FAO-BASED RESPONSIBLE FISHERY MANAGEMENT CERTIFICATION SURVEILLANCE REPORT (NO.1)

For The

U.S. Alaska King and Snow Crab Bering Sea Commercial Fisheries (200 mile EEZ)

Facilitated By the

Alaska Seafood Marketing Institute (ASMI)

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I. Summary and Recommendations

The Alaska Seafood Marketing Institute (ASMI), requested an assessment of the U.S. Alaska King and Snow Crab Bering Sea commercial fisheries according to the FAO Based Responsible Fisheries Management (RFM) Certification Program. The application was made in April 2010. Assessment commenced and assessment validation was completed in December 2011, proceeding to full assessment and final certification determination on 16th April 2012.

This report is the **1st Surveillance Report (ref: AK/Cra/001.1/2013)** for the U.S. Alaska King and Snow Crab Bering Sea commercial fisheries following Certification awarded against the FAO-Based RFM Program, awarded on the 16th April 2012. The objective of the Surveillance Report is to monitor for any changes/updates (after 12 months) in the management regime, regulations and their implementation since the previous assessment and to determine whether these changes (if any) and current practices remain consistent with the overall confidence rating scorings of the fishery allocated during initial certification.
In addition to this, any areas reported as "items for surveillance" or corrective action plans in the previous assessment are reassessed and a new conclusion on consistency of these items with the Conformance Criteria is given accordingly. Neither non-conformances were identified during either the full assessment or the 1st surveillance assessment. Consequently, no corrective action plans were issued. However, the issue of bottom trawl fisheries overlapping with Bristol Bay red king crab habitat was monitored.

The certification covers the the U.S. Alaska King and Snow Crab Bering Sea Commercial Fisheries [Bristol Bay Red King Crab *(Paralithodes camtschaticus)*, Eastern Bering Sea Snow Crab *(Chionoecetes opilio)* and St. Matthew Island Blue King Crab (*Paralithodes platypus)*] legally employing pot gear within Alaska jurisdiction (200 nautical miles EEZ) and subject to a federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] joint management regime.

The surveillance assessment was conducted according to the Global Trust Certification procedures for FAO – Based Responsible Fisheries Management Certification using the FAO – Based RFM Conformance Criteria V1.2 fundamental clauses as the assessment framework.

The assessment was conducted by a team of Global Trust appointed Assessors comprising of two externally contracted fishery experts and Global Trust internal staff. Details of the assessment team are provided in Appendix 1.

The main Key outcomes have been summarized in Section 5 "Assessment Outcome Summary".

II. Assessment Team Details

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III. Acronyms

ABC	Allowable Biological Catch
ACL	Annual Catch Limits
ADFG	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
ASMI	Alaska Seafood Marketing Institute
AWT	Alaska Wildlife Troopers
BOF	Board of Fisheries
BSAI	Bering Sea and Aleutian Islands
BSFRF	Bering Sea Fisheries Research Foundation
CCRF	Code of Conduct for Responsible Fisheries
CDQ	Community Development Quota
CPUE	Catch per Unit Effort
CPT	Crab Plan Team
EIS	Environmental Impact Statement
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FAO	Food and Agriculture Organization of the United Nations
FMP	Fishery Management Plan
GOA	Gulf of Alaska
GHL	Guideline Harvest Level
IFQ	Individual Fishing Quota
LLP	License Limitation Program
MSA	Magnuson-Stevens Act
mt	Metric tons
MSY	Maximum Sustainable Yield
NEPA	National Environmental Policy Act
nm	Nautical miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
OFL	Overfishing Level
OLE	Office for Law Enforcement
PSC	Prohibited Species Catch
RACE	Resource Assessment and Conservation Engineering
REFM	Resource Ecology and Fisheries Management
RFM	Responsible Fisheries Management
SAFE	Stock Assessment and Fishery Evaluation (Report)
SSC	Scientific and Statistical Committee
TAC	Total Allowable Catch
USCG	U.S. Coast Guard

Stock Status Definitions

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.

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 of the BSAI crab FMP.

Maximum sustainable yield (MSY) is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. MSY 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.

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 of the BSAI crab FMP to abundance estimates.

1. Introduction

This Surveillance Report documents the 1st Surveillance Assessment (2013) the U.S. Alaska King and Snow Crab Bering Sea commercial fisheries (3 species) originally certified on April 16th 2012, and presents the recommendation of the Assessment Team and the Certification Committee for continued FAO-Based RFM Certification.

Unit of Certification
The U.S. Alaska King and Snow Crab Bering Sea Commercial Fisheries [Bristol Bay Red King Crab *(Paralithodes camtschaticus)*, Eastern Bering Sea Snow Crab *(Chionoecetes opilio)* and St. Matthew Island Blue King Crab (*Paralithodes platypus)*] legally employing pot gear within Alaska jurisdiction (200 nautical miles EEZ) and subject to a federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] joint management regime, underwent their 1st surveillance assessment against the requirements of the FAO-Based RFM Conformance Criteria Version 1.2 Fundamental clauses.

This 1st Surveillance Report documents the assessment result for the continued certification of commercially exploited U.S. Alaska King and Snow Crab Bering Sea fisheries to the FAO-Based RFM Certification Program. This is a voluntary program that has been supported by ASMI who wishes to provide an independent, third-party certification that can be used to verify that these fisheries are responsibly managed according to the FAO-Based RFM Program.

The assessment was conducted according to the Global Trust procedures for FAO-Based RFM Certification using the fundamental clauses of the FAO-Based RFM Conformance Criteria Version 1.2 (Sept 2011) in accordance with EN45011/ISO/IEC Guide 65 accredited certification procedures. The assessment is based on the fundamental clauses specified in the FAO-Based RFM Conformance Criteria.

The assessment is based on 6 major components of responsible management derived from the FAO Code of Conduct for Responsible Fisheries (1995) and Guidelines for the Eco-labelling of products from marine capture fisheries (2009); including:

A The Fisheries Management System
B Science and Stock Assessment Activities
C The Precautionary Approach
D Management Measures
E Implementation, Monitoring and Control
F Serious Impacts of the Fishery on the Ecosystem

These six major components are supported by 13 fundamental clauses (+ 1 in case of enhanced fisheries) that guide the FAO-Based RFM Certification Program surveillance assessment.

A summary of the site meetings is presented in Section 5. Assessors included both externally contracted fishery experts and Global Trust internal staff (Appendix 1).

1.1. Recommendation of the Assessment Team

Following this 1st Surveillance Assessment, in 2013, the assessment team recommends that continued Certification under the FAO-Based Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fisheries, the U.S. Alaska King and Snow Crab Bering Sea Commercial Fisheries [Bristol Bay Red King Crab *(Paralithodes camtschaticus)*, Eastern Bering Sea Snow Crab *(Chionoecetes opilio)* and St. Matthew Island Blue King Crab (*Paralithodes platypus)*] legally employing pot gear within Alaska jurisdiction (200 nautical miles EEZ) and subject to a federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] joint management regime.

2. Fishery Applicant Details

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3. Unit of Certification

Unit of Certification			
U.S. ALASKA KING AND SNOW CRAB BERING SEA COMMERCIAL FISHERIES			
Fish Species (Common & Scientific Name)	***Geographical Location of Fishery***	***Gear Type***	***Principal Management Authority***
Red King crab (*Paralithodes camtshatichus*)	Bristol Bay	Pot gear	National Marine Fisheries Service (NMFS)
Eastern Bering Sea Snow crab *(Chionocetes opilio)*	Eastern Bering Sea		North Pacific Fishery Management Council (NPFMC)
Blue King crab *(Paralithodes platypus)*	St. Matthew Island		Alaska Department of Fish and Game (ADFG) and Alaska Board of Fisheries (BOF)

4. Surveillance Meetings

Date, time	Organization	Representatives	Item discussed
4th June 2013, 13:00-15:00	Alaska Bering Sea Crabbers Association, Seattle	Mark Gleason (Executive Director) Vito Romito (GTC), Geraldine Criquet (GTC)	• Function of the Association: represents harvest sector, results from a merging between 3 associations at the beginning of 2013. • Ongoing projects of the Association: IUU from Russia, development of new markets, support BS Research Institute, involved with the Crab Plan Team, collaboration work with the Washington University, hatchery program for King crabs rehabilitation. • Changes in law, regulations or fishery operations: no major changes. • Fishermen participation: from Alaska, Washington and Oregon. • Fishery-dependent data collection: logbooks, dockside inspections by ADFG staff. • No transshipment, VMS mandatory. • Bycatch dynamics, interactions with endangered species: no interactions with ETP species. • Updates on bycatch avoidance mechanisms (e.g. escape rings, large mesh size, cod fingers): no updates. • Gear used: only standard pots. • Gear loss, recovery of lost pots: more last year because of ice, and large part was snow crab pots, there is no active pot recovery program. • Area closures: nothing new specific to crab, effort for more incorporation of fishermen's knowledge, collaboration with the Groundfish Forum. • Relation to recent modification of trawl sweeps for flatfish fleet: positive development. • Gear conflicts with other users, overlapping fishing areas with other crab or groundfish fisheries: crabbers send information on their pots location to trawlers.

			• Industry collaboration in research activities: St Matthew annual survey. • Economic data collection: new economic data collection program approved by the NPFMC last fall and is now in the NMFS process. The objective is to assess the effectiveness of the rationalization. • Adequacy of consultation between management authorities and industry: adequate consultative process.
5th March 2013, 16:00-17:00	Pacific Seafood Processors Assoc. (PSPA), Seattle	Glenn Reed (President) Vito Romito (GTC), Geraldine Criquet (GTC)	• Changes in law, regulations or fishery operations: no major changes. • Gear conflicts with other users, overlapping fishing areas with other crab or groundfish fisheries.
6th March 2013, 14:00-15:00	Alaska Fisheries Science Center (AFSC), Seattle	Benjamin J. Turnock, EBS snow crab stock assessment scientist Vito Romito (GTC), Geraldine Criquet (GTC)	• Historic overview of the fishery: rebuilding plan until 2010, legal size is 78 mm, catches are concentrated around Pribilof Island. • Ongoing research on snow crab reproduction: relationship between sperm storage and fishing pressure • Stock status: ESB snow crab biomass is above reference point (B35%). • Ecological importance of EBS snow crab. • Revised economic data collection program: approved by the NPFMC last fall and is now in the NMFS process.
7th March 2013 16:30-17:30	United Fishermen of Alaska (UFA), Juneau	Julianne Curry (Executive Director) Vito Romito (GTC), Geraldine Criquet (GTC)	• Changes in law, regulations or fishery operations: no major changes. • Gear conflicts with other users, overlapping fishing areas with other crab or groundfish fisheries. • Adequacy of consultation between management authorities and industry: adequate consultative process.
8th March 2013, 14:00-15:30	Alaska Department of Fish and Game (ADFG), Juneau	Jie Zheng Bristol Bay Red King crab stock assessment scientist) Vito Romito (GTC), Geraldine	• Changes in law, regulations or fishery operations: no major changes. • Current overview of the fishery: number of vessel operating is similar to last year, same geographical distribution of catches. • Updates on Bristol Bay Red King crab (BBRKC) stock structure and/or genetic studies: no updates since last year.

		Criquet (GTC)	• Survey activities: Bering Sea Fisheries Research Foundation (BSFRF) conducted a trawl survey in 2007 and 2008, the selectivity was better than the NFMS trawl survey due to the smaller mesh size used, similar biological sampling in NMFS and BSFRF trawl surveys. • Recent recruitment trends and significant change in age structure for the BBRKC: low recruitment during the last 5 years, older individuals. • Data collection, monitoring: VMS mandatory, logbooks, dockside inspections by ADFG. • It appears that mature female crab have moved to historically important spawning grounds in the Southern Bristol Bay: ongoing research to understand the potential overlap with flatfish trawlers, and the effects on the overall BBRKC stock. • CIE review: last review 3 years ago for the stock assessment. • Information exchange with Russia: no information exchange.
14th March 2013, 09:30-10:30	Alaska Wildlife Troopers (AWT), Kodiak Island	Lt Will Ellis (Commander Southwestern Region) Vito Romito (GTC), Geraldine Criquet (GTC)	• Enforcement of management measures supporting selectivity, reduction of discards, reduction of bycatch of GKC. • Pre-fishing season check. • Number of boardings, number and types of violations. • Gear marking regulations, checking and concern relating to pot loss. • General level of compliance: very high.
19th March 2013, 14:30-16:30	North Pacific Fisheries Management Council (NPFMC), Anchorage	Chris Oliver, Dave Witherell, Diane Stram Vito Romito (GTC), Geraldine Criquet (GTC)	• Changes in law, regulations or fishery operations: no major changes. • Revised economic data collection program: approved by the NPFMC last fall and is now in the NMFS process. • It appears that mature female crab has moved to the historical important spawning ground in the Southern Bristol Bay: ongoing research to understand the potential overlap with flatfish trawlers, and the effects on the overall BBRKC stock. • Information exchange with Russia: very limited. • MSA: proposal for revisiting.

5. Surveillance Assessment Outcome Summary

1. *Alaska's BSAI crab stocks are managed under the Fishery Management Plan for Bering Sea/ Aleutian Islands King and Tanner Crabs (FMP). The crab FMP was developed under a negotiated agreement between the State of Alaska and the federal government. The result was a state/federal fishery management plan (FMP) which incorporated concerns of the NPFMC, NMFS and MSA requirements on the federal side and ADFG, the BOF and Alaska statutes on the state side. This balance resulted in true Joint Management where the needs of both Alaska residents and those from other states were met. The crab FMP has three categories of regulations which reflect the state and federal emphasis. Once the state and federal agencies and the BOF and NPFMC arrived at consensus and put the Joint management document to public review, it was submitted to the Secretary of Commerce who accepted joint management for the BSAI crab fisheries.*

2. *The NMFS and the NPFMC participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes. This occurs whenever resources under their management may be affected by other developments and each time they create, renew or amend regulations. The fishery management agencies have processes, committees and groups that allow potential coastal zone developments and issues to be brought to formal review and engagement such as the NPFMC meetings or the BOF meetings. From witnessing the processes, interviews with representatives of these organizations, The Council and the BOF actively encourage stakeholder participation, and all their deliberations are conducted in open, public sessions. Decisions are transparently documented on the various websites of these organizations in a timely manner.*
   With a Congressionally approved approach creating Processor Quota Shares and Individual Fishing Quotas for rationalized crab fisheries in the BSAI in 2005, the numbers of buyers and sellers were capped, seasons were protracted and vessels were able to join cooperatives that resulted in fewer vessels deploying less gear on the grounds. The economic conditions under which fishing industries operate promote responsible fisheries, and these circumstances are actively reviewed and demonstrated in the analysis by NMFS. ADFG also track ex-vessel value of the fisheries they manage, and produce Annual Management Reports that support the analysis. Decisions are based on both biological and socio-economic information collected and analyzed by NPFMC, NMFS and ADFG staff economists that participate in the economic, social and cultural evaluation and review process of fishery management proposals. Allocation also considers subsistence and community development initiatives.

3. *Long-term fisheries management objectives are outlined in the BSAI Crab FMP. State regulations for the king and snow (& Tanner crab) fisheries are listed under the Alaska Administrative Code, Title 5, Chapter 34 and 35. The MSA, as amended, sets out ten national standards for fishery conservation and management (16 U.S.C. § 1851) to which all fishery management plans must be consistent.*
   Conservation of aquatic habitats and biodiversity are integral parts of the NPFMC's management process. These concerns and decisions are summarized annually in the AFSC Ecosystems Considerations report and the ecosystem sections of each annual Stock

Assessment and Fishery Evaluation (SAFE) report. Furthermore, Essential Fish Habitat (EFH) identification and protection constitute a key objective for the management system as outlined in the BSAI crab FMP. Many groundfish fisheries have closed areas or restricted harvest prescriptions to protect crab and their habitat. The directed fishery gear for BSAI crab has an environmentally small footprint (1% of the area fished) and impact. The pot gear deployed is demonstrated to be relatively selective, with ADFG mandated escape mechanisms for juvenile crabs and females, and biodegradable pot components to reduce ghost fishing from lost pots. Pot loss has decreased considerably since rationalization (and season extension) of the BSAI crab fisheries.

4. *The collection, aggregation and use of data in stock assessments for the BSAI crab fisheries are undertaken through collaboration between the NPFMC, the NMFS and ADFG. Data collection, analysis and stock assessment of the BSAI crab fisheries respect the NPFMC's BSAI crab FMP requirements. NMFS and ADFG collect fishery dependent data and undertake fishery-independent surveys for all BSAI crab fisheries providing the basis for the assessment of the crab stocks and their impact on the ecosystem. The NMFS annual trawl surveys of the eastern Bering Sea provide indices of relative abundance and biomass for all three fisheries. Full details of the datasets for the three fisheries and their time series can be found in the annual Stock Assessment and Fishery Evaluation (SAFE) reports.*

Bristol Bay red king crab (BBRKC) and Eastern Bering Sea snow crab (EBSSC) bycatch data are collected by ADFG and NMFS, and fisheries-independent data from the NMFS annual trawl surveys of the eastern Bering Sea and two recent Bering Sea Fisheries Research Foundation (BSFRF) surveys. St Matthew blue king crab (SMBKC) fisheries data are collected by ADFG, bycatch data by ADFG and NMFS, and fisheries-independent data from the NMFS annual trawl surveys of the eastern Bering Sea and the triennial ADFG pot survey. ADFG runs and deploys ADFG observers on vessel participating in the BSAI crab fisheries as an important component of data collection and fishery management. Observers are deployed on all catcher-processor vessels in the crab fisheries, on randomly selected catcher vessels in the BBRKC (minimum 20% of participating vessels carry observers) and EBSSC (minimum 30% of participating vessels carry observers) fisheries, and on all vessels fishing for SMBKC. Observed pot lifts in 2010/11 represented 1.5%, 2.8% and 8.2% of the total pot lifts in the fishery for the BBRKC, EBSSC and SMBKC fisheries respectively. All three fisheries have effective fishery data collection systems in place and surveys providing fishery-independent estimates of stock biomass as well as sufficiently long time series of both fishery-dependent and fishery-independent data. In addition to fishery data, annual SAFE reports provide information on ecosystem indicators which may have an impact on BSAI crab stocks.

The socio-economic data requirements as set in the BSAI crab FMP include: 1) the value of crab harvested, 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.

5. *The NMFS undertakes shellfish stock assessments through the annual Eastern Bering Sea trawl survey which provides the primary input to the shellfish assessments. Information derived from both regular surveys and associated research are analysed by AFSC stock assessment scientists and supplied to fishery management agencies and to the commercial*

fishing industry. In addition, economic and ecosystem assessments are provided to the Council on an annual basis.

For the BBRKC fishery, a length-based analysis (LBA) model combines multiple sources of survey, catch and bycatch data using a maximum likelihood approach to estimate abundance, recruitment and catchabilities, catches and bycatch of the commercial pot fisheries and groundfish trawl fisheries. For the SMBKC fishery a three-stage catch-survey analysis (CSA) assesses the male component of the stock incorporating data from commercial catches from the directed fishery and its observer program, the annual EBS trawl survey, triennial pot surveys and bycatch data from the groundfish trawl fishery. This assessment model is in development and has not yet been approved by the Crab Plan Team, so for 2011 a survey-based assessment was used. For the EBSSC fishery the stock assessment uses a size and sex-structured model which is fitted to time series of total catch data from the directed fishery and bycatch data from the trawl fishery, size frequency data from the catch in the pot fishery and the bycatch in both the pot and trawl fisheries, and abundance data from the NMFS trawl survey and two recent BSFRF surveys. The assessment provides a range of alternative model scenarios, but all model scenarios indicate that the stock is rebuilt.

Ecosystem SAFE documents are provided yearly to the NPFMC. An ongoing goal is to produce an ecosystem assessment utilizing a blend of data analysis and modelling to clearly communicate the current status and possible future directions of ecosystems.

6. *The status determination criteria for crab stocks are calculated on an annual basis using a five-tier system that accommodates varying levels of uncertainty of information, and incorporates new scientific information providing a mechanism for continually improving the status determination criteria as more information becomes available. For tier 3 stocks, the target reference point is $B_{35\%}$ (when spawning biomass is reduced to 35% of the unfished condition), a proxy for B_{MSY}, or biomass at Maximum Sustainable Yield (MSY). Stock status of BSAI crabs are determined by two metrics. Firstly, the stock is considered to be overfished if the stock size is estimated to be below the minimum stock size threshold (MSST) or limit reference point (1/2 MSY). Secondly, overfishing is considered to have occurred if the exploitation level, or fishing mortality, exceeds the fishing mortality at the overfishing level (F_{OFL}), or more intuitively if the total catch exceeds the OFL level (equivalent to MSY).*

Reference points are considered appropriate and precautionary for stock harvest practices.

Stock	Tier	Reference Point (RP)	Biomass at RP	Biomass at present	Percentage of Reference Point
BBRKC	3a	$B_{35\%}$	27,500 t	26,300 t	96%
SMBKC	4a	Bmsy proxy	3,560 t	5,629 t	158%
EBSSC	3b	$B_{35\%}$	154,669 t	165,200 t	107%

There is strong evidence from the assessments that since rationalization, the level of fishing permitted for all three crab stocks has been commensurate with the current state of the fishery resources and never exceeded the overfishing level.

7. *The overall management for the BBRKC, EBSSC and SMBKC comprises all the elements as specified in the FAO guidelines for the precautionary approach. FAO Guidelines for the Precautionary Approach (PA) (FAO 1995) advocate a comprehensive management process that includes data collection, monitoring, research, enforcement, and review.*
Absence of adequate scientific information is not used as a reason for postponing or failing to take conservation and management measures. The three crab stocks part of this assessment are managed under a tier system rule based on stock knowledge. 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. The lower the tier, the less conservative the determination of OFL/ABC and ACL are, due to a greater level of information being known about the stock. Higher tier stocks are managed more conservativelydue to gaps in the information about the stock. This system is intrinsically precautionary in nature and the results involve catches always lower than the overfishing level. The annual assessments and subsequent SAFE reports for the BSAI crab fisheries allow for the identification of areas where there are gaps in the knowledge of the stock which require further research and/or improvements.

8. *The NPFMC's FMP for BSAI crab stocks outlines the harvest strategy and harvest control rule, the stock status definitions, the criteria used to determine stock status using a five-tier system and the step-by-step framework under which the NPFMC sets final overfishing levels (OFLs) and acceptable biological catches (ABCs). The BSAI Crab FMP Plan authorizes the use of pot gear to harvest the crab resources.*
The Crab Rationalization program allocates BSAI crab resources among harvesters, processors, and coastal communities who have been involved with and/or were dependent upon these fisheries. Share allocations to harvesters and processors, together with incentives to participate in fishery cooperatives, increases efficiencies, provides economic stability, and facilitates compensated reduction of excess capacities in the harvesting and processing sectors. Community interests are protected by CDQ allocations and regional landing and processing requirements, as well as by several community protection measures.
The BSAI crab FMP defers design specifications required for commercial crab pots and ring nets to the State. Escape mechanisms may be incorporated or mesh size adjusted to allow female and sublegal male crab to escape. Crabbers are constructing pots with larger web on the panels to allow for female and juvenile crab to exit the pot before the gear is hauled back. The yearly marine habitat footprint has been assessed and its impact considered very small for the entire BSAI directed crab fisheries. Regulation imposes that undersized males and females must be promptly discarded from crab vessels to decrease handling mortality rates. Discarded crabs are returned to the sea in a variety of methods including direct release and/or with the use of chutes and ramps.
The Federal BSAI Crab FMB describes fishing season requirements, those are aimed to protect king and snow/Tanner crabs during the molting and mating portions of their life cycle. Also, groundfish closure areas, or trawl protection areas, are in place to minimize the impact of groundfish harvests on crab resource.

9. *There is clearly defined harvest strategy that consists of a set of defined management measures designed to maintain the crab stocks at levels capable of producing maximum sustainable levels. These include harvest control rule, stock status definitions, criteria used to determine stock status using a five-tier system and the step-by-step framework under which the NPFMC sets final overfishing levels (OFLs) and acceptable biological catches (ABCs). Using this strategy and clearly laid out rebuilding plans, two of these stocks were rebuilt from being declared overfished.*

The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." EFH are necessary to maintain stocks capable of producing maximum sustainable yields. At present, there is an area of overlap between current female red king crab distribution and areas where trawling occurs in the southern Bristol Bay. The NPFMC is currently researching this issue and in discussions about the best way to proceed with the management of this area.

10. *The North Pacific Fishing Vessel Owners association (NPFVO) provides a large and diverse training program. Training ranges from firefighting on a vessel, damage control, man-overboard, MARPOL, etc. The Alaska Marine Safety Education Association has trained more than 10,000 fishermen in marine safety and survival and a Coast Guard-required class on emergency drills. The Alaska Maritime Training Center is a United States Coast Guard (USCG) approved training facility located in Seward, Alaska, and offers USCG/STCW-compliant maritime training (STCW is the international Standards of Training, Certification, & Watchkeeping). In addition to the standard courses offered, customized training is available to meet the specific needs of maritime companies.*

The University of Alaska Sea Grant Marine Advisory Program (MAP) provides education and training in several sectors, including fisheries management, in the form of seminars and workshops. MAP also conducts sessions of their Alaska Young Fishermen's Summit. Each Summit is an intense course in all aspects of Alaska fisheries, from fisheries management & regulation (e.g. MSA), to seafood markets & marketing. MAP provides training and technical assistance to fishermen and seafood processors in Western Alaska. A number of training courses and workshops were developed in cooperation with local communities and CDQ groups. Additional education is provided by the Fishery Industrial Technology Center, in Kodiak, Alaska.

11. *There is a division of effort and emphasis in the at-sea enforcement between the USCG and the AWT. Under joint management there are both state and federal laws to enforce, and both state and federal agents actively conduct at-sea enforcement. The USCG is responsible for enforcing the main federal vessel regulations: this includes safety at sea, drug enforcement, vessel compliance with ESA and EFH requirements and assuring compliance of federal permits, observer coverage, licenses and VMS in the crab fisheries. While the AWT have vessels that conduct at-sea compliance with gear regulations, are capable of hauling and confiscating crab pots, sample crab harvests at sea to assure sex and size requirements are met and assure that the vessels have all required state and federal licenses. From October 1 through March 31 each year the E/V Stimson and E/V Woldstad each spend 60 days conducting joint patrols inspecting crab and Pacific cod vessels, and Village Public Safety visits. Additionally AWT, along with ADFG area biologists and technicians, conduct vessel*

inspections dockside, conducting hold inspections and observing offloads of harvested crab for compliance.

The entire crab harvests are conducted in Alaskan waters by American vessels. No foreign fleet is allowed to fish in the Alaska's EEZ. All fishing vessels must be at least 75% U.S. ownership. Because the fishery was rationalized in 2005, most enforcement of IFQ/IPQ violations, as well as size, sex and season violations occur at offloading.

12. *In Alaska waters, enforcement policy section 50CFR600.740 states: (a) The MSA provides four basic enforcement remedies for violations, in ascending order of severity, as follows: (1) Issuance of a citation (a type of warning), usually at the scene of the offense (see 15 CFR part 904, subpart E). (2) Assessment by the Administrator of a civil money penalty. (3) For certain violations, judicial forfeiture action against the vessel and its catch. (4) Criminal prosecution of the owner or operator for some offenses. The MSA treats sanctions against the fishing vessel permit to be the carried out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator. The 2011 Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions issued by NOAA Office of the General Counsel – Enforcement and Litigation, provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA.*

The Marine Division of AWT and the State of Alaska Department of Law pursue a very aggressive enforcement policy. They attend the BOF and are integral into the process for regulation formulation and legislation, analogous to the USCG attendance and input in the Council process. AWT has Statutory / Regulatory legislation pertaining to their Authority.

13. *The purpose of the Crab Ecosystem Considerations and Indicators (CECI) report is to consolidate ecosystem information specific to the crab stocks in the BSAI FMP. The last EFH review (2010) identified impacts of trawling on EFH habitat of red king Crab in Southern Bristol Bay as a potential problem area. The NPFMC is addressing the issue.*

In the BSAI crab fisheries Final Environmental Impact Statement (EIS), the impact of pot gear on benthic Eastern Bering Sea species is discussed. The total portion of the EBS impacted by commercial pot fishing may be less than 1% of the shelf area and the report concludes that BSAI crab fisheries have an insignificant effect on benthic habitat. Habitat protection areas, prohibited species caps (PSC) and crab bycatch limits are in place to protect important benthic habitat for crab and other resources and to reduce crab bycatch in the trawl and fixed gear groundfish fisheries. If PSC limits are reached in bottom trawl fisheries executed in specific areas, those fisheries are closed.

The EBS crab fisheries catch a small amount of other species as bycatch. A limited number of groundfish, such as Pacific cod, Pacific halibut, yellowfin sole, and sculpin are caught in the directed pot fishery. The invertebrate component of bycatch includes echinoderms, snails, non-FMP crab, and other invertebrates. As noted in the Endangered Species Act EIS report, crab fisheries do not adversely affect ESA listed species, destroy or modify their habitat, or comprise a measurable portion of their diet.

Based on food habits data collected in the summer months during the annual EBS bottom trawl survey, Pacific cod, Pacific halibut and skates are the primary predators of large or legal size crab although legal-sized crab are a minimal component of these predators diets. The

short and long term effects of removing large male crab from a population are not well understood and may vary by species and population as outlined in various scientific studies. Such studies are ongoing.

6. Conformity Statement

The Assessment Team recommends that continued certification under the FAO Based Responsible Fisheries Management Program is granted to the Alaska Bering Sea and Aleutian Islands king and snow crab commercial fishery employing pot gear within Alaska's jurisdiction (200 nautical miles EEZ), under federal [National Marine Fisheries Services (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) and Board of Fisheries (BOF)] management.

7. FAO-Based Conformance Criteria Fundamental Clauses for Surveillance Reporting

A. The Fisheries Management System

1. There shall be a structured and legally mandated management system based upon and respecting International, National and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.

FAO CCRF 7.1.3/7.1.4/7.1.9/7.3.1/7.3.2/7.3.4/7.6.8/7.7.1/10.3.1

FAO Eco 28

Evidence adequacy rating:

☑ High **☐ Medium** **☐ Low**

Rating determination

Summary

Alaska's BSAI crab stocks are managed under the Fishery Management Plan for Bering Sea/ Aleutian Islands King and Tanner Crabs (FMP). The crab FMP was developed under a negotiated agreement between the State of Alaska and the federal government. The result was a state/federal fishery management plan (FMP) which incorporated concerns of the NPFMC, NMFS and MSA requirements on the federal side and ADFG, the BOF and Alaska statutes on the state side. This balance resulted in true Joint Management where the needs of both Alaska residents and those from other states were met. The crab FMP has three categories of regulations which reflect the state and federal emphasis. Once the state and federal agencies and the BOF and NPFMC arrived at consensus and put the Joint management document to public review, it was submitted to the Secretary of Commerce who accepted joint management for the BSAI crab fisheries.

BSAI crabs are managed under the Fishery Management Plan for Bering Sea/ Aleutian Island King and Tanner Crabs (FMP). The crab FMP was developed under a negotiated agreement between the State of Alaska and the federal government. The result was a state/federal fishery management plan (FMP) which incorporated concerns of the NPFMC, NMFS and MSA requirements on the federal side and ADFG, the BOF and Alaska statutes on the state side. This balance resulted in true Joint Management where the needs of both Alaska residents and those from other states were met. The crab FMP has three categories of regulations which reflect the state and federal emphasis. Once the state and federal agencies and the BOF and NPFMC arrived at consensus and put the Joint management document to public review, it was submitted to the Secretary of Commerce who accepted joint management for the BSAI crab fisheries. The NPFMC is one of eight regional councils established by the Magnuson-Stevens Fishery Management and Conservation Act (MSFMCA or MSA) to oversee management of the nation's fisheries. The MSA is the primary layer of governance for Bering Sea crab fisheries. The MSA sets out ten national standards for fishery conservation and management (16 U.S.C. § 1851), with which all FMPs must be consistent. Under the MSA, the NPFMC is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, a FMP and any necessary amendments that regulate conservation and

management for each fishery under its authority.

