Appendix B: Draft Risk Table for the 2025 Stock Assessment and Fishery Evaluation Report for the Pribilof Islands Blue King Crab Fisheries of the Bering Sea and Aleutian Islands Regions

William T. Stockhausen Elizabeth Siddon

2025-08-29

Introduction

In December 2018, the SSC recommended that all groundfish assessment authors use the risk table when determining whether to recommend an ABC lower than the maximum permissible. In June 2025, the SSC requested that a draft risk table be developed for the eastern Bering Sea Tanner crab stock. The following was used to complete the draft risk table, based on the template updated in 2023 to reflect only three levels of concern and implementing the SSC's December 2023 request regarding the labels for these levels:

	Assessment-related considerations	***Population dynamics considerations***	***Environmental/ecosystem considerations***	***Fishery Performance***
Level 1: Normal	Typical to moderately increased uncertainty/minor unresolved issues in assessment.	Stock trends are typical for the stock; recent recruitment is within normal range.	No apparent environmental/ecosystem concerns	No apparent fishery/resource-use performance and/or behavior concerns
Level 2: Increased concern	Major problems with the stock assessment; very poor fits to data; high level of uncertainty; strong retrospective bias.	Stock trends are highly unusual; very rapid changes in stock abundance, or highly atypical recruitment patterns.	Multiple indicators showing consistent adverse signals a) across the same trophic level as the stock, and/or b) up or down trophic levels (i.e., predators and prey of the stock)	Multiple indicators showing consistent adverse signals a) across different sectors, and/or b) different gear types
Level 3: Extreme concern	Severe problems with the stock assessment; severe retrospective bias. Assessment considered unreliable.	Stock trends are unprecedented; More rapid changes in stock abundance than have ever been seen previously, or a very long stretch of poor recruitment compared to previous patterns.	Extreme anomalies in multiple ecosystem indicators that are highly likely to impact the stock; Potential for cascading effects on other ecosystem components	Extreme anomalies in multiple performance indicators that are highly likely to impact the stock

The table is applied by evaluating the severity of four types of considerations that could be used to support a scientific recommendation to reduce the ABC from the maximum permissible. These are stock assessment considerations, population dynamics considerations, environmental/ecosystem considerations, and fishery performance considerations. Examples of the types of concerns that might be relevant in crab assessments include the following:

1. Assessment considerations—data-inputs: skipped surveys, lack of fishery-independent trend data; model fits: poor fits to fits to fishery or survey data, inability to simultaneously fit multiple data inputs; model performance: poor model convergence, multiple minima in the likelihood surface, parameters hitting bounds; estimation uncertainty: poorly-estimated but influential year classes; retrospective bias in biomass estimates.
2. Population dynamics considerations—decreasing biomass trend, poor recent recruitment, inability of the stock to rebuild, abrupt increase or decrease in stock abundance.
3. Environmental/ecosystem considerations—adverse trends in environmental/ecosystem indicators, ecosystem model results, decreases in ecosystem productivity, decreases in prey abundance or availability, increases or increases in predator abundance or productivity.
4. Fishery performance—fishery CPUE exhibits a contrasting pattern to the stock biomass trend, unusual spatial patterns of fishing, changes in the percent of TAC taken, changes in the duration of fishery openings.

Summary and ABC Recommendation

It should be noted that a Ecosystem and Socioeconomic Profile (ESP) has not been created for PIBKC. The environmental/ecosystem conditions informing this table are derived from the from 2025 indicators, where available, or the 2024 Eastern Bering Sea Ecosystem Status Report (ESR; Siddon, 2024); the 2025 report has not been finalized.

The summarized results of the risk table for the Pribilof Islands blue king crab stock are in the table below. All scores are Level 1, suggesting no need to change the ABC buffer used in previous assessments. Consequently, the assessment author recommends that the overall risk level is the same as in 2024/25 and recommends using the previous ABC buffer (25%).

Assessment-related considerations	*Population dynamics considerations*	*Environmental/ecosystem considerations*	*Fishery Performance*
Level 1: Normal	***Level 1: Normal***	***Level 1: Normal***	***Level 1: Normal***
No concerns regarding assessment methodology.	An ESP with stock-specific ecosystem indicators related to natural mortality, growth, and recruitment, has not been developed for this stock. Lack of larval supply to the Pribilof Islands area has been identified as a major factor limiting juvenile recruitment. However, these represent ongoing concerns.	Warm conditions with a reduced cold pool extent in 2024; forecast to be warm with delayed sea ice arrival in 2025. Corrosive bottom waters remain a concern for growth and survival. Overall, though, ecosystem concerns are minor with uncertain impacts on the stock.	An ESP with fishery-informed indicators has not been deeveloped for this stock: there is no directed fishery because the stock is overfished and under a rebuilding plan. Bottom trawl fishing and pot fishing for Pacific cod have been excluded from the Pribilof Islands Habitat Conservation Zone (PIHCZ) since 2005 and 2015, respectively. Area closures to Tanner crab and snow crab pot fisheries are implemented annually by ADF&G to avoid PIBKC bycatch; these generally incorporate the PIHCZ. Fishery performance concerns are minor for this stock.

