Responsible Fishery Management (RFM)

U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab Commercial Fisheries

Surveillance Report

Certification Body (CB):	**Global Trust Certification**
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Fishery client:	Bering Sea Crab Client Group
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Foreword

The Responsible Fisheries Management (RFM) Certification program is a third-party sustainable seafood certification program for wild capture fisheries owned by the Certified Seafood Collaborative (CSC), a 501(c)(3) non-profit foundation led by a diverse board of seafood and sustainability industry experts.

The program was previously owned by the Alaska Seafood Marketing Institute (ASMI) when it was known as the Alaska RFM program but when ownership passed to the CSC in July 2020 scope of the program was expanded to include other North American fisheries outside the State of Alaska.

The Responsible Fisheries Management (RFM) Standard is composed of Conformance Criteria based on the 1995 FAO Code of Conduct for Responsible Fisheries and the FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Marine Capture Fisheries adopted in 2005 and amended/extended in 2009. The Standard also includes full reference to the 2011 FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Inland Fisheries which in turn are now supported by a suite of guidelines and support documents published by the UN FAO. Further information on the RFM program may be found at: https://www.alaskaseafood.org/rfm-certification/

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2 Glossary

Acronym	Complete Name
AAC	Alaska Administrative Code
ABC	Allowable Biological Catch
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
CFEC	Commercial Fisheries Entry Commission
CFR	Code of Federal Regulations
CPT	Crab Plan Team
CPUE	Catch per Unit Effort
CR	Crab Rationalization
CSC	Certified Seafood Collaborative
EBFM	Ecosystem-Based Fisheries Management
EIS	Environmental Impact Statement
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESP	Ecosystem and Socioeconomic Profile
FAO	Food and Agriculture Organization of the United Nations
FEP	Fishery Ecosystem Plan
FMP	Fishery Management Plan
GOA	Gulf of Alaska
GHL	Guideline Harvest Level
IFQ	Individual Fishing Quota
IPHC	International Pacific Halibut Commission
IRFA	Initial Regulatory Flexibility Analysis
IRIU	Improved Retention/Improved Utilization
LLP	License Limitation Program
MCS	Monitoring, Control and Surveillance
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fisheries Management and Conservation Act
MSE	Management Strategy Evaluation
mt	Metric tons
MSY	Maximum Sustainable Yield
NC	Non-conformity
NEPA	National Environmental Policy Act
nm	Nautical miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOV	Notice of Violation

Acronym	Complete Name
NPFMC	North Pacific Fishery Management Council
OFL	Overfishing Level
OLE	Office for Law Enforcement
OY	Optimum Yield
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
SSL	Steller Sea Lion
TAC	Total Allowable Catch
USCG	U.S. Coast Guard

3 Executive Summary

3.1 Brief intro and description of surveillance process

This Surveillance Report documents the 1st surveillance assessment of the second cycle of recertification for the U.S. Alaska Bering Sea and Aleutian Islands King and Snow crab commercial fisheries originally certified on April 16th, 2012, and the Eastern Bering Sea Tanner Crab and Aleutian Islands Golden King Crab fisheries that were certified on December 7th, 2017, and presents the recommendation of the Assessment Team for continued FAO-Based RFM Certification.

Unit of Certification

The U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow crab commercial fisheries [Bristol Bay Red King crab (*Paralithodes camtschaticus*), St. Matthew Island Blue King crab (*Paralithodes platypus*), Eastern Bering Sea Tanner Crab (*Chionoecetes bairdi*), Aleutian Islands Golden King Crab (*Lithodes aequispinus*), and Eastern Bering Sea Snow crab (*Chionoecetes opilio*)] 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 UoCs are as described in **Error! Reference source not found.**.

This Surveillance Report documents the assessment results for the continued certification of the above fisheries to the RFM Certification Program. This is a voluntary program that has been supported by ASMI previously and now by Certified Seafood Collaborative foundation (CSC) who wish to provide an independent, third-party certification that can be used to verify that these fisheries are responsibly managed.

The assessment was conducted according to the Global Trust procedures for Alaska RFM Certification using the fundamental clauses of the RFM Conformance Criteria Version 2.1 (September 2020) in accordance with ISO 17065 accredited certification procedures.

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:

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

These four major components are supported by 12 fundamental clauses (+ 1 in case of enhanced fisheries) that guide the RFM Certification Program surveillance assessment.

The surveillance process included a desktop review of relevant new documentary information including but not limited to: the most current fishery assessment and stock evaluation reports; Crab Plan team reports and meeting minutes; Council publications; relevant scientific publications; ecosystem status reports; fishery management plans and amendments thereof; changes to state and federal regulations; fishery enforcement statistics; environmental impact statements; marine mammal stock assessments; and strategic plans (see Section 10 - References for a more complete listing of documents reviewed).

The surveillance process also included substantive meetings with representatives from each of the key fishery management agencies charged with management of the BSAI King, Tanner and Snow Crab commercial fisheries.

Assessment team meetings included: North Pacific Fishery Management Council (NPFMC); Alaska Department of Fish & Game (ADFG); Alaska Fisheries Science Center (Alaska FSC); and NOAA National Marine Fisheries Alaska Regional Office (NOAA Regional). The assessment team also met with the Bering Sea Crab Client Group (BSCCR) – fishery client and certificate holder. Owing to constraints imposed by COVID-19, all meetings were held remotely via videoconferencing.

As described more fully in the following report sections, the assessment team did note some minor changes to the fishery management system. However, none of these changes were seen to undermine continued compliance of the fishery management system for BSAI King, Tanner and Snow Crab commercial fisheries with requirements of the RFM Standard. Progress in addressing non-conformities, as judged against defined milestones in client action plans, was judged to be adequate and on target.

A summary of the site meetings is presented in Section 6. Assessors included both externally contracted fishery experts and Global Trust internal staff.

3.2 Summary of main findings.

The Audit team has determined that the AK BSAI Crab commercial fishery operated within the defined Alaskan UoA remained in compliance with the RFM Fishery Standard's Fundamental Clauses for the Fisheries Management System component (Clauses 1, 2, 3), Precautionary approach (Clauses 4, 5), Management Measures (Clauses 7, 8, 9), Monitoring and Control component (Clauses 10, 11), and Ecosystem Impact (Clauses 12, 13). However, there was a non-conformance raised in clause 6.3 because it was found that Eastern Bering Sea Snow crab was determined to be overfished.

3.3 Recommendation with respect to continuing Certification

Following this 1st Surveillance Assessment of the second recertification cycle, the assessment team recommends that continued Certification under the Alaska Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fisheries, the U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow crab commercial fisheries [Bristol Bay Red King crab (*Paralithodes camtschaticus*), St. Matthew Island Blue King crab (*Paralithodes platypus*), Eastern Bering Sea Tanner Crab (*Chionoecetes bairdi*), Aleutian Islands Golden King Crab (*Lithodes aequispinus*), and Eastern Bering Sea Snow crab (*Chionoecetes opilio*)] 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.

3.4 Assessment Team Details

The Assessment Team for this assessment was as follows; further details are provided in Appendix 1):

- Dr. Ivan Mateo – Lead Assessor, responsible for RFM Fundamental Clauses 4, 5, 6, 7, 8, and 9
- Dr. Wesley Toller – Assessor, responsible for RFM Fundamental Clauses 1, 2, 3, 10, 11 and 12

3.5 Details of Applicable RFM Documents

This assessment was conducted according to the relevant program documents outlined in **Error! Reference source not found.** below.

Table 1. Relevant RFM program documents including applicable versions.

Document title	Version number, Issue Date	Usage
RFM Procedure 2: Application to Certification Procedures for the RFM Fishery Standard.	Version 6, September 2020	Process
Responsible Fisheries Management Certification Program Fisheries Standard.	Version 2.1, September 2020	Standard
Responsible Fisheries Management Certification Program Guidance to Performance Evaluation for the Certification of Wild Capture and Enhanced Fisheries in North America.	Version 2.1, January 2021	Guidance to Standard

4 Client contact details

Table 2. Client details and key contact information.

Applicant Information		
Organization/Company Name:		Bering Sea Crab Client Group
Address:	Street:	23929 22nd Drive SE, Bothell
	City:	Seattle
	State:	Washington
	Country:	USA
	Zip code	98199
Applicant Key Contact Information		
Name:		Scott Goodman
Position:		General Manager
E-mail:		sgoodman@nrccorp.com

5 Units of Certification

5.1 Units of Certification

The Units of Certification (i.e., what is covered by the certificate) are as described in Table 3 below.

Table 3. Units of Certification.

Unit of Certification 1 of 5		
Species:	Common name:	Red King crab
	Latin name:	*Paralithodes camtschaticus*
Stock(s):		Bristol Bay Red King crab
Geographical area:		U.S. Federal and State waters off the U.S. State of Alaska
Fishing gear/method:		Baited pot/trap gears
Client group:		Bering Sea Crab Client Group LLC
Unit of Certification 2 of 5		
Species:	Common name:	Snow crab
	Latin name:	*Chionoecetes opilio*
Stock(s):		Eastern Bering Sea Snow crab
Geographical area:		U.S. Federal and State waters off the U.S. State of Alaska
Fishing gear/method:		Baited pot/trap gears
Client group:		Bering Sea Crab Client Group LLC
Unit of Certification 3 of 5		
Species:	Common name:	Blue King crab
	Latin name:	*Paralithodes platypus*
Stock(s):		St. Matthew Island Blue King crab
Geographical area:		U.S. Federal and State waters off the U.S. State of Alaska
Fishing gear/method:		Baited pot/trap gears
Client group:		Bering Sea Crab Client Group LLC
Unit of Certification 4 of 5		
Species:	Common name:	Tanner crab
	Latin name:	*Chionoecetes bairdi*
Stock(s):		Eastern Bering Sea Tanner crab
Geographical area:		U.S. Federal and State waters off the U.S. State of Alaska
Fishing gear/method:		Baited pot/trap gears
Client group:		Bering Sea Crab Client Group LLC
Unit of Certification 5 of 5		
Species:	Common name:	Golden King crab
	Latin name:	*Lithodes aequispinus*
Stock(s):		Aleutian Islands Golden King crab
Geographical area:		U.S. Federal and State waters off the U.S. State of Alaska
Fishing gear/method:		Baited pot/trap gears
Client group:		Bering Sea Crab Client Group LLC
Management system: (all Units of Certification)		U.S. Federal and State fisheries within the Gulf of Alaska and the Bering Sea & Aleutian Islands managed by: - National Marine Fisheries Service (NMFS) - North Pacific Fishery Management Council (NPFMC) - Alaska Department of Fish and Game (ADFG) - Alaska Board of Fisheries (BOF)

5.2 Changes to the Units of Certification

The assessment team confirmed that there were no changes to the Units of Certification.

6 Summary of site visits and/or consultation meetings

Desktop reviews are the preferred assessment vehicle within the RFM program. In general, on-site/off-site audits are required only if the Certification Body deems that a desktop review may be inadequate for determining whether the fishery is continuing to comply with the RFM Fishery Standard, based on the performance of the fishery, status of non-conformances and related corrective actions.

Table 4. Summary of site visits and/or consultation meetings.

Meeting Date and Location	Personnel	Areas of discussion
Date: 10/11/2023 Location: Remote (video call)	North Pacific Fishery Management Council: Diana Evans, Diana Stram, Sarah Marrinan, Sam Cunningham, and Sarah Rheinsmith Assessment Team Members: Dr. Ivan Mateo, Lead Assessor Dr. Wes Toller, Assessor	Topics Discussed: ▪ Changes to fishery management or harvest strategy ▪ Amendments to the Crab FMP ▪ SAFE processes and authorship ▪ Updates/rebuilding plans for EBS snow crab and SMBKC ▪ CCTF and Council actions in response to climate change ▪ Update on EFH 5-year review ▪ Recent AI surveys / new info on corals & sponge habitats
Date: 10/16/2023 Location: Remote (video call)	Alaska Fisheries Science Center: William Stockhausen, Cody Szuwalski, Melissa Haltauch and Ron Felthoven Assessment Team Members: Dr. Ivan Mateo, Lead Assessor Dr. Wes Toller, Assessor	Topics Discussed: ▪ Overview/update on status of target stocks ▪ New assessment methodologies, changes to harvest strategy/control rules, fishery data collection, and research on life history parameters ▪ Reasons for collapse of EBS snow crab stock ▪ Unobserved fishing mortality (UFM) ▪ Status of Tanner crab stock and survey result ▪ Integration of risk tables, ecosystem indicators and TKLKS
Date: 10/17/2023 Location: Remote (video call)	Bering Sea Crab Client Group: Scott Goodman Assessment Team Members: Dr. Ivan Mateo, Lead Assessor Dr. Wes Toller, Assessor	Topics Discussed: ▪ Changes to overarching management framework ▪ Unobserved fishing mortality (UFM) ▪ Red King Crab Savings Area and ABSC petition ▪ Update on ongoing BSFRF research projects ▪ Status update for CAP for NC#1 - SMBKC ▪ Status update for CAP for NC#2 – BBRKC ▪ Status update for CAP for NC#3 - AIGKC
Date: 10/18/2023 Location: Remote (video call)	NOAA Regional Office: Krista Milani, Andrew Olson, Bridgette Mansfield, Brian Brown, Gretchen Harrington, Cathy Coon, Verena Gill, Alicia Miller, and Steve Whitney Assessment Team Members: Dr. Ivan Mateo, Lead Assessor Dr. Wes Toller, Assessor	Topics Discussed: ▪ Changes to overarching management framework ▪ Current challenges in BSAI crab fishery management ▪ Update on RAM and crab rationalization program ▪ CMMs related to fishery impacts on biodiversity, habitats and ecosystems ▪ Programmatic EIS and initiatives related to climate change ▪ ETP species: interactions with crab fisheries or concerns ▪ EFH 5-year review: status and impacts on crab mgmt. ▪ Follow-up on NCs for SMBKC, BBRKC and AIGKC
Date: 10/19/2023 Location: Remote	Alaska Department of Fish & Game: Forrest Bowers, Mark Stichert, and Katie Palof Assessment Team Members:	Topics Discussed: ▪ Changes to overarching management framework ▪ Overview/update on status of target stocks ▪ BBRKC status, trends, and changes to RKCSA ▪ Unobserved fishing mortality (UFM)

Meeting Date and Location	Personnel	Areas of discussion
(video call)	Dr. Ivan Mateo, Lead Assessor Dr. Wes Toller, Assessor	▪ ETP species: interactions with crab fisheries or concerns ▪ SMBKC stock status update ▪ AIGKC stock status update ▪ Follow-up on NCs for SMBKC, BBRKC and AIGKC
Date: 10/30/2023 Location: Remote (video call)	Bering Sea Crab Client Group: Scott Goodman Assessment Team Members: Dr. Ivan Mateo, Lead Assessor Dr. Wes Toller, Assessor	Closing Meeting. Topics Discussed: ▪ Findings of conformity ▪ New non-conformity re “overfished” status of snow crab ▪ Updates on corrective actions for outstanding NCs - SMBKC stock status - AIGKC habitat

7 Summary findings

Surveillance audits are summary audits intended to evaluate continued compliance with the RFM Fishery Standard. Each aspect of the fishery they are intended to focus on is addressed below.

7.1 Update on topics that trigger immediate failure

The following fisheries management issues cause a fishery to immediately fail RFM assessment:

- Dynamiting, poisoning, and other comparable destructive fishing practices.
- Significant illegal, unreported, and unregulated (IUU) fishing activities in the country jurisdiction.
- Shark finning.
- Slavery and slave labor on board fishing vessels.
- Any significant lack of compliance with the requirements of an international fisheries agreement to which the U.S. is signatory. A fishery will have to be formally cited by the International Governing body that has competence with the international Treaty in question, and that the US has been notified of that citation of non-compliance.

The Assessment Team has, as part of this surveillance, carried out a review of any new evidence with respect to these issues and found no evidence that any of the above issues are occurring within certified units of the U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab Commercial Fisheries.

7.2 Changes in the management regime and processes

There were no changes in the management regime or its processes that would affect the outcome of certification or that have potential to change the effect of the fishery on resources.

7.3 Changes to the organizational responsibility of the main management agencies

There were no changes to organizational responsibilities of the main management agencies that constitute the fishery management framework.

7.4 New information on the status of stocks

7.4.1 Eastern Bering Sea Snow Crab[1]

Fishery information relative to OFL setting

The 2022/23 directed fishery was closed. Bycatch in the non-directed crab and groundfish fisheries resulted in a total catch mortality of 0.05 kt (with handling mortality rates applied). Because the total catch mortality for this stock was below the 2022/23 OFL of 10.3 kt, overfishing did not occur.

Stock biomass and recruitment trends

Observed mature male biomass (MMB) at the time of the survey increased from an average of 161.68 kt in the early to mid-1980s to historical highs in the 1990s (observed MMB during 1990, 1991, and 1997 were 443.79, 466.61, and 326.75 kt, respectively). The stock was declared overfished in 1999 in response to the total mature biomass dropping below the 1999 minimum stock size threshold. MMB in that year decreased to 95.85 kt. Observed MMB slowly increased after 1999, and the stock was declared rebuilt in 2011 when estimated MMB at mating was above B35%. However, after 2011, the stock declined and the observed MMB at the time of survey dropped to a low in 2016 of 63.21 kt. Recently, MMB was increasing as a large recruitment event moved through the size classes, but that recruitment has since disappeared, and the observed MMB reached an all-time low

[1] https://meetings.npfmc.org/CommentReview/DownloadFile?p=deec307e-4c06-4636-b606-f30e6e16e098.pdf&fileName=Eastern%20Bering%20Sea%20Snow%20Crab%20SAFE.pdf

(24.21 kt) in the 2023 survey. The model estimated a sharp uptick in MMB at the time of the survey from 2022 to 2023, despite the decrease in observed biomass.

Estimated recruitment shifted from a period of high recruitment to a period of low recruitment in the mid-1990s (late 1980s when lagged to fertilization). A large year class recruited to the survey gear in 2015 and was tracked until 2019, but it was not present in subsequent surveys, and appears to have since disappeared from the eastern Bering Sea shelf before reaching commercial size.

Tier determination/Plan Team discussion and resulting OFL/ABC determination, status, and catch specifications
Snow crab was declared overfished in 2021 on the basis that the 2021 assessment indicated MMB was below the MSST. EBS snow crab was a Tier 3 stock in previous assessments, with the OFL determined by the FOFL control rule using F35% as the proxy for FMSY. The Tier 3 proxy for BMSY (B35%) is the MMB at mating based on average recruitment from 1982 to present. The recommended model (23.3a) updates the annual probability of having undergone terminal molt and includes a large proportion of morphometrically mature males that are presumably too small to effectively contribute to reproduction and will not attain a commercially viable size (> 101 mm CW). Thus, F35% would require near 100% exploitation of commercially viable males. The CPT noted the concern that B35% assumes reproductive equivalency among mature males of all sizes, which is unlikely the case.

For 2023, the CPT recommends that Tier 4 harvest control rules be used for setting reference points for the 2023/24 fishing season. This is intended to be a temporary measure until more appropriate reference point specifications are determined for the stock. In the Tier 4 approach the FMSY proxy is equivalent to natural mortality (M). In effect, using M as a proxy for FMSY reduces fishing mortality on large mature males which are the most reproductively viable. The BMSY proxy is the average MMB from 1982 – 2022.

The current assessment model estimates that MMB for February 15, 2023 (92.39 kt) was 34% of BMSY (273.83 kt). The Tier 4 approach results in an OFL of 0.31 kt. The projected MMB at the time of mating assuming the OFL was taken for 2023/24 is above the criteria for a directed fishery closure. The CPT recommends that the ABC buffer be decreased to 20%. This decrease was based on reduced concern over model convergence and bimodality, and use of Tier 4 harvest control rules.

7.4.2 Bristol Bay Red King Crab[2]

Fishery information relative to OFL setting
The 2022/23 directed fishery was closed. Bycatch in the non-directed crab and groundfish fisheries resulted in a total catch mortality of 0.07 kt (with handling mortality rates applied). Because the total catch mortality for this stock was below the 2022/23 OFL of 3.04 kt, overfishing did not occur.