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.

Stock Assessment and Harvest Rates

The NMFS Alaska Fisheries Science Center in Seattle and the Kodiak Fisheries Research Center (KFRC) generate the scientific information and analysis necessary for the conservation, management, and utilization of the region's crab resources. ADFG is a strong participant in crab research, at headquarters (HQ), Dutch Harbor and Kodiak, their research and analysis is also integrated into the conservation and management of Alaskan crab stocks. The NPFMC and NMFS set overfishing levels (OFL), determine all sources of mortality, and make numerous management decisions via consultation with the NFMS Restricted Access Management Division (RAM) on Individual Fishing Quotas/Individual Processor Quotas.

http://www.afsc.noaa.gov/ and http://www.afsc.noaa.gov/Kodiak/default.htm

During 2012, new Stock Assessment and Fishery Evaluation (SAFE) reports were completed for each of the major crab species and fisheries. Annual stock assessments show changes in the biomass of a stock, fishing effects on the stocks, summarize biological data taken on the species and incorporate multiple parameters including the ecosystem, temperature regime, and data from other fisheries. Data are updated annually with the most current information. The SAFE reports provide information for better stock management via mortality estimates, biomass reference points and suggested allowable catches. SAFE documents are reviewed by the Crab Plan Team and the Scientific and Statistical Committee of the NPFMC.

BSAI King and Tanner crab SAFE 2012:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/SAFE/CrabSAFE/CrabSAFE2012.pdf

Stock Identification and Management Units

Each of the Bering Sea crab fisheries are considered discrete stocks and treated as single stocks for management purposes. There have been no changes in the stock units since certification.
The ADFG defines a succinct area under their regulation 5 AAC34.800 Description of Registration Area T, for the single stock red king crab fishery. Red king crabs were caught at 65 of the 136 NMFS Eastern Bering Sea continental shelf bottom trawl survey stations in the Bristol Bay management district in 2011. The NMFS survey illustrates a single stock fishery on their 2011 survey. The St. Matthew Island blue king crab fishery is defined by specific district boundaries encompassing the fishable population's location, under 5 AAC 34.905 (C)(2) Description of Registration Area Q districts, Saint Matthew Island Section with studies showing little to no genetic exchange with the Pribilof or Western Bering Sea populations. The *C. opilio* (snow) crab fishable population is much more broadly distributed, with the district area boundaries defined under 5 AAC 35.505 (e)(1) and (B)(2) Description of Registration Area J districts. The NMFS's snow crab model, vetted through the

NPFMC's Crab Plan Team (CPT), treats the population as a single stock. Snow crabs are caught in all areas of the Bristol Bay District, Pribilof District, and St. Matthew Island Section sampling strata within the EBS trawl survey.
http://www.afsc.noaa.gov/Kodiak/shellfish/crabebs/2012EBSSurveyTechMemoDraft.pdf

Enforcement

There is a division of effort and emphasis in the at-sea enforcement between the USCG and the AWT. Under joint management there are both state and federal laws to enforce, and both state and federal agents actively conduct at-sea enforcement. The USCG is responsible for enforcing the main federal vessel regulations: this includes safety at sea, drug enforcement, vessel compliance with ESA and EFH requirements and assuring compliance of federal permits, observer coverage, licenses and VMS in the crab fisheries. While the AWT have vessels that conduct at-sea compliance with gear regulations, are capable of hauling and confiscating crab pots, sample crab harvests at sea to assure sex and size requirements are met and assure that the vessels have all required state and federal licenses. From October 1 through March 31 each year the E/V *Stimson* and E/V *Woldstad* each spend 60 days conducting joint patrols inspecting crab and P. cod vessels, and Village Public Safety visits. Additionally AWT, along with ADFG area biologists and technicians, conduct vessel inspections dockside, conducting hold inspections and observing offloads of harvested crab for compliance. Because the fishery was rationalized in 2005, most enforcement of IFQ/IPQ violations, as well as size, sex and season violations occur at offloading.
http://dps.alaska.gov/AWT/detachments.aspx
www.nmfs.noaa.gov/ole/ak_alaska.html
www.uscg.mil/d17/

Potential changes to the BSAI crab fisheries participation requirements

In January 2013 the NPFMC published the "Initial Review Draft REGULATORY IMPACT REVIEW And INITIAL REGULATORY FLEXIBILITY ANALYSIS OF PROVISIONS DEFINING ACTIVE PARTICIPATION REQUIREMENTS FOR THE ACQUISITION AND USE OF OWNER SHARES".
Access to the Bering Sea and Aleutian Island crab fisheries is regulated through the allocation of harvest share privileges (or shares). Holders of long term shares, known as quota shares (QS), receive an annual allocation of individual fishing quota (IFQ), representing a privilege to harvest a certain number of pounds of crab during that year. Under the program, 97 percent of the QS pool was initially allocated to holders of limited entry permits under the previous management program.
These QS are known as "owner" QS. Under the management program, these owner QS are transferable to any person who meets a minimum sea time requirement; thereafter, holders of these owner shares may maintain those holdings without any further or continuing qualification.

Purpose and need statement

The Council has adopted the following the problem statement for this action:
The Bering Sea/Aleutian Islands (BSAI) Crab Rationalization Program is a comprehensive approach to rationalize an overcapitalized fishery. Conservation, safety, and efficiency goals have largely been met under the program. Provisions that allow for absentee ownership of crab harvest shares support long-term investment by persons or corporations with little or no involvement in the prosecution of

the fisheries and limit the amount of quota available for active participants. This action is intended to ensure that ownership of quota transitions to persons who are actively involved in the prosecution of the fisheries. This development will be followed accordingly as it progresses.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/catch_shares/Crab/CrabOwnerParticipation213.pdf

2. Management organizations shall participate in coastal area management institutional frameworks, decision-making processes and activities related to the fishery and its users, in support of sustainable and integrated resource use, and conflict avoidance.

FAO CCRF 10.1.1/10.1.2/10.1.4/10.2.1/10.2.2/10.2.4

Evidence adequacy rating:

☑ High **☐ Medium** **☐ Low**

Rating determination

Summary

The NMFS and the NPFMC participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes. This occurs whenever resources under their management may be affected by other developments and each time they create, renew or amend regulations. The fishery management agencies have processes, committees and groups that allow potential coastal zone developments and issues to be brought to formal review and engagement such as the NPFMC meetings or the BOF meetings. From witnessing the processes, interviews with representatives of these organizations, The Council and the BOF actively encourage stakeholder participation, and all their deliberations are conducted in open, public sessions. Decisions are transparently documented on the various websites of these organizations in a timely manner.

With a Congressionally approved approach creating Processor Quota Shares and Individual Fishing Quotas for rationalized crab fisheries in the BSAI in 2005, the numbers of buyers and sellers were capped, seasons were protracted and vessels were able to join cooperatives that resulted in fewer vessels deploying less gear on the grounds. The economic conditions under which fishing industries operate promote responsible fisheries, and these circumstances are actively reviewed and demonstrated in the analysis by NMFS. ADFG also track ex-vessel value of the fisheries they manage, and produce Annual Management Reports that support the analysis. Decisions are based on both biological and socio-economic information collected and analyzed by NPFMC, NMFS and ADFG staff economists that participate in the economic, social and cultural evaluation and review process of fishery management proposals. Allocation also considers subsistence and community development initiatives.

NEPA

The NMFS and the NPFMC participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes, a socio-economic and biological/ environmental impact assessment of various proposed scenarios, before the path of action is decided. This occurs whenever resources under their management may be affected by other developments and each time they create, renew or amend regulations. The NEPA processes provide public information and opportunity for public involvement that are robust and inclusive at both the state and federal levels. Fisheries are relevant to the NEPA process in two ways. First, each significant NPFMC fisheries package must go through the NEPA review process. Second, any project that could impact fisheries (i.e., oil and gas, mining, coastal construction projects, etc.,) that is either on federal lands, in federal waters, receives federal funds or requires a federal permit, must go through the NEPA process. In this manner, both fisheries and non-fisheries projects that have a

potential to impact fisheries have a built in process by which concerns of the NPFMC, NMFS, state agencies, industry, other stakeholders or the public can be and are accounted for.
The state is a cooperating agency in the NEPA process for federal actions, so that gives the State of Alaska a seat at the table for federal actions. This includes decision-making processes and activities relevant to the fishery resource and its users in support of sustainable and integrated use of living marine resources and avoidance of conflict among users.
Overall, the NEPA process, existing agencies and processes (e.g. ADFG, the Alaska Department of Environmental Conservation, the Department of Natural Resources (DNR), US Fish and Wildlife Service, the Alaska National Interest Lands Conservation Act, the DNR's Office of Project Management and Permitting and Bureau of Ocean Energy Management), and the existing intimate and routine cooperation between federal and state agencies managing Alaska's coastal resources (living and non-living) is capable of planning and managing coastal developments in a transparent, organized and sustainable way, that minimizes environmental issues while taking into account the socio-economic aspects, needs and interests of the various stakeholders of the coastal zone.
Virtually every development affecting the natural environment, by regulation, has to go through the NEPA environmental impact assessment process which identifies its potential environmental, social and economic impacts and/or benefits. The NEPA processes provide public information and opportunity for public and agencies involvement that are robust and inclusive at both the state and federal levels.

DEC

The Department of Environmental Conservation (DEC) implements statutes and regulations affecting air, land and water quality. DEC is the lead state agency for implementing the federal Clean Water Act and its authorities provide considerable opportunity to maintain high quality fish and wildlife habitat through pollution prevention (http://dec.alaska.gov/).

ADFG

ADFG protects estuarine and marine habitats primarily through cooperative efforts involving other state and federal agencies and local governments. ADFG has jurisdiction over the mouths of designated anadromous fish streams and legislatively designated state special areas (critical habitat areas, sanctuaries and refuges). Some marine species also receive special consideration through the state's Endangered Species program.

DNR

The Department of Natural Resources (DNR) manages all state-owned land, water and natural resources except for fish and game. This includes most of the state's tidelands out to the three mile limit with approximately 34,000 miles of coastline. DNR authorizes the use of log-transfer sites, access across state land and water, set-net sites for commercial gill net fishing, mariculture sites for shellfish farming, lodge sites and access for the tourism industry, and water rights and water use authorizations. DNR also uses the state Endangered Species Program to preserve natural habitat of species or subspecies of fish and wildlife that are threatened with extinction (http://dnr.alaska.gov/).

USFWS

The U.S. Fish and Wildlife Service (USFWS) is a bureau within the Department of the Interior. Its

objectives include 1) Assisting in the development and application of an environmental stewardship ethic based on ecological principles, scientific knowledge of fish and wildlife, and a sense of moral responsibility; 2) Guide the conservation, development, and management of the US's fish and wildlife resources. 3) Administer a national program to provide the public opportunities to understand, appreciate, and wisely use fish and wildlife resources. The USFWS functions include enforcement of federal wildlife laws, protection of endangered species, management of migratory birds, restoration of nationally significant fisheries, conservation and restoration of wildlife habitat such as wetlands, help of foreign governments with their international conservation efforts. Additionally, the USFWS distributes of hundreds of millions of dollars, collected through the Sport Fish and Restoration Program. These funds are derived from an excise taxes on fishing equipment, motorboat and small engine fuels and import duties. Funds are distributed to State fish and wildlife agencies for fishery projects, boating access and aquatic education (http://www.fws.gov/help/about_us.html).

ANILCA

The Alaska National Interest Lands Conservation Act (ANILCA) conveyed large sections of federal land to settle Alaska native lands claims and provide the State of Alaska title to other large sections promised under Statehood. Additionally, it enclosed large swaths of land into federal parks and monuments for ecological protection for future generations. ANILCA directs federal agencies to consult and coordinate with the state of Alaska. State agencies responsible for natural resources, tourism, and transportation work as a team to provide input throughout federal planning processes (http://dnr.alaska.gov/commis/opmp/anilca/anilca.htm).

OPMP

The Department of Natural Resources (DNR) Office of Project Management and Permitting (OPMP) coordinates the review of larger scale projects in the state. Because of the complexity and potential impact of these projects on multiple divisions or agencies, these projects typically benefit from a single primary point of contact. A project coordinator is assigned to each project in order to facilitate interagency coordination and a cooperative working relationship with the project proponent. The office deals with a diverse mix of projects including transportation, oil and gas, mining, federal grants, ANILCA coordination, and land use planning. Every project is different and involves a different mix of agencies, permitting requirements, statutory responsibilities, and resource management responsibilities (http://dnr.alaska.gov/commis/opmp/).

BOEM

The Bureau of Ocean Energy Management (BOEM) (previously Minerals and Management) is responsible for managing environmentally and economically responsible development and provide safety and oversight of the offshore oil and gas leases. The activities of BOEM and the process for application and approval of oil exploration permits overlaps extensively with evaluations by ADNR, ADFG and ADEC given the potential impacts of such activities on anadromous and other marine resources and their habitat. An example of this is provided by the Cook Inlet Offshore Oil & Gas Exploration Permit Application & Approval Process available at:
http://dog.dnr.alaska.gov/Permitting/Documents/Arcadis/Arcadis_Flowchart_CookInletOffshore_Draft.pdf

http://www.boem.gov/uploadedFiles/Proposed_OCS_Oil_Gas_Lease_Program_2012-2017.pdf

The ACMP was defeated in August 2012 ballot election

The Alaska Coastal Management Question, or Ballot Measure 2, was on the August 28, 2012 ballot in the state of Alaska as an indirect initiated state statute, where it was defeated (76,440 votes to 46,678 votes). The measure would have established a new coastal management program in the state; prior coastal management program expired on July 1, 2011, after the legislature adjourned the second of two special sessions without passing legislation required to extend the program. The failure of this ballot measure leaves Alaska as the only coastal state in the U.S. without a coastal management program. As of February 1, 2013 the Alaskan legislature has not reintroduced any bill regarding the ACMP. In the absence of ACMP the value of the NEPA process has increased to assure participation in the CMP.

http://housemajority.org/press.php?p=media&id=35&leg=28

The assessment team considers that the collectivity of: the NEPA process, existing agencies and processes (e.g. ADFG, ADEC, DNM, USFWS, ANILCA and OPMP), and the existing intimate and routine cooperation between federal and state agencies managing Alaska's coastal resources is capable of planning and managing coastal developments in a transparent, organized and sustainable way. However, effects of the failure to re-establish a coastal management program have yet to be determined. Essentially, the coastal management plan would formalize and centralize better the role of the state in the decision making, but otherwise, the agencies in Alaska have shown to be capable of this type of planning as well as allowing stakeholder input in the process even without the ACMP.

The NPFMC process. The Council system was designed so that fisheries management decisions were made at the regional level to allow input from affected stakeholders which assures that the rights of coastal communities and their historic access to the fishery is included in the decision process. Council meetings are open, and public testimony - both written and oral - is taken on each and every issue prior to deliberations and final decisions. Public comments are also taken at all Advisory Panel and Scientific and Statistical Committee meetings. While there is not a formal "call for proposals," interested stakeholders are welcome to draft letters to the Council.

http://www.fakr.noaa.gov/npfmc/index.html

The BOF process. The BOF main role is to conserve and develop the fishery resources of the state. The board is also charged with making allocative decisions, and ADFG is responsible for management based on those decisions. The BOF meets four to six times per year in communities around the state to consider proposed changes to fisheries regulations around the state. The board uses the biological and socioeconomic information provided by the Alaska Department of Fish and Game, public comment received from people inside and outside of the state, and guidance from the Alaska Department of Public Safety and Alaska Department of Law when creating regulations that are sound and enforceable. Advisory committees are the local "grass roots" groups that meet to discuss fish and wildlife issues and to provide recommendations to the boards. There are 82 committees throughout the state each with expertise in a particular local area. This process ensures that the local communities' customary uses and practices are considered.

Advisory Committees (AC) are local "grass roots" citizen groups intended to provide a local voice for the collection and expression of public opinions and recommendations on matters relating to the management of fish and wildlife resources in Alaska. ADFG staff regularly attends the AC meetings in their respective geographic areas to provide information to the public and hear local opinions on fishery related activities. Currently, there are 82 advisory committees in the state. Of these, approximately 80% to 85% are "active", meaning they regularly meet, write proposals, comment and attend BOF meetings. The enabling statute for the AC system is AS 16.05.260. Regulations governing the ACs are found in the Alaska Administrative Code (AAC) Title 5, Chapters 96 – 97 http://www.boards.adfg.state.ak.us/bbs/what/prps.php.

CDQs. The Community Development Quota (CDQ) Program began in December of 1992 with the goal of promoting fisheries related economic development in western Alaska. The program is a federal fisheries program that involves eligible communities who have formed six regional organizations, referred to as CDQ groups.

There are 65 communities within a fifty-mile radius of the Bering Sea coastline who participate in the program. The CDQ program allocated a portion of the Bering Sea and Aleutian Island harvest amounts to CDQ groups, including halibut, groundfish (Pollock, Pacific cod, flatfish and rockfish), crab and bycatch species. The CDQ program was granted perpetuity status during the 1996 reauthorization of the Magnuson-Stevens Act.

The Economic status of the fisheries off the BSAI area can be found in the Economic SAFE. These reports are published yearly along with the Ecosystem SAFEs and the various fishery Stock Assessment and Resource Evaluation (SAFE) reports.
http://www.afsc.noaa.gov/refm/docs/2012/economic.pdf

3. Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.

FAO CCRF 7.3.3/7.2.2

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

Summary

Long-term fisheries management objectives are outlined in the BSAI Crab FMP. State regulations for the king and snow (& Tanner crab) fisheries are listed under the Alaska Administrative Code, Title 5, Chapter 34 and 35. The MSA, as amended, sets out ten national standards for fishery conservation and management (16 U.S.C. § 1851) to which all fishery management plans must be consistent.

Conservation of aquatic habitats and biodiversity are integral parts of the NPFMC's management process. These concerns and decisions are summarized annually in the AFSC Ecosystems Considerations report and the ecosystem sections of each annual Stock Assessment and Fishery Evaluation (SAFE) report. Furthermore, Essential Fish Habitat (EFH) identification and protection constitute a key objective for the management system as outlined in the BSAI crab FMP. Many groundfish fisheries have closed areas or restricted harvest prescriptions to protect crab and their habitat. The directed fishery gear for BSAI crab has an environmentally small footprint (1% of the area fished) and impact. The pot gear deployed is demonstrated to be relatively selective, with ADFG mandated escape mechanisms for juvenile crabs and females, and biodegradable pot components to reduce ghost fishing from lost pots. Pot loss has decreased considerably since rationalization (and season extension) of the BSAI crab fisheries.

Management Objectives

The BSAI king and Tanner crab FMP lists the following objectives:

- Biological Conservation Objective: Ensure the long-term reproductive viability of king and Tanner crab populations.
- Economic and Social Objective: Maximize economic and social benefits to the nation over time.
- Gear Conflict Objective: Minimize gear conflict among fisheries.
- 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.
- Vessel Safety Objective: Provide public access to the regulatory process for vessel safety considerations.
- Due Process Objective: Ensure that access to the regulatory process and opportunities for redress are available to all interested parties.
- Research and Management Objective: Provide fisheries research, data collection, and

analysis to ensure a sound information base for management decisions.

The national standards and management objectives defined in BSAI FMP provide adequate evidence to demonstrate the existence of long-term objectives clearly stated in management plans.

NMFS conducts biological research that is used by the NPFMC's Crab Plan Team to recommend a Total Allowable Catch (TAC) in each fishery. ADFG uses their recommendations along with the best scientific data available at the time to establish catch limits for each of its crab fisheries in the Bering Sea.
The BOF and the department also maintain long-term objectives for these fisheries established in regulation and in Annual Management Reports. State regulations for the king and Tanner crab fisheries are listed under the Alaska Administrative Code, Title 5, Chapter 34 and 35. Long term objectives for State regulations are listed under 5 AAC 34.816 Bristol Bay red king crab harvest strategy, 5 AAC 34.917 St. Matthew Island Section blue king crab harvest strategy, and 5 AAC 35.517 Bering Sea *C. opilio* Tanner crab harvest strategy. Annual Management Reports may be found on the department's web site. (*C.opilio* is also known as "snow" crab).

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/CrabFMPOct11.pdf

http://www.adfg.alaska.gov/sf/publications/index.cfm?ADFG=main.singleWordSearchSubmit
http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/KingTannerCrab-2012-2014.pdf
http://www.adfg.alaska.gov/sf/publications/index.cfm?ADFG=main.fullTextSearchSubmit

In 2005, the NPFMC instituted an approved rationalization approach creating Processor Quota Shares as well as Individual Fishing Quotas for rationalized crab fisheries in the BSAI. By capping the numbers of buyers and sellers, and providing greatly protracted seasons, vessels were able to join cooperatives that resulted in fewer vessels deploying less gear on the grounds and it removed excess fishing capacity to improve the economic viability of the fishing industry.

The pot gear deployed is selective, with ADFG mandated escape rings to allow small crab to escape, and biodegradable twine to reduce ghost fishing from lost pots. With the race for fishing no longer hanging over the fleet, this resulted in reduced pot losses, reduced damage from on-deck sorting, reduced deadloss, and a higher quality product.

Because a large, efficient fleet operating in a race for fish scenario can quickly surpass a harvest target when they locate high concentrations of crab, fishery rationalization was an important NPFMC objective. Prior to rationalization, more than 300 vessels would participate in the larger fisheries. When the fisheries were rationalized, a lesser number qualified to receive quota shares of the rationalization program (245 Bristol Bay red king crab quota holders, 231 Bering Sea *C. opilio* (snow crab) holders, and 136 St. Matthew Island blue king crab holders). A quota share holder may hold quota in several (or all) fisheries, as allocation was derived from the historical volume of pounds legally landed by an individual entity, as compared to the total pounds landed by the entire fleet. Today, because of the use of cooperatives, many fewer vessels are needed to take the TAC; and because the vessel owners fish within fishery cooperatives, they can stack permits on fewer vessels and reduce operational costs. The most recent available data show (2010/2011 season) there were sixty-five vessels that landed 13.3 million pounds in the Bristol Bay red king crab fishery. Those crab had an exvessel value of $83.2 million. That season there were also eleven vessels that participated

in the St. Matthew fishery, landing 1,107,668 million pounds valued at approximately $4.5 million exvessel. In the 2010/11 snow crab fishery, sixty-eight vessels harvested 48.9 million pounds of crab, with an exvessel value of $103.87 million.

http://www.adfg.alaska.gov/FedAidPDFs/FMR12-22.pdf

B. Science and Stock Assessment Activities

4. There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.

FAO CCRF 7.1.9/7.4.4/7.4.5/7.4.6/8.4.3/12.4
ECO 29.1-29.3

Evidence adequacy rating:

☑ High **☐ Medium** **☐ Low**

Rating determination

Summary

The collection, aggregation and use of data in stock assessments for the BSAI crab fisheries are undertaken through collaboration between the NPFMC, the NMFS and ADFG. Data collection, analysis and stock assessment of the BSAI crab fisheries respect the NPFMC's BSAI crab FMP requirements. NMFS and ADFG collect fishery dependent data and undertake fishery-independent surveys for all BSAI crab fisheries providing the basis for the assessment of the crab stocks and their impact on the ecosystem. The NMFS annual trawl surveys of the eastern Bering Sea provide indices of relative abundance and biomass for all three fisheries. Full details of the datasets for the three fisheries and their time series can be found in the annual Stock Assessment and Fishery Evaluation (SAFE) reports.

Bristol Bay red king crab (BBRKC) and Eastern Bering Sea snow crab (EBSSC) bycatch data are collected by ADFG and NMFS, and fisheries-independent data from the NMFS annual trawl surveys of the eastern Bering Sea and two recent Bering Sea Fisheries Research Foundation (BSFRF) surveys. St Matthew blue king crab (SMBKC) fisheries data are collected by ADFG, bycatch data by ADFG and NMFS, and fisheries-independent data from the NMFS annual trawl surveys of the eastern Bering Sea and the triennial ADFG pot survey. ADFG runs and deploys ADFG observers on vessel participating in the BSAI crab fisheries as an important component of data collection and fishery management. Observers are deployed on all catcher-processor vessels in the crab fisheries, on randomly selected catcher vessels in the BBRKC (minimum 20% of participating vessels carry observers) and EBSSC (minimum 30% of participating vessels carry observers) fisheries, and on all vessels fishing for SMBKC. Observed pot lifts in 2010/11 represented 1.5%, 2.8% and 8.2% of the total pot lifts in the fishery for the BBRKC, EBSSC and SMBKC fisheries respectively. All three fisheries have effective fishery data collection systems in place and surveys providing fishery-independent estimates of stock biomass as well as sufficiently long time series of both fishery-dependent and fishery-independent data. In addition to fishery data, annual SAFE reports provide information on ecosystem indicators which may have an impact on BSAI crab stocks.

The socio-economic data requirements as set in the BSAI crab FMP include: 1) the value of crab harvested, 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.

Observations from the survey, commercial and other fisheries

ADFG and NMFS collect yearly data from a variety of sources to characterize the fishery, status and

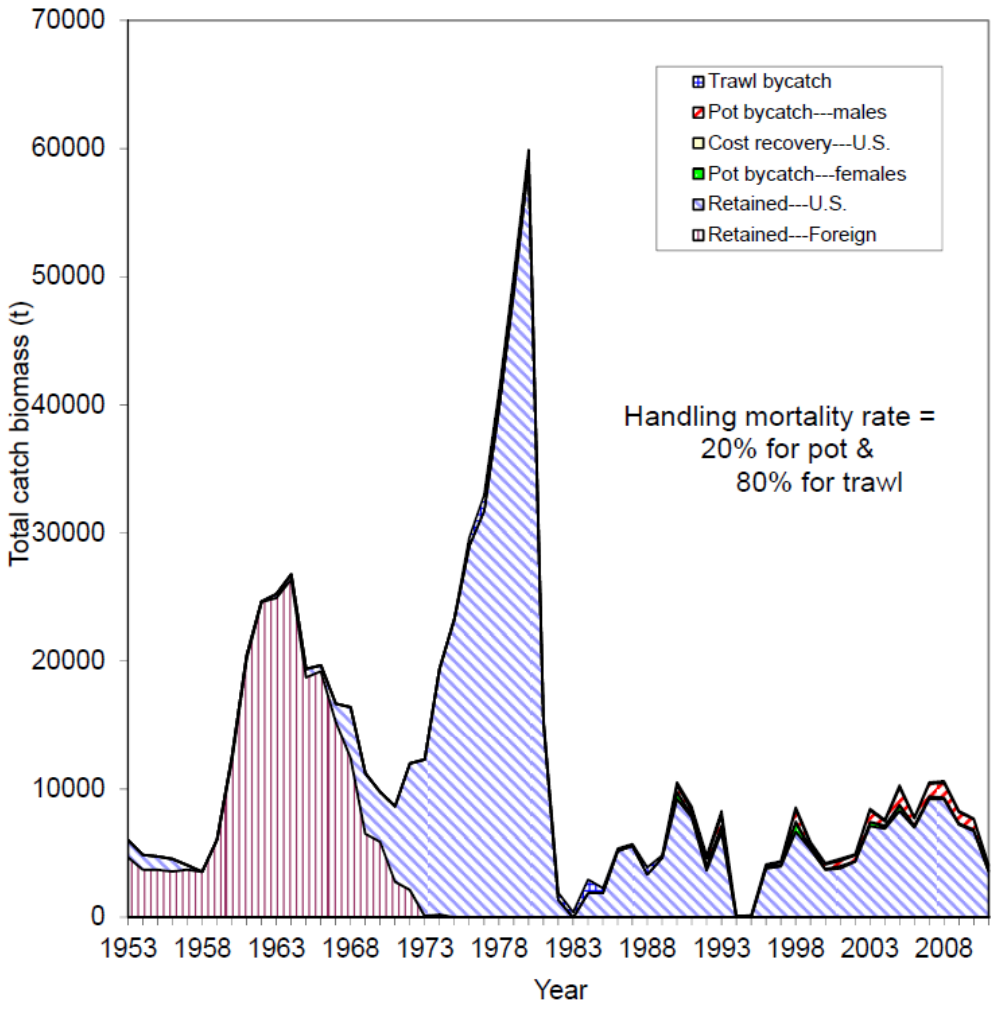
population trends in all regulatory areas.
ADFG and NMFS collect fishery data and undertake fishery-independent surveys for all Bering Sea and Aleutian Islands (BSAI) crab fisheries providing the basis for the assessment of the crab stocks and their impact on the ecosystem. The NMFS annual trawl surveys of the eastern Bering Sea provide indices of relative abundance and biomass for all three Unit of Certification fisheries. Landings data in the form of retained catch numbers and biomass, and fishing effort in terms of pot lifts are recorded on the ADFG eLandings system (previously reported on paper 'fish tickets'). Pot bycatch data are obtained from crab fisheries bycatch data recorded on the ADFG observer database, and trawl and fixed gear bycatch data from the groundfish fishery are obtained from the NMFS observer database. Estimates of bycatch mortality biomass assume handling mortality rates of 20% for pot bycatch and 80% and 50% for trawl and fixed gear bycatch, respectively.

Crab removals
Total removals from the crab populations come from multiple sources including the directed fishery, as bycatch in other fisheries, and surveys.

Bristol Bay red king crab
New data include commercial catch and bycatch in 2011/2012 and the 2012 summer trawl survey. Catch data and size frequencies of retained crab from the directed BBRK crab pot fishery from 1960 to the 2011/12 season were used in the most recent SAFE analysis. Observers were placed on directed crab fishery vessels starting in 1990. Size frequency data on the total catch (retained plus discarded) in the directed crab fishery were available from 1992 to 2009/10. BSFRF conducted trawl surveys in 2007 and 2008 with a small-mesh trawl net and 5-minute tows in inshore areas adjacent to historic NMFS Bristol Bay survey sites.

Data	Years
Commercial fishery data	
INPFC landings (length, year, CPUE)	1960-73
ADFG	1974-2012
Bycatch data (ADFG, NMFS)	1990-2012
Fishery Independent data	
NMFS EBS trawl survey	1975-2011
Late EBS trawl survey stations	1999, 2000, 2006-2012
BSFRF (small mesh tows)	2007-2008

Data included in BBRKC 2012 SAFE report



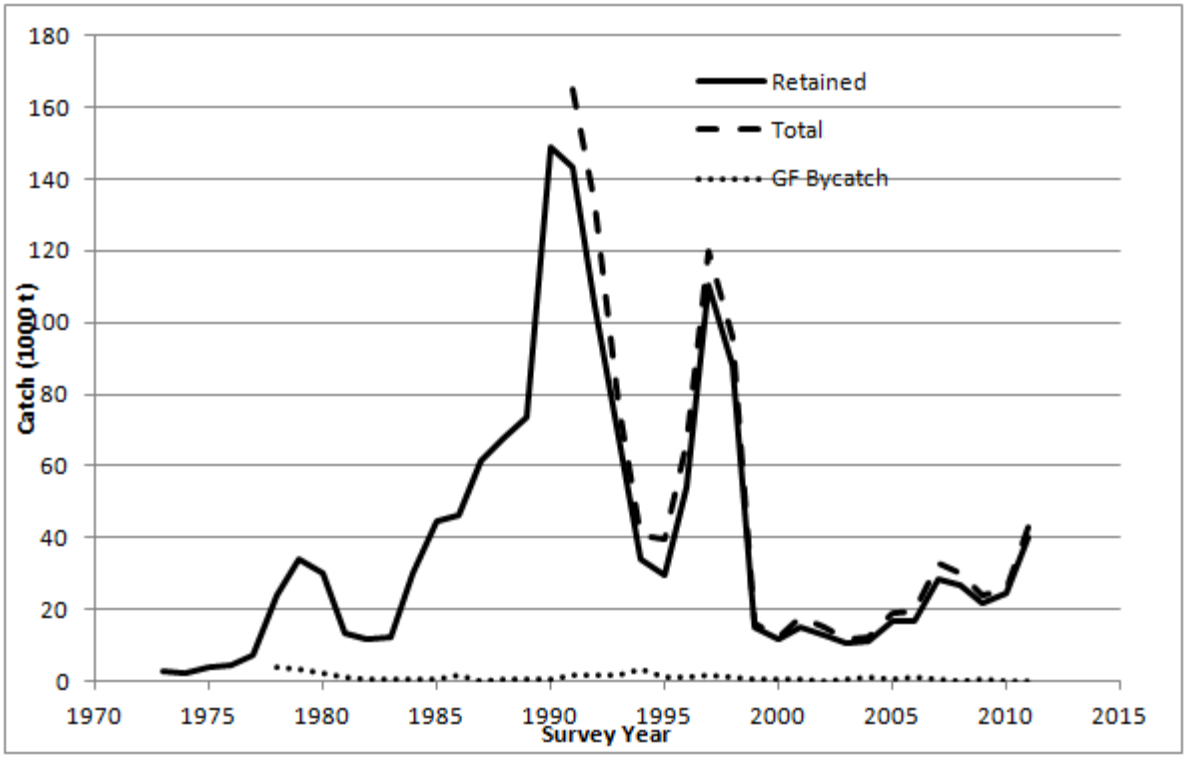
Retained catch biomass and bycatch mortality biomass (t) for Bristol Bay red king crab from 1960 to 2011. Handling mortality rates were assumed to be 0.2 for the directed pot fishery and 0.8 for the trawl fisheries.

