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Certified: Dan Benda
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SCIENTIFIC AND STATISTICAL COMMITTEE
to the
NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
April 6-8, 2010

The SSC met during April 6-8, 2010 at the Hilton Hotel, Anchorage, Alaska. Members present were:

Keith Criddle, Chair (for Pat L).
University of Alaska Fairbanks
Troy Buell
Oregon Department of Fish and Wildlife
George Hunt
University of Washington
Franz Mueter
University of Alaska Fairbanks
Doug Woodby
Alaska Department of Fish and Game
Farron Wallace, Vice Chair
Washington Depart of Fish and Wildlife
Robert Clark
Alaska Department of Fish and Game
Gordon Kruse
University of Alaska Fairbanks
Lew Queirolo
NOAA Fisheries—Alaska Region
Milo Adkison (for Terry Quinn)
University of Alaska Fairbanks
Anne Hollowed
NOAA Fisheries—AFSC
Kathy Kuletz
US Fish and Wildlife Service
Ray Webster
International Pacific Halibut Commission

Members absent were:

Sue Hills
University of Alaska Fairbanks
Terry Quinn II
University of Alaska Fairbanks
Pat Livingston
NOAA Fisheries—AFSC
Seth Macinko
University of Rhode Island

B-1(a) Plan Team Nominations

The SSC approves the nomination of Karla Bush to the Crab Plan Team and Joseph Stratman to the Scallop Plan Team.

C-4 Central GOA Rockfish Program

The SSC received a presentation of the initial draft RIR/EA/IRFA from Mark Fina and Jon McCracken (NPFMC). There was no public comment.

The draft analysis is thorough, clearly documented, and well reasoned. We commend the effort of the authors and **the SSC recommends the analysis be released for public review.** The SSC did, however, identify a few issues that ought to be addressed and these issues are described below. (Minor structural and editorial comments will be supplied directly to the authors.)

The GOA Rockfish Pilot Program "sunsets" on December 31, 2011. Absent alternative action by the Council, the management of the fishery reverts to the structure that prevailed before the Rockfish Pilot Program was implemented, as modified by various Council actions that have been taken in the interim,

(e.g., Amendment 80). Alternative 1 does not perpetuate the "status quo" and should be identified as the "No Action" alternative.

The draft analysis should be revised to temper text that suggests that resource rents and economic profits ***will*** be generated. While leases, sales, and fishing allocations, create the opportunity to capture resource rents and normal profits, gaining those rents and profits is still contingent on individual skill and business acumen (estimates of rents and profits should be adjusted to reflect risk expectations.) Similarly, as has been observed in the halibut/sablefish IFQ program and the Alaska salmon limited entry program, the sales price of shares may not reflect the future stream of resource rents, etc., because buyers bid for (and sellers offer) shares based on imperfect and incomplete knowledge of the future. Moreover, share transfers can reflect non-pecuniary considerations.

The MRA discussion (pages 105 through 111) suggests that Pacific cod and sablefish MRAs result in high discards, poor quality of product, and economic hardship for rockfish target operators. Yet, at the same time, the analysis describes commonly occurring covert targeting of P.cod and sablefish during trips with very low rockfish catch. This appears to demonstrate that P.cod and sablefish **can** be avoided, at least to a "natural" bycatch rate (i.e., MRA), making the initial assertion of "unavoidable" waste and discards dubious. The RIR should be revised to provide a more objective discussion of the operational implications of "topping off" and/or targeting of P.cod and sablefish.

Where possible, the RIR should be revised to highlight the extent to which the CGOA Rockfish Pilot Program resulted in statistically significant gains (management, economics, safety, and conservation) relative to the status quo ante commencement of the CGOA Rockfish Pilot Program.

The RIR indicates that some combinations of alternatives and options may be unworkable, e.g., the alternative that allocates a portion of catcher vessel shares to processors. It would be useful to provide a list or matrix of those combinations that are unworkable in order to highlight these for the public and the Council.

There is inconsistency between the RIR and the EA in the characterization of the relative exvessel values of the target rockfish species.

The analysis of the effects of the alternatives on ESA listed species, marine mammals, and seabirds is minimal, consisting of a statement that the alternatives are not expected to affect interactions. However, adoption of any of the alternatives is likely to change the temporal and possibly spatial distribution of the fishery, which is likely to have implications for interactions with migratory animals whose densities in the region change throughout the year. The discussion should be expanded to address these potential changes in interactions.

The provisions for rollover of unused halibut PSC to other GOA trawl fisheries are likely to increase effort and catch in those fisheries that have historically been constrained by halibut PSC, as was the case in the pilot program. While the analysis clearly states that this has the potential to increase impacts to benthic habitat from these fisheries, it would be beneficial to include information on the sensitivity of the habitat to fishing impacts.

Finally, the SSC observes that the proposed action is relatively complex, but the draft is systematically presented so as to facilitate an understanding of the many elements, options, and suboptions, as well as their myriad interactions. One inherent outcome of the analytical approach adopted by the authors is substantial redundancy in the successive iterative treatment of decision points. With the RIR alone extending over 200 pages, some effort at editorial consolidation deserves consideration as subsequent versions of the document emerge.

