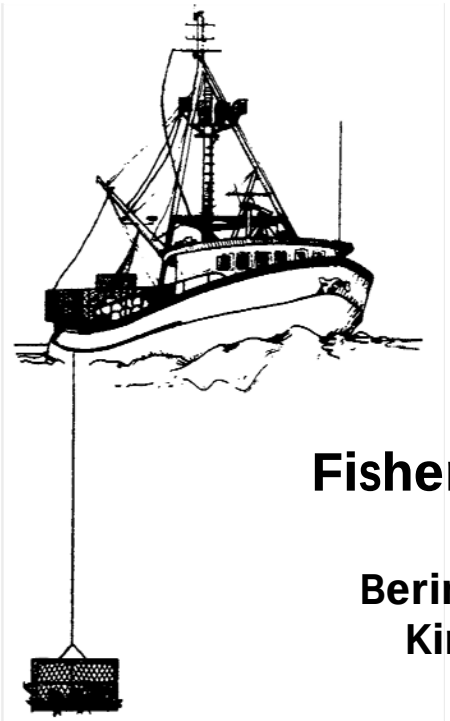

Fishery Management Plan

for

Bering Sea/Aleutian Islands
King and Tanner Crabs

October 2011

North Pacific Fishery Management Council
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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.

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.

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 Repealed the Research Plan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 Defined essential fish habitat (superseded by Amendment 16)
12. Identify Habitat Areas of Particular Concern and protection measures (proposed)
16. Defined essential fish habitat and protection measures (proposed)
23. Revised the Aleutian Islands Habitat Conservation Area boundaries near Agattu and Buldir Islands.

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
Essential Fish Habitat	Sex Restrictions	State Observer Requirements
Habitat Areas of Particular Concern	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 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-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.

Essential Fish Habitat *(EFH)* - The FMP describes and identifies EFH for BSAI crab and identifies fishing and non-fishing threats to BSAI crab EFH, research needs, and EFH conservation and enhancement recommendations.

***Habitat Areas of Particular Concern** (HAPC)* - The FMP identifies specific HAPCs for the BSAI crab fisheries and establishes management measures to reduce potential adverse effects of fishing on HAPCs.

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 Diomede 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 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:

1. 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.
2. 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.
3. 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

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

fishermen and processors. The State has made a 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 reinstitution 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 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.

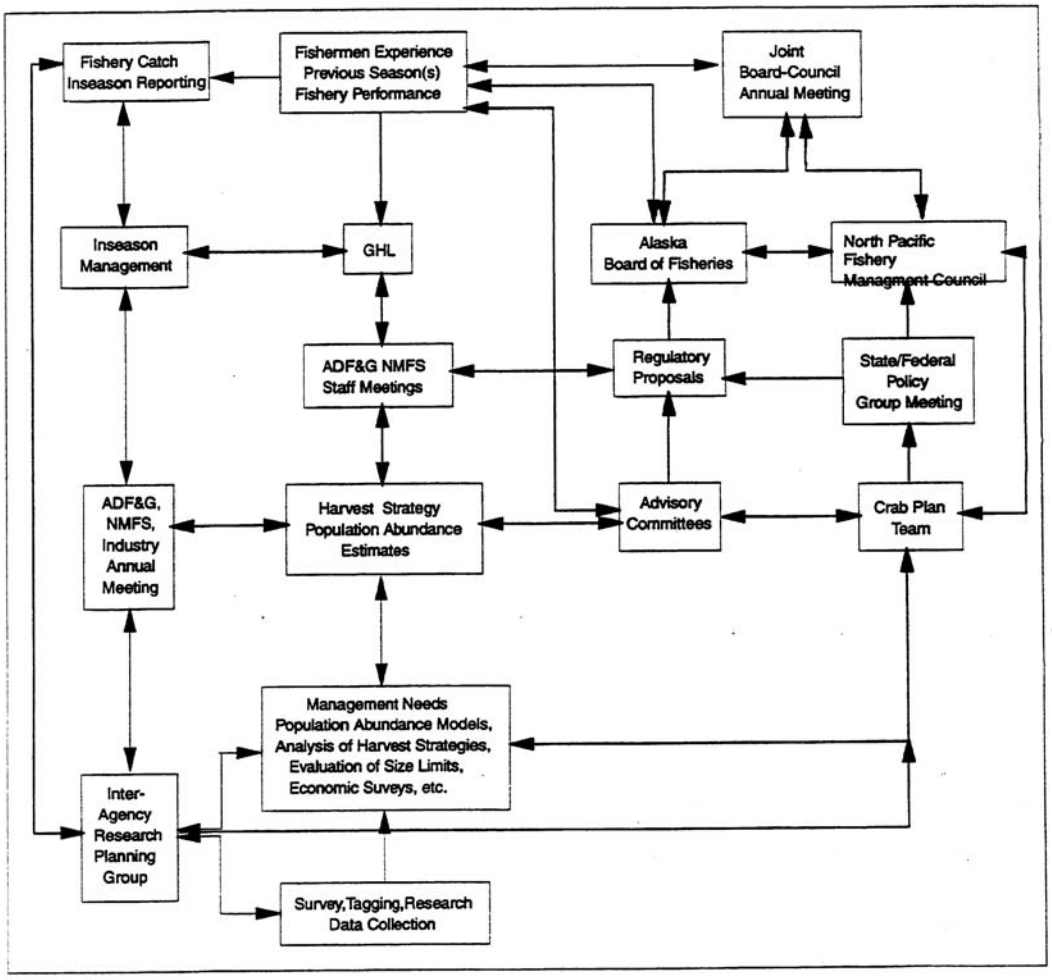
The CIAC shall function similarly to the Council's "Interim Action Committee." The CIAC shall consider each request for review to determine whether the management measure(s) or other relevant matter(s) is consistent with this FMP (including compliance with framework criteria), the Magnuson-Stevens Act, 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. GHLs 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 Finding of Consistency of Existing State Regulations with the FMP, the Magnuson-Stevens 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 Definitions of Terms

The following terms are used extensively throughout this FMP:

Acceptable biological catch (ABC) is a level of annual catch of a stock that accounts for the scientific uncertainty in the estimate of OFL and any other specified scientific uncertainty and is set to prevent, with a greater than 50 percent probability, the OFL from being exceeded. The ABC is set below the OFL.

ABC Control Rule is the specified approach in the five-tier system for setting the maximum permissible ABC for each stock as a function of the scientific uncertainty in the estimate of OFL and any other specified scientific uncertainty.

Annual catch limit (ACL) is the level of annual catch of a stock that serves as the basis for invoking accountability measures. For crab stocks, the ACL will be set at the ABC.

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

Habitat Conservation Areas: Areas where fishing restrictions are implemented for purposes of habitat conservation.

Habitat Conservation Zone: A subset of a habitat conservation area in which additional restrictions are imposed on fishing beyond those restrictions established for the habitat conservation area to protect specific habitat features.

Habitat Protection Areas: Areas of special, rare habitat features where fishing activities that may adversely affect the habitat are restricted.

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.

F_{MSY} control rule means a harvest strategy which, if implemented, would be expected to result in a long-term average catch approximating MSY.

B_{MSY} stock size is the biomass that results from fishing at constant F_{MSY} and is the minimum standard for a rebuilding target when a rebuilding plan is required.

Maximum fishing mortality threshold (MFMT) is defined by the F_{OFL} control rule, and is expressed as the fishing mortality rate.

Minimum stock size threshold (MSST) is one half the B_{MSY} stock size.

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.

Overfished is determined by comparing annual biomass estimates to the established MSST. For stocks where MSST (or proxies) are defined, if the biomass drops below the MSST (or proxy thereof) then the stock is considered to be overfished.

Overfishing is defined as any amount of catch in excess of the overfishing level (OFL). The OFL is calculated by applying the F_{OFL} control rule annually estimated using the tier system in Chapter 6.0 to abundance estimates.

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.

Total allowable catch (TAC) is the annual catch target for the directed fishery for a stock, set to prevent exceeding the ACL for that stock and in accordance with section 8.2.2.

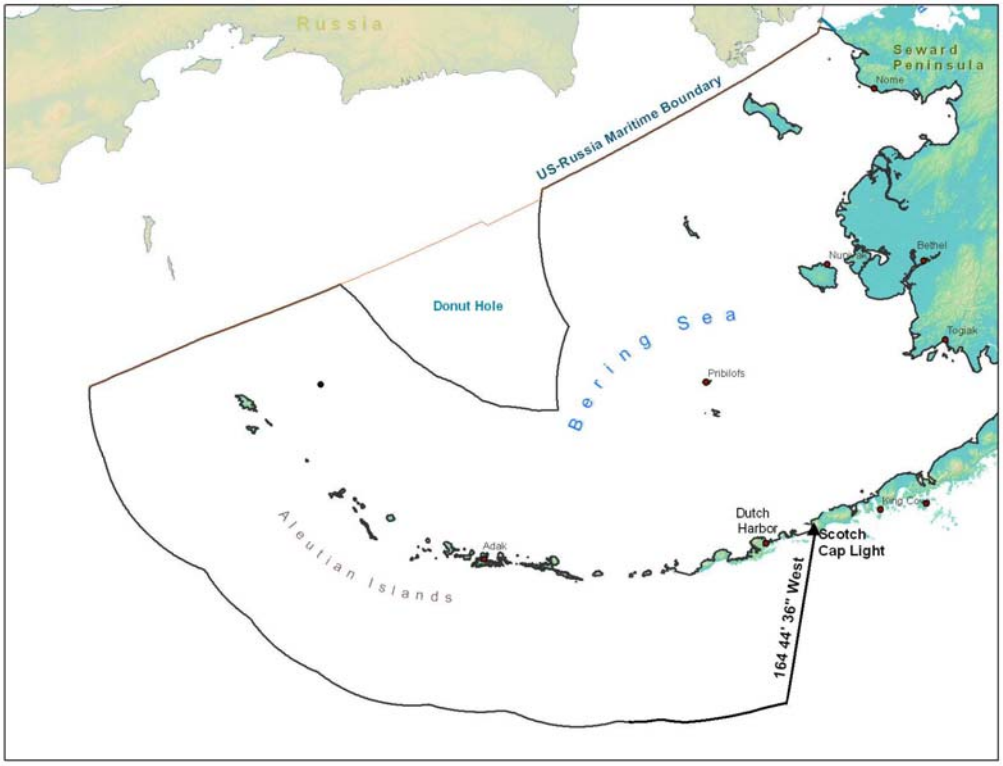
5 Description of Fishery Management Unit

This FMP applies to commercial fisheries for red king crab *Paralithodes camtschaticus*, blue king crab *P. platypus*, golden (or brown) king crab *Lithodes aequispinus*, Tanner crab *Chionoecetes bairdi*, and snow crab *C. opilio* in the BS/AI area, except for the following stocks exclusively managed by the State of Alaska: Aleutian Islands Tanner crab, Dutch Harbor red king crab, St. Matthew golden king crab, and St. Lawrence blue king crab.

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; to avoid confusion, the name Tanner crab is used for *C. bairdi* and snow crab is used for *C. opilio*. 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 BS/AI area is defined as those waters of the EEZ lying south of the Chukchi Sea statistical area as described in the coordinates to Figure 1 to 50 CFR part 679, east of the 1990 U.S./Russian maritime boundary line, 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.

Figure 5-1 The BS/AI Area



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.

6 Status Determination Criteria

Status determination criteria for crab stocks are annually calculated using a five-tier system that accommodates varying levels of uncertainty of information. The five-tier system incorporates new scientific information and provides a mechanism to continually improve the status determination criteria as new information becomes available. Under the five-tier system, overfishing and overfished criteria and acceptable biological catch (ABC) levels are annually formulated. The annual catch limit (ACL) for each stock equals the ABC for that stock. Each crab stock is annually assessed to determine its status and whether (1) overfishing is occurring or the rate or level of fishing mortality for the stock is approaching overfishing, (2) the stock is overfished or the stock is approaching an overfished condition, and (3) the catch has exceeded the ACL.

For crab stocks, the overfishing level (OFL) equals maximum sustainable yield (MSY) and is derived through the annual assessment process, under the framework of the tier system. Overfishing is determined by comparing the (OFL), with the catch estimates for that crab fishing year. For the previous crab fishing year, NMFS will determine whether overfishing occurred by comparing the previous year's OFL with the catch from the previous crab fishing year. For the previous crab fishing year, NMFS will also determine whether the ACL was exceeded by comparing the ACL with the catch estimates for that crab fishing year. Catch includes all fishery removals, including retained catch and discard losses, for those stocks where non-target fishery removal data are available. Discard losses are determined by multiplying the appropriate handling mortality rate by observer estimates of bycatch discards. For stocks where only retained catch information is available, the OFL and ACL will be set for and compared to the retained catch.

NMFS will determine whether a stock is in an overfished condition by comparing annual biomass estimates to the established MSST, defined as ½ B_{MSY}. For stocks where MSST (or proxies) are defined, if the biomass drops below the MSST (or proxy thereof) then the stock is considered to be overfished. MSSTs or proxies are set for stocks in Tiers 1-4. For Tier 5 stocks, it is not possible to set an MSST because there are no reliable estimates of biomass.

If overfishing occurred or the stock is overfished, section 304(e)(3)(A) of the Magnuson-Stevens Act, as amended, requires the Council to immediately end overfishing and rebuild affected stocks.

The Magnuson-Stevens Act requires that FMPs include accountability measures to prevent ACLs from being exceeded and to correct overages of the ACL if they do occur. Accountability measures to prevent TACs and GHLs from being exceeded have been used under this FMP for the management of the BSAI crab fisheries and will continue to be used to prevent ACLs from being exceeded. These include: individual fishing quotas and the measures to ensure that individual fishing quotas are not exceeded, measures to minimize crab bycatch in directed crab fisheries, and monitoring and catch accounting measures. Accountability measures in the harvest specification process include downward adjustments to the ACL and TAC in the fishing year after an ACL has been exceeded.

Annually, the Council, Scientific and Statistical Committee, and Crab Plan Team will review (1) the stock assessment documents, (2) the OFLs and ABCs, and total allowable catches or guideline harvest levels (3) NMFS's determination of whether overfishing occurred in the previous crab fishing year, (4) NMFS's determination of whether any stocks are overfished and (5) NMFS's determination of whether catch exceeded the ACL in the previous crab fishing year.

Optimum yield is defined in Chapter 4. Information pertaining to economic, social and ecological factors relevant to the determination of optimum yield is provided in several sections of this FMP, including sections 7.2 (Management Objectives), Chapter 11, Appendix D (Biological and Environmental Characteristics of the Resource), and Appendix H (Community Profiles).

For each crab fishery, the optimum yield range is 0 to < OFL catch. For crab stocks, the OFL is the annualized maximum sustainable yield (MSY) and is derived through the annual assessment process, under the framework of the tier system. Recognizing the relatively volatile reproductive potential of crab stocks, the cooperative management structure of the FMP, and the past practice of restricting or even prohibiting directed harvests of some stocks out of ecological considerations, this optimum yield range is intended to facilitate the achievement of the biological objectives and economic and social objectives of this FMP (see sections 7.2.1 and 7.2.2) under a variety of future biological and ecological conditions. It enables the State to determine the appropriate TAC levels below the OFL to prevent overfishing or address other biological concerns that may affect the reproductive potential of a stock but that are not reflected in the OFL itself. Under section 8.2.2, the State establishes TACs at levels that maximize harvests, and associated economic and social benefits, when biological and ecological conditions warrant doing so.

6.1 Five-Tier System

The OFL and ABC for each stock are annually estimated for the upcoming crab fishing year using the five-tier system, detailed in Table 6-1 and 6-2. First, a stock is assigned to one of the five tiers based on the availability of information for that stock and model parameter choices are made. Tier assignments and model parameter choices are recommended through the Crab Plan Team process to the Council's Scientific and Statistical Committee. The Council's Scientific and Statistical Committee recommends tier assignments, stock assessment and model structure, and parameter choices, including whether information is "reliable," for the assessment authors to use for calculating the proposed OFLs and ABCs based on the five-tier system.

For Tiers 1 through 4, once a stock is assigned to a tier, the determination of stock status level is based on recent survey data and assessment models, as available. The stock status level determines the equation used in calculating the F_{OFL}. Three levels of stock status are specified and denoted by "a," "b," and "c" (see Table 6-1). The F_{MSY} control rule reduces the F_{OFL} as biomass declines by stock status level. At stock status level "a," current stock biomass exceeds the B_{MSY}. For stocks in status level "b," current biomass is less than B_{MSY} but greater than a level specified as the "critical biomass threshold" (β).

In stock status level "c," the ratio of current biomass to B_{MSY} (or a proxy for B_{MSY}) is below β. At stock status level "c," directed fishing is prohibited and an F_{OFL} at or below F_{MSY} would be determined for all other sources of fishing mortality in the development of the rebuilding plan. The Council will develop a rebuilding plan once a stock level falls below the MSST.

For Tiers 1 through 3, the coefficient α is set at a default value of 0.1, and β set at a default value of 0.25, with the understanding that the Scientific and Statistical Committee may recommend different values for a specific stock or stock complex as merited by the best available scientific information.

In Tier 4, a default value of natural mortality rate (M) or an M proxy, and a scalar, γ, are used in the calculation of the F_{OFL}.

In Tier 5, the OFL is specified in terms of an average catch value over an historical time period, unless the Scientific and Statistical Committee recommends an alternative value based on the best available scientific information.

Second, the assessment author prepares the stock assessment and calculates the proposed OFLs by applying the F_{OFL} and using the most ecent abundance estimates. The assessment authors calculate the proposed ABCs by applying the ABC control rule to the proposed OFL.

Stock assessment documents shall:

- use risk-neutral assumptions;
- specify how the probability distribution of the OFL used in the ABC control rule is calculated for each stock; and
- specify the factors influencing scientific uncertainty that are accounted for in calculation of the probability distribution of the OFL.

Second, the Crab Plan Team annually reviews stock assessment documents, the most recent abundance estimates, the proposed OFLs and ABCs, and complies the Stock Assessment and Fishery Evaluation Report. The Crab Plan Team then makes recommendations to the Scientific and Statistical Committee on the OFLs, ABCs, and any other issues related to the crab stocks.

Third, the Scientific and Statistical Committee annually reviews the Stock Assessment and Fishery Evaluation Report, including the stock assessment documents, recommendations from the Crab Plan Team, and the methods to address scientific uncertainty.

In reviewing the Stock Assessment and Fishery Evaluation Report, the Crab Plan Team and the Scientific and Statistical Committee shall evaluate and make recommendations, as necessary, on:

- the assumptions made for stock assessment models and estimation of OFLs;
- the specifications of the probability distribution of the OFL;
- the methods to appropriately quantify uncertainty in the ABC control rule; and
- the factors influencing scientific uncertainty that the State has accounted for and will account for on an annual basis in TAC setting.

The Scientific and Statistical Committee will then set the final OFLs and ABCs for the upcoming crab fishing year. The Scientific and Statistical Committee may set an ABC lower than the result of the ABC control rule, but it must provide an explanation for setting the ABC less that the maximum ABC.

As an accountability measure, the total catch estimate used in the stock assessment will include any amount of harvest that may have exceeded the ACL in the previous fishing season. For stocks managed under Tiers 1 through 4, this would result in a lower maximum ABC in the subsequent year, all else being equal, because maximum ABC varies directly with biomass. For Tier 5 stocks, the information used to establish the ABC is insufficient to reliably estimate abundance or discern the existence or extent of biological consequences caused by an overage in the preceding year. Consequently, the subsequent year's maximum ABC will not automatically decrease. However, when the ACL for a Tier 5 stock has been exceeded, the Scientific and Statistical Committee may decrease the ABC for the subsequent fishing season as an accountability measure.

6.1.1 Tiers 1 through 3

For Tiers 1 through 3, reliable estimates of B, B_{MSY}, and F_{MSY}, or their respective proxy values, are available. Tiers 1 and 2 are for stocks with a reliable estimate of the spawner/recruit relationship, thereby enabling the estimation of the limit reference points B_{MSY} and F_{MSY}.

- Tier 1 is for stocks with assessment models in which the probability density function (pdf) of F_{MSY} is estimated.
- Tier 2 is for stocks with assessment models in which a reliable point estimate, but not the pdf, of F_{MSY} is made.
- Tier 3 is for stocks where reliable estimates of the spawner/recruit relationship are not available, but proxies for F_{MSY} and B_{MSY} can be estimated.

For Tier 3 stocks, maturity and other essential life-history information are available to estimate proxy limit reference points. For Tier 3, a designation of the form "F_X" refers to the fishing mortality rate associated with an equilibrium level of fertilized egg production (or its proxy such as mature male biomass at mating) per recruit equal to X% of the equilibrium level in the absence of any fishing.

The OFL and ABC calculation accounts for all losses to the stock not attributable to natural mortality. The OFL and ACL are total catch limits comprised of three catch components: (1) non-directed fishery discard losses; (2) directed fishery discard losses; and (3) directed fishery retained catch. To determine the discard losses, the handling mortality rate is multiplied by bycatch discards in each fishery. Overfishing would occur if, in any year, the sum of all three catch components exceeds the OFL.

6.1.2 Tier 4

Tier 4 is for stocks where essential life-history, recruitment information, and understanding are insufficient to achieve Tier 3. Therefore, it is not possible to estimate the spawner-recruit relationship. However, there is sufficient information for simulation modeling that captures the essential population dynamics of the stock as well as the performance of the fisheries. The simulation modeling approach employed in the derivation of the annual OFLs captures the historical performance of the fisheries as seen in observer data from the early 1990s to present and thus borrows information from other stocks as necessary to estimate biological parameters such as γ.

In Tier 4, a default value of natural mortality rate (M) or an M proxy, and a scalar, γ, are used in the calculation of the F_{OFL}. Explicit to Tier 4 are reliable estimates of current survey biomass and the instantaneous M. The proxy B_{MSY} is the average biomass over a specified time period, with the understanding that the Council's Scientific and Statistical Committee may recommend a different value for a specific stock or stock complex as merited by the best available scientific information. A scalar, γ, is multiplied by M to estimate the F_{OFL} for stocks at status levels **"**a**"** and **"**b,**"** and γ is allowed to be less than or greater than unity. Use of the scalar γ is intended to allow adjustments in the overfishing definitions to account for differences in biomass measures. A default value of γ is set at 1.0, with the understanding that the Council's Scientific and Statistical Committee may recommend a different value for a specific stock or stock complex as merited by the best available scientific information.

If the information necessary to determine total catch OFLs and ACLs is available for a Tier 4 stock, then the OFL and ACL will be total catch limits comprised of three catch components: (1) non-directed fishery discard losses; (2) directed fishery discard losses; and (3) directed fishery retained catch. If the information necessary to determine total catch OFLs and ACLs is not available for a Tier 4 stock, then the OFL and ACL are determined for retained catch. In the future, as information improves, data would be available for some stocks to allow the formulation and use of selectivity curves for the discard fisheries

(directed and non-directed losses) as well as the directed fishery (retained catch) in the models. The resulting OFL and ACL from this approach, therefore, would be the total catch OFL and ACL.

6.1.3 Tier 5

Tier 5 stocks have no reliable estimates of biomass and only historical catch data is available. For Tier 5 stocks, the OFL is set equal to the average catch from a time period determined to be representative of the production potential of the stock, unless the Scientific and Statistical Committee recommends an alternative value based on the best available scientific information. The ABC control rule sets the maximum ABC at less than or equal to 90 percent of the OFL and the ACL equals the ABC.

For Tier 5 stocks, where only retained catch information is available, the OFL and ACL will be set for the retained catch portion only, with the corresponding limits applying to the retained catch only. For Tier 5 stocks where information on bycatch mortality is available, the OFL and ACL calculations could include discard losses, at which point the OFL and ACL would be applied to the retained catch plus the discard losses from directed and non-directed fisheries.

Figure 6-1 Overfishing control rule for Tiers 1 through 4. Directed fishing mortality is 0 below β.

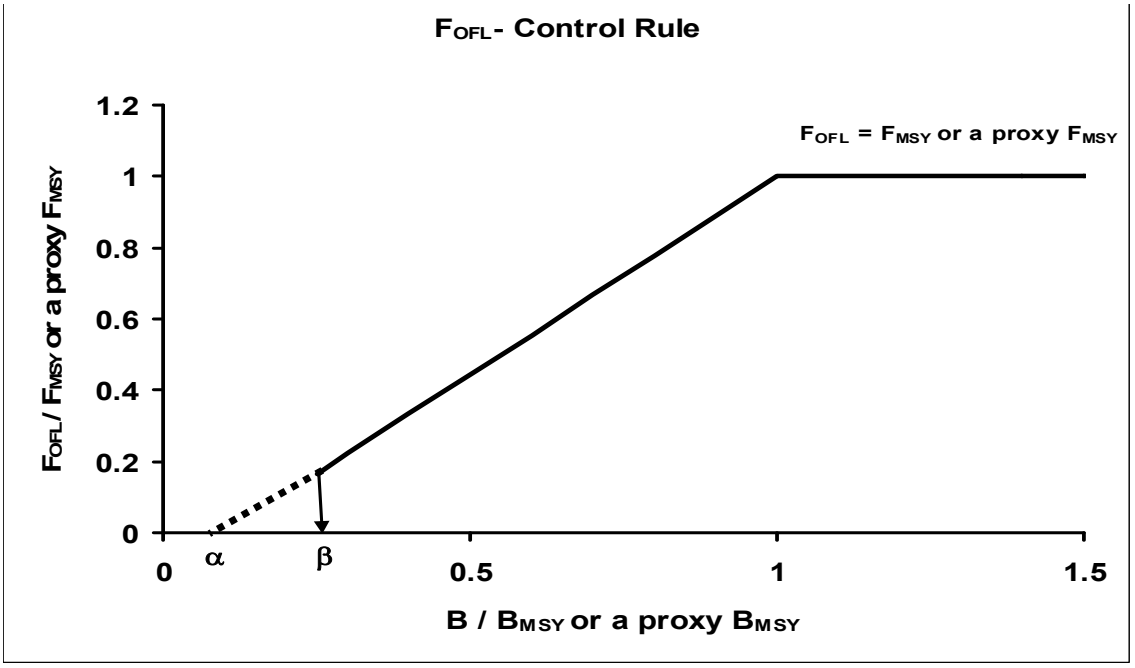


Table 6-1 Five-Tier System for setting overfishing limits *(OFLs) and Acceptable Biological Catches (ABCs)* for crab stocks. The tiers are listed in descending order of information availability. Table 6-2 contains a guide for understanding the five-tier system.

Information available	Tier	Stock status level	F_{OFL}	ABC control rule
B, B_{MSY}, F_{MSY}, and pdf of F_{MSY}	1	a. $\frac{B}{B_{msy}} > 1$	$F_{OFL} = \mu_A$ =arithmetic mean of the pdf	
		b. $\beta < \frac{B}{B_{msy}} \leq 1$	$F_{OFL} = \mu_A \frac{B/B_{msy} - \alpha}{1-\alpha}$	ABC≤(1-b_y) * OFL
		c. $\frac{B}{B_{msy}} \leq \beta$	*Directed fishery F = 0* $F_{OFL} \leq F_{MSY}$†	
B, B_{MSY}, F_{MSY}	2	a. $\frac{B}{B_{msy}} > 1$	$F_{OFL} = F_{msy}$	
		b. $\beta < \frac{B}{B_{msy}} \leq 1$	$F_{OFL} = F_{msy} \frac{B/B_{msy} - \alpha}{1-\alpha}$	ABC≤(1-b_y) * OFL
		c. $\frac{B}{B_{msy}} \leq \beta$	*Directed fishery F = 0* $F_{OFL} \leq F_{MSY}$†	
B, $F_{35\%}^{*}$, $B_{35\%}^{*}$	3	a. $\frac{B}{B_{35\%*}} > 1$	$F_{OFL} = F_{35\%}*$	
		b. $\beta < \frac{B}{B_{35\%}*} \leq 1$	$F_{OFL} = F^{*}_{35\%} \frac{\frac{B}{B^{*}_{35\%}} - \alpha}{1-\alpha}$	ABC≤(1-b_y) * OFL
		c. $\frac{B}{B_{35\%}*} \leq \beta$	*Directed fishery F = 0* $F_{OFL} \leq F_{MSY}$†	
B, M, $B_{msy^{prox}}$	4	a. $\frac{B}{B_{msy^{prox}}} > 1$	$F_{OFL} = \gamma M$	
		b. $\beta < \frac{B}{B_{msy^{prox}}} \leq 1$	$F_{OFL} = \gamma M \frac{B/B_{msy^{prox}} - \alpha}{1-\alpha}$	ABC≤(1-b_y) * OFL
		c. $\frac{B}{B_{msy^{prox}}} \leq \beta$	*Directed fishery F = 0* $F_{OFL} \leq F_{MSY}$†	
Stocks with no reliable estimates of biomass or M.	5		OFL = average catch from a time period to be determined, unless the SSC recommends an alternative value based on the best available scientific information.	ABC≤0.90 * OFL

*35% is the default value unless the SSC recommends a different value based on the best available scientific information.

† An $F_{OFL} \leq F_{MSY}$ will be determined in the development of the rebuilding plan for an overfished stock.

Table 6-2 A guide for understanding the five-tier system.

- F_{OFL} — the instantaneous fishing mortality (F) from the directed fishery that is used in the calculation of the overfishing limit (OFL). F_{OFL} is determined as a function of:
  - F_{MSY} — the instantaneous F that will produce MSY at the MSY-producing biomass
    - A proxy of F_{MSY} may be used; e.g., $F_{x\%}$, the instantaneous F that results in x% of the equilibrium spawning per recruit relative to the unfished value
  - B — a measure of the productive capacity of the stock, such as spawning biomass or fertilized egg production.
    - A proxy of B may be used; e.g., mature male biomass
  - B_{MSY} — the value of B at the MSY-producing level
    - A proxy of B_{MSY} may be used; e.g., mature male biomass at the MSY-producing level
  - β — a parameter with restriction that $0 \leq \beta < 1$.
  - α — a parameter with restriction that $0 \leq \alpha \leq \beta$.
- The maximum value of F_{OFL} is F_{MSY}. $F_{OFL} = F_{MSY}$ when $B > B_{MSY}$.
- F_{OFL} decreases linearly from F_{MSY} to $F_{MSY} \cdot (\beta-\alpha)/(1-\alpha)$ as B decreases from B_{MSY} to $\beta \cdot B_{MSY}$
- When $B \leq \beta \cdot B_{MSY}$, $F = 0$ for the directed fishery and $F_{OFL} \leq F_{MSY}$ for the non-directed fisheries, which will be determined in the development of the rebuilding plan.
- The parameter, β, determines the threshold level of B at or below which directed fishing is prohibited.
- The parameter, α, determines the value of F_{OFL} when B decreases to $\beta \cdot B_{MSY}$ and the rate at which F_{OFL} decreases with decreasing values of B when $\beta \cdot B_{MSY} < B \leq B_{MSY}$.
  - Larger values of α result in a smaller value of F_{OFL} when B decreases to $\beta \cdot B_{MSY}$.
  - Larger values of α result in F_{OFL} decreasing at a higher rate with decreasing values of B when $\beta \cdot B_{MSY} < B \leq B_{MSY}$.
- The parameter, b_y, is the value for the annual buffer calculated from a P* of 0.49 and a probability distribution for the OFL that accounts for scientific uncertainty in the estimate of OFL.
- P* is the probability that the estimate of ABC, which is calculated from the estimate of OFL, exceeds the "true" OFL (noted as OFL') (P(ABC>OFL').

6.2 Rebuilding Overfished Fisheries

6.2.1 Bering Sea Tanner (Chionoecetes bairdi) crab

NMFS declared Bering Sea Tanner crab overfished on March 3, 1999 because the spawning biomass estimated from the NMFS trawl survey was below the minimum stock size threshold of 94.8 million pounds specified in this FMP. The Council developed a rebuilding plan for the Tanner crab stock within one year from this date, as required by the Magnuson-Stevens Act in section 304(e). The rebuilding plan is sufficient to rebuild the stock to the Bmsy level and the rebuilding time period satisfies the requirements of section 304(e)(4)(A) of the Magnuson-Stevens Act, and the plan complies with the national standard guidelines at 50 CFR 600.310(e). The Council's rebuilding plan incorporates the harvest strategy developed by ADF&G and adopted by the Alaska Board of Fisheries. Section 8.0 of the FMP defers to the State of Alaska the authority to develop harvest strategies, with oversight by NMFS and the Council.

The rebuilding plan approved by the Council in October 1999 contains the following three components to improve the status of this stock: a harvest strategy, bycatch control measures, and habitat protection measures. The rebuilding plan is estimated to allow the Bering Sea Tanner crab stock to rebuild, with a 50% probability, to the Bmsy level in 10 years. The stock will be considered "rebuilt" when the stock reaches Bmsy in two consecutive years. The revised harvest strategy should result in more spawning biomass as more larger male crab would be conserved and fewer juveniles and females would die due to discarding. This higher spawning biomass would be expected to produce good year-classes when environmental conditions are favorable. Protection of habitat and reduction of bycatch will reduce mortality on juvenile crabs, thus allowing a higher percentage of each year-class to contribute to spawning (and future landings).

Harvest Strategy: ADF&G has recently developed a stairstep harvest strategy for Tanner crabs, which was adopted by the Board in March 1999 and detailed in the ADF&G regional information report "Overview of Population Dynamics and Recommended Harvest Strategy for Tanner Crabs in the Eastern Bering Sea" (Zheng and Kruse 1999), which is appendix 2 in the Environmental Assessment for the Rebuilding Plan, Amendment 11.

The harvest strategy contains five components:

- Threshold: 21.0 million pounds of females biomass >79 mm CW. The fishery will be closed when the stock is below threshold.
- Mature Harvest Rates: 20% of molting mature males when biomass of females >79 mm CW is □45.0 million pounds and 10% of molting mature males when the biomass of females >79 mm CW is □21.0 million pounds and <45.0 million pounds. Molting mature males are 100% of newshell and 15% of oldshell males >112 mm CW.
- Legal Harvest Rate Cap: a 50% cap of exploitable legal males, which are 100% of newshell and 32% of oldshell legal males.
- GHLs for Bristol Bay and Pribilof Islands: GHLs are determined separately for crabs east of 168°W (Bristol Bay) and west of 168°W (Pribilof Islands) in the Eastern Subdistrict of the Bering Sea.
- A Precautionary Measure: when the stock is reopened to fishing after having been closed to all commercial fishing in the preceding season due to the depressed stock condition, the GHL in the season will be reduced to one-half of the value as computed in the above GHL determination.
- TACs for Bristol Bay and Pribilof Islands: TACs are determined separately for crabs east of 166°W (Bristol Bay) and west of 166°W (Pribilof Islands) in the Eastern Subdistrict of the Bering Sea.

Bycatch Controls: Bycatch control measures have previously been implemented in the crab, scallop, and groundfish fisheries. Further, the Council requested the Board and ADF&G to consider additional measures (such as gear modifications and area closures) to reduce bycatch of Tanner crab in crab fisheries.

Habitat protection: Adequate habitat is essential for maintaining the productivity of fishery resources. Measures previously implemented that protect Tanner crab habitat from fishing impacts include several areas where trawling and dredging is prohibited. Essential fish habitat (EFH) has been defined and potential threats have been identified. Additional measures could be implemented to further protect habitat. For agency consultation purposes, the Council will highlight the importance of Tanner crab EFH

in maintaining stock productivity. To the extent feasible and practicable, this area should be protected from adverse impacts due to non-fishing activities.

Mechanisms are in place for monitoring the effectiveness of the rebuilding plan. The NMFS eastern Bering Sea bottom-trawl survey provides an annual assessment of the status of the eastern Bering Sea Tanner crab stock. ADF&G will use the results of that survey to determine openings and harvest levels according to the eastern Bering Sea Tanner crab harvest strategy. The annual survey will allow the BSAI Crab Plan Team to include an assessment of the Tanner crab stock status relative to the overfished level and its progress towards the rebuilt level in the Stock Assessment and Fishery Evaluation (SAFE) Report for the king and Tanner crab fisheries of the BSAI. Programs exist within ADF&G and NMFS to contain levels of catch and bycatch at those prescribed in the rebuilding plan. Estimates of Tanner crab bycatch from all commercial fisheries will be reported annually in the SAFE and the BSAI Crab Plan Team will assess that bycatch relative to the expectations and assumptions of the rebuilding plan.

6.2.2 Bering Sea snow (*Chionoecetes opilio*) crab

NMFS declared snow crab overfished on September 24, 1999 because the spawning biomass estimated from the NMFS trawl survey was below the minimum stock size threshold of 460.8 million pounds specified in this FMP. The Council developed a rebuilding plan for the snow crab stock within one year from this date, as required by the Magnuson-Stevens Act in section 304(e). The rebuilding plan is sufficient to rebuild the stock to the Bmsy level and the rebuilding time period satisfies the requirements of section 304(e)(4)(A) of the Magnuson-Stevens Act, and the plan complies with the national standard guidelines at 50 CFR 600.310(e).

The rebuilding plan approved by the Council in June 2000 provides a framework for the following three components to improve the status of this stock: a harvest strategy, bycatch control measures, and habitat protection measures. This is a framework rebuilding plan because FMP defers to the State of Alaska the authority to develop harvest strategies and gear modification measures, with oversight by NMFS and the Council (Section 8.3 FMP). The rebuilding plan incorporates the harvest strategy developed by ADF&G and adopted by the Alaska Board of Fisheries. The rebuilding plan also incorporates the gear modification measures to reduce bycatch of female and sub-legal male snow crab in the directed crab fishery adopted by the Alaska Board of Fisheries. Identified snow essential fish habitat will be protected from adverse impacts by non-fishing activities. The Council or the State of Alaska may modify the components of the rebuilding plan according to new scientific information.

The stock will be considered "rebuilt" when the stock reaches Bmsy in one year. The rebuilding harvest strategy should result in more spawning biomass as more larger male crab would be conserved and fewer juveniles and females would die due to discarding. This higher spawning biomass would be expected to produce large year-classes when environmental conditions are favorable. The reduction of bycatch will reduce mortality on juvenile and female crabs, thus allowing a higher percentage of each year-class to contribute to spawning and future landings.

Under this rebuilding plan, changes to the components of the plan must; (1) comply with the existing criteria in the FMP and the national standard guidelines at 50 CFR 600.310(e), (2) be sufficient to rebuild the stock to the Bmsy level within a rebuilding time period that satisfies the requirements of section 304(e)(4)(A) of the Magnuson-Stevens Act, and (3) be consistent with applicable Federal law.

Mechanisms are in place for NMFS and the Council to monitor the effectiveness of the rebuilding plan to ensure that actions taken by the State of Alaska and the Council under the rebuilding plan rebuild the stock to the Bmsy level within 10 years. The annual NMFS eastern Bering Sea bottom-trawl survey provides an assessment of the status of the snow crab stock. The survey will allow the BSAI Crab Plan

Team to include an assessment of the snow crab stock status relative to the overfished level and its progress towards the rebuilt level in the annual Stock Assessment and Fishery Evaluation (SAFE) Report for the king and Tanner crab fisheries of the BSAI. The Crab Plan Team will also conduct annual assessments of snow crab bycatch in the trawl fisheries and continue research on snow crab habitat. Programs exist within ADF&G and NMFS to contain levels of catch and bycatch at those prescribed in the rebuilding plan.

6.2.3 St Matthew blue king *(Paralithodes platypus)* crab

NMFS declared St. Matthew blue king crab overfished on September 24, 1999, because the spawning biomass estimated from the NMFS trawl survey was below the minimum stock size threshold of 11 million pounds specified in this FMP. The Council developed a rebuilding plan for the St. Matthew blue king crab stock within one year from this date, as required by the Magnuson-Stevens Act in section 304(e). The rebuilding plan is sufficient to rebuild the stock to the Bmsy level, the rebuilding time period satisfies the requirements of section 304(e)(4)(A) of the Magnuson-Stevens Act, and the plan complies with the national standard guidelines at 50 CFR 600.310(e).

The rebuilding plan approved by the Council in June 2000 contains the following three components to improve the status of this stock: a harvest strategy, bycatch control measures, and habitat protection measures. This is a framework rebuilding plan because the FMP defers to the State the authority to develop harvest strategies, gear modification measures, and habitat protection areas in State waters, with oversight by NMFS and the Council (see Section 8.0). The rebuilding plan is estimated to allow the St. Matthew blue king crab stock to rebuild, with a 50% probability, to the Bmsy level in less than 10 years. The stock will be considered "rebuilt" when the stock reaches Bmsy in two consecutive years.

The rebuilding plan incorporates the harvest strategy developed by ADF&G and adopted by the Alaska Board of Fisheries. The revised harvest strategy should result in more spawning biomass as more larger male crab would be conserved and fewer juveniles and females would die due to incidental catch and discard mortality. This higher spawning biomass would be expected to produce good year-classes when environmental conditions are favorable.

The rebuilding plan also incorporates the following conservation measures taken by the Alaska Board of Fisheries; gear modification measures to reduce bycatch of female and sub-legal male blue king in the directed crab fishery, and a habitat protection area to protect egg-baring females in State waters around St. Matthew Island, Hall Island and Pinnacles Island. The reduction of bycatch and protection of habitat will reduce mortality on juvenile crabs and egg-baring females, thus allowing a higher percentage of each year-class to contribute to spawning (and future landings).

Mechanisms are in place for monitoring the effectiveness of the rebuilding plan. The NMFS eastern Bering Sea bottom-trawl survey provides an annual assessment of the status of the St. Matthew blue king crab stock. ADF&G also conducts a pot survey on a triennial basis for blue king crab in the St. Matthew area. Most of the pot survey effort is devoted to the area south of St. Matthew Island in the relatively shallow waters (25-55 fm) that supports much of the blue king crab commercial fishery and the mature female population. Use of pots allows for surveying areas that are not accessible to the NMFS trawl survey. This survey is invaluable for providing population indices and indicators of crab distribution for large portions of the legal and mature female stock that are not represented in the annual NMFS trawl survey. ADF&G will use the results of these surveys to determine fishery openings and harvest levels according to the St. Matthew blue king crab harvest strategy.

The surveys will allow the BSAI Crab Plan Team to include an assessment of the St. Matthew blue king crab stock status relative to the overfished level and its progress towards the rebuilt level in the annual Stock Assessment and Fishery Evaluation (SAFE) Report for the king and Tanner crab fisheries of the BSAI. Existing monitoring programs will be used by ADF&G and NMFS to contain levels of catch and bycatch at those prescribed in the rebuilding plan.

6.2.4 Pribilof Islands blue king crab (*Paralithodes platypus*)

NMFS declared Pribilof Islands blue king crab overfished on September 23, 2002, because the spawning biomass estimated from the NMFS trawl survey was below the minimum stock size threshold of 6.6 million pounds specified in this FMP. The Council developed a rebuilding plan for the Pribilof Islands blue king crab stock within one year, as required by the Magnuson-Stevens Act in section 304(e). The rebuilding plan is sufficient to rebuild the stock to the Bmsy level, the rebuilding time period satisfies the requirements of section 304(e)(4)(A) of the Magnuson-Stevens Act, and the plan complies with the national standard guidelines at 50 CFR 600.310(e).

The rebuilding plan approved by the Council in October 2003 contains a conservative harvest strategy to improve the status of this stock. This is a framework rebuilding plan because the FMP defers to the State the authority to develop harvest strategies, with oversight by NMFS and the Council (see Section 8.0). The rebuilding plan is estimated to allow the Pribilof Islands blue king crab stock to rebuild, with a 50% probability, to the B_{msy} level in less than 10 years. The stock will be considered "rebuilt" when the stock reaches B_{msy} in two consecutive years.

The rebuilding plan utilizes the harvest strategy developed by ADF&G and adopted by the Alaska Board of Fisheries. The rebuilding harvest strategy, which closes the fishery until the stock is rebuild, should result in more spawning biomass as more larger male crab would be conserved and fewer juveniles and females would die due to incidental catch and discard mortality. This higher spawning biomass would be expected to produce good year-classes when environmental conditions are favorable.

Under this rebuilding plan, changes to the harvest strategy must: (1) comply with the existing criteria in the FMP and the national standard guidelines at 50 CFR 600.310(e), (2) be sufficient to rebuild the stock to the Bmsy level within a rebuilding time period that satisfies the requirements of section 304(e)(4)(A) of the Magnuson-Stevens Act, and (3) be consistent with applicable Federal law.

No additional habitat or bycatch measures are part of this rebuilding plan because neither habitat nor bycatch measures are expected to have a measurable impact in rebuilding. Habitat is thoroughly protected from fishing impacts by the existing Pribilof Islands Habitat Conservation Zone, which encompasses the majority of blue king crab habitat. Bycatch of blue king crab in both crab and groundfish fisheries is a negligible proportion of the total population abundance.

NMFS has mechanisms in place for monitoring the effectiveness of the rebuilding plan. The NMFS eastern Bering Sea bottom-trawl survey provides an annual assessment of the status of the Pribilof Islands blue king crab stock. The surveys will allow the BSAI Crab Plan Team to include an assessment of the Pribilof Islands blue king crab stock status relative to the overfished level and its progress towards the rebuilt level in the annual Stock Assessment and Fishery Evaluation Report for the BSAI king and Tanner crab fisheries.

7 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: To protect, conserve, and enhance adequate quantities of essential fish habitat (EFH) to support king and Tanner crab populations and maintain a healthy ecosystem.

Habitat is defined as the physical, chemical, geological, and biological surroundings the support healthy, self-sustaining populations of living marine resources. Habitat includes both the physical component of the environment which attracts living marine resources (e.g. salt marshes, sea grass beds, coral reefs, intertidal lagoons, and near shore characteristics) and the chemical (e.g. salinity, benthic community) and biological characteristics (e.g. scallop life stage histories, oceanography) that are necessary to support living marine resources. The quality and availability of habitat supporting the king and Tanner crab populations are important. Fishery managers should strive to ensure that those waters and substrate necessary to king and Tanner crabs for spawning, breeding, feeding, or growth to maturity are available. It is also important to consider the potential impact of king and Tanner crab fisheries on other fish and shellfish populations. King and Tanner crab EFH is described in Appendix F of this FMP.

Those involved in both management and exploitation of king and Tanner crab resources will actively review actions by other human users of the management area to ensure that their actions do not cause deterioration of habitat. Any action by a State or Federal agency potentially affecting king and Tanner 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 king and Tanner 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 GHLs, (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 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
Essential Fish Habitat	Sex Restrictions	Bycatch Limits (in crab fisheries)
Habitat Areas of Particular Concern	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, 1999. The Council may however extend the moratorium up to 2 additional years, if a permanent limited access program is imminent.

Elements of the Moratorium

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. A moratorium qualification for which a vessel moratorium permit has not been issued prior to December 31, 1998, or for which a vessel moratorium permit is not applied for on or before December 31, 1998, will not be eligible for a vessel moratorium permit after that date.

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.

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.

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.

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.

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.

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.

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.

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.

Small Vessel Exemptions. Vessels 32 ft or less LOA would be exempted from the moratorium in the Bering Sea and Aleutian Islands.

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.

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.

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.

In addition to the original qualification requirements, a vessel must also have made a legal landing of any LLP crab species between January 1, 1996 and February 7, 1998 to qualify for a general license and the species/area endorsements earned under the original LLP qualification, with the following exemptions:

1. Vessels with only a Norton Sound red and blue summer king crab endorsement.
2. All vessels that are less than 60' LOA and are qualified under the original LLP.
3. Vessels that made landings in the BSAI crab fishery in 1998, on or before February 7, 1998, and for which the owner acquires license limitation rights from a vessel that meets the general qualification period (GQP) and endorsement qualification period (EQP) landing requirements.
4. A vessel that was lost or destroyed and which made a landing in the BSAI crab fishery at any time from the time when the vessel left the fishery through January 1, 2000. A vessel would be deemed to have met the recent participation criteria and would be granted a general license and all the species/area endorsements to which it was entitled under the original crab LLP.

Regarding the new provisions above, the recent landings requirement applies to each potentially qualified vessel. Further, the acquisition of any qualifying history, or entering into a contract for such acquisition, must have occurred by 8:36 a.m. Pacific time on October 10, 1998.

5. These provisions do not preclude a vessel owner from combining catch histories to accommodate the recency requirements so long as these histories were acquired prior to 8:36 a.m. Pacific time on October 10, 1998.

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", except that a BSAI general crab license may be separated solely for the purposes of a crab license buyback program if such is approved by the Council and Secretary. 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, provided such vessel was under construction or operating in an existing CDP as of October 9, 1998. 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, Pribilof, or St. Matthew, during that registration year. The Norton Sound fishery is the only superexclusive registration area authorized by this FMP.

8.1.6 Essential Fish Habitat and Habitat Areas of Particular Concern

8.1.6.1 Description of Essential Fish Habitat

Section 303(a)(7) of the Magnuson-Stevens Act requires FMPs to describe and identify Essential Fish Habitat (EFH), minimize to the extent practicable adverse effects of fishing on EFH, and identify other

actions to conserve and enhance EFH. This FMP describes king and tanner crab EFH in text, maps EFH distributions, and includes information on habitat and biological requirements for each life history stage of the species. Appendix F contains this required information, as well as identifying an EFH research approach.

8.1.6.2 Description of Habitat Areas of Particular Concern

The EFH regulations at 50 CFR 600.815(a)(8) provide the Councils with guidance to identify habitat areas of particular concern (HAPCs). HAPCs are meant to provide greater focus to conservation and management efforts and may require additional protection from adverse effects. FMPs should identify specific types or areas of habitat within EFH as HAPCs based on one or more of the following considerations:

1. the importance of the ecological function provided by the habitat;
2. the extent to which the habitat is sensitive to human-induced environmental degradation;
3. whether, and to what extent, development activities are, or will be, stressing the habitat type; or
4. the rarity of the habitat type.

In 2005, the Council identified the following areas as HAPCs within EFH:

- Alaska Seamount Habitat Protection Areas
- Bowers Ridge Habitat Conservation Zone

Maps of these HAPCs, as well as their coordinates, are contained in Appendix F.

8.1.6.3 Conservation and Enhancement Recommendations for EFH and HAPC

Appendix F identifies fishing and non-fishing threats to EFH. Conservation and enhancement recommendations for non-fishing threats to EFH and HAPCs are described therein.

In order to protect EFH from fishing threats, the Council established the following areas:

- Aleutian Islands Habitat Conservation Area
- Aleutian Islands Coral Habitat Protection Areas

Maps of these areas, as well as their coordinates, are contained in Appendix F. In addition, the Council established restrictions for these areas as described below.

Aleutian Islands Habitat Conservation Area
The use of nonpelagic trawl gear is prohibited year-round in the Aleutian Islands Habitat Conservation Area, except in designated areas; however, the use of trawl gear is prohibited in the king and tanner crab fisheries (see Section 8.1.1).

Aleutian Islands Coral Habitat Protection Areas
The use of bottom contact gear, as described in 50 CFR part 679, and anchoring by federally permitted fishing vessels is prohibited in the Aleutian Islands Coral Habitat Protection Areas.

