The other species of king and Tanner crabs are included in this FMP because the State now provides for a fishery for these species under the conditions of a permit issued by the commissioner of ADF&G. Other crab species may be added at a later time.

The BS/AI area is defined 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) (Figure 5.1). The 1988 agreement between the two parties shifted the boundary westward from the convention line of 1867. The U.S. ratified the agreement in 1990, but the Russian Federation had yet to do so as of February 1998. Nevertheless, the Russian Federation is provisionally applying the maritime boundary agreement and the U.S. position is that the maritime boundary is in force.

The BS/AI area contains several stocks of king and Tanner crabs (see Appendix E) that are discrete from stocks in the Gulf of Alaska. In addition, the physical environment of this area possesses attributes distinguishable from crab grounds in the Gulf of Alaska. Stocks of king and Tanner crabs in the Gulf of Alaska are not included in this management unit and will be managed by the State until the Council prepares an FMP for those stocks.

The Council considered the following in determining the boundaries for the management unit:

1. Crab fisheries outside and inside the BS/AI management unit are clearly different in a number of important respects. First, historically the Gulf of Alaska fisheries rely largely on single species while the BS/AI fisheries are concerned with multiple species (i.e. mainly red king crab in the Gulf of Alaska vs. red, blue, and golden king crabs in the BS/AI area, and C. bairdi in the Gulf of Alaska vs. C. opilio and C. bairdi in the BS/AI area). Second, there is a difference in composition of resident and nonresident fishermen between the two areas (the Gulf of Alaska fisheries have been conducted mostly by Alaska residents and the BS/AI fisheries mostly by residents of Washington and Oregon). Third, the composition and mix of vessel size classes is different in the two areas; the BS/AI area is traditionally fished by larger vessels. Fourth, a greater proportion of the king and Tanner crab fisheries in the Gulf of Alaska occur within State waters than do the king and Tanner crab fisheries in the Bering Sea.
2. The coordination of king and Tanner crab management in the BS/AI area with the BS/AI groundfish FMP was another consideration. This is especially important with respect to incidental catch issues.

Figure 5.1

6.0 SPECIFICATION OF MAXIMUM SUSTAINABLE YIELD, OPTIMUM YIELD, MINIMUM STOCK SIZE THRESHOLDS, OVERFISHING LEVELS, ANNUAL HARVEST, AND ANNUAL PROCESSING

The total allowable level of harvest and processing depends upon specification of MSY and OY. Although the estimate of MSY is of questionable utility in managing crab stocks due primarily to highly variable recruitment, MSY has been estimated on the basis of the best scientific data available for each species and stock of king and Tanner crab covered in this FMP.

Optimum yield (OY) is defined for this FMP as the amount of crab that may be legally landed under the requirements of this FMP and under the laws of the State of Alaska that have not been superseded by the Secretary pursuant to this FMP. The term ‘optimum’, with respect to the yield from a fishery, means the amount of crab which --

- (a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
- (b) is prescribed as such on the basis of maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and
- (c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Optimum yield (OY) is defined for this FMP as the amount of crab that may be legally landed under the requirements of this FMP and under the laws of the State of Alaska that have not been superseded by the Secretary pursuant to this FMP. The term ‘optimum’, with respect to the yield from a fishery, means the amount of crab which –

- (a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
- (b) is prescribed as such on the basis of maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and
- (c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Maximum sustainable yield (MSY) is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. MSY is estimated from the best information available. Proxy stocks are used for BSAI crab stocks where insufficient scientific data exists to estimate biological reference points and stock dynamics are inadequately understood. MSY for crab species is computed on the basis of the estimated biomass of the mature portion of the male and female population or total mature biomass (MB) of a stock. A fraction of the MB is considered sustained yield (SY) for a given year and the average of the SYs over a suitable period of time is considered the MSY.

Overfishing: The term “overfishing” and “overfished” mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce MSY on a continuing basis. Overfishing is defined for king and Tanner crab stocks in the BSAI management area as any rate of fishing mortality in excess of the maximum fishing mortality threshold, F_{msy} , for a period of 1 year or more. Should the actual size of the stock in a given year fall below the minimum stock size threshold, the stock is considered overfished. If a stock or stock complex is considered overfished or if overfishing is occurring, the Secretary will notify the Council to take action to rebuild the stock or stock complex.

MSY control rule means a harvest strategy which, if implemented, would be expected to result in a long-term average catch approximating MSY. The MSY control rule for king and Tanner crabs is the mature

biomass of a stock under prevailing environmental conditions, or proxy thereof, exploited at a fishing mortality rate equal to a conservative estimate of natural mortality.

MSY stock size is the average size of the stock, measured in terms of mature biomass of a stock under prevailing environmental conditions, or a proxy thereof. It is the stock size that would be achieved under the MSY control rule. It is also the minimum standard for a rebuilding target when remedial management action is required. For king and Tanner crab, the MSY stock size is the average mature biomass observed over the past 15 years, from 1983 to 1997.

Maximum fishing mortality threshold (MFMT) is defined by the MSY control rule, and is expressed as the fishing mortality rate. The MSY fishing mortality rate $F_{msy} = M$, is a conservative natural mortality value set equal to 0.20 for all species of king crab, and 0.30 for all *Chionoecetes* species.

Minimum stock size threshold (MSST) is whichever is greater: one half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock or stock complex were exploited at the maximum fishing mortality threshold. The minimum stock size threshold is expressed in terms of mature biomass of a stock under prevailing environmental conditions, or a proxy thereof.

Table 6.1. MSST, MSY, OY, and the MSY control rule estimates for BSAI king and Tanner crab stocks. Estimated values are in millions of pounds. (NA indicates that insufficient data exists at this time to estimate the value)

Stock	MSST	MSY	OY range	MSY control rule
Adak red king	NA	1.5	0 - 1.5	0.2
Bristol Bay red king	44.8	17.9	0 - 17.9	0.2
Dutch Harbor red king	NA	NA	NA	0.2
Pribilof Islands red king	3.3	1.3	0 - 1.3	0.2
Norton Sound red king	NA	0.5	0 - 0.5	0.2
Pribilof Islands blue king	6.6	2.6	0 - 2.6	0.2
St Matthew blue king	11.0	4.4	0 - 4.4	0.2
St Lawrence blue king	NA	0.1	0 - 0.1	0.2
Aleutian Is. golden king	NA	15.0	0 - 15.0	0.2
Pribilof Is. golden king	NA	0.3	0 - 0.3	0.2
St. Matthew golden king	NA	0.3	0 - 0.3	0.2
Aleutian Is. scarlet king	NA	NA	NA	0.2
EBS scarlet king	NA	NA	NA	0.2
TOTAL king crab		43.9	0 - 43.9	
E. Aleutian Is. Tanner	NA	0.7	0 - 0.7	0.3
EBS Tanner	94.8	56.9	0 - 56.9	0.3
W. Aleutian Is. Tanner	NA	0.4	0 - 0.4	0.3
TOTAL Tanner crab		58.0	0 - 58.0	
EBS snow	NA	276.5	0 - 276.5	0.3
TOTAL snow crab		276.5	0 - 276.5	
E. Aleutian Is. angulatus	NA	1.0	0 - 1.0	0.3
EBS angulatus	NA	0.3	0 - 0.3	0.3
E. Aleutian Is. tanneri	NA	1.8	0 - 1.8	0.3
EBS tanneri	NA	1.5	0 - 1.5	0.3
W. Aleutian Is. Tanneri	NA	0.2	0 - 0.2	0.3
TOTAL other Tanners		4.8	0 - 4.8	

Pursuant to the Magnuson-Stevens Act, Section 201(d), there is no allowable level of foreign fishing or joint venture processing for the fisheries covered by this FMP. Fishing vessels of the United States will harvest the OY. As such none of the OY will be made available for foreign fishing. Similarly, United states fish processors have more than enough capacity to process the OY. The U.S. fishing and fish processing industries have achieved OY since 1981.

Incidental bycatch of king and Tanner crabs in trawl fisheries is currently regulated by limiting catches of these “prohibited species” by the BS/AI groundfish FMP and will be coordinated with implementation of this FMP and with stock conditions within the BS/AI area. The Council will provide estimates of levels of king and Tanner crab bycatch in groundfish fisheries prosecuted in the BS/AI management unit in a timely manner to ADF&G and the Board to allow the State to account for these removals in management of the directed crab fisheries.

7.0 GOAL AND OBJECTIVES

The Council, in cooperation with the State, is committed to developing a long-range plan for managing BS/AI crab fisheries that will promote a stable regulatory environment for the seafood industry and maintain the health of the resources and environment. The management system conforms to the Magnuson-Stevens Act's national standards as listed in Appendix B and the comprehensive Statement of Goals adopted by the Council on December 7, 1984.

7.1 Management Goal

The management goal is to maximize the overall long-term benefit to the nation of BS/AI stocks of king and Tanner crabs by coordinated Federal and State management, consistent with responsible stewardship for conservation of the crab resources and their habitats.

7.2 Management Objectives

Within the scope of the management goal, seven specific objectives have been identified. These relate to stock condition, economic and social objectives of the fishery, gear conflicts, habitat, weather and ocean conditions affecting safe access to the fishery, access of all interested parties to the process of revising this FMP and any implementing regulations, and necessary research and management. Each of these objectives requires relevant management measures (see Chapter 8). Several management measures may contribute to more than one objective, and several objectives may mesh in any given management decision on a case-by-case basis.

7.2.1 Biological Conservation Objective: Ensure the long-term reproductive viability of king and Tanner crab populations.

To ensure the continued reproductive viability of each king and Tanner crab population through protection of reproductive potential, management must prevent overfishing (see definition in Chapter 4). Management measures may also be adopted to address other biological concerns such as: restricting harvest of crabs during soft shell periods and maintaining low incidental catch of nonlegal crab. Other factors, including those currently under investigation, such as the effects of cold air temperatures on incidentally-caught egg bearing females and their resultant larvae (Carls 1987), could also be considered. The maintenance of adequate reproductive potential in each crab stock will take precedence over economic and social considerations.

7.2.2 Economic and Social Objective: Maximize economic and social benefits to the nation over time.

Economic benefits are broadly defined to include, but are not limited to: profits, income, employment, benefits to consumers, and less tangible or less quantifiable social benefits such as the economic stability of coastal communities. To ensure that economic and social benefits derived for fisheries covered by this FMP are maximized over time, the following will be examined in the selection of management measures:

1. The value of crab harvested (adjusted for the amount of crab dying prior to processing and discarded, which is known as deadloss) during the season for which management measures are considered,
2. The future value of crab, based on the value of a crab as a member of both the parent and harvestable stock,

3. Subsistence harvests within the registration area, and
4. Economic impacts on coastal communities.

This examination will be accomplished by considering, to the extent that data allow, the impact of management alternatives on the size of the catch during the current and future seasons and their associated prices, harvesting costs, processing costs, employment, the distribution of benefits among members of the harvesting, processing and consumer communities, management costs, and other factors affecting the ability to maximize the economic and social benefits as defined in this section.

Social benefits are tied to economic stability and impacts of commercial fishing associated with coastal communities. While social benefits can be difficult to quantify, economic indices may serve as proxy measures of the social benefits which accrue from commercial fishing. In 1984, 7 percent of total personal income or 27 percent of total personal income in the private sector in Alaska was derived from commercial fishing industries. However, in coastal communities most impacted by commercial fishing in the BS/AI area, the impacts were much greater. In 1984, 47 percent of the total personal income earned in the Southwest Region of Alaska (Aleutian Islands, Bethel, Bristol Bay Borough, Dillingham, and Wade Hampton Census Areas) or 98 percent of the total personal income in the private sector for this region was derived from commercial fishing activities (Berman and Hull 1987). Some coastal communities in this region are even more heavily dependent on commercial fish harvesting and/or processing than this. On a statewide basis, shellfish accounted for 21 percent of the total exvessel value of commercial fish harvested in Alaska in 1984. Therefore, social and economic impacts of BS/AI crab fisheries on coastal communities can be quite significant and must be considered in attempts to attain the economic and social objective.

Subsistence harvests must also be considered to ensure that subsistence requirements are met as required by law. Basically, State law requires that a reasonable opportunity be provided for subsistence use before other consumptive use is allowed. It is very difficult to evaluate the economic impact of subsistence fishing. Yet, fish, shellfish, and game harvested by subsistence users to provide food for the family or social group can greatly exceed the economic value of the product itself (R. Wolfe, ADF&G, Division of Subsistence, personal communication). Data on subsistence red king crab fishing have been obtained in the Norton Sound-Bering Strait area of the BS/AI management unit (Thomas 1981; Magdanz 1982, 1983; and Magdanz and Olanna 1984, 1985), and declines in subsistence harvests have been associated with changes in crab distributions, poor ice conditions, and reductions in crab stocks due to commercial harvest and poor recruitment (ADF&G 1986).

7.2.3 Gear Conflict Objective: Minimize gear conflict among fisheries.

Management measures developed for the king and Tanner crab fisheries will take into account the interaction of those fisheries, and the people engaged in them, with other fisheries. To minimize gear conflict among fisheries, the compatibility of different types of fishing gear and activities on the same fishing grounds should be considered. King and Tanner crab fisheries are conducted with pots, which are stationary gear. Many other fisheries in the fishery management unit, both domestic and foreign, are conducted with mobile trawl or seine gear. Seasons, gear storage, and fishing areas may be arranged to eliminate, insofar as possible, conflicts between gear types and preemption of fishing grounds by one form of gear over another.

7.2.4 Habitat Objective: Preserve the quality and extent of suitable habitat.

The quality and availability of habitat supporting the BS/AI area king and Tanner crab populations are important. Fishery managers should strive to ensure that optimal habitat is available for juvenile and breeding, as well as the exploitable, segments of the population. It also will be important to consider the

potential impact of crab fisheries on other fish and shellfish populations. The BS/AI habitat of king and Tanner crabs, and the potential effects of changes in that habitat on the fishery are described in Appendix F of this FMP.

Those involved in both management and exploitation of crab resources will actively review actions by other human users of the BS/AI area to ensure that their actions do not cause deterioration of habitat. Any action by a State or Federal agency potentially affecting crab habitat in an adverse manner may be reviewed by the Council for possible action under the Magnuson-Stevens Act. The Council will also consider the effect on crab habitat of its own management decisions in other fisheries.

7.2.5 Vessel Safety Objective: Provide public access to the regulatory process for vessel safety considerations.

Upon request, and when appropriate, the Council and the State shall consider, and may 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 safety of vessels.

7.2.6 Due Process Objective: Ensure that access to the regulatory process and opportunity for redress are available to all interested parties.

In order to attain the maximum benefit to the nation, the interrelated biological, economic and social, habitat, and vessel safety objectives outlined above must be balanced against one another. A continuing dialogue between fishery managers, fishery scientists, fishermen, processors, consumers, and other interested parties is necessary to keep this balance. Insofar as is practical, management meetings will be scheduled around fishing seasons and in places where they can be attended by fishermen, processors, or other interested parties.

Access to the FMP development and regulatory process is available through membership in a Council work group, testimony on the record before the Council's Advisory Panel or SSC, or before the Council itself, testimony before the Board, conversations with members of the plan team or officials of regulatory agencies, and by commenting on the FMP, any subsequent amendments and any regulations proposed for their implementation.

This FMP defers much of day-to-day crab management to the State. Means of access to the regulatory process at the State level and of redress of perceived wrongs by the State are necessary. Appendix C describes the State management system and mechanisms for public input. Chapters 9 and 10 of this FMP contain procedures for challenge of State laws or regulations regarding management of these fisheries alleged to be inconsistent with the Magnuson-Stevens Act, the FMP, or any other applicable Federal law.

7.2.7 Research and Management Objective: Provide fisheries research, data collection, and analysis to ensure a sound information base for management decisions.

Necessary data must be collected and analyzed in order to measure progress relative to other objectives and to ensure that management actions are adjusted to reflect new knowledge. Achieving the objective will require new and ongoing research and analysis relative to stock conditions, dynamic feedback to market conditions, and adaptive management strategies. For example, some possible research topics could include (1) the basis for exclusive registration areas, (2) the basis for sex restrictions in retained catch, (3) the basis for size limits, (4) the process for determining GHs, (5) bioeconomic analyses of specific regulatory proposals, and (6) defining oceanographic conditions important to maximizing productivity of crab stocks.

An annual area management report to the Board discussing current biological and economic status of the fisheries, GHL ranges, and support for different management decisions or changes in harvest strategies will be prepared by the State (ADF&G lead agency), with NMFS and crab plan team input when appropriate. This will be available for public comment, and presented to the Council on an annual basis. GHLS will be revised when new information is available. Such information will be made available to the public.

8.0 MANAGEMENT MEASURES

This chapter describes management measures that may be used to achieve the FMP's management objectives. Most of these management measures are currently used by the State to manage BS/AI king and Tanner crab fisheries; some measures are appropriate for more than one management objective.

Three categories of management measures are described (Table 8.1): Category 1 measures are those that are specifically fixed in the FMP, and require an FMP amendment to change. Category 2 measures are those that are framework-type measures which the State can change following criteria set out in the FMP. Category 3 measures are those measures that are neither rigidly specified nor frameworked in the FMP. The measures in Categories two and three above may be adopted as State laws subject to the appeals process outlined in the FMP (see Chapters 9 and 10).

The following description of management measures is not intended to limit the State government to only these measures. However, implementation of other management measures not described in the FMP must be consistent with the FMP, the Magnuson-Stevens Act, and other applicable Federal law, and may occur only after consultation with the Council.

Although specific strategies for attainment of objectives in the FMP are not described, management measures described in this chapter are all derived to attain one or more of those objectives. Any subsequent management measures must also be justified based upon consistency with the objectives in this FMP. All management measures must, further, be consistent with the Magnuson-Stevens Act and other applicable Federal law.

Table 8.1. Management measures used to manage king and Tanner crabs in the BS/AI management unit by category.

Category 1 (Fixed in FMP)	Category 2 (Frameworked in FMP)	Category 3 (Discretion of State)
Legal Gear	Minimum Size Limits	Reporting Requirements
Permit Requirements	Guideline Harvest Levels	Gear Placement and Removal
Federal Observer Requirements	In-season Adjustments	Gear Storage
Limited Access	Districts, Subdistricts and Sections	Vessel Tank Inspections
Norton Sound Superexclusive Registration	Fishing Seasons	Gear Modifications
	Sex Restrictions	Bycatch Limits (in crab fisheries)
	Pot Limits	State Observer Requirements
	Registration Areas	Other
	Closed Waters	

8.1 Category 1—Federal Management Measures Fixed By The FMP

8.1.1 Legal Gear

Trawls and tangle nets are specifically prohibited because of the high mortality rates which they inflict on nonlegal crab. Specification of legal gear is important to attainment of the biological conservation and economic and social objectives of this FMP.

8.1.2 Permit Requirements

No Federal fishing permits are required for harvesting vessels, except as required by the Moratorium on new vessels entering the fishery as described in Section 8.1.4. and regulated by 50 CFR 679. Vessel moratorium permits are required through December 31, 1998, unless the moratorium is extended by the Council. Upon expiration of the vessel moratorium, an approved License Limitation Program, as described in Section 8.1.4. and regulated by 50 CFR 679, would require a Federal Crab License for vessels. As noted in Section 8.1.4, a Federal Crab License will be required on vessels participating in the BSAI king and Tanner crab fisheries. This FMP assumes that all crab fishermen are licensed and vessels are licensed and registered under the laws of the State, and as such, while fishing in the EEZ are subject to all State regulations that are consistent with the FMP, Magnuson Act, and other applicable Federal law. This assumption is based on the requirement of lending institutions and insurance companies that the crab vessels be registered with the State of Alaska and be able to enter State waters. If, in the future, vessels participate in the fishery without registering with the State, it is likely that a plan amendment will be required. State registered vessels are subject to enforcement sanctions issued pursuant to State procedures.

8.1.3 Federal Observer Requirements

Any vessel fishing for king or Tanner crab, and/or processing king crab or Tanner crab within the BS/AI area, shall be required to take aboard an observer, when so requested by the Director, Alaska Region, NMFS. Such an observer requirement may be imposed, notwithstanding the existence of a State mandated observer program for State registered vessels. To the maximum extent practicable, the Regional Administrator will coordinate any Federal observer program with that required by the State.

Observers are necessary aboard some crab fishing and/or processing vessels to obtain needed information such as catch per unit of effort (CPUE), species composition, sex composition, size composition of the catch, proportion of soft-shell crab being handled, and other information required to manage the crab stocks in the BS/AI area.

Observer requirements are important to attainment of the biological conservation and research and management objectives of this FMP.

8.1.4 Limited Access

8.1.4.1 Moratorium on Vessels Entering the Fisheries

Beginning on January 1, 1996 a moratorium on harvesting vessels (including harvester/processors) entering the BSAI King and Tanner Crab fisheries is in effect. Vessels fishing in State waters will be exempt. The vessel moratorium will last until the Council replaces or rescinds the action, but in any case will end on December 31, 1998. The Council may however extend the moratorium up to 2 additional years, if a permanent limited access program is imminent.

Elements of the Moratorium

1. Qualifying Period. In order to qualify, a harvesting vessel must have made a reported landing in one of the designated moratorium fisheries during the period beginning January 1, 1988, and ending February 9, 1992, including landings of moratorium species from State waters. Moratorium species are those managed under Council FMPs and include groundfish (other than fixed gear sablefish) in the BSAI and GOA and BSAI king and Tanner crab.
2. Eligible Fisheries. If a vessel qualifies based on Item 1 above, the following provisions apply:
 - a. A vessel that made a qualifying landing in the BSAI crab fisheries would be eligible to participate in the BSAI crab fisheries under the moratorium.
 - b. A vessel that made a qualifying landing in the BSAI or GOA groundfish fisheries would be eligible to participate in the BSAI/GOA groundfish fisheries **AND** the BSAI crab fisheries under the moratorium providing:
 - (1) it uses only the same fishing gear in the BSAI crab fisheries that it used in the groundfish fisheries to qualify for the moratorium, and
 - (2) it does not use any fishing gear prohibited in the BSAI crab fisheries.
 - c. A vessel that made a qualifying landing in the BSAI or GOA groundfish fisheries, and during the period February 9, 1992, through December 11, 1994, made a landing in the BSAI crab fisheries would be eligible to continue to participate in the BSAI crab fisheries under the moratorium using the gear with which the crab landing was made.
3. Length Increases During the Moratorium: The 20% Rule. Moratorium qualified vessels will be limited to a 20% increase in length overall (LOA) as long as the increase does not result in a vessel greater than 125 ft LOA. The 20% increase will be based on the LOA of the original qualified vessel. Vessels over 125 ft LOA may not be lengthened under any circumstance.
4. Reconstruction of Vessels During the Moratorium. An eligible vessel that is reconstructed during the moratorium retains its privilege to participate in all fisheries under the Council's jurisdiction subject to the following provisions: (1) If reconstruction is completed prior to June 24, 1992, the new size is unrestricted and length increases subject to the 20% Rule discussed above are allowed between June 24, 1992 and the end of the moratorium. (2) If reconstruction began prior to June 24, 1992 but was not completed until after that date, the new size would be unrestricted but no more length increases would be allowed. (3) If reconstruction commences on or after June 24, 1992, increases in length may not exceed the 20% Rule. (4) Other types of vessel reconstructions or upgrades may occur as long as they do not result in the lengthening of a vessel.
5. Replacement of Vessels During the Moratorium. During the moratorium, qualifying vessels can be replaced with non-qualifying vessels so long as the replaced vessel leaves the fishery. Though multiple or sequential replacements are allowed, vessel length can only be increased subject to the 20% Rule. In the case of existing qualified vessels over 125 ft LOA, the replacement vessel cannot exceed the length of the original vessel. In the event of a combined replacement/reconstruction, increases in LOA may not exceed the 20% Rule.