EBS snow crab

Catch data and size frequencies of retained crab from the directed snow crab pot fishery from 1978 to the 2011/12 season were used in the most recent SAFE analysis. Observers were placed on directed crab fishery vessels starting in 1990. Size frequency data on the total catch (retained plus discarded) in the directed crab fishery were available from 1992 to 2009/10. Total discarded catch was estimated from observer data from 1992 to 2011/12. The discarded male catch was estimated for 1978 to 1991 in the model using the estimated fishery selectivities based on the observer data for the period 1992 to 2011/12. The discard catch estimate was multiplied by the assumed mortality of discards from the pot fishery. The mortality of discarded crab was assumed to be 50%. BSFRF conducted trawl surveys in 2009 and 2010 providing estimates of abundance and length frequencies.

Data component	Years
Retained male crab pot fishery size frequency by shell condition	1978/79-2011/12
Discarded male and female crab pot fishery size frequency	1992/3-2011/12
Trawl fishery bycatch size frequencies by sex	1991-2011/2012
Survey size frequencies by sex and shell condition	1978-2012
Retained catch estimates	1978/79-2011/12
Discard catch estimates from snow crab pot fishery	1992/93-2011/12 from observer data
Trawl bycatch estimates	1973-2011/12
Total survey biomass estimates and coefficients of variation	1978-2012
2009 study area biomass estimates and coefficients of variation and length frequencies for BSFRF and NMFS tows	2009
2010 study area biomass estimates and coefficients of variation and length frequencies for BSFRF and NMFS tows	2010

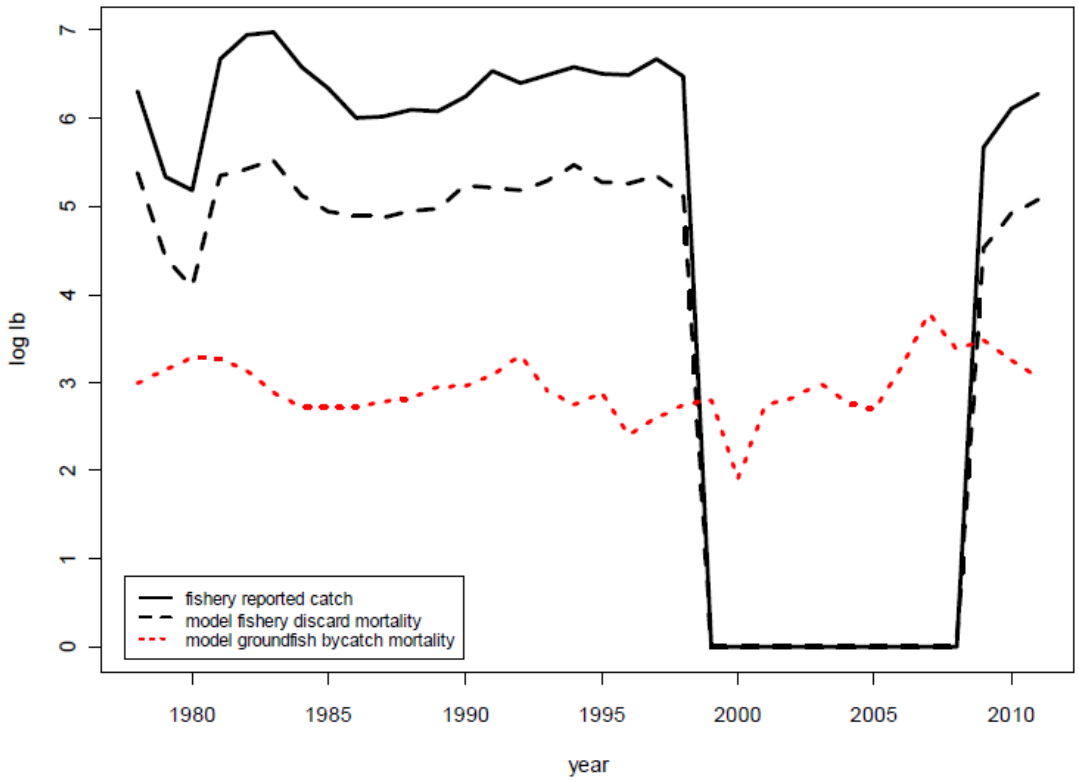
Data sources and updates used in the 2012 EBSSC SAFE report.



Catch (1000 t) from the directed snow crab pot fishery and groundfish trawl bycatch. Total catch is retained catch plus discarded catch after 50% discard mortality was applied. Trawl bycatch is male and female bycatch from groundfish trawl fisheries with 80% mortality applied.

Saint Matthew blue king crab

Major data sources used in this assessment are annual directed-fishery retained-catch statistics from fish tickets (1978/79-1998/99, 2009/10 - 2011/12); the annual NMFS eastern Bering Sea trawl survey (1978-2012); the triennial ADFG SMBKC pot survey (every third year 1995-2010; ADFG crab-observer pot-lift sampling (1990/91-1998/99, 2009/10-2011/12); and NMFS groundfish-observer bycatch biomass data (1992/93- 2010/12). It is especially noteworthy that the two surveys cover different geographic regions and that each has in some years encountered proportionally large numbers of male blue king crab in areas where the other is not represented. Groundfish SMBKC bycatch data come from NMFS Bering Sea reporting areas 521 and 524.



Components of SMBKC fishing mortality biomass for the years 1978/79 – 2011/12. Note logarithmic scale.

BSAI King and Tanner crab SAFE 2012:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/SAFE/CrabSAFE/CrabSAFE2012.pdf

Fishery-independent data

NMFS, ADFG and BSFRF surveys

Bering Sea

NMFS conducts an annual trawl survey in the EBS to determine the distribution and abundance of crab and groundfish fishery resources and hence provides fishery-independent estimates of abundance and biological data. Since 1972 the survey has covered the full stock distribution except for inshore waters. The assessment uses tow-by-tow survey data from 1975-2011. Abundance estimates by sex, size and shell condition are derived from the survey data using an area-swept

approach. Starting in 2010 the NMFS expanded the EBS trawl survey north to 65.5 °N, covering the remainder of the EBS shelf. The ADFG also conducts a triennial pot survey in the Saint Matthew region (last survey in 2010 and scheduled for summer of 2013), which surveys areas of important habitat for blue king crab that are not accessible to the NMFS EBS trawl survey..

The 2012 standard EBS trawl survey was conducted onboard two chartered commercial fishing vessels and began on 4 June in the northeast corner of Bristol Bay. The survey moved westward, sampling 376 stations and finishing on 25 July. One vessel returned to the Bristol Bay area to resample 20 stations between 29 July and 02 August.

The assessment teams for the three crab stocks are aware of these sources of potential bias in stock biomass estimates and have collected additional information where necessary to revise their estimates of stock biomass. For example, additional survey stations have been sampled for the Bristol Bay red king crab stock after the standard summer survey to ensure realistic assessment of mature female crabs which may not have molted prior to the main summer survey, and the Bering Sea Fisheries Research Foundation (BSFRF) also conducted small-meshed surveys in 2007 and 2008 to ensure that the trawl net captured nearly all crabs within the swept area. For the St. Matthew blue king crab stock there is an additional high density sampling area, and triennial pot surveys also potentially provide alternative indices of stock abundance. For the Eastern Bering Sea snow crab stock, additional trawl surveys were undertaken by BSFRF in 2009 and 2010.

Biological Data Collection

All crab were removed from the catch, sorted by species and sex, and a total catch weight was obtained for each species. Individual crab carapaces were measured (± 1 mm) to provide a size-frequency distribution of each sample. Crab sizes are reported as carapace width (CW) excluding spines for Tanner and snow crab, and carapace length (CL) for all king crab and hair crab. Individual weights were collected on a subsample of each species to add to the existing length-weight data. Carapace shell condition was assessed for each crab sampled and assigned to one of six classes according to specific criteria. All female crab abdomens were evaluated to determine reproductive condition based on the size of the egg clutch, the condition of the eggs and color of the eggs.

A standard project added in 2012 was to begin monitoring was to begin monitoring primary indicators of female reproductive potential for mature crabs throughout their distribution. For *Chionocetes* spp. 15 mature female crab and for *Paralithodes* spp. 20 mature female crab were collected from each tow. Egg clutches were removed and sent back to the laboratory for an assessment of fecundity and condition.

Bristol Bay red king crab

During the 2012 NMFS EBS trawl survey, red king crab were caught at 59 of the 156 stations (136 Bristol Bay district stations and 20 resample stations). An additional 20 stations were sampled in the Bristol Bay area at the conclusion of the survey due to a high percentage of females having not yet molted prior to the first sampling. This is believed to be due to the molting cycle being delayed by lower bottom temperatures. Bottom temperatures significantly increased from June (0.9° C) to the retow in July (4.0° C) which was followed by a significant change in the eyed to uneyed ratio during the survey. Male abundance estimates were lower for the resurvey stations. Following the Crab Plan Team recommendation, the standard survey data was used for male abundance estimates and

only the resurvey data, plus the standard survey data outside the resurveyed stations was used, to assess female abundance during these resurvey years.
http://www.afsc.noaa.gov/Kodiak/shellfish/crabEBS/2012EBSSurveyTechMemoDraft.pdf

The Commercial Fisheries Division of the Alaska Department of Fish and Game (ADFG) conducts stock assessment surveys for red king crab in seven areas throughout the state. Trawl surveys are conducted on an annual basis in the Kodiak area, annual or biennial in Cook Inlet and Prince William Sound, and triennial in Norton Sound. An annual pot survey is conducted in Southeast Alaska, and occasional pot surveys in the Pribilof Islands, and the Petrel Bank grounds in the central Aleutian Islands.
http://www.adfg.alaska.gov/index.cfm?adfg=redkingcrab.research

The Bering Sea Fisheries Research Foundation (BSFRF) has been conducting research in cooperation with ADFG and NMFS. The BSFRF conducted trawl surveys for Bristol Bay red king crab in 2007 and 2008 with a small-mesh trawl net and 5-minute tows. Current research projects include the conduction of inshore surveys of BBRKC to gather distribution and density information for areas not reached by the NMFS trawl survey.
http://www.bsfrf.org/crab_research.php

EBS snow crab

The legal minimum size limit for male snow crab is 3.1 inches CW (78mm), but processors currently prefer a minimum size of 4.0 inches CW (102 mm). The density of male snow crab is reported for both the legal (≥ 3.1 in. CW) and preferred (≥ 4.0 in. CW) size categories. Snow crab were caught at 273 of the 376 stations in the combined areas of the Bristol Bay District, Pribilof District and St. Matthew Island Section sampling strata.
http://www.afsc.noaa.gov/Kodiak/shellfish/crabEBS/2012EBSSurveyTechMemoDraft.pdf

The Bering Sea Fisheries Research Foundation (BSFRF) has been conducting research in cooperation with ADFG and NMFS. Current research projects include studies into the handling mortality of snow crab to answer the questions regarding the 50% mortality used in the stock assessment.

Handling Mortality

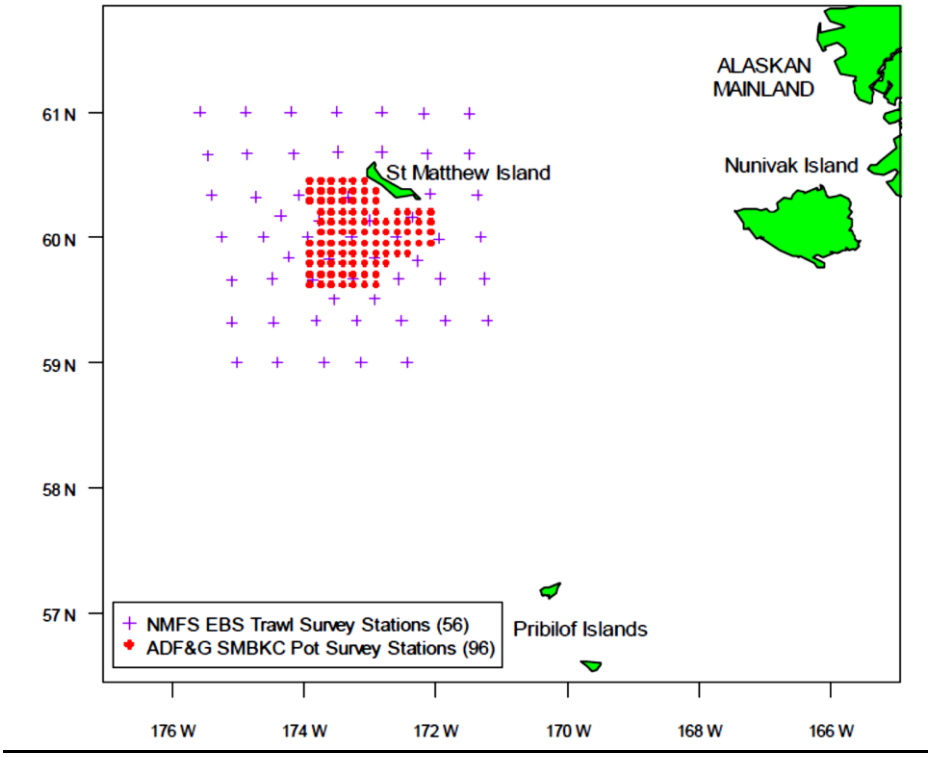
The CPT has been evaluating handling mortality as the result of two years of at sea assessment using reflex action mortality predictor (RAMP) assessment. The status quo 50% mortality factor was a conservative mortality estimate which served as a safe surrogate that provided protection for the stocks until at-sea studies that estimate short-term handling mortality of snow, Tanner, and king crab could be determined for the eastern Bering Sea. The issue of handling mortality is of particular concern for the snow crab fishery in which one crab is discarded for every three retained. The RAMP predicted that mean short-term handling mortalities for the 2010/11 and 2011/12 fisheries were 4.6% and 4.5%, respectively. Vessel-specific handling mortality was found to be negatively correlated with back-deck temperatures; for example, short-term mortality rates increase to 35% at -14 degrees C. But most vessels do not fish in those conditions over the season's length. Using St. Paul airport temperature as a proxy for back-deck conditions, the estimated mean mortality rate for the

1990/91-2010/11 fishing seasons was 4.0%; the highest seasonal estimate was 8.0% during one season in the early 1990s. However, these mortality rates do not address additional long-term handling mortality, so additional precautionary factors are needed.

Based on these results and subsequent discussions, the CPT recommended reducing the current value used in calculations involving total handling mortality from 0.5 to 0.3, derived by adding the highest annual short-term estimate (0.08) to the highest injury rate (0.12), and multiplying this sum by 1.5 under the assumption that long-term mortality contributes an additional mortality equal to 50% of the short-term mortality rate. The CPT did not recommend any changes to the handling mortality estimates used for Tanner and king crabs because no new information was provided on Tanner crab and the RAMP approach does not appear to be useful for golden and red king crab. In September 2013, the CPT will present model options with 0.5, 0.3 and a third option that incorporates other precautionary factors. It is most likely that this new RAMP has provided the Council with enough information to arrive at a revised and lower mortality rate that the status quo 50%.
http://www.bsfrf.org/crab_research.php
http://www.adfg.alaska.gov/fedaidpdfs/RIR.5J.2000.06.pdf

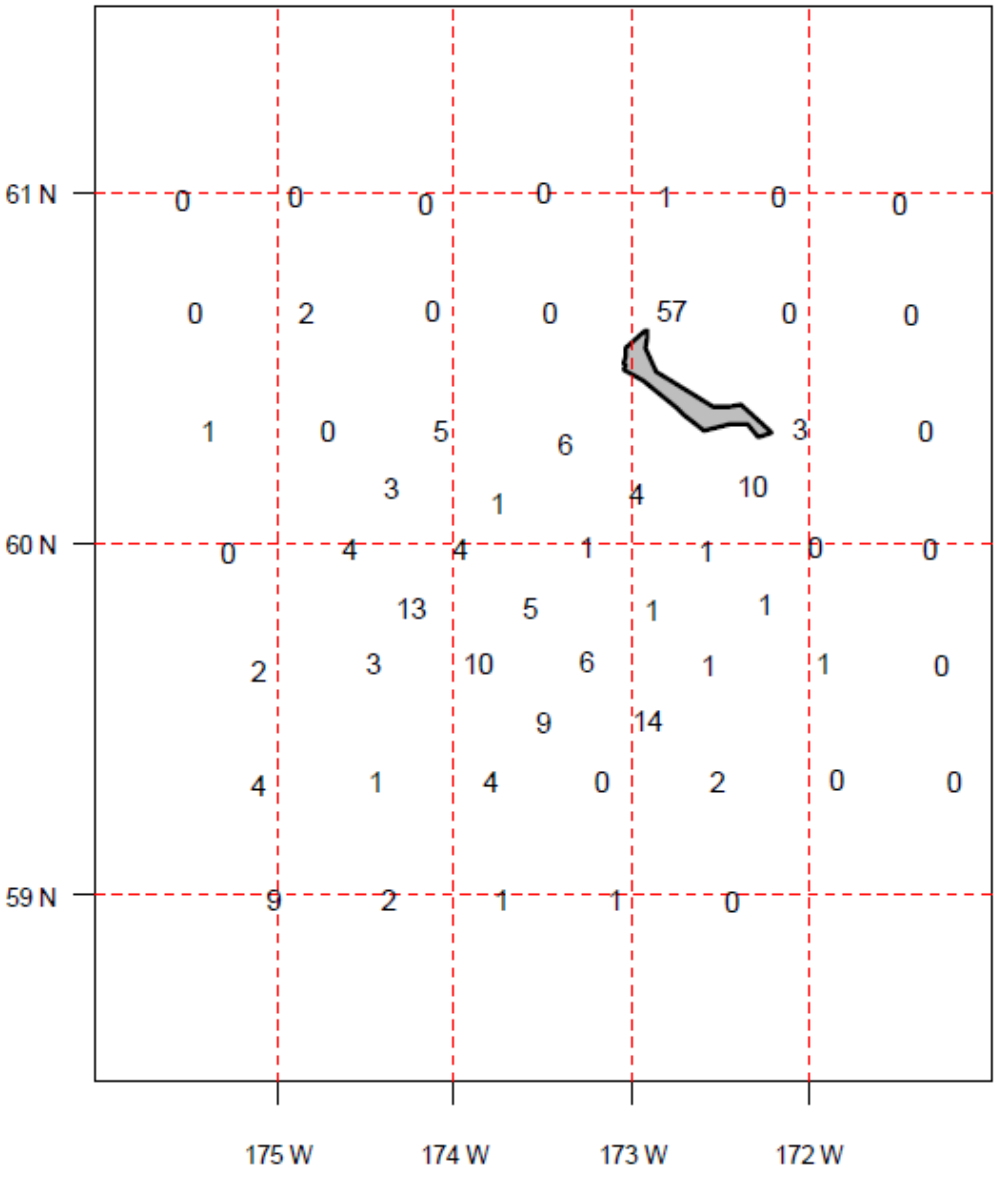
Saint Matthew blue king crab

Blue king crab were caught at 37 of the 57 stations surveyed in the St. Matthew section sampling strata. The figure below shows the overlap between the NMFS EBS trawl survey stations and the ADFG triennial pot survey stations. Coverage with both gear types ensures that areas that may be unavailable to one of the sampling gear types will be sampled by the other.



Trawl and pot-survey stations used in the SMBKC stock assessment.

The figure below shows the blue king crab catches from the NMFS trawl survey. The ADFG pot survey only covers the area to the south and west of St. Matthew Island, and therefore may be missing areas of large blue king crab biomass to the north and east of the island.



Catches of male blue king crab measuring at least 90 mm CL from the 2012 NMFS trawl-survey at the 56 stations used to assess the SMBKC stock. Note that the area north of St. Matthew Island is not represented in the ADFG pot-survey data used in the assessment.

Fishery-dependent data

Commercial catch

The second major component of the annual BSAI crab population analysis data collection is sampling the commercial catch.

Landings data for BSAI crabs in the form of retained catch numbers and biomass, and fishing effort in

terms of pot lifts are recorded on the ADFG eLandings system (previously reported on paper 'fish tickets'), which permits the calculation of catch per unit effort in the various crab fisheries. All eLandings report information is stored on one server and data are available to NMFS, ADFG, NPFMC and the International Pacific Halibut Commission for their scientific, management and enforcement purposes. The data are entered once by one person thus creating fewer data entry errors and the data are verified in real time. The data is clearly timely, since it is used to close or modify a fishery inseason.

Sampling of catches and discards in the directed crab fisheries by on-board observers and sampling of retained catches by shore-based observers through the ADFG observer program, in conjunction with bycatch estimates from the NMFS groundfish observer program, provides data on pot, trawl and fixed gear bycatch to enable an estimate of total removals.

Catch and effort data are available from 1960-2012 for the Bristol Bay red king crab fishery, for 1978/79 to 1998/99 and 2009/10 to 2011/12 for the St Matthew blue king crab fishery and for 1978/79 to 2011/12 for the Eastern Bering Sea snow crab fishery. These significant time series of catch and effort are used in the assessments for the three crab species, although problems with accurate recording of soak time for the gear and estimating catchability precludes the use of some CPUE data. The datasets for catch and effort are updated each year as part of the assessment process described in the SAFE reports.

At-sea sampling in the directed fishery by observers on the ADFG observer program record total catch, bycatch, effort and size frequency and other biological characteristics, and so the data collected from this observer program can be used in both stock assessment of the fishery and in-season projections of fishery performance. ADFG deploys observers on vessels participating in the BSAI crab fisheries as an important component of data collection and fishery management. Observers are deployed on all catcher-processor vessels in the crab fisheries, on randomly selected catcher vessels in the BBRKC (minimum 20% of participating vessels carry observers) and EBSSC (minimum 30% of participating vessels carry observers) fisheries, and on all vessels fishing for SMBKC. Observers are required to sample a specific number of pots per day of vessel coverage. Observed pot lifts in 2010/11 represented 1.5%, 2.8% and 8.2% of the total pot lifts in the fishery for the BBRKC, EBSSC and SMBKC fisheries respectively. In the 2010/11 BBRKC fishery there were 63 catcher vessels and 2 catcher processors participating. Observers sampled a total of 1,942 (1.5% of the 131,627 pots lifted in the fishery. The 2010/11 EBSSC fishery had seventy vessels participating in the fishery, including 66 catcher vessels, two catcher processors two floating processors. Observers in this fishery sampled 2,137 (2.8%) of 67,758 pots lifted. In the SMBKC fishery, there were 11 vessels participating in 2010/11 and 2,410 of the 29,346 pots lifted during the fishery were sampled. Estimates of CPUE for the retained component of the catch from the observer program can therefore provide an independent estimate of fishery CPUE for comparison with estimates given in annual management reports based on eLandings, daily fishing logs and interviews with vessel captains.

Port sampling by ADFG observers is conducted on landings from vessels without onboard observers. Sampling occurs at the shore-based facilities that process the catch. Biological data collected on

landed red king crab consist of carapace length measurement, shell condition and average weight. Confidential interviews, supplemented by daily fishing log (DFL) records, were conducted with vessel captains to acquire detailed information regarding statistical areas fished, effort, and fishery performance. In the 2010/11 BBRKC fishery, 135 of the 236 total landings were sampled. Data was collected from 131 of the 348 landings during the 2010/11 snow crab fishery. There was no port sampling of SMBKC landings due to 100% observer coverage.

The assessment process involves rigorous peer review of the assessments by the whole Crab Plan Team, by the Scientific and Statistical Committee (SSC) of NPFMC, and through specially organised workshops with independent scientists and periodic reviews by the Center for Independent Experts (CIE) review panels. As a result the SAFE reports will note ways in which the use of research results in the assessments could be improved, and identifies gaps in the evidence base which need to be filled by new research. These data are ultimately used for setting management objectives, reference points and performance criteria as well as ensuring adequate linkages between applied research and fisheries management.

Incidental mortality of crab in the commercial crab fishery

Mortality rates of 20-50% are estimated for non-legal and female crab in the directed fisheries. Mortality can vary depending on the weather conditions (extreme cold causes the animals to freeze from exposure), depth of the fishery, handling aboard the vessel and size of the catch.

Incidental catch (bycatch) and mortality in non-directed fisheries

Size frequency data on crab bycatch in trawls is provided also for the BBRKC and EBSSC fisheries and in trawls and fixed gear for the SMBKC fishery from the NMFS Groundfish Observer Program. The NMFS observer program was restructured in 2012 (new regulations taking affect 1 January 2013) to increase observer coverage on smaller vessels, reduce bias in the selection for coverage process and better respond to management needs within individual fisheries.
http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2013.pdf

Following approval of Amendments 24 and 38 to the BSAI Crab FMP, these ten stocks now have annually-specified overfishing limits (OFLs) and Acceptable Biological Catch (ABC) levels1. Total allowable catch (TAC) levels are established exclusively by the State. All catch accrues towards the ABC (or ACL1). Additional bycatch outside of the directed crab fisheries occurs in the BSAI groundfish fisheries and Bering Sea scallop fishery. Total catch from all sources may not exceed the ACL thus currently the State must assume anticipated levels of bycatch for each stock in order to set TAC or GHL at a level where the total catch from directed and non-directed sources will not exceed the ACL. As noted in the accountability measures for the ACL requirements under Amendment 38, if an ACL is exceeded, the TAC or GHL in the following year will be reduced in order to prevent against exceeding the ACL concurrently. Thus all accountability measures come out of the directed crab fishery. In deference to this, in 2010 the Council initiated an analysis of PSC limits in the BSAI groundfish fisheries for BSAI crab stocks in order to potentially limit the overall bycatch for each stock and provide the State with a hard limit for each stock in order to facilitate TAC-setting.
BSAI crab stocks are susceptible to three principal sources of fishery mortality: retained catch and bycatch during the directed fishery, bycatch mortality during other state-managed crab fisheries,

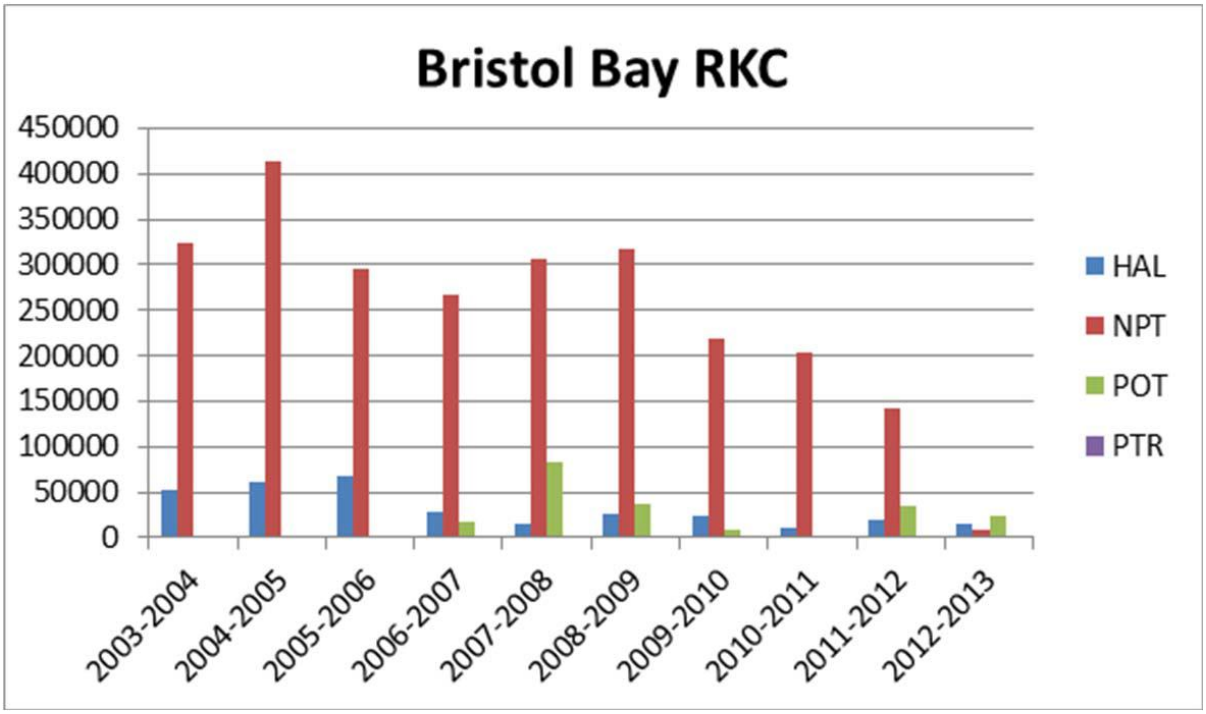
and bycatch mortality during federally-managed groundfish fisheries. For purposes of calculating the bycatch mortality which accrues towards crab ACLs annually, handling mortality rates of 80% for trawl gear and 50% for fixed gear are applied.

Summary of information availability by crab stock, current management measures and bycatch by gear type between 2003/04 – 2011/12 as a proportion of the 2012/13 ABC.

