



## Minutes of the Joint Plan Teams for the Groundfish Fisheries of the Gulf of Alaska (GOA) and Bering Sea Aleutian Islands (BSAI) and the Crab Plan Team

Alaska Fisheries Science Center, Seattle WA  
*September 16, 2019*

### Groundfish Plan Team Membership:

#### BSAI Team

Grant Thompson	AFSC REFM (co-chair)
Steve Barbeau	AFSC REFM (co-chair)
Steve MacLean*	NPFMC (coordinator)
Mary Furuness	NMFS AKRO
Alan Haynie	AFSC REFM
Allan Hicks	IPHC
Lisa Hillier	WDFW
Kirstin Holsman	AFSC REFM
Andy Kingham	AFSC FMA
Brenda Norcross	UAF
Kalei Shotwell	AFSC ABL
Chris Siddon	ADF&G
Jane Sullivan	ADF&G
Cindy Tribuzio	AFSC ABL
Vacant	USFWS

\*initial meeting

#### GOA Team

Jim Ianelli	AFSC REFM (co-chair)
Chris Lunsford	AFSC ABL (co-chair)
Sara Cleaver*	NPFMC (coordinator)
Obren Davis	NMFS AKRO
Craig Faunce	AFSC FMA
Lisa Hillier	WDFW
Pete Hulson	AFSC ABL
Sandra Lowe	AFSC REFM
Nat Nichols	ADF&G
Jan Rumble	ADF&G
Paul Spencer	AFSC REFM
Marysia Szymkowiak*	AFSC REFM
Ben Williams	ADF&G
Kresimir Williams	AFSC RACE
Vacant	USFWS

### BSAI Crab Plan Team Membership:

Martin Dorn	(AFSC-Sea) Co-Chair	Krista Milani (NMFS-AKRO-Dutch Harbor)
Katie Palof	(ADFG-Jun) Co-Chair	André Punt (Univ. of Washington)
Jim Armstrong	(NPFMC) Coordinator	Shareef Siddeek (ADFG-Juneau)
William Bechtol	(UAF-Homer)	William Stockhausen (AFSC-Seattle)
Ben Daly	(ADF&G-Kodiak)	Cody Szuwalski (AFSC-Seattle)
Ginny Eckert	(UAF/CFOS-Juneau)	Miranda Westphal(ADF&G-Dutch Harbor)
Brian Garber-Yonts	(AFSC-Seattle)	Jie Zheng (ADF&G-Juneau)

### Administrative

The Joint meeting of the Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI) Groundfish Plan Teams and the Crab Plan Team, convened Monday September 16, 2019 at 1:00 PM at the Alaska Fisheries Science Center in Seattle, Washington. Introductions were made, including attendees who were not members of the Teams. Not all attendees signed the sign-in sheet (attached in Appendix A), and attendees may have attended one or more meetings for crab or groundfish throughout the week. New Plan Team members included Marysia Szymkowiak (membership not yet official) and Sara Cleaver on the GOA Team, and Steve MacLean on the BSAI Team.

Remote participation via WebEx was available for all sessions. Webex attendees did not all register with their full name, so a complete attendance list is not possible. Some attendees included: Arne Fuglvog,

Asia, CA, CFH, Chris, Dana H, Daniel Falvey, Dick Curran, DW, George, Jason, Jon Warrenchuk, Katy, Linda Behnken, Liz Dawson, MBT, Meaghan B., Megan Peterson, Mike, Miranda, natura, nlanan, Olav, Paul Clampitt, Sarah, Stan Kotwicki, Stephanie Madsen, and Victoria Curran. Other attendees may have been present via WebEx but not noted by recorders.

All documents provided prior to or during the meeting, as well as nearly all presentations given during the meeting, were posted to the Council's [electronic agenda](#). Adjustments to the schedule were made. Diana Stram (North Pacific Fishery Management Council) informed the Teams about the Council initiative to create Handbooks for the Council's advisory bodies, including the Teams, to provide documentation about Council expectations of each body. The SSC has recently completed their handbook and the Team handbook presented by Diana is based on that, with modifications appropriate to the Team's purpose and functions. The handbook will provide documentation about the Council expectations, information about Team functions to new Team members, and inform the public about what to expect from Team meetings. The Team Handbook is in draft form and will be reviewed in iterations over the next year. It is expected that the Team Handbook will be presented to the SSC, AP, and Council for review in October 2020. This was an informational item and no recommendations were offered by the Teams.