In order to minimize adverse effects of fishing, the Council also established restrictions for HAPCs. These restrictions are described below.

Alaska Seamount Habitat Protection Areas
The use of bottom contact gear and anchoring by a federally permitted fishing vessel, as described in 50 CFR part 679, is prohibited in the Alaska Seamount Habitat Protection Area.

Bowers Ridge Habitat Conservation Zone
The use of mobile bottom contact gear, as described in 50 CFR part 679, is prohibited in the Bowers Ridge Habitat Conservation Zone.

8.1.6.4 Review of EFH and HAPC

An annual review of existing and new EFH information will be conducted by NMFS or the Council and this information will be provided to the Crab Plan Team for their review during the annual SAFE process. To address regulatory guidelines for review and revision of EFH FMP components, the Council will conduct a complete review of all the EFH components of the FMP once every 5 years and will amend the FMP as appropriate to include new information.

Additionally, the Council may use the FMP amendment cycle every three years to solicit proposals for HAPCs and/or conservation and enhancement measures to minimize the potential adverse effects of fishing. Any proposal endorsed by the Council would be implemented by FMP amendment.

8.1.7 Habitat Areas of Particular Concern

HAPCs are specific sites within EFH that are of particular ecological importance to the long-term sustainability of managed species, are of a rare type, or are especially susceptible to degradation or development. HAPCs are meant to provide greater focus to conservation and management efforts and may require additional protection from adverse effects.

50 CFR 600.815(a)(8) provides the Councils with guidance to identify habitat areas of particular concern. FMPs should identify specific types or areas of habitat within EFH as habitat areas of particular concern based on one or more of the following considerations:

(i) The importance of the ecological function provided by the habitat.

(ii) The extent to which the habitat is sensitive to human-induced environmental degradation.

(iii) Whether, and to what extent, development activities are, or will be, stressing the habitat type.

(iv) The rarity of the habitat type.

8.1.7.1 HAPC Designation

In 2005, the Council identified the Alaska Seamount Habitat Protection Areas and the Bowers Ridge Habitat Conservation Zone within crab EFH as HAPCs in the BSAI to minimize adverse effects from fishing on EFH. Maps of these HAPCs, as well at the coordinates, are contained in Appendix F.

Alaska Seamount Habitat Protection Area
The use of bottom contact gear, including pot gear, by a federally permitted fishing vessel, as described in 50 CFR part 679, is prohibited in the Alaska Seamount Habitat Protection Area. Anchoring by a federally permitted fishing vessel, as described in 50 CFR part 679, is also prohibited.

Bowers Ridge Habitat Conservation Zone
The use of mobile bottom contact gear, as described in 50 CFR part 679, is prohibited in the Bowers Ridge Habitat Conservation Zone.

8.1.8 American Fisheries Act (AFA) sideboard restrictions

On October 21, 1998, the President signed into law the American Fisheries Act (AFA) which mandated sweeping changes to the conservation and management program for the pollock fishery of the BSAI and to a lesser extent, affected the management programs for the other groundfish fisheries of the BSAI the groundfish fisheries of the GOA, the king and Tanner crab fisheries of the BSAI, and the scallop fishery off Alaska. With respect to the fisheries off Alaska, the AFA requires a suite of new management measures that fall into four general categories: (1) regulations that limit access into the fishing and processing sectors of the BSAI pollock fishery and that allocate pollock to such sectors, (2) regulations governing the formation and operation of fishery cooperatives in the BSAI pollock fishery, (3) sideboard regulations to protect other fisheries from spillover effects from the AFA, and (4) regulations governing catch measurement and monitoring in the BSAI pollock fishery.

While the AFA primarily affects the management of the BSAI pollock fishery, the Council is also directed to develop and recommend harvesting and processing sideboard restrictions for AFA catcher vessels, AFA catcher/processors, AFA motherships, and AFA inshore processors that are fishing for or processing king and Tanner crab harvested in the BSAI. Section 211 of the AFA addresses crab harvesting and processing sideboards and this entire section of the AFA is incorporated into the AFA by reference. Crab harvesting and processing sideboard restrictions that are consistent with section 211 of the AFA will be implemented through regulation or provided to the Board of Fish as recommendations. Any measure recommended by the Council that supersedes section 211 of the AFA must be implemented by FMP amendment in accordance with the provisions of section 213 of the AFA and the Magnuson-Stevens Act.

Limits on participation by AFA vessels. NMFS may issue regulations, as approved by the Council, which define the participation criteria for AFA vessels that wish to participate in the king and/or Tanner crab fisheries of the BSAI.

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 **Error! Reference source not found.**). 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 Total Allowable Catch and Guideline Harvest Level

The FMP authorizes the State to set preseason TACs and GHLs under State regulations. Seasons or areas are closed when the TAC or GHL is reached. TACs are set for the crab fisheries under the Crab Rationalization Program: snow crab; Tanner crab; Bristol Bay red king crab; St. Matthews blue king crab; Pribilof Islands red and blue king crab; Aleutian Islands golden king crab; and Adak red king crab. GHLs are set for the remaining crab fisheries: Pribilof Islands golden king crab and Norton Sound red king crab. ADF&G may close a fishery with a GHL before or after the GHL is achieved based on current in-season information (see section 8.2.3). TACs and GHLs for each fishery will be reported in the Council's annual Stock Assessment and Fishery Evaluation Report, along with the OFLs and ABC/ACLs.

The State will take into account the following factors, to the extent information is available, in developing harvest strategies or setting TACs and GHLs: (1) whether the ACL for that stock was exceeded in the previous year; (2) stock status relative to the OFL and ACL; (3) estimates of exploitable biomass; (4) estimates of recruitment; (5) estimates of thresholds; (6) market and other economic considerations; (7) additional uncertainty; and (8) any additional factors pertaining to the health and status of the stock or the marine ecosystem. Additional uncertainty includes (1) management uncertainty (i.e., uncertainty in the ability of managers to constrain catch so the ACL is not exceeded, and uncertainty in quantifying the true catch amount) and (2) scientific uncertainty identified and not already accounted for in the ABC (i.e., uncertainty in bycatch mortality, estimates of trends and absolute estimates of size composition, shell-condition, molt status, reproductive condition, spatial distribution, bycatch of non-target crab stocks, environmental conditions, fishery performance, fleet behavior, and the quality and amount of data available for these variables).

The State will establish the annual TAC for each crab stock at a level sufficiently below the ACL so that the sum of the catch[2] and the State's assessment of additional uncertainty do not exceed the ACL. The State may establish the annual TACs below such a level to account for the other factors identified above. If an ACL is exceeded, the State will implement accountability measures in the fishing season following the overage to account for the overage through a downward adjustment to the TAC for that species by an amount sufficient to remedy the biological consequences of the overage.

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 preseason, events can occur in-season which would disrupt the management scheme and resultant economic benefits to the nation. When a preseason prediction proves to be incorrect or when an unanticipated event occurs which affects preseason 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

[2] As used here, the term "catch" refers to all sources of fishing mortality included in the ACL for a given stock. Thus, for a stock with a total catch ACL, "catch" includes each of the three catch components identified in section 6.0.1.1 (non-directed fishery discard losses, directed fishery removals, and directed fishery discard losses). For a stock with a retained catch ACL, "catch" includes only the directed fishery removals.

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 GHLs as may be promulgated by State regulations.

   The primary use of in-season emergency order authority is when an established GHL 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 GHL 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 GHL, or below or above the range associated with the GHL.

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 preseason 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 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 GHL, (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 Diomede 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.

8.2.10 Harvest Limitations for AFA vessels

The Council may provide crab harvesting sideboard recommendations to the Board of Fisheries for each king and Tanner crab species. The State of Alaska, through the Board of Fisheries, may issue regulations, as described within Category 2 and 3 of this FMP, to establish an allowable harvest percentage of the GHL by AFA eligible vessels in any BSAI crab fishery, and to govern the in-season management of any sideboard harvest levels established for AFA eligible vessels.

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 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 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 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 Procedure for Council/Secretary of Commerce Participation in State of Alaska Preseason Fisheries Actions and NMRF Review to Determine Consistency of the Regulations with the FMP, Magnuson-Stevens 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 State[3] 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.

[3] Current Board policy limits petitions to the subject of conservation emergencies.

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 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 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.

11 Voluntary Three-Pie Cooperative Program

The following incorporates the preferred Bering Sea Crab Rationalization Program Alternatives – established at the Council's June 2002, October 2002, December 2003, January/February 2003, and April 2003 meetings. Unless otherwise noted, the provisions were adopted at the June 2003 meeting. This motion advances a VOLUNTARY THREE PIE COOPERATIVE, designed to recognize the prior economic interests and importance of the partnership between harvesters, processors and communities.

BSAI Crab Rationalization Problem Statement

Vessel owners, processors and coastal communities have all made investments in the crab fisheries, and capacity in these fisheries far exceeds available fishery resources. The BSAI crab stocks have also been highly variable and have suffered significant declines. Although three of these stocks are presently under rebuilding plans, the continuing race for fish frustrates conservation efforts. Additionally, the ability of crab harvesters and processors to diversify into other fisheries is severely limited and the economic viability of the crab industry is in jeopardy. Harvesting and processing capacity has expanded to accommodate highly abbreviated seasons, and presently, significant portions of that capacity operate in an economically inefficient manner or are idle between seasons. Many of the concerns identified by the NPFMC at the beginning of the comprehensive rationalization process in 1992 still exist for the BSAI crab fisheries. Problems facing the fishery include:

- Resource conservation, utilization and management problems;
- Bycatch and its' associated mortalities, and potential landing deadloss;
- Excess harvesting and processing capacity, as well as low economic returns;
- Lack of economic stability for harvesters, processors and coastal communities; and
- High levels of occupational loss of life and injury.

The problem facing the Council, in the continuing process of comprehensive rationalization, is to develop a management program which slows the race for fish, reduces bycatch and its associated mortalities, provides for conservation to increase the efficacy of crab rebuilding strategies, addresses the social and economic concerns of communities, maintains healthy harvesting and processing sectors and promotes efficiency and safety in the harvesting sector. Any such system should seek to achieve equity between the harvesting and processing sectors, including healthy, stable and competitive markets.

Elements of the Crab Rationalization Program

Harvesting Sector Elements

Harvester shares shall be considered a privilege and not a property right.

1.1 Crab fisheries included in the program are the following fisheries subject to the Federal FMP for BSAI crab:

Bristol Bay red king crab

Brown king (AI Golden king) crab
Adak (WAI) red king crab – West of 179° W
Pribilof Islands blue and red king crab
St. Matthew blue king crab
Opilio (EBS snow) crab
Bairdi (EBS Tanner) crab

3. Exclude the EAI Tanner, WAI Tanner, Dutch Harbor (EAI) red king crab, and Adak (WAI) red king crab east of 179° West longitude.

1.2 Persons eligible to receive an initial allocation of QS must be:

Option 1. Any person that holds a valid, permanent, fully transferable LLP license.

1.3 Categories of QS/IFQs

1.3.1 Crab Fishery Categories - QS/IFQs will be assigned to each of the crab fisheries included in the program as identified in paragraph 1.1 except Dutch Harbor red king, EAI Tanner, and WAI Tanner and WAI red king crab east of 179° West longitude.

1.3.1.1 Brown king crab (AI golden king crab) option.

Option 1. Split into two categories: Dutch Harbor (EAI) brown king crab (east of 174° W long.) and Western Aleutian Islands brown king crab (west of 174° W long.).

1.3.1.2 Tanner crab

Split into two categories: Eastern Tanner (bairdi) crab (east of 166° W long.) and Western Tanner (bairdi) crab (west of 166° W long.).

1.3.2 Harvesting sector categories - QS/IFQs will be assigned to one of the following harvesting sector categories:

a. catcher vessel (CV), or
b. catcher/processor (CP)

QS-IFQ for the Catcher/Processor sector is calculated from the crab that were both harvested and processed onboard the vessel. This shall confer the right to harvest and process crab aboard a catcher processor in accordance with section 1.7.2.

1.3.3 Processor delivery categories - QS/IFQs for the CV sector shall be assigned to the following two processor delivery categories (the percentage split between class A/B shares is defined under the Processing Sector Elements, 2.4):

(a) Class A – allow deliveries only to processors with unused PQs
(b) Class B – allow deliveries to any processor, except catcher processors

1.3.4 Regional Categories - QS/IFQs for the CV sector is assigned to regional categories. The two regions are defined as follows (see Regionalization Elements for a more detailed description of the regions):

North Region - All areas on the Bering Sea north of 56° 20' N. Latitude.
South Region - All areas not included in the North Region.

1.4 Initial allocation of QS

1.4.1. Calculation of initial QS distribution will be based on legal landings excluding deadloss.

(a) Calculation of QS distribution. The calculation is to be done, on a vessel-by-vessel basis, as a percent of the total catch, year-by-year during the qualifying period. Then the sum of the yearly percentages, on a fishery-by-fishery basis, is to be divided by the number of qualifying years included in the qualifying period on a fishery-by-fishery basis to derive a vessel's QS.

For each of the fisheries for which such a vessel holds valid endorsement for any years between the sinking of the vessel and the entry of the Amendment 10 replacement vessel to the fishery and was active as of June 10, 2002, allocate QS according to 50% of the vessel's average history for the qualifying years unaffected by the sinking.

Additional Sunken Vessel Provision (from December 2002 motion)

The following provision would apply to persons whose eligibility to replace their vessel was initially denied under PL 106-554. The sunken vessel must have been replaced with a newly constructed vessel and have been under construction by June 10, 2002, and participated in a Bering Sea crab fishery by October 31, 2002 for a person to receive a benefit under this provision.

For each of the fisheries for which such a vessel holds a valid endorsement , for all seasons between the sinking of the vessel and the entry of the replacement vessel to the fishery within the IRS replacement period (as extended by the IRS, if applicable) allocate QS according to 50 percent of the vessel's average history for the qualifying years unaffected by the sinking. Construction means the keel has been laid.

(b) Basis for QS distribution.

Option 1. For eligibility criteria in paragraph 1.2, the distribution of QS to the LLP license holder shall be based on the catch history of the vessel on which the LLP license is based and shall be on a fishery-by-fishery basis. The underlying principle of this program is one history per vessel.

(Option 1) Persons who have purchased an LLP, with GQP, EQP and RPP qualifications to remain in a fishery may obtain a distribution of QS on the history of either the vessel on which the LLP is based or on which the LLP is used, NOT both. License transfers for purposes of combining LLPs must have occurred by January 1, 2002.

(Old Option 3) In cases where the fishing privileges (i.e. moratorium qualification or LLP license) of an LLP qualifying (i.e. GQP, EQP, RPP and Amendment 10 combination) vessel have been transferred, the distribution of QS to the LLP shall be based on the aggregate catch histories of (1) the vessel on which LLP license was based up to the date of transfer, and (2) the vessel owned or controlled by the LLP license holder and identified by the license holder as having been operated under the fishing privileges of the LLP qualifying vessel after the date of transfer. Only one catch history per LLP license. The only catch histories that may be credited by transfer under this suboption are the individual catch histories of vessels that generate a valid permanent fully transferable LLP license.

1.4.2. Qualifying Periods for Determination of the QS Distribution:

1.4.2.1 Opilio (EBS snow crab)

Option 4. 1996 - 2000 (5 seasons)

a. Best 4 seasons

1.4.2.2 Bristol Bay red king crab

Option 3. 1996 - 2000 (5 seasons)
a. Best 4 seasons

1.4.2.3 Bairdi (EBS Tanner crab)

Option 2. 91/92 - 1996 (best 4 of 6 seasons)

1.4.2.4 and 1.4.2.5 Pribilof red and blue king crab

Option 2. 1994 - 1998
b. Drop one season

1.4.2.6 St. Matthew blue king crab

Option 2. 1994 - 1998
b. Drop one season

1.4.2.7 Brown king crab (based on biological seasons)

(*Options apply to both Dutch Harbor (EAI) and Adak western Aleutian Island brown king crab)*
Option 4. 96/97 2000/01 (all 5 seasons)
Suboption: Award each initial recipient QS based on:
b. historical participation in each region.

1.4.2.8 Adak (WAI) red king crab - west of 179° west long.

Option 1. 1992/1993 – 1995/1996 (4 seasons)
d. Best 3 seasons

1.5 Annual allocation of IFQs:

1.5.1 Basis for calculating IFQs:
Option 2. Convert GHL to a TAC and use the TAC as the basis.

1.6 Transferability and Restrictions on Ownership of QS/IFQs:

1.6.1 Persons eligible to receive QS/IFQs by transfer:

Option 2. US citizens who have had at least:
(b). 150 days of sea time
Option 3. Entities that have a U. S. citizen with 20% or more ownership and at least:
(b). 150 days of sea time
Suboption: Initial recipients of harvesting quota share grandfathered
*Definition of sea time
Option 1. Sea time in any of the U.S. commercial fisheries in a harvesting capacity.
Option 4. Allow a CDQ organization to be exempted from the restriction for the 150 days of sea time requirement under 1.6 Transferability and Restrictions on Ownership of QS/IFQs.

1.6.2 Leasing of QS (leasing is equivalent to the sale of IFQs without the accompanying QS.)

Leasing is defined as the use of IFQ on vessel which QS owner holds less than 10% ownership of vessel or on a vessel on which the owner of the underlying QS is present:

Option 1. Leasing QS is allowed with no restrictions during the first five years after program implementation. IFQ may be leased (i.e., transferred) after a delivery to cover any potential overages, provided that the IFQ account of the person conducting the lease has a positive balance before starting a fishing trip and at least a zero balance by June 30, the end of the crab fishing year.

1.6.3 Separate and distinct QS Ownership Caps - apply to all harvesting QS categories pertaining to a given crab fishery with the following provisions:

a. Initial issuees that exceed the ownership cap are grandfathered at their current level as of June 10, 2002; including transfers by contract entered into as of that date.
b. Apply individually and collectively to all QS holders in each crab fishery;
c. Percentage-cap options for the Bristol Bay red king crab, Opilio, Bairdi, Pribilof red and blue king crab and St. Matthew blue king crab fisheries (a different percentage cap may be chosen for each fishery):
    - Option 4. 1.0% of the total QS pool for Bristol Bay red king crab.
    - Option 5. 1.0% of the total QS pool for Opilio crab.
    - Option 6. 1.0% of the total QS pool for Eastern Bairdi crab.
    - Option 7. 1.0% of the total QS pool for Western Bairdi crab.
    - Option 8. 2.0% of the total QS pool for Pribilof red and blue king crab.
    - Option 9 2.0% of the total QS pool for St. Matthew blue king crab.
d. A percentage-cap of 10% is adopted for the Dutch Harbor (EAI) brown king crab, and a 10% cap for western Aleutian Island (Adak) brown king crab.
e. A percentage-cap of 10% is adopted for WAI (Adak) red king crab west of 179º West longitude.

<u>Harvest Share Ownership Caps for CDQ Groups (from the February 2003)</u>

The following ownership caps shall apply to CDQ ownership of crab QS

Bristol Bay red king crab	5%
Bering Sea opilio crab	5%
Eastern Bering Sea bairdi crab	5%
Western Bering Sea bairdi crab	5%
Pribilof red and blue king crab	10%
St. Matthew blue king crab	10%
EAI brown king crab	20%
WAI red king crab	20%
WAI brown king crab	20%

In addition, the Council shall apply the individual and collective rule for calculation of the CDQ ownership caps, under which the holder of an interest in an entity will be credited with holdings in proportion to its interest in the entity.

1.6.4 Controls on vertical integration (ownership of harvester QS by processors):

Option 2: A cap of 5% with grandfathering of initial allocations as of June 10, 2002, including transfers by contract entered into as of that date.

Option 3: Vertical integration ownership caps on processors shall be implemented using both the individual and collective rule using 10% minimum ownership standards for inclusion in calculating the cap. PQS ownership caps are at the company level.

Processor Holdings of Harvest Shares (A/B Share Issue) (from the April 2003 motion)

Crab harvester QS held by IPQ processors and persons affiliated with IPQ processors will only generate class A annual IFQ, so long as such QS is held by the IPQ processor or processor affiliate.

IPQ processors and affiliates will receive class A IFQ at the full poundage appropriate to their harvesters QS percentage.

Independent (non-affiliated) harvesters will receive class B IFQ pro rata, such that the full class B QS percentage is allocated to them in the aggregate.

"Affiliation" will be determined based on an annual affidavit submitted by each QS holder. A person will be considered affiliated, if an IPQ processor controls delivery of a QS holder's IFQ.

Catcher Processor Elements

1.7.2.1.1 Catcher/Processors shall be granted CP-QS in the same manner as catcher vessels.

1.7.2.3 Allowance for Catcher/Processors:

Option 2. Catcher/Processors are allowed to purchase additional PQS from shore based processors as well as PQS from other Catcher/Processors as long as the crab is processed within 3 miles of shore in the designated region.

Option 4. Catcher/Processors may sell unprocessed crab to any processor

Option 5. Only catcher processors that both caught and processed crab onboard their qualifying vessels in any BSAI crab fishery during 1998 or 1999 will be eligible for any CP QS in any IFQ or Coop program.

Option 6. CP-QS initially issued to a catcher/processor shall not be regionally or community designated.

Option 8. The CP sector is capped at the aggregate level of initial sector-wide allocation.

1.7.2.4 Transfers to shore-based processors:

c. Catcher/Processors shall be allowed to sell CP/QS as separate Catcher Vessel QS and PQS. The shares shall be regionally designated when sold (both shares to same region).

1.7.2.5 Conversion to Catcher/Processor Shares.

(1) This amendment authorizes:

(A) an eligible entity holding processor quota shares to elect on an annual basis to work together with other entities holding processor quota shares and affiliated with such eligible entity through common ownership to combine any catcher vessel quota shares for the Northern Region with their processor quota shares and to exchange them for newly created catcher/processor owner quota shares for the Northern Region; and

(B) an eligible entity holding catcher vessel quota shares to elect on an annual basis to work together with other entities holding catcher vessel quota shares and affiliated with such eligible entity through common ownership to combine any processor quota shares for the Northern Region with their catcher vessel quota shares and to exchange them for newly created catcher/processor owner quota shares for the Northern Region.

(2) Eligibility and Limitations.

(A) The authority provided in paragraph (1)(A) shall

(i)(I) apply only to an entity which was initially awarded both catcher/processor owner quota shares, and processor quota shares under the plan (in combination with the processor quota shares of its commonly

owned affiliates) of less than 7 percent of the Bering Sea/Aleutian Island processor quota shares; or

(II) apply only to an entity which was initially awarded both catcher/processor owner quota shares under the plan and processor quota shares under section 417(a) of the Coast Guard and Maritime Transportation Act of 2006 (Public Law 109–241;120 Stat. 546);

(ii) be limited to processor quota shares initially awarded to such entities and their commonly owned affiliates under the plan or section 417(a) of that Act; and

(iii) shall not exceed 1 million pounds per entity during any calendar year.

(B) The authority provided in paragraph (1)(B) shall

(i) apply only to an entity which was initially awarded both catcher/processor owner quota shares, and processor quota shares under the plan (in combination with the processor quota shares of its commonly owned affiliates) of more than 7 percent of the Bering Sea/Aleutian Island processor quota shares;

(ii) be limited to catcher vessel quota shares initially awarded to such entity and its commonly owned affiliates; and

(iii) shall not exceed 1 million pounds per entity during any calendar year.

(3) Exchange Rate. The entities referred to in paragraph (1) shall receive under the amendment 1 unit of newly created catcher/processor owner quota shares in exchange for 1 unit of catcher vessel owner quota shares and 0.9 units of processor quota shares.

(4) Area of Validity. Each unit of newly created catcher/processor owner quota shares under this subsection shall only be valid for the Northern Region.

Other Harvester Options

1.7.3 Catch accounting under IFQs - All landings including deadloss will be counted against IFQs. Options for treatment of incidental catch are as follows:

Option 4. Discards of incidentally caught crab will be allowed

Option 5. Request ADF&G & BOF & BOF/NPFMC Joint Protocol Committee to address concerns of discard, highgrading, incidental catch and need for bycatch reduction and improved retention in season with monitoring to coincide with implementation of a crab rationalization program.

1.7.4 Use caps on IFQs harvested on any given vessel are provided for those vessels not participating in a voluntary cooperative described under section 6.1.:

Option 1. c. Two times the ownership cap:

2.0% for BS Opilio crab
2.0% BB red king crab
2.0% Eastern BS bairdi crab
2.0% Western BS bairdi crab
4.0% for Pribilof red and blue king crab
4.0% for St. Matthew blue king crab
20% for EAI (Dutch Harbor) brown king crab
20% for Adak (WAI) brown king crab
20% for Adak (WAI) red king crab west of 179° West longitude

1.8.1 Options for captain and crews members (from December 2002 motion):

1.8.1.2 Percentage to Captain:

1. Initial allocation of 3% shall be awarded to qualified captains as C shares.
   a. Allocation from QS pool

1.8.1.3 Species specific:

1. As with vessels.

1.8.1.4 Eligibility:

Option 1

1. A qualified captain is determined on a fishery by fishery basis by
   1) having at least one landing in 3 of the qualifying years used by the vessels and
   2) having recent participation in the fishery as defined by at least one landing per season in the fishery in two of the last three seasons prior to June 10, 2002.

Suboption: For recency in the Adak red king, Pribilof, St. Matthew, and bairdi fisheries a qualified captain must have at least one landing per season in the opilio, BBRKC, or AI brown crab fisheries in two of the last three seasons prior to June 10, 2002 (operators of vessels under 60 feet are exempt from this requirement for the Pribilof red and blue king crab fishery).

2. A captain is defined as the individual named on the Commercial Fishery Entry Permit.

For captains who died from fishing related incidents, recency requirements shall be waived and the allocation shall be made to the estate of that captain. All ownership, use, and transfer requirements would apply to C shares awarded to the estate.

1.8.1.5 Qualification period:

1. As with vessels.

1.8.1.6 Distribution per captain:

1. C QS based on landings (personal catch history based on ADF&G fish tickets) using harvest share calculation rule.

Regionalization and Class A/B Designation

Option 2: C shares shall be a separate class of shares not subject to the Class A share delivery requirements.

Initial Allocation Regionalization

If C shares are regionalized, at the initial allocation regional designations shall be made based on the captain's history, with an adjustment to the allocation to match the PQS regional ratio made based on the same scheme used for regional adjustment of harvest shares.

1.8.1.7 Transferability criteria:

Purchase of C QS.

a. C QS may be purchased only by persons who are

Option 1. US citizens who have had at least 150 days of sea time in any of the US commercial fisheries in a harvesting capacity and

Option 2. active participants

An "active participant" is defined by participation as captain or crew in at least one delivery in a crab fishery included in the rationalization program in the last 365 days as evidenced by

ADF&G fish ticket, affidavit from the vessel owner, or evidence from other verifiable sources.

C share leasing

a. C QS are leasable for the first three seasons a fishery is prosecuted after program implementation.
b. In cases of hardship (injury, medical incapacity, loss of vessel, etc.) a holder of C shares may lease C QS, upon documentation and approval, (similar to CFEC medical transfers) for the term of the hardship/disability for a maximum of 2 years over a 10 year period.
c. IFQ may be leased (i.e., transferred) after a delivery to cover any potential overages, provided that the IFQ account of the person conducting the lease has a positive balance before starting a fishing trip and at least a zero balance by June 30, the end of the crab fishing year.

1.8.1.8 Loan program for crab QS

A low-interest rate loan program consistent with MSA provisions, for skipper and crew purchases of QS, shall be established for QS purchases by captains and crew members using up to 25% of the Crab IFQ fee program funds collected. These funds can be used to purchase A, B, or C shares.

Loan funds shall be accessible by active participants only.

Any A or B shares purchased under the loan program shall be subject to any use and leasing restrictions applicable to C shares (during the period of the loan).

National Marine Fisheries Service (NOAA Fisheries) is directed to explore options for obtaining seed money for the program in the amount of $250,000 to be available at commencement of the program to leverage additional loan funds.

1.8.1.9 Captain/Crew on Board requirements

1) Holders of captain QS or qualified lease recipients are required to be onboard vessel when harvesting IFQ.
2) C QS ownership caps for each species are

Option 2. the same as the vessel use caps for each species

C share ownership caps are calculated based on the C QS pool (i.e. section 1.7.4). Initial allocations shall be grandfathered.

3) Use caps on IFQs harvested on any given vessel shall not include C shares in the calculation.

1.8.1.10 C/P Captains

Captains with C/P history shall receive C/P C QS at initial issuance. C/P C shares shall carry a harvest and processing privilege.

Option 3. C/P C shares may be harvested and processed on C/Ps or harvested on catcher vessels and delivered to shore based processors.

1.8.1.11 Cooperatives

C share holders shall be eligible to join cooperatives.
C shares shall be included in the IFQ fee program.

1.8.2 Overage Provisions for the Harvesting Sector:

Allowances for overages during last trip:
Option 2. Overages up to 3% will be forfeited. Overages above 3% results in a violation and forfeiture of all overage.

1.8.3 AFA Vessel Option. Eliminate harvester sideboard caps.

1.8.5 Sideboards

Non-AFA vessels that qualify for QS in the rationalized opilio crab fisheries would be limited to their GOA groundfish catch history excluding sablefish. The sideboards would be based on the history of vessels subject to the caps, applied in aggregate, on an area specific basis, and apply jointly to both the vessel and the license.

Vessels with less than 750,000lbs total opilio history during the qualifying years and more than 680MT of total cod history during the qualifying years would be exempt from the GOA Pacific cod sideboard cap.

Vessels with less than 50MT total groundfish landings in the qualifying period would be prohibited from participating in the GOA Pacific cod fishery.

Vessels with less than 0.22% of total Bering Sea opilio catch history from 1996 through 2000 and 20 or more deliveries of pollock harvested in the GOA from 1996 through 2000 would be exempt from the GOA pollock sideboard cap. The percent is of the total Bering Sea *C. opilio* catch history, including both qualified and unqualified catch history from non-AFA crab vessels.

Require that crab co-ops limit their members to their aggregate cod catch in both federal and state waters to the sideboarded amount (provided such a limitation is within the Council's authority). Staff is requested to examine how this integrates with the existing coop structure in the preferred alternative and identification of enforcement options available to the coop which will ensure compliance with parallel fishery limitations.

Sideboards will expire on rationalization of the Gulf of Alaska.

2. Processing Sector Elements

Processor shares shall be considered a privilege and not a property right.

2.1 Eligible Processors - processors (including catcher-processors) eligible to receive an initial allocation of processing quota shares (PQs) are defined as follows:

(a.) U.S. corporation or partnership (not individual facilities) that processed crab during 1998 or 1999, for any crab fishery included in the IFQ program.

Hardship provisions for processors that did not process crab in 1998 or 1999 but meet the following provisions:

- A processor (not Catcher/Processor) that processed opilio crab in each season between 1988 and 1997 and
- Invested significant capital in the processing platform after 1995, will be determined to be a qualified processor.
- Significant capital is defined as a direct investment in processing equipment and processing vessel improvements in excess of $1 million.

2.2 Categories of Processing Quota Shares

2.2.1 Crab fishery categories - processing quota shares shall be issued for the same crab species identified in Section 1.1

2.2.2 Regional categories - processing quota shares will be categorized into two regions (see Regionalization Elements for description of regions):

Northern Region - All areas on the Bering Sea north of 56º 20' N. latitude
Southern Region - All areas not in the Northern region

2.3 Initial allocation of processing quota shares

Option 1. Processing quota shares shall be initially issued to Eligible Processors based on three-year average processing history[4] for each fishery, determined by the buyer of record listed on ADF&G fish tickets, as follows:

(a) 1997 - 1999 for Bristol Bay red king crab
(b) 1996 - 1998 for Pribilof red and blue king crab,
(c) 1996 - 1998 for St. Matthew blue crab
(d) 1997 - 1999 for opilio crab
(e) Eastern and Western BS bairdi crab based on 50/50 combination of processing history for BBRKC and opilio
(f) 1996/97 - 1999/00 seasons for brown king crab
(g) The qualifying years for issuance of IPQ in the Adak (WAI) red king crab fishery west of 179° West longitude will be:

Option B. Based on Western Aleutian Islands brown king crab IPQ

Option 4. If the buyer can be determined, by NMFS using the State of Alaska Commercial Operators Annual Report, fish tax records, or evidence of direct payment to fishermen, to be an entity other than the entity on the fish ticket, then the IPQ shall be issued to that buyer.

2.4 Percentage of season's GHL or TAC for which IPQs are distributed:

2.4.1 IPQs will be issued for a portion of the season's GHL or TAC for each species to provide open delivery processing as a means to enhance price competition:

Option 3. 90% of GHL (or TAC) would be issued as IPQs - the remaining 10% would be considered open delivery.

2.5 Implementation of the open delivery-processing portion of the fishery:

Catcher vessel QS/IFQs are categorized into Class A and Class B shares. Purchases of crab caught with Class A shares would count against IPQs while purchases of crab caught with Class B shares would not. Crab caught with Class B shares may be purchased by any processor on an open delivery basis.

2.6 Transferability of processing shares - provisions for transferability include the following:

a. Processing quota shares and IPQs would be freely transferable, including leasing. IPQ may be leased (i.e., transferred) after receipt of a delivery to cover any potential overages, provided that the IPQ account of the person conducting the lease has a zero or positive balance by June 30, the end of the crab fishing year.
b. IPQs may be used by any facility of the eligible processor (without transferring or leasing)
c. Processing quota shares and IPQs categorized for one region cannot be transferred to a processor for use in a different region.
d. New processors may enter the fishery by purchasing IPQ or by purchasing Class B Share crab or by processing CDQ crab.

2.7 Ownership and use caps –

2.7.1 Ownership caps

Option 4. No ownership to exceed 30% of the total PQS pool on a fishery by fishery basis with initial issuees grandfathered.

[4]The three-year average shall be the three-year aggregate pounds purchased by each Eligible Processor in a fishery divided by the three-year aggregate pounds purchased by all Eligible Processors in that fishery.

PQS ownership caps should be applied using the individual and collective rule using 10% minimum ownership standards for inclusion in calculating the cap. PQS ownership caps are at the company level.

2.7.2 Use Caps.

In the Northern Region annual use caps will be at 60 percent for the opilio crab fishery unless subject to a custom processing cap exemption as described in component 2 of the section titled "Clarifications and Expressions of Council Intent..

2.8 Other Optional Provisions:

The crab processing caps enacted by Section 211(c)(2(A) of the AFA would be terminated

Binding Arbitration System (from February 2003 motion)

The Council adopts the following elements for a system of binding arbitration to resolve failed price negotiations.

1. The Standard for Arbitration

   The primary role of the arbitrator shall be to establish a price that preserves the historical division of revenues in the fisheries while considering relevant factors including the following:

   a. Current ex vessel prices (including prices for Class A, Class B, and Class C shares recognizing the different nature of the different share classes)
   b. Consumer and wholesale product prices for the processing sector and the participants in the arbitration (recognizing the impact of sales to affiliates on wholesale pricing)
   c. Innovations and developments of the different sectors and the participants in the arbitration (including new product forms)
   d. Efficiency and productivity of the different sectors (recognizing the limitations on efficiency and productivity arising out of the management program structure)
   e. Quality (including quality standards of markets served by the fishery and recognizing the influence of harvest strategies on the quality of landings)
   f. The interest of maintaining financially healthy and stable harvesting and processing sectors
   g. Safety
   h. Timing and location of deliveries
   i. Reasonable underages to avoid penalties for overharvesting quota and reasonable deadloss

2. Market Report

   An independent market analyst selected by the mutual agreement of the sectors will present to both sectors and all designated arbitrators an analysis of the market for products of that fishery.

3. Selection of the Arbitrator(s) and Market Analyst

   The market analyst and arbitrator(s) will be selected by mutual agreement of the PQS holders and the QS holders. PQS holders collectively must agree and QS holders collectively must agree. Processors may participate collectively in the selection process. The details of the selection will be decided at a later time.

4. Shares subject to binding arbitration

   This binding arbitration system shall address price disputes between holders of delivery restricted IFQ (including Class A IFQ and Class C IFQ when subject to delivery restrictions) and holders of IPQ. Binding arbitration does not apply to the negotiation of price for deliveries under the class B

IFQ and Class C IFQ when not subject to delivery restrictions. C share holders, however, may elect to participate in the arbitration process prior to delivery restrictions taking effect.

5. Shares of processor affiliates
   Participation of processor affiliates in binding arbitration as IFQ holders will be determined by any applicable rules governing anti-trust. Any parties eligible for collective bargaining under the Fishermen's Marketing Act of 1934 will be eligible to participate in binding arbitration. No antitrust exemption should be made to enable processor affiliated IFQ holders to participate in arbitration.

6. Payment of the arbitration and market analysis
   The payment for the market analysis and the arbitrators will be shared by the two sectors. Cost shall be shared by all participants in all fisheries.

   For shared costs, the payment of those costs shall be advanced by IPQ holders. The IPQ holders will collect the IFQ holders' portion of the shared costs by adding a pro rated surcharge to all deliveries of Class A crab.

7. Quality dispute resolution
   In cases where the fisherman and the processor cannot come to agreement on quality and thus price for crab, two mechanisms are suggested for resolving the price dispute-after the processor has processed the crab (to avoid waste from dumping the load at sea): (1) In cases where fishermen and processors have agreed to a formula based price, the two parties would take their normal shares of the price, after the disputed load is sold. (2) This type of dispute would most likely apply in cases where fishermen desire to stay with fixed dockside prices and there is disagreement on quality and therefore price. These cases could be referred to an independent quality specialist firm. The two parties in dispute would decide which firm to hire.

8. Data used in arbitration
   Under any arbitration structure, the arbitrator must have access to comprehensive product information from the fishery (including first wholesale prices and any information necessary to verify those prices).

   Processors may participate in common discussions concerning historical prices in the fisheries.

   Subject to limitations of antitrust laws and the need for proprietary confidentiality, all parties to an arbitration proceeding shall have access to all information provided to the arbitrator(s) in that proceeding.

   Data collected in the data collection program may be used to verify the accuracy of data provided to the arbitrator(s) in an arbitration proceeding. Any data verification will be undertaken only if the confidentiality protections of the data collection program will not be compromised.

9. Enforcement of the Arbitration Decision
   The decision of the arbitrator will be enforced by civil damages

10. Oversight and administration of the Binding Arbitration system.
    Oversight and administration of the binding arbitration should be conducted in a manner similar to the AFA cooperative administration and oversight. System reporting requirements and administrative rules should be developed in conjunction with the Council and NOAA Fisheries after selection of the preferred program.

The structure for the system of Binding Arbitration system shall be as described below:

LAST BEST OFFER BINDING ARBITRATION

GENERAL

The Last Best Offer Model provides a mechanism to resolve failed price and delivery negotiations efficiently in a short period before the opening of the season. The Model includes the following specific characteristics:

1. Processor-by-processor. Processors will participate individually and not collectively, except in the choice of the market analyst and the arbitrator/arbitration panel.
2. Processor-affiliated shares. Participation of processor-affiliated shares will be limited by the current rules governing antitrust matters.
3. Arbitration standard. The standard for the arbitrator is the historic division of revenues between harvesters and processors in the aggregate (across the entire sectors), based on arm's-length first wholesale prices and ex-vessel prices (Option 4 under "Standard for Arbitration" in the staff analysis). The arbitrator shall consider several factors including those specified in the staff analysis, such as current ex vessel prices for both A, B and C Shares, innovations, efficiency, safety, delivery location and timing, etc.
4. Opt-in. An IFQ holder may opt in to any contract resulting from a completed arbitration for an IPQ holder with available IPQ by giving notice to the IPQ holder of the intent to opt in, specifying the amount of IFQ shares involved, and acceptance of all terms of the contract. Once exercised, an Opt-in is binding on both the IPQ holder and the IFQ holder.
5. Performance Disputes. Performance and enforcement disputes (e.g. quality, delivery time, etc.) initially will be settled through normal commercial contract dispute remedies. If those procedures are unsuccessful, the dispute will be submitted for arbitration before the arbitrator(s). If those procedures are unsuccessful and in cases where time is of the essence, the dispute will be submitted for arbitration before the arbitrator(s). The costs of arbitration shall be paid from the fees collected, although the arbitrator(s) will have the right to assign fees to any party for frivolous or strategic complaints.
6. Lengthy Season Approach. For a lengthy season, an IPQ holder and an IFQ holder (or group of IFQ holders) may agree to revise the entire time schedule below and could agree to arbitration(s) during the season. That approach may also be arbitrated pre-season if the holders cannot agree.

PROCESS

1. Negotiations and Voluntary Share Matching.
   At any time prior to the season opening date, any IFQ holders may negotiate with any IPQ holder on price and delivery terms for that season (price/price formula; time of delivery; place of delivery, etc.). If agreement is reached, a binding contract will result for those IFQ and IPQ shares. IPQ holders will always act individually and never collectively, except in the choice of the market analyst (which may occur at any time pre-season) and the arbitrator/arbitration panel for which all IFQ and IPQ holders will consult and agree.
2. Required Share-Matching and Arbitration.
   Beginning 5 days after the issuance of IFQ and IPQ by NMFS, IFQ holders may match up IFQ shares not already subject to contracts with any IPQ shares not under contract, either as collective groups of IFQ holders or as individual IFQ holders (the offered IFQ shares must be a substantial amount of the IFQ Holder(s)' uncontracted shares). The IPQ holder must accept all proposed matches up to its non-contracted IPQ share amount. All IFQ holders "matched" with an IPQ holder will jointly choose an arbitrator with that IPQ holder. The matched share holders are committed to the arbitration once the arbitrator is chosen (if the parties wish, the arbitrator may

initially act as a mediator to reach an agreement quickly). Arbitration must begin no later than 15 days after the issuance of IFQ and IPQ by NMFS.

3. Data.
   The Arbitrator will gather relevant data independently and from the parties to determine the historical distribution of first wholesale crab product revenues (at FOB point of production in Alaska) between harvesters and processors in the aggregate (across the entire sectors). For a vertically integrated IPQ holder (and in other situations in which a back-calculation is needed), the arbitrator will work with that IPQ holder and the IFQ holders to determine a method for back-calculating an accurate first wholesale price for that processor. The Arbitrator will receive a pre-season market report from the market analyst, and may gather additional data on the market and on completed arbitrations. The Arbitrator will also receive and consider all data submitted by the IFQ holders and the IPQ holder. The Arbitrator will not have subpoena power.

4. Arbitration Decisions.
   Arbitration will be based on a "last best offer" system, with the Arbitrator choosing one of the last best offers made by the parties. The Arbitrator will work with the IPQ and IFQ holders to determine the matters that must be included in the offer (e.g. price, delivery time & place, etc.) and will set the date on which "last best offers" must be submitted. The last best offers may also include a price over a specified time period, a method for smoothing prices over a season, and an advance price paid at the time of delivery.
   If several groups or individual IFQ Holders have "matched" with that IPQ Holder, each of them may make a last best offer. Prior to submission of the last-best offers, the Arbitrator may meet with parties, schedule joint meetings, or take any actions aimed at reaching agreement. The Arbitrator will notify the IPQ holder and the IFQ holders of the Arbitration Decision no later than 10 days before the season opening date. The Arbitration Decision may be on a formula or ex-vessel price basis. The Arbitration Decision will result in a contract for the IPQ holder and the IFQ holders who participated in arbitration with that IPQ holder.

5. Post-Arbitration Opt-In.
   Any IFQ holder with shares not under contract may opt in to any contract resulting from an Arbitration Decision for an IPQ holder with IPQ that is not under contract, on all of the same contract conditions (price, time of delivery, etc.). If there is a dispute regarding whether the "opt in" offer is consistent with the contract, that dispute may be decided by the arbitrator who will decide only whether the Opt-in is consistent with the contract.

6. Formula and Prices.
   Throughout the year, the market analyst will survey the crab product market and publish periodically a composite price. That price will be a single price per species, based on the weighted average of the arm's length transactions in products from that species.

7. Non-Binding Price Arbitration (from the April 2003 motion)
   There will be a single annual fleet-wide arbitration to establish a non-binding formula under which a fraction of the weighted average first wholesale prices for the crab products from each fishery may be used to set an ex-vessel price. The formula is to be based on the historical distribution of first wholesale revenues between fishermen and processors, taking into consideration the size of the harvest in each year. The formula shall also include identification of various factors such as product form, delivery time and delivery location. The non-binding arbitration shall be based upon the Standard for Arbitration set out in the February 2003 Council motion, Item 1 including a. through i. As a part of this process, the arbitrator will review all of the arbitration decisions for the previous season and select the highest arbitrated prices for a minimum of at least 7% of the market share of the PQS. This provision allows for the aggregation of up to 3 arbitration findings that collectively equal a minimum of 7 percent of the PQS, to be considered for the highest price for purposes of this provision. If arbitration findings are

aggregated with two or more entities, then the lesser of the arbitrated prices of the aggregated entities included to attain the 7 percent minimum market share of PQS shall be considered for purposes of developing the benchmark price. The arbitrator in the non-binding arbitration shall not be an arbitrator in the last best offer binding arbitration(s). This formula shall inform price negotiations between the parties, as well as the Last Best Offer arbitration in the event of failed price negotiations.

3 Regionalization Elements

3.1 Two regions are proposed:

a. Northern Region - All areas on the Bering Sea north of 56º 20' N. latitude. (This region includes the Pribilof islands and all other Bering Sea Islands lying to the north. The region also includes all communities on Bristol Bay including Port Heiden but excludes Port Moller and all communities lying westward of Port Moller.)
b. Southern Region - All areas not in the Northern Region.

Suboption: Regional categories for deliveries of Aleutian Islands brown king crab are split into a "Western" (west of 174° West longitude) and "Eastern" (east of 174° West longitude) area. 50% of the WAI IPQ brown king crab QS shall be processed in the W AI region.

3.2 Regional categorization of processing and/or harvesting quota shares

3.2.1 Categorization will be based on all historical landings. Periods used to determine regional percentages are the same as in Section 3.2.5.

There shall be no regional designation of the bairdi fishery shares. When there is a harvestable surplus of bairdi, an open season, and the vessel has bairdi quota, bairdi will be retained and delivered as incidental catch in the red /blue king crab and opilio fisheries.

3.2.2 Options for the harvesting sector:

Option 2. Only Class A CV quota shares are categorized by region (applies to point of delivery and not point of harvest).

3.2.3 Options for the processor sector:

Option 1. Processing quota shares and IPQs are categorized by region

3.2.4 Once assigned to a region, processing and/or harvesting quota shares cannot be reassigned to a different region.

3.2.5 Options for addressing any remaining mismatch of harvesting and processing shares within the region.

1. The base years for determining processing shares and the base period for determining the share assigned to each region shall be the same.
2. If the cumulative harvester quota associated with each region differs from the total regional share, by species, the harvester share, by species, shall be adjusted, up or down, in the following manner:
    a. The adjustment shall apply only to harvesters with share in both regions.
    b. The adjustment shall be made on a pro rata basis to each harvester, so that the total share among those harvesters, by region, equals the total share assigned to each region.
3. The adjustment shall only be on shares that carry a regional designation; Class B quota would be excluded from the adjustment.

3.3 Delivery and processing restrictions

3.3.1 The following provisions apply to the delivery and processing of crab with IFQs or IPQs that are categorized by region:

a. Crab harvested with catcher vessel IFQs categorized for a region must be delivered for processing within the designated region, unless an exemption is approved for the West designated IFQ in the WAI golden king crab fishery under provisions described in section 3.3.2.

b. Crab purchased with IPQs categorized for a region must be processed within the designated region, unless an exemption is approved for the West designated IPQ in the WAI golden king crab fishery under provisions described in section 3.3.2.

3.3.2 WAI Golden King Crab Regional Delivery Exemption

NMFS will approve a request to exempt West designated IFQ holders and IPQ holders from the requirement to deliver and process WAI golden king crab west of 174° W. long. for a crab season, if all Eligible Contract Signatories request the exemption in writing for that season. Eligible Contract Signatories are —

a. QS holders: Any person that holds in excess of 20 percent of the West designated WAI golden king crab QS at the time the contract was signed, or their authorized representative.

b. PQS holders: Any person that holds in excess of 20 percent of the West designated WAI golden king crab PQS at the time the contract was signed, or their authorized representative.

c. Municipalities: the City of Adak and the City of Atka, or their authorized representatives.

3.4 Alternative Regionalization/Community Protection Option

IPQ Caps (from the February 2003 meeting)

The amount of IPQ in any year shall not exceed the percentage of the TAC for crab as follows:

For opilio, IPQ percentage times a TAC (after CDQ allocations) of 175 million pounds.

For Bristol Bay red king crab, IPQ percentage times a TAC (after CDQ allocations) of 20 million pounds.

IFQ (that would have been A shares but for the cap) issued in excess of IPQ limit shall be subject to regional landing requirements.

Cool Down Period (from the December 2002 motion and February 2003 motion)

A cooling off period of 2 years shall be established during which processing quota earned in a community may not be used outside that community. (from December 2002 motion)

During the Cool Down Period the following elements will apply (from the February 2003 motion):

1. The method to determine the shares associated with a community will be the same method used for allocating processing quota as established by the Council.
2. Community shall be defined as the boundaries of the Borough or, if no Borough exists, the first class or second class city, as defined by applicable state statute. A community must have at least 3 percent of the initial PQS allocation in any fishery

based on history in the community to require continued use of the IPQs in the community during the cool down period.

3. 10% of the IPQs, on a fishery by fishery basis, may leave a community on annual basis, or up to 500,000 pounds, whichever is less. The amount that can leave will be implemented on a pro rata basis to all PQS holders in a community.
4. Exempt the Bairdi, Adak red crab and Western Aleutian Islands brown crab fishery from the cool down provision.
5. There should be an exemption from the requirement to process in the community if an act of God prevents crab processing in the community. This provision will not exempt a processor from any regional processing requirements, if there is processing capacity in the region.

Regionalization of the Bairdi Fishery (from the February 2003 motion)

If biological information indicates that the bairdi fishery is likely to become a directed fishery, the Council would consider the following management, along with other alternatives for management of that fishery:

If the bairdi fishery becomes a directed fishery, it shall be allocated according to the original distribution of the BBRKC and shall not be subject to the regionalization provisions of the Council Crab Rationalization program.

Community Purchase and Right of First Refusal Options (from April 2003 motion)

1. General Right of First Refusal

For communities with at least three percent of the initial PQS allocation in any BSAI crab fishery based on history in the community except for those communities that receive a direct allocation of any crab species (currently only Adak), allow CDQ groups or community groups representing qualified communities a first right of refusal to purchase processing shares that are based on history from the community which are being proposed to be sold for processing outside the boundaries of the community of original processing history in accordance with the provisions below.

Entity Granted the Right of First Refusal

The right of refusal shall be established by a contract entered into prior to the initial allocation of PQS which will contain all of the terms specified in paragraphs A through I below. The contract will be between the recipient of the initial allocation of the PQS and:

1) the CDQ group in CDQ communities
2) the entity identified by the community in non-CDQ communities.

In non-CDQ communities, the community must designate the entity that will represent the community at least 90 days prior to the deadline for submission of applications for initial allocations of PQS.

