North Pacific Fishery Management Council

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REPORT
of the
SCIENTIFIC AND STATISTICAL COMMITTEE
to the
NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
February 3rd – 5th, 2014

The SSC met from February 3rd through 5th at the Renaissance Hotel, Seattle, WA.

Members present were:

Pat Livingston, Chair *NOAA Fisheries—AFSC*	Chris Anderson *University of Washington*	Alison Dauble *Oregon Dept. of Fish and Wildlife*
Sherri Dressel *Alaska Department of Fish and Game*	Anne Hollowed *NOAA Fisheries—AFSC*	George Hunt *University of Washington*
Gordon Kruse *University of Alaska Fairbanks*	Seth Macinko *University of Rhode Island*	Steve Martell *Int'l. Pacific Halibut Commission*
Franz Mueter *University of Alaska Fairbanks*	Lew Queirolo *NOAA Fisheries—Alaska R egion*	Kate Reedy *Idaho State University Pocatello*
Matt Reimer *University of Alaska Anchorage*		

Members absent were:

Jennifer Burns *University of Alaska Anchorage*	Robert Clark *Alaska Department of Fish and Game*	Terry Quinn *University of Alaska Fairbanks*
Farron Wallace *NOAA Fisheries—AFSC*		

SSC Election of Officers
The SSC reappointed Pat Livingston as chair and Robert Clark as vice chair.

C-11 Observer Annual Performance Review
A presentation on the summary of requests and a draft outline for the 2013 Observer Program Annual Report was given by Martin Loefflad (NMFS-AFSC) and Jennifer Mondragon (NMFS-AKR). Public testimony was provided by Paul MacGregor (At-Sea Processors Association).

The SSC appreciates the presentation and the outline and looks forward to reviewing the 2013 Observer Program Annual Report in June. Last June (2013), the Observer Program Annual Report presented information from the first 16 weeks of 2013. The June 2014 report will evaluate the full 2013 observer

year. Presenters stressed that improvement to the observer program will be an ongoing and iterative process and not all analyses will be completed this first year. The goals of the revised observer program are to increase the statistical reliability of data collected by the program, address cost inequality among fishery participants, and expand observer coverage to previously unobserved fisheries. The focus of the Observer Annual Performance Review for 2013 will be measuring the effectiveness of the deployment plan by looking at deployment coverage and the amount of catch, bycatch, prohibited species catch, and discards. **The SSC requests that the descriptive statistics provided in the Performance Review for 2013 about catch, discard, and observer coverage by area, gear, and target fishery include a comparison between state and federal waters (refer to SSC December 2013 minutes).** In part based on the SSC comments in October 2013, the 2013 Performance Review will focus on the evaluation of the selection process and observer deployment in the vessel selection pool to explore potential sources of vessel selection bias. The SSC recognizes the efforts to decrease sampling bias using a random sampling design in the revised program. However, partial observer coverage presents opportunities to game the system, introduces an observer effect, and most likely leads to a downward bias in estimates of bycatch when extrapolating to the unobserved portion of the fleet. Examining deployment in the vessel selection pool does not address this bias, but will improve information collected from a broader cross section of the fishing fleets. Both the presenters and the SSC agree that it is not possible to address bias in estimates of bycatch, or an observer effect, without 100% observer coverage. The SSC heard a suggestion for the use of VMS and EM on vessels that have been exempted from the vessel pool to provide some coverage for vessels not carrying an observer. While the SSC is concerned about the bias resulting from exempted vessels, it concluded that those systems alone are not capable to provide the catch composition information needed from those vessels.

The SSC reiterates the need for statistically-based performance measures with estimates of uncertainty for the purpose of evaluating how well the observer program is meeting its objectives. Performance metrics that will be used in the June 2013 Performance Review were not presented at this meeting. If possible, the SSC would appreciate reviewing the metrics to be used for the 2013 Performance Review, accompanied with the stated objectives of the revised observer program, at its April 2014 meeting. The SSC looks forward to a discussion at the June 2014 meeting regarding performance metrics and how these address program objectives in the upcoming years. **An additional chapter in the annual report is requested to examine how changes in the observed program design impact incentives, both positive and negative, in the commercial fishing sectors. Direct collaboration with industry is encouraged for developing a better incentive-based structure, and for examining the pros and cons of other partial and 100% coverage models that are in use in other countries and Regional Fisheries Management Organizations (RFMOs).** One example discussed was the penalty-based system in the British Columbia model where, if an individual is not maintaining a high standard in the logbooks, the individual is responsible to cover the costs of a 100% audit. However, presenters noted that it may not be legal in the US to implement a penalty-based system for failing to comply with logbook audits using an independent video monitoring system, as is the case in British Columbia fisheries.

