North Pacific Fishery Management Council

Bering Sea/Aleutian Islands Groundfish Plan Team
MINUTES

September 21-22, 2022, AFSC, Seattle, WA

BSAI Team Members			
Steve Barbeaux	AFSC REFM (co-chair)	Lisa Hillier	WDFW
Kalei Shotwell	AFSC REFM (co-chair)	Kirstin Holsman	AFSC REFM
Cindy Tribuzio	AFSC ABL (vice chair)	Phil Joy	ADF&G
Diana Stram	NPFMC (coordinator)	Andy Kingham	AFSC FMA
Caitlin Allen Akselrud	AFSC RACE	Beth Matta	AFSC REFM
Mary Furuness	NMFS AKRO	Andrew Seitz	UAF
Allan Hicks	IPHC	Jane Sullivan	AFSC ABL
		Michael Smith	AFSC REFM

Administrative

The BSAI Groundfish Plan Team ("Team") convened on Wednesday, September 22 at 10:45am PDT. Participation was in-person and remote via Zoom. Roughly 60 people attended the meeting, attendance varied throughout the meeting. All documents provided prior to or during the meeting as well as presentations given during the meeting were posted to the Council's electronic agenda.

Bottom Trawl Surveys

Bering Sea survey results - Duane Stevenson, AFSC, presented the results from the eastern Bering Sea (EBS) and some results from the northern Bering Sea (NBS) bottom trawl surveys. The Team commented on the long term mean calculation for temperature and suggested looking at a fixed climatological baseline (e.g., the previous National Weather Service baseline (1981-2010)). The 2022 survey information will be updated on the Fishery One Stop Shop (FOSS) and Distribution Mapping and Analysis Portal (DisMAP) sites in mid-October. A point was made about the 2022 survey available biomass trends between the NBS and EBS, cold and warm years, and to look for ecosystem reasons other than temperature. Duane agreed on the interest in this information, and more analysis of this type of information is planned for the future. Also, it was pointed out that even though there was a cold pool in 2022, and the area was larger for stations at less than 2 ℃, there were fewer stations at less than 0 ℃.

Duane noted that there were fewer fish measured for length this year compared to previous surveys. A public participant asked if the fewer length measurements had instigated any feedback from the stock assessment authors. It was noted that the reduction in measurements was determined in consultation with assessment authors. The impacts of these reductions will be assessed in the future in conjunction with assessment authors.

The Team commended the survey team regarding the streamlining of the survey products and collaboration and responding to requested feedback from the stock assessment authors.

Aleutian Islands - Ned Laman, AFSC RACE, presented the results of the Aleutian Islands bottom trawl survey. The Team asked for clarification on how to determine the starting year for data to use. The survey in years prior to 1991 was conducted in part by the Japanese and used different fishing gears but has

remained generally consistent since then. The tow duration was shortened in 1997, however the pre- and post-time series are comparable. **The Team recommended that a document detailing the change in gear and survey configurations as well as changes in species identification be available for authors to reference.**

The AI Survey group has experienced substantial turnover recently, resulting in loss of institutional knowledge and experience. The Team asked how this impacts the ability to speciate rougheye and blackspotted rockfish. The presenter stated that the AI survey group has a well-established rubric and training as well as testing with genetics, with accuracy consistently 70-75%. The Team discussed if the increase in biomass variances was possibly due to the reduced number of sampled stations or represented actual changes in distribution. Ned indicated that this had not been evaluated but believed that the slight reduction in stations should not have impacted the variability because the dropped stations were fairly randomly distributed throughout the survey area and depth strata.

The Team noted and appreciated the extra efforts that the AI survey and vessel crews put into special collections.