Contract Terms

A. The right of first refusal will apply to sales of the following processing shares:
    1. PQS and
    2. IPQs, if more than 20 percent of a PQS holder's community based IPQs (on a fishery by fishery basis) has been processed outside the community of origin by another company in 3 of the preceding 5 years.
B. Any right of first refusal must be on the same terms and conditions of the underlying agreement and will include all processing shares and other goods included in that agreement.

C. Intra-company transfers within a region are exempt from this provision. To be exempt from the first right of refusal, IPQs must be used by the same company. In the event that a company uses IPQs outside of the community of origin for a period of 3 consecutive years the right of first refusal on those processing shares (the IPQs and the underlying PQS) shall lapse. With respect to those processing shares, the right of first refusal will not exist in any community thereafter.

D. Any sale of PQS for continued use in the community of origin will be exempt from the right of first refusal. A sale will be considered to be for use in the community of origin if the purchaser contracts with the community to:
    1. use at least 80 percent of the annual IPQ allocation in the community for 2 of the following 5 years (on a fishery by fishery basis), and
    2. grant the community a right of first refusal on the PQS subject to the same terms and conditions required of the processor receiving the initial allocation of the PQS.

E. All terms of any right of first refusal and contract entered into related to the right of first refusal will be enforced through civil contract law.

F. A community group or CDQ group can waive any right of first refusal.

G. The right of first refusal will be exercised by the CDQ group or community group by providing the seller within 60 days of receipt of a copy of the contract for sale of the processing shares:
    1. notice of the intent to exercise and
    2. earnest money in the amount of 10 percent of the contract amount or $500,000 whichever is less.

    The CDQ group or community group must perform all of the terms of the contract of sale within the longer of:
    1. 120 days of receipt of the contract or
    2. in the time specified in the contract.

H. The right of first refusal applies only to the community within which the processing history was earned. If the community of origin chooses not to exercise the right of first refusal on the sale of PQS that is not exempt under paragraph D, that PQS will no longer be subject to a right of first refusal.

I. Any due diligence review conducted related to the exercise of a right of first refusal will be undertaken by a third party bound by a confidentiality agreement that protects any proprietary information from being released or made public.

2. GOA First Right of Refusal

    For communities with at least three percent of the initial PQS allocation of any BSAI crab fishery based on history in the community that are in the area on the Gulf of Alaska north of 56º20'N latitude, groups representing qualified communities will have a first right of refusal to purchase processing quota shares which are being proposed to be transferred from unqualified communities in the identified Gulf of Alaska area.

    The entity granted the right of first refusal and terms and method of establishing the right of first refusal will the same as specified in the general right of first refusal.

3. Community Purchase Option

    Allow for a community organization in those communities that have at least 3 percent of the initial PQS allocation of any BSAI crab fishery based on history in the community to be exempted from the restriction for the 150 days of sea time requirement under 1.6 Transferability and Restrictions on Ownership of QS.

4. Identification of Community Groups and Oversight

For CDQ communities, CDQ groups would be the entity eligible to exercise any right of first refusal or purchase shares on behalf of the community. Ownership and management of harvest and processing shares by CDQ groups will be subject to CDQ regulations.

For non-CDQ communities, the entity eligible to exercise the right of first refusal or purchase shares on behalf of a community will be identified by the qualified city or borough, except if a qualified city is in a borough, in which case the qualified city and borough must agree on the entity. Ownership and management of harvest and processing shares by community entities in non-CDQ communities will be subject to rules established by the halibut and sablefish community purchase program.

5. Right of First Refusal is Non-assignable.

   The community right of first refusal is not assignable by the community group granted the right.

6. Fisheries Exempt from the Community Right of First Refusal.

   The bairdi, Western Aleutian brown king crab and Adak red king crab fisheries are exempt from the right of first refusal.

4. Community Development Allocation (based on existing CDQ program):

Option 2. Expand existing program to all crab fisheries approved under the rationalization program with the exception of the Western AI brown king crab.

Option 3. Increase for all species of crab to 10%. A minimum of 25% of the total CDQ allocation must be delivered on shore.

Option 5. For the WAI brown king crab fishery, the percentage of resource not utilized (difference between the actual catch and GHL) during the base period is allocated to the community of Adak. In any year, that sufficient processing exists at that location, the percentage of the difference between the GHL and actual catch, that was not harvested in these 4 years is not to exceed 10%).

Additional Provisions Concerning the Adak Allocation (from December 2002 motion)

Criteria for Selection of Community Entity to Receive Shares: A non-profit entity representing the community of Adak, with a board of directors elected by the community (residents of Adak) in a manner similar to the CDQ program. As a suboption, the shares given to this entity may be held in trust in the interim by the Aleut Enterprise Corporation and administered by it.

A set of use procedures, investment policies and procedures, auditing procedures, and a city or state oversight mechanism will be developed. Funds collected under the allocation will be placed in a separate trust until the above procedures and a plan for utilizing the funds for fisheries related purposes are fully developed. Funds will be held in trust for a maximum of 2 years, after which the Council will reassess the allocation for further action.

Performance standards for management of the allocation to facilitate oversight of the allocation and assess whether it achieves the goals. Use CDQ type management and oversight to provide assurance that the Council's goals are met. Continued receipt of the allocation will be contingent upon an implementation review conducted by the State of Alaska to ensure that the benefits derived from the allocation accrue to the community and achieve the goals of the fisheries development plan.

5. Program Elements

RAM Division in conjunction with State of Alaska will produce annual reports regarding data being gathered with a preliminary review of the program at 3 years.

Option 2. Formal program review at the first Council Meeting in the 5th year after implementation to objectively measure the success of the program, including benefits and impacts to harvesters (including vessel owners, skippers and crew), processors and communities by addressing concerns, goals and objectives identified in the Crab Rationalization problem statement and the Magnuson Stevens Act standards. This review shall include analysis of post-rationalization impacts to coastal communities, harvesters and processors in terms of economic impacts and options for mitigating those impacts. Subsequent reviews are required every 5 years.

Option 5. A proportional share of fees charged to the harvesting sectors and processing sectors for management and enforcement of the IFQ/IPQ program shall be forwarded to the State of Alaska for use in management and observer programs for BSAI crab fisheries

6. Cooperative model options:

6.1 Coop model with the following elements and options:

1) Individual harvesting and processing histories are issued to both catcher and processors. (Harvesters under Section 1.3.2 a) which meet program qualifications. Processors under Section 2.1, 2.3, and 2.4 (Options 1-4) which meet qualifications of the program).
2) Cooperatives may be formed through contractual agreements among fishermen who wish to join into a cooperative associated with one or more processors holding processor history for one or more species of crab. Fleet consolidation within this cooperative may occur either by internal history leasing and vessel retirement or by history trading within the original cooperative or to a different cooperative. A coop agreement would be filed annually with the Secretary of Commerce, after review by the Council, before a coop's catch history would be set aside for their exclusive use.
3.) Suboption only : There must be at least 4 or more unique harvester quota share holders engaged in one or more crab fisheries to form a coop associated with a processor. Vessels are not restricted to deliver to a particular plant or processing company.
4. New processors may enter the fishery by purchasing IPQ or by purchase of crab caught with B share landings or by processing CDQ crab. New processors entering the fishery may associate with cooperatives.
5. Custom processing would continue to be allowed within this rationalization proposal.

7. Regional Categories: As adopted earlier

8. Duration of coop agreements.

Option 4. A harvester quota shareholder may exit the cooperative at any time after one season. One season shall mean the season established by the Alaska Board of Fisheries for the fishery associated with the quota shares held by the harvester.

10. Observer requirements: Defer observer requirements to the Alaska Board of Fisheries.

11. Length of program: Same as earlier in Section 5.

12. Option for skipper and crew members: Same as developed earlier.

13. Catch Accounting - All landings including deadloss will be counted against a vessel's quota.

Options for treatment of incidental catch are as follows: Same as developed earlier.

14. The North Pacific Fishery Management Council and the National Marine Fisheries Service shall have the authority to implement a mandatory data collection program of cost, revenue, ownership and employment data upon members of the BSAI crab fishing industry harvesting or processing fish under the Council's authority. Data collected under this authority will be maintained in a confidential manner and may not be released to any party other than staffs of federal and state agencies directly involved in the management of the fisheries under the Council's authority and their contractors.

A mandatory data collection program shall be developed and implemented as part of the crab rationalization program and continued through the life of the program. Cost, revenue, ownership and employment data will be collected on a periodic basis (based on scientific requirements) to provide the information necessary to study the impacts of the crab rationalization program as well as collecting data that could be used to analyze the economic and social impacts of future FMP amendments on industry, regions, and localities. This data collection effort is also required to fulfill the Council problem statement requiring a crab rationalization program that would achieve "equity between the harvesting and processing sectors" and to monitor the "…economic stability for harvesters, processors and coastal communities". Both statutory and regulatory language shall be developed to ensure the confidentiality of these data.

Any mandatory data collection program shall include:

A comprehensive discussion of the enforcement of such a program, including enforcement actions that would be taken if inaccuracies in the data are found. The intent of this action would be to ensure that accurate data are collected without being overly burdensome on industry for unintended errors.

The mandatory data collection program shall have the following elements (from the February 2003 motion):

A. Purpose. The purpose of the data program is as set out in the June 2002 motion. The Council will require the production of data needed to assess the efficacy of the crab rationalization program and to determine its relative impact on fishery participants and communities.
B. Type of data to be collected. The data collected shall be that needed to achieve the Council's purpose, with the following general guidelines:
    1. The information will be specific to the crab fisheries included in the crab rationalization plan.
    2. The data shall include information on costs of fishing and processing, revenues for harvesters and processors, and employment data
    3. The general guide for information requirements will be as set out in the draft surveys prepared by National Marine Fisheries Service dated 9/18/02, except
        a) Non-variable costs shall be collected only as needed to explain and analyze variable cost data.
        b) Collect a unique identifier for harvesting and processing crew members to explain changes in participation patterns as requested by the AP
    4. Historical information will be required as recommended by the Data Collection Committee.
C. Method of Collection. Data shall be submitted to an independent third party agent such as the Pacific States Marine Fisheries Commission.
D. Use of data. Data will be used following these general guidelines:

1. Data shall be supplied to Agency users in a blind and unaggregated form.
2. The agencies will develop a protocol for the use of data, including controls on access to the data, rules for aggregation of data for release to the public, penalties for release of confidential data, and penalties for unauthorized use.
3. The agencies will revise the current Memorandum of Understanding governing the sharing of data between the State of Alaska and National Marine Fisheries Service, and will address in this MOU the role of the third party data collection agent.
4. The Agency and Council will promote development of additional legislative and regulatory protection for these data as needed.

E. Verification of Data. The third party collection agent shall verify the data in a manner that assures accuracy of the information supplied by private parties.

F. Enforcement of the data requirements. The Council endorses the approach to enforcing the data requirements developed by the staff and the Data Collection Committee, as set out on page 3.17-20 in the February, 2003 document entitled "BSAI Crab Rationalization Program, Trailing Amendments", which provides:

> Anticipated Enforcement of the Data Collection Program The analysts anticipate that enforcement of the data collection program will be different from enforcement programs used to ensure that accurate landings are reported. It is critical that landings data are reported in an accurate and timely manner, especially under an IFQ system, to properly monitor catch and remaining quota. However, because it is unlikely that the economic data will be used for in-season management, it is anticipated that persons submitting the data will have an opportunity to correct omissions and errors[37] before any enforcement action would be taken. Giving the person submitting data a chance to correct problems is considered important because of the complexities associated with generating these data. Only if the agency and the person submitting the data cannot reach a solution would the enforcement agency[38] be contacted. The intent of this program is to ensure that accurate data are collected without being overly burdensome on industry for unintended errors.
>
> A discussion of four scenarios will be presented to reflect the analysts understanding of how the enforcement program would function. The four scenarios are 1) a case where no information is provided on a survey; 2) a case where partial information is provided; 3) a case where the agency has questions regarding the accuracy of the data that has been submitted; and 4) a case where a random "audit" to verify the data does not agree with data submitted in the survey.
>
> In the first case, the person required to fill out the survey does not do so. In the second case, the person fills out some of the requested information, but the survey is incomplete. Under either case that person would be contacted by the agency collecting the data and asked to fulfill their obligation to provide the required information. If the problem is resolved and the requested data are provided, no other action would be taken. If that person does not comply with the request, the collecting agency would notify enforcement that the person is not complying with the requirement to provide the data. Enforcement would then use their discretion regarding the best method to achieve compliance. Those methods would likely include fines or loss of quota and could include criminal prosecution.

[37]The intent of the program is to have enforcement actions triggered by the willful and intentional submission of incorrect data or noncompliance with the requirements to submit data.

[38]The term enforcement agency in this case may or may not include the RAM Division and the Office of Administrative Appeals (in addition to NMFS Enforcement). Those details are still under discussion within NOAA.

In the third case the person fills out all of the requested information, but the agency collecting the data, or the analysts using the data, have questions regarding some of the information provided. For example, this may occur when information provided by one company is much different than that provided by similar companies. These data would only be called into question when obvious differences are encountered. Should these cases arise, the agency collecting the data would request that the person providing the data double check the information. Any reporting errors could be corrected at that time. If the person submitting the data indicates that the data are accurate and the agency still has questions regarding the data, that firm's data could be "audited". It is anticipated that the review of data would be conducted by an accounting firm selected jointly by the agency and members of industry. Only when that firm refuses to comply with the collecting agencies attempts to verify the accuracy of the data would enforcement be contacted. Once contacted, enforcement would once again use their discretion on how to achieve compliance.

The fourth case would result when the "audit"[39] reports different information than the survey. The "audit" procedure being contemplated is a verification protocol similar to that which was envisioned for use in the pollock data collection program developed by NMFS and PSMFC. During the design of this process, input from certified public accountants was solicited in order to develop a verification process that is less costly and cumbersome than a typical "audit" procedure. That protocol involves using an accounting firm, agreed upon by the agency and industry, to conduct a random review of certain elements of the data provided[40].

Since some of the information requested in the surveys may not be maintained by companies and must be calculated, it is possible that differences between the "audited" data from financial statements and survey data may arise. In that case the person filling out the survey would be asked to show how their numbers were derived[41]. If their explanation resolves the problem, there would be no further action needed. If questions remained, the agency would continue to work with the providers of the data. Only when an impasse is reached would enforcement be called upon to resolve the issue. It is hoped that this system would help to prevent abuse of the verification and enforcement authority.

In summary, members of the crab industry will be contacted and given the opportunity to explain and/or correct any problems with the data, that are not willful and intentional attempts to mislead, before enforcement actions are taken. Agency staff does not view enforcement of this program as they would a quota monitoring program. Because these data are not being collected in "real" time, there is the opportunity to resolve occasional problems as part of the data collection system. Development of a program that collects the best information possible to conduct analyses of the crab rationalization program, minimizes the burden on industry, and minimizes the need for enforcement actions are the goals of the data collection initiative.

[39]This "audit" could be the result of either the random review process that is contemplated or an "audit" triggered under scenario three.

[40]However, in cases of non-compliance in which enforcement has to be notified, the data verification process is likely be more comprehensive.

[41]Any time a number must be derived, the survey will provide direction on how the calculate the information requested. This direction should help minimize differences. However, when discrepancies do arise, the firm will be given an opportunity to show how they derived their figures, and correct the information if necessary.

Clarifications and Expressions of Council Intent

At its October 2002 meeting the Council clarified several issues in the June 10, 2002 motion identifying a preferred alternative for rationalizing the Bering Sea/Aleutian Islands crab fisheries. Since the Council motion of June was not a final action, the Chairman suspended the rule which would require a super majority to alter the motion. Decisions were by a simple majority of the Council. In addition, Hazel Nelson, who joined the Council since the June meeting, was permitted to participate in all votes. The following clarifications of the June motion were made:

1. A cutoff date of June 10, 2002 was established for the processor shares ownership cap grandfather provision - The ownership cap on processing shares to prevent persons from acquiring shares in excess of specific caps would be applied as of June 10, 2002. This cutoff date would prevent persons from acquiring interests in processing history in excess of the specified cap after the cutoff date.
2. Ownership/use cap distinction - The current council motion contains several provisions that limit ownership and use of the harvest and processing shares. These provisions include the following:

   1.6.3 contains provisions limiting the ownership of QS
   1.6.4 contains provisions limiting processor ownership of QS
   1.7.4 contains provisions limiting a vessels use of IFQs
   2.7.1 contains provisions limiting ownership of the PQS pool
   2.7.2 contains a use cap of 60 percent for the Northern region opilio crab fishery

   The Council confirmed that the ownership caps limit ownership of the QS and PQS, which carry a long-term privilege, and IFQs and IPQs, which are annual allocations. Application of the caps to both types of shares is consistent with interpretation of caps in the halibut and sablefish IFQ program, in which use caps are interpreted as limiting IFQ use and the ownership of both QS and IFQs. This broad interpretation has two primary effects. First, this interpretation prevents individuals from accumulating shares in excess of the cap through leasing arrangements. Long term leasing, unlimited under a narrow interpretation of the caps, could allow a person to effectively control shares well in excess of cap. Second, under the broad interpretation the caps operate as a individual use cap since IFQ and IPQ holdings determine use. The IPQ use cap in the North region *C. opilio* fishery also operates as both a cap on ownership of PQS and IPQs in that region and as a use cap on IPQs in that region. The vessel use caps would limit the use of shares on a vessel but would not impose any limit on share ownership.

   Although custom processing is permitted by the Council motion, the Council established that limits on ownership and use would count any crab custom processed by a plant toward the cap of the plant owner, unless those crab meet the custom processing exemption described below. The application of the cap to custom processing is intended to prevent consolidation, which could occur if that custom processing is not considered.

   Custom Processing Cap Exemption

   Fisheries and Regions:

   Custom processing will be exempt from use caps in the following regions and fisheries:

   North region of the Bering Sea *C. opilio* fishery;
   Western Aleutian Islands golden king crab fishery West designated or Undesignated shares processed in the West region;
   Western Aleutian Islands red king crab fishery;
   Eastern Aleutian Islands golden king crab fishery;
   St. Matthew Island blue king crab fishery;
   Pribilof Islands red and blue king crab fishery;

Definition of custom processing exemption:
Physical processing of IPQ crab held by a person who is not affiliated with the owner of the facility at which those IPQ crab are processed. IPQ custom processed at a facility owned by an entity does not count toward the cap of the entity (i.e., only processor share holdings count toward an entity's cap).

Locations qualified for the exemption:
Custom processing will qualify for the exemption from IPQ use caps, provided that processing is undertaken in the applicable fishery and region at a shore plant, or a floating processor that is moored at a dock or docking facilities (e.g., dolphins, permanent mooring buoy) in a harbor in a community that is a first or second class city or a home rule city, except for the community of Atka, where a floating processor may anchor at any location, provided that it is within the municipal boundary.

Facility cap
Outside of the West region, no facility may process more than 60 percent of EAI golden king crab and WAI red king crab.

Provisions to protect interests of the community of origin
In the event that processing shares currently or formerly subject to a right of first refusal are transferred from the initial recipient, custom processing of those shares in the community of origin will not be counted toward cap of the processing plant (the shares would only count toward the cap of the share holder).

3. Norton Sound red king crab fishery CDQ allocation - The Council clarified that the increase of CDQ allocations does not apply to the Norton Sound red king crab fishery. The Norton Sound fishery was excluded from the CDQ allocation increase because its currently regulated under a super exclusive permit program that prohibits its participants from participating in any of the other BSAI crab fisheries. The Norton Sound permit rules are for the benefit local, small vessel participants in that fishery.
4. Adak allocation in the WAI(Adak) golden king crab fishery - The Council motion provides for the allocation of unused resource (up to 10 percent) in the WAI (Adak) golden king crab fishery to the community of Adak. The Council asked for additional information for determining the entity to receive this allocation (see Additional Issues, below).
5. Regionalization of the initial allocation in the WAI (Adak) golden king crab fishery - In the Council's motion, the WAI golden king crab fishery is regionalized by designation of 50 percent of A shares (and corresponding processor shares) as west shares and by the remaining 50 percent of A shares (and corresponding processor shares) being undesignated. The Council clarified that individual processing share allocations would be made with the 50 percent west shares to participants with processing facilities in the west. If the allocations of processors with facilities in the west does not equal 50 percent, the remaining west allocation could be allocated on a pro rated basis to participants without facilities in the west. These remaining west shares could be pro rated so that each shareholder with west facilities would get the same portion of its initial allocation as west shares.

   For harvesters, individual harvesters share allocations would made with each harvester with west history allocated west shares. If the allocations of vessels with west history exceed 50 percent of the fishery, share allocations would be pro rated so that each shareholder with west history receives the same portion of its allocation as west shares.

6. Catcher/processor definition for purposes of processing crab harvested with Class B harvest shares[5] - A catcher/processor must be defined for purposes of applying the restriction on deliveries of B shares to catcher/processors (Section 1.3.3(b)). In a share based program, definition of this sector can be problematic because vessels used as catcher/processors are also used as floating processors. The Council clarified that for purposes of implementing this provision, a vessel that takes deliveries of crab harvested with Class B shares would be considered a floating processor for the duration of the season and would be prohibited from operating as a catcher/processor during that season. Likewise, a vessel that operates as a catcher/processor during a season would be prohibited from taking delivery of crab harvested with Class B shares during that season.
7. Sector cap on catcher/processors - Catcher/processors are permitted to purchase PQS from shore based facilities for use within 3 miles of shore (Section 1.7.2.3, Option 2). The "catcher/processor sector" also is capped at "the aggregate level of the initial sector-wide allocation" (Section 1.7.2.3, Option 8). The Council clarified the following effects of these provisions:
    A) The catcher/processor sector-wide cap applies only to catcher/processor shares and not to the use or ownership of processing shares by catcher/processors.
    B) Catcher/processor shares cannot be created by combining the processing privilege of PQS or IPQs with the harvest privilege of Class A QS or IFQs.
    C) The catcher/processor sector-wide cap applies only to catcher/processor shares and not to the use or ownership of catcher vessel harvest shares by catcher/processors.
8. Regionalization of PQS allocations to catcher/processors - Processing shares allocated to catcher/processors would be regionally designated based on the historic area of processing. State records of processing activity should be adequate for determining the location of processing activity.
9. Definition of a lease - the word "not" was inadvertantly omitted from the definition of a lease. The definition was revised to read:

    > Leasing is defined as the use of IFQs on a vessel that the QS owner holds less than 10% ownership of vessel or on a vessel on which the owner of the underlying QS is not present (Section 1.6.2).

10. Grandfathering vessel use allocations in excess of the cap - The Council clarified that a vessel the activity of which is the basis for an allocation in excess of the vessel use cap would be grandfathered with respect to that allocation.
11. Cost recovery definition - The Council clarified that cost recovery funds would be collected in accordance with the current cost recovery program, which allows for the collection of actual costs up to 3 percent of ex vessel gross revenues. The Council provided that costs would be paid in equal shares by the harvesting and processing sectors (on all landings including landings of crab harvested with Class B IFQs). Catcher/processors would pay the entire 3 percent since catcher/processors participate in both sectors. A loan program for share purchases would be established with up to 25 percent of the fees collected. The motion authorized the collection of up to 133 percent of actual costs of management under the new program, which would provide for 100 percent of management costs after allocation of up to 25 percent of the cost recovery to the loan program. NMFS will assign no more than the minimum amount of fees required to aid in loan financing. No fees would be assigned for loan financing unless required.

5 This clarification pertains only to processing of crab harvested with Class B harvest shares and does not pertain to processing of crab harvested with Class A IFQs or the harvesting of crab.

12. Regionalization of the WAI (Adak) red king crab fishery - The processor share allocation in the WAI (Adak) red king crab fishery would be based on the historical landings in the WAI (Adak) golden king crab fishery. No landings in the golden king crab fishery were in the North during the qualifying years. The Adak red king crab fishery would therefore be entirely South. The South designation will be made despite the landing of a portion of the harvests in the Adak red king crab fishery in the North region during the qualifying years for vessels.
13. Rules governing cooperatives - The Council clarified the following rules for governing cooperatives:
    A) Exemption from use caps - Cooperative members would not be subject to either the individual or vessel use caps, which would apply to IFQ holders that are not cooperative members.
    B) Application of ownership caps - To effectively limit ownership, the number of shares (IFQs and QS) that each cooperative member could bring to a cooperative would be subject to the ownership caps (with initial allocations grandfathered).
    C) IFQ allocations to cooperatives - The annual allocations of IFQs of cooperative members would be made to the cooperative, with use of those shares governed by the cooperative agreement.
    D) Leasing - Leasing among cooperative members would be unlimited. For IFQ holders that are not cooperative members, leasing would be allowed for the first 5 years of the program.
    E) Inter-cooperative transfers - Transfers between cooperatives would be undertaken by the members individually, subject to ownership caps. Requiring the inter-cooperative transfers to occur through members is necessary for the application of the ownership caps.
    F) Four entities are required for a cooperative - The requirement for four owners to create a cooperative would require four unique entities to form a cooperative. Independent entities must be less than 10 percent common ownership without common control (similar to the AFA common ownership standard used to implement ownership caps).
    G) Monitoring and enforcement at the cooperative level - The monitoring and enforcement of harvest allocations would be at the cooperative level (rather than the individual level). Cooperative members would be jointly and severally liable for the actions of the cooperative.

Vertical Integration Caps (from the February 2003 motion)

The Council clarified that the 5 percent cap on QS holdings by processors shall exempt only the primary corporate processing entity from more restrictive generally applicable caps on QS holdings. All individuals and subsidiaries will be subject to the general caps on QS holdings.

A/B Share Linkage (from the April 2003 meeting)

At its April 2003 meeting:

The Council clarified that the A/B share component of QS will be linked for purposes of transfers.

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.

ALASKA DEPARTMENT OF
FISH & GAME
DIVISION OF COMMERCIAL FISHERIES
JUNEAU, ALASKA

NATIONAL MARINE FISHERIES
SERVICE
ALASKA REGION
JUNEAU, ALASKA

STATE/FEDERAL ACTION PLAN
FOR MANAGEMENT OF
COMMERCIAL KING AND TANNER CRAB FISHERIES
OCTOBER, 1993

PURPOSE: To foster improved coordination and communication between National Marine Fisheries Service (NMFS) and Alaska Department of Fish & Game (ADF&G) with respect to crab management under the Fishery Management Plan for the Commercial King and Tanner Crab Fisheries in the Bering Sea and Aleutian Islands Area (FMP). Interagency action groups will implement this coordination.

BACKGROUND: The FMP approved in 1989 establishes a State/Federal cooperative management regime that defers crab management to the State of Alaska with Federal oversight. The Secretary of Commerce defers to the State's regulatory regime providing it is consistent with the FMP, the Magnuson Fishery Conservation and Management Act (Magnuson Act) and other Federal law.

A management goal and specific objectives are identified in the FMP. ADF&G, in consultation with NMFS, recommends to the Alaska Board of Fisheries (Board) appropriate management measure(s) for a given year and geographical area to accomplish the objectives. Three categories of management measures are available for consideration: (1) those that are specifically fixed and require an FMP amendment to change, (2) those that are framework-type measures which the State can change without an FMP amendment but following specified criteria, and (3) measures that are neither rigidly specified nor frameworked in the FMP. The measures in categories (2) and (3) may be adopted as State laws subject to the appeals process outlined in the FMP.

The State is not limited to the measures outlined above. Any other management measures must be justified based upon consistency with the FMP objectives, the Magnuson Act, and other applicable Federal law.

Overall, the FMP has efficiently managed the crab fisheries. The framework approach has worked well for the majority of crab management issues. However, Category 2 management measures have been appealed to the Secretary (specifically, pot limits and registration areas). Members of the industry also have criticized Board actions with respect to Category 2 measures

(setting of guideline harvest levels). In order to avoid future contentious problems, NMFS and ADF&G will adopt this action plan to more formally implement State/Federal cooperation in crab management.

ACTION: Three action groups, described below, will facilitate this joint coordination.

a) Research Planning Group
b) Crab Plan Team
c) State/Federal Policy Group

Research Planning Group
The purpose of this group will be to consider long-term crab research priorities, current research activities, and each agency's particular research interests. The group will include NMFS, ADF&G and university crab biologists as well as other representatives from NMFS/Fisheries Management Division; Alaska Fisheries Science Center and ADF&G/Division of Commercial Fisheries. Some of these individuals also may be members of the Crab Plan Team.

This group will work on the development of a long-term plan for applied crab research which will help foster a healthy exchange of ideas among fishery biologists and managers on particular needs. The plan will focus on development of optimal long-term harvest policies. The plan will be updated annually and will function as a vehicle to coordinate the expenditure of crab funds between ADF&G and NMFS and to seek additional funding for critical research.

The group will meet annually for a one- or two-day period at a time and place convenient for the majority of group members.

Crab Plan Team
The annual development of the preseason guideline harvest levels (GHLs) is a dynamic process dependent on using the most current information available and applying this information via analysis and statistical modeling. Scientists from NMFS and ADF&G are currently involved in this process.

Though individual members of the Plan Team have always participated in the development of GHLs, public perception is that this is an ad hoc process. Due to the timing of the Bering Sea surveys and the openings of the early fall fisheries, only a limited amount of time exists to analyze, discuss, amend and release the GHLs to the public in a timely fashion. To release preseason GHLs that have been reviewed using a Council process, such as that used to establish annual groundfish harvest specifications under the groundfish FMPs, would require that

current season opening dates for the fall fisheries be delayed and/or rescheduled, or the previous year's survey information would have to be used to set GHLs in the current year. The latter option could interfere with the FMP management objective of biological conservation. In addition, the Council would have to schedule a special meeting or allow time during the September meeting to address crab management after the survey information became available.

The purpose of a Plan Team review will be to formally incorporate its input in the GHL process. The FMP calls for Plan Team input in the preparation of an annual area management report to the Board. This report includes a discussion of the current status of GHLs and support for different management decisions. This report is reviewed by the State, NMFS, and the Council, and available for public comment on an annual basis.

The Plan Team will meet annually to review GHLs in a session that is open to the public.

State/Federal Policy Group

The purpose of the State/Federal Policy Group will be to review and discuss crab management issues prior to Board and/or Council review. This group will include senior staff and legal counsel and will meet annually, or more often if necessary. Many issues may be resolved through interagency agreement. For instance, prior to final Board action, this Policy Group could review whether crab management proposals and petitions are consistent with the FMP and reflect an appropriate and desired management strategy. Also, this group will review FMP amendment proposals. Their recommendations will be forwarded to the Board and the Council, providing guidance as the Board establishes management regulations.

OTHER ACTION:

In addition to the above action groups, NMFS and ADF&G will meet annually with crab industry representatives to discuss crab management issues such as, but not limited to, setting of GHLs, stock analysis, current research, and harvest strategies. The location of meetings will alternate between Washington and Alaska. These meetings will provide an opportunity for review of crab management issues and industry input to management agencies.

Council and Board members have agreed to form a Consultation Group composed of a subcommittee of Council and Board members that will meet publicly on an annual basis to focus on crab issues. (These meetings could occur at one of the regularly scheduled Council or Board meetings.) This joint subcommittee could review staff data on the status of crab stocks and fisheries and both public and staff information regarding crab

management and then provide guidance to the respective Council and Board on pertinent crab issues. Council and Board representatives would benefit by meeting for the sole purpose of discussing crab-related issues.

Both NMFS and ADF&G agree to jointly request Council and Board concurrence on these action groups and their role in the cooperative management of the king and Tanner crab fisheries in the Bering Sea and Aleutian Islands.

This State/Federal Action Plan for Management of Commercial King and Tanner Crab Fisheries has been approved by:

Steven Pennoyer
Director, Alaska Region
National Marine Fisheries Service

10/12/93
Date

Carl L. Rosier
Commissioner
Alaska Department of Fish & Game

10/15/93
Date

Appendix B 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

D.1.0 Description of the Management Area

The Bering Sea covers almost 3 million km^2 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 cooing 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.

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

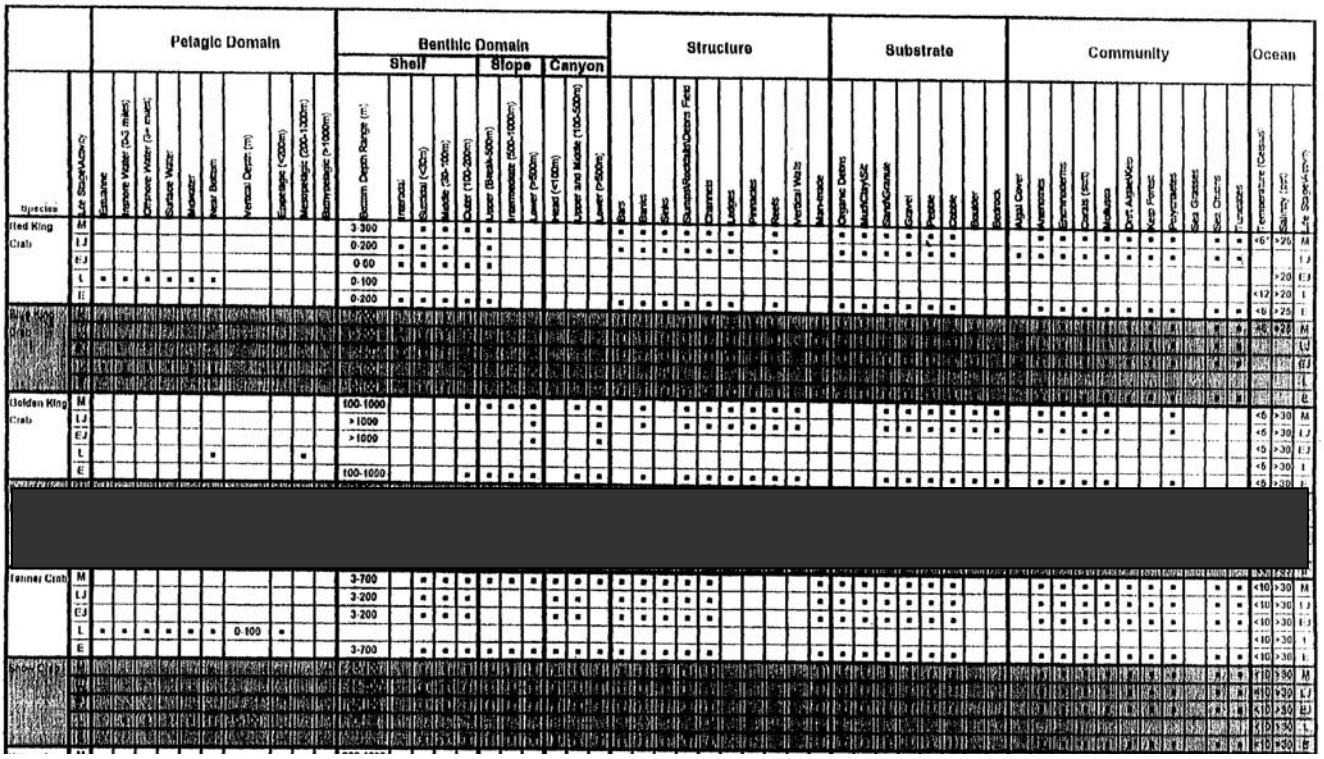
			Feeding Types					Movements							Behavior								Periods				
Species	Life Stage/Activity	Duration of Life Stage (years)	Lecithotrophic	Planktotrophic	Omnivore	Detritivore	Unknown	Drift with Ocean Conditions	Reside in Nursery Areas	Inshore Molting/Mating Migration	Offshore Migration	Diel Migration	Nocturnally Active	Unknown	Solitary	Burrowing	Mating Aggregation	Molting Aggregation	Defensive/Pooling Aggregation	Special Aggregation	Other Aggregation	Unknown	Months Molting	Unknown	Months Mating	Unknown	Life Stage/Activity
Red King Crab	M	7-15+			■					■	■		■				■		fem	■			Dec-Jun		Jan-Jul		M
	LJ	4			■						■		■						■	■			Year Around				LJ
	EJ	2			■				■				■		■					■			Year Around				EJ
	L	0.2		■				■				■										■	Mar-Jul				L
	E	1	■																								E
Blue King Crab	[illegible]																										
Golden King Crab	M	6+			■									■						■			Year Around		Year Around		M
	LJ	4-5			■									■						■			Year Around				LJ
	EJ	2			■				■													■	Year Around				EJ
	L	0.2	■											■								■	Year Around				L
	E	1	■																								E
[illegible]																											
Tanner Crab	M	6				■				■	■				■	■	■			■			Jan-Jun		Feb-Jun		M
	LJ	4				■					■				■	■							Jan-Dec				LJ
	EJ	2				■			■						■	■							Jan-Dec				EJ
	L	0.2		■				■				■								■			Jun-Jul				L
	E	1	■																								E
Snow Crab	[illegible]																										

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

Characteristic features	Consequences
Physical features	
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
Biological features	
High production and slow turnover	
Fewer species (than in lower latitudes)	High standing stocks
Large numbers of marine mammals and birds	Few species quantitatively very dominant High predation by apex predators
Pronounced seasonal migrations	Great local space and time changes of abundance
Fisheries resource features	
Pollock dominant semidemersal species	Flexible feeding and breeding habits, special environmental adaption
Yellowfin sole dominant demersal species	Abundant benthos food supply
Herring and capelin dominant pelagic species	Important forage species in the ecosystem
Abundant crab resources	Large, relatively shallow shelf Few predators on adults, special environmental adaption
Abundant marine mammals	Abundant food supply, no enemies, insignificant hunting Compete with man for fishery resources
Man-related features	
Fisheries development rather recent	Ecosystem in near-natural state, not yet fully adjusted to effects of extensive fishery
Little-inhabited coasts	Ample space for breeding colonies of mammals and birds Very limited local fisheries, no pollution

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. I. Univ. of Washington Press, Seattle, Washington: 597-610.

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



D2.0 General 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 GHLs, 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.

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

D2.2 Description 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).

Commercial red and blue king crab harvests by year in pounds.

Year	Bristol Bay Red King	Pribilof Islnds. Blue King	Pribilof Islnds. Red King	St. Matthew Blue King	Norton Sound Red King	Adak Red King	Aleutian Red King
1953	13,228,600						
1954	10,392,600						
1955	10,549,000						
1956	10,183,800						
1957	9,116,800						
1958	8,126,800						
1959	11,578,600						
1960	25,157,000					2,074,000	
1961	40,777,000					6,114,000	
1962	53,229,000					8,006,000	
1963	57,299,000					17,904,000	
1964	63,852,800					21,193,000	
1965	43,076,000					12,915,000	
1966	42,895,600	2,006,400				5,883,000	
1967	33,145,200	2,409,000				14,131,000	
1968	34,698,400	1,595,000				18,100,000	
1969	18,994,800	5,471,400				18,018,000	
1970	20,165,200	1,280,400				16,057,000	
1971	17,914,800	1,227,600				15,475,924	
1972	26,109,800	299,200				18,724,144	
1973	29,363,400	1,320,000				9,741,464	
1974	50,153,400	8,819,800				2,774,963	
1975	51,326,259	2,433,714				411,583	
1976	63,919,728	6,611,084				0	
1977	69,967,868	6,456,738		1,202,066	520,000	905,527	
1978	87,618,320	6,395,512		1,984,251	2,090,000	807,195	
1979	107,828,057	5,995,231		210,819	2,930,000	467,229	
1980	129,946,463	10,970,346		219,777	1,190,000	1,419,513	
1981	33,591,388	9,080,729		4,627,761	1,380,000	1,648,926	
1982	3,001,210	4,405,353		8,844,789	230,000	1,701,818	
1983	0	2,193,395		9,454,323	370,000	1,981,579	
1984	4,182,406	306,699		3,764,592	390,000	1,367,672	
1985	4,174,953	532,735		2,427,110	430,000	906,283	
1986	11,393,934	258,939		1,003,162	480,000	712,243	
1987	12,289,067	701,337		1,075,179	330,000	1,213,933	
1988	7,387,795	0		1,325,185	240,000	1,567,314	
1989	10,264,791	0		1,166,256	250,000	1,118,566	
1990	20,362,342	0		1,725,349	190,000	828,105	
1991	17,177,894	0		3,372,066	0	951,278	
1992	8,043,018	0		2,474,080	70,000	1,286,424	
1993	14,628,639	0	2,607,634	2,999,921	336,000	698,077	
1994	0	0	1,338,953	3,764,262	328,000	196,967	
1995	0	1,267,454	871,173	3,166,093	318,000	38,941	
1996	8,405,614	937,032	200,304	3,060,916	224,000	0	0
1997	8,772,144	512,374	756,818	4,649,660	93,000	0	0

*Bristol Bay red king crab data from 1953 to 1974 and Pribilof Islands blue king crab data from 1966 to 1974 are from Otto, R.S. of Eastern Bering Sea King Crab Stocks. Pages 107-116 *in* Jamieson, G.S., and N. Bourne [ed.]. North Pacific Workshop on S Invertebrates. Can. Spec. Publ. Fish. Aquat. Sci. 92: 430 p.

*All other data are from Alaska Dept. of Fish and Game, Annual Management Report for the Shellfish Fisheries of the Westwar Report No. 4K97-41.

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

Commercial golden king crab harvest by year in pounds.							
	Dutch Harbor	Aleutian E174 Sequam Stock	Adak	Aleutian W174 Adak Stock	Pribilof Islnds.	Northern Dist.	
Year	Golden King	Golden King	Golden King	Golden King	Golden King	Golden King	
1975			25,490				
1976			2,285				
1977			47,445				
1978			0				
1979			23,485				
1980			58,914				
1981	115,715		1,194,046				
1982	1,184,971		8,006,274		69,970	193,507	
1983	1,810,973		8,128,029		856,475		
1984	1,521,142		3,180,095				
1985	1,968,213		11,124,759		Confidential		
1986	1,869,180		12,798,004		Confidential		
1987	1,383,198		8,001,177		Confidential	424,394	
1988	1,545,113		9,080,196		Confidential	160,441	
1989	1,852,249		10,162,400		Confidential	Confidential	
1990	1,718,848		5,250,687				
1991	1,447,732		6,254,409		Confidential		
1992	1,357,048		4,916,149		Confidential	Confidential	
1993	915,460		4,635,683		67,458		
1994	1,750,267		6,135,965		88,985	Confidential	
1995	1,993,980		4,896,911		341,700	1,200	
1996		3,255,523		4,644,748	329,009	Confidential	
1997		3,564,292		In Progress	179,249	0	
*Data are from Alaska Dept. of Fish and Game, Annual Management Report for the Shellfish Fisheries of the Westward Region, 1996. Regional Information Report No. 4K97-41.							

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

Commercial *Chionoecetes* species harvest by year in pounds.

Year	Bering Sea *C. bairdi*	Bering Sea *C. Opilio*
1965	4,746,000	
1966	6,034,000	
1967	33,600,000	
1968	43,333,900	
1969	70,127,500	
1970	48,178,180	2,182,800
1971	49,337,717	2,596,935
1972	38,622,471	1,169,475
1973	22,889,043	7,320,075
1974	33,285,695	502,416
1975	38,968,507	3,875,760
1976	66,156,221	5,639,400
1977	78,282,654	11,906,052
1978	47,631,924	59,644,689
1979	22,890,958	53,523,102
1980	23,864,183	34,000,619
1981	29,630,492	52,750,034
1982	11,008,779	29,355,374
1983	5,273,881	26,128,410
1984	1,208,223	26,813,074
1985	3,151,498	65,998,875
1986	0	97,984,539
1987	0	101,903,388
1988	2,210,394	134,030,185
1989	7,012,965	149,455,848
1990	44,590,077	161,821,350
1991	51,837,159	328,647,269
1992	35,130,866	315,302,034
1993	16,891,320	230,787,000
1994	7,766,886	149,775,765
1995	4,233,061	75,252,677
1996	1,806,077	65,712,797
1997	0	119,452,070

*Harvest of Bering Sea *Chionoecetes bairdi* and *C. opilio* from 1965 to 1980 include foreign harvests as calculated in Table E.2.c.
*All other data are from Alaska Dept. of Fish and Game, Annual Management Report for the Shellfish Fisheriesin the Westward Region. Regional Information Report No. 4K97-41.

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).
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).
Bering Sea District C. bairdi	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 C. opilio	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.

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.

		Size of Carapace at Maturity			
Area	Species	Males	Females	Source	Minimum Size
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	6.50
	golden king	107 [2]	100 [1]	Somerton & Otto 1986	5.50
St. Matthew Section	blue king	77 [2,5]	81 [1]	Somerton and MacIntosh 1983 Somerton & Otto 1986	5.50
Norton Sound Section	red king	-	71 [1]	Otto et al., 1990	4.75
	blue king	-	-		5.50
Bering Sea	*bairdi*	105-116 [6]	78-94 [7]	Somerton 1981b	5.50
Bering Sea/ Aleutian Is.	*C. opilio*	75 [6]	56 [7]	Otto 1988	3.10

[1] Size at which 50% are mature (SM_{50}) 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 (SM_{50}) 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.

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.

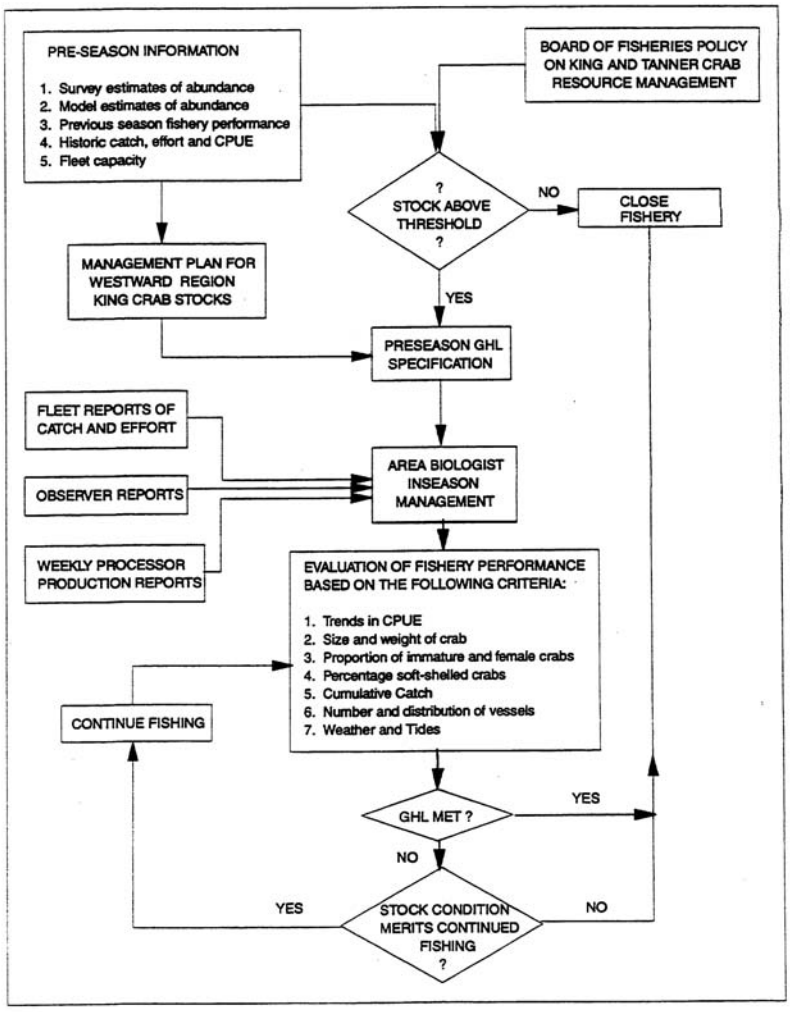


Figure E.2. Current fishing seasons for king and Tanner crab stocks in the BS/AI area (second seasons for larger crabs are also possible by State emergency order (EO). Source: Alaska Department of Fish and Game Commercial Shellfish Regulations.

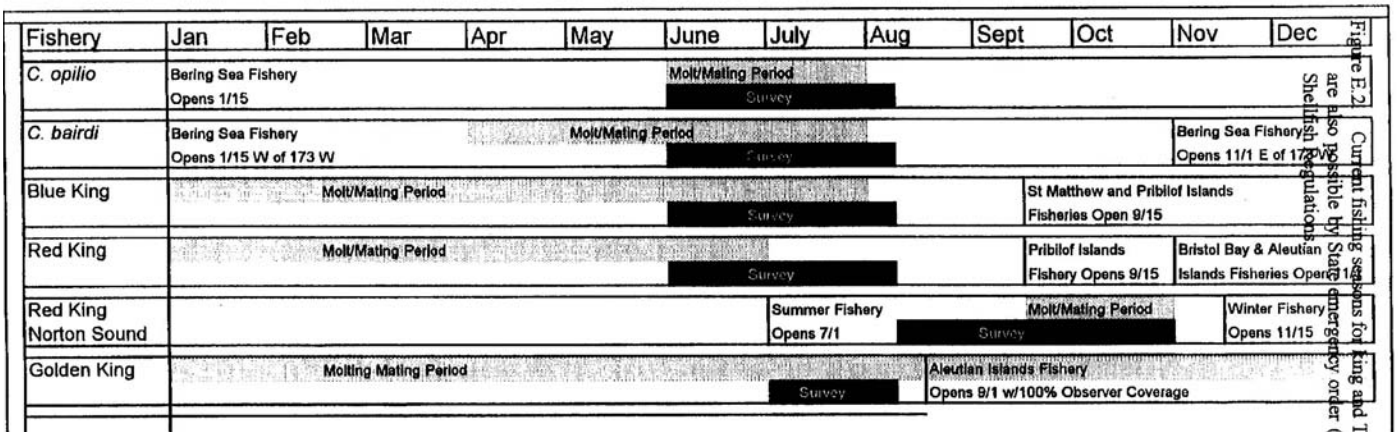


Figure E.3. Bering Sea and Aleutian Islands management unit showing State of Alaska registration areas for king and Tanner crab. The boundary of the management unit extends to the outer limit of the EEZ, and the seaward boundary of registration areas, districts, and subdistricts is fixed by State regulation.

