**SCIENTIFIC AND STATISTICAL COMMITTEE**
**DRAFT REPORT TO THE**
**NORTH PACIFIC FISHERY MANAGEMENT COUNCIL**
**April 1st – 3rd, 2024**

The SSC met from April 1st – 3rd, 2024 in Anchorage, AK. Members present in Anchorage were:

Franz Mueter, Co-Chair
*University of Alaska Fairbanks*

Sherri Dressel, Co-Chair
*Alaska Dept. of Fish and Game*

Alison Whitman, Vice Chair
*Oregon Dept. of Fish and Wildlife*

Chris Anderson
*University of Washington*

Amy Bishop
*University of Alaska Anchorage*

Curry Cunningham
*University of Alaska Fairbanks*

Mike Downs
*Wislow Research*

Jason Gasper
*NOAA Fisheries—AKRO*

Robert Foy
*NOAA Fisheries—AFSC*

Michael Jepson
*Independent Contractor*

Kailin Kroetz
*Arizona State University*

Brad Harris
*Alaska Pacific University*

Dana Hanselman
*NOAA Fisheries—AFSC*

Kathryn Meyer
*Washington Dept. of Fish and Wildlife*

Andrew Munro
*Alaska Dept. of Fish and Game*

Chris Siddon
*Alaska Dept. of Fish and Game*

Patrick Sullivan
*Cornell University*

Robert Suryan
*NOAA Fisheries—AFSC*

Ian Stewart
*Intl. Pacific Halibut Commission*

SSC members that attended virtually include:

Martin Dorn
*University of Washington*

# SSC Administrative Discussion

Diana Evans and Katie Latanich (NPFMC) provided a detailed planning update for the Climate Scenario Workshop to be held June 5-6 in Kodiak, AK. Topics covered included workshop information, expectations and outcomes, along with a draft agenda. Ms. Latanich also introduced case studies and climate scenario planning. The SSC appreciates the overview and looks forward to a productive workshop.

Franz Mueter (SSC co-chair) provided a brief update on plans for SCS8. Dr. Mueter shared potential keynotes and case studies from the North Pacific region, as well as opportunities for participation.

# B1 Plan Team Nomination

The SSC reviewed the nomination of Andrew Olson (ADF&G) to the BSAI Crab Plan Team. The SSC finds this nominee to be well-qualified and recommends the Council approve their nomination.

# C1 Scallop Harvest Specifications

The SSC received a presentation on the 2024 Scallop Stock Assessment and Fishery Evaluation (SAFE) from Scallop Plan Team (SPT) co-chairs Sarah Rheinsmith (NPFMC) and Tyler Jackson (ADF&G), and

Scott Miller (NOAA-AKRO). The SSC thanks Mike Byerly (ADF&G) for his many years of service on the SPT and congratulates him on his upcoming retirement. There was no public testimony.

Amendment 18 to the Scallop FMP removed the requirement for the SPT to submit an annual SAFE report and set specifications on an annual basis. Therefore, the SSC will set specifications for two years and not receive the next SAFE until 2026. The SPT will meet in 2025 to discuss fishery performance, receive an update on survey information, and make recommendations to the SSC on whether overfishing is occurring.

The assessment methods for this stock were not changed in 2024. The SSC appreciates the author's efforts to revise the SAFE document to a format consistent with other SAFE documents and to streamline the information specific to the stock assessment.

In 2023/24 total catch (retained catch + discard mortality) was 328,112 lb (149 t) shucked meats, about 26% of the 1.284 million lb (582 t) OFL, **so overfishing did not occur in 2023/24**. In the absence of stock-size estimates, **the overfished status of the scallop stock is unknown**.

**The SSC agrees with the SPT to again recommend a 1.284 million lb (582 t) OFL for 2024/25 and 2025/26**, the default OFL specified in the Scallop FMP based on average total catch from 1990-1997 (excluding 1995). **However, for future assessments, the SSC appreciates the authors' consideration of appropriate reference periods and recommends that the SPT develop and evaluate additional reference periods to better inform OFL determination.** The SSC supports the work by ADF&G staff on considering more recent years as adequately representing current production potential in the stock. **The SSC recommends the max ABC (based on 90% OFL), as described in the Scallop FMP, of 1.156 million lb (524 t) OFL for 2024/25 and 2025/26.** For the next assessment cycle the SSC recommends that a rationale be provided for setting ABC equal to the max ABC, with considerations for whether a reduction from maxABC may be warranted.

The SPT also presented updates to observer and dredge survey data and noted 2023 survey increases in small (<100 mm) scallop in the WKI and EKI beds and missing small size modes in YAK beds. **The SSC had a number of recommendations to be considered for future survey analyses and SAFE documents**:

- A survey power analysis between the historically used ('Homer') dredge and the new ('Kodiak') dredge was attempted but the results were biased due to changes made to the gear and highly uncertain due to low statistical sample sizes. The SSC requests that the ADF&G survey team consider whether there are any lessons learned from the before/after gear testing that could, at minimum, qualitatively assess changes in the gear effectiveness between the historical and current gear.

- Provide historical survey (dredge and large mesh) data results (abundance and CPUE) and commercial landings by area in future SAFE documents.

- Similarly, provide a historical table with changes in GHL over time and describe the rationale for the GHL changes.

- Collect data on the size composition of clappers by area encountered in the fishery to inform potential causes of the substantial, and concerning, increase in empty shells.

Results from the ADF&G author's efforts to improve modeled biomass for a subset of scallop beds was presented. The SSC appreciates the explorations of a state-space random walk model for the core-areas that have survey data, but agrees that an approach that considers the available length data would be more appropriate. The SSC supports the author's decision to stop working on a single age-based population dynamic model and agrees that future modeling efforts should focus on catch-at-length models for core

beds that have data, and a catch-informed method as is currently used for non-core beds. These modeling efforts could potentially support a new process for OFL determinations based on the sum of the OFLs for the core beds and the non-core beds. The SSC has the following specific recommendations on future models and SAFE documents:

- When evaluating different analytical methods for core and non-core areas, consider groundfish examples where multiple tiers are used to determine a single OFL for different areas (e.g., BSAI blackspotted/rougheye rockfish, GOA pollock). Consider the St. Matthew blue king crab assessment model, a relatively simple size-structured model with three size bins, as an example that could potentially be adapted for core bed scallop assessments.

- In non-core areas, distinguish between beds where scallops are no longer present and beds where scallops are still present and could potentially support a fishery.

- Provide historical fishery CPUE data so that the early time periods of this fishery can be considered relative to current stock production.

- Include information to assess stock production and potential hyperstability in fishery CPUE data. To provide context and help interpret changes in fishery CPUE, the SSC suggests developing indices or a better description of how fishing behavior (e.g. reduced fishing area, exploratory fishing) has changed over time.

- Provide rationale for the 20% handling mortality used in the assessment and additional estimates of retained not landed (RNL). Studies from east coast fisheries should be consulted when considering the handling mortality. Also provide results from the Kamishak Bay ADF&G study on discard mortality.

- If a size-based model is developed in the next assessment, identify criteria for determining both the years used as a $B_{MSY}$ reference period and whether to include the most recent year in that period.

- Consider holding a SPT scallop modeling meeting with external model experts during the interim before the next full assessment in 2026 to consider potential modeling approaches for core beds. If progress on new modeling approaches is sufficient, the SSC would be prepared to consider these methods for OFL and ABC setting in 2026.

- Consider the importance of stock delineations based on all survey data available (e.g. IPHC survey, Large Mesh trawl) in understanding differences in trends and productivity across all beds. Mapping the location of scallop occurrence in these surveys may be useful in this exercise.

The SPT received an update on results from disease data relative to environmental conditions. The SSC recommends that future consideration for impacts of the multiple heatwaves in the past ten years be considered.

An updated socioeconomic analysis was presented in the 2024 SAFE. Of note was the decrease (9%) in prices due to imports from Japan. The SSC is encouraged to see that its multi-year comments on socioeconomic considerations, last summarized in the 2022 SAFE, are in the process of being addressed and looks forward to continued work in this area as described in Appendix A and during the staff presentation. The expansion of Table A1.2, Scallop landings by port, from 2019-2022 to 1990-2022/23, in the current SAFE is especially useful. This fishery is important from a socioeconomic analytic perspective in that the National Standard 8 goal of providing for the sustained participation of fishing communities does not appear to have been met over time for multiple reasons. It has the potential to serve as a case study

including lessons learned that would be of benefit to future management program design and application in other fisheries. The SSC appreciates the historical information on socioeconomic data, but suggests that the clarity and readability of the SAFE could be increased in the future by clearly defining sections that relate to historical versus current socioeconomic status.