D-1 Ecosystem Vision

Diana Evans (NPFMC) gave the SSC an update on efforts by the Council's Ecosystem Committee to develop an Ecosystem Vision Statement. An edited mark-up copy was presented of the version provided in the Action Memo. There was no public testimony.

Ecosystem principles are included in the Council's management approach in both groundfish FMPs. As the Crab, Salmon, and Scallop FMPs do not have similar ecosystem-focused sections, it is appropriate for the Council to develop an Ecosystem Vision Statement that transcends all FMPs. **The SSC fully supports this effort.**

The draft value statement, vision statement, and implementation strategy embody elements consistent with an ecosystem approach to fisheries management. The SSC felt that the draft language looked reasonable, but three specific comments are offered. First, in the implementation strategy, the SSC recommends clarifying "associated ecosystem components" by something like the following phrase: "associated ecosystem components, such as habitats and non-managed species." Second, it was noted that the new text "interrelationships among species" is redundant. It is preferable to say "relationships among species" or "interactions among species." Last, it was requested that the final language should be clear that humans, and their communities, are part of the ecosystem.

D-2 Bering Sea FEP

A discussion paper was presented on the potential development of a Bering Sea Fishery Ecosystem Plan (FEP) by Diana Evans (NPFMC). The discussion paper lays out many of the issues that need to be considered if the Council moves forward with the FEP. Public comment was provided by Jackie Dragon (Greenpeace).

The SSC endorses the Ecosystem Committee (EC) recommendation to develop an FEP for the Bering Sea. However, we note that there are many ongoing activities that fulfill some of the potential purposes of an FEP, such as the annual Ecosystem Considerations chapter and Ecosystem Assessment. Therefore it is critical that the Council first identifies clear objectives for a future Bering Sea FEP that will add value to the existing management framework rather than duplicating what is already being done. **If the Council decides to go forward with a Bering Sea FEP, the SSC recommends making the FEP a living document that provides a framework for considering policy choices and trade-offs as these affect FMP species and the broader Bering Sea ecosystem.**

When evaluating the merits of a potential FEP and deciding on a possible structure, the Council should consider the full range of approaches that have been used in the development and implementation of other FEPs to identify FEP elements best suited for the Bering Sea region. As the discussion paper points out, it would be a formidable task to synthesize ecosystem information for the Bering Sea in light of the wealth of new information that is now becoming available from the Bering Sea Project and other research. Nevertheless, the SSC sees value in synthesizing key ecosystem information relevant to the management of FMP species to evaluate how recent advances in our understanding of the Bering Sea ecosystem can help inform management decisions.

The SSC discussed the geographic scope of a Bering Sea FEP and endorsed the EC recommendation to include the shelf and slope of the eastern Bering Sea to 60°N. However, the Council may want to consider expanding this area to include Norton Sound, which has a commercial fishery for red king crab. Furthermore, the FEP should include species such as seabirds and mammals that transit through the Bering Sea region or utilize the Bering Sea on a seasonal basis, as well as the communities of western Alaska, which form an integral part of the Bering Sea ecosystem. The SSC suggests allowing the

geographic scope of the FEP to change over time as the distribution of FMP species and the associated ecosystem boundaries change.

The SSC suggests that the risk assessment conducted for the AI FEP should provide a useful approach for evaluating risks from fishing and other anthropogenic activities and their effects on the ecosystem and coastal communities. This approach may be particularly useful for identifying and guiding high priority ecosystem-based initiatives that cut across existing FMPs, such as responses to ocean acidification, climate change and socio-economic initiatives.

Finally, the SSC highlights the need to conduct outreach in the development of the FEP as well as to include an outreach and communication component in the FEP. As suggested in the discussion paper, the FEP could be designed to regularly communicate new developments in ecosystem science to the Council and its constituents.

