



May 23, 2014

North Pacific Fishery Management Council  
605 W. 4th Ave. Suite 306  
Anchorage, AK 99501

Dear Council Members:

Re: Agenda item D-5 crab research priorities

The Aleutian King Crab Research Foundation (AKCRF) is dedicated to promoting scientific research activities essential for the conservation and management of Aleutian Islands king crab (both golden and red).

AKCRF reviewed the draft research priorities developed by the Crab Plan Team and offers the enclosed comments for consideration by the SSC and Council. Continued research into Aleutian Islands king crab stocks is extremely important, as evidenced by the CPT recommendations, and we heartily support a priority on research funds to conduct this needed research.

Sincerely,

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**AKCRF COMMENTS**  
on  
**Crab Plan Team revisions to 2013 Council Research Priorities**

p Row Labels	Res_Title
101	<p><b>Life history research on non-recovering crab stocks</b></p> <p>CPT Priority: <b>medium</b></p> <p><b>SSC/Council Priority: High</b></p> <p>Why certain stocks have declined and failed to recover as anticipated is a pressing issue (e.g., Pribilof Island blue king crab, Adak red king crab). Research into all life history components, including predation by groundfish on juvenile crab in nearshore areas, is needed to identify population bottlenecks, an aspect that is critically needed to develop and implement rebuilding plans.</p> <p><b><i>AKCRF Comments: Support CPT recommendation as a medium priority.</i></b></p>
107	<p><b>Improve handling mortality rate estimates for crab [note that nearly completed for chionoecetes; not yet for king crab]; develop methodology for king crab</b></p> <p>CPT Priority: <b>high</b></p> <p><b>SSC/Council Priority: High</b></p> <p>Improve estimate of discarded crab handling mortality rate. This will require improving understanding of the post-release mortality rate of discarded crab from directed and non-directed crab pot fisheries and principal groundfish (trawl, pot, and hook and line) fisheries. The magnitude of post-release mortality is an essential parameter in the determination of the overfishing level used to evaluate overfishing in stock assessment and projection modeling. Empirical data exist for snow crab so new handling mortality data are needed for Tanner and king crab by size, sex, and fishery type with consideration of temperature. <b>A methodology is needed for king crab.</b></p> <p><b><i>AKCRF Comments: Support CPT recommendation as a high priority and the specific identification of the need for a methodology for king crab. AKCRF has engaged in cooperative research with NMFS to determine handling mortality for Aleutian Islands golden king crab (along with growth and response to ocean acidification). Based on preliminary results, it appears the handling mortality for golden king crab may be far less than for red king crab and far less than the assumed 50%. We agree better methodology is needed for king crab and especially for golden king crab which are far more hardy than red king crab.</i></b></p>
111	<p><b>Biomass indices and alternate methodologies for lowest tier species</b></p> <p>CPT Priority: <b>high</b></p> <p><b>SSC/Council Priority: Medium</b></p> <p>Develop biomass indices for lowest tier species (Tier 5 for crab, Tier 6 for groundfish), such as sharks and octopus. Explore alternative methodologies for Tier 5 and 6 stocks such as length-based methods, catchability experiments (e.g., net selectivity), or biomass dynamics models.<b>[consider link to 143]</b></p> <p><b><i>AKCRF Comments: Support CPT recommendation as high priority. This is linked to item 143 specific to developing a reliable index of abundance for Aleutian Islands golden king crab, a Tier 5 stock. We believe that golden king crab are a high priority species because of the large and stable ongoing directed commercial fishery. AKCRF is currently working with ADF&amp;G to develop a reliable survey, but other aspects such as length based methods and survey catchability should be investigated as well.</i></b></p>
116	<p><b>Studies to identify crab stock boundaries</b></p>

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CPT Priority: **high**

**SSC/Council Priority: High**

Conduct studies to evaluate **all crab** stock boundaries **relative to management boundaries** (e.g., Bristol Bay red king crab, Adak red king crab, Pribilof blue king crab). Studies are needed in the areas of genetics, reproductive biology, larval distribution, and advection. Mark-recapture studies are needed as well. [\[link to 163\]](#)

***AKCRF Comments: Support CPT recommendation as high priority. Identification of boundaries for stocks will improve management and stock sustainability. Adak red king crab is an important stock to study because the Alaska Board of Fisheries created a separate management district with new fishing regulations and the Council has discussed the issue of removing Adak from the FMP.***

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Effects of trawling on female red king crab and subsequent recruitment **[underway]**

CPT Priority: **High**

**SSC/Council Priority: High**

Research is needed on the effects of trawling on the distribution of breeding and ovigerous female red king crab and subsequent recruitment. Relevant studies include effects of potential habitat modifications on the distribution of females, particularly in nearshore areas of southwest Bristol Bay (partially underway), and environmental effects (e.g., trawling overlap in warm vs. cold years). Retrospective studies, the use of pop-up tags to identify larval release locations, and larval advection using Regional Ocean Modeling System would help address this need.

***AKCRF Comments: Support CPT recommendation as high priority. Also, note that as trawl fisheries that were closed for protection of Steller sea lions reopen, it may be necessary to expand this research to Aleutian Islands golden and red king crab.***

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Continuation of State and Federal annual and biennial surveys

CPT Priority: High

**SSC/Council Priority: Critical**

Continuation of State and Federal annual and biennial surveys in the GOA, AI, and EBS, including BASIS surveys and crab pot surveys, is a critical aspect of fishery management off Alaska. It is important to give priority to these surveys, in light of recent federal budgets in which funding may not be sufficient to conduct these surveys. Loss of funding for days at sea for NOAA ships jeopardizes these programs. Budgetary concerns have resulted in cuts to not only days at sea, which increases uncertainty, but also sampling the deepest strata, which threatens the value of trawl surveys as a synoptic ecological survey. These surveys provide baseline distribution, abundance, and life history data that form the foundation for stock assessments and the development of ecosystem approaches to management. Although an ongoing need, these surveys are considered the highest priority research activity, contributing to assessment of commercial groundfish and crab fisheries off Alaska.