### **ESP/Prioritization**

Kalei Shotwell provided an overview of the AFSC Stock Assessment Classification under the Next Generation Stock Assessment Improvement Program (NGSAIP). The Stock Assessment Classification System includes 5 input data attributes (catch, size and/or age composition, abundance, life history, and ecosystem linkages) which are scored on levels from 0 to 5, indicating a data-limited or data-rich stock. The AFSC process for Stock Assessment Classification (SAC) included 61 groundfish and crab stocks. In this process, authors completed forms with current and target levels for each of their stocks, and the review team provided justification for any difference between the author scores and the NGSAIP target scores. The final scores were nearly always defaulted to the stock assessment author target scores and only deviated to allow for new survey information. Two Q & A sessions preceded completion of these forms, and a FAQ document was created with input from authors. Author contributions in this process were highlighted.

Across all FMPs, the guideline NGSAIP target scores for the ecosystem linkage category were very similar across stocks due to the cumulative nature of the scoring criteria proposed in the NGSAIP. There is concern for this lack of differentiation between stocks and improvements on the calculation may be helpful for other Centers as they conduct this exercise.

Classification data will go into the species information system. There will be an annual update of the current values by each author, and a review of the target values on a longer time scale (potentially five years). The National Stock Assessment Program is planning to conduct a gap analysis for future use in accounting. Next steps include using the SAC data to prioritize stocks for conducting ESPs, and potentially using data gaps combined with stock assessment priorities for directing AFSC research.

Kalei also provided a review of the three-day ESP Data Workshop that was held in May 2019. A Tech Memo from this workshop is planned for 2020. Next steps include:

- Finalizing ESP Data List and setting up access on the AFSC server using a NOAA approved data access protocol (e.g., Environmental Research Division's Data Access Program (ERDDAP))
- Draft ESP Stock Priorities List using stock assessment classification
- Setup timeline for ESP data delivery and production
- Continue cross-program collaboration

The ESP Model Workshop, which will focus on data delivery and modeling applications, is planned for Spring 2020.

Example ESPs exist for sablefish, GOA pollock, and SMBKC, which are currently appendices to the respective SAFE report chapters.

The Teams took no action. However, prioritization of certain stocks for ESPs (continuation of GOA pollock, potential for GOA Pacific cod ESP) was discussed within other agenda items.

### **PEEC Workshop report**

Ebett Siddon summarized the Preview of Ecosystem and Economic Conditions (PEEC) workshop held June 6-7, 2019. This two-day workshop was a joint effort between the Integrated Ecosystem Assessment Program and Ecosystem Status Report team. In Fall 2017, the SSC requested that any ecosystem data indicating potential problems not accounted for in assessment models need to be brought to the attention of the SSC and Teams early in the process (i.e., at the October Council meeting). In the winter of 2017/18, there was an unprecedented lack of sea ice in the Northern Bering Sea and real-time data were presented to the Council in October 2018. This information was extremely valuable and the PEEC workshop was scheduled to help communicate such early “Red Flag” information.

The objectives of the PEEC Workshop were to review “Hot Topics” from the 2018 assessment cycle and to identify areas of concern in relation to current (2019) physical, biological, and economic conditions. The end goal of this workshop was to inform upcoming surveys, the fall stock and ecosystem assessment cycle, and the Council. Over 2 days there were 40 presentations with information on climate, physics, and all trophic levels. “Red Flags” that were discussed included:

- GOA experiencing another marine heatwave since Sept 2018 (continued through summer 2019)
- Low abundance of some 2019 year classes (FOCI larval survey in WGOA), but 2018 GOA pollock year class is “strong” (MACE Shelikof Strait Survey)
- Second winter of little to no sea ice in Northern Bering Sea (NBS)
- Gray whale strandings potentially related to changes in the NBS food web.

This information (and additional information gathered through summer/fall surveys) will be presented to the SSC, AP, and Council in October. The next PEEC workshop will be in late May/early June of 2020 in a larger conference room to accommodate all the people interested in attending. Timing considerations for this meeting depend on survey data availability.

### **Bering Sea FEP**

Kerim Aydin presented an update on the Bering Sea Fishery Ecosystem Plan (BS FEP), a Council strategic planning document developed to inform fishery management decisions. The BS FEP has transitioned from the development to the implementation phase. There was discussion about why the Aleutian Island FEP contributors haven’t met to assess the implementation of that document.