With regard to the process of developing an FEP, the SSC recommends drawing on a wide range of expertise from agencies, academia, and NGOs with frequent input from the public. While the SSC believes that a well-designed FEP for the Bering Sea would bring many potential benefits, these benefits need to be evaluated relative to the considerable costs of embarking on the development of such a plan.

D-3 Chinook EDR

The SSC received a presentation of the Chinook PSC avoidance economic data report (EDR) from Brian Garber-Yonts and Alan Haynie (NMFS-AFSC). Public testimony was provided by Ed Richardson (Pollock Conservation Cooperative). The report was informative and effective in responding to SSC questions. The analysts clearly summarized early experience gleaned from the survey instrument and responses received. **The SSC is encouraged by the information presented and supports continued efforts to improve, refine, and interpret survey design and responses.**

The authors identified a number of shortcomings with the Amendment 91 Chinook Salmon EDR program, including the potential misunderstanding of when/how to use the salmon movement "logbook checkbox" and the inability to capture pricing information for Chinook PSC quota from the Compensated Transfer Reports. The SSC suggests following up on several aspects of the Compensated Transfer Report and "logbook checkbox" as identified in the discussion. For example, "what constitutes a move when checking the logbook checkbox?" and "how can the price of Chinook PSC be disaggregated from reported transfers of bundled Chinook PSC and pollock quota?" In addition, "what assumptions are being made about CV at-sea sorting when interpreting responses about Chinook avoidance?" As explained by the analysts, CV Chinook PSC counts are documented during off-load to the processing facility. Depending upon the implicit assumption about whether at-sea sorting aboard CVs is or is not prevalent, interpretation of Chinook 'avoidance' behavior by CVs may be problematic.

Despite these possible shortcomings in the current instrument, the SSC recommends that the Vessel Fuel and Vessel Master survey questions remain consistent over time (to the extent practicable)—at least initially. Additional years of data, along with varying fishery conditions over time, will reveal whether or not the survey instruments are capturing adequate information to inform the Council on the performance of Chinook avoidance under Amendment 91. At this point, it is difficult to fully identify the

strengths and weaknesses of the data collection program with only a single year of data, particularly one in which the Chinook caps were far from binding, so avoidance was not a pressing issue.

The SSC looks forward to seeing additional analysis using the data collected from the Amendment 91 Chinook Salmon PSC Avoidance EDR program. Further analysis may reveal additional shortcomings/strengths of the survey instruments, and guide future refinement of the EDR program. The SSC cautions the authors when using EDR information to estimate the opportunity cost of avoiding Chinook PSC, given how difficult it is to identify this opportunity cost. While a legitimate topic for exploration, the appropriate disclaimers, caveats, and limitations must be presented.

Ideally, interpretation of survey statistics and subjective, open ended information provided by respondents would be presented in a context that identifies and, to the extent practicable, evaluates the importance of the many exogenous influences that enter into fishing behavior (e.g., world seafood demand [both in general and species/product specific], competing supplies, substitutes in the market, fuel supply and price, global economic parameters). These exogenous factors can provide a more comprehensive and contextually rich understanding of these fishery resources.

D-4 Crab Modeling

Andre Punt (UW, CPT member) presented a summary of the Crab Modeling workshop held at the Hilton Hotel in Anchorage AK on January 14-17, 2014. The workshop focused on three major components: 1) development of the Generalized Crab Model (Gmacs), 2), the Norton Sound red king crab assessment, and 3) compilation of data used in crab assessments. Unfortunately, no one from the SSC was able to participate in this year's workshop.

Athol Whitten (UW) and Jim Ianelli (NMFS-AFSC) have made significant progress on developing a generalized length-based assessment model for use with all crab stocks. The code for this project is written in AD Model Builder and C++; it is open-source and hosted on a free public website in which anyone may obtain a copy of the source code. In its present state, the assessment model is not ready for conducting parallel assessments with existing models, although it is anticipated that parallel assessments may be ready as early as May 2014 and possibly for use in 2015 assessments. There are no explicit plans. The SSC encourages the continued development of the code. The SSC recommends that model developers include assessment analysts in discussions regarding model development to ensure that the end product will accommodate desired aspects of current and future models. It was also recommended that, if the assessment analysts request training on using the model, then Dr. Whitten should provide this training. **In addition, the SSC also recommends that a peer review of the new generalized crab model be conducted outside the CPT.**

A general confounding problem in all of the length-based assessment platforms used for crab stock assessment is jointly resolving growth, selectivity and natural mortality. The CPT recommends, where possible, that tagging data be integrated directly into the model to inform the length-transition matrices. Also, the CPT recommends avoiding dome-shaped selectivities unless there is a good biological reason for doing so. The SSC endorses both of these general recommendations.

