Draft SSC Report
October 2022

C1 BSAI Crab

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General comments (1 of 2)

- The SSC ***appreciates*** the extensive public testimony on BSAI crab agenda items
- The SSC ***recognizes*** the severe economic consequences of the potential closures of Bristol Bay red king crab (BBRKC) and EBS snow crab stocks
- The SSC ***recognizes*** the need to protect female crab and their habitat and supports collaborative approaches between federal and State agencies to better account for the reproductive potential of crab stocks in stock assessment models.
- The SSC also ***supports*** collaboration to make crab assessment models as informative as possible for State management.

C1 BSAI Crab

General comments (2 of 2)

- The SSC ***supports*** the CPT plans to discuss appropriate model start dates as well as reference periods for B_{MSY} at their January 2023 meeting
- The SSC appreciates the CPT discussion to explore shifting harvest specifications for EBS snow crab to December
- The SSC ***encourages*** crab assessment authors to move as much of the research and model development as possible to earlier in the year
- The SSC ***encourages*** further considerations or ideas on potential cooperative surveys for crab stocks
- The SSC ***recommend*** a working group be formed to address the use of simpler models for at least snow crab, Tanner crab and BBRKC

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Ecosystem Status Report Preview (1 of 2)

- Gulf of Alaska and Aleutian Islands
  - **No emerging major environmental concerns** were noted at this time
  - Multi-year recovery from the marine heatwave of 2016-2018 continues in the GOA but marine heatwave persists in AI
  - Invasive green crabs have arrived in SE Alaska
- Bering Sea
  - Continuing salmon run failures in western Alaska
  - Typhoon Merbok in September 2022
    - Substantial damage to coastal communities
    - Unkown impacts on benthic and pelagic communities

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Ecosystem Status Report Preview (2 of 2)

- Conditions relevant to crab in the Bering Sea
  - Overall return to cooler conditions may benefit some crab stocks, in particular snow crab
  - Increase in corrosive conditions (acidification) on portions of the Bering Sea shelf may negatively affect growth and survival
  - Mixed trends for prey productivity and competitors
  - Predators on pelagic and benthic crab stages increased in 2022

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Summer Trawl Survey Results (1 of 3)

- Crab-specific results from the summer bottom trawl survey were provided
- The SSC ***commends*** both the survey team and the crab assessment authors on the rapid turnaround time of survey data in crab assessments
- Overall MMB increased relative to last year but remains very low
- The SSC continues to register ***substantial concern*** with the status of BSAI crab stocks based on these survey trends
    - Snow crab continues to decrease in multiple size-sex categories,
    - Further decreases in Pribilof Islands blue king crab

C1 BSAI Crab

Summer Trawl Survey Results (2 of 3)

- Some positive signs
  - MMB increased for many stocks from 2021
  - Evidence of incoming recruitment for snow crab, Tanner crab and SMBKC

C1 BSAI Crab

Summer Trawl Survey Results (3 of 3)

- Re-towing considerations
  - A portion of BBRKC females had not completed their molt-mate cycle, triggering the re-tow protocol
  - However, re-towing was not completed taking into consideration the threshold analysis, low female biomass, and their broad distribution
  - The SSC ***supports*** the ongoing re-evaluation of the value of the re-tow data
  - The SSC ***continues*** to recommend investigations into the drivers of temporal variability in molt-mate cycles

C1 BSAI Crab Harvest Specifications

Summary of Harvest Specifications (1 of 1)

- The SSC agreed with the CPT on selected models, associated OFLs and ABC buffers for all crab stocks
- St. Matthew blue king crab and Pribilof Island blue king crab are overfished and under a rebuilding plan
- EBS snow crab is overfished and a rebuilding plan is under development
- No other stocks were overfished or approaching an overfished state
- No stocks experienced overfishing

C1 BSAI Crab Harvest Specifications

EBS Snow crab (1 of 2)

- Full assessment, stock remains at low mature male biomass levels following the large mortality event
- Tier 3b, overfished
- The SSC ***recommends*** the OFL and ABC from model 22.1a (in agreement with the CPT), but with strong concerns over model convergence to the best solution
- 25% ABC buffer
  - CPT recommended buffer, same as 2021
  - SSC identified reduced population dynamics concerns from 2020-2021, but increased model convergence issues in 2022

C1 BSAI Crab Harvest Specifications

EBS Snow crab (2 of 2)

- The SSC ***recommends*** developing a Tier 4 calculation for snow crab and other crab models as an alternative if no acceptable Tier 3 model is available
- The SSC further ***suggests*** development of a working group to support exploration of simpler models for crab stocks to help better understand and support Tier 3 model performance
- The SSC ***recommends*** continued efforts to create additional time for crab stock assessments, noting that the timeline in 2021 and 2022 prevented solving critical model instability issues

C1 BSAI Crab Harvest Specifications

EBS Snow crab - Rebuilding Plan (1 of 2)

- The SSC ***recommends*** moving forward with a rebuilding plan based on model 22.1a, resampling recruitment and mortality from the period 1982-2017
- This results in T_{min} = 2029, and T_{max} = 2033.
- The rebuilding plan can therefore consider management alternatives that provide for fisheries while achieving a T_{target} between 2029 and 2033.
- The SSC highlights that this timeline for rebuilding may be optimistic, as it assumes no additional mortality events and recruitment consistent with the historical period, despite projections of additional warming in the Bering Sea.
    - However, research points to both temperature and crab density as drivers of recent mortality event

