

Minutes of the Gulf of Alaska (GOA) Groundfish Plan Team

North Pacific Fishery Management Council
1007 West Third, Suite 400
Anchorage, Alaska 99501
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Administrative

The GOA Groundfish Plan Team (“Team”) convened on Tuesday, November 16 at 9:00 am PST. Participation was remote via Adobe Connect. All SAFE documents were posted to the [AFSC draft assessments page](#), and all other documents provided prior to or during the meeting as well as presentations given during the meeting were posted to the Teams’ [electronic agenda](#).

GOA Ecosystem Status Report

Bridget Ferriss presented the GOA Ecosystem Status Report. The report continues to be synthesized in terms of combining indicators. Bridget noted several changes in the report for this year including a change in how EGOA and WGOA are divided to reflect fisheries management zones, continued collaboration on forage fish indicators to better compliment the biennial Forage Report, and a pause on human dimensions indicators as conversations around the role of those in the ESRs continues between the AFSC and SSC. There are a number of new contributions to the ESR and the ESR team worked to create a 4-minute video to communicate the results of the 2020 GOA ESR to the public. The Team agreed that the video was very well done and useful.

Overall, the Gulf was more normal and extreme conditions had dissipated somewhat. The lack of recovery from the recent marine heatwave period may be associated with cumulative effects and variable recovery time as well as lower productivity overall in the system. This year, 2021, marked a second consecutive non-marine heatwave year although the system is still in transition from the 2014-2016 heatwave period. Ocean temperatures for the coming winter 2021/2022 are predicted to be around average and for spring 2022 are expected to be below average, with a La Niña predicted. Indicators demonstrated below average conditions for planktivorous groundfish and seabirds indicating they are not finding an abundance of nutritious copepods.

Large pink salmon harvests in the Gulf this year may imply competition in the food web because of their large grazing capacity, which has been related in the literature to reduced copepods and impacts on seabirds and other fish. There was some evidence of that in indicators in the WGOA but not across the Gulf as a whole.

There was discussion surrounding the link between copepods and groundfish condition that was made in the presentation. The Team sought clarification on how information from the copepod indicator should be translated in terms of fish production. Age-2+ pollock may be eating more euphausiids and be more piscivorous at that age. Bridget noted that there is not a consistent euphausiid indicator and that some groundfish eat copepods in the spring. This copepod indicator should be interpreted in terms of how the system was developing in the spring related to general productivity that contributes to the diet of planktivorous fish in general, given the lack of data on other indicators like euphausiids.

The Team also asked about whether bottom up or top-down factors could be driving the differences in copepod abundance. Bridget responded that small copepods are less boom-and-bust in response to short-

term environmental fluctuations and are more consistent in abundance through warm and cool periods than larger copepod species. A low abundance of large copepods could indicate that they were not there, they were grazed down by predators, or that they entered diapause earlier. Each would have varying ecological implications.

The Team inquired about the linkage between declining seabird bycatch and shifts in gear in the sablefish IFQ fishery from hook-and-line to pot gear. The question was whether observer coverage or electronic monitoring could be a factor in that reduction. There has not been a change in the observer sampling design or in regulations to explain drops in albatross bycatch during 2017 to 2020. There was also a question about whether the bycatch numbers reflect mortality, and the author later clarified that all albatross "caught" are mortalities.

Regarding the stability and resilience of groundfish community indicators, there was a question about the mean life span indicator – this indicator reflects the mean lifespan (maximum known age) of the fish that are being caught. If the survey is catching more longer-lived species, the mean life span indicator increases, and the more shorter-lived species indicator decreases (this indicator is weighted by abundance). There is regional variability in which species are driving the stability and resilience indicator across the WGOA and EGOA.

The Team inquired about how to interpret the terms “high richness” and “high diversity.” How do these measures contribute to stability and resilience? Bridget explained that richness is the number of species and diversity is how evenly distributed those species are higher richness and higher diversity. Together, they should lead to higher stability and resilience. A rich and diverse system should be less vulnerable to short-term environmental fluctuations. If a large number of species exist in an area, there may be some functional redundancies, so if one type of forage fish declines, for example, another type of forage fish would be available as prey. The Team noted that while high richness and diversity contribute to stability and resilience, they may not imply high production.

The Team noted that the ESR is improving every year and thanked Bridget for her work.

GOA pollock

Martin Dorn presented the pollock ESP “report card”, which included no added indicators from the previous ESP. Some indicators were missing due to survey cancellations and data delivery timing. All ecosystem indicators were in an average or neutral state, except the nearshore Kodiak YOY survey which indicated a higher than average abundance of age 0 pollock. Most socioeconomic indicators could not be evaluated this year, but of the two that could, the spring fishery CPUE was high, however the amount of roe per unit catch was lower. Overall, the ESP portrays a return to average conditions.