EBS Pacific Cod

Steve Barbeaux presented model update suggestions and explorations for the eastern Bering Sea Pacific cod model for 2022. The author acknowledged that Grant Thompson had been the stock assessment author for this stock for the past 36 years and retired in 2021. The Team recognized how valuable Grant's work has been. At the request of the SSC, no substantial changes have been proposed for the assessment model for 2022, however the author presented five areas of model exploration. The Team received an overview of the data used in the assessment and the features of the four models used in the current ensemble model for Pacific cod. Exploration results were provided for 5 distinct aspects:

Removing the seasonally corrected annual weight-at-length relationship. The author presented results of removing corrected annual weight at length relationship from the model. Because of the lack of improvement to fit by including this relationship and difficulty in projecting it, **the Team and author recommended that the seasonally-corrected annual weight-at-length relationship used in the base model be discarded for 2022 and that an exploration of alternative methods for modeling seasonal growth be conducted in future assessments.**

The author developed R scripts for pulling data from available databases and processing the data, which included a new algorithm for constructing the fishery length composition data and more appropriately weighted older data. **The Team and author recommended using the newly developed data processing scripts for producing the fishery length composition distribution data.**

The Team discussed ensuring consistency of ageing bias across Pacific cod stock assessment models. Based on advice from the Age and Growth Laboratory, and to be consistent across Pacific cod stock assessment models, **the Team and author recommend that fitting ageing bias for the most recent time period be removed for the 2022 models and that the author explore more options for capturing variability in growth (e.g., increases in size-at-age in recent years) in future assessments.**

The author presented the exploration of alternative input sample sizes used for the fishery length compositions to ensure the Dirichlet-multinomial log theta parameter is not fit at or near a bound. The Team discussed that when log theta is on the bound, it collapses to a multinomial distribution. The new weighting of the length composition data should not be considered for 2022, however new weighting should be explored more thoroughly in future assessments with examination of model stability and

sensitivity to changes. **The Team recommended that the issue of input sample size calculation be brought to the Joint Plan Teams in November for discussion in relation to consistency across assessments and alternative means for calculating length and age composition input sample sizes including bootstrap and model-based effective sample sizes.** The Team discussed this as a possible subject for development of a new working group.

The author presented the exploration results of fitting an additional standard error term on the VAST bottom trawl survey index, but the author did not recommend this for consideration in 2022. The Team agreed with this conclusion.

The Team thanked and acknowledged the author for the incredible amount of work that went into the explorations of the model this year. There was support for the authors to re-explore a seasonal model for Bering Sea Pacific cod to account for seasonal trends in weight-at-length in future assessments. In light of the most recent genetic and tagging data, the Team supports the author's vision to explore an expanded spatial model that incorporates the western Gulf of Alaska in the model in future years.

AI Pacific Cod

Ingrid Spies presented the AI Pacific cod assessment. This stock is currently a Tier 5 stock, but the author has been developing an age structured model in parallel which has been presented and documented over the past several years. Three age structured models were presented for review:

- 2021: Last year's "SIMPLE" model, but coded in ADMB

- 2022_1 ("COMPLEX"), with 3 fisheries (pot, trawl, longline) and 2 surveys (longline and trawl) and starts in 1978 and programmed in SS3

- 2022_2 ("SIMPLE"), includes 1 survey (trawl) and 1 single fishery, starting in 1991 and is programmed in SS3, but designed to mimic model 2021

The Team supported the author's recommendation to bring forward the Tier 5 as well as last year's model coded in ADMB, and the two SS3 Model alternatives (2022_1 and 2022_2) for the November assessment, due to the following points (1) there are time-series with sufficient data to support an age structured model, (2) there are new survey data in 2022, and (3) the SS3 models would be consistent with the modeling frameworks used for Pacific cod in the EBS and GOA assessments. The Team supported the use of SS3 in moving this stock to a Tier 3 model because the platform is consistent across assessments and there is consistency and systematic review of the SS3 platform.

The Team supported the author's recommendations to consider parameterizations for sigma R, and data weighting and to work with EBS and GOA authors to standardized tuning of sigmaR in future assessments. The Team also supported the author's recommendation to use the Aleutian Islands observer data to estimate maturity at age because AI cod have different growth, are genetically distinct, and the observer records are unique to the AI and more numerous. The Team discussed the start date for the model and supported beginning both 2022_1 and 2022_2 in 1991 as there were no survey data in the model until 1991 (the presented model 2022_1 extends back to 1978).

