

SSC Draft Report

June 2019

C1 – BSAI Crab

- Specifications for Aleutian Islands golden king crab (AIGKC) and Pribilof Islands blue king crab (PIBKC)
- St. Matthew Island blue king crab rebuilding analysis update
- Model reviews for September/October
 - EBS Tanner crab
 - St. Matthew Island blue king crab (SMBKC)
 - EBS snow crab
 - Pribilof Islands red king crab (PIRKC)
 - Bristol Bay red king crab (BBRKC)
- EBS Tanner crab management strategy evaluation
- Other issues from Crab Plan Team Report

C1 – AI Golden King Crab Specifications

- Tier 3 male-only, length-based stock assessment model based on fishery data
- Single OFL and ABC, but separate models for eastern (EAG) and western (WAG) stock components.
- The SSC **supports** the Plan Team recommended model for harvest specifications (last year's model updated with 2017/18 and 2018/19 data and with a reduced number of gear codes for CPUE standardization)
- The SSC **agrees** with Tier 3 status for AIGKC, 25% buffer between OFL and ABC, and the Plan Team recommended OFL and ABC
- AIGKC was not subject to overfishing, is not overfished or approaching an overfished condition

C1 – Pribilof Island Blue King Crab Specifications

- Full assessment, population shows no sign of recovery
- 2019 MMB = 175 t \ll B_{msy} (4,106 t)
- Continues to be overfished, overfishing will be evaluated at September PT
- The **SSC recommends** the author and PT recommended ABC and OFLs which are the same as previous specifications
- OFL = 1.1 t, ABC = 0.87 t (25% buffer)
- The **SSC recommends** the authors consider conducting the stock structure template used in groundfish

C1- St. Matthew BKC Rebuilding

- The **SSC recommends** bringing forward the breakpoints for the fall 2019 assessment.
 - The analysis suggests a new productivity regime may have occurred in 1989, resulting a break in 1996 for MMB.
- The **SSC recommends** scenarios 1 and 5 be brought forward for the fall assessment and rebuilding analysis:
 - Bmsyproxy period and recruitment periods to be evaluated: 1996-2017 and 1978- 2017.
 - $F=0$ (with groundfish) and $F=state$ harvest policy (and groundfish).
- The **SSC recommends** the stock be declared rebuilt when the stock first increases above Bmsy.

C1- St. Matthew BKC Rebuilding (continued)

- The **SSC recommends** available ecosystem indicator information be related to changes in the stocks reproductive potential
 - Provide information on red king crab biomass and Pacific Cod trends in the St. Matthew Stock Area
- The **SSC did not recommend** changes to the current groundfish management measures be evaluated
 - The SSC notes groundfish discards have been low and stable, and did not change rebuilding projection timelines.
 - SSC requested an analysis to investigate the sensitivity of projections to increases in groundfish catch, recognizing NMFS can manage catch to the OFL.

C1 – St. Matt. Blue King Crab Models for Fall 2019

- Three models supported by CPT and SSC for Fall 2009:
 - Base (2018 accepted model) updated with 2019 data
 - “Fit survey” model, which considers increased weighting of survey data
 - VAST model using survey data

C1 – EBS Tanner Crab Models for Fall 2019

- Model improvements include:
 - Correction of input data that caused model sensitivity to incidental catch
 - Changes to growth that corrected the problem of parameters hitting bounds
 - From here on, the model will be fit to abundance or biomass but not both
 - Progress being made to incorporate BSFRF side-by-side data in model
 - Plan to explore the possibility that decreased growth and changes in the probability of terminal molt may correct the problem that the model overestimates large males

C1 – EBS Tanner Crab Models (continued)

- 7 models supported by CPT and SSC for consideration in Fall 2019:
 - 2018 base model
 - Base model with updated datasets, and
 - Other models representing incremental changes (e.g., fits to male chela height data, a male maturity classification curve, and BSFRF side-by-side data).

