

C2 Bristol Bay Red King Crab Closures Initial Review

The SSC received a second initial Environmental Assessment/Regulatory Impact Review (EA/RIR) presentation from Sam Cunningham (NPFMC), Mason Smith (NOAA-AKRO), and Sarah Rheinsmith (NPFMC) on alternatives and options for closures to the Bristol Bay Red King Crab Savings Area (RKCSA) and NMFS area 512. Oral testimony was received from Jim Armstrong (Freezer Longline Coalition, FLC), John Gauvin and Sarah Webster (Alaska Seafood Cooperatives), Jon Warrenchuk (Oceana), Scott Hanson (F/V Beauty Bay), Jamie Goen (Bering Sea Crabbers), and Oystein Lone (Peter Pan Seafood/Independent Pot Cod Harvesters).

The SSC thanks the authors for this comprehensive initial review draft, which has improved substantially since the June 2023 draft. BBRKC has been in a steady decline since the late 2000s, likely due to a combination of environmental and fisheries factors, provoking potential management actions focused "on reducing BBRKC mortality from groundfish fishing in areas that may be important to BBRKC and where BBRKC may be found year-round, which may help increase stock abundance and promote achievement of optimum yield from the directed BBRKC fishery while minimizing negative impacts to affected groundfish fleet operations as well as target and PSC species," according to the Council purpose and need statement. **The SSC finds that this document provides sufficient information to inform Council decision making for final action after addressing SSC recommendations.** The EA/RIR generally describes that the potential benefits to BBRKC stock are challenging to quantify given available data and the potential effects on groundfish fisheries are variable, depending on what alternatives and options are selected.

The SSC appreciates the addition of the requested CPUE-based reallocation of effort model in addition to the PSC rate allocation model presented in June, as requested. While there are some differences in the results of these two analyses, they broadly show similar outcomes. Of some concern is the increase in PSC predicted for Chinook and EBS snow crab that are already in depressed states at this time. If possible, the SSC suggests showing these in relative terms (e.g., % change) and, if possible, including confidence intervals calculated either analytically or through bootstrapping.

The SSC had an in-depth discussion on the CPUE-based model and the reallocation of effort. The extent and spatial and temporal distribution of effort displacement is critical to understanding the biological, economic and community impacts. The SSC notes that the analysis would have been more informative if the displaced effort had been constrained such that the resulting catch matches the annual total catch of target groundfish species. The SSC has significant concerns regarding the implementation of the CPUE model, which was intended to better capture where displaced effort might occur. Because of considerable differences in CPUE between the RKCSA and areas outside the RKCSA, the model as implemented results in biased estimates of RKC PSC. For example, when CPUE is higher outside the RKCSA, such as in Fig. 3-9, the displaced effort is higher than the effort that would actually be needed to catch the same amount of the target species, resulting in an over-estimation of RKC PSC. It is likely that on balance, both the PSC method and the CPUE method produce PSC increases that are higher than might be expected (the PSC method was intended to provide an upper bound on the potential PSC increase but the CPUE method was intended to better reflect actual displacement).

Public testimony also highlighted the potential benefits of incorporating greater temporal resolution into these models, such as redistributing displaced effort on a more frequent basis than seasonally, suggesting that this could further refine effort allocation. The SSC suggests that the current approach captures dominant dynamics and recognizes that incorporating greater temporal resolution would require substantial effort, so does not recommend a change is needed before final review in June. However, the SSC encourages authors to include additional discussion of the limitations of the current resolution to the extent possible. If the Council recommends further evaluation of closure areas for RKC, a better understanding of how vessels may use a combination of timing and location to avoid impacting crab may be useful.

The SSC notes that the evaluation of effort and PSC displacement is heavily reliant on at-sea observer coverage. In the Pacific cod pot fishery, these rates have ranged from 7-17% since 2013, noting that vessels opting into Electronic Monitoring (EM) do not provide at-sea estimates of crab discards. The SSC also discussed that RKC PSC may include RKC from outside the BBRKC stock area. So changes in RKC PSC may affect RKC broadly across the Bering Sea, and is not only confined to the BBRKC stock area, which is relevant for overall PSC accounting and management.

Prior to final action, the SSC recommends the following:

- Adding a new model (“proportional model”) where effort displaced from areas closed under Alternatives 2 and 3 is reallocated among all open areas in the Bering Sea in proportion to observed (“true”) effort in those areas. This proportional redistribution model leverages revealed behavior that reflects effects of fish quality, travel cost and other factors that drive vessels’ decisions but are not explicitly incorporated in the model. Ensure that any effort-based - predictions are adjusted for CPUE in the area where the vessel is displaced so that total predicted target catch approximately matches observed (i.e., “true”) total target catch. The existing PSC method is scaled to target catch, but the recommended proportional redistribution model for CPUE requires effort be rescaled to attain observed target catch levels. The SSC acknowledges it will not be possible to exactly match total catch of all species, particularly for pot gear, so recommends focusing on total catch of the target, or an index of multiple targets, for each fleet.
- The SSC suggests the current CPUE-based prediction will not contribute substantially new insight beyond the proposed proportional model and the upper bound provided by the PSC approach. Therefore, if the proportional model is added, then the CPUE model can be dropped from the document. However, if the proportional model is not able to be completed, the existing CPUE model should be scaled so predicted total target catch matches observed target catch.
- Inclusion of a table that is similar to the table in the presentation showing the qualitative effects across fishery and PSC species in a stoplight diagram (Figure 1)

PSC Species	Alt 2				Alt 3	Alt 2/3
	POT	NPT	PTR	HAL	POT	POT
Red king crab	↑	↓		↓	↓	↓
Opilio crab	↑	↑			↑	↑
Bairdi crab		↑				↓
Halibut		↑		↑		
Chinook salmon			↑			
Non-Chinook salmon			↑			
Herring			↑			




Figure 1: Slide 21 from C2 BBRKC Closure Initial Review staff presentation to the SSC (available on the February 2024 [SSC eAgenda](#)).