The Team also supports the author's recommendation to weight fishery catch data by number of fish in the haul, by weight of catch by area, trimester, and gear as was done in previously presented versions of this model. **To be consistent with other assessments, the Team recommended exploring methods to use bootstrap approaches for weight at age and use the approach for creating the fishery length composition distributions that were used in the EBS Pacific cod assessment in future assessments.**

As is the case in the GOA Pacific cod assessment, the author uses a dome-shaped selectivity for the longline survey. This approach was used in the GOA Pacific cod assessment to reflect the narrow depth range of the survey relative to the age-specific depth distributions of Pacific cod in the GOA. **The Team recommended the author explore (extrinsic to the model) evidence for the dome-shaped selectivity for the AFSC longline survey (e.g., depth/size survey selectivity based on Pacific cod depth preference as used in the GOA) in future assessments.**

Pacific Ocean Perch

Paul Spencer provided an overview of the Center of Independent Experts (CIE) review for BSAI Pacific ocean perch (POP) that occurred virtually in May 11-13, 2022. Overall, the CIE determined that the BSAI POP stock assessment used the best available science and is appropriate for management use. All reviewers noted the lack of fit to the recent Aleutian Islands survey and associated retrospective pattern but no clear solution was determined. There was insufficient evidence to change the data weighting from the McAllister-Ianelli procedure used in the current assessment. Individual CIE reviewers also provided several recommendations for the future. Of these CIE recommendations, the author recommended the following changes to be brought forward in November 1) fitting the model to survey abundance instead of biomass, 2) exploring stochastic initial age compositions, and 3) for equilibrium initial age composition, explore mortality rates other than that currently used in the model.

The Team agreed with the author's recommendations for model alternatives in November.

The Team discussed if updated maturity research was warranted. The previous study, Tenbrink and Spencer (2013), was very thorough, however, it was based on samples collected in 2010. The author noted that there may be variability in maturity over time, but we do not have the data to verify this. Therefore, it may be helpful to update the maturity study. The Team noted the CIE request to explore estimating the age-length conversion matrix within the stock assessment model and mentioned the new work on the WHAM model that was presented in the Joint Plan Team. This stock could be a potential case study for testing the features of the new model.

Blackspotted/Rougheye Rockfish

Paul Spencer presented responses to previous SSC and Team comments and updates to the BSAI blackspotted/rougheye assessment. The author recommended not including "other" surveys (AFSC longline, IPHC longline, and ADF&G survey) into the assessment, and the Team agreed based on the justifications provided in the document and presentation.

Regarding the IPHC Longline survey, the author noted that historically the IPHC survey could be used as an additional index in the assessment; however, the survey would not be a reliable index moving forward due to changes in sampling design that have occurred since 2020. However, the Team recognized that even though the IPHC survey may not be useful for this assessment, there may be some cases/stocks where that survey would be useful, so a prescriptive recommendation to not use it in any assessment is not warranted at this time. It is difficult to track how the spatial design of the IPHC survey in the Aleutian Islands and the eastern Bering Sea changes from year to year, beginning in 2020. The Team encourages authors to investigate these changes and consider how to take them into account prior to using the data within their assessments.

Regarding the AFSC longline survey, the Team noted that data users need to understand that the survey does not sample the western Aleutian Islands and that the way it defines western versus the eastern Aleutian Islands is not consistent with the way the trawl survey defines these areas. This consideration was aligned with the author's recommendation to not use this survey for this assessment.

The author also presented explorations of shifts in size compositions which supported the hypothesis that observed changes in size compositions were not related to changes in fishery behavior as the survey size compositions closely mirror the fishery size compositions. The Team agreed that the fishery and survey were both encountering more small fish in recent years. However, the Team noted that the analysis was limited to only hauls/sets that encountered blackspotted/rougheye rockfish as bycatch and did not characterize the overall behavior of the fisheries (e.g. Atka mackerel, POP, Pacific cod) which encountered blackspotted rockfish as bycatch.

Finally, the author provided comparisons to the value of M in other North American BS/RE stocks in response to SSC comments about M being "very high". The Team supported these justifications, and further noted that it may be worth examining the much-lower value of M used in the GOA BS/RE stock assessment.

The Team had no recommendations for model changes to the previously approved model for this stock for November 2022.