# C2 Salmon Bycatch Reports and Draft EIS and Social Impact Analysis - Initial Review

There were multiple presentations under the C2 Salmon Bycatch agenda item. First, the SSC received a presentation from Patrick Barry (NOAA-AFSC) on the most recent genetics reports for chum salmon in the Bering Sea, with a brief overview for Chinook salmon. Diana Stram, Kate Haapala and Sarah Marrinan (NPFMC) presented the draft Environmental Impact Statement (DEIS) and the Social Impact Assessment (SIA). Finally, the SSC received two presentations on industry proposals for Alternative 4 of the DEIS from Austin Estabrooks and Stephanie Madsen (At-Sea Processors Association), and from Susie Zagorski (Inshore Incentive Plan Agreement (IPA) representative) and John Henderschedt (President of the Mothership Fleet Cooperative and United Catcher Boat Board Member).

Written public testimony from Donald Bykonen (self), Austin Estabrooks (Pollock Conservation Cooperative), Stephanie Madsen (At-sea Processors Association), Bobbie Manasco (self), Steve Martell (Sea State, Inc.), Marissa Wisniewski (Alaska Marine Conservation Council), and Stella [no last name provided] (self) was received and posted to the SSC agenda before the meetings. Oral public testimony at the meetings was provided by Jimmy R. Hurley Sr. (self), Steve Martell and Merrill Rudd (Sea State, Inc.), Steve Ricci (Bristol Bay Economic Development Corporation), Stephanie Madsen and Austin Estabrooks (At-sea Processors Association), Shannon Carroll (Trident Seafoods), Frank Kelty (City of Unalaska), Glenn Merrill (Glacier Fish Company), Josh Wisniewski (self), Brent Paine (United Catcher Boats), Craig Rose (FishNext Research), Heather Mann (Midwater Trawlers Cooperative), Craig Chythlook (Native Peoples Action), Brenden Raymond-Yakoubian (Kawerak, Inc.), and Francis Thompson (Vice President, Algaaciq Tribal Government). Themes noted in public testimony included:

- the relative advantages of an IPA approach due to their adaptability and flexibility;
- support for shutting down the pollock fishery in specific clusters; concern for potential risk to CDQ lease values under a hard cap;
- the need to figure out benefits and costs of specific alternatives;
- the impact of hatchery fish on multiple aspects the Western Alaska (WAK) salmon fisheries returns and approaches to bycatch reduction; the role of climate change in pollock/chum salmon fishery interactions and concern about the Council's problem statement leading with ecosystem and climate impacts on chum stocks;
- need to improve analysis of impacts to shoreside processors;
- the need for more Alaska Native representation in the management process in general and in this analysis in particular;
- the importance of the pollock fisheries to processors, support service sector businesses, and communities in the BSAI region;
- concerns about understanding future impacts based a retrospective analysis;
- challenges in establishing and documenting conservation impacts that could result from the proposed alternatives;

- whether impacts to the pollock sectors are overstated in the analysis;
- the increased importance of pollock to multiple sectors and communities given current adverse conditions in other fisheries;
- the benefits of ethnographic research for SIAs;
- the importance of an updated adult equivalency (AEQ) assessment of the impact of salmon bycatch;
- ongoing efforts to reduce salmon bycatch;
- the need to remove positionality from the purpose and need of the proposed action, and
- subsistence access to salmon is essential for social, cultural, community, and individual well-being.

Themes related to issues within the purview of the SSC were discussed in response to staff presentations and during SSC deliberations and are addressed as noted in the following sections.

## Genetics Report

The SSC received a presentation on the genetics reports for 2023 BSAI chum salmon and 2023 BSAI and GOA Chinook salmon prohibited species catch (PSC; hereafter, also referred to as bycatch, as in the presentation). The SSC thanks the authors of the bycatch genetics reports for their efforts to provide these useful and informative written products on an operational timescale. The SSC highlights that the timeline for analysis and presentation of these results has been significantly reduced by nearly a year in the recent past, due to the efforts of the Auke Bay Laboratory Genetics Program and the North Pacific Observer Program. The genetic stock composition estimates provided in these reports are critical for understanding the impact of chum and Chinook salmon PSC on Alaskan stocks and informing the current DEIS on chum salmon bycatch. Specifically, the presentation of stock composition estimates stratified in space and time provides a basis for understanding the sometimes counterintuitive impacts of active chum salmon avoidance measures concerning WAK chum salmon.

When the SSC last reviewed the salmon bycatch genetics reports in June 2022, it had several requests, including:

- Providing credible intervals for estimated stock-specific bycatch in numbers, in addition to the credible intervals for proportions.
- Figures describing spatial bycatch patterns across time.
- Enhanced parallel structure between Chinook and chum bycatch reports.

The authors have successfully incorporated all of these SSC requests.

The bycatch genetics reports are comprehensive but approachable and easy to read with clear descriptions of the findings for 2023, that are placed in the context of recent years and long-term averages. Including consistent language and interpretable and informative figures makes this product very useful.

In the context of chum salmon, the SSC supports planned and ongoing efforts to leverage low-coverage whole genome sequencing to refine the genetic resolution of the Coastal Western Alaska (CWAK) reporting group, to the extent practicable. The SSC highlights the value of this higher resolution baseline, particularly separating Bristol Bay chum salmon from chum salmon stocks that are exhibiting more pronounced declines in abundance and for which there is greater subsistence reliance. However, the SSC understands this represents a research effort and the final success and timeline remain uncertain.

The SSC offers the following recommendations for further development of the bycatch genetics reports going forward:

- To better understand realized patterns in total and reporting group-specific bycatch, additional context on overall fishing effort should be included in addition to the magnitude of bycatch across space. While the SSC appreciates the display of annual centroids in fishing effort and encourages continued inclusion, the SSC suggests that the relative amount of fishing effort by ADF&G statistical area be visualized for the most recent year, with separate panels for each sector. This would help inform the distribution of salmon bycatch relative to fishing effort.

- A description of ongoing and planned research within each of the chum and Chinook salmon bycatch genetics reports to help inform the Council on forthcoming advances in methodology.

- Discussion of individual-based assignment for chum and Chinook salmon, including its feasibility, challenges and potential level of uncertainty.

- Discussion of whether there are meaningful differences in stock composition by sector after controlling for the spatial distribution of fishing effort.

The SSC remains concerned about whether the current observer genetic sub-sampling approach for Bering Sea chum salmon is sufficient to meet the minimum sample sizes necessary for mixed stock analysis at the increasingly fine-scale spatial and temporal resolution necessary. To address this question, the SSC requests a table of chum salmon genetic sample sizes by year, timing, cluster, and fishing area defined spatial strata separately, and by sector. Based on this information, the SSC requests that analysts provide a discussion of the sufficiency of the current subsampling strategy in the next chum salmon bycatch genetics report.

## Draft Environmental Impact Statement

The SSC received a presentation on the DEIS in response to the April 2023 Council motion on chum salmon bycatch. The Council is considering new management measures to minimize chum salmon bycatch, but particularly the bycatch of WAK-origin chum salmon in the Eastern Bering Sea (EBS) pollock fishery. The motion was revised in October 2023 after a preliminary analysis was conducted and the analysts developed a preliminary DEIS for this meeting. The SSC thanks the analysts and contributors for the tremendous amount of work that was needed to prepare the DEIS on such a short timeline as well as their presentation, which was immensely helpful in distilling some of the key information in the draft document. The SSC thanks Council staff and industry for providing annual reports on current IPAs and potential IPA revisions under Alternative 4 of the DEIS. The SSC also thanks all of the members of the public (listed above) who provided both written and oral testimony on this very complex and important issue.