Details

Assessment considerations

Risk Level 1: Normal

A spatiotemporal species distribution model to estimate a time series of mature male biomass from NMFS EBS bottom trawl survey data has been used this year for the first time to better handle recent surveys with no catches of mature males (Stockhausen 2025). Where comparable, the model-based index is consistent with estimates from previous assessments.

Population dynamics considerations

Risk Level 1: Normal

Stock biomass has fluctuated about historically low levels for the past 25 years, with no sign of increased recruitment. For much of that time, the stock has been under a federal rebuilding plan with the directed fishery closed and fishery exclusion zones have been implemented to minimize bycatch in other crab and groundfish fisheries. No indications of increased recruitment; larval supply may be the limiting factor to juvenile recruitment.

Environmental/Ecosystem considerations

Risk Level 1: Normal

Ecosystem indicators are organized into several categories to capture the scope of considerations available in the ESR reports:

- Distribution: December 2023 had significant along-shelf winds that could have driven offshore Ekman transport. March to May 2024 had weaker, but more sustained winds that also favored offshore transport (ESR: Hennon, 2024). Strong summer winds in 2024 resulted in a deep mixed layer (ESR: Hennon, 2024).
- Environmental Processes: During winter 2024-2025, the NPI was negative (ESR: Siddon, 2025) for the first time in 9 years, an indication of a stronger Aleutian Low Pressure System (ESR: Siddon, 2025). This means the Bering Sea was warm, stormy, and had less sea ice.
- Summer bottom trawl SSTs in the EBS were slightly cool, while mean bottom water temperature increased by 0.5°C from 2024 to 2025. The extent of the cold pool was below average and a 29% decrease from 2024 (ESR: Siddon, 2025).
- Sea ice is expected to arrive in the northern Bering Sea later in winter 2025/2026 than 2024/2025 due to comparatively low sea ice extent currently in the Chukchi Sea (ESR: Siddon, 2025 forecast will be updated for final ESR).
- The NMME ensemble forecasts as of today show moderate warm SST anomalies over much of the SEBS (<0.5°C) into fall 2025, except Bristol Bay shows anomalies up to +2 °C. The NBS is projected to have SSTs close to the historical mean (ESR: Siddon, 2025 forecast will be updated for final ESR).
- Bottom waters remained near threshold levels in 2024 that could negatively impact growth and survival, with the most corrosive bottom waters found in slope waters and over the northwest shelf (ESR: Pilcher, 2024).
- Prey: Diatom abundance anomalies, based on the Continuous Plankton Recorder, remained positive from 2023 to 2024 (ESR: Siddon, 2025), indicating above-average feeding conditions for pelagic crab stages in 2023 and 2024.
- Competitors: Over the southern shelf, motile epifauna (e.g., sea stars, brittle stars) biomass increased from 2023 to 2024 and remains above the long term mean (ESR: Siddon, 2024). Benthic forager (i.e., small-mouthed flatfish) biomass increased from 2023 to 2024, but remains below the time series mean, suggesting competition for prey resources remains low in 2024 (ESR: Siddon, 2024).
- Predators: Bristol Bay sockeye salmon run sizes were closer to the long-term average in 2023-2024 (ESR: Siddon, 2024), after multiple years of large run sizes, indicating a possible decline in predation pressure on larval crab.

Fishery performance

Risk Level 1: Normal

Fishery-informed indicators do not exist for PIBKC: there is no directed fishery because the stock is overfished and under a rebuilding plan. Bottom trawl fishing and pot fishing for Pacific cod have been excluded from the Pribilof Islands Habitat Conservation Zone (PIHCZ) since 2005 and 2015, respectively. Area closures to Tanner crab and snow crab pot fisheries are implemented annually by ADF&G to avoid PIBKC bycatch; these generally incorporate the PIHCZ. The OFL (1.16 t) was

exceeded in 2015/16. Most bycatch mortality occurred in the hook-and-line fishery for Pacific cod and groundfish non-pelagic trawl fishery (1.018 t), with a smaller amount occurring in the Tanner crab fishery (0.166 t). Bycatch levels have subsequently decreased.

References

Please note that references for ESPs and ESRs use the citing convention specified in title pages of the ESP/ESR main report for individual contributions and the main report.

Stockhausen, W.T. 2025. 2025 Stock Assessment and Fishery Evaluation Report for the Pribilof Islands Blue King Crab Fisheries of the Bering Sea and Aleutian Islands Regions. North Pacific Fishery Management Council, Anchorage, AK. Available from https://meetings.npfmc.org/Meeting/Details/3097.

Hennon, T. 2024. Winds at the Shelf Break. In: Physical Environment Synthesis. In: Siddon, E. 2024. Ecosystem Status Report 2024: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.

Pilcher, D., J. Cross, N. Monacci, E. Kennedy, E. Siddon, and W.C. Long. 2024. Ocean Acidification. In: Siddon, E. 2024. Ecosystem Status Report 2024: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.

Siddon, E. 2024. Ecosystem Status Report 2024: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.

Siddon, E. 2025 (in press). Ecosystem Status Report 2025: Eastern Bering Sea, Stock Assessment and Fishery Evaluation Report, North Pacific Fishery Management Council, 1007 West 3rd Ave., Suite 400, Anchorage, Alaska 99501.