Other Rockfish

Jane Sullivan presented on using the new 'rema' R package for the BSAI other rockfish assessment. The 'rema' R package and methodology was previously described in the preceding Joint Team meeting, so the presentation focused on bridging results from the previously accepted model to the TMB version of the model and the addition of the AFSC Longline survey (LLS) for the shortspine thornyhead (SST) portion of the stock. The addition of the LLS is in response to an SSC request to develop methods to be more robust to survey reduction efforts. Jane recommended using the LLS in the eastern Bering Sea (EBS) slope area but recommended against using the LLS data for the Aleutian Islands (AI) area because the AI portion of the LLS does not sample the full AI area. The Team concurred with the author's recommendations on which section of the LLS survey should be used. There was some discussion on when the AI bottom trawl survey time series should begin. The Team recommended the author communicate with the Groundfish Assessment Program (GAP) survey team to determine the appropriate starting year for the bottom trawl survey data for these species, and to document that decision in the assessment document.

Jane presented a bridging exercise for SST comparing the random effects (RE) base model with the AI BTS developed in ADMB (Model 20) with an RE model developed in the rema R package (Model 20.a). She also presented a random effects multivariate (REM) model (Model 22) developed in the rema R package which included the addition of the LLS relative population weights (RPW) for SST on the EBS slope. The Team was satisfied that the bridging exercise adequately documented the benefits of moving to the rema R package based models and that Model 22 was an improvement over Model 20.a.

The Team recommended that for November the author provide results for the last approved model, Model 20, and the updated Model 22.

Shortraker Rockfish

Kalei Shotwell gave a presentation on the shortraker rockfish assessment. Like other rockfish described above, because the 'rema' R package proposed to be used for this assessment had been previously described in the preceding Joint Team meeting, the shortraker rockfish presentation was relatively short with little discussion on the proposed modeling method. Kalei explored the addition of the IPHC and LLS in response to an SSC request to develop methods to be more robust to survey reduction efforts. Kalei recommended against using the IPHC survey due to changes in sampling coverage. She recommended using the LLS in the EBS slope area but recommended against using the LLS data for the AI survey. The

Team concurred with these recommendations for appropriate use of the available survey data. There was some discussion on when the Aleutian Islands bottom trawl survey time series should begin. **The Team recommended the author communicate with the Groundfish Assessment Program (GAP) survey team to determine the appropriate starting year for the bottom trawl survey data for this species, and to document that decision in the assessment document.**

Kalei presented a bridging exercise comparing the random effects (RE) base model with the AI BTS developed in ADMB (Model 18) with an RE model developed in the rema R package (Model 18.a) and with the same model developed as a REM model (Model 18.b) in the rema R package. She also presented a REM model (Model 22) developed in the rema R package which included the addition of the LLS relative population weights (RPW) for SST on the EBS slope. The Team was satisfied that the bridging exercise adequately documented the benefits of moving to the rema R package-based models and that Model 22 was an improvement over Model 18.b.

The Team recommended limiting the November analysis to the last approved model, Model 18, and the updated Model 22. The Team was highly supportive of the effort to standardize the use of the rema R package for Tier 4 and 5 assessments including for shortraker rockfish.

Greenland Turbot

Meaghan Bryan presented the update to the Greenland turbot assessment. There were three new model runs which were compared with the previous assessment model. First, there was a software update to SS3, in which the sex-specific offset in the double normal selectivity pattern was re-parameterized to constrain the final selectivity of the largest length bin to be equal to or less than the peak (Run 1). Second, AFSC longline survey length data were included as a direct input and selectivity at length was estimated within the model (Run 2). Finally, mean length at age from the EBS slope bottom trawl survey was also included (Run 3). **The Team recommended that Runs 1 and 3 be brought forward in November, with documentation of the Run 2 bridging exercise included in the appendix to the SAFE.**

The Team discussed how to present changes when the platform is updated, in this case SS3.30.12 was updated to SS3.30.19. The SS3.30.19 update provided significant upgrades and changes. However, these platform changes impact many assessment models. In the example of Greenland turbot, Run 1 is the status quo model run in SS3.30.19. Would this then become the status quo because SS3.30.12 is now obsolete? Does the author need to present a model run of the most recent data using the old software version? The Team requested SSC guidance for how to best present this type of model change. For example, would a short presentation in the Joint Groundfish Plan Team which discusses the pertinent changes to the platform suffice? Or would the authors be required to present the base model results with a run from the obsolete software version in each of the assessments presented in November?