6. Replacement of Vessels Lost or Destroyed On or After January 1, 1989 But Before January 1, 1996. Vessels lost or destroyed on or after January 1, 1989 may be replaced provided the following conditions are met. (1) The LOA of the replacement vessel does not exceed the 20% rule. (2) The replacement vessel must make a landing in a moratorium fishery prior to December 31, 1997 to remain a qualified vessel. The replaced vessel would no longer be a moratorium qualified vessel.
7. Replacement of Vessels Lost or Destroyed After January 1, 1996. Vessels lost or destroyed after January 1, 1996 may be replaced subject to the 20% Rule and the replaced vessel would no longer be a moratorium qualified vessel.
8. Salvage of Vessels Lost or Destroyed On or After January 1, 1989. A moratorium qualified vessel lost or destroyed between January 1, 1989 and the end of the moratorium may be salvaged and will be considered a moratorium qualified vessel, as long as it has not already been replaced, as per item 5 above.
9. Salvage of Vessels Lost or Destroyed Before January 1, 1989. A moratorium qualified vessel lost or destroyed before January 1, 1989 may not be replaced. The lost or destroyed vessel may be salvaged and become moratorium qualified if it meets the following two conditions: (1) Salvage operations must have been ongoing as of June 24, 1992. (2) The salvaged vessel must make a landing in a moratorium fishery prior to December 31, 1997.
10. Small Vessel Exemptions. Vessels 32 ft or less LOA would be exempted from the moratorium in the Bering Sea and Aleutian Islands.
11. Disadvantaged Communities. New vessels constructed after implementation of Community Development Quota (CDQ) programs, pursuant to an approved CDQ project, will be exempt from the moratorium. In order to qualify for such exemption the vessel must: (1) be constructed solely for the purpose of furthering the goals of a community CDQ project, and (2) be a specialized vessel designed and equipped to meet the needs of a community or group of communities that have specific and unique operating requirements. Such exemptions would be limited to vessels 125 ft LOA and under. These vessels may fish in both CDQ and non-CDQ fisheries. Vessels built pursuant to a CDQ project under this exemption that are transferred to a non-CDQ entity during the life of the moratorium may not be considered eligible under the moratorium.
12. Halibut and Sablefish Fixed Gear Vessels. Halibut and sablefish fixed gear vessels operating under the provisions of the proposed IFQ Amendment will be exempted from the vessel moratorium as it affects directed halibut and sablefish operations. Such an exemption becomes effective at the time of implementation of the IFQ program. Non-qualifying vessels entering the halibut and sablefish fisheries under this exemption may not participate in any other directed fisheries under the Council's authority. If the total retained catch of species other than halibut and sablefish exceeds 20% of the total weight of all species of fish on board, then the vessel must be a moratorium-qualified vessel.
13. Transfer of Moratorium Rights. It shall be assumed that any transfer of vessel ownership includes a transfer of moratorium fishing rights. Moratorium rights may however be transferred without a transfer of ownership of the original qualifying vessel or any subsequently qualified vessel. The recipient of such transfers of rights will bear the burden of proof for moratorium qualification. Transfers of moratorium rights may not be used to circumvent the 20% Rule. Moratorium permits may be transferred only in their entirety; i.e., species or gear endorsements may not be separated and transferred independently.

8.1.4.2 Vessel License Limitation

A vessel license limitation program (LLP) was approved as Amendment 5 on September 12, 1997 and requires a Federal Crab License on harvesting vessels (including harvester/processors) participating in the BSAI King and Tanner Crab fisheries. Vessels fishing in State waters will be exempt, as will vessels < 32'. The LLP will replace the vessel moratorium and will last until the Council replaces or rescinds the action. The crab CDQ portion of Amendment 5 became effective March 23, 1998. The crab CDQ program establishes the crab CDQ reserve and authorizes the State of Alaska to allocate the crab CDQ reserve among CDQ groups and to manage crab harvesting activity of the BS/AI CDQ groups.

Elements of the License Limitation Program

1. Nature of Licenses. General crab licenses will be issued, based on historical landings defined in Federal regulations, for BSAI king and Tanner crab fisheries covered under the FMP, with the following species/area endorsements:

- a. Pribilof red and Pribilof blue king crab
- b. *C. opilio* and *C. bairdi*
- c. St. Matthew blue king crab
- d. Adak golden king crab
- e. Adak red king crab
- f. Bristol Bay red king crab
- g. Norton Sound red and Norton Sound blue summer king crab

Species/area combinations not listed above may be fished by any vessel that holds a valid Federal crab license regardless of the endorsements attached to the license, if those fisheries are open and the vessel meets all other State and Federal regulatory requirements.

2. License Recipients. Licenses will be issued to current owners (as of June 17, 1995) of qualified vessels, except in the Norton Sound summer red and blue king crab fisheries. Licenses for these fisheries would be issued to:

- a. Individuals who held a State of Alaska Permit for the Norton Sound summer king crab fisheries and made at least one landing; or
- b. Vessel owners as of June 17, 1995 in instances where a vessel was corporate owned, but operated by a skipper who was a temporary contract employee.

The owners as of this date must be "persons eligible to document a fishing vessel" under Chapter 121, Title 46, U.S.C. In cases where the vessel was sold on or before June 17, 1995, and the disposition of the license qualification history was not mentioned in the contract, the license qualification history would go with the vessel. If the transfer occurred after June 17, 1995, the license qualification history would stay with the seller of the vessel unless the contract specified otherwise.

3. License Designations. Licenses and endorsements will be designated as Catcher Vessel or Catcher Processor and with one of three vessel length classes (<60', ≥60' but < 125', or ≥ 125' LOA).

4. Who May Purchase Licenses. Licenses may be transferred only to "persons" defined as those "eligible to document a fishing vessel" under Chapter 121, Title 46, U.S.C. Licenses may not be leased.

5. Vessel/License Linkages. Licenses may be transferred without a vessel, i.e., licenses may be applied to vessels other than the one to which the license was initially issued. However, the new vessel is still subject to the license designations, vessel upgrade provisions, 20% upgrade rule (defined in provision seven) , and the no leasing provision. Licenses may be applied to vessels shorter than the "maximum LOA" regardless of the length of the vessel class designations. Vessels may also use catcher processor licenses on catcher vessels. However, the reverse is not allowed. It was the Council's intent that vessels be allowed to "downgrade".
6. Separability of General Licenses and Endorsements. General licenses may be issued for the Bering Sea /Aleutian Islands groundfish, Gulf of Alaska groundfish, and Bering Sea /Aleutian Islands crab fisheries. Those general licenses initially issued to a person based on a particular vessel's catch history are not separable and shall remain as a single "package". General licenses transferred after initial allocation shall remain separate "packages" in the form they were initially issued, and will not be combined with other general groundfish or crab licenses the person may own. Species/area endorsements are not separable from the general license they are initially issued under, and shall remain as a single "package," which includes the assigned catcher vessel/catcher processor and length designations.
7. Vessel Replacements and Upgrades. Vessels may be replaced or upgraded within the bounds of the vessel length designations and the "20% rule". This rule was originally defined for the vessel moratorium program. The maximum length over all (MLOA) with respect to a vessel means the greatest LOA of that vessel or its replacement that may qualify it to conduct directed fishing for groundfish covered under the license program, except as provided at § 676.4(d). The MLOA of a vessel with license qualification will be determined by the Regional Director as follows:
 - (a) For a vessel with license qualification that is less than 125' LOA, the maximum LOA will be equal to 1.2 times the vessel's original qualifying length or 125', which ever is less; and
 - (b) For a vessel with license qualification that is equal to or greater that 125', the maximum LOA will be equal to the vessel's original qualifying length.

If a vessel upgrades under the "20% rule" to a length which falls into a larger license length designation after June 17, 1995, then the vessel owner would be initially allocated a license and endorsement(s) based on the vessels June 17, 1995 length. Those licenses and endorsements could not be used on the qualifying vessel, and the owner would be required to obtain a license for that vessel's designation before it could be fished. Vessels in the Norton Sound summer king crab fisheries may upgrade more than 20% (as defined in the 20% rule) so long as the vessel does not exceed 32' LOA after the upgrade is complete.
8. License Ownership Caps. No more than five general crab licenses may be purchased or controlled by a "person," with grandfather rights to those persons who exceed this limit in the initial allocation. Persons with grandfather rights from the initial allocation must be under the five general license cap before they will be allowed to purchase any additional licenses. A "person" is defined as those eligible to document a fishing vessel under Chapter 121, Title 46, U.S.C. For corporations, the cap would apply to the corporation and not to share holders within the corporation.
9. Vessel License Use Caps. There is no limit on the number of licenses (or endorsements) which may be used on a vessel.
10. Changing Vessel Designations. If a vessel qualifies as a catcher processor, it may select a one time (permanent) conversion to a catcher vessel designation.

11. Implement a Skipper Reporting System. NMFS will implement a skipper reporting system which requires crab license holders to report skipper names, addresses, and service records.
12. CDQ Vessel Exemption. Vessels < 125' obtained under an approved CDQ plan to participate in both CDQ and non-CDQ target fisheries, will be allowed to continue to fish both fisheries without a license. If the vessel is sold outside the CDQ plan, the vessel will no longer be exempt from the rules of the crab license program.
13. Lost Vessels. Vessels which qualified for the moratorium and were lost, damaged, or otherwise out of the fishery due to factors beyond the control of the owner and which were replaced or otherwise reentered the fishery in accordance with the moratorium rules, and which made a landing any time between the time the vessel left the fishery and June 17, 1995, will be qualified for a general license and endorsement for that species/area combination.
14. Licenses Represent a use Privilege. The Council may alter or rescind this program without compensation to license holders; further, licenses may be suspended or revoked for (serious and/or multiple) violations of fisheries regulations.

CDQ Allocation.

CDQs will be issued for 3.5% in 1998; 5% in 1999; and 7.5% in 2000 of all BSAI crab fisheries that have a Guideline Harvest Level set by the State of Alaska. The program will be patterned after the pollock CDQ program (defined in section 14.4.11.6 of the BSAI groundfish FMP), but will not contain a sunset provision. Also, Akutan will be included in the list of eligible CDQ communities.

8.1.5 Superexclusive Registration in Norton Sound

This FMP establishes the Norton Sound Section of the Northern District of the king crab fishery as a superexclusive registration area. Any vessel registered and participating in this fishery would not be able to participate in other BSAI king crab fisheries, such as Adak, Bristol Bay, Dutch Harbor, Pribilof, St. Lawrence, or St. Matthew, during that registration year. The Norton Sound fishery is the only superexclusive registration area authorized by this FMP.

8.2 Category 2—Framework Management Measures

8.2.1 Minimum Size Limits

The FMP authorizes the State to adjust size limits under State regulations. In establishing minimum size limits, the State can consider, within constraints of available information, the following: (1) size at maturity (physiological, functional, or morphometric), (2) protection of reproductive capability, (3) market and other economic considerations, (4) natural and discard mortality rates, (5) growth rates, and (6) yield per recruit.

Typically, biological considerations such as (1), (2), and (4)-(6) are used to establish minimum legal size limits to ensure that conservation needs are served. Generally, preference for larger crabs based upon market and other economic considerations is achieved through processor/harvester agreements. If minimum size limits are proposed to be changed, an analysis with appropriate documentation will be presented.

Minimum size limits are commonly used in managing crab fisheries, and are important in meeting both the biological conservation and economic and social objectives of this FMP. The use of the estimated average

size of maturity is intended to allow crabs to mate at least once before being subjected to harvest. Evidence available for red king crab suggests that recently matured males may not enter into mating activity until one or two years after attaining maturity, while studies on Tanner crab suggest that this period of delay does not exist. Thus, minimum size limits may be set at various intervals above the average size of maturity depending on a species life history pattern. In addition, the rate of growth after maturity enters into the estimation of minimum size limits. This has resulted in variable minimum size limits depending on the species and area inhabited (Table 8.2) In developing fisheries with insufficient information, there may be no size limit set.

Prior to the use of legal minimum size limits, minimum size of crabs landed was probably dictated by industry economic conditions, and to a large extent economics continues to play an important role. The legal minimum size limit for the Tanner crab species *C. opilio* has been 3.1", based on information on size of maturity and reproductive behavior. However, the average minimum size of crab landed since the inception of the domestic fishery has been in the range of 4.0" to 4.5". This reflects the desire for larger crabs by the processing sector. Past requests for lowering the minimum size limit for the Tanner crab species *C. bairdi* from 5.5" to 5.0" have met with resistance, also because of market preferences for a larger crab. Thus, the processing sector's preference for larger crab is accommodated by the industry, rather than through regulation.

Minimum size limit regulations interact closely with GHL regulations (see Section 8.2.2 below). The minimum commercial size limit has been determined for each area by using the size when 50 percent of the male population is sexually mature and adding the estimated dimensional growth of males up to a two-year period. This normally would give each male the opportunity to reproduce at least once before becoming vulnerable to the fishery. The minimum size limit serves to determine the portion of the total male stock that is subjected to exploitation. The GHL for a given season and area is established by applying an exploitation rate to the commercial fraction of the males defined as legal by the minimum size limit in effect.

8.2.2 Guideline Harvest Levels

The FMP authorizes the State to set preseason GHLs under State regulations. The term GHL may be expressed as a range about a point estimate. A range of harvest levels allows the State to make in-season management decisions based on current data obtained from the fishery. Seasons or areas may be closed when the GHL is reached, or earlier or later based on current in-season information (see Section 8.2.3). GHL is used in this FMP in lieu of TAC because BSAI crab fisheries are regulated using this term. The following factors are approved and will be considered to the extent information is available in establishing GHLs: (1) estimates of exploitable biomass, (2) estimates of recruitment, (3) estimates of threshold, (4) estimates of MSY or OY, and (5) market and other economic considerations. The sum of all upper ranges of the GHLs for king crabs and either species of Tanner crab must fall within the OY ranges established in this FMP.

The GHL is the result of a process which includes the examination of the effects of different harvesting strategies on the seven objectives of management listed previously in this FMP. While harvest strategies will be evaluated relative to all seven of these objectives, GHL will most frequently be used as a management measure to achieve only the first two objectives. For this reason, the GHL is primarily composed of two interrelated components: a biological component and a socioeconomic component.

In overview, the biological component, acceptable biological catch (ABC), is set to achieve the biological conservation objective of preventing overfishing. Because the maintenance of adequate reproductive potential takes precedence over economic and social considerations as described in objective 7.2.1, the ABC serves as an upper bound constraint on harvest. A target harvest level is then chosen within ABC to maximize the anticipated discounted benefits to the fishery over the long term. As described in objective

7.2.2, these benefits include: profits, personal income, employment, benefits to consumers, and less tangible or less quantifiable social benefits such as the economic stability of coastal communities. The GHL range represents a confidence interval around the proposed harvest level reflecting the uncertainty in stock status and the uncertainty in estimates of socioeconomic benefits. Ideally, bioeconomic analysis such as Matulich, et al. (1987a, b, c) should be used to determine the GHL. However, such modeling efforts are relatively new and complex; in the future they should be employed along with more conventional means of determining the GHL.

Regardless of the specific approach, the process of determining a GHL which prevents overfishing and maximizes socioeconomic benefits includes the routine collection and analysis of biological, economic, social, and other data. Crab resources of the BS/AI area vary in the level of scientific information available for management. Consequently, exact procedures for determining appropriate ABCs and GHLs vary due to differences in the quality and quantity of resource data bases. Information necessary to evaluate the five Federally-approved factors (above) for establishing GHLs include data from trawl surveys, pot surveys, fishery performance statistics (catch per unit of effort), price, personal income, employment, and other market and economic data.

Having specified an ABC, a GHL must be chosen to be less than or equal to the ABC. Ideally, bioeconomic analyses such as Matulich, et al. (1987c) can provide advice to management about the benefits to be received from alternative harvest levels. Such analyses can be used to evaluate the benefits (e.g., personal income, employment, etc.) resulting from two alternative harvest strategies. For example, high exploitation rates can be applied to obtain high current harvest levels of recruit-sized crabs at the expense of foregone future harvest. Alternatively, low exploitation rates can be applied to obtain higher future harvest of larger crabs at the expense of lower current harvest. Information on other socioeconomic factors, such as benefits to consumers and economic stability of coastal communities can also be used in the determination of harvest level.

As discussed within the Research and Management Objective, an annual area management report will be prepared which describes the determination of GHLs and ABCs for all types of stocks using the best available information. This report will be reviewed by the State, NMFS, and the Council, and available for public comment on an annual basis. The GHLs contained in this report will be updated when new information is available. This information will be made available to the public.

8.2.3 In-season Adjustments

The FMP authorizes the State to make in-season adjustments to GHLs and to fishing period lengths and to close areas under State regulations. In making such in-season adjustments, the State shall consider appropriate factors to the extent in-season data is available on: (1) overall fishing effort, (2) catch per unit of effort and rate of harvest, (3) relative abundance of king or Tanner crab, (4) achievement of GHLs, (5) proportion of soft-shelled crabs and rate of deadloss, (6) general information on stock condition, (7) timeliness and accuracy of catch reporting, (8) adequacy of subsistence harvests, and (9) other factors that affect ability to meet objectives of the FMP.

After registration areas are opened, seasons set, minimum sizes, and GHLs established pre-season, events can occur in-season which would disrupt the management scheme and resultant economic benefits to the nation. When a pre-season prediction proves to be incorrect or when an unanticipated event occurs which affects pre-season predictions, compensatory in-season adjustments must be made to keep the management system on track toward the biological and economic objectives of this FMP. In-season adjustments and analysis will be conducted within the constraints of this FMP.

All in-season adjustments must be recorded and justified in writing. These justifications are attached to the emergency order and will be made available for review to the public, the State, the NMFS, and other regulatory agencies.

The State monitors the condition of king and Tanner crab stocks through such data and information as are practically available, both preseason and in-season. When the State, in close communication with the NMFS, finds that continued fishing effort would jeopardize the viability of king or Tanner crab stocks within a registration area, or continued fishing would be counter to the goal and objectives established by this FMP, the registration area or a portion of the registration area is closed by emergency order. In determining whether to close a registration area, the State shall consider all appropriate factors to the extent there is information available on such factors. Factors to be considered for king and Tanner crabs include:

1. The effect of overall fishing effort within the registration area.

Large amounts of effort, vessels, and pots are often concentrated on crab aggregations. In extreme cases, high amounts of gear loss because of entanglement, and propeller contact result in wastage and unknown levels of harvest. In these limited areas, high levels of sorting of females and resultant mortality, and high levels of handling and sorting of nonmarketable crab because of soft-shell conditions result in wasted product and nonquantified harvests to the crab stocks. In-season data concerning these practices can result in emergency closures of limited areas where these conditions occur, resulting in a more orderly fishery, reduced gear loss, less wastage, and the ability to meet the biological conservation objective, as well as other objectives identified in this FMP. This provision also addresses the ability of the ADF&G to close a registration area when the projected harvest equals or exceeds the GHL established for the registration area.

2. Catch per unit of effort and rate of harvest.

In addition to using CPUE to provide estimates when preseason GHLS are to be attained, these data are also analyzed in-season to check survey accuracy used to establish stock abundance levels and GHLS. Often the effort expended in surveys is limited, particularly when compared to the sampling power of the commercial fleet. However, standardization of effort of the commercial fleet is always a limiting factor in interpreting in-season data. If in-season data analysis suggests stocks are significantly higher or lower than indicated by survey, GHLS may be adjusted in-season using the new in-season estimates. Exploitation rates are generally not changed in-season, unless the estimates of stock levels using in-season data are so different from preseason estimates that different exploitation rates are necessary.

In cases where annual survey data are either unavailable, or unreliable, in-season data are relied on heavily. Such provisions are essential for prevention of overfishing and adherence to the biological conservation objective of this FMP. To the degree exploitation rates are established to meet economic and social objectives, this provision could be used to maximize economic benefits as well.

3. Relative abundance of king or Tanner crab within the area in comparison with preseason expectations.

Relative abundance is usually established by comparison of current in-season data with trends established over time within the current season or comparison with previous year's CPUE data. In certain cases, survey data may be obtained during an open fishery. These relative abundance data of king and Tanner crab stocks would be applied immediately to adjustment of GHLS as stated previously under item 2. This factor is usually considered as additional analysis of the data obtained or established under factors 1 and 2 previously discussed.

4. Such GHGs as may be promulgated by State regulations.

The primary use of in-season emergency order authority is when an established GHG is reached and the fishery is to be closed within current State regulations established within the framework procedures listed in this FMP. The midpoint of the GHG is usually targeted except in cases where in-season data and analysis, or other provisions discussed in this section, require closure either before or after obtaining the established GHG, or below or above the range associated with the GHG.

5. The proportion of soft shell king or Tanner crab being handled and proportion of deadloss.

This factor is paramount to ensure product quality and prevention of unnecessary wastage. When deliveries of crab require significant levels of discard because of deadloss or unmarketable crab, a portion or all of a registration area may be closed to further harvest. Such closures are issued when sorting is of sufficient magnitude, at sea or at the unloading site, to have significant impacts on product quality or significant wastage. Rates of discard will vary; fixed rates are generally not established because factors modifying such decisions include the availability of nonmolting crab within the registration area and the degree of alternative areas available to fish that have low rates of soft shell crab or molting crab. Even though local areas of high molting may occur, often other areas are available for harvest, and economic forces cause the fleet to move to those areas with acceptable handling mortality and deadloss associated with the harvest. The ability of managers to consider these factors without rigidly establishing formulas for issuing closures provides for continued fishing when the biological or economic consequences will be minimal, even though short periods of high sorting in local areas may occur. Such flexibility allows the State to meet the biological conservation objective, as well as the economic and social objective established in this FMP.

6. General information on the condition of the king or Tanner crab stocks within the area.

This factor, in addition to including the soft-shell or molting conditions discussed previously, includes the salability of the product. Discard of large amounts of old shell crab that have no market value but are capable of mating and assisting in reproduction is one of the factors considered. In cases where diseases or parasites affect product quality, emergency order closures of portions of a stock could benefit the industry significantly, while allowing continued harvest of portions of the stock that have high quality crab. Low yields from newly molted crab are also a factor which may be considered when wastage levels are high in comparison to the economic value of the harvest. Use of this factor primarily addresses the economic and social objective established by this FMP.

7. Timeliness and accuracy of catch reporting by buyers, fishermen, or vessel operators within the registration area to the extent that such timeliness or accuracy may reasonably be expected to affect proper management.

Management of a commercial fishery depends upon appropriate and timely data. In that in-season closure decisions almost always result in short-term loss of income for the participating commercial fleet and the processing industry, even though these closures will in the long run ensure long-term economic viability of these same participants, the temptation to underreport or misreport is obvious. Without accurate data, the management process breaks down. Therefore, the State may close a fishery if the timeliness and accuracy of catch reporting is inadequate. Only with this provision does the State have the ability to ensure compliance with reporting requirements and retain the ability to accurately regulate the fishery within the objectives established by this FMP. This factor is used in justifying emergency action only when misreporting is of such magnitude as to jeopardize the management process.

8. Adequacy of subsistence harvests within the registration area.

If a crab stock has been customarily or traditionally used for subsistence diminishes so that all consumptive uses of that stock cannot be accommodated, State law requires that in most areas of Alaska, subsistence uses have a priority over other uses. Emergency order authority would be used if subsistence fisheries requirements are not being met by established regulations by the State. Emergency order authority would close commercial fisheries to ensure that subsistence harvests would be achieved without jeopardizing conservation concerns established in the biological conservation objective of this FMP.

8.2.4 District, Subdistrict, and Section Boundaries

The FMP authorizes the State to adjust district, subdistrict, and section boundaries on the basis of any of the following criteria: (1) if the area contains a reasonably distinct stock of crab that requires a separate GHL estimate to avoid possible overharvest, (2) if the stock requires a different size limit from other stocks in the registration area, (3) if different timing of molting and breeding requires a different fishing season, (4) if estimates of fishing effort are needed pre-season so that overharvest can be prevented, or (5) if part of an area is relatively unutilized and unexplored, and if creation of a new district, subdistrict, or section will encourage exploration and utilization.