The BS FEP organizes ecosystem indicators and subsequent products around the Council’s 6 ecosystem goals. The BS FEP has 17 objectives that map/link to those 6 overarching goals. For each objective, an evaluation of current and ideal indicators will occur as part of a gap analysis. Ideal indicators for each of AFSC’s products can vary based on (1) the spatial or temporal scale of the indicator and (2) the end-user of the product (i.e., what it is trying to inform). The BS FEP has discussed a new product, the Ecosystem Health Report Card, which could serve as a broader scale overview of ecosystem health and will include indicators that vary/change on longer time-scales than those included in the Ecosystem Status Report. This would not represent an additional set of new indicators, but rather a new place to house some indicators currently in the ESRs.

The BS FEP approved the following five Action Modules: (1) Climate change, (2) Local, Traditional Knowledge, and Subsistence, (3) EBFM gap analysis, (4) Interdisciplinary conceptual models, and (5) Research. The first two of these were initiated by the Council in December 2018, and the BS FEP Team is

looking for  $\approx 10$  people for the Climate Change Task Force and  $\leq 15$  people for the Local and Traditional Knowledge Task Forces. They want diverse representation, including AFSC researchers, Traditional Knowledge holders, and representatives of indigenous organizations and NGOs. Letters of nomination should be submitted to the BS FEP Team and will be reviewed and approved by SSC/Council.

Outreach and communications related to the BS FEP have included story maps for the website (<https://www.npfmc.org/bsfep/>), and they are currently working on alternatives that can be accessed by remote communities with limited internet access. The Teams commended the FEP Team on the story maps. The next meeting for the BS FEP Team will be March 2-6, 2020.

The Teams took no action and thanked Kerim and the BS FEP Team for their progress.

### **SSPT overview**

Steve Kasperski presented on the workings of the Social Sciences Planning Team. Three main themes of their current tasks are social science gap analysis, qualitative data, and the economic data report. The social science data gap analysis was originally organized around Magnuson-Stevens Act and Executive Order 12866 and the goal of maximizing net benefits to broadly defined groups of producers, consumers, and communities of place and practice, and estimating external costs. However, there was concern that this had been too focused on economics and would need to be more broadly framed to incorporate many social data gaps including distributional impacts and equity issues. The social science data gap analysis will be restructured for a SSPT teleconference scheduled for November 2019.

Qualitative data are currently used frequently but not always clearly defined and there is a split between anecdotal information and scientific data collections. The SSPT believes that qualitative information could be used more completely, particularly local knowledge and traditional knowledge (LK/TK), fishing conditions, and understanding responses to and impacts of management and environmental change. This will also be taken up in a presentation developed by the SSPT for the scheduled November 2019 teleconference.

Concerning the economic data report (EDR), the SSPT suggests that issue 2 of the Council's motion regarding the EDR revisions be bifurcated into: 1) issues that are straightforward and can be addressed in the short term; and 2) issues that require a data-collection framework and can only be addressed in the long term. The SSPT supports the idea of revisions to the current EDR data collection framework and would like to have a role in those potential revisions. The proposed framework will be reviewed during the teleconference planned for November 2019.

Team discussion initially centered on the use of qualitative data in stock assessments and formalizing data collection. Steve talked about the need to define the scale of the formal collection (e.g. individual fisher, fleet, town, etc.). There also was some discussion on the need to find out how to work qualitative data into the Council process and how to build a formal process for collecting data from those with knowledge and communicating these data to the assessment authors. The SSPT is working on developing a process for facilitating this kind of communication.

The Teams took no action and thanked Steve for his report.

### **Ecosystem status report: climate and oceanography update**

Stephani Zador presented the ecosystem status report update. Highlights included the following:

- Sea surface temperatures (SSTs) in Alaska waters were predominantly warm over the past year.
- Western GOA shelf waters have largely been in a heatwave state since last September.
- Sea level pressure (SLP) patterns contributed to the development and continuation of warm SSTs; also, SLP patterns set up strong winds from the south across the Bering Sea in February.
- Sea ice showed delayed development, but the extent was close to the median through December/January; the southerly winds caused ice to retreat through February, which is typically a

- month when sea ice extent is still increasing.
- SST projections indicate continued warmth, but not to the extent seen last year.

The Teams took no action.

## VAST

Jim Thorson (HEPR, AFSC) presented an overview of the Vector Autoregressive Spatio-Temporal (VAST) model, including benefits, drawbacks, and proposed terms of reference for using VAST in 2019 SAFE reports. VAST is a “delta” model fit to biomass sampling data through an equation modeling the probability of encountering the species and the abundance if the species is encountered. Two linear predictors (with link functions) estimate annual intercepts, spatial variation, and spatio-temporal variation (an interaction term) to connect data to predictions across space and time.