Last year the SSC did not accept the NSRKC model presented in October 2013. In moving forward, the recent workshop made several notable changes to the underlying assessment model structure. First, weighting of the likelihood component for annual recruitment deviations was changed to have a CV of approximately 0.50. This change significantly reduced the most recent recruitment estimate over the model that was presented last year. Relative to other red king crab models, this is a relatively data poor assessment. Parameter bounds were used inappropriately to constrain the estimation problem. Increasing the range in the parameter bounds resolved some of the convergence issues. Additional issues surrounding the input data were also noted, specifically fitting the model to size-composition information from an abundance index, but not fitting the model to the actual abundance index. Other technical issues in the set-up of the assessment model were also discussed.

The last component of the crab modeling workshop dealt with identifying sources of input data for the assessment models. Many of the input data were legacy data that had no clear documentation on their derivation from the raw sources (databases). It was noted in the NSRKC data that strata selection for constructing the relative abundance index was not consistent among years. Bob Foy will present to the CPT and SSC a series of alternative strata options, and the SSC will need to make a recommendation on how these data sets should be assembled. **The SSC recommends that clear documentation of the protocols for assembling time series, length composition information, and criteria for specific strata be included as part of the annual documentation of the assessment so that it exists as a living document to be approved by the CPT when periodic changes are made**.

Another notable change to the data streams is the use of the chela height-to-length ratio to determine the maturity-at-length information that is required to calculate mature male biomass in the Tanner and snow crab stocks. Chela height versus carapace width data have been pooled across all years to develop a length-at-maturity relationship. This is analogous to pooling length-age data across all years and using it as an age-length-key for each year. These chela height versus carapace width data are now being disaggregated for the purposes of developing annual maturity-at-length keys. The SSC endorses this change to the protocol for determining the maturity-at-length schedules.

At present, a weight-length regression relationship is used to determine the haul weight for the survey; the sources of the data for this weight-length regression are unknown and recent data only date back to 2009. To correct for potential bias associated with changes in the weight-length regression parameters, the actual haul weight averaged over the strata will be used to calculate the abundance index. The SSC also endorses this change to calculating the relative abundance indices in survey data. In all cases when commercial fishery CPUE is used as an index in a stock assessment model, the SSC recommends investigating CPUE standardization before the model is fit to these data.

In addition to the data issues described above, the analysts discovered that size frequency data for crabs collected from groundfish fisheries extended further back in time than previously thought. The impact of adding these early data to the snow crab model will be presented in May 2014. Given the number of new changes to the model structure and the input data streams, there is concern about the number of permutations and combinations that will be required to address the issues raised in this most recent workshop.

D-5 Economic SAFEs

Crab Economic SAFE

The SSC received a presentation of the 2014 Crab SAFE from Brian Garber-Yonts (NMFS-AFSC). The draft document provides a marked improvement over previous Crab SAFE documents, which have been sporadically prepared in the past. This version provides economic and operational information, supported by improved interpretative text, and moves in the direction of providing a well-documented time series of key economic statistics, useful in the Council's management process. It is a good demonstration of the kinds of variables that can be tracked, and types of analyses that can be supported, when a more comprehensive data collection is available. New elements, such as employment statistics, labor compensation, source of labor, and shares accruing to labor, by target fishery add interesting information. Likewise, treatment of quota sale and leasing patterns across the type, species, price, and mode is a very nice addition. The SSC noted the importance of gathering information on a few key variables such as gear purchase and maintenance costs that were lost when scaling down the Crab EDR.