8.2.5 Fishing Seasons

Fishing seasons are used to protect king and Tanner crabs during the molting and mating portions of their life cycle. Normally the fisheries have been closed during these sensitive periods to protect crab from mortality caused by handling and stress when shells are soft, and to maximize meat recovery by delaying harvest until the shells have filled out. Fisheries conducted during sensitive biological periods have been, and should be in the future, carefully designed to prevent any irreparable damage to the stocks.

Closed seasons have been set to maximize the reproductive potential of the king and Tanner crab populations based on one or more of the following conditions:

1. Protection of any breeding population of male crab that may form dense schools prior to and during annual migrations into shallow water breeding grounds. Such migrations have been described for red king crab and could possibly occur with other crabs.
2. Consideration of molting periods so that the shells have hardened enough to permit handling with minimal damage or mortality.
3. Protection of the population during sensitive soft-shell periods.
4. Consideration of increasing product quality.
5. Minimization of bycatch.

At times, seasons have been set that conflict with some of the preceding conditions. Such openings historically have been based on one or more of the following considerations:

1. Provision for an exploratory fishery.
2. Compensation for particularly adverse environmental conditions, such as sea ice covering the fishing grounds.

The biologically sensitive period in the life cycle of both king and Tanner crabs within the management unit is generally from late winter to early summer. Part of the Tanner crab fishery has occurred during the mating period, although the timing of seasons for individual stocks may vary. Very little information is available on the sensitive period for golden king crab. The information that is available for golden king crab indicates that mating, molting, and hatching occur throughout the year and a sensitive period cannot be defined. Crab harvests frequently occur over a short period of time. Therefore, there is an opportunity to look beyond strictly biological conditions when setting season openings.

Within biological constraints, the open fishing season has been set:

1. To minimize the amount of deadloss. Deadloss has been found to increase if crabs are in soft-shell condition, if they are held for long time periods, if holding tanks are contaminated with fresh or warm water, or if crabs are handled too often.
2. To produce the best possible product quality.
3. To minimize fishing during severe weather conditions.
4. To minimize the cost of industry operations.
5. To coordinate the king and Tanner crab fisheries with other fisheries that are making demands on the same harvesting, processing, and transportation systems. Seasons can be timed relative to one another to spread fishing effort, prevent gear saturation, and allow maximum participation in the fisheries by all elements of the crab fleets, and
6. To reduce the cost of enforcement and management before, during, and after an open season, as affected by the timing and area of different king and Tanner crab seasons, and as affected by seasons for other resources.

King and Tanner crab seasons may be combined to minimize handling mortality, to maximize efficiency, and to reduce unnecessary administrative and enforcement burdens. Seasons may also be combined when a given species is taken primarily as an incidental catch; for example, *C. bairdi* are taken incidental to the red king crab fishery in Adak. Such considerations are secondary, however, to optimal utilization of each species. Specification of fishing seasons is important in achieving biological conservation, economic and social, vessel safety, and gear conflict objectives of this FMP.

8.2.6 Sex Restrictions

Unless a surplus is determined to be available, female crabs cannot be taken. The surplus would be dependent on the number of crabs above the threshold amount used in the spawning stock calculation of OY. Most west coast crab fisheries take only male crab, a restriction that is assumed to contribute to maximum reproductive potential. The data base to support or reject an extensive harvest of female king or Tanner crab is poor. There have been some recent studies indicating that there are probably surplus female crab which can be taken when stock levels are high (Reeves and Marasco, 1980; Reeves, 1981). However, the accumulative effects of a female harvest and the subsequent environmental impacts are not demonstrable at this time and will not be understood until additional FMP research and analysis has been completed pursuant to the research and management objective of this FMP.

Harvesting female king crab has not been an issue in past management of the king and Tanner crab fisheries. While management philosophy endorses a limited fishery for females in years of high abundance, industry

has shown little interest. Not only are females considerably smaller than males of the same age, but the proportion of recoverable meat is much less than that of males of the same size. When a surplus of crabs is determined, this plan authorizes experimental harvest and processing of females by a State permit if fishermen provide accurate documentation of harvest rates and location, and processing and marketing results are made available to the management agency.

8.2.7 Pot Limits

This FMP authorizes the State to use pot limits to attain the biological conservation objective and the economic and social objective of this FMP. In establishing pot limits, the State shall consider, within constraints of available information, the following: (1) total vessel effort relative to GHF, (2) probable concentrations of pots by area, (3) potential for conflict with other fisheries, (4) potential for handling mortality of target or nontarget species, (5) adverse effects on vessel safety including hazards to navigation, (6) enforceability of pot limits, and (7) analysis of effects on industry.

Pot limits must be designed in a nondiscriminatory manner. For example, pot limits that are a function of vessel size can be developed which affect large and small vessels equally. Historic data on pot registration and length overall (LOA) could be used for developing pot limit regulations.

Only special types of situations warrant the use of pot limits. There are at least two such cases. First, because the deployment of excessive amounts of gear may result in high amounts of wastage due to pots lost to advancing ice cover, pot limits may be a useful measure to attain the biological conservation objective. Second, it may not be possible to satisfy conservation concerns in a fishery using excessive amounts of gear to catch a relatively small guideline harvest from a depressed stock. Lacking ability to regulate the total number of pots placed on the grounds, it would otherwise be necessary to prohibit the fishery from ever opening. A limited but highly valuable fishery would be foregone. In this instance, prohibition of the fishery would satisfy biological conservation concerns, but the economic and social objective would not be satisfied. Rather, a pot limit would provide a mechanism to attain the economic and social objective within biological conservation constraints.

8.2.8 Registration Areas

This FMP adopts existing State registration areas within the BS/AI fishery management unit. The management unit historically has been divided by the State into four king crab registration areas—Bering Sea, Bristol Bay, Adak, and Dutch Harbor and one Tanner crab registration area—Westward (Figure 8.1). Kodiak, South Peninsula and Chignik are also part of the State's Westward registration area but not part of the management unit in this FMP.

Registration areas may be further divided into fishing districts, subdistricts, and sections for purposes of management and reporting, although Tanner crab districts and subdistricts correspond most closely to king crab registration areas in regards to size (see Appendix G and Figure 8.1). Registration areas are characterized by relatively homogeneous established fisheries on stocks of crab that have insignificant transfer of adults between areas. These stocks tend to be fished by the same general class of boats from year to year, with seasons varying somewhat from area to area because of natural causes such as differences in timing of molting and breeding. Geographic remoteness from processing plants and support facilities may further characterize some areas. State regulations require vessels to register for fishing in these areas, and may require vessels to register for specific fishing districts within a registration area. Registration requirements allow estimation of fishing effort and the rate at which the resource will be harvested.

King crab registration areas within the management unit are designated as either exclusive or nonexclusive. Vessels can register for any one exclusive area and are not restricted in their choice, but cannot fish in any other exclusive area during the registration year. They can, however, fish any or all other nonexclusive areas. Fishermen often consider potential harvest, proposed prices, and distances between the fishing grounds and processing facilities when making their selection of an exclusive area. Historically, on a statewide basis exclusive registration areas are relatively small with the exception of Bristol Bay, contain known concentrations of crab, are adjacent to shore, and have well developed fisheries. Nonexclusive registration areas are usually quite large, have developing fisheries, and may contain some sections that are both underutilized and unexplored. The Norton Sound registration area has been designated as a superexclusive area by Federal law.

The use of exclusive area designations can aid in dispersing fishing effort while still allowing the majority of the fleet the opportunity to harvest the majority of the crab. Exclusive registration areas can help provide economic stability to coastal communities (see objective 7.2.2) or to segments of the industry dependent on an individual registration area's crab stocks, particularly if the character of the fishing fleet and the related industry participants depending upon the registration area's potential production would not allow movement to another registration area. This is particularly advantageous to the less mobile vessels if the area in which they fish is not the most profitable area for the more mobile vessels. This will not necessarily provide greater stability for the less mobile vessels because as fishery conditions change from year to year, the mobile vessels can change the area(s) in which they fish. However, on the average, fewer mobile vessels will fish in the less profitable areas if fishing in multiple areas is restricted. The removal of exclusive area regulations could place extreme economic pressure on smaller or older vessels unable to respond with fishing mobility (Katz and Bledsoe 1977).

Although exclusive registration areas can reallocate catch among different size vessels, it is not always clear which way the allocation effects will go and, therefore, each situation must be studied carefully (Larson, ed. 1984). The specification of registration area, both exclusive and nonexclusive, may be important to attainment of the economic and social objectives of this FMP.

Any designation of an area or district as exclusive must be supported by a written finding by the State that considers all of the following factors to the extent information is available:

1. The extent to which the designation will facilitate proper management of the fishery,
2. The extent to which such designation will help provide vessels with a reasonable opportunity to participate in the fishery,
3. The extent to which such designation will help to avoid sudden economic dislocation. Established processing facilities and fishing fleets within a registration area may provide economic stability for the labor force and affected communities and may be destroyed or adversely affected by an in-season influx of mobile processing plants and additional fishing power,
4. The extent to which the designation will encourage efficient use of vessels and gear,
5. The extent to which the economic benefits conferred by the designation will be offset by economic costs and inefficiencies, and
6. The extent to which other management measures could yield the results desired from the designation.

The following are examples of situations in which the designation or maintenance of the exclusive registration area might be appropriate:

1. The existence of differences in seasons between registration areas that could promote peak harvest rates only at the beginning of each season. Vessels capable of moving rapidly between areas could fish the season opening of more than one area, thereby creating an adverse impact on the vessels that planned on or were capable of fishing just one area for the entire season.
2. The occurrence of exvessel price settlements at different times in different registration areas, causing concentration of fishing and processing effort in registration areas that have completed price settlements.
3. Historic profitable utilization of the crab resource of an area by a fleet that could not be used to fish in more distant areas, and by processors heavily dependent for their supplies of crab upon the activities of that fleet.
4. Crab populations that vary in availability or on a seasonal basis may trigger effort shifts between registration areas to maximize the economic returns for a single segment of the overall fishing and processing effort. This provides a significant advantage for mobile processing units and larger vessels capable of operating in a wide range of sea conditions, but which may not in any particular area be as efficient as the less mobile harvesting and processing units that they displace.
5. The crab fishing fleet has experienced rapid growth and advanced in fishing efficiency. There is, therefore, an increasing potential for overharvest of a particular stock, especially during normal fluctuations in crab populations. Situations may exist where, in the absence of limitations, the number of vessels registering for an area or district may possess a one-trip cargo capacity that exceeds the amount of crab that can be safely taken from that area. The absence of flexibility to modify registration areas in this instance could result in either no fishing or in an overharvest.
6. Registration areas historically fished by small vessels require a longer period of fishing time to harvest crab resources because they cannot fish in bad weather and have limited carrying capacity. Relatively low production levels of inshore fishing grounds combined with inshore migration of king crab stocks over a very long season provide the smaller vessels opportunity to maximize their production capabilities. Larger vessels designed primarily for areas of greater fishing power can adversely affect the economics of established fleets, processing facilities, labor forces, and community dependence on production from the local resource, while failing to maximize utilization of smaller crab stocks.
7. Since fleet capabilities have developed in response to demands within registration areas, they may vary significantly with regard to the volume of fishing gear (pot units) used, the ability to transport quantities of pot gear, and the severity of the weather in which they can fish. These factors and others can place a fleet comprised of mostly small vessels at a distinct disadvantage.
8. Some registration areas contain several discrete harvestable stocks of crab, which become available to the fishery at different periods during the season. These registration areas tend to develop fleets with less fishing power and also less overhead costs. The best yield from this type of fishery is usually attained by avoiding "pulse" fisheries, which harvest high volume from

the immediately available stocks and tend to overharvest some stocks and underharvest others.

8.2.9 Closed Waters

Subsistence fisheries in the BS/AI area have been protected by closing to commercial fishing those waters fished in the subsistence fishery. The FMP recognizes State regulations that prohibit commercial fishing for king crab in waters within 10 miles of mean lower low water around St. Lawrence, King and Little Diomed Islands. The FMP also recognizes the following State closure to protect the Norton Sound subsistence king crab fishery:

All waters of the Norton Sound Section enclosed by a line from 65°23' N. lat., 167° W. long. to 64°15' N. lat., 167° W. long. to 64°15' N. lat., 162° W. long. to 63°27' N. lat., 162° W. long. are closed to the taking of king crab for commercial purposes during the summer season, currently August 1 to September 3. According to current State regulations, the State may reduce, by small increments, the closed waters to no less than 3 miles from mean lower low tide to allow the commercial king crab fishery to efficiently obtain the allowable harvest of red king crab.

The State may designate new closed waters areas or expand or reduce existing State closed waters areas. In making such changes, the State shall consider appropriate factors to the extent data are available on: (1) the need to protect subsistence fisheries, (2) the need to protect critical habitat for target or non-target species, (3) the prevention of conflict between harvesting of species, and (4) the creation of navigational hazard.

8.3 Category 3—Management Measures Deferred to State

8.3.1 Reporting Requirements

Assuming that all vessels participating in the fishery are licensed and registered with the State, only State reporting requirements are required by this FMP. Therefore, reporting requirements shall be deferred to the State.

Reporting of crab catches by individual vessel operators was required as early as 1941. Current State requirements (5 AAC 39.130) include: reporting the company or individual that purchased the catch; the full name and signature of the permit holder; the vessel that landed it with its license plate number; the type of gear used; the amount of gear (number of pots, pot lifts); the weight and number of crab landed including deadloss; the dates of landing and capture; and the location of capture. Processing companies are required to report this information for each landing purchased, and vessel operators are required to provide information to the processor at the time of sale. All reports (“fish tickets”) are confidential. Reporting requirements ensure adequate information and efficient management and enforcement. The State of Alaska obtains timely information through its current reporting requirements for all vessels participating in the fishery. Additional information is currently available from the State of Alaska shellfish observer program. The price paid for crab is also important information for managing the fisheries and is included on fish tickets but is currently not required information by the State because it is not always available at the time the fish tickets are prepared.

As the commercial Alaskan king and Tanner crab fisheries have grown over recent years, so has our knowledge of these species. Information gained through scientific surveys, research, and fishermen's observations have all led to a better understanding of the biology, environmental requirements, and behavior of the crab stocks. Since fishery managers monitor harvest rates in-season to determine areas of greatest fishing effort, thereby preventing overharvest of individual crab stocks, the current State catch and processing report requirements are an important component in achieving the biological conservation, economic and social, and research and management objectives of this FMP.

8.3.2 Gear Placement and Removal

The FMP defers gear placement and removal requirements to the State. Placement of unbaited gear, with doors secured open, on the fishing grounds before and after a season has been allowed within certain limits. Such early placement or late removal has been justified in light of (1) its lack of biological impacts, (2) enforcement problems and costs borne by the public and the industry, (3) lack of potential gear conflict, (4) the unavailability of loading or unloading facilities and gear storage areas, (5) vessel safety, (6) increasing the competitiveness of smaller vessels, and (7) decreasing fishing costs.

Because of regulations which allow gear placement on the grounds prior to, and immediately following a season, some highly competitive crab fisheries grew out of the need to provide additional time to haul gear to and from the fishing grounds because of limited storage and loading and unloading facilities available to the entire fleet.

8.3.3 Gear Storage

The FMP defers gear storage requirements to the State. Crab pots are generally stored on land or in designated storage areas at sea. Storage in a nonfishing condition in ice-free water areas of low crab abundance also has been justified in light of: (1) expected biological impacts; (2) the potential enforcement costs to the public; (3) the costs to vessel owners of storage on land; (4) the availability of other land and sea storage areas; and (5) the possibility that it would lead to gear conflict.

8.3.4 Vessel Tank Inspections

The FMP defers tank inspection requirements to the State. Vessel tank, or live-hold and freezer, inspections usually are required before the opening of a king or Tanner crab fishing season to meet the legal requirements for the State's landing laws, provide effort information, and provide for a fair start to the fishery. The State normally considers the following factors when determining whether inspections should be required: (1) enforcement requirements, (2) the ability of the vessels to move easily between the fishing grounds and the location of inspection centers, (3) the time necessary for the vessels to transport their gear from storage areas to fishing grounds, (4) the fuel consumption that the inspection requirement will cause, and (5) the equity of allowing all participants to start the fishery at substantially the same time.

8.3.5 Gear Modifications

The FMP defers design specifications required for commercial crab pots and ring nets to the State. Pots and ring nets are the specified legal commercial gear for capturing crab in the BS/AI area (see Section 8.1.1). Multiple pots attached to a ground line are currently allowed by the State in the brown (golden) king crab, scarlet king crab (Lithodes couesi), grooved Tanner crab (C. tanneri), and triangle Tanner crab (C. angulatus) fisheries. Various devices may be added to pots to prevent capture of other species; to minimize king crab bycatch, the State currently requires tunnel-eye heights to not exceed 3 inches in pots fishing for C. bairdi or C. opilio in the Bering Sea. Escape mechanisms may be incorporated or mesh size adjusted to allow female and sublegal male crab to escape; the State currently specifies escape rings or mesh panels in regulation for pots used in the BS/AI C. bairdi, C. opilio, and brown (golden) king crab fisheries, in the Bristol Bay king crab fishery, and in the Pribilof District king crab fishery. State regulations also currently require incorporation of biodegradable twine as an escape mechanism on all pots which will terminate a pot's catching and holding ability in case the pot is lost.

8.3.6 Bycatch Limits

The FMP defers the right to implement bycatch limits of other species of crab in the crab fisheries managed under this FMP to the State. Often, regulation of bycatch in the directed fishery involves no, or limited, allocation because the same fishermen participate in both fisheries.

8.3.7 State Observer Requirements

The FMP defers the State Observer requirements to the State. The State may place observers aboard crab fishing and/or processing vessels when the State finds that observers provide the only practical mechanism to obtain essential biological and management data or when observers provide the only effective means to enforce regulations. Data collected by onboard observers in crab fisheries include effort data and data on the species, sex, size, and shell-age/shell-hardness composition of the catch. The State currently requires onboard observers on all catcher/processor or floating-processor vessels processing king or Tanner crab and on all vessels participating in the Aleutian Islands red or brown (golden) king crab fisheries. The State currently may require observers as part of a permit requirement for any vessel participating in the scarlet king crab (*Lithodes couesi*), grooved Tanner crab (*C. tanneri*), or triangle Tanner crab (*C. angulatus*) fisheries. The State currently may require observers on selected catcher vessels taking red or blue king crab in the Norton Sound section, if ADF&G provides funding for the observer presence. The State currently may require observers on vessels taking red or blue king crab in the St. Lawrence Island Section. The State may also require onboard observers in other crab fisheries (e.g., the Pribilof Islands Korean hair crab *Erimacrus isenbeckii* fishery) to, in part, monitor bycatch of king or Tanner crab. Observers provide data on the amount and type of bycatch occurring in each observed fishery and estimates of bycatch by species, sex, size, and shell-age/shell-hardness for each observed fishery are currently provided in annual reports by ADF&G.

8.3.8 Other

As previously noted, the State government is not limited to only the management measures described in this FMP. However, implementation of other management measures not described in the FMP must be consistent with the FMP, the Magnuson-Stevens Act, and other applicable Federal law, and may occur only after consultation with the Council. This management measure provides for an expanded scope of Federal review. Other management measures that the State may wish to implement are subject to the review and appeals procedures described in Chapters 9 and 10 of this FMP.

9.0 PROCEDURE FOR COUNCIL/SECRETARY OF COMMERCE PARTICIPATION IN STATE OF ALASKA PRESEASON FISHERIES ACTIONS AND NMFS REVIEW TO DETERMINE CONSISTENCY OF THE REGULATIONS WITH THE FMP, MAGNUSON-STEVEN'S ACT, AND OTHER APPLICABLE FEDERAL LAW

Prior to the Board Meeting

Commencing on the date the Secretary approves this FMP, and until the next regularly scheduled Board meeting concerning crab regulations, any member of the public may appeal any existing regulation to the State² and, if unsuccessful, to the Secretary, and any Alaska Statute to the Secretary, in accordance with the procedure set forth below. Secretarial review is limited to whether the challenged statute or regulation is consistent with the FMP, the Magnuson-Stevens Act, and other applicable Federal law.

At the Board Meeting

Before the annual Board meeting, the public has an opportunity to petition the State for new regulations or repeal of existing regulations. Copies of all proposals will be available to the public and to NMFS and the Council. Representatives of NMFS, NOAA's Office of General Counsel, and the Council will meet with the State and will participate in the State's discussions and deliberations for the purpose of assisting the State in determining the extent to which proposed management measures fall within the scope of the FMP, the Magnuson-Stevens Act, and other applicable Federal Law. However, these representatives will not vote on the various management measures.

After the Board Meeting

After the meeting, the procedure for review of the resulting crab regulations follows two paths:

First, under the State Administrative Procedure Act (described in Appendix C) an interested person may petition the Board for the adoption or repeal of a regulation. A member of the public who objects to a crab regulation must first appeal through this procedure and must receive an adverse ruling which will be reviewed by the CIAC prior to the appeal being reviewed by the Secretary. The CIAC will have no authority to grant or reject the appeal, but shall comment upon the appeal for the benefit of the Secretary. An appeal to the Board is not limited to a challenge that the proposed regulation is inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law. The Secretary will, however, consider only challenges to regulations alleging that the new regulations are inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law. The Secretary will not respond to comments that merely object to a regulation or state that an alternate regulation is better unless the interested person ties the objection to the appropriate standard of review. This will allow the Secretary to disregard frivolous comments and to encourage interested persons to participate fully in the State procedures before seeking Secretarial intervention. Nothing in this FMP is intended to limit any opportunity under the State Administrative Procedure Act for an interested person to seek judicial review of regulations.

The second path of review will be a Secretarial review of the measures adopted by the Board. During this review, the Secretary will review any measure adopted by the Board for consistency with the FMP, the Magnuson-Stevens Act, and other applicable Federal law. The Secretary will also consider comments submitted by the Council on any measure adopted by the State during the 20 days after the end of the Board meeting. The Secretary may hold an informal hearing, if time permits, to gather further information

² Current Board policy limits petitions to the subject of conservation emergencies.

concerning the regulations under review. The Secretary will consider only comments on whether the new regulations are consistent with the FMP, the Magnuson-Stevens Act and other applicable Federal law.

If, as a result of its own review, or its review of comments received, or as a result of an appeal of an adverse decision in the State appeal process, the Secretary makes a preliminary determination that a regulation is inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law, then the Secretary will:

1. publish in the Federal Register a proposed rule that is consistent with the FMP, the Magnuson-Stevens Act, and other applicable Federal law, together with the reasons for the rule, and request comments for 30 days, and
2. provide actual notice of the proposed rule to the Council and the Commissioner of ADF&G. The State will have 20 days to request an informal hearing.

If, after reviewing public comments and any information obtained in an informal hearing, the Secretary decides that the State regulations in question are consistent with the FMP, the Magnuson-Stevens Act, and other applicable Federal law, the Secretary will publish in the Federal Register a withdrawal of the proposed rule, and so notify the State and the Council.

If the State withdraws the regulation or states that it will not implement the regulation in question, the Secretary will publish in the Federal Register a withdrawal of the proposed rule. The State may choose to withdraw its rule as a result of its own appeals procedure or because of the review procedure set up under this FMP.

If, after reviewing public comments and any information obtained in an informal hearing, the Secretary decides that the regulations in question are inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law, the Secretary will publish in the Federal Register a final rule that supersedes the State regulation in the EEZ. Such rules are Federal regulations, which will comply with Federal rulemaking procedures and be enforced as Federal law.

If preseason changes are made at a Board meeting which takes place later in the year than anticipated here, or if there is not time to follow the procedure described in this chapter so that any final Federal rule that may be necessary can be effected in a timely fashion, the Secretary will notify the Council and the Commissioner of ADF&G that he will use an expedited review procedure, possibly including deletion of the requirement for initial appeal to the State, and explain what the procedure is. In the expedited review, the Secretary will provide for comment by the Council (or a committee of the Council) and the Commissioner of ADF&G if at all possible. However, if necessary, the Secretary can immediately publish in the Federal Register an interim final rule that supersedes in the EEZ any State regulation that the Secretary finds is inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law, and ask for comments on the interim final rule.

