



BERING SEA FISHERIES RESEARCH FOUNDATION  
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FORGING COOPERATIVE RESEARCH PARTNERSHIPS IN THE BERING SEA

June 3, 2022

Dr. Sherri Dressel, and Dr. Franz Meuter – Co-Chairs  
Scientific and Statistical Committee, NPFMC  
1007 West Third, Suite 400  
Anchorage, AK 99501

RE: Comments on C3 BSAI Crab – NMFS Survey, Opilio in GMACs, Rebuilding Options, Research Strategies

Dear Dr. Dressel, Dr. Meuter, and SSC Members,

BSFRF has four brief and related areas of comment to the SSC for this Council meeting:

- 1) Strong support for the NMFS survey being fully conducted in the standard areas, northern Bering Sea area, and further contingent sampling (BBRKC retows, etc).
- 2) Support and tracking the SSC review of the snow crab assessment from status quo to GMACs model.
- 3) Development, review and selection of rebuilding plan options for snow crab – with some accounting of flexibility.
- 4) Updates on our current research to fill gaps, and provide new information asap, for both BBRKC and snow crab.

The Bering Sea Fisheries Research Foundation (BSFRF) is a non-profit research foundation formed in 2003 by voluntary participants within the Bering Sea crab industry. Our mission is to conduct or support collaborative research to improve scientific understanding and management of Bering Sea crab stocks. We recognize that climate change and the changing environment in the Bering Sea is impacting the status of a number of marine resources and that likely several related variables bring heightened uncertainty to crab management even while many efforts are underway to improve our understanding. With BBRKC closed and Bering Sea opilio collapsing and entering a rebuilding plan, we offer the Foundation's comments on current science, research, and management.

Much of the BSFRF research to date has focused on improving the information from crab-specific surveys, paired with NOAA-AFSC survey results in the stock assessment models to inform survey selectivity. The NMFS trawl surveys have been a long standing and strong 'backbone' of annual data providing abundance, biomass, and size composition references to the stock assessments. From a crab-industry perspective, the 2022 survey (which is currently underway) needs to be completed in a strong, standardized way – to help corroborate 2021 survey results and the overall recent stock trends. We heard recent May CPT discussions addressing 2022 survey options and we have some primary points to note for the SSC. First, we appreciated the rounded CPT input that captured some of the concern that 'now may not be a good time' to cut corner stations, or to generally collect less information for crab stocks. In particular, cutting or removing all corner stations (the higher density sampling design centered around the Pribilofs and St. Matthew Islands)

was considered closely. BSFRF would advise that these should be completed this year in full. Part of the discussion around corner station significance was to consider trade-offs in available survey time where other sampling (like deep-water non-standard stations) could be added mostly to benefit a broader understanding of snow crab densities and abundance in about 10 stations at the margin of the standard survey area. While this sampling is not fully understood currently, and one sampling year would not adequately inform that area, we believe it would provide valuable information and we would advise that these be completed. This effort would occur later in the survey and we are exploring ways that BSFRF could assist. We also appreciated the discussion around clarifying the objectives to resample BBRKC during a continuation of survey periods when warranted (resampling at a later period about 20-30 leg 1 stations to specifically monitor the reproductive [egg-condition] of females) to track and note status changes. The CPT made recommendations to move the eyed-egg threshold to trigger resampling upward (from 10% to 25%), and we would advise that if the observed leg 1 ratio this June falls within that range, that retowing be completed this year especially if there is evidence from the survey of colder Bristol Bay bottom temperatures.

We appreciate Dr. Cody Szuwalski's efforts to bring the current opilio status quo model to an end and transition the snow crab assessment to GMACs. This has been a difficult transition and we are aware that moving to a new model is being considered during a very sensitive time. The exploration of a more complete understanding of the factors influencing the current snow crab status, near term trends, and outlook is ongoing as we heard from during the CPT. We see GMACs for snow crab as hopefully a way forward to more transparently and clearly link assessment dynamics and stock status during a critical period for the opilio resource. Noting that GMACs was updated during the meeting amidst some points of concern, we agree with the CPT recommendation to proceed with GMACs as the basis for the September assessment.

For the rebuilding plan options, we understand that the basis for development of options was completed in GMACs as it was the only option capable of projections. We have some concerns however, that there are some fundamental limits on how well options can currently be specified. Part of our concern is dependent on process and timing, and part is related to the substance of option details. In particular, we have concerns related to process/timing that may functionally limit estimation of values for  $T_{min}$  and  $T_{max}$ . If there is an option (some consideration of flexibility) that allows the 2022 summer survey results (mostly size composition of smaller crab) to inform this estimation we would encourage that. We see the presence/absence of juvenile size composition from the population (what's coming down the road) as critical and potentially having two adjacent survey points (2021 and 2022) could impact projection timelines. On a more substance based concern, we are currently investigating a more complete understand 'fishing impacts' and what could be inferred and related to fundamental assumptions about  $F_0$  and other  $F$  values that would be important in rebuilding option development and selection. More specifically, we see that rebuilding plan options should be flexible enough to include a more complete characterization of fishing impacts. The current approach to understanding impacts from directed fishing and non-directed fishing may be limiting our assumptions about natural mortality ( $M$ ) and fishing mortality ( $F$ ) which may need some fundamental reconsideration. We are currently exploring options to help with further understanding of what this means within the CPT peer group and others.

BSFRF is facing the same consequences as the industry that support us – our research funds are mostly drawn directly from crab fishing revenues. We are tightening our belts, shaking the bushes for more support, and continuing with our strategy to address high priority research areas that fill some of the critical gaps that exist in seasonal distribution, density, movement, and other biological information. We note for the SSC that BBRKC red king crab female movement vectors from pop up satellite tags from our sampling last fall will be available soon in the coming days. This information

along with distribution from the current NMFS survey will help to address some movement information for this stock. We are continuing also to pursue research on a BBRKC winter survey paired with tagging, in collaboration with the Amendment 80 researchers which we see linked to our movement work for RKC. We recently completed the placement of satellite tags during the end of the current snow crab fishery on about 20 male opilio. We have further plans collaborating with ADFG and NMFS for tagged opilio during the St. Matthew pot survey (ADFG), and the potential development of a custom snow crab tag (proposed work) for larger scale research in the very near future.

Thank you for your time and consideration of our input.

Sincerely,

A handwritten signature in black ink, appearing to read "Scott Goodman". The signature is fluid and cursive, with a long horizontal stroke at the end.

BERING SEA FISHERIES RESEARCH FOUNDATION  
Scott Goodman  
Executive Director