Bayesian adaptive sampling analysis indicated that the spring larval CPUE had the highest inclusion probability, followed by the arrowtooth flounder biomass, although the fact that the latter has a positive effect on the pollock assessment is not intuitive given potential predation / competition issues. Some results from an ecosystem-linked research assessment model were presented, where natural mortality (M) varied with abundance of major pollock predators. This model resulted in an improved fit to survey biomass, and a high estimated M from 1995-2009.

Cole Monnahan presented the GOA pollock assessment. Highlighted investigations included concerns about the size of the 2018 year class (which is much lower in recent surveys), an increase in spawning fish weight-at-age, and the influence of the model assumptions related to the NMFS bottom trawl survey. Cole also noted an increasing trend in age diversity, indications of a large 2020 year class, and apparently favorable environmental conditions. The four surveys used in the model provided new data from 2021.

Three of them showed increases relative to previous estimates and it was noted that this contrasted with recent diverging trends among some surveys. The survey that indicated a decline (related to the 2019 value) was the summer GOA-wide acoustic survey. The reduction in the estimate of the 2018 year class was mainly due to the low value of age-2 abundance estimated in Shelikof survey data (in contrast to the high value of age-1 from this survey in 2019). A stable retrospective pattern was observed (Mohn's $\rho = 0.056$). The stock is currently above B40%, with low risk of being reduced below B20%.

The Team inquired about how catchability parameters for the Shelikof Strait and ADF&G surveys were modeled and noted that they appeared to be inversely correlated. Cole stated that this is likely coincidental given the spatial and temporal differences between these surveys. The discussion then turned to whether a random walk process is an appropriate approach. It was noted that the residuals suggested a multi-year pattern and that led to this approach. Cole suggested that this and potentially other process error components should be evaluated and estimated within the model rather than specified.

In response to previous Team comments, Cole investigated catchability and the influence of surveys on the estimated scale of abundance. An investigation of the time-varying catchability on the Shelikof Strait acoustic index was performed by exploring a logistic transform on the parameter which limits the domain to a maximum of 1 as it is not expected that this parameter should exceed that value. This resulted in a more varied pattern in catchability and better fit to the survey. The Team also recommended performing a leave-one-out analysis with the surveys to assess sensitivity to the different time series. This showed that the NMFS bottom trawl influences the absolute scale of the population estimates.

The risk table was presented with all categories scored at level 1 (no increased concerns) with no reduction from max ABC. This is a change from 2019 when there were elevated assessment and population dynamics concerns. The Team agreed with this conclusion.

Three concerns for this years assessment were identified: 1) An increase in the survey data weight-at-age for almost all ages relative to the 2020 assessment; 2) the apparent reduction in the 2018 year class; and 3) uncertain scale of the population (which is driven by the prior for catchability in the NMFS bottom trawl survey).

The Team recommends that the methodologies for projecting weight at age from the survey data be investigated, possibly by implementing a random-effects model or a sample weighted mean approach rather than a simple average.

The Team discussed the issue of how model specification of the prior for catchability on the NMFS bottom trawl survey affects the scale of the population estimates. Cole noted that the prior distribution on BT survey catchability appears to drive the estimates. He noted that the prior was derived by consulting with survey scientists. The fact that the posterior distribution of the parameter was nearly identical to the prior suggested that the data are uninformative. Alternatively, it could be possible that the data were simply consistent with the prior.

The Team recommends the author further research this issue, including conducting a prior sensitivity analysis and potentially looking at applying priors (if available) for other surveys in the assessment.

Cole presented a list of planned research topics including constraints on catchabilities and development of prior distributions, investigating trends in weight at age, the influence of timing of the Shelikof survey on catchability, maturity, and selectivity, the scaling of the model, data weighting, combining bottom trawl and acoustic surveys, and selectivity functional forms. **The Team supports the authors' planned research into these topics and agreed their relative priority.**

The Team thanked Martin Dorn for his excellent guidance and efforts in conducting the GOA pollock assessment for the past many years, and wished him all the best in his retirement.

GOA Pacific cod ESP

Kalei Shotwell provided an overview of the Pacific cod ESP report card. The simplified report card template allows for including current year data to inform indicators but does not address Team or SSC recommendations which are done during partial or full reports. The indicator suite is composed of ecosystem and socioeconomic indicators but the author noted no updated community economic indicators were provided in this report card. The majority of ecosystem indicators were in a “neutral” or “average” status likely attributed to the GOA returning to a cooler regime following the marine heat wave stanza earlier. The economic indicators imply lower ex-vessel value and revenue per unit effort. Overall, there are more suitable above average transport and cooling, larvae appear to be low, both juvenile and adult condition factors are mixed, and economic indicators are low. The inclusion probability analysis identified two potential covariates, spawning habitat suitability and eddy kinetic energy in the Kodiak area. Additionally, ecosystem linked models using the age-0 CPUE Kodiak beach seine survey are being explored as alternatives for the operational assessment model. For 2022, the ESP Team will meet in January and review indicators in February to determine if a partial ESP or simplified report card will be recommended. If a partial is recommended, it will be presented at the June SSC meeting and to the Team in September.