Stock biomass and recruitment trends
Based on model 23.0a, the MMB at the time of mating is estimated to have been highest in the late 1970s (~128 kt), with secondary peaks in 1989 (30 kt) and 2002-2003 (~35 kt), followed by a gradual decline. The estimated MMB at time of mating in 2022/23 was 18.34 kt. The projection for the 2023/24 time of mating, which assumes the fishing mortality in 2023/24 matches that corresponding to the OFL, is 14.98 kt. Estimates of recruitment since 1985 have been generally low relative to those estimated for the period prior to 1985 and with intermittent peaks in 1995, 2002, and 2005 (83, 74, and 54 million crab, respectively). The estimate for 2023, 7.5 million crab, was the second largest since 2018 but is highly uncertain because it is based on only the 2023 NMFS EBS survey data.

[2] https://meetings.npfmc.org/CommentReview/DownloadFile?p=98a4f80c-eee1-428f-941e-8c2dcf21a14d.pdf&fileName=Bristol%20Bay%20Red%20King%20Crab%20SAFE.pdf

Tier determination/Plan Team discussion and resulting OFL and ABC determination

Based on the information available, BBRKC is categorized as a Tier 3 stock. The CPT recommends computing average recruitment as has been done in recent assessments (i.e., based on model recruitment using the time period from 1984 (corresponding to fertilization in 1977) to the penultimate year of the assessment. The estimated B35% is 19.36 kt. MMB projected for 2023/24 is 14.98 kt, 77% of B35%. Consequently, the BBRKC stock is in Tier 3b for 2023/24. The corresponding OFL is 4.42 kt.

The CPT recommends continuing to use a 20% buffer because the level of uncertainty expressed in 2021 and 2022 remains, although the basis for those concerns has changed slightly. These include:

- Continued lack of recent recruitment.
- Poor and variable environmental conditions (e.g., cold pool distributional shifts).
- NMFS female survey biomass in 2023 increased above historically low levels for the first time in five years, but this was predicated on a single exceedingly large tow (thus the accompanying uncertainty was large).
- The lack of fit to 2018-2023 NMFS female survey biomass.
- The retrospective patterns exhibited by the recommended model, even though this was improved over last year's assessment model (21.1b).

MMB for 2022/23 was estimated to be 18.34 kt and above MSST (9.68 kt), hence the stock was not overfished in 2022/23. The total catch mortality in 2022/23 (0.07 kt) was less than the 2022/23 OFL (3.04 kt); hence overfishing did not occur in 2022/23. Based on MCMC projections, the probability of MMB in 2023/24 dropping below the MSST when fishing at F_{OFL} was less than 0.5, so the stock is not 'approaching an overfished condition.

7.4.3 Eastern Bering Sea Tanner crab[3]

Fishery information relative to OFL setting

A single OFL is set for Tanner crab in the EBS. The State of Alaska sets separate TACs for directed fisheries east and west of 166° W longitude. The retained catch in the area west of 166°W longitude was 384 t, and 528 t for the area east of 166°W longitude. Bycatch in the non-directed crab and groundfish fisheries resulted in a total catch mortality of 1.19 kt (with handling mortality rates applied). Because the total catch mortality for this stock was below the 2022/23 OFL of 32.81 kt, overfishing did not occur.

Stock biomass and recruitment trends

The MMB at the time of mating was estimated to have been highest in the early 1970s (close to 400 kt), with secondary peaks in 1989 (108 kt), 2008 (122 kt), and 2014 (117 kt). The estimated MMB on February 15, 2023, was 74.17 kt and the projection for February 15, 2024, was 48.77 kt under the assumption that the OFL was taken. Estimates of recruitment since 1999 have been generally low relative to the peaks estimated for the period prior to 1990. Estimates of strong recruitment in recent years do not appear to have propagated into larger size classes in subsequent years and this was a concerning source of uncertainty in the most recent assessment.

Tier determination/Plan Team discussion and resulting OFL and ABC determination

The CPT recommends the OFL for this stock be based on the Tier 3 control rule. Application of the Tier 3 control rule requires a set of years for defining average recruitment corresponding to BMSY under prevailing environmental conditions. This recommended time period is 1982 – 2022, based on the approach used to select the time period for the 2022 assessment, which excluded the most recent estimate of recruitment given its uncertainty.

[3] https://meetings.npfmc.org/CommentReview/DownloadFile?p=3e66c001-f76d-4f38-b744-f9d815d9147e.pdf&fileName=Eastern%20Bering%20Sea%20Tanner%20Crab%20SAFE.pdf

Based on the estimated biomass on February 15, 2023, the stock is at 137% of BMSY, and therefore is in Tier 3a. The FMSY proxy (*F*35%) is 1.16 yr-1, and the 2023/24 *F*OFL is 1.16 yr-1 under the Tier 3a OFL control rule, which results in a total OFL of 36.20 kt. The CPT recommended a 25% buffer to account for model uncertainty and stock productivity uncertainty be applied to the OFL to set ABC = 27.15 kt. The 25% buffer is an increase from previous years due to increased concerns regarding the appropriateness of B35% and F35% as proxies due to uncertainty related to MMB as the currency of management, similar to those expressed for snow crab. Total catch mortality in 2022/23 (1.19 kt) was below the OFL, therefore overfishing did not occur.

7.4.4 St. Matthew blue king crab[4]

Fishery information relative to OFL setting

The fishery was prosecuted as a directed fishery from 1977 to 1998. Harvests peaked in 1983/84 when 4,288 t (9.453 million lb) were landed by 164 vessels. Harvest was fairly stable from 1986/87 to 1990/91, averaging 568 t (1.252 million lb) annually. Harvest increased to a mean catch of 1,496 t (3.298 million lb) during the 1991/92 to 1998/99 seasons until the fishery was declared overfished and closed in 1999 when the stock size estimate was below the MSST. In November 2000, Amendment 15 to the FMP was approved to implement a rebuilding plan for the St. Matthew Island blue king crab stock. The rebuilding plan included a harvest strategy identified in regulation by the Alaska Board of Fisheries, an area closure to control bycatch, and gear modifications. In 2008/09 and 2009/10, the MMB was estimated to be above BMSY for two years and the stock declared rebuilt in 2009.

The fishery re-opened in 2009/10 after a 10-year closure, closed in 2013/14 due to declining trawl-survey biomass, and opened from 2014/15 to 2015/16 with a TAC of 300 t (0.655 million lb). But fishery performance was relatively poor with retained catches of 140 t (0.309 million lb) in 2014/15 and 48 t (0.105 million lb) in 2015/16 and has remained closed since 2016/17. Bycatch of non-retained blue king crab has occurred in the St. Matthew blue king crab fishery, the eastern Bering Sea snow crab fishery, and trawl and fixed-gear groundfish fisheries. The stock declined below the minimum stock size threshold in 2018 and was declared overfished. A rebuilding plan was implemented in October 2020.

Stock biomass and recruitment trends

The 1978-2022 NMFS trawl survey mean biomass is 5,448 t with the 2022 value (2,366 t) below the long-term median and near the median since 2000. This 2022 biomass of ≥90 mm carapace length (CL) male crab (5.22 million pounds; 2,368 t; CV = 50%) is 43% of the long-term mean, and a 23% increase from the 2021 biomass. The most recent 3-year average of NMFS surveys is 46% below the mean value, indicating a decline in biomass compared to historical survey estimates, notably in 2010 and 2011 that were over four times the current average. However, the 2022 value increased from 2021, like the increase observed in the 2019 survey data. The last ADF&G pot survey in 2018 gave the lowest biomass index in the time series (12% of the mean from the 11 surveys conducted since 1995). This 2022 pot survey is underway and will not be completed until after the 2022 assessment cycle. New data will be included in the 2024 assessment. Assessment model estimates suggest this stock (in survey biomass units) is presently near 39% of the long-term model-predicted survey mean. The trend suggests relative stability in the last few years, although the 2019 NMFS survey is not well fit.

Recruitment was assessed as the number of male crab in the 90–104 mm CL size class. The 2022 trawl-survey area-swept estimate of 0.617 million male recruits is near the average since 1978 and increased from the last 5 years of survey data. Recent six-year (2016-2022) average recruitment is 37% of the long-term mean. In the pot survey, the abundance of this size group in 2017 was also the second lowest in the time series (22% of the mean) whereas in 2018 the value was the lowest observed (10% of the mean value).

[4] https://meetings.npfmc.org/CommentReview/DownloadFile?p=1312283f-75f5-4d94-8432-a2fb6f5c9dcf.pdf&fileName=C1%20BSAI%20Crab%20SAFE%202023%20Intro.pdf

Tier determination/Plan Team discussion and resulting OFL and ABC determination
The stock assessment is based on the previously accepted model configuration, Model 16.0, updated with 2021/22 groundfish bycatch and 2022 NMFS trawl survey data.

The CPT concurs with the author's recommendation to use Model 16.0 for the 2022/23 crab year. The stock is in Tier 4. The CPT recommends that the full assessment period (1978/79–2021/22) be used to define the proxy BMSY in terms of average estimated *MMBmating*. The projected MMB estimated for 2022/23 is 1,310 t and the FMSY proxy is the natural mortality rate (0.18-1 year) and *FOFL* is 0.061, results in a mature male biomass OFL of 0.07 kt. The MMB/BMSY ratio is 0.4. The author recommended and the CPT concurred with a 25% buffer on the OFL for the ABC. The ABC based on this buffer is 0.05 kt.

Given that this is a biennial assessment, the CPT further recommends that the OFL and ABC for 2023/2024 remain at an OFL of 0.07 kt and ABC of 0.05 kt. This stock will next be assessed in 2024.

The stock was found to be below MSST in 2021/22 as well as 2022/23 (as projected) and remains in overfished condition. Total catch was less than the OFL in 2020/21 and hence overfishing did not occur.

7.4.5 Aleutian Islands Golden King Crab[5]

Fishery information relative to OFL setting
The directed fishery has been prosecuted annually since the 1981/82 season. Retained catch peaked in 1986/87 at 6.685 kt (14.8 million lb) and averaged 5.398 kt (11.9 million lb) over the 1985/86-1989/90 seasons. Average harvests dropped sharply from 1989/90 to 1990/91 to a level of 3.110 kt (6.9 million lb) for the period 1990/91–1995/96. Management based on a formally established GHL began with the 1996/97 season; individual GHLs are applied to areas east and west of 174oW longitude (referred to here as the EAG and WAG, respectively). The 2.677 kt (5.9 million lb) combined GHL established for the 1996/97 season, which was based on the previous five-year average catch, was subsequently reduced to 2.586 kt (5.7 million lb) beginning in 1998/99. The GHL remained at 2.586 kt (5.7 million lb) until 2005/06 when the fishery was rationalized, at which time the TAC was set to the same value. The TAC remained at 2.586 kt (5.7 million lb) until 2008/09, at which point it was increased to 2.715 kt (5.99 million lb) and remained so until the 2011/12 season. Between 2012/13 and 2021/22, the TAC fluctuated between 2.515 kt (5.6 million lb; 2016/17 season) and 3.257 kt (7.18 million lb; 2019/20 season). Since 2019/20, the TACs have been based on the harvest strategy adopted by the Alaska Board of Fisheries in March 2019.

Total mortality of Aleutian Islands (AI) golden king crab includes retained catch in the directed fishery, mortality of discarded catch, and bycatch in fixed-gear and trawl groundfish fisheries, though bycatch in other fisheries is low compared to mortality in the directed fishery. Prior to 2022/23, retained catch in the post-rationalized fishery ranged from 2.379 kt (5.3 million lb) in 2006/07 to 3.319 kt (7.32 million lb) in 2019/20. Total catch mortality ranged from 2.506 to 3.729 kt (5.5 to 8.2 million lb) for the same period. At the time of the 2023/24 assessment, the fisheries had not been completed, so retained catch and total catch mortality are estimates. The estimated retained catch in 2022/23 was 2.369 t (5.2 million lb), the lowest in the post-rationalized period, while the estimated total catch mortality was 2.612 kt (5.8 million lb), the third lowest in this time period.

Stock biomass and recruitment trends
Estimated MMB for the EAG decreased from the 1980s to the 1990s, then increased during the 2000s, decreased marginally during the early 2010s, and has systematically increased since 2014. Estimated MMB for the WAG decreased substantially during the late 1980s and 1990s, increased somewhat during the 2000s, decreased for

[5] https://meetings.npfmc.org/CommentReview/DownloadFile?p=a2fe7082-f356-4863-a7f1-cfbac6ef110e.pdf&fileName=08_Aleutian%20Islands%20Golden%20King%20Crab%202023%20Intro.pdf

several years after 2008 and has since fluctuated about a relatively low value. Stock trends have generally reflected the fishery standardized CPUE trends in both regions.

Tier determination/Plan Team discussion and resulting OFL and ABC determination

The CPT recommends that this stock be managed as a Tier 3 stock in 2023/24. A single OFL and ABC is defined for AIGKC. However, separate models are available by area. During its May 2017 meeting, the CPT recommended that stock status be determined by adding the area-specific estimates of current MMB and BMSY to ensure that there would only be one stock status for the AIGKC stock. However, area-specific stock status is used to determine the ratio of FOFL to F35% by area, which is then used to calculate the OFLs by area, which are then summed to calculate an OFL for the entire stock. The SSC has concurred with this approach. The CPT recommends that the BMSY proxy for the Tier 3 harvest control rule be based on the average recruitment from 1987-2017, years for which recruitment estimates are relatively precise.

This is the only crab assessment that relies solely on fishery CPUE as an index of abundance. The CPUE index standardization process, subject to past CPT and SSC review, is a key reason for the 25% buffer between the OFL and the ABC used in past years. Concerns raised in recent assessments are summarized in the following table:

Table 5. Concerns of stock assessment for Aleutian Golden king crab.

Concern	Year expressed	CPT 2023 concern	Reason
Only crab assessment that relies entirely on fishery CPUE as an index of abundance.	2020	Yes	No change.
Uncertainty in natural mortality.	2020	Less	A revised estimate for natural mortality based on a peer- reviewed study (Siddeek *et al.*, 2022) was used.
The limited spatial coverage of the fishery with respect to the total stock distribution.	2020	Yes	No change.
The small number of vessels on which CPUE is based.	2020	Yes	No change.
Retrospective pattern for the EAG.	2020	Yes	No change. Retrospective patterns were not presented but assumed to be similar to those seen last year.
CPUE standardization is still subject to some methodological concerns.	2020	Less	No change. Principal methodological concerns have been met, but some issues remain.
Catches from the WAG that were not included in the assessment.	2021	Less	Method to extrapolate retained and total catches to year end has been documented; CPT accepted the method used.
Model convergence concerns reflecting potential parameter confounding (jitter analysis resulted in multiple solutions for MMB and $B_{35\%}$ at same likelihood values).	2021	Unknown	Jitter analysis was not conducted for the CPT-recommended models.

The SSC adopted a 30% buffer for the ABC in 2021/22 based primarily on concerns raised by a jitter analysis that suggested the model may be converging to local minima, exhibiting multiple values for reference points associated with a single value for the likelihood. In 2022/23, the CPT recommended, and the SSC concurred with, reducing the buffer for the ABC back to 25%, its value before 2021/22, principally because no problems of this sort occurred for the 2022 recommended models and the CPT found reasons to reduce or eliminate several other concerns. For

2023/24, the CPT found that several previously expressed concerns continued to exist, the principal one being the retrospective patterns for the recommended EAG model. Thus, the CPT recommends continuing to use a 25% buffer, its value last year, on the OFL for the ABC

7.5 Update on fishery catches[6]

Table 6. Status and catch specifications (1000 t) for snow crab. Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2019/20	56.8	167.3	15.4	15.4	20.8	54.9	43.9
2020/21	76.7	26.7	20.4	20.4	26.2	95.4	71.6
2021/22	91.6	41.3	2.5	2.5	3.6	7.5	5.6
2022/23	136.9	92.4	Closed	0	0.05	10.3	7.7
2023/24		69.2				0.31	0.25

Table 7. Status and catch specifications (1000 t) for Bristol Bay red king crab. Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2019/20	12.72	14.24	1.72	1.78	2.22	3.40	2.72
2020/21	12.12	13.96	1.20	1.26	1.57	2.14	1.61
2021/22	12.01	16.64	0	0.02	0.10	2.23	1.78
2022/23	9.68	18.34	0	0.02	0.07	3.04	2.43
2023/24		14.98				4.42	3.54

Table 8. Status and catch specifications (1000 t) for Tanner crab. Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2019/20	18.31	56.16	0.00	0.00	0.54	28.86	23.09
2020/21	17.97	56.34	1.07	0.66	0.96	21.13	16.90
2021/22	17.37	62.05	0.50	0.49	0.78	27.17	21.74
2022/23	18.19	74.17	0.91	0.91	1.19	32.81	26.25
2023/24		48.77				36.20	27.15

[6] https://meetings.npfmc.org/CommentReview/DownloadFile?p=1312283f-75f5-4d94-8432-a2fb6f5c9dcf.pdf&fileName=C1%20BSAI%20Crab%20SAFE%202023%20Intro.pdf

Table 9. Historical status and catch specifications for St. Matthew Island blue king crab (t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	GHL	Retained Catch Mortality[1]	Total Catch Mortality[2]	OFL[3]	ABC[3]
2018/19	1.74	1.15	0.00	0.00	0.001	0.04	0.03
2019/20	1.67	1.06	0.00	0.00	0.001	0.04	0.03
2020/21	1.65	1.14	0.00	0.00	0.001	0.05	0.04
2021/22	1.63	1.18	0.00	0.00	0.001	0.05	0.04
2022/23		1.31	0.00	0.00	0.001	0.066	0.050
2023/24		1.31				0.066	0.050

Table 10. Status and catch specifications (1000 t) for Aleutian Islands golden king crab. Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch**.**

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2019/20	5.909	16.323	3.257	3.319	3.735	5.249	3.937
2020/21	6.026	16.207	2.999	3.000	3.444	4.798	3.599
2021/22	5.859	12.592	2.690	2.699	3.056	4.817	3.372
2022/23	5.832	13.600	2.291	2.369[a]	2.612[a]	3.761	2.821
2023/24		12.069				4.182	3.137

7.6 Significant changes in the ecosystem effects of the fishery

There was no indication of significant changes since the last assessment in the actual or potential impacts of BSAI crab fisheries on the Eastern Bering Sea ecosystem or the Aleutian Islands ecosystem[7]. However, environmental events observed in the EBS over recent years have negatively impacted upon crab stocks. Foremost among these is the decline of the EBS snow crab stock. Szuwalski (2023) reported that since 2018 more than 10 billion snow crab have disappeared from the Bering Sea shelf and the population collapsed to historical lows in 2021. They linked this collapse to a marine heatwave that occurred in the Bering Sea during 2018 and 2019. Calculated caloric requirements and observed body condition suggests that starvation may have played a role in the collapse. Fisheries disaster funds were requested in 2022 after allowable catches in the fisheries were slashed by ~90% in 2021 and short-term prospects for snow crab in the Bering Sea are grim. The collapse of snow crab foreshadows climate-related fisheries management problems that will be more frequently faced around the globe. Losing a frame of reference for future ecosystems as environmental conditions move beyond historical observations shifts our management paradigm from predictive to reactive. New managements paradigms will be needed to face this challenge (see Szuwalski *et al.*, 2023).

[7] It is possible, if not probable, that crab fishery impacts to BSAI ecosystems have reduced in recent years owing to fishery closures for BBRKC and EBS snow crab stocks (M. Stichert, pers. comm.).

7.7 Violations and enforcement information

Since re-assessment of BSAI king and Tanner crab in 2022, the number of USCG boardings of crab vessels has been somewhat limited owing to fishery closures during this period: BBRKC fishery was closed for the 2021/2022 and 2022/2023 seasons; SMBKC was closed for the 2021/2022 and 2022/2023 seasons; and EBS snow crab was closed for the 2021/2022 season. Nonetheless, available information from USCG indicates that violations remain infrequent and enforcement actions were relatively uncommon (see summary under Fundamental Clause 10). USCG also reported that crab vessel operators were extremely compliant with vessel safety inspections.