D-1 (a) Crab ACL analysis and BSAI snow and Tanner crab rebuilding

Diana Stram (NPFMC) presented an overview of the draft Environmental Assessment for three proposed amendments to the FMP for the Bering Sea and Aleutian Islands king and Tanner crabs. The EA covers analyses for three proposed actions that are contained in a single EA because they were on the same timeline and because rebuilding plans are affected by the implementation of Annual Catch Limits (ACLs). The actions consist of: (1) establishing ACLs to meet requirements of the MSA; (2) revising the EBS snow crab rebuilding plan because snow crab were not rebuilt by the end of the existing rebuilding time frame (2009/10); and (3) preparing a rebuilding plan for EBS Tanner crab because the stock has been determined to be approaching an overfished condition. The latter action may be removed from the EA and put on a different timeline. The SSC also received presentations from Jack Turnock (AFSC) on the ACL methodology, the new Tanner crab model, and the snow crab model. Brian Garber-Yonts (AFSC) presented a proposed methodology for economic projections and Forrest Bowers (Crab Plan team chair) presented Crab Plan Team recommendations.

Public testimony was provided by Leonard Herzog (Homer Crab Cooperative), Arni Thomson (Alaska Crab Coalition), Linda Kozak (Crab Group of Independent Harvesters), and Dick Tremaine (Siu Alaska Corporation).

The SSC expresses appreciation to the Crab Plan Team and the crab stock assessment scientists who have contributed extraordinary effort and participated in multiple meetings under tight timelines to prepare and review drafts of the ACL and rebuilding analyses. We are especially appreciative of the efforts of the Council staff and Crab Plan Team in moving this process along and for providing informative and succinct reports to the SSC.

Annual Catch Limits

The MSRA requires a mechanism to specify Annual Catch Limits that may not exceed the Acceptable Biological Catch recommended by the SSC to the Council. This proposed action examines two alternatives to the Status Quo that would annually establish ABCs below the estimated Overfishing Level (OFL) and then set ACL = ABC. The alternatives use either a constant buffer (ABC = x% of OFL) or a variable buffer approach to maintain the probability that ABC exceeds OFL at a specified value of $P^* < 50\%$.

The SSC commends the authors for developing a common template for the individual chapters. This consistency greatly facilitates review of a large volume of information and should be maintained to the extent possible.

The following comments and recommendations address the overall process, the structure of the document, and analytical aspects of the ACL analyses and rebuilding plans.

In addition to the proposed control rule, a modification of the crab specification setting process is required to allow the SSC to review assessments and recommend ABCs on an annual basis. Three options that could either delay TAC setting (Option 1) or would require a change in the timing of when the SSC makes its ABC recommendations (Options 2&3) are laid out in the document. A fourth option was suggested in public testimony: to complete ABC recommendations for all stocks in June. **The SSC recommends evaluating this additional option to assess the risks associated with not including the latest information (i.e. the summer survey data) when setting TACs for the following season. The SSC also suggests that the analysts consider the feasibility of a web-based meeting under option 3.**

The EA does not yet include a discussion of accountability measures (AM). The Crab Plan Team made a strong recommendation to provide AMs for all sources of mortality, which would require limits on bycatch in other fisheries where such limits do not currently exist. **The SSC agrees, the EA needs to**

include a discussion of AMs that would provide an incentive to keep total removals below the ACL. Consideration of how to allocate catch and bycatch is largely a policy choice. The SSC notes that the monitoring and methods for enforcing AMs should be included in the EA. Because of the timeline for EA, a full analysis of options to limit bycatch across multiple fleets is not possible. Therefore, the SSC concurs with the Crab Plan Team recommendation to begin consideration of these issues on a species-by-species basis in upcoming rebuilding plans such as that for Pribilof Island blue king crab and Tanner crab. Care should be taken in the design of AMs applied to fisheries that induce incidental crab mortalities; ill-structured AMs could threaten benefits gained under rationalization.

The structure of the preliminary EA allows for a comparison of the alternatives in terms of their short-term, medium-term, and long-term implications for catches and revenue. The analyses are very technical and require a large volume of information to be presented. To facilitate public review, the SSC has the following recommendations.

