



C4 Crab PSC Limits in the BSAI Groundfish Trawl Fisheries

February 2021

Action Memo

Council Staff: Sarah Marrinan
Other Presenters: Sara Cleaver (NPFMC) and Angela Forristall (NPFMC/ Sea Grant)
Action Required: 1. Review the Preliminary/ Initial Review Draft of the EA/RIR
2. Determine whether to select a Preliminary Preferred Alternative and release the document for final action, request an Initial Review Analysis with additional information, or take no action.

BACKGROUND

Crab prohibited species catch (PSC) management measures exist for the protection of Bristol Bay red king crab (*Paralithodes camtschaticus*; BBRKC), Eastern Bering Sea (EBS) Tanner crab (*Chionoecetes bairdi*; or *C. bairdi*), and EBS snow crab (*Chionoecetes opilio*; or *C. opilio*) stocks in the BSAI and include triggered area closures for BSAI groundfish trawl fisheries. Crab PSC caught in a specified area while groundfish fishing with trawl gear accrues to a crab PSC limit (in numbers of crab) established for that BSAI groundfish trawl fishery. If the limit is met, the specified area is closed to nonpelagic trawl directed fishing for groundfish in the fishery/sector that reaches its crab PSC limit. The current PSC limits for BBRKC, EBS snow crab, and EBS Tanner crab are defined differently, but all based on some metric of crab abundance.

The Council is considering a regulatory change that would set crab PSC limits to their lowest limit in the BSAI trawl Community Development Quota (CDQ) and non-CDQ groundfish fisheries when the corresponding crab directed fishery is closed, in addition to the existing abundance-based triggers.

- For the BSAI groundfish trawl fisheries collectively, this would mean the PSC limits for BBRKC in Zone 1 would be 32,000 animals if the directed BBRKC fishery is closed.
- For EBS snow crab, the PSC limit in the *C. opilio* Bycatch Limitation Zone (COBLZ) would be 4.350 million animals if the directed fishery is closed.
- For EBS Tanner crab, analysts are assuming that the Council intended for the PSC limits to be set at a fixed 730,000 animals in Zone 1 and 2.07 million animals in Zone 2 under Alternative 2, unless Tanner crab abundance dictated a lower PSC limit. These limits are not the lowest tier of Tanner crab PSC currently specified in regulation, but they are the lowest fixed amount as there is no minimum threshold. Thus, the Council should clarify if this was the intended action.

At present, most Bering Sea crab stocks are experiencing low productivity and small population sizes, leading to large reductions in directed harvest levels. This action is intended to ensure there is consistency in management measures between crab directed fisheries and bycatch in groundfish fisheries, making

more explicit the balance of impacts to all the fisheries and communities that are affected by the status of depressed stocks.

The analysis states that changes in groundfish trawl fishing behavior and thus changes to resource components are expected to be limited from the proposed action, relative to no action. For BBRKC this is primarily because PSC limits are already indirectly linked to the status of the directed fishery by having the same thresholds as the State of Alaska's harvest strategy for BBRKC. Therefore, while BBRKC PSC limits set to their lowest threshold would likely affect the BSAI groundfish trawl fleet which could have implications for economic or environmental resource components, these impacts might occur equally under no action. The analysis highlights some exceptions in which the PSC limits and the crab directed fishery status may not be aligned.

The action alternative represents a greater likelihood that, in particular, Zone 1 and 2 Tanner PSC limits would be set at their lowest fixed abundance-based level. However, the groundfish trawl sectors have routinely caught far less snow crab and Tanner crab than even the lowest PSC limits for their corresponding sector (with the exception of snow crab PSC in 2010 in the TLAS fishery and Zone 2 Tanner PSC in 2011 in the A80 fishery). Based on past PSC in the groundfish trawl sectors, Alternative 2 is expected to have a limited effect on mitigating snow and Tanner crab PSC, relative to no action. The analysis further describes the extent of the expected impacts on the directly regulated groundfish trawl sector, associated processors, communities, vessel safety, and the directed crab fisheries as well as the BBRKC, EBS snow crab and EBS Tanner crab stocks.

At the Council's request, the analysis also includes source numbers for the crab abundance estimates used to calculate the PSC limits. The crab PSC limits are set each year during the harvest specifications process and apportioned across groundfish sectors. To determine PSC limits, stock assessment authors provide NMFS Inseason Management and/or Council staff with the abundance or biomass values necessary to compare to PSC thresholds established in Federal regulations. Historically, these estimates were all derived from area-swept estimates of the NMFS bottom trawl survey. Presently, they are all derived from model-based estimates. In the past, the abundance estimates used to evaluate PSC thresholds have not always been publicly available. Public testimony has requested the stock assessment authors provide the values used to determine crab PSC limits in the publicly available SAFE reports, and the Crab Plan Team (CPT) and SSC also endorsed this request.