The inspection activities by Alaska Wildlife Troopers (AWT) were also somewhat reduced compared to previous years because of the recent fishery closures (see summary under Fundamental Clause 10) but AWT report that, overall, the BSAI crab fisheries show a high level of compliance with regulations (D. DeGraaf, pers. comm.).

7.8 Other information that may affect the outcome of certification

The assessment team is not aware of any other information that may affect the outcome of certification including an update on any new fishery developments since certification not already covered in other sections.

7.9 Update on consistency to the fundamental clauses of the RFM Fishery Standard

There were no changes in the fishery relevant to the fundamental clauses of the RFM Fishery Standard. The fishery continues to conform to the requirements of all Fundamental Clauses of the RFM Fishery Standard.

7.9.1 Section A: The Fisheries Management System

7.9.1.1 Fundamental Clause 1. Structured and legally mandated management system

1.	**There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.**
Summary of relevant changes:	Certified BSAI king and Tanner crab fisheries are in conformance with RFM Fundamental Clause 1. As summarized below, the evidence viewed during surveillance confirms that these fisheries continue to operate under a structured and legally mandated management system that respects international, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment. 1.1. There shall be an effective legal and administrative framework established at local and national level appropriate for the fishery resource and conservation and management. The crab fisheries in Alaska's Bering Sea and Aleutian Islands (BSAI) are governed by the Fishery Management Plan (FMP) for Commercial King and Tanner Crab, which was authorized by the US Secretary of Commerce on June 2, 1989. The North Pacific Fishery Management Council (NPFMC) and their Crab Plan Team (CPT) prepared the FMP, which was then submitted to the National Marine Fisheries Service (NMFS) for public review and comment before being approved by the Secretary of Commerce (NPFMC 2011). The Magnuson-Stevens Fishery Management and Conservation Act (MSFMCA or MSA) established the NPFMC as one of eight regional fishery management councils to oversee management of the nation's fisheries. The MSA is the main legal document that governs the BSAI crab fisheries. The Act establishes ten national standards for fishery conservation and management (16 USC 1851), which must be followed by all FMPs. Within the MSA, the NPFMC is permitted to develop an FMP and any necessary revisions for each fishery under its jurisdiction and submit them to the Secretary of Commerce for approval, disapproval, or partial approval. While the NPFMC is in charge of crab

1.	There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.
	management in the BSAI, the FMP creates a State/Federal cooperative management regime that defers crab management to the State of Alaska with limited Federal control. 1.2. Management measures shall take into account the whole stock unit over its entire area of stock distribution. As detailed in the BSAI Crab RFM Re-assessment Report (Global Trust 2022)[8], management measures consider the whole stock biological unit over its entire area of distribution, the area through which the species migrates during its life cycle, and other biological characteristics of the stock. The Council and NMFS produce annually a Stock Assessment & Fishery Evaluation (SAFE) report[9] covering all crab stocks within the BSAI King and Tanner Crab Fishery Management Plan (FMP), including each of the five stocks under consideration here. Both state and federal assessment biologists meet at the NPFMC Plan Team meetings and share assessment information and harvest strategies to assure conservation management over the entire stock distribution. Investigations of crab stock structure are ongoing and include studies of distribution and movement (Murphy 2020; Daly *et al.*, 2020) as well as population genetic research (*e.g.*, Johnson 2019). Recently, Katie Palof of ADFG presented a finalized red king crab (RKC) stock structure document to the Crab Plan Team (CPT 2023). Given that BSAI crab stock management boundaries were originally based on historic fishing grounds, the stock structure document provides guidance for splitting and lumping RKC stocks using available scientific information. Katie presented Bering Sea RKC distribution plots, highlighting the overlap in spatial distributions of Northern District, Pribilof Islands and Bristol Bay stocks. Genetic studies indicate that the Western Aleutian and Norton Sound RKC populations are isolated populations, while gene flow between BBRKC, PIRKC and GOA RKC suggests that these stocks are not demographically independent populations. Understanding gene flow between Northern District RKC and other Bering Sea stocks has been limited due to a lack of genetic studies. 1.3./1.4/1.5./1.6. Transboundary stocks. The five stocks under assessment are not considered shared, straddling, high seas, or highly migratory stocks, nor are they considered common shared resources exploited by two or more States. As such, the following six supporting clauses are not applicable: 1.3, 1.3.1, 1.4, 1.4.1, 1.5 and 1.6.1. 1.6 The means to finance fisheries management organizations are agreed and such arrangements aim to recover costs of fisheries conservation, management, and research. There are established means by which fisheries management activities, organizations and arrangements are financed and, where appropriate, these arrangements aim to recover the costs of fisheries conservation, management, and research. The main costs associated with managing, researching, and enforcing the BSAI crab fishery are covered by Congressional funding for federal programs. In addition to financing from the Alaska Legislature, NMFS provides some funding to the state of Alaska. The Crab Observer Program is supported by business monies as well as grants from Test Fish. ADFG sends an annual financial report[10] to the Crab Observer Oversight Task Force (COOTF) outlining test fish expenses on the BSAI crab fisheries observer program (ADFG 2023).

[8] https://rfmcertification.org/certified-fishery-species/alaska-crab/
[9] https://www.npfmc.org/library/safe-reports/
[10] https://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareaaleutianislands.shellfish#crabobserver

1.	**There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.**
	1.7. Review and Revision of conservation and management measures. The NPFMC has mechanisms in place to guarantee that the effectiveness of conservation and management measures is continually assessed. Mechanisms exist to update or eliminate present management measures in light of new information. The MSA, for example, requires Regional Fishery Management Councils to "review on a continuing basis, and revise as appropriate, the assessments and specifications made pursuant to section 1853(a)(3) and (4) of this title with respect to the optimum yield," according to 1852(f)(5). The Alaska BOF, like the NPFMC, has mechanisms in place to guarantee that the efficacy of state conservation and management measures, including those for BSAI crab stocks, is continually reviewed. The BOF meeting calendar is published by ADFG so that stakeholders can suggest changes to existing regulations or provide feedback on current proposals. This includes, for example, the preparation and publication of a Book of Proposals (*e.g.*, BOF 2023-2024 Proposal Book[11]) which details all regulatory proposals that will be heard by the BOF during upcoming meetings. There is strong evidence for continuing review of the efficacy of current conservation and management measures and to revise them in the light of new information. For example, in June of 2023 the NPFMC initiated development of a Programmatic Environmental Impact Statement (EIS) for all Council-managed fisheries and recommended NMFS initiate NEPA scoping and solicit public input on the following Purpose and Needs Statement: "The federal action under consideration is to clarify the management policy and objectives for all federal fisheries managed under the Magnuson-Stevens Act and the Halibut Act under the jurisdiction of the North Pacific Fishery Management Council (Council) in the Gulf of Alaska, the Bering Sea, and Aleutian Islands, including objectives for adapting to the effects of climate change. The purpose of this action is to ensure that the management framework of the Council is adequate to meet current and forthcoming challenges in the federal fisheries, and to describe and implement that framework in a comprehensive manner to improve the Council's ecosystem-based management approach. Given changing conditions in the fisheries, new Council efforts, and significant climate-related impacts on the marine ecosystem, there is a need to evaluate the management policy and objectives for federal fishery management to be adaptable and responsive in order to better meet the objectives of the Magnuson Stevens Act and Halibut Act, to ensure long-term sustainability of the stocks managed under those statutes, and to sustain participation in and benefits from the fisheries over time. The Council intends to ensure that the management framework is structured to use the best available science, which includes climate science and local and traditional knowledge, and also recognizes Alaska tribes and communities that rely on subsistence resources" (NPFMC 2023). 1.8. Transparent management arrangements and decision making. In terms of management arrangements and decision-making processes, NPFMC operations are organized in a highly transparent manner. The Council provides a wealth of information on their website[12], including meeting agendas, discussion papers, and records of decisions. All Council deliberations are held in open, public session, and the Council actively promotes stakeholder participation (NPFMC 2012). The Council's Three Meeting Outlook identifies issues that are likely to be of importance and thus covered at the next three NPFMC sessions, allowing stakeholders to prepare and submit views for debate ahead of time.

[11] https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.proposalbook
[12] https://www.npfmc.org/

1.	**There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.**
	Similar to NPFMC, Alaska BOF's management arrangements and decision-making processes for BSAI crab fisheries are organized in a highly transparent manner. BOF and ADFG provide a wealth of information on their website[13], including meeting agendas, regulatory proposals, discussion papers, news items, and decision records. BOF will consider proposals concerning changes to the state's fishing regulations submitted timely by members of the public, organizations, advisory committees, and ADFG staff (e.g., BOF 2023-2024 Proposal Book[14]). BOF deliberations are held in an open, public session, which actively encourages stakeholder participation. 1.9. Compliance with international conservation and management measures The crab fisheries under consideration are prosecuted exclusively within waters of the U.S. EEZ and State of Alaska. These fisheries do not occur on the high seas. Thus, when viewed narrowly, supporting clause 1.9 is not applicable. Nonetheless, there are laws regulating high seas fishing activity and the U.S. is actively engaged in addressing this issue through, for example its ratification of the *Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas*[15].
References:	ADFG. 2023. 2023 ADF&G Shellfish Observer Program Test Fishery Account Annual Report to COOTF. https://www.adfg.alaska.gov/static/fishing/PDFs/commercial/bering_aleutian/fy23_adfgreporttoCOOTF.pdf BOF. 2023. Board of Fisheries 2023-2024 Proposal Book. October 2023 through March 2024. https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.proposalbook CPT. 2023. BSAI Crab Plan Team Report. September 12-14, 2023. https://meetings.npfmc.org/CommentReview/DownloadFile?p=372e0a74-35d3-44cc-9f51-cd0d97d2e3e2.pdf&fileName=CPT%20Report%20September%202023.pdf Daly, B., et al. 2020. Red king crab larval advection in Bristol Bay: Implications for recruitment variability. Fisheries Oceanography 29(6): 505-525. https://onlinelibrary.wiley.com/doi/full/10.1111/fog.12492 FAO Compliance Agreement. 1993. Agreement to promote compliance with international conservation and management measures by fishing vessels on the high seas. FAO, Rome. http://www.fao.org/fileadmin/user_upload/legal/docs/012t-e.pdf Global Trust. 2022. Responsible Fishery Management (RFM): U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab Commercial Fisheries. 2nd Re-assessment. February 25, 2022. 345 pp. https://rfmcertification.org/certified-fishery-species/alaska-crab/ Johnson, G.M. 2019. Genetic diversity and population genetic structure of tanner crab *Chionoecetes bairdi* in Alaskan waters. Thesis (M.S.) University of Alaska Fairbanks, 2019. https://scholarworks.alaska.edu/handle/11122/10506

[13] http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main
[14] https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.proposalbook
[15] https://www.fao.org/3/x3130m/X3130E00.htm

1.	**There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.**	
	Magnuson–Stevens Fishery Conservation and Management Act (MSFCMA), commonly referred to as the Magnuson–Stevens Act (MSA). Enacted April 13, 1976. 16 U.S.C. §§ 1801-1884 as amended. https://www.law.cornell.edu/uscode/text/16/chapter-38/subchapter-IV Murphy, J.T. 2020. Climate change, interspecific competition, and poleward vs. depth distribution shifts: Spatial analyses of the eastern Bering Sea snow and Tanner crab (*Chionoecetes opilio* and *C. bairdi*). Fisheries Research. Volume 223, March 2020, 105417. https://www.sciencedirect.com/science/article/abs/pii/S0165783619302723 NPFMC. 2011. Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs. North Pacific Fishery Management Council, October 2011. 229 p. http://www.npfmc.org/wp-content/PDFdocuments/fmp/CrabFMPOct11.pdf NPFMC. 2012. Statement of Organization, Practices, and Procedures of the North Pacific Fisheries Management Council. Draft, 23 March 2012. 31 p. https://www.npfmc.org/wp-content/PDFdocuments/membership/SOPPs412.pdf NPFMC. 2023. North Pacific Fishery Management Council D2 PEIS Council Motion, June 11, 2023. https://meetings.npfmc.org/CommentReview/DownloadFile?p=37104c8f-4824-41ed-a730-dd195dd32d5c.pdf&fileName=D2%20Motion.pdf	
Statement of consistency to the RFM Fishery Standard		**The fishery continues to conform to the requirements of Fundamental Clause 3 of the RFM Fishery Standard**

7.9.1.2 Fundamental Clause 2. Coastal area management frameworks

2.	**Management organizations shall participate in coastal area management, decision-making processes and activities related to the fishery and its users, supporting sustainable and integrated resource use, and conflict avoidance.**
Summary of relevant changes:	Certified BSAI king and Tanner crab fisheries are in conformance with RFM Fundamental Clause 2. Evidence viewed during surveillance confirms that relevant management organizations participate in coastal area management, decision-making processes and activities related to the fishery and its users, supporting sustainable and integrated resource use, and conflict avoidance. <u>2.1/2.2/2.3/2.4 Policy, legal and institutional frameworks adopted to achieve sustainable and integrated use of marine resources along with mechanisms to avoid conflict shall be in place.</u> To ensure sustainable and integrated use of marine resources, a framework of regulatory, legal, and institutional capacities has been put in place, as well as measures to avoid conflict among users. Through the federal National Environmental Policy Act (NEPA) processes, NMFS and the NPFMC participate in coastal area management-related institutional frameworks. This occurs whenever they generate, renew, or change resources under their supervision that may be influenced by other developments and each time they create, renew or amend regulations. Representatives from the fishing industry and fishing communities must be consulted during decision-making processes, and information on management measures must be widely distributed. Potential coastal zone developments and challenges can be brought to official evaluation and involvement through fishery management agencies' processes, committees, and groups, such as the NPFMC meetings or BOF meetings. All Council and BOF deliberations are held in open, public meetings, and both entities aggressively promote stakeholder input. Decisions are transparently documented on the respective websites of these organizations,[16,17] in a timely manner. Information related to management measures is disseminated in a timely manner. For example, ADFG regularly publishes and distributes booklets summarizing current regulations (*e.g.*, the 2023-2024 King and Tanner Crab Commercial Fishing Regulations; ADFG 2023) which are also made available online[18]. On its website, the NPFMC makes information regarding management measures available to the public by posting up-to-date content about current and upcoming meetings, topical issues, and Council publications. ADFG posts notifications related to the implementation of commercial fisheries management measures, such as fishery advisories, summaries, press releases, and forecasts, on its website[19] in a timely way. Similarly, NMFS makes available on its websites[20] information about regulatory and management actions and other resources relevant to commercial fisheries. <u>2.5 The economic, social and cultural value of coastal resources shall be assessed in order to assist decision-making on their allocation and use.</u> The evaluation of Alaskan fisheries' economic, social, and cultural worth is an important aspect of the decision-making process for coastal resource management. The NPFMC and the BOF's main responsibilities are to manage fisheries resources sustainably and to allocate resources to different users in compliance with the MSA.

[16] https://www.npfmc.org/
[17] https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main
[18] https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_king_tanner_crab_2023_2024.pdf
[19] https://www.adfg.alaska.gov/index.cfm?adfg=home.main
[20] https://www.fisheries.noaa.gov/region/alaska

2.	**Management organizations shall participate in coastal area management, decision-making processes and activities related to the fishery and its users, supporting sustainable and integrated resource use, and conflict avoidance.**	
		Alaska Fisheries Science Center (AFSC) manages the Economic and Social Sciences Research (ESSR) program[21] in Alaska. ESSR's goal is to offer economic and sociocultural data to help NMFS fulfill its stewardship responsibilities. ESSR provides online access to community profiles with baseline socioeconomic data for 136 Alaska villages that are heavily involved in commercial fishing[22]. The website has comprehensive community biographies, concise snippets, and searchable maps of communities participating in commercial, recreational, and subsistence fishing[23]. AFSC has published economic status reports for BSAI king and Tanner crab fisheries (Garber-Yonts and Lee, 2017) as well as a market profile for Alaska groundfish and crab (AFSC, 2016). Many of the AFSC Program's operations are carried out in partnership with other federal and state agencies, as well as colleges. Regional economic effect models, behavioral models of fishing operations, economic performance indicators, and non-market value of living marine resources are all current study areas. The Alaska Fisheries Information Network (AKFIN) provides further data on the value of coastal resources: its mission is to consolidate, manage, and disseminate information relating to commercial fishing[24]. The AFKIN maintains an analytic database of both State and Federal historic, commercial Alaska fisheries data important to the needs of fisheries analysts and economists. These records are necessary for determining the economic value of Alaska's fishing industry, among other things (McDowell Group, 2020). Results from economic assessments are presented annually in Economic Stock Assessment and Fishery Evaluation Reports or "Economic SAFE reports" (Garber-Yonts and Lee, 2017), together with comprehensive information on stock assessments and updates on ecosystem status and trend ("Ecosystem SAFE" reports). <u>2.6/2.7 Research and monitoring of the coastal environment, mechanisms for cooperation and coordination, appropriate technical capacities and financial resources, conflict avoidance amongst user groups.</u> DOMESTIC: State and federal organizations collaborate on research and monitoring of the coastal environment. There are well-established multidisciplinary research programs that analyze the physical, chemical, biological, economic, and social components of the coastal environment and contribute to better management. NPFMC, NMFS and ADFG engage in monitoring of coastal resources either during the NEPA review of plan amendments or during their on-going studies and evaluations. Other cooperating agencies/entities include: Alaska Department of Environmental Conservation (ADEC); Alaska Department of Natural Resources (ADNR); DNR Office of Project Management and Permitting (OPMP); U.S. Fish and Wildlife Service (USFWS); and Bureau of Ocean Energy Management (BOEM), as well as the North Pacific Research Board (NPRB) and Institute of Marine Science (IMS) of the UAF's School of Fisheries and Ocean Science. Domestic collaboration and coordination structures are well-established and supported by adequate technical capabilities and financial resources. INTERNATIONAL: There are mechanisms in place to facilitate international cooperation and coordination between states for monitoring of the coastal environment. There are management systems and action plans in place for reaction and containment if an incident with the potential for detrimental environmental effects occurs (e.g., an oil leak, an invasive species escape). There are also systems in place to guarantee that information is promptly shared with the relevant State partner (e.g. notifying Canadian authorities if such an incident threatened to spill into Canadian seas).