- While the document contains a concise summary of the fixed-buffer and P^* methods, the comparison of alternatives should include a general discussion of the advantages and disadvantages of the two approaches in addition to comparing catches and revenues under different options. This should include a discussion of how each approach conceptually meets the MSA requirements (which are formulated in terms of a P^*-type approach), how adaptable each approach is to changes in our perception of uncertainty, the complexity of adopting the P^* approach compared to constant buffers, and how each approach differs in terms of variability in ABCs over time. For example the P* approach may result in higher variability in ABCs and catches over time if stock assessment uncertainty changes from year to year, while a constant buffer would not be affected by changes in uncertainty. Of course a central feature and advantage of the P* approach is its responsiveness to true changes in uncertainty and this should be highlighted.
- We encourage further development of summary tables and figures that allow easy comparisons of the consequences of alternatives and options. For individual stocks, contour or perspective plots of catch or revenue over a range of values for the buffer and for the additional uncertainty (0 to 0.6 to cover the full range of σ_b) similar to current Figure 6.14. To summarize results across stocks, a table showing the magnitude of the buffer for each stock (rows) at different levels of additional uncertainty (columns, e.g. 0, 0.2, 0.4, 0.6) at a given level of P* would be most useful. A similar table summarizing the implied P^* values at a given buffer size across stocks at different levels of uncertainty would be useful. These tables could highlight the proposed levels of additional uncertainty for each stock. We also suggest including two summary tables as follows:
    - A table of the implied buffer at a given level of P* and at the chosen value of σ_b for each stock
    - A table of the implied P* value at a given buffer and the chosen value of σ_b for each stock
- The levels of assumed additional uncertainty (σ_b) that are currently under consideration (0.2, 0.4 and 0.6) have a strong impact on the results; it is critical to provide a sound rationale for these values to the extent possible. The SSC offers the following suggestions to strengthen the rationale for the choice of σ_b:
    - As stated in our February 2010 SSC minutes, reference could be made to previous analyses of "typical levels" of retrospective bias, for example the analysis of retrospective bias observed in West Coast groundfish stock assessments. Similar analyses may have been completed in other regions.
    - The variety of snow crab models that are currently being considered offer an opportunity to illustrate the extent of variability in OFL estimates across models. An assessment of this variability across a variety of models with good support can provide a minimum estimate of additional uncertainty for this stock.
    - **The SSC supports the CPT approach to classifying stocks into those with relatively low, intermediate, and high levels of additional uncertainty.** The relative ranking of

stocks seems appropriate given our current understanding of uncertainties, but the rationale for the overall range of uncertainties considered should be strengthened.

- The SSC is concerned that default values for σ_b (as well as for other parameters such as γ) could become thought of as fixed values. The EA should clarify that these values can and should be re-evaluated and updated as our understanding of uncertainty changes. Perhaps the CPT and stock assessment authors could be encouraged or required to annually provide a brief justification for the current value of σ_b.

- While short-term results are presented in terms of the consequences on catch-related quantities of either a given value of the buffer or a given P^* value, medium-term results are primarily presented in terms of the different buffer sizes (and under different levels of uncertainty), albeit with the corresponding probability of overfishing. Therefore it is difficult to evaluate the consequences of a given P* value and this has the unintended effect of focusing the results on the constant buffer approach. The consequences of the P^* approach should be presented in the form of tables or plots that summarize catch-related quantities at several selected P^* values. The consequences for variability in ABC and TAC due to application of fixed buffer or constant P* approaches should be discussed.
- For the presentation of results in this document, it is very important to clearly communicate uncertainty and how to interpret the figures that show medians with lower and upper bounds. We suggest adding a short section before the stock-specific chapters that provides a primer on uncertainty across multiple projections. As a possible model for how to more effectively communicate uncertainty to the public, the SSC suggests examining relevant sections in the most recent IPCC report. For example, this section could include a figure that shows individual trajectories from multiple projections (<<800) with the median and lower and upper confidence bounds superimposed. The section should clearly describe how to interpret these bounds.
- The document could benefit from a table of definitions as suggested in public testimony.

Comments on ACL analyses

- **The SSC endorsed the general approach for projections presented by André Punt in February**. For several stocks, new models were used in the analyses that have not been reviewed or fully documented. Very little detail is included in the EA on these models and it is not obvious what relevant parameters are and how these parameters were chosen or estimated. Some of these parameters could have a large impact on the analyses, such as the presumed level of uncertainty in R (σ_R). The SSC realizes that the EA is not the appropriate place to document these models. **The SSC recommends that important assumptions and parameter values be included in the EA and that models be documented elsewhere and included by reference.** One option is to include a brief description as an appendix.
- Some of the key parameters of the projection model relate to recruitment and are summarized in a table for both the Ricker and Beverton-Holt relationships. The methodology chapter should include a brief description of the general approach used to estimate these parameters. In some cases, the projection used different parameter values than those estimated (σ_R, e.g. Table 7.2), this should be justified. **To minimize confusion, the SSC recommends that the EA include results for only one of the recruitment specifications.** While results differ between the Ricker and Beverton-Holt models, the SSC believes that differences in the form of the stock-recruitment relationship may be one of the smaller sources of uncertainty and could be subsumed in the "additional uncertainty". An alternative would be to capture some of the uncertainty directly by randomly selecting either the Ricker or Beverton-Holt model for each of the 800 projections (assuming each is equally likely).
- The analysts examined four alternative approaches for quantifying uncertainty in OFL for Tier 5 stocks. The SSC recommends that these approaches be carried forward in the analyses.

- A consistent approach should be used to evaluate probability of the stock being in an overfished condition. The approach currently differs between snow/tanner crab projection model and the model used for other stocks.
- The relationship between standard deviation of log(MMB), the coefficient of variation of log(MMB), and variability in MMB should be clearly articulated in the document to avoid confusion. Generally, it appears that the standard error of log(MMB) is used as a proxy for its CV (a good approximation for values less than about 0.4-0.5).