Stock	Abundance estimate	Current fishery	Existing Bycatch controls	Trawl bycatch mortality as % of ABC	Fixed gear mortality as % of ABC	Assumption in TAC-setting
Bristol Bay red king crab	√	√	Trawl PSC limits and closure area	0.72%-2.10%	0.19%-0.35%	Maximum mortality in last 20 years (0.84 million pounds)
EBS Tanner crab	√		Trawl PSC limits	1.25%-2.15%	0.55%-2.93%	Varies based upon estimates of needs in the snow crab fishery
EBS snow crab	√	√	Trawl PSC limits	0.20%-1.14%	0.04%	Depends on stock status and buffer below ABC
St. Matthew blue king crab	√	√	Bottom Trawl closure area	0.02%-0.05%	0.08%-7.09%	Maximum mortality in last 20 years (0.077 million pounds)

https://alaskafisheries.noaa.gov/npfmc/PDFdocuments/bycatch/CrabBycatchBSAI213.pdf

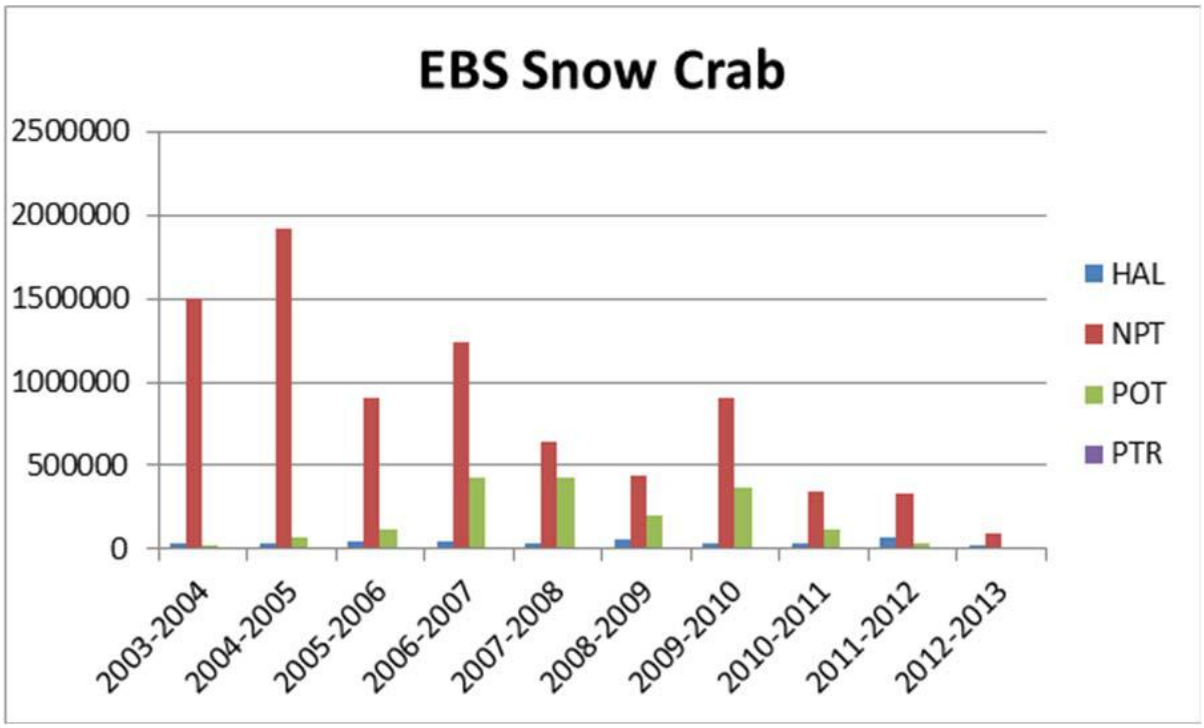
BBRKC



Bycatch of BBRKC by gear type in weight in pounds (where HAL=halibut longline, NPT=non-pelagic trawl, POT= pot gear and PTR= pelagic trawl)

The State has assumed the maximum amount of bycatch mortality by groundfish fisheries for this stock (maximum since 1990) at 0.84 million pounds. For 2013 this represents 5.3% of the ABC of 15.80 million pounds. There are several management measures under the FMP to protect Bristol Bay red king crab stocks and habitat. These are fixed closures and a triggered time/area closure to trawl gear. No additional bycatch management measures are currently in place for fixed gear or bycatch outside of the designated areas.

EBSSC



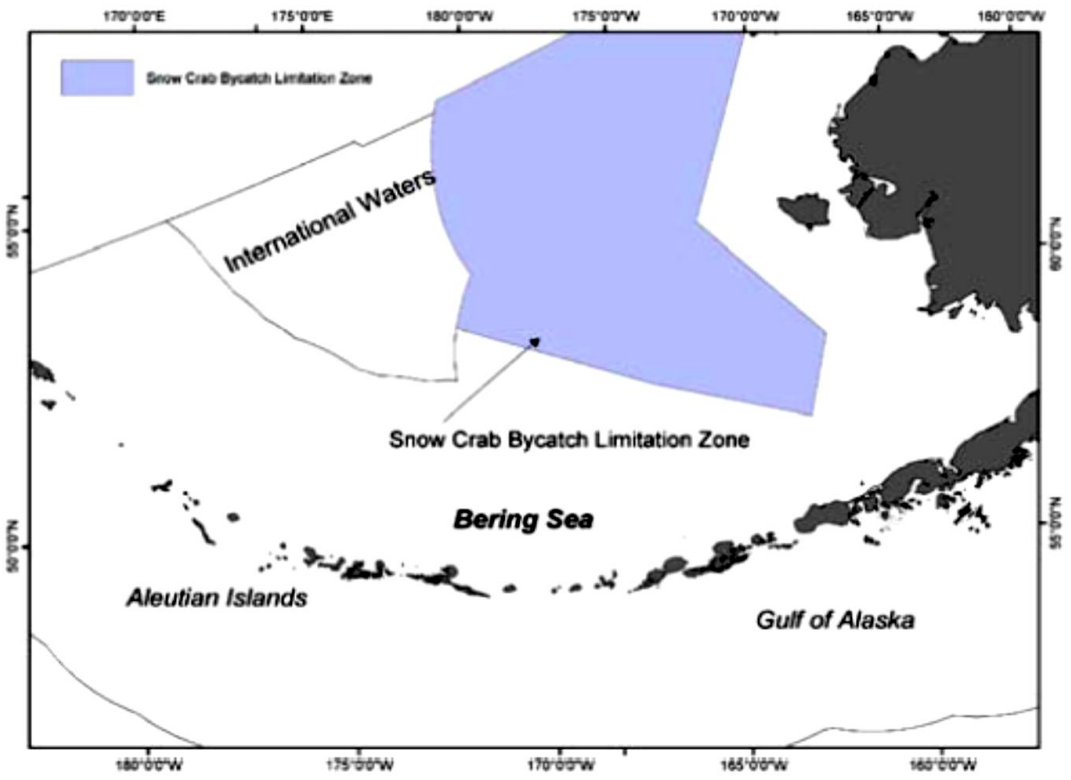
Bycatch of snow crab by gear type in weight (pounds) (where HAL=halibut longline, NPT=non-pelagic trawl, POT= pot gear and PTR= pelagic trawl)

The majority of the bycatch occurs consistently in the non-pelagic trawl fisheries, specifically in the yellowfin sole, flathead sole and rock sole fisheries as well as the Pacific cod trawl fishery. Of the fixed gear fisheries, the highest amounts of bycatch on average are in the Pacific cod pot and hook and line fisheries.

In recent years bycatch in the groundfish fishery has not been a significant concern for the State in setting the snow crab TAC due to the buffer between the TAC calculated by the State harvest strategy and the ABC recommended by the SSC. However changes in stock status have a significant effect on the relative importance of estimating bycatch mortality by the groundfish fishery in comparison to directed fishery removals.

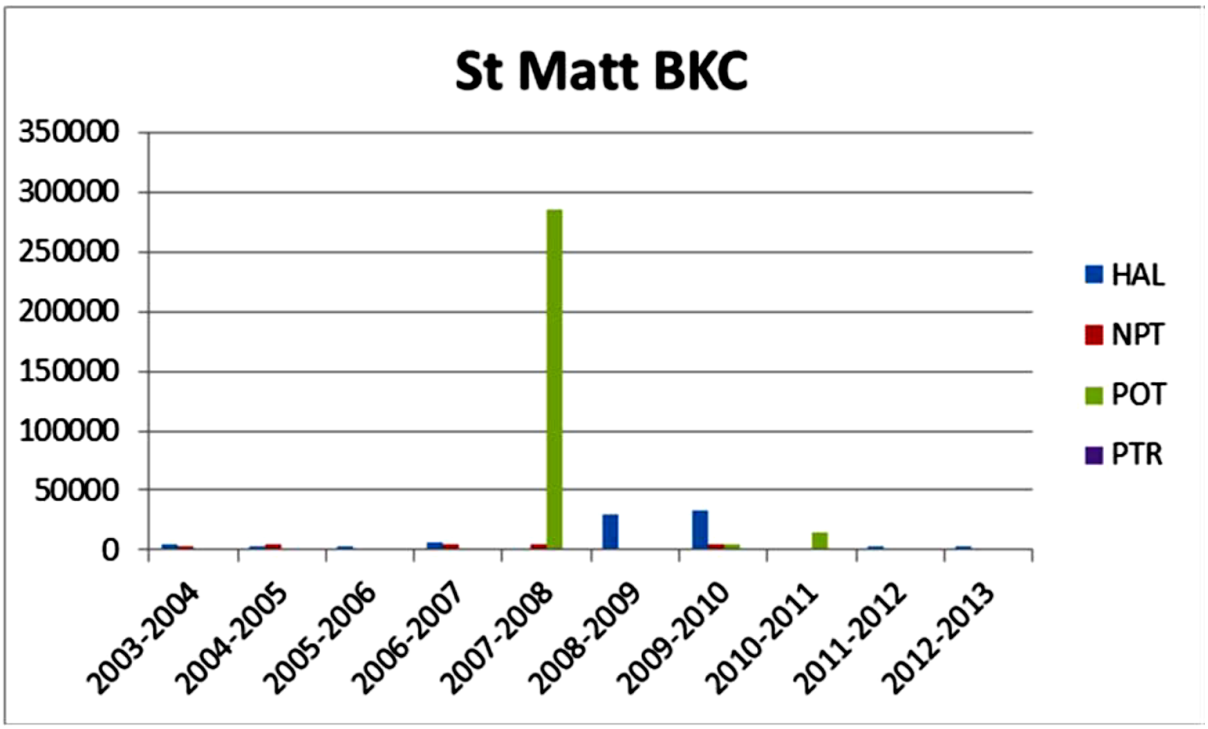
The FMP contains a triggered time/area closure for trawl fisheries to protect snow crab stocks and their habitat. There are no additional management measures for fixed gear fisheries or trawl bycatch outside of the time/area closure.

A closure for EBS snow crab (*C. opilio*) is triggered if the limit is reached in specified fisheries. The limit accrues for bycatch taken within the *C. opilio* Bycatch Limitation Zone (COBLZ). That area then closes for the fishery that reaches its specified limit.



C. opilio **Bycatch Limitation Zone (COBLZ)**

SMBKC



Bycatch of SMBKC by gear type by weight (pounds) (where HAL=halibut longline, NPT=non-pelagic trawl, POT= pot gear and PTR= pelagic trawl)

The majority of the SMBKC bycatch occurs the Pacific cod pot and hook and line fisheries. There are no PSC limits for any gear type for SMBKC. Non-pelagic trawl gear fishing is prohibited in St. Matthew Island Habitat Conservation Area in the vicinity of St. Matthew Island to protect blue king crab stocks and habitat.

Setting an appropriate TAC for SMBKC to accommodate bycatch in groundfish fisheries beneath the ACL has been problematic in recent years when the fishery was opened. In 2012/12 the TAC computed according to the State harvest strategy would have led to a TAC > ABC, thus the State needed to first make assumptions about the maximum amount of bycatch potential in the groundfish fisheries (taken as the maximum from 1991/92 – 2011/12 at 0.77 million lbs.) and subtracted that from the approved ABC in order to evaluate what was remaining for other crab fisheries and the directed crab fishery. This bycatch allowance represented 38% of the ABC.

Sport/ personal use catch

ADFG sets seasonal (June 1 to Jan. 31) and daily limits for BBRKC (6 male crab of legal size/6 in possession) subsistence, sport or personal use. A State of Alaska license is required to participate in subsistence, personal use or sport fishing.

Economic considerations

The BSAI crab FMP has an economic and social objective which is defined as maximising 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. Following the FMP:

"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.

Economic data collection is a component of the Crab Rationalization Program instituted in 2005. The Economic Data Report (EDR) program is focused on collecting production, cost, earnings, and employment information from harvesting and processing sectors of crab fisheries to evaluate effects

of the CR Program over time. Congress required that an independent third-party data collection agent (DCA) administer the collection and dissemination of the crab EDR data. NMFS selected the Pacific States Marine Fisheries Commission (PSMFC) to be the DCA. Amendment 42 to the Fishery Management Plan (FMP) for BSAI King and Tanner Crabs, which published on June 17, 2013, revises and simplifies the annual EDR forms.
http://alaskafisheries.noaa.gov/sustainablefisheries/crab/rat/edr/

Ecosystem considerations

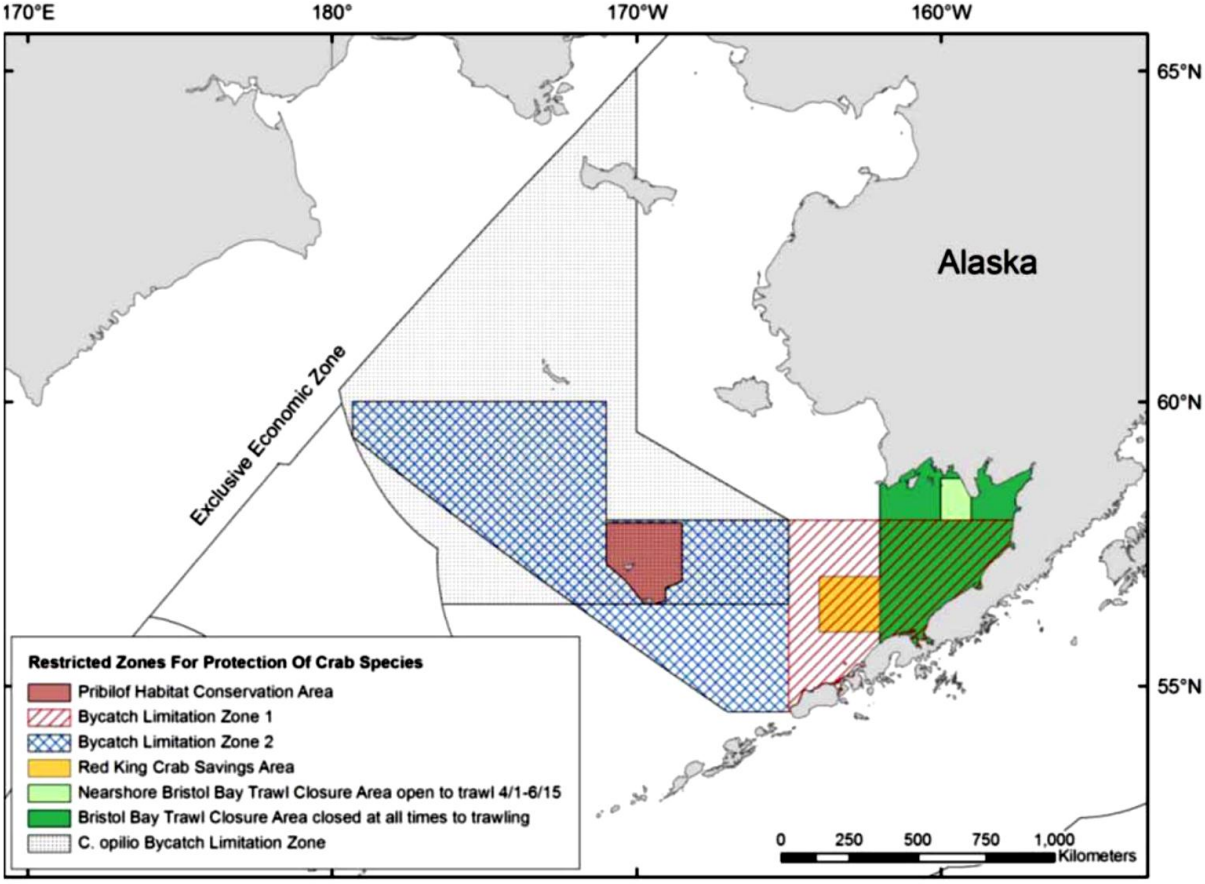
Annual SAFE documents contain an ecosystem section, taking into account the fishery's effect on the target species, other species, and habitat. These sections are updated as new information is gathered.

BBRKC

The NPFMC and the CPT have been in discussions over the 2010 5-year EFH review and its differences from the 2005 EFH EIS. A 2012 discussion paper addresses the measures already in place for protection of BBRKC EFH and additional measures for consideration. The 2010 CIE review of the Bristol Bay red king crab stock assessment model determined that a more descriptive understanding of the key temporal and spatial biological processes is necessary. Life history characteristics should include primiparous and multiparous mating locations and timing, hatching, larval period and movement, settlement period and location, growth at each stage, molt frequency and timing, time and size at maturity, and adult migration patterns. More specific understanding of these stages would promote a better understanding of habitat requirements and potential impacts of fishing on each stage. Such a conceptual model would help to interpret survey and model results as well as assess key bottlenecks in the life history to identify habitat with fishery removal specific concerns.

The focus of the papers (both 2012 and 2013) included a discussion of the importance of southwestern Bristol Bay for red king crab populations, particularly an area southwest of Amak Island, and whether and how trawl fisheries in that area may be impacting the crab habitat. It was proposed that eggs released here have greater chance of survival through larval and juvenile life history stages due to oceanographic currents in this area and that the extent of the Bering Sea cold pool affects the distribution of ovigerous females and subsequently, the location of larval release. Given the potential redistribution of crab in the area southwest of Amak Island due to temperature changes, the Council also requested that the discussion paper look at the efficacy of existing red king crab protection areas, such as the Red King Crab Savings Area and the Nearshore Bristol Bay Trawl Closure, to see whether these closed areas are still providing both habitat and bycatch protection to red king crab. These studies are now in progress at the Council level.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/EFH/BBRKC_EFH212.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/EFH/BBRKC_EFH213.pdf



Restricted Zones for protection of crab in the eastern Bering Sea.

5. There shall be regular stock assessment activities appropriate for the fishery, its range, the species biology and the ecosystem, undertaken in accordance with acknowledged scientific standards to support its optimum utilization.

FAO CCRF 7.2.1/12.2/12.3/12.5/12.6/12.7/12.17

FAO Eco 29-29.3

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

The NMFS undertakes shellfish stock assessments through the annual Eastern Bering Sea trawl survey which provides the primary input to the shellfish assessments. Information derived from both regular surveys and associated research are analysed by AFSC stock assessment scientists and supplied to fishery management agencies and to the commercial fishing industry. In addition, economic and ecosystem assessments are provided to the Council on an annual basis.

For the BBRKC fishery, a length-based analysis (LBA) model combines multiple sources of survey, catch and bycatch data using a maximum likelihood approach to estimate abundance, recruitment and catchabilities, catches and bycatch of the commercial pot fisheries and groundfish trawl fisheries. For the SMBKC fishery a three-stage catch-survey analysis (CSA) assesses the male component of the stock incorporating data from commercial catches from the directed fishery and its observer program, the annual EBS trawl survey, triennial pot surveys and bycatch data from the groundfish trawl fishery. This assessment model is in development and has not yet been approved by the Crab Plan Team, so for 2011 a survey-based assessment was used. For the EBSSC fishery the stock assessment uses a size and sex-structured model which is fitted to time series of total catch data from the directed fishery and bycatch data from the trawl fishery, size frequency data from the catch in the pot fishery and the bycatch in both the pot and trawl fisheries, and abundance data from the NMFS trawl survey and two recent BSFRF surveys. The assessment provides a range of alternative model scenarios, but all model scenarios indicate that the stock is rebuilt.

Ecosystem SAFE documents are provided yearly to the NPFMC. An ongoing goal is to produce an ecosystem assessment utilizing a blend of data analysis and modelling to clearly communicate the current status and possible future directions of ecosystems.

2012 BBRKC Stock Assessment

Twelve model scenarios were evaluated in May 2011. In the 2012 report, only results for scenario 7ac are presented. The results for all other scenarios were presented in the SAFE report in May 2011. The 7ac scenario include: (1) basic M = 0.18, and additional mortalities as one level (1980-1984) for males and two levels (1980-1984 and 76-79 & 85-93) for females; (2) including BSFRF survey data in 2007 and 2008; (3) estimating NMFS survey catchability for 1970-72 and assuming it to be 0.896 for all other years; (4) three levels of molting probabilities for males; (5) estimating effective sample size from observed sample sizes; (6) standard survey data for males and retow data for females; and (7) estimating initial year length compositions.

Noted changes in the stock assessment results for 2012 include both male and female abundances from the 2012 summer trawl survey were lower than expected. The estimated mature male

abundance in 2012 was about 10.2% lower than that of 2011. The overall estimated crab abundance and biomass during the most recent five years were generally lower than those estimated in 2011.

Data	Years
Commercial fishery data	
INPFC landings (length, year, CPUE)	1960-73
ADFG	1974-2012
Bycatch data (ADFG, NMFS)	1990-2012
Fishery Independent data	
NMFS EBS trawl survey	1975-2011
Late EBS trawl survey stations	1999, 2000, 2006-2012
BSFRF (small mesh tows)	2007-2008

Data included in BBRKC 2012 SAFE report

Summary of the 2012 BBRKC stock assessment model

To reduce annual measurement errors associated with abundance estimates derived from the area-swept method, the ADFG developed a length-based analysis (LBA) in 1994 that incorporates multiple years of data and multiple data sources in the estimation procedure. The model combines multiple sources of survey, catch, and bycatch data using a maximum likelihood approach to estimate abundance, recruitment, and catchabilities, catches and bycatch of the commercial pot fisheries and groundfish trawl fisheries.

Catchability and fishery selectivity

Retained selectivity, female pot bycatch selectivity, and both male and female trawl bycatch selectivity are estimated as a function of length. Trawl survey selectivities/catchability are estimated with different sets of parameters (β, $L50$) estimated for males and females as well as four different periods (1968-69, 1970-72, 1973-81 and 1982-09). NMFS survey catchability/selectivity consists of capture probability and crab availability.

Mortality

Based on an assumed maximum age of 25 years and the 1% rule (Zheng 2005), basic M was estimated to be 0.18 for both males and females.

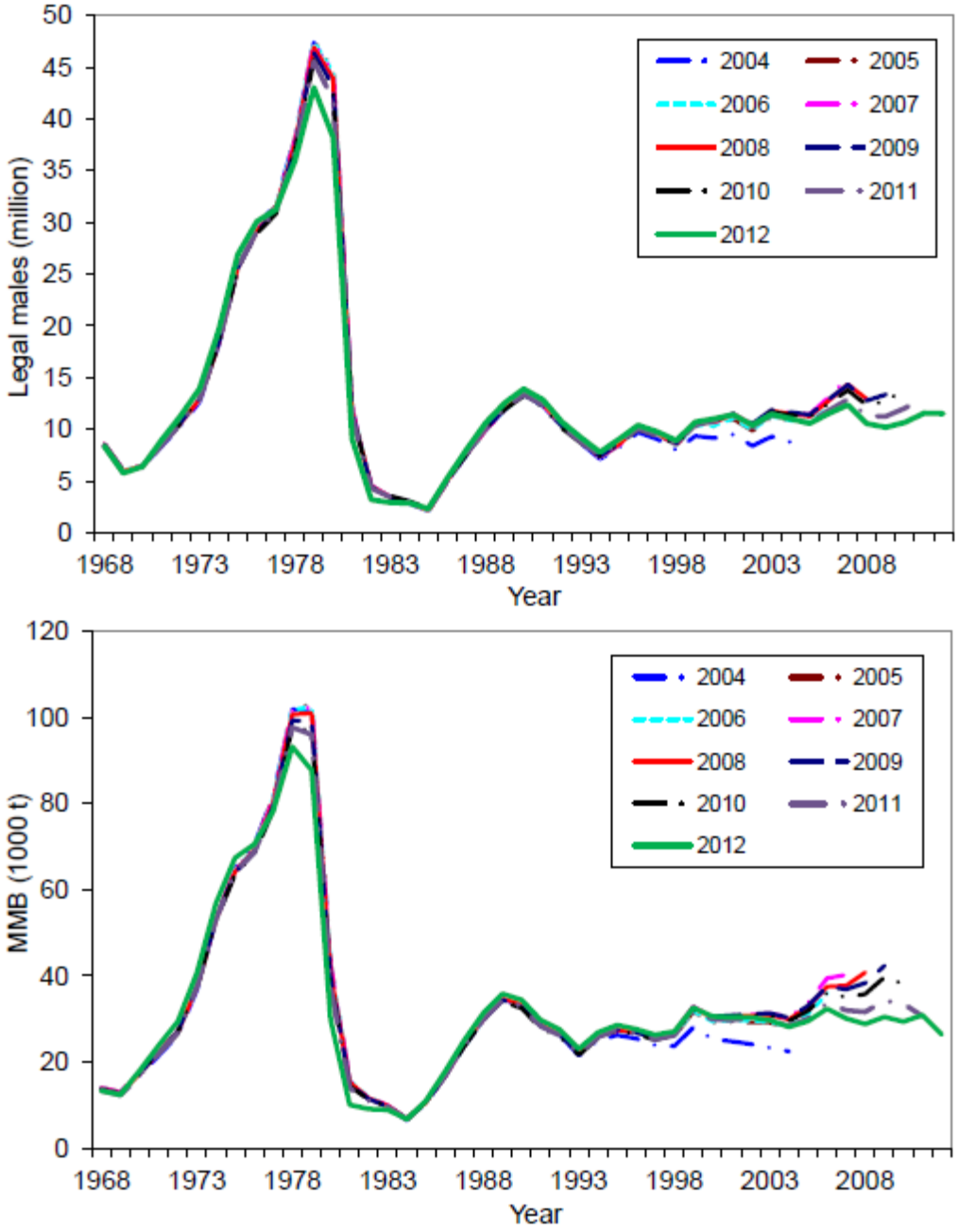
Zheng, J. 2005. A review of natural mortality estimation for crab stocks: data-limited for every stock? Pages 595-612 *in* G.H. Kruse, V.F. Gallucci, D.E. Hay, R.I. Perry, R.M. Peterman, T.C. Shirley, P.D. Spencer, B. Wilson, and D. Woodby (eds.). Fisheries Assessment and Management in Data-limited Situation. Alaska Sea Grant College Program, AK-SG-05-02, Fairbanks.

Retrospective pattern

Two kinds of retrospective analyses were conducted for this report: (1) historical results and (2) the 2011/2012 model hindcast results. The historical results are the trajectories of biomass and abundance from previous assessments that capture both new data and changes in methodology over time. Treating the 2012 estimates as the baseline values, it is also possible to evaluate how well the model had done in the past. The 2012 model results are based on sequentially excluding one-

year of data to evaluate the current model performance with fewer data.

Overall, both historical results and the 2011/2012 model results performed reasonably well. No great overestimates or underestimates occurred.



Comparison of estimates of legal male abundance (top) and mature male biomass (bottom) on Feb. 15 of Bristol Bay red king crab from 1968 to 2012 made with terminal years 2004- 2012 with scenario 7ac. These are results of the 2012 model. Legend shows the year in which the assessment was conducted. Pot and trawl handling mortality rates were assumed to be 0.2 and 0.8, respectively.

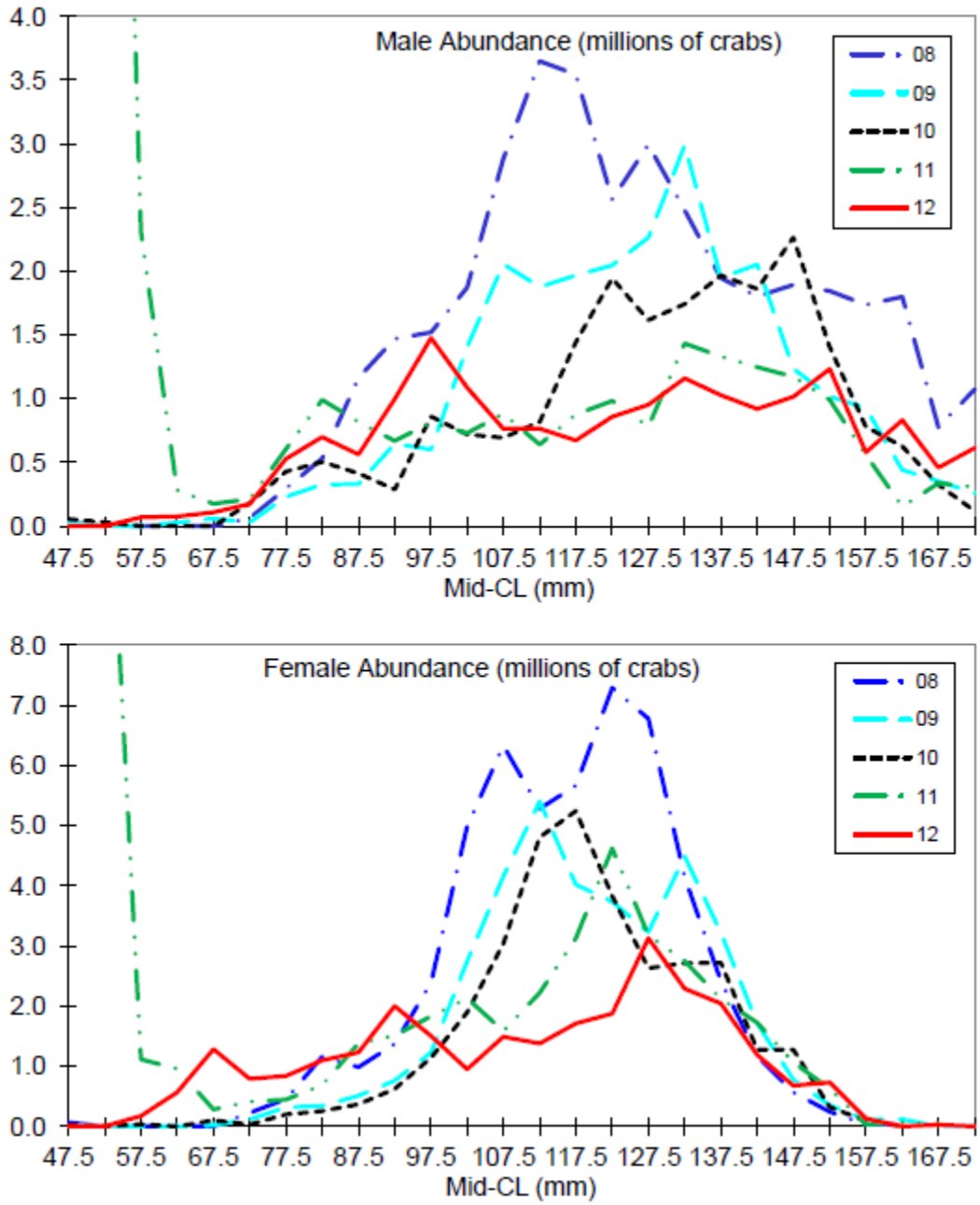
Results

Status and catch specifications (1000 t):

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2006/07			7.04	7.14	7.81	N/A	N/A
2007/08		37.69[A]	9.24	9.30	10.54	N/A	N/A
2008/09	15.56[B]	39.83[B]	9.24	9.22	10.48	10.98	N/A
2009/10	14.22[C]	40.37[C]	7.26	7.27	8.31	10.23	N/A
2010/11	13.63[D]	32.64[D]	6.73	6.76	7.71	10.66	N/A
2011/12	13.77[E]	30.88[E]	3.55	3.61	4.09	8.80	7.92
2012/13		26.32[E]	NA	NA	NA	7.96	7.17

The stock was above MSST in 2010/11 and is hence not overfished. Overfishing did not occur.

The near future outlook for the Bristol Bay RKC stock is a declining trend. The three recent above-average year classes (hatching years 1990, 1994, and 1997) had entered the legal population by 2006. Most individuals from the 1997 year class will continue to gain weight to offset loss of the legal biomass to fishing and natural mortalities. The above-average year class (hatching year 2000) with lengths centered around 87.5 mm CL for both males and females in 2006 and with lengths centered around 112.5-117.5 mm CL for males and around 107.5 mm CL for females in 2008 has largely entered the mature male population in 2009 and the legal population by this year. No strong cohorts have been observed in the survey data after this cohort until last year. There was a huge tow of juvenile crab of size 45-55 mm in 2011. Assessment scientists are disappointed that no huge tows of juvenile crab were caught in the 2012 survey. Because this is one tow only, it is difficult to assume its strength until the next two or three years. Due to lack of recruitment, mature and legal crabs should continue to decline next year. Current crab abundance is still low relative to the late 1970s, and without favorable environmental conditions, recovery to the high levels of the late 1970s is unlikely.



Length frequency distributions of male (top panel) and female (bottom panel) red king crabs in Bristol Bay from NMFS trawl surveys during 2007-2011. For purposes of these graphs, abundance estimates are based on area-swept methods.

2012 EBSSC Stock Assessment

A size based model was developed for eastern Bering Sea snow crab (*Chionoecetes opilio*) to estimate population biomass and harvest levels.