[21] https://www.fisheries.noaa.gov/alaska/socioeconomics/alaska-economic-and-social-sciences-research
[22] https://www.fisheries.noaa.gov/resource/map/alaska-subsistence-fishing-communities-interactive-map
[23] https://www.fisheries.noaa.gov/resource/map/alaska-subsistence-fishing-communities-interactive-map
[24] https://www.psmfc.org/program/alaska-fisheries-information-network-akfin

2.	Management organizations shall participate in coastal area management, decision-making processes and activities related to the fishery and its users, supporting sustainable and integrated resource use, and conflict avoidance.
	Since 1994, Canada, Mexico, and the United States have worked together to protect North America's environment under the North American Agreement on Environmental Cooperation (NAAEC). The NAAEC founded the Commission for Environmental Cooperation (CEC)[25] - a tri-national intergovernmental institution, to facilitate international collaboration on environmental preservation, conservation, and enhancement in North America. The CEC's mission is to "facilitate collaboration and public participation in order to foster conservation, protection, and enhancement of the North American environment for the benefit of current and future generations, in the context of increasing economic, trade, and social links between Canada, Mexico, and the United States." Through its cooperative work program and other programs, the CEC is tasked with addressing some of North America's most severe environmental issues. Additionally, there is a high degree of bilateral coordination between the United States and Canada with respect to the coastal environment in the eastern North Pacific region (i.e., the area comprising the Bering Sea and Aleutian Islands). The large, shared border and different ecosystems requires tight cooperation across numerous U.S. states, Canadian provinces, U.S. Tribes, First Nations, and local and federal agencies, resulting in one of the world's oldest and most effective environmental partnerships. Over 40 international agreements have been enacted by the two federal governments to help with environmental management in the border area, with over 100 more at the state level between US states and Canadian provinces[26].
References:	ADFG. 2023. 2023 – 2024 Statewide King and Tanner Crab Commercial Fishing Regulations. Alaska Department of Fish and Game. 213 pp. https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_king_tanner_crab_2023_2024.pdf AFSC. 2016. Wholesale market profiles for Alaska groundfish and crab fisheries. 134 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115. https://apps-afsc.fisheries.noaa.gov/News/pdfs/Wholesale_Market_Profiles_for_Alaskan_Groundfish_and_Crab_Fisheries.pdf CEC Strategic Plans. http://www.cec.org/files/documents/strategic_plans/cec-strategic-plan-2021-2025.pdf Garber-Yonts, B. E. and J.T. Lee. 2017. Stock Assessment and Fishery Evaluation Report for the King and Tanner Crab Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Islands Area : Economic Status of the BSAI King and Tanner Crab Fisheries off Alaska, 2017. https://repository.library.noaa.gov/view/noaa/18293 McDowell Group. 2020. The Economic Value of Alaska's Seafood Industry. January 2020. Prepared by McDowell Group. Prepared for Alaska Seafood Marketing Institute. 34 pp. http://uploads.alaskaseafood.org/2020/01/McDowell-Group_ASMI-Economic-Impacts-Report-JAN-2020.pdf
Statement of consistency to the RFM Fishery Standard	**The fishery continues to conform to the requirements of Fundamental Clause 2 of the RFM Fishery Standard**

[25] http://www.cec.org/ecosystems/marine-and-coastal-conservation/
[26] https://www.epa.gov/international-cooperation/epa-collaboration-canada

7.9.1.3 Fundamental Clause 3. Management objectives and plan

3.	**Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.**
Summary of relevant changes:	Certified BSAI king and Tanner crab fisheries remain in conformance with RFM Fundamental Clause 3. As summarized below, evidence viewed during surveillance confirms that the management objectives for these fisheries continue to be implemented through management rules and actions that are clearly articulated in a fishery management plan (FMP). 3.1 Long-term management objectives shall be translated into a plan or other management document and be subscribed to by all interested parties. Long-term objectives are outlined in the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (NPFMC, 2011). FMP objectives are dictated by, and consistent with, the Magnuson-Stevens Act (MSA). Management decisions are made by the Council and BOF, and implemented and enforced by AWT, NMFS-OLE and USCG. Both NPFMC and ADFG make Council and Board deliberations and associated records publicly available on their websites. The decision-making processes of both agencies are extremely transparent and inclusive of all stakeholders, thereby ensuring that the plan is subscribed to by all interested parties. 3.2. Management measures should limit excess fishing capacity, promote responsible fisheries, take into account artisanal fisheries, protect biodiversity and allow depleted stocks to recover. Conservation and management measures for BSAI crab prevent excess fishing capacity and ensure that stock exploitation remains economically viable. Crab Rationalization or CR, introduced in 2005, put a cap on the number of buyers, extended fishing seasons, and enabled vessel operators to join cooperatives, resulting in fewer vessels deploying less gear on the grounds[27,28]. These changes were driven by a Congressionally approved that created Processor Quota Shares and Individual Fishing Quotas for rationalized crab fisheries in the BSAI. The Council contracted a ten-year review of the effectiveness of crab rationalization (NPFMC, 2017). Authors of the CR review concluded that the extent to which crab harvesting and processing capacity was reduced since CR Program implementation is measurable, and fairly objective when considered in terms of the number of vessels and processing facilities that have participated in CR program fisheries over time. ADFG also tracks the ex-vessel value of the fisheries and produces Annual Management Reports (e.g., Nichols and Shaishnikoff, 2022) that support the analysis. NPFMC, NMFS, and ADFG staff economists participate in the economic, social, and cultural evaluation and review process of fishery management recommendations, and their decisions are based on both biological and socioeconomic data collected and processed. Subsistence and community development programs are also taken into account while allocating funds. There are formal systems in place to ensure the recovery of stocks that have been found to be depleted. To prevent overfishing and rebuild depleted species, the Magnuson-Stevens Act section 304(e)(4)(A) and the National Standard Guidelines both require the establishment of a rebuilding plan. Rebuilding should occur as quickly as possible, considering the status and biology of any overfished fish stocks, the needs of fishing communities, recommendations from international organizations in which the US participates, and the interaction of the overfished fish stock with the marine ecosystem. Systems to rebuild depleted stocks are effectively implemented in BSAI crab fisheries, as evidenced by the recent approval of a rebuilding plan for snow crab in the Bering Sea (50 CFR 679: NOAA, 2023).

[27] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/bering-sea-and-aleutian-islands-crab-rationalization-program
[2828] https://www.npfmc.org/fisheries-issues/fisheries/bsai-crab-allocations/

3.	Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.
	There are explicit objectives and management measures to ensure that biodiversity of aquatic habitats and ecosystems is conserved and endangered species are protected. The MSA establishes an overall legal framework for the conservation of benthic biodiversity in aquatic ecosystems. Similarly, the Endangered Species Act (ESA) establishes an overall legal framework for ensuring the protection of endangered species. The NPFMC's management process includes preserving the biodiversity of aquatic habitats and ecosystems. The BSAI crab FMP lays out seven management objectives, one of which is a specific habitat aim (NPFMC, 2011). NPFMC has adopted an Ecosystem-Based Fishery Management (EBFM) approach that emphasizes the importance of biodiversity conservation at the ecosystem level[29].
References:	Magnuson–Stevens Fishery Conservation and Management Act (MSFCMA), commonly referred to as the Magnuson–Stevens Act (MSA). Enacted April 13, 1976. 16 U.S.C. §§ 1801-1884 as amended. https://www.law.cornell.edu/uscode/text/16/chapter-38/subchapter-IV Nichols, E., and J. Shaishnikoff. 2022. Annual management report for shellfish fisheries of the Bering Sea/Aleutian Islands Management Area, 2021/22. Alaska Department of Fish and Game, Fishery Management Report No. 22-28, Anchorage. https://www.adfg.alaska.gov/FedAidPDFs/FMR22-28.pdf NOAA, 2023. 50 CFR 679 Fisheries of the Exclusive Economic Zone Off Alaska; Snow Crab Rebuilding Plan in the Bering Sea and Aleutian Islands. A Rule by the National Oceanic and Atmospheric Administration on 09/07/2023. 88 FR 61477. https://www.federalregister.gov/documents/2023/09/07/2023-19300/fisheries-of-the-exclusive-economic-zone-off-alaska-snow-crab-rebuilding-plan-in-the-bering-sea-and NPFMC, 2011. Fishery Management Plan for Bering Sea and Aleutian Islands King and Tanner Crabs. North Pacific Fishery Management Council. October 2011. 229 p. https://www.npfmc.org/wp-content/PDFdocuments/fmp/CrabFMPOct11.pdf NPFMC, 2017. Ten-Year Program Review for the Crab Rationalization Management Program in the Bering Sea/ Aleutian Islands. North Pacific Fishery Management Council. Final Draft: January 2017. 249 pp. https://www.npfmc.org/wpcontent/PDFdocuments/catch_shares/Crab/Crab10yrReview_Final2017.pdf
Statement of consistency to the RFM Fishery Standard	**The fishery continues to conform to the requirements of Fundamental Clause 3 of the RFM Fishery Standard**

[29] https://www.npfmc.org/how-we-work/management-policies/

7.9.2 Section B: Science & Stock Assessment Activities, and the Precautionary Approach

7.9.2.1 Fundamental Clause 4. Fishery data

4.	**There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.**
Summary of relevant changes:	4.1. <u>All fishery removals and mortality of the target stock(s) shall be considered by management. All fishery removals and mortality of the target stocks is considered by management.</u> The ADFG conducts an annual monitoring program to collect information on retained catch, bycatch/discards, and crab bycatch/discards in all BSAI directed crab fisheries, as well as crab bycatch/discards in all groundfish fisheries. These monitoring and observer programs, taken together, provide the foundation for a reliable annual estimate of total removals from all crab stocks for assessment and management reasons. In each yearly stock assessment, complete and trustworthy statistics on catch and fishing effort are produced and subjected to rigorous statistical analysis. The findings of the research have been used to create management objectives, reference points, and performance standards, as well as for annual adjustment of allowable catch levels. Historical and most recent data are available in the 2022 crab stock assessments.[30] 4.2. <u>An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures shall be established.</u> To collect accurate data for research and assist compliance with appropriate fishery management measures, a program of at-sea and dock-side observers has been established.[31] Historical and most recent data are available in the 2022 crab stock assessments. 4.3. <u>Management entities shall make data available in a timely manner and in an agreed format in accordance with agreed procedures.</u> The information gathered in steps 4.1 and 4.2 above is made available in order to conduct annual assessments of all BSAI crab stocks. At the federal and state levels, policies and processes are in place to ensure the confidentiality of data submitted to and collected by workers and contractors. Only authorized users have access to confidential data.[32] [33] 4.4/4.5. <u>States shall stimulate the research required to support national policies related to fish as food and collect sufficient knowledge of social, economic and institutional factors relevant to the fishery in question to support policy formulation.</u> Federal and state agencies, as well as business organizations that support national policy on fish as food, actively promote research into all areas of seafood utilization. Dedicated research has yielded extensive information of the BSAI crab fishery' economic, social, marketing, and institutional elements. The annual collection and analysis of pertinent data serves as the foundation for continuous fisheries monitoring, analysis, and policy formation. The most up-to-date data may be found in the 2022 socioeconomic evaluation of these fisheries.[34] 4.6. <u>States shall investigate and document traditional fisheries knowledge and technologies, in particular those applied to small scale fisheries, in order to assess their application to sustainable fisheries conservation, management and development.</u>

[30] https://www.npfmc.org/about-the-council/plan-teams/bsai-crab-planning-team/#currentcrab
[31] https://www.fisheries.noaa.gov/alaska/fisheries-observers/north-pacific-observer-program
[32] https://www.st.nmfs.noaa.gov/st1/recreational/documents/Intercept_Appendices/Appendix%20M%20031408%20NOAA%20administrative%20order%20216-100.pdf
[33] http://www.adfg.alaska.gov/FedAidPDFs/SP12-14.pdf
[34] https://meetings.npfmc.org/CommentReview/DownloadFile?p=398785e2-d50b-49f4-bb64-c5f4834a93d1.pdf&fileName=D4%20Crab%20Economic%20SAFE%202022.pdf

4.	There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.
	Traditional fisheries knowledge is acquired through continual opportunities for public/community participation into the fisheries management process, ensuring that it is applied to sustainable fisheries conservation, management, and development. 4.7. States conducting scientific research activities in waters under the jurisdiction of another State shall ensure that their vessels comply with the laws and regulations of that State and international law. NA 4.8. States shall promote the adoption of uniform guidelines governing fisheries research conducted on the high seas. NA 4.9/4.10/4.11. States shall promote and enhance the research capacities of developing countries, support (upon request) States engaged in research investigations aimed at evaluating stocks which have been previously un-fished or very lightly fished. NA
References:	
Statement of consistency to the RFM Fishery Standard	**The fishery continues to conform to the requirements of Fundamental Clause 4 of the RFM Fishery Standard.**

7.9.2.2 Fundamental Clause 5. Stock assessment

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.**
Summary of relevant changes:	5.1 States shall ensure that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, social science, aquaculture and nutritional science. The research shall be disseminated accordingly. States shall also ensure the availability of research facilities and provide appropriate training, staffing and institution building to conduct the research, taking into account the special needs of developing countries. There is a well-organized institutional framework in place for doing the necessary research for fishery management. The NPFMC and the BOF jointly manage the BSAI crab fishery under the Fishery Management Plan (FMP).[35]40 An annual stock assessment and fisheries evaluation (SAFE) report is one of the FMP's requirements. The SAFE report includes a detailed description of the data and methodology used in the stock assessment, any changes in approaches, the estimated stock status in relation to pre-determined fisheries management reference points, advice on appropriate harvest levels, and an assessment of the relative success of existing state and federal fishery management programs for each stock/fishery. When uncertainty is high, stock status criteria employed in the assessment of BSAI crab stocks ensure more precautionary methods to managing fisheries. There are no small-scale or low-value crab fisheries in the BSAI. Nonetheless, each stock's assessment technique and degree of reliability differs. These stocks' status determination criteria are derived using a five-tier system that accounts for varying levels of information uncertainty. As new scientific knowledge becomes available, the five-tier system incorporates it and provides a means to continuously enhance the status determination criteria. There are well-established institutions with trained personnel conducting research on all aspects of fishing. The results are made available as needed to ensure that the most up-to-date scientific evidence is used to conserve, manage, and develop fisheries. The Alaska Fisheries Science Center (ASFC) is the NMFS Alaska Region's research arm.[36] Its mission is to plan, develop, and manage scientific research programs which generate the best scientific data available for understanding, managing, and conserving the region's living marine resources and the environmental quality essential for their existence. The Resource Assessment and Conservation Engineering (RACE) Division[37] consists of scientists from a variety of disciplines whose mission is to conduct quantitative fishery surveys and related ecological and oceanographic research to describe the distribution and abundance of commercially important fish and shellfish stocks in the region, as well as to look into ways to reduce bycatch, bycatch mortality, and fishing-related habitat damage. Resource Ecology and Fisheries Management (REFM) Division conducts research and data collection to support an ecosystem approach to management of fish and crab resources[38]. Division scientists evaluate how fish stocks, ecosystem relationships and user groups might be affected by fishery management actions and climate. The Habitat and Ecological Processes Research (HEPR) Program[39] develops scientific research that supports implementation of an ecosystem approach to fishery management.

[35] https://www.npfmc.org/wp-content/PDFdocuments/fmp/CrabFMP.pdf
[36] https://www.fisheries.noaa.gov/about/alaska-fisheries-science-center
[37] https://www.fisheries.noaa.gov/about/resource-assessment-and-conservation-engineering-division
[38] https://www.fisheries.noaa.gov/about/resource-ecology-and-fisheries-management
[39] https://www.fisheries.noaa.gov/alaska/ecosystems/habitat-and-ecological-processes-research-alaska#:~:text=The%20Habitat%20and%20Ecological%20Processes%20Research%20Program%20focuses%20on%20integrated,on%20four%20main%20research%20areas.

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.**	
		5.2. The state of the stocks under management jurisdiction, including the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration shall be monitored. The ability to assess and monitor the effects of climate or environmental change on BSAI crab stocks and ecosystems, as well as the state of these stocks and the repercussions of ecosystem changes caused by human activities, is well established. For stock assessment scientists, fisheries management, and the general public, annual Ecosystem SAFE publications provide a brief summary of the status of Alaska's marine ecosystems. It provides thorough information and updates on the state and trends of ecosystem components, as well as early indicators of direct human influences that may require management intervention or evidence of the efficacy of earlier management measures.[40] 5.3. Management organizations shall cooperate with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources. International partnership and cooperation stimulate research to enable the best possible use of BSAI crab resources. The results of BSAI crab stock research are regularly published in peer-reviewed journals and presented/discussed at important international conferences and symposia[41]. Scientists participate in meetings of different organizations involving attendees from various countries, including, for example, the North Pacific Marine Science Organization (PICES)[42], which has members from the US, Russia, Japan, and Canada, to exchange and discuss the latest results and advances stock assessment science and management of fishery resources. 5.4. The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programs to improve understanding of the biology, environment, and status of trans-boundary aquatic stocks. Although the BSAI crab is not a trans-boundary species, the US and Russia share numerous important stocks of living marine resources in the North Pacific Ocean and Bering Sea, making coordination of conservation and management activities between the two countries critical. The "Agreement Between the Governments of the United States of America and the Government of the Union of Soviet Socialist Republics on Mutual Fisheries Relations," which established the US-Russia Intergovernmental Consultative Committee, was signed on May 31, 1988[43]. The Agreement's major goal is to maintain a beneficial fisheries partnership between the two countries. The US and Russia collaborate on scientific research, consult on fisheries issues outside of their EEZs and outside the EEZs of any third party to ensure effective conservation and management, and work together to combat illegal, unreported, and unregulated (IUU) fishing. The United States and Russia signed a Joint Statement on Enhanced Fisheries Cooperation on April 29, 2013, reaffirming the 1988 Agreement while focusing future cooperation on combating IUU fishing, collaborating on Arctic fisheries science and management, and advancing conservation efforts in the Ross Sea region of Antarctica 5.5. Data generated by research shall be analyzed and the results of such analyses published in a way that ensures confidentiality is respected, where appropriate. The results of BSAI crab fisheries data analysis, which are generated both through commercial fisheries data collection programs and research surveys and other research programs, are published in program reports, and the annual SAFE report describes how the various datasets have contributed

[40] https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/EBSecosys.pdf
[41] https://www.fisheries.noaa.gov/resource/publication-database/noaa-fisheries-scientific-publications-database
[42] http://www.pices.int/
[43] https://2009-2017.state.gov/documents/organization/138873.pdf

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.**	
	to the assessment of stock status. NOAA/National Marine Fisheries Service administrative order 216-100 establishes policies and procedures for safeguarding the confidentiality of data provided to and acquired by the agency. Only authorized users have access to confidential data; they must have a need to collect or use these data in the performance of an official duty, and they must sign a non-disclosure statement affirming their understanding of NMFS obligations regarding confidential data, as well as the penalties for unauthorized use and disclosure. Contractors collecting data with Federal authority must follow all processes that apply to Federal personnel. Under agreements with the State, each State data collector collecting confidential data will sign a statement at least as protective as the one signed by Federal employees.	
References:		
Statement of consistency to the RFM Fishery Standard	**The fishery continues to conform to the requirements of Fundamental Clause 5 of the RFM Fishery Standard**	

7.9.2.3 Fundamental Clause 6. Biological reference points and harvest control rule

6.	**The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.**
Summary of relevant changes:	6.1/6.2/6.3/6.4 States shall determine for the stock both safe targets for management (Target Reference Points) and limits for exploitation (Limit Reference Points), shall measure the status of the stock against these reference points and agree to actions to be undertaken if reference points are exceeded. For the management of BSAI crab fisheries, safe target reference points have been devised. The following stock status definitions can be found in the Crab FMP.[44] 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. The annual catch limit (ACL) is the yearly catch level of a stock that is used to trigger accountability measures. The ACL for EBS crab stocks will be set at the ABC. The total allowable catch (TAC) for a stock is the annual catch objective set for the directed fishery in line with section 8.2.2 of the FMP to avoid exceeding the ACL for that stock. The preseason predicted level of allowed fish harvest that will not threaten the fish stocks' long-term output is referred to as the guideline harvest level (GHL). A GHL can be stated as a range of authorized crab harvests for each registration area, district, sub district, or sector.[45] Under current ecological and environmental conditions, the maximum sustainable yield (MSY) is the biggest long-term average catch or yield that may be obtained from a stock or stock complex. MSY is calculated based on the most up-to-date data. The OFL represents the maximum sustainable yield for crab stocks (MSY). FMSY control rule refers to a harvest technique that, if applied, should yield a long-term average catch that approximates MSY. When a rebuilding plan is needed, the minimal criteria for a rebuilding target is BMSY stock size, which is the biomass that results from fishing at constant FMSY. Annual biomass estimations are compared to the set MSST to evaluate if a stock is overfished. If the biomass falls below the MSST (or proxies) for stocks where MSST (or proxies) are defined, the stock is deemed overfished Any amount of catch in excess of the overfishing level is defined as overfishing (OFL). The OFL is calculated using the FOFL control rule and abundance estimates. Crab stock status determination criteria are calculated annually using a five-tier system that accounts for changing levels of information uncertainty. Section 304(e)(3)(A) of the Magnuson-Stevens Act, as amended, requires the NPFMC to quickly stop overfishing and restore affected stocks if overfishing occurs or the stock is overfished. The MSA also mandates that Fishery Management Plans (FMPs) include accountability measures to prevent ACL violations and to remediate any ACL violations that do occur. Seasonal, area, and gear allocations, restricted areas, bycatch limits, in-season fisheries closures, gear restrictions, limited entrance, catch shares, and observer and vessel monitoring requirements could all be used as

[44] https://www.npfmc.org/wp-content/PDFdocuments/fmp/Crab/CrabFMP.pdf
[45] https://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareaaleutianislands.shellfish#management

6.	**The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.**	
		accountability measures. All of these techniques are intended to enable for close monitoring of catch levels from all sources, as well as the rapid response to specific bycatch issues and the creation of a database for assessing the potential effects of future management activities. Individual fishing quotas (IFQs) and efforts to ensure IFQs are not exceeded, measures to limit bycatch in directed crab fisheries, and monitoring and catch accounting measures are among the specific accountability measures utilized by the BSAI crab FMP to prevent the ACL from being exceeded. Furthermore, if the ACL was exceeded in the preceding fishing year, the ACL and TAC were decreased. <u>Supporting Clause 6.3</u> **Eastern Bering Sea Crab** In the 1st surveillance assessment of the 2nd cycle of recertification the certified BSAI crab fisheries conducted in 2023, the assessment team found that the Eastern Bering Sea crab unit of certification was not in conformity with RFM Supporting Clause 6.3 because NMFS had determined that the EBS snow crab was "overfished". A minor non-conformity was raised, and the fishery client prepared a corrective action plan that was accepted by the assessment team, as documented in this surveillance report (**Error! Reference source not found.**). **Bristol Bay Red King Crab** In the 1st surveillance assessment of the 2nd cycle of recertification for the certified BSAI crab fisheries conducted in 2023, the assessment team found that the BBRKC unit of certification was again in conformity with RFM Supporting Clause 6.3 because it was found that the stock status was not approaching an overfished situation and it was past the midway from the LRP to TRP (Figure 1). **St Mathew Blue King Crab** In the 2nd surveillance assessment of the certified BSAI crab fisheries conducted in 2018, the assessment team found that the St. Matthew Island Blue King Crab unit of certification was not in conformity with RFM Supporting Clause 6.3 because NMFS had determined that the SMBKC stock was "overfished". A minor non-conformity was raised, and the fishery client prepared a corrective action plan that was accepted by the assessment team, as documented in the 2nd surveillance report. During the present surveillance assessment (the 1st surveillance audit of 2nd cycle of re certification), the stock status of SMBKC was found to be unchanged from 2019. That is, the 2022 SAFE report indicates that SMBKC continues to be designated as overfished (Palof *et al*., 2022). For this reason, the assessment team has again assigned a confidence level of "medium" to RFM Supporting Clause 6.3 and the minor non-conformity remains open. Progress by the client in implementing the agreed upon corrective action plan to resolve the NC is described below further in Section 9 of this report (**Error! Reference source not found.**).