Comments on Economic Analyses

The SSC believes that the proposed economic methodology appears to sufficiently comport with the identified ACL method for king and snow crab fisheries. The model may be appropriate as a general characterization for other stocks, but only to the extent that the price series of those other stocks is correlated with the king and snow crab price series. Care needs to be taken in the next revision of this analysis to clearly differentiate between costs and possible foregone first wholesale revenues. While it is important to characterize the full time path of first wholesale revenues for rebuilding analyses, it may be more appropriate to represent the distribution of annual first wholesale revenues for single time steps that represent short-, medium, and long-run projections in the ACL analyses. The SSC recommended in its February 2010 minutes that the analysts summarize output over a shorter time frame of 5 or 6 years because "the shorter time frame would be of more immediate interest to the public, would be less influenced by assumptions about future recruitment, and would provide more robust economic projections, given the large uncertainties about future macro- and micro-economic factors."

Careful documentation should be provided within each economic section of the analyses, to clearly identify the implicit and explicit assumptions employed in the derivations, as well as the implications for interpreting the "first wholesale gross revenue foregone" projections.

The SSC offers the following minor-editorial comments for the authors:

- Replace "Annual Catch Level" and "Overfishing Level" with "Annual Catch Limit" and "Overfishing Limit" throughout the document.
- Footnote 15 (p. 33) refers to 'Options 5-7'. Please clarify if this should refer to Alternatives 5-7?
- Table 3.2 appears incomplete and does not explain the parameter γ.
- Make sure to fix references to all tables and figures in next draft.
- Variables names should be consistent throughout document, e.g. B is generally used for the Buffer (or rather, 1-Buffer), whereas b is used for additional uncertainty in the assessment. However, b in the economic section (p. 52) refers to the buffer.
- Table 4.1: Clarify footnote ("& - set to the point estimate"), which erroneously implies that P^* is set to its point estimate. This should state that total ABC is set to the OFL point estimate for $P^* = 0.5$.
- Fix equation 3.4 (should be square root)
- Check all tables for accuracy as there are some counterintuitive results. For example, in Table 10-4 (p. 301), the MMB initially increases then decreases, while the ABC increases overall, but the catch greatly decreases over the 6 years of the projection.
- Add species names in headers of Chapters 4-10
- Some inconsistency among stocks in terms of summarizing medium-term projections. Start year is sometimes 2009, sometimes 2010. Sometimes actual catch was applied in 2009 and ABC=OFL (snow crab), whereas in others (e.g. NSRKC, p. 300), buffer was applied in 2009.

Snow crab:

The SSC received a presentation from Jack Turnock ((NMFS-AFSC)) on results from recent Bering Sea snow crab model runs requested by the Crab Plan Team and the SSC. **The SSC appreciates his presentation and efforts to explore model sensitivity.**

This analysis built on earlier model explorations by addressing implications of incorporating the results of the 2009 Bering Sea Fisheries Research Foundation (BSFRF) trawl survey into the snow crab assessment. In addition, the author explored implications of separate selectivity curves for males and females and assumptions regarding natural mortality, survey biomass weighting, survey selectivity and survey catchability.

The SSC supports Crab Plan Team recommendations for model runs that will be presented at the May, 2010 Crab Plan Team meeting. In an effort to more fully explore model sensitivity to alternative assumptions on growth and mortality, **the SSC recommends the author run a suite of models that assumes the Somerton selectivity curve and assumes a male natural mortality rate between 0.2 - 0.5 incrementing values by 0.05.** For these model runs, female mortality will be fixed at 0.23, growth, maturity probability and female selectivity will be re-estimated. **The SSC also recommends a model that assumes the Somerton selectivity curve, estimates growth, maturity probability and mortality with a prior based on Canadian tagging data.** Finally, the SSC requests that the methods used to estimate natural mortality (survivorship) are discussed in the assessment and to the extent possible; the SSC requests that the authors consider stage based mortality to address the likelihood that mortality varies with immature and mature (terminally molted) crabs..

EBS Tanner crab rebuilding

A new stock assessment model has been developed for Tanner crab, which was adapted from the existing snow crab model. Tanner crab rebuilding will be removed because it is now on a different timeline and only the ACL analyses within this EA will use the new Tanner crab model.

Several authors have documented temporal and spatial differences in maturity of Tanner crab (Somerton and Myers, 1983 and Pengilly and Zheng, 1982). The SSC encourages the analysts to consider these processes in future model versions. **The SSC agrees with Crab Plan Team recommendations for changing rebuilding options for snow crab under each of the alternatives**: Increase probability of rebuilding either by extending time frame (e.g. to 8 years) or increased probability of rebuilding at year Ttarget to 70% or 90%.

D-1(b) PI BKC Rebuilding Plan

A report on the EA/RIR for the Pribilof Islands Blue King Crab Rebuilding Plan was presented by Diana Stram (NPFMC), Bob Foy (NMFS-Kodiak), and Scott Miller (NMFS-ARO). Public testimony was provided by Ed Richardson (Pollock Conservation Cooperative).

The challenge to rebuild the Pribilof Islands blue king crab stock is a difficult one. There is no apparent stock-recruit relationship. It is not clear whether the current B_{msy} estimate is a reasonable expectation for stock status under current conditions. Even the optimistic Ricker or Beverton-Holt fit projects stock rebuilding over a 40- to 50-year time frame. In reality, recovery may depend on chance and fortuitous environmental conditions leading to several strong year classes. Nevertheless, a new rebuilding analysis is required.