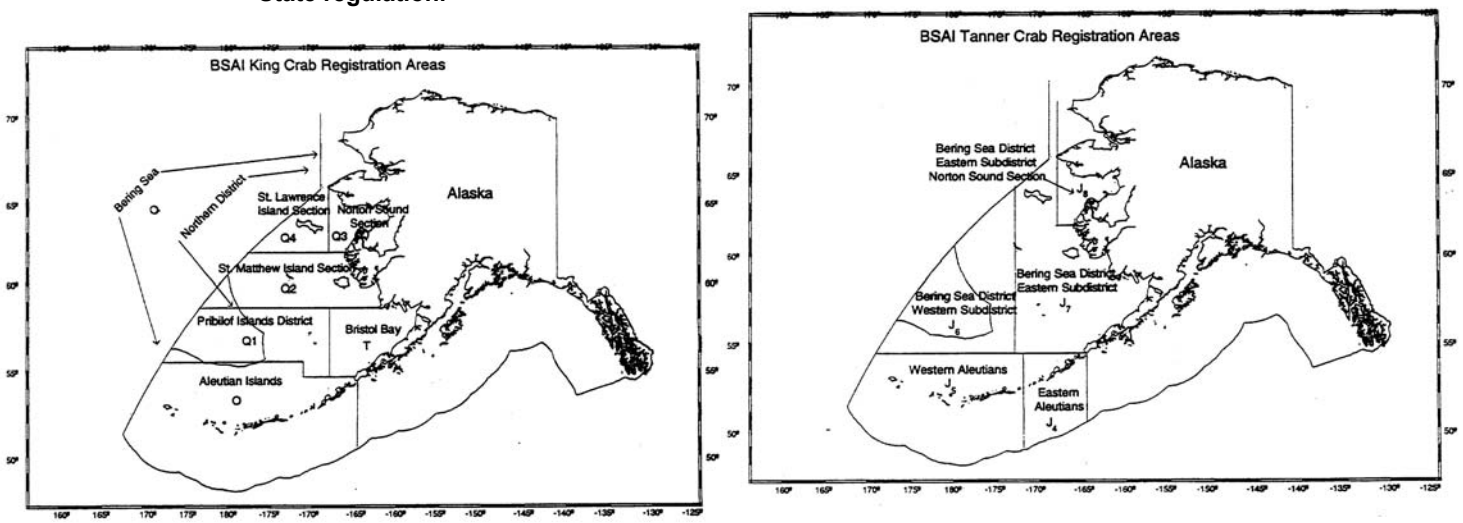
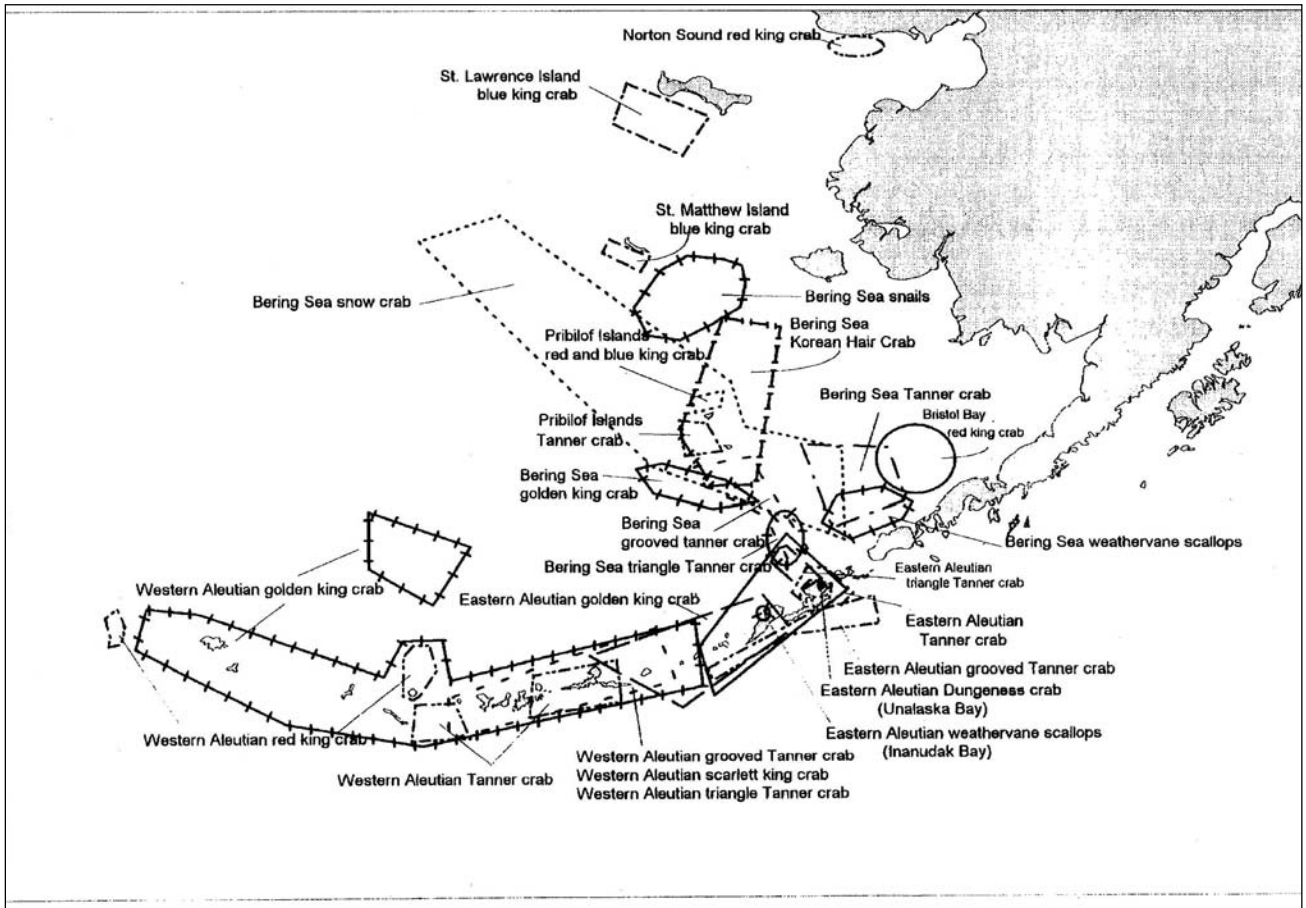


Figure E.4. Map showing general location of crab fisheries in the BSAI.



General location of commercially exploited shellfish stocks in Bering Sea and Aleutian Islands waters.

The following species profiles, prepared in 1998, provide information on the biology, management history and stock structure of each BSAI crab species managed under this FMP. Specific information on habitat requirements for each BSAI crab species managed under this FMP is provided in section D3.0.

Red King Crab

Biology: Red king crab (*Paralithodes camtshaticus*) 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, preseason 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 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.

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	

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 Adak stocks. 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.

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.

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.

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

Norton Sound and Adak 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.

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.

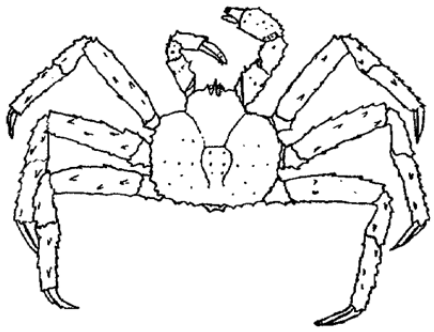
Blue King Crab

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, and St. Matthew 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^{o}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)
* 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	



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.

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.

Year	Abundance	GHL	Catch
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.

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 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.

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.

Year	Abundance	GHL	Catch
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

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 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 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)
* 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	

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 crab s 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.

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

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.

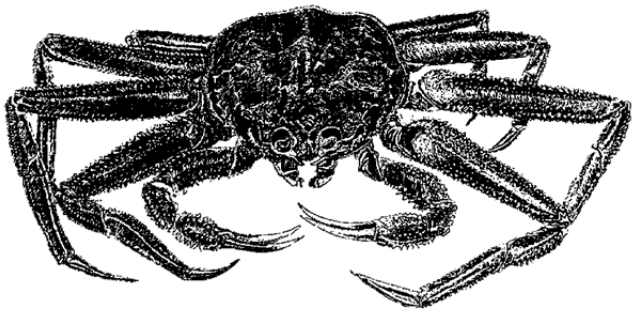
Management measures implemented in the BSAI king and Tanner crab fisheries, as defined by the federal crab FMP, by category.

Category 1 (Fixed in FMP)	Category 2 (Frameworked in FMP)	Category 3 (Discretion of State)
* 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	

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.

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 GHL is established for the Bristol Bay red king crab stock, the Tanner crab fishery is restricted to the area west of 163^{o} W longitude.

Stock Structure: Tanner crab (*C. bairdi*) are managed for the eastern Bering Sea.



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.

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.

Year	Abundance	GHL	Catch
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	26.0	7.3	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.

Snow Crab

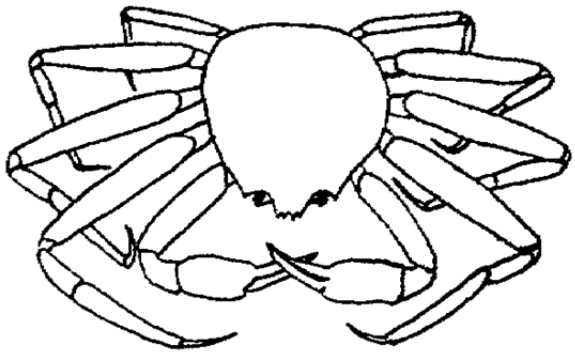
Biology: Snow crabs (*Chionoecetes opilio*) are distributed on the continental shelf of the Bering Sea, Chukchi Sea, and in the western Atlantic Ocean as far south as Maine. Snow crab are not present in the Gulf of Alaska. In the Bering Sea, snow crabs are common at depths less than 200 meters. The eastern 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 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)
* 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	

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.

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.

Year	Abundance	GHL	Catch
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 D.3: Essential Fish Habitat and Habitat Areas of Particular Concern

Contents

1.0 Overview

Section 303(a)(7) of the Magnuson-Stevens Act requires that FMPs describe and identify Essential Fish Habitat (EFH), minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to conserve and enhance EFH. FMPs must describe EFH in text, map EFH distributions, and provide information on habitat and biological requirements for each life history stage of the species. This appendix contains all of the required EFH provisions of the FMP, including the requirement in EFH regulations (50 Code of Federal Regulations [CFR] 600.815(a)(2)(i)) that each FMP must contain an evaluation of the potential adverse effects of all regulated fishing activities on EFH.

In 2005 NMFS and the Council completed the Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska (EFH EIS, NMFS 2005). The EFH EIS provided a thorough analysis of alternatives and environmental consequences for amending the Council's FMPs to include EFH information pursuant to Section 303(a)(7) of the Magnuson-Stevens Act and 50 CFR 600.815(a). Specifically, the EFH EIS examined three actions: (1) describing and identifying EFH for Council managed fisheries, (2) adopting an approach to identify HAPCs within EFH, and (3) minimizing to the extent practicable the adverse effects of fishing on EFH. The Council's preferred alternatives from the EFH EIS were implemented through Amendment 16 to the BSAI King and Tanner Crab FMP and corresponding amendments to the Council's other FMPs.

2.0 Life History Features and Habitat Requirements of FMP Species

This section describes habitat requirements and life histories of the crab species managed by this FMP. Information contained in this appendix details life history information for federally managed crab species. Each species or species group is described individually; however, summary tables that denote habitat associations (Table 2), reproductive traits (Table 3), and predator and prey associations (Table 4) are also provided. In each section, a species-specific table summarizes habitat requirements.

2.1 Habitat Types

Bering Sea

The Bering Sea is a semi-enclosed, high-latitude sea. Of its total area of 2.3 million sq. km, 44 percent is continental shelf, 13 percent is continental slope, and 43 percent is deep-water basin. Its broad continental shelf is one of the most biologically productive areas of the world. The Eastern Bering Sea (EBS) contains approximately 300 species of fish, 150 species of crustaceans and mollusks, 50 species of seabirds, and 26 species of marine mammals (Livingston and Tjelmeland 2000). However, commercial fish species diversity is lower in the EBS than in the Gulf of Alaska (GOA).

A special feature of the EBS is the pack ice that covers most of its eastern and northern continental shelf during winter and spring. The dominant circulation of the water begins with the passage of North Pacific water (the Alaska Stream) into the EBS through the major passes in the Aleutian Islands (AI) (Favorite et al. 1976). There is net water transport eastward along the north side of the AI and a turn northward at the continental shelf break and at the eastern perimeter of Bristol Bay. Eventually EBS water exits northward through the Bering Strait, or westward and south along the Russian coast, entering the western North Pacific via the Kamchatka Strait. Some resident water joins new North Pacific water entering Near Strait, which sustains a permanent cyclonic gyre around the deep basin in the central Bering Sea (BS).

The EBS sediments are a mixture of the major grades representing the full range of potential grain sizes of mud (subgrades clay and silt), sand, and gravel. The relative composition of such constituents determines the type of sediment at any one location (Smith and McConnaughey 1999). Sand and silt are the primary components over most of the seafloor, with sand predominating the sediment in waters with a depth less than 60 m. Overall, there is often a tendency of the fraction of finer-grade sediments to increase (and average grain size to decrease) with increasing depth and distance from shore. This grading is particularly noticeable on the southeastern BS continental shelf in Bristol Bay and immediately westward. The condition occurs because settling velocity of particles decreases with particle size (Stokes Law), as does the minimum energy necessary to resuspend or tumble them. Since the kinetic energy of sea waves reaching the bottom decreases with increasing depth, terrigenous grains entering coastal shallows drift with water movement until they are deposited, according to size, at the depth at which water speed can no longer transport them. However, there is considerable fine-scale deviation from the graded pattern, especially in shallower coastal waters and offshore of major rivers, due to local variations in the effects of waves, currents, and river input (Johnson 1983).

The distribution of benthic sediment types in the EBS shelf is related to depth (Figure 2). Considerable local variability is indicated in areas along the shore of Bristol Bay and the north coast of the Alaska Peninsula, as well as west and north of Bristol Bay, especially near the Pribilof Islands. Nonetheless, there is a general pattern whereby nearshore sediments in the east and southeast on the inner shelf (0 to 50 m depth) often are sandy gravel and gravelly sand. These give way to plain sand farther offshore and west. On the middle shelf (50 to 100 m), sand gives way to muddy sand and sandy mud, which continue over much of the outer shelf (100 to 200 m) to the start of the continental slope. Sediments on the central and northeastern shelf (including Norton Sound) have not been so extensively sampled, but Sharma (1979) reports that, while sand is dominant in places here, as it is in the southeast, there are concentrations of silt both in shallow nearshore waters and in deep areas near the shelf slope. In addition, there are areas of exposed relic gravel, possibly resulting from glacial deposits. These departures from a classic seaward decrease in grain size are attributed to the large input of fluvial silt from the Yukon River and to flushing and scouring of sediment through the Bering Strait by the net northerly current.

McConnaughey and Smith (2000) and Smith and McConnaughey (1999) describe the available sediment data for the EBS shelf. These data were used to describe four habitat types. The first, situated around the shallow eastern and southern perimeter and near the Priblof Islands, has primarily sand substrates with a little gravel. The second, across the central shelf out to the 100 m contour, has mixtures of sand and mud. A third, west of a line between St. Matthew and St. Lawrence islands, has primarily mud (silt) substrates, with some mixing with sand (Figure 2). Finally, the areas north and east of St. Lawrence Island, including Norton Sound, have a complex mixture of substrates.

Important water column properties over the EBS include temperature, salinity, and density. These properties remain constant with depth in the near-surface mixed-layer, which varies from approximately 10 to 30 m in summer to approximately 30 to 60 m in winter (Reed 1984). The inner shelf (less than 50 m) is, therefore, one layer and is well mixed most of the time. On the middle shelf (50 to 100 m), a two-layer temperature and salinity structure exists because of downward mixing of wind and upward mixing due to relatively strong tidal currents (Kinder and Schumacher 1981). On the outer shelf (100 to 200 m), a three-layer temperature and salinity structure exists due to downward mixing by wind, horizontal mixing with oceanic water, and upward mixing from the bottom friction due to relatively strong tidal currents. Oceanic water structure is present year-round beyond the 200-m isobath.

Three fronts, the outer shelf, mid-shelf, and inner shelf, follow along the 200-, 100-, and 50-m bathymetric contours, respectively; thus, four separate oceanographic domains appear as bands along the broad EBS shelf. The oceanographic domains are the deep water (more than 200 m), the outer shelf (200 to 100 m), the mid-shelf (100 to 50 m), and the inner shelf (less than 50 m).

The vertical physical system also regulates the biological processes that lead to separate cycles of nutrient regeneration. The source of nutrients for the outer shelf is the deep oceanic water; for the mid-shelf, it is the shelf-bottom water. Starting in winter, surface waters across the shelf are high in nutrients. Spring surface heating stabilizes the water column, then the spring bloom begins and consumes the nutrients. Steep seasonal thermoclines over the deep EBS (30 to 50 m), the outer shelf (20 to 50 m), and the mid-shelf (10 to 50 m) restrict vertical mixing of water between the upper and lower layers. Below these seasonal thermoclines, nutrient concentrations in the outer shelf water invariably are higher than those in the deep EBS water with the same salinity. Winter values for nitrate-N/phosphate-P are similar to the summer ratios, which suggests that, even in winter, the mixing of water between the mid-shelf and the outer shelf domains is substantially restricted (Hattori and Goering 1986).

Effects of a global warming climate should be greater in the EBS than in the GOA. Located further north than the GOA, the seasonal ice cover of the EBS lowers albedo effects. Atmospheric changes that drive the speculated changes in the ocean include increases in air temperature, storm intensity, storm frequency, southerly wind, humidity, and precipitation. The increased precipitation, plus snow and ice melt, leads to an increase in freshwater runoff. The only decrease is in sea level pressure, which is associated with the northward shift in the storm track. Although the location of the maximum in the mean wind stress curl will probably shift poleward, how the curl is likely to change is unknown. The net effect of the storms is what largely determines the curl, and there is likely to be compensation between changes in storm frequency and intensity.

Ocean circulation decreases are likely to occur in the major current systems: the Alaska Stream, Near Strait Inflow, Bering Slope Current, and Kamchatka Current. Competing effects make changes in the Unimak Pass inflow, the shelf coastal current, and the Bering Strait outflow unknown. Changes in hydrography should include increases in sea level, sea surface temperature, shelf bottom temperature, and basin stratification. Decreases should occur in mixing energy and shelf break nutrient supply, while competing effects make changes in shelf stratification and eddy activity unknown. Ice extent, thickness, and brine rejection are all expected to decrease.

Temperature anomalies in the EBS illustrate a relatively warm period in the late 1950s, followed by cooling (especially in the early 1970s), and then by a rapid temperature increase in the latter part of that decade. For more information on the physical environment of the EBS, refer to the Alaska Groundfish Fisheries Programmatic Supplemental EIS (NMFS 2004).

Aleutian Islands

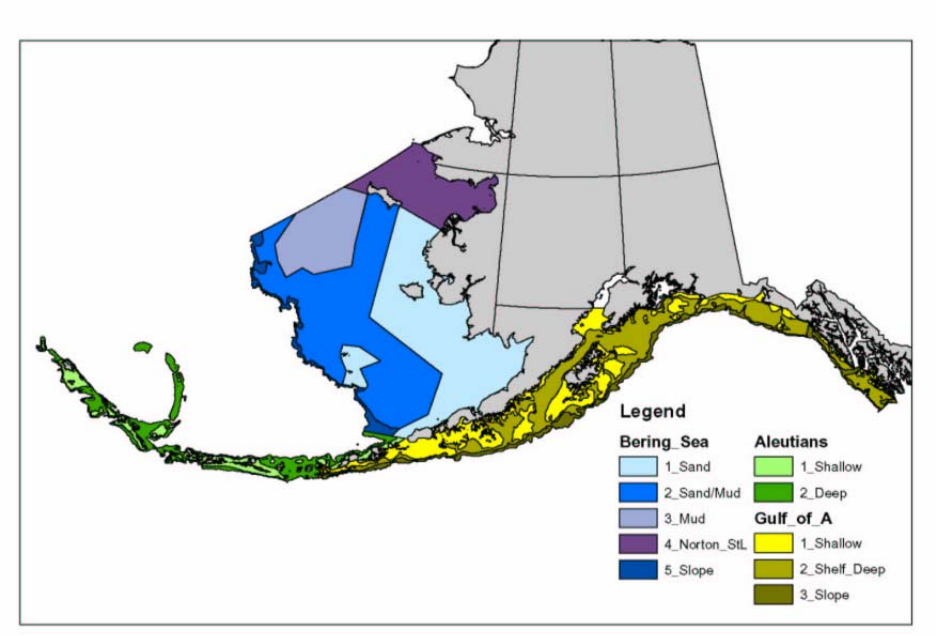
The Aleutian Islands lie in an arc that forms a partial geographic barrier to the exchange of northern Pacific marine waters with EBS waters. The AI continental shelf is narrow compared with the EBS shelf, ranging in width on the north and south sides of the islands from about 4 km or less to 42 to 46 km; the shelf broadens in the eastern portion of the AI arc. The AI comprises approximately 150 islands and extends about 2,260 km in length.
Bowers Ridge in the AI is a submerged geographic structure forming a ridge arc off the west-central AI. Bowers Ridge is about 550 km long and 75 to 110 km wide. The summit of the ridge lies in water approximately 150 to 200 m deep in the southern portion deepening northward to about 800 to 1,000 m at its northern edge.

The AI region has complicated mixes of substrates, including a significant proportion of hard substrates (pebbles, cobbles, boulders, and rock), but data are not available to describe the spatial distribution of these substrates.

The patterns of water density, salinity, and temperature are very similar to the GOA. Along the edge of the shelf in the Alaska Stream, a low salinity (less than 32.0 ppt) tongue-like feature protrudes westward. On the south side of the central AI, nearshore surface salinities can reach as high as 33.3 ppt, as the higher salinity EBS surface water occasionally mixes southward through the AI. Proceeding southward, a minimum of approximately 32.2 ppt is usually present over the slope in the Alaska Stream; values then rise to above 32.6 ppt in the oceanic water offshore. Whereas surface salinity increases toward the west as the source of fresh water from the land decreases, salinity values near 1,500 m decrease very slightly. Temperature values at all depths decrease toward the west.

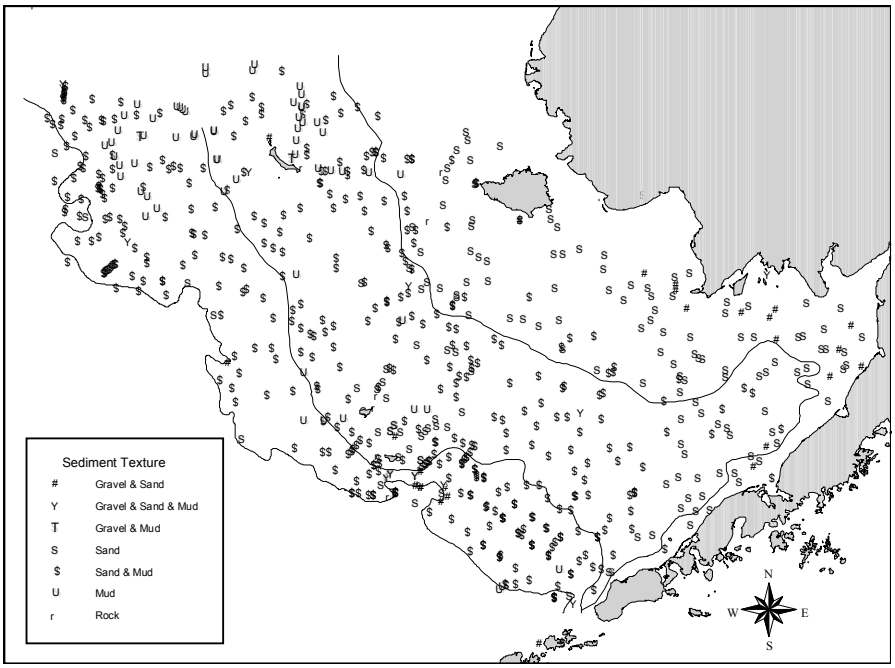
Climate change effects on the AI area are similar to the effects described for climate change in the EBS. For more information on the physical environment of the AI, refer to the Alaska Groundfish Fisheries Programmatic Supplemental EIS (NMFS 2004).

Figure 1 Surficial sediment textural characteristics (Appendix B, NMFS 2005) for the continental shelf.



Source: Naidu, 1988

Figure 2 Distribution of Bering Sea Sediments



Source: Smith and McConnaughey 1999

2.2 General Life History Information for Crab

Shallow inshore areas (less than 50 m depth) are very important to king crab reproduction as they move onshore to molt and mate. Tanner crabs also occupy shallower depths during molting and mating. All BSAI crab are highly vulnerable to predation and damage during molting when they shed their exoskeleton. Female king crab molt annually to mate while Tanner and snow crab exhibit terminal molt and carry sperm for future clutch fertilization. The habitat occupied by molting and mating crab differs from that occupied by mature crabs during the remainder of the year. The EFH EIS crab technical team noted protection of crab in molting mating habitat during this sensitive life history stage is important.

Larval stages are distributed according to vertical swimming abilities, and the currents, mixing, or stratification of the water column. Generally, the larval stages occupy the upper 30 m, often in the mixed layer near the sea surface. As the larvae molt and grow into more actively swimming stages they are able to seek a preferred depth. After molting through multiple larval stages, crabs settle on the bottom. Settlement on habitat with adequate shelter, food, and temperature is imperative to survival of first settling crabs. Young of the year red and blue king crabs require nearshore shallow habitat with significant cover that offers protection (e.g., sea stars, anemones, macroalgae, shell hash, cobble, shale) to this frequently molting life stage. Early juvenile stage Tanner and snow crab also occupy shallow waters and are found on mud habitat. Late juvenile stage crab are most active at night when they feed and molt. The EFH EIS crab technical team emphasized the importance of shallow areas to all early juvenile stage crabs and in particular the importance to red and blue king crabs of high relief habitat nearshore with extensive biogenic assemblages. The area north and adjacent to the Alaska peninsula (Unimak Island to Port Moller), the eastern portion of Bristol Bay, and nearshore areas of the Pribilof and Saint Matthew Islands are locations known to be particularly important for king crab spawning and juvenile rearing.

Egg Stage
Female king and Tanner crabs extrude eggs, carry and nurture them outside the maternal body. The number of eggs developed by the female increases with body size and is linked to nutrition at favorable temperatures. Information on egg bearing females is used to define habitat for the egg stage of crabs.

Larval Stage
Successful hatch of king and Tanner crab larvae is a function of temperature and concentration of diatoms, so presence of larvae in the water column can vary accordingly. Larvae are planktonic. Their sustained horizontal swimming is inconsequential compared to horizontal advection by oceanographic conditions. Larvae vertically migrate within the water column to feed. Diel vertical migration may be a retention mechanism to transport larvae inshore.

Early Juvenile Stage
The early juvenile stage includes crabs first settling on the bottom (glacothoe and megalops), young of the year crabs, and crabs up to a size approximating age 2. Habitat relief is obligatory for red and blue King crabs of this life stage. Individuals are typically less than 20 mm CL distributed in nearshore waters among niches provided by sea star arms, anemones, shell hash, rocks and other bottom relief. Early juvenile Tanner crab settle on mud, are known to occur there during summer but are not easily found in this habitat in winter.

Late Juvenile Stage
The late juvenile stage for crab is defined as the size at about age 2 to the first size of functional maturity. Late juvenile crabs are typically found further offshore in cooler water than early juvenile crabs. Smaller red king crabs of this life stage form pods during the day that break apart during the night when the crabs forage and molt. As these crabs increase in size, podding behavior declines and the animals are found to forage throughout the day.

Mature Stage
Mature crabs are defined as those crabs of a size that is functionally mature. Functional maturity is based on size observed in mating pairs of crabs. This maturity definition differs from morphometric maturity based on chela height and physiological maturity when sperm or eggs can be produced. The mature stage includes crabs from the first size of functional maturity to senescence.

The following abbreviations are used in the habitat tables to specify location, position in the water column, bottom type, and other oceanographic features.

Table 1 **Abbreviations used in the EFH report tables to specify location, depth, bottom type, and other oceanographic features**

Location

ICS = inner continental shelf (1-50 m)
MCS = middle continental shelf (50-100 m)
OCS = outer continental shelf (100-200 m)
USP = upper slope (200-1000 m)
LSP = lower slope (1000-3000 m)
BSN= basin (>3000 m)
BCH = beach (intertidal)
BAY = nearshore bays, give depth if appropriate (e.g., fjords)
IP = island passes (areas of high current), give depth if appropriate

Water column

D = demersal (found on bottom)
SD/SP = semi-demersal or semi-pelagic if slightly greater or less than 50% on or off bottom
P = pelagic (found off bottom, not necessarily associated with a particular bottom type)
N = neustonic (found near surface)

Bottom Type

M = mud S = sand
SM = sandy mud
MS = muddy sand
SAV = subaquatic vegetation (e.g., eelgrass, not kelp)
R = rock
CB = cobble
G = gravel
C = coral
K = kelp

Oceanographic Features

UP = upwelling G = gyres F = fronts E = edges
CL = thermocline or pycnocline

General

U = Unknown N/A = not applicable

Table 2 Summary of Habitat Associations for BSAI Crab

BSAI Crab		Nearshore				Shelf			Slope						Stratum Reference							Location							Physical Oceanography				
						Inner	Middle	Outer	Upper		Inter-mediate		Lower	Basin												Pelagic							
Species	Life Stage	Freshwater	Estuarine	Intertidal	Subtidal	1-50m	51-100m	101-200m	201-300m	301-500m	501-700m	701-1000m	1001-3000m	>3000m	Shallows	Island Pass	Bay/Fjord	Bank	Flat	Edge	Gully	Surafce	Near surface	Semi-demersal	Demersal	1-200m (epi)	201-1000m (meso)	>1000m (bathy)	Upwelling areas	Gyres	Thermo/pycnocline	Fronts	Edges (ice, bath)
Blue King Crab	M					x	x	x																	x								
	LJ					x	x	x																	x								
	EJ					x	x																		x								
	L					x	x																			x							
	E					x	x	x																	x								
Golden King Crab	M							x	x	x	x	x				x		x							x								
	LJ												x	x				x							x								
	EJ												x	x											x								
	L																									x							
	E							x	x	x	x							x							x								
Red King Crab	M					x	x	x																	x								
	LJ					x	x	x																	x								
	EJ					x	x																		x								
	L					x	x																			x							
	E					x	x	x																	x								
Snow Crab	M					x	x	x																	x								
	LJ					x	x	x																	x								
	EJ					x	x																		x								
	L					x	x																			x							
	E					x	x	x																	x								
Tanner	M					x	x	x	x	x	x						x	x							x							x	
	LJ			x	x	x	x	x	x	x								x							x						x	x	
	EJ				x	x	x	x	x	x								x							x								
	L		x	x	x	x	x																			x						x	
	E				x	x	x	x	x	x	x	x													x							x	

BSAI Crab		Substrate													Structure									
Species	Life Stage	Organic Debris	Mud	Sand	Gravel	Mud & sand	Mud & gravel	Sand & mud	Gravel & mud	Gravel & sand	Gravel & sand & mud	Gravel & mud & sand	Cobble	Rock	Bars	Sinks	Slumps\Rockfalls\Debris	Channels	Ledges	Pinnacles	Seamounts	Reefs	Vertical Walls	Man-made
Blue King Crab	M			x	x								x	x			x	x	x	x		x	x	
	LJ			x	x								x	x			x	x	x	x		x	x	
	EJ																							
	L																							
	E			x	x								x	x			x	x	x	x		x	x	
Golden King Crab	M			x	x								x	x			x	x	x	x	x	x	x	
	LJ			x	x								x	x			x	x	x	x		x	x	
	EJ																							
	L																							
	E			x	x								x	x			x	x	x	x		x	x	
Red King Crab	M	x	x	x	x	x	x	x	x	x	x	x												
	LJ	x	x	x	x	x	x	x	x	x	x	x												
	EJ				x								x	x										
	L																							
	E	x	x	x	x	x	x	x	x	x	x	x												
Snow Crab	M	x	x	x	x	x	x	x	x	x	x	x												
	LJ	x	x	x	x	x	x	x	x	x	x	x												
	EJ	x	x	x	x	x	x	x	x	x	x	x												
	L																							
	E	x	x	x	x	x	x	x	x	x	x	x												
Tanner	M	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x			x			x
	LJ	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x						x
	EJ	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x						x
	L																							
	E	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x						x

Table 3. Summary of Reproductive Traits of BSAI Crab

BSAI Crab Species	Life Stage	Age at Maturity: Female 50%	Age at Maturity: Female 100%	Age at Maturity: Male 50%	Age at Maturity: Male 100%	Fertilization/Egg Development: External	Internal	Oviparous	Ovoviviparous	Viviparous	Spawning Behavior: Batch Spawner	Broadcast Spawner	Egg Case Deposition	Nest Builder	Egg/Young Guarder	Egg/Young Bearer	Spawning Season: January	February	March	April	May	June	July	August	September	October	November	December
Blue King Crab	M	6+			6+	X		X								X	X	X	X	X	X	X	X					
	LJ																											
	EJ																											
	L																											
	E																											
Golden King Crab	M	6+			6+	X		X								X	X	X	X	X	X	X	X	X	X	X	X	X
	LJ																											
	EJ																											
	L																											
	E																											
Red King Crab	M	7 to 8		7 to 10		X		X								X	X	X	X	X	X	X	X					
	LJ																											
	EJ																											
	L																											
	E																											
Snow Crab	M	5 to 6		6 to 8		X	X	X								X	X	X	X	X	X	X						
	LJ																											
	EJ																											
	L																											
	E																											
Tanner Crab	M	5 to 6		6 to 8		X	X	X								X	X	X	X	X	X	X						
	LJ																											
	EJ																											
	L																											
	E																											

Table 4. Summary of Predator and Prey Relationships for BSAI Crab

Predator to

BSAI Crab Species	Life Stage	Algae	Plants	Plankton	Zooplankton	Diatoms	Sponges	Eusphausiid	Hydroids	Amphipoda	Copepods	Starfish	Polychaetes	Squid	Philodae (gunnels)	Bi-valves	Mollusks	Crustaceans	Ophiuroids (brittle stars)	Shrimps, mysidacae	Sand lance	Osmerid (eulachon)	Herring	Myctophid (lantern fishes)	Cottidae (sculpins)	Arrowtooth	Salmon	Cod	Pollock	Halibut
Blue King Crab	M	X				X			X			X	X			X	X	X												
	LJ	X				X			X			X	X			X	X	X												
	EJ																													
	L																													
	E																													
Golden King Crab	M	X				X			X			X	X			X	X	X	X											
	LJ	X				X			X			X	X			X	X	X												
	EJ																													
	L																													
	E																													
Red King Crab	M	X				X			X			X	X			X	X	X												
	LJ	X				X			X			X	X			X	X	X												
	EJ																													
	L																													
	E																													
Snow Crab	M	X				X			X			X	X			X	X	X												
	J	X				X			X			X	X			X	X	X												
	L																													
Tanner Crab	M	X				X			X			X	X			X	X	X												
	LJ	X				X			X			X	X			X	X	X												
	EJ																													
	L	X			X	X																								
	E																													

Prey of

BSAI Crab Species	Life Stage	Jellyfish	Starfish	Chaetognaths (arrowworms)	Crab	Herring	Salmon	Pollock	Pac fic Cod	Rockfish	Rock Sole	Flathead Sole	Yellowfin sole	Arrowtooth flounder	Skate	Hailbut	Salmon Shark	Northern Fur Seal	Harbor Seal	Steller sea lion	Dalls Porpoise	Beluga whale
Blue King Crab	M								X							X						
	LJ								X							X						
	EJ								X							X						
	L																					
	E																					
Golden King Crab	M								X							X						
	LJ								X							X						
	EJ								X							X						
	L																					
	E																					
Red King Crab	M								X							X						
	LJ								X							X						
	EJ								X							X						
	L																					
	E																					
Snow Crab	M								X													
	J								X			X	X		X	X						
	L																					
Tanner Crab	M								X													
	LJ								X		X	X	X		X	X						
	EJ								X		X	X	X		X	X						
	L	X		X		X	X	X														
	E																					

2.3 Habitat Description for Red King Crab (*Paralithodes camtschaticus*)

Life History and General Distribution

Red king crab (*Paralithodes camtshaticus*) is widely distributed throughout the BS and AI, GOA, Sea of Okhotsk, and along the Kamchatka shelf. Red king crab are typically at depths <100 fathoms (fm). 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, 50 percent maturity is attained by males at 12 cm CL and 9 cm CL by females (about 7 years). Female red king crab in the Norton Sound area reach 50 percent maturity at 6.8 cm and do not attain maximum sizes found in other areas. Size at 50 percent maturity for females in the western Aleutians is 8.9 cm CL. Natural mortality of adult red king crab is assumed to be about 18 percent per year (M=0.2), due to old age, disease, and predation.

Fishery

The red king crab fisheries are prosecuted using mesh covered pots (generally 7 or 8 feet square) set on single lines. Mean age at recruitment is about 8 to 9 years. Two discrete populations of red king crab are actively fished in the BSAI region: Bristol Bay and Norton Sound. A third population surrounding the AI was managed separately as Adak and Dutch Harbor stocks until 1996 when the management areas were combined. The fishery on the Adak stock was closed in 1996, and the fishery on the Dutch Harbor stock has closed since the 1983 to 1984 season. These fisheries historically occurred in the winter and spring. Red king crab are allowed as bycatch during golden king crab fisheries in those areas. Other populations of red king crab are fished in the Pribilof Islands area, St. Matthew, and St. Lawrence Island area, but are managed in conjunction with the predominant blue king crab fisheries. Red king crab stocks are managed separately to accommodate different life histories and fishery characteristics. Male only red king crab >16.5 cm CL are allowed to be taken from Bristol Bay and the Pribilof and AI. The minimum size limit for harvest of male only crab from the Norton Sound and the St. Matthew and St. Lawrence Island population is 12 cm. The season in Bristol Bay begins on November 1 and generally has lasted less than 10 days in recent years. Bycatch in red king crab fisheries consists primarily of Tanner crab and nonlegal red king crab. The commercial fishery for red king crab in Norton Sound occurs in the summer, opening July 1, and a winter through-the-ice fishery opens November 15 and closes May 15.

Bottom trawls and dredges could disrupt nursery and adult feeding areas.

Relevant Trophic Information

Pacific cod is the main predator on red king crabs. Walleye pollock, yellowfin sole, and Pacific halibut are minor consumers of pelagic larvae, settling larvae, and larger crabs, respectively. Juvenile crab may be cannibalistic during molting.

Approximate Upper Size Limit of Juvenile Crab (in cm): The size at 50 percent maturity is 7 and 9 cm CL for female and male red king crabs, respectively, from Norton Sound and St. Matthew and St. Lawrence Islands; it is 9 and 12 cm, respectively, for Bristol Bay and the Pribilof and Aleutian Islands.

Habitat and Biological Associations

Egg: Egg hatch of larvae is synchronized with the spring phytoplankton bloom in southeast Alaska suggesting temporal sensitivity in the transition from benthic to planktonic habitat. Also see mature phase description; eggs are carried by adult female crab.

Larvae: Red king crab larvae spend 2 to 3 months in pelagic larval stages before settling to the benthic life stage. Reverse diel migration and feeding patterns of larvae coincide with the distribution of food sources.

Early Juvenile: Early juvenile stage red king crabs 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. Young-of-the-year crabs occur at depths of 50 m or less.

Late Juvenile: Late juvenile stage red king crabs ages of 2 and 4 years exhibit decreasing reliance on habitat and a tendency for the crab to form pods consisting of thousands of crabs. Late juvenile crab associate with deeper waters and migrate to shallower water for molting and mating in the spring. Aggregation behavior continues into adulthood.

Mature: Mature red king crabs exhibit seasonal migration to shallow waters for reproduction. The remainder of the year, red king crabs are found in deeper waters. In Bristol Bay, red king crabs 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.

SPECIES: Red king crab, *Paralithodes camtschaticus*

Life Stage	Duration or Age	Diet/Prey	Season /Time	Location	Water Column	Bottom Type	Oceanographic Features	Other
Eggs	11 mo	NA	May-April	NA	NA	NA	F	
Larvae	3-5 mo	Diatoms, Phytoplankton Copepod nauplii	April-August	MCS, JCS	P	NA	F	
Juveniles	1 to 5-6 yrs	Diatoms Hydroids	All year	ICS, MCS, BCH, BAY	D	SAV (epifauna), R, CB, G	F	Found among biogenic assemblages (sea onions, tube worms, bryozoans, ascidians, sea stars)
Adults	5-6+ yrs	Mollusks, echinoderms, polychaetes, decapod, crustaceans, Algae, urchins, hydroids, sea stars	Spawning Jan-June	MCS, ICS, BAY, BCH	D	S, M, CB, G	F	

2.4 Habitat Description for Blue King Crab *(Paralithodes platypus)*

Life History and General Distribution

Blue king crab (*Paralithodes platypus*) has a discontinuous distribution throughout its range (Hokkaido, Japan to Southeast Alaska). In the BS, discrete populations exist in the cooler waters around the Pribilof Islands, St. Matthew Island, and St. Lawrence Island. Smaller populations have been found in Herendeen

Bay and around Nunivak and King Island, as well as isolated populations in the GOA. Blue king crab molt multiple times as juveniles. In the Pribilof area, 50 percent maturity of females is attained at 9.6 cm CL, which occurs at about 5 years of age. Blue king crab in the St. Matthew area mature at smaller sizes (50 percent maturity at 8.1 cm CL for females) and do not get as large overall. Skip molting occurs with increasing probability for those males larger than 10 cm CL and is more prevalent for St. Matthew Island crab. Larger female blue king crab have a biennial ovarian cycle and a 14-month embryonic period. 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 0.6ºC.

Fishery

The blue king crab fisheries are prosecuted using mesh covered pots (generally 7 or 8 feet square) set on single lines. Two discrete stocks of blue king crab are fished: the Pribilof Islands and the St. Matthew Island stocks. These blue king crab fisheries have occurred in September in recent years. Bycatch in the blue king crab fisheries consist almost entirely of non-legal blue king crabs. Male only crabs >16.5 cm carapace width (CW) are harvested in the Pribilof Islands, while the St. Matthew Islands fishery is managed with a minimum size limit of 140 mm.

Bottom trawls and dredges could disrupt nursery and adult feeding areas.

Relevant Trophic Information

Pacific cod is a predator on blue king crabs.

Approximate Upper Size Limit of Juvenile Crab (in cm): The size at 50 percent maturity is 9- and 12-cm CL for female and male crabs from the Pribilof Islands, and 8- and 10.5-cm CL for St. Matthew Island.

Habitat and Biological Associations

Egg: See mature phase description; eggs are carried by adult female crab.

Larvae: Blue king crab larvae spend 3.5 to 4 months in pelagic larval stages before settling to the benthic life stage. Larvae are found in waters between 40 to 60 m deep.

Early Juvenile: Early juvenile blue king crabs require area found in substrate characterized by gravel and cobble overlaid with shell hash and sponge, hydroid, and barnacle assemblages. These habitat areas have been found at 40 to 60 m around the Pribilof Islands.

Late Juvenile: Late juvenile blue king crab are found in nearshore rocky habitat with shell hash.

Mature: Mature blue king crabs occur most often between 45 and 75 m deep on mud-sand substrate adjacent to gravel rocky bottom. Female crabs are found in a habitat with a high percentage of shell hash. Mating occurs in mid-spring. Larger older females reproduce biennially, while small females tend to reproduce annually. Fecundity of females range from 50,000 to 200,000 eggs per female. It has been suggested that spawning may depend on the availability of nearshore rocky-cobble substrate for protection of females. Larger older crabs disperse farther offshore and are thought to migrate inshore for molting and mating.

SPECIES: **Blue king crab, *Paralithodes platypus***

Life Stage	Duration or Age	Diet/Prey	Season/ Time	Location	Water Column	Bottom Type	Oceano-graphic Features	Other
Eggs	14 mo.	NA	Starting April-May	NA	NA	NA	F	
Larvae	3.5 to 4 mo.		April-July	MCS, ICS	P	NA	F	
Juveniles	to about 5 years		All year	MCS, ICS	D	CB, G, R	F	
Adults	5+ years		Spawning Feb-Jun	MCS, ICS	D	S, M, CB, G, R	F	

2.5 Habitat Description for Golden King Crab *(Lithodes aequispina)*

Life History and General Distribution

Golden king crab (*Lithodes aequispina*), also called brown king crab, range from Japan to British Columbia. In the BS and AI, golden king crab are found at depths from 100 to 1,000 m, generally in high relief habitat such as inter-island passes, and they are usually slope-dwelling. Size at sexual maturity depends on latitude and ranges from 9.8 to 11 cm CL, with crabs in the northern areas maturing at smaller sizes. Females carry up to 20,000 eggs, depending on their size. The season of reproduction appears to be protracted and may be year-round.

Fishery

The golden king crab fisheries are prosecuted using mesh covered pots set on longlines to minimize gear loss. The primary fishery is in the AI, with minor catches coming from localized areas in the BS and GOA. Until 1996, the golden king crabs in the AI were managed as two separate stocks: Adak and Dutch Harbor. The fishing season opens September 1 and male crab >15.2 cm are harvested. Golden king crab are harvested in the BS under conditions of a permit issued by the Commissioner of the Alaska Department of Fish and Game. Bycatch consists almost exclusively of non-legal golden king crab. Escape rings were adopted by the Alaska Board of Fisheries in 1996 to reduce capture and handling mortality of non-target crab; a minimum of four 5.5-inch rings are required on pots used in golden king crab fisheries.

Relevant Trophic Information

Unknown

Approximate Upper Size Limit of Juvenile Crab (in cm): The size (CL) at 50 percent maturity for females and males: Aleutians 11 and 12.5 cm, Pribilofs 10 and 10.7 cm, Northern BS 9.8 and 9.2 cm.

Habitat and Biological Associations

Golden king crabs occur on hard bottom, over steep rocky slopes, and on narrow ledges. Strong currents are prevalent. Golden king crabs coexist with abundant quantities of epifauna: sponges, hydroids, coral, sea stars, bryozoans, and brittle stars.

Egg: Information is limited. See mature phase description; eggs are carried by adult female crab.

Larvae: Information is not available.

Early Juvenile: Information is not available.

Late Juvenile: Late juvenile golden king crabs are found throughout the depth range of the species. Abundance of late juvenile crab increases with depth, and these crab are most abundant at depths >548 m.

Mature: Mature golden king crabs occur at all depths within their distribution. Males tend to congregate in somewhat shallower waters than females, and this segregation appears to be maintained throughout the year. Legal male crabs are most abundant between 274 and 639 m. Abundance of sub-legal males increases at depth >364 m. Female abundance is greatest at intermediate depths between 274 and 364 m.

SPECIES: Golden king crab, *Lithodes aequispina*

Life Stage	Duration or Age	Diet/Prey	Season/ Time	Location	Water Column	Bottom Type	Oceano-graphic Features	Other
Eggs		n/a	all year	LSP	D			
Larvae	U		all year	U	P			
Juveniles			all year		D			
Adults		Ophiuroids, sponges, plants	Spawning Feb.-Aug.	LSP, BSN	D			

2.6 Habitat Description for Scarlet King Crab *(Lithodes couesi)*

Life History and General Distribution

Little information is available on the biology of the scarlet king crab (*Lithodes couesi*), found in the BS and AI area. Based on data from the GOA, this species occurs in deep water, primarily on the continental slope. Spawning may be asynchronous. Females can produce up to 5,000 eggs, depending on female size.

Fishery

Scarlet king crab are harvested by longlining mesh covered pots. Directed fishing may occur only under conditions of a permit issued by the Commissioner of the Alaska Department of Fish and Game. Scarlet king crab are also taken incidentally in the golden king crab fishery.

Relevant Trophic Information

Unknown

Approximate Upper Size Limit of Juvenile Crab (in cm): The size (CL) of 50 percent maturity for female and males is 8 cm and 9.1 cm.

Habitat and Biological Associations

Scarlet king crab are associated with steep rocky outcrops and narrow ledges. Strong currents are prevalent.

Egg: Information is limited. See mature phase description; eggs are carried by adult female crab.

Larvae: Information is not available.

Early Juvenile: Information is not available.

Late Juvenile: Information is not available.

Mature: Information is limited. Mature scarlet king crabs are caught incidentally in the golden king crab and *C. tanneri* fisheries.

2.7 Habitat Description for Tanner Crab (*Chionoecetes bairdi*)

Life History and General Distribution

Tanner crab (*Chionoecetes bairdi*) are distributed on the continental shelf of the North Pacific Ocean and BS from Kamchatka to Oregon. Off Alaska, Tanner crab are concentrated around the Pribilof Islands and immediately north of the Alaska Peninsula. They are found in lower abundance in the GOA. Size at 50 percent maturity, as measured by CW is 11 cm for males and 9 cm for females in the BS. The corresponding age of maturity for male Tanner crab is approximately 6 to 8 years. Mature male Tanner crabs may skip a year of molting as they attain maturity. Natural mortality of adult Tanner crab is assumed to be about 25 percent per year (M=0.3).

Fishery

The Tanner crab fisheries are prosecuted using mesh covered pots (generally 7 or 8 feet square) set on single lines. Mean age at recruitment is 8 to 9 years. Male crab >14 cm CW may be harvested. Fisheries operate on three separate stocks: EBS, eastern AI, and western AI. The directed fishery was closed in 1996 due to low catch per unit effort (CPUE) relative to pre-season expectations. The Tanner crab stocks of the AI are very small, and populations are found in only a few large bays and inlets. As such, the fisheries are limited, occurring during the winter. No commercial fishery was allowed for Tanner crabs in either the east or west AI in 1995 and 1996. The directed fishery for BS Tanner crab opens 7 days after closure of the Bristol Bay red king crab fishery. However, retention of Tanner crab is allowed during the Bristol Bay red king crab fishery that opens November 1. Bycatch in the directed fishery consists of primarily of non-legal Tanner crab and red king crab. A 3-inch maximum tunnel height opening for Tanner crab pots is required to inhibit the bycatch of red king crab. Also, escape rings are required to reduce capture and handling mortality of all non-target crab; a minimum of four 5-inch rings are required on pots used in Tanner crab fisheries.

Bottom trawls and dredges could disrupt nursery and adult feeding areas.

Relevant Trophic Information

Pacific cod is the main predator on Tanner crabs in terms of biomass. Predators consume primarily age 0 and 1 juvenile Tanner crab with a less than 7-cm CW. However, flathead sole, rock sole, halibut, skates, and yellowfin sole are important in terms of numbers of small crab. Larval predators include salmon, herring, jellyfish, and chaetognaths. Cannibalism has been observed in laboratory environments among juvenile crabs during molting.

Approximate Upper Size Limit of Juvenile Crab (in cm): The size at 50 percent maturity is 9- and 11-cm CW for female and male crabs.

Habitat and Biological Associations

Egg: See mature phase description; eggs are carried by adult female crab.

Larvae: Larvae of *C. bairdi* Tanner crabs are typically found in the BSAI water column from 0 to 100 m in early summer. They are strong swimmers and perform diel migrations in the water column (down at night). They usually stay near the depth of the chlorophyll maximum during the day. The last larval stage settles onto the bottom mud.

Early Juvenile: Early juvenile *C. bairdi* Tanner crabs occur at depths of 10 to 20 m in mud habitat in summer and are known to burrow or associate with many types of cover. Early juvenile *C. bairdi* Tanner crabs are not easily found in winter.

Late Juvenile: The preferred habitat for late juvenile *C. bairdi* Tanner crabs is mud. Late juvenile Tanner crab migrate offshore of their early juvenile nursery habitat.

Mature: Mature *C. bairdi* Tanner crabs migrate inshore, and mating is known to occur from February through June. Mature female *C. bairdi* Tanner crabs have been observed in 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 female *C. bairdi* Tanner crabs can retain viable sperm in spermathecae up to 2 years or more. Females carry clutches of 50,000 to 400,000 eggs and nurture the embryos for 1 year after fertilization. Primiparous females may carry the fertilized eggs for as long as 1.5 years. Brooding occurs in 100 to 150 m depths.