***AKCRF Comments: Support SSC/Council priority as critical. However, in light of the development of cooperative surveys with industry such as for Aleutian Islands golden king crab and hopefully Adak red king crab this concept should be expanded. These cooperative surveys should be considered critical as well, since they are being planned in cooperation with ADF&G and are an improvement on and replacement for agency surveys that are no longer conducted.***

**AKCRF COMMENTS**  
on  
**Crab Plan Team revisions to 2013 Council Research Priorities**

**143**      **Alternative approaches to acquire fishery-independent abundance data for Aleutian Islands golden king crab**

CPT Priority: **high**

**SSC/Council Priority: High**

Explore alternative approaches to the triennial ADF&G Aleutian Islands golden king crab pot survey to acquire fishery-independent abundance data on stock distribution and recruitment of Aleutian Islands golden king crab, including the potential for future cooperative research efforts with Industry.[\[link to above\]](#)

***AKCRF Comments: Support CPT recommendation as high priority. Development of a cooperative survey between ADF&G and industry is working toward providing an alternative approach to the now defunct Triennial Survey. This survey will replace and is expected to include numerous improvements over the Triennial Survey. Therefore, its development and continuation should be considered critical as are those surveys identified in 138, above.***

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**144**      **Assess seasonal diets and ~~movements~~ **species interactions** for fish and shellfish**

CPT Priority: **high**

**SSC/Council Priority: High**

~~Assess~~ **Collect** seasonal or species-specific information for use in improved assessment and management (e.g., expand or continue cooperative research). The data would be useful in studies of species interactions in spatially explicit stock assessments **and understanding predation effects on crab stocks.**

***AKCRF Comments: Support CPT recommendation of high priority and explicit inclusion of predation effects on crab stocks.***

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**147**      **Studies on factors that affect **survey** catchability particularly for **King and Tanner** crab ~~and Aleutian Islands golden king crab~~**

CPT Priority: **high**

**SSC/Council Priority: High**

For groundfish and crabs, studies are needed on factors that affect catchability, as they directly bear on estimates of the stock assessment. Research to refine the estimates of survey catchability,  $q$ , used to infer absolute, rather than relative, abundance would substantially improve the quality of management advice. Particular emphasis should be placed on Tanner **and red king** crab because of recent trends in stock status, and ~~on fishery and fishing gear selectivity~~ for Aleutian Island golden king crab to improve the stock assessment model.

***AKCRF Comments: Support CPT recommendation as high priority. It is recognized that a reliable index of abundance is needed for Aleutian Islands golden king crab in order to have an acceptable stock assessment model. While development of such a survey is underway, it is also necessary to understand the catchability of the survey so that ultimately an accurate estimate of population size, and subsequently fishing mortality, can be developed.***

**AKCRF COMMENTS**  
on  
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- 151 **Acquire basic life history information (e.g., natural mortality, growth, size at maturity, molt probabilities) for data-poor stocks.**

CPT Priority: high

**SSC/Council Priority: High**

Acquire basic life history information needed for stock assessment, PSC, and bycatch management of data-poor stocks, such as scallops, sharks, skates, sculpins, octopus, grenadiers, squid, and **BSAI king and Tanner crab stocks**. Specifically, information is needed on natural mortality, growth, size at maturity, **molt probabilities** and other basic indicators of stock production/productivity).

***AKCRF Comments: Support CPT recommendation as high priority. This is a priority for AKCRF, which has worked cooperatively with NMFS to supply animals for growth, handling mortality, and ocean acidification studies. While this research is relatively new, it has already provided very interesting and unexpected results.***

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- 157 **Develop and validate aging methods for crabs.**

CPT Priority: high, ongoing

**SSC/Council Priority: High**

Develop and validate aging methods for crabs to improve estimates of M for stock assessments.

***AKCRF Comments: Support CPT recommendation as high priority.***

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- 168 **Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort in response to management change**

CPT Priority: high

**SSC/Council Priority: High**

Conduct prospective and retrospective analyses of changes in the spatial and temporal distribution of fishing effort, in response to management actions (e.g., time/area closures, marine reserves, PSC and other bycatch restrictions, co-ops, IFQs).

***AKCRF Comments: Support CPT recommendation as high priority. Such research may provide insights into changes in the Aleutian Islands golden king crab fishery since rationalization. Participants estimate they fish about half the previously fished grounds in the eastern Aleutians and about 20% of the previously fished grounds in the western Aleutians. This change has significant implications for management and conservation of the stock.***

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- 173 **Evaluate the effectiveness of setting ABC and OFL levels for data-poor stocks**

CPT Priority: High

**SSC/Council Priority: Medium**

Evaluate the effectiveness (e.g., potential for overharvest or unnecessarily limiting other fisheries) of setting ABC and OFL levels for data-poor stocks (Tier 5 and 6 for groundfish and Tiers 4 and 5 for crab, e.g., squid, octopus, shark, sculpins, other flatfish, other rockfish, skates, grenadier, and crab). ~~Research is needed to refine the basis for setting gamma for Tier 4 crab stocks.~~

***AKCRF Comments: Support CPT recommendation as high priority. Uncertainty surrounding the effectiveness of OFL has resulted in lack of consistency in setting ABC and a variety of other***

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*untested means of ensuring conservation of stocks. Research into, and better understanding of the effectiveness of, OFL could result in simplification of regulations and better assurance of not unnecessarily restricting fisheries. Aleutian Islands golden king crab should be considered a priority species for this work.*

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