The SSC recognizes that the draft EA/RIR is preliminary and recommends the following corrections and additions:

- There are many placeholders in the document for which information needs to be inserted.
- The Council needs to define a problem statement and the statement should be included in the EA.
- The document should have a background section including a description of the history of the stock, fishery, and management. Subsistence and personal use crab fishing, if any, should be discussed.
- Stock management reference points (e.g., B_{msy}) and their uncertainty should be discussed.
- The document should discuss the issue of whether blue king crabs in the St. Matthew and Pribilof Islands areas are separate stocks. Historically, recruitment trends were similar between the two areas, but recent trends appear to be different. On the other hand, geographic distributions are not very discrete. The SSC recommends that the authors refer to the report produced from the stock structure workshop held by the SSC in February 2009 as an aid to resolving this issue.
- The document should describe environmental changes affecting blue king crab, as well as ecological changes (e.g., predators). Changes in local distributions of Pacific cod and flatfish predators may be revealed by the NMFS trawl survey database (see Zheng and Kruse 2006) for cursory examination of some of these trends in the Pribilof Islands areas.
- The document should consider likely crab PSC in the halibut fishery. This review should be brought into the analysis to consider the efficacy of the alternatives to achieve stock rebuilding.
- A broader discussion of the Pribilof Islands fishing economy and the limited fishing opportunities available to the resident fleet should be discussed.

In regard to the alternatives, the SSC has the following requests:

- The alternatives should be explained clearly and completely. For instance, the ADF&G closure area (alternative 3) currently applies only to snow and Tanner crab (e.g., p. 10-11). In section 2.6, it is stated that the alternatives impose restrictions on either all fixed gear fleets or just the Pacific cod pot fishery. However, alternatives 3 and 4 are options applying to all groundfish fisheries (not just fixed gear).
- The PSC cap alternative (Alternative 5) needs to be more fully developed. **The SSC supports exploration of PSC caps that would trigger closures, as suggested by the Crab Plan Team.** The document also needs to clarify how the PSC would be accrued. As the OFL is based on mature males, would females and immature crabs also count when summing the total catch or would there be a PSC cap that includes females and immature males that is not necessarily tied directly to the OFL? Also, what are the boundaries that would be used to determine whether a crab PSC removal would count toward Pribilof Islands or St. Matthew Island blue king crab?
- The analysts should explore an option for increased or full observer coverage on groundfish fisheries in the area. For instance, the RIR presentation indicated relatively low observer coverage on the flatfish fishery, and none of halibut vessels.

In regards to methods, the SSC has the following suggestions:

- If possible within the timeframe of the analysis, the analysts should update and incorporate CVs on the trawl survey estimates of abundance in a single model.
- Given the apparent lack of relationship between stock and recruitment, Ricker and Beverton-Holt models provide poor fits to the data. The fits should be plotted on the stock-recruit figure. The SSC recommends continuing with both models, plus alternative recruitment models based on random draws from the historical recruitment distribution.
- The analysis should clarify the approach (e.g., parametric or non-parametric) taken by which recruitment is randomly sampled. The analysts indicated that they began an approach to reconstruct historical and presumed large recruitments that supported the fishery prior to the start of the trawl survey. However, the use of a non-parametric random recruitment model was not able to generate large recruitment. A parametric, log-normal recruitment approach could perhaps

occasionally generate large recruitments. The document should justify the length of the time series used in the three recruitment model alternatives.

- While it is not practical for the time frame of the rebuilding analysis, over the long-term, the stock assessment authors should consider including ADF&G pot survey data in the assessment. One analytical approach to inclusions is a stock synthesis model, such as Zheng et al. (1998) developed for Norton Sound red king crab, which includess trawl and pot surveys, plus summer and winter fishery catches.

In regards to results, the SSC requests the following:

- Table 3 (and others) need to include the units for the data being presented.
- Confidence intervals on stock projections should be constrained to non-negative values (e.g. Figure 16).

For the RIR/IRFA, the SSC offers the following:

- The SSC endorses the approach taken in terms of effects. The revenue at risk approach is an appropriate approach to take in this case.
- The SSC advises that the economic analysis should consider other users of resources in the area, such as the halibut fishery and subsistence/personal use fisheries for crabs.
- The analysis should consider significant seasonal price variability in the analysis.
- The analysis should characterize the regional economic impacts of the alternatives.

D-1(c) Design of 2010 NOAA/BSFRF field research

Bob Foy (NMFS-AFSC) and Steve Hughes (Natural Resource Consultants) summarized the proposed survey design for 2010. Results from the 2009 side-by-side and survey-to-survey experiments indicate that selectivity and catchability vary significantly by spatial and temporal differences in depth, sediment type, and other covariates confounding interpretation of results. Side-by-side surveys will be conducted north-east of the Pribilof Islands including the high density area around St. Matthew. This area was chosen to be a better representation of core snow crab distribution and sampling will collect data on a number of covariates likely to impact survey selectivity. **The SSC supports the survey design and Crab Plan Team recommendation that encourages continued efforts to ensure sampling will be representative of the entire population.** The SSC reiterates Crab Plan Team remarks on the importance for the survey researchers and the assessment author to work closely together such that the information collected during the survey can be easily incorporated in the May 2011 stock assessment.