**The SSC recognizes the great importance of chum salmon for subsistence harvest and people that rely on this harvest in Western Alaska.** The SSC also acknowledges that evaluating and comparing alternative measures for addressing chum salmon bycatch is a complex problem, with a great deal of interconnected information and data among the alternatives being considered, and that the alternatives (and options within) are not necessarily mutually exclusive. In addition, the SSC acknowledges that many factors are affecting chum salmon populations that have resulted in this period of low abundance, and this action is attempting to address one of these potential factors. **However, despite using the best available scientific information, the lack of data, the assumptions that would need to be made, and the associated uncertainties make it extremely challenging to identify definitive and measurable differences in chum salmon conservation benefits among the alternatives being considered. Nevertheless, it is imperative that the analysis provides, to the extent practicable, an integrative assessment of whether such benefits could be realized, while also evaluating potential impacts from the alternatives relative to all the NS guidelines and applicable laws.**

The purpose of this proposed action is to develop management alternatives to minimize bycatch of WAK origin chum salmon in the EBS pollock fishery consistent with the Magnuson-Stevens Act, National Standards, and other applicable law. The vast majority of non-Chinook bycatch in the EBS pollock fishery is chum salmon. Consistent, annual genetics stock composition information indicates that the majority of chum salmon bycatch in the pollock fishery is of Russian/Asian hatchery origin; therefore, chum salmon bycatch management alternatives were structured around improving performance in avoiding WAK chum salmon specifically.

The task of the SSC was to review the DEIS and to evaluate whether the analysis provided is adequate, meets the analytical requirements of applicable laws and executive orders, and provides the Council with a sufficient understanding of the probable impacts of a decision related to this action.

**The SSC finds that the initial review analysis is not sufficient to inform Council decision-making at final action and recommends the DEIS undergo additional analysis and review.** The rationale for this decision is as follows:

- **The analysis of Alternative 1 (status quo) provided limited information of impact and efficacy of current management measures in avoiding WAK chum salmon** (current IPAs, Chinook bycatch avoidance priority, etc.). The analysts stated that impacts under status quo are unable to be quantified, but without this, understanding the potential effects of the other alternatives in relation to the status quo is not possible.

- For Alternative 2 (Overall chum salmon PSC limit for B season), it was suggested in the analysis and in public testimony that **an overall chum salmon PSC limit (or hard cap) will not necessarily reduce WAK chum salmon bycatch**, given that areas of lower total chum salmon bycatch risk may coincide with regions with higher representation of WAK chum salmon. However, limited information was provided to fully understand this potential. Further, if this is a likely potential result, then it would be counter to the purpose and need of the action.

- **Alternative 3 (Chum salmon PSC limit with an associated WAK chum salmon bycatch annual threshold) has a number of limitations that precluded a complete analysis and limited ability to evaluate potential outcomes and impacts relative to other alternatives.** The analysts described the potential challenges with implementing Alternative 3 as it is currently written where the Council specified a WAK chum salmon threshold range. The intent of using a range was to account for uncertainty in the point estimate of the proportion of WAK chum salmon in the overall chum salmon bycatch. Analysts are seeking input from the Council regarding how it intends to use the range. The analysts are also seeking clarification from the Council on the interpretation of performance standards that need to be met after a sector is at a lower PSC limit. Finally, a major issue with Alternative 3 is understanding how it would be implemented and what its efficacy would be without inseason genetics; therefore, it is unclear whether this is a feasible alternative at this time.

- **Alternative 4 (Additional regulatory requirements for Incentive Plan Agreements (IPAs) to be managed within the IPAs) is not yet fully developed, so there was limited information or analysis in the DEIS to evaluate potential outcomes of this alternative relative to, or in addition to, the other alternatives.** It is the SSC's understanding that the Council will refine Alternative 4 based on proposals received from catcher processor (CP) and mothership/catcher vessel (M/CV) sectors of industry. The SSC is supportive of the full development of Alternative 4 because it is an important addition to the alternatives being considered, and the current IPAs have demonstrated success in reducing Chinook salmon bycatch. While the analysts indicated that they would not be able to complete a full analysis of Alternative 4 even after further refinement of the alternative by the Council, the SSC considers that it would be important to place potential impacts of a fully developed Alternative 4 into context with other alternatives. Further, it was not clear

whether Alternative 4 would be implemented in conjunction with an overall chum salmon PSC limit (Alternative 2) or a chum salmon PSC limit with a WAK chum salmon threshold (Alternative 3), or in lieu of the other alternatives. This could have a substantial influence on how the pollock fishery is prosecuted and would influence the evaluation of potential impacts. Understanding the potential effects of Alternative 4 and the specific impacts of the IPA tools proposed is important. For example, how would the move along rule operate in practice, and would specific movement distance requirements and bycatch rate triggers be defined? What actions under Alternative 4 are additive, or indeed different, beyond what the industry response would be under Alternatives 1-3? Is more extensive genetic sampling needed to support the time-area-sector IPA approaches proposed in Alternative 4? Not knowing how any further analysis of Alternative 4 in context of the other alternatives would be done is one reason the SSC requests additional review.

One of the key issues identified in the DEIS was the limited ability to assess the potential impacts of different alternatives and options and benefits to WAK chum runs without an AEQ and impact analysis. The analysts provided a thorough explanation of the challenges of doing such analyses and why it is not possible at this time - primarily because of lack of data, needing to make a number of assumptions and resulting high uncertainty in any estimates. **Through SSC questions and discussion, and public testimony, it was very clear that many see the need and value of producing an estimate of the scale of WAK chum salmon bycatch in context with other components of chum salmon escapement (acknowledging that escapement enumeration is incomplete), subsistence and commercial harvests, and other sources of fishing mortality including capture of WAK chum salmon in the State waters South Peninsula fishery, using the best scientific information available while clearly documenting the uncertainty in the different components as well as the associated caveats.** This was a view expressed in the SSC's review of the preliminary analysis in October 2023, in which without an AEQ and impact analysis for Bering Sea chum salmon, the SSC encouraged the analysts to use the genetic and other information available to explore and provide estimates of maximum thresholds (i.e. know that AEQ is below a certain maximum number). This is an important component for being able to assess and compare among the potential benefits (or costs) of the various alternatives and options. Key to this is also defining the measures of success. While AEQ projections would be an informative measure, given the uncertainty in any estimate it is unlikely that a statistically significant change as a result of any action be demonstrated. Moreover, information for a full AEQ is not available, therefore the SSC suggests a simpler alternative below. **The SSC is concerned about the asymmetric treatment of uncertainty related to different types of outcomes and the potential bias toward large industry impacts and away from impacts on salmon dependent communities.** On one hand, there are substantial uncertainties and modeling challenges in characterizing potential fleet behavioral responses to Alternatives 2 and 3 which might mitigate impacts to pollock harvesters, but the analysts did provide an upper bound on cost to the fleet. However, the current analysis requires large and arguably unrealistic assumptions to obtain these quantitative estimates, and these assumptions bias the interpretation of the results toward large pollock industry impacts. Specifically, the retrospective analysis assumes no behavioral change and presents the maximum possible decrease in revenue. The prospective discussion of potential costs, on the other hand, assumes behavioral change does occur and is relatively extensive in outlining many potential costs. In reality, there will likely be some behavioral change and the loss in revenue and costs will be lower than what is presented; what will not happen is the full revenue loss together with the full suite of cost increases.

There is also high uncertainty associated with the benefit of decreasing bycatch on WAK chum salmon populations and subsistence or commercial harvest, on both shorter and longer time scales, but an analogous estimate of an upper bound on potential impacts is not provided. In fact, no quantitative work related to potential impacts on salmon-dependent communities is provided. The high uncertainty in estimating returns on their own does not mean that estimates of an upper bound couldn't still be useful within this broader context. The upper limit could support more synthesis of potentially impacted communities.

The following sections provide a number of recommendations and considerations in preparing the next version of this document. Understanding the limited time available for revisions and new analyses, the SSC has attempted to limit suggestions and recommendations to those that are believed to be the most important, and caveat those that may be more challenging to fully complete with the phrase: "to the extent practicable."

*Unintended impacts: the potential for increased WAK chum salmon and other bycatch under Alternative 2*

**The SSC highlights the potential for unintended impacts to occur and recommends that as the EIS is revised and shortened, the potential for negative impacts on WAK chum salmon and other bycatch be presented earlier and in a more streamlined manner, including in the Executive Summary.** The SSC suggests that quantitative outcomes associated with target catch and bycatch, along with qualitative text, could be synthesized and characterized in terms of lower and upper bounds (or similar terminology). The presentation of lower and upper bounds could reference the methods used to establish the bound. The tables that relate to the method (e.g. season closures) could be left in an appendix to avoid presenting numbers that are lower/upper bounds in tables without appropriate labeling as such.