The Team questioned what the motivation is for bringing forth indicators for the ESP team to review and the author responded that providing an indicator provides a direct link to stock assessment and provides an opportunity for non-stock assessment researchers to introduce their ecosystem and socioeconomic research into the assessment and Council arena. The author requested the Team respond if this simplified report card was appropriate in content and detail for Plan Team review.

The Team recommends the author and ESP Teams continue their work on the ESPs and appreciate the length and detail of this template report card for explaining the indicators and conveying pertinent information that informs management.

GOA Pacific cod assessment

Steve Barbeaux and Ingrid Spies presented this year’s assessment. There are two interesting research developments. First, the genetic distribution of selective differentiation of the ZP3 protein shows that this protein is distinctly different in populations adjacent to the BSAI (WGOA and CGOA) compared to those in the SE GOA. The Team asked whether or not the spike in natural mortality during the heatwave could partially be explained by these genetics. They explained that it could also be due to movement. Second, satellite tagging data in the WGOA indicates substantial connectivity between the WGOA and the BS.

Steve presented the base model from last year and two updated models originally demonstrated in September 2021. Model 21.2 was recommended and the Team agreed. This model uses environmental links that were shown to be informative and were plausible given previous analyses on temperature-dependent growth and marine heatwave impacts on natural mortality.

A novel jack-knife approach (which Steve called “leave one out”) was shown. This provided a unique way to evaluate the influence of annual data by leaving out all data in a given year. The Team appreciated this analysis and provided suggestions on alternative presentations of these results that may avoid some confusion. As a side note, the Team would like to establish some common terminology. In statistics, “Jack-knife” generally refers to sensitivities of individual data points. In stock assessments, “Leave one out” analyses commonly refer to dropping an entire time series to evaluate the contribution of different data sources.

Steve provided alternative projection scenarios, one based on recent average recruitment and the standard period (since 1977). The Team recommended the standard post-1977 projection period (“Projection A”) for status determination but noted that continued poor recruitment will impact the potential for stock increases.

GOA Northern and southern rock soles

Meaghan Bryan presented the assessment for northern and southern rock sole. The most recent full assessment was in 2017, which treated the stocks as from a single area. This year Meaghan developed assessments that accounted for growth differences between regions. As rock sole catch estimates from the NOAA-Fisheries Alaska Regional Office are undifferentiated by species, the assessment assumes that rock sole catch was evenly split between the species.

In addition to the accepted northern rock sole model from 2017, other single-area northern rock sole models were considered in this assessment and included features such as asymptotic fishery selectivity and constraining the coefficient of variation (CV) of length at age for old fish (a parameter in fitting growth curves within the Stock Synthesis assessment model). Two-area models for northern rock sole estimated a parameter that distributes recruitment between areas, and also evaluated asymptotic fishery selectivity and fixing the CV of the length of old fish in the growth model. Models for southern rock sole are largely similar to northern rock sole.

The overall fits among the models for northern rock sole were similar. There was some improvement in the fit to survey biomass in the two-area models but autocorrelated residuals in the fits to the survey index persisted. The retrospective pattern for SSB was poor, with Mohn’s rho ranging from 0.15 to 0.27 across the models. The southern rock sole models generally fit the data better and had a favorable retrospective pattern for SSB (Mohn’s rho ranging from 0.05 to 0.09 across the models). Meaghan recommended the two-area model for both stocks and the Team agreed. These two-area models improve the fit of the spatial growth patterns relative to the previously used single area models.

The assessment authors identified several research recommendations, including addressing the autocorrelated residual pattern in the fit to the survey biomass data (this may motivate investigating time-varying selectivity), exploring methods for splitting the catch between species, and accounting for uncertainty in the catch. **The Team agreed that the recommended two-area models are an improvement over the previously used assessment models and supports these research topics.**

GOA Shallow water flatfish

Besides northern and southern rock sole, the remaining species in the SWF complex are in Tier 5. In general, the majority of these species other than rock sole have low exploitation rates. Rock sole catches have been declining since 2009. English sole catch has been increasing but at low levels relative to rock sole.

Biomass for tier 5 species was estimated using the random effects model. Survey biomass estimate trends varied among species between the 2019 to 2021 surveys. Biomass estimates of Alaska plaice decreased 53%, butter sole decreased 28%, English sole increased 101% , sand sole increased 16%, starry flounder decreased 34%, and yellowfin decreased by 1%. Biomass of the tier 5 species have shown a general decline since 2000 and the 2021 estimate was 1% lower than in 2020. ABC and OFL values for 2022 and 2023 are lower than previous estimates.