SPECIES: Tanner crab, *Chionoecetes bairdi*

Life Stage	Duration or Age	Diet/Prey	Season/ Time	Location	Water Column	Bottom Type	Oceano-graphic Features	Other
Eggs	1 year	NA	April-March	NA	NA	NA	F	
Larvae	2 to 7 mo.	Diatoms Algae Zooplankton	Summer	MCS, ICS	P	NA	F	
Juveniles	1 to 6 years	Crustaceans polychaetes mollusks diatoms algae hydroids	All year	MCS, ICS, BAY, BCH	D	M	F	
Adults	6+ years	Polychaetes crustaceans mollusks hydroids alsae diatoms	Spawning Jan. to June (peak April-May)	MCS, ICS	D	M	F	

2.8 Habitat Description for Snow Crab (*Chionoecetes opilio*)

Life History and General Distribution

Snow crabs (*Chionoecetes opilio*) are distributed on the continental shelf of the BS, Chukchi Sea, and in the western Atlantic Ocean as far south as Maine. Snow crab are not present in the GOA. In the BS, snow crabs are common at depths less than 200 m. The EBS 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 percent of the females are mature at 5-cm CW, the mean size of mature females varies from year to year over a range of 6.3- to 7.2-cm CW. Females cease growing with a terminal molt upon reaching maturity and rarely exceed 8 cm CW. The median size of maturity for males is about 8.5-cm CW

(approximately 6 to 8 years old). Males larger than 6 cm grow at about 2 cm per molt, up to an estimated maximum size of 14.5-cm CW, but individual growth rates vary widely. Natural mortality of adult snow crab is assumed to be about 25 percent per year (M=0.3).

Fishery

The snow crab fishery is prosecuted using mesh covered pots (generally 7 or 8 feet square) set on single lines. Male only crab greater than 7.8-cm CW may be harvested; however, a market minimum size of about 10.2 cm CW is generally observed. Most male snow crab probably enter the fishery at around age 6 to 8 years. Snow crab are probably one stock in the BS. The season opening date is January 15. A 3-inch maximum tunnel height opening for snow crab pots is required to inhibit the bycatch of red king crab. A minimum of eight 4-inch escape rings are required on snow crab pots to reduce capture and handling mortality of non-target crab. Bycatch in the snow crab fishery consists primarily of *C. bairdi* and non-legal *C. opilio*.

Bottom trawls and dredges could disrupt nursery and adult feeding areas.

Relevant Trophic Information

Pacific cod, sculpins, skates, and halibut are the main predators on snow crabs in terms of biomass. Snow crabs less than 7-cm CW are most commonly consumed. Other predators include yellowfin sole, flathead sole, Alaska plaice, walleye pollock, rock sole, bearded seals, and walrus. Juvenile snow crabs have been observed to be cannibalistic during molting in laboratory environments.

Approximate Upper Size Limit of Juvenile Crab (in cm): The size at 50 percent maturity is 5- and 8.5-cm CW for female and male crabs, respectively.

Habitat and Biological Associations

Egg: See mature phase description; eggs are carried by adult female crab.

Larvae: Larvae of C. opilio snow crab are found in early summer and exhibit diel migration. The last of three larval stages settles onto bottom in nursery areas.

Early Juvenile: Shallow water areas of the EBS are considered nursery areas for *C. opilio* snow crabs and are confined to the mid-shelf area due to the thermal limits of early and late juvenile life stages.

Late Juvenile: A geographic cline in size of *C. opilio* snow crabs indicates that a large number of morphometrically immature crabs occur in shallow waters less than 80 m.

Mature: Female *C. opilio* snow crabs are acknowledged to attain terminal molt status at maturity. Primiparous female snow crabs mate January through June and may exhibit longer egg development period and lower fecundity than multiparous female crabs. Multiparous female snow crabs can store spermatophores in seminal vesicles and fertilize subsequent egg clutches without mating. At least two clutches can be fertilized from stored spermatophores, but the frequency of this occurring in nature is not known. Females carry clutches of approximately 36,000 eggs and nurture the embryos for approximately 1 year after fertilization. However, fecundity may decrease up to 50 percent between the time of egg extrusion and hatching, presumably due to predation, parasitism, abrasion, or decay of unfertilized eggs. Brooding probably occurs in depths greater than 50 m.

SPECIES: **Snow crab, *Chionoecetes opilio***

Life Stage	Duration or Age	Diet/Prey	Season/ Time	Location	Water Column	Bottom Type	Oceano-graphic Features	Other
Eggs	1 year	NA		NA	NA	NA	F	
Larvae	2 to 7 mo.	Diatoms algae zooplankton	Spring, summer	ICS, MCS	P	NA	F	
Juveniles	1 to 4 years	Crustaceans polychaetes mollusks diatoms algae hydroids	All year	ICS, MCS, OCS	D	M	F	
Adults	4+ years	Ploychaetes brittle stars mollusks crustaceans hydroids algae diatoms	Spawning Jan. to June (peak April-May)	ICS, MCS, OCS	D	M	F	

2.9 Habitat Description for Grooved Tanner Crab *(Chionoecetes tanneri)*

Life History and General Distribution

In the eastern North Pacific Ocean, the grooved Tanner crab (*Chionoecetes tanneri*) ranges from northern Mexico to Kamchatka. Little information is available on the biology of the grooved Tanner crab. This species occurs in deep water and is not common at depths exceeding 300 m. Male and female crabs are found at similar depths. Male and female grooved Tanner crab generally reach maturity at 11.9- and 7.9-cm CW, respectively.

Fishery

Directed harvest of grooved Tanner crab has been sporadic since the first reported landings in 1988. Crabs are taken in mesh covered pots deployed on a longline. Harvest can occur only under conditions of a permit issued by the Commissioner of the Alaska Department of Fish and Game.

Relevant Trophic Information

Unavailable

Approximate Upper Size Limit of Juvenile Crab (in cm): Size at 50 percent maturity is 11.9-cm CW for males and 7.9-cm CW for females.

Habitat and Biological Associations

Egg: Information is not available.

Larvae: Information is not available.

Early Juvenile: Information is not available.

Late Juvenile: Information is not available.

Mature: In the EBS, mature male grooved Tanner crabs may be found somewhat more shallow than mature females, but male and female crabs do not show clear segregation by depth.

2.10 Habitat Description for Triangle Tanner Crab (*Chionoecetes angulatus*)

Life History and General Distribution

In the eastern North Pacific Ocean, the distribution of triangle Tanner crab (*Chionoecetes angulatus*) ranges from Oregon to the Sea of Okhotsk. This species occurs on the continental slope in waters deeper than 300 m and has been reported as deep as 2,974 m in the EBS. A survey limited to a particular depth range found that mature male crabs inhabit depths around 647 m shallower than the mean depth of 748 m for female crabs. Size at 50 percent maturity for male triangle Tanner crabs is 9.1-cm CW and 5.8-cm CW for females.

Fishery

A directed fishery for triangle Tanner crab was documented for the first time in 1995. Prior to 1995, these crab had been harvested as bycatch in the *C. tanneri* fishery. Directed harvest is allowed only under the conditions of a permit issued by the Commissioner of the Alaska Department of Fish and Game. Crab are taken in mesh covered pots deployed on a longline.

Relevant Trophic Information

Unknown

Approximate Upper Size Limit of Juvenile Crab (in cm): In the EBS, male triangle Tanner crabs reach size at 50 percent maturity at 9.1-cm CW and females at 5.8-cm CW.

Habitat and Biological Associations

Egg: Information is not available.

Larvae: Information is not available.

Early Juvenile: Information is not available.

Late Juvenile: Information is not available.

Mature: The mean depth of mature male triangle Tanner crabs (647 m) is significantly less than for mature females (748 m), indicating some pattern of sexual segregation by depth.

3.0 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." For the purpose of interpreting the definition of essential fish habitat: "waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom,

structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

EFH is the general distribution of a species described by life stage. General distribution is a subset of a species population and is 95 percent of the population for a particular life stage, if life history data are available for the species. Where information is insufficient and a suitable proxy cannot be inferred, EFH is not described. General distribution is used to describe EFH for all stock conditions whether or not higher levels of information exist, because the available higher level data are not sufficiently comprehensive to account for changes in stock distribution (and thus habitat use) over time.

EFH is described for FMP-managed species by life stage as general distribution using guidance from the EFH Final Rule (67 FR 2343), such as the EFH Level of Information definitions. Analytical tools are used and recent scientific information is incorporated for each life history stage from scientific habitat assessment reports. EFH descriptions include both text (see section 3.1) and a map (see section 3.2), if information is available for a species' particular life stage. These descriptions are risk averse, supported by scientific rationale, and account for changing oceanographic conditions, regime shifts, and the seasonality of migrating crab stocks. The methodology and data sources for the EFH descriptions are described in Appendix D to the EFH EIS (NMFS 2005).

3.1 Description of Essential Fish Habitat

EFH descriptions are based upon the best available scientific information. In support of this information, a thorough review of FMP species is contained in this Appendix and in the EFH EIS (NMFS 2005). A summary of the habitat information levels for each species, as described in the EFH regulations at 50 CFR 600.815(a)(1)(iii), is listed in Table 8.1. An "x" means that insufficient information is available to determine EFH for the life stage and "1" means information is available to determine EFH.

Table 8.1 EFH information levels currently available for BSAI crab, by life history stage.

BSAI Crab Species	Egg	Larvae	Early Juvenile	Late Juvenile	Adult
Red king crab	inferred	x	x	1	1
Blue king crab	inferred	x	x	1	1
Golden king crab	inferred	x	x	1	1
Tanner crab	inferred	x	x	1	1
Snow crab	inferred	x	x	1	1

3.1.1 Red King Crab

Eggs
Essential fish habitat of the red king crab eggs is inferred form the general distribution of egg-bearing female crab. (See also Adults.)

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile red king crab is the general distribution area for this life stage, located in bottom habitats along the inner (0 to 50 m), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates consisting of rock, cobble, and gravel and biogenic structures such as boltenia, bryozoans, ascidians, and shell hash, as depicted in Figure 3.

Adults
EFH for adult red king crab is the general distribution area for this life stage, located in bottom habitats along the nearshore (spawning aggregations) and the inner (0 to 50 m), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates consisting of sand, mud, cobble, and gravel, as depicted in Figure 3.

3.1.2 Blue King Crab

Eggs
Essential fish habitat of the blue king crab eggs is inferred from the general distribution of egg-bearing female crab. (See also Adults.)

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile blue king crab is the general distribution area for this life stage, located in bottom habitats along the nearshore where there are rocky areas with shell hash and the inner (0 to 50), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates consisting of rock, cobble, and gravel, as depicted in Figure 4.

Adults
EFH for adult blue king crab is the general distribution area for this life stage, located in bottom habitats along the inner (0 to 50 m), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates consisting of sand and mud adjacent to rockier areas and areas of shell hash, as depicted in Figure 4.

3.1.3 Golden King Crab

Eggs
Essential fish habitat of golden king crab eggs is inferred from the general distribution of egg-bearing female crab. (See also Adults.)

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile golden king crab is the general distribution area for this life stage, located in bottom habitats along the along the upper slope (200 to 500 m), intermediate slope (500 to 1,000 m), lower slope (1,000 to 3,000 m), and basins (more than 3,000 m) of the BSAI where there are high-relief living

habitats, such as coral, and vertical substrates, such as boulders, vertical walls, ledges, and deep water pinnacles, as depicted in Figure 5.

Adults
EFH for adult golden king crab is the general distribution area for this life stage, located in bottom habitats along the along the outer shelf (100 to 200 m), upper slope (200 to 500 m), intermediate slope (500 to 1,000 m), lower slope (1,000 to 3,000 m), and basins (more than 3,000 m) of the BSAI where there are high relief living habitats, such as coral, and vertical substrates such as boulders, vertical walls, ledges, and deep water pinnacles, as depicted in Figure 5.

3.1.4 Tanner Crab

Eggs
Essential fish habitat of Tanner crab eggs is inferred form the general distribution of egg-bearing female crab. (See also Adults.)

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile Tanner crab is the general distribution area for this life stage, located in bottom habitats along the inner (0 to 50 m), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates consisting mainly of mud, as depicted in Figure 6.

Adults
EFH for adult Tanner crab is the general distribution area for this life stage, located in bottom habitats along the inner (0 to 50 m), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates consisting mainly of mud, as depicted in Figure 6.

3.1.5 Snow Crab

Eggs
Essential fish habitat of snow crab eggs is inferred form the general distribution of egg-bearing female crab. (See also Adults.)

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile snow crab is the general distribution area for this life stage, located in bottom habitats along the inner (0 to 50 m), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates consisting mainly of mud, as depicted in Figure 7.

Adults

EFH for adult snow crab is the general distribution area for this life stage, located in bottom habitats along the inner (0 to 50 m), middle (50 to 100 m), and outer shelf (100 to 200 m) throughout the BSAI wherever there are substrates consisting mainly of mud, as depicted in Figure 7.

3.2 Maps of Essential Fish Habitat

Figure 3. EFH Distribution - BSAI Red King Crab (Late Juveniles/Adults)

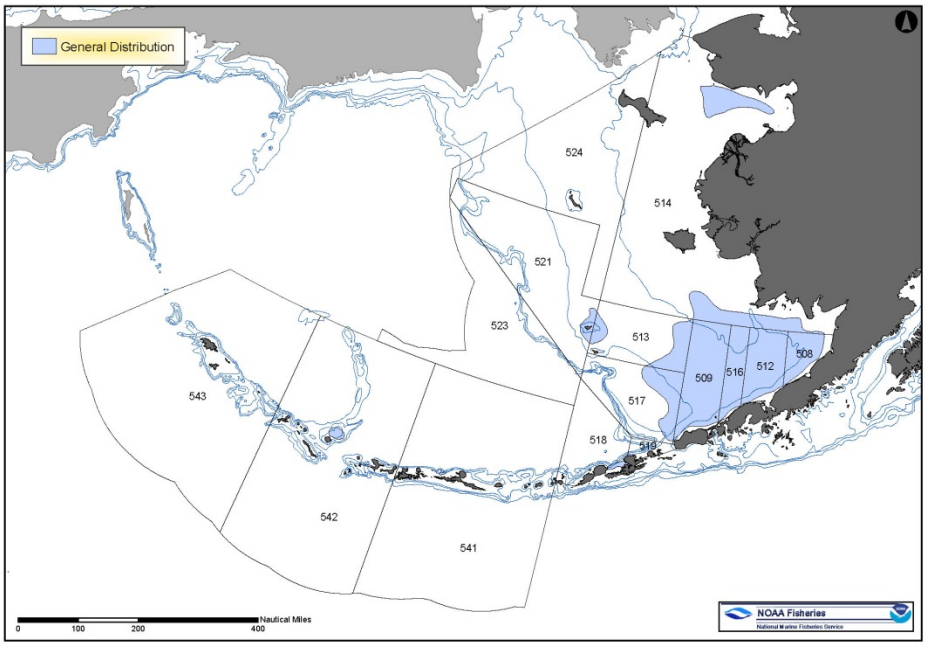


Figure 4. EFH Distribution - BSAI Blue King Crab (Late Juveniles/Adults)

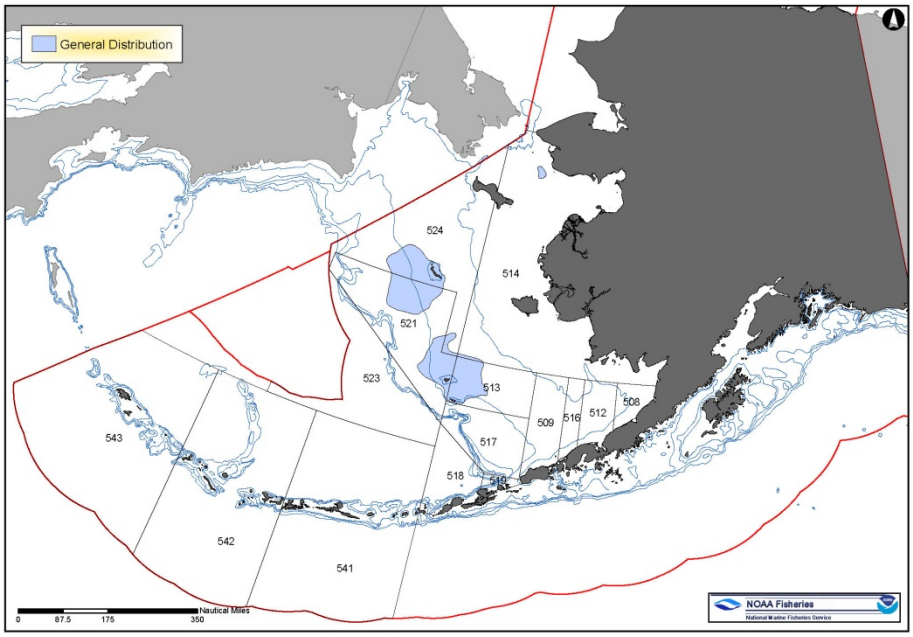


Figure 5. EFH Distribution - BSAI Golden King Crab (Late Juveniles/Adults)

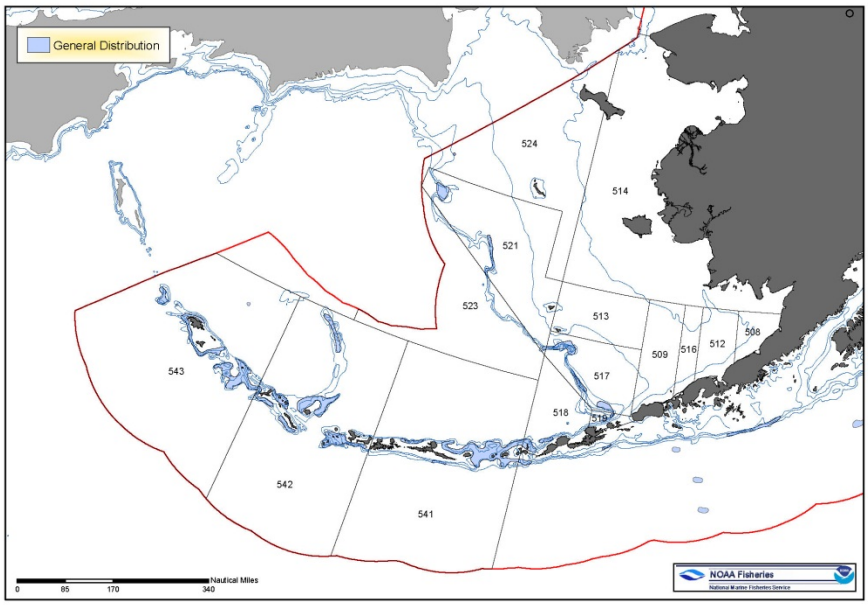


Figure 6. EFH Distribution - BSAI Tanner Crab (Late Juveniles/Adults)

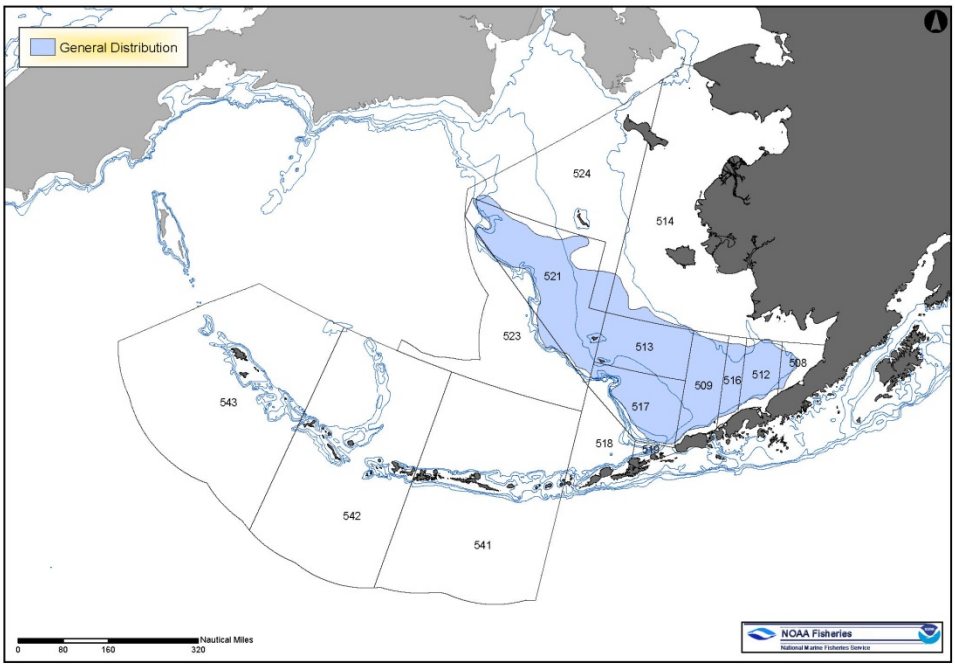
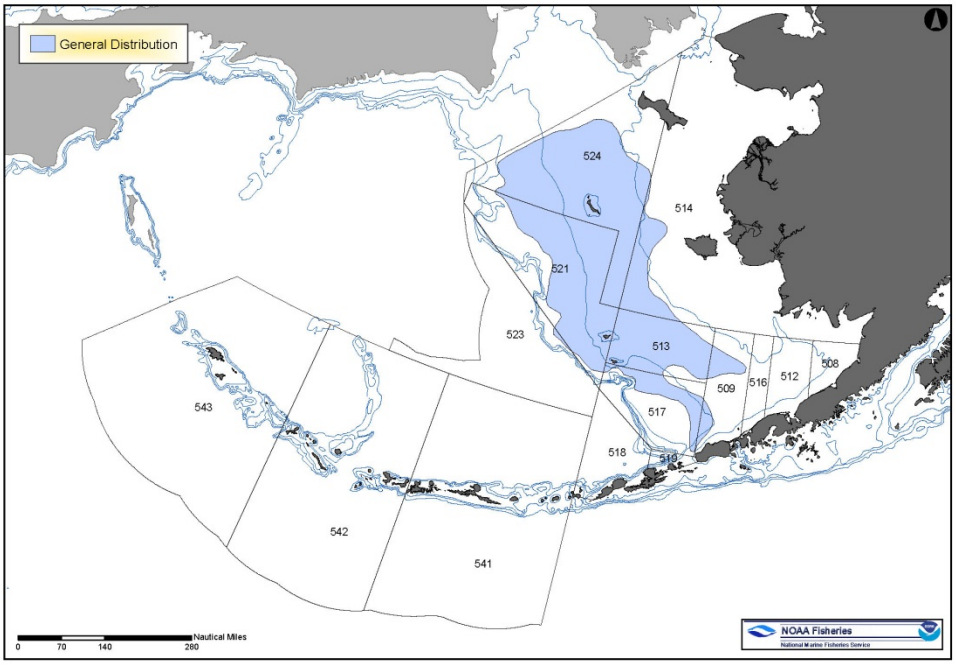


Figure 7. EFH Distribution - BSAI Snow Crab (Late Juveniles/Adults)



3.3 Essential Fish Habitat Conservation and Habitat Areas of Particular Concern

The Council established the Aleutian Islands Habitat Conservation Area and the Aleutian Islands Coral Habitat Protection Areas to protect EFH from fishing threats. The Council also established two Habitat Areas of Particular Concern (HAPCs) within crab EFH to protect those areas from fishing threats: the Alaska Seamount Protection Area and the Bowers Ridge Habitat Conservation Zone. Maps of these areas, as well at the coordinates, are provided below.

HAPCs are specific sites within EFH that are of particular ecological importance to the long-term sustainability of managed species, are of a rare type, or are especially susceptible to degradation or development. HAPCs are meant to provide greater focus to conservation and management efforts and may require additional protection from adverse effects.

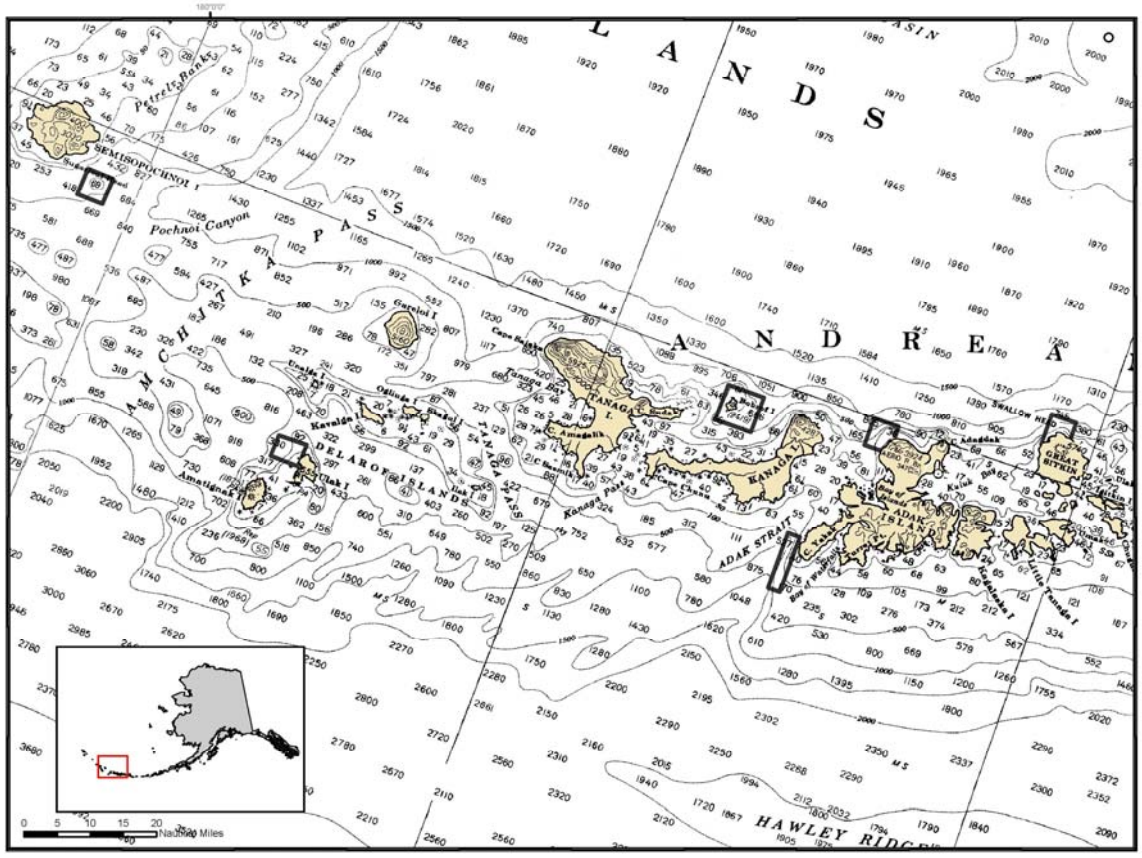
3.3.1 Aleutian Islands Coral Habitat Protection Areas

The use of bottom contact gear, including pot gear, as described in 50 CFR part 679, is prohibited year-round in the Aleutian Islands Coral Habitat Protection Areas, see Figure 8. Anchoring by a federally permitted fishing vessel, as described in 50 CFR part 679, is also prohibited. The coordinates for the areas are listed in the table below.

Area Number	Name	Latitude			Longitude		
1	Great Sitkin Is	52	9.56	N	176	6.14	W
	Great Sitkin Is	52	9.56	N	176	12.44	W
	Great Sitkin Is	52	4.69	N	176	12.44	W
	Great Sitkin Is	52	6.59	N	176	6.12	W
2	Cape Moffett Is	52	0.11	N	176	46.65	W
	Cape Moffett Is	52	0.10	N	176	53.00	W
	Cape Moffett Is	51	55.69	N	176	53.00	W
	Cape Moffett Is	51	55.69	N	176	48.59	W
	Cape Moffett Is	51	57.96	N	176	46.52	W
3	Adak Canyon	51	39.00	N	177	0.00	W
	Adak Canyon	51	39.00	N	177	3.00	W
	Adak Canyon	51	30.00	N	177	3.00	W
	Adak Canyon	51	30.00	N	177	0.00	W
4	Bobrof Is	51	57.35	N	177	19.94	W
	Bobrof Is	51	57.36	N	177	29.11	W
	Bobrof Is	51	51.65	N	177	29.11	W
	Bobrof Is	51	51.71	N	177	19.93	W
5	Ulak Is	51	25.85	N	178	59.00	W
	Ulak Is	51	25.69	N	179	6.00	W
	Ulak Is	51	22.28	N	179	6.00	W
	Ulak Is	51	22.28	N	178	58.95	W
6	Semisopochnoi Is	51	53.10	N	179	53.11	E
	Semisopochnoi Is	51	53.10	N	179	46.55	E
	Semisopochnoi Is	51	48.84	N	179	46.55	E
	Semisopochnoi Is	51	48.89	N	179	53.11	E

Note: Each area is delineated by connecting the coordinates in the order listed by straight lines. The last set of coordinates for each area is connected to the first set of coordinates for the area by a straight line. The projected coordinate system is North American Datum 1983, Albers.

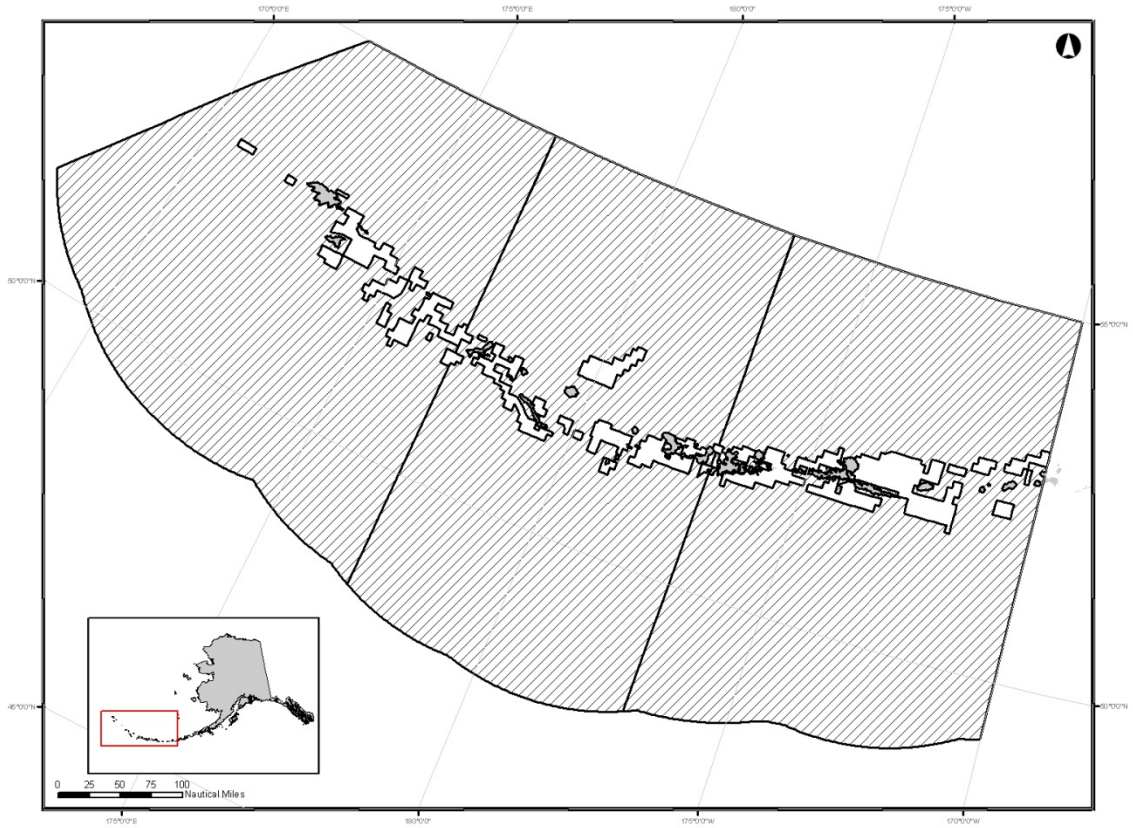
Figure 8 Aleutian Islands Coral Habitat Protection Areas



3.3.2 Aleutian Islands Habitat Conservation Area

Nonpelagic trawl gear fishing is prohibited year-round in the Aleutian Islands Habitat Conservation Area, except for designated areas open to nonpelagic trawl gear. The Aleutian Islands Habitat Conservation Area is defined as the entire Aleutian Islands groundfish management subarea, as described in 50 CFR 679. Areas open to nonpelagic trawl gear fishing in the Aleutian Islands shown in Figure 9; however, the use of trawl gear is prohibited in the BSAI King and Tanner crab fisheries.

Figure 9 Aleutian Islands Habitat Conservation Area. Polygons are areas open to nonpelagic trawl gear.



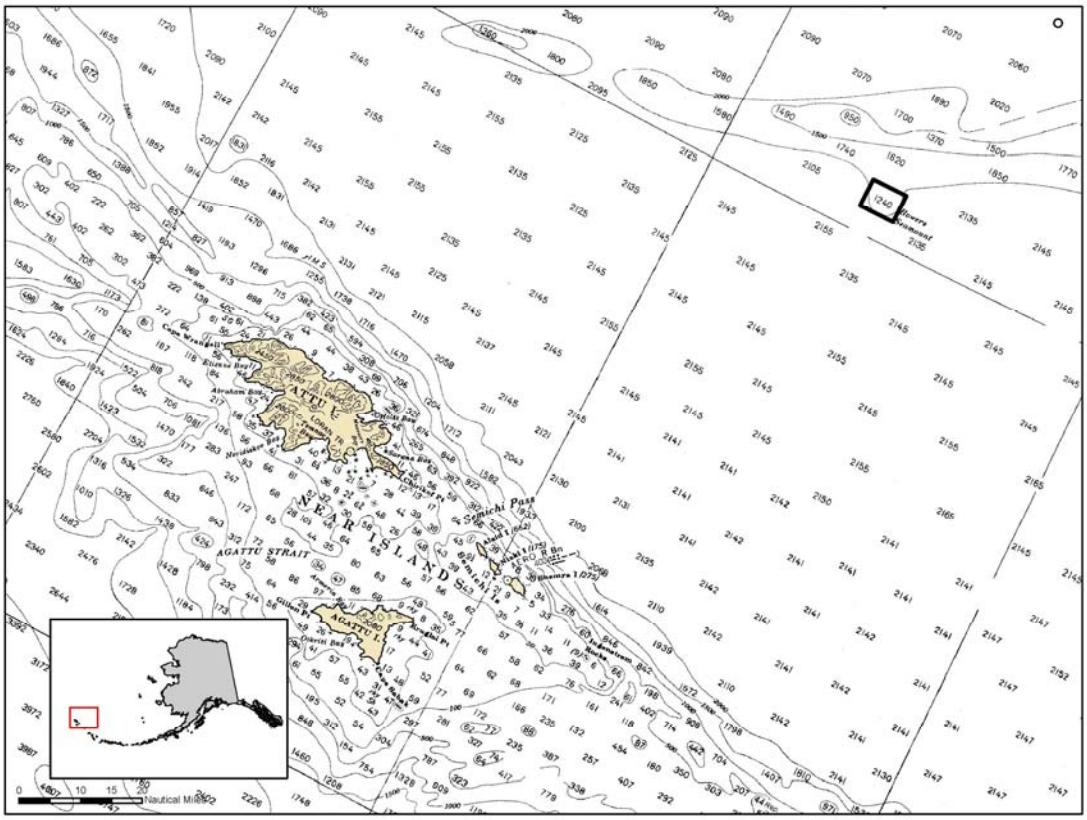
3.3.3 Alaska Seamount Habitat Protection Area

The use of bottom contact gear by a federally permitted fishing vessel, as described in 50 CFR part 679, is prohibited year-round in the Alaska Seamount Habitat Protection Area, see Figure 10. Anchoring by a federally permitted fishing vessel, as described in 50 CFR part 679, is also prohibited. Coordinates for the Alaska Seamount Habitat Protection Area are listed in the table below.

Area Number	Name	Latitude	Longitude
15	Bowers Seamount	54 9.00 N	174 52.20 E
	Bowers Seamount	54 9.00 N	174 42.00 E
	Bowers Seamount	54 4.20 N	174 42.00 E
	Bowers Seamount	54 4.20 N	174 52.20 E

Note: The area is delineated by connecting the coordinates in the order listed by straight lines. The last set of coordinates is connected to the first set of coordinates by a straight line. The projected coordinate system is North American Datum 1983, Albers.

Figure 10 Alaska Seamount Habitat Protection Area in the Aleutian Islands



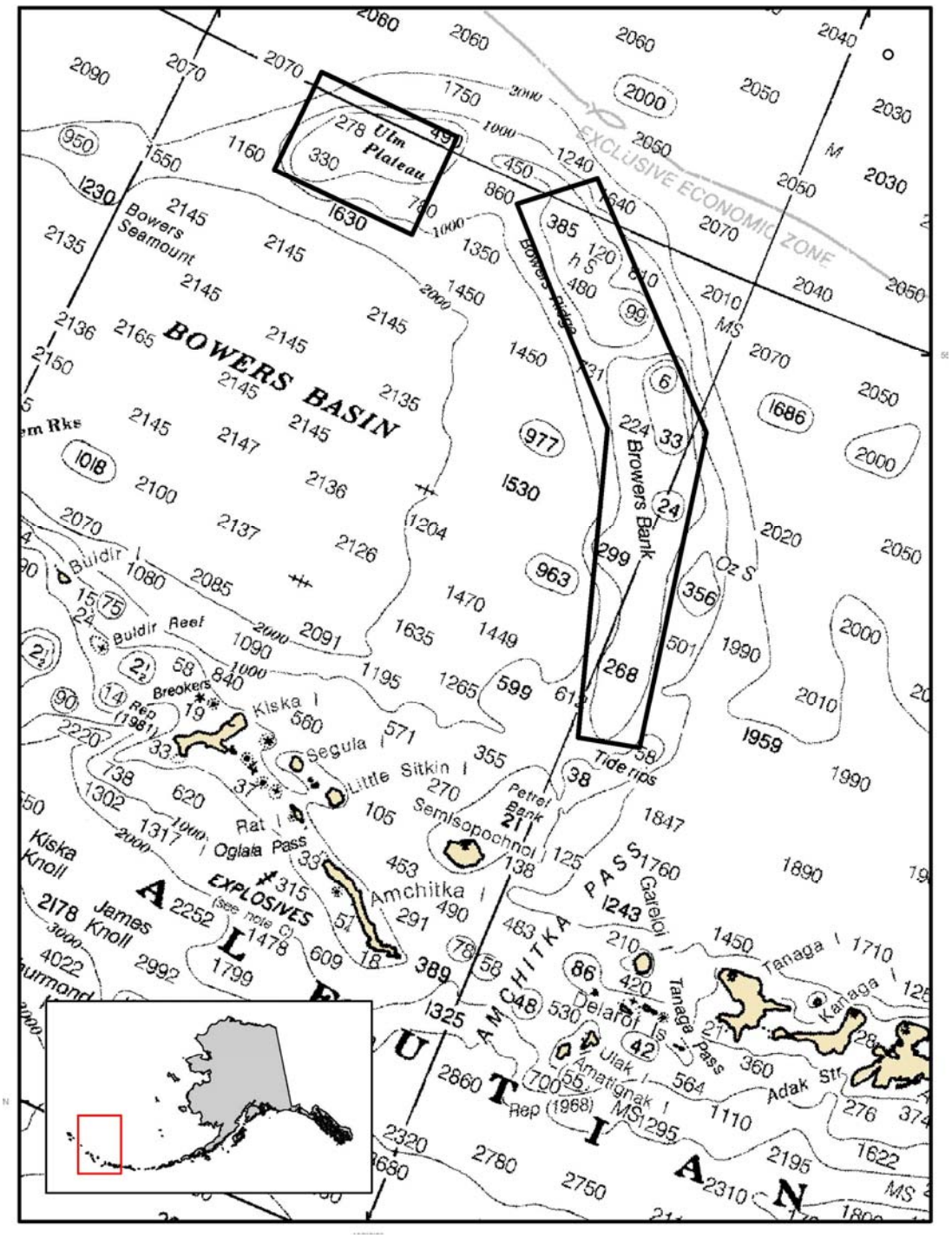
3.3.4 Bowers Ridge Habitat Conservation Zone Error! Bookmark not defined.

The use of mobile bottom contact gear, as described in 50 CFR part 679, is prohibited year-round in the Bowers Ridge Habitat Conservation Zone, see Figure 11. The areas are described in the table below.

Area Number	Name	Latitude			Longitude		
1	Bowers Ridge	55	10.50	N	178	27.25	E
	Bowers Ridge	54	54.50	N	177	55.75	E
	Bowers Ridge	54	5.83	N	179	20.75	E
	Bowers Ridge	52	40.50	N	179	55.00	W
	Bowers Ridge	52	44.50	N	179	26.50	W
	Bowers Ridge	54	15.50	N	179	54.00	W
2	Ulm Plateau	55	5.00	N	177	15.00	E
	Ulm Plateau	55	5.00	N	175	60.00	E
	Ulm Plateau	54	34.00	N	175	60.00	E
	Ulm Plateau	54	34.00	N	177	15.00	E

Note: Each area is delineated by connecting the coordinates in the order listed by straight lines. The last set of coordinates for each area is connected to the first set of coordinates for the area by a straight line. The projected coordinate system is North American Datum 1983, Albers.

Figure 11 Bowers Ridge Habitat Conservation Zone



3.3.5 HAPC ProcessError! Bookmark not defined.

The Council may designate specific sites as HAPCs and may develop management measures to protect habitat features within HAPCs.

50 CFR 600.815(a)(8) provides guidance to the Councils in identifying HAPCs. FMPs should identify specific types or areas of habitat within EFH as habitat areas of particular concern based on one or more of the following considerations:

(i) The importance of the ecological function provided by the habitat.

(ii) The extent to which the habitat is sensitive to human-induced environmental degradation.

(iii) Whether, and to what extent, development activities are, or will be, stressing the habitat type.

(iv) The rarity of the habitat type.

Proposed HAPCs, identified on a map, must meet at least two of the four considerations established in 50 CFR 600.815(a)(8), and rarity of the habitat is a mandatory criterion. HAPCs may be developed to address identified problems for FMP species, and they must meet clear, specific, adaptive management objectives.

The Council will initiate the HAPC process, by setting priorities and issuing a request for HAPC proposals. Any member of the public may submit a HAPC proposal. HAPC proposals may be solicited every 3 years or on a schedule established by the Council. The Council may periodically review existing HAPCs for efficiency and consideration based on new scientific research.

Criteria to evaluate the HAPC proposals will be reviewed by the Council and the Scientific and Statistical Committee prior to the request for proposals. The Council will establish a process to review the proposals and may establish HAPCs and conservation measures (NPFMC 2005).

4.0 Effects of Fishing on Essential Fish Habitat

This section addresses the requirement in EFH regulations (50 CFR 600.815(a)(2)(i)) that each FMP must contain an evaluation of the potential adverse effects of all regulated fishing activities on EFH. This evaluation must 1) describe each fishing activity, 2) review and discuss all available relevant information, and 3) provide conclusions regarding whether and how each fishing activity adversely affects EFH. Relevant information includes the intensity, extent, and frequency of any adverse effect on EFH; the type of habitat within EFH that may be affected adversely; and the habitat functions that may be disturbed.

In addition, the evaluation should 1) consider the cumulative effects of multiple fishing activities on EFH, 2) list and describe the benefits of any past management actions that minimize potential adverse effects on EFH, 3) give special attention to adverse effects on habitat areas of particular concern (HAPCs) and identify any EFH that is particularly vulnerable to fishing activities for possible designation as HAPCs, 4) consider the establishment of research closure areas or other measures to evaluate the impacts of fishing activities on EFH, 5) and use the best scientific information available, as well as other appropriate information sources.

This evaluation assesses whether fishing adversely affects EFH in a manner that is more than minimal and not temporary in nature (50 CFR 600.815(a)(2)(ii)). This standard determines whether Councils are required to act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable.

Much of the material supporting this evaluation is located in the following sections of the EFH EIS (NMFS 2005). These include:

- Descriptions of fishing activities (including gear, intensity, extent and frequency of effort) - Sections 3.4.1 and 3.4.2.
- Effects of fishing activities on fish habitat - Section 3.4.3.
- Past management actions that minimize potential adverse effects on EFH - Sections 2.2 and 4.3.
- Habitat requirements of managed species - Sections 3.2.1, 3.2.2, and Appendices D and F.
- Features of the habitat - Sections 3.1, 3.2.4 and 3.3.
- HAPCs - 2.2.2.7, 2.2.2.8, 2.3.2, and 4.2
- Cumulative effects of multiple fishing activities on EFH, Section 4.4.

Appendix B of the EFH EIS also contains a comprehensive, peer-reviewed analysis of fishing effects on EFH and detailed results for each managed species. This FMP incorporates by reference the complete analysis in Appendix B of the EFH EIS and summarizes below the results for each managed species.

Section B.1 of Appendix B of the EFH EIS has a detailed discussion regarding the relevant rules and definitions that must be considered in developing the fishing effects on EFH analysis. The analysis is based on determining whether an effect on EFH is more than minimal and not temporary (50 CFR 600.815(a)(2)(ii)).

Fishing operations change the abundance or availability of certain habitat features (e.g., prey availability or the presence of living or non-living habitat structure) used by managed fish species to accomplish spawning, breeding, feeding, and growth to maturity. These changes can reduce or alter the abundance, distribution, or productivity of that species, which in turn can affect the species' ability to "support a sustainable fishery and the managed species' contribution to a healthy ecosystem" (50 CFR 600.10). The outcome of this chain of effects depends on characteristics of the fishing activities, the habitat, fish use of the habitat, and fish population dynamics. The duration and degree of fishing's effects on habitat features depend on the intensity of fishing, the distribution of fishing with different gears across habitats, and the sensitivity and recovery rates of habitat features.

A numeric model was developed as a tool to structure the relationships among available sources of information on these factors. This model was designed to estimate proportional effects on habitat features that would persist if current fishing levels were continued until affected habitat features reached an equilibrium with the fishing effects. Details on the limitations and uncertainties of the model and the process used by the analyst are in Section B.1 of Appendix B of the EFH EIS (NMFS 2005).

4.1 Effects of Fishing Analysis

Section B.2 of Appendix B of the EFH EIS (NMFS 2005) contains details of the fishing effects on EFH analysis. Fishing operations can adversely affect the availability of various habitat features for use by fish species. Habitat features are those parts of the habitat used by a fish species for the processes of spawning, breeding, feeding, or growth to maturity. A complex combination of factors influences the effects of fishing on habitat features, including the following:

2. Intensity of fishing effort
3. Sensitivity of habitat features to contact with fishing gear
4. Recovery rates of habitat features
5. Distribution of fishing effort relative to different types of habitat

The goal of this analysis was to combine available information on each of these factors into an index of the effects of fishing on features of fish habitat that is applicable to issues raised in the EFH regulations. The effects of fishing on recovery of EFH is described by the long term effect index (LEI). Features that recover very quickly could achieve a small LEI under any fishing intensity. Features that recover very slowly may have a high LEI even with small rates of fishing effects. The LEI is used in the summaries to describe the fishing effects on EFH for managed species. They represent the ability of fishing to reduce however much of each feature was present in an area as a proportional reduction. LEIs were calculated for all areas where fishing occurred, including some areas where the subject feature may never have existed.

Section B.2.4.3 of Appendix B of the EFH EIS contains information regarding recovery rates for various habitat types. Long and short recovery times were 3 to 4 months for sand, 6 to 12 months for sand/mud, and 6 to 18 months for mud habitats. In general, very little data are available on the recovery periods for living structure. Recovery rates of structure-forming invertebrates associated with the soft bottom, based on their life history characteristics, is estimated at 10 to 30 percent per year with a mean of 20 percent per year. Hard-bottom recovery rates are estimated to be slower, 1 to 9 percent per year, with a mean of 5 percent per year based on hard-bottom invertebrate life history characteristics. Recovery rates of gorgonian corals are potentially much longer, with rates of 50, 100, and 200 years estimated.

The habitat and regional boundaries were overlaid using geographic information systems (GIS) (ArcMap), resulting in the classification of each of the 5-by-5-km blocks by habitat type. Where a boundary passed through a block, the area within each habitat was calculated, and those areas were analyzed separately. For the GOA and AI habitats, the estimates of proportions of hard and soft substrate habitat types were entered into the classification matrix for each block. The total area of each benthic habitat was calculated through GIS based on coastlines, regional boundaries, habitat boundaries, and depth contours (Table B.2-7 of the EFH EIS).

Additional details on the quantity and quality of data and studies used to develop the analysis, how the analysis model was derived and applied, and considerations for the LEIs are contained in Section B.2 of Appendix B of the EFH EIS.

4.2 Fishing Gear Impacts

The following sections summarize pertinent research on the effects of fishing on seafloor habitats.

4.2.1 Bottom Trawls

The EFH EIS effects of fishing analysis evaluates the effects of bottom trawls on several categories of habitats: infaunal prey, epifaunal prey, living structure, hard corals, and nonliving structure.

Infaunal Prey

Infaunal organisms, such as polychaetes, other worms, and bivalves, are significant sources of prey for Alaska groundfish species. Because researchers were not able to determine which crustaceans cited in trawl effects studies were actually infauna, all crustaceans were categorized as epifaunal prey. Studies of the effects of representative trawl gear on infauna included Kenchington et al. (2001), Bergman and Santbrink (2000), Brown (2003), Brylinsky et al. (1994), and Gilkinson et al. (1998).

Kenchington et al. (2001) examined the effects on over 200 species of infauna from trawl gear that closely resembled the gear used off of Alaska. Three separate trawling events were conducted at intervals approximating 1 year. Each event included 12 tows through an experimental corridor, resulting in an

average estimate of three to six contacts with the seafloor per event. Of the approximately 600 tests for species effects conducted, only 12 had statistically significant results. The statistical methods were biased toward a Type 1 error of incorrectly concluding an impact. Ten of the significant results are from a year when experimental trawling was more concentrated in the center of the corridors where the samples of infauna were taken. It is likely that more trawl contacts occurred at these sampled sites than the 4.5 estimate (average of three to six contacts) used to adjust the multiple contact results. As such, the results that were available from the study (non-significant values were not provided) represent a sample biased toward larger reductions when used to assess median reductions of infauna. The resulting median effect was 14 percent reduction in biomass.

Bergman and Santbrink (2000) studied effects on infauna (mostly bivalves) from an otter trawl equipped with 20-centimeter (cm) rollers in the North Sea. Because the study was conducted on fishing grounds with a long history of trawling, the infaunal community may already have been affected by fishing. Experimental trawling was conducted to achieve average coverage of 1.5 contacts within the experimental area over the course of the study. Results were provided for two substrate types: coarse sand with 1 to 5 percent of the area contacted, and silt and fine sand with 3 to 10 percent of the area contacted. The five infauna biomass reductions in the first area had a median of 8 percent. The ten infauna biomass reductions from the second area had a median of 5 percent.

