North Pacific Fishery Management Council

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Joint Groundfish Plan Teams
MINUTES

September 19-20, 2022 – Alaska Fishery Science Center Seattle, WA

BSAI Team		GOA Team	
Steve Barbeaux	AFSC REFM (co-chair)	Jim Ianelli	AFSC REFM (co-chair)
Kalei Shotwell	AFSC REFM (co-chair)	Chris Lunsford	AFSC ABL (co-chair)
Cindy Tribuzio	AFSC ABL (vice-chair)	Sara Cleaver	NPFMC (coordinator)
Diana Stram	NPFMC (coordinator)	Kristan Blackhart	NMFS OS&T
Caitlin Allen Akselrud	AFSC RACE	Obren Davis	NMFS AKRO
Mary Furuness	NMFS AKRO	Craig Faunce	AFSC FMA
Allan Hicks	IPHC	Lisa Hillier	WDFW
Lisa Hillier	WDFW	Pete Hulson	AFSC ABL
Kirstin Holsman	AFSC REFM	Sandra Lowe	AFSC REFM
Phil Joy	ADF&G	Nat Nichols	ADF&G
Andy Kingham	AFSC FMA	Andrew Olson	ADF&G
Beth Matta	AFSC REFM	Jan Rumble	ADF&G
Andrew Seitz	UAF	Paul Spencer	AFSC REFM
Michael Smith	AFSC REFM	Marysia Szymkowiak	AFSC REFM
Jane Sullivan	AFSC ABL		

Administrative/Intro/Council updates

The Joint meeting for the Groundfish Plan Teams ("Teams") began on Monday, September 19, 2022 at 9:00am PDT at the AFSC. Participation was both in person and offered remotely via Zoom. Roughly 70 people attended the meeting, but 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 Teams' electronic agenda. All presentations are linked in the header for each agenda item in this report.

Council updates: Diana Stram and Sara Cleaver provided an overview of Team roles and responsibilities, current Council activities as well as an update on Council process changes that are still under consideration. Some of these may affect the timing of Plan Team meetings and harvest specifications process and feedback from the Teams is sought on this effort. It was noted that no decisions are being made by the Council at this time. There was some discussion about moving the September meeting to August, however it was noted that survey data gets processed in August and an earlier meeting would preclude any survey presentations to the Teams and the public, and also impact resulting ESR updates. The Teams noted that there are plans to improve efficiency within the Teams and some of these plans may assist in some of the timing issues faced by the Teams and turning documents over to the SSC in a timely manner.

Diana Stram updated the Teams on the work of the Climate Change Taskforce (CCTF) and noted that the Council and committees will be reviewing the Climate Readiness Synthesis (CRS) report from the CCTF's efforts under the first objective in the work plan. She noted that the report will be distributed to

the Teams for informal review and comments as desirable and a presentation will be made at an appropriate time to the Joint Teams on CCTF progress. Kirstin Holsman (co-Chair of CCTF) suggested that the Joint Teams consider formation of a workgroup of Plan Team members, CCTF members and others (stock assessment authors, SSC) to provide recommendations on inclusion of climate change information in future stock assessments, building upon Section 2 of the CRS report. The Teams requested that Kirstin and Diana work together to develop a draft terms of reference for this workgroup for distribution and discussion in November prior to recommending the formation of such a workgroup. It was noted further in BSAI discussions that two potential assessment case studies for this workgroup could be EBS pollock and yellowfin sole.

Future meetings: The November Groundfish Plan Team meetings will be held November 14-18, 2022. Tentative dates for 2023 meetings are: September 19-22 and November 13-17.

Additional items: The Teams discussed the history of various Plan Team workgroups (recruitment, data limited, stock structure, etc) and that the policy would be to continue to recommend the formation of workgroups as issues arise.

Spatial Management Policy Papers

Diana Stram provided an overview of the NPFMC policy on spatial management. Included was a document that summarized Plan Team and SSC recommendations along with a timeline on spatial management issues pertinent to the BSAI blackspotted/rougheye (BS/RE) rockfish stock (BS/RE Spatial Issues). Two applications of this policy have occurred recently, BSAI BS/RE stock structure concerns and concerns over the current grouping of the GOA Demersal Shelf Rockfish (DSR) subgroup within the Other Rockfish (OR) complex. Despite very different issues and a defined four-step policy process, the policy has not provided enough direction to resolve the spatial management issues in either case. As a result, the prescribed timelines and goals the policy lays out have lapsed and the Council has not taken action. Team discussion and public comment illustrated the need for resolution, whether additional research is warranted to resolve questions or if redefining the policy is needed to identify a threshold for triggering an action when an impasse occurs. The Teams continue to have concerns about the application of the spatial management policy for both issues and look forward for additional direction from the Council on how to interpret the policy to better address spatial management issues. Further discussion of the OR/DSR issue was on the GOA Groundfish Plan Team agenda.

AFSC Stock Prioritization

Chris Lunsford gave a presentation on the status, prioritization, and future direction of the AFSC stock assessment enterprise. Chris updated the Teams on the status of the stock assessment enterprise, including number of assessments, frequency, increases in complexity, and increases in requests from the Teams and the SSC. For 2022, the AFSC will be unable to complete full assessments for BSAI skate complex and BSAI flathead sole. These two may be done as partials". The partial assessment planned for BSAI Alaska plaice may not be completed. This is due to unexpected turnover and staffing issues.

The current assessment frequency status was compared to pre-2017 before stock prioritization. Ongoing improvements and initiatives such as reproducibility, transferability, transparency, and automation were reviewed. Chris noted that assessment and review capacities are at their limits throughout the entire process and there was a need to balance efficiencies, workload, and need for information, with staff resources. He proposed revisiting stock prioritization with the 2017 stock prioritization analysis as a starting point for assessing ways of reducing overall annual workloads. Candidate stocks for reduced assessment frequency were proposed for 2023.