10.0 PROCEDURE FOR APPEAL TO THE SECRETARY OF COMMERCE TO SET ASIDE AN IN-SEASON ACTION OF THE STATE

For the purposes of this section, an in-season appeal is an appeal of any action by the State, other than an action taken by the State that NMFS had already reviewed in the process described above. It includes an appeal of an action of the Board, of the ADF&G, or of the State legislature. The in-season appeal process is limited similarly to the preseason review process, in that the Secretary will only consider appeals that the State regulation is inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law. For example, where State in-season, discretionary action is alleged to violate a Magnuson-Stevens Act National Standard, a management measure fixed in the FMP, or fails to follow the criteria set forth in the FMP for a decision under a frameworked management measure, an appeal to the Secretary would be appropriate. The Secretary will not consider appeals that merely state that the appellant does not like the regulation or prefers another. The latter argument is to be presented to the State.

If a person believes that an in-season action of the State is inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law, the person must, within 10 days of the issuance of the in-season action, submit to the Secretary in writing a description of the action in question and the reasons that it is inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law. The Secretary will immediately provide a copy of the appeal to the CIAC and the Commissioner of ADF&G. The Secretary will, to the extent possible when reviewing any appeal of an in-season management decision, communicate with the CIAC in advance of making his decision whether to grant or reject the appeal in order to solicit the CIAC's and the Commissioner's comments on the management decision at issue. If time permits, he will allow them 5 days for comment on the appeal. If the Secretary determines that there is not sufficient time available for this review, he will seek comments by telephone from the Commissioner of ADF&G and from the Council.

State crab regulations grant certain rights to appeal in-season area closures. An interested person may wish to pursue State appeal procedures along with the procedure described here. If, after review of the appeal and any comments from the Commissioner of ADF&G and the Council, the Secretary determines that the challenged action is consistent with the FMP, the Magnuson-Stevens Act, and other applicable Federal law, he will so notify the appellant, the Commissioner of ADF&G, and the Council.

If, after review of the appeal and any comments of the Commissioner of ADF&G and the Council, the Secretary finds that the in-season action is inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law, and that for good cause he must immediately issue Federal regulations that supersede State regulations in the EEZ, he will publish in the Federal Register the necessary final Federal rule and request comments on the rule.

If, after review of the appeal and the comments of the Commissioner of ADF&G and the Council, the Secretary makes a preliminary determination that the action is inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable Federal law, but that Federal regulations that supersede the State regulation in the EEZ need not be implemented immediately, he will follow the procedure for preseason actions (see Chapter 9). That is, he will publish a proposed rule in the Federal Register and request comment, provide the State with an opportunity for an informal adjudicatory hearing, and either withdraw the proposed rule or publish a final rule that supersedes the State rule in the EEZ. This would be a Federal action and would comply with Federal rulemaking procedures.

Appendix A State/Federal Action Plan

The following document is the State/Federal Action Plan for the commercial king and Tanner crab fisheries. This Action Plan details the cooperative management system for BSAI crab fisheries between the North Pacific Fishery Management Council and the State of Alaska.

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Appendix B
Act

National Standards of the Magnuson-Stevens Fishery Conservation and Management Act

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
2. Conservation and management measures shall be based upon the best scientific information available.
3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
4. Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (a) fair and equitable to all such fishermen, (b) reasonably calculated to promote conservation, and (c) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
5. Conservation and management measures shall, where practicable, promote efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.
7. Conservation and management shall, where practicable, minimize costs and avoid unnecessary duplication.
8. Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.
9. Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
10. Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

Appendix C State of Alaska Management Structure

Institutions: The State Organizational Act of 1959 provided for Alaska Statutes, Title 16, which deals with Alaska Fish and Game Resources. Article 1 provides for a Department of Fish and Game whose principal executive officer is the Commissioner of Fish and Game. The Commissioner is appointed by the Governor for 5 years. The Commercial Fisheries Division was established to manage all commercially harvested fish species in Alaska. The Division is headed by a director who supervises four regional supervisors. The regions are further separated into management areas. Area management biologists are responsible for collecting catch data and monitoring fisheries in their areas. A Subsistence Section within the Commissioner's Office was established to document subsistence needs and utilization and to make recommendations for developing regulations and management plans to ensure subsistence use preference.

The enforcement of fish and game laws and regulations is provided by ADF&G and the Alaska Department of Public Safety (ADPS). The fish and wildlife protection officers of the ADPS operate independently of the ADF&G, although communication between the two departments is maintained and activities are coordinated.

Jurisdiction: ADF&G asserts management authority over all migratory fish and shellfish species which enter and leave territorial waters of the State, including the migratory fish and shellfish taken from State waters which are indistinguishable, in most instances, from those taken from adjacent high seas areas. Regulations governing migratory fish and shellfish cover both areas and are enforced by the State's landing laws. These landing laws prohibit the sale or transportation within State waters of migratory fish and shellfish taken on the high seas unless they were taken in accordance with State regulations.

The Fisheries Regulatory Process: The Alaskan system has a seven-member Board, composed of fishermen and other businessmen appointed by the Governor, which considers both public and staff regulatory proposals in deciding on regulatory changes. The Board is required by law to meet or hold a hearing at least once a year in each of the following areas of the State in order to assure all people of the State ready access to the Board: (a) Upper Yukon-Kuskokwim-Arctic, (b) Western Alaska (including Kodiak), (c) South Central, (d) Prince William Sound (including Yakutat), and (e) Southeast. Since the late 1960s, the Board, and before it, the Board of Fish and Game, has usually held a minimum of two meetings annually to adopt changes in the fisheries regulations. The fall Board meeting, usually held in early December, considers proposals for changes in sport fishing regulations and in commercial and subsistence finfish regulations. A spring Board meeting, usually held in late March or early April, considers commercial and subsistence shellfish regulatory proposals (see Chapter 2). Regulations which may be adopted by the Board cover seasons and areas, methods and means of harvesting, quotas, and times and dates for issuing or transferring licenses and registrations.

Advisory committees, composed of people concerned about the fish and game resources of their locality, serve as local clearinghouses and sources of proposals for Board consideration. Following submission of advisory committees and public proposals, ADF&G staff members review the proposals and redraft the wording, when necessary, to conform to the style required. ADF&G also submits proposals for the Board's consideration.

In adopting new regulations, the Board follows Alaska's Administrative Procedure Act. This act has several requirements: At least 30 days prior to the adoption of new regulations, a notice giving the time and place of the adoption proceedings, reference to the authority under which the regulations are proposed, and a summary of the proposed action, must be published in a newspaper of general circulation and sent to all interested people who have asked to be informed of the proposals. During the proceedings, the public must

be given an opportunity to testify on the proposed changes. If a new regulation is adopted, it must be submitted to the Lieutenant Governor through the Attorney General's office. Thirty days after being filed with the Lieutenant Governor, the new regulation becomes effective. Because of these requirements, new regulations usually do not become effective until about 2 months after being adopted by the Board. Regulatory flexibility is given to the Commissioner of Fish and Game and to his authorized designees to adjust seasons, areas, and weekly fishing periods by emergency order.

The requirements outlined in the preceding paragraph do not apply in the case of emergency regulations, which may be adopted if needed for the immediate preservation of public peace, health, safety, or general welfare. An emergency regulation remains in effect 120 days unless it is adopted as a permanent regulation through the procedure described above. Emergency regulations have the same force and effect as permanent regulations. The Board has delegated authority to the Commissioner to adopt emergency regulations where an emergency exists as described in AS 44.62.250.

Appeals to the Board of Fisheries

Reconsideration of issues during a meeting: During a Board meeting, any Board member may move to reconsider an issue regardless of how the member voted on the original issue. Board Policy #80-78-FB requires that the motion be made prior to the adjournment of the meeting, that the motion be supported with new evidence, unavailable at the time of the original vote, and that public notice be given as to when reconsideration will occur.

Petitions to the Board: Under Section AS 44.62.220, an interested person may petition the Board for the adoption or repeal of a regulation. Upon receipt of a petition requesting the adoption, amendment or repeal of a regulation, the Board shall, within 30 days, deny the petition in writing or schedule the matter for public hearing. The Board and the Board of Game adopted a Joint Board Petition Policy which limits the scope of petitions they are willing to act upon outside of the normal regulatory cycle. The Joint Board recognized that in rare instances extraordinary circumstances may require regulatory changes outside this process. Therefore, it is the policy of the Board and the Board of Game that petitions will only be accepted if the problem outlined in the petition results in a finding of emergency. In accordance with State policy (AS 44.62.270), emergencies will be held to a minimum and rarely found to exist. Alaska Statute 44.62.250 specifies that in order to adopt emergency regulations, the agency must find that it is necessary for the immediate preservation of the public peace, health, safety, or general welfare. If such a finding is made, the agency adopting the emergency regulation shall submit a copy to the Lieutenant Governor for filing and for publication in the "Alaska Administrative Register". Notice of adoption shall be given within five days of the adoption. Failure to give notice within ten days automatically repeals the regulation. For fish and game regulations, the Boards determined that an emergency is an unforeseen, unexpected event that either threatens a fish or game resource, or an unforeseen, unexpected resource situation where a biologically allowable resource harvest would be precluded by delayed regulatory action and such delay would be significantly burdensome to the petitioners since the resource would be unavailable in the future.

In 1995, the Board of Fisheries modified its petition policy for category 2 measures in the BSAI king and Tanner crab FMP (see State Regulation 5 AAC 39.998). The Board of Fisheries recognizes that in rare instances, circumstances may require regulatory changes outside the process described in 5 AAC 96.625(b) - (d). Notwithstanding 5 AAC 96.625(f), a petition for a regulatory change may be submitted under this section and 5 AAC 96.625(a) for a Category 2 management measure in a Bering Sea/Aleutian Islands king or Tanner crab fishery described in the federal Fishery Management Plan (FMP) for the Commercial King

and Tanner Crab Fisheries in the Bering Sea/Aleutian Islands. It is the policy of the Board of Fisheries that a petition submitted under this section will be denied and not scheduled for hearing unless the petition:

- (1) addresses a Category 2 management measure and is filed within 30 days from the date that the board adopted that Category 2 management measure;
- (2) presents an issue that is not solely allocative; and
- (3) presents new legal, biological, or management information that indicates the regulation may not be consistent with the federal FMP."

Appeals to the Commissioner of Fish and Game

Petitions: Board Policy #79-53-FB delegates authority to the Commissioner to adopt emergency regulations, during times of the year when the Board is not in session. The Commissioner may adopt, in accordance with the Administrative Procedure Act (AS 44.62), an emergency regulation where an emergency exists as described in AS 44.62.250. All emergency actions shall, to the full extent practicable, be consistent with Board intent. The Commissioner is further required to consult, if possible, with members of the Board to obtain their views.

In-season Management Actions: Within 5 days after the closure of any registration area, an individual holding a king or Tanner crab permit issued by the Commercial Fisheries Entry Commission or the owner of any vessel registered to that area may formally request the commissioner to reopen the area. The commissioner shall personally review pertinent information on the condition of crab within the area, and shall formally announce his decision within 14 days of the request. 5AAC 34.035(d), 35.035(d).

Judicial Review: The APA in Section 44.62.300 provides for court review of regulatory actions of the Board or commissioner. An interested person may get a judicial declaration on the validity of a regulation by bringing an action for declaratory relief. All actions are to be brought in the Superior Court. The court may declare the regulation invalid for a substantial failure to comply with required administrative procedures (AS 44.62.010-44.62.320) or, in the case of an emergency regulation or order of repeal, upon the grounds that the facts recited in the statement do not constitute an emergency under AS 44.62.250.

Appendix D Biological and Environmental Characteristics of the Resource

Life History Features: A summary of the life history of king and Tanner crabs in the BS/AI area can be found in the Essential Fish Habitat Assessment for BSAI king and Tanner crabs (NPFMC 1998). A summary of life history traits for BSAI king and Tanner crab species is provided in Table D-1.

Description of Habitat Types: The Bering Sea covers almost 3 million km² and is unusual in having an extremely wide continental shelf, ranging from 500 km wide in the southeast region to over 800 km wide in the north (NRC 1996). The Bering Sea has certain characteristic features which make it different from other corresponding regions in higher latitudes (see Table D.1 from Favorite and Laevastu, 1981). The Bering Sea shelf is flat and relatively featureless, with the exception of three large and some small islands. Its gradient is 0.24 m/km sloping gradually to a depth of about 170 m at the shelf break. (Niebauer et al. 1995, Sharma 1977). The geography of the coastal area bordering the Bering Sea has been shaped by geologic forces, strong erosion of the Bering itself, and the subarctic climate.

The southern border of the Bering Sea is bounded by the Aleutian Islands, a chain of volcanic islands, many of which are still active, driven by tectonic forces (NRC 1996). The islands extend more than 1,770 km and consist of more than 50 islands, in five groups, separating the Bering Sea from the North Pacific Ocean. The Aleutian and Shumagin Islands are low mountains with steep to moderate slopes and rolling topography. Plateaus and uplands occur in some places in the chain. Elevations of the islands range from sea level to nearly 1,524 m. A number of the islands have wave-derived terraces up to 183 m above sea level, and are bordered by lower sea cliffs from previous sea level stands. Broad and flat intertidal platforms derived from glacial period sea level changes surround some islands. Those islands with peaks higher than 914 m were heavily glaciated and include fjords extending up to 610 m into the sea.

The Pribilof Islands are five small islands in the Bering Sea that lie 322 km north of the Aleutian Island of Unalaska. St George Island is characterized by hills and ridges with steep cliffs rising up to 274 m. In contrast St. Paul Island has a rolling plateau with some extinct volcanic peaks. The islands of St. Matthew, Pinnacle and Hall are located north of the Pribilof Islands and about 324 km west of mainland Alaska. These islands have steep shorelines and volcanic ridges with volcanic cones rising up to 458 m (NRC 1996).

The waters of the Bering Sea can be partitioned (Kinder and Schumacher, 1981 a, b) during the summer by transition zones which separate four hydrographic domains (Table D.2). The hydrographic domains are distinguished by bottom depth and seasonal changes in their vertical density structure. During the winter this structure is absent or much less apparent under the ice. Maximum ice extent occurs in March or April and the seasonal ice advance and retreat in the Bering Sea on the average extends over a distance 920 km along 170°W (Konishi and Saito, 1974). Beginning in the nearshore area, the coastal domain includes waters less than 50 m in depth that due to tidal and wind mixing do not stratify seasonally. A frontal zone of transition separates the coastal domain from the middle shelf domain. In the middle shelf domain, over bottom depths of 50 to 100 m, seasonal stratification sets up during the ice-free season, and warmer, less saline waters overlie colder and more saline bottom waters. This stratification persists until broken down by winter cooling and storms. A broad transition or frontal zone separates the middle shelf zone from the outer shelf domain. This latter domain, in water depths from 100 to 170-200 m, is characterized by well-mixed upper and lower layers separated by a complex intermediate layer containing fine density structure. In general, outer shelf waters intrude shoreward near the bottom, while middle shelf waters spread seaward above them. Beyond the outer shelf domain, the shelf break front separates shelf waters from the oceanic domain, with its more saline, less aerobic waters overlying the Bering Sea slope and deep basin.

Net circulation in the Bering Sea is generally sluggish. While there is a relatively strong current at the shelf break (about 0.10 m s⁻¹), net flow over the shelf is weak at 0.01-0.03 m s⁻¹ directed toward the northwest and

parallel to the isobaths. However, moderate to strong tidal and wind-driven currents can be established over the shelf. Tidal current speed is about 0.3 m s^{-1} (Niebauer et al. 1995). The hydrography over the shelf is dominated by a system of three fronts, located approximately parallel to the 50 and 100-isobaths and the shelf break (Coachman, 1986). Nearshore coastal currents from the Gulf of Alaska shelf flow into the Bering Sea through Unimak Pass and then apparently continue northeastward along the Alaska Peninsula. Within the middle shelf domain (water depths from 50-100 m) currents are weak and variable, responding temporarily as wind driven pulses. In the outer shelf domain, a mean northwestward flow exists along the shelf edge and upper slope following depth contours.

With respect to the physiographic regimes and hydrographic domains of the Bering Sea, king crabs cross boundaries during seasonal and spawning migrations from one domain to another. Shelf dwellers, during the winter period king crabs move shoreward during the late winter and early spring and congregate on molting and spawning shoals. Crabs may occupy shoals from 50 to less than 20 fathoms at this time of year. *Chionoecetes* species also may make off-on shelf migrations for spawning and molting. A summary of habitat associations for life stages of BSAI king and Tanner crab species is provided Table D.3.

Habitat Areas of Particular Concern: Shallow inshore areas (less than 50 m depth) are very important to king crab reproduction. After molting through four larval (zoea) stages, king crab larvae develop into glaucothoe which are young crabs that settle in the benthic environment in nearshore shallow areas with significant cover, particularly those with living substrates (macroalgae, tube building polychaete worms, kelp, mussels, and erect bryozoans). The area north and adjacent to the Alaska peninsula (Unimak Island to Port Moller) and the eastern portion of Bristol Bay are locations known to be particularly important for rearing juvenile king crab.

Table D.1 Life history traits for BSAI king and Tanner crab species.

Table D.2 Characteristic features of the eastern Bering Sea shelf ecosystem.

Characteristic features	Consequences
<i>Physical features</i>	
Large continental shelf	High standing stocks of biota High fish production Large food resources for mammals
High latitude area	Nutrient replenishment with seasonal turnover Environmental distribution limits for many species Large seasonal changes Seasonal presence of ice Accumulation of generations
Large occasional changes	Seasonally changing growth Seasonal migrations Possibility of large anomalies
Ice	Presence of ice-related mammals Migration of biota (in and out) caused by ice Limited production in winter
Cold bottom water	Outmigration of biota Higher mortalities and lower growth of benthic and demersal biota Accumulation of generations
High runoff	Low salinities (near coasts) High turbidities Presence of eurohaline faunas
Sluggish circulation	Local biological production Local pelagic spawning
<i>Biological features</i>	
High production and slow turnover	High standing stocks
Fewer species (than in lower latitudes)	Few species quantitatively very dominant
Large numbers of marine mammals and birds	High predation by apex predators
Pronounced seasonal migrations	Great local space and time changes of abundance
<i>Fisheries resource features</i>	
Pollock dominant semidemersal species	Flexible feeding and breeding habits, special environmental adaption
Yellowfin sole dominant demersal species	Abundant benthos food supply Important forage species in the ecosystem
Herring and capelin dominant pelagic species	Large, relatively shallow shelf Few predators on adults, special environmental adaption
Abundant crab resources	Abundant food supply, no enemies, insignificant hunting Compete with man for fishery resources
Abundant marine mammals	Ecosystem in near-natural state, not yet fully adjusted to effects of extensive fishery
<i>Man-related features</i>	
Fisheries development rather recent	Ample space for breeding colonies of mammals and birds Very limited local fisheries, no pollution
Little-inhabited coasts	

Favorite, Felix and Taivo Laevastu, 1981. Finfish and the environment. In Hood, D.W. and J.A. Calder (eds.): The eastern Bering Sea shelf: oceanography and resources, Vol. 1. Univ. of Washington Press, Seattle, Washington: 597-610.

Table D.3 Habitat associations for BSAI king and Tanner crab species.

Appendix E Description of the Fisheries and Stocks

E1.1 History of the Fishery

The red king crab resource in the eastern Bering Sea was exploited by Japan in the 1930s and small amounts of Tanner crab were harvested beginning in 1953 (Zahn 1970, Otto 1981). The king crab fishery in the BS/AI area has gone through rapid development in the last 25 years. After a short lived, small-scale American fishery in the late 1940s and 1950s, the Japanese reentered the fishery in 1953 and the Soviet Union entered the fishery in 1958. During 1964, the United States arranged bilateral agreements with Japan and the U.S.S.R. The foreign fisheries were gradually supplanted by an entirely American fishery which has had more than enough capacity to harvest and process the total resource since the late 1960s. Foreign fisheries for king crabs ceased in 1974 and those for Tanner crabs ceased in 1980. Historical harvests of BSAI king and Tanner crab are listed in Tables E1-E3

Prior to Alaska statehood, the U.S. Bureau of Commercial Fisheries managed the crab fishery off Alaska. The Bureau established a minimum size limit, prohibited retention of soft shell and female crabs, and prohibited the use of tangle nets and set a minimum size for trawl nets. After achieving statehood, regulatory authority was vested in the Board with management responsibility assigned to the ADF&G. The Board adopted the Bureau's regulatory regime and added a registration system designed to protect local fleets and enhance management ability. By 1960, due to the expansion of the fishery, the State enacted landing laws which prohibited the sale or transportation within State waters of migratory fish and shellfish taken on the high seas unless they were taken in accordance with State regulations. In 1970, the Board reacted to a rapid decline in the Kodiak king crab fishery by establishing a quota system, which was designed to allow a significant portion of the recruit class to be held over for the next year. This quota system was intended to moderate extreme fluctuations in harvest levels associated with the previous recruits-only fishery, and to enhance the reproductive potential of the stocks. In 1975, the Board modified the catch quota system to GHs, which were expressed as a range instead of a point estimate. This gave the State greater flexibility in selecting the most opportune point at which to close individual fisheries since more weight could be given to data collected during the course of the fishing season.

The domestic Tanner crab fishery in the BS/AI area underwent rapid development in the 1970's. Both C. bairdi and C. opilio are harvested in the Bering Sea and C. bairdi is harvested in the waters off the Aleutian Islands. The first reported catch of C. bairdi within the management unit was 17,900 pounds taken incidental to the Bering Sea king crab fishery in 1968. C. bairdi soon became a target species, and by 1976 approximately 22.9 million pounds were landed from the BS/AI area. A Japanese fishery for C. opilio was displaced by a completely domestic fishery in 1981. The first reported catches of C. opilio occurred in 1978 with about 1.7 million pounds landed. As C. bairdi stocks declined, C. opilio harvest increased rapidly, and since 1980, C. opilio harvests have exceeded C. bairdi harvests for the management unit.

Currently, 17 separate stocks of king and Tanner crab are managed in the BS/AI area (Table E.4). In most cases, these stocks are geographically separable on the basis of distribution and differing biological characteristics and interchange with adjacent groups is limited to oceanographic transport of planktonic larvae. In some cases, however, stocks are merely defined by existing regulatory boundaries either for statistical purposes or because pertinent information is lacking.

Scarlet king crab and grooved and triangle Tanner crab are unlikely to become the target of a large commercial fishery due to the great depths they inhabit; however, the increasing value of crab and the fluctuating supply of other Alaskan crab species may stimulate technological developments making deepwater crab fishing more economical.

A map showing the general location of BSAI crab fisheries is shown in Figure E.4.

E1.2 Status of BSAI Crab Stocks

The most current status of the resource is found in the annual Stock Assessment and Fishery Evaluation Report (SAFE). The report consists of the ADF&G annual management report, status of stocks report and shellfish observer program report, a summary of the NMFS survey of BSAI crab stocks, and a list of recently published literature pertinent to BSAI crab management (NPFMC, 1997). The report details stock condition, fishery resource size, fishing effort, catch statistics, current biological and economic status of the fisheries, guideline harvest levels and ranges, and harvest strategies.

Table E.1. Commercial BSAI red and blue king crab harvest (pounds).

Table E.2. Commercial BSAI golden king crab harvest by year in pounds.

Table E.3. Commercial BSAI Chionoecetes crab harvest by year in pounds.

