March 29, 2024

Ms. Angel Drobnica, Chair
North Pacific Fishery Management Council
1007 West Third, Suite 400
Anchorage, AK 99501

RE: Comment on Agenda Item D3 Research Priorities

Dear Chair Drobnica and Council Members:

The Alaska Bering Sea Crabbers (ABSC) is a trade association representing the majority of independent crab harvesters who commercially fish for king, snow (opilio), and Tanner (bairdi) crab with pot gear in the Bering Sea and Aleutian Islands (BSAI) Crab Rationalization Program. We appreciate the opportunity to comment to the SSC on agenda item D3 - research priorities.

We are grateful for the public process this Council provides and the opportunity to submit our research priorities under the request for information web portal and again through public comment at the February SSC meeting and April Council meeting. Similarly, we appreciate the two separate meetings where the Council's Crab Plan Team (CPT) took up this issue and adopted their crab-specific research priorities. To that end, we support both the CPT's top five research priorities (Table 1) along with their research priorities that were not ranked in the top five but still warranted being a priority for ongoing research (Table 2). Crab research in the North Pacific is more important now than it has ever been. Crab-related research made up four of the Council's top ten research priority list for 2022-2024 (Table 3). Given the status of the Bering Sea crab stocks now, we hope that crab research remains this Council's highest priority and consider updating and adding more research topics to the new top-ten list.

Research ID	Title
148	Spatial distribution, habitat requirements, and movement of crabs relative to life history events and fishing
CPT004	Evaluate fishing gear impacts on crab, benthic communities, and essential fish habitat
CPT003	Improved maturity estimation and reproductive potential characterization for crab. *Combines CPT002, N008, and 592.*
715	Physiological responses of crab to climate stressors
CPT001	Early life history population bottlenecks

Table 1: CPT Top 5 research priorities ranked in order.

Research ID	Title
167	Alternative approaches to acquire fishery-independent abundance data for unsurveyed crab stocks.
532	Natural mortality estimation for crab stocks
731	Norton Sound Red King Crab case study
CPT005	Annual monitoring survey in the NBS
CPT006	Develop and evaluate global climate models (GCMs) or other projection models to assess climate change impacts on biology (recruitment, growth, spatial distributions, and benthic productivity), and to evaluate management strategies under different climate, ecological, and economic conditions. *Combines 223 and 225*

Table 2: CPT research priorities that were not ranked in the Top 5, but still warrant being a priority for ongoing research.

NPFMC Top Ten Research Priorities for 2022-2024

	Research ID	Title	Rationale for Elevation to Top Ten	Council Priority
★	148	Spatial distribution and movement of crabs relative to life history events and fishing	Environmental conditions are changing rapidly in the eastern Bering Sea, driving related changes in the distribution of commercial crab stocks. Fishing behavior and life history timing (e.g., reproduction, growth) may subsequently be influenced by changes in crab distribution. The CPT discussed collection of data on distribution and movement relative to oceanographic conditions as critical for the development of the complex models needed to predict future stock abundance, stock boundaries, stock production, and management strategies.	Urgent
	163	Conduct routine fish, crab, and oceanographic surveys in the Arctic Ocean	Although fishing is currently prohibited in Alaska's Arctic waters, the region is changing rapidly and fish or crab populations may expand into or increase locally in the Arctic. Therefore, it is important to conduct routine surveys to monitor changes in Arctic waters.	Important
	178	Develop a framework and collect economic information	Addresses the need for a framework for collection of economic information on commercial, recreational, and charter fishing, as well as fish processing, to meet the requirements of the MSFCMA sections 303(a)(5, 9, 13), 303(b)(6), and 303A.	Urgent
	189	Develop stock-specific ecosystem indicators and incorporate into stock assessments	To support an ecosystem approach to management in the context of single- (or multi-) species assessments, there is a continued need to develop indicators that link ecosystem variability and changes to variability in growth, survival and recruitment of fish stocks as illustrated by the recent dramatic downturn in Pacific cod. This provides an important avenue for linking ecosystem changes directly to management-relevant reference points such as OFL and ABC.	Urgent
★	246	Cooperative research efforts to supplement existing at-sea surveys that provide seasonal, species-specific information on upper trophic levels	The pelagic distributions and abundances of top predators (seabirds and marine mammals) provide indicators of the availability of prey, many of which are commercially important species such as pollock or Pacific cod. Thus, knowledge of their distributions and abundances can be useful as indicators of ecosystem "health". Also, in some instances, these top predators are inadvertently impacted by fisheries. Thus knowledge of their distributions can be important for fisheries where impacts may occur.	Important
	431	Develop tools for analyzing coastal community vulnerability to fisheries management changes	Predictive accuracy of pre-implementation economic and social impact assessments of proposed fishery management changes (e.g., halibut ABM) would be improved through better understanding of how various dimensions of community vulnerability and resilience can be effectively analyzed and, ultimately, how identified and measured vulnerabilities are likely to variously interact with the nature, direction, and magnitude of proposed changes to the fishery. An example needing these tools is understanding the linkages between federal commercial fisheries PSC catch of chinook and impacts on use of salmon resource by communities in western coastal Alaska by continued development of genetic tools.	Important
★	592	Maturity estimates for Bering Sea and Aleutian Island crab stocks	The availability of maturity data from male and female crab are incomplete for use in stock assessment models. Key parameters defining size at maturity, proportion mature at size, and the potential for biennial reproductive cycles are currently uncertain for many stocks. Methods for determining spatial and temporal variability of these quantities are needed to adequately characterize mature biomass.	Urgent
	611	Collection of socio-economic information	Collect socio-economic information on commercial, recreational, and charter fishing, as well as fish processing, to meet the requirements of the MSFCMA sections 303(a)(5, 9, 13), 303(b)(6), and 303A.	Critical Ongoing Monitoring
	712	Gap Analyses on loss of biological samples due to implementation of EM	Research to determine the effects of loss of biological data collections due to Electronic Monitoring (EM). As the use of EM increases in different fisheries, fewer at-sea observer observations and collections are being made which reduces haul specific data collections. Evaluations of the effects of this on catch accounting estimates and stock assessment are needed as well as an evaluation of alternative sources or proxies for biological data as EM use increases.	Urgent
★	731	Norton Sound Red King Crab case study	Needed to help understand and address urgent stock assessment and management challenges in the NSRKC fishery, including the efficacy of previously instituted community protection management measures through the collaborative involvement of the LKTKS taskforce and the Climate Change taskforce. This could be informative for better understanding predation by groundfish on juvenile crab in nearshore areas and population bottlenecks, and to improve management to improve stock condition. What is happening in this fishery involves cross-jurisdictional considerations, points to the need to work with multiple knowledge systems, highlights the intertwined nature of human dimensions and fishery changes (e.g. the effect of climate changes on species distribution and harvest capabilities), and is an urgent matter given the gravity of the changes occurring with the crab population and harvest.	Urgent