In a recent master's thesis, Brown (2003) studied the effects of experimental trawling in an area of the nearshore EBS with sandy sediments. Trawling covered 57 percent of the experimental area. Several bivalves had lower abundance after trawling, while polychaetes were less affected. The median of the reduction in percentages for each species, after adjusting for coverage, was a 17 percent reduction in biomass per gear contact.

Brylinsky et al. (1994) investigated effects of trawling on infauna, mainly in trawl door tracks, at an intertidal estuary. Only three results were provided for infauna in roller gear tracks, but the results were so variable (-50 percent, +12 percent, +57 percent) that they were useless for the purpose of this analysis. Eight results on the effects of trawl doors on species biomass were available for polychaetes and nemerteans. These results had a median of 31 percent reduction in biomass and a 75th percentile of 42 percent reduction in biomass. Gilkinson et al. (1998) used a model trawl door on a prepared substrate to estimate that 64 percent of clams in the door's path were exposed after one pass, but only 5 percent were injured. Doors make up less than 4 percent of the area of the seafloor contacted by Alaska trawls.

The results of Kenchington et al. (2001), Bergman and Santbrink (2000), and Brown (2003) were combined for inclusion in the model, resulting in a median of 10 percent reduction in biomass per gear contact for infaunal species due to trawling, and 25th and 75th percentiles of 5 and 21 percent, respectively (Table B.2-5 of the EFH EIS).

Epifaunal Prey

Epifaunal organisms, such as crustaceans, echinoderms, and gastropods, are significant prey of Alaska groundfish species. However, one of the most common classes of echinoderms, asteroids, are rarely found in fish stomachs. While some crustaceans may be infauna, an inability to consistently identify these species resulted in all crustaceans being categorized as epifaunal prey. Studies of the effects of representative trawl gear on epifauna included Prena et al. (1999), Brown (2003), Freese et al. (1999), McConnaughey et al. (2000), and Bergman and Santbrink (2000).

Prena et al. (1999), as a component of the Kenchington et al. (2001) study, measured the effects of trawling on seven species of epifauna. The median of these results was a 4 percent biomass reduction per gear contact. There appeared to be in-migration of scavenging crabs and snails in this and other studies.

Removing crab and snails left only two measurements, 6 and 7 percent reductions in biomass. Bergman and Santbrink (2000) measured effects on four epifaunal species in the experimental coarse sand area (median reduction in biomass was 12 percent) and five epifaunal species in the experimental fine sand area (median reduction in biomass was 16 percent). When crabs and snails were removed, the coarse sand area was unchanged, and the median value for the fine sand area was 15 percent biomass reduction. Brown (2003) studied six epifaunal species, resulting in a median reduction in biomass per gear contact of 5 percent. Combining results from Prena et al. (1999), Brown (2003), and Bergman and Santbrink (2000), and removing crabs and snails, gives a median reduction in biomass of epifaunal species of 10 percent, and 25th and 75th percentiles of 4 and 17 percent, respectively. These are the q values used for the analysis of the effects of full trawls on epifaunal prey, except for those fisheries using tire gear (see below).

The study of McConnaughey et al. (2000) compared the effects of fishing on an area that received heavy fishing pressure between 4 and 8 years previously, using an adjacent unfished area as a control. Therefore, results included a combination of species reductions and recovery, were not adjusted for multiple contacts, and were not directly comparable to the results of the studies above. However, for comparison with previously discussed studies, the resulting median and 75th percentile reductions in biomass for six species of epifauna (excluding snails and crabs) were 12 and 28 percent, respectively. The median result was within the same range as those from the more direct studies, and the 75th percentile result was not sufficiently higher as to indicate substantial error in the direct estimates.

Freese et al. (1999) studied the effects of tire gear on the epifauna of a pebble and boulder substrate. Eight epifaunal species gave a median response of 17 percent reduction in biomass and a 75th percentile of 43 percent reduction in biomass. Before snails were removed, the 25th percentile indicated an increase in biomass of 82 percent due to colonization by snails. The resulting values when two snail taxa were removed were 38 and 43 percent medians and a 5 percent reduction in epifaunal biomass for the 75th and 25th percentiles. The authors noted a strong transition to apparently smaller effects outside of the direct path of the tire gear. For fisheries in hard-bottom areas, where tire gear is most common, epifaunal effects were adjusted for this increased effect within the path of the tire gear. Typical tire gear covers about 25 percent of the full trawl path (i.e., 14 m out of 55 m total), so the resulting q values are 17 percent reduction in epifaunal biomass for the median (0.25 times 38 plus 0.75 times 10), 23 percent reduction for epifaunal biomass for the 75th percentile (0.25 times 43 plus 0.75 times17), and 5 percent reduction for the 25th percentile.

Living Structure

Organisms that create habitat structure in Alaska waters include sponges, bryozoans, sea pens, soft and stony corals, anemones, and stalked tunicates. Studies of the effects of representative trawls on these groups include Van Dolah et al. (1987), Freese et al. (1999), Moran and Stephenson (2000), Prena et al. (1999), and McConnaughey et al. (2000). The first three studies examined the effects on epifauna on substrates such as pebble, cobble, and rock that support attached erect organisms, while the last two studies were located on sandy substrates. Effect estimates were available for only one type of structure-providing organism, the soft coral *Gersemia*, from Prena et al. (1999). After adjustment for multiple contacts, *Gersemia* had a q of 10 percent reduction in biomass per gear contact.

Both the Van Dolah et al. (1987) and Freese et al. (1999) studies identified removal rates and rates of damage to organisms remaining after contact, raising the question of how damage incurred from contact with gear reduces the structural function of organisms. In Freese et al. (1999), sponges were indicated as damaged if they had more than 10 percent of the colony removed, or if tears were present through more than 10 percent of the colony length. Van Dolah et al. (1987) classified organisms as heavily damaged (more than 50 percent damage or loss) or lightly damaged (less than 50 percent damage or loss). Lacking

better information, the damaged organisms from Freese et al. (1999) were assigned a 50 percent loss of structural function, and the heavily and lightly damaged organisms from VanDolah et al. (1987) were assigned 75 and 25 percent losses of their function respectively.

Adjustments to the Freese et al.(1999) results were based on observations of a further decrease in vase sponge densities 1 year post-study. Freese (2001) indicates that some of the damaged sponges had suffered necrotization (decay of dead tissues) to the extent that they were no longer identifiable. This percentage was added to the category of removed organisms, resulting in q estimates for epifauna structures in the path of tire gear of a 35 percent median reduction in biomass per contact and a 75th percentile of 55 percent reduction in biomass per contact. Summary results of the VanDolah data show a median of 17 percent reduction in biomass per gear contact and a 75th percentile of 22 percent reduction in biomass per gear contact. Moran and Stephenson (2000) combined all erect epifauna taller than 20 cm and studied their reductions subsequent to each of a series of trawl contacts. They estimated a per contact reduction in biomass (q) of 15 percent. Combining the non-tire gear studies gives a full gear q median per contact reduction estimate of 15 percent and a 75th percentile per contact reduction estimate of 21 percent. Using the same methods as applied to epifauna for combining non-tire gear data with the tire gear data produced effect estimates for trawls employing tire gear of a median per contact reduction of 20 percent and a 75th percentile per contact reduction of 30 percent.

Data from McConnaughey et al. (2000) combining initial effects of high-intensity trawling and recovery had a median value for structure-forming epifauna per contact reduction of 23 percent and a 75th percentile reduction of 44 percent. While these results show greater reductions than the single pass estimates from the other studies, the effects of multiple years of high-intensity trawling can reasonably account for such a difference; thus, the above values for q were not altered.

Hard Corals

While numerous studies have documented damage to hard corals from trawls (e.g., Fossa 2002, Clark and O'Driscoll 2003), only one (Krieger 2001) was found that related damage to a known number of trawl encounters. Fortunately, this study occurred in the GOA with a common species of gorgonian coral (*Primnoa rubi*) and with gear not unlike that used in Alaska commercial fisheries. Krieger used a submersible to observe a site where large amounts of *Primnoa* were caught during a survey trawl. An estimated 27 percent of the original volume of coral was removed by the single trawl effort. The site was in an area closed to commercial trawling, so other trawling effects were absent. This value was used for coral sensitivity in the analysis bracketed by low and high values of 22 and 35 percent.

Non-living Structure

A variety of forms of the physical substrates in Alaska waters can provide structure to managed species, particularly juveniles. These physical structures range from boulder piles that provide crevices for hiding to sand ripples that may provide a resting area for organisms swimming against currents. Unfortunately, few of these interactions are understood well enough to assess the effects of substrate changes on habitat functions. A number of studies describe changes to the physical substrates resulting from the passage of trawls. However, there is no consistent metric available to relate the use of such structures by managed species to their abundance or condition. This lack of relationship effectively precludes a quantitative description of the effects of trawling on non-living structure. The following discussion describes such effects qualitatively and proposes preliminary values of q for the analysis.

Sand and Silt Substrates:

Schwinghamer et al. (1998) described physical changes to the fine sand habitats caused by trawling as part of the same study that produced Prena et al. (1999) and Kenchington et al. (2001). Door tracks, approximately 1 m wide and 5 cm deep, were detected with sidescan sonar, adding to the surface relief of

the relatively featureless seafloor. Finer scale observations, made with video cameras, indicated that trawling replaced small hummocky features a few cm tall with linear alignments of organisms and shell hash. A dark organic floc that was present before trawling was absent afterwards. While no changes in sediment composition were detected, measurements of the internal structure of the top 4.5 cm of sediment were interpreted to indicate loss of small biogenic sediment structures such as mounds, tubes, and burrows. Brylinsky et al. (1994) describe trawl tracks as the most apparent effect of trawls on a silty substrate and the tracks of rollers as resulting in much shallower lines of compressed sediment than tracks of trawls without rollers. A wide variety of papers describes trawl marks; these papers include Gilkinson et al. (1998), who describe the scouring process in detail as part of a model door study.

For effects on sedimentary forms, the action of roller gear trawls replaces one set of cm-scale forms, such as hummocks and sand ripples, with door and roller tracks of similar scales. In habitats with an abundance of such structures, this can represent a decrease in seabed complexity, while in relatively smooth areas, an increase in complexity will result (Smith et al. 2000). The effects on internal sediment structure are considered too small in scale to provide shelter directly to the juveniles of managed species. The extent to which they affect the availability of prey for managed species is better measured by directly considering the abundance or those prey species. This consideration was done by studies cited in the prey sections above. Since the observed effects of a single gear contact are relatively subtle, with ambiguous effects on function, the parameter selected for this analysis represents a small negative effect (-2 percent). This provides some effect size that can be scaled up or down if greater or lesser effects are hypothesized or measured.

Pebble to Boulder Substrates:
In substrates composed of larger particles (large pebbles to boulders), the interstitial structure of the substrate has a greater ability to provide shelter to juveniles and adults of managed species. The association of species aggregations with such substrates provides evidence of their function as structure (Krieger 1992, 1993). Freese et al. (1999) documented that the tire gear section of a trawl disturbed an average of 19 percent of the large boulders (more than 0.75-m longest axis) in its path. They noted that displaced boulders can still provide cover, while breaking up boulder piles can reduce the number and complexity of crevices.

In areas of smaller substrate particles (pebble to cobble), the track of the tire gear was distinguishable from the rest of the trawl path due to the removal of overlying silt from substrates with more cobble or the presence of a series of parallel furrows 1 to 8 cm deep from substrates with more pebble. Of the above effects, only breaking up boulder piles was hypothesized to decrease the amount of non-living functional structure for managed species. A key unknown is the proportional difference in functional structure between boulder piles and the same boulders, if separated. If that difference comprised 20 percent of the functional structure, and 19 percent of such piles were disturbed over one-third of the trawl paths (tire gear section), a single trawl pass would reduce non-living structure by only about 1 percent. Even if piles in the remaining trawl path were disturbed at half the rate of those in the path of the tire gear (likely an overestimate from descriptions in Freese et al. 1999), the effect would only increase to 2 percent. Lacking better information, this speculative value was applied in the analysis.

4.2.2 Pelagic TrawlsError! Bookmark not defined.

Studies using gear directly comparable to Alaska pelagic trawls, and thus identifying the resulting effect of such gear contact with the seafloor, are lacking. By regulation, these trawls must not use bobbins or other protective devices, so footropes are small in diameter (typically chain or sometimes cable or wrapped cable). Thus, their effects may be similar to other footropes with small diameters (i.e., shrimp or Nephrops trawls). However, these nets have a large enough mesh size in the forward sections that few, if any, benthic organisms that actively swim upward would be retained in the net. Thus, benthic animals that

were found in other studies to be separated from the bottom and removed by trawls with small-diameter footropes would be returned to the seafloor immediately by the Alaska pelagic trawls. Pelagic trawls are fished with doors that do not contact the seafloor, so any door effects are eliminated. Finally, because the pelagic trawl's unprotected footrope effectively precludes the use of these nets on rough or hard substrates, they do not affect the more complex habitats that occur on those substrates.

Two studies of small footrope trawls were used to represent the effects of pelagic trawl footropes on infaunal prey. Since most infaunal prey are too small to be effectively retained by bottom trawls, the large mesh size of pelagic trawls was not considered a relevant difference for the feature. Ball et al. (2000) investigated the effects of two tows of a Nephrops trawl in the Irish Sea on a muddy sand bottom in two different years. Eighteen taxonomic groups were measured in each year, including bivalves, gastropods, crustaceans, and annelids. For the 27 abundance reductions cited, the median effect was a 19 percent reduction abundance per gear contact, and the 75th percentile was a 40 percent reduction in abundance per gear contact, with the adjustment for multiple tows. The infauna responses measured from four passes of a whiting trawl on a clay-silt bottom in the Bay of Maine included three bivalves and seven polychaetes and nemerteans. The median response was a 24 percent reduction in abundance per gear contact, and the 75th percentile was a 31 percent reduction in abundance per gear contact, with the adjustment for multiple tows. Combining the two studies gave a median per contract reduction of 21 percent and a 75th percentile per contact reduction of 36 percent. These values were higher than those for roller gear trawls since there is continuous contact across the footrope and a greater ability of smaller footropes to penetrate the substrate.

Sessile organisms that create structural habitat may be uprooted or pass under pelagic trawl footropes, while those that are more mobile or attached to light substrates may pass over the footrope, with less resulting damage. Non-living structures may be more affected by pelagic trawl footropes than by bottom trawl footropes because of the continuous contact and smaller, more concentrated, surfaces over which weight and towing force are applied. In contrast, bottom trawls may capture and remove more of the large organisms that provide structural habitat than pelagic trawls because of their smaller mesh sizes. The bottom trawl doors and footropes could add complexity to sedimentary bedforms as mentioned previously, while pelagic trawls have an almost entirely smoothing effect. Based on these considerations, values of 20 percent reduction per gear contact and 30 percent reduction per gear contact were selected for both living and non-living structure.

4.2.3 Longlines

Studies that quantitatively assess the effects of longlines on seafloor habitat features were not found. Due to the light weight of the lines used with longline gear, effects on either infaunal or epifaunal prey organisms are considered to be limited to anchors and weights. Since these components make up less than 1/500th of the length of the gear, their effects are considered very limited (0.05 percent reduction per contact was the value used). Similarly, effects on the non-living structure of soft bottoms are also likely to be very limited.

Organisms providing structure may be hooked or otherwise affected by contact with the line. Observers have recorded anemones, corals, sea pens, sea whips, and sponges being brought to the surface hooked on longline gear, indicating that the lines move some distance across the seafloor and can affect some of the benthic organisms. The effects on non-living structure in hard-bottom areas due to hang-ups on smaller boulder piles and other emergent structures are limited to what may occur at forces below those necessary to break the line. Similar arguments to those used for bottom trawl effects on hard non-living structure would justify an even lower effect than the value generated for bottom-trawling (1 percent). Unfortunately, there are no data to indicate what proportion the retained organisms represent of those

contacted on the seafloor or the level of damage to any of the affected organisms. Values for reduction of living structure equal to one-half of those for bottom trawls were used for the area contacted by longlines.

4.2.4 PotsError! Bookmark not defined.

The only studies on pots (Eno et al. 2001) have examined gear much smaller and lighter than that used in Alaska waters and are, thus, not directly applicable in estimating effects of pots on habitat. Alaska pots are approximately 110 times as heavy and cover 19 times the area as those used by Eno et al. (2001) (2.6 kilograms [kg], 0.25 m^2). The Eno et al. (2001) study did show that most sea pens recovered after being pressed flat against the bottom by a pot. Most Alaska pots have their mesh bottoms suspended 2.5 to 5 cm above their weight rails (lower perimeter and cross pieces that contact the substrate first); hence, the spatial extent to which the greater weight of those pots is applied to organisms located underneath the pots is limited, but more intense.

The area of seafloor disturbed by the weight rails is of the greatest concern, particularly to the extent that the pot is dragged across the seafloor by bad weather, currents, or during hauling. Based on the estimated weight of the pots in water, and the surface area of the bottom of these rails, the average pressure applied to the seafloor along the weight rails (about 1 pound per square inch [lb/in^2] [0.7 kilogram per square centimeter (kg/cm^2)]) is sufficient to penetrate into most substrates during lateral movement. The effects of pots as they move across the bottom were speculated to be most similar to those of pelagic trawls with smaller contact diameter and more weight concentrated on the contact surface. Therefore, structure reduction values 5 percent greater than those determined for pelagic trawls were used.

4.2.5 Dinglebar

Dinglebar troll gear consists of a single line that is retrieved and set with a power or hand troll gurdy, with a terminally attached weight (cannon ball -12 lbs. or iron bar), from which one or more leaders with one or more lures or baited hooks are pulled through the water while a vessels is underway. Dinglebar troll gear is essentially the same as power or hand troll gear, the difference lies in the species targeted and the permit required. For example, dinglebar troll gear can be used in the directed fisheries for groundfish (e.g. cod) or halibut. These species may only be taken incidentally while fishing for salmon with power or hand troll gear. There is a directed fishery for ling cod in Southeast Alaska using dinglebar troll gear. Trolling can occur over any bottom type and at almost any depths. Trollers work in shallower coastal waters, but may also fish off the coast, such as on the Fairweather Grounds. The dinglebar is usually made of a heavy metal, such as iron, is used in nearly continuous contact with the bottom, and therefore, is likely to disturb bottom habitat.

4.2.6 Dredge Gear

Dredging for scallops may affect habitat by causing unobserved mortality to marine life and modification of the benthic community and sediments. Similar to trawling, dredging places fine sediments into suspension, buries gravel below the surface and overturns large rocks that are embedded in the substrate. Dredging can also result in dislodgement of buried shell material, burying of gravel under re-suspended sand, and overturning of larger rocks with an appreciable roughening of the sediment surface. A study of scallop dredging in Scotland showed that dredging caused significant physical disturbance to the sediments, as indicated by furrows and dislodgement of shell fragments and small stones (Eleftheriou and Robertson 1992). The authors note, however, that these changes in bottom topography did not change sediment disposition, sediment size, organic carbon content, or chlorophyll content. Observations of the Icelandic scallop fishery off Norway indicated that dredging changed the bottom substrate from shell-sand to clay with large stones within a 3-year period (Aschan 1991). Mayer *et al.* (1991), investigating the effects of a New Bedford scallop dredge on sedimentology at a site in coastal Maine, found that vertical

redistribution of bottom sediments had greater implications than the horizontal translocation associated with scraping and plowing the bottom. The scallop dredge tended to bury surficial metabolizable organic matter below the surface, causing a shift in sediment metabolism away from aerobic respiration that occurred at the sediment-water interface and instead toward subsurface anaerobic respiration by bacteria (Mayer *et al.* 1991). Dredge marks on the sea floor tend to be short-lived in areas of strong bottom currents, but may persist in low energy environments (Messieh *et al.* 1991).

Two studies have indicated that intensive scallop dredging may have some direct effects on the benthic community. Eleftheriou and Robertson (1992), conducted an experimental scallop dredging in a small sandy bay in Scotland to assess the effects of scallop dredging on the benthic fauna. They concluded that while dredging on sandy bottom has a limited effect on the physical environment and the smaller infauna, large numbers of the larger infauna (mollusks) and some epifaunal organisms (echinoderms and crustaceans) were killed or damaged after only a few hauls of the dredge. Long-term and cumulative effects were not examined, however. Aschan (1991) examined the effects of dredging for islandic scallops on macrobenthos off Norway. Aschan found that the faunal biomass declined over a four-year period of heavy dredging. Several species, including urchins, shrimp, seastars, and polychaetes showed an increase in abundance over the time period. In summary, scallop gear, like other gear used to harvest living aquatic resources, may effect the benthic community and physical environment relative to the intensity of the fishery.

Adverse effects of scallop dredges on benthic communities in Alaska may be lower in intensity than trawl gear. Studies on effects of trawl and dredge gear have revealed that, in general, the heavier the gear in contact with the seabed, the greater the damage (Jones 1992). Scallop dredges generally weigh less than most trawl doors, and the relative width they occupy is significantly smaller. A 15 ft wide New Bedford style scallop dredge weighs about 1,900 lbs (Kodiak Fish Co. data). Because scallop vessels generally fish two dredges, the total weight of the gear is 3,800 lbs. Trawl gear can be significantly heavier. An 850 horsepower vessel pulling a trawl with a 150 ft sweep may require a pair of doors that weigh about 4,500 pounds. Total weight of all trawl gear, including net, footrope, and mud gear would weigh even more (T. Kandianis, personal communication). Hence, based on weight of gear alone, scallop fishing may have less effect than bottom trawling, however its effects may be more concentrated.

4.3 Results of the Analysis of Effects of Fishing on Habitat FeaturesError! Bookmark not defined.

No fishing occurred in blocks covering a large proportion of the seafloor area shallower than 1,000 m from 1998 to 2002 (Table B.2-8 of the EFH EIS), and even more blocks were unaffected by trawling. Most of the fished blocks experienced intensities less than 0.1, and only a small proportion of the area (2.5 percent BS, 0.8 percent AI, and 0.9 percent GOA) was in blocks with intensities above 1.0. These fishing intensities determined the spatial distribution of the indices of fishing effects estimated by the model.

The analysis estimated an LEI of the effects of fishing on infaunal prey, epifaunal prey, living structure (coral treated separately), and non-living structure across different habitats and between fisheries. The LEI estimated the percentage by which these habitat features would be reduced from a hypothetical unfished abundance if recent intensity and distribution of fishing effort were continued over a long enough term to achieve equilibrium. Equilibrium is defined as a point where the rate of loss of habitat features from fishing effects equal the gain from feature recovery. The spatial pattern of long-term effect indices largely reflects the distribution of fishing effort scaled by the sensitivity and recovery rates assigned to different features in different habitat types. Thus, patterns on the charts of LEI for each

feature class were very similar, with higher overall LEIs for more sensitive or slower recovering features (Figures B.2-2 to B.2-5 of the EFH EIS). Prey LEIs were substantially lower than structure LEIs, reflecting their lower sensitivity and faster recovery rates.

All habitats included substantially unfished and lightly fished areas that have low LEIs (less than 1 percent) as well as some areas of high fishing that resulted in high LEIs (more than 50 percent or even more than 75 percent). In the AI, GOA, and EBS slope, substantial LEIs were primarily concentrated into many small, discrete pockets. On the EBS shelf, there were two larger areas where high LEIs were concentrated: (1) an area of sand/mud habitat between Bristol Bay and the Pribilof Islands and (2) an area of sand habitat north of Unimak Island and Unimak Pass, mostly inside of the 100-m contour.

Some of the patterns in fishing effects can be related to areas closed to bottom trawl fishing. In the GOA, no bottom trawling is allowed east of 140ºE longitude, and fishing effects are light there. Bottom trawling has been substantially restricted within specified radii (10 and 20 nm) of Steller sea lion rookeries and haulouts. The effects of these actions on LEI values are most clearly seen in the AI, where high LEI values are concentrated in small patches where the narrow shelf does not intersect these closures. Two large EBS areas around the Pribilof Islands and in and adjacent to Bristol Bay both mostly in sand substrates, are closed to bottom trawling to protect red king crab habitat. These closures concentrate fishing in the southern part of the EBS into the remaining sand, sand/mud, and slope habitats, which likely increases the predicted LEI in those areas.

Aggregate LEIs for each of the habitats are shown in Table B.2-9 of the EFH EIS. As discussed above, prey declined less than biostructure due to lower sensitivity and faster recovery rates. No prey feature was reduced by more than 3.5 percent (BS slope habitat). Biological structure features had LEIs between 7 and 9 percent in the hard substrate habitats where recovery rates were slow. LEIs above 10 percent were indicated for the biological structure of the sand/mud and slope habitats of the EBS where fishing effort is concentrated, and recovery rates are moderately slow.

Because of uncertainties in key input parameters, some evaluation was needed to determine how widely the resulting estimates might vary. In addition to the LEIs cited above, which were generated with median or central estimates for each input parameter (referred to below as central LEIs), LEI was estimated for both large and small values of sensitivity and recovery. High estimates of sensitivity were combined with low recovery rates to provide an upper LEI, and low estimates of sensitivity were combined with high recovery rates to produce a lower LEI. Lower LEIs for the habitat features (except for coral, which is discussed below) ranged from 8 to 50 percent of the original median estimates. Infaunal and epifaunal prey lower LEIs were all at or below 0.5 percent proportional reduction habitat, those for non-living structure were below 2 percent, and those for living structure were below 4 percent. The corresponding upper LEIs ranged from 1.5 to 3 times the original median estimate. The largest upper LEI values for infauna and epifauna prey were for the EBS sand/mud and slope habitats and ranged from 3.5 to 7 percent, with all other upper LEIs below 2 percent. Non-living structure upper LEIs were greatest on the GOA hard substrates, the AI shallow water habitat, and the EBS slope, ranging from 7 to 14 percent, with all other upper LEIs below 4 percent. In six habitats (the three GOA hard substrates, the AI shallow water habitats, and the EBS sand/mud and slope habitats), the upper LEI exceeded 10 percent, with the highest value (21 percent) on the GOA slope.

The analysis also calculated the proportion of each LEI attributable to each fishery. Fishery-specific LEI values for the habitat/feature combinations with the highest overall LEIs (all involving living structure) in each region are presented in Table B.2-10 of the EFH EIS. While the pollock pelagic trawl fishery was the largest single component (4.6 percent) of the total effects on living structure in the EBS sand/mud habitat, the combined effects of the bottom trawl fisheries made up all of the remaining 6.3 percent (total LEI of 10.9 percent). This was not true for living structure on the EBS slope, where nearly all (7.2 percent

out of 10.9 percent) of the LEI was due to the pollock pelagic trawl fishery. Living structure on hard bottom substrates of the GOA slope was affected by bottom trawling for both deepwater flatfish and rockfish. While the LEIs of these two fisheries were nearly equal, it is likely that much more of the rockfish effort occurred on hard substrates as compared with trawling for deepwater flatfish. [Because the spatial distribution of hard and soft substrate was unknown, such differences are not explicitly accounted for in the fishing effects analysis.] Therefore, most of the effects on this feature were attributed to the rockfish trawl fishery. In the shallow, hard substrate habitat of the AI, most of the effects (4.2 out of 7.3 percent) on living structure were attributable to the trawl fishery for Pacific cod. The remainder was attributed to Atka mackerel trawling at 2.5 percent. Living structure was the only habitat feature in which the effect of a passive gear fishery, longlining for Pacific cod, had an LEI above 0.1 percent. This fishery accounts for the consistent light blue (less than 1 percent LEI) coverage in Figure B.2-3 (a, b, and c) of the EFH EIS of many shallow areas of the AI not open to trawling.

Results for ultra-slow recovering structures, represented by hard corals, were different from those of other living structure in several ways. Corals had the highest LEI values of the fishing effects analyses. Because the very slow recovery rate of these organisms results in very high (more than 75 percent LEI) eventual effects with more than the most minimal amount of trawl fishing (annual trawl effort less than one tenth the area of the block), the distribution of high LEI values directly reflects the distribution of blocks subject to more than minimal trawl effort (Figure B.2-6 [a, b, and c] of the EFH EIS). The LEI values by habitat range from 6 to 20 percent with the highest values in the shallow AI and GOA slopes. These results mostly reflect the proportion of blocks in each habitat type subject to more than minimal trawl effort. Even though fairly wide ranges of both sensitivity and recovery rates were used for the upper and lower LEI estimates for coral, the range between upper and lower LEI was not as wide as for the other living structure organisms, ranging from plus 40 to -33 percent of the central value.

This analysis combined available information to assess the effects of Alaska fisheries on marine fish habitat. It estimated the effects (as measured by LEIs) of fisheries on habitat features that may be used by fish for spawning, breeding, feeding, or growth to maturity. These LEIs represent the proportion of feature abundances (relative to an unfished state) that would be lost if recent fishing patterns were continued indefinitely (to equilibrium). Therefore, all LEIs represent effects that are not limited in duration and satisfy the EFH regulation's definition of "not temporary." The magnitude and distribution of feature LEIs can, thus, be compared with the distribution of the use of that feature by fish species to assess whether the effects are "more than minimal" relative to that species' EFH (Section B.3 of the EFH EIS). Effects meeting this second element would necessarily meet both elements (more than minimal and not temporary) due to the nature of the LEI estimates.

4.4 Evaluation of Effects on EFH of BSAI Crab Species

This section evaluates whether the fisheries, as they are currently conducted off of Alaska, will affect habitat that is essential to the welfare of the managed fish populations in a way that is more than minimal and not temporary. The previous statement describes the standard set in the EFH regulations which, if met, requires Councils to act to minimize such effects. The above analysis has identified changes to habitat features that are not expected to be temporary. The habitat features were selected as those which a) can be affected by fishing and b) may be important to fish in spawning, breeding, feeding, and growth to maturity. This section evaluates the extent that these changes relate to the EFH of each managed species and whether they constitute an effect to EFH that is more than minimal.

Two conclusions are necessary for this evaluation: (1) the definition of EFH draws a distinction between the amount of habitat necessary for a species to "support a sustainable fishery and the managed species' contribution to a healthy ecosystem" (50 CFR 600.10) and all habitat features used by any individuals of a

species; (2) this distinction applies to both the designation of EFH and the evaluation of fishing effects on EFH. If these conclusions are valid, the "more than minimal" standard relates to impacts that potentially affect the ability of the species to fulfill its fishery and ecosystem roles, not just impacts on a local scale. The forgoing analysis has indicated substantial effects to some habitat features in some locations, many of which are within the spatial boundaries of the EFH of a species that may use them in a life-history function. These habitat changes may or may not affect the welfare of that species (a term used to represent "the ability of a species to support a sustainable fishery and its role in a healthy ecosystem").

The evaluation method is detailed in Section B.3.1 of Appendix B of the EFH EIS (NMFS 2005).

The Effects of Fishing on EFH analysis in the EFH EIS was made to answer the question: "Is there evidence that fishing adversely affects EFH in a manner that is more than minimal and not temporary in nature?" The following text summarizes the results of the analysis for each managed species. The details of the analysis for each species, including the habitat connections and the evaluation of effects, are contained in Section B.3.3 of Appendix B of the EFH EIS (NMFS 2005) and are incorporated by reference.

4.4.1 Red King Crab

Issue	***Evaluation***
Spawning/breeding	MT (Minimal, temporary, or no effect)
Feeding	U (Unknown effect)
Growth to maturity	MT (Minimal, temporary, or no effect)

Summary of Effects - There is only a small area of overlap between current female red king crab distribution and areas where trawling occurs. Mating areas experience little impact; however, trawling in deeper waters somewhat overlaps the migration route to mating areas. There are essentially no fishing effects in areas important to juvenile red king crab. All known juvenile rearing areas are currently protected by trawl closure areas. Most of the distribution of red king crab is to the north and east of the high fishing effects areas. Given the current very small overlap and fishing intensity in areas with red king crab of all life stages, professional judgement indicates that fisheries do not currently adversely affect the EFH of red king crab.

4.4.2 Blue King Crab

Issue	***Evaluation***
Spawning/breeding	MT (Minimal, temporary, or no effect)
Feeding	U (Unknown effect)
Growth to maturity	MT (Minimal, temporary, or no effect)

Summary of Effects—Fishing activities are considered to have overall minimal and temporary effects on the EFH for blue king crab, although both the Pribilof Islands stock and the St. Matthew stock of blue king crabs are considered to be below MSST. Habitat loss or degradation by fishing activities probably did not play any role in the decline of these stocks. For the Pribilof Islands blue king crab, any fishing activities thought to have adverse consequences have previously been mitigated by establishment of the Pribilof Islands trawl closure area. For St. Matthew blue king crab, there has never been a groundfish bottom trawl fishery in the area. Given the current very small overlap and fishing intensity in areas with blue king crab of all life stages, professional judgement indicates that fisheries do not currently adversely affect the EFH of blue king crab.

4.4.3 Golden King Crab

Issue	*Evaluation*
Spawning/breeding	MT (Minimal, temporary, or no effect)
Feeding	U (Unknown effect)
Growth to maturity	U (Unknown effect)

Summary of Effects—Fishing activities are considered to have overall minimal and temporary effects on the EFH for golden king crab. Groundfish trawl fishing in the EBS slope is of some concern; however, any effects are thought to be minimal. Professional judgement indicates that fisheries do not adversely affect the EFH of golden king crab.

4.4.4 Scarlet King Crab

Issue	*Evaluation*
Spawning/breeding	MT (Minimal, temporary, or no effect)
Feeding	U (Unknown effect)
Growth to maturity	U (Unknown effect)

Summary of Effects—Fishing activities are considered to have overall minimal and temporary effects on the EFH for scarlet king crab. This is a deepwater species with almost no overlap with commercial fisheries, so habitat effects are unlikely. Professional judgement indicates that fisheries are unlikely to adversely affect the EFH of scarlet king crab.

4.4.5 Tanner Crab

Issue	*Evaluation*
Spawning/breeding	MT (Minimal, temporary, or no effect)
Feeding	MT (Minimal, temporary, or no effect)
Growth to maturity	MT (Minimal, temporary, or no effect)

Summary of Effects— Fishing activities are considered to have overall minimal and temporary effects on the EFH for Tanner crabs. Tanner crab settle and grow on mud habitat, which was the least affected habitat in the EBS. This analysis of the spatial distribution of Tanner crabs relative to expected habitat impacts indicates that Tanner crabs have not demonstrated shifts away from regions heavily impacted by fishing. The closure of the Bristol Bay region and its associated reduction in habitat impacts did not attract crabs to the region. The effects of fishing activities on Tanner crab feeding activities is minimal.

4.4.6 Snow Crab

Issue	*Evaluation*
Spawning/breeding	U (Unknown effect)
Feeding	MT (Minimal, temorary, or no effect)
Growth to maturity	MT (Minimal, temporary, or no effect)

Summary of Effects - Fishing activities are considered to have overall minimal and temporary effects on the EFH for snow crabs. The current distribution of snow crab does not overlap the high trawl effects area to any extent. Juvenile snow crab distribution occurs on mud substrate and does not overlap areas of high trawling effects. Fishing effects on snow crab habitat and the subsequent impacts on snow crab feeding are expected to be minimal.

4.4.7 Deepwater Tanner Crabs

Issue	*Evaluation*
Spawning/breeding	MT (Minimal, temporary, or no effect)
Feeding	U (Unknown effect)
Growth to maturity	U (Unknown effect)

Summary of Effects—Fishing activities are considered to have overall minimal and temporary effects on the EFH for deepwater Tanner crabs. These are deepwater species with almost no overlap with commercial fisheries, so habitat effects are unlikely. Professional judgment led to the conclusion that fisheries are unlikely to adversely affect the EFH of deepwater Tanner crabs.

4.5 Conclusions

Species Evaluations

Evaluations were completed for 26 managed species (or species groups) and 8 forage species, all managed under the 5 FMPs developed by the Council (Table B.4-1 of the EFH EIS). See Sections B.3.2 to B.3.4 of the EFH EIS for more detailed information. Based on the available information, the analysis found no indication that continued fishing at the current rate and intensity would affect the capacity of EFH to support the life history processes of any species. In other words, the effects of fishing on EFH would not be more than minimal. Reasons for minimal ratings were predominantly either lack of a connection to affected habitat features, or findings from stock analyses that current fishing practices (including effects on habitat) do not jeopardize the ability of the stock to produce MSY over the long term. Other evaluations indicated that, even though a connection may exist between a habitat feature and a life-history process, the expected feature reductions were considered too small to make effects at the population level likely. There were also cases where the effects did not overlap significantly with the distribution of the species.

Most of unknown ratings were for species that have received relatively little study; hence, their life history needs and population status are poorly known. Most species with unknown ratings support small or no fisheries. Conversely, species that support significant fisheries have been studied more. In some cases, associations between the habitat features and life history processes were indicated, but the evaluator did not have enough information to assess whether the linkage and the amount of feature reduction would affect species welfare.

Even for well studied species, the knowledge to trace use of habitat features confidently for spawning, breeding, feeding, and growth to maturity to population level effects is not yet available. Several evaluators specifically cited uncertainty regarding the effect of particular noted linkages, and some urged caution.

General Effects on Fish Habitat

While this evaluation identified no specific instances of adverse effects on EFH that were more than minimal and not temporary, the large number of unknown ratings and expressions of concern make it prudent to look for more general patterns across all of the species and habitat features.

Specific areas with high fishing effort were identified in the effects-of-fishing analysis. These included two large areas of the EBS, one north of Unimak Island and Unimak Pass and the other between the Pribilof Islands and Bristol Bay. Both of these areas have continued to be highly productive fishing grounds through decades of intensive fishing. While that may initially seem at odds with the LEI results,

it is consistent with the evaluation that the habitat features affected by fishing either are not those important to the species fished in those areas, or are not being affected in a way that limits species welfare.

Fishing concentrations in other areas were smaller, but made up higher proportions of the EBS slope. The largest effect rates were on living structure, including coral. The high reliance on limited areas for fishing production and their high estimated LEIs make it prudent to obtain better knowledge of what processes occur in those locations.

Table B.3-1 of the EFH EIS shows the habitat connections identified for each life stage of managed species and species groups. Each row represents a species life stage and each column one of the habitat types from the fishing-effects analysis. At their intersections, evaluators entered letters representing each of the habitat features (prey or structure classes) used by that life stage in that habitat. Most species of groundfish have pelagic larval and egg stages. Only one species, Atka mackerel, had a connection with a benthic habitat feature for its egg or larval stages. Crab species are attached to the female in the egg stage, pelagic in the larval stage and benthic in the juvenile and adult stages. A combined tally at the bottom of Table B.3-1 notes how many species/life-stages were identified for each habitat feature in each habitat. Prey features represented about twice as many connections as structure features. The habitat feature/type combinations that had LEIs above 5 percent, outlined in the table, tended to have few connections. The highest number of connections (six) were for living structures on the GOA deep shelf, which had the lowest LEI of the outlined habitat feature/type combinations (6.2 percent). Connections with the highlighted blocks mostly involved rockfish species, with a few connections from Atka mackerel and blue king crab.

Cropping and summing effects on habitat features by distributions of the adults of each species (Table B.3-3 in the EFH EIS) depicted how the fishing effects overlapped in the locations where each species is present. The general distribution values related to the broader areas occupied, while the concentration values related to areas of higher abundance. Concentration LEIs were generally higher than the estimates based on general distribution because adult species concentrations determine where fisheries operate. It is unfortunate that distributions were not available for juveniles because connections to the habitat feature with the highest LEIs (living structure) mostly involved the growth to maturity process. Characterizing juvenile distributions should be a high priority for future research.

Reductions across adult species distributions for the living structure were mostly between 10 and 17 percent. Higher values occurred for red king crab (29 percent for both coverages). NMFS noted that the distribution of juveniles was mostly outside of the affected areas. Prey class effects by species distributions were all at or below 5 percent.

While LEIs for hard corals are subject to the limitations mentioned in Section B.2.6 in the EFH EIS, they had the highest LEIs when considered by species distributions. Intersections where meaningful effects are most likely to occur are those between areas where hard corals are prevalent and species for which a significant portion of their distribution occurs in the same areas, including populations of golden king crab, Atka mackerel, sablefish, and the rockfish species. Coral LEIs at these points ranged from 23 to 59 percent. While few evaluators cited coral as specifically linked to life history functions, in some areas it may be an important component of the living structure that is potentially linked to growth to maturity for some of these species. Because of their very slow recovery, corals warrant particular consideration for protection and for the development of improved knowledge of their habitat functions and distribution.

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5.0 Non-fishing Impacts

The diversity, widespread distribution, and ecological linkages with other aquatic and terrestrial environments make the waters and substrates that comprise EFH susceptible to a wide array of human activities unrelated to fishing.

Non-fishing activities have the potential to adversely affect the quantity or quality of EFH in riverine, estuarine, and marine systems. Broad categories of such activities include, but are not limited to, mining, dredging, fill, impoundment, discharge, water diversions, thermal additions, actions that contribute to nonpoint source pollution and sedimentation, introduction of potentially hazardous materials, introduction of exotic species, and the conversion of aquatic habitat that may eliminate, diminish, or disrupt the functions of EFH. For each activity, known and potential adverse impacts to EFH are described in the EFH EIS, Appendix G (NMFS 2005). The descriptions explain the mechanisms or processes that may cause the adverse effects and how these may affect habitat function. This FMP incorporates by reference the complete analysis of non-fishing impacts in Appendix G of the EFH EIS and summarizes the results for each type of non-fishing activity (NMFS 2005).

Non-fishing activities discussed in this document are subject to a variety of regulations and restrictions designed to limit environmental impacts under federal, state, and local laws. Many current requirements help to avoid or minimize adverse effects to aquatic habitats, including EFH. The conservation recommendations contained in this document are rather general and may overlap with certain existing standards for specific development activities. Nevertheless, the recommendations highlight practices that can help to avoid and minimize adverse effects to EFH. During EFH consultations between NMFS and other agencies, NMFS strives to provide reasonable and scientifically based recommendations that account for restrictions imposed under various state and federal laws by agencies with appropriate regulatory jurisdiction. Moreover, the coordination and consultation required by Section 305(b) of the Magnuson-Stevens Act do not supersede the regulations, rights, interests, or jurisdictions of other federal or state agencies. NMFS will not recommend that state or federal agencies take actions beyond their statutory authority, and NMFS' EFH conservation recommendations are not binding.

The conservation measures discussed in this document should be viewed as options to avoid, minimize, or compensate for adverse impacts and promote the conservation and enhancement of EFH. Ideally, non-water-dependent actions should not be located in EFH if such actions may have adverse impacts on EFH. Activities that may result in significant adverse effects on EFH should be avoided where less environmentally harmful alternatives are available. If there are no alternatives, the impacts of these actions should be minimized. Environmentally sound engineering and management practices should be employed for all actions that may adversely affect EFH. If avoidance or minimization is not practicable, or will not adequately protect EFH, compensatory mitigation (as defined for Section 404 of the Clean Water Act – the restoration, creation, enhancement, or in exceptional circumstances, preservation of wetlands and/or other aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved) should be considered to conserve and enhance EFH.

Section 303(a)(7) of the Magnuson-Stevens Act requires FMPs to identify activities other than fishing that may adversely affect EFH and define actions to encourage the conservation and enhancement of EFH, including recommended options to avoid, minimize, or compensate for the adverse effects identified. During consultation, agencies strive to consider all potential non-fishing impacts to EFH so that the appropriate recommendations can be made. Because impacts that may adversely affect EFH can be direct, indirect, and cumulative, the biologist must consider and analyze these interrelated impacts.

The conservation recommendations included with each activity present a series of site-specific measures the action agency can undertake to avoid, offset, or mitigate impacts to EFH. Not all of these suggested measures are necessarily applicable to any one project or activity that may adversely affect EFH. More specific or different measures based on the best and most current scientific information may be developed before or during EFH consultations and communicated to the appropriate agency. The conservation recommendations provided herein represent a short menu of actions that can contribute to the conservation, enhancement, and proper functioning of EFH.

While it is necessary to distinguish between activities to identify possible adverse impacts, it is equally important to consider and analyze these activities as they interrelate within habitats. This document is organized by activities that may potentially impact EFH occurring in four discrete ecosystems. The separation of these ecosystems is artificial, and many of the impacts and their related activities are not exclusive to one system.

The format for presenting the information in this document provides an introductory description of each activity, identification of potential adverse impacts, and suggested general conservation measures that would help minimize and avoid adverse effects of non-fishing activities on EFH. Table 3.4-36 in the EFH EIS identifies the categories from Appendix G and correlates them with possible changes in physical,

chemical, and biological parameters, and Table 3.4-37 in the EFH EIS takes the same categories from Appendix G and broadly interprets whether the effects from the activities in Alaska have been positive, insignificant, negative, or unknown.

5.1 Upland Activities

5.1.1 Nonpoint Source Pollution

Nonpoint source pollution generally results from land runoff, precipitation, atmospheric deposition, seepage, or hydrologic modification. Technically, the term nonpoint source means anything that does not meet the legal definition of point source in Section 502(14) of the Clean Water Act (CWA), which refers to discernable, confined, and discrete conveyance from which pollutants are or may be discharged. The major categories of nonpoint pollution are as follows:

- Agricultural runoff
- Urban runoff, including developed and developing areas (Section G.2.2 of the EFH EIS)
- Silvicultural (forestry) runoff (Section G.2.1.1 of the EFH EIS)
- Marinas and recreational boating
- Road construction
- Channel and streambank modifications, including channelization (Section G.4.7 of the EFH EIS)
- Streambank and shoreline erosion

Nonpoint source pollution is usually lower in intensity than an acute point source event, but it may be more damaging to fish habitat in the long term. Nonpoint source pollution is often difficult to detect. It may affect sensitive life stages and processes, and the impacts may go unnoticed for a long time. When severe pollution impacts are finally noticed, they may not be tied to any one event; hence, it may be difficult to correct, clean up, or mediate.

5.1.2 Silviculture/Timber Harvest

Recent revisions of Alaska's federal and state timber harvest regulations and best management practices (BMPs) have resulted in increased protection of EFH on federal, state, and private timber lands. Current forest management practices, when fully implemented and effective, avoid or minimize adverse effects to EFH that can result from the harvest and cultivation of timber and other forestry products. However, timber harvest can have both short- and long-term impacts throughout many coastal watersheds and estuaries if management practices are not fully implemented or effective. Past timber harvest in Alaska was not conducted under the current protective standards, and some effects from past harvesting continue to affect EFH.

If appropriate environmental standards are not followed, forest conditions after harvest may result in altered or impaired instream habitat structure and watershed function. In general, timber harvest can have a variety of effects such as removing the dominant vegetation; converting mature and old-growth upland and riparian forests to tree stands or forests of early seral stage; reducing permeability of soils and increasing the area of impervious surfaces; increasing sedimentation from surface runoff and mass wasting processes; altering hydrologic regimes; and impairing fish passage through inadequate design, construction, and/or maintenance of stream crossings (Northcote and Hartman 2004). Timber harvest may result in inadequate or excessive surface and stream flows, increased streambank and streambed erosion, loss of complex instream habitats, sedimentation of riparian habitat, and increased surface runoff with

associated contaminants (e.g., herbicides, fertilizers, and fine sediments). Hydrologic characteristics (e.g., water temperature), annual hydrograph change, and greater variation in stream discharge can be associated with timber harvest. Alterations in the supply of large woody debris (LWD) and sediment can have negative effects on the formation and persistence of instream habitat features. Excess debris in the form of small pieces of wood and silt can cover benthic habitat and reduce dissolved oxygen levels.

Potential Adverse Impacts

There are many complex and important interactions, in both small and large watersheds, between fish and forests (Northcote and Hartman, 2004). Five major categories of activities can adversely affect EFH: 1) construction of logging roads, 2) creation of fish migration barriers, 3) removal of streamside vegetation, 4) hydrologic changes and sedimentation and 5) disturbance associated with log transfer facilities (LTFs) (Section G.4.9 of the EFH EIS). Potential impacts to EFH have been greatly reduced by the adoption of best management practices (BMPs) designed to protect fish habitat.

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. For timber operations near streams with EFH, adhere to modern forest management practices and BMPs, including the maintenance of vegetated buffers to reduce sedimentation and supply LWD.
2. Avoid timber operations to the extent practicable in wetlands contiguous with anadromous fish streams.
3. For timber operations near estuaries or beaches, maintain vegetated buffers as needed to protect EFH.
4. Maintain riparian buffers along all streams to the extent practicable. In Alaska, buffer width is site-specific and dependent on use by anadromous and resident fish and stream process type.
5. Incorporate watershed analysis into timber and silviculture projects whenever possible or practicable. Particular attention should be given to the cumulative effects of past, present, and future timber sales within the watershed.
6. For forest roads, see Section G.2.3 in the EFH EIS, Road Building and Maintenance.

5.1.3 Pesticide Application (includes insecticides, herbicides, fungicides)

Pesticides are frequently detected in freshwater and estuarine systems that provide EFH. Pesticides are substances intended to prevent, destroy, control, repel, or mitigate any pest. They include the following: insecticides, herbicides, fungicides, rodenticides, repellents, bactericides, sanitizers, disinfectants, and growth regulators. More than 800 different pesticides are currently registered for use in the U.S. Legal mandates covering pesticides are the CWA and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Water quality criteria for the protection of aquatic life have only been developed for a few of the currently used chemicals (EPA, Office of Pesticide Programs). The most common pesticides are insecticides, herbicides, and fungicides. These are used for pest control on forested lands, agricultural crops, tree farms and nurseries, highways and utility rights of way, parks and golf courses, and residences. Pesticides can enter the aquatic environment as single chemicals or as complex mixtures. Direct applications, surface runoff, spray drift, agricultural return flows, and groundwater intrusions are all examples of transport processes that deliver pesticides to aquatic ecosystems.

Habitat alteration from pesticides is different from more conventional water quality parameters, such as temperature, suspended solids, or dissolved oxygen, because, unlike temperature or dissolved oxygen, the presence of pesticides can be difficult to detect due to limitations in proven methodologies. This

monitoring may also be expensive. As analytical methodologies have improved in recent years, however, the number of pesticides documented in fish and their habitats has increased.

Potential Adverse Impacts

There are three basic ways that pesticides can adversely affect EFH. These are (1) a direct toxicological impact on the health or performance of exposed fish, (2) an indirect impairment of the productivity of aquatic ecosystems, and (3) a loss of aquatic vegetation that provides physical shelter for fish.

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Incorporate integrated pest management and BMPs as part of the authorization or permitting process to ensure the reduction of pesticide contamination in EFH (Scott et al. 1999).
2. Carefully review labels and ensure that application is consistent. Follow local, supplemental instructions such as state-use bulletins where they are available.
3. Avoid the use of pesticides in and near EFH.
4. Refrain from aerial spraying of pesticides on windy days.

5.1.4 Urban/Suburban Development

Urban development is most likely the greatest non-fishing threat to EFH. Urban growth and development in the U.S. continue to expand in coastal areas at a rate approximately four times greater than in other areas. Urban and suburban development and the corresponding infrastructure result in four broad categories of impacts to aquatic ecosystems: hydrological, physical, water quality, and biological indicators (Center for Watershed Protection [CWP] 2003). Runoff from impervious surfaces is the most widespread source of pollution into the nation's waterways (EPA 1995). When a watershed's impervious cover exceeds 10 percent, impacts to stream quality can be expected (CWP 2003).