The Team noted there appeared to be a positive correlation between the survey biomass estimates and the catches. This may suggest that the incidental catches of these flatfish reasonably reflect patterns observed from the survey data.

Area-specific apportionments for this complex were based on survey data as evaluated using the standard random-effects model for the Tier 5 components. Together with the estimated northern and southern rock sole biomass results in the following apportionment: western 42.2%, central 49.5%, 5.5% Yakutat, and 2.8% for Southeast. The Team agreed with this approach and estimates.

For the risk table assessment, the author recommended an overall designation of level 1 but a level 2 was assigned to assessment related concern because yellowfin sole survey estimates have steadily declined. The Team agreed with the ABC and OFL recommendations.

GOA Rex sole

Carey McGilliard presented the full 2021 GOA rex sole assessment. Catch is typically well below ABC/TAC levels but was exceptionally low in 2021, attributed to both fishery closures and marketing/tariff issues rather than conservation concerns. Survey biomass in 2021 was an increase over 2019 with the greatest biomass or rex sole occurring in the Central GOA. Updates done in 2021 (Model 21.0) include using Francis data weighting methods, omitting the 1984 and 1987 bottom trawl survey data, and estimating survey catchability with a normal prior based on previously conducted survey efficiency studies. Mini-bridging analyses were conducted to see the effects of these changes. Removing the two surveys from the 1980's had little effect on model performance and were deemed appropriate since these surveys aren't comparable to the existing survey time series. For data weighting, the Francis reweighting method was chosen over other data weighting methods because it provided better fits to survey biomass. The previously used McAllister-Ianelli approach was not chosen because it emphasizes compositional data in its weighting scheme resulting in modeled survey biomass estimates that are higher than observed, attributed to several recent large year classes seen in the fishery that have high uncertainty at this time. Model fits to fishery data are markedly improved with the two-area model but still indicate some mismatch in growth may be occurring in the data not explained by the two area split. A small retrospective pattern exists in Model 21.0 but has a reasonable Mohn's rho and is within acceptable ranges. The 2022 author-recommended and Team-endorsed ABC/OFL are an increase in both areas and are higher than those recommended last year. The risk table had level 2 concerns in both the assessment-related concerns and the population dynamics considerations largely due to several new large year classes that have only been observed a couple times and are higher than historically seen and a potential that the model is not tracking time-varying growth as evidenced in the fits to conditional age-at-length data. The author provided several research priorities including developing an ageing error matrix, improving maturity-at-age estimates, and looking into growth further including time-varying growth.

The Team supports the author's research priorities, encourages further discussion on the utility of conducting maturity studies across the entire GOA, and endorses the author's intent to develop an ageing error matrix and further explore natural mortality rates.

GOA Arrowtooth flounder

Kalei Shotwell presented the full 2021 arrowtooth flounder assessment. In response to Team and SSC recommendations the authors provided a full risk table this year, will further investigate use of AFSC longline survey and the IPHC survey in future assessments, and provided a sensitivity analysis regarding non-standardized survey length frequency data. Catch in 2021 was low and attributed to poor markets and tariffs. The 2021 survey biomass was slightly above the 2019 estimates and survey age compositions indicate a potentially strong 2017 year class exists. Exploration of the AFSC longline survey data indicated a decadal pattern up to 2010 followed by a decline. For 2021, the authors continue to use the 2019 model but a data correction was made. Non-standardized survey length data from 1985, 1986, and 1989 were removed because sensitivity analyses showed very little effect on total and spawning biomass when these data were omitted. This model (19.0) provides reasonable fits to the data despite in some

years there is a lack of fit for females and a small retrospective bias is present. Total and spawning biomass are trending lower yet well above B40%, and the 2022 ABC is 5% lower than last year. For the risk table, the authors recommended Level 1, no apparent concern, for all categories and no reduction to maxABC was recommended. The author provided several future research priorities including investigating lack of fit in female survey age and fishery length compositions, exploring incorporation of new multi-species modeling efforts, and looking at alternative survey and VAST estimates.

The Team supports the author's recommended model and ABC/OFL recommendations, noting the stock trends are declining and the model is tracking this trend, and apportionments are stable. The Team also supports the author's suggested research topics including development of an ESP for arrowtooth flounder and incorporation of the CEATTLE multi-species model.

The Team discussed the use of non-standardized surveys including the 1984 and 1987 surveys that historically have been used in many assessments but were cooperative surveys with Japan and not comparable to our domestic survey index starting in 1990. Considering the length of the bottom trawl survey time series, it is no longer common practice to use any of these non-standardized surveys as part of the time series.

GOA Pacific ocean perch

The POP assessment was presented by Ben Williams. The model used this year is the same as the previous assessment, with normal updates to the assessment data. Catch has remained below the TAC and survey results show a high biomass index in 2021. The spatial abundance seems to continue a westward shift based on survey data. The 2019 survey age data suggest an above average 2016 year-class but this has yet to show up in the 2020 fishery age data.

