North Pacific Fishery Management Council

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Scientific and Statistical Committee

REPORT

April 1-3, 2019 Hilton Hotel, Anchorage, AK

Committee Members in attendance:

Anne Hollowed, **Co-Chair** (*NOAA Fisheries—AFSC)*
Gordon Kruse, **Co-Chair** (*University of Alaska Fairbanks)*
Chris Anderson (*University of Washington)*
Amy Bishop *(Alaska Sea Life Center)*
Mike Downs (*Northern Economics)*
Ron Felthoven (*NOAA Fisheries—AFSC)*
Jason Gasper (*NOAA Fisheries – Alaska Region)*
Dana Hanselman (*NOAA Fisheries—AFSC)*
Brad Harris (*Alaska Pacific University)*
Dayv Lowry (*Washington Dept. of Fish and Wildlife*)
Franz Mueter (*University of Alaska Fairbanks)*
Andrew Munro (*Alaska Dept. of Fish and Game)*
Kate Reedy (*Idaho State University Pocatello*)
Heather Renner (*U.S. Fish and Wildlife Service)*
Ian Stewart (*Intl. Pacific Halibut Commission)*
Alison Whitman (*Oregon Dept. of Fish and Wildlife*)

Members absent:
Sherri Dressel (*Alaska Dept. of Fish and Game)*
George Hunt (*University of Washington*)
Terry Quinn (*University of Alaska Fairbanks)*

B-1 Crab Plan Team Nomination

The SSC reviewed the nomination of Dr. Jie Zheng to the BSAI Crab Plan Team. The SSC finds this nominee to be well-qualified and recommends the Council approve his nomination.

SSC Procedures

The SSC received an updated draft of the SSC Handbook from Diana Evans (NPFMC). The SSC thanks Ms. Evans for her work on this document and will work to resolve remaining minor edits via email.

ACLIM Report

Dr. Kirstin Holsman and Dr. Alan Haynie (AFSC) presented an update on the Alaska Climate Integrated Modeling Project (ACLIM) approach. This project is an interdisciplinary collaboration between researchers at NOAA, the University of Washington, and others to project and evaluate climate impacts on fisheries in the Bering Sea. The presentation reviewed the suite of modeling approaches and analyses that are currently used in a Management Strategy Evaluation (MSE) framework for testing climate-resilient policies for management. This presentation built on the biophysical modeling workshop held at the February SSC meeting and reviewed some recent work on socioeconomic, stock assessment, and food web modeling for the Bering Sea.

As indicated in February, results from the Bering Sea ocean circulation model agree well with empirical observations. Projections suggest substantial warming over the Bering Sea shelf, particularly in the northern Bering Sea, and an increase in the intensity and duration of heat waves. Consistent with observations, plankton models suggest a long-term decline in the abundance of large crustacean zooplankton, which are important food for fish. Upper trophic level modeling suggests that these changes will affect fish productivity with a substantial risk that the biomass of Pacific cod and walleye pollock

will decline under continued warming, even in the absence of fishing. The risk of such declines is considerably higher under the high emissions scenario, stressing the importance of mitigation measures. Notably, the projected changes in biomass for walleye pollock are broadly consistent among different modeling approaches (climate-enhanced single species models, multi-species models, and size-spectrum models). Importantly, predicted long-term trends in fish biomass were consistent among models based on smoothed or annual outputs from global climate models and regionally downscaled models. However, temporal variability in biomass consistent with past observations was only evident in model projections when using projections from a regionally downscaled model, highlighting the importance of downscaling. The SSC was interested in whether additional downscaling (higher spatial resolution) may further enhance this effect on variability.

Emissions scenarios for driving climate models have been well defined, primarily through the work of the IPCC, and provide a reasonable set of contrasting future conditions for assessing ecosystem changes using biophysical models linked to climate model projections. In contrast, defining socio-economic scenarios for analysis of fisheries and fishery management responses provides substantial challenges due to uncertainty about economic trends and the complex behaviors of fishers and fishing communities. Within ACLIM, the development of scenarios has focused on providing a set of contrasting futures of how the social-ecological system could evolve. For example, some analyses have focused on comparing four scenarios based on possible constraints on either pollock/cod or flatfish due to bycatch (PSC) or protected species measures: (1) no fishing, (2) Status Quo management, (3) increased share of pollock and cod, and (4) increased flatfish share.

The SSC appreciates the clear presentation and commends the presenters and ACLIM team on their excellent progress to date. The completed and ongoing work is impressive and we appreciated seeing some preliminary results from project components that have not previously been presented to the SSC, such as results from the size-based model (MIZER). Clearly, as a proof of concept, the ACLIM project has been very successful and has contributed to informing the Council about some key challenges associated with climate warming. The ACLIM approach provides an excellent set of tools for providing long-term strategic advice to the Council, but a major challenge remains identifying/implementing appropriate management responses to better prepare for future climate change impacts on the Bering Sea ecosystem. A common theme identified during ACLIM (and other) stakeholder meetings has been the relative rigidity of the current management system, highlighting the need for increased flexibility to respond to opportunities and provide sufficient scope for adaptation. The analysts highlighted the need for both incremental and transformative adaptation. While the Council has a proven capacity for incremental adaptation, it would benefit from enhancing its capacity to enable the kinds of transformative actions that may be needed to address climate change challenges that are unfolding over relatively long time horizons.

The SSC suggests that the most appropriate ‘on-ramp’ for long-term strategic advice emerging from ACLIM analyses is through the climate Action Module of the Bering Sea Fishery Ecosystem Plan (FEP). Other ‘on-ramps’ for this information are provided through Ecosystem Status Reports (ESRs) and through Ecosystem and Socioeconomic Profiles (ESPs) that are being developed for individual stocks. Outputs from several of the models have been, and should continue to be, used to track multi-species and system-level changes. Model results are useful for identifying key mechanisms as well as emerging behaviors that can inform single-species assessments and management options. The multi-species and multi-model approach inherent in ACLIM can also be used to better quantify and reduce uncertainties about climate change impacts and may even be useful as an early warning system for system-level shifts. Additionally, forecasts of species’ biomass and recruitment may be useful to stock assessment scientists to anticipate future changes in estimates of fish productivity and biological reference points under future climate scenarios.