The Team strongly supports the resumption of the eastern Bering Sea slope bottom trawl survey, since it is a major source of data for deeper water species; for Greenland turbot, it better represents the mature portion of the stock. The AFSC longline survey data is also an important source of turbot data, especially now that sex is being recorded (as of 2021) in addition to length data. The author expects this data source to become a more important inclusion in the model as the time series develops, and the Team supports the extra work being done on the survey since the data are being used directly in the assessment.

Yellowfin Sole

Ingrid Spies presented the base model along with two alternative models.

- Model 18.2 = current base model with design-based abundance index and age compositions + sex-specific survey selectivity

- Model 22.1 = design-based abundance index and age compositions + single survey selectivity

- Model 22.2 = model-based (i.e., VAST) abundance index and age compositions + single survey selectivity

The Team recommended the author bring forward all three of the proposed models for consideration in the November full assessment.

There was discussion about what input sample sizes to use with the model-based age composition data in Model 22.2. The Team agreed that the author continue to apply Francis weighting with the current fixed input sample sizes in 2022. The Team notes there are plans within the AFSC to develop standardized methods and software for calculating input sample sizes. The Team encourages the author to revisit this topic in future iterations of the assessment when new methods become available.

The author indicated that running the VAST age compositions took approximately 16 hours and that these slow run times are a bottleneck for producing stock assessment inputs at the AFSC. The Team supports efforts within the Groundfish Assessment Program (GAP) to develop alternative methods for running model-based estimators (e.g., VAST) using cloud computing or other high powered processing resources. The Team noted that funding for computing resources may be available within NOAA through the congressional Inflation Reduction Act.

The Team supports the author's continued research on the temperature-driven growth model for projections. One suggestion from the Team was to compare the temperature-driven growth model with a model that has a random walk on growth parameters to see if the temperature-driven model outperforms the random walk model.

EBS Acoustic Trawl

Sarah Stienssen provided an overview of the 2022 Acoustic Trawl Survey for walleye pollock. [diana to add link to presentation]. Midwater acoustic data collected on the groundfish charters are used to inform an AVO Index time series for annual use in the walleye pollock EBS stock assessment. In 2022 there were a number of staffing issues which impacted survey design. There is also no data from the Russian side as no permission was obtained for crossing into Russian waters. The survey timing needed to be paired down due to staffing issues on the Oscar Dyson and the survey design was modified to accommodate only 2 legs in case staffing issues were not resolved in time to accommodate a third leg. Specifically, survey spacing was increased from 20 nmi to 40 nmi. Less trawling also occurred (12 hrs a day vs 18 hrs a day) to alleviate staffing concern shortages on the Oscar Dyson. Once a Leg 3 was added, a cross transect across the core area was added and existing transects were extended to the north.Wider transects spacing and reduced trawling effort likely introduced additional uncertainty into survey results.

Discussion by the Team centered on the variance imparted by the increased transect spacing and reduced trawling in 2022. The acoustic team noted that while analysis of the resulting uncertainty has not yet been accomplished, some information is available based on previous examinations of historical acoustic survey results used to justify the 2020 saildrone survey. Alex De Robertis indicated that they found the CV to nearly double when increasing transect spacing to 40 nmi by withholding data in previous surveys [see Fig 4 in De Robertis et al., 2021] and they would anticipate a similar increase in CV in 2022 effort. He anticipates the CV would be smaller for the 2022 survey as some 20 nmi spaced transects were conducted in high-abundance areas in the northwest part of the survey area. Analysis of previous surveys has indicated that total biomass is not sensitive to the amount of trawl data as pollock dominate the ecosystem

and the backscatter to biomass conversion is not sensitive to fish size [see Figs 3 in De Robertis et al., 2021]. The reduction in trawling effort is not a major concern given that pollock dominate acoustic scattering in the survey area, and the 2022 survey was dominated by a single year class of pollock. The next acoustic summer for the Bering Sea is scheduled for 2024 and survey effort in 2023 will be in the Gulf of Alaska.

The Team greatly appreciates the extra efforts of the acoustic team to produce comparable results in a timely manner despite the extreme staffing circumstances of the 2022 survey.

EBS Pollock

Jim Ianelli gave a presentation on proposed assessment updates and current research concerning Eastern Bering Sea walleye pollock. The only suggested change to the base model for November was in the method used to calculate the survey mean weights-at-age. He noted that the previously used approach was applying fixed (over time) length-weight parameters (by sex) to annual length-at-age estimates. This tended to under-estimate the variability of weights-at-age and was substantially different from the more recent annual data based on individual fish weights.