Observed survey mature male biomass decreased from 167,400 t in 2011 to 120,800 t in 2012. Observed survey mature female biomass also decreased from 280,000 t in 2011 to 220,600 t in 2012. The 2012 estimate of males greater than 101 mm decreased to 87 million crab from 150.7 million in 2011, a decrease of 42%. Base model estimates of mature male biomass at mating decreased from 198,800 t in 2010/11 to 165,200 t in 2011/12 (107% of B35% (154,669 t)). Retained catch in the 2011/12 fishery increased to 40,500 t, an increase from the 2010/11 fishery retained

catch of 24,670 t. The total catch in the 2011/12 fishery was estimated at 44,600 t below the OFL of 73,800 t.

Additional data included in the 2012 EBSSC SAFE include: 2012 Bering Sea survey biomass and length frequency data, 2011/12 directed fishery retained and discard catch and length frequencies and groundfish discard length frequency from 2011/12 added and 2011/12 groundfish discard catch.

Data component	Years
Retained male crab pot fishery size frequency by shell condition	1978/79-2011/12
Discarded male and female crab pot fishery size frequency	1992/3-2011/12
Trawl fishery bycatch size frequencies by sex	1991-2011/2012
Survey size frequencies by sex and shell condition	1978-2012
Retained catch estimates	1978/79-2011/12
Discard catch estimates from snow crab pot fishery	1992/93-2011/12 from observer data
Trawl bycatch estimates	1973-2011/12
Total survey biomass estimates and coefficients of variation	1978-2012
2009 study area biomass estimates and coefficients of variation and length frequencies for BSFRF and NMFS tows	2009
2010 study area biomass estimates and coefficients of variation and length frequencies for BSFRF and NMFS tows	2010

The various data components used in the 2012 EBSSC SAFE model

Summary of the 2012 EBSSC stock assessment model

The assessment model used for the September 2011 assessment was the model recommended by the CPT in May 2011 and the SSC in June 2011 ("Model 6"). The model structure of the Base model in the current assessment is the same as the recommended Model 6 of the September 2011 assessment. The Eastern Bering Sea snow crab fishery stock assessment uses a size and sex-structured model which is fitted to time series of total catch data from the directed fishery and bycatch data from the trawl fishery, size frequency data from the catch in the pot fishery and the bycatch in both the pot and trawl fisheries, and abundance data from the NMFS trawl survey and two recent BSFRF surveys.

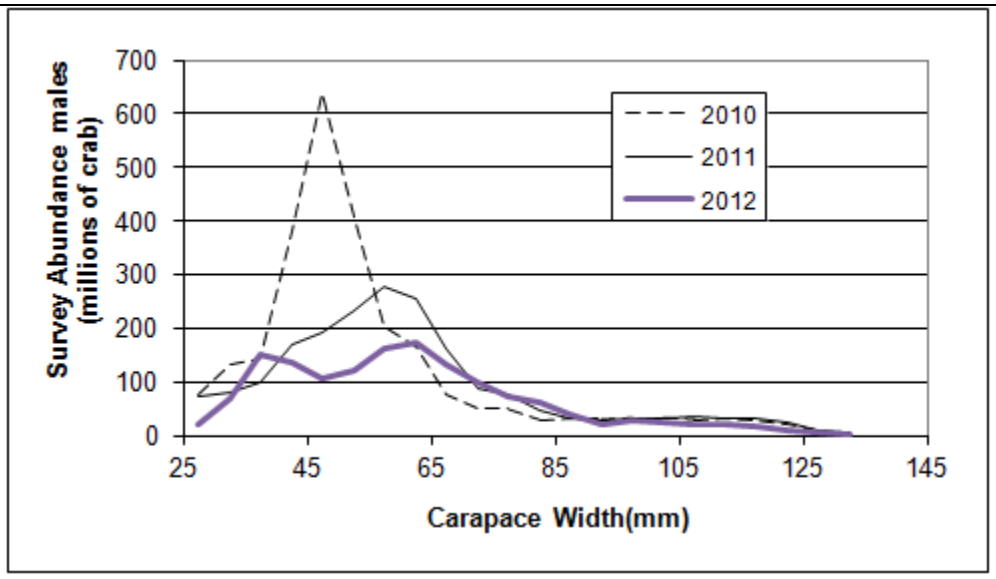
NMFS Survey

Survey total mature biomass declined to 341,400 t in 2012. Survey mature male biomass increased from 157,300 t in 2010 and 167,400 t in 2011, then declined to 120,800 t in 2012. The observed survey estimate of males greater than 101 mm increased from 137.6 million in 2010 and 150.7 million in 2011 then declined to 87.0 million in 2012. Survey mature female biomass increased from 145,100 t in 2010 and 280,000 t in 2011 then declined to 220,600 t in 2012.

Year	Observed survey female mature biomass	CV female mature biomass	Observed survey male mature biomass	CV male mature biomass	Observed survey total mature biomass	Observed number of males > 101mm (millions)
1978/79	153	0.2	193.1	0.12	346.2	163.4
1979/80	323.7	0.2	240.3	0.12	564.1	169.1
1980/81	364.9	0.2	193.8	0.12	558.7	133.9
1981/82	195.9	0.2	107.7	0.12	303.6	40.7
1982/83	213.3	0.2	173.1	0.12	386.4	60.9
1983/84	125.4	0.2	146	0.12	271.5	65.2
1984/85	70.4	0.4	161.2	0.24	231.5	139.9
1985/86	12.5	0.4	69.6	0.24	82.1	71.5
1986/87	47.7	0.4	87.3	0.24	135.1	77.1
1987/88	294.7	0.2	192.1	0.12	486.8	130.5
1988/89	276.9	0.125	251.6	0.12	528.5	170.2
1989/90	427.3	0.32	299.1	0.095	726.4	162.4
1990/91	312.1	0.185	442.4	0.105	754.5	389.6
1991/92	379.2	0.19	430.5	0.145	809.6	418.8
1992/93	242.4	0.2	238.5	0.12	480.9	232.5
1993/94	237.3	0.2	178.3	0.12	415.6	124.4
1994/95	216.8	0.16	163.6	0.15	380.4	71.2
1995/96	257	0.115	209.5	0.105	466.5	63
1996/97	161.7	0.145	281.7	0.09	443.4	154.8
1997/98	157.5	0.195	319.9	0.09	477.4	280.2
1998/99	124.3	0.255	201.1	0.12	325.4	208.4
1999/00	51.4	0.195	89.5	0.10	140.9	82.1
2000/01	152.4	0.435	88.9	0.14	241.3	65.7
2001/02	131.4	0.28	129.2	0.185	260.6	67.6
2002/03	50.5	0.295	90.2	0.195	140.8	63.1
2003/04	74.2	0.285	73	0.20	147.3	52.3
2004/05	84.5	0.28	75.8	0.16	160.3	56
2005/06	158.2	0.17	119.5	0.16	277.7	61.5
2006/07	109.6	0.17	134.5	0.18	244.2	118.7
2007/08	121.4	0.26	147.3	0.15	268.7	124.1
2008/09	86.4	0.22	121.6	0.10	208	97.7
2009/10	103.8	0.22	141.3	0.12	245	125.9
2010/11	145.1	0.156	157.3	0.142	302.4	137.6
2011/12	280.0	0.178	167.4	0.120	447.4	150.7
2012/13	220.6	0.198	120.8	0.143	341.4	87.0

Observed survey female, male and total spawning biomass(1000t) and numbers of males > 101mm (millions of crab).

Survey abundance by size for males and females indicate a moderate level of recruitment moving through the stock and resulting in the recent increase in abundance. In 2009 small crab (<50mm) increased in abundance relative to 2008. The 2010 length frequency data showed high abundance in the 40 to 50 mm range. The recruitment progressed into the mature female abundance in 2011 and also can be seen in male abundance in the 50-65mm range in 2011. However, in 2012, the progress of the recruitment is not evident.



Survey male abundance by length for 2010, 2011 and 2012.

Discard Mortality

Discard mortality was assumed to be 50% for this assessment. The fishery for snow crabs occurs in winter when low temperatures and wind may result in freezing of crabs on deck before they are returned to the sea. Short term mortality may occur due to exposure, which has been demonstrated in laboratory experiments, where 100% mortality occurred under temperature and wind conditions that may occur in the fishery. Even if damage did not result in short term mortality, immature crabs that are discarded may experience mortality during molting some time later in their life. Discard mortality has declined over the last three years from 12.9% in 2008/09 to 9.4% in 2009/10 and 4.2% in 2010/11.

Results

The OFL for 2012/13 for the Base model was 67,800 t, a declined from the 2011/12 OFL of 73,500 t mainly due to a decrease in biomass.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2007/08	72.1	98.9[A]	28.6	28.6	35.0		
2008/09	74.1	109.3[B]	26.6	26.5	31.5	35.1	
2009/10	66.6	127.7[C]	21.8	21.8	23.9	33.1	
2010/11	73.7	196.6[D]	24.6	24.7	26.7	44.4	
2011/12	77.3[E]	165.2[E]	40.3	40.3	44.7	73.5	66.2
2012/13		146.3[F]				67.8	60.8

The stock was above MSST in 2011/12 and is hence not overfished. Overfishing did not occur during the 2011/12 fishing year.

The history of fishing mortality and MMB at mating with the F35% control rule for the Base model estimates the 2011/12 F to be below the overfishing level and MMB at mating just above B35%.

2012 SMBKC Stock Assessment

Summary of the 2012 SMBKC stock assessment model

The 2011 assessment employed a survey-based approach. This assessment employs a 3- stage length-based assessment model first presented in May 2011 and accepted by the CPT in May 2012. The model was developed as an alternative to a similar 4-stage model used prior to 2011.

The current SMBKC stock assessment model is similar in complexity and a variant of the previous four-stage SMBKC CSA model (2010 SAFE). Like the earlier model, it considers only male crab at least 90 mm in CL, but it combines stages 3 and 4 of the earlier model resulting in just three stages (male size classes) determined by carapace length measurements of (1) 90-104 mm, (2) 105-119 mm, and (3) 120 mm+. This consolidation was heavily driven by concern about the accuracy and consistency of shell-condition information, which had been used in distinguishing stages 3 and 4 of the earlier model. Six alternative model configurations were explored along with the base model, and while two of the alternatives provided accurate fits of the data, the fit was no better than the base model. The base model was retained due to being the model accepted by the SSC and CPT.

The 2012 estimate of 12.46 million pounds (5,652 t; CV 0.33) represents a marked decrease from the 2011 estimate, it is still among the highest values since 1988 and well above the post-collapse low of 2.812 million pounds (1,275 t; CV 0.36) reported in 2005. Estimated 2011/12 total male catch is determined as the sum of fishery-reported retained catch, estimated male discard mortality in the directed fishery, and estimated male bycatch mortality in the groundfish fisheries. With the 2011/12 OFL at 3.74 million pounds (1,70 t) and estimated 2011/12 total male catch equal to 1.88 + 0.217 + 0.0009 = 2.10 million pounds (953 t), no declaration of overfishing is warranted. Recent assessments of stock biomass suggest it is well above the MSST and that the stock is neither overfished nor approaching an overfished condition.

Year	MSST	Biomass (MMB_{mating})	TAC	Retained Catch	Total Catch	OFL[a]	ABC
2009/10	3.4 (1,500)	12.76 (5,790)	1.167 (529.3)	0.461 (209)	0.530 (240)	1.72 (780)	-
2010/11	3.4 (1,500)	14.77 (6,700)	1.600 (725.7)	1.264 (573)	1.408 (639)	2.29 (1,040)	-
2011/12	3.4 (1,500)	11.09[b] (5,030)	2.539 (1,151)	1.881 (853)	2.10 (953)	3.74 (1,700)	3.40 (1,540)
2012/13	4.0[c] (1,800)	12.41[d] (5,629)	TBD	TBD	TBD	2.24[e] (1,020)	2.02[a, f] (916)

Major data sources used in this assessment are annual directed-fishery retained-catch statistics from fish tickets (1978/79-1998/99, 2009/10 - 2011/12); the annual NMFS eastern Bering Sea trawl survey (1978-2012); the triennial ADFG SMBKC pot survey (every third year 1995-2010); ADFG crab-observer pot-lift sampling (1990/91-1998/99,2009/10-2011/12); and NMFS groundfish-observer bycatch biomass data (1992/93-2010/12).

BSAI King and Tanner crab SAFE 2012:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/SAFE/CrabSAFE/CrabSAFE2012.pdf

C. The Precautionary Approach

6. The current state of the stock shall be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and target. Remedial actions shall be available and taken where reference point or other suitable proxies are approached or exceeded.

FAO CCRF 7.5.2/7.5.3
Eco 29.2/29.2bis/30-30.2

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

Summary

The status determination criteria for crab stocks are calculated on an annual basis using a five-tier system that accommodates varying levels of uncertainty of information, and incorporates new scientific information providing a mechanism for continually improving the status determination criteria as more information becomes available. For tier 3 stocks, the target reference point is $B_{35\%}$ (when spawning biomass is reduced to 35% of the unfished condition), a proxy for B_{MSY}, or biomass at Maximum Sustainable Yield (MSY). Stock status of BSAI crabs are determined by two metrics. Firstly, the stock is considered to be overfished if the stock size is estimated to be below the minimum stock size threshold (MSST) or limit reference point (1/2 MSY). Secondly, overfishing is considered to have occurred if the exploitation level, or fishing mortality, exceeds the fishing mortality at the overfishing level (F_{OFL}), or more intuitively if the total catch exceeds the OFL level (equivalent to MSY).

Reference points are considered appropriate and precautionary for stock harvest practices.

Stock	Tier	Reference Point (RP)	Biomass at RP	Biomass at present	Percentage of Reference Point
BBRKC	3a	$B_{35\%}$	27,500 t	26,300 t	96%
SMBKC	4a	Bmsy proxy	3,560 t	5,629 t	158%
EBSSC	3b	$B_{35\%}$	154,669 t	165,200 t	107%

There is strong evidence from the assessments that since rationalization, the level of fishing permitted for all three crab stocks has been commensurate with the current state of the fishery resources and never exceeded the overfishing level.

The biomass that is associated with MSY, Bmsy, is effectively treated as the target reference point since it is the desired stock condition (but effective harvest is always lower, consistent with ABC, ACL and TAC formulations as explained below), although MSY itself is treated as a upper limit rather than a target reference point because the overfishing limit (OFL) is based upon MSY. The (lower) limit reference point corresponds to ½ MSY. The harvest rate is decreased when stock biomass is moving from upper to limit reference point and is reduced to zero when the stock reaches the limit

reference point. At that point, a rebuilding plan is implemented.
For tier 3 stocks, the target reference point is $B_{35\%}$ (when spawning biomass is reduced to 35% of the unfished condition), a proxy for Bmsy. Under the Magnuson-Stevens Act (MSA) new statutory requirements were established in 2006 to end and prevent overfishing by the use of annual catch limits (ACLs) and appropriate accountability measures if those ACLs should be exceeded. The measures were required to be implemented by 2010 for all stocks subject to overfishing and by 2011 for all remaining stocks that were not currently subject to overfishing.

The terms "overfishing" and "overfished" are defined as a rate or level of fishing mortality that jeopardises the capacity of a fishery to produce maximum sustainable yield (MSY) on a continuing basis, and thus NPFMC prescribe that the overfishing level (OFL – the catch limit that should never be exceeded) should never exceed the amount that would be taken if the stock were fished at Fmsy or a proxy for Fmsy. Stock status of BSAI crabs are therefore determined by two metrics. Firstly, the stock is considered to be overfished if the stock size is estimated to be below the minimum stock size threshold (MSST). Secondly, overfishing is considered to have occurred if the exploitation level, or fishing mortality, exceeds the fishing mortality at the overfishing level (F_{OFL}), or more intuitively if the total catch exceeds the OFL.

The NPFMC's fishery management plan (FMP) for BSAI crab stocks outlines the stock status definitions, the criteria used to determine stock status using a five-tier system and the step-by-step framework under which the NPFMC sets final overfishing levels (OFLs) and acceptable biological catches (ABCs). The MSA requires that the Science and Statistical Committee (SSC) of the NPFMC determine the scientific benchmarks while the Council itself recommends quotas based on these benchmarks. This separation of responsibilities is a key step forward in the goal of eliminating overfishing and enhancing recovery of overfished stocks.

The OFL is the catch level above which overfishing is occurring, and the harvest control rules aim to prevent overfishing by establishing a maximum fishing mortality threshold and using this threshold value to determine annual catch limits. The ABC is the level of annual catch that accounts for scientific uncertainty in the estimate of OFL and other uncertainties. The ABC is set below the OFL. The ACL is the level of catch that serves as the basis for invoking accountability measures, and for crab stocks the ACL is set at the ABC. The TAC is the annual catch target for the fishery which is set at or below the ACL and may take into account uncertainty in the management process and socio-economic factors, or other biological concerns that may affect the reproductive potential of the stock but that are not reflected in the OFL itself.

The status determination criteria for crab stocks are calculated on an annual basis using a five-tier system that accommodates varying levels of uncertainty of information, and incorporates new scientific information providing a mechanism for continually improving the status determination criteria as more information becomes available. Under the system overfishing and overfished criteria and ABC (= ACL) levels are formulated. For crab stocks, the overfishing level equals MSY and is derived through the annual assessment process. Each crab stock is assessed annually to determine its status and if catch estimates exceed the OFL, then overfishing is occurring. If annual biomass estimates are below MSST (defined as 0.5 Bmsy) then the stock is overfished. If

overfishing has occurred or the stock is overfished, the Magnuson-Stevens Act (MSA) requires NPFMC to immediately end overfishing and rebuild stocks. The MSA also requires that the FMP include accountability measures to prevent ACLs from being exceeded and to correct overages if they do occur.

BBRKC and EBSSC are managed as tier 3 stocks. Tier 3 is for stocks where reliable estimates of the spawner-recruit relationship are not available, but proxies for Fmsy and Bmsy are estimated. For tier 3 stocks, the term F35% refers to a fishing mortality associated with an equilibrium level of spawning per recruit equal to 35% of the equilibrium level of spawning per recruit in a virgin, unfished stock. Similarly, B35% refers to the long term average biomass that would be expected under average recruitment and F=F35%.
SMBKC is managed as a tier 4 stock. Tier 4 is for stocks where there is insufficient population data to estimate the spawner-recruit relationship, but simulation modelling is used to derive OFLs which capture the historical performance of the fisheries and borrow information from other stocks. Estimation of F_{OFL} requires estimates of current survey biomass, natural mortality rate (M) or proxy, and a scalar, γ , which allows adjustments in the overfishing definitions to account for differences in biomass measures.

Stock	Tier	Reference Point (RP)	Biomass at RP	Biomass at present	Percentage of Reference Point
BBRKC	3a	$B_{35\%}$	27,500 t	26,300 t	96%
SMBKC	4a	Bmsy proxy	3,560 t	5,629 t	158%
EBSSC	3b	$B_{35\%}$	154,669 t	165,200 t	107%

BBRKC

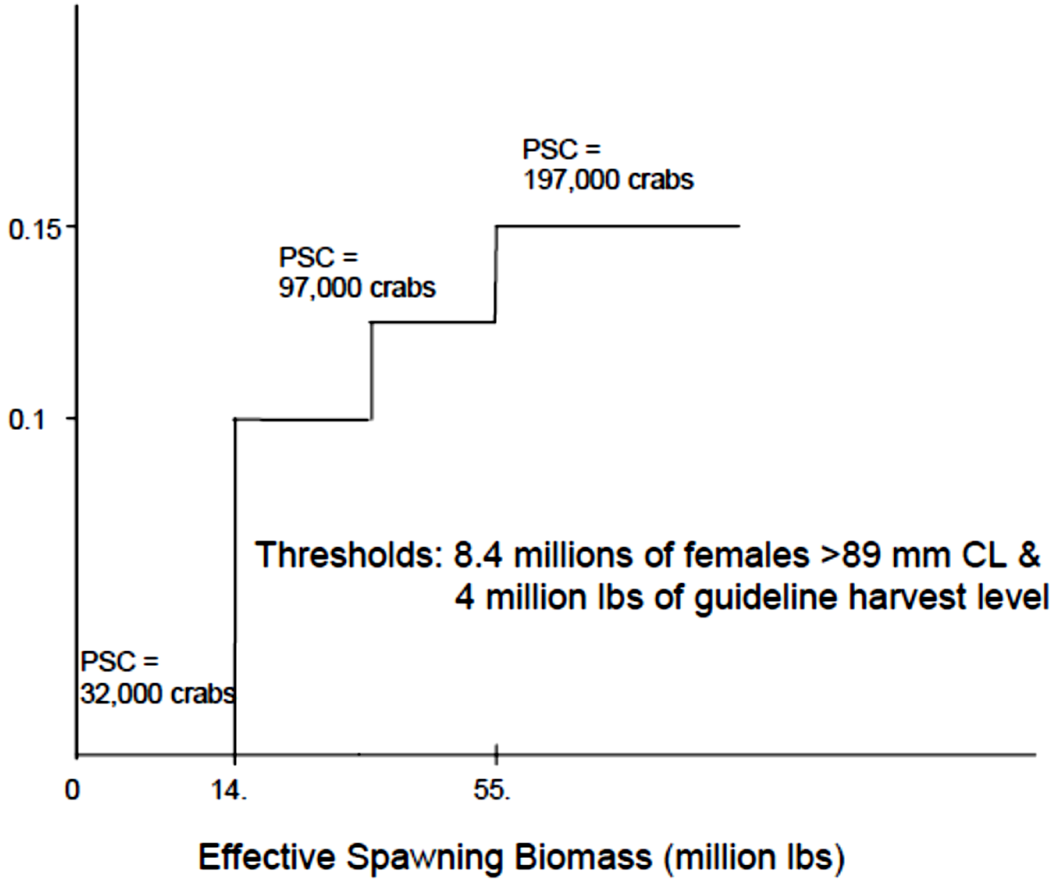
For the Bristol Bay red king crab stock, the CPT recommends that it is assigned to tier 3, and that the proxy for Bmsy (B35%) be the mature male biomass at mating calculated using the average recruitment from 1984-2011 multiplied by male biomass-per-recruit corresponding to F35% minus the mature male catch under an F35% harvest strategy. The B35% is estimated at 27.5 kt. Mature male biomass (MMB) was estimated at 26.32 kt which equates to 96% of B35%. MMB is significantly higher than the MSST of 13.77 kt, so the Bristol Bay red king crab stock is not currently overfished. The total catch was 4.09 kt which is well below the OFL of 8.80, so overfishing did not occur in 2011/12. The CPT recommended that for 2012/13 the ABC should be set below the maximum ABC because of uncertainties in the estimation of OFL, and the SSC recommended an ABC of 90% of the OFL. The table below shows the status and catch specifications calculations for the last 4 years and the estimates of OFL and ABC and the forecast biomass for 2012/2013. The table shows clear evidence that in recent years the stock has not been overfished and that overfishing has not occurred.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2006/07			7.04	7.14	7.81	N/A	N/A
2007/08		37.69[A]	9.24	9.30	10.54	N/A	N/A
2008/09	15.56[B]	39.83[B]	9.24	9.22	10.48	10.98	N/A
2009/10	14.22[C]	40.37[C]	7.26	7.27	8.31	10.23	N/A
2010/11	13.63[D]	32.64[D]	6.73	6.76	7.71	10.66	N/A
2011/12	13.77[E]	30.88[E]	3.55	3.61	4.09	8.80	7.92
2012/13		26.32[E]	NA	NA	NA	7.96	7.17

The stock was above MSST in 2010/11 and is hence not overfished. Overfishing did not occur.

Additionally, the BBRKC fishery adopted a new harvest strategy in 1996, based on a new assessment model and research findings.

That strategy had two mature male harvest rates: 10% when effective spawning biomass (ESB) is between 14.5 and 55.0 million lbs and 15% when ESB is at or above 55.0 million lbs. The maximum harvest rate cap of legal males was changed from 60% to 50%. An additional threshold of 14.5 million lbs of ESB was also added. In 1997, a minimum threshold of 4.0 million lbs was established as the minimum GHL for opening the fishery and maintaining fishery manageability when the stock abundance is low. In 2003, the Board modified the current harvest strategy by adding a mature harvest rate of 12.5% when the ESB is between 34.75 and 55.0 million lbs.



Current harvest rate strategy (line) for the Bristol Bay red king crab fishery and annual prohibited species catch (PSC) limits (numbers of crabs) of Bristol Bay red king crabs in the groundfish fisheries in zone 1 in the eastern Bering Sea. Harvest rates are based on current-year estimates of effective spawning biomass (ESB), whereas PSC limits apply to

previous-year ESB.

EBSSC

For the Eastern Bering Sea snow crab stock, the CPT recommends that it is assigned to tier 3, and that the proxy for Bmsy (B35%) should be the mature male biomass based on the average recruitment from 1979 to 2011. The B35% for 2011/12 was estimated at 154.7 kt. Mature male biomass (MMB) was estimated at 146.3 kt which is 107% of B35%. MMB is significantly higher than the MSST of 77.3 kt, so the Eastern Bering Sea snow crab stock is not currently overfished. The total catch in 2011/12 was 44.7 kt, which was well below the OFL of 73.5 kt, so overfishing did not occur in 2011/12. The table below shows the status and catch specifications calculations for the last 5 years and the estimates of OFL and ABC and the forecast biomass for 2012/2013. All model scenarios indicated that the stock is above the B35%, so the stock is rebuilt, and table shows clear evidence that in recent years the stock has not been overfished and that overfishing has not occurred.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2007/08	72.1	98.9[A]	28.6	28.6	35.0		
2008/09	74.1	109.3[B]	26.6	26.5	31.5	35.1	
2009/10	66.6	127.7[C]	21.8	21.8	23.9	33.1	
2010/11	73.7	196.6[D]	24.6	24.7	26.7	44.4	
2011/12	77.3[E]	165.2[E]	40.3	40.3	44.7	73.5	66.2
2012/13		146.3[F]				67.8	60.8

The stock was above MSST in 2011/12 and is hence not overfished. Overfishing did not occur during the 2011/12 fishing year.

SMBKC

For the St Matthew blue king crab stock, the CPT recommends that it be assigned to tier 4. The Bmsy proxy was estimated for the period 1989/90 to 2009/10 MMB. This is the first year for the three stage catch survey analysis (CSA) assessment model developed for this fishery. Bmsy proxy is estimated as 3.56 kt. Mature male biomass in 2012/13 was estimated as 5.63 kt which equates to 156% of Bmsy proxy. MMB is very much higher than MSST of 1.8 kt, so the St Matthew blue king crab stock is not considered to be overfished. The total male catch in 2011/12 was 0.95 kt which is below the OFL of 1.7 kt, so overfishing did not occur in 2011/12. There is considerable uncertainty in the estimate of natural mortality which is a key component of assessments of tier 4 stocks, and in the survey data which may be an underestimate of abundance. In the light of these uncertainties, the CPT recommended that the maximum ABC should not be used, but a 10% buffer giving an ABC of 2.02 kt for 2012/13. The table below shows the status and catch specifications calculations for the last 4 years and the estimates of OFL and ABC and the forecast biomass for 2012/2013. The stock was declared rebuilt in 2009, and the table shows clear evidence that since the fishery re-opened, the stock has not been overfished and that overfishing has not occurred.

Year	MSST	Biomass (MMB_{mating})	TAC	Retained Catch	Total Catch	OFL[a]	ABC
2009/10	3.4 (1,500)	12.76 (5,790)	1.167 (529.3)	0.461 (209)	0.530 (240)	1.72 (780)	-
2010/11	3.4 (1,500)	14.77 (6,700)	1.600 (725.7)	1.264 (573)	1.408 (639)	2.29 (1,040)	-
2011/12	3.4 (1,500)	11.09[b] (5,030)	2.539 (1,151)	1.881 (853)	2.10 (953)	3.74 (1,700)	3.40 (1,540)
2012/13	4.0[c] (1,800)	12.41[d] (5,629)	TBD	TBD	TBD	2.24[e] (1,020)	2.02[e, f] (916)

During 2012, new SAFE reports were completed for each of the major crab species and fisheries. The Bristol Bay red king crab (BBRKC) report was updated with 2012 fishery data through August 2012 and data from the 2012 summer trawl survey. Near term outlook for this stock is a continued declining trend. Recruitment has been very poor in the last 6 years. The St. Matthew blue king crab (SMBKC) report shows the 2012 biomass estimate of 12.46 million pounds (5,652 t; CV 0.33) which represents a marked decrease from the 2011 estimate (21.07 million pounds, 9,557 t), it is still among the highest values since 1988 and well above the post-collapse low of 2.812 million pounds (1,275 t; CV 0.36) reported in 2005. Data used in the SMBKC assessment have been updated to include the most recent fishery and survey (2012) numbers. For eastern Bering Sea snow crab (EBSSC), observed survey mature male biomass decreased from 167,400 t in 2011 to 120,800 t in 2012. Observed survey mature female biomass also decreased from 280,000 t in 2011 to 220,600 t in 2012. The trends in model predictions were consistent with trends in the recent survey data. Harvest rates for 2012/13 were set by ADFG.

Fishery Management Plan for BSAI crab:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/CrabFMPOct11.pdf

BSAI King and Tanner crab SAFE 2012:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/SAFE/CrabSAFE/CrabSAFE2012.pdf

7. **Management actions and measures for the conservation of stock and the aquatic environment shall be based on the Precautionary Approach. Where information is deficient a suitable method using risk assessment shall be adopted to take into account uncertainty.**

FAO CCRF 7.5.1/7.5.4/7.5.5
FAO ECO 29.6/32

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating Determination
Summary

The overall management for the BBRKC, EBSSC and SMBKC comprises all the elements as specified in the FAO guidelines for the precautionary approach. FAO Guidelines for the Precautionary Approach (PA) (FAO 1995) advocate a comprehensive management process that includes data collection, monitoring, research, enforcement, and review.

Absence of adequate scientific information is not used as a reason for postponing or failing to take conservation and management measures. The three crab stocks part of this assessment are managed under a tier system rule based on stock knowledge. 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. The lower the tier, the less conservative the determination of OFL/ABC and ACL are, due to a greater level of information being known about the stock. Higher tier stocks are managed more conservatively due to gaps in the information about the stock. This system is intrinsically precautionary in nature and the results involve catches always lower than the overfishing level. The annual assessments and subsequent SAFE reports for the BSAI crab fisheries allow for the identification of areas where there are gaps in the knowledge of the stock which require further research and/or improvements.

FAO Guidelines for the Precautionary Approach (PA) (FAO 1995) advocate a comprehensive management process that includes data collection, monitoring, research, enforcement, and review. Prior identification of desirable (target) and undesirable (limit) outcomes must be carried out and measures are required that will avoid undesirable outcomes with high probability and correct them promptly should they occur. The Guidelines suggest that this be achieved through decision rules that specify in advance what action should be taken when specified deviations from operational targets are observed (i.e. harvest control rules). Furthermore, the Guidelines suggest that a management plan should not be accepted until it has been shown to perform effectively in terms of its ability to avoid undesirable outcomes (for example through simulation trials). Lastly, the absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species as well as non-target species and their environment.

King and snow 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 are divided into three categories: (1) fixed in the FMP, (2) frame worked in the FMP, and (3) discretion of the State of Alaska. The State of Alaska is responsible for developing harvest strategies to determine GHL/TAC under the framework in the FMP.

The BBRKC and EBSSC stocks are both managed under the tier 3 management scheme, SMBKC falls into the tier 4 management level, making management more conservative. The NPFMC treats OFL (MSY) as an upper limit rather than a target. This system is intrinsically precautionary in nature and the practical results can be seen by comparing catches against OFL determinations for 3 crab stocks under assessment.

BBRKC

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2006/07			7.04	7.14	7.81	N/A	N/A
2007/08		37.69[A]	9.24	9.30	10.54	N/A	N/A
2008/09	15.56[B]	39.83[B]	9.24	9.22	10.48	10.98	N/A
2009/10	14.22[C]	40.37[C]	7.26	7.27	8.31	10.23	N/A
2010/11	13.63[D]	32.64[D]	6.73	6.76	7.71	10.66	N/A
2011/12	13.77[E]	30.88[E]	3.55	3.61	4.09	8.80	7.92
2012/13		26.32[E]	NA	NA	NA	7.96	7.17

The stock was above MSST in 2010/11 and is hence not overfished. Overfishing did not occur.