D-2 (a) Scallop SAFE

Diana Stram (NPFMC) summarized the 2010 February Scallop Plan Team (SPT) minutes.

The SSC appreciates the effort that authors have made to re-organize the SAFE. In particular we appreciate that the report now contains most of the necessary information to evaluate reference points (OFLs, GHLs). The following additional modifications could be considered:

- A discussion of the criteria by which this meta- population could be managed as a unit stock and the potential contribution of each bed to the meta- population should be added. In particular, authors should consider reviewing stock boundaries using the Stock Structure Workshop Report (P. Spencer, Alaska Fisheries Science Center).
- An investigation of scallop movement within beds should be a research priority, with the purpose of determining whether scallops can fill areas previously harvested.

- The SSC appreciates the authors' efforts to adopt standard survey regions. Standardization has occurred in PWS-Kayak Island and Cook Inlet. The SSC encourages efforts to develop surveys for other areas
- Additional information on the estimation of q derived from the underwater video techniques in the PWS area should be provided.
- The Scallop Plan Team minutes indicate that the camera sled has been deployed in seven regions off Kodiak. This information should be included in the SAFE area summaries.
- A careful review of table and figure references is needed throughout the document.
- The SSC appreciates the authors' efforts to document how GHLs are estimated (in Section 2.2 and also in Section 3). However, there are no descriptions of how data are used in setting GHLs in Prince William Sound or Cook Inlet. The SSC requests that the methods be summarized in a table by area. Within the area summaries, the authors should indicate the process by which fishery information (e.g., fishery CPUE, age/size composition, apparent recruitment levels) is used by managers to adjust GHLs. In addition, the section describing the estimation of GHL for the westward region mentions that staff set CPUE benchmarks. The rationale for these benchmarks should be clearly stated in the document.
- With the adoption of ACLs it is critical that formulized and consistent control rules are developed. This will aid in creating a transparent process for setting GHLs within registration areas each year.
- The SSC continues to encourage the development of a statewide ageing protocol and development of an age structured model for scallop stocks in the Central Region.

The SSC notes the following area-specific concerns.

- The PWS area CPUE and abundance estimates are the lowest on record for the west bed. In addition, the fishery CPUE was the lowest on record in the 2008/09 season.
- The Cook Inlet area CPUE and abundance estimates are the lowest on record for the south bed and weak meats were noted in both the north and south beds.

Given the reliance on CPUE for scallop assessments, the SSC encourages an evaluation of differences in dredge selectivity between fishing regions, including an analysis of the influence of bottom type on performance.

D-2 (b) Scallop ACL

Diana Stram (NPFMC) provided an overview of the ACL alternatives under consideration and the analyses in the preliminary review draft. Jim Stone (Alaska Scallop Association) provided public testimony.

The SSC feels that having an OFL based on retained catch when the ACL is based on total mortality could be problematic, and recommends that **the OFL be recalculated to include estimates of total mortality**. Accountability measures could be better articulated; a better description of management by ADF&G would aid in evaluating the efficacy of current measures. An additional alternative for the non-target species could be considered; i.e., lumping them in with weathervane scallops into a scallop complex.

D-3(a) GOA Tanner crab Area Closures

Diana Evans (NPFMC), Nick Sagalkin (ADF&G) and John Olson (NMFS, Alaska Region) reported on a draft of an initial review of area closures for Tanner crab protection in the GOA groundfish fisheries. They discussed basic Tanner crab life history, abundance and directed catch of crabs in management sections in Kodiak, Prohibited Species Catch (PSC) of Tanner crab in groundfish fisheries in these sections and in areas proposed for closure or special regulation to reduce PSC. This document will ultimately be used by the Council for weighing alternatives for tanner crab PSC avoidance in specific

areas of the GOA adjacent to Kodiak Island. Public comment was provided by Dorothy Childers (Alaska Marine Conservation Council), Jon Warrenchuk (Oceana), and John Gauvin (Best Use Cooperative).

The authors are to be commended for their work on the analysis of alternatives, which evolved significantly from earlier discussion papers that involved both Chinook salmon and Tanner crab to the current version that focuses only on Tanner crab PSC. The authors have done an admirable job of working within and through the limitations of available data, especially with respect to PSC on unobserved vessels. **However, the SSC recommends that the following issues be clarified or resolved prior to the document being released for public review:**