Table 3: NPFMC top ten research priorities for 2022-2024, the four crab-specific research topics are denoted with a red star.

We would also like to acknowledge and recognize the work that the Social Science Plan Team (SSPT) has done to create their list of research priorities for the Council. Their top-five priority list includes one of the Council's previous top-ten priorities, "*Norton Sound red king crab case study"*. This was also identified in the CPT's honorable mentions list for ongoing research. This project will inform a number of important

topics related to crab science, communities that rely on crab, local and traditional knowledge of crab and the economics that's integrated with it all. The SSPT also had two other worthwhile crab topics on their special mention list that ABSC also supports:

- *Research ID #714 Evaluate impacts on Northern Bering Sea communities, commercial fishermen, and shore-based processing facilities from climate impacts,* and
- *Research ID #N020 Identify pathways and other opportunities for fishermen and communities to diversify and adapt in the face of climate-driven changes to fisheries (e.g., Bering Sea crab crashes).*

Of note from the Unobserved Fishing Mortality Work Group (UFMWG) report, among gears, research on the lethality of pelagic trawl gear was identified as the highest priority owing to "*the expectation that this gear has the potential for a relatively high ratio of unobserved:observed encounters with crab*." This may be captured in the CPT's number two priority in their top-five list (research ID #CPT004), but would benefit from the inclusion of the specific language "unobserved fishing mortality". This intent is captured in the CPT's description of this research recommendation, along with focusing on important life history stages. A key take-home message from the UFMWG report is the need for field studies to address data gaps.

Furthermore, at the Council's recent February 2024 meeting, they initiated a discussion paper for pelagic trawl gear that includes "*minimizing bycatch*" [observed and unobserved] on crab and "*minimizing the impacts of pelagic trawl gear on sensitive benthic habitat and unobserved mortality of stocks that rely on such habitat*" (C2 Council motion, Feb2024). Scientists have flagged concern over groundfish fishing impacts on crab and habitat degradation since at least 2006 while the Bristol Bay red king crab stock has been in decline (see attachment). The need for this research continues to be urgent.