**The SSC is particularly concerned with the potential for increased WAK chum salmon bycatch under Alternative 2, and recommends that tables, figures, and statements that are not consistent with this potential should be removed or edited.** The SSC appreciates that these points are communicated in and around Table 6-52 on page 234 and suggests that this table and discussion occur earlier. Additionally, this potential should be explored qualitatively and quantitatively throughout the section evaluating the impact of Alternatives 2-4. In these sections, language should be chosen to not imply that Alternative 2 will decrease WAK chum salmon bycatch with any certainty. Instead, all language should be inclusive of the outcome with WAK chum salmon bycatch increases under Alternative 2.

The SSC is similarly concerned with the clarity of the quantitative results and text related to the potential for increased bycatch of Chinook salmon and herring. Although the season closure assumption provides an upper bound for revenue, it is likely a lower bound for Chinook salmon and herring bycatch, and putting these together in a main summary table could be misleading for the reader. As discussed, the SSC suggests one path to clarify impacts of the alternatives is to use language and table headings/labels identifying upper and lower bounds of potential outcomes. The SSC also identified text that is not consistent with the potential for increased bycatch of Chinook and recommends a review be undertaken to remove this type of language.

The DEIS describes well the challenges the pollock sectors face if they exceed the herring PSC limit in a particular year. The annual PSC limit is set at 1% of the annual biomass of EBS herring and attainment of a fishery's apportionment triggers closure of herring savings areas (HSA) to that fishery. In addition to the current language in the document, the SSC recommends adding a brief clarification of the potential impacts that can occur due to the interaction between avoiding chum PSC and exceeding the herring PSC limit, particularly with respect to the closure of Herring Savings Area 3 (HSA3). Exceeding the herring PSC limit does not shut down pollock fishing, but closes HSAs, and the current location of HSA3 has unique implications for the pollock fleet when combined with salmon avoidance. As described in Tojo et al. (2007)[1], the 2020 APA request for emergency action and NMFS denial letter for the Emergency Rule (both linked through the B2 NMFS Management Report on the Council's October 2020 agenda), the distribution of herring in overwintering areas has shifted since the HSAs were set up in 1991, such that herring PSC rates outside of the HCA3 have been greater than inside HCA3 in some recent years. As a result, if pollock sectors exceed the herring PSC limit to avoid reaching a chum bycatch cap and trigger the closure of HSA3, an unintended consequence may occur such that vessels will be moved out of an area that may have lower herring, chum, and/or Chinook bycatch into areas with higher levels.

[1] Tojo, N, G. H. Kruse and F. C. Funk. 2007. Migration dynamics of Pacific herring (*Clupea pallasii*) and response to spring environmental variability in the southeastern Bering Sea. Deep-Sea Research II, 54: 2832-2848.

*Understanding conservation benefits*

**To better understand the potential benefits of any of the alternatives, an improved description of the regulatory process should be provided.** This would support a richer understanding of whether the range of estimated bycatch reductions could result in increased escapement leading to increased harvest opportunities and, if so, to whom potential impacts from increased returns could accrue (as described in the SIA). This could be framed around the potential flow of saved salmon to communities if bycatch is reduced, after accounting for likely marine mortality prior to freshwater return and should include information on state regulations related to the prioritization of subsistence, commercial, and sport fisheries and any possible characterization of potentially impacted rivers.

*Choice of Abundance Indices*

A number of suboptions are being considered for Alternative 2, Option 2 that include different combinations of WAK chum salmon indices to set a threshold for triggering a PSC limit. The analysts provided results of a dynamic factor analysis (DFA) and cross correlation analysis in Appendix 7 and are seeking SSC feedback on these analyses and which suboption to use. The SSC finds the analyses to be reasonable and the results suggest that the Yukon River Summer chum index could be a good proxy for all of the indices (i.e. they all seem to follow similar temporal patterns). Tables 6-35 to 6-37 of the DEIS indicate that an overall chum salmon PSC limit would have been in place in the most recent three years for which complete information is available (2020-2022) for all three suboptions. From 2011-2019, no overall chum salmon PSC limit would have been in place for any of the suboptions. **These tables suggest that using the Yukon Summer Chum index (Suboption 2a) would not have resulted in inaction when a reduced PSC limit was warranted based on the other indices for the time period examined.** Therefore, for simplicity, Suboption 2a (Yukon Summer Chum index only) would seem acceptable. The SSC suggests, however, that it might be prudent to also use the Norton Sound minimum standardized index or Bethel Test Fishery CPUE index in case the synchrony of the indexes were to diminish in the future. Despite these results, the SSC notes that a PSC limit would have only been put in place once the chum salmon runs had already declined. Given the life history of chum salmon and age composition of the bycatch, to be effective one would want to limit the bycatch before that happens. **This would suggest that to meet the purpose of this action, lower thresholds would need to be explored.** In addition, the SSC recommends providing the variance estimates for all of the area indices, which are important to understand how observation error may affect their use as management triggers.

*Impacts on the pollock fleet*

The SSC recognizes that a full dynamic model of fleet behavioral responses to the different alternatives is not possible; however, the SSC finds the presentation of the current outcomes under Alternatives 2 and 3 can potentially be interpreted differently. As described above, **the SSC suggests that the current analyses and discussion could be reframed around bounding outcomes and presenting lower and upper bounds for changes in pollock revenue and bycatch quantities.** Other specific suggestions include:

- As it regards the examination of how a potential shutdown due to the WAK chum salmon bycatch limit being reached is expected to impact revenue and cost relative to the status quo, the SSC is concerned that simultaneously focusing on decreased revenue and increased costs is unrealistic. This process is complex and hinges on fleet behavior preceding a potential shutdown. Under the assumption of no fleet behavioral adjustment, both costs and revenues are likely to decrease due to the cessation of fishing. Under the assumption of fleet movement to avoid a shutdown (as described in Public Testimony) the impacts to costs associated with moving to other fishing areas and/ or conducting test-tows to assess chum interactions as well as impacts on revenue associated with lower CPUE fishing or changes in catch composition leading to sub-optimal product mix should be considered.

- The SSC emphasizes the importance of discussing a lower bound on revenue changes. Low revenue impacts for some fleets would be consistent with prior years where fleets were not close to the cap. Furthermore, this would be consistent with the IPA reports that indicated that the CP fleet did adopt measures in 2022 and 2023 to mitigate WAK chum salmon bycatch and there was no season shutdown or substantial revenue loss reported.

- Based on the IPA reports, the SSC is also concerned with the status quo/Alternative 1 for the CP fleet as this appears to include industry actions already implemented to avoid WAK chum salmon. The SSC suggests consideration of whether 2022 is an appropriate year to include in the retrospective analysis.

*Structure of Alternative 3*

The SSC also recommends that additional discussion is needed in the DEIS in regard to the implementation of Alternative 3. Specifically, whether a two-year lag for assessing estimates of WAK chum salmon bycatch relative to the performance standard and the subsequent management response is preferable to using past estimates of the WAK proportion of bycatch as a time-area stratified in-season management tool. During public comment, figures were presented that included estimates of the number of WAK chum salmon caught per chum bycatch as part of the Rolling Hotspot Program. The SSC suggests that the analysts, to the extent practicable, explore the feasibility of using historical data to estimate the WAK chum rates for in-season management, such as is done for halibut DMRs. This would allow an in-season assessment of bycatch against the performance standard. For example, the previous year's genetic stock composition estimates by cluster or fishing area, or a multi-year average thereof, could be used in conjunction with in-season chum salmon bycatch numbers to provide a mid-season estimate of season total bycatch stock composition. Retrospective analysis of this approximation method could be informative for understanding how well recent average genetic estimates within spatial strata can be used to approximate the total seasonal stock composition of bycatch and help to assess the value and necessity of inseason genetic information.

*Recommendations for Qualitative and Quantitative Analyses to Support the Evaluation of Alternatives*

Impact Analysis/Scale of bycatch relative to other population components

**Recognizing the challenges of developing an AEQ and an impact analysis, the SSC recommends that the analysts explore alternative ways to understand the efficacy of the different alternatives for conserving WAK chum salmon during periods of low abundance.** Having a general evaluation of the number of chum salmon likely to return to rivers as a function of each alternative or even a sense of the size of the mitigative impact this action is trying to achieve would be valuable in assessing the impact or benefit of the different alternatives. The SSC acknowledges that there will be considerable uncertainties that would need to be considered and suggests that even providing ranges would be useful. Progress that industry analysts have made in exploring impact scenarios may be helpful in framing approaches to address this issue.