Crab Plan Team Feedback

The CPT was consulted several times during the development of this analysis. In May 2020, the analysts asked the CPT specific questions about the source of abundance estimates used to set PSC, the relationship of bycatch to crab stock population dynamics, and the role of unobserved mortality.¹ In September 2020, assessment authors provided the results of sensitivity analyses on the possible effects of unobserved mortality on crab stocks.² These sensitivity analyses are also included as Appendix 4 to the document.

In January 2021, the CPT received an update on the Preliminary/ Initial Review Draft Analysis from analysts. In particular, the CPT discussed whether the abundance estimates used for the PSC limits should account for survey catchability (Q parameter), as is done in the stock assessment model. They highlighted that particularly for snow and Tanner crab, this can substantially impact the resulting abundance estimate that is evaluated relative to the limits. **Related to this, the CPT would like feedback from the SSC on**

¹ CPT report from May 2020: <https://meetings.npfmc.org/CommentReview/DownloadFile?p=fa83196d-dd52-4829-a253-3ffc7cb817d0.pdf&fileName=C2%20CPT%20Report%20May%202020.pdf>

² CPT report from Oct 2020: <https://meetings.npfmc.org/CommentReview/DownloadFile?p=d2d1e96b-1aa8-4472-949c-ea77945997e6.pdf&fileName=C1%20Crab%20Plan%20Team%20Report%20Sept%202020.pdf>

the appropriate way to estimate abundance for use relative to PSC limits. As the CPT report includes specific questions for the SSC and the Council to consider, an excerpt is attached.

Federal regulations are not specific to the source/ process for estimating mature female BBRKC abundance used for PSC limit. For both snow and Tanner crab the Federal regulations say, “based on total abundance of [*C. bairdi* /*C. opilio*] crabs as indicated by the NMFS annual bottom trawl survey”

Excerpt from the Crab Plan Team Report Jan 2021

14. Crab PSC in groundfish fisheries – Plan Team feedback to analysts

Sarah Marrinan and Sara Cleaver (NPFMC staff) gave an update on a preliminary/initial review of crab prohibited species catch (PSC) limits in the BSAI groundfish trawl fisheries. The Council received public testimony on this issue and initiated a preliminary/ initial review analysis in December 2019. The CPT was then briefed on the issue in May 2020 followed by a sensitivity analysis done by assessment authors for September 2020. Following this update, Council staff will present the initial/preliminary analysis to the Council at the February 2021 meeting. The presentation was meant to give the CPT opportunity to provide feedback.

The analysis consisted of two alternatives: 1) no action, and 2) reduced PSC limits for BSAI trawl CDQ and non-CDQ groundfish fishing when the corresponding directed crab fishery is closed. The goal of the action is to ensure consistency in management measures among the directed fisheries and groundfish bycatch fisheries to better balance the impacts on depressed stocks. The Council requested that the analysis include source numbers for the abundance estimates used to calculate the PSC limits and clearly state whether estimates are from raw data from the NMFS bottom trawl survey or from the stock assessment models.

There was discussion among the CPT about inconsistencies across stocks in PSC inputs and calculations, but it was acknowledged that inconsistencies are largely based on how/when the PSC limits were developed. For BBRKC, thresholds for PSC calculations match those used in the state harvest strategy, whereas those for snow and Tanner crabs were based on industry negotiations.

There was discussion about whether the PSC calculations should account for survey catchability (Q parameter), which is mostly relevant for snow and Tanner crab since Q for BBRKC is close to 1. Because Q is generally small for snow and Tanner crab, incorporating Q could substantially increase (e.g., double) PSC limits for those stocks based on the formulae. While it appears that the intent was to account for catchability, this should be clarified by the SSC/Council. It is assumed that survey selectivity should be accounted for, but catchability (Q) should be further clarified. It was recommended that if catchability is to be used for PSC calculations, then the current threshold calculations should be revisited with an analysis. Related to this, the CPT would like feedback from the SSC on: 1) clarification about the inclusion of catchability, Q, in PSC calculations; 2) clarification about how to incorporate selectivity and catchability in PSC calculations as selectivity and Q are estimated in the model and thus change each time the assessment is updated (e.g., Tanner crab had a change in catchability estimates in 2019 which impacted PSC limit calculations); 3) define PSC calculations (e.g., a % of mature male abundance? Other?). A suggested approach was to fix Q at 1.0 for snow and Tanner calculations, although there was not a consensus among CPT members on this as a recommendation. It was noted that the Council has asked that future SAFE documents include PSC values and calculations to help with record keeping. Sara noted that the current PSC regulations indicate data as that of the “NMFS bottom trawl survey” and are not specific as to whether raw area-swept or model-based estimates are to be used. The CPT seeks guidance from the SSC on this issue.