C1 BSAI Crab Harvest Specifications

EBS Snow crab - Rebuilding Plan (2 of 2)

- The SSC ***recommends*** that approaches are developed to estimate unobserved crab mortality from trawl gears for use in stock assessments.
  - The magnitude of likely mortality is currently unknown
  - Will require a transparent approach determining which inputs from previous work are used, and new analyses may be necessary

C1 BSAI Crab Harvest Specifications

Bristol Bay Red King Crab (1 of 3)

- Relative to 2021, the 2022 NMFS trawl survey biomass estimates increased slightly for females and increased 38% for mature males.
- Mature male biomass at the time of mating continues to be low with little evidence of substantial incoming recruitment.
- Full Assessment, the SSC ***recommends*** model 21.1b in agreement with author and CPT
- Tier 3b, the stock is not overfished and overfishing did not occur
- Maintain 20% ABC buffer, in agreement with CPT
  - Disagreed with using low recruitment and low stock biomass rationale, but large and increasing retrospective bias

C1 BSAI Crab Harvest Specifications

Bristol Bay Red King Crab (2 of 3)

- The SSC ***recommends*** that the authors try to isolate factors that reduce the retrospective bias in mature male biomass
- The SSC ***recommends*** the authors use the January CPT workshop to determine the best starting year for the model
- The SSC ***supports*** cooperative research between the BSFRF, NMFS and ADF&G on tagging to examine hypotheses regarding spatial shifts in distribution
- The SSC ***recommends*** investigating the highly biased fits to the BSFRF index

C1 BSAI Crab Harvest Specifications

Bristol Bay Red King Crab (3 of 3)

- The SSC ***appreciates*** the BBRKC ESP, and encourages further exploration of predation and appropriate socio-economic indicators
- The SSC ***recommends*** that the authors consider the contribution of crab found to the north of the management area to this stock
    - consider the implications of including crab from this area for the assessment and sustainability of the stock

C1 BSAI Crab Harvest Specifications

EBS Tanner crab (1 of 2)

- Full assessment, stock stable overall
- Mature biomass at 137% of Bmsy
- Tier 3a, not overfished
- The SSC ***recommends*** Model 22.03 in agreement with author & CPT
- Maintain 20% ABC buffer as recommended by CPT
    - decline in recruitment since 2019, recruitment pulses not reaching larger sizes, poor model fits to larger crab.

C1 BSAI Crab Harvest Specifications

EBS Tanner crab (2 of 2)

- The SSC *recommends* transitioning this model to GMACS
- The SSC *recommends* continued efforts to investigate model outputs that better inform State management
- The SSC *recommends* continued effort to fit simpler models to help better understand and support recommended model performance.

C1 BSAI Crab Harvest Specifications

Pribilof Island Red King Crab (1 of 1)

- Full assessment, conducted on triennial basis.
- Tier 4 GMACS assessment with B_{msy} proxy = 35% of MMB from 2000 to present. Fishery closed since 1999
- SSC supports the author- and CPT- recommended model (22.1b), 25% buffer, OFL and ABC.
- 25% ABC buffer used in previous assessment and is the buffer used with other low information king crab stocks (SMBKC, PIBKC)
- Additional technical recommendations for the author

C1 BSAI Crab Harvest Specifications

St. Matthew Blue King Crab (1 of 1)

- Estimated MMB increased slightly in 2022, recruitment increased from 2021 to 2022, but remains below-average
- Stock was declared overfished in fall of 2018 and is managed under a rebuilding plan
- Fishery has remained closed to targeted fishing since 2015
- Full assessment, Tier 4 stock
- SSC ***concurs*** with the author & CPT recommended OFL and ABC
- Maintain 25% ABC buffer as recommended by CPT
    - retrospective pattern in MMB, two diverging survey trends, and limited stock specific life history information.
- Additional technical recommendations for authors

C1 BSAI Crab Harvest Specifications

Norton Sound RKC Model Runs (1 of 1)

- Models 22.0, 22.1, 22.2 explore size-specific shell condition probabilities and M to address fishing behavior and a lack of larger crab in the fishery.
- SSC ***supports*** authors bringing forward **only** the base model (21.0) with updated survey data as new models were not a substantial improvement
- The SSC ***recommends***
  - The author bring forward methods for estimating discards, addressing the lack of data and potential for new bycatch in recent years
  - Continue transition to GMACS model
  - Updates on maturity and movement data
  - Additional technical recommendations

C1 BSAI Crab Harvest Specifications

Overfishing Updates (1 of 1)

- The SSC was provided with the final catch for four BSAI crab stocks to determine their respective overfishing status
- These include:
  - Pribilof Island blue king crab (biennial; next full in 2023)
  - Aleutian Islands golden king crab (annual)
  - Pribilof Islands golden king crab (triennial; next full in 2023)
  - Western Aleutian Islands red king crab (triennial; next full in 2023)
- The SSC notes that for all of these stocks, catch was below their respective OFL
- Therefore, overfishing did not occur for these stocks