The abundance estimates from the acoustic trawl (AT) GOA pollock summer survey appear to match the BT survey this year, in contrast with the results from the past two years which did not match. A length composition comparison shows that the AT survey may be missing smaller fish.

For the majority of model outputs, this year's assessment results are very similar to the 2020 assessment, with a slight increase in predicted total and spawning biomass. Retrospective pattern continues to be negative, Mohn's $\rho = -0.16$, and stock appears to be under the control rule specification. Spawning biomass is projected to decrease in coming years.

The ABC recommendation is slightly higher for 2022 than last year's projection, with a slight decline projected for 2023. Apportionment based on survey biomass reflect a shift from the Eastern GOA into the Central and Western GOA areas, with the majority of the catch apportioned to the central GOA area (80.5%).

Questions from the Team included inquiry about the status of using the VAST spatio-temporal model as an alternative abundance index, work on which is ongoing and will involve a number of other rockfish stocks.

The ongoing industry-AFSC cooperative research study into estimating abundances in untrawlable habitats using industry vessels, headed by Madison Hall, was highlighted and is included as an appendix in the SAFE document. Further communication with this group and monitoring of their progress was encouraged by the Team.

The risk table scored the assessment and population dynamics considerations at level 2: Substantially increased concern (the presentation slide has an error in the text for the former, but is correct in SAFE document), and ecosystem and fisheries performance considerations at level 1: No apparent concern.

Despite the assessment and population dynamics concerns, due to the fact that the model is underestimating survey estimates, and thus less of an immediate management concern, no reduction in maxABC is recommended by the author. The Team accepted the author's recommendation. A general comment was made that assessment models often cannot accurately model unexpected increases in abundance indices, resulting in negative retrospective patterns.

The Team noted the apparent instability in apportionments for many rockfish species. The group was made aware of a UW graduate student, Kelly Mistry, who is working with Mark Scheuerell on issues associated with apportionment. This includes the potential for using random effects models, as well as the VAST framework to address this issue. There were also questions regarding the ongoing decline in abundance in the eastern GOA, where there is no directed fishery. This decline was noted as a potential area of future research. The Team would welcome a full assessment next year if warranted by any large changes, such as those that might result from incorporating VAST model abundance indices.

GOA Rougheye/Blackspotted rockfish

Jane Sullivan presented the rougheye/blackspotted rockfish assessment. She responded to Team and SSC comments including comparing species trends at similar depth strata between the longline and trawl surveys. She found that the surveys rarely tracked each other when split by area and depth strata, and that the surveys partition biomass differently among regions. She updated the Team on progress made on species identification and on biological parameters that had been estimated outside of the model.

The updated data resulted in reductions in ABC and OFL relative to last year, which tracks declines in recent survey biomass estimates. The retrospective pattern was poor and appears to be biased high. Likelihood profiles over survey catchability showed that the information content of the available data is poor. The Team noted that the estimated dome shape of the selectivity should be evaluated in the future as it was unclear why 40 year old fish would be so much less selected than a 30 year old fish.

The Team agreed with the data and model issues raised by the author including data weighting, trawl survey length data, survey index refinements, and parameterizations for survey catchabilities and selectivities. The Team continued to place a high priority on developing robust species identification methods and in estimating composition data.

GOA Shortraker rockfish

Katy Echave presented the Gulf of Alaska shortraker rockfish assessment. The assessment was a straightforward update using both trawl and longline surveys to estimate biomass. The majority of the catch occurs in the EGOA and catch in all areas has been decreasing since 2018. The HAL fishery catch of shortraker rockfish has decreased to low levels due to the transition to pot gear in the sablefish IFQ fishery. Discard rates for fixed gear under full retention mandates were higher than expected and an overall review is pending to determine how well this new regulation has been implemented and communicated with industry. The apportionments were updated and changed very little from the previous year.

The Team recommends that the authors look at natural mortality, and refers to recent papers in the literature addressing best practices. The Team further discussed that this is a request for rockfish in general and not only specific to shortraker rockfish.

GOA Dusky rockfish

Ben Williams presented the Dusky Rockfish partial assessment this year. A full assessment is expected in 2022. The authors will be examining the ways in which VAST survey biomass estimates differ from

design based estimates in the future. This is important because the parameterizations used for VAST greatly change the estimates of survey biomass (e.g., using the delta-Gamma approach instead of the delta-lognormal. The author provided the maxABC from the projection model as well as the SSC recommended stair-step ABC for 2022 and the Team agreed with using the staircase ABC for 2022.

GOA Northern rockfish

This is a partial assessment year for northern rockfish, and thus the projection model is run with updated catch. Overall, the catch remains well below the ABC, and the 2021 recommended ABC is slightly lower than the previous year. The projected biomass continues a gradual decline with little apparent recruitment in the near term. The VAST estimates using the AFSC GAP program specifications are quite similar to the design based estimate, with both being highly variable, especially for a long lived species. This may be in part to an unknown and potentially variable proportion of the stock occupying untrawlable habitat, and thus being missed by the BT survey. The authors and GAP staff are evaluating the VAST index for several GOA rockfish species including northern rockfish for next year's assessment.