The SSC understands the desire for an action that supports healthy crab populations and healthy communities. **The document comprehensively discusses the potential benefits of various management measures for the recovery of the BBRKC stock, yet acknowledges the challenge in predicting their effectiveness due to limitations in current research and data.**

Concerning environmental and ecological impacts, the document suggests that the proposed management measures are unlikely to significantly affect the populations of groundfish or seabirds, and previous EFH analyses have shown minimal and temporary effects to habitat. EFH species distribution models indicate

that the important habitat for most RKC straddles the RKCSA and area 512, with more adult females in Area 512 but that some distribution changes may be temperature-dependent. The SSC notes that such distribution changes should be considered in the written interpretation of static habitat maps due to the current highly variable climate. The SSC also discussed the benefits of closing groundfish fisheries in area 512, and the potential increase in Pacific cod predation on crabs if the removal of fisheries increases abundance of predatory cod. The description of RKC consumption by crab in the document is noted as an area for improvement, and **the SSC recommends adding any RKC consumption estimates by Pacific cod (in biomass or number) in the next iteration if possible.**

The document highlights the complexity of quantifying habitat importance for BBRKC, alongside the emerging concern over unobserved mortality rates, the magnitude of which remains uncertain. Despite the low bottom contact in area 512 and the decline in bottom contact in recent years inside the RKCSA, the SSC acknowledges that there are likely data limitations to quantifying the actual habitat disturbance in these areas. Lastly, the SSC acknowledges the probable economic impacts on fisheries displaced by these measures, including increased operational costs and the necessity to navigate other management constraints and PSC limits.

In discussion of the alternatives, several critical points emerge that warrant further discussion and clarification. First, there is a need for **clarification of the rationale behind the selection of the 50,000-ton threshold, as an explicit explanation in the analysis would lend support to this benchmark trigger. Additionally, the SSC recommends analysts explicitly consider the scenario under Alternative 3 that closes area 512 to pot gear and the RKCSA remains open, especially in terms of catch redirection from area 512 to the RKCSA.**

The document revisits recommendations made by the SSC in June 2023 regarding the application of LKTK on-ramps in Section 3.5. The SSC found this section informative, and notes that there is additional information that could be included or referenced to Section 3.5 from Section 3.3 (Historical Analysis of Groundfish Effort Distribution and Bycatch) given industry expertise on fishing locations and techniques provided in that section.

It would be useful to explore the communities engaged in or dependent on the BBRKC fishery that would be the beneficiaries of potential conservation aspects of the proposed action, were those benefits to occur. This would involve the compilation of sets of standardized social impact analysis (SIA) engagement and dependency tables for BBRKC catcher vessels (CVs), catcher processors (CPs), and shore-based and/or inshore floating processors. These would be analogous to those produced for the groundfish sectors potentially experiencing adverse impacts as a result of the implementation of the proposed action alternative(s). This would be separate from the examination of the likelihood of such outcomes and their overall implications. Despite the document's acknowledgment of its limitations in quantifying conservation benefits, **it is crucial to identify which communities or stakeholders would likely benefit if such advantages were realized, aligning with considerations under NS8 guidelines.**

Additional specific points of interest for the summaries in Section 4 include the role of Over 60 feet (O60) CVs in the BBRKC fishery, the increasing trend in groundfish tendering activities and the community affiliations and diversity of the fishing portfolios of those tender vessels, and the broader implications of these dynamics as highlighted in public testimony. Conducting an analysis of the members of the BBRKC CV fleet that also participated in the O60 Pacific cod pot fishery in the form of a reciprocal analysis to that shown in Figure 3-6 could offer valuable insights.

The SSC recommends inclusion of a brief qualitative characterization of the nature and degree of overlap between the relevant varying sets of potentially affected groundfish fishing communities and the set of potentially affected BBRKC fishing communities under different alternative combinations. This would aid in understanding patterns of differential distribution of social and community impacts across the proposed alternatives and options. **Additionally, the SSC recommends a more detailed**

categorization differentiating shore-based and inshore floating processor segments of the processing sector, along with a characterization of the catcher vessel component of tendering activities associated with the relevant groundfish fisheries. This could be done by splitting operating codes to more accurately reflect this segment which could help inform the distinction between permanent and transient processing capacity and activity within the relevant groundfish fisheries and the BBRKC fishery of the time series tables used in the analysis. Additional suggestions for improving the clarity of aggregations of communities (e.g., Seattle vs Seattle MSA and “Other”) in the sets of SIA fishing community engagement and dependency tables have been provided to the authors.

The SSC also recommends:

- Maps of observed pot effort (partial coverage and non-EM) versus total effort for the Pacific cod fishery to complement existing effort displacement maps.
- Public testimony included concerns about hook and line (HAL) mortality being overstated in the analysis due to crab dropping off the gear before being brought onboard. A data summary showing the proportion of HAL RKC drop offs versus RKC brought onboard should be included in the analysis if available.