Table E.4. Stocks of king and Tanner crab in the BS/AI area.*

Aleutian Islands golden king crab	Probably separated from Bering Sea stocks by an area of sparse king crab abundance north of Unimak Pass. There may be various distinct biological groups in the area (see Otto and Cummiskey 1985, Somerton and Otto 1986).
Aleutian Islands red king crab	One or several distinct groups that are geographically separated by deep water trenches in passes between islands and from Bering Sea stocks by an area of sparse king crab abundance north of Unimak Pass.
Bristol Bay red king crab	A distinct biological group (see Otto et al. 1989). Blue and golden king crab also occur here in low abundance but are not separately managed.
Pribilof District blue king crab	A distinct biological and geographic group (see Otto and Cummiskey 1990, Somerton and MacIntosh 1983a, 1983b).
Pribilof District red king crab	A distinct biological and geographic group.
Pribilof District golden king crab	Probably two biological groups (Pribilof and Zhemchug Canyons) that are not entirely geographically distinct from each other or from golden king crab found in Bristol Bay or the Northern District (see Otto and Cummiskey 1985, Somerton and Otto 1986).
St. Matthew Section blue king crab	A distinct biological and geographic group (see Otto and Cummiskey 1990, Somerton and MacIntosh 1983a, 1983b).
St. Lawrence Section blue king	Probably distinct from groups to the south crab but may actually be several groups. Not available in commercial abundance.
Northern District golden king crab	A group that has unique biological characteristics but may not be geographically distinct (see Otto and Cummiskey 1985, Somerton and Otto 1986).
Norton Sound Section red king crab	A distinct biological and geographic group (see Powell et al. 1983, Otto et al. 1989).
Western Aleutians <u>C. bairdi</u>	Perhaps several groups but not geographically separated from E. Aleutians. Separate grouping from Eastern Aleutians for statistical purposes. Fishery almost entirely incidental to king crab fishing.
Eastern Aleutians <u>C. bairdi</u>	Not geographically distinct from Western Aleutians. Grouping for statistical purposes. Fishery is largely incidental.
Bering Sea District <u>C. bairdi</u>	Probably distinct from group(s) in Aleutian Islands. Probably consists of two groups (east and west) that differ biologically (see Somerton 1981).
Bering Sea District <u>C. opilio</u>	Considered as distinct because species is almost absent from Aleutians. Gradations in biological characteristics over their geographical range. Probably continuous with populations found in Soviet waters.

* Limited stock information is available for scarlet king crab, grooved Tanner crab, and triangle Tanner crab. For purposes of reporting, harvest of these deepwater crabs is grouped by existing king and Tanner crab registration areas.

Table E.5. Estimated size of maturity for king crab (carapace length, mm) and Tanner crab (carapace width not including spines, mm) and minimum legal size (carapace width including spines, inches) currently in regulation for fisheries within the BS/AI management unit.

Area	Size of Carapace at Maturity				Minimum Size
	Species	Males	Females	Source	
Aleutian Islands	red king	-	89 ¹	Blau 1990	6.50
	golden king	109-130 ²	106-113 ¹	Otto and Cummiskey 1985	6.00
Bristol Bay	red king	103 ^{2,3}	89 ¹	males: Somerton 1980 females: Otto et al. 1990	6.50
Pribilof District	red king	-	102 ¹	Otto et al. 1990	6.50
	blue king	108 ^{2,4}	96 ¹	Somerton and MacIntosh 1983 Somerton & Otto 1986	6.50
St. Matthew Section	golden king	107 ²	100 ¹		5.50
	blue king	77 ^{2,5}	81 ¹	Somerton and MacIntosh 1983 Somerton & Otto 1986	5.50
Norton Sound Section	golden king	92 ²	98 ¹		5.50
	red king	-	71 ¹	Otto et al., 1990	4.75
St. Lawrence Section	blue king	-	-		5.50
	blue king	-	-		5.50
Bering Sea/ Aleutian Is.	<u>bairdi</u>	105-116 ⁶	78-94 ⁷	Somerton 1981b	5.50
	<u>C. opilio</u>	75 ⁶	56 ⁷	Otto 1988	3.10
	<u>C. tanneri</u>	119 ⁶	79 ⁷	Somerton and Donaldson 1996	-
	<u>C. angulatus</u>	91 ⁶	58 ⁷	Somerton and Donaldson 1996	-
	scarlet king	91 ⁸	80 ⁹	Somerton 1981a	-

¹ Size at which 50% are mature (SM₅₀) as determined by presence of eggs or empty egg cases.

² Intersection point of lines fit to characterize two phases of growth in the right chela.

³ Size at functional maturity used for fishery management is 120 mm carapace length.

⁴ Size at functional maturity used for fishery management is 120 mm carapace length.

⁵ Size at functional maturity used for fishery management is 105 mm carapace length.

⁶ Size at which 50% are mature (SM₅₀) as determined by chela allometry; Bering Sea.

⁷ Mean size of mature animals as determined by presence of eggs or empty egg cases; Bering Sea.

⁸ Size at which 50% are mature (SM₅₀) as determined by chela allometry; Gulf of Alaska.

⁹ Size at which 50% are mature (SM₅₀) as determined by presence of eggs or empty egg cases; Gulf of Alaska.

Figure E.1. In-season management decision making by Alaska Department of Fish and Game (ADF&G) based on preseason specification of guideline harvest level (GHL). Area management biologists may issue emergency orders closing fisheries, but final decisions are made by the Commissioner or his designee.

Figure E.2. Current fishing seasons for king and Tanner crab stocks in the BS/AI area (second seasons for larger crabs are also possible by State emergency order (EO)). Source: Alaska Department of Fish and Game Commercial Shellfish Regulations.

Figure E.3. Bering Sea and Aleutian Islands management unit showing State of Alaska registration areas for king and Tanner crab. The boundary of the management unit extends to the outer limit of the EEZ, and the seaward boundary of registration areas, districts, and subdistricts is fixed by State regulation.

Figure E.4. Map showing general location of crab fisheries in the BSAI.

Red King Crab

Biology: Red king crab (*Paralithodes camtschaticus*) is widely distributed throughout the Bering Sea and Aleutian Islands, Gulf of Alaska, Sea of Okhotsk, and along the Kamchatka shelf. King crab molt multiple times per year through age 3 after which molting is annual. At larger sizes, king crab may skip molt as growth slows. Females grow slower and do not get as large as males. In Bristol Bay, fifty percent maturity is attained by males at 120 mm CL and 90 mm CL by females (about 7 years). Red king crab in the Norton Sound area mature at smaller sizes and do not attain maximum sizes found in other areas. In Bristol Bay, red king crab mate when they enter shallower waters (<50 m), generally beginning in January and continuing through June. Males grasp females just prior to female molting, after which the eggs (43,000 to 500,000 eggs) are fertilized and extruded on the female's abdomen. The female red king crab carries the eggs for 11 months before they hatch, generally in April. Red king crab spend 2- 3 months in larval stages before settling to the benthic life stage. Young-of-the-year crab occur at depths of 50 m or less. They are solitary and need high relief habitat or coarse substrate such as boulders, cobble, shell hash, and living substrates such as bryozoans and stalked ascidians. Between the ages of two and four years, there is a decreasing reliance on habitat and a tendency for the crab to form pods consisting of thousands of crabs. Podding generally continues until four years of age (about 65 mm), when the crab move to deeper water and join adults in the spring migration to shallow water for spawning and deep water for the remainder of the year. Mean age at recruitment is 8-9 years.

Management: Red king crab stocks in the Bering Sea and Aleutian Islands are managed by the State of Alaska through a federal king and Tanner crab fishery management plan (FMP). Under the FMP, management measures fall into three categories: (1) those that are fixed in the FMP under Council control, (2) those that are frameworked so the State can change them following criteria outlined in the FMP, and (3) those measures under complete discretion of the State. During the 1970s and 1980s, pre-season guideline harvest levels were set at 20-60% of legal male abundance based on several indicators of stock condition. Between 1989 and 1995, the State set guideline harvest levels for red king crab based on a mature male harvest rate of 20%, with a harvest cap of 60% of legal male abundance. In 1996, the

Management measures implemented for the BSAI king and Tanner crab fisheries, as defined by the federal crab FMP, by category.

Category 1 (Fixed in FMP)	Category 2 (Frameworked in FMP)	Category 3 (Discretion of State)
<ul style="list-style-type: none"> * Legal Gear * Permit Requirements * Federal Observer Requirements * Limited Access * Norton Sound Superexclusive Registration Area 	<ul style="list-style-type: none"> * Minimum Size Limits * Guideline Harvest Levels * Inseason Adjustments * Districts, Subdistricts and Sections * Fishing Seasons * Sex Restrictions * Closed Waters * Pot Limits * Registration Areas 	<ul style="list-style-type: none"> * Reporting Requirements * Gear Placement and Removal * Gear Storage * Gear Modifications * Vessel Tank Inspections * State Observer Requirements * Bycatch Limits (in crab fisheries) * Other

harvest rate for Bristol Bay red king crabs was reduced to 10% of the mature males to allow stock rebuilding. A threshold of 8.4 million mature females, equating to an effective spawning biomass of 14.5 million pounds, has been established as a minimum benchmark for harvesting this stock. Current minimum legal size for Bristol Bay, Aleutian Islands, and Pribilof Islands red king crab is 165 mm, or 6.5 inches in carapace width. Minimum legal size for Norton Sound, St. Matthew, and St. Lawrence Island red king crab is 4.75" carapace width.



In addition to minimum size and sex restrictions, the State has instituted numerous other regulations for the Eastern Bering Sea crab fisheries. The State requires vessels to register with the state by obtaining licenses and permits, and register for each fishery and each area. Norton Sound has been designated a superexclusive area, meaning that vessels fishing this fishery are not allowed in other fisheries, and vice-versa. A 10-mile area around King Islands has been closed to commercial crabbing for local subsistence reasons. Observers are required on all vessels processing crab in the Bering Sea and Aleutian Islands area. Season opening dates are set to maximize meat yield and minimize handling of softshell crabs. The season

opening date for Bristol Bay red king crab fisheries is November 1. Beginning in 1996, the Aleutian Islands area (formally Adak and Dutch Harbor) opens September 1. The Norton Sound summer season opens on July 1, and a though-the-ice fishery occurs from November 15 to May 15. Pot limits have been established based on vessel size and guideline harvest level. In Norton Sound, the pot limits are 50 for vessels > 125 feet, and 40 for vessels < 125 feet. A minimum size of 9" stretched mesh on one vertical panel is required for pots used in the Bristol Bay red king crab fishery. Other gear restrictions include a requirement that crab pots be fitted with a degradable escape mechanism consisting of #30 cotton thread (max. diameter) or a 30-day galvanic timed release mechanism.

Stock Structure: Three discrete stocks of red king crab are actively managed in the BSAI region: Bristol Bay, Norton Sound, and Aleutian Islands stocks. The Aleutian Islands stock consists of Adak and Dutch Harbor populations. Other populations of red king crab are found in the Pribilof Islands area, St. Matthew, and St Lawrence Island area, but are managed in conjunction with blue king crab fisheries. Red king crab stocks are managed separately to accommodate different life histories and fishery characteristics.

Bristol Bay Stock: Area swept estimates of abundance for the Bristol Bay red king crab stock are obtained through the NMFS annual bottom trawl surveys. A length-based analysis, developed by the Alaska Department of Fish and Game, incorporates survey and commercial catch and observer data into more precise abundance estimates. Abundance estimates generated by this model are used to set guideline harvest levels. After declining abundance throughout the 1960s and reaching a low during the years 1970-1972, recruitment to the Bristol Bay red king crab stock increased dramatically in the mid- and late 1970s. Recruitment was much lower during the 1980s and 1990s. By 1994, recruitment was about 1/20th of what it was in 1977. Since then, the length-based model indicates a slight but steady increase in the abundance of small males and females.

During the fishery's heyday, new all-time record landings were established in each year from 1977 to 1980 (peaking at 129.9 million pounds). This was followed by a stock collapse in 1981 and 1982, leading to a total closure of the Bristol Bay fishery in 1983. In 1984, the stock showed some recovery and a limited fishery was reestablished. Between 1984 and 1993, the fishery continued at levels considerably below those of the late 1970s. Annual landings during this period ranged from 4.2 million to 20.4 million pounds. After 1993, the stock declined again, and no

fishery occurred in 1994 and 1995. Pot limits have been established based on vessel size and harvest level.

Total harvest (thousands of pounds) of red king crab from the Dutch Harbor, Adak, and Norton Sound area, 1980-1996.

Year	Dutch Harbor	Adak	Norton Sound
1980	17,661	1,420	1,190
1981	1,393	1,649	1,380
1982	5,155	1,702	230
1983	431	1,982	370
1984	0	1,368	390
1985	0	908	430
1986	0	712	480
1987	0	1,214	330
1988	0	1,567	240
1989	0	1,119	250
1990	0	828	190
1991	0	951	0
1992	0	1,266	70
1993	0	698	336
1994	0	197	328
1995	0	36	323
1996	0	0	220
1997	0	0	93

Abundance of legal males (millions of crab from LBA model), pre-season guideline harvest levels (GHL, in millions of pounds), and total catches (millions of pounds, including deadloss) of Bristol Bay red king crab, 1980-1996.

Year	Abundance	GHL	Catch
1980	44.2	70.0 - 120	129.9
1981	9.5	70.0 - 100	35.1
1982	2.9	10.0 - 20	3.0
1983	2.5	0	0
1984	2.3	2.5 - 6.0	4.2
1985	1.8	3.0 - 5.0	4.2
1986	4.3	6.0 - 13.0	11.4
1987	6.7	8.5 - 17.7	12.3
1988	8.3	7.5	7.4
1989	9.7	16.5	10.3
1990	10.1	17.1	20.4
1991	8.5	18.0	17.2
1992	6.6	10.3	8.0
1993	5.8	16.8	14.6
1994	4.5	0	0
1995	5.1	0	0
1996	5.9	5.0	8.4
1997	5.9	7.0	8.8

Note: abundance through 1994 included Pribilof area red king crab.

The Bristol Bay red king crab fishery is prosecuted using mesh covered pots (generally 7 or 8 foot square) set on single lines. Over 280 vessels participated in the Bristol Bay red king crab fishery in recent years when a guideline harvest level was established (1991-1993). The season begins on November 1, and generally has lasted less than 10 days in recent years. These crab average about 6.5 pounds and fetch a high ex-vessel price; \$3

to \$5 per pound was paid during the 1989-1993 fisheries. Total ex-vessel value ranged from \$40,000,000 to \$100,000,000 in those years.

Norton Sound and Aleutian Islands Stocks: Surveys of these populations are not regularly conducted, and abundance is not estimated each year. Consequently, aside from years when surveys are conducted, fisheries for these stocks are generally managed based on catch history and in-season catch performance monitoring.

Prior to 1977, red king crab were taken in Norton Sound for subsistence uses only. Commercial landings peaked at 3 million pounds in 1979, and declined to average about 300,000 pounds annually. The 1995 summer fishery was prosecuted by 48 vessels, which landed 323,000 pounds. Average weight of crab landed was 3 pounds, with an ex-vessel price of \$2.87 per pound. A winter fishery occurs from November 15 to May 15. Holes are chopped through the ice, and pots are tended by fishermen on snow machines. In 1995, 42 fishermen participated in the commercial fishery, harvesting 7,538 red king crabs. These crabs were sold locally fresh (or fresh frozen) for \$6 each, or shipped live to Anchorage. A winter subsistence fishery is prosecuted by local people either using hand lines or with commercial-style pots set through the ice. In 1995, 57 subsistence fishermen harvested over 4,000 crabs.

Harvest of red king crab from the Dutch Harbor area began in 1961, and peaked at 33 million pounds in 1966. Thereafter, harvests declined, averaging about 11 million pounds annually through 1976. A secondary peak harvest occurred in 1980 with 17.7 million pounds taken, after which the stock collapsed and has not recovered. No red king crab fishery has been allowed in this area since 1983.

The Adak red king crab fishery began in 1960, and peaked at 21 million pounds in 1964. Catches remained high at about 16 million pounds annually through 1972. During 1977 to 1993, landings were low (about 1 million pounds annually) but stable. Since then the stock has declined. A small portion of the red king crab harvest in this area is taken as bycatch in the golden king crab longline pot fishery. The majority, however, is harvested by golden king crab vessels with single line pots in a directed fishery. The 1995 fishery was prosecuted by 10 vessels, which harvested 36,000 pounds of red king crab with an ex-vessel value of \$5.50 per pound. Average weight of landed crab was 7 pounds. No fishery was allowed in 1996 or 1997.

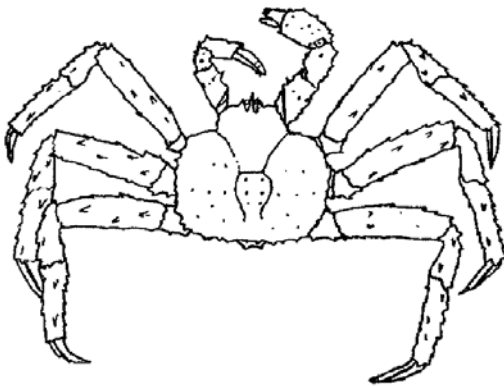
Blue King Crab

Biology: Blue king crab (*Paralithodes platypus*) has a discontinuous distribution throughout their range (Hokkaido Japan to Southeast Alaska). In the Bering Sea, discrete populations exist around the Pribilof Islands, St. Matthew Island, and St. Lawrence Island. Smaller populations have been found around Nunivak and King Island. Blue king crab molt multiple times as juveniles. Skip molting occurs with increasing probability for those males larger than 100 mm carapace length. Average molt increment for adult males is 14 mm. In the Pribilof area, 50% maturity of females is attained at 96 mm (about 3.8 inches) carapace length, which occurs at about 5 years of age. Blue king crab in the St. Matthew area mature at smaller sizes (50% maturity at 81 mm CL for females) and do not get as large overall. Blue king crab have a biennial ovarian cycle and a 14 month embryonic period. Juvenile blue king crab require cobble habitat with shell hash. These habitat areas have been found at 40-60 m around the Pribilofs Islands. Unlike red king crab, juvenile blue king crab do not form pods, instead relying on cryptic coloration for protection from predators. Adult male blue king crab occur at an average depth of 70 m and an average temperature of 0.6°C.

Management: Blue king crab stocks in the Bering Sea are managed by the State of Alaska through a federal BSAI king and Tanner crab fishery management plan (FMP). Under the FMP, management measures fall into three categories: (1) those that are fixed in the FMP under Council control, (2) those that are frameworked so the State can change following criteria outlined in the FMP, and (3) those measures under complete discretion of the State. The State generally sets pre-season guideline harvest levels for blue king crab based on a mature male harvest rate of 20%. Threshold levels have been established for these stocks, below which a fishery will not occur. A threshold level of 0.77 million crabs >119 mm CL has been established for the Pribilof stock; the St. Matthew threshold is 0.6 million males >104 mm CL. Current minimum legal size for the Pribilof District blue king crab is 6.5" in carapace width. Minimum legal size for blue king crab in the St. Matthew Island area is 5.5" carapace width.

Management measures implemented for the BSAI king and Tanner crab fisheries, as defined by the federal crab FMP, by category.

Category 1 (Fixed in FMP)	Category 2 (Frameworked in FMP)	Category 3 (Discretion of State)
<ul style="list-style-type: none"> * Legal Gear * Permit Requirements * Federal Observer Requirements * Limited Access * Norton Sound Superexclusive Registration Area 	<ul style="list-style-type: none"> * Minimum Size Limits * Guideline Harvest Levels * Inseason Adjustments * Districts, Subdistricts and Sections * Fishing Seasons * Sex Restrictions * Closed Waters * Pot Limits * Registration Areas 	<ul style="list-style-type: none"> * Reporting Requirements * Gear Placement and Removal * Gear Storage * Gear Modifications * Vessel Tank Inspections <ul style="list-style-type: none"> * State Observer Requirements * Bycatch Limits (in crab fisheries) * Other



In addition to minimum size and sex restrictions, the State has instituted numerous other regulations for BSAI crab fisheries. The State requires vessels to register with the state by obtaining licenses and permits, and register for each fishery and each area. Observers are required on all vessels processing king and Tanner crab in the BSAI. Season opening dates are set to maximize meat yield and minimize handling of softshell crabs. The season opening date for Pribilof District blue king crab fishery is September 15. In 1995, a combined GHL for red king and blue king crab fisheries in the Pribilof District was established. Pot limits have been established based on vessel size; the current pot limits are 50 for vessels > 125 feet, and 40 for vessels < 125 feet in the Pribilof District. In the St. Matthew area, the current pot limits are 75 for vessels > 125 feet, and 60 for vessels < 125 feet. Other gear restrictions include a requirement that crab pots be fitted with a degradable escape mechanism consisting of

#30 cotton thread (max. diameter) or a 30-day galvanic timed release mechanism. Also, for the Pribilofs district, king crab pots must have 1/3 of one vertical surface comprised of 9" stretched-mesh webbing.

Stock Structure: Two discrete stocks of blue king crab are actively managed in the BSAI region: the Pribilof Islands and St. Matthew Island stocks. Other smaller populations of blue king crab are found in the vicinity of St. Lawrence Island and Nunivak Island, as well as isolated populations in the Gulf of Alaska. Blue king crab stocks are managed separately to accommodate different life histories and fishery characteristics.

Pribilof District Stock: Abundance estimates for the Pribilof Islands blue king crab stock are obtained through the NMFS annual bottom trawl surveys using an area-swept method. Survey data indicate a series of good recruitment in the early 1970s. Recruitment fell off in the early 1980s, but improved signs of recruitment were observed in the early 1990's. Recent survey data indicate that total stock size has generally increased over the past 10 years.

During the late 1970s, landings of blue king crab from the Pribilof District increased to peak at 11 million pounds in the 1980-81 season. This was followed by a rapid decline in the early 1980s, leading to a total closure of the fishery in 1988. No fishery occurred from 1988-1994. By 1995, stock conditions had improved such that a combined GHL for red and blue king crab of 2.5 million pounds was established.

Like the Bristol Bay red king crab fishery, the blue king crab fisheries are prosecuted using square, mesh covered pots (generally 7 by 7 foot square pots - "7 by's" or larger) set on single lines. In 1995, 119 vessels participated in the Pribilof District red and blue king crab fishery. The season began on September 15 and lasted 7 days. Blue king crab fetched \$3 per pound exvessel, making the total fishery worth \$3.6 million. Average weight of blue king crab harvested was 7.3 pounds. For 1997, 48 vessels, including one catcher-processor, fished Pribilof blue king crabs. The 1997 season lasted 14 days and yielded crabs with an average weight of 7.5 pounds, valued at \$2.82 per pound exvessel.

St. Matthew Stock: Abundance estimates for the St. Matthew blue king crab stock are obtained through the NMFS annual bottom trawl surveys using an area-swept method. Survey data indicated the

Abundance of legal males (millions of crab from catch-survey estimates), pre-season guideline harvest levels (GHL, in millions of pounds), and total catches (millions of pounds, including deadloss) of St. Matthew District blue king crab, 1980-1997.

<u>Year</u>	<u>Abundance</u>	<u>GHL</u>	<u>Catch</u>
1980	2.90	na	na
1981	3.78	1.5 - 3.0	4.6
1982	4.98	5.6	8.8
1983	3.41	8.0	9.5
1984	1.70	2.0 - 4.0	3.8
1985	0.99	0.9 - 1.9	2.4
1986	0.54	0.2 - 0.5	1.0
1987	0.84	0.6 - 1.3	1.1
1988	1.09	0.7 - 1.5	1.3
1989	1.53	1.7	1.2
1990	1.82	1.9	1.7
1991	2.39	3.2	3.4
1992	2.47	3.1	2.5
1993	2.61	4.4	3.0
1994	2.54	3.0	3.8
1995	2.30	2.4	3.2
1996	3.13	2.4	1.1
1997	4.10	5.0	4.6

presence of relatively high numbers of juvenile males in the late

1970s. These crabs recruited to fisheries in the early 1980s. Recent survey data indicate that the stock is at average abundance levels, but may be declining slightly.

Harvest of blue king crab from the St. Matthew District began in 1977, peaking at 9.5 million pounds in 1983. This was followed by reduced harvests in the late 1980s. By the early 1990's, abundance of large males had increased, and GHLs were increased to over 3 million pounds.