6.	**The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.**

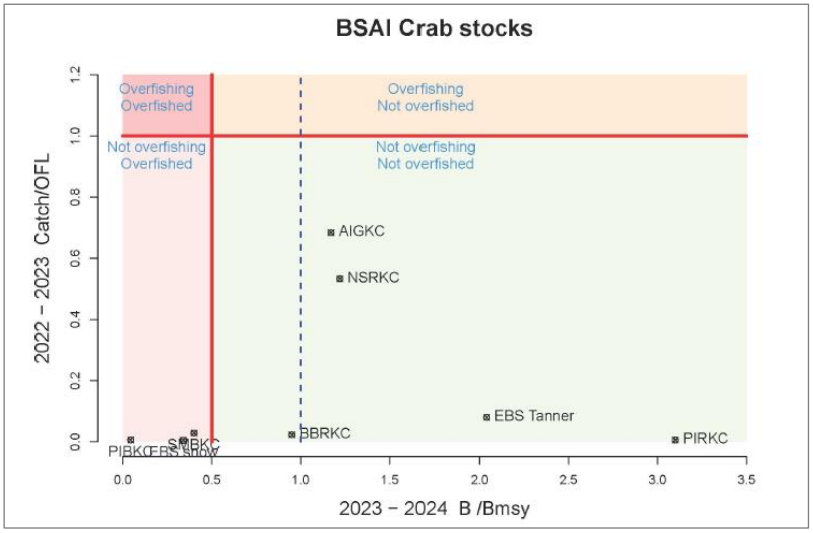

Figure 1. Status of eight Bering Sea and Aleutian Islands crab stocks in relation to status determination criteria (BMSY, MSST, overfishing) for 2022/23. Note that information is insufficient to assess Tier 5 stocks according to these criteria (WAIRKC, PIGKC),[46]

Table 11. Stock status in relation to status determination criteria for 2022/23 as estimated by the most recent assessment. Hatched areas indicate parameters not applicable for that tier. Values are in thousands of metric tons (kt).[47]

Chapter	Stock	Tier	MSST[1]	BMSY or BMSYproxy	2022/23[2] MMB	2022/23 MMB/ MMBMSY	2022/23 OFL	2022/23 Total Catch	Rebuilding Status
1	EBS snow crab	3	136.9	273.8	92.4	0.34	10.32	0.05	**overfished**
2	BB red king crab	3	9.68	19.36	18.34	0.95	3.04	0.07	
3	EBS Tanner crab	3	18.19	36.39	74.17	2.04	32.81	2.62	
4	Pribilof Islands red king crab	4	0.85	1.71	3.88	2.27	0.685	0.004	
5	Pribilof Islands blue king crab	4	2.10	4.10	0.18	0.044	0.00116	0.00	**overfished**
6	St. Matthew Island blue king crab	4	1.63	3.26	1.31	0.40	0.07	0.002	**overfished**
7	Norton Sound red king crab [2]	4	0.95	1.98	2.42	1.22	0.30	0.16	
8	AI golden king crab	3	5.832	11.66	13.60	1.17	3.76	2.57	
9	Pribilof Islands golden king crab [3]	5					0.093	Conf.	
10	Western AI red king crab	5					0.056	<0.001	

References:

Statement of consistency to the RFM Fishery Standard	**The fishery does NOT continue to conform to the requirements of Fundamental Clause 6 of the RFM Fishery Standard.**

[46] https://meetings.npfmc.org/CommentReview/DownloadFile?p=1312283f-75f5-4d94-8432-a2fb6f5c9dcf.pdf&fileName=C1%20BSAI%20Crab%20SAFE%202023%20Intro.pdf

[47] https://meetings.npfmc.org/CommentReview/DownloadFile?p=1312283f-75f5-4d94-8432-a2fb6f5c9dcf.pdf&fileName=C1%20BSAI%20Crab%20SAFE%202023%20Intro.pdf

7.9.2.4 Fundamental Clause 7. Precautionary approach

7.	**Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty.**
Summary of relevant changes:	7.1. The precautionary approach shall be applied widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment. To conserve BSAI crab resources and preserve their ecosystem, the precautionary approach is used in their conservation, management, and exploitation. The MSA mandates the creation of FMPs for all federally managed and regulated fisheries. OFL (MSY) is seen as an upper limit rather than a target by the NPFMC. To account for the risks involved in calculating MSY, catches are in line with the TAC and substantially below the OFL. The precautionary approach, as used in the management of BSAI crab fisheries, takes into account uncertainties about stock size and productivity, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality, and the impact of fishing activities on non-target and associated or dependent species, as well as environmental and social factors. Of note, in March of 2019 the BOF approved a state harvest strategy for Aleutian Islands Golden King Crab (Daly *et al*., 2019a, b). 7.2. For new and exploratory fisheries, procedures shall be in place for promptly applying precautionary management measures, including catch or effort limits. NA: there are no new and exploratory species.
References:	
Statement of consistency to the RFM Fishery Standard	**The fishery continues to conform to the requirements of Fundamental Clause 7 of the RFM Fishery Standard**

7.9.3 Section C: Management Measures, Implementation, Monitoring, and Control

7.9.3.1 Fundamental Clause 8. Management measures

8.	**Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.**
Summary of relevant changes:	8.1. Conservation and management measures shall be designed to ensure the long-term sustainability of fishery resources at levels which promote the objective of optimum utilization and be based on verifiable and objective scientific and/or traditional sources. In the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact shall be considered. Conservation and management procedures have been put in place to preserve the long-term viability of BSAI crab resources at levels that promote optimum usage, based on verifiable and objective scientific, traditional, fisher, and community sources. The NPFMC's fishery management plan (FMP) for BSAI crab stocks provides stock status definitions, a five-tier approach for determining stock status, and a step-by-step framework for setting final overfishing levels (OFLs) and permissible biological catches (ABCs). According to the MSA, the NPFMC's Science and Statistical Committee (SSC) develops scientific benchmarks, and the Council recommends quotas based on these benchmarks. This division of responsibility is an important step toward ending overfishing and improving the recovery of overfished stocks. The cost-effectiveness and social impact of potential conservation and management approaches for BSAI crab fisheries are taken into account while evaluating them. The NMFS AFSC's Resource Ecology and Fisheries Management (REFM) Division runs a research program to support an ecosystem approach to managing BSAI crab stocks, which includes examining climate and environmental changes, as well as a socio-economic program that includes evaluating economic impacts of fisheries rationalization programs and compiling and evaluating socio-cultural data on BSAI crab stocks. Economic and ecosystem assessments evaluate how fish stocks, ecosystem relationships and user groups might be impacted fishery management actions and climate. 8.2. States shall prohibit dynamiting, poisoning and other comparable destructive fishing practices. Dynamiting, poisoning and other comparable destructive fishing practices are prohibited in Alaska. The BSAI crab FMP authorizes the use of pot gear to harvest crab resources. 8.3. States shall seek to identify domestic parties having a legitimate interest in the use and management of the fishery. The Crab Rationalization program identified all domestic parties with a genuine interest in the use and management of BSAI crab fisheries, and the impact of the CR Program on these parties has been studied over time (see Weidlich and Downs, 2016[48]) Indigenous peoples' traditional customs, needs, and interests are recognized, as are the interests of local fishing communities. All relevant parties will be consulted to secure their cooperation in attaining responsible fisheries. The process of identifying domestic par ties having a legitimate interest in a fishery is still a top priority for the Council, according to recent activities.

[48] https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/AppendixA-SocialimpactAssessment.pdf

8.	**Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.**	
		For example, during drafting of the Rebuilding Plan for Saint Matthew Island Blue King Crab (NPFMC 2019)[49], those domestic parties with a legitimate interest in the SMBKC fishery were identified as part of the Council's socio-economic analysis to determine impacts of proposed alternative actions. 8.4. Mechanisms shall be established where excess capacity exists, to reduce capacity. Fleet capacity operating in the fishery shall be measured. States shall maintain, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations and a record of all authorizations to fish allowed by them. Mechanisms have been put in place to restrict capacity to levels that are compatible with the long-term sustainability of BSAI crab resources. The capacity of the fleet has been determined and is being closely monitored. All fishing activities have statistics updated on a regular basis, and a record of all fishing authorizations is kept. Crab fisheries managed by the BSAI are rationalized and have a limited number of participants. Since 2002, the number of fish caught has decreased. The remaining vessel ownership has tended to accumulate in fewer and larger towns as a result of the fleet consolidation that accompanied the rationalization. (See NPFMC 2017: Ten-Year Program Review for the Crab Rationalization Management Program in the Bering Sea/ Aleutian Islands[50]). The crab fleet capacity has been fixed since 2006 and participation has been continuously monitored by NMFS's Restricted Access Management Program (RAM)[51] and the Alaska Commercial Fisheries Entry Commission (CFEC).[52] 8.5. Technical measures shall be taken into account, where appropriate, in relation to: fish size, mesh size or gear, closed seasons, closed areas, areas reserved for particular (e.g., artisanal) fisheries, protection of juveniles or spawners. In BSAI crab fisheries, measures are in place to limit the size of crabs that can be kept, mandate escape systems to safeguard undersized and female crabs, establish closed seasons and closed zones, and set aside areas for local, aboriginal fishing.[53] The BSAI crab FMP gives the state the authority to change size limitations in accordance with state rules. Biological considerations are typically utilized to create minimum legal size limitations in order to meet conservation goals. Female crabs cannot be seized unless a surplus is confirmed to be available. Crabs are protected during the molting and mating stages of their life cycle by fishing seasons. Closed seasons have been established to maximize crab populations' reproductive capacity. Because of the significant death rates that can be imposed on non-legal crab, the FMP specifically restricts the use of trawls and entangle net gear for crab catching. In the BSAI crab fisheries, pots and ring nets are the only allowed commercial gear. FMPs must describe and identify Essential Fish Habitat (EFH), minimize the adverse effects of fishing on EFH to the degree practical, and identify alternative actions to maintain and enhance EFH. The BSAI crab FMP describes crab EFH and contains ecological and biological needs for each stage of the species' life cycle. 8.6. Fishing gear shall be marked. Gear used in BSAI crab fisheries must be marked so the owner can be identified (5 AAC 34.051.King crab gear marking requirements; 5 AAC 35.051 Tanner crab gear marking requirements).[54]

[49] https://meetings.npfmc.org/CommentReview/DownloadFile?p=c45c58ad-ec18-44f2-abc5-95ed49be1fd1.pdf&fileName=C6%20SMBKC%20Rebuilding%20Initial%20Review%20Analysis.pdf
[50] https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/Crab10yrReview_Final2017.pdf
[51] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/restricted-access-management-division
[52] https://www.cfec.state.ak.us/
[53] https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_king_tanner_crab_2023_2024.pdf
[54] https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_king_tanner_crab_2023_2024.pdf

8.	**Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.**
	8.7. Measures shall be introduced to identify and protect depleted resources and those resources threatened with depletion, and to facilitate the sustained recovery/restoration of such stocks. Also, efforts shall be made to ensure that resources and habitats critical to the well-being of such resources which have been adversely affected by fishing or other human activities are restored. Measures have been put in place to detect and safeguard depleted and threatened resources, as well as to assist their long-term recovery/restoration. In addition, measures have been put in place to ensure that resources and habitats vital to the well-being of BSAI crab resources have been restored after being harmed by fishing or other human activity. The MSA also requires that the FMP include accountability measures to prevent ACLs from being exceeded and to correct overages if they do occur. Clearly defined management measures, including harvest strategies and control rules, designed to maintain crab stocks at levels capable of producing maximum sustainable levels are included in the FMP. Measures require reducing fishing mortality if a stock is declining and closure of the directed fishery if depleted. For each federal activity that may have a major impact on the quality of the human environment, the National Environmental Policy Act (NEPA)[55] requires the development of an Environmental Impact Statement (EIS). NEPA is a thorough procedure that establishes checks and balances against environmental changes that may have an impact on ecosystems, natural processes, and the socioeconomic sphere of fisheries. The EIS Database[56] contains thorough information on EISs that address the potential implications of government action on Alaska's resources and habitats. There are formal systems in place to assure the recovery of stocks that have been found to be exhausted. To prevent overfishing and rebuild depleted species, the Magnuson-Stevens Act section 304(e)(4)(A) and the National Standard Guidelines both require the establishment of a rebuilding plan. Rebuilding should occur as quickly as possible, taking into account the status and biology of any overfished fish stocks, the needs of fishing communities, recommendations from international organizations in which the US participates, and the interaction of the overfished fish stock with the marine ecosystem. There is indication that the MSA-mandated protocols for dealing with decreased stocks are being followed in the BSAI crab fisheries. In response to NMFS's notice in October 2018 that the population was overfished, the Council has created a draft rebuilding plan for SMBKC.[57] For the past five years , the commercial fishing on the SMBKC stock has been closed, and bycatch in fixed gear fisheries has been the main source of SMBKC fishery mortality[58]. SMBKC is now considered a BSAI prohibited species and, as such, prohibited species catch (PSC) data for SMBKC are reported weekly on the NMFS website[59] to safeguard against overfishing. 8.8/8.9/8.10/8.11/8.12/8.13. States shall encourage the development and implementation of technologies and operational methods that reduce waste and discards and reduce the loss of fishing

[55] https://www.epa.gov/nepa
[56] https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/search;jsessionid=63AEE14F47528527C25BD0FA06866A00?search=&__fsk=1786697290#results
[57] https://meetings.npfmc.org/CommentReview/DownloadFile?p=c45c58ad-ec18-44f2-abc5-95ed49be1fd1.pdf&fileName=C6%20SMBKC%20Rebuilding%20Initial%20Review%20Analysis.pdf
[58] https://meetings.npfmc.org/CommentReview/DownloadFile?p=405d640b-0b19-4b28-a403-dd7192df650a.pdf&fileName=SMBKC%20SAFE%202022.pdf
[59] https://www.fisheries.noaa.gov/alaska/bycatch/crab-bycatch-rates

8.	**Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.**
	gear. The implications of the introduction of new fishing gears, methods and operations shall be assessed, and the effects of such introductions monitored. New developments shall be made available to all fishers and shall be disseminated and applied appropriately. BSAI crab fisheries must use gear and technology that have been proven to be environmentally safe, cost effective, and sufficiently selective to reduce non-target species catch, waste, and discards, as well as gear and practices that increase escaping fish and crab survival rates. For a long time, the use of highly selective pots to reduce unwanted catch of target species as well as bycatch of non-target species, as well as the development of handling practices to reduce rejected catch mortality, have been significant parts of the management of BSAI crab fisheries. There has been extensive investigation into every area of gear performance and discard mortality. Discards are recorded by on-board observers in all fisheries and estimates of total discard mortality are factored into overall fishery removals. This has offered a strong incentive to reduce the amount of undesirable catch to the greatest extent possible. Their records show that legal crab of the target species dominates captures, with significantly lesser amounts of other species.[60] To reduce the loss of gear and the ghost fishing consequences of lost or abandoned gear, pollution, and waste, BSAI crab fisheries have designed and implemented selective, environmentally safe, and cost-effective fishing gear and practices. After the BSAI crab fisheries were rationalized, the number of participating vessels fell, resulting in a slower-paced fishery with lower rates of lost fishing gear and longer soak times, giving undersized and female crab more chance to escape. Crabbers are making pots with broader web on the panels to let female and juvenile crabs out before the gear is dragged back. State regulations[61] require crab pots have escape rings and other mechanisms to minimize the potential for ghost fishing. Prior to each fishing season, the ADFG inspects pots and vessel holding tanks. Alaska Wildlife Troopers (AWT) enforce all restrictions at sea, and the ADFG's on-board observer program collects information that can be used for enforcement. There is no proof that gadgets were used to get around the intent of the gear regulations. Professional associations and the licensing system provide harvesters with information on new gear developments and any corresponding regulatory requirements. Prior to their introduction, new fishing technologies (i.e., new fishing gear, tactics, and operations) are thoroughly evaluated to determine their potential for disrupting BSAI crab habitats and ecosystems. Any commercial-scale introduction of a novel fishing method would have to go through a thorough evaluation process before coming live, as well as demonstrate regulatory compliance and be subject to continued monitoring. Since the re-assessment, no new fishing technology relevant to BSAI crab fisheries have been recorded. 8.14. Policies shall be developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures NA
References:	

[60] https://www.adfg.alaska.gov/FedAidPDFs/FDS14-49.pdf
[61] https://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/cf_king_tanner_crab_2023_2024.pdf

8.	**Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.**
Statement of consistency to the RFM Fishery Standard	**The fishery continues to conform to the requirements of Fundamental Clause 8 of the RFM Fishery Standard**

7.9.3.2 Fundamental Clause 9. Appropriate standards of fishers' competence

9.	**Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards, guidelines and regulations.**
Summary of relevant changes:	9.1./9.2./9.3. Education and training programs. Fishermen can take use of advanced education and training programs to improve their abilities and professional certifications.[62] [63] [64] At the Federal level, NOAA has formulated a plan to implement the FAO CCRF across all US fisheries (NMFS 1997)[65]. The plan recently updated (NMFS 2012)[66], includes objectives for education, safety and training of fishers. As part of their required education and training, all those involved in BSAI crab fishing operations are given information on the most important provisions of the FAO CCRF (1995), as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations. United Fishermen of Alaska (UFA) and Alaska Fisheries Development Foundation (AFDF) released a study in 2019 that details the documents and permissions required for commercial fishing in Alaska.[67] Records of all BSAI crab fishers are maintained as part of licence and permit programs which contain information on their service and qualifications, including certificates of competency.[68] [69]
References:	
Statement of consistency to the RFM Fishery Standard	**The fishery continues to conform to the requirements of Fundamental Clause 9 of the RFM Fishery Standard**