The SSC found the table on Slide 140 of the DEIS and SIA presentation to be a potentially useful way to represent the scale of PSC impacts in comparison to commercial and subsistence catches. **The SSC recommends, to the extent practicable, that similar tables are developed for other alternatives and options.** However, the SSC stresses that it is important to clearly state the purpose of the table, document decisions and caveats, and describe how the intended comparisons should be made. For example, because the message is about scale, the decisions/caveats should address the quality of the numbers (i.e., rough estimates, most likely on average, worst case, best available information). The unobserved annual numbers of CWAK chum in the Area M commercial harvest column (2011–2021) were apparently estimated using a "worst case" scenario, applying the 2022 CWAK proportion from only the June fishery (18%) rather than the proportion across the entire fishery (12.8% June to August; 90% CI 11.7–13.9; see Table 27 in Dann et

al. 2023[2]). Information quality can easily be conveyed, and an undue sense of certainty can be avoided, by rounding the numbers to appropriate levels (100s, 1000s, or 10,000s of fish). Uncertainty in the numbers should also be characterized in the descriptive text or the table itself. For example, commercial fisheries harvest numbers may all have a CV=0.05 and could be noted in a footnote. In addition, the SSC notes that the units being measured change across columns, by maturity, stock component, and by geographic scope. For example, what does it mean to compare an immature chum salmon in the bycatch to a mature salmon migrating home? Or compare the harvest of CWAK chum in the South Peninsula salmon fishery to commercial harvest of WAK chum (CWAK, Upper/Middle Yukon, and Kotzebue)?

The SSC suggests that whenever possible the conventions and uncertainties used in the Western Alaska Salmon Stock Identification Program (WASSIP) process be adopted as these were developed jointly by ADF&G and stakeholders and subsequently reviewed by a panel of experts. The SSC also suggests that information from the three WASSIP years (2007-2009) be included in the table as these three years were the most systematic, comprehensive, and defensible numbers for WAK chum harvests. The 2022 South Peninsula chum salmon stock contribution estimates and sampling design also followed the WASSIP methods, but for a more restricted area. Munro et al. (2012)[3] provides guidance and advice for making inferences within and outside of the WASSIP years, which will be helpful for setting the context for these tables.

The SSC notes that this table is intended only to present comparisons of scale in terms of harvest rather than in context of annual run sizes. If the latter is intended, then information about escapements should be included, with appropriate caveats. These could be combined escapement goals and escapements for systems where the data are available.

Simplified AEQ

The SSC identified the importance of understanding how many chum may return to Western Alaska rivers under each of the alternatives. **Therefore, the SSC recommends that, to the extent practicable, the analysts explore a quasi-AEQ calculation.** Given the considerable uncertainty associated with a full AEQ calculation for chum salmon, the SSC requests that analysts undertake a simple calculation using bracketing scenarios to provide a potential range of impacts. As a starting point, a useful scenario would compare the average age composition of chum taken as PSC to the average age composition of chum salmon returning to freshwater as observed in escapement. The difference between the average PSC age and average escapement age, for the CWAK, Upper/Middle Yukon River, and Kotzebue chum salmon provides a baseline estimate of the number of additional years of marine mortality that are likely to occur before chum salmon available to capture in the pollock trawl fishery return to freshwater. Another way to bracketing the potential range scenario would include 1) assuming all chum salmon taken as PSC would have returned to freshwater in the current year, which represents an unlikely but informative upper bound for describing reporting group specific PSC impacts relative to observed subsistence and commercial catch, and escapements and 2) assuming all chum salmon taken as PSC were three years old (the youngest age observed) and applying a reasonable marine mortality rate.

The annual chum salmon PSC by WAK reporting groups, as listed in the chum salmon genetics report, multiplied by a reasonable assumption for annual marine survival for chum salmon, raised to the power of the average number of years prior to return would provide a rough but informative way to convert annual

[2] Dann, T. H., H. A. Hoyt, E. M. Lee, E. K. C. Fox, and M. B. Foster. 2023. Genetic stock composition of chum salmon harvested in commercial salmon fisheries of the South Alaska Peninsula, 2022. Alaska Department of Fish and Game, Special Publication No. 23-07, Anchorage.

[3] Munro, A. R., C. Habicht, T. H. Dann, D. M. Eggers, W. D. Templin, M. J. Witteveen, T. T. Baker, K. G. Howard, J. R. Jasper, S. D. Rogers Olive, H. L. Liller, E. L. Chenoweth, and E. C. Volk. 2012. Harvest and harvest rates of chum salmon stocks in fisheries of the Western Alaska Salmon Stock Identification Program (WASSIP), 2007–2009.

chum salmon PSC numbers by reporting group to potential foregone chum salmon returns. The SSC recognizes that this requires choosing among age composition time series that may be available for different chum salmon escapement projects within each reporting group but suggests that the largest and most comprehensive escapement project may be most appropriate and reasonable for evaluating average age at return.

Evaluation of Alternative 3

**The SSC questions the assumption in the analysis that impacts under Alternative 3 would be similar to those under Alternative 2** and encourages the analysis of the potential for different impacts under Alternative 3 versus Alternative 2. To facilitate this, the SSC has several suggestions.

**First, a qualitative approach to contrasting the alternatives could entail describing and contrasting the incentives under the various alternatives.** This information could be summarized for each alternative in a table or figure. One important incentive to highlight is the difference between Alternative 2 incentivizing avoiding chum salmon and Alternatives 3 and 4 that are focused on reducing WAK chum salmon. For example, to the extent there is some predictability in where and when WAK chum salmon may occur, Alternative 3 outcomes in terms of WAK chum salmon will likely differ from Alternative 2. Alternative 3 would entail a longer time scale of analysis, but if chum salmon PSC limits (caps) would reduce profit, Alternative 3 could induce near-term avoidance of WAK chum salmon and longer-term innovation in data and analysis to avoid WAK chum salmon. However, if the chum caps are high and not costly, the penalty may not be effective in inducing reductions in WAK chum salmon bycatch. Similarly, incentives under caps versus without caps could provide insights into differences between Alternatives 2 and 3 and Alternative 4.

**Second, to the extent practicable, the SSC also suggests two types of quantitative analysis leveraging the genetic data that could provide richer information on the potential impacts associated with the alternatives.**

- *WAK chum salmon predictability.* Understanding predictability is important for understanding how outcomes in terms of WAK chum salmon may differ among the alternatives. For example, if available (prior year, in-season) data and information is not useful in predicting WAK chum salmon bycatch rates, then there may be little difference between Alternatives 2 and 3; conversely, higher predictability could be associated with improved performance in terms of WAK chum salmon avoidance under Alternatives 3 and 4.

  The SSC suggests providing more detailed analysis and discussion of spatial and temporal chum catches relative to stock proportions by sector and over the available time period in order to try to identify areas and times where WAK chum salmon are more likely to occur. The efficacy of bycatch control measures such as rolling hotspots and move along rules depend critically on spatial and temporal correlation of chum bycatch. An analysis of chum bycatch spatial and temporal correlation is needed to better evaluate strategies for avoiding bycatch. Such an analysis could help identify if there is a general pattern of timing and location of chum occurrence so that areas can be avoided at certain times of year (i.e., the concept of corridors to allow salmon to pass through).

- *Heterogeneity across space and time in target and bycatch species and past fleet movements.* Short of complicated models predicting fleet behavior, simple summary statistics could be presented to support qualitative insights into the potential ranges of revenue and bycatch impacts realized outcomes under an alternative. These summary statistics could include information on the heterogeneity in target and bycatch species across space and time - i.e., how much flexibility the fleet has. This could be done using data from different areas and time frames on pollock CPUE, chum bycatch per unit of pollock, WAK chum salmon bycatch per unit of pollock, and Chinook and herring bycatch per unit of pollock. Other summary statistics could capture the extent to which

fleets have moved in the past. The SSC suggests that it may be helpful to characterize a few potential cases for each fleet, that could reflect discussions of likely outcomes with industry. This may help develop additional insights into heterogeneity of impacts across fleets. The feasibility is conditional on sufficient spatial and temporal data - as many of these metrics require fishing to observe outcomes.

Evaluation of Alternative 4

As stated above, the SSC supports an evaluation of Alternative 4, and has some suggestions for what this potentially could entail. The SSC notes that the industry reports did not provide sufficient detail for the SSC to understand the modeling approaches. Additionally, there are not clear predictions of outcomes made within the fleets' presentations that are comparable to the outcomes analysts tracked under Alternatives 1, 2, and 3. The analysis could be informed by:

- Discussion of the mechanisms for change under Alternative 4, with particular contrast to Alternative 3. Based on industry comment, the SSC encourages discussion of incentives associated with hard caps. The SSC also encourages consideration of a longer time horizon and the extent to which different alternatives would perform under different ecological conditions.