Some of the remaining challenges include: (1) how to operationalize the approaches and routinely update models and model results; and (2) how to deal with changing dynamics and future conditions that are outside the range of observed conditions. With regards to operationalizing the ACLIM approach, the **SSC**

suggests that the FEP Action Module provides a framework for ensuring that ACLIM models and model results become part of an overall climate change strategy to re-evaluate management strategies every 5-7 years. With regard to changing dynamics, the SSC highlighted the observed shifts in distribution of pollock and Pacific cod in recent years. We note that several existing (FEAST) and emerging modeling approaches (crab IBM, spatial MICE, multi-species VAST) are spatially explicit and have the potential to account for spatial dynamics. Nevertheless, the exploration and appropriate representation of spatial dynamics in projection models is likely to be an important avenue for further research.

C-4 Scallop SAFE

The SSC received a presentation on the scallop SAFE from the Scallop Plan Team co-chairs, Jim Armstrong (NPFMC) and Quinn Smith (ADF&G). No public testimony was provided.

The SSC greatly appreciates the efforts by the Scallop Plan Team and especially the authors of this year's scallop SAFE report. The report is very well done and contains valuable new information on recent fishery independent surveys, fishery performance metrics, and management activities.

The SSC supports the Scallop Plan Team's recommendation to set the OFL for the 2019/20 season equal to maximum OY (1.29 million lb; 585 t) as defined in the Scallop FMP, which applies a 20% mortality rate to discards. The SSC also supports the Team's recommendation to set ABC for scallops in 2019/20 consistent with the maximum ABC control rule (90% of OFL), which is equal to 1.161 million lb (527 t). These recommendations are unchanged in recent years.

The SSC suggests that the scallop SAFE could be considered for a change in assessment frequency similar to the exercise conducted for groundfish stock prioritization. Given that the ABC/OFL recommendations have not changed for some time and they are not near being fully utilized, **the SSC recommends that the authors consider presenting an "Executive Summary" format every other year.** This would save time for the analysts and Scallop Plan Team to focus on some of the recommended analyses and assessment improvements.

The SSC appreciates the responses to previous SSC comments from both 2018 and 2017, noting that many of these requests remain outstanding and should be addressed in subsequent analyses. As the SSC requests are numerous, and progress toward resolving some requests is dependent upon staffing and funding, the SSC looks forward to further progress on these SSC requests in upcoming SAFE reports. For instance, further actions on many of the SSC's comments are dependent on filling ADF&G's biometrician position. Therefore, refilling the vacant scallop biometrician position should be a high priority. The SSC appreciates the additional response to our request to include more annual quantitative indicators of community participation.

With respect to documenting communities substantially engaged in, or dependent on, the scallop fishery, the SSC acknowledges the data confidentiality constraints inherent in a fishery with few participants. The SSC recommends that the analysts explore ways to use qualitative information, potentially in combination with indices of relative change, to illustrate the changes that have resulted in this fishery that involved 13 communities (according to the FMP) from the 1990s through the early 2000s, but is now apparently concentrated in a single community. This represents an important case study of the sustained participation (or lack thereof) of fishing communities in a federally managed fishery, per National Standard 8. The analysts intended to include social and economic data in the main SAFE, but because of the furlough, were unable to complete that task this year. **The SSC recommends these data be integrated in the next full SAFE report.**

In recent years, the SSC has commented on CPUE declines in a number of fishing areas. In this year's assessment, fishery CPUE seems to be rapidly rebounding in many of the eastern beds, while some of the western areas appear to be depressed. These regional increases in CPUE coupled with the substantial

estimates of area-swept biomass and survey indications of recruitment, discussed below, suggests that the stock may be able to sustain higher rates exploitation in those areas.

The SAFE provides information on fishery independent surveys that were implemented during 2016-2018. The SSC greatly appreciates ADF&G's efforts to continue and refine these surveys. Over time, these surveys could lead to good estimation of scallop abundance and stock trends, facilitate the interpretation of long-term fishery CPUE trends, provide advance notice of recruitment strength, and allow development of biological reference points for management corresponding to a higher tier (at a minimum, something akin to tier 5 groundfish, F = M*B). The SAFE reports a substantial increase in the number of small scallops caught in this survey, continuing the trend seen in last year's SAFE report. This may indicate prospects for increased recruitment in some areas, which may result in improved stock status in the future. However, a time series of survey results will be needed to determine how well the survey estimates relative abundance trends in small scallops. **The SSC recommends that the analysts consider what the goal of the survey is when considering their future survey designs and the desired level of precision (current target is a CV of 20%).** For example, it may be better to sample a broader spatial domain with fewer stations and lower levels of precision, if an Alaska-wide stock assessment model is the primary goal. The assessment would also benefit from additional detail on the bootstrap method, and the design-based method used to calculate the CV. **The SSC also recommends that the analysts explore the NMFS bottom trawl survey catches of scallops to see if they could be used to inform the sampling frame. Additionally, it would be useful to see fishery catches in the same table as survey results (and in the same units; e.g., round weight) to easily assess the potential range of exploitation rates by area.**

For many years the SSC has been requesting that an age-structured model be produced. However, challenges include validation of scallop aging and the short time series of fishery independent surveys. In addition, any Alaska-wide model would likely have to be some variety of a spatially-explicit metapopulation model to account for the sedentary nature of scallops and the likely larval drift that seeds different beds from upstream source beds. The SSC notes that recent papers on connectivity of groundfish populations derived from the GOA Integrated Ecosystem Research Program may be useful for informing drift trajectories for scallop larvae (see recent papers by Stockhausen and Gibson in Deep Sea Research Part II: Topical Studies in Oceanography). **The SSC recommends that the authors elucidate a framework for the data and steps needed to improve the assessment and potentially move to an age- or length-based assessment model in the future, even if staffing to implement the model remain pending.**

Given the reliance on fishery CPUE, **the SSC requests further documentation of the methods used to standardize the time series that are used to inform Minimum Performance Standards and to infer relative stock trends**. Consideration should be given to the fraction of the beds actually accessed by the fishery each year, including potential thresholds for when CPUE data may be informative about the abundance/density on that bed vs. simply reflecting fishery conditions and practices in light of current low levels of fishery participation

The analysts showed that the bycatch rates of crab are very low compared to the caps. However, scallop catches are also low in some regions (e.g., Bering Sea). Thus, in addition to the current presentation of crab bycatch, the SSC suggests that the authors calculate bycatch rates as crabs/ton of scallops or crabs per hours of dredge so that bycatch relative to target catch can be examined.