The Teams discussed the pros and cons of several proposals for consideration, including rolling over specifications for stocks that have trivial changes to harvest specifications (ABC, OFL) for an assessment cycle. This would alleviate the need for going through the entire Team and SSC review process for that assessment cycle and streamline the specification process for those stocks. What defined a trivial amount was up for discussion and would likely be dependent on the state of the stock and the magnitude of potential changes.

The Team noted that this policy would not provide efficiencies for assessment authors, as the same amount of work would be required to determine the level of change for projected biological reference points. Streamlining the projection code and processes could potentially accomplish the same efficiencies. Members of the audience expressed concern about determining a threshold level, and the need for flexibility to respond to changes with off-cycle assessments. The Teams acknowledged that the Spencer et al. (2019) vulnerability analysis could provide useful context for eastern Bering Sea groundfish species and that a new vulnerability assessment for Gulf of Alaska groundfish species was in production.

The Team pointed out that from an author perspective, partial assessments, projections, etc. are a lower priority for time savings and increased efficiency for authors. Addressing other areas of focus and priorities (e.g., full assessments, SAFE Guidelines, etc.) could provide greater benefits. The Teams agreed and pointed out the need to consider vulnerability and the need to be proactive with climate ready assessments.

The discussion moved to the North Pacific assessment and review process, and the distinction between full and benchmark assessments. The Teams pointed out that the effort for reviewing a benchmark versus a full assessment is the same. The current challenge is the amount of material to review (in a compressed time frame), and the review bodies' resources. Further, the need to be prepared to address climate shocks which require increased assessments and monitoring should be balanced with reductions in assessment frequency.

The Teams agreed that the SAFE Guidelines should be revisited. SAFE chapters have become large, complex, and contain increasing amounts of scientific information and responses to comments. They are unwieldy and difficult to navigate. The Teams pointed out that the level of review should align with the number of changes in annual updates. Few significant or trivial changes do not require a full review effort. The Teams discussed the need to engage industry in these conversations. Target species and priorities shift, and the industry wants to be prepared for changes to ABC/OFLs. Careful consideration should be given to decreased frequencies for high value stocks. The Teams further pointed out that any changes in the system would need to have flexibility built in to be responsive to climate change, sudden shifts in distribution, unexplained mortality events, etc.

The Teams noted that the AFSC will be moving forward in 2023 with the following:

- Review of the 2017 stock prioritization process and metrics,
- Consideration of additional stocks for reduced frequency,
- Revisitation of SAFE Guidelines and consideration of an intermediate option between a partial and full assessment
- Clarification and modification of requirements for partial and full assessments, and
- Consideration of off-year requirements.

Ecological and Socioeconomic Profiles (ESP) update

Kalei Shotwell provided an update on ESPs, noting that there has been some data streamlining and reorganizing with the program.

Review of ESPs has been done in September to provide information for stock assessment authors, and the Teams find these updates useful. The Teams discussed earlier timing, to give more time for stock assessments to review and incorporate results. Kalei commented that this would be more difficult because of data transmission from surveys and other information that are incorporated into the ESPs. Previously, the full ESP draft was presented in November but with that timing, it was hard to incorporate into stock assessments, so it was moved earlier. There was support from the Teams for the schedule of full ESPs in September and report cards in November.

One Team member noted that data quality has improved a lot. The Teams appreciate the help that AKFIN has provided for this project. Also, the Teams agreed that having National ESP Program updates is helpful and Kalei noted that there have been good ideas that come forward from the National Program that our region may want to use.

Ecosystem Status Report (ESR) Climate Overview

Ivonne Ortiz provided an overview of the Ecosystem Status Report (climate and physical information) for the EBS, AI, and GOA, including recent extreme events. The ESR authors and the Teams acknowledged and expressed concern for communities and colleagues in the Northern Bering Sea and Yukon regions that continue to experience multiple sequential extremes events this year. It is important to also note that Rob Suryan's presentation included biological indices that are included in each region's ESR. The Teams noted between these two presentations that while conditions in the EBS and GOA have improved in terms of long-term warming, biologically the systems appear to be more similar to "warm" or Marine Heatwave (MHW) systems. Specifically, Ivonne presented multiple indices for the EBS that indicate sea ice extent and surface water temperatures are cooler than in MHW years, closer to the long-term mean. However, the thickness of the ice is much reduced and spring melt occurred earlier (with warmer than average surface temperatures in the spring). The Teams noted that this may explain the reduced lipid-rich large zooplankton indices presented by Rob Suryan and the Teams discussed that the ESR authors could explore the linkage between physical conditions in the EBS and the productivity of the system (e.g., sea ice and spring melt productivity).

The Teams noted that the AI continues to have a moderate MHW (as in 2021, 2020), especially the western AI and that the spatial extent of the MHW was up to 75% in the Western AI for multiple time periods over the last few years which may impact juveniles in surface waters. The Teams also noted the long-term warming trend in air temperature in the EBS, with temperatures well above average for the past six years with a notable exception in May 2022 which was the first cold anomaly in the last 6 years. The Teams noted this is consistent with the long-term SST time-series that illustrate long-term warming trends in the AI (in both winter and summer) and in the GOA in summer (but not winter in that time-series). The Teams support continued presentation of long-term climate trends as they are important for providing context of recent MHW conditions and potential impacts of climate change.

The Teams acknowledge the immense effort of the ESR authors to collate and synthesize a broad array of environmental indices into a succinct summary that is useful for context of advice. The Teams commend the ESR authors on the compilation of such information towards management relevant information. The Teams support continued presentation of the ESR to the Plan Teams.

Forage Species

David McGown presented an overview of the 2022 Forage Fish Species Congress held earlier this year, which focused on the major scientific goals and knowledge gaps by region, and recommendations for future research priorities. The steering committee hopes to present to the Council's Ecosystem Committee in December or later. The steering committee has proposed a session on North Pacific forage species at next year's PICES meeting, but they are awaiting a response.