- The SSC suggests consideration of a separate analysis for CP vs CV fleets.

- The CP fleet took action in 2022, and based on industry reports, chum salmon bycatch decreased overall but with an increase in WAK chum salmon in 2022, but then total chum and WAK chum salmon bycatch both decreased in 2023. This could be validated within the report. The evaluation could include assessing this performance relative to the candidate caps.

- The SSC acknowledges that quantitative assessment of Alternative 4 for the shoreside and mothership fleets is difficult. The SSC appreciates the discussion and inclusion of Alternative 4 in Table 6-52. The SSC suggests that the discussion could be expanded based on the quantitative predictability and heterogeneity analyses described above.

- The SSC understands that some combination of provisions in Alternative 4 and the other Alternatives is possible and, if so, notes that Alternative 4 proposals could potentially be adversely affected if one of the other Alternatives is implemented simultaneously. For example, it was suggested that hard caps could result in an extended fishing season, potentially increasing the bycatch of Chinook salmon in the fall.

*Other Considerations*

Spatial Management Measures

The SSC highlights that spatial characteristics of chum bycatch are currently not addressed in the Alternatives 1 - 3, but data to inform such measures exists. For example, WAK chum bycatch is proportionately much higher east of 170 deg. W, but the overall chum bycatch rate is lower. Conversely, west of 170 deg. W, the overall bycatch rate is higher, but chum salmon in this area are predominantly of Northeast Asia and Southeast Asia origin. Under an overall B-season PSC limit, public comment noted that this could result in an increased incentive to fish east of 170 W, perversely increasing the impact on WAK chum. Spatial management measures such as a sub-cap for chum bycatch east of 170 deg W that would restrict bycatch in areas where the proportion of WAK chum is a high percent of the overall chum bycatch, could be constructed based on historical data. The SSC recognizes, however, that establishing new management lines based on historical data can be problematic for many reasons, particularly when climate change is leading to changes in migration and distribution for many marine species.

Performance Review of any new management measures

The pollock fishery is one of the most highly regulated in the world. For any new constraint on how pollock are harvested, there is a potential to create perverse incentives and unintended consequences. These are due to inevitable tradeoffs required to achieve multiple objectives, such as minimizing bycatch of chum, Chinook, herring simultaneously. The SSC recognizes that this potential action could include many different trade-offs and possible non-intuitive outcomes. The SSC recommends clearly defining which outcomes would be considered a success at the time of the action and how those outcomes would be measured. **Therefore, the SSC recommends scheduling a performance review of any new management measures to reduce chum bycatch relatively soon after implementation.** This will allow managers to quantitatively evaluate the effectiveness of management actions and make the needed corrections.

## Incentive Plan Agreements/Alternative 4 Industry Proposals

The SSC does not typically receive IPA reports and appreciates the information presented on the variety of techniques used to try to reduce both Chinook and chum bycatch. In terms of the Alternative 4 IPA adjustments, there were two different proposals, one for CPs, and a second for CVs and mothership sectors combined. Differences between the two IPA proposals are necessary because of differences in the way the fleets operate and how data are generated. The suite of provisions provided shows the complex interplay of factors including fleet behavior and operational constraints, genetic stock identification, and bycatch reduction engineering.

Additionally, the SSC discussion touched on other complexities, including the tradeoffs among PSC (Chinook, chum and herring), spatio-temporal management strategies, and increases in Asian hatchery chums, highlighting the ongoing search for effective, adaptable management solutions in the face of uncertain and dynamic environmental conditions. There was some discussion about the practicality of using real-time data when combined with historical genetics, which suggested a need for more details and analysis on how these data would be successfully used to avoid salmon.

The SSC appreciates receiving these ideas and commends the proposals for thinking about further ways to incentivize the reduction of chum salmon bycatch, while minimizing the impact to fleet performance and other PSC species. It is encouraging to hear how the potential expansion of available genetic information, combined with rolling hot spots, could be used to guide avoidance efforts in-season. The SSC also appreciates the proposal for more transparency in communication with Western Alaskans on how the IPAs are performing. Additional discussions of how to evaluate this alternative are included in the DEIS section under “Evaluation of Alternative 4”.

## Social Impact Assessment

The SSC thanks the analysts and contributors for producing a comprehensive document with an impressive level of detail on an extremely tight deadline. The SSC also thanks the members of the public (listed above) who provided both written and oral testimony that touched on the SIA.

The following provides several recommendations and considerations in preparing the next version of the SIA document, many of which are directed toward improving accessibility to information that is already in the document.

*Regulatory Context (Section 2)*

The discussion of National Standard (NS) 4 should clearly state that the proposed alternatives would not result in direct distribution of fishing privileges, such that this action is not to be judged against the allocation requirements of NS4. This discussion would also benefit from the addition of a note that (1) clearly indicates that incidental allocative effects may result from the implementation of one or more of the alternatives if conservation benefits were to be realized for WAK chum salmon stocks, (2) summarizes a

few examples of the many intervening variables involved (e.g., natural mortality, interception in other fisheries), and (3) recognizes that incidental effects may be important or even intended outcomes.

The SSC recommends that this section also include a reference to NS6 and a summary that ties each regulatory or Executive Order element to sections of the SIA (or DEIS, if appropriate) where the pertinent information can be found.

*Description of Community and Regional Participation by Fishery (Section 4)*

In the Floating Processors and Motherships (Section 4.1.2) discussion, analysts should clarify why these two sectors are grouped together for the purposes of the SIA, given the often-differing nature of the two sectors to port communities (e.g., where the operational and taxation effects of floating processors are more similar to those of shore-based processing plants than to motherships and motherships are more similar to catcher processors than to floating processors).

The Community Processing Characterization (Section 4.1.4.1) usefully describes annual rounds at the relevant multi-species processing plants that have been typical in recent years, based largely on data from 2019/2020. More recently, however, conditions have evolved with the closure of major crab fisheries, declines in Pacific cod, and downturns in the halibut and sablefish fisheries, all of which create uncertainty for processing operations and the communities in which they operate in general and for the communities of Akutan and King Cove in particular. The SSC acknowledges that these conditions are not due to the proposed action; however, these sector and community context conditions have the potential to substantially influence the nature and magnitude of potential direct, indirect, and cumulative impacts related to the proposed action. These conditions should be more clearly described in the SIA.

The accessibility of the information in the Community Sketches (Section 4.1.5) portion of the SIA would benefit from the addition of summary tables at the start of the discussion and a common order of presentation that tracks with commonalities in geography and nature of engagement in the relevant fishery sectors of the communities. Specific SSC suggestions include placing the communities in the following order in tables where multiple communities appear: Unalaska, Akutan, King Cove, Kodiak, Seattle MSA, and Newport; adding a CDQ column to Table 4-20; and creating new summary tables to be placed before the individual community discussion sections. These new summary tables would include:

- A community engagement matrix that includes the communities as rows and engagement indicators as columns (e.g., CV ownership, CP ownership, shore-based processor location, port of CP transfer location, support services location, etc.) to show at a glance patterns of engagement for the individual communities and across communities. The indicators could be scaled to indicate relative engagement or dependency.

- A consolidated Alaska communities population and demographics table that would replace the individual community population and demographic information tables in each of the community summaries (the data from each existing individual community table would become rows [or columns] in the consolidated table). The addition of a State of Alaska row [or column] could then be used to place each community in the larger 'general population' context. The table could be simplified from those currently appearing in the community discussions by elimination of variables that are not used in the analysis. Table cells could also be color coded or otherwise designated to indicate at a glance those demographic indicators that are above or below statewide levels (without obscuring underlying absolute values) to show patterns relevant to environmental justice or other analytic considerations.

- A new Alaska communities table that contains the same 2020 US Decennial Census and current ACS 5-year estimates data that parallels existing Table 4-28 (with one row each for Unalaska, King Cove, Kodiak, plus a State of Alaska row for comparison).

- A new consolidated table for Unalaska, Akutan, and King Cove that splits out demographic data for the non-group quarters population and group quarters population similar to those used in previous Council analyses. This will allow characterization and contrast of processing worker population and non-processing worker populations in these communities, which is important for environmental justice and other analytic considerations, including identifying the level of indigenous representation in the non-group quarters component community population. This table will also help support a discussion of the varying nature of the integration of processors and their associated populations into the everyday social fabric of the overall host community where relevant to the analysis.