C-6 Community Quota Entity Fish-up in 3A

The SSC reviewed an RIR of a proposed management measure that would allow Community Quota Entities (CQEs) in Area 3A to fish D class halibut quota with C class vessels. There was no public testimony. The proposed action is consistent with the goals and objectives of the formation of CQEs, and addresses the key policy objectives of coastal communities' sustained participation in the IFQ program,

maintaining fleet diversity, and full utilization of their quota. The analysis does a good job explaining the rationale leading to the proposed action, and in addressing the impacts of the alternatives with regard to providing increased flexibility to the CQEs while having minimal impact on the QS market. **The SSC recommends that the document be released for public review** with the following additions and edits:

- Provide an analysis of the NMFS recommendation to allow C class vessels to fish CQE quota for the whole season without the additional limitations and costly programming modifications of Alternatives 2 and 3. Public comments submitted also unanimously favor this recommendation as the preferred alternative.
- Consider the precedent-setting nature of this action by projecting the impacts on other CQEs, communities, QS value, and individual IFQ holders.
- Since only community residents can harvest CQE quota, consider using ownership addresses instead of home port for participating vessels.
- Replace the reference to anecdotal information in the Impacts on Safety section (2.10.3) with the more appropriate characterization of stakeholder input as local knowledge.
- Please clarify the phrase "diluting the magnitude of potential impacts" as used in Executive Summary (last paragraph on Page 6).

C-7 Observer Fee Analysis

Council staff (Elizabeth Figus, Sam Cunningham), NMFS staff (Alicia Miller, Jennifer Ferdinand, Cathy Tide), and PSMFC staff (Geoff Mayhew) presented an Environmental Assessment/Regulatory Impact Review (EA/RIR) analyzing adjustments to the fee that supports deployment of observers and future electronic monitoring in the commercial groundfish and Pacific halibut fisheries that are subject to partial coverage monitoring throughout the GOA and BSAI. Three alternatives were explored: Alternative 1 - status quo, 1.25% fee applied across all landings in the partial coverage category; Alternative 2 - a fee increase of up to a maximum of 2% to apply across the partial coverage category; and Alternative 3 - maintain the 1.25% fee as a minimum for all sectors but allow the Council to adjust the observer fee for any fishery gear sector up to 2%. The proposed management measures would apply exclusively to groundfish and Pacific halibut fisheries in the GOA and BSAI. The stated purpose of this action is to supplement the Observer Program costs in the face of decreasing federal funding, maintain and enhance the Council's ability to meet policy objectives through monitoring, and fund deployment of electronic monitoring systems.

Public testimony was provided by Dan Falvey (ALFA), Rhonda Hubbard (Kruzof Fisheries LLC), and Molly Zaleski (Oceana).

The SSC commends the analysts for the scope and depth of this analysis and appreciates the challenges resulting from observer program budget instability. This EA/RIR provides a broad overview of how observer coverage is funded and implemented in North Pacific fisheries. The analysis focuses primarily on estimating the potential revenues associated with different fee structures and related those to the history of the observer program, the development of electronic monitoring and associated cost uncertainties, and evaluates revenue fee options with respect to the Council's eight stated policy objectives for observer coverage. It does not, however, attempt to evaluate the benefits of observer data to in-season management or stock assessments, for example. **The SSC recommends public release of this document with revisions, as specified below, to enhance the ability of members of the public to clearly assess the benefits to the coverage facilitated by the increased fee in terms comparable to the costs and business metrics relevant to them.**

The quantitative analysis of potential revenues to be raised under each alternative provides useful interpretive text (such as decomposing variance estimators into sub-components) that makes it more readily understood by the numerate public. Consideration is given to factors that affect both the price and

volume of fishery resources that affect ex-vessel revenues and thus the fee base to fund observer coverage. The analysis examines the likely funding outcomes associated with the different alternatives as well as how these costs would be distributed among the communities that are likely to be most affected through potentially uniformly increased fees under Alternative 2 (by examining revenue dependency on the set of fishery sectors that are tied to the partial coverage observer requirements). For the analysis of Alternative 3, the SSC recommends that additional information on the patterns of community engagement in the partial coverage fisheries by sector be presented to allow consideration of potential differential distribution of cost impacts of variable fee increases across communities.

While the potential cost side of the cost/benefit analysis is examined in depth, the benefits of observer coverage discussed in section 4.4 are not explored in any quantitative manner. Many of the benefits arising from the observer data are limited to qualitative discussion of the effects on the representativeness metrics of the annual observer deployment plan. However, this plan is largely aimed at getting statistically representative coverage for various vessel classes rather than estimating the total or marginal net benefits to the nation of additional observations as data is applied in a range of models and management contexts. Without a quantitative understanding of the net benefits provided by varying data levels, it is not possible to compare them to the estimated costs. **The SSC agrees with the authors that observer data are valuable, but cannot discern how that value compares with the costs incurred by the partial coverage fleet by reading this analysis.** The analytical framework employed by the authors appears to be well-enough developed such that it can be used to explore the potential cost and burden implications of more specific impacts of Council motions over different permutations of Alternative 3 (as well as the first two alternatives). However, it is essential to translate these funding requirements for observer coverage to economic outcomes that are meaningful to the affected fleets, both to meet analytical requirements for a cost-benefit analysis and to facilitate, improve and inform the comparisons among alternatives for the public. Prior to the June 2019 Council meeting, the SSC requests that the authors add information to the analysis that identifies the channels through which the proposed alternatives can generate benefits for the fleet (a useful list is included in the 2015 "Final Supplement to the FINAL Supplement to the Environmental Assessment For Restructuring the Program for Observer Procurement and Deployment in the North Pacific"). In addition, reasonable attempts should be made to quantify the largest sources of economic benefits to make clear to the public that they are receiving a return on their fee expenses. For example, if possible, a Monte Carlo analysis of how changes in observer coverage lead to different in-season PSC estimates and resulting incidence of fishery closures and foregone revenues could be very effective (as higher-variance catch estimates are more prone to error and necessitate greater precaution).

D-2 Salmon Status Determination Criteria

Jim Armstrong (NPFMC) and Gretchen Harrington (NMFS-AKRO) introduced the Action Memorandum, Cook Inlet Salmon Committee report, and discussion paper pertaining to potential revisions to the Fishery Management Plan (FMP) for salmon fisheries in the EEZ off Alaska. These revisions are needed to comply with the Ninth Circuit Court's ruling that the Cook Inlet portion of the salmon fishery must be included in the FMP. Andrew Munro (ADF&G) presented Alternative 2 (Section 2.5.2 of the discussion paper) and Curry Cunningham (Alaska Pacific University) presented an analysis on potential overcompensation of two sockeye salmon stocks in upper Cook Inlet. Public testimony was presented by Dan Anderson, a Cook Inlet driftnet fisherman and member of the Cook Inlet Salmon Committee.