GOA Deepwater flatfish

Carey McGilliard presented a partial assessment for the deepwater flatfish complex. The next full assessment is scheduled for 2023. Kamchatka flounder was included in this year's assessment for the first time. Catch of Kamchatka flounder has been recorded as deepwater flatfish in the AKRO Catch Accounting System since 2011 but had not been previously included in the assessment. Based on Team and SSC recommendations, the author used a Tier 6 approach to assign a species-level OFL of 69 t (maximum historical catch) for Kamchatka flounder. The Team discussed the possibility of an important, small population of GOA Kamchatka flounder being negatively impacted by the assignment of species-specific ABC and OFL but decided that directed fishing was unlikely and no real concern existed. The Team also discussed the discrepancy between the ABC (52 t), OFL (69 t), and the 2021 survey estimated biomass (6 t) and recommended the author explore alternative Tier 6 methods for determining ABC instead of of maximum catch maximum catch for OFL in future assessments to bring ABC and OFL more inline with recent survey biomass estimates. The Team made no recommendation on what the timeframe should be used for average catch since that is a SSC determination.

GOA Flathead sole

Maia Kapur presented the partial assessment for flathead sole. A full assessment was scheduled for this year, but due to limited staff resources, the full assessment will be postponed until 2022. After next year's full assessment, the next full assessment for flathead sole will be the scheduled 2025 assessment, and then full assessments will continue on the normal 4-year cycle. The last full assessment was conducted in 2017 with an age-structured model and Tier 3 determination. The projection model for the partial assessment was run using parameter values from the accepted 2017 flathead sole assessment model, together with updated catch information for 2017-2020, and estimated catches for 2021, and 2022-2023. The 2022 and 2023 ABCs and OFL are very similar to last year's projected values for 2022. The Team concurred with the application of the projection model and accepted the recommended ABCs and OFLs. Area ABC apportionments for flathead sole are based on the projected survey biomass using the random effects model. The apportionments included updated 2021 survey information. This led to Team discussion on whether partial assessments should use updated survey information in the projections, or only updated catch information. The standard is to include updated survey information only when it has been used in the assessment model. However, the Team discussed whether there should be exceptions for stocks on a 4-year time schedule (e.g. flathead sole). The Team accepted the updated apportionments for flathead sole, but concluded that the policy of only applying updated information on catch and running the projection model was necessary for partial assessments and updating apportionment percentages by area based on new survey information should not be done even for stocks on a 4-year schedule..

GOA Demersal shelf rockfish

Kellii Wood presented this year's assessment. The most recent survey was in the Southern Southeast Outside section in 2020. ROV surveys occur across the 4 different management areas and each area is typically surveyed every 3 or 4 years. The yelloweye rockfish (the majority of the complex) biomass point estimate continues to be at low levels compared to historic biomass levels, warranting precautionary harvest levels and conservative management measures. The authors have adopted the SSC recommendations to use the lower 90th confidence interval of the DSR biomass for setting the OFL and ABC for the harvest specifications, rather than basing them on biomass point estimates. Three of the 4 risk level considerations scored at Level 2, while one scored at Level 1 (environmental/ecosystem considerations). The DSR assessment has always recommended an $F_{ABC} = M$ of yelloweye rockfish, which is below the Tier 4 $\max F_{ABC}$.

The Team discussed the assessment schedule for DSR: the last full assessment was in 2018. The authors asked for clarifications about the cycle for DSR assessments, and the Team agreed that this assessment should be on a two-year cycle in even years. Thus, the next full assessment should occur in 2022. The authors noted that there is ongoing effort to develop an age-structured assessment, which might be able to be incorporated into the next assessment. Additionally, recent IPHC surveys may provide additional data about yelloweye rockfish CPUE.

GOA Other rockfish

Cindy Tribuzio presented the GOA Other rockfish (OR) assessment. The OR complex comprises up to 27 species that are divided into two sub-groups within the complex based on life history, spatial distribution and fishery and survey characteristics. The two sub-groups include demersal shelf rockfish (DSR) (canary, China, copper, quillback, rosethorn, tiger, and yelloweye rockfish) and slope rockfish (20 remaining species).

The author presented updates to the assessment that included catch, trawl survey data, reporting catch from unidentified rockfish, random effects model weighted mortality estimates, and split fractions updated for EGOA to match assessment structure. The OR assessment is composed of Tiers 4, 5, and 6 and no new changes in the assessment methodology were presented. Catch of OR species in the W/C GOA exceeded the ABC where increases of harlequin, redstripe, silvergray, and yelloweye were observed, whereas catch continues to be well below the ABC in EGOA. Catch discards are generally variable but were higher than expected due to the full retention mandate of rockfish implemented in 2020 and is being further investigated.