In 1995, a total of 90 vessels (1 catcher-processor, 89 catcher vessels) participated in the St. Matthew blue king crab fishery. The season began on September 15 and lasted 5 days, during which time 3.2 million pounds were landed. Blue king crab fetched \$2.32 per pound exvessel, making the total fishery worth \$7.1 million. The average crab size was 4.8 pounds. In 1997, 117 vessels participated and harvested 4.6 million pounds in 7 days. Crab averaged 4.9 pounds each and brought \$2.21 per pound exvessel, making the total fishery worth \$9.8 million.

The Alaska Department of Fish and Game applied catch-survey analysis to St. Matthew Island and Pribilof Islands blue king crab stock beginning

Abundance of legal males (millions of crab from catch-survey estimates), pre-season guideline harvest levels (GHL, in millions of pounds), and total catches (millions of pounds, including deadloss) of Pribilof District blue king crab, 1980-1997.

<u>Year</u>	<u>Abundance</u>	<u>GHL</u>	<u>Catch</u>
1980	5.32	5.0 - 8.0	11.0
1981	3.20	5.0 - 8.0	9.1
1982	1.77	5.0 - 8.0	4.4
1983	1.04	4.0	2.2
1984	0.71	0.5 - 1.0	0.3
1985	0.65	0.3 - 0.8	0.5
1986	0.51	0.3 - 0.8	0.3
1987	0.41	0.3 - 1.7	0.7
1988	0.25	0	0
1989	0.19	0	0
1990	0.49	0	0
1991	1.00	0	0
1992	1.13	0	0
1993	1.21	0	0
1994	1.12	0	0
1995	1.22	2.5	1.3
1996	0.88	1.8	1.1
1997	0.82	1.5	0.7

Note: Since 1995, GHL includes both red and blue king crab combined.

in 1996. It is particularly suited for blue king crabs that occupy untrawlable areas.

Golden King Crab

Biology: Golden king crab (*Lithodes aequispinus*), also called brown king crab, range from Japan to British Columbia. In the Bering Sea and Aleutian Islands (BSAI), golden king crab are found at depths from 200 m to 1,000 m, generally in high relief habitat such as inter-island passes. Size at sexual maturity depends on latitude, with crabs in the northern areas maturing at smaller sizes. In the St. Matthew area, golden king crab are 50% mature at 92 mm carapace length (males) and 98 mm carapace length (females). In the Pribilof and western Aleutian Islands area, 50% maturity of males is attained at 107 mm (about 3.5 inches) carapace length and 100 mm (about 3.3 inches) carapace length for females. Further south, in the eastern Aleutian Islands, fifty percent maturity is attained at 130 mm carapace length (males) and 111 mm carapace length (females). Little information is known about the biology of a related species, scarlet king crab (*Lithodes couesi*), found in the Bering Sea and Aleutian Islands area. This species occurs in deep water and have been harvested incidental to golden king crab and *Chionoecetes tanneri* fisheries. A total of 13,871 pounds of scarlet king crab were harvested in 1995. In 1997, 7,170 pounds of scarlet king crab were landed.

Management: King crab stocks in the Bering Sea are managed by the State of Alaska through a federal BSAI king and Tanner crab fishery management plan (FMP). Under the FMP, management measures fall into three categories: (1) those that are fixed in the FMP and under Council control, (2) those that are frameworked so that the State can change following criteria outlined in the FMP, and (3) those measures under complete discretion of the State. Current minimum legal size for golden king crab is 6.0 inches in carapace width for Area O; elsewhere in the Bering Sea minimum size is 5.5" cw. Minimum size for *L. couesi* is 5.5 inches. As with other king crab, only males are harvested. Maximum allowable fishing mortality for the mature male golden king crab stock, as established by the FMP, is $F_{OFL} = F_{MSY} = M$.

Management measures implemented for the BSAI king and Tanner crab fisheries, as defined in the federal crab FMP, by category.

Category 1 (Fixed in FMP)	Category 2 (Frameworked in FMP)	Category 3 (Discretion of State)
<ul style="list-style-type: none"> * Legal Gear * Permit Requirements * Federal Observer Requirements * Limited Access * Norton Sound Superexclusive Registration Area 	<ul style="list-style-type: none"> * Minimum Size Limits * Guideline Harvest Levels * Inseason Adjustments * Districts, Subdistricts and Sections * Fishing Seasons * Sex Restrictions * Closed Waters * Pot Limits * Registration Areas 	<ul style="list-style-type: none"> * Reporting Requirements * Gear Placement and Removal * Gear Storage * Gear Modifications * Vessel Tank Inspections <ul style="list-style-type: none"> * State Observer Requirements * Bycatch Limits (in crab fisheries) * Other

In addition to minimum size and sex restrictions, the State has instituted numerous other regulations for the Eastern Bering Sea crab fisheries. The State requires vessels to register with the state by obtaining licenses and permits, and register for each fishery and each area. For Bering Sea golden king crabs, a commissioners permit is also required. Areas established for king crab are shown in the adjacent figure. Observers are required on all vessels processing king and Tanner crab in the BSAI. By regulation, observers are also required on all vessels fishing for golden king crab in the Aleutian Islands. Observers collect needed biological data and also provide enforcement monitoring for the longline fishery. Season opening dates are set to maximize yield per recruit and minimize handling of softshell crabs. The season opening date for golden king crabs in the Aleutian Islands area is September 1. By regulation, pots used in the Aleutian Islands golden king crab fishery must be longlined to reduce gear loss. A minimum of 10 pots must be linked together. Escape rings were adopted by the Board in 1996 to reduce capture and handling mortality of non-target crab; a minimum of four 5.5" rings are required on pots used in golden king crab fisheries. Other gear restrictions include a requirement that crab pots be fitted with a degradable escape mechanism consisting of #30 cotton thread (max. diameter) or a 30-day galvanic timed release mechanism.



Stock Structure: Several discrete stocks of golden king crab are thought to exist in the BSAI region. Until 1996, the Aleutian Islands stock was separated into two management areas, Adak and Dutch Harbor. The entire area is now managed as one area; Dutch Harbor Area O. Based on historic landing data, two

golden crab stocks have been identified and are managed as the Sequam and Adak stocks separated at 174° W longitude.

Bering Sea and Aleutian Islands Stocks: Abundance estimates for golden king crab are not available as no surveys have been routinely undertaken. Golden crab are found over habitat not suitable for trawl surveys. Pot surveys and fishery performance are utilized as indices of abundance, however.

The golden king crab fishery is prosecuted using mesh covered pots set on longlines. There is no limit to the number of pots a vessel can fish at one time. In recent Adak golden king crab fisheries, vessels set an average of 500 pots, with larger vessels generally fishing more pots.

A total of 34 vessels participated in the 1994-1995 Adak golden king crab fishery. The fishery lasted 288 days, with a total harvest was 6.4 million pounds. Average weight of golden crab harvested was 4.1 pounds in the Adak area. These crab were worth \$3.33 per pound exvessel, for a total season value of \$20.3 million.

The 1995 Dutch Harbor golden king crab fishery was prosecuted by 17 vessels. The season opened on September 1, and lasted 38 days. A total of 2 million pounds were landed at an exvessel price of \$2.60 per pound. Average weight of Dutch Harbor golden king crab was 4.6 pounds.

Total catches (thousands of pounds, including deadloss) of BSAI golden king crab, by management area, 1980-1997.

<u>Year</u>	<u>Dutch Harbor</u>	<u>Adak District</u>	<u>Pribilof District</u>	<u>Saint Matthew</u>
1980	na	59	0	na
1981	116	1,194	8	na
1982	1,185	8,006	70	na
1983	1,811	8,128	856	194
1984	1,521	3,180	0	0
1985	1,968	11,125	trace	0
1986	1,869	12,798	4	0
1987	1,383	8,001	26	424
1988	1,545	9,080	3	160
1989	1,852	10,162	7	4
1990	1,719	5,251	0	0
1991	1,448	6,254	6	0
1992	1,357	4,916	3	trace
1993	915	4,636	67	0
1994	1,750	6,378	89	13
1995	1,994	4,897	conf.	1
	Aleutians Area O			
	<u>East</u>	<u>West</u>		
1996	3,256	4,665	329	conf.
1997	3,564	628	179	0

Tanner Crab

Biology: Tanner crab (*Chionoecetes bairdi*) are distributed on the continental shelf of the North Pacific Ocean and Bering Sea from Kamchatka to Oregon. Off Alaska, Tanner crab are concentrated around the Pribilof Islands and immediately north of the Alaska Peninsula, and are found in lower abundance in the Gulf of Alaska. Size at 50% maturity, as measured by carapace width, is 110 mm for males and 90 mm for females in the Bering Sea. The corresponding age of maturity for male Tanner crab is about 6 years. Growth during the next molt increases the size of males to about 120-140 mm. Mature male Tanner crabs may skip a year of molting as they attain maturity. Natural mortality of adult Tanner crab is estimated at about 25% per year (M=0.3). Tanner crab females are known to form high-density mating aggregations, or pods, consisting of hundreds of crabs per mound. These mounds may provide protection from predators and also attract males for mating. Mating need not occur every year, as some female Tanner crabs can retain viable sperm in spermathecae up to 2 years or more. Females have clutches of 50,000 to 400,000 eggs. Little information is known about the biology of two other closely related species of Tanner crab found in the Bering Sea and Aleutian Islands area. The grooved Tanner crab (*Chionoecetes tanneri*) and triangle Tanner crab (*Chionoecetes angulatus*) occur in deep water (> 400 fathoms) and have been commercially harvested only in the past few years.

Management: Tanner crab stocks in the Bering Sea are managed by the State of Alaska through a federal BSAI king and Tanner crab fishery management plan (FMP). Under the FMP, management measures fall into three categories: (1) those that are fixed in the FMP under Council control, (2) those that are frameworked so that the State can change following criteria outlined in the FMP, and (3) those measures under complete discretion of the State. The State sets pre-season guideline harvest levels for Tanner crab based on a mature male harvest rate of 40%. Minimum legal size for Bering Sea Tanner crab, *C. bairdi*, is 5.5 inches carapace width. Minimum legal sizes for other Tanner species are: *C. tanneri* 5.0 inches; *C. angulatus* 4.5 inches.

Management measures implemented in the BSAI king and Tanner crab fisheries, as defined by the federal crab FMP, by category.		
<u>Category 1</u> <u>(Fixed in FMP)</u>	<u>Category 2</u> <u>(Frameworked in FMP)</u>	<u>Category 3</u> <u>(Discretion of State)</u>
<ul style="list-style-type: none"> * Legal Gear * Permit Requirements * Federal Observer Requirements * Limited Access * Norton Sound Superexclusive Registration Area 	<ul style="list-style-type: none"> * Minimum Size Limits * Guideline Harvest Levels * Inseason Adjustments * Districts, Subdistricts and Sections * Fishing Seasons * Sex Restrictions * Closed Waters * Pot Limits * Registration Areas 	<ul style="list-style-type: none"> * Reporting Requirements * Gear Placement and Removal * Gear Storage * Gear Modifications * Vessel Tank Inspections * State Observer Requirements * Bycatch Limits (in crab fisheries) * Other

In addition to minimum size and sex restrictions, the State has instituted numerous other regulations for the Eastern Bering Sea crab fisheries. The State requires vessels to register with the state by obtaining licenses and permits, and register for each fishery and each area. Observers are required on all vessels processing king and Tanner crab in the BSAI. Season opening dates are set to maximize meat yield and minimize handling of softshell crabs. The season opening date for the Bering Sea Tanner crab fishery is November 1. Pot limits have been established for the *C. bairdi* Tanner crab fishery based on vessel size; the current pot limits are 250 for vessels > 125 feet, and 200 for vessels < 125 feet. In the Bering Sea, a 3" maximum tunnel height opening for Tanner crab pots is required to inhibit the bycatch of red king crab. Escape rings were adopted by the Board in 1996 to reduce capture and handling mortality of non-target crab; a minimum of four 5.0" rings, or 1/3 of the web on one panel of 7 1/4" stretched mesh, is required on pots used in Tanner crab fisheries. Other gear restrictions include a requirement that crab pots be fitted with a degradable escape mechanism consisting of #30 cotton thread (max. diameter) or a 30-day galvanic timed release mechanism. In years when no GHM is established for the Bristol Bay red king crab stock, the Tanner crab fishery is restricted to the area west of 163° W longitude.



Stock Structure: Tanner crab (*C. bairdi*) are managed into 3 separate stocks: eastern Bering Sea, eastern Aleutian Islands, and western Aleutian Islands. The grooved Tanner crab (*C. tanneri*) fishery is likewise regulated by these management areas.

Eastern Bering Sea Stock: The eastern Bering Sea Tanner crab (*C. bairdi*) stock is currently at very low abundance. The 1995 NMFS bottom trawl survey indicated relatively low levels of juveniles, pre-recruits, females, and large males. Data indicate poor recruitment in coming years.

The Bering Sea Tanner stock has undergone two large fluctuations. Catches increased from 5 million pounds in 1965 to over 78 million pounds in 1977. After that, the stock declined to the point where no fishery occurred in 1986 and 1987. The fishery reopened in 1988, and landings increased to over 40 million pounds in 1990. Another decline ensued, and the 1995 Tanner crab season produced only 4.2 million pounds. The 1995 fishery was prosecuted by 196 vessels and lasted 15 days. Average weight of crab landed was 2.3 pounds valued at \$2.80 per pound exvessel. Total value of the 1995 fishery was \$11.7 million. In 1994 and 1995, fishing was prohibited east of 163°W to reduce bycatch of red king crab. In 1996, 196 vessels harvested 1.8 million pounds of Tanner crab in the directed fishery (12 days) and incidental to a red king crab fishery (4 days). Average weight was 2.5 pounds valued at \$2.50 per pound. Due to the depressed nature of the stock and predominance of old shell crab, no fishery was allowed in 1997.

Aleutian Islands Stock: The Tanner crab stock of the Aleutian Islands is very small, and populations are found in only a few large bays and inlets. As such, the fishery is limited. Annual harvests in the Aleutian Islands area were 200,000 to 800,000 pounds through 1985. Thereafter, stocks declined, and landings were reduced. Alaska Department of Fish and Game trawl surveys indicated a dramatic decline from 1991 to 1994. No landings were made in either area in 1995. Due to depressed stocks, no fishery was allowed in the Eastern Aleutians in 1996 or 1997.

Fisheries for deepwater species of Tanner crab have been developing in recent years. A directed fishery for grooved Tanner crab began in 1993, and about 200,000 pounds were landed in 1995. These crab weighed an

average of 1.9 pounds, and sold for \$1.50 per pound exvessel. Less than 3 vessels reported landings of *C. angulatus* in 1995 and 1996, and consequently, catches are confidential. There were no landings of *C. angulatus* in 1997.

Abundance of large males (millions of crab ≥ 5.3 " from NMFS trawl survey), pre-season guideline harvest levels (millions of pounds), and total catches (millions of pounds, including deadloss) of Bering Sea Tanner crab (*C. bairdi*), 1980-1996.

<u>Year</u>	<u>Abundance</u>	<u>GHL</u>	<u>Catch</u>
1980	31.0	28 - 36	36.6
1981	14.0	28 - 36	29.6
1982	10.1	12 - 16	11.0
1983	6.7	5.6	5.3
1984	5.8	7.1	1.2
1985	4.4	3.0	3.1
1986	3.1	0	0
1987	8.3	0	0
1988	17.4	5.6	2.2
1989	42.3	13.5	7.0
1990	53.7	72.3	64.6
1991	45.5	32.8	31.8
1992	52.8	39.2	35.1
1993	27.2	19.8	16.9
1994	20.0	7.5	7.8
1995	13.3	5.5	4.2
1996	12.5	6.2	1.8

Note: abundance through 1988 included Pribilof area Tanner crab.

Total harvest (thousands of pounds) of Tanner crab (*C. bairdi*) from the Aleutian Islands area, 1980-1996.

<u>Year</u>	<u>Western AI</u>	<u>Eastern AI</u>
1980	221	886
1981	839	655
1982	488	740
1983	384	548
1984	163	240
1985	207	166
1986	43	167
1987	141	160
1988	149	310
1989	49	326
1990	15	172
1991	8	50
1992	conf.	99
1993	0	119
1994	0	167
1995	0	0
1996	conf.	0
1997	0	0

Total harvest (thousands of pounds, deadloss included) of deepwater Tanner crab (*C. tanneri*) from the BSAI, by management area, 1993-1997.

<u>Year</u>	<u>Western AI</u>	<u>Eastern AI</u>	<u>Bering Sea</u>
1993	0	conf.	659
1994	conf.	759	332
1995	146	882	1,005
1996	conf.	106	106
1997	0	0	0

Snow Crab

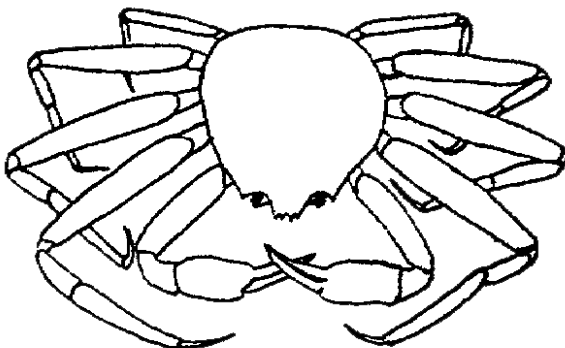
Biology: Snow crabs (*Chionoecetes opilio*) are distributed on the continental shelf of the Bering Sea, Chukchi Sea, and in the western Atlantic Ocean as far south as Maine. Snow crab are not present in the Gulf of Alaska. In the Bering Sea, snow crabs are common at depths less than 200 meters. The eastern Bering Sea population within U.S. waters is managed as a single stock, however, the distribution of the population extends into Russian waters to an unknown degree. While 50% of the females are mature at 50 mm, the mean size of mature females varies from year to year over a range of 63 mm to 72 mm carapace width. Females cease growing with a terminal molt upon reaching maturity, and rarely exceed 80 mm carapace width. Males similarly cease growing upon reaching a terminal molt when they acquire the large claw characteristic of maturity. The median size of maturity for males is 65 mm carapace width (approximately 4 years old). Males larger than 60 mm grow at about 20 mm per molt, but individuals vary widely in this regard. Female snow crabs are able to store spermatophores in seminal vesicles and fertilize subsequent egg clutches without mating. At least two clutches can be fertilized from stored spermatophores, but the frequency of this occurring in nature is not known. Snow crab feed on an extensive variety of benthic organisms including bivalves, brittle stars, crustaceans (including other snow crabs), polychaetes and other worms, gastropods, and fish. In turn, they are consumed by a wide variety of predators including bearded seals, Pacific cod, halibut and other flatfish, eel pouts, sculpins, and skates.

Management: The Bering Sea snow crab stock is managed by the State of Alaska through a federal BSAI king and Tanner crab fishery management plan (FMP). Under the FMP, management measures fall into three categories: (1) those that are fixed in the FMP under Council control, (2) those that are frameworked so that the State can change following criteria outlined in the FMP, and (3) those measures under complete discretion of the State. The State sets pre-season guideline harvest levels for snow crab based on a mature male harvest rate of 58% for snow crab larger than 4 inches. Although the minimum legal size for snow crab is 78 mm (3.1 inches), the fishery has generally harvests crabs over 4 inches in carapace width.

Management measures implemented in the BSAI king and Tanner crab fisheries, as defined by the federal crab FMP, by category.

Category 1 (Fixed in FMP)	Category 2 (Frameworked in FMP)	Category 3 (Discretion of State)
<ul style="list-style-type: none"> * Legal Gear * Permit Requirements * Federal Observer Requirements * Limited Access * Norton Sound Superexclusive Registration Area 	<ul style="list-style-type: none"> * Minimum Size Limits * Guideline Harvest Levels * Inseason Adjustments * Districts, Subdistricts and Sections * Fishing Seasons * Sex Restrictions * Closed Waters * Pot Limits * Registration Areas 	<ul style="list-style-type: none"> * Reporting Requirements * Gear Placement and Removal * Gear Storage * Gear Modifications * Vessel Tank Inspections * State Observer Requirements * Bycatch Limits (in crab fisheries) * Other

In addition to minimum size and sex restrictions, the State has numerous other regulations for the Eastern Bering Sea crab fisheries. The State requires vessels to register with the state by obtaining licenses and permits, and register for each fishery and each area. Observers are required on all vessels processing crab in the BSAI. Season opening dates are set to maximize yield per recruit and minimize handling of softshell crabs. The season opening date for snow crab fisheries is January 15. Pot limits have been established based on vessel size; the current pot limits are 250 for vessels > 125 feet, and 200 for vessels < 125 feet. A 3" maximum tunnel height opening for snow crab pots is required to inhibit the bycatch of red king crab. Escape rings were adopted by the Board in 1996 to reduce capture and handling mortality of non-target crab; a minimum of four 3.75" rings are required on snow crab pots or, instead of rings, 1/3 of one vertical mesh panel can be 5" stretched mesh. Other gear restrictions include a requirement that crab pots be fitted with a degradable escape mechanism consisting of #30 cotton thread (max. diameter) or a 30-day galvanic timed release mechanism.



Stock Structure: Snow crab are thought to be one stock throughout its range in the BSAI area. However, management the area is divided into two subdistricts, and NMFS estimates abundance and sets GHL by subdistrict.

Eastern Bering Sea Stock: Abundance of large male snow crab increased dramatically from 1983 to 1991, but has since declined. The 1993 NMFS Bering Sea trawl survey indicated the total abundance of large males (over 4 inches) at 135 million crab, a 48% decrease

from 1992. Small (3-4") legal-size males also declined in abundance, consistent with the decline in large males observed since 1991. The 1995 NMFS bottom trawl survey indicated relatively low levels of large male crab. However, the survey indicated an 88% increase in the numbers of pre-recruits, and a 44% increase in the number of large females. These signs of strong recruitment were apparent in the 1996 survey, as survey results indicated the number of large crab doubled.

Catch of Bering Sea snow crab increased from under 1 million pounds in 1974 to over 315 million pounds in 1992. The 1992 peak catch was followed by reduced landings thereafter. The 1995 opilio fishery was prosecuted by 253 vessels. The season began on January 15 and lasted 33 days. A total of 74 million pounds were landed. Average weight of crab retained was 1.2 pounds worth \$2.43 per pound exvessel. Total value of the 1995 snow crab fishery was \$180 million exvessel.

Increased landings occurred in recent years due to good recruitment of sublegal males. In 1997, 119.4 million pounds of snow crab were harvested. Average weight of crab taken was 1.2 pounds. A total of 226 vessels have participated. Exvessel price was \$0.79/lb, for a total fishery value of \$92.5 million. The 1998 fishery opened with a GHl of 234 million pounds, of which 3.5% was allocated as community development quota, CDQ.

Abundance of large males (millions of crab ≥ 4.0 " from NMFS trawl survey), pre-season guideline harvest levels (millions of pounds), and total catches (millions of pounds, including deadloss) of Bering Sea snow crab, 1980-1998.

<u>Year</u>	<u>Abundance</u>	<u>GHl</u>	<u>Catch</u>
1980	na	n/a	39.6
1981	na	39.5 - 91.0	52.8
1982	na	16.0 - 22.0	29.4
1983	na	15.8	26.1
1984	na	49.0	26.8
1985	153	98.0	66.0
1986	75	57.0	98.0
1987	83	56.4	101.9
1988	151	110.7	134.0
1989	171	132.0	149.5
1990	187	139.8	161.8
1991	420	315.0	328.6
1992	484	333.0	315.3
1993	256	207.2	230.8
1994	135	105.8	149.8
1995	72	73.6	75.3
1996	69	50.7	65.7
1997	172	117.0	119.4
1998	306	234	239.9

Appendix F Habitat Concerns

Potential for Habitat Alteration: This section discusses types of human activities that have a potential to cause pollution and habitat degradation that could affect king and Tanner crab populations in the BS/AI area. It is not intended as a statement of present conditions; rather, it is designed to identify those areas of uncertainty that may reasonably deserve Council attention in the future. Whether the likelihood and level of these activities or events may cause harm to crab resources and their habitats can be better judged on a case-by-case basis when the details of a proposed activity's location, magnitude, timing, and duration are more fully known.