VAST has three characteristics. First, the model is exchangeable among years, meaning that year labels can be reordered without changing the results, and each year is not influenced by another. The second characteristic is an exception to the first characteristic that allows for autoregressive spatio-temporal variation, where adjacent years do influence each other. The model can be fit to spatially unbalanced data and predict hotspots that may persist through time and space via linear interpolation (in log-space). The third characteristic is that the approach can be easily extended to a multivariate model that predicts categories such as species, ages, etc. This is useful for expansion of age composition data, for example.

When comparing VAST estimates with design-based estimates, abundance indices typically look similar and errors are typically smaller when using VAST. However, VAST may predict additional statistics, such as effective area occupied over time, that may be useful. VAST also produces diagnostics such as a spatial representation of the data, residuals plotted spatially, and quantile-quantile plots showing how well the fit matches the assumptions. Many agencies are using VAST, including Pacific FMC, New England FMC, ICES, and North Pacific FMC (dusky rockfish in 2015 and northern rockfish in 2018).

Two benefits of using VAST, of many, were discussed. The first benefit was being able to use spatially unbalanced data. For example, the NBS trawl survey data, which have not been collected every year, can be used to create an index of abundance over time when used in combination with EBS trawl survey data. Five options were identified that suggested how the NBS data may be used in an assessment, where one of the options was to create model-based index and composition data. Pollock data were used as an example, which showed an increase in NBS abundance from 2011 to 2016, when NBS data were not collected. This was due to temporal interpolation between 2010 and 2017 and spatial interpolation from observations near the border between the EBS and NBS trawl surveys. Currently, there is no statistic to investigate how much of the interpolation is influenced temporally or spatially, but would be an interesting area of research. However, there are interesting statistics such as the center of gravity (which has meaning when compared to other stocks) and effective area occupied. A suggestion was made to investigate the ability of VAST to predict large unobserved areas by omitting some data from the EBS Bering Sea trawl survey in a cross-validation type exercise. This would provide some indication of the prediction ability for the northern Bering Sea. Overall, Jim suggested to keep sampling the northern Bering Sea as often as possible, and assimilate the data while accounting for an unbalanced spatial design.

A second benefit, improving statistical efficiency given limited data, was identified. This involves extracting more information out of the data than a design-based estimator would. The example of outliers was used to show that an individual outlier observation can have a large influence on the estimate and standard error from a design-based estimator, while a model-based index will have a more homogenous standard error and be less influenced by outliers.

Four drawbacks were presented, the first of which is the potential for model-based estimators to introduce bias. Many simulation studies have shown that using VAST with fisheries data results in little bias, and performed similarly to GAM in one study. A second drawback was that an analyst may “shop for an

answer." Well defined terms of reference would avoid, and Jim provided examples of some items that could be included. Recently, Jim published guidance for fifteen decisions that must be made by users of VAST (Thorson 2019 *Fisheries Research* 210:143-161. <https://doi.org/10.1016/j.fishres.2018.10.013>). The third drawback is that VAST may require consideration of data weighting in the stock assessment. Jim suggested that additional variance on the index, or time-varying catchability, be estimated in the stock assessment. Also, Jim identified that further research on the influence of the number of knots used in VAST and whether fitting to lognormal error in VAST changes the need to fit to lognormal error in a stock assessment would be useful. The final drawback was difficulty in communicating the method, and there is a plan to improve communication.

Jim concluded with a potential timeline for including VAST estimates in stock assessments, with spring identification of the stocks needing analysis and initial runs occurring in the spring and results of updated runs being made available in the fall. It was suggested that the AFSC Groundfish Assessment Program (GAP) would provide standardized model-based indices based on the terms of reference, with the understanding that the assessment authors would be free to use them or not, and could re-run VAST themselves and justify any necessary departures from the terms of reference. The presentation concluded with a list of good practices.

Many items were discussed, including needed improvements for dealing with correlation across islands. VAST already does not allow positive densities to be estimated on land, but there may be some amount of spatial influence from observations on either side of islands. Concern was raised about misuse of the model, and although none have been established officially as yet, terms of reference would help to ensure that this does not happen. PFMC currently endorses the use of VAST in stock assessments after being reviewed by the SSC, which has defined default settings or best practices, but assessment authors are encouraged to investigate further.