The accessibility of the document would be enhanced by the further development of the Executive Summary and inclusion of a more formal Economic Report Card at the start of the document that emulates the very helpful compilation of summary information and Ecosystem Indices at the beginning of the Ecosystem Considerations Chapter in the BSAI/GOA Groundfish SAFE. As with the groundfish SAFE, it would be useful to have retrospective information on where, broadly, Alaska fisheries benefits accrue, through tracking the communities in which their participants live. In particular, it would be informative to identify where quota owners, harvesters, crew, and processing workers live. Relevant scales for reporting might be Alaska, Pacific Northwest, U.S., or foreign residency.

There are numerous examples of inaccurate use of terminology in both the Crab and Groundfish Economic SAFEs. Authors are advised to consult the SSC's comments on the 2014 draft Groundfish Economic SAFE, as well the SSC's Reports on the SAFE from 2011 and 2012. The SSC will provide detailed editorial comments to the Crab Economic SAFE analysts.

Groundfish Economic SAFE

The SSC received a presentation of the 2014 Economic Groundfish SAFE document from Ron Felthoven and Ben Fissel (NMFS-AFSC). There was no public testimony.

It is encouraging to see continued progress on extending and improving the Economic SAFE. The SSC appreciates the effort, demonstrated in this draft, to elevate the Economic SAFE to a level nearer to par with the Biological SAFE documents. The improvements seen in the past two to three years exhibit the AFSC's renewed commitment of staff and resources proportionate to the importance of these data in the Council's decision-making process.

There are numerous improved elements in this draft. The effective presentation of data and improved supporting text make the SAFE a valuable reference document in support of the Council's management process. The effort to enhance the informational content of the SAFE by supplementing the statistical data with indices, to identify and highlight apparent trends over a series of seasons is a good contribution. One noteworthy improvement is the enhanced utilization of accurate and consistent terminology. Nevertheless,

improvement in accessibility through the use of accurate terminology understandable to the target audience is needed. Thorough proof-reading and editing are strongly recommended.

The uneven treatment of material in the SAFE is likely a product of multiple contributing authors. Selection of a single editor, responsible for checking consistency and relevancy of commentary, could potentially solve this problem and would further strengthen the document. Additionally the SSC requests that the authors explicitly identify the species included in the "other" species category. The SSC further recommends that the authors elaborate on the interpretation of some of the descriptive statistics presented throughout the 2014 Economic Groundfish SAFE document. For instance, Section 6 of the document references multiple figures containing the percentage of quota harvested by all groundfish catch share programs, with little interpretation as to why quota was not fully utilized. If the goal of the Economic Groundfish SAFE is to summarize the status of the groundfish fisheries, the authors should be careful to interpret some of the trends presented in the document, especially to highlight some of the challenges that North Pacific groundfish programs currently face.

As the Economic Groundfish SAFE document evolves over time to include additional informational content, it is important that the document remains accessible and informative to an audience that is looking for an overview of the current status of the North Pacific groundfish fisheries. To this end, the SSC recommends that the authors include summary information that highlights some of the recent trends in the North Pacific groundfish fisheries and some of the challenges that groundfish programs currently face. The accessibility of the document would be greatly enhanced by opening with an Executive Summary and Economic Report card, similar to the compilation of summary information and Ecosystem Indices that appears at the beginning of the Ecosystem Considerations Chapter of the Groundfish SAFE.

In response to the standing request for additional suggestions for information that could be integrated into the SAFE, the SSC recommends that the authors consider the following for inclusion in future versions:

- Use standard long-term forecasts of global economic conditions—like those used for business and investment forecasting—to project changes in the seafood consumer, supply or processing markets globally. For example, how big might the change in pollock demand in China be due to rising incomes? Might offshore processing become more expensive as a result of rising wages, and shifting locations? What will be the effect of long-term overfishing of flatfish in West Africa on the market for Alaska flatfish products?
- Use standard short-term forecasts of global economic conditions to foresee changes in global market conditions that will affect prices.
- Include retrospective information on where, broadly, Alaska fisheries benefits accrue, though tracking the communities in which their participants live. In particular, are harvesters, their crew, and the processing workers from Alaska, the Pacific Northwest, the U.S., or foreign countries?