Habitat alteration may lower both the quantity and quality of king or Tanner crab products through physical changes or chemical contamination. Life stages differ in their habitat requirements and tolerance to effects of habitat alteration. It is possible for the timing of a major alteration event and the occurrence of a large concentration of living marine resources to coincide in a manner that may affect fishery stocks and their supporting habitats. The effects of such events may be masked by natural phenomena and may not be detected for a variety of reasons, or may be delayed in becoming evident. However, the process of habitat degradation more characteristically begins with small-scale projects that result in only minor losses or temporary disruptions to organisms and habitat. As the number and rate of occurrence of these and other major projects increases, their cumulative and synergistic effects become apparent over larger areas. It is often difficult to separate the effects of habitat alteration from other factors such as fishing mortality, predation, and natural environmental fluctuations.

Species such as king and Tanner crab that are dependent on coastal areas during various stages of their life, particularly for reproduction, are more vulnerable to habitat alterations than are species that remain offshore. Also, the effects of habitat alteration on species offshore are not as apparent as they are in coastal areas. Concern is warranted, however, to the degree that (1) the offshore environment is subject to habitat degradation from either inshore activities or offshore uses, and (2) to the extent that some species living offshore depend directly or indirectly on coastal habitats for reproduction and food supply.

At present, there are no indications that human activities in the BS/AI area have had any measurable effect on the existing habitats of king or Tanner crab. The present primary human use of the offshore area is commercial fishing. While the establishment of other activities could potentially generate user conflicts, pollution, and habitat deterioration, it is the collective opinion of the Council and NMFS that the status of the habitat in this management area is generally unaffected by other human activities at this time. Activities that could adversely affect habitat in this area are discussed below.

1. Offshore petroleum production.

Information can be found in Berg (1977); Deis (1984); OCSEAP Synthesis Reports on the St. George Basin (1982), the Navarin Basin (1984), and the North Aleutian Shelf (1984); Thorsteinson and Thorsteinson (1982); and the University of Aberdeen (1978). The Alaska offshore area comprises 74 percent of the total area of the U.S. continental shelf. Because of its size, the Alaska outer continental shelf (OCS) is divided into three subregions—Arctic, Bering Sea, and Gulf of Alaska. Areas where oil and gas leases have occurred or are scheduled in the BS/AI area include the Navarin Basin (1989)(Morris, 1981), St. George Basin (1990)(NMFS, 1979), North Aleutian Basin (1990)(NMFS, 1980) and the Shumagin Basin (1992) (Morris, 1987).

If a commercial quantity of petroleum is found in the Bering Sea, its production would require construction of facilities and all the necessary infrastructure for pipelines to onshore storage and shipment terminals or for the construction of offshore loading facilities. Offshore-loading terminals may be more feasible than onshore pipelines for transportation from Alaska. Unlike exploration, development and production would continue year round and would have to surmount the problems imposed by winter sea ice in many areas. Norton Basin and perhaps Navarin Basin might require ice-breaking tanker capabilities. There are also occasional proposals for moving oil from Arctic fields via the Bering Sea, which would also require ice-breaking capabilities.

Oil and gas related activities in the BS/AI area have the potential to cause pollution of habitats, loss of resources, and use conflicts. Physical alterations in the quality and quantity of existing local habitats may occur because of the location and construction of offshore drilling rigs and platforms, loading platforms, tanker terminals, pipelines, and tankering of oil. We have noted oil tankers and transportation are the major causes of oil spills.

Large oil spills are the most serious potential source of oil and gas development-related pollution in the eastern Bering Sea and Navarin Basin. Offshore oil and gas development will inevitably result in some oil entering the environment. Most spills are expected to be of small size, although there is a potential for large spills to occur. Chronic oil spills which build up in the sediments around rigs and facilities are also a problem. In whatever quantities, lost oil can affect habitats and living marine resources. Many factors determine the degree of damage from a spill; the most important variables are the type of oil, size and duration of the spill, geographic location of the spill, and the season. Although oil is toxic to all marine organisms at high concentrations, certain species are more sensitive than others. In general, the early life stages (eggs and larvae) are most sensitive; juveniles are less sensitive, and adults least so (Rice, et al. 1984).

Habitats most sensitive to oil pollution are typically located in those coastal areas with the lowest physical energy because once oiled, these areas are the slowest to repurify. Examples of low energy environments include tidal marshes, lagoons, and seafloor sediments. Exposed rocky shores and ocean surface waters are higher energy environments where physical processes will more rapidly remove or actively weather spilled oil.

It is possible for a major oil spill (i.e., 50,000 bbls and greater) to produce a surface slick covering up to several hundred square kilometers of surface area. Oil would generally be at toxic levels to some organisms within this slick. Beneath and surrounding the surface slick, there would be some oil-contaminated waters. Mixing and current dispersal would act to reduce the oil concentrations with depth and distance. If the oil spill trajectory moves toward land, habitats and species could be affected by the loading of oil into contained areas of the nearshore environment. In the shallower waters, an oil spill could be mixed throughout the water column and contaminate the seabed sediments. Suspended sediment can also act to carry oil to the seabed. It is believed up to 70 percent of spilled oil may be incorporated in seafloor sediments where it is available to deposit feeding organisms (crab) and their prey items.

Toxic fractions of oil mixed to depth and under the surface slick could cause mortalities and sublethal effects to individuals and populations. However, the area contaminated by a moderately large spill would appear negligible in relation to the overall size of the area, though not necessarily negligible in terms of areas important for red king crab settling, rearing, or mature commercial crab species in the North Aleutian and Bering Sea. For example, Thorsteinson and Thorsteinson (1982) calculated that a 50,000 barrel spill in the St. George Basin would impact less than 0.002 percent of the total size of this area. Oil spills at sea generally are believed to be local and transitory, having only minor effects on fish and shellfish populations overall. Measurable damage to fishery stocks from an oil spill would appear to be the exception rather than the rule. Even if concentrations of oil are sufficiently diluted not to be physically damaging to marine organisms or their consumers, it still could be detected by them, and alter certain patterns of their behavior. If an oil spill reaches nearshore areas with productive nursery grounds or areas containing high densities of eggs and larvae, a year class of a commercially important species of fish or shellfish could be reduced, and any fishery dependent on it may be affected in later years. An oil spill at an especially important habitat (e.g., a gyre where larvae are concentrated) could also result in disproportionately high losses of the resource compared to other areas.

Tainting of crab is a potential problem in areas subject to either chronic or acute oil pollution which the Bering Sea and Aleutian areas are. Crab exposed to oily conditions acquire an oily or objectionable taste. Environmental Protection Agency criteria governing tainting in fisheries products state: "materials should not be present in concentration that individually or in combination produce undesirable flavors which are detectable by organoleptic tests performed on edible portions." Tainting is, therefore, of great concern to fishermen due to the fear that tainted catches will be refused at the processing plant as well as potential damage and loss of gear due to contamination.

Other sources of potential habitat degradation and pollution from oil and gas activities include the disposal of drilling muds and cuttings to the water and seabed and of drilling fluids and produced waters in the water column. These materials contain heavy metals, hydrocarbons, or other chemical compounds that would be released to the environment. In the Gulf of Mexico it is estimated that approximately five million barrels of drilling muds containing 2.3 million pounds of toxic metals are discharged yearly by oil and gas industries (U.S. Environmental Protection Agency, 1985). Congress is scheduled to determine by June 1988 as to whether oil and gas waste should be regulated as hazardous waste. Dredged materials from pipeline laying may also be released into the environment. These materials may contain toxic heavy metals, particularly in portions of Norton Sound.

2. Coastal development and filling.

Minimal developmental pressure has occurred in the coastal habitat of the BS/AI area. An extension of the airport runway at the village of Unalaska into water approximately 50 feet in depth has received the necessary permits and is under construction. Construction of a large-scale port facility is planned for the city of Nome and smaller-scale harbors are currently under construction on St. Paul and St. George Islands. The Dutch Harbor area has had intertidal areas filled for fish processing facilities. Beyond these specific projects, development activity in the coastal areas of the Bering Sea and the Aleutian Islands has been largely limited to construction of erosion control measures and breakwaters. Because of the desirability of finding protection from Bering Sea storms, suitable port development sites often are valuable to fishery resources for similar related reasons. Without special considerations these facilities could affect local flushing, water temperatures, water quality, and access by fishes and crustaceans. In other areas, shallow water depth requires construction of long structures projected seaward in order to provide direct access from the uplands to deeper-draft ocean going vessels. These causeways could alter both along-shore physical processes and the migration and movement of marine organisms in the area.

3. Marine mining.

At present, mining activity has been limited to extraction of gravel and gold in the Bering Sea and the Aleutian peninsula. Gravel is needed for almost all construction projects throughout the area and is relatively unavailable from upland sources. Consequently, gravel is obtained by mining gravel beaches along the Bristol Bay coast (e.g., Goodnews Bay, Kangirivvar Bay) and in the lower reaches of the Yukon and Kuskokwim Rivers. Mining of large quantities of beach gravel can significantly affect the removal, transport, and deposition of sand and gravel along shore, both at the mining site and at other more distant areas. During mining, water turbidity increases and the resuspension of organic materials could affect less motile organisms (i.e., eggs and recently hatched larvae), and displace the more motile species from the area. Spawning and rearing habitats could be damaged or destroyed by these actions. Neither the future extent of this activity nor the effects of such mortality on the abundance of marine species is known. The demand for gravel is likely to increase if the economy and associated development expands.

Dredging for gold has been attempted at various sites along the Aleutians and as of 1988, a major gold dredging project is underway within State waters in Norton Sound. In addition to mining in State waters, plans are being made to lease approximately 178,000 acres of Federal sea bottom in Norton Sound beginning in July of 1989. A total of 80 million cubic meters of sea bottom may be dredged from Federal waters during the life of the project. Such activity has the potential to cause direct and indirect damage to benthic habitat and to fish and shellfish within the influence of the sediment discharge plume. Re-suspension of trace metals, especially mercury, which co-occur with placer gold deposits and potential subsequent contamination of commercial and subsistence species such as red king crab or marine mammal species is of particular concern with marine gold dredging. As onshore mineral reserves dwindle or economic value increases, there will likely be increasing interest in mining of marine ore deposits in the Bering Sea EEZ.

4. Ocean discharge and dumping.

At present, there are only two areas in the BS/AI area where the ocean discharge of nonorganic materials is known to occur on a large scale. Both of the areas are dredged material disposal sites near the city of Nome and have been in use for approximately 50 years. The two areas were given final designation as ocean dredged material disposal sites by the Environmental Protection Agency. Use of these sites presents no new habitat concerns.

The return of materials dredged from the ocean to the water column is considered a discharge activity. Depending upon the chemical constituency of the local bottom sediments and any alterations of dredged materials prior to discharge, living marine resources in the area may be exposed to elevated levels of heavy metals. For example, natural deposits of mercury occur in eastern Norton Sound and elemental mercury, measured at levels ranging from 250-1300 up/l, has been identified in marine sediments in that area (Nelson, et al. 1975). The levels of this heavy metal exceed the 3.7 up/l set by the EPA Marine Quality Standards as the maximum allowable concentration; although no measurements of the more toxic methyl and dimethyl forms of mercury have been made in this area, Wood (1974) demonstrated that mercury available to the aquatic environment in any form can result in steady state concentrations of methyl, dimethyl, and metallic mercury through microbial catalysis and chemical equilibrium.

Large-scale gold dredging projects in eastern Norton Sound will result in the discharge and resuspension of sediments that could introduce mercury to the water column.

Accumulation of heavy metals in fish is usually natural, but also may be an indication of habitat deterioration. The Federal Drug Administration's (FDA) safety limit for mercury is presently 1.0 ppm of methyl mercury or about 1.1 ppm of mercury. No heavy metal problems have been encountered to date with fish or shellfish products from the BS/AI area.

5. Derelict fragments of fishing gear and general litter.

The introduction of persistent plastic debris into the marine environment occurs when commercial fisheries take place. The debris includes synthetic netting, pots, longline gear, packing bands, and other material. Because of the lack of a monitoring program, estimates of debris have been based on (1) observations of debris at sea and on beaches, and (2) occasional reports of accidental or deliberate discards of fishing gear. Studies by Merrell (1984) and others have shown that much of the observed debris consists of fragments of trawl netting. Much of this netting has been discarded incidentally as a result of net repair activities. The quantity of marine debris that is produced by commercial fisheries depends on a variety of factors including the types and amount of gear used and the efforts fishermen make to reduce both accidental and deliberate discards.

Debris may result in the mortality of marine fish and shellfish, marine mammals, and birds that become entangled in or ingest it. Derelict monofilament gillnet such as that used on the high seas for salmon and squid will catch fish, birds, and marine mammals. Discarded trawl netting that floats is not a threat to most fish, but it has been identified as a source of mortality for marine mammals and birds. Similarly, discarded packing bands have been identified as a source of mortality for marine mammals. Other discarded gear, such as lost pots, continues to fish unattended for varying lengths of time. It is estimated that 10 percent of the crab pots used each season by the crab fleet are lost. Derelict pots without degradable panels could, particularly with natural rebaiting which occurs when organisms wander into the pots and die, fish for up to 15 years before finally deteriorating to the point where they lose structural integrity (High and Worlund, 1979). Present, all shellfish pots used in the Bering Sea must, by State Regulation 5 AAC 39.145, be equipped with a degradable, untreated cotton panel large enough for shellfish to escape the pot should it be lost. Neither the extent of debris-related mortality nor the effects of such mortality on the abundance of various species is known at this time.

6. Benthic habitat damage by bottom gear.

Bottom trawls are presently the predominant gear used to harvest groundfish in the BS/AI management area and are likely to continue as the major gear for the flatfish and Pacific cod fisheries of the Bering Sea shelf. The generally flat and uniform bottom composed of sand and mud presents a good substrate for bottom trawling. Any effect of gear dragged along the bottom depends on the type of gear, its rigging, and the type of bottom and its biota. Trawl doors dragging on sand and soft bottom stir up sand and silt which resettles quickly. On muddy bottoms, the disturbed mud settles in a few hours, depending on the current speed and resulting turbulence near the bottom. Any damaged organisms, as well as the infauna which might have been dug up by the trawl, are likely quickly preyed upon by fish and crabs.

Although the substrate itself is likely only temporarily affected by trawling, the direct effect upon king and Tanner crab stocks could be substantial dependent upon the type and intensity of gear use and the area in question. Crab are mobile species, yet could experience high mortality as a result of mechanical crushing and bycatch in trawls (Johnsen, 1985). Research on gear selectivity in the Bering Sea could result in enforceable gear rigging standards that would minimize bycatch of non-target species without significantly reducing catch rates for target groundfish species.

7. Discharge of seafood processing wastes.

Seafood processing has been conducted for years in processing ports in Alaska. Crab and fish have been processed in various ports such as Kodiak, Dutch Harbor, and Akutan by floating and shoreside processors with little impact upon habitat for crab and other species. However, localized damage to benthic environment consisting of up to several acres of bottom being driven anoxic by rotting processing waste and piles of waste up to 26 feet deep have

been recorded. Discharges from these processors now require National Pollutant Discharge Elimination System (NPDES) permits from the Environmental Protection Agency. At-sea floating processors are covered by a general NPDES permit which requires that processing waste be ground into finer than one-half inch particles and discharged below the surface (Personal Communication, Dr. Bruce Duncan, U.S. Environmental Protection Agency, 701 C Street, Box 19, Anchorage, AK 99513).

Although seafood has been processed at sea by foreign fishing vessels in the past without apparent harm to the marine habitat, there has been one instance reported of unusual quantities of fish carcasses (not ground in conformance with the general NPDES permit) accompanied by dead scallops brought up in scallop dredges (Capt. Louie Audet, F/V Shayline Nicholas). It will be important to be alert to similar possible perturbations of the environment resulting from at-sea processing discharges.

Existing Programs for Habitat Protection.

This section describes (1) general legislative programs, portions of which are particularly directed or related to the protection, maintenance, or restoration of the habitat of living marine resources; and (2) specific actions taken by the Council and NMFS within the BS/AI area for the same purpose.

1. Federal legislative programs and responsibilities related to protection of crab habitat. The Department of Commerce, through NOAA, is responsible for, or involved in, protecting living marine resources and their habitats under a number of Congressional authorities that call for varying degrees of interagency participation, consultation, or review. A potential for further Council participation exists wherever Federal review is required or encouraged. In some cases, State agencies may share the Federal responsibility.

(a) Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). This Act provides for the conservation and management of U.S. fishery resources within the 200-mile exclusive economic zone, and is the primary authority for Council action. Conservation and management is defined as referring to “all of the rules, regulations, conditions, methods, and other measures which are required to rebuild, restore, or maintain, and which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine environment, and which are designed to assure that . . . irreversible or long-term adverse effects on fishery resources and the marine environment are avoided.” Fishery resource is defined to include habitat of fish. The North Pacific Council is charged with developing FMPs, FMP amendments, and regulations for the fisheries needing conservation and management within its geographical area of authority. FMPs are developed in consideration of habitat-related problems and other factors relating to resource productivity. After approval of FMPs or FMP amendments, NMFS is charged with their implementation.

The National Oceanic and Atmospheric Administration Marine Fisheries Program Authorization Act, P.L. 99-659, added Section 302(I) to the Magnuson-Stevens Act. The new section states as follows:

“Each Council may comment on, or make recommendations concerning, any activity undertaken, or proposed to be undertaken, by any State or Federal agency that, in the view of the Council, may affect the habitat of a fishery resource under its jurisdiction. Within 45 days after receiving such a comment or recommendation from a Council, a Federal agency must provide a detailed response, in writing, to the Council regarding the matter.”

Section 303(a)(7) of the Magnuson-Stevens Act requires any fishery management plan or plan amendment to include readily available information on the habitat and an assessment of the effects of habitat changes on the fishery.

(b) Fish and Wildlife Coordination Act of 1958 (FWCA). The FWCA provides the primary expression of Federal policy for fish and wildlife habitat. It requires interagency consultation to assure that fish and wildlife are given equal consideration when a Federal or Federally-authorized project is proposed which controls, modifies, or develops the Nation's waters. For example, NMFS is a consulting resource agency in processing Department of the Army permits for dredge and fill and construction projects in navigable waters, Environmental Protection Agency (EPA) ocean dumping permits, Federal Energy Regulatory Commission hydroelectric power project proposals, and Department of the Interior (DOI) Outer Continental Shelf (OCS) oil and gas and mineral leasing activities, among others.

(c) National Environmental Policy Act of 1969 (NEPA). NEPA requires that the effects of Federal activities on the environment be assessed. Its purpose is to insure that Federal officials weigh and give appropriate consideration to

environmental values in policy formulation, decision making and administrative actions, and that the public is provided adequate opportunity to review and comment on the major Federal actions. An EIS or environmental assessment for a finding of no significant impact is prepared for FMPs and their amendments. NEPA requires preparation of an Environmental Impact Statement (EIS) only for major Federal actions that significantly affect the quality of the human environment; an environmental assessment is sufficient if it justifies a finding of no significant impact (FONSI). NMFS reviews EISs and provides recommendations to mitigate any expected impacts to living marine resources and habitats.

(d) Clean Water Act (CWA). The purpose of the CWA, which amends the Federal Water Pollution Control Act, is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters; to eliminate the discharge of pollutants into navigable waters; and to prohibit the discharge of toxic pollutants in toxic amounts. Discharge of oil or hazardous substances into or upon navigable waters, contiguous zone and ocean is prohibited. NMFS reviews and comments on Section 404 permits for deposition of fill or dredged materials into U.S. waters, and on EPA National Pollutant Discharge Elimination System permits for point source discharges.

(e) River and Harbor Act of 1899. Section 10 of this Act prohibits the unauthorized obstruction or alteration of any navigable water of the United States, the excavation from or deposition of material in such waters, or the accomplishment of any other work affecting the course, location, condition, or capacity of such water. Authority was later extended to artificial islands and fixed structures located on the Outer Continental Shelf. The Act authorizes the Department of the Army to regulate all construction and dredge and fill activities in navigable waters to mean high water shoreline. NMFS reviews and comments on Public Notices the Corps of Engineers circulates for proposed projects.

(f) Endangered Species Act of 1973 (ESA). ESA provides for the conservation of endangered and threatened species of fish, wildlife, and plants. The program is administered jointly by DOI (terrestrial, freshwater, and some marine species such as walrus) and DOC (marine fish, and some marine mammals including the great whales). Federal actions that may affect an endangered or threatened species are resolved by a consultation process between the project agency and DOC or DOI, as appropriate. For actions related to FMPs, NMFS provides biological assessments and Section 7 consultations if the Federal action may affect endangered or threatened species or cause destruction or adverse modification of any designated critical habitat.

(g) Coastal Zone Management Act of 1972 (CZMA). The principal objective of the CZMA is to encourage and assist States in developing coastal zone management programs, to coordinate State activities, and to safeguard the regional and national interests in the coastal zone. Section 307(c) requires that any Federal activity directly affecting the coastal zone of a State be consistent with that State's approved coastal zone management program to the maximum extent practicable. The Alaska Coastal Management Act requires consistency of all state and local governments with the Alaska coastal management program and any subsequent district programs. Under present policy, FMPs undergo consistency review. Alaska's State coastal management program contains a section on standards for coastal development, energy facilities, mining and mineral processing, habitats, and direct land and water quality which gives the State the ability to influence the location and design of activities which may effect fishery habitat. District coastal management programs may incorporate more specific habitat protection requirements for marine areas. Following a January 1984 U.S. Supreme Court ruling, the sale of OCS oil and gas leases no longer requires a consistency review; such a review is triggered at the exploratory drilling stage.

(h) Marine Protection, Research and Sanctuaries Act (MPRSA). Title I of the MPRSA establishes a system to regulate dumping of all types of materials into ocean waters and to prevent or strictly limit the dumping into ocean waters of any material which would adversely affect "human health, welfare or amenities or the marine environment, ecological systems, or economic potentialities." NMFS may provide comments to EPA on proposed sites of ocean dumping if the marine environment or ecological systems may be adversely affected. Title III of the MPRSA authorizes the Secretary of Commerce (NOAA) to designate as marine sanctuaries areas of the marine environment that have been identified as having special national significance due to their resource or human-use values. The Marine Sanctuaries Amendments of 1984 amend this Title to include, as consultative agencies in determining whether the proposal meets the sanctuary designation standards, the Councils affected by the proposed designation. The Amendments also provide the Council affected with the opportunity to prepare draft regulations, consistent with the Magnuson-Stevens Act national standards, for fishing within the FCZ as it may deem necessary to implement a proposed designation.

(i) Outer Continental Shelf Lands Act of 1953, as amended (OCSLA). The OCSLA authorizes the Department of Interior's Minerals Management Service (MMS) to lease lands seaward of state marine boundaries, design and oversee environmental studies, enforce special lease stipulations, and issue pipeline rights-of-way. It specifies that no exploratory drilling permit can be issued unless MMS determines that "such exploration will not be unduly harmful to aquatic life in the area, result in pollution, create hazardous or unsafe conditions, unreasonably interfere with other uses of the area, or disturb any site, structure or object of historical or archaeological significance." Drilling and production discharges related to OCS exploration and development are subject to EPA NPDES permit regulations under the CWA. Sharing responsibility for the protection of fish and wildlife resources and their habitats, NOAA/NMFS, FWS, EPA and the States act in an advisory capacity in the formulation of OCS leasing stipulations that MMS develops for conditions or resources that are believed to warrant special regulation or protection. Some of these stipulations address protection of biological resources and their habitats. Interagency Regional Biological Task Forces and Technical Working Groups have been established by MMS to offer advice on various aspects of leasing, transport, and environmental studies. NMFS is represented on both groups in Alaska.