[62] http://www.avtec.edu/
[63] http://seagrant.uaf.edu/map/fishbiz/index.php
[64] http://amsea.org/
[65] https://repository.library.noaa.gov/view/noaa/3063
[66] https://repository.library.noaa.gov/view/noaa/4057/noaa_4057_DS1.pdf
[67] https://www.afdf.org/wp-content/uploads/Social-Responsibility-on-Vessels-in-Alaska-Med-Res-FINAL-2019-03-08.pdf
[68] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/restricted-access-management-division
[69] http://www.cfec.state.ak.us/

7.9.3.3 Fundamental Clause 10. Effective legal and administrative framework

10.	**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.**
Summary of relevant changes:	There were no significant changes in relation to conformance with Fundamental Clause 10. As summarized below, the evidence viewed during surveillance confirms that the certified BSAI crab fisheries continue to operate under an effective legal and administrative framework which utilizes robust mechanisms for monitoring, control, and surveillance (MCS). 10.1. Enforcement agencies and framework: Crab regulations are primarily enforced at sea by the National Marine Fisheries Service (NMFS) Office of Law Enforcement (OLE), which uses the United States Coast Guard (USCG) at-sea platforms, and ashore by the NMFS OLE and the State of Alaska's Division of Wildlife Troopers (AWT). The AWT vessel E/V Stinson also undertakes at-sea enforcement, examining gear and catch for legal specifications. Alaska fisheries laws and regulations, particularly 50 CFR 679, are enforced by the USCG and NMFS OLE. Between the USCG and the AWT, there is a coordinated effort focusing on at-sea enforcement. Both state and federal laws must be enforced under combined supervision, and both state and federal agents actively perform at-sea enforcement. The USCG is charged with enforcement of major federal vessel rules, such as safety at sea, narcotics enforcement, vessel compliance with ESA and EFH requirements, and ensuring that federal permits, observer coverage, licenses, and VMS in the crab fisheries are all in order. AWT has vessels capable of conducting at-sea compliance with gear regulations, hauling and confiscating crab pots, sampling crab harvests at sea, ensuring that sex and size standards are satisfied, and ensuring that the vessels have all requisite state and federal licenses. Additionally, AWT, in collaboration with ADFG area biologists and technicians, inspects vessels dockside, conducts hold inspections, and monitors harvested crab offloads for compliance. The crab fisheries under assessment here are harvested exclusively within the Alaska EEZ. These fisheries are not part of any international agreement nor are they part of a framework of sub-regional or regional fisheries management organizations or arrangements. No foreign fleet is allowed to fish in the Alaska EEZ. All fishing vessels must be at least 75% U.S. ownership. Thus, the entire crab harvest is carried out by American vessels. Update on recent MCS activities: The USCG regularly provides updates to the NPFMC summarizing the agency's broader enforcement activities in the region (*e.g.*, USCG 2023) in relation to inter alia IUU fishing, US/Russia Maritime Boundary Line enforcement, and marine protected species and critical habitat enforcement. With respect to the BSAI crab fisheries under consideration here, the USCG (Lt. Commander J. A. Raskie, pers. comm.) reported the following MCS activities in 2021 and 2022: **Snow Crab -** 1 boarding in 2021, no safety or fisheries violations. High level of compliance **EBS Tanner -** 1 boarding in 2022, no safety or fisheries violations. High level of compliance **BBRKC -** no boardings (no fishery occurred in 2021/22 or 2022/23[70]) **SMBKC -** no boardings (no fishery occurred in 2021/22 or 2022/23[71]) **AIGKC -** 2021 - 1 boarding conducted off the fishing grounds (vessel in transit from the fishing grounds). No safety issues documented. Fisheries compliance was not checked during this boarding.

[70] https://meetings.npfmc.org/CommentReview/DownloadFile?p=91463040-bc4f-49ff-82e6-33618e0faeee.pdf&fileName=C1%20BBRKC%20SAFE.pdf
[71] https://meetings.npfmc.org/CommentReview/DownloadFile?p=b8fa68d8-37ed-4c53-b156-d1c9e4e70408.pdf&fileName=SMBKC%20status%20determination.pdf

10.	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.

2022 - USCG worked with OLE to look into a possible instance of early fishing gear deployment (1 week prior to season opening) but was unable to substantiate a potential violation.
2023 – USCG investigated pots in an area closed to crab fishing gear. Subsequent OLE review showed the Globe plotter and position data placed the vessel outside of any overlapping closed area and OLE concluded that no charges would be pursued (P. Noll, NOAA OLE, email to vessel operator)

No gear loss concerns were observed or reported to USCG during the period of interest. The USCG noted that most of the vessels participating in BSAI crab fisheries are "mandatory examination" candidates due to their operating areas and they are extremely compliant when it comes to receiving their required fishing vessel safety examinations (S. Wilwert, Fishing Vessel Safety Program Manager, USCG District 17, pers. comm.).

Alaska Wildlife Troopers (AWT) maintain a presence at-sea and dockside during most of this fishery, when the season is open. Fishermen participating in the fishery are checked to confirm they are properly permitted and licensed, fishing in the appropriate area and not exceeding quota limits set by ADFG. AWT conducts dockside inspections in ports where product is being delivered. AWT inspects permits and licenses, product being delivered, and confirms the location where fishing occurred. Further AWT confirms product is properly being documented on the required fish ticket. With respect to the BSAI crab fisheries under consideration here, the AWT (Captain D. DeGraaf, Southern Detachment Commander, Alaska Wildlife Troopers, pers. comm.) reported the following MCS activities in 2021 and 2022:
Snow Crab - In 2021, Troopers on the P/V Stimson pulled and inspected 65 pots from 13 vessels representing 25% of the registered fleet. Two dockside boardings were conducted while vessels were delivering crab; no violations observed. (no fishery occurred in 2022/23[72]).
BBRKC - no boardings (no fishery occurred in 2021/22 or 2022/23[73])
SMBKC - no boardings (no fishery occurred in 2021/22 or 2022/23[74])
AIGKC - No patrols/ no gear inspected. Dockside boardings conducted of all vessels involved (usually just three or four registered for this fishery). There were two cases of retention of undersized crab.

10.2./10.3/10.4. Fishing permit requirements:
According to federal laws, all vessels collecting BSAI crab must be approved and permitted to fish. Without explicit permission, fishing vessels are not permitted to operate on the resource in question. A Federal Crab Vessel Permit (FCVP) is required for all crab vessels participating in the BSAI rationalized crab fishery.

Owners of any vessel engaged in the rationalized crab fisheries (CR crab, including IFQ/IPQ fisheries; CDQ fisheries except Norton Sound king crab; and the Golden King Crab allocation to Adak) are required to submit an annual FCVP. SFP (Stationary Floating Processor), CPR (catcher-processor), and CAT (Catch-and-Transfer) are the three types of operation endorsements (catcher vessel).

The FCVP has VMS and logbook reporting requirements. A copy of the permit must be carried on board any fishing vessel and must be available for examination by an authorized officer at any time. Vessels participating in directed fishing for LLP groundfish species in the GOA or BSAI, or fishing in

[72] https://meetings.npfmc.org/CommentReview/DownloadFile?p=91463040-bc4f-49ff-82e6-33618e0faeee.pdf&fileName=C1%20BBRKC%20SAFE.pdf
[73] https://meetings.npfmc.org/CommentReview/DownloadFile?p=91463040-bc4f-49ff-82e6-33618e0faeee.pdf&fileName=C1%20BBRKC%20SAFE.pdf
[74] https://meetings.npfmc.org/CommentReview/DownloadFile?p=b8fa68d8-37ed-4c53-b156-d1c9e4e70408.pdf&fileName=SMBKC%20status%20determination.pdf

10.	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.
	any BSAI LLP crab fisheries, must have a Federal LLP license as of January 1, 2000. An original LLP license that is onboard the vessel must be used to name the vessel.
References:	Palof, K. 2023a. Bristol Bay Red King Crab Stock Assessment 2023. September 2023 Plan Team Draft. 145 pp. https://meetings.npfmc.org/CommentReview/DownloadFile?p=91463040-bc4f-49ff-82e6-33618e0faeee.pdf&fileName=C1%20BBRKC%20SAFE.pdf Palof, K. 2023b. Saint Matthew Island Blue King Crab update 2023. September 2023. 1 p. https://meetings.npfmc.org/CommentReview/DownloadFile?p=b8fa68d8-37ed-4c53-b156-d1c9e4e70408.pdf&fileName=SMBKC%20status%20determination.pdf USCG 2023. 17th Coast Guard District Enforcement Report: June to September 2023. October 2023. 11 pp. https://meetings.npfmc.org/CommentReview/DownloadFile?p=12dbbecc-7cbc-4695-9565-f560af9d4a5c.pdf&fileName=B6%20USCG%20Report.pdf
Statement of consistency to the RFM Fishery Standard	**The fishery continues to conform to the requirements of Fundamental Clause 9 of the RFM Fishery Standard**

7.9.3.4 Fundamental Clause 11. Framework for sanctions

11.	**There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations.**
Summary of relevant changes:	As summarized below, evidence viewed during surveillance confirms the certified BSAI king and Tanner crab fisheries are in conformance with RFM Fundamental Clause 11. A framework for sanctions remains in place and is an effective means to support compliance and discourage violations. <u>11.1 States laws of adequate severity shall be in place that provide for effective sanctions.</u> The MSA provides four basic enforcement remedies for violations (50 CFR 600.740 Enforcement policy)[75]: 1. Issuance of a citation, 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 MSA requires permit sanctions following the assessment of a civil penalty or the imposition of a criminal fine. In such cases, the MSA 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/operator (50 CFR 600.740 (4)c). NOAA's "Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions" (Penalty Policy) went into effect on June 24, 2019, superseding previous policy versions from 2011 and 2014[76]. The purpose of this Policy is to continue 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 non-compliance are eliminated. (5) Compliance is expeditiously achieved and maintained to protect natural resources. This revised Policy also reflects legislation passed and regulations promulgated since issuance of the 2014 Policy, in particular: • The Illegal, Unreported, and Unregulated Fishing Enforcement Act of 2015, Pub. L. 114-81, which implemented the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing and amended the enforcement provisions of a number of statutes administered by NOAA. • The most recent adjustments to the maximum civil monetary penalties authorized under statutes administered and enforced by NOAA, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990 (see 83 Fed. Reg. 706 (January 8, 2018)). For significant violations, the NOAA attorney may recommend charges under NOAA's civil administrative process (see 15 CFR 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.

[75] https://www.govinfo.gov/content/pkg/CFR-2010-title50-vol8/pdf/CFR-2010-title50-vol8-sec600-740.pdf
[76] https://www.noaa.gov/general-counsel/gc-enforcement-section/penalty-policy-and-schedules

11.	**There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations.**	
	11.2 Sanctions applicable to violations and illegal activities shall be adequate in severity to be effective in securing compliance and discouraging violations wherever they occur. Sanctions shall also be in force to affect authorization to fish and/or to serve as masters or officers of a fishing vessel in the event of non-compliance with conservation and management measures. 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 as determined by the US Attorney's Office. Sanctions are comparatively severe (NOAA 2023). They include the possibility of temporary or permanent revocation of fishing privileges. Withdrawal or suspension of authorizations to serve as masters or officers 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. Given the scarcity of repeat offenders, it appears that sanctions are of adequate severity to support compliance and discourage violations. Finally, the cooperation of citizens and industry is cultivated through programs such as AWT's Fish and Wildlife Safeguard[77] program which encourages the reporting of violations, and "leverages" the range of enforcers. 11.3 Fisheries management organizations shall ensure that sanctions for IUU fishing by vessels and, to the greatest extent possible, nationals under its jurisdiction are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. This may include the adoption of a civil sanction regime based on an administrative penalty scheme. Fisheries management organizations shall ensure the consistent and transparent application of sanctions. All commercial catch of crab in Alaska must be reported to ADFG through Fish Tickets or eLandings documentation, within 7 days of landing or first purchase of the resource. As such, all legal commercial crab catch in Alaska is reported. Sanctions for the illegal harvesting of crab in Alaska are established in the state's Fish and Game Code AS 16.5[78] and they are severe. Penalties include fines, prison time, suspension of permits, as well as seizure of catch, gear and/or vessel.	
References:	NOAA, 2019. Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions NOAA Office of General Counsel – Enforcement Section. June 24, 2019. https://www.noaa.gov/sites/default/files/2023-06/Penalty-Policy-FINAL-June24-2019.pdf NOAA, 2023. Assessment of Civil Administrative Penalties. Prepared by A. Hattan, and B. McTague, NOAA Office of General Counsel, Enforcement Section, Juneau, Alaska. 4 pp. https://meetings.npfmc.org/CommentReview/DownloadFile?p=a4a3373d-d23c-4ec5-9fa6-810d73c0acfc.pdf&fileName=PPT%20B3%20NOAA%20GCES%20Penalty%20Policy.pdf	
Statement of consistency to the RFM Fishery Standard		**The fishery continues to conform to the requirements of Fundamental Clause 11 of the RFM Fishery Standard**

[77] https://dps.alaska.gov/awt/safeguard#:~:text=Wildlife%20Safeguard's%20purpose%20is%20to,Troopers%20related%20to%20this%20program%3F
[78] http://touchngo.com/lglcntr/akstats/statutes/Title16/Chapter05.htm

7.9.4 Section D: Serious Impacts of the Fishery on the Ecosystem

7.9.4.1 Fundamental Clause 12. Impacts of the fishery on the ecosystem

12.	**Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.**
Summary of relevant changes:	Evidence viewed during surveillance confirms the certified BSAI king and Tanner crab fisheries are in conformance with RFM Fundamental Clause 12. There is in place a robust fisheries management system that appropriately and adequately considers fishery interactions and effects on the ecosystem (NPFMC, 2011). The BSAI crab fishery management system is based on the best available science while allowing for inputs from fishery participants and other stakeholders including the provision of local and/or traditional knowledge. The management system also incorporates risk-based approaches for determining most probable adverse impacts of the fishery so that potentially adverse impacts of the fishery on the ecosystem are appropriately assessed and effectively addressed. Habitat protection areas, prohibited species catch (PSC) limits, 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 crab fisheries catch a small amount of other species as bycatch. A limited number of groundfish, such as Pacific cod, Pacific halibut, and yellowfin sole are caught in the directed pot fishery. 12.1 Impact of environmental factors on the target stock. There is an assessment of the impacts of environmental factors on target stocks and species belonging to the same ecosystem. NPFMC and NMFS regularly assess the impacts of environmental factors on BSAI crab stocks (e.g., Crab SAFE; NPFMC, 2022) and other species belonging to the same ecosystem (*e.g.*, EBS Pacific Cod SAFE; Barbeaux *et al.*, 2022). Ecosystem assessments for BSAI crab fisheries are updated annually in the BSAI Crab SAFE. In 2019, an Ecosystem and Socioeconomic Profile (ESP) was introduced for St. Matthew Blue King Crab stock (Fedewa *et al.*, 2019). In 2020, ESPs were included for SMBKC and BBRKC stock assessments (Fedewa *et al.*, 2020a, b). ESPs have since been included in the 2022 BBRKC stock assessment (Fedewa *et al.*, 2022) and the 2023 EBS draft snow crab stock assessment (Fedewa and Shotwell, 2023). Additionally, the status of habitats and ecosystems are monitored within the broader framework of Alaska's large marine ecosystems and results are updated and published annually (*e.g.*, Siddon, 2022). Collectively, these ecosystem assessments consider target stocks, associated or dependent species, and the relationship among populations in the ecosystem. In 2018, the Council approved the Bering Sea Fisheries Ecosystem Plan (NPFMC, 2019), thereby formalizing its commitment[79] to ecosystem-based fisheries management (EBFM) of the Bering Sea. The Council has acknowledged that moving toward EBFM is an ongoing process and as new information or tools become available the Council will respond by improving the fishery management program. The BS FEP will serve as a framework for continued incorporation of ecosystem goals and actions in regional management. The BS FEP sits alongside the Fishery Ecosystem Plan already developed for the Aleutian Islands (NPFMC, 2007) and it augments ongoing efforts for monitoring ecosystems in the Alaska Region (*e.g.*, Ortiz and Zador, 2022; Siddon, 2022). Szuwalski *et al.* (2023a) studied the recent collapse of snow crab in the eastern Bering Sea and attributed declines to successive marine heatwaves in 2018 and 2019. Their work underscores the

[79] https://www.npfmc.org/how-we-work/management-policies/

12.	**Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.**
	need to better understand how environmental factors may impact target stocks, particularly in the context of climate change. Climate change has already had large impacts on the Bering Sea fisheries and ecosystem and impacts are expected to increase over the next decade, with largest changes and risks associated with warmest future scenarios (i.e., higher carbon emission scenarios) (IPCC, 2022). Recent national and regional strategic evaluations have identified the immediate need for climate integrated management advice and information, and recent United States Government Accountability Office report to congressional committees (GAO-22-105132) identified two priority recommendations to (1) "publicly disseminate information on actions taken by the Regional Fishery Management Councils and NMFS' Atlantic Highly Migratory Species Division to enhance the climate resilience of federal fisheries" and (2) "identify and prioritize opportunities to enhance the climate resilience of federal fisheries… and develop a plan to implement them." The Climate Change Taskforce (CCTF) has compiled a climate readiness synthesis (Stram *et al*., 2022) as a starting point for NPFMC in ascertaining how "climate ready" the current management system is overall and to assist in augmenting existing management for improved climate resilience. <u>12.2.1-3 Main and minor species: protection from adverse impacts.</u> The Council, NMFS and ADFG have established processes for the detection of potentially adverse impacts to non-target catch/associated species taken in BSAI crab fisheries. In addition, monitoring processes are in place to ensure that potentially adverse impacts to non-target catch/associated species do not arise in BSAI crab fisheries. ADFG implements a mandatory observer program for BSAI crab fisheries (Schwenzfeier *et al.*, 2012). Non-target catches, including discards of target stocks (females, undersized males) and stocks other than the "stock under consideration", are recorded in an observer database which is maintained by ADFG (for more details on observer sampling methods see Gaeuman, 2014). Observer results are provided regularly to stock assessment authors so that potential impacts are considered during annual stock assessment activities (*e.g*., NPFMC, 2022). Fishery management organizations have considered the most probable adverse impacts of BSAI crab fisheries on associated species (NMFS, 2004; Chilton *et al.*, 2011). The pot gear used for crab in the BSAI is relatively selective and the consensus view among experts is that the primary associated species in the BSAI crab fisheries are non-retained crabs which are species managed under the Crab FMP. Females and sub-legal crabs which are brought up in pots with legal males may account for up to two thirds of the total catch (NMFS, 2004). Therefore, in line with the previous RFM assessment (Global Trust, 2022), non-target crab species are designated "main associated species" in accordance with RFM guidance (*i.e.*, those taxa contributing to the top 80% of total bycatch in the Bycatch Species Profile (BSP). All removals and mortalities of FMP crabs - whether from crab fisheries, groundfish fisheries or scallop fisheries - is accounted for in annual stock assessment activities. Accordingly, these catches (including discards) are appropriately monitored and do not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts were to arise, effective remedial action would be taken. RFM guidance identifies "minor associated species" as those taxa contributing to the next 15% of total bycatch in the BSP (*i.e*., taxa representing between 80% and 95% of total bycatch; RFM, 2021). As per the previous RFM assessment (Global Trust, 2022), minor associated species generally fell into four taxonomic groupings:

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

- unidentified snails;
- Pacific cod;
- non-FMP crabs; and
- brittle star, basket star and other echinoderms.