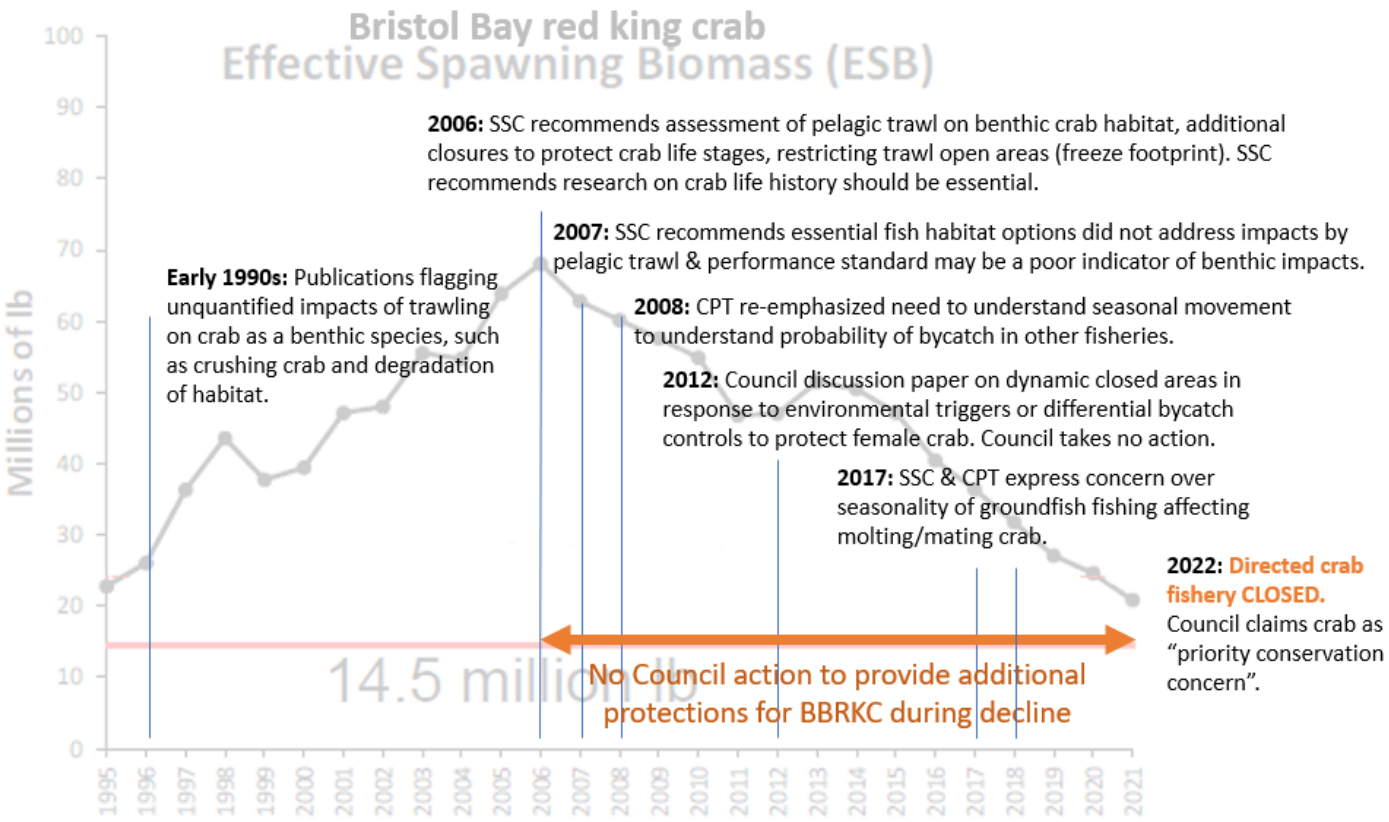
With several Bering Sea crab stocks at a level of "priority conservation concern" as determined by the Council, it is time to elevate collaborative field research on unobserved fishing mortality on crab and fishing gear impacts on habitat as a top priority. The Council's Feb 2024 motion on C2 for crab stated, "*The Council continues to place a high priority on these research projects* [unobserved fishing mortality, gear impacts on habitat, seasonal distributions] *and encourages funding entities to also prioritize them highly*." Elevating the need for this research to the Council's top ten list will facilitate uptake by the North Pacific Research Board, among other funding organizations, and could expedite the return of a critical piece of data to help fill these data gaps.

In summary, ABSC supports the CPT's top five research priorities from their January 2024 meeting. We request the SSC and Council clarify research ID #CPT004 to include specific language on "unobserved fishing mortality" and elevate it to a top priority. ABSC also supports the SSPT's recommendation for inclusion of research ID's #714 and #N020 as important given climate change and the need to help the human side of the fisheries equation. ABSC supports the CPT's five additional research priorities that were not ranked in the top five, but still warrant being a priority for ongoing research, one of which (research ID #731) was also a top priority recommended by the SSPT. Alaska's commercial crab stocks have been hit hard in recent years while crab harvesters and fisheries managers have more questions than answers. We ask that the Council elevate crab research projects to the highest priority.

Sincerely,

Jamie Goen
Executive Director
Alaska Bering Sea Crabbers

ATTACHMENT


Bristol Bay red king crab
Effective Spawning Biomass (ESB)
Millions of lb
100
90
80
70
60
50
40
30
20
10
0
1995
1996
1997
1998
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2021
Early 1990s: Publications flagging unquantified impacts of trawling on crab as a benthic species, such as crushing crab and degradation of habitat.
2006: SSC recommends assessment of pelagic trawl on benthic crab habitat, additional closures to protect crab life stages, restricting trawl open areas (freeze footprint). SSC recommends research on crab life history should be essential.
2007: SSC recommends essential fish habitat options did not address impacts by pelagic trawl & performance standard may be a poor indicator of benthic impacts.
2008: CPT re-emphasized need to understand seasonal movement to understand probability of bycatch in other fisheries.
2012: Council discussion paper on dynamic closed areas in response to environmental triggers or differential bycatch controls to protect female crab. Council takes no action.
2017: SSC & CPT express concern over seasonality of groundfish fishing affecting molting/mating crab.
2022: Directed crab fishery CLOSED.
Council claims crab as "priority conservation concern".
14.5 million lb
No Council action to provide additional protections for BBRKC during decline