The Council directed the SSC to review escapement-based status determination criteria (SDC) options and overcompensation analyses for consistency with National Standards 1 and 2. National Standard 1 indicates that *conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield (OY) from each fishery for the U.S. fishing industry*. National Standard 1 guidelines include the specification of SDC so that overfishing and overfished determinations can be made for stocks and stock complexes in an FMP. National Standard 2 specifies that *conservation*

and management measures shall be based upon the best scientific information available. Scientific information includes, but is not limited to, factual input, data, models, analyses, technical information, or scientific assessments.

Discussion Paper

Section 2.5 of the discussion paper considers SDC and ACLs for three policy alternatives: (1) no action, (2) cooperative management with the state, and (3) federal management. Among these, **the SSC review focused solely on Alternative 2: Cooperative management with the state (Section 2.5.2), as this is the most administratively tenable of the alternatives provided.**

In Alternative 2, salmon stocks caught in Cook Inlet are separated into three tiers for the purposes of status determination criteria and annual catch limits based on differing levels of information. Tier 1 stocks are those for which stock-specific catches and escapements are annually calculated. The MSY control rule is of the "constant escapement" form. As stated in the discussion paper, the catch corresponding to the control rule in any given year is equal to the amount that would result in a post-harvest run size equal to the MSY escapement goal, unless the pre-harvest run size fails to exceed the MSY escapement goal, in which case the catch corresponding to the control rule is zero. Fishing mortality rate for these stocks is estimated as a weighted average of recent run-specific exploitation rates observed in the stock. The maximum fishery mortality threshold (MFMT) for these stocks is computed as a weighted average of recent run-specific exploitation rates corresponding to the MSY control rule. If fishing mortality exceeds MFMT in any year, then the stock will be considered to be experiencing overfishing. If a stock's productive capacity falls below the minimum stock size threshold (MSST) in any year, the stock will be considered to be overfished. Both MFMT and MSST will be updated by ADF&G each year. Preseason, the ACL can be expressed as the sum of observed potential yields from the previous T-1 years (where T = mean generation time) and the preseason forecast of run size minus the lower bound of the escapement goal for year T. Postseason, the ACL using all T years of realized runs will be used to determine if the ACL was met or not. Section 2.5.2 provides formulae to calculate these SDC quantities but does not specify a mechanism for calculating OFL.

Tier 2 stocks are those that cannot be effectively distinguished from one another but that are taken in mixed stock fisheries in Cook Inlet. Thus, these stocks are managed as a complex using select "representative" stocks as indicator stocks. An indicator stock is one with measurable and objective status determination criteria (e.g., sustainable escapement goals based on weir counts) that can be used to help manage and evaluate more poorly known stocks within the complex. The same MSY control rule is used for both Tier 2 and Tier 1 stocks, except for Tier 2 the rule is applied to aggregate stocks in a complex. Using the same definitions and criteria described under Tier 1, a determination that one or more indicator salmon stocks is being subjected to overfishing would constitute a determination that the respective stock complex is being subjected to overfishing (aside from three exceptions noted on page 49). The productive capacity of a stock complex is measured as the sum of the indicator stocks' escapements from the most recent T years. The MSST for a stock complex is equal to one-half the sum of the indicator salmon stocks' MSY escapement goals from the most recent T years. If a stock complex's productive capacity falls below the MSST in any year, it will be determined that the stock complex is overfished.

Tier 3 stocks have no reliable estimates of escapement, but they do have reliable catch. Thus, SDC for Tier 3 stocks is based on the catch history for each species. This catch-only control rule is similar to Tier 6 for federally managed groundfish. Only an OFL and ABC would be set for Tier 3 stocks because it is not possible to set an MSST in the absence of escapement estimates. It is proposed that OFL would be calculated as the maximum catch within a specified range of years, unless an alternative value is established by ADF&G on the basis of the best available scientific information. The discussion paper proposes to calculate ABC as 0.9 times OFL to buffer for uncertainty. The SSC requests the analysts to clarify whether OFL in the example in Table 2-4 is the product of the maximum catch of all brood years

of chum salmon and generation time (4), or is only the maximum catch of one brood year. If it is the former, then the SSC wonders if this approach is sufficiently precautionary. This needs to be clarified.

Overcompensation Analysis

A separate report by Curry Cunningham considered the evidence for overcompensation in the recruitment of two sockeye salmon stocks in upper Cook Inlet. Compensation is contrasted with overcompensation. *Compensation* is the tendency for population productivity (recruits-per-spawner) to decline as spawner abundance increases – i.e., total number of recruits levels off to a maximum, resulting in a decrease in potential yield for each additional spawner beyond the spawner abundance expected to produce maximum sustainable yield (Smsy). For populations exhibiting compensation, surplus escapement is expected to result in foregone yield in the current year, but no reduction in future recruitment. On the other hand, *overcompensation* is the tendency for recruitment to decrease at high levels of spawning abundance. For a salmon stock exhibiting overcompensation, surplus escapement may be expected to result in both foregone yield in the current year, as well as reduced recruitment (and yields) in future years. Thus, presence/absence of overcompensation greatly affects the consequences of exceeding escapement goals.

The overcompensation analysis considered six stock-recruit models. Four of these models are routinely considered for these two sockeye salmon stocks by the ADF&G: (1) the standard Ricker stock-recruit curve, (2) Ricker model with brood year interaction of delayed density-dependent compensation described by main effects, (3) a similar Ricker model with brood year interaction of delayed density-dependent compensation with a statistical interaction term, and (4) an autoregressive Ricker model, which addresses an assumption that process errors (random variation in a stock-recruitment relationship) may not be fully independent across time. Two alternative stock-recruitment models were used to explore the support from the available data for either a Beverton-Holt relationship (includes compensation, but precludes overcompensation), or a Ricker-type relationship (allows for overcompensation). The first of these two alternative models (model 5) is a mixture of the Ricker and Beverton-Holt models in which the value of a fitted parameter indicates support for one or the other model form. The second of these two alternative models (model 6) is a generalized Deriso-Schnute model that can take the shape of either the Beverton-Holt or a Ricker model based on fits to the data. Models were fitted to sockeye salmon data for the Kenai River late-run and Kasilof River stocks using Bayesian methods. Fits were evaluated using a Watanabe-Akaike information criterion (WAIC), such that smaller WAIC values indicate better model fit.