The Teams highlighted a few points:

- Delineating how different species distributions are affected by environmental data would be useful.
- Forage species information is also critical for setting up multispecies models.
- Separating information by northern and southern Bering Sea would be useful to evaluate the potential for divergent carrying capacity related to climate change.
- Being able to reconstruct a time series would be helpful for multivariate approaches.

The Teams recommended that the forage fish workshop requested by the Council occur after the BSAI forage fish assessment in 2023 to better coincide with the assessment cycle.

Recruitment Processes Alliance Update

Rob Suryan presented an overview of the 2022 ecosystem surveys in the BS and GOA with the goal of providing the most recent information on ecosystem conditions affecting fish recruitment processes and highlighting some current projects. Many people from across divisions and agencies were involved. The Bering Sea showed typically warm year responses of fewer larger copepods and large catches of age-0 pollock and juvenile sockeye. Age-0 Pacific cod were seen in the BS ecosystem surveys, which is unusual. In the GOA, more large and small copepods were observed along with more age-0 Pacific cod and age-0 pollock. Fish condition studies are planned for each area to determine effects on survival. A discussion of starvation in sablefish larvae revealed that sablefish larvae metabolize their yolk sac slowly and are eating while the yolk sac is present. Experiments on starvation resiliency will be repeated at higher temperatures to mimic warming conditions that sablefish may experience.

During Team discussion it was hypothesized that the ice melting faster could be due to it being thinner in 2020. This may have resulted in less ice algae and thus a decline in large copepods. It was noted that information from the ecosystem surveys are currently presented in the ESRs. The Teams noted that future survey presentations should include a summary slide with ESP-specific indicators.

Fishing Effects on Essential Fish Habitat (EFH)

Molly Zaleski and Scott Smeltz presented an overview of the Essential Fish Habitat (EFH) 5-year review with a focus on the fishing effects (FE) evaluation. Following the presentation, the Teams discussed the presented maps and noted that impact evaluation primarily focused on the adult life stage for species-specific EFH areas. Species Distribution Maps (SDMs) based on the adult life stage were endorsed by both the SSC and stock assessment authors in 2016, but a decision should be made during the next 5-year review cycle on whether to incorporate additional species-specific life stages. The Teams agreed that the 2022 FE evaluation incorporated newly available information and supported the continued conclusion that adverse effects of fishing activity on EFH are minimal and temporary in nature for all species. Questions were raised over how to evaluate FE on data limited stocks. Authors presented information for 5 GOA groundfish species where FE were unable to be determined due to insufficient data. The Teams commented that it was unclear how to proceed for stocks with little to no data informing the models and the need for an option for the stock assessment authors to note that models may not be appropriate for

some data limited stocks. **The Teams recommended that the SSC provide input on the process for the evaluation of FE on data limited stocks**. Stock assessment authors noted that in some cases data were insufficient to provide conclusive evaluations. For species where the authors reported insufficient information, the Teams and authors recommended that the complex map be used as a proxy for the individual species EFH maps for the FE assessment.

Spiny dogfish was highlighted as one of the stocks identified as lacking data for FE evaluation. **The Teams and authors recommended an evaluation of fishing effects on GOA spiny dogfish EFH using the FE model and the 50% CEA from the new EFH map and providing this analysis for the SSC meeting.** The Teams discussed and emphasized the value of the longline data set. **The Teams recommended incorporating survey longline (both the AFSC and IPHC longline surveys) data into SDMs where appropriate to evaluate the value of using these data for FE evaluations.** The Teams recognized that substantial work went into this evaluation and noted its value to stock assessment authors.

AFSC Longline Survey

Kevin Siwicke presented an informational update on the 2022 AFSC longline survey of the GOA and AI (the Bering Sea is surveyed in odd years and was not covered in this year's survey). Overall, preliminary relative population numbers for sablefish continued an increasing trend. An investigation of hook competition was presented for continuity, but there was uncertainty surrounding the interpretation of the results. The Teams asked if changes in abundance for some species could be indicative of species moving out of the survey range. Whale interactions with survey gear continued at similar rates to previous years, while subsurface temperatures recorded during the survey remained higher than average.

During the 2022 survey, scientists conducted a comparison study between hook-and-line and slinky pot gear types; the results showed catch rates and length comps between the two gears to be comparable across depths. The Teams discussed the results of this gear comparison study. Project collaborators noted that the correlation coefficient between the two gears was surprisingly high and the presence of smaller fish in the slinky pots on day 1 was to be expected because the escape rings on the pots were closed; it was further noted that this effect was more related to depth, rather than gear. The Teams asked about the magnitude of bycatch in the slinky pots. Project collaborators noted higher bycatch on the hooks but low overall bycatch levels in the project area which was mud habitat utilized by sablefish and not many other species. Another question focused on gear equivalency (i.e., how it was determined that 90 skates = 120 pots). Kevin noted that catch rates are standardized for the analysis, but the number of pots was increased for the study this year to try to improve the equivalency. The Teams noted that industry catch rates are better with slinky pots than hook-and-line gear, so these results are surprising; further discussion with industry was suggested.

Additional Team discussion centered around interpolation methods used for calculating relative population numbers when areas are not sampled (e.g., Bering Sea in even years). Methods are based on sablefish and may be inconsistent for other species, and comparisons may be inappropriate. The Teams noted that methods to interpolate the Bering Sea and Aleutian Islands in off-years may affect how other stocks should be interpreted. Analysts for these stocks should be aware.

Whale Depredation Estimates

Megan Williams presented an analysis of whale depredation on sablefish fishery catch. This analysis built upon work from previous years and was updated with recent observer data. The 2017 GAM model was updated with new data resulting in an increase in estimated sperm whale depredation. When binning the data in five-year intervals, the increase in sperm whale depredation was consistent across years. A second model for the proportion of sets depredated showed that sperm whales and killer whales tended to

depredate on sets on larger boats and deeper sets more often. Overall, a small amount of the total mortality can be attributed to whale depredation, but depredation rates are regional. For example, most killer whale depredation occurs in the west.