C1 – EBS Snow Crab Models for Fall 2019

- Author carefully considered many model features of ongoing concern:
 - Natural mortality, growth, shell condition, skip molting, catchability, recruitment deviations, maturity, data weighting, and incidental catch
 - New analyses contributing to higher (better?) estimates of natural mortality and new data contributing to better understanding of growth
 - Prioritized work plan proposed to make progress on all issues, including starting over with a simple model and carefully adding features to it

C1 – EBS Snow Crab Models (continued)

- 5 models supported by CPT and SSC for consideration in Fall 2019:
 - Status quo (base) model
 - Model with higher natural mortality
 - Model with linear growth for females and kinked growth for males
 - Model with linear growth for both females and males
 - Models that estimate different recruitment size distributions for males and females
- Additional data will be needed to fully resolve issues concerning growth

C1 – Prib. Is. Red King Crab Models for Fall 2019

- 3 models supported by CPT and SSC for consideration in Fall 2019:
 - Running average, which is an inverse variance weighted 3-year running average of mature male biomass (used prior to 2017)
 - Random effects model, which is fit to survey male biomass (used in 2017)
 - Integrated assessment model, which fits male abundance and length composition data from the survey (under development).
 - However, it may not be realistic to expect acceptance the integrated assessment in Fall 2019, as it will be the first opportunity for full SSC model review

C1 – Prib. Is. Red King Crab Models (continued)

- Two important issues for Fall 2019:
 - *Uncertainty in stock status* – models 1 & 2 indicate that MMB is very close to the minimum stock size threshold, whereas model 3 suggests that the stock is near B_{MSY}
 - *Uncertainty in B_{MSY}* – Tier 4 requires identifying a set of years when the stock is near B_{MSY} , however the fishery was open only 5 of the last 27 years. Alternative ways to estimate B_{MSY} will be considered in Fall 2019

C1 – Bristol Bay Red King Crab Models for Fall 2019

- 3 models supported by CPT and SSC for consideration in Fall 2019:
 - Base model – Model 18.0a from September 2018
 - Base model with better bycatch data – base model with updated groundfish fishery bycatch data and separated into trawl and fixed gear
 - GMACS – base model with better bycatch data using GMACS
- SSC appreciates hard work to fit this complex model in GMACS
- A number of issues must be resolved before GMACS can be accepted:
 - Authors identified seven GMACS issues that need to be addressed (including unrealistically high fishing mortality estimate for 1981)
 - CPT recommended additional diagnostics that would facilitate comparisons with the GMACS model so that outcomes can be better understood

C1 – Tanner Crab Management Strategy Evaluation (MSE)

- Informational report on an MSE for Tanner crab by Madison Shipley (UW M.S. student).
- MSE for state management (Harvest Control Rules), but based on and relevant to the Tanner crab assessment on which OFL/ABCs are set by the Council process.
- Technical extensions suggested to improve the simulation: simulating survey data, accounting for female crab in the dynamics, including alternate structural hypotheses and parameter uncertainty.
- Managers and fishery stakeholders should consider the MSE an iterative process, and further develop objectives as initial results become available.

C1 – BSAI Crab Other Topics

- Basis for B_MSY and recruitment regimes
 - The **SSC recommends** authors and CPT provide some rationale for the current basis and clarify the objective of selecting a basis
- VAST models (spatial temporal models)
 - The **SSC recommends** authors and CPT continue evaluating these models and adopting where appropriate
- Catch estimation
 - The **SSC recommends** that methods for catch estimation be well documented and housed in a common data warehouse (e.g. AKFIN)
- Economic SAFE
 - The **SSC recommends** that community level indicators continue to be developed

C1 – BSAI Crab Other Topics (continued)

General stock assessment

- Discussed ESP example with St. Matthews Blue King Crab
- Discussed ESP workshop, risk tables, and clarifications to previous SSC requests
- The SSC recognizes that there are many products and tools in development