Pacific cod, *Gadus macrocephalus*, is a widely distributed and highly abundant representative of the greater groundfish community which is managed by NPFMC as a tier 3 stock in the Eastern Bering Sea and is thus adequately assessed elsewhere (Barbeaux *et al*., 2022). Regarding the three invertebrate taxonomic groupings, NMFS (2004) concluded that gastropods and echinoderms comprise a major portion of the total biomass of the eastern Bering Sea and small losses due to pot bycatch would have little significance. In some cases, crab pot bycatch have become part of small, dedicated fisheries as for snails, octopus, and Korean hair crab. Minor losses of other invertebrates are not estimable but assumed to be relatively insignificant. In addition, the minor amount of these species caught as bycatch does not result in declines in species diversity because it does not cause a decline in any species abundance. From this information, NOAA Fisheries concludes that status quo has an insignificant effect on the population levels of benthic species caught as bycatch.

During surveillance, ADFG noted that it is possible, if not probable, that the likelihood of crab fishery impacts to BSAI ecosystems, including potential impacts to non-target catch/associated species, would be even further reduced owing to fishery closures for BBRKC and EBS snow crab stocks during the period (M. Stichert, ADFG, pers. comm.).

12.2.4-5 ETP species: protection from adverse impacts.

Management objectives exist which seek to ensure that endangered species are protected from adverse impacts resulting from interactions with BSAI crab fisheries. All U.S. fisheries management, including that of BSAI crab fisheries, must be consistent with the MSA[80], the Marine Mammal Protection Act (MMPA)[81], and the U.S. Endangered Species Act (ESA)[82]. Each of these acts establishes management guidelines, objectives, and legal protections for threatened and endangered species. During surveillance, ADFG noted that it is possible, if not probable, that the likelihood of crab fishery impacts to BSAI ecosystems, including potential impacts to ETP species, would be even further reduced owing to fishery closures for BBRKC and EBS snow crab stocks during the period (M. Stichert, ADFG, pers. comm.).

SEABIRDS

NMFS reported no takes of ESA-listed seabirds (endangered short-tailed albatross (*Phoebastria albatrus*), threatened spectacled eider (*Somateria fischeri*), and threatened Alaska breeding population of Steller's eider (*Polysticta stelleri)*) in 2022 in federal fisheries off Alaska (NMFS, 2023). In comparison to other gear types used in federal fisheries off Alaska, pot gear remains the gear type with the least amount of estimated seabird bycatch, representing an average of 2.8 percent of the total seabird bycatch from all gear types from 2011 through 2021 (range 0 to 13.4 percent). In 2021, there was no estimated seabird bycatch from pot gear (Tide and Eich, 2022) nor any reported bycatch of ESA-listed seabirds in BSAI crab traps (A. Olsen, pers. comm.).

[80] https://www.fisheries.noaa.gov/resource/document/magnuson-stevens-fishery-conservation-and-management-act
[81] https://www.fisheries.noaa.gov/topic/marine-mammal-protection
[82] https://www.fisheries.noaa.gov/topic/laws-policies/endangered-species-act

12.	**Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.**
	MARINE MAMMALS Young *et al*. (2022) provide an update on the stock status of bowhead whale (*Balaena mysticetus*) Western Arctic Stock. Based on currently available data, the minimum estimated mean annual mortality and serious injury rate incidental to U.S. commercial fisheries (0 whales) is not known to exceed 10% of the Potential Biological Removal or PBR (10% of PBR = 12) and, therefore, can be considered insignificant and approaching a zero mortality and serious injury rate. However, the authors note there are key uncertainties in the assessment. Although there are few records of bowhead whales being killed or seriously injured incidental to commercial fishing, about 12.2% of harvested bowhead whales examined for scarring (59/485 records) had scars indicating line entanglement wounds (George *et al*., 2017) and the southern range of the population overlaps with commercial pot fisheries (Citta *et al*., 2014). In the update of the stock status of humpback whale (*Megaptera novaeangliae kuzira*): Mexico-North Pacific Stock, Young *et al*. (2022) provide a summary of mortality and serious injury of humpback whales within the range of the Mexico-North Pacific stock for the years 2016-2020. Crab pot gear was not recorded as a cause of injury (0 whales). Nonetheless, as humpback whales are increasing their range and number further north through the Bering into the Chukchi and Beaufort (Stafford *et al.*, 2023), entanglement in crab pot gear – a previously documented occurrence in the Bering Sea crab fishery[83] - may become a concern in the future (A. Olson, pers. comm.). <u>12.2.6-8 Habitats: knowledge of essential habitats and protection from adverse impacts.</u> In accordance with requirements of the MSA, management agencies have knowledge of essential fish habitat (EFH) for the BSAI crab stocks under consideration. Crab EFH was described in Appendix F of the Crab FMP (NPFMC, 2011). FMP amendment 49, approved on May 31, 2018 (Final Rule: 83 FR 31340), updates the description and identification of EFH, and updates information on adverse impacts to EFH based on the best scientific information available (NOAA Fisheries, 2018). The potential for fishery impacts on habitats is assessed through the EFH process. Management systems ensure that fishery impacts on EFH and on habitats that are highly vulnerable to damage by the fishing gear are avoided, minimized, or mitigated. The 2023 EFH 5-year Review was recently completed (Limpinsel *et al*., 2023) and the FMP amendments are being prepared for the December 2023 Council meeting. Updates to the BSAI Crab FMP will include new species distribution models and maps, updated text descriptions, EFH fishing effects evaluations, a reference to the new Non-Fishing Effects Report, and research priorities looking ahead (A. Olson, pers. comm.). The new BSAI Crab EFH maps are for all life history stages combined for summer distribution due to data availability for the species distribution model ensembles. No species were elevated for mitigation measures against fishing effects to EFH, though some species were highlighted with concerns around limited data or smaller areas to review (*e.g.*, Petral Bank for AI red king crab). The BSAI Crab FMP will be updated with new maps, text descriptions, and EFH information (see draft Summary Report from the NPFMC February 2023 meeting[84]).

[83] https://www.adn.com/fishing/article/alaska-crab-buoys-hitch-ride-hawaii-humpback-whale/2014/04/07/
[84] https://meetings.npfmc.org/CommentReview/DownloadFile?p=8ede1412-f469-4dd2-94ed-b8f3e58845e7.pdf&fileName=C4%202023%20EFH%20Review%20Summary%20Report.pdf

12.	**Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.**
	In summer of 2023, the NOAA ship *Okeanos Explorer* made a research cruise with the AFSC to perform deepwater mapping in the Aleutian Islands[85]. The primary goal of the cruise was to increase mapping coverage in unexplored regions off Alaska, with a focus on waters deeper than 200 m. Survey results are still pending. NOAA presented an overview of its program objectives to the Council, noting the focus on deepwater habitats of the Aleutian Islands for 2023 (Hourigan and Coleman, 2023). 12.2.9-10 Ecosystems: monitoring and protection from adverse impacts. NPFMC, NMFS and ADFG consider the most probable impacts of BSAI king and Tanner crab fisheries on the ecosystem, assess and monitor those impacts, and where necessary take remedial actions to address adverse impacts if and when they should arise. Examples of evidence viewed during surveillance included: - Crab FMP (NPFMC, 2011) - Crab EIS (NMFS, 2004) - Annual Crab SAFE Reports (NPFMC, 2022) - BSAI Crab Plan Team Report (CPT, 2023) - Crab CECIs (Chilton *et al*., 2011) - BS and AI FEPs (NPFMC, 2007; 2018) - ADFG Mandatory Crab Observer Program (*e.g*., Gaeuman, 2014) - Annual Alaska Ecosystem Status Reports (Siddon, 2022; Ortiz and Zador, 2022) - Snow crab rebuilding plan (NOAA, 2023) - LKTKS Protocol (NPFMC, 2023)[86] 12.3-4 Key prey species and dependent predators The food web roles of the five BSAI crab stocks under consideration here are reasonably well understood and none are considered key prey species (see detailed evidence presented under Supporting Clause 12.3 in Global Trust (2022). The Council does not identify BSAI crab stocks as forage species for groundfish (e.g., see BSAI Groundfish FMP[87]), and no predators are known to have an obligate or dependent relationship (*sensu* Pikitch *et al.*, 2012) with BSAI crab stocks. Thus, available evidence indicates that the BSAI crab stocks under consideration here are not key prey species whose removal could adversely impact dependent predators (Chilton *et al*., 2011). Nonetheless, mechanisms do exist within the Council process to establish outcome indicators consistent with achieving avoidance of severe adverse impacts on dependent predators. For example, the BSAI Groundfish FMP and Salmon FMP[88] both address potential impacts to dependent predators using outcome indicators. Thus, there are ongoing programs for monitoring of outcome indicators to ensure that adverse impacts to dependent predators do not arise. Outcome indicators for crab predators are in place and used for ongoing monitoring programs as evidenced by the annual publication of stock assessment and fishery evaluation (SAFE) reports[89],

[85] https://oceanexplorer.noaa.gov/okeanos/explorations/seascape alaska/ex2303/welcome.html#:~:text=Expedition%20Summary,of%20Alaska%20and%20Aleutian%20Islands

[86] https://www.npfmc.org/how-we-work/management-policies/

[87] https://www.npfmc.org/wp-content/uploads/BSAIfmp.pdf

[88] https://www.npfmc.org/wp-content/PDFdocuments/fmp/Salmon/SalmonFMP.pdf

[89] https://www.npfmc.org/library/safe-reports/

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	marine mammal stock assessment reports (Young *et al*., 2022), and ecosystem status reports (Siddon, 2022; Ortiz and Zador, 2022). 12.5 Pollution and MARPOL Laws and regulations based on the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) are in place and enforced. The US Senate ratified MARPOL and Congress implemented it by the Act to Prevent Pollution from Ships (APPS; 33 U.S.C. §§1905-1915) on October 21, 1980. The US EPA and USCG have established protocols for managing its enforcement[90]. To further facilitate enforcement, APPS contains a "whistle blower provision" - those who come forward with violations of APPS or MARPOL may be compensated with up to 50% of the monetary penalties that the U.S. Government receives from the guilty parties[91]. 12.6 Research on gear impacts In Alaska there is a great deal of research into the social and environmental impact of fishing gear and its impact on biodiversity and coastal fishing communities. This research is performed, promoted, or supported by public entities including NFMS-AFSC, NPFMC and NPRB, academic institutions such as the Institute of Social and Economic Research, University of Alaska[92], as well as private groups such as the Alaska Fisheries Development Foundation (AFDF)[93], Alaska Bering Sea Crabbers (ABSC)[94], and Bering Sea Fisheries Research Foundation (BSFRF)[95]. 12.7 Marine Protected Areas (MPAs) State and Federal management agencies and NPFMC have frequently used MPAs as management tools in Alaska. According to Brock (2015), 95 MPAs have been established in Alaska, covering a total area of 2,737,588 km^2 in four major ecoregions. Given the large number of MPAs, it is not surprising that specific conservation objectives vary from one MPA to another. However, most of Alaska's MPAs have been established with an aim to ensure the sustainability of fish stocks and fisheries, and/or to protect marine biodiversity and critical or sensitive habitats. For example, the NPFMC notes that vast areas of the North Pacific have been permanently closed to groundfish trawling and scallop dredging to reduce potential adverse impacts on sensitive habitat and to protect benthic invertebrates. These marine protected areas comprise a relatively large portion of the continental shelf, and in many respects, serve as marine reserves. In addition, fishery closures established in nearshore areas to reduce interactions with Steller sea lions have ancillary benefits of reducing habitat impacts as well[96]. The National Marine Protected Areas Center[97] maintains a comprehensive geospatial database for MPAs that combines publicly available data with information from state and federal MPA programs. An updated map of MPAs was presented in the BSAI Crab re-assessment report (Global Trust 2022). Or see the NMPAC website[98] to view an interactive MPA Inventory for the Alaska region.
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[90] https://www.epa.gov/enforcement/marpol-annex-vi-and-act-prevent-pollution-ships-apps
[91] https://www.whistleblowers.org/stop-shipping-pollution/
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[93] https://afdf.org/
[94] https://www.alaskaberingseacrabbers.org/science
[95] https://bsfrf.org/
[96] https://www.npfmc.org/fisheries-issues/issues/habitat-protections/
[97] https://marineprotectedareas.noaa.gov/aboutmpas/mpacenter/
[98] https://marineprotectedareas.noaa.gov/dataanalysis/mpainventory/mpaviewer/

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	Bering-Chukchi-Beaufort Seas bowhead whales. Arctic 70(1):37-46. DOI: dx.doi.org/10.14430/arctic4631. https://journalhosting.ucalgary.ca/index.php/arctic/article/view/67669 Hourigan, T.F. and H. Coleman. 2023. NOAA Deep Sea Coral Research & Technology Program: Alaska Deep-Sea Coral & Sponge Initiative 2020-2024. PowerPoint presentation to NPFMC, February 2023. https://meetings.npfmc.org/CommentReview/DownloadFile?p=ba0ace95-1b84-4c8c-b54a-6a90a04f7404.pdf&fileName=PPT%20C4%20Deep%20Sea%20Coral%20Update.pdf Global Trust. 2022. Responsible Fishery Management (RFM): U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab Commercial Fisheries. 2nd Re-assessment. February 25, 2022. 345 pp. https://rfmcertification.org/certified-fishery-species/alaska-crab/ IPCC. 2022. Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. https://www.ipcc.ch/report/ar6/wg2/ Limpinsel, D., S. McDermott, C. Felkley, E. Ammann, S. Coxe, G.A. Harrington, S. Kelly, J.L., Pirtle, L. Shaw, and M. Zaleski 2023. Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska: EFH 5-year review from 2018-2023. National Marine Fisheries Service, Alaska Region, Juneau, Alaska. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/AKR-30. doi: 10.25923/9z4h-n860 https://repository.library.noaa.gov/view/noaa/50445/noaa_50445_DS1.pdf NMFS. 2004. Bering Sea Aleutian Islands Crab Fisheries Final Environmental Impact Statement. NOAA NMFS, NPFMC. August 2004. 1003 p. https://alaskafisheries.noaa.gov/sites/default/files/analyses/crabeis0804-chapters.pdf NMFS. 2023. 2023 Seabird Report to the North Pacific Fishery Management Council, April 2023. 19 pp. https://meetings.npfmc.org/CommentReview/DownloadFile?p=3e5070b0-2ae9-4270-9a14-0d28b3051e64.pdf&fileName=B2%20Seabird%20Report%202023.pdf NOAA Fisheries, 2018. Crab FMP Amendment 49 – amendment text for updating EFH description and non-fishing impacts to EFH (EFH Omnibus Amendment). https://www.fisheries.noaa.gov/action/amendment-49-fmp-bering-sea-aleutian-islands-king-and-tanner-crabs NOAA, 2023. 50 CFR 679 Fisheries of the Exclusive Economic Zone Off Alaska; Snow Crab Rebuilding Plan in the Bering Sea and Aleutian Islands. A Rule by the National Oceanic and Atmospheric Administration on 09/07/2023. 88 FR 61477. https://www.federalregister.gov/documents/2023/09/07/2023-19300/fisheries-of-the-exclusive-economic-zone-off-alaska-snow-crab-rebuilding-plan-in-the-bering-sea-and NPFMC, 2007. Aleutian Islands Fishery Ecosystem Plan. December 2007. 198 pp. https://www.npfmc.org/aleutian-islands-fishery-ecosystem-plan/

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Statement of consistency to the RFM Fishery Standard		**The fishery continues to conform to the requirements of Fundamental Clause 12 of the RFM Fishery Standard**

8 Update on compliance and progress with non-conformances and agreed action plans

This section details compliance and progress with non-conformances and agreed action plans including:

a) A review of the performance of the Client specific to agreed corrective action plans to address non-conformances raised in the most recent assessment or re-assessment or at subsequent surveillance audits including a summary of progress toward resolution.
b) A list of pre-existing non-conformances that remain unresolved, new non-conformances raised during this surveillance, and non-conformances that have been closed during this surveillance.
c) Details of any new or revised corrective action plans including the Client's signed acceptance of those plans.
d) An update of proposed future surveillance activities.

8.1.1 Closed non-conformances

Non-conformance 2 (of 3)	
Clause:	6.3
Non-conformance level:	Minor
Non-conformance:	Guidance for current status states that "At a minimum, the stock is located above the midway point between the target (BMSY) and the limit (MSST = .5 BMSY) reference point. That means current biomass should be ~ 19.00 kt but it is well below that at ~ 15.00 kt. Therefore, a NC is raised against BBRKC.
Rationale:	Total catch (retained and bycatch mortality) increased from 7.6 kt in 2004/05 to 10.6 kt in 2007/08 but has decreased since then; total catch in 2019/20 was 2.22 kt. MMB for 2019/20 was estimated to be 14.24 kt and above MSST (10.62 kt); hence the stock was not overfished in 2019/20. The total catch mortality in 2019/20 (2.22 kt) was less than the 2019/20 OFL (3.40 kt); hence overfishing did not occur in 2019/20. However, several CPT members expressed concern that the stock will be overfished in a few years and that king crab stocks do not seem to rebuild easily, once an overfished condition is reached. It was suggested that it may be time to review the use of F35% as a proxy for FMSY for this and other Alaskan crab stocks.

Corrective Action Plan (CAP):	Date: December 5, 2021 From: Bering Sea Crab Client Group (BSCCG) *[BSCCG is wholly owned subsidiary of BSFRF]* Mr. Scott Goodman (Executive Director) Bering Sea Fisheries Research Foundation (BSFRF) 4039 21st Avenue W, Suite 404 Seattle, WA 98199 To: Dr. Ivan Mateo, Ph.D Fisheries Assessment Officer 3rd Floor, Block 3 Quayside Business Park Mill Street, Dundalk Co. Louth, Ireland RE: Preliminary **Corrective Action Plan** – for minor non-conformances in the Bristol Bay King Crab Unit of Assessment. Ref: AK/CRA/003/2021 (Conducted as part of U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab Commercial Fisheries – Re and Full Assessments, 2021/22 Dear Dr. Mateo, Please find this summary below to be our response for a new corrective action plan which we are submitting as part of ongoing certification and surveillance work in response to your draft Full Assessment Report and issuance of non-conformance items from earlier this fall. The Bristol Bay red king crab stock (BBRKC) supports an important and iconic Alaskan crab fishery, and was closed this year for the first time since a two season period in 1994/1995. As a stakeholder group representing the Bering Sea crab industry through the BSCCG (RFM client) we have been concerned with the continuing, slow downward trajectory in this stock status. We generally agree with the basis for nonconformance noted in the updated assessment with some qualifying remarks in our proposed action steps below. **Action Plan Item 1: Focus on Continued Collection of Seasonal Movement Data for BBRKC** Movement information for the BBRKC stock is generally lacking specific information that could more fully inform the understanding of seasonal movement, molting, and mating of portions of the stock. The BSCCG is represented by BSFRF which supports ongoing collaborative research to improve understanding of BBRKC movement. Since 2019, BBRKC have been monitored through ongoing tagging and movement research with BSFRF, NOAA and ADF&G. Tagging efforts have included traditional (spaghetti tags) tags which require a recovery (during the fishery or bycatch event), new technology using acoustic tags and remote monitoring (2019-2021), and more recently with a larger scale deployment of satellite tags on mature male and female RKC. Recently, BSFRF, NOAA, and ADF&G scientists completed a collaborative effort during a 22-day charter (10/25/21-11/15/21) which placed approximately 320 tags on BBRKC in six (6) locations within Bristol Bay. The objectives of this work are to enhance understanding of both the male and female components of this stock. We propose for this action step to update the assessment team on the full objectives of this collaborative work, the continuing research plans which currently extend into 2022/2023, and for preliminary project summaries (as they become available) and for general summaries of tag recoveries and movement information that will inform continued project steps and considerations for management of BBRKC. BBRKC Corrective Action Plan BSCCG 12/05/21 Page 1
Progress against the CAP:	In the 1st surveillance of the 2nd cycle of recertification of the certified BSAI crab fisheries conducted in 2023, the assessment team found that the BBRKC unit of certification was again in conformity with RFM Supporting Clause 6.3 because it was found that the stock status was not approaching an overfished situation and it was past the midway point from the Limit reference point to Target Reference Point. (Please see Figure 1 on section 6.3).

Non-conformance status:	Closed – following surveillance audit 1.