It was noted that there was an increase in the use of pots in the central GOA and perhaps this resulted in a redistribution of depredation to other areas. The Teams suggested that would be a good topic for additional work.

The Teams noted there was a considerable decrease in total sablefish mortality due to whales in 2021, likely attributed to an increase in pot gear. Even though the whale depredation rates were similar, there was a smaller amount of effort using hook-and-line gear, resulting in lower overall sablefish depredation mortality.

Megan noted that the magnitude of depredation compared to the quota has been very small (less than 1%). Annual updates to the model may be unnecessary due to the limited amount of mortality. However, if data were lacking to inform the model and pot gear catch continues to increase, it may be worthwhile to provide stability and simplicity in how the estimates were applied. Additionally, the ESP could be an appropriate place to document changes in depredation. Stakeholders were interested in further research, possibly with a coarser analysis to accommodate the sparse data.

The Teams noted that observer coverage between CPs and CVs differ, and lumping data would be more indicative of rates from CPs. The Teams stressed the importance of evaluating whether current observer coverage is enough to parse differences between the two sectors.

Sablefish CPUE Standardization

Matthew Cheng presented recent developments in standardizing fishery-dependent Catch-Per-Unit-Effort (CPUE) across gear types for sablefish. The current assessment uses observer and logbook data for the hook-and-line fishery, however, the pot fishery for sablefish has been increasing in recent years and should be taken into account in the CPUE index. Further, the current assessment does not leverage the logbook pot data that is available to supplement the observer data, which is projected to decrease due to implementation of electronic monitoring. Two model structures were presented, one that included both the pot and hook-and-line fisheries and another that only included the hook-and-line fishery. Results from each model agreed well with the current CPUE index used in the assessment, except for trends in recent years. The Teams concluded that the combined hook-and-line and pot index should be considered for use in the 2023 assessment, but how to calculate uncertainty and how the assessment may deal with selectivity are currently unknown. The Teams asked whether the CPUE trend could change over time as the fleet gains experience fishing sablefish with pots, as well as whether vessel effects were considered in the models. The author noted that it is difficult to ID vessels, as different vessel codes have been used in the observer and logbook data, but when vessel ID was investigated as a random effect there was no significant improvement in the model. The Teams noted that a bootstrap approach could be used to quantify the uncertainty in the CPUE index. The Teams also noted that the relative difference in catchability between hook-and-line and pot gear could be further evaluated through this analysis. The Teams commended Matt for his work and look forward to reviewing a possible sablefish assessment configuration that includes this combined gear index.

Pacific Sleeper Shark Stock Structure and Model Updates

Cindy Tribuzio provided a presentation on the Pacific sleeper shark stock structure template in the GOA and BSAI and an exploration of data-limited assessment models in response to previous Teams and SSC requests. Key findings of the stock structure template include declines in fishery and survey catch since

the early 2000s, contracted spatial extent in both the fishery and survey, high vulnerability to depletion due to low productivity life history characteristics (e.g., generation time likely exceeding 50 years), no significant genetic stock structure but potential for demographic structure, and identification of a potential nursery habitat in the Bering Sea. Also, most of the Pacific sleeper sharks caught in Alaska are immature. These findings suggest a need for improved monitoring and the author provided several recommendations for the Teams to consider regarding expanded monitoring and improvements to the stock assessment.

The author presented alternative models to bring forward in November using the Only Reliable Catch Data (ORCS) model that uses analyst-evaluated scores for a number of stock attributes that are then averaged to determine the stock status as underexploited, fully exploited or overexploited. A base and ORCS model alternative would be presented for Pacific sleeper shark in the BSAI and GOA. The constant catch models were not recommended as they assume catch is known without error and do not take into account accessory information.

The Teams agreed with the author's recommendations regarding the stock structure template.

Specifically, the author recommended and the Teams concurred with:

1. **Retaining observer at-sea length measurements and expand list of shark species codes,**
2. **Separating the Pacific spiny dogfish ABC from the other shark species in the GOA,**
3. **Developing fishery -dependent and -independent indices for use in stock assessment**
4. **Continuing to expand biological studies of Pacific sleeper sharks to inform catch models**
5. **Creating a more efficient combined (BSAI and GOA) stock assessment document for Alaska sharks.**

The Teams also agree with the author's recommendation to bring forward the status quo assessment approach and the ORCS catch model as alternatives for sleeper sharks in November.

The author proposed an alternative approach for the other/unidentified sharks in the BSAI and GOA and spiny dogfish in the GOA to account for extreme and rare catch events. **The Teams agreed with the authors recommendation to bring the alternative approach forward in November.**

The Teams discussed current efforts to reach out to the observer program regarding potential change in protocols, using logbooks to record more information, and a special project to use machine learning to speciate sharks in the fixed-gear electronic monitoring strata. Since a sibling pair was found in the eastern Bering Sea, it was suggested by a member of the audience that close-kin mark recapture may be a way to expand to an estimate of population size. The Teams further discussed the benefits of combining the stock assessment and that there was precedent in the Alaska skate stock assessments for splitting separate species within a single stock assessment report. It was noted by an industry stakeholder that making "smaller boxes'" could just introduce additional pathways for the industry to "trip up" - and that there may be benefit to first focus on better monitoring and investigating the spatial distribution of the catch before shifting to smaller management units.

The Teams also discussed that the Tier 6 designation has typically been applied to stocks that historically were not targeted and also did not have a reliable estimate of biomass. A member of the public noted that these sharks are not targets and are already discarded when caught and that it was unclear what the impacts to the industry would be with these changes. The Teams also discussed the benefit of the ORCS catch model to lower risk of exploitation and that the methodology was similar to the risk table. The Teams discussed the need to maintain consistency with the National Standards and have separate OFLs and ABCs for each FMP in the combined document.