- As a general methodological note, a caveat regarding the impact of Covid conditions on 2020 decennial census data quality should be added where relevant.

The SSC notes that the individual community sketches each include a "Local Economy and Links to Commercial and Subsistence Fisheries" subsection. The SSC recommends that the SIA include a new overarching section on the links between commercial and subsistence fisheries in Unalaska, Akutan, and King Cove be presented before the individual community sketches. This discussion could draw forward some of the key information developed on the social, cultural, and other non-economic dimensions or meanings of subsistence presented in the later chum salmon subsistence sections and combine that information with the already cited Reedy (2009) analyses of the "entangled" relationship of commercial to subsistence fisheries in these specific Aleutian communities. This would highlight the fundamental importance of subsistence and the key role of sustained participation in federal fisheries to the community well-being in general and through subsistence practices in particular. It would also allow the individual community "Links" sections to be streamlined to only focus on differences between the individual communities rather than on redundant treatments of the commonalities between them.

To help the reader identify larger patterns of communities with engagement and dependency on fisheries that have been identified as potentially impacted by one or more of the proposed alternatives, the SSC recommends that the SIA include a map or series of maps that overlay geographies such as the federal management areas, the CDQ regions, the state commercial chum fishery management areas, and the geographies used to analyze chum salmon subsistence related issues. This will help with understanding commonalities and differences in existing conditions and the potential differential distribution of varying outcomes across the wide range of communities potentially involved. This map or set of maps could be usefully placed in this section or moved forward as a part of a general overview, introduction, or executive summary for the SIA.

The SSC recommends that the community sketch for Kodiak (Section 4.1.5.3) focus on the City of Kodiak rather than the Kodiak Island Borough given the relatively narrow nature of engagement in and dependence on the relevant fisheries (ownership of CVs in the City of Kodiak only, as shown in quantitative data presented elsewhere in the SIA, and base of CV support services, which are described in other Council analyses as concentrated in and immediately around the City of Kodiak). The SSC also recommends that the community sketch for Seattle (Section 4.1.5.5) focus on the Seattle MSA rather than on the City of Seattle to be consistent with the quantitative engagement and dependency data presented elsewhere in the SIA and consistent with the interconnected nature of the Seattle MSA area as identified in other Council analyses. **The SSC also recommends the analysts include annual information on crew employment on AFA Catcher/Processors using a similar format to Figure 10 of the 2017 AFA program review.**

*Community Development Quota Program (Section 4.2)*

The SSC heard public testimony regarding the differential impacts to CDQ groups that could arise due to potential impacts on the value of leased CDQ quota in the face of hard caps on chum salmon bycatch or other conditions that could result from implementation of one or more of the proposed alternative and option combinations, and the SSC recommends these potential impacts be considered during revisions. The SSC

understands that these impacts could vary based on different positions of individual CDQ groups, especially with regard to direct ownership interest in the entities directly participating in the relevant fisheries and the differing negotiating positions that such ownership may imply. A specific question analysts should consider: to what extent might CDQ quota be fished last, and therefore leave CDQ groups susceptible to lost revenue arising from a season closure?

Nearly all CPs harvesting pollock are associated with some amount of CDQ pollock harvest, suggesting arrangements through leasing and ownership with the CP sector. The analysis provides ownership information, but this is not a complete view of the business linkages and leasing among the CPs, and differential impacts between the AFA and CDQ sectors should the chum limit become constraining on pollock. The analysis should include a broader description of the relationships and potential impacts under the Alternatives, including:

- Referencing the DEIS Section 6.1 that provides detailed information on vessel ownership by CDQ group and information on harvest diversification and revenue among AFA and CDQ programs.
- Describing how pollock constraints on the AFA sector may change bargaining power among the CDQ groups relative to the CPs.
- Including information on the proportion of all CPs that harvest CDQ catch and, if possible, the median CDQ catch per vessel (metric across all vessels, annual, to avoid confidentiality issues).

*Subsistence Harvests of Salmon (Section 4.3) and Commercial Harvest of Chum Salmon (Section 4.4)*

The SSC recommends reversing the order of Sections 4.3 and 4.4, for three reasons:

- The commercial harvest section takes into account engagement and dependency similar to what was done for the pollock fishery to facilitate analytic comparability between the two commercial fisheries, providing continuity for the reader.
- As the relevant pollock commercial fisheries direct or support services sectors are “entangled” with subsistence as described earlier, so is the commercial chum salmon fishery “entangled” with the subsistence chum salmon fishery.
- The commercial salmon fishery will be shut down before the subsistence fishery if forced priority choices have to be made, which provides a logical basis for reordering the flow of the analysis.

The SSC would like to express its appreciation for the work that has gone into the development and ongoing refinement of the LKTKS search engine and recognizes its successful use in identifying materials used in Section 4.3 of the SIA.

*Analysis of Impacts (Section 5)*

In the status quo and alternatives discussions of shore-based processing communities, the SSC recommends highlighting the role of recent fisheries volatility and accompanying uncertainties noted under Section 4.1.4.1 in understanding the potential impact of any of the alternatives and noting that the overall value of the pollock fishery to these plants includes the timing of the availability of pollock relative to the availability of other fisheries (e.g., groundfish, salmon, halibut, and crab). Given shoreside processors may be linked through business arrangements, this discussion may include potential impacts or risk to operations beyond the BSAI.

In the status quo discussion of Kodiak and Newport, the SSC suggests that the kinship and residential ties related to the CV sector mentioned in public testimony be noted in the analysis, as well as the availability of CV support services in Newport (and Lincoln County as a whole) of a scale not available in Alaska, as noted in previous Council analyses.

*Overall need for synthesis of the DEIS and SIA*

The SSC appreciates the tremendous amount of time and effort the analysts and contributors put into preparing the DEIS and SIA and the volume of information and analyses provided. Throughout the EIS and SIA, additional work is needed to synthesize the information presented to identify and discuss potential outcomes associated with the different alternatives. The inclusion of an executive summary of key findings is essential for review to advance before the Council and enables the SSC to evaluate the extent to which findings are supported by best available science. An executive summary could benefit from a summary of the types and categories of costs and benefits and, where applicable, who they would be born by or accrue to. This could be done for each of the alternatives. Additionally, the level of uncertainty associated with these different costs and benefits could be characterized. The SSC also recommends including a table summarizing the key impacts or potential effects of the different alternatives in the Executive Summary (e.g., DEIS Table 6-52; page 243).

# D3 Research Priorities

The SSC was unable to take up D3 Research Priorities at this meeting due to time constraints and discussed taking up this agenda item at the June 2024 meeting or in a virtual meeting, pending scheduling discussion with Council staff. The SSC would like to thank Nicole Watson (NPFMC) for all the great work to improve the process, ensure its completion, and thoroughly document all that was accomplished.

# D4 Sablefish IRA Workshop

The SSC convened a workshop to scope terms of reference (TOR) for a potential research contract under Council IRA funds (approximately 1.5 - 2 year contract). The goal of the contract would be to develop a tool to support Council TAC-setting decisions for stocks experiencing climate-induced variability, with an initial calibration and application for the sablefish fishery. The SSC received introductory presentations from Dan Goethel (NOAA-AFSC) on sablefish stock assessments and existing sablefish management strategy evaluation (MSE) models, and Dan Holland (NWFSC) on economic data and dynamics of the sablefish industry that could be represented in an integrated MSE. Public testimony was provided by Bernie Burkholder (Sablefish & Halibut Pot Association), Linda Behnken (Alaska Longline Fishermen's Association) and Peggy Parker (Halibut Association of North America).

The workshop approached scoping the TOR by considering the range of actionable policy scenarios, and the economic, social and biological dynamics that would need to be captured to inform the Council for TAC setting. While the term Maximum Economic Yield (MEY) has been applied in developing this project concept, discussion focused on attaining optimum yield (OY). Presentations clarified that MEY is an equilibrium concept within a bioeconomic model, and the objectives of this project focus on managing disequilibrium shocks to stock and market variables to balance multiple objectives. An introductory presentation made the distinction between an MSE tool (i.e., modeling framework for conducting simulations) and an MSE process in which stakeholders are engaged in developing, calibrating, and selecting the scenarios to which the model is applied, and interpreting results.