- Better documentation of historical abundance of Tanner crab by area that adds support to statements that the majority of Tanner crab abundance has been and continues to be focused in the Eastside and Northeast Kodiak section.
- Provide justification, if available from other areas (e.g., BSAI), for a decrease in unobserved mortality in trawls, as a possible benefit from the use of trawl sweep modifications (e.g., elevating devices, such as disks), as suboptions in the two options in alternative 2.
- Clarify that the selection of suboptions that specify gear modifications to trawls and/or pot gear would require more experimental work to determine utility, optimal configuration and enforcement measures in the affected GOA groundfish fisheries.
- Provide estimates of the composition (sex, age/size) of Tanner crab PSC catch if available
- Provide maps of bottom sediment type overlain with estimates of Tanner crab PSC catch in areas proposed for closure.
- Cite the work of Stone et al. in regards to the efficacy of existing closed areas around Kodiak Island (e.g., Red King Crab closures) in affecting crab abundance.
- Clarify either that all areas selected for closure are to be considered as a single closure or that one or more of these areas could be optionally chosen for closure, and that the analysis is sufficiently disaggregated to support decision making.
- Provide background information (e.g., Donaldson et al.), if available, on movement patterns and ranges of Tanner crab in relation to the size of the proposed closured areas.
- Provide information, if available, on the possible effect of groundfish not harvested in proposed closure areas as potential predators on Tanner crab.
- Clarify the relationship between Tanner crab PSC catch in management sections and proposed closure areas with abundance of Tanner crab, directed catch of Tanner crab, and catch of groundfish species in these same sections and closure areas. The SSC suggests that a single table be provided with all of these metrics to be compared.
- Additional discussion of the potential effect of closure areas on fleet behaviors, especially with respect to differences in vessels less than 60' in length versus longer vessels.
- Highlight the problems in data collection and analysis when the target fishery (pelagic versus non-pelagic) is defined in terms of the percentage of catch that is pollock. The SSC suggests that the analysts construct a histogram of percentage pollock in the catch among vessels to bring this issue to light.
- Add a discussion of potential methods for evaluation of the efficacy of closure areas on Tanner crab abundance using ADF&G surveys or other approaches.
- When comparing Tanner crab catch to the abundance within the proposed closed areas, analysts should attempt to use abundance estimates that are representative of areas under considerations.
- Discuss the potential biological effects of closure areas by comparing CPUE in directed flatfish fisheries inside versus outside of closure areas. If closure areas are implemented, additional trawl effort outside of closure areas to attain the TAC may affect habitat and PSC catch of Tanner crab in these outside areas.
- Explore the use of the VMS catch-in-areas database to further elucidate the location of historical catches and PSC crab catches with respect to the proposed closed areas.

- The draft analysis should be edited to denote incidental catches of crab in the groundfish fisheries by the regulatory designation: PSC.

D-3(c) Northern Bering Sea Research Plan

The SSC received a report on the northern Bering Sea Research Plan and have no comments at this time.

D-3(d) Amendment 80 coop report

The SSC appreciates the succinct and informative presentation provided by Jason Anderson (Amendment 80 Co-op manager). Reported co-op performance statistics appear to provide evidence that, only through relatively active cooperative management of PSC allowances (in this instance, Pacific halibut PSC allowances), was the sector able to avoid reaching a "binding" PSC limit. This is encouraging, because it suggests that the provision contained in the Council's Amendment 80 cooperative program envisioning trading of PSC allowance units is having the desired outcome, thus far.

D-3(e) Chinook salmon excluder EFP

The SSC received a presentation from John Gauvin, (North Pacific Fisheries Research Foundation) on the results of testing of a salmon excluder device for the pollock trawl fishery under EFP 08-02. No public testimony was received on this item.

The SSC appreciates Mr. Gauvin's informative presentation and is encouraged by the progress that has been made in improving the rate and consistency of Chinook salmon escapement, as well as the development of the first salmon excluder that appears to be usable under working conditions in the fishery. The presentation focused on testing of the latest iteration of the "flapper-style" excluder during the 2010 pollock A-season. Compared to previous designs, the flapper was located further aft in the trawl in an area of lower water flow, enabling the escapement holes to remain approximately 50% open and allowing salmon escapement under normal towing speed. In addition, weighting of the flapper was moved forward, allowing the tail of the flapper to trail straight back, and floats around the escapement holes were utilized to create a hood to facilitate salmon escapement.

The concept for a salmon excluder has evolved over a number of years, and results of the most recent test appear to be the most promising to date, with an average Chinook salmon escapement rate of 25% to 34% and an average pollock escapement rate of 0.4% to 1.6%, depending on the test vessel. This latest iteration of the excluder also eliminated problems with large volumes of pollock clogging and eventually tearing the net ahead of the excluder, and loss of door spread. Unfortunately, to date the flapper design has not been effective in excluding chum salmon. This is likely due to behavioral differences between Chinook and chum salmon and, if practical, it may be useful to observe chum salmon behavior around trawl webbing in a flume tank. Interestingly, lights used in conjunction with underwater camera systems appeared to attract Chinook salmon, and using light to facilitate Chinook salmon escapement seems a promising direction for future research. There are strong incentives in place for the pollock fleet to avoid Chinook PSC, and Mr. Gauvin indicated that several vessels intend to use the excluder device during the 2010 pollock A-season as part of their strategy to minimize Chinook PSC. **The SSC notes that recording even simple data such as the presence or absence of an excluder device on each tow during the fishing season could provide further insights into the efficacy of the excluder in reducing salmon PSC, particularly in light of the sensitivity of Chinook salmon escapement rates to positioning and weighting of the flapper panel.**

D-4(a) EFH 5-year review

A summary of the 5 year review of Essential Fish Habitat (EFH) was provided by Diana Evans (NPFMC), Matt Eagleton (NMFS), and John Olson (NMFS) with assistance from Nick Sagalkin (ADF&G). Public comment was made by Jon Warrenchuk (Oceana).