Much of the discussion revolved around timing; specifically, whether the model-based indices could be produced in time to be included in stock assessments. Running the VAST model would add an extra several days to a week to the delivery of indices to stock assessment authors, and the current delivery dates are already pushing deadlines. Data from the surveys are finalized late in the year, and these analyses would need to be done quickly. Computing power could be prioritized for GAP, but it is uncertain how much time this would save. Timing may work for crab stock assessment authors given that there is a May meeting where model configuration is agreed upon, but groundfish stock assessment authors need the indices by the end of September at the latest (and earlier would be better).

Overall, VAST has benefits of being able to incorporate unbalanced spatial designs, accounting for extreme catch events, and combining surveys. Some drawbacks include island effects and few diagnostics. However, work continues on VAST and many researchers are testing the software and improving it.

**The Teams (Crab and Groundfish Plan Teams) agree that the VAST model shows promise and recommend that terms of reference be developed. This can begin by using Thorson (2019) and ideas presented during this meeting.**

**The Teams recognize that time is critical in the fall, and recommend that if VAST is used, a process that accommodates short timelines be developed. The Teams encourage the assessment and survey groups to coordinate on a likely time-line for the Teams to consider.**

**The Teams recommend simulation testing to evaluate the performance of VAST under spatially unbalanced designs, such as with the EBS and NBS trawl surveys.**

**The Teams recommend that GAP produce VAST estimates for use by stock assessment authors, and applauds their willingness to assist.**

**The Teams recommend the development of diagnostics that identify when the model may not be performing as well as design-based indices.**

### **EM observer program issues**

Craig Faunce presented an update of the observer program's deployment plan and issues related to electronic monitoring (EM). There were two main discussion points, one related to the deployment and monitoring system for the fixed gear fleet (i.e., hook and line and pot gears) and the other related to a proposed EFP for trawl fisheries.

For fixed gear, a history of EM development and current issues was reviewed. The first years involved research and development and the data were only started for actual application within catch accounting starting in recent years (2018 Hook and line, 2019 Pot). Boats are permitted to "opt-in" or "opt-out" of the fixed gear EM program at the start of the year but must submit a monitoring plan to NMFS. The fixed gear EM is used for catch enumeration at less than 100% coverage. Because of the program implementation, (opting in or out) designing an efficient and optimal program is impossible because the number and kind of sampling units is unknown in advance (vessels are not required to carry/use EM). Other issues with the fixed gear EM were raised, including that videos from fishing towards the end of the year were not reviewed due to the lag between when the hard drives were received and when a reviewer was able to review the drive. It was clarified that this was part of the initial phase of the program and that this should be less of an issue in future years since more reviewers can be hired during busy time periods.

Craig highlighted some results of the 2018 Annual Report and 2020 Annual Deployment Plan. In particular the volume of biological data that could potentially be lost by use of EM instead of human observers on fixed gear vessels. Lost biological data can be in the form of sample collections (e.g., otoliths, genetics) or size data used to estimate total catch. In the GOA, catch from trips that target Sablefish, halibut and Pacific cod have 31%, 26% and 24% of their tonnage from fixed gear EM vessels (respectively). Shore-side sampling may be used for sample collections, but haul level catch estimation data are lacking.

Craig sought the Teams' support on the following items:

- The fixed gear EM vessel selection process should be re-evaluated (to improve efficiency of funds relative to reducing potential biases and estimation uncertainty)
- That the 30% trip selection value be re-evaluated
- The impact of non-review of end-of-year fixed gear EM (video) data be evaluated (and develop measures to avoid this problem)
- Evaluate how EM catch-estimation methods are done for fixed gear. Specifically, how catch in biomass is estimated in the absence of biological data.
- Identify and establish ways to integrate fixed gear EM data with standard observer data feeds (e.g., via AKFIN).

**The Teams recommended that the above items be pursued and addressed.**

With respect to the EFP proposal for EM on trawl vessels, Craig laid out the scenarios evaluated (some 400,000 simulations) in the Annual Deployment Plan and compared trade-offs with the fixed gear EM and coverage. This EFP is not in place yet and the AKRO and FMA are working with the authors of the proposal on the final EFP.

The Team appreciated the efforts to evaluate the new program and the work to evaluate where there are potentially serious shortfalls of funding. Craig noted that presently, for estimates to be reasonably consistent with best practices, there is a funding shortfall.

**The Teams recommended that resources be allocated to fund this shortfall and that efficiency measures to deploy observers and EM systems be pursued.**