The SSC commends the authors on their efforts to identify users of the SAFE, how this diverse audience uses it, and what they would like to see in the future. The SAFE cannot be all things to all people, but understanding its value to various groups can determine the content and organization for future iterations. The SSC would like to see the addition of links to relevant publications and technical memos, especially on community research. In addition, the authors are encouraged to explore ways to improve the quality of the graphs and tables in the document and in the PowerPoint presentations to the Council. Larger fonts,

more efficient figures with legends that can be read from the back of a large room, and a careful selection of representative figures rather than all of the graphs available will make for more powerful presentations. In summary, this Groundfish Economic SAFE represents a good advancement in documenting economic performance in these fisheries and **the SSC requests an annual update of the Economic SAFE documents at future February SSC meetings.**

Other Items

Bering Sea Canyons Workshop

Steve MacLean (NPFMC) convened a workshop on Bering Sea canyons. During the workshop, Mike Sigler, Chris Rooper, and Jerry Hoff (NMFS-AFSC) provided an update on Bering Sea canyons research, as well as ongoing coral and sponge research, including modeling. A written report accompanied the presentations on coral and sponge research initiatives. John Olson (NMFS-AKR) presented information on the relative distribution of fishing effort along the Bering Sea slope. Craig Rose (NMFS-AFSC, retired) and Carwyn Hammond (NMFS-AFSC) spoke about agency-industry cooperative research on trawl impacts. Merrick Burden (Marine Conservation Alliance) spoke about efforts to gather local knowledge about EBS bottom hardness from different industry sectors. During the workshop, there were many questions and comments by members of the Council family.

The SSC last heard a report on this research at the June 2013 Council meeting. Taken together, the ongoing research constitutes an impressive effort to improve understanding of bottom habitats in the GOA and BSAI regions. Considerable new progress on the canyon and coral/sponge research has been made. The SSC appreciates the information on terrestrial influences associated with productivity in deep sea canyons from a study in New Zealand, and requests additional information to place the Bering Sea canyons into a broader context. The EBS coral model has been improved by using a refined grid, improved trawl positioning, incorporation of tidal currents, and a hurdle model to estimate abundance rather than only presence or absence. In response to SSC comments, the work now includes considerations of biodiversity and rarity. Field research is now in its third and final year.

There was considerable discussion about the utility of industry knowledge about bottom hardness. Some expressed concern that the information was not being collected in standard, verifiable ways. It was explained that different gear groups may use different criteria to identify "hard" bottom. The intention is that this anecdotal information will be included in the analysis as data layers, and it would be retained in modeling efforts only if this information improves the model fits to known coral/sponge areas.

There was also considerable discussion about the design of upcoming drop camera surveys of the EBS slope. The plan is to deploy the drop camera using a design whereby each square is weighted by the model probability of coral abundance, with the proviso that each stratum would receive a minimum of 10 drops. Some concern was expressed about whether this approach would underestimate the presence of coral in perceived low-density areas. **The SSC recommends careful consideration of the optimal design of this survey with respect to the priority question to be addressed, including the variance in high and low density areas.**

The SSC appreciates information on the model predicted distributions of coral locations and the maps on fishing in these areas. The squares associated with fishing intensity were presented on a coarser scale. If possible, it would be better if fishing intensity and coral distributions could be presented on the same spatial scales, perhaps overlaid on one another for better comparisons.

Bering Sea Project Modeling

Jim Ianelli and Kerim Aydin (NMFS-AFSC) presented an overview of the new models and some results emerging from the Bering Sea Project (BEST/BSIERP). Three types of modeling efforts were identified: a) climate enhanced single or multispecies stock projection models, b) multi-species biomass dynamics modeling, and c) fully coupled end-to-end ecosystem models. The Bering Sea Project investigators acknowledge that each modeling approach has inherent strengths and weaknesses. The multi-model ensembles will provide interesting comparisons in the future.

The end-to-end ecosystem model developed from the Bering Sea Project was described. This model includes a nested suite of models with feedbacks between modeling components. The projections are driven by three IPCC class models that were developed for the 4th IPCC Assessment Report (AR4): the Japanese model MIROC, the Canadian model CGM3, and the German model ECHO-G. These 3 climate models do not reflect the most recent generation models that were developed for the 5th Assessment Report. Current versions of the model take approximately 40 days for one run, although improvements in runtime are expected due to new access to high speed computers.