Trawl survey biomass declined slightly from the previous survey and shifted to EGOA, however, there were many changes in species specific biomass. Notable declines in species specific biomass occurred for sharpchin (-26%), harlequin (-94%), and redstripe rockfish (-85%) whereas increases occurred for silvergray (48%), redbanded (87%) and yelloweye rockfish (109%). The author presented updated weighted M estimates for the random effects model 15.1, where M is responsive to the proportional biomass of Tier 5 species. Weighted M estimates decreased from the previous year due the survey catching less high M species and more low M species.

For the risk table assessment the author recommended not conducting a risk analysis due the OR complex consisting of up to 27 data-limited species, difficulty in identifying a single primary/dominant species as it changes between assessments and is untenable to complete a risk table for each of the six primary species which are varied in life histories, fishery characteristics, and survey availability. Additionally, if a single species were selected, data are sparse at the species specific level and much of the environmental data is borrowed from proxy species or generalized and overall may not be that informative for all of the species in the complex.

The Team discussed the discrepancy in catch and survey biomass due to survey catchability issues of higher M species and the resulting impact on weighted M for Tier 5. The author noted that many of the dominant species in this complex have patchy distributions and low catchability and small changes in biomass can have a large impact on ABCs. The Team noted that an individual or a few species should not have such strong influence on the weighted M estimates. It was further discussed that species groupings could be looked at for future improvement.

The Team appreciates and acknowledges the author's effort and time dedicated to determine a weighted (based on survey information) M applied to the Tier 5 aggregate so that harvest rates align with the species mix. However, the variability among species was too extreme, likely due to sampling variability in the survey. Given that there is little evidence that the survey is accurately tracking the species biomass and mix of species, there is insufficient information to warrant this approach. Consequently, **the Team recommended rolling over harvest recommendations from 2021 due to the discrepancy between catch and survey biomass and the estimation of weighted M being influenced by a few species that have patchy distributions and survey catchability/availability issues.**

The Team recommends the author further explore issues with using the current method of weighted M biomass estimates. The Team continues to support an earlier recommendation that the DSR subgroup be moved into the DSR assessment and make the DSR assessment GOA-wide pending a Council analysis on spatial management implications. The Team is encouraged that a working group is planning on addressing some of these issues and look forward to the outcomes.

The Team recommends incorporating 1 t of the northern rockfish ABC apportionment for EGOA to be combined with OR in the WYAK management area and added for management purposes.

GOA Skates

Olav Ormseth presented the assessment for big, longnose, and other skates. The presentation included an overview of the complex, survey results on biomass and size compositions and an update on stock status, catch information, apportionment methods and harvest recommendations. Skate diversity is highly depth dependent; the level of diversity increases with depth. Results from the AFSC bottom trawl survey indicate the majority of skate biomass occurs in the CGOA. There has been a general decline in skate biomass over the last 10-15 years, and the downward trend is most notable in the CGOA. Big skate biomass has decreased since 2011. For longnose skates, biomass estimates are more stable, with a bit of a decline in the EGOA, but overall AFSC BTS and RE estimates increased in 2021 across areas. The trend for other skates is domed-shaped, however, the AFSC BTS- and RE-estimated biomass of other skates increased slightly in 2021. Skate catch has shown a steady decline in the total catch since 2013.

Olav highlighted how the PWS survey does not overlap with any other survey, and therefore provides additional data that otherwise would not be obtained. It was noted that Kamishak and Kachemak Bay surveys have been discontinued due to budget constraints. The PWS survey has changed and is now rotating areas to match with districts for tanner crab. Olav noted that skates are caught a lot in recreational fisheries in localized areas and it may be worth looking at data if it is available to estimate catch and release in sport fisheries. Sport and research catches are included for federal waters.

ADFG members let the Team know a proposal is before AK Board of Fish to develop a directed skate fishery in PWS. Both ADFG and NMFS have commented to this proposal and should be of interest to the Council since past directed fisheries saw overages in skate catch, halibut discards surpassed skate catch, and no PWS stock assessment for skates so the GOA-wide skate assessment would be the only proxy available to management.

The author presented data on retention rates (pulled from catch accounting (CAS)) and described how an increase in ex vessel price likely caused increased retention up to 2013 (at least for longnose), which caused some ABC overages. Management measures such as inseason adjustments, and bans on retention began in 2013. Over time, the MRAs have changed from 20% to 5%. The Team had a few questions on retention rates which have increased in recent years. A member of the public mentioned that gear type could be influencing retention rates; more catch occurring in trawl fisheries and less catch by fixed gear (due to lower cod TACs) may drive retention rates higher. The Team highlighted that more investigation on retention rates by gear type in the directed fishery may be helpful for big skates.