Results indicated that, for the Kenai River stock, there was relatively equal support for all model types with slightly better fit to model (3), the Ricker model with the brood year interaction that includes the statistical interaction term. On the other hand, for the Kasilof River stock, there was much stronger support for model (4), the autoregressive Ricker model. The preferred model for the Kenai River indicates Smsy (spawning abundance yielding MSY) of 1.03 million salmon, with MSY of 3.14 million salmon. For the Kasilof River, the preferred model resulted in estimates of Smsy of 235,000 salmon and MSY of 629,000 salmon. These model results are consistent with ADF&G's findings in their most recent escapement goal review for these stocks.

Regarding the two generalized models, results from model (5), the Ricker Beverton-Holt mixture model, indicate more support for the Beverton-Holt model than the Ricker model. This preference for the Beverton-Holt like model indicates there is *limited evidence for overcompensation.* The Deriso-Schnute model results suggested more support for the Beverton-Holt relationship for the Kenai River stock, but nearly equal evidence for Ricker and Beverton-Holt relationships for the Kasilof River stock. The report noted that a model-based preference for the Ricker model does not necessarily indicate that overcompensation is present, because the Ricker model is flexible and allows models both with and without overcompensation. **Thus, taken together, the report concluded that these mixture models provide little support for overcompensation in sockeye salmon stocks in the Kasilof and Kenai rivers.**

SSC Recommendations

National Standard 1 requires conservation and management measures that prevent overfishing while achieving OY for each FMP fishery, and National Standard 1 guidelines call for the specification of SDC so that overfishing and overfished determinations can be made for stocks and stock complexes. This is a challenging task for Pacific salmon for several reasons. Salmon are managed based on an escapement goal. Salmon run size (abundance) is estimated after the fishery and after salmon return to spawning grounds. Salmon harvest rates are not known until after the fishery is closed and catches are enumerated. The National Standard 1 Guidelines contemplate limited circumstances that may require alternative approaches to setting ACLs and cite Pacific salmon as an example of stocks that may require an alternative approach.

The SSC compliments the analysts for developing a pragmatic approach toward developing SDC for salmon in Cook Inlet. While Alternative 2 in Section 2.5.2 of the discussion paper is still somewhat of a "work in progress," **the SSC feels that the proposed SDC are on track to develop a three-tier system that would meet MSFCMA requirements for National Standard 1. Moreover, it is the SSC's opinion that the control rules used to estimate SDCs for salmon appear to be compliant with National Standard 2 by making use of the best scientific information available, including the best data, models and analyses.** However, the SSC did not evaluate the data, models, and analyses used by the state for salmon management, The SSC appreciates that the tiers are based on levels of scientific information available to estimate SDCs, which mirrors the existing practice for groundfish.

The SSC offers the following specific comments on Alternative 2:

- In the example, the MSST was fixed and the MFMT varied between years in response to the observed catch in state waters. The SSC seeks clarification of how the expected state waters catch would be estimated for the upcoming year to enable estimation of the MFMT.
- As indicated above, the SSC would like the analysts to clarify whether OFL in the example in Table 2-4 is the product of the maximum catch of all brood years of chum salmon and generation time (4), or is only the maximum catch of one brood year. If it is the former, then the SSC wonders if this approach is sufficiently precautionary.
- As indicated in the discussion paper, ADF&G will provide a list of Tier 2 indicator stocks and Tier 3 stocks. The SSC looks forward to these lists.
- In Tier 1 and 2, OFLs and ABCs are not specified as they are for Tier 3. As MSSTs and MFMTs are provided, this may be a matter of clarity of wording. Including OFLs and ABCs for these two tiers will be crucial to meeting the requirements of the MSFCMA.
- The MSFCMA also requires bycatch reporting methods, tools to minimize bycatch, and a fishery impact statement. These will need to be developed prior to final revision of the FMP.
- The buffer used to estimate ABCs from OFLs should be clearly stated and justified. What is the basis for the 10% buffer used for Tier 3 stocks? This would appear to be a small buffer for stocks with the lowest levels of information (i.e., no estimates of escapement and no escapement goals) and, thus, the highest levels of uncertainty regarding stock status. The document should address sources of uncertainty and relate those levels of uncertainty to the sizes of the buffers between OFLs and ABCs.
- In the examples provided for Tiers 1 and 2, assumptions are made about the proportion of catches taken in the EEZ. The document should describe how these proportions will be estimated, as well as any changes in data collection necessary to calculate those estimates. A measure of the uncertainty in the proportion would also be appreciated.
- The majority of salmon catches are taken in state waters, but the control rules are estimated for federal waters only. It may be prudent to estimate SDCs on a stock-wide basis. As currently constructed, the full burden of conservation as a result of overfishing or overfished status appears to

be levied in federal waters. Please clarify how overfishing or overfished determinations would be addressed in practice for federal and state waters.

- The proposed control rules are based on the lower bound of the MSY-based escapement goal range. For calculation of the MFMT, this does not appear to be very conservative. Please consider alternatives (e.g., Smsy), and provide justification for the choice.
- Please clarify the current and likely future availability of genetic tools to allocate catches by stock for Tier 2 and 3 stocks.
- Please more fully address marine mammals, and other predators, requirements of salmon as prey. Consider whether or not marine mammal interaction thresholds are warranted. Harvest guidelines advocated in the FMP will need to provide for ecosystem services provided by salmon, in addition to fishery needs.

The SSC appreciates the opportunity for early evaluation of the potential changes in the salmon FMP for consistency with National Standards 1 and 2. **The SSC requests a similar early look at Section 4.3, Economic and Community Impacts of Salmon Fishing, for an evaluation for consistency with National Standard 8 and associated relevant best scientific information available.** An early SSC review would be important for two primary reasons. First, it is assumed that the current Cook Inlet-focused FMP amendment analysis will be precedent-setting, with the types of data and methodological approach used likely guiding subsequent FMP amendment analyses for the similarly situated defined traditional net fishing areas in Prince William Sound and Alaska Peninsula regions. Second, there are known data and methodological challenges to be addressed, including the fact that historical analyses of only the federal waters portion of the catch is not possible (as noted on page 97 of the document) and the fact that state data in general vary from the data typically used to support Council social/community impact analyses.