The Secretary of the Interior is required to maintain an oil and gas leasing program that "consists of a schedule of proposed lease sales indicating, as precisely as possible, the size, timing, and location of leasing activity" that will best meet national energy needs for a 5-year period following its approval or reapproval. In developing the schedule of proposed lease sales, the Secretary is required to take into account the potential impacts of oil and gas exploration on other offshore resources, including the marine, coastal, and human environments.

Once a lease is awarded, before exploratory drilling can begin in any location, the lessee must submit an exploration plan to the Minerals Management Service for approval. An oil spill contingency plan must be contained within the exploration plan. If approved by MMS and having obtained other necessary permits, the lessee may conduct exploratory drilling and testing in keeping with lease sale stipulations and MMS Operating Orders. If discoveries are made, before development and production can begin in a frontier lease area, a development plan must be submitted and a second EIS process begun. At this time, a better understanding of the location, magnitude, and nature of activity can be expected, and resource concerns may once again be addressed before development can be permitted to proceed.

(j) National Fishing Enhancement Act of 1984. Title II of this Act authorizes the Secretary of Commerce (NOAA) to develop and publish a National Artificial Reef Plan in consultation with specified public agencies, including the Councils, for the purpose of enhancing fishery resources. Permits for the site, construction, and monitoring of such reefs are to be issued by the Department of the Army under Section 10 of the River and Harbor Act, Section 404 of the Clean Water Act, or Section 4(e) of the Outer Continental Shelf Lands Act, in consultation with appropriate Federal agencies, States, local governments and other interested parties. NMFS will be included in this consultation process.

(k) Marine Mammal Protection Act (MMPA) as amended in 1994. The MMPA establishes a moratorium on the taking and importing of marine mammals and marine mammal products, with certain exception. Takings of marine mammals is authorized under limited circumstances, including incidental takings during commercial fishing operations. Such takes are regulated by Federal agencies. Maintaining the original aspirations of the MMPA, the amendments continue to protect marine mammals, seeking to maintain stocks at, or recover stocks to, their optimum sustainable population levels. To achieve that goal, protection of essential habitats including rookeries, mating grounds, and areas of similar significance is emphasized.

The most significant amendments involved establishing a new regime to govern the taking of marine mammals incidental to commercial fishing. Three new sections were added to the MMPA to address commercial fishing: the preparation of stock assessments for all marine mammal stocks in waters under U.S. jurisdiction; development and implementation of take reduction plans for stocks that may be reduced or are being maintained below their optimum sustainable population levels due to interactions with commercial fisheries; and studies of pinniped-fishery interactions.

(l) Marine Plastic Pollution Research and Control Act of 1987. This Act prohibits dumping of plastics (including fishing gear) at sea, and restricts dumping of ship-generated garbage at sea and in navigable waters of the United States.

(m) Regulatory Flexibility Act as amended in 1996. The Regulatory Flexibility Act (RFA) requires agencies to assess impacts of its proposed regulations on small entities. The objective of the RFA is to require consideration of the

capacity of those affected by regulations to bear the direct and indirect costs of regulation. The intent is to encourage Federal agencies to utilize innovative administrative procedures when dealing with small entities that would otherwise be unnecessarily adversely affected by Federal regulations.

(n) Executive Order 12866 (E.O. 12866) of 1993. To achieve the purpose of the Regulatory Flexibility Act, E.O. 12866 directs agencies to promulgate only such regulations as are required by law and to assess all costs and benefits of available regulatory alternatives, including not regulating, and providing economic incentives to encourage the desired behavior. The assessment of costs and benefits includes both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. The agency should choose the regulatory approach that maximizes net benefits, including economic, environmental, public health and safety, distributive impacts, equity, and where the agency has determined that the benefits of the intended regulation justify its cost.

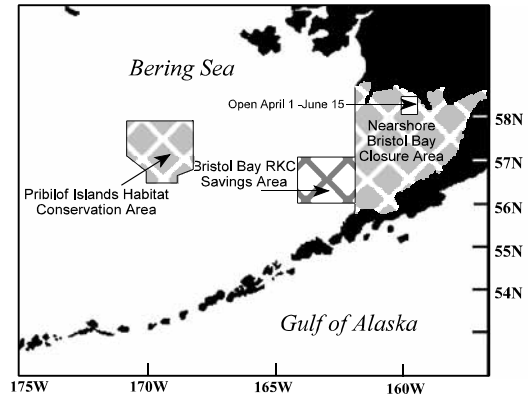
The agency shall base its decision on the best reasonably obtainable scientific, technical, economic and other information concerning the need for, and consequences of, the intended regulation.

Appendix G. Overview of Measures to Minimize Crab Bycatch in Other Fisheries

The Council and the Alaska Board of Fisheries have adopted numerous regulations designed to protect habitat and minimize bycatch and bycatch mortality of crab taken incidentally in groundfish and scallop fisheries. An overview of these measures is provided below.

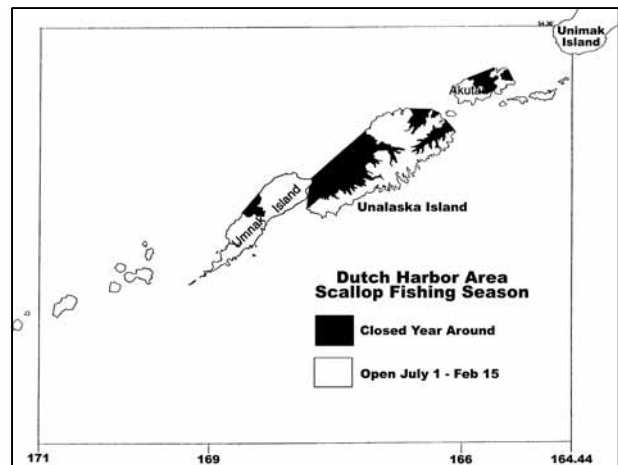
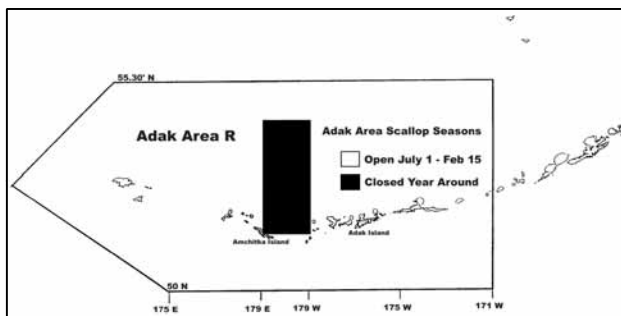
Closure Areas

Several areas of the Bering Sea have been closed to groundfish trawling and scallop dredging to reduce potential adverse impacts on the habitat for crab and other resources. Beginning in 1995, the Pribilof Islands Conservation Area was closed to all trawling and dredging year-round to protect blue king crab habitat (NPFMC 1994b). Also beginning in 1995, the Red King Crab Savings Area was established as a year-round bottom trawl and dredge closure area (NPFMC 1995). This area was known to have high densities of adult red king crab, and closure of the area greatly reduced bycatch of this species. To protect juvenile red king crab and critical rearing habitat (stalked ascidians and other living substrate), another year-round closure to all trawling was implemented for the nearshore waters of Bristol Bay. Specifically, the area east of 162° W (i.e., all of Bristol Bay) is closed to trawling and dredging, with the exception of an area bounded by 159° to 160° W and 58° to 58°43' N that remains open to trawling during the period April 1 to June 15 each year.

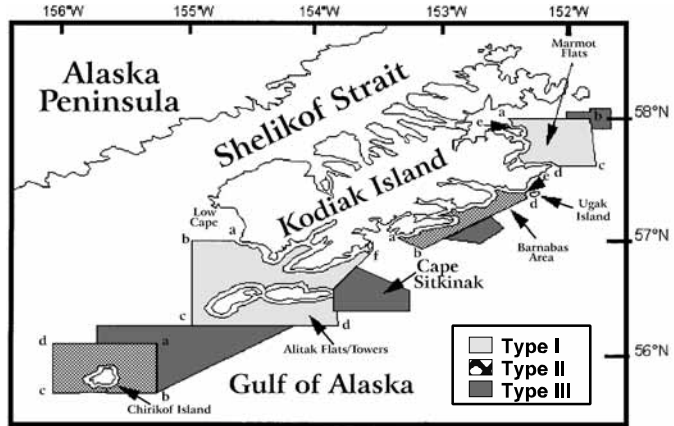


Location of trawl closure areas to protect red and blue king crab habitats.

The figures below show locations of other areas in the BSAI closed to scallop dredging.



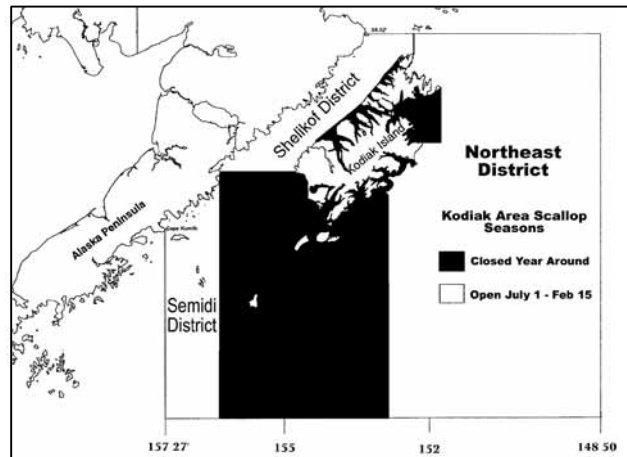
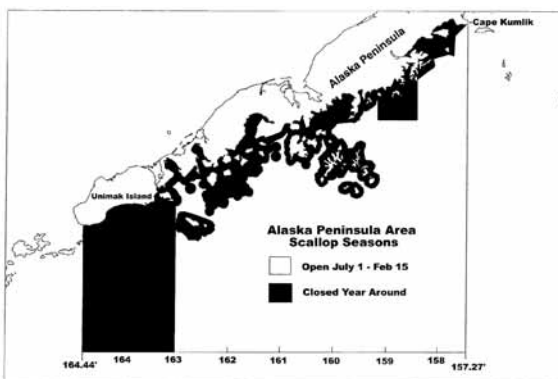
There are also trawl and dredge closure areas in the Gulf of Alaska to protect king crab and crab habitat. In the Kodiak Island area, trawl closure areas were designed based on the use of areas by crab life stage and level of recruitment (NPFMC 1993). Three types of areas are designated. Type I areas have very high king crab concentrations and, to promote rebuilding of the crab stocks, are closed all year to all trawling except with pelagic gear. Type II areas have lower crab concentrations and are only closed to non-pelagic gear from February 15 through June 15. Type III areas are adjacent to Type I and II areas and have been identified as important juvenile king crab rearing or migratory areas. Type III areas become operational following a determination that a "recruitment event" has occurred. The Regional Director will classify the expanded Type III area as either Type I or II, depending on the information available. A "recruitment event" is defined as the appearance of female king crab in substantially increased numbers (when the total number of females estimated for a given district equals the number of females established as a threshold criterion for opening that district to commercial crab fishing). A recruitment event closure will continue until a commercial crab fishery opens for that district or the number of crabs drops below the threshold level for that district.



22 Location of trawl closure areas in the Gulf of Alaska to protect red king crabs.

No trawling is allowed in the eastern Gulf of Alaska as of March 23, 1998. This area was closed as part of the license limitation system that was adopted as GOA Groundfish FMP Amendment 41.

The figures below show areas closed to scallop dredging in the Gulf of Alaska.

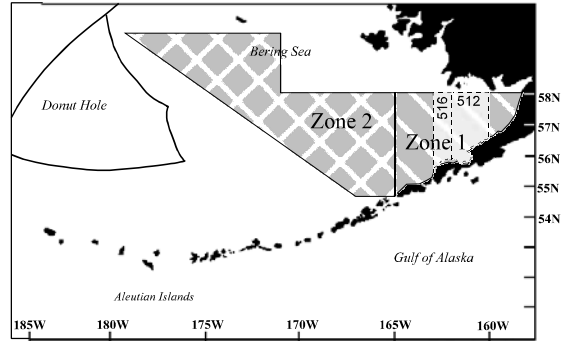


Bycatch Limits

The Council has adopted numerous limits on the incidental capture of crabs taken in groundfish and scallop fisheries. A summary is provided below.

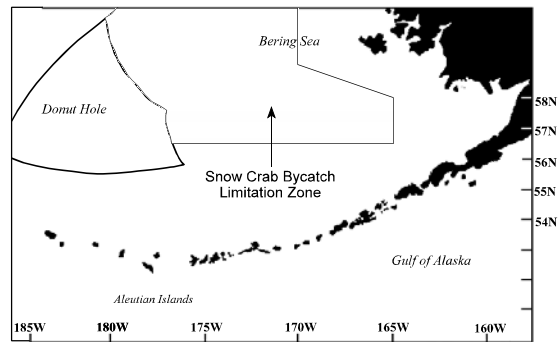
Prescribed bottom trawl fisheries in specific areas are closed when prohibited species catch (PSC) limits of *C. bairdi* Tanner crab, *C. opilio* crab, and red king crab are taken. Bycatch limitation zones for Tanner and red king crab PSC are shown in the figure below. Crab PSC limits for groundfish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

PSC limits for red king crab and <i>C. bairdi</i> Tanner crab.			
Species	Zone	Crab Abundance	PSC Limit
Red King Crab	Zone 1	Below threshold or 14.5 million lbs of effective spawning biomass (EBS)	35,000
		Above threshold, but below 55 million lbs of EBS	100,000
		Above 55 million lbs of EBS	200,000
Tanner Crab	Zone 1	0-150 million crabs	0.5% of abundance
		150-270 million crabs	750,000
		270-400 million crabs	850,000
		over 400 million crabs	1,000,000
Tanner Crab	Zone 2	0-175 million crabs	1.2% of abundance
		175-290 million crabs	2,100,000
		290-400 million crabs	2,550,000
		over 400 million crabs	3,000,000



Location of the crab bycatch limitation zones.

Under Amendment 40, PSC limits for snow crab (*C. opilio*) taken in groundfish fisheries are based on total abundance of *opilio* crab as indicated by the NMFS standard trawl survey (NPFMC 1996). The snow crab PSC cap is set at 0.1133% of the Bering Sea snow crab abundance index, with a minimum PSC of 4.5 million snow crab and a maximum of 13 million snow crab. Snow crab taken within the “Snow Crab Bycatch Limitation Zone” accrue towards the PSC limits established for individual trawl fisheries. Upon attainment of a snow crab PSC limit apportioned to a particular trawl target fishery, that fishery are prohibited from fishing within the snow crab zone.



27 Location of the snow crab bycatch limitation zone.

Crab bycatch limits have also been established for the Alaska scallop fisheries. Annual crab bycatch limits (CBLs) are specified for red king crab and Tanner crab species in each registration area or district thereof. In Registration Area Q (the Bering Sea), the annual CBLs shall equal the following amounts:

1. The CBL of red king crab caught while conducting any fishery for scallops shall be within the range of 500 to 3,000 crab based on specific considerations.

2. The CBL of *C. opilio* Tanner crab caught while conducting any fishery for scallops is 0.003176 percent of the most recent estimate of *C. opilio* abundance in Registration Area Q.
3. The CBL of *C. bairdi* Tanner crab caught while conducting any fishery for scallops is 0.13542 percent of the most recent estimate of *C. bairdi* abundance in Registration Area Q.

In other Registration Areas (Gulf of Alaska and Aleutian Islands), CBLs will be based on the biological condition of each crab species, historical bycatch rates in the scallop fishery, and other socioeconomic considerations that are consistent with the goals and objectives of the FMP.

Weatherwane scallop registration areas, seasons, GHl's (pounds, shucked), and crab bycatch limits established for the 1997 scallop fishery, by area.

<u>Area</u>	<u>GHl</u> <u>(pounds)</u>	<u>Fishing</u> <u>Season</u>	<u>Crab Bycatch Limits</u>		
			<u>king</u> <u>crab</u>	<u>Tanner</u> <u>crab</u>	<u>Snow</u> <u>crab</u>
D - District 16	0 - 35,000	Jan 10 - Dec 31	n/a	n/a	n/a
D - Yakutat	0 - 250,000	Jan 10 - Dec 31	n/a	n/a	n/a
E - Eastern PWS	0 - 50,000	Jan 10 - Dec 31	n/a	500	n/a
Western PWS	combined	Jan 10 - Dec 31	n/a	130	n/a
H - Cook Inlet (Kamishak)	0 - 20,000	Aug 15 - Oct 31	60	24,992	n/a
Cook Inlet (Outer area)	combined	Jan 1 - Dec 31	98	2,170	n/a
K - Kodiak (Shelikof)	0 - 400,000	July 1 - Feb 15	35	51,000	n/a
Kodiak (Northeast)	combined	July 1 - Feb 15	50	91,600	n/a
M - AK Peninsula	0 - 200,000	July 1 - Feb 15	79	45,300	n/a
O - Dutch Harbor	0 - 170,000	July 1 - Feb 15	10	10,700	n/a
Q - Bering Sea	0 - 600,000	July 1 - Feb 15	500	238,000	172,000
R - Adak	0 - 75,000	July 1 - Feb 15	50	10,000	n/a

Appendix H. Current (1998) and Historic Boundaries for Registration Areas and Fishing Districts, Sub-districts, and Sections within the BSAI Management Unit

Current Registration Areas

King Crab

Bering Sea Registration Area (Statistical Area Q): has as its southern boundary a line from 54°36' N. lat., 168° W. long., to 54°36' N. lat., 171° W. long., to 55°30' N. lat., 171° W. long., to 55°30' N. lat., 173°30' E. long., as its northern boundary the latitude of Point Hope (68°21' N. lat.), as its eastern boundary a line from 54°36' N. lat., 168° W. long., to 58°39' N. lat., 168° W. long., to Cape Newenham (58°39' N. lat.), and as its western boundary a line from 55°30' N. lat., 173°30' E. long., to 65°32' N. lat., 168°55' W. long., to 68°21' N. lat., 168°55' W. long. (the U.S.-Russian Convention line of 1867).

Pribilof District Q₁: waters of Statistical Area Q south of the latitude of Cape Newenham (58°39' N. lat.).

Northern District: waters of Statistical Area Q north of latitude of Cape Newenham (58°39' N. lat.).

Saint Matthew Island Section Q₂: waters north of the latitude of Cape Newenham (58°39' N. lat.) and south of the latitude of Cape Romanzof (61°49' N. lat.);

Norton Sound Section Q₃: waters east of 168° W. long., and north of latitude of Cape Romanzof (61°49' N. lat.) and south of the latitude of Cape Prince of Wales (65°36' N. lat.);

Saint Lawrence Island Section Q₄: all remaining waters of the district.

Bristol Bay Registration Area (Statistical Area T): has as its northern boundary the latitude of Cape Newenham (58°39' N. lat.), as its southern boundary the latitude of Cape Sarichef (54°36' N. lat.), as its western boundary 168° W. long. and includes all waters of Bristol Bay.

Aleutian Islands Registration Area (Statistical Area O): has as its eastern boundary the longitude of Scotch Cap Light (164°44' W. long.), its western boundary the U.S.-Russian Convention line of 1867, and its northern boundary a line from the latitude of Cape Sarichef (54°36' N. lat.) to 171° W. long., north to 55°30' N. lat., and west to the U.S.-Russian convention line of 1867.

¹This registration area no longer contains any districts or Sub-districts. The area's two distinct golden king crab stocks, as identified from historic commercial landings, are managed separately at the 174° W. long. line.

Tanner Crab

BS/AI Portion of the Westward Registration Area (BS/AI Portion of Statistical Area J): all Bering Sea waters east of 172° E. long., and all waters between the longitude of Scotch Cap Light (164°44'36" W. long.) and east of 172° E. long. to the seaward boundary as fixed by State regulation and all Bering Sea waters east of 172° E. longitude.

Eastern Aleutian District J₄: all waters of Statistical Area J between the longitude of Scotch Cap Light and 172° W. long., and south of 54°36' N. lat.

Western Aleutian District J₅: all waters of Statistical Area J west of 172° W. long. and south of 54°36' N. lat.

Bering Sea District: all Bering Sea waters of Statistical Area J north of 54°36' N. lat.

Western Sub-district J₆: all waters of the Bering Sea District west of 173° W. long.

Eastern Sub-district J₇: all waters of the Bering Sea District east of 173° W. long., including the waters of Bristol Bay.

Norton Sound Section J₈: all waters east of 168° W. long. and north of the latitude of Cape Romanzof;

General Section: all waters of the Eastern Sub-district not included in the Norton Sound Section.

Historic Registration Areas

King Crab

Historic Adak Registration Area R

North Amlia District: all Bering Sea waters of Statistical Area R east of the longitude of North Cape on Atka Island (174°09' W. long.), north of the latitude of Cape Utalug (52°06' N. lat.) including all waters of Nazan Bay.

South Amlia District: Pacific Ocean waters of Statistical Area R east of the longitude of Cape Kigum on Atka Island (175°20'30" W. long.) and south of a line from Cape Kigum to Cape Utalug on Atka Island, to the westernmost point of Amlia Island 171° W. long.

(North Atka District: all Bering Sea waters of Statistical Area R east of longitude of Cape Kigum on Atka Island (175°20'30" W. long.) west of the longitude of North Cape on Atka Island (174°09' W. long.) and northerly of a line from Cape Kigum to Cape Utalug on Atka Island excluding all waters of Nazan Bay.

Adak District: all waters of Statistical Area R west of the longitude of Cape Kigum on Atka Island (175°20'30" W. long.), and east of 179°15' W. long.

Petrel Bank District: waters of Statistical Area R west of 179°15' W. long., east of 179° E. long., south of 55°30' N. lat., and north of 51°45' N. lat.

Western Aleutians District: all waters of Statistical Area R west of 179°15' W. long., excluding the Petrel Bank district.

Historic Dutch Harbor Registration Area O

Akun District: all waters of Statistical Area O east of 165°34' W. long., and north of the latitude of Jackass Point (54°06'35" N. lat.).

Akutan District: all Bering Sea waters of Statistical Area O west of 165°34' W. long., east of the longitude of Koriga Point on Unalaska Island (166°59'50" W. long.) and north of a line from Erskine Point on Unalaska Island to Jackass Point on Akun Island.

Egg Island District: all Pacific Ocean waters of Statistical Area O east of the longitude of Udagak Strait on Unalaska Island (166°15' W. long.) south of a line from Erskine Point on Unalaska Island (53°59' N. lat., 166°16'45" W. long.) to Jackass Point on Akun Island, then to 54°06'35" N. lat., 164°44'45" W. long., including the waters of Beaver Inlet and Udagak Strait.

Unalaska District: all Bering Sea waters of Statistical Area O west of the longitude of Koriga Point on Unalaska Island (166°59'50" W. long.) east of Cape Tanak on Umnak Island (168° W. long.) and north of a line from Kettle Cape on Umnak Island (53°16'40" N. lat., 168°07' W. long.), to Konets Head on Unalaska Island (53°19' N. lat., 167°51' W. long.).

Western District: all Bering Sea waters of Statistical Area O west of the longitude of Cape Tanak on Umnak Island and all Pacific Ocean waters of king crab Registration Area O west of the longitude of Udagak Strait (166°16' W. long.) and south of a line from Kettle Cape on Umnak Island (53°16'40" N. lat., 168°07' W. long.) to Konets Head (53°19' N. lat., 167°51' W. long.) on Unalaska Island, excluding the waters of Udagak Strait and Beaver Inlet.

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Appendix J. Community Profiles

National Standard 8 of the Magnuson-Stevens Act mandates that conservation and management shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to provide for the sustained participation of such communities, and to the extent practicable, minimize adverse economic impacts on such communities. The following is a community profile for of one community in the BSAI region. Copies of profiles for other coastal communities, entitled “Faces of the Fisheries”, are available from the Council office.