State-Space Configurations

Giancarlo M. Correa presented *Incorporating length information and growth estimation in the Woods Hole Assessment Model (WHAM)*. He presented the utility and limitations of the current model as well as new expansions to that model. The Teams raised the possibility that these new approaches, which allow climate linked assessments to be conducted rapidly and propagate errors correctly and easily, are transformative. **The Teams recommended that a workshop proposed by the author around this approach and applications be conducted in the Spring.** Case studies that could be included at the workshop were subsequently discussed (e.g., the SEATTLE multispecies model and projection model for Matthieu Veron, postdoc working with Cody Szuwalski).

Random Effects-Tier 4-5 Considerations

Jane Sullivan provided a presentation on a consensus version of the random effects model (called the 'rema' package in R) for Tier 4/5 and apportionment. The Teams discussed additional features available in 'rema', including estimation of additional observation error in the models, model comparison using AIC, calculation of weighted AIC to investigate relative contributions of individual parameters, potential priors on process error based on life history, the addition for covariates to the model, and the potential correlation of additional observation error among different indices. Jane indicated that there is much potential for future expansion and exploration, and the aim of this version was to provide a starting point for replacing the various random effects model approaches in ADMB. The Teams commended the work. Several users of the software noted that they found the new approach easy to use and well documented.

The Teams recommended that stock assessment authors transition from the ADMB random-effects survey smoother to this package which implements the same model with several improvements.

The Teams also supported future developments for this package, including model validation work and continued exploration of implementing the Tweedie distribution for data with zeros.

Economic SAFE

Ben Fissel presented the September draft of the Economic SAFE Report. Ben is leaving the NOAA AFSC and this will be his last presentation of the Econ SAFE. The Teams acknowledged Ben's many years of service and great contributions towards producing the Econ SAFE and the EPR sections within the individual stock chapters.

The report updates available economic information for 2021; as always there is a one-year delay in most economic data. Ben will provide a more comprehensive presentation of trends at the November Plan Team meeting. The Economic and Social Science Research Program (ESSR) at AFSC is working on backfilling his responsibilities. ESSR will continue to produce the Econ SAFE as usual, but ESSR is in the process of finding a person to take the lead on the Econ SAFE going forward. Ben provided a brief summary of groundfish economic activity. The content of the September Econ SAFE draft will be similar to previous years, inclusive of the executive summary, the economic data tables and economic indices.

The discussion started with a question about how people will complete their ESPs without economic information. Ben responded that they do not anticipate any changes in the delivery of their services and expertise. The discussion continued around the 10 ESPs and Economic Performance Reports (EPRs) made by Ben. These documents usually end up in the appendix in other reports, but people usually blend the economic information to make them useful across different contexts. Stakeholders find great value in AKFIN and its ability to help people obtain the data in these reports directly. The discussion then turned

towards the importance of the economic expertise offered by Ben and ESSR. Ben responded that ESSR will continue to be responsive to questions, but ESSR could also use more feedback on what information stakeholders find value in and really need. There was a question about low cod prices, but Ben responded that cod prices were not that low, it was more an issue with lower volumes. The final question in the discussion was about COVID surveys and existing efforts to measure the impact of COVID. Ben explained that there was an external COVID survey implemented outside of ESSR, but the survey samples are limited. Cost information collections may be useful as well in measuring the impact of COVID, but with the existing cost information available to ESSR, the impact of COVID has been tough to disentangle from other phenomena.

The Teams suggested that the Council poll how different people use the Economic SAFE report; specifically, to find which items are most useful. This transition phase provides an opportunity to explore new ways of presenting information.

Genomic Update on Pollock and Cod

Sara Schall presented the latest results on this work. One question raised was whether there was consistency between satellite tagging results and the genetics studies. Some tagged individuals have been sequenced and future work will integrate these results. The Teams noted that examining parallel studies in demography along with the new genetic analyses will be included when the next stock structure analyses are requested. This should coincide with the combined results of the tagging and genetics studies and may be appropriate in the next couple of years. The Teams support this study and it should remain a high priority. They also noted that the next stock structure report should include information from the GOA and BSAI combined.

Adjourn

The Joint Plan Team meeting adjourned at 5pm Pacific time.

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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
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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.

North Pacific Fishery Management Council

Gulf of Alaska Groundfish Plan Team
MINUTES

September 21-22, 2022 – Alaska Fishery Science Center Seattle, WA

GOA Team Members			
Jim Ianelli	AFSC REFM (co-chair)	Pete Hulson	AFSC ABL
Chris Lunsford	AFSC ABL (co-chair)	Sandra Lowe	AFSC REFM
Sara Cleaver	NPFMC (coordinator)	Nat Nichols	ADF&G
Kristan Blackhart	NMFS OS&T	Andrew Olson	ADF&G
Obren Davis	AFSC FMA	Jan Rumble	ADF&G
Craig Faunce	NMFS AKRO	Paul Spencer	AFSC REFM
Lisa Hillier	WDFW	Marysia Szymkowiak	AFSC REFM

Administrative

The GOA Groundfish Plan Team ("Team") convened on Wednesday, September 21, 2021 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.

Shelikof Survey

Dave McGowan provided a summary of the 2022 winter acoustics survey. Transects were performed in 2021 in the southern end of the survey area that were not done in 2022. The public noted that there may have been juvenile pollock in those two transects, and that this could affect estimates. An industry representative noted that the fleet did not see the fish move north while it was harvesting its A-season pollock.

Pollock distribution was contracted this year and had moved to the southwest. Dave noted that the temperature was close to average, but there may have been some environmental driver affecting behavior.