The presentation primarily focused on the Forage Euphausiid and Abundance in Space and Time (FEAST) model which tracks species responses to climate/ocean change by tracking gradients of bioenergetic demands and local prey availability. Three categories of detail are included with respect to treatment of growth and ontogeny for species within the ecosystem. Preliminary results of the model show good correspondence with observed seasonal distributions of zooplankton and fish. The stocks that are tracked with the highest level of detail are the core species: arrowtooth flounder, Pacific cod, and walleye pollock. Current versions of the model do not track observed recruitment patterns for the three core species. However, simulations where the model is seeded with year-class strength estimated from single-stock assessments do track the population dynamics of juvenile and adult fish suggesting that the post-recruit population dynamics are reasonably parameterized in the model. Efforts to improve the recruitment processes component of the model include developing a short-term (6-9 month) projection capability. It was indicated that knowledge of the spatial distribution and abundance of zooplankton (including euphausiids) abundances in all four seasons would be valuable for advancing the understanding and parameterization of recruitment processes for the core stocks. The SSC would like to receive a description of how the new information would inform the FEAST model and improve recruitment projections. This research need could be considered by the SSC and Plan Teams for inclusion in the annual research priorities of the Council. It was indicated that the fisher's choice (FishSET, Haynie et al.) and fleet behavior (Dalton et al.) components of the model, are still under development**. The SSC noted that it would be useful to receive an update on the fleet/fisher's response component(s) of the end-to-end model in the future**.

Progress on the development of a multispecies management strategy evaluation tool was presented. This model utilizes future climate/ocean scenarios from the ROMS/NPZ model components and applies

bioenergetic and foraging responses from the FEAST model components to develop an operating model for the MSE. This modeling tool allows investigators to explore the implications of different harvest control rules on the future status and trends of a smaller suite of interacting species (arrowtooth flounder, Pacific cod and walleye pollock). A paper focused on the performance of different multispecies harvest strategies has been submitted for publication.

The SSC appreciated the chance to receive a progress report on the Bering Sea project models. Each of the modeling approaches hold considerable potential to inform the long-range strategic planning of the NPFMC. **The SSC supports the multi-model comparative approach, looks forward to future presentations by the three modeling teams, and requests that modelers assess the utility of using suites of bio-physical moorings as cost effective means of collecting information on the timing and spatial distribution of primary and secondary production in the Bering Sea.**

GOAIERP Project

Kerim Aydin and Olav Ormseth (NMFS-AFSC) provided an overview of NPRB's GOAIERP. This 5-year project was initiated in 2010. The field components have been completed and analysts are now conducting data analysis and interpretation. Field sampling was conducted in 2011 and 2013, but it was compromised by mechanical issues on the Oscar Dyson in 2011 and by the shutdown of the federal government in 2013. Field data indicated that 2011 was an unusual year and should provide good contrast to 2013.

The focal species for the project are Pacific ocean perch, arrowtooth flounder, sablefish, Pacific cod, and pollock. These 5 species were selected because they exhibit marked differences in life history. The goal of the project was to gather data and conduct analyses to evaluate three broad and not mutually exclusive hypotheses regarding recruitment variability: a) The primary determinant of year-class strength for marine groundfishes in the GOA is early life survival. This is regulated in space and time by climate-driven variability in a biophysical gauntlet comprising offshore and nearshore habitat quality, larval and juvenile transport, and settlement into suitable demersal habitat; b) The physical and biological mechanisms that determine annual survival of juvenile groundfishes and forage fishes differ in the eastern and western GOA regions; c) Interactions among species (including predation and competition) are influenced by the abundance and distribution of individual species and by their habitat requirements, which vary with life stage and season..

These hypotheses are related and the strength of each hypothesis will be evaluated based on two field years, modeling, and retrospective analyses. With only two years of field research the success of the project will rely heavily on retrospective studies and modeling. The SSC recommends that the investigators explore and consider other survey data to supplement NMFS bottom trawl survey data. Suggested data series include: oceanographic studies of Kaluda trough (Lagerloef 1983); the Steller Sea Lion Research Initiative (SSLRI), the eastside of Kodiak fishery interaction study (Walline et al. 2013); the Alaska Department of Fish and Game trawl survey and the OCSEAP nearshore surveys. The SSC also recommends that the role of pink salmon in the GOA ecosystem should be considered to the extent practicable.