EBSSC

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2007/08	72.1	98.9[A]	28.6	28.6	35.0		
2008/09	74.1	109.3[B]	26.6	26.5	31.5	35.1	
2009/10	66.6	127.7[C]	21.8	21.8	23.9	33.1	
2010/11	73.7	196.6[D]	24.6	24.7	26.7	44.4	
2011/12	77.3[E]	165.2[E]	40.3	40.3	44.7	73.5	66.2
2012/13		146.3[F]				67.8	60.8

The stock was above MSST in 2011/12 and is hence not overfished. Overfishing did not occur during the 2011/12 fishing year.

SMBKC

Year	MSST	Biomass (MMB_{mating})	TAC	Retained Catch	Total Catch	OFL[a]	ABC
2009/10	3.4 (1,500)	12.76 (5,790)	1.167 (529.3)	0.461 (209)	0.530 (240)	1.72 (780)	-
2010/11	3.4 (1,500)	14.77 (6,700)	1.600 (725.7)	1.264 (573)	1.408 (639)	2.29 (1,040)	-
2011/12	3.4 (1,500)	11.09[b] (5,030)	2.539 (1,151)	1.881 (853)	2.10 (953)	3.74 (1,700)	3.40 (1,540)
2012/13	4.0[c] (1,800)	12.41[d] (5,629)	TBD	TBD	TBD	2.24[e] (1,020)	2.02[e, f] (916)

Major sources of uncertainties in Stock Assessment and additional research

BBRKC

As identified in the 2012 BBRKC SAFE report, data gaps exist in the following areas:

a. Information about changes in natural mortality in the early 1980s;
b. Un-observed trawl bycatch in the early 1980s;
c. Natural mortality;
d. Crab availability to the trawl surveys;
e. Juvenile crab abundance.

The 2012 BBRKC SAFE report also identified research priorities for this stock as:

a. Estimating natural mortality;
b. Estimating crab availability to the trawl surveys;
c. Surveying juvenile crab abundance in near shore;
d. Studying environmental factors that affect the survival rates from larvae to recruitment.

EBSSC

Research is needed to improve our knowledge of snow crab life history and population dynamics to reduce uncertainty in the estimation of current stock size, stock status and optimum harvest rates.

Tagging programs need to be initiated to estimate longevity and migrations. Although the eastern Bering Sea population is managed as a single stock, the distribution of the population may extend into Russian waters. Continued studies and analyses are needed refine the estimate of natural mortality.

A method of verifying shell age is needed for all crab species. A study was conducted using lipofuscin to age crabs, however verification of the method is needed. Radiometric aging of shells of mature crabs is costly and time consuming. Aging methods will provide information to assess the accuracy of assumed ages from assigned shell conditions (i.e. new, old, very old, etc), which have not been verified.

Techniques for determining which males are effective at mating and how many females they can successfully mate with in a mating season are needed to estimate population dynamics and optimum harvest rates. At the present time it is assumed that when males reach morphometric maturity they stop growing and they are effective at mating. Field studies are needed to determine how morphometric maturity corresponds to male effectiveness in mating. In addition the uncertainty associated with the determination of morphometric maturity (the measurement of chelae height and the discriminate analysis to separate crabs into mature and immature) needs to be analyzed and incorporated into the determination of the maturity by length for male snow crab.

Female opilio in waters less than 1.5 °C and colder have been determined to be biennial spawners in the Bering Sea. Future recruitment may be affected by the fraction of biennial spawning females in the population as well as the estimated fecundity of females, which may depend on water temperature.

A female reproductive index needs to be developed that incorporates males, mating ratios, fecundity, sperm reserves, biennial spawning and spatial aspects.

Analysis needs to be conducted to determine a method of accounting for the spatial distribution of

the catch and abundance in computing quotas.

SMBKC

Currently, no recommendations regarding research priorities for this stock have been advanced by the SMBKC SAFE report authors.

Current Research

Recent publications regarding research being done with BSAI crab species include the effects of ocean acidification on RKC embryos and larvae; the effects of ocean acidification on RKC and Tanner crab growth, condition, calcification and survival; RKC fecundity and maternal size; and quantification of the mortality rate of crabs after encounters with trawls.

BSAI King and Tanner crab SAFE 2012:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/SAFE/CrabSAFE/CrabSAFE2012.pdf
http://www.afsc.noaa.gov/RACE/shellfish/default_sf.php

D. Management Measures

8. Management shall adopt and implement effective measures including; harvest control rules and technical measures applicable to sustainable utilization of the fishery and based upon verifiable evidence and advice from available scientific and objective, traditional sources.

FAO CCRF 7.1.1/7.1.2/7.1.6/7.4.1/7.6.1/7.6.9/12.3
FAO Eco 29.2/29.4/30

Evidence adequacy rating:

☑High **☐ Medium** **☐ Low**

Rating determination

Summary

The NPFMC's FMP for BSAI crab stocks outlines the harvest strategy and harvest control rule, the stock status definitions, the criteria used to determine stock status using a five-tier system and the step-by-step framework under which the NPFMC sets final overfishing levels (OFLs) and acceptable biological catches (ABCs). The BSAI Crab FMP Plan authorizes the use of pot gear to harvest the crab resources.

The Crab Rationalization program allocates BSAI crab resources among harvesters, processors, and coastal communities who have been involved with and/or were dependent upon these fisheries. Share allocations to harvesters and processors, together with incentives to participate in fishery cooperatives, increases efficiencies, provides economic stability, and facilitates compensated reduction of excess capacities in the harvesting and processing sectors. Community interests are protected by CDQ allocations and regional landing and processing requirements, as well as by several community protection measures.

The BSAI crab FMP defers design specifications required for commercial crab pots and ring nets to the State. Escape mechanisms may be incorporated or mesh size adjusted to allow female and sublegal male crab to escape. Crabbers are constructing pots with larger web on the panels to allow for female and juvenile crab to exit the pot before the gear is hauled back. The yearly marine habitat footprint has been assessed and its impact considered very small for the entire BSAI directed crab fisheries. Regulation imposes that undersized males and females must be promptly discarded from crab vessels to decrease handling mortality rates. Discarded crabs are returned to the sea in a variety of methods including direct release and/or with the use of chutes and ramps.

The Federal BSAI Crab FMB describes fishing season requirements, those are aimed to protect king and snow/Tanner crabs during the molting and mating portions of their life cycle. Also, groundfish closure areas, or trawl protection areas, are in place to minimize the impact of groundfish harvests on crab resource.

Alaska Board of Fisheries

It is the goal of the BOF and ADFG to manage king and Tanner crab stocks in a manner that will protect, maintain, improve and extend these resources for the greatest overall benefit to Alaska and

the nation. Achievement of this goal is necessarily constrained by the requirement to minimize: 1) risks of irreversible adverse effects on reproductive potential; 2.) harvest during biologically sensitive periods of the life cycle; 3.) adverse interactions with other fish and shellfish stocks and fisheries. Management of these fisheries for the purpose of achieving this goal will result in a variety of benefits which include, but are not limited to, the following:

1) Maintaining healthy stocks of king and Tanner crabs of sufficient abundance to insure their continued reproductive viability and the maintenance of their role in the ecosystem;
2) Providing a sustained and reliable supply of high quality product to the industry and consumers which will provide substantial and stable employment in all sectors of the economy relating to these fisheries; and
3) Providing opportunities for subsistence and personal use fisheries on these stocks.

Policies

To achieve the management goal and provide the benefits available from these resources, it is necessary to set policies which will protect stocks and provide for optimum utilization of these resources. It is the policy of the BOF to:

1) Maintain crab stocks comprised of various size and age classes of mature animals in order to maintain the long term reproductive viability of the stock and reduce industrial dependency on annual recruitment, which is extremely variable. Benefits of this policy are most apparent when weak recruitment occurs. As population abundance and structure change with declining recruitment, harvests should be reduced.
2) Routinely monitor crab resources to provide information on abundance of females as well as pre recruit, recruit and post recruit males. This is necessary to detect any changes in the population which may require adjustments in management to prevent irreversible damage to the reproductive potential of each stock. Harvest must be conducted in a conservative manner in the absence of adequate information on stocks.
3) Protect king and Tanner crab stocks during biologically sensitive periods of their life cycle. Closure of the fishing season is necessary at times surrounding the annual mating, molting and egg hatching periods in order to reduce unnecessary mortality of soft animals, disturbance during mating and damage to egg clutches.
4) Minimize handling and unnecessary mortality of non-legal crabs and other non-target animals. Capture and handling of females, sublegal males and animals of other species results in a loss of reproductive ability and biomass that may be detrimental to a stock.
5) Maintain an adequate brood stock to rebuild king or Tanner crab populations when they are depressed. Maintenance of an adequate brood stock takes precedence over short term economic considerations. When populations are at or below threshold, the minimum stock size that allows sufficient recruitment so that sock can rebuild itself, fisheries must be closed and must remain closed until there is adequate brood stock.
6) Establish regulations which will help improve the socioeconomic aspects of management by harvesting crab when their meat yield is highest; providing for fair starts and closures to seasons; insuring enforceability of regulations; and other measures providing for an orderly fishery.

Management Measures:

1.) **Harvest Rates**. Exact harvest rates in each situation are chosen based on abundance of pre-recruit males and females as well as legal males, the established minimum size or the actual size of crab landed, percentage of females bearing eggs, and the ratio of recruit to post-recruit males.
2.) **Size Limits**. Size limits provide some protection against overharvest and also provide for improved product quality.
3.) **Sex Restrictions**. Harvest of king and Tanner crabs is limited to males only in an attempt to provide full fertilization of females and increase the chances of reproductive success.
4.) **Fishing Seasons**. Biological seasons should be set to minimize the harvest of king and Tanner crabs during times surrounding the annual mating, molting and egg hatching periods.
5.) **Guideline Harvest Levels (GHLs)**. A preseason estimate of the level of allowable king and Tanner crab harvest is established for each fishery.
6.) **Closed Areas**. To minimize the handling and unnecessary mortality of non-legal and or molting crabs, or to prevent conflicts with other fisheries or stocks, it may be necessary to close portions of management areas.
7.) **Gear Types**. Fishing for king and Tanner crabs is limited to pots, ring nets, or diving gear depending on area. Biodegradable panels are required on pots to minimize adverse effects of lost gear. Escape rings, large mesh panels, or other measures may be required to gear to meet BOF policies.
8.) **Inseason Adjustments**. Inseason adjustments may be made to the guideline harvest level and length of the fishing season. When information shows the continued fishing effort would jeopardize the reproductive viability of king or Tanner crab stocks, closures may occur by Emergency Order.
9.) **Other Measures**. Additional regulations or management measures may be adopted to control disease, reduce handling and trapping mortality due to weather, require tank inspections, specify registration procedures, gear storage, gear limitations or any other regulations needed to meet the BOF goals for managing these fisheries.

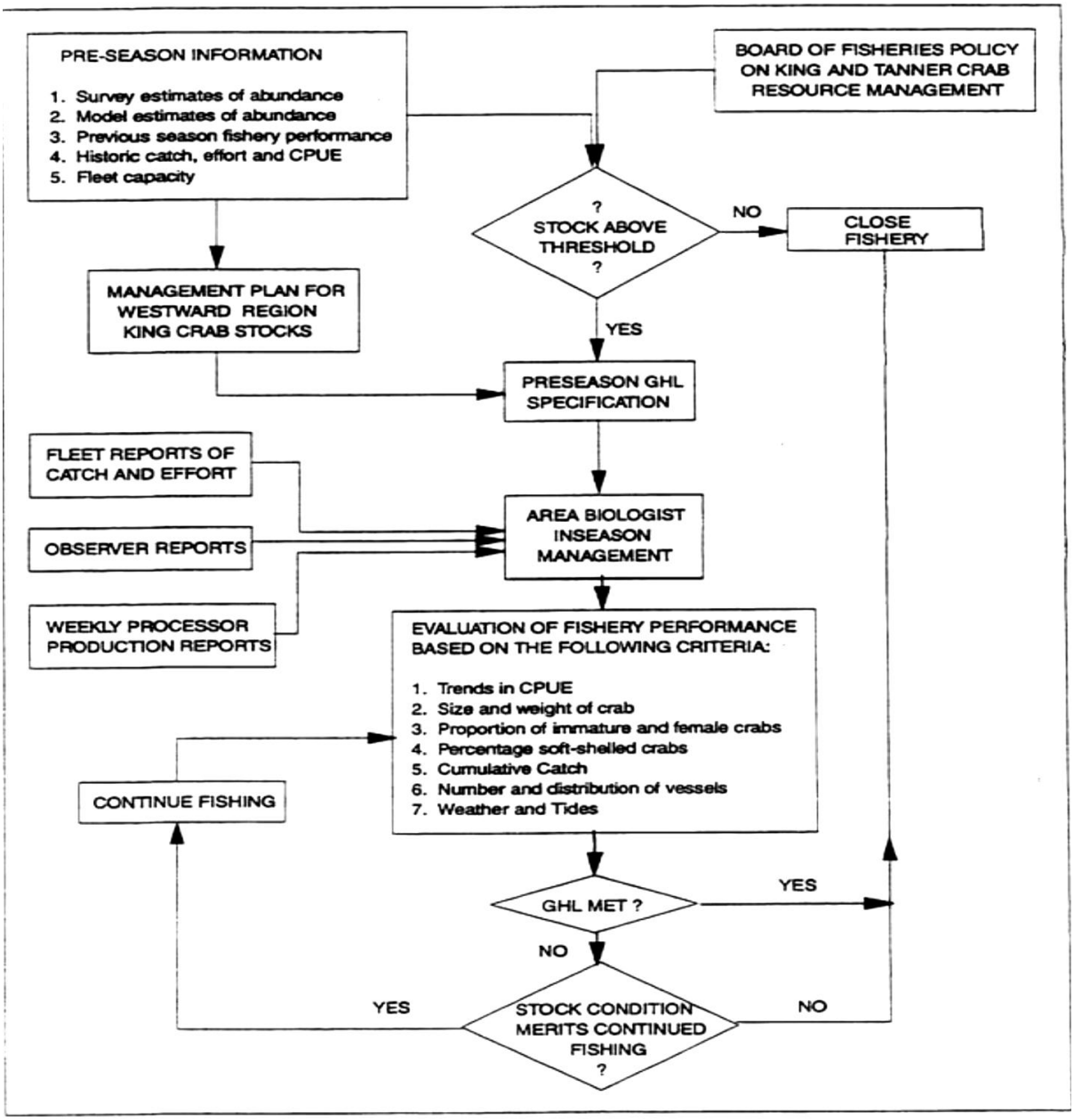
http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/KingTannerCrab-2012-2014.pdf

Harvest rate policy and catch limits management

The OFL is the catch level above which overfishing is occurring, and the harvest control rules aim to prevent overfishing by establishing a maximum fishing mortality threshold and using this threshold value to determine annual catch limits. The ABC is the level of annual catch that accounts for scientific uncertainty in the estimate of OFL and other uncertainties. The ABC is set below the OFL. The ACL is the level of catch that serves as the basis for invoking accountability measures, and for crab stocks the ACL is set at the ABC. The TAC is the annual catch target for the fishery which is set at or below the ACL and may take into account uncertainty in the management process and socio-economic factors, or other biological concerns that may affect the reproductive potential of the stock but that are not reflected in the OFL itself.

The status determination criteria for crab stocks are calculated on an annual basis using a five-tier system that accommodates varying levels of uncertainty of information, and incorporates new

scientific information providing a mechanism for continually improving the status determination criteria as more information becomes available. Under the system overfishing and overfished criteria and ABC (= ACL) levels are formulated. For crab stocks, the overfishing level equals MSY and is derived through the annual assessment process. Each crab stock is assessed annually to determine its status and if catch estimates exceed the OFL, then overfishing is occurring. If annual biomass estimates are below MSST (defined as 0.5 Bmsy) then the stock is overfished. If overfishing has occurred or the stock is overfished, the Magnuson-Stevens Act (MSA) requires NPFMC to immediately end overfishing and rebuild stocks. The MSA also requires that the FMP includes accountability measures to prevent ACLs from being exceeded and to correct overages if they do occur.



In-season management decision making by Alaska Department of Fish and Game (ADFG) 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.

Regulations

Individual fishing quota program

Crab Rationalization program components include quota share allocation, processor quota share allocation, IFQ and individual processing quota (IPQ) issuance, quota transfers, use caps, crab harvesting cooperatives, protections for Gulf of Alaska groundfish fisheries, arbitration system, monitoring, economic data collection, and cost recovery fee collection.

Under the individual fishing quota share system in place for the BSAI crab fishery, fishing capacity (vessels and gear) has been reduced. With the implementation of IFQs in the fishery, the derby type fishery was eliminated, seasons were extended and wastage was reduced in the crab fishery. Regulations in place address waste, discard, bycatch, and endangered species interactions in the halibut fisheries. The NMFS, and ADFG promulgate these regulations through the NPFMC, and the Alaska Board of Fisheries.
http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/KingTannerCrab-2012-2014.pdf

The Community Development Quota (CDQ) Program involves 65 communities within a fifty-mile radius of the Bering Sea coastline who are allocated a portion of the Bering Sea and Aleutian Island harvest of pollock, halibut, Pacific cod, crab and bycatch species.

Other regulations governing the crab fisheries include closed areas, seasonal closures, gear restrictions and pot limits, and size and sex limits.

Gear

Fishing gear is regulated to pot gear only (although crabs rings are mentioned in the regulations, they are not used). The size, construction and number of pots a vessel may fish are regulated. Mesh size and escape rings are utilized to reduce the capture of female and undersize crab.

Size limits

The BBRKC fishery is limited to males measuring six and one-half inches or greater in width of shell. The EBSSC fishery is limited to males measuring 3.1 inches or greater in width of shell, however a processor favoured width of four inches is generally used by the industry. The SMBKC fishery is limited to males measuring five and one-half inches or greater in width of shell.

Time restrictions

Seasons are established in regulation by the ADFG/ BOF. Open and closed periods, as well as fishing period limits are set in regulation. The crab fisheries are closed during peak spawning times.

Geographical closures

Regulations are in place to address discards of crab species caught as prohibited species in other fisheries. Gear modifications now in place in the Bering Sea flatfish fisheries require the use of bobbins on the trawl sweeps to reduce contact with the ocean floor and limit the mortality of any

crab encountered. Additional trawl closures for areas in the waters of Bristol Bay (19,000 sq mi), the Pribilof Island Habitat Conservation Area (7,000 sq mi), the Aleutian Island (277,000 sq mi), the Northern Bering Sea Research Area (85,000 sq mi), the Eastern Gulf of Alaska (53,000 sq miles) and Cook Inlet (7,000 sq mi) closed thousands of square miles of sea bottom to bottom trawling which provides a significant degree of refuge for crab species.

Observer program

Observers are required at 100% coverage for all catcher processor crab vessels. The SMBKC fishery also has 100% observer coverage. The BBRKC and EBSSC fisheries have 20% and 30% of registered vessel observer coverage, respectively. All vessels participating in Amendment 80 trawl fisheries in the BSAI are required to carry fishery observers for 100% of their fishing time. This allows for accurate in-season updates on crab PSC.

9. There shall be defined management measures designed to maintain stocks at levels capable of producing maximum sustainable levels.

FAO CCRF 7.1.8/7.6.3/7.6.6/8.4.5/8.4.6/8.5.1/8.5.3/8.5.4/8.11.1/12.10

FAO Eco 29.2bis

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

Summary

There is clearly defined harvest strategy that consists of a set of defined management measures designed to maintain the crab stocks at levels capable of producing maximum sustainable levels. These include harvest control rule, stock status definitions, criteria used to determine stock status using a five-tier system and the step-by-step framework under which the NPFMC sets final overfishing levels (OFLs) and acceptable biological catches (ABCs). Using this strategy and clearly laid out rebuilding plans, two of these stocks were rebuilt from being declared overfished.

The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." EFH are necessary to maintain stocks capable of producing maximum sustainable yields. At present, there is an area of overlap between current female red king crab distribution and areas where trawling occurs in the southern Bristol Bay. The NPFMC is currently researching this issue and in discussions about the best way to proceed with the management of this area.

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. 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.

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.

Gear modifications include increased mesh size, escape rings and biodegradable panels that reduce the number of female and sub-legal crab that are caught. Time and area closures protect spawning crab populations. Restrictions impressed upon other fisheries and gear groups are designed to minimize crab bycatch and protect the crab resource. These include areas closed to trawling, crab as a prohibited species in groundfish fisheries and gear modifications in the BSAI trawl fleet to reduce crab mortality.

BSAI King and Tanner crab SAFE 2012:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/SAFE/CrabSAFE/CrabSAFE2012.pdf

The NPFMC and the CPT have been in discussions over the 2010 5-year EFH review and its differences from the 2005 EFH EIS. A 2012 discussion paper addresses the measures already in place for protection of BBRKC EFH and additional measures for consideration. The 2010 CIE review of the Bristol Bay red king crab stock assessment model determined that a more descriptive understanding of the key temporal and spatial biological processes is necessary. Life history characteristics should include primiparous and multiparous mating locations and timing, hatching, larval period and movement, settlement period and location, growth at each stage, molt frequency and timing, time and size at maturity, and adult migration patterns. More specific understanding of these stages would promote a better understanding of habitat requirements and potential impacts of fishing on each stage. Such a conceptual model would help to interpret survey and model results as well as assess key bottlenecks in the life history to identify habitat fishery removal specific concerns.

The focus of two Council papers (both 2012 and 2013) included a discussion of the importance of southwestern Bristol Bay for red king crab populations, particularly an area southwest of Amak Island, and whether and how trawl fisheries in that area may be impacting the crab habitat. It was proposed that eggs released here have greater chance of survival through larval and juvenile life history stages due to oceanographic currents in this area and that the extent of the Bering Sea cold pool affects the distribution of ovigerous females and subsequently, the location of larval release. Given the potential redistribution of crab in the area southwest of Amak Island due to temperature changes, the Council also requested that the discussion paper look at the efficacy of existing red king crab protection areas, such as the Red King Crab Savings Area and the Nearshore Bristol Bay Trawl Closure, to see whether these closed areas are still providing both habitat and bycatch protection to red king crab. These studies are now in progress at the Council level.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/EFH/BBRKC_EFH212.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/EFH/BBRKC_EFH213.pdf

10. Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards and guidelines and regulations.

FAO CCRF 8.1.7/8.1.10/8.2.4/8.4.5

Evidence adequacy rating:

☑ High **☐ Medium** **☐ Low**

Rating determination

Summary

The North Pacific Fishing Vessel Owners association (NPFVO) provides a large and diverse training program. Training ranges from firefighting on a vessel, damage control, man- overboard, MARPOL, etc. The Alaska Marine Safety Education Association has trained more than 10,000 fishermen in marine safety and survival and a Coast Guard-required class on emergency drills. The Alaska Maritime Training Center is a United States Coast Guard (USCG) approved training facility located in Seward, Alaska, and offers USCG/STCW-compliant maritime training (STCW is the international Standards of Training, Certification, & Watchkeeping). In addition to the standard courses offered, customized training is available to meet the specific needs of maritime companies.

The University of Alaska Sea Grant Marine Advisory Program (MAP) provides education and training in several sectors, including fisheries management, in the form of seminars and workshops. MAP also conducts sessions of their Alaska Young Fishermen's Summit. Each Summit is an intense course in all aspects of Alaska fisheries, from fisheries management & regulation (e.g. MSA), to seafood markets & marketing. MAP provides training and technical assistance to fishermen and seafood processors in Western Alaska. A number of training courses and workshops were developed in cooperation with local communities and CDQ groups. Additional education is provided by the Fishery Industrial Technology Center, in Kodiak, Alaska.

The North Pacific Fishing Vessel Owners association (NPFVO) provides a large and diverse training program that many of the professional crew members must pass. Training ranges from firefighting on a vessel, damage control, man-overboard, MARPOL, and so on.

The State of Alaska, Department of Labor & Workforce Development (ADLWD) includes AVTEC (formerly called Alaska Vocational Training & Education Center, now called Alaska's Institute of Technology). One of AVTEC's main divisions is the Alaska Maritime Training Center. The goal of the Alaska Maritime Training Center is to promote safe marine operations by effectively preparing captains and crew members for employment in the Alaskan maritime industry.

The Alaska Maritime Training Center is a United States Coast Guard (USCG) approved training facility located in Seward, Alaska, and offers USCG/STCW-compliant maritime training (STCW is the international Standards of Training, Certification, & Watchkeeping). In addition to the standard courses offered, customized training is available to meet the specific needs of maritime companies. Courses are delivered through the use of their world class ship simulator, state of the art computer based navigational laboratory, and modern classrooms equipped with the latest instructional delivery technologies.

The Center's mission is to provide Alaskans with the skills and technical knowledge to enable them

to be productive in Alaska's continually evolving maritime industry. Supplemental to their on-campus classroom training, the Alaska Maritime Training Center has a partnership with the Maritime Learning System to provide mariners with online training for entry-level USCG Licenses, endorsements, and renewals.

The University of Alaska Sea Grant Marine Advisory Program (MAP) provides education and training in several sectors, including fisheries management, in the forms of seminars and workshops. In addition, MAP conducts sessions of their Alaska Young Fishermen's Summit (AYFS). Each Summit is an intense, 3-day course in all aspects of Alaska fisheries, from fisheries management & regulation, to seafood markets & marketing. The target audience for these Summits is young Alaskans from coastal communities. The 2012 AYFS was held Feb. 13 and 14 in Juneau, and the 2013 AYFS will be held in December in Anchorage. The two-day conference aimed at providing crucial training and networking opportunities for fishermen entering the business or wishing to take a leadership role in their industry. The event took advantage of the Juneau location by introducing participants to the legislative process, and introducing the fish caucus of the legislature to the issues and concerns of Alaska's emerging fishermen.

The Alaska Fisheries Business Assistance Project, Fishbiz**,** is a seafood business training and educational program for Alaska's seafood industry participants and dependent coastal communities. Fishbiz services focus on education, research and extension, and offers educational workshops, seminars, manuals and industry updates.

Finally, the Alaska Marine Safety Education Association (AMSEA) provides courses on small boating safety, drill conductor training, stability and damage control, ergonomics, dredger safety and survival at sea training.

Alaska Maritime Training Center: http://www.avtec.edu/AMTC.htm

Alaska Sea Grant Marine Advisory Program: http://seagrant.uaf.edu/map/

North Pacific Fishing Vessel Owner's Association: http://www.npfvoa.org/

Alaska Marine Safety Education Association: http://www.amsea.org/

http://www.stcw.org/
http://seagrant.uaf.edu/map/fishbiz/index.php
http://www.sfos.uaf.edu/fitc/academicprograms/
http://seagrant.uaf.edu/map/workshops/2013/ayfs/

E. Implementation, Monitoring and Control

11. An effective legal and administrative framework shall be established and compliance ensured through effective mechanisms for monitoring, surveillance, control and enforcement for all fishing activities within the jurisdiction.

FAO CCRF 7.1.7/7.7.3/7.6.2/8.1.1/8.1.4/8.2.1
FAO Eco 29.5

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination
Summary

There is a division of effort and emphasis in the at-sea enforcement between the USCG and the AWT. Under joint management there are both state and federal laws to enforce, and both state and federal agents actively conduct at-sea enforcement. The USCG is responsible for enforcing the main federal vessel regulations: this includes safety at sea, drug enforcement, vessel compliance with ESA and EFH requirements and assuring compliance of federal permits, observer coverage, licenses and VMS in the crab fisheries. While the AWT have vessels that conduct at-sea compliance with gear regulations, are capable of hauling and confiscating crab pots, sample crab harvests at sea to assure sex and size requirements are met and assure that the vessels have all required state and federal licenses. From October 1 through March 31 each year the E/V Stimson and E/V Woldstad each spend 60 days conducting joint patrols inspecting crab and Pacific cod vessels, and Village Public Safety visits. Additionally AWT, along with ADFG area biologists and technicians, conduct vessel inspections dockside, conducting hold inspections and observing offloads of harvested crab for compliance.
The entire crab harvests are conducted in Alaskan waters by American vessels. No foreign fleet is allowed to fish in the Alaska's EEZ. All fishing vessels must be at least 75% U.S. ownership. Because the fishery was rationalized in 2005, most enforcement of IFQ/IPQ violations, as well as size, sex and season violations occur at offloading.

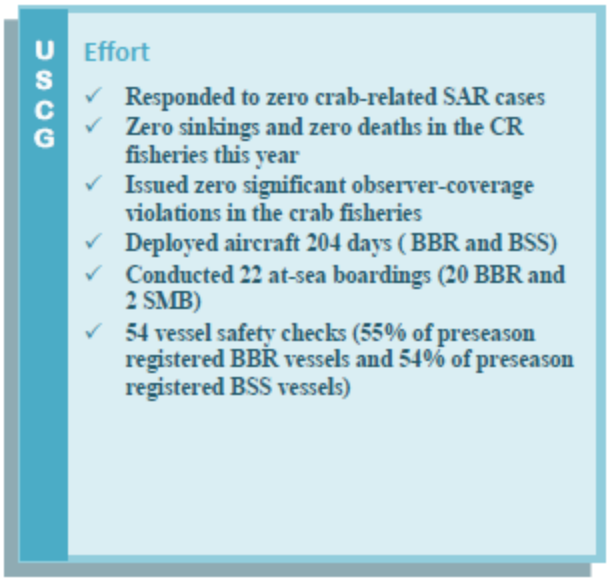
The NMFS Office of Law Enforcement with use of the United States Coast Guard's at-sea platforms is primarily responsible for enforcing crab regulations at sea, while the NMFS Office of Law Enforcement and the State of Alaska's Division of Wildlife Troopers (AWT) have that responsibility ashore. AWT spends about 90% of their effort doing dockside enforcement of offloaded crab (although The AWT vessel E/V Stinson also does at-sea enforcement, checking gear and catch for legal specification). The U.S. Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE) enforce Alaska fisheries laws and regulations, especially 50CFR679.

USCG

The U.S. Coast Guard (USCG) is the lead federal maritime law enforcement agency for enforcing national and international law on the high-seas, outer continental shelf and inward from the U.S. Exclusive Economic Zone (EEZ) to inland waters. The USCG also patrols US waters to reduce foreign poaching, and inspects fishing vessels for compliance with safety requirements.
The year-end report for the USCG activity in the 2012 commercial BSAI crab fisheries listed 6

boardings in the snow crab fishery, 12 boardings in the RKC fishery and 4 boardings in the SMBKC fishery. Helicopters were transferred to stations closer to where the fisheries occur for both enforcement and safety.

Summary of USCG effort during the 2011/12 EBS crab season



http://alaskafisheries.noaa.gov/ram/crab/1112crabrpt.pdf

NMFS OLE

NOAA Office of Law Enforcement Special Agents and Enforcement Officers perform a variety of tasks associated with the protection and conservation of the nation's living marine resources. In order to enforce these laws, OLE special agents and enforcement officers use OLE patrol vessels to board vessels fishing at sea, and conduct additional patrols on land, in the air and at sea in conjunction with other local, state and Federal agencies. OLE has responsibility for enforcement of the crab rationalization program. . In addition, OLE's officers inspect and cross check at landings and processors records for reconciliation, and closely monitor Prohibited Species Catch in non-crab fisheries.

In any given year, OLE Agents and Officers spend an average 10,000-11,000 hours conducting patrols and investigations, and an additional 10,000-11,000 hours on outreach activities. The OLE maintains 19 patrol boats around the country to conduct a variety of patrols including Protected Resources Enforcement Team (PRET) boardings, protection of National Marine Sanctuaries and various undercover operations.

OLE Special Agents and Enforcement Officers conduct complex criminal and civil investigations, board vessels fishing at sea, inspect fish processing plants, review sales of wildlife products on the internet and conduct patrols on land, in the air and at sea. NOAA Agents and Officers can assess civil penalties directly to the violator in the form of Summary Settlements (SS) or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation (GCEL).