The survey started one week later in 2022 but did find the pre-spawning fish and survey timing appeared appropriate. There were questions about how to decide when the survey should be conducted. Dave noted that part of the general timing is decided by weather, and weather drives the order of the survey (specific locations). There are many factors which go into survey timing. Spawning is driven by degree days, so it is hard to predict spawning timing and the ideal survey timing occurs just before spawning. Also, survey timing has changed in response to information on the spawn-timings collected over the years.

There were questions about factors affecting the change in the horizontal distribution of pollock, but there are no obvious explanations. Dave provided some information on forage fish. Capelin and eulachon are present in the survey area but hard to quantify. More herring were expected in this year's survey but estimates were low. There is interest by the survey team to investigate methods to estimate biomass for forage fish species, specifically for eulachon. A question was raised from the public about staffing for the

surveys in the future. There are new employees who have been hired to support the survey and survey organizers are talking to leadership about getting additional support to maintain MACE survey operations.

There was discussion about survey vessel dependability, mechanical issues, and other problems related to the NOAA vessels. A member of the public noted that industry talked to the congressional delegation when they were in Kodiak about the utility of using NOAA vessels. Survey staff noted that once at sea, there were no problems and things aboard went smoothly. The issues occur at levels above the vessel crew and scientific staff, although there is a lack of deck hands, and maintenance issues also exist. NOAA leadership does need to hear from stakeholders about their priorities. Logistics may be difficult next year and may persist because of staffing issues and COVID. The Team noted this is a topic of conversation in many regions and there are no easy solutions. There were questions about the effect of the loss of survey information due to cancellation of surveys, but this is difficult to quantify.

GOA Pollock

Cole Monnahan presented an update on model results. The first analysis he showed was related to the ability to estimate "SigmaR" (the recruitment variability about a mean value). He was able to estimate this value using the new WHAM (Woods Hole Assessment Model) implementation. The new estimate is 1.3 compared to the previously assumed value of 1.0. It was noted that there is some difference between initial conditions (starting in 1970) specified in WHAM versus the base GOA pollock model.

The Team recommends using the new estimate of Sigma R (1.3) or the best estimate selected by the author.

Cole presented results from sensitivity model runs on bottom-trawl survey (BTS) catchability. The retrospective pattern was much poorer without the prior distribution on survey catchability. The Team discussed how the prior was developed. Martin Dorn said it was in discussions with BTS leads, it was originally set at 1.0, and about 10 years ago it was switched to 0.85, (CV 0.1). The Team agreed with past recommendations to look at the catchability/availability prior. While the Team agreed with the approach currently in use for the prior, especially because the retrospective pattern was better than when the prior was relaxed. More study and discussion would be worthwhile to elicit the prior that's in use including looking at the prior that was developed for Pacific cod.

The BTS catchability estimate varied substantially under the retrospective runs and seemed counterintuitive (it went up when the index was low). The Team suggested examining why this happens to help support assumptions about BTS catchability in the future.

Cole presented a one-step ahead residuals as a replacement for Pearson residuals used as a diagnostic. The Team endorsed this approach. He also showed one approach to help the poor residual patterns in the fits to the age composition (specifically age 4 over time). The Team responded that this was one approach but that it was ad-hoc. They encouraged examining other forms for time-vary selectivity specifications, for example, as done in the EBS pollock assessment.

The issue of inclusion of selectivity from the summer acoustic trawl data was discussed, and the Team left this up to the authors discretion, since new 2021 age composition will be available for the November assessment.

The Team discussed updating winter apportionments and Cole presented an AR(1) process (shared error) for the region-specific data (with an assumed constant CV). This approach is a useful way to identify areas where surveys have been missed. The trade-offs between using an AR(1) process vs a random-walk were discussed. The latter might be more reflective of a persistent species distribution shift. The Teams

suggested doing a cross-validation (or leave one out) approach to help with selecting the model form. Specifically, whether AR(1) out performs a random walk approach.

Cole presented his work on adding covariate specifications applied to survey catchability for the acoustic trawl (AT) data within the assessment. Using TMB allowed for the estimation of error terms for the covariates, and he demonstrated that this can link up important aspects that can affect the assessment. The model with both covariates included a random-walk term, which greatly improved the model fit to the survey data and resolved some discrepancies. This model was the selected model based on AIC. The Team commended this work and agreed that this should be actively pursued so that environmental effects within assessments can be done using the best statistical assumptions possible. This represents work in progress and is not expected to be included in the 2022 assessment results. The Team suggested that a next step would be to scale the variance terms for the survey data fits according to the 1-D relative error estimates available from the AT data. It was also suggested that the AT relative error estimates could be rescaled to have a mean of 0.2 so that the scale of the index uncertainty would be comparable with the base model. The Team discussed whether there is net flux of pollock through the Shelikof strait and how this impacts the catchability estimates.

GOA Other Rockfish

Cindy Tribuzio presented methodology and updates to estimating natural mortality for GOA Other Rockfish.

In recent years, there have been advancements in updating natural mortality estimates (M) for 11 rockfish species across BSAI and GOA to be utilized in stock assessment. A recent tech memo was published that provides a suite of estimates of M that utilized multiple factors including life span, somatic growth, reproductive biology, and metabolism to estimate M. These results provide a suite of new M estimates for select other rockfish species, but authors still need to determine a single M value for each species for use in the stock assessment. Three options were evaluated for other rockfish for determining a single M including: 1) select a single estimate, 2) use the mean/median value, and 3) use a weighted mean value with uncertainty.

The author recommended using Option 3, developing a weighted mean value that estimates uncertainty. Team discussed the subjective nature of this method because it utilizes expert advice to determine data weighting of the M estimates, and that this is done at the discretion of the author. One concern the Team had with this approach is that it is qualitative and emphasized the need for a more expansive explanation of data weighting, methodology, approach, and how biases are minimized. It was noted that the more heavily weighted M estimates will have a large impact on final estimates.

Application of these methods to other rockfish species impacted sharpchin and yelloweye rockfish the most.