The SSC expresses concern that by explicitly incorporating salmon stock escapement estimates made by ADF&G into SDC in the FMP we are implicitly affirming that the methods used to obtain these estimates are best available science, as defined in National Standard 2. While the SSC does not doubt the considerable expertise of ADF&G with regard to escapement estimation, **the SSC requests the opportunity to receive a briefing on the details of these methods so that we may fully assess the assumptions, strengths, and weaknesses of them relative to management criteria for fisheries in the EEZ.**

The SSC offers compliments to the analyst who explored the potential for overcompensation in Kenai River late run and Kasilof River sockeye salmon. **The SSC agrees with the conclusions of this overcompensation analysis, which include: (1) stock-recruit model fits are consistent with ADF&G's findings in their most recent escapement goal review for these stocks; (2) point estimates of Smsy and MSY are 1.03 million and 3.14 million for the Kenai River and 235 thousand and 629 thousand for Kasilof River, respectively, and (3) there is limited evidence for overcompensation across the observed range of spawning abundances (escapements).** Thus, while instances of over-escapement (i.e., escapements larger than Smsy) will result in foregone yield in the current year, they are unlikely to result in reductions in future recruitment and yield. If there are future iterations of this analysis, it would be helpful to use frequentist statistical comparisons (AIC or log-likelihood) alongside of WAIC to provide a more transparent measure of goodness of fit without the influence of prior distributions.

D-4 BSAI Halibut Abundance-based Management of PSC Limits

The SSC received a presentation from Diana Stram, Cary McGilliard, and Curry Cunningham. Public testimony was received from Chad See (Freezer-Longliner Coalition), Heather McCarty (Central Bering Sea Fishermen's Association), Steve Martell (SeaState), John Gauvin (Alaska Seafood Cooperative) and Peggy Parker (Halibut Association of North America). The review documents provided an overview of

biological parameter specifications, analytical assumptions, and ABM policy alternatives for preliminary evaluation. The accompanying presentation included a detailed exposition of the structure and assumptions embedded in the extended management strategy evaluation (MSE) model being designed to understand the mechanisms through which ABM might impact management in the Bering Sea.

The SSC commends the analysts' persistence in working to understand the complex and uncertainty-ridden dynamics of the halibut stock and how it is affected by participants in multiple fleets. Their efforts to engage stakeholders in the process are extensive. The model being developed already reflects an impressive level of thought and coding effort, and the SSC anticipates it being a very useful analytical tool which will provide structure for the analysis and comparison of ABM alternatives.

The SSC reviewed model structure and assumptions including: age-invariant natural mortality; scenarios for recruitment and weight-at-age; sector-specific selectivity; spatial distribution through the two-area (BSAI and other) model; implementation of PSC allocation determination and allocation; modeling PSC usage as an average of recently observed rates; simulation of the IPHC assessment process; calculation of the coastwide TCEY of O26 fish, and distributing it regionally, and to IFQ and CDQ groups; planned performance metrics; and stakeholder feedback about other factors. **The SSC supports the methodological approach developed by the analysts**, with suggestions for further consideration of two assumptions. First, age structure is critical to how reducing PSC take of smaller fish leads to increases in spawning stock and large fish available to the directed fishery, and **thus the SSC recommends a sensitivity analysis of age-dependent versus age-invariant natural mortality structure**. Second, **the SSC recommends considering variable PSC utilization rates** as PSC levels, and the ratios of PSC to target species abundance, vary. In addition, the SSC appreciated the efforts to approximate the IPHC Assessment and including uncertainty, but **recommends that the analysts include the autocorrelation in the residual fit to the survey data rather than the trends in spawning stock biomass**.

The analysts asked the SSC for guidance on how to evaluate alternative policy scenarios under the range of biological parameters about which there is uncertainty. This is an important consideration because the SSC sees the model's role as identifying what elements of the policy scenarios create distinct or contrasting performance metric outcomes in the presence of uncertainty and stochasticity. **The SSC recommends minimizing effort on alternative biological parameter values, in order to focus on identifying the policy parameters that generate the greatest policy contrasts.** A simpler way to approach this might be to identify a baseline biological scenario that encompasses plausible ranges of variability in recruitment, weight-at-age and spatial distribution and generates contrast by simulating over a long time horizon, and then conduct single parameter sensitivity analyses around that baseline if necessary. **The analysts should validate the baseline biological scenario by demonstrating that it generates recruitment variability, spatial distribution, and SSB levels consistent with those observed under status quo management. The SSC recommends that the analysts simplify the presentation of outcomes by reducing the number of performance metrics calculated**, focusing on reducing redundancy.

Although considerable effort has been put into specifying policy scenarios for evaluation, **the SSC recommends that the initial applications of the model be considered exploratory, and instead focus on identifying which policy elements have the most influence on the performance measures**. These explorations should include contrast in the starting point (Element 1) "to allow investigation of the performance of ABM alternatives relative to differences only in the scale of the starting points" (SSC minutes from April 2018) and contrast in the combination of trawl and setline survey indices. The exploration is best served by framing hypotheses about mechanisms through which each element affects (or does not affect) each performance measure, and then using the model to establish whether the multiple offsetting dynamics within the model aggregate to produce changes in performance measures that are large, small, or indistinguishable given uncertainty and stochasticity. Such effects might vary with the relative abundances of large and small halibut. The SSC wishes to leave the analysts considerable flexibility in specifying these hypotheses and in choosing policy scenarios to evaluate them. Presentation

of model outcomes from these cases should be more than just a table of resulting performance metrics, but rather should include a discussion of the biological and behavioral mechanisms that are influential in determining changes from the status quo.

Absent a heuristic understanding of whether or how ABM policies are likely to change the identified performance metrics, and where existing data support identifying differences among policies, the SSC is concerned that the model will not be ready to provide results for initial review in October. **The SSC anticipates needing to review the results of the exploratory analysis in advance of recommending specification of policy alternatives for detailed evaluation.**

D-5 Alaska Region Economic Data Reporting Programs

The SSC received a presentation reviewing the history, format and use of the current Economic Data Report (EDR) data from Sarah Marrinan (Council Staff), Steve Kasperski (AFSC) and Brian Garber-Yonts (AFSC). Public testimony was provided by Mark Fina (US Seafoods).