The EFH review provided at this meeting was an updated version of the document presented at the February, 2010 Council meeting. New in this version was a compilation and summary of information provided by the Crab Plan Team, the Scallop Plan Team, and salmon scientists from the Alaska Fisheries Science Center on prospective changes to EFH for FMP crab, scallop, and salmon species, respectively. The SSC wishes to thank the authors for responding to requests made by the SSC in February for inclusion of crab, scallop, and salmon information, as well as our requests for information on research results pertinent to EFH determinations and for further documentation for sablefish recommendations.

The SSC agrees with the recommendation to amend the EFH descriptions of individual species of BSAI and GOA groundfish, BSAI crab, scallop, and salmon (See Table 22).

The SSC also agrees with the recommendation to re-analyze the effects of fishing on EFH for crab, specifically in relation to the potential impacts of trawling on benthic habitats for spawning red king crab in southern Bristol Bay. In that case, a significant female component of the spawning population has repopulated an area now subject to intense trawling. This area was believed to be important as red king crab spawning habitat in the 1970s, a time of peak crab abundance when bottom temperatures were relatively cold, a condition that has only recently been observed in the past several years. The SSC suggests that the form of the analysis may be best left to the Crab Plan Team to recommend.

If the Council elects to amend the FMPs, then the SSC would like to see the following considerations included in future revisions.

- In regards to the benthic habitat in protected areas in the Aleutian Islands Habitat Conservation Area, it would be helpful to differentiate those areas that are within fishing depths by gear types (trawl, longline, and pot) and those areas that are protected but beyond standard fishing depths. There should be a distinction between on-shelf and off-shelf regions, due to extensive differences in habitat and fauna, as well as in their respective historic and current fishing pressures.
- Updated estimates of annual bycatch of structure forming invertebrates (corals, sponges, and others) should be included in tables and displayed spatially for each of the management regions, allowing evaluation of trends through time. Figures similar to the color maps provided with the summary document (color figures 1 to 25) would be helpful.
- The SSC requests that the analysts consider the importance of pelagic habitats, such as fronts and upwelling zones, as EFH, that could be vulnerable to fishing or non-fishing disturbance (e.g., fuel oil spills from fishing).

The SSC would also like to highlight several research priorities that would be expected to aid the evaluation of EFH issues:

- There is a continuing need to validate the LEI model and to improve estimates of recovery rates, particularly for the more sensitive habitats, including coral and sponge habitats in the Aleutian Islands region, possibly addressed through comparisons of benthic communities in trawled and untrawled areas.
- There is also a continuing need to obtain high resolution mapping of benthic habitats, particularly in the on-shelf regions of the Aleutian Islands.
- Time series of maturity at age should be collected to facilitate the assessment of whether habitat conditions are suitable for growth to maturity.

- In the case of red king crab spawning habitat in southern Bristol Bay, research is needed on the current impacts of trawling on habitat in spawning areas and the relationship of female crab distribution with respect to bottom temperature.

D-4(b) HAPC Criteria and Priorities

Chapter 12 of the EFH review summary, addressing recommendations for Habitat Areas of Particular Concern (HAPC), was presented by Diana Evans (Council Staff), Matt Eagleton (NMFS), and John Olson (NMFS). Public comment was provided by John Gauvin (Best Use Cooperative), Gerry Merrigan (Alaska Longline Co.), and Jon Warrenchuk (Oceana).

The SSC appreciates the incorporation of our comments on the HAPC proposal evaluation criteria. We suggest that to facilitate the evaluation of proposals according to those criteria, rarity should be required to obtain a score of 2 or above for a proposal to move forward, in keeping with the Council's intent to have rarity as a prerequisite. For proposals that meet that criterion, scores of the remaining 3 criteria would be added together to obtain the final total score (that is, no longer including rarity). We point out that this method (similar to what was used in the original HAPC cycle) assumes that all criteria have equal weight and that they operate independently (i.e., they are "orthogonal"). We are not suggesting any changes to the "Data Certainty Factor."

D-4(c) AI Team TOR

Diana Evans (NPFMC) presented the draft terms of reference for the Aleutian Islands Ecosystem Team (AIET).

The SSC agrees that effective implementation of Ecosystem Approaches to Management requires that ecosystem considerations are an integral part of its scientific advice. **The SSC agrees that an AIET should be formed to periodically review the cumulative risks of present and future actions on the AI ecosystem through the development of the FEP.**

The SSC recommends that the Terms of Reference (TOR) should minimize redundancy in the delivery of scientific advice to the NPFMC. To achieve this flow of information we recommend the following changes to the TOR for the AIET:

Establishment: (2nd sentence). *The AIET update and maintain information on ecosystem interactions as they relate to the Aleutian Islands by periodically updating the AI FEP.*

The SSC recommends that the first and second paragraph under item 4b be modified to read:

Organization 4(b) *Facilitate the use of the AI FEP in Council management. The AIET may also play a role in facilitating the use of the FEP as a management tool for actions related to the Aleutian Islands.*

The AIET will communicate information and reports flowing through the Ecosystem Committee to the NPFMC and SSC typically by making reports to the BSAI Plan Team.

Organization 4 (b iii) *The AIET should strive to communicate the findings of the to AI FEP State, Federal and Council analysts as appropriate so it can be incorporated early in the analysis process.*