The Team endorsed the methodologies for estimating M and supports the author's recommendation of using the weighted mean with uncertainty method to estimate. **The Team recommended the methodology and approach for estimating values of M be brought forward in the next full assessment for documentation purposes and that decision points in determining species specific values and rationale be included.**

SEO Demersal Shelf Rockfish

Phil Joy (ADF&G) presented a new state-space surplus production model (SS-SPM), and an updated random effects model (REMA), for the demersal shelf rockfish (DSR) complex in the Southeast Outside

(SEO) Subdistrict. A full assessment will be presented in November 2022. The Team commends the author on the thorough presentation of both the development process and the results of these new models.

The Team recommended that:

- **the REMA model be used for producing biomass estimates going forward.** The Team appreciated the work that went into developing the surplus production model but considers it a "research" model at this time.
- **the November 2022 assessment document includes the three versions of the results table for comparison purposes (current model [status quo], REMA model with IPHC survey data, and REMA model without IPHC survey data). The surplus production model results should be presented as an appendix.** The Team expressed concerns about using the IPHC survey data for a patchily distributed species such as yelloweye rockfish, and how appropriate the IPHC survey is for tracking yelloweye population trends.
- **the author use the biomass point estimate instead of the lower 90% CI that is being used in the current model. If the author recommends an ABC/OFL reduction, it should be justified in the risk table.**
- **the author determine the origins of the $F_{40\%}$ value (0.026) being used and noted that if a Tier 4 designation is determined to be inappropriate, that the author should consider dropping to Tier 5 to more appropriately reflect the data limitations of DSR.**
- **the author consult the catch accounting group at the Alaska Regional Office for the best way to estimate historical yelloweye rockfish discards in the halibut fishery and resulting catch estimates.**
- **the author, after consultation with the SSC, pursue a CIE-type review of this assessment in the next 2 years.**

Other Rockfish / DSR Spatial Management

Sara Cleaver presented an update on applying Step 2 of the Council's Spatial Management Policy to a proposal to separate GOA demersal shelf rockfish (DSR) species from the Other Rockfish Complex and establish a Gulf-wide DSR OFL and area-specific ABCs. The presentation, per the Council's October 2021 recommendation, included a discussion paper that addressed additional management considerations associated with recategorizing DSR. The DSR and Other Rockfish assessments would be revised to reflect the revised species groupings if the Council moves forward with this change.

Both the Team and the SSC have been proponents of this change to DSR and Other Rockfish species recategorization for a number of years. The DSR OFL would be set Gulf-wide. The DSR ABCs would be combined area-specific WGOA, CGOA, and West Yakutat ABCs, along with a separate East Yakutat/Southeast Outside ABC. This would allow the State of Alaska to continue to manage the DSR complex in the SEO District, particularly yelloweye rockfish, with the State's existing management tools. An aggregate ABC for the W/C GOA and West Yakutat could increase NMFS's DSR management flexibility and limit the potential for, and frequency of, placing the DSR complex on PSC status.

The Team noted that there already is a suite of management measures in place to curtail and control the catch of rockfish in general, including full retention requirements for fixed gear, with corresponding limits on the amount of rockfish that may enter commerce.

The Team recommended that the 2022 DSR assessment incorporate an example of how the DSR Gulf-wide OFL and the ABCs would be calculated under this revised categorization, including corresponding changes to the Other Rockfish OFLs and ABCs.

The Team suggested that Council begin the planning process for the rulemaking needed to revise regulations associated with the establishment of a Gulf-wide DSR category, per potential Council action on this item.

GOA CLIM

Martin Dorn, Alberto Rovellini, and Grant Adams gave a presentation on the evolution of GOA CLIM including the ATLANTIS and the CEATTLE models. Alberto Rovellini presented an update on the development and calibration of an Atlantis ecosystem model for the Gulf of Alaska. The intent of ATLANTIS is to hindcast heatwave impacts on GOA groundfish and provide projections of future impacts from climate change scenarios on the GOA. The ATLANTIS model includes 78 functional groups of groundfish, marine mammals, invertebrates, birds, bacteria, and detritus. Fishing is incorporated in the models through catch removals. Improvements to the model are needed to better reflect where harvests actually occur.

The Team asked where the species' thermal information in the model comes from because understanding how temperature will change and impact the system is particularly useful. Alberto noted that if we use these tools to understand the effects of warming, the right architecture must be built for understanding the impacts of temperature on each species, and we also must understand thermal niches and their intersection with spatial distributions of groundfish. Currently, the ATLANTIS model is using the broadest thermal envelope that a species can tolerate, and if the temperature rises above that, ATLANTIS essentially removes the species from that area.

The Team asked if mortality is tied to the bioenergetics responses in this model and if survival is linked to this. Alberto responded that ATLANTIS can be configured for that, but the GOA CLIM team is explicitly not imposing mortality that is not associated with harvests in ATLANTIS. Mortality is not explicitly tied to bioenergetics.

The Team noted that a recent GAO report noted that the timeframe of the science projections for models like ATLANTIS are misaligned with current management needs. The Earth System models that ATLANTIS projections are based on, project 50-100 years out. The ATLANTIS model is somewhat constrained with these timeframes for projections.

The Team noted that the method of applying Species Distribution Maps (SDMs) to survey data may be useful.

Grant Adams presented his work on MSEs using CEATTLE to determine whether ignoring predation mortality leads to an inability to achieve management goals in Alaska. Outputs from this model are used in developing the output for ESRs every year. The Team encouraged this approach as a strategic way of looking at patterns in how predation mortality may be changing over time, noting that this approach could be one way to synthesize diet data. This work demonstrates one way to test our current management strategy (single species versions) with a multi-species operating model. The Team supports this work and noted that this type of work should be considered in the Council's research priorities process.