During discussions and questions on how these data are used in the assessment, Jim noted that survey mean-weights-at-age are used as empirical estimates applied to model numbers-at-age to obtain model predicted survey biomass. Secondarily, the survey data are used to supplement the fishery weight-at-age estimates, especially for the "current year" e.g., for 2022 in the November assessment. These help the fishery estimates (and concomitant uncertainty) for the near-term future years. They also affect reference points.

The Team was concerned that for the spatio-temporal model using model output as model input could be problematic as the assessment model could smooth input that had already been smoothed in the initial process used to generate it. This concern was considered by the author, but the variance of the estimates appeared to be consistent with those developed from the naïve estimates.

There was further Team discussion focused on the issue of the Groundfish Assessment Program's (GAP) ability to provide additional data products this year. Jim indicated that the spatio-temporal estimates for all of the survey data through 2019 had already been produced, however the GAP would need to produce the 2021 estimates if this method was to be implemented. Given current workflow, staff workloads, and computer time needed to produce these estimates a GAP representative on the Team indicated that it was not certain these estimates could be provided in a timely manner.

The Team agreed that both the spatial and "non-spatial" methods appeared to be an improvement over the previous method and that the spatio-temporal method was consistent with how other model components such as the VAST derived biomass index and numbers at age were produced. However, the Team noted that the spatio-temporal approach has yet to be peer reviewed and documentation was unavailable for the Team to review. **The Team therefore recommended that the non-spatial approach be used as the basis for the 2022 assessment.** The differences from the spatial approach were very minor so for now, the simple empirical approach is preferred.

The next section of the presentation considered trends in weight frequency of the catch from observer data and examined spatial and temporal trends and their relation to environmental conditions and apparent shifts in the overall distribution of the stock. The Team noted that the cold pool extent might not be the best metric as the intensity of the cold pool might also be a factor. The Team noted that although the cold pool in 2022 appears to have extended much further south in 2022 the intensity of the cold pool was much lower than in previous years with similar extent. It was also noted by a member of the public that there are many factors involved in a fisher's decision to fish in a particular area including regulatory factors,

bycatch, and market considerations and as well as other economic factors not captured in this investigation.

For the analysis of pollock distribution in the survey Jim presented figures showing the VAST estimates of pollock distribution throughout the Eastern and Northern Bering Sea (NBS). This triggered several threads of discussion. Jim was asked about the uncertainty in the estimated distributions in the NBS in years when surveys were not conducted in this region. Jim noted that although we generally think of 2010 as the beginning of surveying the NBS, there were data from earlier years from this region used in the analysis. In addition, uncertainty in NBS estimates for years without data is much greater than years with data. Jim also noted that the cold pool was used as a covariate in the VAST estimates. The Team noted that if it was a temperature effect and not specifically a cold pool effect, the use of station temperature in the model directly or some measure of bottom temperature such as a spline of the spatial distribution of shelf temperatures might be more appropriate. The Team discussed the use of temperature and different sources of temperature estimates to achieve different objectives. For example, trawl survey station specific bottom temperatures might be appropriate to model distribution. However, for the evaluation of biological measures, such as those described for growth in the proposed spatio-temporal weight-at-age estimates, the use of ROMS temperatures might be better suited as specific date or date ranges could be chosen to represent longer term temperature trends. The Team supported further research in this area.

In response to the author recommending future explorations of spatial extent of the trawl electronic monitoring (EM) Experimental Fishing Permit (EFP) fishing activity, the Team noted that authors do not yet have access to the trawl EM EFP logbook data. This lack of access to these data affects the ability to evaluate spatial patterns of the fishery.

Proposed 2023 and 2024 Harvest Specification Recommendations and Halibut Discard Mortality Rates

The Team approved the proposed 2023 and 2024 harvest specifications by recommending the final 2023 BSAI harvest specifications for OFLs and ABCs as published in the Federal Register in March 2022.

The Team approved the 2023 and 2024 halibut discard mortality rates as presented in the Halibut DMR Working Group recommendations for 2023 and 2024.

Adjourn

The meeting adjourned at approximately 4:00 PDT on September 22, 2022.