Potential Adverse Impacts

Development activities within watersheds and in coastal marine areas often impact the EFH of managed species on both long- and short-term scales. The CWP made a comprehensive review of the impacts associated with impervious cover and urban development and found a negative relationship between watershed development and about 26 stream quality indicators (CWP 2003). Many of the impacts listed here are discussed in greater detail in other sections of this document. The primary impacts include (1) the loss of riparian and shoreline habitat and vegetation and (2) runoff. Upland and shoreline vegetation removal can increase stream water temperatures, reduce supplies of LWD, and reduce sources of prey and nutrients to the water system. An increase in impervious surfaces, such as the addition of new roads (see Section G.2.3 of the EFH EIS), roofs, bridges, and parking facilities, results in a decreased infiltration to groundwater and increased runoff volumes. This also has the potential to adversely affect water quality and water quantity/timing in downstream water bodies (i.e., estuaries and coastal waters).

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Implement BMPs (EPA 1993) for sediment control during construction and maintenance operations.
2. Avoid using hard engineering structures for shoreline stabilization and channelization when possible.

3. Encourage comprehensive planning for watershed protection to avoid filling and building in floodplain areas affecting EFH.
4. Where feasible, remove impervious surfaces such as abandoned parking lots and buildings from riparian and shoreline areas, and reestablish wetlands and native vegetation.
5. Protect and restore vegetated buffer zones of appropriate width along all streams, lakes, and wetlands that include or influence EFH.
6. Manage stormwater to duplicate the natural hydrologic cycle, maintaining natural infiltration and runoff rates to the maximum extent practicable.
7. Where in-stream flows are insufficient to maintain water quality and quantity needed for EFH, establish conservation guidelines for water use permits and encourage the purchase or lease of water rights and the use of water to conserve or augment instream flows in accordance with state and federal water laws.
8. Encourage municipalities to use the best available technologies in upgrading their wastewater systems to avoid combined sewer overflow problems and chlorinated sewage discharges into rivers, estuaries, and the ocean.
9. Design and install proper on-site disposal systems.

5.1.5 Road Building and MaintenanceError! Bookmark not defined.

The building and maintenance of roads can affect aquatic habitats by increasing rates of natural processes such as debris slides or landslides and sedimentation, introducing exotic species, degrading water quality, and introducing chemical contamination (e.g., petroleum-based contaminants; Section G.2.2 of the EFH EIS). Paved and dirt roads introduce an impervious or semipervious surface into the landscape. This surface intercepts rain and creates runoff, carrying soil, sand and other sediments, and oil-based materials quickly downslope. If roads are built near streams, wetlands, or other sensitive areas, they may experience increased sedimentation that occurs from maintenance and use, as well as during storm and snowmelt events. Even carefully designed and constructed roads can become sources of sediment and pollutants if they are not properly maintained.

Potential Adverse Impacts

The effects of roads on aquatic habitat can be profound. They include (1) increased deposition of fine sediments, (2) changes in water temperature, (3) elimination or introduction of migration barriers such as culverts, (4) changes in streamflow, (5) introduction of non-native plant species, and (6) changes in channel configuration (see Section G.2.1.1 and the standards referenced in the EFH EIS).

Recommended Conservation Measures

The following conservation measures for road building and maintenance should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. To the extent practicable, avoid locating roads near fish-bearing streams.
2. Incorporate appropriate erosion control and stabilization measures into road construction plans to reduce erosion potential.
3. Build bridges when possible.
4. Locate stream crossings in stable stream reaches.
5. Design bridge abutments to minimize disturbances to streambanks and place abutments outside of the floodplain whenever possible.

6. To the extent practicable, avoid road construction across alluvial floodplains, mass wastage areas, or braided stream bottom lands unless site-specific protection can be implemented to ensure protection of soils, water, and associated resources.
7. Avoid side-casting of road construction and maintenance materials on native surfaces and into streams.
8. To the extent practicable, use native vegetation in stabilization plantings.
9. Ensure that maintenance operations avoid adverse affects to EFH.

5.2 Riverine Activities

5.2.1 Mining

Mining and mineral extraction activities take many forms, such as commercial dredging and recreational suction dredging, placer, area surface removal, and contour operations (Section G.5.6 of EIS EFH). Activities include gravel mining (NMFS 2004), exploration, site preparation, mining, milling, waste management, decommissioning or reclamation, and mine abandonment (American Fisheries Society [AFS] 2000). Mining and its associated activities have the potential to cause environmental impacts from exploration through post-closure. These impacts may include adverse effects to EFH. The operation of metal, coal, rock quarries, and gravel pit mining has caused varying degrees of environmental damage in urban, suburban, and rural areas. Some of the most severe damage, however, occurs in remote areas, where some of the most productive fish habitat is often located (Sengupta 1993). In Alaska, existing regulations, promulgated and enforced by other federal and state agencies, have been designed to control and manage these changes to the landscape to avoid and minimize impacts. These regulations are regularly updated as new technologies are developed to improve mineral extraction, reclaim mined lands, and limit environmental impacts. However, while environmental regulations may avoid, limit, control, or offset many of these potential impacts, mining will, to some degree, always alter landscapes and environmental resources (National Research Council [NRC] 1999).

Mineral Mining

Potential Adverse Impacts

The effects of mineral mining on EFH depend on the type, extent, and location of the activities. Potential impacts from mining include (1) adverse modification of hydrologic conditions so as to cause erosion of desirable habitats, (2) removal of substrates that serve as habitat for fish and invertebrates, (3) conversion of habitats,(4) release of harmful or toxic materials, and (5) creation of harmful turbidity levels.

Recommended Conservation Measures

The following conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. To the extent practicable, avoid mineral mining in waters, riparian areas, and floodplains containing EFH.
2. Schedule necessary in-water activities when the fewest species/least vulnerable life stages of federally managed species will be present.
3. Use an integrated environmental assessment, management, and monitoring package in accordance with state and federal law and regulations.
4. Minimize spillage of dirt, fuel, oil, toxic materials, and other contaminants into EFH.

5. Treat and test wastewater (acid neutralization, sulfide precipitation, reverse osmosis, electrochemical, or biological treatments) and recycle on site to minimize discharge to streams.
6. Minimize opportunities for sediments to enter or affect EFH.
7. If possible, reclaim, rather than bury, mine waste that contains heavy metals, acid materials, or other toxic compounds if leachate can enter EFH through groundwater.
8. Restore natural contours and plant native vegetation on site after use to restore habitat function to the extent practicable.
9. Minimize the aerial extent of ground disturbance (e.g., through phasing of operations), and stabilize disturbed lands to reduce erosion.

Sand and Gravel Mining

Potential Adverse Impacts

Sand and gravel mining is extensive and occurs by several methods. These include wet-pit mining (i.e., removal of material from below the water table), dry-pit mining on beaches, exposed bars, and ephemeral streambeds, and subtidal mining. Sand and gravel mining in riverine, estuarine, and coastal environments can create EFH impacts, including (1) turbidity plumes and resuspension effects, (2) removal of spawning habitat, and (3) alteration of channel morphology.

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. To the extent practicable, avoid sand/gravel mining in waters containing EFH.
2. Identify upland or off-channel (where the channel will not be captured) gravel extraction sites as alternatives to gravel mining in or adjacent to EFH, if possible.
3. Design, manage, and monitor sand and gravel mining operations to minimize potential direct and indirect impacts to EFH, if operations in EFH cannot be avoided.
4. Minimize the areal extent and depth of extraction.
5. Include restoration, mitigation, and monitoring plans, as appropriate in sand/gravel extraction plans.

5.2.2 Organic and Inorganic Debris

Natural occurring flotsam, such as LWD and macrophyte wrack (i.e., kelp), plays an important role in aquatic ecosystems, including EFH. LWD and wrack promote habitat complexity and provide structure to various aquatic and shoreline habitats. The natural deposition of LWD creates habitat complexity by altering local hydrologic conditions, nutrient availability, sediment deposition, turbidity, and other structural habitat conditions. Conversely, inorganic flotsam and jetsam debris can negatively impact EFH. Inorganic marine debris is a problem along much of the coastal U.S., where it litters shorelines, fouls estuaries, entangles fish and wildlife, and creates hazards in the open ocean. Marine debris consists of a wide variety of man-made materials, including general litter, plastics, hazardous wastes, and discarded or lost fishing gear. The debris enters waterbodies indirectly through rivers and storm drains, as well as directly via ocean dumping and accidental release. Although laws and regulatory programs exist to prevent or control the problem, marine debris continues to affect aquatic resources.

Organic Debris Removal

Natural occurring flotsam, such as LWD and macrophyte wrack (i.e., kelp), is sometimes intentionally removed from streams, estuaries, and coastal shores. This debris is removed for a variety of reasons, including dam operations, aesthetic concerns, and commercial and recreational uses. However, the presence of organic debris is important for maintaining aquatic habitat structure and function. Removal can alter the ecological conditions of riverine, estuarine, and coastal ecosystems and habitats.

Potential Adverse Impacts

The removal of organic debris from natural systems can reduce habitat function, adversely impacting habitat quality. Reductions in woody debris inputs to estuaries may also affect the ecological balance of estuarine systems by altering rates and patterns of nutrient transport, sediment deposition, and availability of in-water cover for larval and juvenile fish. Beach grooming and wrack removal can substantially alter the macrofaunal community structure of exposed sand beaches by reducing species richness, abundance, and biomass of macrofauna associated with beach wrack (e.g., sand crabs, isopods, amphipods, and polychaetes).

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Leave LWD whenever possible, removing it only when it presents a threat to life or property.
2. Encourage appropriate federal, state, and local agencies to prohibit or minimize commercial removal of LWD from rivers, estuaries, and beaches.
3. Encourage appropriate federal, state, and local agencies to aid in the downstream movement of LWD around dams, culverts, and bridges wherever possible, rather than removing it from the system.
4. Educate landowners and recreationalists about the benefits of maintaining LWD.
5. Localize beach grooming practices, and minimize them whenever possible.

Inorganic Debris

Numerous national and international laws are intended to prevent the disposal of marine debris in ocean waters, including ocean dumping and land-based sources. Nationally, land-based sources of marine debris account for about 80 percent of the marine debris on beaches and in U.S. waters. Debris can originate from combined sewer overflows and storm drains, stormwater runoff, landfills, solid waste disposal, poorly maintained garbage bins, floating structures, and general littering of beaches, rivers, and open waters. Typical debris from these land-based sources includes raw or partially treated sewage, litter, hazardous materials, and discarded trash.

Potential Adverse Impacts

Land and ocean based marine debris is a very diverse problem, and adverse effects to EFH are likewise varied. Floating or suspended trash can directly affect fish that consume or are entangled in it. Toxic substances in plastics can kill or impair fish and invertebrates that use habitat polluted by these materials. The chemicals leach from plastics, persist in the environment, and can bioaccumulate through the food web.

Once floatable debris settles to the bottom of estuaries, coastal, and open ocean areas it may cover and suffocate immobile animals and plants, creating large spaces devoid of life. Currents can carry suspended debris to underwater reef habitats where the debris can become snagged, damaging these sensitive habitats. The typical floatable debris from combined sewer overflows includes street litter, sewage

containing viral and bacterial pathogens, pharmaceutical by-products from human excretion, and pet wastes. Pathogens can also contaminate shellfish beds and reefs.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Encourage proper trash disposal in coastal and ocean settings.
2. Advocate and participate in coastal cleanup activities.
3. Encourage enforcement of regulations addressing marine debris pollution and proper disposal.
4. Provide resources and technical guidance for development of studies and solutions addressing the problem of marine debris.
5. Provide resources to the public explaining the impact of marine debris and giving guidance on how to reduce or eliminate the problem.

5.2.3 Dam Operation

Dams are constructed and operated to provide sources for hydropower, water storage, and flood control. Their operation, however, can affect water quality and quantity in riverine systems.

Potential Adverse Impacts
The effects of dam construction and operation on EFH can include (1) migratory impediments, (2) water flow and current pattern shifts, (3) thermal impacts, and (4) limits on sediment and woody debris transport.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

6. Operate facilities to create flow conditions that provide for passage, water quality, proper timing of life history stages, and properly functioning channel conditions to avoid strandings and redd dewatering.
7. Develop water and energy conservation guidelines for integration into dam operation plans and into regional and watershed-based water resource plans.
8. Provide mitigation (including monitoring and evaluation) for nonavoidable adverse effects on EFH.

5.2.4 Commercial and Domestic Water Use

Commercial and domestic water use demands to support the needs of homes, farms, and industries require a constant supply of water. Freshwater is diverted directly from lakes, streams, and rivers by means of pumping facilities, or is stored in impoundments. Because human populations are expected to continue increasing in Alaska, it is reasonable to assume that water uses, including water impoundments and diversion, will similarly increase (Gregory and Bisson 1997).

Potential Adverse Impacts
Water diversions can involve either withdrawals (reducing flow) or discharges (increasing flow). The withdrawal of water can affect EFH by (1) altering natural flows and the process associated with flow rates, (2) affecting shoreline riparian habitats, (3) affecting prey bases, (4) affecting water quality, and (5) entrapping fishes. Problems associated with return flows include increased water temperature,

increased salinity, introduction of pathogens, decreased dissolved oxygen, increased toxic contaminants from pesticides and fertilizers, and increased sedimentation (Northwest Power Planning Council [NPPC] 1986). Diversions can also physically divert or entrap EFH-managed species (Section G.5.3 of the EFH EIS).

Recommended Conservation Measures
The recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Design projects to create flow conditions that provide for adequate passage, water quality, proper timing of life history stages, and properly functioning channels to avoid juvenile stranding and redd dewatering, as well as to maintain and restore proper channel, floodplain, riparian, and estuarine conditions.
2. Establish adequate instream flow conditions for anadromous fish.
3. Screen water diversions on fish-bearing streams, as needed.
4. Incorporate juvenile and adult fish passage facilities on all water diversion projects (e.g., fish bypass systems).
5. Where practicable, ensure that mitigation is provided for nonavoidable impacts.

5.3 Estuarine Activities

5.3.1 Dredging

Dredging navigable waters creates a continuous impact primarily affecting benthic and water-column habitats in the course of constructing and operating marinas, harbors, and ports. Routine dredging (i.e., the excavation of soft-bottom substrates) is used to create deepwater navigable channels or to maintain existing channels that periodically fill with sediments. In addition, port expansion has become an almost continuous process due to economic growth, competition between ports, and significant increases in vessel size (Section G.4.3 of the EFH EIS). Elimination or degradation of aquatic and upland habitats is commonplace because port expansion almost always affects open water, submerged bottoms, and, possibly, riparian zones.

Potential Adverse Impacts
The environmental effects of dredging on EFH can include (1) direct removal/burial of organisms; (2) turbidity/siltation effects, including light attenuation from turbidity; (3) contaminant release and uptake, including nutrients, metals, and organics; (4) release of oxygen consuming substances; (5) entrainment; (6) noise disturbances; and (6) alteration to hydrodynamic regimes and physical habitat.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Avoid new dredging to the maximum extent practicable.
2. Where possible, minimize dredging by using natural and existing channels.
3. Site activities that would likely require dredging (such as placement of piers, docks, marinas, etc.) in deep-water areas or design such structures to alleviate the need for maintenance dredging.
4. Incorporate adequate control measures by using BMPs to minimize turbidity and dispersal of dredged material in areas where the dredging equipment would cause such effects.

5. For new dredging projects, undertake multi-season, pre-, and post-dredging biological surveys to assess the cumulative impacts to EFH and allow for implementation of adaptive management techniques.
6. Provide appropriate compensation for significant impacts (short-term, long-term, and cumulative) to benthic environments resulting from dredging.
7. Perform dredging at times when impacts to federally managed species or their prey are least likely. Avoid dredging in areas with submerged aquatic vegetation.
8. Reference all dredging latitude-longitude coordinates at the site so that information can be incorporated into a geographical information system format.
9. Test sediments for contaminants as per EPA and USACE requirements.
10. Identify excess sedimentation in the watershed that prompts excessive maintenance dredging activities, and implement appropriate management actions, if possible, to ensure that actions are taken to curtail those causes.
11. Ensure that bankward slopes of the dredged area are slanted to acceptable side slopes (e.g., 3:1) to prevent sloughing.
12. Avoid placing pipelines and accessory equipment used in conjunction with dredging operations to the maximum extent possible close to kelp beds, eelgrass beds, estuarine/salt marshes, and other high value habitat areas.

5.3.2 Material Disposal/Fill Material

The discharge of dredged materials subsequent to dredging operations or the use of fill material in aquatic habitats can result in sediments (e.g., dirt, sand, mud) covering or smothering existing submerged substrates, loss of habitat function, and adverse effects on benthic communities.

Disposal of Dredged Material

Potential Adverse Impacts

The disposal of dredged material can adversely affect EFH by (1) altering or destroying benthic communities, (2) altering adjacent habitats, and (3) creating turbidity plumes and introducing contaminants and/or nutrients.

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Study all options for disposal of dredged materials, including upland disposal sites, and select disposal sites that minimize adverse effects to EFH.
2. Where long-term maintenance dredging is anticipated, acquire and maintain disposal sites for the entire project life.
3. Encourage beneficial uses of dredged materials.
4. State and federal agencies should identify the direct and indirect impacts open-water disposal permits for dredged material may have on EFH during proposed project reviews.
5. Minimize the areal extent of any disposal site in EFH, or avoid the site entirely. Mitigate all non-avoidable adverse impacts as appropriate.

Fill Material

Potential Adverse Impacts
Adverse impacts to EFH from the introduction of fill material include (1) loss of habitat function and (2) changes in hydrologic patterns.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH:

1. Federal, state, and local resource management and permitting agencies should address the cumulative impacts of past and current fill operations on EFH and consider them in the permitting process for individual projects.
2. Minimize the areal extent of any fill in EFH, or avoid it entirely. Mitigate all non-avoidable adverse impacts as appropriate.
3. Consider alternatives to the placement of fill into areas that support EFH.

5.3.3 Vessel Operations/Transportation/Navigation

The growth in Alaska coastal communities is putting demands on port districts to increase infrastructure capacity to accommodate additional vessel operations for cargo handling activities and marine transportation. Port expansion has become an almost continuous process due to economic growth, competition between ports, and significant increases in vessel size (Council 1999). In addition, increasing boat sales have put more pressure on improving and building new commercial fishing and small boat harbors.

Potential Adverse Impacts
Port facilities, vessel/ferry operations, and recreational marinas can impact to EFH, especially by filling productive shallow water habitats. Potential adverse impacts to EFH can occur during both the construction and operation phases. These include direct, indirect, and cumulative impacts on shallow subtidal, deep subtidal, eelgrass beds, mudflats, sand shoals, rock reefs, and salt marsh habitats. There is considerable evidence that docks and piers block sunlight penetration, alter water flow, introduce chemicals, and restrict access and navigation (Section G.4.6 of the EFH EIS). The increase in hard surfaces close to the marine environment increases nonpoint surface discharges (Section G.2.2 of the EFH EIS), adds debris sources, and reduces buffers between land use and the aquatic ecosystem. Additional impacts include vessel groundings, modification of water circulation (breakwaters, channels, and fill), vessel wake generation, pier lighting, anchor and prop scour, discharge of contaminants and debris, and changing natural patterns of fish movement.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Locate marinas in areas of low biological abundance and diversity; if possible, for example, avoid the disturbance of eelgrass or other submerged aquatic vegetation including macroalgae, mudflats, and wetlands as part of the project design.
2. If practicable, excavate uplands to create marina basins rather than converting intertidal or shallow subtidal areas to deeper subtidal areas for basin creation.
3. Leave riparian buffers in place to help maintain water quality and nutrient input.
4. Should mitigation be required, include a monitoring plan to gauge the success of mitigation efforts.

5. Include low-wake vessel technology, appropriate routes, and BMPs for wave attenuation structures as part of the design and permit process.
6. Incorporate BMPs to prevent or minimize contamination from ship bilge waters, antifouling paints, shipboard accidents, shipyard work, maintenance dredging and disposal, and nonpoint source contaminants from upland facilities related to vessel operations and navigation.
7. Locate mooring buoys in water deep enough to avoid grounding and to minimize the effects of prop wash.
8. Use catchment basins for collecting and storing surface runoff from upland repair facilities.
9. Locate facilities in areas with enough water velocity to maintain water quality levels within acceptable ranges.
10. Locate marinas where they do not interfere with drift sectors determining the structure and function of adjacent habitats.
11. To facilitate the movement of fish around breakwaters, provide a shallow shelf or "fish bench" on the outside of the breakwater.
12. Harbor facilities should be designed to include practical measures for reducing, containing, and cleaning up petroleum spills.
13. Use appropriate timing windows for construction and dredging activities to avoid potential impacts on EFH.

5.3.4 Introduction of Exotic Species

Introductions of exotic species into estuarine, riverine, and marine habitats have been well documented and can be intentional (e.g., for the purpose of stock or pest control) or unintentional (e.g., fouling organisms). Exotic fish, shellfish, pathogens, and plants can enter the environment from industrial shipping (e.g., as ballast), recreational boating, aquaculture (Section G.4.10 of the EFH EIS), biotechnology, and aquariums. The transportation of nonindigenous organisms to new environments can have many severe impacts on habitat (Omori et al. 1994).

Potential Adverse Impacts

Long-term impacts from the introduction of nonindigenous and reared species can change the natural community structure and dynamics, lower the overall fitness and genetic diversity of natural stocks, and pass and/or introduce exotic lethal disease. Overall, exotic species introductions create five types of negative effects: (1) habitat alteration, (2) trophic alteration, (3) gene pool alteration, (4) spatial alteration, and (5) introduction of diseases.

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Uphold fish and game regulations of the Alaska Board of Fisheries (AS 16.05.251) and Board of Game (AS 16.05.255), which prohibit and regulate the live capture, possession, transport, or release of native or exotic fish or their eggs.
2. Adhere to regulations and use best management practices outlined in the State of Alaska Aquatic Nuisance Species Management Plan (Fay 2002).
3. Encourage vessels to perform a ballast water exchange in marine waters (in accordance with the U.S. Coast Guard's voluntary regulations) to minimize the possibility of introducing exotic estuarine species into similar habitats.

4. Discourage vessels that have not performed a ballast water exchange from discharging their ballast water into estuarine receiving waters.
5. Require vessels brought from other areas over land via trailer to clean any surfaces that may harbor non-native plant or animal species (propellers, hulls, anchors, fenders, etc.).
6. Treat effluent from public aquaria displays and laboratories and educational institutes using exotic species before discharge to prevent the introduction of viable animals, plants, reproductive material, pathogens, or parasites into the environment.
7. Prevent introduction of non-native plant species into aquatic and riparian ecosystems by avoiding use of non-native seed mixes or invasive, non-native landscaping materials near waterways and shorelines.
8. Encourage proper disposal of seaweeds and other plant materials used for packing purposes when shipping fish or other animals.

5.3.5 Pile Installation and Removal

Pilings are an integral component of many overwater and in-water structures. They provide support for the decking of piers and docks, function as fenders and dolphins to protect structures, support navigation markers, and help in the construction of breakwaters and bulkheads. Materials used in pilings include steel, concrete, wood (both treated and untreated), plastic, or a combination thereof. Piles are usually driven into the substrate by using either impact hammers or vibratory hammers. Impact hammers consist of a heavy weight that is repeatedly dropped onto the top of the pile, driving it into the substrate. Vibratory hammers use a combination of a stationary, heavy weight and vibration, in the plane perpendicular to the long axis of the pile, to force the pile into the substrate. Impact hammers are able to drive piles into most substrates (including hardpan, glacial till, etc.), vibratory hammers are limited to softer, unconsolidated substrates (e.g., sand, mud, and gravel).

Piles can be removed using a variety of methods, including vibratory hammer, direct pull, clam shell grab, or cutting/breaking the pile below the mudline, leaving the buried section in place.

Pile Driving

Potential Adverse Impacts

Pile driving can generate intense underwater sound pressure waves that may adversely affect EFH. These pressure waves have been shown to injure and kill fish (CalTrans 2001, Longmuir and Lively 2001, Stotz and Colby 2001, Stadler, pers. obs. 2002). Injuries associated directly with pile driving are poorly studied, but include rupture of the swimbladder and internal hemorrhaging (CalTrans 2001; Abbott and Bing-Sawyer 2002; Stadler, pers. obs. 2002). The type and intensity of the sounds produced during pile driving depend on a variety of factors, including, but not limited to, the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile-driving hammer. Driving large hollow-steel piles with impact hammers produces intense, sharp spikes of sound that can easily reach levels injurious to fish. Vibratory hammers, on the other hand, produce sounds of lower intensity, with a rapid repetition rate.

Systems successfully designed to reduce the adverse effects of underwater sounds on fish have included the use of air bubbles. Both confined (i.e., metal or fabric sleeve) and unconfined air bubble systems have been shown to attenuate underwater sound pressures (Longmuir and Lively 2001, Christopherson and Wilson 2002, Reyff and Donovan 2003).

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Install hollow-steel piles with an impact hammer at a time of year when larval and juvenile stages of fish species with designated EFH are not present.
2. Drive piles during low tide when they are located in intertidal and shallow subtidal areas.
3. Use a vibratory hammer when driving hollow-steel piles.
4. Implement measures to attenuate the sound should it exceed threshold levels. If sound pressure levels are anticipated to exceed acceptable limits, implement appropriate mitigation measures when practicable. Methods to reduce the sound pressure levels include, but are not limited to, the following:
    a) Surround the pile with an air bubble curtain system or air-filled coffer dam.
    b) Because the sound produced has a direct relationship to the force used to drive the pile, use a smaller hammer to reduce the sound pressures.
    c) Use a hydraulic hammer if impact driving cannot be avoided. The force of the hammer blow can be controlled with hydraulic hammers; reducing the impact force will reduce the intensity of the resulting sound.
5. Drive piles when the current is reduced (i.e., centered around slack current) in areas of strong current to minimize the number of fish exposed to adverse levels of underwater sound.

Pile Removal

Potential Adverse Impacts
The primary adverse effect of removing piles is the suspension of sediments, which may result in harmful levels of turbidity and release of contaminants contained in those sediments. Vibratory pile removal tends to cause the sediments to slough off at the mudline, resulting in relatively low levels of suspended sediments and contaminants. Breaking or cutting the pile below the mudline may suspend only small amounts of sediment, providing that the stub is left in place, and little digging is required to access the pile. Direct pull or use of a clamshell to remove broken piles may, however, suspend large amounts of sediment and contaminants. When the piling is pulled from the substrate using these two methods, sediments clinging to the piling will slough off as it is raised through the water column, producing a potentially harmful plume of turbidity and/or contaminants. The use of a clamshell may suspend additional sediment if it penetrates the substrate while grabbing the piling.

While there is a potential to adversely affect EFH during the removal of piles, many of the piles removed are old creosote-treated timber piles. In some cases, the long-term benefits to EFH obtained by removing a chronic source of contamination may outweigh the temporary adverse effects of turbidity.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Remove piles completely rather than cutting or breaking them off, if they are structurally sound.
2. Minimize the suspension of sediments and disturbance of the substrate when removing piles. Measures to help accomplish this include, but are not limited to, the following:
    a) When practicable, remove piles with a vibratory hammer, rather than using the direct pull or clamshell method.
    b) Remove the pile slowly to allow sediment to slough off at, or near, the mudline.

c) The operator should first hit or vibrate the pile to break the bond between the sediment and the pile to minimize the potential for the pile to break, as well as to reduce the amount of sediment sloughing off the pile during removal.
d) Encircle the pile, or piles, with a silt curtain that extends from the surface of the water to the substrate.

3. Complete each pass of the clamshell to minimize suspension of sediment if pile stubs are removed with a clamshell.
4. Place piles on a barge equipped with a basin to contain all attached sediment and runoff water after removal.
5. Using a pile driver, drive broken/cut stubs far enough below the mudline to prevent release of contaminants into the water column as an alternative to their removal.

5.3.6 Overwater Structures

Overwater structures include commercial and residential piers and docks, floating breakwaters, barges, rafts, booms, and mooring buoys. These structures typically are located in intertidal areas out to about 49 feet (15 meters) below the area exposed by the mean lower low tide (i.e., the shallow subtidal zone). Light, wave energy, substrate type, depth, and water quality are the primary factors controlling the plant and animal assemblages found at a particular site. Overwater structures and associated activities can alter these factors and interfere with key ecological functions such as spawning, rearing, and refugia. Site-specific factors (e.g., water clarity, current, depth, etc.) and the type and use of a given overwater structure determine the occurrence and magnitude of these impacts.

Potential Adverse Impacts
Overwater structures and associated developments may adversely affect EFH in a variety of ways, primarily by (1) changes in ambient light conditions, (2) alteration of the wave and current energy regime, and (3) activities associated with the use and operation of the facilities (Nightingale and Simenstad 2001).

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Use upland boat storage whenever possible to minimize need for overwater structures.
2. Locate overwater structures in deep enough waters to avoid intertidal and shade impacts, minimize or preclude dredging, minimize groundings, and avoid displacement of submerged aquatic vegetation, as determined by a preconstruction survey.
3. Design piers, docks, and floats to be multiuse facilities to reduce the overall number of such structures and to limit impacted nearshore habitat.
4. Incorporate measures that increase the ambient light transmission under piers and docks. These measures include, but are not limited to, the following:
    a) Maximize the height of the structure, and minimize the width of the structure to decrease the shade footprint and using grated decking material.
    b) Use reflective materials (e.g., concrete or steel instead of materials that absorb light such as wood) on the underside of the dock to reflect ambient light.
    c) Use the fewest number of pilings necessary to support the structures to allow light into under-pier areas and minimize impacts to the substrate.
    d) Align piers, docks, and floats in a north-south orientation to allow the arc of the sun to cross perpendicular to the structure and to reduce the duration of light limitation.

5. Use floating rather than fixed breakwaters whenever possible, and remove them during periods of low dock use. Encourage seasonal use of docks and off-season haul-out.
6. Locate floats in deep water to avoid light limitation and grounding impacts to the intertidal or shallow subtidal zone.
7. Maintain at least 1 foot (0.30 meter) of water between the substrate and the bottom of the float at extreme low tide.
8. Conduct in-water work when managed species and prey species are least likely to be impacted.
9. To the extent practicable, avoid the use of treated wood timbers or pilings and use alternative materials such as untreated wood, concrete, or steel.
10. Mitigate for unavoidable impacts to benthic habitats. Mitigation should be adequate, monitored, and adaptively managed.

5.3.7 Flood Control/Shoreline Protection

Protecting riverine and estuarine communities from flooding events can result in varying degrees of change in the physical, chemical, and biological characteristics of existing shoreline and riparian habitat. The use of dikes and berms can also have long-term adverse effects on tidal marsh and estuarine habitats. Tidal marshes are highly variable, but typically have freshwater vegetation at the landward side, saltwater vegetation at the seaward side, and gradients of species inbetween that are in equilibrium with the prevailing climatic, hydrographic, geological, and biological features of the coast. These systems normally drain through highly dendritic tidal creeks that empty into the bay or estuary. Freshwater entering along the upper edges of the marsh drains across the surface and enters the tidal creeks. Structures placed for coastal shoreline protection include, but are not limited to, concrete or wood seawalls, rip-rap revetments (sloping piles of rock placed against the toe of the dune or bluff in danger of erosion from wave action), dynamic cobble revetments (natural cobble placed on an eroding beach to dissipate wave energy and prevent sand loss), vegetative plantings, and sandbags.

Potential Adverse Impacts

Dikes, levees, ditches, or other water controls at the upper end of a tidal marsh can cut off all tributaries feeding the marsh, preventing freshwater flushing and annual flushing, annual renewal of sediments and nutrients, and the formation of new marshes. Water controls within the marsh proper intercept and carry away freshwater drainage, block freshwater from flowing across seaward portions of the marsh, increase the speed of runoff of freshwater to the bay or estuary, lower the water table, permit saltwater intrusion into the marsh proper, and create migration barriers for aquatic species. In deeper channels where reducing conditions prevail, large quantities of hydrogen sulfide are produced. These quantities are toxic to marsh grasses and other aquatic life. Acid conditions of these channels can also result in release of heavy metals from the sediments.

Long-term effects on the tidal marsh include land subsidence (sometimes even submergence), soil compaction, conversion to terrestrial vegetation, greatly reduced invertebrate populations, and general loss of productive wetland characteristics. Loss of these low-salinity environments reduces estuarine fertility, restricts suitable habitat for aquatic species, and creates abnormally high salinity during drought years. Low-salinity environments form a barrier that prevents the entrance of many marine species, including competitors, predators, parasites, and pathogens.

Armoring of shorelines to prevent erosion and to maintain or create shoreline real estate simplifies habitats, reduces the amount of intertidal habitat, and affects nearshore processes and the ecology of numerous species (Williams and Thom 2001). Hydraulic effects on the shoreline include increased energy seaward of the armoring, reflected wave energy, dry beach narrowing, substrate coarsening, beach

steepening, changes in sediment storage capacity, loss of organic debris, and downdrift sediment starvation (Williams and Thom 2001). Installation of breakwaters and jetties can result in community changes from burial or removal of resident biota, changes in cover and preferred prey species, and predator attraction (Williams and Thom 2001). As with armoring, breakwaters and jetties modify hydrology and nearshore sediment transport, as well as movement of larval forms of many species (Williams and Thom 2001).

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Minimize the loss of riparian habitats as much as possible.
2. Do not undertake diking and draining of tidal marshlands and estuaries.
3. Wherever possible, use soft approaches (such as beach nourishment, vegetative plantings, and placement of LWD) to shoreline modifications.
4. Include efforts to preserve and enhance EFH by providing new gravel for spawning areas, removing barriers to natural fish passage, and using weirs, grade control structures, and low-flow channels to provide the proper depth and velocity for fish.
5. Construct a low-flow channel to facilitate fish passage and help maintain water temperature in reaches where water velocities require armoring of the riverbed.
6. Offset unavoidable impacts to in-stream fish habitat by providing rootwads, deflector logs, boulders, and rock weirs and by planting shaded riverine aquatic cover vegetation.
7. Use an adaptive management plan with ecological indicators to oversee monitoring and to ensure that mitigation objectives are met. Take corrective action as needed.

5.3.8 Log Transfer Facilities/In-water Log Storage

Rivers, estuaries, and bays were historically the primary ways to transport and store logs in the Pacific Northwest. Log storage within the bays and estuaries remains an issue in several Pacific Northwest bays. Using estuaries and bays and nearby uplands for storage of logs is common in Alaska, with most LTFs found in Southeast Alaska and a few located in Prince William Sound.

Potential Adverse Impacts

Log handling and storage in the estuary and intertidal zones of rivers can result in modification of benthic habitat and water quality degradation within the area of bark deposition (Levings and Northcote 2004). EFH may also be physically impacted by activities associated with facilities, constructed in the water, that are used to transfer commercially harvested logs to or from a vessel or log raft, including log rafts. Bark and wood debris may accumulate as a result of the abrasion of log surfaces from transfer equipment and impact EFH. After the logs have entered the water, they usually are bundled into rafts and hooked to a tug for shipment. In the process, bark and other wood debris can pile up on the ocean floor. The piles can smother clams, mussels, some seaweed, kelp, and grasses, with the bark sometimes remaining for decades. Accumulation of bark debris in shallow and deep-water environments has resulted in locally decreased epifaunal macrobenthos richness and abundance (Kirkpatrick et al. 1998, Jackson 1986). Log storage may also result in a release of soluble organic compounds within the bark pile. The physical, chemical, and biological impacts of log operations can be substantially reduced by adherence to appropriate siting and operational constraints. Adherence operational and siting guidelines will reduce (1) the amount of bark and wood debris that enters the marine and coastal environment, (2) the potential for displacement or harm to aquatic species, and (3) the accumulation of bark and wood debris on the ocean floor.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Restrict or eliminate storage and handling of logs from waters where state and federal water quality standards cannot be met at all times outside of the authorized zone of deposition.
2. Minimize potential impacts of log storage by employing effective bark and wood debris control, collection, and disposal methods at log dumps, raft building areas, and mill-side handling zones; avoiding free-fall dumping of logs; using easy let-down devices for placing logs in the water; and bundling logs before water storage (bundles should not be broken except on land and at millside).
3. Do not store logs in the water if they will ground at any time or shade sensitive aquatic vegetation such as eelgrass.
4. Avoid siting log-storage areas and LTFs in sensitive habitat and areas important for specified species, as required by the ATTF guidelines.
5. Site log storage areas and LTFs in areas with good currents and tidal exchanges.
6. Use land-based storage sites where possible, with the goal of eliminating in-water storage of logs.

5.3.9 Utility Line/Cables/Pipeline Installation

With the continued development of coastal regions comes greater demand for the installation of cables, utility lines for power and other services, and pipelines for water, sewage, etc. The installation of pipelines, utility lines, and cables can have direct and indirect impacts on the offshore, nearshore, estuarine, wetland, beach, and rocky shore coastal zone habitats. Many of the primary and direct impacts occur during the construction phase of installation, such as ground disturbance in the clearing of the right-of-way, access roads, and equipment staging areas. Indirect impacts can include increased turbidity, saltwater intrusion, accelerated erosion, and introduction of urban and industrial pollutants.

Potential Adverse Impacts
Adverse effects on EFH from the installation of pipelines, utility lines, and cables can occur through (1) destruction of organisms and habitat, (2) turbidity impacts, (3) resuspension of contaminants, and (4) changes in hydrology.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Align crossings along the least environmentally damaging route. Avoid sensitive habitats such as hard-bottom (e.g., rocky reefs), cold-water corals, submerged aquatic vegetation, oyster reefs, emergent marsh, and mud flats.
2. Use horizontal directional drilling where cables or pipelines would cross anadromous fish streams, salt marsh, vegetated inter-tidal zones, or steep erodible bluff areas adjacent to the inter-tidal zone to avoid surface disturbances.
3. Avoid construction of permanent access channels since they disrupt natural drainage patterns and destroy wetlands through excavation, filling, and bank erosion.
4. Store and contain excavated material on uplands.

5. Backfill excavated wetlands with either the same or comparable material capable of supporting similar wetland vegetation and at original marsh elevations.
6. Use existing rights-of-way whenever possible to lessen overall encroachment and disturbance of wetlands.
7. Bury pipelines and submerged cables where possible.
8. Remove inactive pipelines and submerged cables unless they are located in sensitive areas (e.g., marsh, reefs, sea grass, etc.) or in areas that present no safety hazard.
9. Use silt curtains or other type barriers to reduce turbidity and sedimentation whenever possible near the project site.
10. Limit access for equipment to the immediate project area.
11. Limit construction equipment to the minimum size necessary to complete the work.
12. Conduct construction during the time of year when it will have the least impact on sensitive habitats and species.
13. Suspend transmission lines beneath existing bridges or conduct directional boring under streams to reduce the environmental impact.
14. For activities on the Continental Shelf, shunt drill cuttings through a conduit and either discharge the cuttings near the sea floor, or transport them ashore.
15. For activities on the Continental Shelf, and to the extent practicable, locate drilling and production structures, including pipelines, at least 1 mile (1.6 kilometers) from the base of a hard-bottom habitat.
16. For activities on the Continental Shelf, and to avoid and minimize adverse impacts to managed species, implement the following to the extent practicable:
    a) Bury pipelines at least 3 feet (0.9 meter) beneath the sea floor, whenever possible. Particular considerations (i.e., currents, ice scour) may require deeper burial or weighting to maintain adequate cover. Buried pipeline and cables should be examined periodically for maintenance of adequate earthen cover.
    b) Where burial is not possible, such as in hard-bottomed areas, attach pipelines and cables to substrate to minimize conflicts with fishing gear.
    c) Locate alignments along routes that will minimize damage to marine and estuarine habitat.
    d) Where user conflicts are likely, consult and coordinate with fishing stakeholder groups during the route-planning process to minimize conflict.

5.3.10 Commercial Utilization of Habitat

Productive embayments are often used for commercial culturing and harvesting operations. These locations provide protected waters which serve as sites for oyster and mussel culturing. These operations may occur in areas of productive eelgrass beds. In 1988, Alaska passed the Alaska Aquatic Farming Act which is designed to encourage establishment and growth of an aquatic farming industry in the state. The Act establishes four criteria for issuance of an aquatic farm permit, including the requirement that the farm may not significantly affect fisheries, wildlife, or other habitats in an adverse manner.

Potential Adverse Impacts

Adverse impacts to EFH by operations that directly or indirectly use habitat include (1) discharge of organic waste, (2) shading and direct impacts to the seafloor, (3) risk of introducing undesirable species, and (4) impacts on estuarine food webs.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Site mariculture operations away from exisiting kelp or eelgrass beds. If mariculture operations are to be located adjacent to existing kelp or eelgrass beds, monitor these beds on an annual basis and resite the mariculture facility if monitoring reveals adverse effects.
2. Do not enclose or impound tidally influenced wetlands for mariculture. Take into account the size of the facility, migratory patterns, competing uses, hydrographic conditions, and upstream uses when siting facilities.
3. Undertake a thorough scientific review and risk assessment before any non-native species are introduced.
4. Encourage development of harvesting methods to minimize impacts on plant communities and the loss of food and/or habitat to fish populations during harvesting operations.
5. Provide appropriate mitigation for the unavoidable, extensive, or permanent loss of plant communities.

5.4 Coastal/Marine Activities

5.4.1 Point-source Discharges

Point-source discharges from municipal sewage treatment facilities or storm water discharges are controlled through EPA's regulations under the CWA and by state water regulations. The primary concerns associated with municipal point-source discharges involve treatment levels needed to attain acceptable nutrient inputs and overloading of treatment systems due to rapid development of the coastal zone. Storm drains are contaminated from communities using settling and storage ponds, street runoff, harbor activities, and honey buckets. Annually, wastewater facilities introduce large volumes of untreated excrement and chlorine through sewage outfall lines, as well as releasing treated freshwater into the nation's waters. This can significantly alter pH levels of marine waters (Council 1999).

Potential Adverse Impacts
There are many potential impacts from point-source discharge, but point-source discharges and resulting altered water quality in aquatic environments do not necessarily result in adverse impacts, either to marine resources or EFH. Because most point-source discharges are regulated by the state or EPA, effects to receiving waters are generally considered on a case-by-case basis. Point-source discharges can adversely affect EFH by (1) reducing habitat functions necessary for growth to maturity, (2) modifying community structure, (3) bioaccumulation, and (4) modifying habitat.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Locate discharge points in coastal waters well away from shellfish beds, sea grass beds, coral reefs, and other similar fragile and productive habitats.
2. Reduce potentially high velocities by diffusing effluent to acceptable velocities.
3. Determine benthic productivity by sampling before any construction activity related to installation of new or modified facilities. Develop outfall design (e.g., modeling concentrations

within the predicted plume or likely extent of deposition along a productive nearshore) with input from appropriate resource and Tribal agencies.

4. Provide for mitigation when degradation or loss of habitat occurs from placement and operation of the outfall structure and pipeline.
5. Institute source-control programs that effectively reduce noxious materials to avoid introducing these materials into the waste stream.
6. Ensure compliance with pollutant discharges regulated through discharge permits which set effluent discharge limitations and/or specify operation procedures, performance standards, or BMPs. These efforts rely on the implementation of BMPs to control polluted runoff (EPA 1993).
7. Treat discharges to the maximum extent practicable, including implementation of up-to-date methodologies for reducing discharges of biocides (e.g., chlorine) and other toxic substances.
8. Use land-treatment and upland disposal/storage techniques where possible. Limit the use of vegetated wetlands as natural filters and pollutant assimilators for large-scale discharges to those instances where other less damaging alternatives are not available, and the overall environmental and ecological suitability of such actions has been demonstrated.
9. Avoid siting pipelines and treatment facilities in wetlands and streams. Since pipelines and treatment facilities are not water-dependent with regard to positioning, it is not essential that they be placed in wetlands or other fragile coastal habitats. Avoiding placement of pipelines within streambeds and wetlands will also reduce inadvertent infiltration into conveyance systems and retain natural hydrology of local streams and wetlands.

5.4.2 Fish Processing Waste—Shoreside and Vessel Operation

Seafood processing facilities are either shore-based facilities discharging through stationary outfalls or mobile vessels engaged in the processing of fresh or frozen seafood (Science Applications International Corporation 2001). Discharge of fish waste from shoreside and vessel processing has occurred in marine waters since the 1800s (Council 1999). With the exception of fresh market fish, some form of processing involving butchering, evisceration, precooking, or cooking is necessary to bring the catch to market. Precooking or blanching facilitates the removal of skin, bone, shell, gills, and other materials. Depending on the species, the cleaning operation may be manual, mechanical, or a combination of both (EPA 1974). Seafood processing facilities generally consist of mechanisms to offload the harvest from fishing boats; tanks to hold the seafood until the processing lines are ready to accept them; processing lines, process water, and waste collection systems; treatment and discharge facilities; processed seafood storage areas; and necessary support facilities such as electrical generators, boilers, retorts, water desalinators, offices, and living quarters. In addition, marinas that cater to patrons who fish a large amount can produce an equally large quantity of fish waste at the marina from fish cleaning.

Potential Adverse Impacts

Generally, seafood processing wastes consist of biodegradable materials that contain high concentrations of soluble organic material. Seafood processing operations have the potential to adversely affect EFH through (1) direct and/or nonpoint source discharge, (2) particle suspension, and (3) increased turbidity and surface plumes.

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. To the maximum extent practicable, base effluent limitations on site-specific water quality concerns.

2. To the maximum extent practicable, avoid the practice of discharging untreated solid and liquid waste directly into the environment.
3. Do not allow designation of new ZODs. Explore options to eliminate or reduce ZODs at existing facilities.
4. Control stickwater by physical or chemical methods.
5. Promote sound fish waste management through a combination of fish-cleaning restrictions, public education, and proper disposal of fish waste.
6. Encourage the alternative use of fish processing wastes (e.g., fertilizer for agriculture and animal feed).
7. Explore options for additional research.
8. Locate new plants outside rearing and nursery habitat. Monitor both biological and chemical changes to the site.

5.4.3 Water Intake Structures/Discharge Plumes

The withdrawal of riverine, estuarine, and marine waters by water intake structures is a common aquatic activity. Water may be withdrawn and used, for example, to cool power-generating stations and create temporary ice roads and ice ponds. In the case of power plants, the subsequent discharge of heated and/or chemically treated discharge water can also occur.

Potential Adverse Impacts
Water intake structures and effluent discharges can interfere with or disrupt EFH functions in the source or receiving waters by (1) entrainment, (2) impingement, (3) discharge, (4) operation and maintenance, and (5) construction-related impacts.

Recommended Conservation Measures
The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Locate facilities that rely on surface waters for cooling in areas other than estuaries, inlets, heads of submarine canyons, rock reefs, or small coastal embayments where managed species or their prey concentrate.
2. Design intake structures to minimize entrainment or impingement.
3. Design power plant cooling structures to meet the best technology available requirements as developed pursuant to Section 316(b) of the CWA.
4. Regulate discharge temperatures (both heated and cooled effluent) so they do not appreciably alter the temperature to an extent that could cause a change in species assemblages and ecosystem function in the receiving waters.
5. Avoid the use of biocides (e.g., chlorine) to prevent fouling where possible. Implement the least damaging antifouling alternatives.
6. Mitigate for impacts related to power plants and other industries requiring cooling water.
7. Treat all discharge water from outfall structures to meet state water quality standards at the terminus of the pipe.

5.4.4 Oil/Gas Exploration/Development/Production

Offshore exploration, development, and production of natural gas and oil reserves have been, and continue to be, an important aspect of the U.S. economy. As demand for energy resources grows, the debate over trying to balance the development of oil and gas resources and the protection of the environment will also continue. Projections indicate that U.S. demand for oil will increase by 1.3 percent per year between 1995 and 2020. Gas consumption is projected to increase by an average of 1.6 percent during the same time frame (Waisley 1998). Much of the 1.9 billion acres within the offshore jurisdiction of the U.S. remains unexplored (Oil and Gas Technologies for the Arctic and Deepwater 1985). Some of the older oil and gas platforms in operation will probably reach the end of their productive life in the near future, and decommissioning them is also an issue.

Potential Adverse Impacts

Offshore oil and gas operations can be classified into exploration, development, and production activities (which includes transportation). These activities occur at different depths in a variety of habitats. Not all of the potential disturbances in this list apply to every type of activity. These areas are subject to an assortment of physical, chemical, and biological disturbances, including the following (Council 1999, Helvey 2002):

- Noise from seismic surveys, vessel traffic, and construction of drilling platforms or islands
- Physical alterations to habitat from the construction, presence, and eventual decommissioning and removal of facilities such as islands or platforms, storage and production facilities, and pipelines to onshore common carrier pipelines, storage facilities, or refineries
- Waste discharges, including well drilling fluids, produced waters, surface runoff and deck drainage, domestic waste waters generated from the offshore facility, solid waste from wells (drilling muds and cuttings), and other trash and debris from human activities associated with the facility
- Oil spills
- Platform storage and pipeline decommissioning

The potential disturbances and associated adverse impacts on the marine environment have been reduced through operating procedures required by regulatory agencies and, in many cases, self-imposed by facilities operators. Most of the activities associated with oil and gas operations are conducted under permits and regulations that require companies to minimize impacts or avoid construction in sensitive marine habitats. New technological advances in operating procedures also reduce the potential for impacts.

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH:

1. As part of pre-project planning, identify all species of concern regulated under federal or state fishery management plans that inhabit, spawn, or migrate through areas slated for exploration, development, or production.
2. Avoid the discharge of produced waters into marine waters and estuaries. Reinject produced waters into the oil formation whenever possible.
3. Avoid discharge of muds and cuttings into the marine and estuarine environment.
4. To the extent practicable, avoid the placement of fill to support construction of causeways or structures in the nearshore marine environment.

5. As required by federal and state regulatory agencies, encourage the use of geographic response strategies that identify EFH and environmentally sensitive areas.
6. To the extent practicable, use methods to transport oil and gas that limit the need for handling in environmentally sensitive areas, including EFH.
7. Ensure that appropriate safeguards have been considered before drilling the first development well into the targeted hydrocarbon formations whenever critical life history stages of federally managed species are present.
8. Ensure that appropriate safeguards have been considered before drilling exploration wells into untested formations whenever critical life stages of federally managed species are present.
9. Oil and gas transportation and production facilities should be designed, constructed, and operated in accordance with applicable regulatory and engineering standards.
10. Evaluate and minimize impacts to EFH during the decommissioning phase of oil and gas facilities, including possible impacts during the demolition phase.

5.4.5 Habitat Restoration/Enhancement

Habitat loss and degradation are major, long-term threats to the sustainability of fishery resources (NMFS 2002). Viable coastal and estuarine habitats are important to maintaining healthy fish stocks. Good water quality and quantity, appropriate substrate, ample food sources, and substantial hiding places are needed to sustain fisheries. Restoration and/or enhancement of coastal and riverine habitat that supports managed fisheries and their prey will assist in sustaining and rebuilding fisheries stocks and recovering certain threatened or endangered species by increasing or improving ecological structure and functions. Habitat restoration/enhancement may include, but is not limited to, improvement of coastal wetland tidal exchange or reestablishment of historic hydrology, dam or berm removal, fish passage barrier removal/ modification, road-related sediment source reduction, natural or artificial reef/substrate/habitat creation, establishment or repair of riparian buffer zones, improvement of freshwater habitats that support anadromous fishes, planting of native coastal wetland and submerged aquatic vegetation, creation of oyster reefs, and improvements to feeding, shade or refuge, spawning, and rearing areas that are essential to fisheries.