EDRs provide critical information about the level and distribution of benefits from North Pacific fisheries among the fleets and communities that are engaged in them. Experience has demonstrated that it is possible to gather data that are of sufficient accuracy and precision to support scientifically valid analyses for which there are not substitute data sources or proxies available. Further, EDR designers and users have learned many, and implemented some, lessons that have led subsequent EDR programs to improve upon earlier ones. However, the North Pacific is far behind the national norm in the portion of the fleet about which we have cost data that allow us to fulfil regulatory requirements for conducting cost-benefit, impact, and distributional analyses. To address this gap, **the SSC concurs with the sentiment that there are further opportunities to reduce the agency and respondent reporting burden, increase data usefulness, and expand data utilization.**

Each EDR program was designed specifically to provide information that fed into quinquennial catch share program reviews, and each review has relied on its EDR data in its program evaluation. However, EDR data has proven more broadly useful, and is included in annual monitoring through the Economic SAFE reports for groundfish and crab. It is also used in bioeconomic models that help parameterize stock assessments. EDRs provide critical information for meeting RIR requirements for analysis of Council actions, such as halibut deck sorting, GOA trawl bycatch management, and Pacific cod trawl management; in this capacity, EDRs are the only source of crew employment data that are central to identifying how many actions affect community engagement. Finally, EDR data supports peer reviewed research that elucidates how management affects outcomes for fishery participants. **The SSC concludes that EDR programs are essential to meeting National Standard 2 requirements for the application of the best available science, including data collection practices, in support of National Standard 4's fairness of equity provisions, National Standard 5's efficiency provision, and National Standard 8's mandate to provide for the sustained participation of [fishing] communities and … minimize adverse economic impacts on such communities.**

While current EDR programs have conclusively demonstrated the practicality and utility of the EDR program, the analysis recommends several ways in which EDR implementation could be improved to better achieve Council goals. The analysts suggest EDRs could be better aligned and standardized to reduce questions about data we now know to be less useful, and instead capture types of information now known to be more useful in analysis. A cross-cutting challenge is how to best capture the portion of costs associated with a particular fishery, in entities that participate in multiple fisheries (possibly in multiple jurisdictions), as well as non-fishing activities such as tendering. **The SSC supports efforts to identify and evaluate these improvements, and suggests consultation with the Social Science Planning Team, which is tasked with evaluating data streams in the context of broad social and economic data gaps.**

In addition to evaluating changes to the forms, the analysts identify elements of the current EDR process that are barriers to using the EDR more widely. These include that Council staff lacks direct access to the

data; the EDR-specific confidentiality rule-of-5 means information frequently cannot be reported; limited fleet coverage often means that all fleets affected by an action lack EDR data and cannot be analyzed comparably; and lack of standard data definitions and analytical frameworks mean it is difficult to for Council staff and other analysts to apply. Acknowledging the limitations of standardization among diverse fleets and FMP objectives**, the SSC recommends efforts to reduce these barriers to using EDR data.**

To reduce the collection burden and improve the utility, transparency and accessibility of the EDR data, the SSC supports several specific recommendations made by the analysts:

- The third-party auditing process creates a context of potential "violations" for misreporting when questions are misinterpreted, when in fact this is an administrative data collection which NWFSC has more constructively pursued by working with and training the submitters to obtain good faith, accurate reporting.
- Each EDR should be reviewed for duplication of reporting material with other data sources.
- NMFS should work to clarify the goals of the EDR programs so that industry perceives minimal disincentives to reveal management-relevant financial information to the federal government.

The SSC further suggests that the analysis, and the ensuing process for improving EDR practices, could be enhanced by:

- Specifically stating lessons learned in the North Pacific historical review.
- Drawing on lessons learned from other regions, most of which have now eclipsed the North Pacific in gathering useful EDR data, especially on vessel and processing costs.
- Revisiting the quinquennial program reviews to identify questions that have been raised but were not adequately addressed by EDR information.
- The importance and utility of EDRs can be more easily demonstrated to industry through routine, systematic inclusion of more EDR metrics in fishery monitoring data products, such as annual SAFE reports. This would also help fulfill the National Standard 2 mandate of incorporating social and community information into SAFE reports, make EDR data more directly accessible to a wider range of user groups, and provide an opportunity to develop a standard set of key indicators of community engagement, dependency, and sustained participation in an annually refreshed time-series format. These data could, in turn, serve as early indicators of changing trends in community participation in, for example, those years between program reviews or FMP amendment analyses in a given fishery.

D-9 Economic SAFEs

SSC comments are exclusively related to the economic groundfish SAFE, as the economic crab SAFE was not provided for review prior to the start of the SSC meeting. This is not the first time the crab SAFE has not been provided in time for review and this trend is troublesome, especially in light of the increased flexibility provided by changing the due date from the December Council meeting to the February Council meeting a few years ago (and this year review was delayed until April). Timely, thorough updating and review of economic SAFEs is crucial to ensure that management processes adequately account for financial and societal aspects of fisheries. It was noted that none of the SSC comments provided at the June 2018 meeting were addressed in this year's crab economic SAFE. The analyst, however, committed to addressing these comments in a revised version of the crab economic SAFE that will be provided to the Crab Plan Team at their May 2019 meeting and noted that this document would be available to the SSC for review at the June 2019 Council meeting.

The development of the Economic Report Card metrics, as has been done with the Ecosystem Status Report, is very useful but we would like to see an expanded discussion of the changes or trends in indicators, along with the potential causes for some of the changes. One could use these potential factors,

which may be responsible for noted trends, as areas of inquiry or hypotheses for future studies. This would also allow the SSC to provide guidance on prioritizing a focused set of questions with the most utility.

Section 1.1.1 includes a portion of the Groundfish Plan Team's report, titled "Economic Summary of BSAI." While this section is informative and interesting, it seems as though it was simply pasted in indiscriminately without culling out information that was already presented in other sections of the economic SAFE. Given the length of the document, it would be helpful to limit the amount of redundant information provided between sections. It is also particularly important that any such data included should be consistent among sections, which has been an issue in the past (due largely to database changes during the time period in which different datasets were sourced by different individuals). Even the current draft notes "Some values may differ slightly from those found in the rest of the report." This statement suggests the authors were aware of inconsistencies which should have been reconciled before publication. As this section includes Gulf of Alaska information, the title (which just references BSAI) should be broadened to include both regions.

In Section 5, the economic indices do a very effective job of explaining the source of variation in ex-vessel and first-wholesale revenues by breaking them out into price and volume changes, as well as by species and product form, by region and sector. The color coding is a useful way to communicate the rate of change in some variables and identify major shocks. In some of the figures, the year labels are a bit large and difficult to read, and the same holds true for axes labels on some legends.