The GOAIERP modeling approach was described. Investigators are developing individual-based models for the core species to track the reproductive products through space and time in the first year of life. So far, the models do not close the life cycle and only simulate the gauntlet of events during the first year until settlement occurs. The platforms use output from the GLOBEC NEP coupled bio-physical model of the Gulf of Alaska. The SSC notes that the current modeling approach does not formally allow testing of the Bailey et al. (2000) shifting control hypothesis because top down predation pressure is not tracked through the life cycle. The SSC encourages the investigators to explore options to address this shortcoming through modeling or retrospective analyses.

Bailey KM (2000) Shifting control of recruitment of walleye pollock (Theragra chalcogramma) after a major climate and ecosystem change. Mar Ecol Prog Ser 198: 215−224

Lagerloef, G. (1983) Topographically controlled flow around a deep trough transecting the shelf off Kodiak Island, Alaska. J. Phys. Oceanogr. 13:139–146.

Walline, P. A. Hollowed, S. Stienessen, C. Wilson. 2012. "Short-term effects of commercial fishing on the distribution and abundance of walleye pollock (Theragra chalcogramma). Can. J. of Fish. and Aquatic Sci. 69:354-368.

GOA Trawl Social Survey and BSAI Crab Rationalization Study Prospectus

The SSC received presentations from Marysia Szymkowiak (NMFS contractor) and Amber Himes-Cornell (NMFS-AFSC) on a social science survey of GOA trawl-fishery-dependent communities and a study prospectus on participation in the BSAI Crab Rationalization program. There was no public testimony.

The BSAI Crab Rationalization study will conduct qualitative research to understand participation, crew compensation, and lease rates. Researchers will conduct semi-structured interviews with a cross-section of stakeholders to improve understanding of the issues they face by using a guiding list of topics. The SSC recommends that the interviews follow a more structured format than was presented so that answers are comparable among respondents. Presenters amended their initial methodology from a snowball sampling approach to a random sample of participants in each stakeholder group, which the SSC supports to get representative samples. The SSC looks forward to seeing the results of this project in the fall and following how their report will be used in the Council process and by stakeholders.

The GOA Groundfish Trawl Bycatch Management voluntary social survey was developed in anticipation of a management action to reduce bycatch and PSC that has yet to be developed and finalized. The SSC previously commented on the development of a fast track EDR that was aimed at collecting data from the groundfish trawl fisheries before and after implementation of this anticipated action. The SSC noted at that time that the EDR had a number of flaws and that research on community impacts was completely absent despite being identified in the Council's Purpose and Needs statement. The SSC commends the researchers for implementing a survey that will address the social effects and provide a baseline before a GOA catch share plan is created. The SSC acknowledges the difficulty in developing such a comprehensive survey without knowing what the management action will be. The SSC had concerns with a number of issues such as how the data from this voluntary survey will be used alongside the mandatory EDR data, but these concerns were satisfactorily addressed. Nonetheless, the SSC suggests that the

analysts consider more deliberate ways in which these two data collection methods can be integrated, which could potentially result in a more comprehensive analysis and understanding.

The SSC is concerned that the survey population of vessel owners and operators, crewmembers, and processing sector members will capture impacts on only a portion of the place-based communities they are including. It was also a concern that this survey does not include those trawl fishermen who may have already left the fleet in anticipation of a catch share plan. The SSC supports efforts to conduct qualitative assessments to more fully survey the communities and quantify the potential impacts of the action.

Both of the social surveys of the crab and trawl fishery participants present interesting opportunities to collect information on leasing practices that can augment leasing data currently collected by EDR programs. **The SSC notes that it will be important to protect the anonymity of crew responding to the surveys and interviews**.

To the extent practicable, the SSC also advises the survey team to come up with a strategy to identify a control group for the baseline survey to assess the impact of a bycatch and PSC management action on GOA communities. The SSC recognizes that this is a difficult task given that the actual bycatch and PSC management action has yet to be identified. However, the ability to determine the actual impact of bycatch and PSC measures on communities may be limited in a before-and-after analysis that does not have an adequate proxy for what GOA communities would have looked like in the absence of implementation.