Following extensive discussion, the SSC recommends the IRA Climate Ready Fisheries project develop an MSE tool to advise the Council on approaches to TAC setting in the face of environmental and market variability that may arise under climate change. To ensure that results are directly relevant to the Council

decision-making process, the focus should be on approaches that could inform the Council's TAC setting within the existing framework for harvest specification (i.e., the SSC would continue to recommend OFL and ABC specifications under Tier 3), although other approaches could be evaluated as appropriate within the broader larger context of multi-objective optimum yield as defined in the MSA. The SSC's recommendations on the IRA research project are based on our collective experience supporting research colleagues and mentees in how to achieve specific project goals with available time, data, skills and resources; and thus are more advisory in nature than the SSC's more usual recommendations on applying best available science to meet the National Standards.

Specifying particular scenarios to be evaluated is beyond the purview of the SSC, but introductory presentations laid out key decisions for design of the model and the skillset(s) required to operationalize a model that meets project goals. Council actions in response to climate change in general, and recruitment spikes in sablefish in particular, may lead to changes in dynamics in: 1) fish stocks; 2) fleet behavior; 3) fleet cost structures; and 4) price and market response. Integrating these dynamics into an MSE requires developing different component models that require different data and modeling skills. Thus, the SSC focused on identifying which components are most important to develop fully and for which components there are data and information to support that work. In each case, the SSC anticipates the model will support examining the effects of policy scenarios on stock health and composition, and on human outcomes such as economic risk and stability of harvests; revenue and profit over time; the distribution of revenue, net revenue, jobs and other benefits across gear types, size classes and communities. In addition to examining outcomes for the stock and the directed fishery, an important decision point will be whether to represent outcomes for, and impacts on, non-directed sablefish fleets in the model.

The SSC recommends that this project proceed in the following way:

- *Numerical fishery modeling*. **There are at least two current biologically focused MSE models of sablefish in development (one Alaska-specific, another coastwide), and the SSC recommends initially exploring a partnership with the authors of the Alaska-specific model to add model elements with the economic dynamics of interest.** Although the project for the Alaska-specific model was not funded to coordinate with the IRA project, leveraging the thought and coding effort already invested in that project is the best way to develop an appropriately sophisticated biological model. It is likely that as the IRA project design is refined some modifications to the partner model will be necessary to ensure that a range of climate-forcing scenarios can be considered, as well as producing outputs needed for economic modeling (e.g., size classes or individual fleets) are tracked within the MSE.

- *Fleet behavior modeling*. **The SSC recommends that fleet response, with an emphasis on TAC utilization by different subfleets, be the primary modeling focus of the MSE developed through the IRA project.** While the SSC does not expect that data or available time and resources will support a full econometrically estimated production model or random utility participation model, there is sufficient data and information to condition a profit-based model of the extent of fishing. An important source of information for specifying and calibrating this model is local knowledge available from fleet participants and processors, who could be invited to participate in an MSE process.

- *Fleet cost modeling*. **The SSC recommends that a high-level model of fishing costs, which reflects differences across and within gear types, be calibrated by drawing on a handful of proxy information.** This includes a decade-old cost survey of the Alaska sablefish fleet (prior to conversion to slinky pots), studies in other regions, and local knowledge from fleet participants. Collecting the data necessary to support a cost or input-based production model would be prohibitive with IRA project resources and time constraints.

- *Market analysis*. **The SSC recommends approaching market responses primarily as a set of possible future scenarios relating landings, size and price which are applied to proposed policies.** Current observed sablefish pricing dynamics are outside of the range of historical data, and thus analyzing or resampling that data will not provide insight into how future markets will respond to gluts of small sablefish, or how additional markets might be developed for either small or large sablefish. Further, focusing more on market dynamics will produce a model that is less generalizable beyond sablefish.

- *Generalized tactical tools* - In order to meet the intent of IRA funds, it will be important that the study develops tools that are not just specific for sablefish but contribute to overall improvements to the inclusion of socioeconomic data to Council TAC setting. While sablefish may be the case study focus, other stocks have similarly high variability recruitment, and the Council needs a generalized process or tools to assist when there are extreme changes in ABCs and OFLs.

**To implement these recommendations, the SSC recommends hiring a postdoc who is trained as an economist and has skills in coding simulation models and, preferably, experience working with stakeholders.** The skills of an economist will be necessary to evaluate alternative approaches to specifying and calibrating a net-profit based fleet behavior module to the MSE, and to calibrating a cost model and developing market scenarios. This project will necessarily involve transdisciplinary collaboration with stock assessors; experts in local knowledge approaches; and economists with skills in market, production and fleet behavior models. **To ensure adequate support in this project, and in career development, the SSC recommends the candidate be co-located with mentors engaged in research developing similar models.** Engaging expert mentors also increases the likelihood the model developed is maintained for application beyond the timeline of this funding.

As a starting point, the SSC has developed the following draft TOR:

*We seek a postdoctoral Research Associate to develop an interdisciplinary management strategy evaluation simulation model that captures key economic dynamics within the North Pacific sablefish fishery. This position would provide leadership in research, stakeholder consultation, data analysis, coding, interpretation of model results and writing for this project. Sablefish is harvested by a directed fleet utilizing fixed gear (hooks and pots), and as incidental catch by trawl fleets targeting other groundfish.*

*The project: Through IRA funding, the NPFMC is developing an economically sophisticated management strategy evaluation framework to advise the Council on approaches to TAC setting in the face of current and future environmental and market variability arising under climate change. Several biological MSE frameworks have been developed for North Pacific stocks, and the emphasis in this project is to design and implement modules capturing economic dynamics within fisheries, and calibrate the model to evaluate alternative harvest policies for sablefish.*

*The candidate will:*

- *Develop approaches to using available data and resources to build models of key economic dynamics within fisheries, with an emphasis on fleet behavior and factors that drive underutilization of TACs.*

- *Collaborate with developers of biological MSE models to identify how to integrate economic modules into existing code bases.*

- *Use a combination of data and local knowledge to specify and calibrate a simulation model of fishing cost.*

- *Use historical price data and expert knowledge to specify scenarios for future market conditions, including price flexibility and new market development.*
- *Analyze fishing activity data, supplemented with stakeholder input, to develop a net profit-based model of fishing activity and harvest.*
- *Characterize economic heterogeneity within and across fleets in order to characterize distributional impacts of policy scenarios.*
- *Apply the MSE model to a range of policy scenarios and interpret the results for different fleets to provide the Council advice on how economic considerations can be informative for TAC setting.*
- *Thoroughly document code and make code publicly available for reproducibility and transparency.*

*The ideal candidate will have a PhD or foreign equivalent in economics, agricultural or natural resources economics, or a related field, as well as strong statistical and simulation programming skills, with significant experience developing models in R.*

The SSC will provide a full list of recommended qualifications to the Council if this moves forward.

# SSC Member Associations

At the beginning of each meeting, members of the SSC publicly acknowledge any direct associations with SSC agenda items. If an SSC member has a financial conflict of interest (defined in the 2003 Policy of the National Academies and discussed in Section 3) with an SSC agenda item, the member should recuse themselves from participating in SSC discussions on that subject, and such recusal should be documented in the SSC report. In cases where an SSC member is an author or coauthor of a report considered by the SSC, that individual should recuse themselves from discussion about SSC recommendations on that agenda item. However, that SSC member may provide clarifications about the report to the SSC as necessary. If, on the other hand, a report is prepared by individuals under the immediate line of supervision by an SSC member, then that member should recuse themselves from leading the SSC recommendations for that agenda item, though they may otherwise participate fully in the SSC discussion after disclosing their associations with the authors. The SSC notes that there are no financial conflicts of interest between any SSC members and items on this meeting's agenda.

At this April 2024 meeting, a number of SSC members acknowledged associations with specific agenda items under SSC review. Chris Siddon is a second-level supervisor for Tyler Jackson, C1 Scallop Plan Team co-chair and author of the scallop SAFE document. Robert Foy is the third or greater level supervisor for contributors to the following agenda items: Pat Barry and AFSC authors on chum and Chinook genetics reports (C2 Chum bycatch analysis); Dan Goethel (D4 Sablefish IRA workshop); AFSC members of the CPT and GPT (D7 Research Priorities). Dana Hanselman supervises Wes Larson and is a second level supervisor to Patrick Barry, Jackie Whittle, Katie D'Amelio, Lukas DeFillipo and Chris Kondzela (C2 Salmon bycatch). Dr. Hanselman also supervises Chris Lunsford and is a second level supervisor to Dan Goethel and Ben Williams (D4 Sablefish IRA). Finally, Curry Cunningham supervises Joshua Zahner, a contributor to D4 Sablefish IRA workshop.