GCEL can then assess a civil penalty in the form of a Notice of Permit Sanctions (NOPs) or Notice of Violation and Assessment (NOVAs), or they can refer the case to the U.S. Attorney's Office for criminal proceedings. For perpetual violators or those whose actions have severe impacts upon the resource criminal charges may range from severe monetary fines, boat seizures and/or imprisonment may be levied by the United States Attorney's Office.

Alaska Division: NMFS OLE 2013 Enforcement Priorities

Magnuson-Stevens Act

HIGH PRIORITY

• Observer assault, harassment, or interference violations.
• Felony and major civil cases involving significant damage to the resource or the integrity of management schemes.
• Commercialization of sport-caught or subsistence halibut.
• Maritime Boundary Line incursions by foreign fishing or transport vessels.
• Outreach and education.

MEDIUM PRIORITY

• Misdemeanor and civil cases involving observer coverage violations.
• Closed Area/VMS Violations, ongoing.
• Commercial vessel incursions into closure areas or other Marine Protected Areas.
• Recordkeeping and reporting violations that impact data consistency or integrity.
• Violations involving lesser damage to the resource or the integrity of management schemes.

LOW PRIORITY

• Catch Reporting and Trip Limits.
• Noncompliance with trip and cumulative limits, and record keeping requirements for landings of federally managed marine species, and specifically catch share programs.
• Gear Violations.
• Deployment of unlawful gear utilized in commercial fisheries under NOAA's jurisdiction.
• Lesser permit violations.

Endangered Species Act and Marine Mammal Protection Act

HIGH PRIORITY

• Violations wherein responsible subject and species are identifiable.
• Lethal Takes, Level "A" Harassment with the potential to injure marine mammal stock.
• Species of interest are Cook Inlet Beluga, other whale species, Northern fur seal, or Steller sea lion.
• Any violation involving injury or potential injury to people, such as a vessel-whale collision.
•Outreach and education.

MEDIUM PRIORITY

• Non-lethal takes, Level "B" Harassment with the potential to disturb a marine mammal stock in the wild by causing a disruption of behavioral patterns including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.
• Species is threatened rather than endangered.

LOW PRIORITY

• Violations wherein responsible subject is not identifiable.
• Injured or dead animal cannot be located.
• Objective evidence is not obtainable.
• Takes of individual marine mammal species that appear consistent with legal harvest by Alaska Natives.

International/Lacey Act

HIGH PRIORITY

• Felony and major civil violations. For example, interstate or foreign trafficking of commercial quantities of illegally harvested fish or marine resources.
• Harvest or transhipment of marine resources by foreign fishing vessels.
• Domestic or international violations involving seafood safety; substantive mislabeling of product in domestic or international commerce.
• IUU listed vessels.

MEDIUM PRIORITY

• Misdemeanor and civil violations. For example, interstate or foreign trafficking of small quantities of illegally harvested fish or marine resources.
• Mislabeling violations.
• IUU identified product.

LOW PRIORITY

• Minor mislabeling violations.
• Violations wherein responsible subject/vessel not identifiable.

AWT

The C Detachment of the Alaska Wildlife Troopers covers the Island of Kodiak, King Salmon, Dillingham, and the Aleutian Islands. Detachment headquarters is located in Kodiak and under the command by a Lieutenant, Sergeants in Dutch Harbor, King Salmon, and Kodiak assist with the overall supervision of this region. Posts within the region include: Dutch Harbor, Kodiak, Dillingham, King Salmon, Iliamna, and Cold Bay (Seasonal Posting).
Currently the detachment has 11 commissioned Wildlife Troopers, two Boat Officer IVs, three Boat Officer III's , two Boat Officer I's, two Vessel Technician II's, Administrative Clerk II and III, and four Public Safety Technician II's.

This detachment has enforcement responsibility for Commercial Fisheries in Salmon, Herring, Crab, and Groundfish in areas that contain some of the nation's richest fisheries, such as the Bering Sea Crab fisheries and Bristol Bay Red Salmon, and in areas that can produce some of the world's most severe weather.
The detachment operates most of the Departments large patrol vessels:

- P/V Stimson 156 foot – Dutch Harbor
- P/V Cama'i 65 foot- Kodiak
- P/V Woldstad 121 foot- Kodiak
- P/V Kvichak 32 foot- King Salmon

<u>Crab Observer Program</u>
Since 1988 ADFG has required varying levels of observer coverage aboard vessels participating in the

BAI crab fisheries. The ADFG Observer report for 2010/2011 summarizes commercial crab fisheries by crab observers deployed on floating-processor vessels, catcher-processor vessels, and catcher vessels and provides historical data for comparison. Primary data summaries include estimates of CPUE and information about size and shell condition of both captured and retained crabs. Further information include catch rates by soak time & depth, female reproductive condition, sampled pot lift locations, species composition of sampled pot lifts, total legal tally results.

Dockside inspections

Crab information is mainly collected through a dockside sampling program. Dockside samplers (port samplers), ADFG staff, provide an independent data source for assessing the accuracy of the CPUE estimates for retained legal crab. They will also call AWT if an inspection has spotted a violation. ADFG technicians and Wildlife Troopers also perform pot and vessel holding tank inspections prior to each fishing season.

Vessel Monitoring System

Any vessel used to harvest crab in the rationalized crab fisheries must have a functioning VMS transmitter on board. The VMS must be transmitting when the following three conditions are met:
1) the vessel is operating in any reporting area off Alaska; and,
2) the vessel has crab pots or crab pots hauling equipment, or a crab pot launcher onboard; and,
3) the vessel has (or is required to have) a Federal Crab Vessel Permit (FCVP).
NMFS'OLE is able to detect through the VMS signal whether a boat is fishing or transiting in an area and through those data they base much of their enforcement decisions to act against a potential offenses.

The NOAA Fisheries VMS database was an invaluable tool for the USCG this crab-fishing year. Although the BBRKC fleet is relatively contained within the "RKC Savings Area," positional information allowed USCG cutters and aircraft effective preparation for Search and Rescue (SAR). VMS was even more important during the EBSSC fishery due to fleet use of a much greater geographic area than for BBRKC. The trend toward fewer vessels distributed over a larger area necessitates future VMS use for SAR planning and response. During 2011/12 the USCG issued no violations for inoperative VMS units.

Logbooks

Logbooks are also mandatory. These include:
1) The Daily Fishing Log (DFL), which must be maintained by the operator of a catcher vessel using pot gear to harvest CR crab from the BSAI; and,
2) The Daily Cumulative Production Log (DCPL), which must be maintained by the operator of a CV vessel using pot gear to harvest CR crab from the BSAI.

http://dps.alaska.gov/AWT/detachments.aspx
www.nmfs.noaa.gov/ole/ak_alaska.html
www.uscg.mil/d17/
http://elandings.alaska.gov/
http://www.gc.noaa.gov/enforce-office3.html
http://www.nmfs.noaa.gov/ole/docs/2013/ole-division-priorities-2013-final.pdf
http://www.nmfs.noaa.gov/ole/investigations.html

12. There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations.

FAO CCRF 7.7.2/8.2.7

Evidence adequacy rating:

☑ **High** ☐ **Medium** ☐ **Low**

Rating determination

Summary

In Alaska waters, enforcement policy section 50CFR600.740 states: (a) The MSA provides four basic enforcement remedies for violations, in ascending order of severity, as follows: (1) Issuance of a citation (a type of warning), usually at the scene of the offense (see 15 CFR part 904, subpart E). (2) Assessment by the Administrator of a civil money penalty. (3) For certain violations, judicial forfeiture action against the vessel and its catch. (4) Criminal prosecution of the owner or operator for some offenses. The MSA treats sanctions against the fishing vessel permit to be the carried out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator. The 2011 Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions issued by NOAA Office of the General Counsel – Enforcement and Litigation, provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA.

The Marine Division of AWT and the State of Alaska Department of Law pursue a very aggressive enforcement policy. They attend the BOF and are integral into the process for regulation formulation and legislation, analogous to the USCG attendance and input in the Council process. AWT has Statutory / Regulatory legislation pertaining to their Authority.

The Magnuson-Stevens Act provides four basic enforcement remedies for violations (50CFR600.740 Enforcement policy).

(1) Issuance of a citation (a type of warning), usually at the scene of the offense (see 15 CFR part 904, subpart E).

(2) Assessment by the Administrator of a civil money penalty.

(3) For certain violations, judicial forfeiture action against the vessel and its catch.

(4) Criminal prosecution of the owner or operator for some offenses.

In some cases, the Magnuson-Stevens Act requires permit sanctions following the assessment of a civil penalty or the imposition of a criminal fine. In sum, the Magnuson-Stevens Act treats sanctions against the fishing vessel permit to be the carrying out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator.

Magnuson-Stevens Penalty Matrix

	Level of Intent			
Harm to the Resource or Regulatory Program, Offense Level	A Unintentional	B Negligent	C Reckless	D Willful
I	Written warning-$1,000	Written warning-$1,500	Written warning-$2,000	Written warning-$2,500
II	Written warning-$2,000	$2,000-$5,000	$5,000-$10,000	$10,000-$15,000
III	$2,000-$5,000	$5,000-$10,000	$10,000-$15,000	$15,000-$25,000
IV	$5,000-$15,000	$15,000-$25,000	$25,000-$50,000 and permit sanction of 10-20 days*	$50,000-$80,000 and permit sanction of 20-60 days*
V	$15,000-$25,000	$25,000-$50,000 and permit sanction of 10-20 days*	$50,000- $80,000 and permit sanction of 20-60 days*	$60,000- $100,000 and permit sanction of 60-180 days*
VI	$25,000-$50,000	$50,000-$80,000 and permit sanction of 20-60 days*	$60,000-$100,000 and permit sanction of 60-180 days*	$100,000-statutory maximum and permit sanction of 1 year-permit revocation*

http://www.nmfs.noaa.gov/sfa/reg_svcs/Councils/ccc_2011/Tab%20L%20-%20Enforcement%20Issues/Enforcement%20Issues.pdf

in the "Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions" issued by NOAA Office of the General Counsel – Enforcement and Litigation - March 16, 2011. This Policy provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA. The purpose of this Policy is to ensure that: (1) civil administrative penalties and permit sanctions are assessed in accordance with the laws that NOAA enforces in a fair and consistent manner; (2) penalties and permit sanctions are appropriate for the gravity of the violation; (3) penalties and permit sanctions are sufficient to deter both individual violators and the regulated community as a whole from committing violations; (4) economic incentives for noncompliance are eliminated; and (5) compliance is expeditiously achieved and maintained to protect natural resources. Under this Policy, NOAA expects to improve consistency at a national level, provide greater predictability for the regulated community and the public, improve transparency in enforcement, and more effectively protect natural resources.

For significant violations, the NOAA attorney may recommend charges under NOAA's civil administrative process (*see* 15 C.F.R. Part 904), through issuance of a Notice of Violation and Assessment of a penalty (NOVA), Notice of Permit Sanction (NOPS), Notice of Intent to Deny Permit (NIDP), or some combination thereof. Alternatively, the NOAA attorney may recommend that there is a violation of a criminal provision that is sufficiently significant to warrant referral to a U.S. Attorney's office for criminal prosecution.

http://www.noaanews.noaa.gov/stories2011/pdfs/Penalty%20Policy%20--%20FINAL.pdf

NOAA's OLE Agents and Officers can assess civil penalties directly to the violator in the form of

Summary Settlements (SS) or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation (GCEL). GCEL can then assess a civil penalty in the form of a Notice of Permit Sanctions (NOPs) or Notice of Violation and Assessment (NOVAs), or they can refer the case to the U.S. Attorney's Office for criminal proceedings. For perpetual violators or those whose actions have severe impacts upon the resource criminal charges may range from severe monetary fines, boat seizures and/or imprisonment may be levied by the United States Attorney's Office.
There are very few repeat offenders. Sanctions include the possibility of temporary or permanent revocation of fishing privileges. Withdrawal or suspension of authorization to serve as master or an officer of a fishing vessel are also among the enforcement options. Within the USA EEZ, penalties can range up through forfeiture of the catch to forfeiture of the vessel, including financial penalties and prison sentences.

50CFR600.740 Enforcement policy
http://www.nmfs.noaa.gov/ole/investigations.html

The Marine Division of AWT and the State of Alaska Department of Law pursue a very aggressive enforcement policy. They attend the BOF and are integral into the process for formulation or legislation, analogous to the USCG attendance and input in the Council process. AWT has Statutory / Regulatory legislation pertaining to their Authority: AS 16 Fish & Game, 5AAC Fish & Game, 20 AAC Commercial Fishing, AS 11 Criminal, AS 46 Environment, AS 44 State Government, AS 02 Aeronautics, AS 18 Health & Safety. A State violation is a criminal violation (strict liability).
AWT: http://housemajority.org/coms/hres/27/AWT_Fisheries_Enforcement.pdf

Finally, the cooperation of citizens and industry is cultivated through programs such as AWT's Fish & Wildlife Safeguard program, which encourages the reporting of violations, and "leverages" the range of enforcers.
http://dps.alaska.gov/AWT/safeguard.aspx

F. Serious Impacts of the Fishery on the Ecosystem

13. Considerations of fishery interactions and effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified and using a risk based management approach for determining most probable adverse impacts. Adverse impacts on the fishery on the ecosystem shall be appropriately assessed and effectively addressed.

FAO CCRF 7.2.3/8.4.7/8.4.8/12.11

Eco 29.3/31

Evidence adequacy rating:

☑ High **☐ Medium** **☐ Low**

Rating determination

Summary

The purpose of the Crab Ecosystem Considerations and Indicators (CECI) report is to consolidate ecosystem information specific to the crab stocks in the BSAI FMP. The last EFH review (2010) identified impacts of trawling on EFH habitat of red king Crab in Southern Bristol Bay as a potential problem area. The NPFMC is addressing the issue.

In the BSAI crab fisheries Final Environmental Impact Statement (EIS), the impact of pot gear on benthic Eastern Bering Sea species is discussed. The total portion of the EBS impacted by commercial pot fishing may be less than 1% of the shelf area and the report concludes that BSAI crab fisheries have an insignificant effect on benthic habitat. Habitat protection areas, prohibited species caps (PSC) and crab bycatch limits are in place to protect important benthic habitat for crab and other resources and to reduce crab bycatch in the trawl and fixed gear groundfish fisheries. If PSC limits are reached in bottom trawl fisheries executed in specific areas, those fisheries are closed.

The EBS crab fisheries catch a small amount of other species as bycatch. A limited number of groundfish, such as Pacific cod, Pacific halibut, yellowfin sole, and sculpin are caught in the directed pot fishery. The invertebrate component of bycatch includes echinoderms, snails, non-FMP crab, and other invertebrates. As noted in the Endangered Species Act EIS report, crab fisheries do not adversely affect ESA listed species, destroy or modify their habitat, or comprise a measurable portion of their diet.

Based on food habits data collected in the summer months during the annual EBS bottom trawl survey, Pacific cod, Pacific halibut and skates are the primary predators of large or legal size crab although legal-sized crab are a minimal component of these predators diets. The short and long term effects of removing large male crab from a population are not well understood and may vary by species and population as outlined in various scientific studies. Such studies are ongoing.

The Ecosystem Considerations report is produced annually for the North Pacific Fishery Management Council as part of the Stock Assessment and Fishery Evaluation (SAFE) report. The goal of the Ecosystem Considerations report is to provide an overview of marine ecosystems in Alaska through ecosystem assessments and tracking time series of ecosystem indicators. The ecosystems under consideration include the eastern Bering Sea, the Aleutian Islands, and the Gulf of Alaska. This year, the report includes a preliminary Arctic ecosystem assessment.

BSAI King and Tanner crab SAFE 2012:
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/resources/SAFE/CrabSAFE/CrabSAFE2012.pdf
http://www.afsc.noaa.gov/REFM/docs/2012/ecosystem.pdf

Impacts of fishing gear on the habitat

Pot gear is considered a passive gear (not towed). There are no serious, irreversible concerns of crab pot gear interaction on the habitat that are presented in the recent (2010) NPFMC Essential Fish Habitat review. However, there is potential for other gear types to impact crab habitat, such as bottom trawls and dredges could disrupt nursery and adult feeding areas.

http://www.fakr.noaa.gov/habitat/efh/review/efh_5yr_review_sumrpt.pdf
http://alaskafisheries.noaa.gov/habitat/efh/review/appx3.pdf

Essential Fish Habitat

The NPFMC and the CPT have been in discussions over the 2010 5-year EFH review and its differences from the 2005 EFH EIS. A 2012 discussion paper addresses the measures already in place for protection of BBRKC EFH and additional measures for consideration. The 2010 CIE review of the Bristol Bay red king crab stock assessment model determined that a more descriptive understanding of the key temporal and spatial biological processes is necessary. Life history characteristics should include primiparous and multiparous mating locations and timing, hatching, larval period and movement, settlement period and location, growth at each stage, molt frequency and timing, time and size at maturity, and adult migration patterns. More specific understanding of these stages would promote a better understanding of habitat requirements and potential impacts of fishing on each stage. Such a conceptual model would help to interpret survey and model results as well as assess key bottlenecks in the life history to identify habitat fishery removal specific concerns.

The focus of the papers (both 2012 and 2013) included a discussion of the importance of southwestern Bristol Bay for red king crab populations, particularly an area southwest of Amak Island, and whether and how trawl fisheries in that area may be impacting the crab habitat. It was proposed that eggs released here have greater chance of survival through larval and juvenile life history stages due to oceanographic currents in this area and that the extent of the Bering Sea cold pool affects the distribution of ovigerous females and subsequently, the location of larval release. Given the potential redistribution of crab in the area southwest of Amak Island due to temperature changes, the Council also requested that the discussion paper look at the efficacy of existing red king crab protection areas, such as the Red King Crab Savings Area and the Nearshore Bristol Bay Trawl Closure, to see whether these closed areas are still providing both habitat and bycatch protection to red king crab. These studies are now in progress at the Council level.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/EFH/BBRKC_EFH212.pdf
http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/conservation_issues/EFH/BBRKC_EFH213.pdf

Regulations

Regulations are in place to address waste, discard, bycatch, and endangered species interactions in the crab fisheries. The NMFS and ADFG promulgate these regulations through the NPFMC, and the Alaska Board of Fisheries. Gear requirements and restrictions set limits for the size of pots, presence

of escape rings and bio-degradable mesh and mesh sizes.

General spawning areas have been mapped in Alaska. Crab fisheries are closed during peak spawning times, by regulation. The NPFMC has established Marine Protected Areas that benefit juvenile fish and adult spawners. Additional trawl closures for areas in the Bering Sea, AI and GOA provide a significant degree of refuge for crab species.

Fishery	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
BBRKC	Molting/mating and spawning period										BB fishery open	
EBSSC		Bering Sea fishery open				Molt/mate/spawn						
SMBKC	Molting/ mating and spawning period								SM fishery open			

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.

Bycatch data

In order to avoid exceeding stock ABC/ACLs, ADFG must account for all possible sources of fishery mortality when establishing TACs for the state-managed BSAI crab fisheries. BSAI crab stocks are susceptible to three principal sources of fishery mortality: retained catch and bycatch during the directed fishery, bycatch mortality during other state-managed crab fisheries, and bycatch mortality during federally-managed groundfish fisheries. All those sources of fishery mortality are forecast with uncertainty. However, ADFG can forecast the mortality during crab fisheries with greater confidence than it can forecast the mortality during federal groundfish fisheries because ADFG establishes the TACs for the crab fisheries, has access to extensive observer data on crab bycatch during crab fisheries that can be used to estimate bycatch as a function of retained catch, and has the ability to close areas to crab fishing that have potential for high crab bycatch. On the other hand, ADFG has no control over the bycatch mortality that occurs during the federal groundfish fisheries and no means for forecasting bycatch mortality in groundfish fisheries except for the estimates of bycatch mortality in past years. To accommodate the uncertainty on bycatch mortality in groundfish fisheries when establishing TACs, ADFG has assumed that the maximum of the annual bycatch mortality due to groundfish fisheries in the previous 20 years could occur.

The NPFMC was delivered a problem statement regarding crab bycatch in October of 2011. Total catch overfishing levels (OFLs) are specified annually for the ten crab stocks included in the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (FMP); these OFLs account for all sources of fishing mortality including directed crab fishery discards and bycatch mortality caused by groundfish, scallop, and Pacific halibut fisheries. Requirements to comply with Annual Catch Limits (ACLs), addressing uncertainty in OFL estimates, include Accountability Measures (AMs) that trigger a management action if an ACL is exceeded.

Crab bycatch in the directed crab and scallop fisheries is controlled by the State of Alaska, however current management structure does not link the crab and groundfish FMPs; if a crab ACL is exceeded due to bycatch mortality in a groundfish fishery the resulting AM would reduce directed crab fishery harvest the following year. Crab bycatch management measures were first adopted for BSAI groundfish trawl fisheries in 1986. These measures, established in the BSAI groundfish FMP, consist of triggered or fixed time and area closures and prohibited species catch (PSC) limits; PSC limits

apply only to Bristol Bay red king, Bering Sea Tanner, and Bering Sea snow crab. There are no PSC limits for the remaining seven FMP crab stocks and the existing closure areas do not circumscribe the full distributional range of stocks they are intended to protect, thereby allowing bycatch mortality to occur without accrual towards PSC limits. Furthermore no bycatch management measures are imposed on the fixed gear groundfish or Pacific halibut sectors. In order to address crab bycatch in the BSAI groundfish fisheries the BSAI groundfish FMP must be amended.

Potential alternatives for the FMP Amendment:

Alternative 1 - No action
Maintain existing crab PSC limits and closure areas.

Alternative 2 - Variable PSC limits
Crab PSC limits would be set annually based on crab abundance.
Components with options for Alternative 2 (Note: different components may be chosen for each FMP crab stock):

1.) Component 1: Closure areas
    a) Existing closure areas
    b) Expand triggered closure areas to include full distribution of each crab stock

    Option: Triggered closure areas encompassing distribution of vulnerable size/sex components of crab stock
2.) Component 2: Timing of closure areas
    a) Fixed
        i. Year-round
        ii. Seasonal

    Option: based on vulnerable life history or gear susceptibility

    b) Triggered
        iii. Full
        iv. Stair-stepped (area closed expands as bycatch triggers are reached)
3.) Component 3: Groundfish sectors/target fisheries included
    a) All trawl sectors
    b) All fixed gear sectors
    c) Halibut IFQ
4.) Component 4: Accountability measures
    a) Crab bycatch would accrue inseason towards groundfish sector PSC limit and an overage would trigger accountability measures during the subsequent season or year for that groundfish sector
5.) Component 5: Catch accounting issues
    a) Account for PSC limit accrual against time/area closure thresholds on a crab fishing year (June-May)

    b) Account PSC limit accrual against time/area closure thresholds on a groundfish fishing year (January - December)

Stock	Area	Gear type	Timing	For trigger closures		
				Allocation by sector or target fishery in 2013	How catch accrues	2013 PSC limit
Bristol Bay red king crab	Red King Crab Savings Area	nonpelagic trawl	closed year-round, except subarea			
	Nearshore Bristol Bay Trawl Closure	nonpelagic trawl	closed year-round, except Togiak subarea open 4/15-6/15			
	Zone 1	all trawl	when limit is reached, area closes to target fishery	Amd. 80 sector yellowfin sole Pacific cod pollock/mackerel/ other species	RKC bycatch in Zone 1, by fishery	97,000 allocated among target fisheries
EBS Tanner crab	Zone 1	all trawl	when limit is reached, area closes to target fishery	Amd. 80 sector yellowfin sole rockfish Pacific cod pollock/mackerel/ other species	Tanner crab bycatch in Zone 1, by fishery	980,000 allocated among target fisheries
	Zone 2	all trawl	when limit is reached, area closes to target fishery	Amd. 80 sector yellowfin sole rockfish Pacific cod pollock/mackerel/ other species	Tanner crab bycatch in Zone 2, by fishery	2,970,000 allocated among target fisheries
Pribilof Islands blue king crab	Pribilof Islands Habitat Conservation Area	all trawl	year-round			
EBS snow crab	*C. opilio* Bycatch Limitation Zone (COBLZ)	all trawl	when limit is reached, area closes to target fishery	Amd. 80 sector yellowfin sole rockfish Pacific cod pollock/mackerel/ other species	Snow crab bycatch in the COBLZ, by fishery	10,501,333 allocated among target fisheries
	Northern Bering Sea Research Area	nonpelagic trawl	currently year-round; fishing may resume in future under a research plan			
St Matthew blue king crab	St Matthew Island Habitat Conservation Area	nonpelagic trawl	year-round			

Summary of groundfish management measures to address crab bycatch in the trawl fisheries.

NPFMC staff suggests prioritization, the stocks for which the State faces the most challenges in TAC setting should likely be addressed first as these are the ones with the highest variability in bycatch and difficulties in projecting bycatch estimates. Stock status however, plays a very important role in the ability to adequately account for relative removals in the groundfish fisheries. In recent years, the two stocks which have been the most problematic for estimating bycatch needs are the EBS Tanner crab stock and the St. Matthew blue king crab stock. For Tanner crab the existing trawl measures, as shown in Table 5 appear to comprise the majority of the trawl bycatch but a significant contribution to the overall bycatch occurs in the fixed gear fisheries for which there are no measures. While there are no limits for the St. Matthew blue king crab stock, trawl bycatch is generally minimal and fixed gear (especially pot gear) bycatch can be significant in some years. Measures to limit fixed gear bycatch for both stocks (Tanner crab, St. Matthew blue king crab) could be considered.

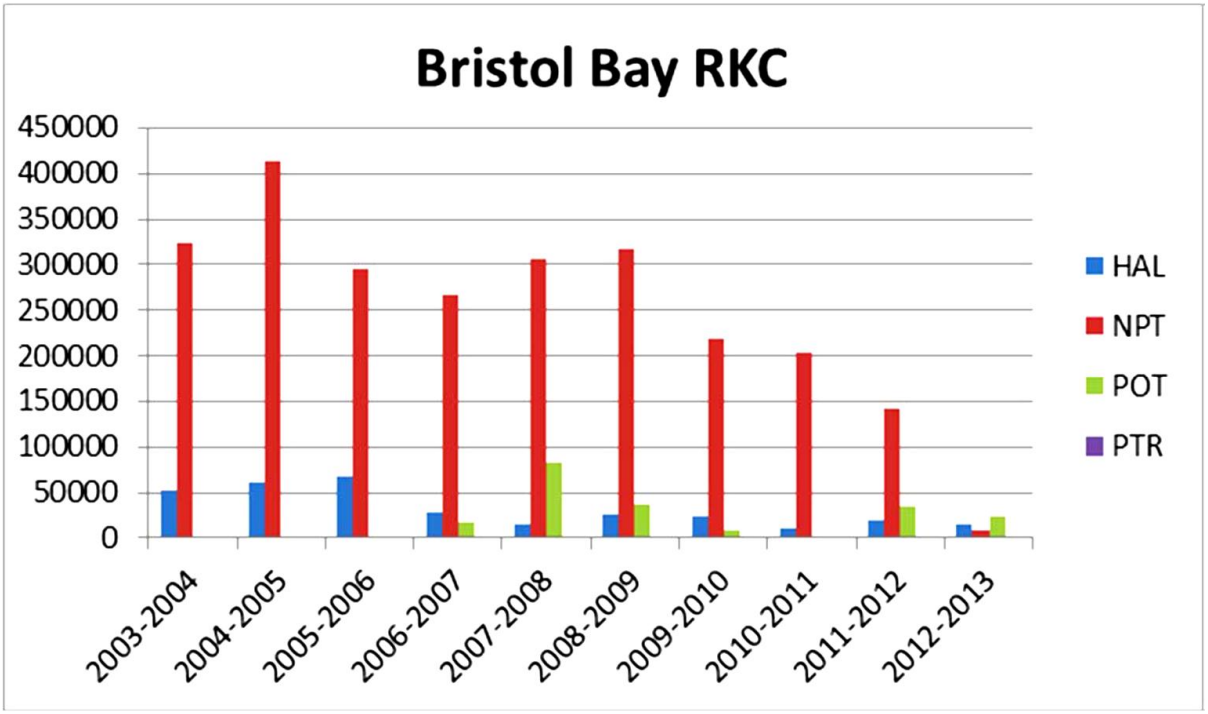
With stock status declines, the relative bycatch assumption becomes increasingly important. Currently the Bristol Bay red king crab stock has been declining while snow crab has been increasing.

The limit for Bristol Bay red king crab is specified on threshold levels of stock abundance and trawl bycatch consistently makes up the largest proportion of overall groundfish bycatch, however in some years fixed gear bycatch can be significant. For snow crab the COBLZ closure and trawl catch comprises 88-98% of the total trawl bycatch but fixed gear bycatch can also comprise a significant portion (up to 49%) of the bycatch in some years. Additional measures to limit fixed gear bycatch for both stocks (Bristol Bay red king crab and snow crab) could be considered.

Summary of information availability by crab stock, current management measures and bycatch by gear type between 2003/04 – 2011/12 as a proportion of the 2012/13 ABC.

Stock	Abundance estimate	Current fishery	Existing Bycatch controls	Trawl bycatch mortality as % of ABC	Fixed gear mortality as % of ABC	Assumption in TAC-setting
Bristol Bay red king crab	√	√	Trawl PSC limits and closure area	0.72%-2.10%	0.19%-0.35%	Maximum mortality in last 20 years (0.84 million pounds)
EBS Tanner crab	√		Trawl PSC limits	1.25%-2.15%	0.55%-2.93%	Varies based upon estimates of needs in the snow crab fishery
EBS snow crab	√	√	Trawl PSC limits	0.20%-1.14%	0.04%	Depends on stock status and buffer below ABC
St. Matthew blue king crab	√	√	Bottom Trawl closure area	0.02%-0.05%	0.08%-7.09%	Maximum mortality in last 20 years (0.077 million pounds)

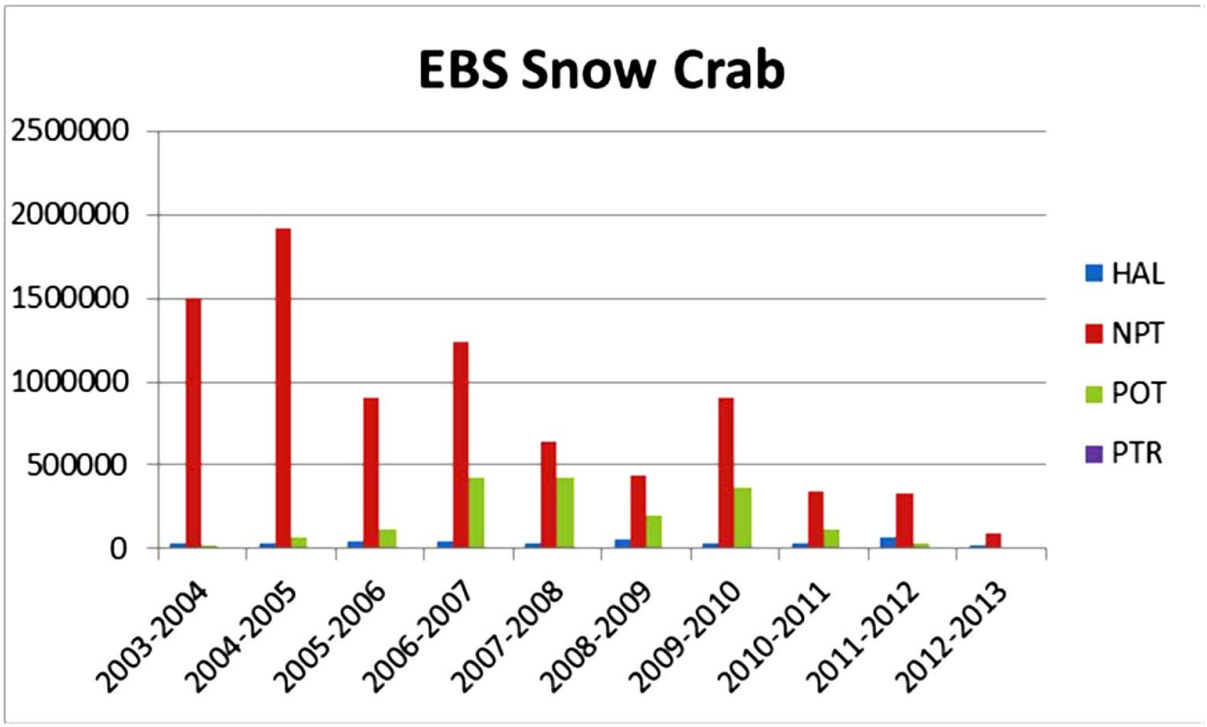
BBRKC



Bycatch of BBRKC by gear type in weight in pounds (where HAL=halibut longline, NPT=non-pelagic trawl, POT= pot gear and PTR= pelagic trawl)

The State has assumed the maximum amount of bycatch mortality by groundfish fisheries for this stock (maximum since 1990) at 0.84 million pounds. For 2013 this represents 5.3% of the ABC of 15.80 million pounds. There are several management measures under the FMP to protect Bristol Bay red king crab stocks and habitat. These are fixed closures (RKC Savings Area) and a triggered time/area closure to trawl gear (Nearshore BB Trawl Closure). No additional bycatch management measures are currently in place for fixed gear or bycatch outside of the designated areas.