The price projections presented in Section 6 are a thoughtful way to provide updated price data in this report given that the reported prices are from over a year ago. The process of comparing last year's projections to the realization of the most recent prices provides useful information on the robustness of the price "nowcast" estimates. It would be useful to see a larger number of price projections and realizations from past years in one table as the nowcasts continue to be published. Seeing the magnitude and direction of the prediction errors that arose could give some indication of bias in the estimates, volatility in the pricing, and the relative prediction accuracy across species or product forms.

In Section 9, the Amendment 80 tables and figures are very thorough and the discussion provided is insightful. Given ongoing discussions over the utility of collecting cost and earnings (EDR) data for analyses, this section provides a concrete example for all the various types of information that can be better understood from such data. To further the utility of these data, trends or patterns in observed data could be summarized and a list of potential research questions/hypotheses that identify or attribute the sources of change should be developed. These trends could be investigated by following up with company or sector representatives for informal discussions or through statistical analyses of the data, or ideally both.

The SSC particularly appreciates the responsiveness to comments from the SSC last year in Section 10 (Communities). In this section, the authors associate the communities with large general categories like harvesting or processing engagement, but the SSC would prefer to see the specific fisheries these communities are engaged in or dependent upon for future policy analyses. This would clearly be a long list of communities and fisheries, so if there is an electronic database available to filter these data it would be particularly useful. The SSC noted that in Section 10.1.2 (Methods) that levels of analysis differ across regions as, for example, the Kodiak Island Borough communities are aggregated to the borough level but the Aleutians East Borough communities are not. The SSC has suggested using a consistent approach, with community level information being presented to the degree possible but aggregated to the borough level where confidentiality restrictions dictate. With respect to Section 10.1.3 (Commercial Fisheries Engagement Indices), the SSC requested that a priority be placed on addressing the noted data gap for inshore floating processor (IFP) operational location information going forward, as communities derive a range of benefits, including public revenues from local and shared state fish landing taxes, from IFPs operating inside of municipal boundaries similar to those generated by shore-based processors.

The community sketches are very informative and the SSC appreciates seeing information included here beyond fishing and processing data, as those data should be interpreted in the larger context of the factors which affect community well-being. Pie charts are included for each community with regard to landed harvesting revenue by species. The bar charts inside each "slice" presumably are to reflect variation in that species component, but it is difficult to interpret with no scale, and it is not clear if the scale is identical across species. Since the percent value listed is for the mean, perhaps consider adding an estimate of the variance below it, which may be more readily interpretable. In addition, some communities may have low harvesting engagement and high processing engagement, but it seems each sketch includes a pie chart for harvesting only. It may make sense to swap out the harvest pie chart for a processing pie chart in those communities, and to include both pie charts if both harvesting and processing rise above some level of engagement.

The processing information also differs from sketch to sketch; many include a figure, one has a table, and others have neither. And, as opposed to the harvesting data reported, generally species-specific information are not provided. If the different formatting used among the sections was adopted as a way to accommodate a two-page length, this should not be the primary determination of the sketch format. Rather, we would prefer to see a standardized format in which the breadth of the available information dictates the length. Note also that the transition of the document to the history of Alaska fisheries in section 10.3 needs more context. Authors may consider adding language to motivate how each section fleshes out the bigger picture of how communities are engaged or dependent on North Pacific fisheries. The section which follows and includes data on the role of and reliance on fish taxes in communities is an especially valuable contribution to this report. The SSC also recommends the addition of data that display the demographic differences, where relevant, between the general community population and locally present if relatively transient processing workers drawn from labor pools outside of the community. It was suggested that group quarters housing data may provide a useful means of addressing this recommendation, especially for communities in southwest Alaska. In short, the SSC noted that the community information presented in the groundfish economic SAFE, with its combination of indices and community sketches, provides a useful template for the incorporation of social and community data into the SAFE documents for other fisheries.

Section 11 presents catch share performance metrics by program, and the metrics are useful for illustrating trends in many of the fishery characteristics one might expect to see following these management transitions. The table showing percent changes in catch share metrics from previous years is a highlight of the section, as it is very concise and informative and a vehicle for identifying research questions.

The SAFE Appendix includes a section detailing ongoing or recently completed research projects by AFSC social science staff. While increasing awareness of these products has value, there may be a way to create even more utility. Ideally many of the listed projects will be aimed at analyzing specific fishery management actions or developing tools to improve analysts' ability to analyze actions. The SSC recommends adding a row after each project description, similar to a "keywords" description that often accompanies an abstract, that describes the types of fishery management issues or actions it can be used to inform (e.g., spatial closures, equity or distributional concerns, regional economic impacts, protected species), and whether it could be used in an *ex-ante* or *ex-post* context. The bulk of the work done by Council staff are *ex-ante* analyses of proposed or potential effects of actions, but *ex-post* catch share program reviews now must be prepared on specified intervals and so this differentiation of the application of these research projects could be helpful. Additionally, AFSC staff could keep these management action headers/classifications and a comprehensive list of projects or publications on their website to facilitate easy retrieval for analysts.

SSC Member Agenda Associations

At the beginning of each meeting, members of the SSC publicly acknowledge any direct associations with SSC agenda items. These associations are characterized as substantially contributing to or reviewing agenda items outside of the NPFMC SSC review process. This may include direct supervision of contributors or serving as authors of agenda items in some situations. As a general practice, those members who have close associations with the development or review of agenda items are expected to recuse themselves from review and development of SSC recommendations for those items at the SSC meeting, though clarifications or background on agenda items may be provided if requested. 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 2019 meeting, multiple SSC members acknowledged associations with specific agenda items under SSC review. Dr. Munro acknowledged direct involvement with the ongoing development of the discussion paper pertaining to D-2 Salmon Status Determination Criteria. Dr. Gasper noted that he contributed to the analysis and development of C-7 Observer Fee analysis and D-2 Salmon FMP discussion paper. Dr. Hollowed is a co-PI on the ACLIM project and she supervises Dr. Ianelli and is the secondary supervisor for Dr. McGilliard who are members of the Halibut ABM working group. Dr. Harris supervises Dr. Cunningham, who presented research on overcompensation for D-2 Salmon Status Determination Criteria and is a member of the Halibut ABM working group. Dr. Harris noted that he did not review or contribute to the work presented. Dr. Felthoven currently supervises a secondary author of D-5 Economic Data Report. Dr. Downs noted that he will be involved in future stages of the Halibut ABM analysis. Finally, Dr. Hanselman is a member of the Halibut ABM working group.