As part of the GOA CLIM project, Martin Dorn presented a reevaluation of the OY range for groundfish in the GOA using single-species MSY estimates. This was the first effort reevaluating the upper end of the OY range in the Gulf of Alaska, with the methods originally used applied to updated stock assessment information. Martin provided relevant historical context and explained how the MSA requires Councils to

review, "on a continuing basis….the assessments and specifications made…with respect to optimum yield". The Team noted that the previously estimated upper end of the OY range currently in use, is likely overestimated due to the early stock assessment methods and information. Of note was the lack of documentation for the 8% reduction from the estimated aggregate MSY for the original upper end of the OY.

Based on this reevaluation of the upper end of the OY using the historical methods with updated MSY values, recent TACs and ABCs seem consistent with the new OY estimate of 444,600 t which may be more realistic than the upper end of the current OY range of 800,000 t. The Team noted the value of this work, and encouraged further efforts to re-evaluate the Gulf of Alaska OY.

Vulnerability Assessment

Ben Williams presented an overview of the GOA Fisheries Climate Vulnerability Assessment that is currently under development. This included a discussion of the project's objectives, methods, and process. Socioeconomic considerations are a key component of this assessment. Ben noted that the group associated with this project plans to poll Team members about their respective species' expertise following the September Plan Team meeting, with a subsequent survey/questionnaire to Team members after the November 2022 meeting.

The Team discussed how one of the drivers for this project is how to incorporate climate change vulnerability information into stock assessments' risk tables. Additionally, the Team discussed the importance of determining the nexus of potential vulnerability with the frequency of assessments, since some assessments are only done periodically.

The Team recommended that other subject matter experts beside Team members and assessment authors be considered as potential resources to assist with ranking and scoring the potential effects and extent of how species may be vulnerable to climate change. This is particularly important for the socioeconomic aspects of the vulnerability assessment.

Northern Rockfish

The Gulf of Alaska Northern Rockfish assessment was presented by Ben Williams. Three model modifications were explored: (1) increasing the length composition plus group, (2) using the Francis method to reweight the composition data, (3) changing the weight on the VAST index from 0.25 to 1, and (4) incorporating skip-spawning into the estimated maturity curve. Model estimates (i.e., biomass or biological reference points) were not sensitive to the plus length group, however, the fit of the length composition data was much improved with an extended plus group. Model estimates were sensitive to the Francis reweighting method and reweighting the VAST index, however, these improvements help the model to achieve a more objective relative weighting between the index and composition data, rather than using a subjective weight of 0.25 to balance the fit between the data sources. Spawning biomass was sensitive to the incorporation of skip-spawning information in the maturity curve, and decreased when skip-spawning was incorporated.

The Team recommended that the following model changes be brought forward in November:

1. **Remove the bottom trawl data from the 1980s**
2. **Extension of the length plus group**
3. **A model that uses the Francis method to reweight the composition data**
4. **A model that sets the VAST index weight at 1 rather than 0.25**

The Team encouraged future research efforts using skip-spawning in the Northern rockfish assessment, as well as investigating the VAST settings used, similar to the analyses in the Dusky rockfish assessment.

The Team recommended that the issue of skip-spawning be brought forward in the risk table for this year's assessment.

Dusky Rockfish

The Gulf of Alaska Dusky Rockfish assessment was presented by Ben Williams. The author explored two model alternatives including: (1) extension of the age and length composition plus group, and (2) alternative settings in the VAST index model. In general, extending the age and length composition plus groups resulted in better fits and have negligible effects on model estimates (i.e., biomass or biological reference points). Alternative settings in VAST were also explored, including the error distribution and number of knots. Model estimates of biomass are sensitive to the settings used in VAST because of the variability in the VAST index both across and within years. It was noted that using the lognormal distribution rather than the gamma distribution which is the current setting employed by GAP, reduced the influence of large biomass estimates (which are highly variable and driven by extreme catch events in the survey), on model results.

The Team recommended that the following model alternatives be brought forward in November:

1. **Remove the bottom trawl survey data from the 1980s**
2. **Extension of the age and length plus groups**
3. **A VAST index using the lognormal distribution and 750 knots**

The Team requested that VAST model diagnostics be placed in an appendix of the November SAFE document. The Team noted that future investigations should include using the Francis reweighting method similar to the Northern rockfish assessment.

Thornyhead Rockfish

Jane Sullivan presented model updates and proposed alternative models for the GOA thornyheads. This update demonstrated application of the *rema* R package to the two-survey model that is informed from the bottom trawl survey (BTS) and longline survey (LLS). This process allowed for bridging between ADMD and TMB, assessing the impact ADMB error had on new data for 2021, and development of new models with additional observation error estimated.

The BTS and LLS survey are stratified differently, where the BTS is stratified by management area and depth and the LLS survey is stratified by management area only. This model allows for parameters to be assigned to different strata and linked to appropriate management areas.

The model correction resulted in a 14.4% decrease in 2020 biomass and apportionment shifted to WGOA, whereas apportionment changed minimally for models with additional observation error.

The Team recommended excluding BTS data from 1984 and 1987 due to different survey methodology and to continue utilizing a two-survey model.

The Team recommended simplifying the model naming convention where Model 18 represents the status quo model, Model 18* is the corrected model in TMB with new data, and Model 22 is the model with additional observation error on BTS and LLS.

The Team recommended discontinuing the misspecified status quo model (Model 18) and bringing forward both the corrected model (Model 18*) and the model with observation error on both the BTS and LLS (Model 22) for the November assessment.

2023 and 2024 Harvest Specification Recommendations and Halibut Discard Mortality Rates

The Team approved the [proposed harvest specifications for 2023 and 2024](#) by recommending the 2023 GOA final 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](#) with one change. The Team agreed with the Halibut DMR Working Group that the GOA non-pelagic trawl CP sector now has a sufficient sample size to calculate the GOA trawl CP DMR instead of using the BSAI proxy DMR. The revised recommendation using the two-year average is 83 percent.

Adjourn

The meeting adjourned at approximately 4:00pm Pacific time.