Potential Adverse Impacts

The implementation of restoration/enhancement activities may have localized and temporary adverse impacts on EFH. Possible impacts can include (1) localized nonpoint source pollution such as influx of sediment or nutrients, (2) interference with spawning and migration periods, (3) temporary or permanent removal feeding opportunities, and (4) indirect effects from actual construction portions of the activity.

Recommended Conservation Measures

The following recommended conservation measures should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. Use BMPs to minimize and avoid potential impacts to EFH during restoration activities. BMPs should include, but are not limited to, the following:
    a) Use turbidity curtains, haybales, and erosion mats to protect the water column.
    b) Plan staging areas in advance, and keep them to a minimum size.
    c) Establish buffer areas around sensitive resources; flag and avoid rare plants, archeological sites, etc.
    d) Remove invasive plant and animal species from the proposed action area before starting work. Plant only native plant species. Identify and implement measures to ensure native vegetation or revegetation success (Section G.4.4 of the EFH EIS).

e) Establish temporary access pathways before restoration activities to minimize adverse impacts from project implementation.

2. Avoid restoration work during critical life stages for fish such as spawning, nursery, and migration. Determine these periods before project implementation to reduce or avoid any potential impacts.
3. Provide adequate training and education for volunteers and project contractors to ensure minimal impact to the restoration site. Train volunteers in the use of low-impact techniques for planting, equipment handling, and any other activities associated with the restoration.
4. Conduct monitoring before, during, and after project implementation to ensure compliance with project design and restoration criteria. If immediate post-construction monitoring reveals that unavoidable impacts to EFH have occurred, ensure that appropriate coordination with NMFS occurs to determine appropriate response measures, possibly including mitigation.
5. To the extent practicable, mitigate any unavoidable damage to EFH within a reasonable time after the impacts occur.
6. Remove and, if necessary, restore any temporary access pathways and staging areas used in the restoration effort.
7. Determine benthic productivity by sampling before any construction activity in the case of subtidal enhancement (e.g., artificial reefs). Avoid areas of high productivity to the maximum extent possible. Develop a sampling design with input from state and federal resource agencies. Before construction, evaluate of the impact resulting from the change in habitat (sand bottom to rocky reef, etc.). During post-construction monitoring, examine the effectiveness of the structures for increasing habitat productivity.

5.4.6 Marine Mining

Mining activity, which is also described in Sections G.3.1.1 and G.3.1.2 of the EFH EIS, can lead to the direct loss of EFH for certain species. Offshore mining, such as the extraction of gravel and gold in the Bering Sea and the mining of gravel from beaches, can increase turbidity of water. Thus, the resuspension of organic materials could affect less motile organisms (i.e., eggs and recently hatched larvae) in the area. Benthic habitats could be damaged or destroyed by these actions. Mining large quantities of beach gravel may significantly affect the removal, transport, and deposition of sand and gravel along the shore, both at the mining site and down-current (Council 1999). Neither the future extent of this activity nor the effects of such mortality on the abundance of marine species is known.

Potential Adverse Impacts

Mining practices that can affect EFH include physical impacts from intertidal dredging and chemical impacts from the use of additives such as flocculates (Council 1999). Impacts may include the removal of substrates that serve as habitat for fish and invertebrates; habitat creation or conversion in less productive or uninhabitable sites, such as anoxic holes or silt bottom; burial of productive habitats, such as in near-shore disposal sites (as in beach nourishment); release of harmful or toxic materials either in association with actual mining, or in connection with machinery and materials used for mining; creation of harmful turbidity levels; and adverse modification of hydrologic conditions so as to cause erosion of desirable habitats. Submarine disposal of mine tailings can also alter the behavior of marine organisms. Submarine mine tailings may not provide suitable habitat for some benthic organisms. In laboratory experiments, benthic dwelling flatfishes (Johnson et al. 1998a) and crabs (Johnson et al. 1998b) strongly avoided mine tailings.

During beach gravel mining, water turbidity increases and the resuspension of organic materials can affect less motile organisms (i.e., eggs and recently hatched larvae) in the area. Benthic habitats can be damaged or destroyed by these actions. Changes in bathymetry and bottom type may also alter population and migrations patterns (Hurme and Pullen 1988).

Recommended Conservation Measures

The following recommended conservation measures for marine mining should be viewed as options to avoid and minimize adverse impacts and promote the conservation, enhancement, and proper functioning of EFH.

1. To the extent practicable, avoid mining in waters containing sensitive marine benthic habitat including EFH (e.g., spawning, migrating, and feeding sites).
2. Minimize the areal extent and depth of extraction to reduce recolonization times.
3. Monitor turbidity during operations, and cease operations if turbidity exceeds predetermined threshold levels. Use sediment or turbidity curtains to limit the spread of suspended sediments and minimize the area affected.
4. Monitor individual mining operations to avoid and minimize cumulative impacts. For instance, three mining operations in an intertidal area could impact EFH, whereas one may not. Disturbance of previously contaminated mining areas may cause additional loss of EFH.
5. Use seasonal restrictions, as appropriate, to avoid and minimize impacts to EFH during critical life history stages of managed species (e.g., migration and spawning).

5.4.7 Persistent Organic Pollutants

The single biggest pollution threat to marine waters in Alaska is the deposition of persistent pollutants from remote sources. A large variety of contaminants can be found in Alaska's marine environment, including persistent organic pollutants (POPs) and heavy metals. North Pacific and Alaska marine waters are perceived as pristine because most of Alaska's 6,640 miles (10,686 kilometers) of coastline are devoid of point-source pollution, unlike much of North America. Effluents from pulp mills, marinas and boat harbors, municipal outfalls, and other industrial activities are generally considered to be the primary sources of contamination in Alaska waters, so most efforts at monitoring and mitigation have been focused on the local level. However, there is an increasing body of evidence suggesting that the greatest contaminant threat in Alaska comes from atmospheric and marine transport of contaminants from areas quite distant from Alaska.

The geography of Alaska makes it particularly vulnerable to contaminants volatilized from Asia. Pesticides applied to crops in Southeast Asia can be volatilized into the air, bound to suspended particulates, transported in the atmosphere to Alaska, and deposited in snow or rain directly into marine ecosystems or indirectly from freshwater flow to nearshore waters. Revolatilization of these compounds is inhibited by the cold temperatures associated with Alaska latitudes, resulting in a net accumulation of these compounds in northern habitats. This same distillation process also transfers volatilized contaminants from the atmosphere to the Pacific at lower latitudes, and ocean currents also deliver the contaminants to Alaska. Concentrations will be very low, but there will extensive geographical marine or land areas to act as cold deposit zones. The effect of these transport mechanisms has been the appearance of persistent organic contaminants in northern latitudes, despite the absence of local sources.

With over 100,000 chemicals on the market and an additional 1,000 to 2,000 new ones introduced annually, there are likely other toxic compounds in the environment whose concentrations are increasing. In addition, combustion and industrial processes result in the inadvertent production of unregulated chemicals (Arctic Monitoring and Assessment Programme [AMAP] 2002).

Potential Adverse Impacts
It is not clear if the levels of contaminants in Alaska waters are causing deleterious effects to populations, because research in this area is still in its infancy. Relatively small and spotty contaminant surveys have established that POPs are present in Alaska waters, forage, and predators. No comprehensive geographical and temporal studies have been done to date to examine trends or sources of variation. The potential for the problem has been exposed; the extent and significance remain to be determined.

The existence of organic contaminants in biological tissues means these contaminants are being transported within the food webs in Alaska fish habitats. The trophic structure of Alaska marine food webs, coupled with the tendency of contaminants to accumulate in Alaska habitats, causes apex predators to concentrate significant amounts of POPs in their tissues. Contamination is probably widespread among forage species at low levels, but apex predators are likely be the most affected as a result of their longevity, lipid storage, and the relatively high concentrations they bear. Contamination can cause immunological and reproductive impairment, acute toxic effects, and population declines. This issue is particularly relevant when the contaminant loads experienced by Alaska natives subsisting on foods derived from marine habitats are considered. Impacts may also occur at lower trophic levels, but there has been even less research in this area.

The impacts of persistent contaminants on populations in Alaska waters are not likely to be acute. The impacts are more likely be expressed as sublethal impacts in apparently healthy animals. These sublethal impacts ultimately lead to reduced reproductive fitness or decreased survival to maturity; therefore, they manifest themselves indirectly. Science is certain that the physical properties of these compounds couple with global climate patterns to ensure that they will be deposited in Alaska habitats, while maintaining their toxicity and perfusing through Alaska food webs, which include some of the most valuable fisheries on the planet. What is uncertain is how these compounds impact the health of organisms deriving sustenance from those food webs and how those impacts might feed back into the food web.

Recommended Conservation Measures
No mitigation strategies are proposed at this time relative to contaminants. There are too many unknowns. POP contaminants are present in Alaska waters and forage species and in predators up through apex predators, but the significance of the present loads is not known. Also, the relative concentrations in forage species (pollock for example) from the EBS, near Russia, or the northern GOA are not known. Comprehensive studies on a geographical, temporal, or widespread species scale to determine any relationship between contaminant loads and population changes have not been conducted. POP contaminants may contribute to poor recovery in some species, but mitigation strategies, whether they would be changes in fishing regulations or international regulation to curb contaminant releases, will likely need a better research foundation to support changes.

6.0 Cumulative Effects of Fishing and Non-fishing Activities on EFH

This section discusses the cumulative effects of fishing and non-fishing activities on EFH. As identified in Section 4.0, historical fishing practices may have had effects on EFH that have led to declining trends in some of the criteria examined. As described in earlier sections, the effects of current fishing activities on EFH are classified as minimal and temporary or unknown. Additional information and analysis is provided in Appendix B of the EFH EIS (NMFS 2005).

A review of the effects of non-fishing activities on EFH is found in Section 5.0. Additional information and analysis is provided in Appendix G of the EFH EIS. Section 5.0 identifies 29 non-fishing activities for which potential effects. However, the magnitude of these effects cannot currently be quantified with

available information. Of the 29 activities, most are described as likely having less than substantial potential effects on EFH. Some of these activities such as urban/suburban development, road building and maintenance (including the placement of fill material), vessel operations/transportation/navigation, silviculture (including LTFs), and point source discharge may have potential cumulative impacts due to the additive and chronic nature of these activities. NMFS does not have regulatory authority over non-fishing activities, but frequently provides recommendations to other agencies to avoid, minimize, or otherwise mitigate the effects of these activities.

Fishing and each activity identified in the analysis of non-fishing activities may not significantly affect the function of EFH. However, the synergistic effect of the combination of all of these activities may be a cause for concern. Unfortunately, available information is not sufficient to assess how the cumulative effects of fishing and non-fishing activities influence the function of EFH on an ecosystem or watershed scale. The magnitude of the combined effect of all of these activities cannot be quantified, so the level of concern is not known at this point.

7.0 Research Approach for EFH

The EFH EIS (NMFS 2005) identified the following research approach for EFH regarding minimizing fishing impacts.

Objectives

Reduce impacts. (1) Limit bottom trawling in the AI to areas historically fished and prevent expansion into new areas. (2) Limit bottom contact gear in specified coral garden habitat areas. (3) Restrict higher impact trawl fisheries from a portion of the GOA slope. (4) Increase monitoring for enforcement. (5) Establish a scientific research program.

Benthic habitat recovery. Allow recovery of habitat in a large area with relatively low historic effort.

Research Questions

Reduce impacts. Does the closure effectively restrict higher-impact trawl fisheries from a portion of the GOA slope? Is there increased use of alternative gears in the GOA closed areas? Does total bottom trawl effort in adjacent open areas increase as a result of effort displaced from closed areas? Do bottom trawls affect these benthic habitats more than the alternative gear types? What are the research priorities? Are fragile habitats in the AI affected by any fisheries that are not covered by the new EFH closures? Are sponge and coral essential components of the habitat supporting FMP species?

Benthic habitat recovery. Did the habitat within closed areas recover or remain unfished because of these closures? Do recovered habitats support more abundant and healthier FMP species? If FMP species are more abundant in the EFH protection areas, is there any benefit in yield for areas that are still fished without EFH protection?

Research Activities

Reduce impacts. Fishing effort data from observers and remote sensing would be used to study changes in bottom trawl and other fishing gear activity in the closed (and open) areas. First, the recent gear-specific fishing pattern must be characterized to establish a baseline for comparison with observed changes in effort after closures occur. An effective analysis of change requires comprehensive effort data with high spatial resolution, including accurate information about the tow path or setting location, as well as complete gear specifications. Effects of displaced fishing effort would have to be considered. The

relative effects of bottom trawl and alternative gear/footrope designs and, thus, the efficacy of the measure should be investigated experimentally in a relatively undisturbed area that is representative of the closed areas. The basis of comparison would be changes in the structure and function of benthic communities and populations, as well as important physical features of the seabed, after comparable harvests of target species are taken with each gear type. Ultimately, there should be detectable increases in FMP species that are directly attributable to the reduced impacts on sponge and coral habitat.

Benthic habitat recovery. Monitor the structure and function of benthic communities and populations in the newly closed areas, as well as important physical features of the seabed, for changes that may indicate recovery of benthic habitat. Whether these changes constitute recovery from fishing or just natural variability/shifts requires comparison with an area that is undisturbed by fishing and otherwise comparable. A reference site would have to remain undisturbed by fishing during the entire course of the recovery experiment. Such a reference site may or may not exist, and the essential elements of comparability for identifying this area are presently unknown. Without proper reference sites, it may still be possible to deduce recovery dynamics based on changes observed in comparable newly closed areas with different histories of fishing disturbance.

Research Time Frame

Changes in fishing effort and gear types should be readily detectable. Biological recovery monitoring may require an extended period if undisturbed habitats of this type typically include large or long-lived organisms and/or high species diversity. Recovery of smaller, shorter-lived components should be apparent much sooner.

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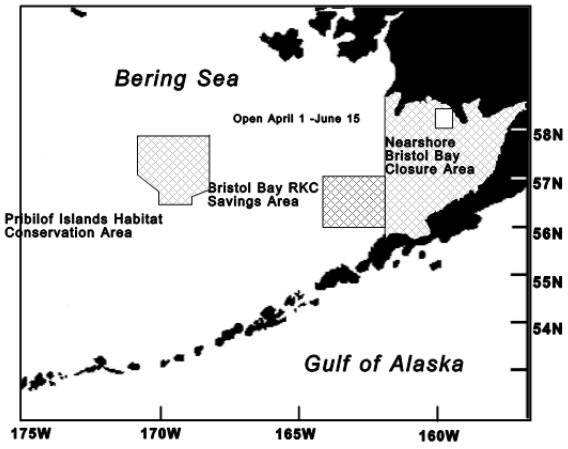
Appendix E. Overview of Measures to Minimize Crab Bycatch in Other Fisheries

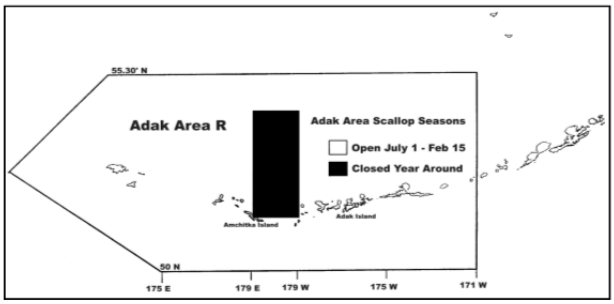
The Council and the Alaska Board of Fisheries have adopted numerous regulations designed to protect habitat and minimize bycatch and bycatch mortality of crab taken incidentally in groundfish and scallop fisheries. An overview of these measures is provided below.

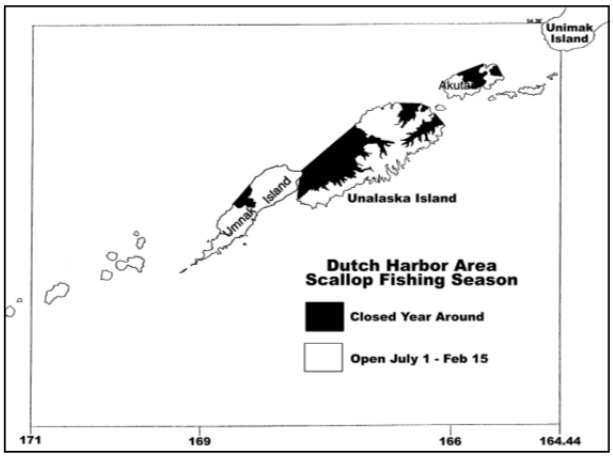
Closure Areas

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.

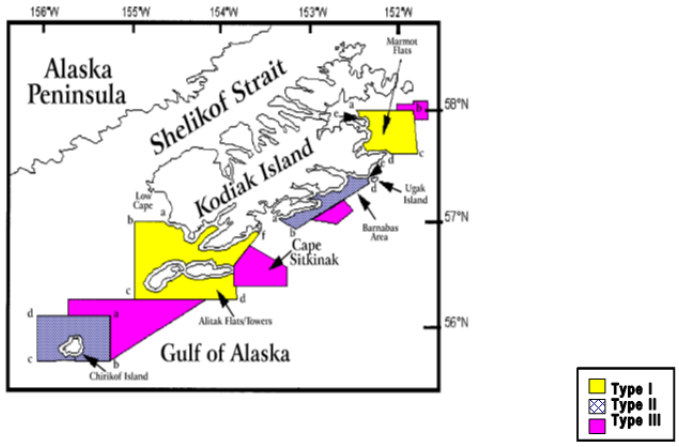


The figures below show locations of other areas in the BSAI closed to scallop dredging.



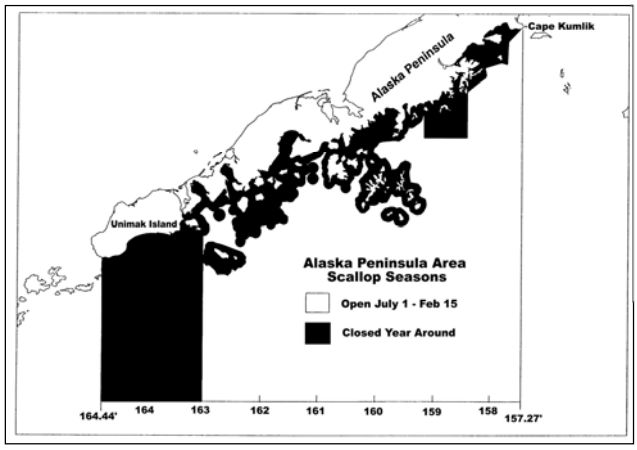


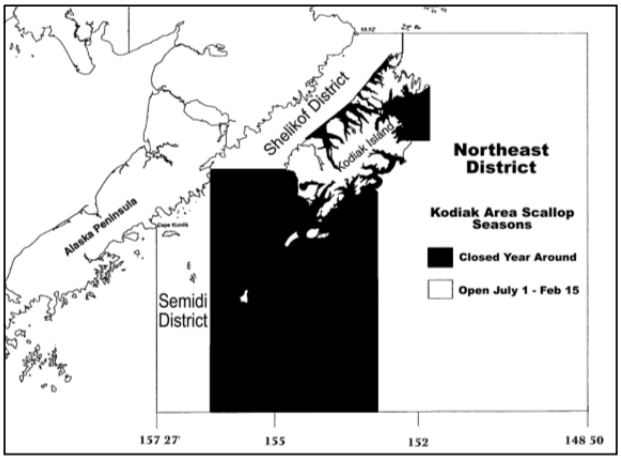
There are also trawl and dredge closure areas in the Gulf of Alaska to protect king crab and crab habitat. In the Kodiak Island area, trawl closure areas were designed based on the use of areas by crab life stage and level of recruitment (NPFMC 1993). Three types of areas are designated. Type I areas 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.



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.

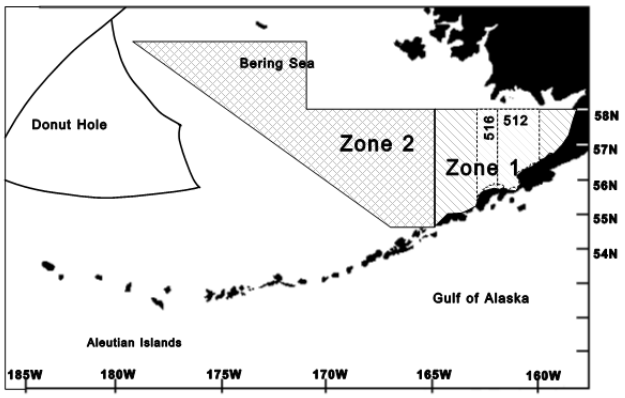




Bycatch Limits

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

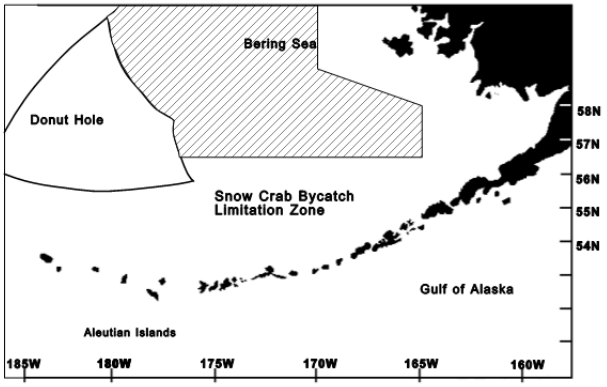
Prescribed bottom trawl fisheries in specific areas are closed when prohibited species catch (PSC) limits of *C. bairdi* Tanner crab, *C. opilio* crab, and red king crab are taken. Bycatch limitation zones for Tanner and red king crab PSC are shown in the figure below. Crab PSC limits for groundfish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



PSC limits for red king crab and C. bairdi 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

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.



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.

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

			Crab Bycatch Limits		
Area	GHL (pounds)	Fishing Season	king crab	Tanner crab	Snow crab
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 F. Current (1998) and Historic Boundaries for Registration Areas and Fishing Districts, Sub-districts, and Sections within the BSAI Management Unit

The following descriptions of the statistical areas are adopted from Alaska State regulations. In the case of the Bering Sea Registration Area (Statistical Area Q) and some of its districts, the boundary descriptions extend into the Chukchi Sea to Point Hope. The FMP's jurisdiction ends at the southern boundary of the Chukchi Sea as described in the coordinates to Figure 1 to 50 CFR part 679.

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 is 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 Q_1: 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 Q_2: 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 Q_3: 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 Q_4: 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.

[1]This 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 J_4: 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 J_5: 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 J_6: all waters of the Bering Sea District west of 173° W. long.

Eastern Sub-district J_7: all waters of the Bering Sea District east of 173° W. long., including the waters of Bristol Bay.

Norton Sound Section J_8: 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 H. 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.

"Faces of the Fisheries"

A publication of Community Profiles by the
North Pacific Fishery Management Council

1994 Printing

These profiles are intended to provide a snapshot of various coastal communities, highlighting their involvement in fisheries off Alaska. Data through 1992 are included with the following regional packages available:

Western Alaska
Pribilof Islands
Alaska Peninsula/Aleutian Islands
South Central Alaska
Prince William Sound
Kodiak Island
Southeast Alaska
Washington (Puget Sound)
Oregon

The information in this publication was compiled and edited by Krys Holmes of Winterholm Press, drawing on a variety of data sources including: Alaska Department of Fish & Game's Community Profile Database; Commercial Fisheries Entry Commission's Fish Ticket Databases; International Pacific Halibut Commission; National Marine Fisheries Service; U.S. Department of Labor; Alaska Department of Labor; Minerals Management Service Social Indicators Studies; Alaska Regional Development Organizations; and various local and regional Chambers of Commerce. For more information, or copies of specific regional profiles, contact the North Pacific Fishery Management Council, P.O. Box 103136, Anchorage, Alaska, 99501, or call (907) 271-2809.

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ST. PAUL

Zip code: 99660
County: 16
FIPS: 66470
Census area code: 586 - Aleutians West

General profile --

The community of St. Paul, the only settlement on St. Paul Island, is located on a narrow thumb of land on the southern tip of the 44-square-mile island, 47 miles from St. George. Here, fur seal rookeries and thousands of sea bird rookeries explode with life in summertime, and windswept, icy shorelines hug and pummel the island through the winter. More than 210 species of sea birds nest here, some from as far away as Argentina. Tourists fly here too, to view the largest single herd of sea mammals in the world — 1.3 million or so fur seals distributed among 14 rookeries and haul-outs. There is also a reindeer herd on St. Paul Island, a holdover from a previous commercial venture.

St. Paul is trying with all its might to become a commercial fishing town. The city has built dock and breakwater, and is completing a 700-foot dock expansion, cold storage, surimi plant and warehouse facility. There is a state-maintained airport with a 5,075-ft. gravel runway that accommodates regular air service. St. Paul is the major port for ships operating in the Central Bering Sea area, but the full potential for developing portside business has not yet been developed because the infrastructure has been so slow in coming.

The community --

St. Paul is the largest community of Aleut people in the world. With a population of 763 and 66.1% Alaska Native, St. Paul's 504 Aleut residents represent the largest remaining concentration of a community of seafaring Natives that once spread throughout the Aleutian Islands and the Alaska Peninsula. The proportion of men to women is uncommonly high (62.6% to 37.4%, respectively). Young people often leave the island for work or schooling, and women are more likely than men to marry or settle into other areas; male residents are more likely to return to their home town, according to a 1988 study (Kevin Waring Associates).

This is a struggling community, with alcohol and drug problems rising in direct proportion to the uncertainty of the economic and political climate. Yet the strong sense of direction and self-determination that the community demonstrates in the face of its sorrowful past and uncertain future is also evident. St. Paul has a 10.8% unemployment rate and a per capita income of $15,115, and 7.1% of the population is below poverty level. Though per capita income is nearly as high as the statewide average, the cost of living is far higher here, 500 miles offshore, than it is in most villages.

Of the 433 residents over 25 years old, 61.7% have high school diplomas, and only 3.2 have college degrees or higher. Some 88 residents speak their Native language, with 58 of them unable to speak English well, and 25 residents speak an Asian or Pacific Island language and do not speak English very well.

Schoolchildren up to 10th grade attend school in St. Paul, but high school juniors and seniors have to leave the island for the school year. The Russian Orthodox church is strong here; St. Paul is one of the few communities with a resident Russian Orthodox priest. There is also an Assembly of God church, attended primarily by non-Natives.

Population data:

Community	Saint Paul
1990 Population	763
Non-Native Population	259
Native Population	504
Percent Native	66.1

Housing Units	177
Vacant Units	23
Owner-Occup Housing Units	105
Median Value of Housing Units	$84,100
Renter-Occup Housing Units	49
Median Rent Paid	$508
Number of Households	161
# Family Households	132
# Non Related Households	29
Median Family Income	$48,000
Persons in Poverty	50
Percent in Poverty	7.11

(Source: ADCRA)

The city of St. Paul, 1990

Males	478
Females	285
White	21.5%
Black	1.5%
Pacific Islanders	5.8%
American Indian, Eskimo or Aleut	66.1%
Other races	5.1%
Median age	28.0
Median household income (1989)	$39,922
Median family income	$48,000
Median per capita income	$15,115
# people with nonfarm self emp. income	9
Mean non-farm self employment income	$12,400
# people on public assistance	20
Mean public assistance income	$4,089
Under poverty level	7.1%
High school graduates (of pop. 25+)	61.7%
College graduates (of pop 25+)	3.2%
Total households	161
Single women raising families	13

(Source: US Census)

The city --

Form of government: The City of St. Paul is a second-class city (incorporated in 1971) and, as primary beneficiary of the St. Paul Trust set up by the federal government in 1983 to facilitate the transition from federal to local control, is also the city's largest employer. The city is run by a city manager and a seven-member city council, and levies a 3% sales tax.

The local Native corporation organized under ANCSA is Tanadgusix (or TDX) Corp., and while not a political force in itself, the corporation is the major land owner and is the major economic development force in the community.

The Aleut Community of St. Paul was organized under the Indian Reorganization Act, and it also is instrumental in fisheries development and other economic activities here. The IRA Council does act as a political institution on the island, and is also a force in helping preserve the Aleut culture in the face of increasing intrusion by Anglo-Americans.

Housing costs: Housing was constructed by the federal government and was extremely limited until the early 1980s. Since then some higher-quality homes have been built, the average household size has decreased, and housing for families and local workers is a lot closer to adequate.

Of the 93 owner-occupied homes in St. Paul, 73 are valued between $50,000 and $99,000, with a median value of $84,100. There are 32 mortgaged homes in St. Paul, with a

median mortgage payment of $414, and the average non-mortgage house payment is $394. Median rent is $688

Municipal facilities: St. Paul has a 300-foot city dock, a 300-foot private dock, a boat harbor, water, electrical, sewer, refuse removal and telephone services. The city has also started a solid waste reduction and recycling program, and is planning a new landfill area.

Community care: The City of St. Paul provides public safety, fire, police, search and rescue and airport fire, crash and rescue services. There is a three-bed Indian Health Service clinic, with three physician's assistants and a paraprofessional social worker. A dentist visits periodically, and an EMT team provides stabilization care in emergencies. The nearest hospital is Anchorage, 800 miles away; emergency patients are evacuated by air.

The economy --

Today, St. Paul is a supply and processing port for a portion of the Bering Sea groundfish and crab fleets. The city and the TDX Corp. have put forth major efforts to increase processing capacity, to build docks and breakwaters to accommodate the Bering Sea fleet, and to find ways to help local fishermen participate more in the region's fisheries. Those efforts themselves, fueled by federal grants and state funding, have generated a certain amount of economic activity.

Also, the magnificent local habitat for Arctic birds, marine mammals and other rare sights have attracted an increasing number of tourists to St. Paul Island. But the primary focus is increasing participation in the Bering Sea fisheries, the industry the U.S. government hoped would provide an economic future for St. Paul after their previous economic structure, and way of life, was shut down in 1983.

The 1990 census showed St. Paul had a 10.8% unemployment rate, and that the economic community supported 330 jobs, as outlined below:

St. Paul jobs, 1990	
Manufacturing non-durable goods	71 jobs
Ag/forestry/fisheries	44
Public administration	41
Educational services	34
Construction	32
Other professional services	28
Health services	19
Communications/utilities	15
Transportation	12
Personal services	12
Retail trade	12
Wholesale trade	6
Business/repair services	2
Entertainment/recreation	2
Total jobs	**330**

The median wage/salary income was $42,026 in 1990. Median self-employment income, among the nine people who reported it, was $12,400.

In 1980, when there were only 244 jobs in St. Paul, 18 people worked in reindeer antler processing, a business not highlighted but which is probably included in the "manufacturing non-durable goods" category, above. Back then, 180 of the 244 jobs — 73.7% — were only part-time jobs. There is no current information on now many of the 330 jobs in 1990 were full-time or part-time.

Subsistence activities --

Subsistence hunting, fishing and gathering has always been an important part of life on the Pribilof Islands. The ADF&G estimated in 1981 that St. Paul residents consumed approximately 307 lbs. of subsistence resources per capita annually (Schroeder, et al). Halibut, cod and sculpin are the primary marine fishes harvested for subsistence purposes. Salmon and

Dolly Varden are absent in the Pribilofs, and clams and marine invertebrates are less abundant than on the mainland or in the Aleutians.

Fur seals are by far the most important marine mammal taken for subsistence use. Though it is illegal under the Fur Seal Act, to commercially harvest these animals, Natives are allowed to take them for subsistence purposes only. Sea lions are also taken frequently, and harbor seals once in a while. The abundance of sea birds, ducks, geese, murre, kittiwakes, cormorants, and least auklets that nest on the island have led to the enthusiastic use of those birds and their eggs by the local Natives. The only land mammal harvested in any number is reindeer.

Following a house-by-house survey in 1981, ADF&G estimated the per-household use of seals, sea lions, halibut and reindeer as follows:

Estimated consumption per household for subsistence purposes, 1981	
Total fur seal	1,020 lbs.
Summer harvest	320
Winter harvest	700
Sea lion	105
Halibut	513
Reindeer	54
Total weight:	**1,692**

Fisheries activities --

Though fisheries activities are the prime mover in the economy and the hopes of St. Paul, their participation has been relatively small so far. The local fleet fishes primarily for halibut; local processors produce crab and several species of groundfish. Several obstacles currently hold back fisheries activities: Though $75 million in federal, state and private funds have been spent building ocean breakwaters, docks and other marine improvements, those improvements have come slowly and the fact that they're not finished yet means the community is missing out on a lot of fisheries activity. So while the fisheries remain St. Paul's primary focus, actual participation is still pretty minimal until the city's fisheries development program can get on line.

St. Paul is the only member of the Central Bering Sea Fishermen's Association (CBSFA), a CDQ corporation, and so has received some pollock quota. CBSFA is using its new groundfish quotas to further develop the port's seafood processing capacities.

Fishing: The St. Paul fleet does not have the vessels or equipment to participate in the cod, pollock or crab fisheries, nor do they have the capital or the expertise to jump into those fisheries right now. All the local boats are under 50' in length. Most fishermen harvest only halibut, in the pulse fisheries in the Bering Sea areas. They began halibut fishing in about 1982 because, though there were no docks or harbor facilities to support a large fleet, the small locally-owned boats could fish off resources close to the island in small boats, which could be hauled out of the water.

The most halibut the St. Paul fleet has ever taken was 75% of the Halibut Area 4C quota in 1990, a year when most longliners preferred to fish elsewhere for regulatory reasons. Most years, the local fleet averages about 35% of the Area 4C harvest, primarily because the size of their boats means they have to sit out bad weather or rough seas while larger boats from outside the area continue fishing. St. Paul has applied some of its partnership funds gained from CDQ arrangements to helping fishermen invest in larger, more competitive vessels. Under the proposed IFQ program, St. Paul and St. George fishermen will be allocated quota shares that, assuming 1992 quotas, would bring in 400,000 to 550,000 lbs. of halibut quota according to CBSFA.

There are no salmon or herring fisheries in the Pribilofs, and the fleet is made up of boats too small to cross the Bering Sea to participate in other small-boat fisheries nearer the mainland. The St. Paul fleet hopes to expand its flexibility to participate in Pacific cod, pollock, flounder, crab, sea urchin and other fisheries.

Table 1: Number of permit holders in St. Paul, by species

YEAR	POUNDS	VALUE	PERMITS	SPECIES	
81	19,213	17,976.00	21	HALIBUT	

83	58,476	47,297.00	44	HALIBUT	
84	142,145	100,960.00	31	HALIBUT	
85	143,350	100,342.00	17	HALIBUT	
86	77,693	114,440.00	11	HALIBUT	
87	98,716	118,459.00	8	HALIBUT	
88	353,545	330,210.00	13	HALIBUT	
89	214,922	203,531.00	15	HALIBUT	
90	144,638	255,720.00	17	HALIBUT	
91	189,036	257,597.00	18	HALIBUT	
92	**	**	2	CRAB	
92	**	**	2	SALMON	

Table 2: Vessels home-ported in St. Paul, by species fished

YEAR	POUNDS	VALUE	VESSELS	SPECIES	
81	19,263	18,021.00	22	HALIBUT	
83	39,163	33,561.00	29	HALIBUT	
83	**	**	1	SALMON	
84	137,739	97,506.00	30	HALIBUT	
85	131,378	91,962.00	14	HALIBUT	
85	**	**	2	SALMON	
86	78,025	114,929.00	12	HALIBUT	
86	**	**	1	SALMON	
87	98,716	118,459.00	8	HALIBUT	
87	**	**	1	HERRIN	
88	353,545	330,210.00	13	HALIBUT	
89	216,362	204,895.00	16	HALIBUT	
89	**	**	1	SALMON	
90	145,152	256,629.00	18	HALIBUT	
91	189,036	257,597.00	18	HALIBUT	
92	**	**	1	OTHER	
92	**	**	1	SALMON	

Table 3: St. Paul permit holders by gear type

YEAR	GEAR	POUNDS	VALUE	PERMITS	SPECIES
81	LGL	11,048	10,425.00	5	HALIBUT
81	JIG	8,165	7,551.00	16	HALIBUT
83	TRL	**	**	1	HALIBUT
83	LGL	19,914	20,209.00	13	HALIBUT
83	JIG	38,220	26,817.00	30	HALIBUT
84	TRL	**	**	1	HALIBUT
84	JIG	9,018	7,663.00	14	HALIBUT
84	LGL	132,353	92,635.00	16	HALIBUT
85	JIG	6,213	4,347.00	6	HALIBUT
85	LGL	137,137	95,995.00	14	HALIBUT
86	JIG	3,495	5,148.00	6	HALIBUT
86	LGL	74,198	109,292.00	7	HALIBUT
87	JIG	7,483	8,980.00	5	HALIBUT
87	LGL	91,233	109,479.00	5	HALIBUT
88	JIG	27,812	25,976.00	6	HALIBUT
88	LGL	325,733	304,234.00	7	HALIBUT

89	JIG	**	**	3	HALIBUT
89	TRL	**	**	3	HALIBUT
89	LGL	208,039	197,013.00	9	HALIBUT
90	JIG	**	**	2	HALIBUT
90	TRL	**	**	2	HALIBUT
90	LGL	140,062	247,629.00	13	HALIBUT
91	TRL	**	**	1	HALIBUT
91	JIG	**	**	3	HALIBUT
91	LGL	185,504	252,794.00	14	HALIBUT
92	NET	**	**	2	SALMON
92	POT	**	**	2	CRAB

Processing: The only processing plant on St. Paul is Pribilof Island Processors (PIP), which underwent Chapter 11 bankruptcy in 1990 and was facing reorganization. However, it geared up for the 1991 season and, according to a 1991 report by Impact Assessment, Inc., took delivery from 18 or 19 crab boats and hired between 55 and 180 people, depending on how busy the plant is. The plant also processes halibut and Pacific cod.

In 1991, reports showed that the PIP plant paid $7/hour to locals, and $5.50/hour to non-locals (the lower wage to compensate for travel, room and board costs). However, many locals are unwilling or unable to work for $7/hour, especially the primary breadwinners of a household. Cost of living studies here show that it requires at least $9.59/hour to barely survive on the most meager budget in St. Paul — and that budget would not provide off-island travel, a motorized vehicle on the island, or any other such "amenities."

In addition, a Japanese-financed group called St. Paul Seafood has been developing a shore-based processing facility and already has invested $28 million, but in 1991 needed additional financing to construct a waste outflow system. This plant was originally designed to process surimi.

The CBSFA is working to attract a major shore-based processor to St. Paul to produce the groundfish made available through the CDQ program. The corporation is also considering chartering a 98' crab boat to tender halibut for the 1993 season.

Economic development plans --

In a study conducted at the end of the federal control of the Pribilofs, four areas were identified as potential economic development opportunities for St. Paul: fisheries, tourism, fur sealing and offshore oil and gas development. Tourism is a small, seasonal activity that contributes some, but not much, to the local economy, and probably is limited because of the expense of flying out to the Pribilofs from the mainland. Fur sealing had already become uneconomical even before it was politically incorrect — and subsequently was outlawed. Offshore oil and gas development was attempted for a while, but regulatory uncertainties concerning oil and gas leases in the Bering Sea killed that idea. Fisheries development is the area's only remaining realistic hope.

The City of St. Paul and the TDX Corp. are struggling through a long-term plan to build a 700-foot dock, surimi plant, a floating processor, cold storage and warehouse facilities along with a bulk fuel terminal, airport terminal, container storage and transfer, a new hotel, restaurant and recreation building. These plans are enhanced by the CBSFA's program to repair the old East Landing dock, develop temporary floating moorage for the local fishing fleet, and boost the harbor development project, which is the most pressing need right now in St. Paul's fisheries development progress.

At the same time that the St. Paul community hopes to develop new opportunities in the Bering Sea fisheries, residents are also concerned that the sea surrounding their island may be overfished. Many residents struggle with their resentment against the gigantic, efficient factory trawl fleet that is designed to potentially degrade the marine environment for lucrative short-term gains, while at the same time hoping that their own fleet can develop enough to participate in the groundfish fisheries as well. There is also discomfort at the idea of developing new fisheries from underutilized resources, after a bad experience in the hair crab fishery when, after local fishermen

opened up the fishery, large Outside boats came in and exploited most of the resource before the locals could catch up to them.

ST. GEORGE

Zip code: 99660
County: 16
FIPS: 65800
Census area code: 586 - Aleutians West

General profile --

St. George is a smaller island and a smaller town than St. Paul and has lived in its larger brother's shadow for most of its 20th Century life. It is the second largest of the five Pribilof Islands, and is 11 miles long and 5 miles wide. A 6,000-ft. gravel runway accommodates regular commercial air traffic from Anchorage and the Aleutians, and most freight and supplies come by barge from Anchorage every month. Like St. Paul, St. George is strategically located in the middle of the groundfish and crab fisheries of the Bering Sea, and is a major breeding ground for fur seals, sea lions and arctic birds.

The climate here is typical of northern maritime regions, with cool, cloudy weather the year round and temperatures ranging from 24°F to 52°F. Average precipitation is 23" annually, and average snowfall is 57".

The community --

With only 143 residents, St. George is tied economically, socially and culturally to St. Paul. The community here is 94.9% Aleut; only seven residents (at the time of the 1990 census) were white. Median age is 28.4, some 64.6% of adults over 25 have finished high school, and 5.1% have a bachelor's degree or higher. St. George residents are considerably poorer than St. Paul residents; here, 42% of the people — ten families out of 36 — are under the poverty line (compared to 7.1% in St. Paul.)

Most residents in this tightly knit community are Russian Orthodox. There are quite a few organized recreational activities for the community, as well as a few continuing education programs for adults, including on-the-job training and academic programs in hatchery management, sponsored by the St. George Aquaculture Association. The local school educates children through the 8th grade; high school students have to leave the island for schooling.

Population data:

Community	Saint George
1990 Population	138
Non-Native Population	7
Native Population	131
Percent Native	94.9
Housing Units	67
Vacant Units	22
Owner-Occup Housing Units	31
Median Value of Housing Units	$55,600
Renter-Occup Housing Units	14
Median Rent Paid	$133
Number of Households	43
# Family Households	36
# Non Related Households	7
Median Family Income	$26,000
Persons in Poverty	60
Percent in Poverty	41.96

(Source: ADCRA)

The city of St. George, 1990	
Males	66
Females	77
Median age	28.4
Median household income (1989)	$25,250
Median family income	$26,000
Median per capita income	$9,332
Under poverty level	42%
# people on public assistance	5
Mean public assistance income	$13,152
High school graduates (of pop. 25+)	64.6%
College graduates (of pop 25+)	5.1%
Total households	43
Single women raising families	2

(Source: US Census)

The city --

Form of government: St. George is a second-class city, (incorporated in 1983) with a seven-member city council and a mayor elected from that council. The seven-member St. George Traditional Council is the tribal government, owns and operates the clinic, publishes a local newspaper, administers recreational programs and also oversees other community development projects and job training for the community. The St. George Tanaq Corp., the local Native corporation, owns the store, hotel, the port and most of the land on the island.

Housing costs: There are 28 owner-occupied homes in St. George, with a median value of $55,600. None of them is mortgaged; the median non-mortgage house payment is $325 per month, and median rent is $475 per month.

Municipal facilities: St. George's new 6,000-foot runway is the only one in the Pribilofs that can accommodate jet traffic. The 8-acre Zapadni Bay Harbor is still under construction, but has been open for use. The City harbor provides 60-ft. and 75-ft. docks, with 250 feet of additional moorage.

The City of St. George also provides electric services, water, sewer, solid waste disposal at the local landfill, public safety and fire protection, and distributes fuel to the community.

Community care: A Village Public Safety Officer acts as the city policeman. A volunteer fire department takes care of fire protection, and there is a four-bed clinic staffed by a physician's assistant and two community health aides. The state public health nurse, a dentist, a doctor and an optometrist visit the community a few times a year.

The economy --

Most of the employment in St. George is government-related. Together government, education and Native corporation jobs make up 60% of the jobs available to St. George residents. The St. George Aquaculture Assoc. has begun developing salmon and shellfish aquaculture programs, with the first salmon returns expected in 1993. In addition, there are several private concerns here, including a day care, gas station, grocery and hardware stores, lumber yard and marine supply, movie rental, restaurant, taxi and underwater construction company.

At the time of the 1990 Census, St. George residents reported 40 jobs among a labor force of 47 people, leaving 7 people unemployed. Census data does not differentiate between full- and part-time jobs. The jobs were distributed as follows:

St. George jobs, 1990 (Source: U.S. Census)	
Educational services	10
Construction	10
Public administration	5
Health services	5
Retail trade	4
Transportation	2
Personal services	2
Professional/related services	2
Total jobs	**40**

Subsistence activities --

Subsistence is as crucial to the cultural and nutritional life of St. George as it is to any rural Alaskan village, though St. George residents usually take less per capita in subsistence resources than St. Paul residents do. The ADF&G estimated in 1981 that St. George residents consumed approximately 270 lbs. of subsistence resources per capita annually (Schroeder, et al). Halibut, cod and sculpin are the primary marine fishes harvested for subsistence purposes. Salmon and Dolly Varden are absent in the Pribilofs, and clams and marine invertebrates are less abundant than on the mainland or in the Aleutians.

Fur seals are by far the most important marine mammal taken for subsistence use. Though it is illegal under the Fur Seal Act, to commercially harvest these animals, Natives are allowed to take them for subsistence purposes only. Sea lions are also taken frequently, and harbor seals once in a while. The abundance of sea birds, ducks, geese, murre, kittiwakes, cormorants, and least auklets that nest on the island have led to the enthusiastic use of those birds and their eggs by the local Natives.

Following a house-by-house survey in 1981, ADF&G estimated the per-household use of seals, sea lions, halibut and reindeer as follows:

Estimated consumption per household for subsistence purposes, 1981	
Total fur seal	561 lbs.
Local harvest	331
From St. Paul	230
Sea lion	324
Halibut	270
Total lbs. per household:	**1,155 lbs.**

Fisheries activities --

Like St. Paul, St. George is struggling to develop a groundfish and crab fishery, and to build up its harbor facilities enough to attract business from the Bering Sea commercial fishing fleets. The City of St. George hopes to develop a shoreside seafood processing facility in Zapadni Bay Harbor, though there are some reservations about how a large processing plant might affect the social structure of this small, isolated and close-knit community.

St. George is a member of the Aleutian Pribilof Island Community Development Association (APICDA), a CDQ organization that also includes Aleutian villages from Adak east to Nelson Lagoon.

Fishing: There are 28 fishermen and 12 fishing vessels in St. George, and the vessels range in size from 16' to 30' in length, according to the Aleutian Pribilof Island Community Development Association. They primarily longline for halibut and cod, though their participation is sometimes limited by bad weather and high seas. Fishing the Bering Sea with vessels of this size is quite a challenge, and the fishing community will have to upgrade the size and safety of its fleet before fishermen can expand their participation in Bering Sea fisheries.

Table 1: Number of permit holders in St. George, by species					
YEAR	POUNDS	VALUE	PERMITS	SPECIES	
83	95,484	68,169.00	41	HALIBUT	
84	5,913	849.00	33	GRNDFISH	
84	104,729	73,080.00	46	HALIBUT	
85	126,999	88,897.00	40	HALIBUT	
86	5,858	1,781.00	8	GRNDFISH	
86	43,189	63,619.00	13	HALIBUT	
87	36,834	44,200.00	9	HALIBUT	
88	138,345	129,214.00	9	HALIBUT	
89	47,016	44,523.00	15	HALIBUT	
90	43,587	77,061.00	17	HALIBUT	

Table 2: Vessels home-ported in St. George, by species fished					
YEAR	POUNDS	VALUE	VESSELS	SPECIES	
83	82,731	57,976.00	34	HALIBUT	
83	**	**	1	SALMON	
84	4,958	712.00	29	GRNDFISH	
84	99,697	69,568.00	44	HALIBUT	
84	**	**	2	SALMON	
85	114,143	79,898.00	37	HALIBUT	
86	5,858	1,781.00	8	GRNDFISH	
86	43,189	63,619.00	13	HALIBUT	
87	36,834	44,200.00	9	HALIBUT	
88	138,345	129,214.00	9	HALIBUT	
89	47,016	44,523.00	15	HALIBUT	
90	43,587	77,061.00	17	HALIBUT	
90	**	**	2	SALMON	

Table 3: St. George permit holders by gear type					
YEAR	GEAR	POUNDS	VALUE	PERMITS	SPECIES
83	TRL	**	**	3	HALIBUT
83	LGL	6,149	6,581.00	12	HALIBUT
83	JIG	87,960	60,577.00	26	HALIBUT
84	LGL	3,712	536.00	16	GRNDFISH
84	JIG	2,201	313.00	17	GRNDFISH
84	LGL	18,878	13,159.00	18	HALIBUT
84	JIG	85,851	59,921.00	28	HALIBUT
85	LGL	36,470	25,528.00	15	HALIBUT
85	JIG	90,529	63,369.00	26	HALIBUT
86	JIG	**	**	2	HALIBUT
86	LGL	5,858	1,781.00	8	GRNDFISH
86	LGL	42,130	62,059.00	11	HALIBUT
87	JIG	**	**	2	HALIBUT
87	LGL	34,944	41,932.00	7	HALIBUT
88	TRL	**	**	1	HALIBUT
88	JIG	**	**	2	HALIBUT
88	LGL	111,775	104,398.00	6	HALIBUT
89	JIG	**	**	3	HALIBUT

89	LGL	22,816	21,606.00	6	HALIBUT
89	TRL	9,862	9,340.00	6	HALIBUT
90	JIG	**	**	3	HALIBUT
90	TRL	**	**	4	HALIBUT
90	LGL	30,200	53,394.00	10	HALIBUT

Processing: Two floating processors operated within the Zapadni Bay Harbor in recent years, but because the harbor itself is incomplete there is no shoreside processing facility operating here. As soon as the harbor is complete, establishing shoreside processing capabilities will become the top priority at St. George Tanaq Corp. The community is looking for a small processor that could operate on a year-round basis, rather than a large plant that would bring in a large influx of new people.

Economic development plans --

Finishing the harbor and finding a shoreside processor are the two economic development priorities for this community. In the past ten years, $30 million has been invested in literally carving the harbor out of the island, but more dredging and construction work is required before the port is usable. The APIDCA has set aside approximately $2.27 million of its CDQ-generated funds to to construct docks and complete upland construction at the harbor. They are seeking $3.3 million from the state legislature to complete the project.

APICDA has entered an agreement with Snopac Products, Inc. to develop a shoreside processing facility on Zapadni Bay after the harbor project is complete. In addition, some CDQ-generated Fishery Investment Funds will be used to help local fishermen upgrade their vessels, gain training with operating larger vessels, and to purchase halibut and sablefish quota shares after the new IFQ program is implemented.