The Alternative 1 (no action) analysis was presented for BBRKC, Tanner crab, and snow crab relative to the triggered area closures (Zones 1 and 2 for BBRKC and Tanner crab, and COBLZ for snow crab). For BBRKC, PSC limits were not set to the lowest threshold during 2008-2020. Had the PSC been reduced,

some sectors may have reached their limit and been closed out of Zone 1 in some years. It was noted that if the directed fishery is not opened and the lowest PSC limits were in place, the Red King Crab Savings Area would be closed to the groundfish sector, the A80 sector limit would be reduced, and a Zone 1 closure would likely result in additional forgone revenue and increased costs associated with fishing. It was noted that trawl PSC still represents a small portion of the total BBRKC fishery mortality, other gear types are estimated to represent a greater portion of the crab PSC, and crab PSC limits at their lowest levels may have a modest impact on the ability of BBRKC to rebuild. Given the expectation for modest stock impacts, BBRKC PSC limits set to lower thresholds are expected to have limited indirect impacts to the directed fishery.

Trawl crab PSC is a small portion of observed fishing mortality for snow and Tanner crab. Snow crab PSC limits hit the lowest threshold in 2017 and the Tanner crab PSC limit hit the lowest threshold in 2008-2010. It is expected that reaching snow or Tanner crab PSC limits would rarely occur, even at reduced PSC levels. Reduced Tanner and snow crab limits would likely have limited impacts to the groundfish sectors, associated processors, and communities, based on past PSC use. The A80 vessels have some flexibility to shift fishing locations and species targets, but lower PSC limits could create negative impacts depending on the time of year, distribution of other PSC species the fleet needs to avoid, and directed species spatial distribution.

A sensitivity analysis was conducted by the stock assessment authors to evaluate the potential impacts of unobserved trawl mortality. For BBRKC, when bycatch biomass increases by 500% or more, estimated MMB values in the terminal years could decrease about 14% or more; the decreases might be much larger for some years. For Tanner crab, based on previous catch rates, increasing bycatch by 1,000% would have lowered the MMB in the 1970s by an estimated ~100,000 t, while in recent years it would have been estimated to be ~6,000 t less. For snow crab, bycatch has been small enough that increasing the bycatch input by 1,000% resulted in only a ~2% change in the terminal year of MMB (with largest changes in the mid-1990s through mid-2010). Overall, less than doubling bycatch mortality would have little overall effect on stock dynamics.

The effect of Alternative 2 (i.e., reduced PSC limits when the directed fishery is closed) was presented, and it was noted that PSC catches did not reach the lowest PSC threshold for any fisheries for 2008-2020, except for Tanner crab (Zone 2) in 2017 and snow crab (COBLZ) in 2008-2010. The expected impacts under Alternative 2 are essentially the same types of impacts highlighted under Alternative 1 (above paragraph). However, Alternative 2 may increase the likelihood crab PSC would be applied at lowest abundance-based thresholds, particularly for Zone 1 and 2 Tanner crab PSC limits. Changes in groundfish trawl fishing behavior, and thus changes in resource components, are expected to be limited, relative to no action. Limited impacts are expected for BBRKC because thresholds are already aligned with the state harvest strategy (not because lower PSC limits would have no effect), and a limited set of impacts are expected for snow and Tanner based on past PSC relative to lowest PSC limits.

Jamie Goen (Alaska Bering Sea Crabbers, ABSC) submitted a comment letter about concern for the health of crab stocks, especially BBRKC. She noted a concern for unobserved mortality, which is not included in assessments or catch accounting. Cory Lescher (ABSC) described a white paper he and others authored which takes a closer look at unobserved mortality and includes a literature review highlighting other research efforts. None of the research addresses rates for unobserved mortality. As such, research is needed on unobserved gear interactions and resulting mortality rates. It was also noted that different life stages may have varying mortality rates (e.g., during molting periods), and this should be considered.