8.1.2 Progress against open non-conformances

Non-conformance 1 (of 3)	
Clause:	6.3
Non-conformance level:	Minor
Non-conformance:	The SMBKC stock was declared overfished on October 22, 2018. In order to comply with provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), a rebuilding plan must be implemented prior to the start of the 2020/2021 fishing season. The fishery was closed for the 2016/17 season and has remained closed each year since. In recent assessments, MSST has been steadily dropping from 1.9 kt in 2016/17 to 1.67 kt in 2019/20. MMB was 1.12 kt in 2020/21 – a very small increase from 1.06 kt in 2019/20 – but the stock remains below the MSST estimated for 2019/20.
Rationale:	Based on the best available information on the biology of the SMBKC stock and environmental conditions, the time necessary to rebuild the stock will exceed 10 years. The SMBKC stock has been in a low productivity phase since 1996 and population recovery will be greatly influenced by environmental conditions. Despite existing protections and frequent fishery closures, the stock has remained in this low productivity phase. Projections of stock recovery incorporate ecosystem constraints on productivity by forecasting recruitment as a function of stock size in model-recruit parameters. The estimated time for rebuilding under the Council's preliminary preferred alternative, taking into account the biology of the species and current environmental conditions, is 25.5 years. The contribution of the rebuilding plan to stock recovery would be additive to measures already in place that limit the effects of fishing activity on SMBKC. The directed fishery for SMBKC is managed under the State of Alaska harvest strategy and has been closed from the 2016/2017 season, prior to the stock being declared overfished. Measures to protect habitat and reduce bycatch potential include prohibitions on non-pelagic trawl gear in the St. Matthew Island Habitat Conservation Area (SMIHCA). Additionally, a 20 nm Steller sea lion closure area around the southern tip of Hall Island prohibits trawling, hook-and-line, and pot fisheries for pollock, Pacific cod, and Atka mackerel may help reduce SMBKC bycatch in those fisheries. Finally, State jurisdictional waters (0 to 3 nm from shore) surrounding St. Matthew, Hall, and Pinnacle Islands are closed to the taking of king and Tanner crab and to commercial groundfish fishing, further reducing the potential for SMBKC bycatch. See evidence for SC 6.3 (Section 9.3.3.3) for details of analyses related to the rebuilding plan. The "Extraordinary circumstances" provision of AK RFM Procedures 2 § 3.17 is used here as a basis for recommending carry over of the NC against SMBKC into this reassessment. The extraordinary circumstances being: (1) The NC was raised in the 2nd surveillance of the previous reassessment and 2 years is a very short time in which to observe a significant improvement in stock status; (2) Fishing pressure is not the sole contributor to the decline of this stock in recent years. Environmental/ecosystem changes associated with ocean warming appear to be impeding recruitment and stock recovery; (3) The fishery has been closed and will remain closed until there is improved recruitment.
Corrective Action Plan (CAP):	The client's corrective action plan (CAP) is presented in full in the 2nd surveillance audit of the 1st certification cycle Global Trust (2018). An update to the CAP was shared with the assessment team during the first surveillance audit of the 2nd cycle of recertification. CAP updates are shown below.

Non-conformance 1 (of 3)	
	STMTBKC Corrective Action Plan - update 01/25/24 **Item #1 - Support of and attention to STMTBKC rebuilding plan.** The terms of the rebuilding plan for this stock remain in effect, and the CPT current stock priorities reflect the assessment is biennial and scheduled for completion in October of 2024. The current stock status is the same in 2023 (September CPT) as 2022 since specifications carried over, and although overfishing did not occur, the stock is not rebuilt. We will provide updates to assessors in September of 2024 when the CPT prepares to meet that month. The 2024 assessment update will incorporate the federal survey data (NMFS summer crab CPUE data) as well as the information from the ADFG St Matthew Pot Survey (2022) which was supported directly in part by the industry stakeholder group (ADFG coordinated with BSFRF and NRC to place independent BSFRF researchers during that survey). We will report and the updated status - including all new data sources this fall. **Item #2 - Support of and Participation in SMBKC Stock Assessment - GMACs support & State Survey.** The update for the stock from an assessment model perspective is static as the biennial approach to updates means there will be more to share from the GMACs SMBKC update in September 2024. We've added a note about the ADFG pot survey for the stock which occurs infrequently - specifically that the 2022 survey had relatively high CPUE for SMBKC and that data has not yet been formally reviewed in the GMACs updated runs. **Item #3 - Record keeping and reporting for SMBKC stock - bycatch monitoring.** The update for the third component of this action plans is to again report there was no substantial SMBKC bycatch occurring in crab or non-crab fisheries in the SMBKC management area as reported by the September CPT. Importantly, the spatial overlap of the SMBKC area with other directed crab fisheries is mostly with Bering Sea opilio - and since there have now been two (2) seasonal opilio closures any SMBKC impacts from the snow crab fishery would be even lower. We would again expect to report more on bycatch as we monitor the seasonal progression of 2024 crab bycatch through the existing NMFS catch reporting system.
Progress against the CAP:	The assessment team reviewed actions taken by the client since re-assessment, including those described in the updated CAP. Client progress is judged to be “on target.
Non-conformance status:	Open – Corrective Actions in place to be reviewed annually at surveillance audits.

Non-conformance 3 (of 3)	
Clause:	12.2.6, Habitat Scoring Element 1
Non-conformance level:	Minor
Non-conformance:	Information presented to the assessment team was not sufficient to confirm that the effects of the AIGKC fishery on sensitive habitats is reduced to a minimum percentage of the total area.
Rationale:	There was not enough evidence to substantiate that the AIGKC Unit of Certification fulfils Habitat Assessment Element 1 of Supporting Clause 12.2.6. More specifically, the assessment team was unable to substantiate: - the spatial footprint (i.e., total area in Km2 or nm2) of the AIGKC fishery on sensitive marine habitats (e.g., based on maps of fishing effort or other data); - the general range of sensitive habitat types (e.g., biogenic habitats) affected and unaffected by the spatial footprint of the AIGKC fishery; and - the percentage area of overlap of the AIGKC fishery with known sensitive habitats including areas known to be rich in structural epifauna/HAPC biota.

Non-conformance 3 (of 3)	
	Note: In the Aleutian Islands, groups considered to be HAPC biota include sea pens, sea whips, corals, anemones, and sponges (RFM Guidance, AK RFM Standard Version 2.1). Also see Global Trust (2022) for evidence considered in the scoring rationale for Supporting Clause 12.2.6.
Corrective Action Plan (CAP):	The client's corrective action plan (CAP) is presented in full in Global Trust (2022). An update to the CAP was shared with the assessment team during the first surveillance audit. CAP updates are shown below.

OVERLAP OF GOLDEN KING CRAB FISHING WITH CORAL HABITAT IN THE ALEUTIAN ISLANDS

PRELIMINARY SUMMARY (S. Goodman, T.S. Smeltz)

This summary is a brief explanation of first efforts to bring existing observed fishery effort information together with modeling utilities to inform a preliminary estimation of overlap for golden king crab fishing with coral habitat in the Aleutian Islands. The goal of these analyses was to quantity the extent of Golden King crab fishing activity on coral habitat in the Aleutian Islands. This required information on both the distribution of corals as well as the distribution and magnitude of crab fishing activity. There are limits to both the available effort data (grouped into cells) and the estimation of habitat using species distribution modeling which relies on typical probability assumptions within the Fishing Effects Models – Essential Fish Habitat methods.

Defining coral habitat

Coral habitat in the Aleutian Islands was defined using the presence/absence species distribution models (SDMs) developed by Rooper et *al*. (2014). The SDM was based on observations made with NMFS bottom trawl surveys and modeled over 1 ha grids in regions west of Unimak Island up to 500 m depths. The SDM was categorized as coral habitat when the probability of coral presence was > 0.5.

Crab fishing footprint

The distribution of crab fishing effort was based on data provided by Scott Goodman. These data consisted of the count of observed crab pots within a 2 nm x 2 nm grid cells from 1995 – 2019. Two approaches were used to quantify the distribution and magnitude of crab fishing activity using these data. In the first approach, any 2 nm x 2 nm was considered "fished" if any positive observed pot counts occurred within the grid cell between 1995-2019. This approach will inevitably lead to overestimations of the spatial extent of fishing as most of these grid cells saw little amount of fishing activity over the 25 year period, and thus the actual footprint fishing within a grid cell would be substantially less than the total area of the grid cell. To better reflect the actual footprint, we used a second approach where we converted number of observed crab pots within a grid cell to an area using a conversion of 1 $pot = 30\ ft^2$ (assumes a pot is 5 ft x 6 ft in size). This provided a measure of the total historical observed proportional area fished within each 2 nm x 2 nm grid cell. This first estimate is not refined further to account for pot lifts (actual number of pots fished per season), nor the recent footprint of the fishery (which ranges between 10%-15% of the historical grounds).

Results

The following table shows the percent of Golden King crab fishing activity that has occurred in coral habitat in the Aleutian Islands from 1995 – 2019 using each of the two methods for measuring the crab fishing footprint.

Fishing footprint method

	Grid cell on/off	Area conversion
Crab fishing footprint in coral habitat[1]	59.8%	2.8%

[1]

Total coral habitat in the Aleutian Islands estimated to be 33,872 km^2 in depths up to 500 m.

In general, based on these methods the grid cell on/off method will tend to be a gross overestimation of the footprint, while the area conversion method will be an underestimation of the aggregated historical data because only observed pots were included in the calculation. A reasonable approach to further refine these estimates would be to increase the area conversion estimate (2.8%) by the proportion of unobserved pots in

Non-conformance 3 (of 3)

Western Aleutians Goldens (WAG) and Eastern Aleutians Goldens (EAG) Fishery Map Summaries for the three most recent completed seasons on the following pages.

- 2020/2021 Season
- 2021/2022 Season
- 2022/2023 Season

- Summary table percentage of pots observed with coral by season below.

FMP Year	Observer Pot Count ALL	Pots with Coral Count - ALL	Percent of Pots with Coral
2007	2077	467	22.48%
2008	1592	364	22.86%
2009	1300	452	34.77%
2010	1295	450	34.75%
2011	1198	304	25.38%
2012	1544	462	29.92%
2013	1720	574	33.37%
2014	1513	517	34.17%
2015	1757	464	26.41%
2016	1665	430	25.83%
2017	1393	346	24.84%
2018	1213	296	24.40%
2019	**1390**	**568**	40.86%
2020	**1284**	**766**	59.66%
2021	**1408**	**634**	45.03%
2022	**1207**	**446**	36.95%

Non-conformance 3 (of 3)	
Progress against the CAP:	The assessment team reviewed actions taken by the client since re-assessment, including those described in the updated CAP. Client progress is judged to be “on target.”
Non-conformance status:	Open – Corrective Actions in place to be reviewed at the next annual surveillance audit.

8.1.3 New non-conformances

Non-conformance 4 (of 4)	
Clause:	6.3
Non-conformance level:	Minor
Non-conformance:	The eastern Bering Sea snow crab population was declared overfished in October 2021 and the directed fishery was closed for the 2022 season. The Council developed a rebuilding plan to be implemented prior to the start of the 2023/2024 fishing season. The projected time for rebuilding the EBS snow crab stock, taking into account the biology of the species and current environmental conditions, is 6 years.
Rationale:	Observed mature male biomass (MMB) slowly increased after 1999, and the stock was declared rebuilt in 2011 when estimated MMB at mating was above B35%. However, after 2011, the stock declined and the observed MMB at the time of survey dropped to 63.21 kt in 2016. Recently, MMB was increasing again as a large recruitment moved through the size classes, but that recruitment has since disappeared and the observed mature male biomass at the time of the 2022 survey was 37.5 kt, a new all-time low and 40% less than the previous all-time low seen in the 2021 survey. On October 19, 2021, NMFS determined and notified the Council that the EBS snow crab stock was overfished. To comply with provisions of the Magnuson-Stevens Act, the Council developed a rebuilding plan to be implemented prior to the start of the 2023/2024 fishing season. In February 2023, the Council chose a rebuilding plan for EBS snow crab that will allow bycatch removals and an opportunity for directed harvest during rebuilding if estimates of stock biomass are sufficient to open the fishery under the State's snow crab harvest strategy. The rebuilding plan is consistent with the Magnuson-Stevens Act and with National Standard 1 Guidelines on time for rebuilding, specifically rebuilding within a time (Ttarget) that is as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock of fish with the marine ecosystems. This rebuilding plan will allow directed fishing pursuant to the State harvest strategy and may provide important economic opportunities for harvesters, processors, and Alaska communities. Maintaining this economic opportunity for a limited directed commercial fishery under the State harvest strategy is important for harvesters, processors, and communities, particularly during this time when the majority of commercial crab stocks are in a state of decline and future openings are likely to be limited. Under the Magnuson-Stevens Act, the time period specified for rebuilding a fishery generally should not exceed 10 years unless the biology of the stock or environmental conditions dictate otherwise. The projected time for rebuilding the EBS snow crab stock, taking into account the biology of the species and current environmental conditions, is 6 years. The main driver in the speed of rebuilding is likely related to recruitment and the ecosystem

Non-conformance 4 (of 4)	
	conditions that allow for increased recruitment into the population. Uncertainty surrounding recruitment and mortality under current ecosystem conditions is expected to heavily influence the rate at which the stock is able to rebuild under the projection parameters. Fishing mortality under the State's current harvest strategy is expected to have only insignificant or minimal impacts on the rate of rebuilding. Amendment 53 adds Section 6.2.3 to the Crab FMP to include the rebuilding plan for EBS snow crab. Under the rebuilding plan, ecosystem indicators developed for the stock will be monitored during rebuilding. The NMFS EBS bottom-trawl survey provides data for the annual assessment of the status of crab stocks in the BSAI, including EBS snow crab, and will continue throughout rebuilding. The Council's BSAI Crab Plan Team will report stock status and progress towards the rebuilt level in the Stock Assessment and Fishery Evaluation (SAFE) Report for the King and Tanner Crab Fisheries of the BSAI. Additionally, the State and NMFS monitor directed fishery catch and bycatch of snow crabs in other fisheries. When the fishery is open, the State requires full observer coverage (100 percent) for catcher/processors and partial coverage (30 percent) for catcher vessels participating in the crab fishery. Observers monitor harvest at sea and landings by catcher vessels and shoreside processors. The State reports the total harvest from the commercial crab fishery, and that report will be included annually in the SAFE Report. The contribution of the rebuilding plan's assessment and monitoring to stock recovery will be additive to measures already in place that limit the effects of fishing activity on EBS snow crab.
Corrective Action Plan (CAP):	Please see section 8.1.4
Progress against the CAP:	
Non-conformance status:	New – opened at surveillance audit 1

8.1.4 New or revised corrective action plans

Bering Sea Opilio Corrective Action Plan

Item #1 - Compilation of recent collaborative workshop information to share with assessors.

The BSFRF (BSCCG Client entity) convened two hybrid snow crab workshops in January and December of 2021, and we will provide the unpublished summary material to assessors for their review before September 2024. The workshops were convened as a collaboration between the Bering Sea crab industry with federal and state co-managing partners (ADFG and NOAA AFSC) and both workshops were hosted by BSFRF. Additionally, BSFRF invited international snow crab experts to these meetings (CA Department of Fisheries and Oceans) to assist US researchers and managers with the context of the collapsed Bering Sea snow crab stock. In both cases, the workshops were focused on what happened (biological and ecosystem responses) and what is next (management responses). Collaborators at both NOAA and ADFG participated in these workshops and relied on portions of the information for summaries related to stock status (NMFS) and fishery determinations (ADFG).

Item #2 - Sharing of information/summaries of 2024 international workshop on snow crab.

The BSFRF (BSCCG Client entity) is setting up a hosted meeting in St. John's, NL (CA) to be co-hosted with DFO in April-May 2024 (dates TBD). The workshop steering committee is currently refining the objectives but there is a strong focus on a renewed/updated view of what's occurring in the Bering Sea snow crab stock in response to climate change, and several associated factors. The workshop focus is not yet complete but is intended to take an applied research approach during a three day period to address primary topics like; are there different management options that can be taken and how do those get developed, is there a fundamental need to revise the understanding of the 'currency of management' namely the sizes and categories of mature and commercial male snow crab, and lastly, what are tractable steps that can be taken to help a depleted stock recover. We will report to assessors on the status of this workshop and finding prior to September 2024.

Item #3 - Support of and attention to Bering Sea opilio rebuilding plan.
The terms of the rebuilding plan for this stock are in effect, and the CPT current stock priorities reflect the assessment is annual and scheduled for October of 2024. The current stock status is the same in 2023 (September CPT) as 2022 - the stock is not rebuilt - although the status determination (current biomass over long term average) improved. We will provide updates to assessors in September of 2024 when the CPT prepares to meet that month. The 2024 assessment update will incorporate the federal survey data (NMFS summer crab CPUE data). We will report on the updated status - including all new data sources this fall.

Item #4 - Support of and Participation in Opilio Stock Assessment - GMACS support & other modeling reviews.
The update for the stock from an assessment model perspective is to continue with GMACS options as the primary path forward which we support and will provide an update in September 2024. While the snow crab modeling continues with some uncertainties related to modeling stability and details around stock dynamics that are substantially changing, the GMACS options/scenarios should be helpful, and we support this as the best modeling practice going forward.

Item #5 - Record keeping and reporting for Bering Sea opilio stock - bycatch monitoring.
The update for the final component of this action plans is track bycatch and provide updates on any substantial changes in opilio bycatch occurring in crab or non-crab fisheries in the management area as reported by the September CPT. The reporting of this will also occur as part of the rebuilding plan monitoring, total mortality estimation within the assessment, and CPT-level reporting on bycatch accounting for all crab stocks.

8.1.5 Proposed surveillance activities

The next assessment will be the 2nd surveillance assessment which will commence for the anniversary of the re-certification in April 2012. This 2nd surveillance will examine progress made in fulfilling the milestones of the corrective action plans.

9 Recommendations for continued certification

9.1 Certification Recommendation

Following this surveillance audit, the Assessment Team recommends that the fishery be awarded continuing certification against RFM Certification Program Fisheries Standard Version 2.1.

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11 Appendices

11.1 Appendix 1 – Assessment Team Bios

11.1.1 Assessment Team Bios

Based on the technical expertise required to carry out this assessment, an Assessment Team was selected as follows.

Dr. Ivan Mateo, Lead Assessor

Dr. Ivan Mateo has over 25 years' experience working with natural resources population dynamic modelling. His specialization is in fish and crustacean population dynamics, stock assessment, evaluation of management strategies for exploited populations, bioenergetics, ecosystem-based assessment, and ecological statistical analysis. Dr. Mateo received a Ph.D. in Environmental Sciences with Fisheries specialization from the University of Rhode Island. He has studied population dynamics of economically important species as well as candidate species for endangered species listing from many different regions of the world such as the Caribbean, the Northeast US Coast, Gulf of California, and Alaska. He has done research with NMFS Northeast Fisheries Science Centre Ecosystem Based Fishery Management on bio-energetic modelling for Atlantic cod He also has been working as environmental consultant in the Caribbean doing field work and looking at the effects of industrialization on essential fish habitats and for the Environmental Defense Fund developing population dynamics models for data poor stocks in the Gulf of California. Dr. Mateo also worked as National Research Council post-doc research associate at the NOAA National Marine Fisheries Services Ted Stevens Marine Research Institute on population dynamic modelling of Alaska sablefish.

Dr. Wesley Toller

Dr. Wesley Toller has an extensive background in fisheries management and habitat conservation. As owner and operator of his own consulting business since 2010, has worked closely with a number of leading certification schemes including the Marine Stewardship Council (MSC) and Aquaculture Stewardship Council (ASC) to develop and improve processes for auditing and accreditation of sustainability standards. He previously worked as a program manager with Accreditation Services International (ASI) where he helped establish the company's MSC Program. Dr. Toller has an in-depth knowledge of ISO requirements and international best practices that pertain to eco-labelling. He has a detail-oriented work style and wide-ranging interests. Dr. Toller has experience in many subject areas within the field of sustainability, and a specialist in sustainable use of fishery resources in the field of fisheries management and marine science. Dr. Toller received his doctorate in biological sciences from the University of Southern California. He currently resides in Seattle.