EBSSC



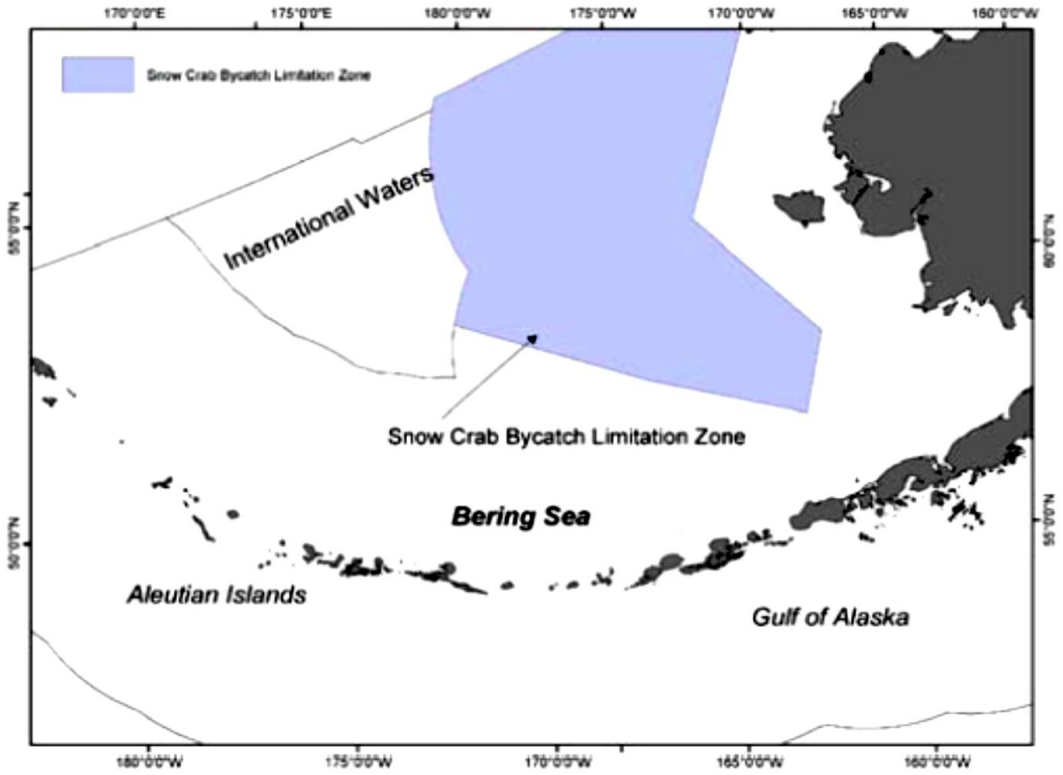
Bycatch of snow crab by gear type in weight (pounds) (where HAL=halibut longline, NPT=non-pelagic trawl, POT= pot gear and PTR= pelagic trawl)

The majority of the bycatch occurs consistently in the non-pelagic trawl fisheries, specifically in the yellowfin sole, flathead sole and rock sole fisheries as well as the Pacific cod trawl fishery. Of the fixed gear fisheries, the highest amounts of bycatch on average are in the Pacific cod pot and hook and line fisheries.

In recent years bycatch in the groundfish fishery has not been a significant concern for the State in setting the snow crab TAC due to the buffer between the TAC calculated by the State harvest strategy and the ABC recommended by the SSC. However changes in stock status have a significant effect on the relative importance of estimating bycatch mortality by the groundfish fishery in comparison to directed fishery removals.

The FMP contains a triggered time/area closure for trawl fisheries to protect snow crab stocks and their habitat. There are no additional management measures for fixed gear fisheries or trawl bycatch outside of the time/area closure.

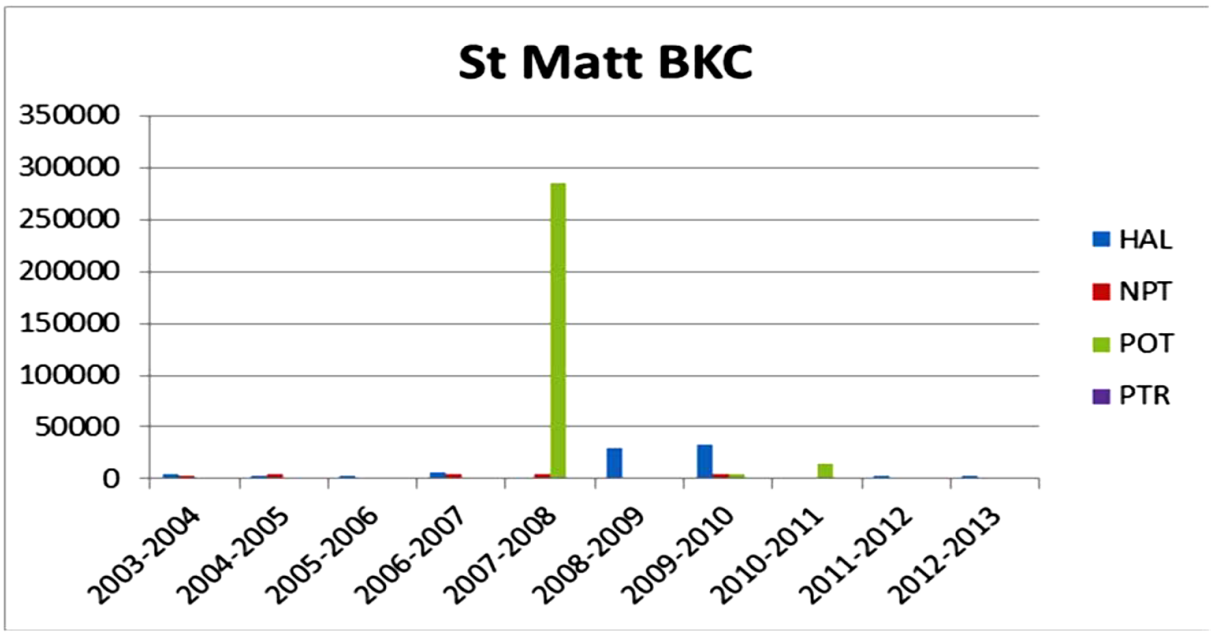
A closure for EBS snow crab (*C. opilio*) is triggered if the limit is reached in specified fisheries. The limit accrues for bycatch taken within the *C. opilio* Bycatch Limitation Zone (COBLZ). That area then closes for the fishery that reaches its specified limit.



***C. opilio* Bycatch Limitation Zone (COBLZ)**

Snow crab taken within the "Snow Crab Bycatch Limitation Zone" (COBLZ) 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 is prohibited from fishing within the COBLZ.

SMBKC



Bycatch of SMBKC by gear type by weight (pounds) (where HAL=halibut longline, NPT=non-pelagic trawl, POT= pot gear and PTR= pelagic trawl)

The majority of the bycatch occurs in the Pacific cod pot and hook and line fisheries. There are no PSC limits for any gear type for SMBKC. Non-pelagic trawl gear fishing is prohibited in St. Matthew Island Habitat Conservation Area in the vicinity of St. Matthew Island to protect blue king crab stocks and habitat.

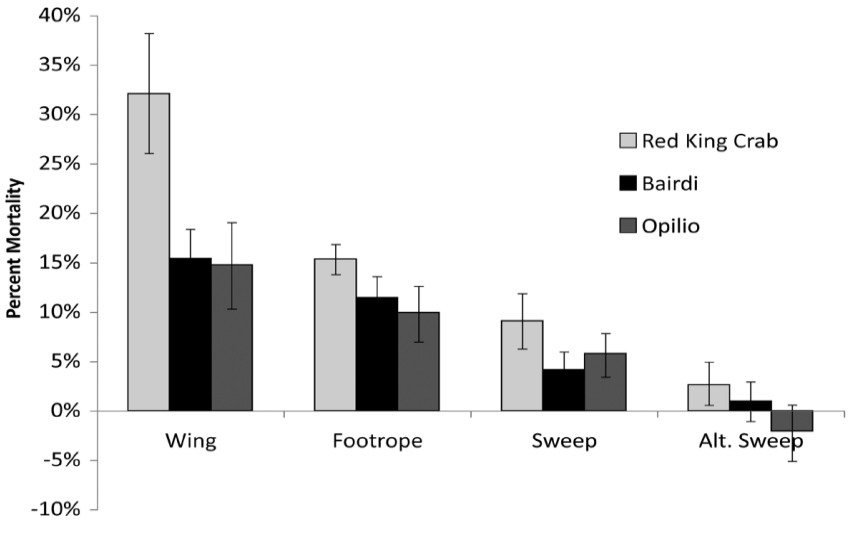
Setting an appropriate TAC for SMBKC to accommodate bycatch in groundfish fisheries beneath the ACL has been problematic in recent years when the fishery was opened. In 2012/12 the TAC computed according to the State harvest strategy would have led to a TAC > ABC, thus the State needed to first make assumptions about the maximum amount of bycatch potential in the groundfish fisheries (taken as the maximum from 1991/92 – 2011/12 at 0.77 million lbs.) and subtracted that from the approved ABC in order to evaluate what was remaining for other crab fisheries and the directed crab fishery. This bycatch allowance represented 38% of the ABC.

http://alaskafisheries.noaa.gov/npfmc/PDFdocuments/bycatch/CrabBycatchBSAI213.pdf

The scallop fishery in the Bering Sea (Registration Area Q,) is executed from July 1st through the end of February and closes if harvest guidelines or CBLs are reached. Since 1993, 100% observer coverage has been required on all vessels participating in the scallop fishery. Scallop observers collect biological data from the targeted catch as well as bycatch species. The Bering Sea fishery within Area Q targets scallop beds in 90 to 106 m of water in a small area (13 nmi^2) north of Unimak Island.

BSAI Groundfish Gear Requirements

Instituted in 2011, vessels fishing in the trawl flatfish fishery are required to use Bering Sea Flatfish Trawl Gear; this gear utilizes strategically placed bobbins to elevate the trawl sweeps and footrope off of the seafloor. The gear has been developed to reduce habitat impacts on the fishing grounds and to reduce the bycatch of bottom-dwelling invertebrates such as crab and soft corals. The bobbins reduced seafloor contact by 90 percent, and greatly reduced crab mortality.



Mortality rates for crabs passing under trawls or past sweeps. Alternative sweeps were equipped with disk clusters to raise sweeps 5 – 7.5 cm above seafloor.

http://www.nmfs.noaa.gov/stories/2012/07/docs/rosereduceeffectstrawlingquarterlyfeature2010feature.pdf

http://www.nmfs.noaa.gov/stories/2012/07/07_26_12trawl_gear_innovation.html

Bycatch from the crab fisheries

Appendix C1.–Total contents of 698 pot lifts sampled during the 2011/12 Bristol Bay red king crab fishery.

Commercial crab species	Total catch (number)	Other species	Total catch (number)
Red King Crab		circumboreal toad crab	1
legal	20,949	graceful decorator crab	1
sublegal	19,278	great sculpin	30
female	1,752	hermit crab unident.	1
Tanner Crab		*Hyas* sp.	1
legal	266	jellyfish unident.	110
sublegal	58	Neptune snail unident.	2
female	4	Pacific cod	140
Snow Crab		Pacific halibut	25
legal	92	sculpin unident.	44
sublegal	1	sea anemone unident.	1
female	0	sea cucumber unident.	2
Hybrid Tanner Crab		snail unident.	51
(legally *opilio*[a])		sponge unident.	14
legal	1	starfish unident.	81
sublegal	0	starry flounder	1
female	0	tunicate unident.	15
Hair Crab		yellowfin sole	199
legal	34	yellow Irish lord	3
sublegal	6		
female	23		

[a] Hybrid Tanner crab that are considered to be *C. opilio* by the criteria of 5 AAC 35.521.

The above table shows total pot contents from the observed pot lifts in the 2011-12 BBRKC fishery. Bycatch species included multiple species of crab, Pacific cod, Pacific halibut, other flatfish, sculpins and invertebrates. The contents contained no species of concern.

Appendix C5.–Total contents of 2,235 pot lifts sampled during the 2011/12 Bering Sea snow fishery.

Commercial crab species	Total catch (number)	Other species	Total catch (number)
Snow Crab		arrowtooth flounder	3
legal	584,924	basket star	473
sublegal	8,435	bivalve unident.	2
female	21,551	flatfish unident.	3
Tanner Crab		flathead sole	6
legal	25,583	giant octopus	13
sublegal	4434	hairy triton	113
female	601	hermit crab unident.	54
Hybrid Tanner Crab		*Hyas* spp.	53
(legally *opilio*[a])		invertebrate unident.	1
legal	1,514	jellyfish unident.	19
sublegal	4	kelp crab unident.	3
female	37	octopus unident.	17
Hybrid Tanner Crab		Pacific cod	1,275
(legally *bairdi*[b])		Pacific halibut	33
legal	146	Pacific ocean perch	1
sublegal	36	Pribilof neptune	126
female	4	prowfish	3
Blue King Crab		rockfish unident.	3
legal	0	rock sole unident.	1
sublegal	1	sculpin unident.	44
female	0	sea anemone unident.	95
Golden King Crab		sea pen or sea whip unident.	1
legal	1	sea pen unident.	2
sublegal	0	sea urchin unident.	12
female	0	silky buccinum (or ladder whelk)	8
		skate unident.	18
		snail unident.	5,146
		sponge unident.	5
		starfish unident.	28
		tunicate unident.	8
		walleye pollock	35
		weathervane scallop	1
		yellowfin sole	92
		yellow Irish lord	203

[a] Hybrid Tanner crab that are considered to be *C. opilio* by the criteria of 5 AAC 35.521.
[b] Hybrid Tanner crab that are considered to be *C. bairdi* by the criteria of 5 AAC 35.521.

The above table shows total pot contents from the observed pot lifts in the 2011-12 EBSSC fishery. Bycatch species included multiple species of crab, Pacific cod, Pacific halibut, other flatfish, sculpins and invertebrates. Snails and Pacific cod were the most prevalent species in the bycatch. The contents contained no species of concern.

Appendix C9.–Total contents of 3,359 pot lifts sampled during the 2011/12 St. Matthew Island blue king crab fishery.

Commerical crab species	Total catch (number)	Other species	Total catch (number)
Blue King Crab		arrowtooth flounder	12
legal	31,269	basket star	105
sublegal	31,632	bigmouth sculpin	23
female	4,138	brittle star unident.	69
Snow Crab		bryozoan unident.	1
legal	2,129	circumboreal toad crab	615
sublegal	541	eelpout unident.	1
female	103	flatfish unident.	7
Tanner Crab		flathead sole	3
legal	4	giant octopus	5
sublegal	24	great sculpin	122
female	5	Greenland turbot	2
Red King Crab		helmet crab	1
legal	2	hermit crab unident.	595
sublegal	1	invertebrate unident.	6
female	0	jellyfish unident.	289
		Kamchatka flounder	3
		nudibranch unident.	1
		octopus unident.	4
		Pacific cod	873
		Pacific halibut	136
		Pacific lyre crab	25
		sand dollar unident.	8
		sculpin unident.	174
		sea anemone unident.	3
		sea cucumber unident.	2
		sea spider unident.	1
		sea urchin unident.	5
		skate unident.	25
		snailfish unident.	26
		snail unident.	1,731
		sponge unident.	5
		starfish unident.	152
		tunicate unident.	1
		walleye pollock	18
		worm unident.	1
		yellowfin sole	22
		yellow Irish lord	54

The above table shows total pot contents from the observed pot lifts in the 2011-12 SMBKC fishery. Bycatch species included multiple species of crab, Pacific cod, Pacific halibut, other flatfish, sculpins and invertebrates. Snails and Pacific cod were the most prevalent species in the bycatch. The contents contained no species of concern.

http://www.adfg.alaska.gov/FedAidpdfs/FDS13-21

Typically, low levels of bycatch of these species do not impact their abundance. Several of the species found as bycatch in the BBRKC, EBSSC and SMBKC fisheries are managed individually and go through their own stock assessment (SAFE report) process. The NPFMC, ADFG and the AFSC have management measures in place to prevent overfishing in these species and to take into account any bycatch from other fisheries. The International Pacific Halibut Commission is responsible for the management of the Pacific halibut resource in the U.S. and Canada. They account for the take of Pacific halibut in other non-halibut directed fisheries in their management efforts. As noted in the Endangered Species Act EIS report, crab fisheries do not adversely affect ESA listed species, destroy or modify their habitat, or comprise a measurable portion of their diet.

NMFS Groundfish Observer Program

The NMFS announced to NPFMC on June 7th 2012 the approval of amendment 86 to the FMP for Groundfish of the BSAI Management Area and Amendment 76 to the FMP for Groundfish of the GOA (RIN 0648-BB42). These amendments restructure the funding and deployment system for observers in the North Pacific groundfish and halibut fisheries and include vessels less than 60 ft. In length and halibut vessels in the North Pacific Groundfish Observer Program, in compliance with the MSA. A final rule to the amendments is expected at later date. Since January 2013, IFQ vessels under 60 feet LOA are required to carry and observer for a minimum of 30% of their time spent fishing, vessels over 60 feet are subject to 100% observer coverage. The additional and more regular coverage will provide information on crab bycatch in the groundfish fisheries. Data will soon be available for use in SAFE documents.
http://www.fakr.noaa.gov/sustainablefisheries/amds/amds86_76/approval060712.pdf

Predator and Prey relationships

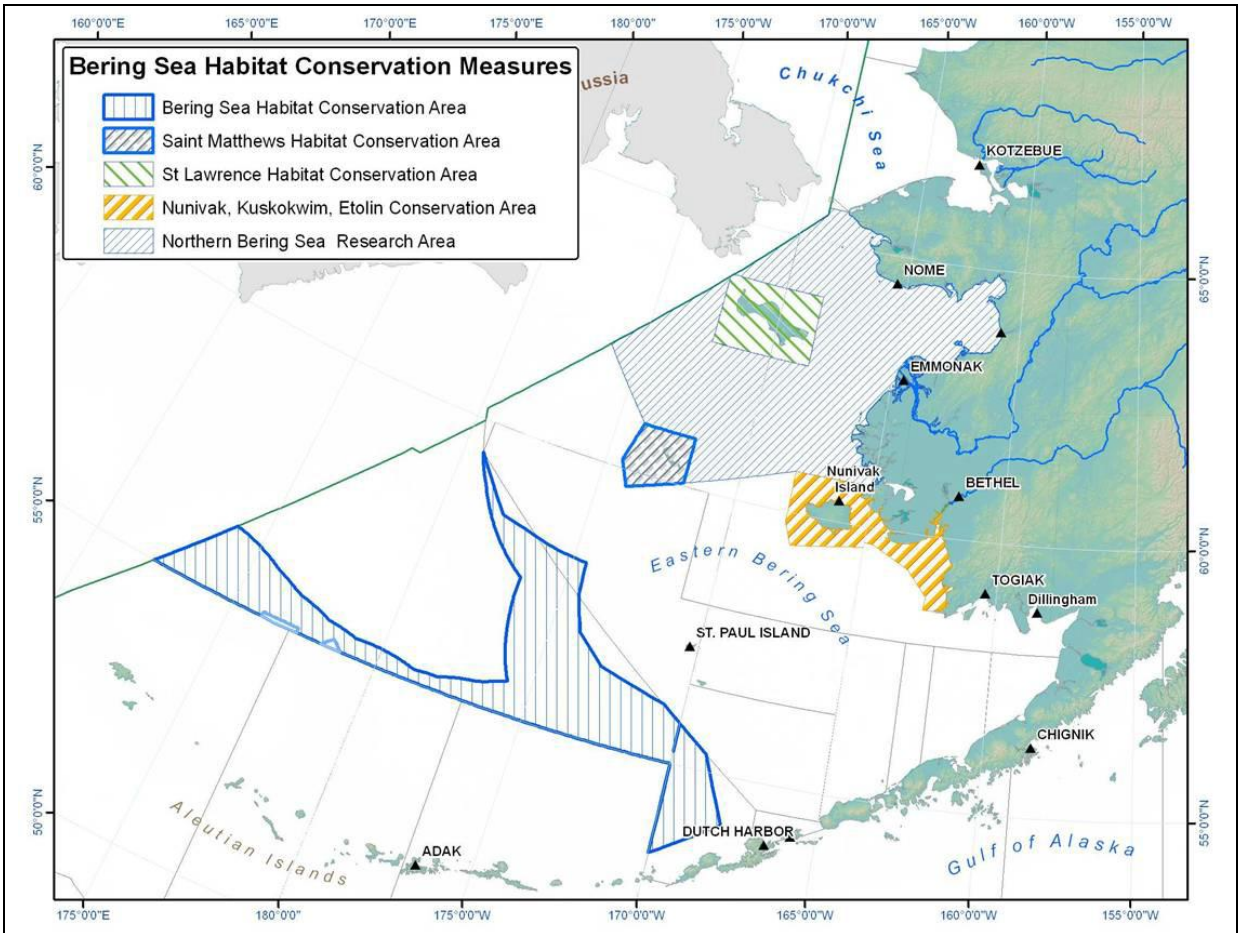
There are few species identified as predators of legal-sized male crab and specific information is limited due to the difficulty of identifying prey items to the species level with only partial carapace or dactyl pieces. Based on food habits data collected in the summer months during the annual EBS bottom trawl survey, Pacific cod, Pacific halibut and skates are the primary predators of large or legal size crab although legal-sized crab are a minimal component of these predators diets.

Male only fisheries

The short and long term effects of removing large male crab from a population are not well understood and may vary by species and population.

Bering Sea Habitat Conservation Measures

Non-pelagic trawl gear fishing is prohibited in St. Matthew Island Habitat Conservation Area in the vicinity of St. Matthew Island to protect blue king crab stocks and habitat. Other habitat areas closed to bottom trawling include: the Northern Bering Sea Research Area; the Bering Sea Habitat Conservation Area; the St. Lawrence Island Habitat Conservation Area and the Nunivak Island, Etolin Strait and Kuskokwim Bay Habitat Conservation Area.



Bering Sea Habitat Conservation measures closure areas.

Alaska Marine Protected Areas

Fisheries managers have established many marine protected areas (MPA's) in the Federal and state waters off Alaska to protect ecological structure and function, establish control sites for scientific research studies, conserve benthic habitat, protect vulnerable stocks, and protect cultural resources. Many MPA's achieve multiple objectives. Over 40 named MPA's, many of which include several sites, encompass virtually all Federal waters off Alaska and most of the state waters where commercial fisheries occur. All of the MPA's include measures to prohibit a particular fishery or gear type (particularly bottom trawls) on a seasonal or year-round basis, and several MPA's prohibit virtually all commercial fishing. Although the effectiveness of MPA's is difficult to evaluate on an individual basis, as a group they are an important component of the management program for sustainable fisheries and conserving marine biodiversity off Alaska (Witherell and Woodby, Marine Fish. Rev. 67(1)).

http://alaskaseafood.org/sustainability/pdf/Marine%20Protected%20Areas%20Brochure.pdf

Clause 14 "where fisheries enhancement is utilized, environmental assessment and monitoring shall consider genetic diversity and ecosystem integrity" is not relevant to this fishery.

8. Performance specific to agreed corrective action plans

Not Applicable. This is the 1st FAO RFM Bering Sea king and snow crab surveillance assessment report. No non-conformances were issued during neither the full assessment nor the 1st surveillance assessment.

9. Unclosed, new non-conformances and new corrective action plans

Not applicable as no unclosed or new non-conformance has been issued.

10. Future Surveillance Actions

The assessment team will review the following during the 2014 surveillance assessment:

- Re-instatement of Alaska Coastal Management Plan
- Trawling areas in Bristol Bay relating to EFH for female red king crab
- Accounting for crab bycatch in groundfish fisheries (including fixed gear)
- Continue to monitor studies relating to male-only fisheries

11. Client signed acceptance of the action plan

Not applicable.

12. Recommendation and Determination

Following this 1st surveillance assessment, in 2013, the assessment team and the certification committee determined that continued Certification under the FAO-Based Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fishery, the U.S. Alaska King and Snow Crab Bering Sea Commercial Fisheries [Bristol Bay Red King Crab *(Paralithodes camtschaticus)*, Eastern Bering Sea Snow Crab *(Chionoecetes opilio)* and St. Matthew Island Blue King Crab (*Paralithodes platypus)*] legally employing pot gear within Alaska jurisdiction (200 nautical miles EEZ) and subject to a federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] joint management regime.

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Appendix 1

Alaska BSAI crab Assessors

Based on the Technical expertise required to carry out the above fishery surveillance assessment, Global Trust Certification Ltd. confirmed the Assessment Team members for this fishery as follows.

Dr. Thomas C. Shirley (Assessor)

Dr. Thomas C. Shirley is a noted authority on high latitude crabs. He is a Professor Emeritus at the University of Alaska Fairbanks, where he was a Professor of Marine Biology for 23 years (1982-2005). He was the Endowed Chair of Biodiversity and Conservation Science at the Harte Research Institute from 2005 to 2011, and is currently Professor of Marine Biology at Texas A&M University-Corpus Christi. Dr. Shirley received his Ph.D. from Louisiana State University and his M.S. and B.S. degrees from Texas A&I University. In addition to his many other publications, Dr. Shirley has authored or co-authored more than 90 peer-reviewed publications, symposium proceedings and technical reports on crabs, including two books, on crab biology, ecology and management. Most of these publications were on red, blue and golden king crabs, Tanner and snow crabs, and Dungeness crabs in Alaska. Dr. Shirley served on the Crab Plan Team of the North Pacific Fisheries Management Council from 1985 to 2005, and reviewed the management plan for king crabs in Southeast Alaska for the Alaska Department of Fish and Game in 2006. Dr. Shirley has received many awards and honorifics, served on national and international panels, and chaired many symposia and workshops on crab biology. Many of his former graduate students now serve in management roles in state and federal agencies or in academic positions in Alaska and throughout the world. Dr. Shirley remains actively involved in research on high latitude and deep-water crab biology and management.

Earl Krygier (Assessor)

Earl E. Krygier gained a BSc in Science, an MSc from the Department of Fisheries and Wildlife, and completed a Ph.D Doctoral Thesis (on the role of nursery areas for juvenile English sole off Oregon) at the Oregon State University. From 1989 to 2008 he worked for ADFG's Commercial Fisheries Division as Extended Jurisdiction Program Manager with primary responsibility on state policy coordination of state, national and international marine fishery matters (research, conservation and management, and policy development), provided support for ADFG's Commissioner in carrying out his NPFMC's responsibilities and acting as the Commissioner's alternate (1989-1997). Earl represented ADFG at the IPHC for 19 years, and he was state representative at the Donut Hole and the U.S./Russian ICC meetings. He sat as alternate for the Commissioner on the North Pacific Research Board (NPRB); represented ADFG on Alaska's CDQ Allocation Team; advised department staff, the Alaska BoF members, the Alaska Legislature and other state officials on NPFMC activities; and proposed management plans, long-range policies and regulatory implications, or inter-jurisdictional issues arising from Council actions. He coordinated ADFG's staff activities at the NPFMC and recommended policies and strategies to the director, commissioner and other state officials in regards to extended jurisdictional fisheries.

From 2008 to present times he is the Owner/Manager of KEE Biological Consultants and served as the Marine Conservation Alliance Foundation's (MCAF) Cooperative Research Coordinator, implementing MCAF's marine research activities in Alaska in cooperation with state or federal agencies, academia, the seafood industry and other interested parties.

Dr. Geraldine Criquet (Assessor)

Géraldine Criquet holds a PhD in Marine Ecology (École Pratique des Hautes Études, France) which focused on coral reef fisheries management, Marine Protected Areas and fish ecology. She has also been involved during 2 years in stock assessments of pelagic resources in the Biscay Gulf, collaborating with IFREMER. She worked 2 years for the Institut de Recherche pour le Développement (IRD) at Reunion Island for studying fish target species growth and connectivity between fish populations in the Indian Ocean using otolith analysis. She served as Consultant for FAO on a Mediterranean Fisheries Program (COPEMED) and developed and implemented during 2 years a monitoring program of catches and fishing effort in the Marine Natural Reserve of Cerbere---Banyuls (France). Geraldine has joined Global trust Certification in August 2012 as Fisheries Assessment Officer and is involved in FAO RFM and MSC fisheries assessments.

Erica Fruh (Technical Support)

Erica Fruh has been involved in commercial fisheries management for over 15 years. She earned her BSc in Marine Biology from Auburn University, and her MSc in Marine Resource Management from Oregon State University. Her MSc project focused on bycatch in trawl and long line fisheries. Previous experience includes fishery biologist roles with the Oregon Department of Fish and Wildlife, the Pacific States Marine Fisheries Commission and NOAA Fisheries. She has worked with most fishing gear types used along the U.S. west coast, spending numerous days at sea participating in tagging studies, population monitoring, bycatch monitoring and fishing mortality studies. She worked as a commercial fisheries observer in the U.S. west coast groundfish trawl fishery, the Oregon pink shrimp fishery and the seine sardine fishery. She spent 10 years contributing to the National Marine Fisheries Service U.S. west coast groundfish bottom trawl survey gathering data for stock assessments, and leading projects on marine debris, seabird sightings and age structure collection. She serves on the Board of Directors for the Newport Fishermen's Wives organization to promote safety at sea.

Dave Garforth (Assessor)

Dave Garforth, BSC, HDip. (Applied Science), MSC has been involved in fisheries and aquatic resources for over 20 years. Currently, managing Global Trust FAO based Fishery Certification Program, with experience in the application of ISO/IEC Guide 65 based seafood certification systems and a professional background in numerous fishery assessments. Previous professional background includes; Development Officer in the Irish Sea Fisheries Board, supply chain and trade experience at Pan European Fish Auctions, the control and enforcement of fisheries regulations as a UK Fishery Officer. Dave is also a lead, third party IRCA approved auditor.

Vito Ciccia Romito (Lead Assessor)

Vito holds a BSc in Ecology and an MSc in Tropical Coastal Management (Newcastle University, United Kingdom). His BSc studies focused on bycatch, discards, benthic impact of commercial fishing gear and relative technical solutions, after which he spent a year in Tanzania as a Marine Research officer at Mafia Island Marine Park carrying out biodiversity assessments and monitoring studies of coral reef, mangrove and seagrass ecosystems. Subsequently, for his MSc, he focused on fisheries assessment techniques, ecological dynamics of overexploited tropical marine ecosystems, and evaluation of low trophic aquaculture as a support to artisanal reef fisheries. Since 2010, he has been fully involved through Global Trust with the FAO-based RFM Assessment and Certification program covering the Alaska commercial salmon, halibut, sablefish, pollock, king and snow crab fisheries and the Icelandic cod, haddock, saithe and redfish fisheries. Vito is also a lead, third party IRCA approved auditor.