The author recommended a decrease in ABC and OFL (and different areas) based on the random effects model for biomass for big skates, and a small increase for longnose, and a small increase for the other skates complex.

The Team inquired about how recently natural mortality had been reviewed for skates and whether it would be a worthwhile exercise. The author indicated that it would be useful and likely an improvement, however there is enough variation in these estimates that the status quo seems to be working and is likely precautionary. The author indicated that if the longstanding estimate of M were changed, it should undergo a comprehensive review. It was also noted that skate discard mortality rate is assumed to be 100%.

The Team inquired about the potential to move any skate species to Tier 3. Olav responded that both size and age-structured assessments have been explored for big and longnose skates in the GOA but are not currently used in management advice. He suggested that measures to streamline and simplify assessments might be something to consider. The Team does not have any recommendations on this at this time.

GOA Octopus

Olav Ormseth gave a presentation of the Tier 6 octopus assessment. He noted the differential size of octopus caught in the survey (smaller) versus bycatch in the fishery (larger). Olav noted that octopus often hide in crevasses and therefore the survey is a poor sampler of octopuses. For this reason, he asserted that survey biomass estimates are unreliable and hence poorly qualified for a Tier 5 approach. While minimal, they are the only estimates available.

Most of the octopus survey biomass and catches are in the Central and Western GOA. The main species is *Enteroctopus dofleini* which is also the most abundant octopus species in shelf waters and makes up the bulk of octopus catches in commercial fisheries. The majority of catch occurs in the Pacific cod fishery. Olav proposed that octopus may be best assigned to the ecosystem category. Alternatively, he suggested that the assessment frequency could be reduced.

Tier 6 specifications are based on the maximum historical catch (1,307 in 2014). The Team discussed the different approach used in the BSAI which is based on using Pacific cod consumption rates to estimate octopus biomass. Olav pointed out the problems associated with the different approaches, noting none were ideal. Being a Tier 6 stock and the lack of a conservation concern, a risk table was unavailable.

The Team noted that Olav was moving on from his current job. The Team commended and were grateful for all of Olav's contributions to non-target species assessments, his leadership in the research of nearshore middle trophic levels as part of the GOA Integrated Ecosystem Research Project, and detailed reporting on forage fish. The Team wishes him well in his move in 2022.

GOA Atka mackerel

Sandra Lowe presented the GOA Atka mackerel assessment, which is on a biennial assessment cycle. GOA Atka mackerel is a Tier 6 stock due to limited information from surveys and age composition data. Survey data for GOA Atka mackerel do not provide reliable estimates of biomass. In 2017 and 2019 there were very few Atka mackerel samples in the survey hauls; in 2021 there was a substantial number of mackerel in a single haul that was then extrapolated over a large strata. Additional age data for Atka mackerel is available from bycatch samples from the GOA fisheries. These data fail to provide a full distribution of ages, but the author noted that there is evidence of correspondence between strong year classes estimated in the Aleutian Islands and those observed in the Gulf of Alaska.

The author noted that this year is likely to be the last year in which the risk table is included in the stock assessment for Atka mackerel. Because stock abundance levels and trends are unknown, meaningful ABCs are not able to be set for Atka mackerel. Therefore, reductions from the maximum permissible ABC are not warranted. Uncertainty for GOA Atka mackerel is accommodated through management with conservative TAC specifications. Given that this is a Tier 6 stock and therefore lacks data to meaningfully set an ABC and inform the risk table, the inclusion of a risk table in future stock assessments is not warranted. The Team thanked the author for yet another excellent assessment and presentation.

General recommendations

The Team recommends all GOA authors evaluate any bottom trawl survey information used in their assessment prior to 1990 including the 1984 and 1987 surveys and conduct sensitivity analyses to evaluate their usefulness to the assessment. This may apply for Aleutian Islands surveys but this was only raised during GOA assessment considerations.

2022 and 2023 GOA Harvest Specification Recommendations

The Team had extensive discussions regarding the practice of removing a small amount of ABC from the northern rockfish assessment and placing it in the other rockfish complex since northern rockfish are included in the other rockfish complex in the Eastern GOA. Rather than treating this solely as a TAC revision, the Team agreed this should be an ABC reduction so that the other rockfish complex TAC is not greater than its ABC.

The Team recommends the summary tables reflect this proposed change in ABC for both northern rockfish and the other rockfish complex. If the SSC concurs, then this change should be captured as a change in ABCs in the harvest specifications. The Team also recommends the small amount of ABC taken from northern rockfish be placed in the West Yakutat management region of the other rockfish complex because this area is closest to the center of distribution of northern rockfish. Additionally, a rockfish trawl fishery operates in this region and is the most likely fishery in the Eastern GOA to catch northern rockfish.

The Team noted the compilation of the 2022 and 2023 specifications and recommended their adoption by the SSC.

Adjourn

The meeting adjourned at 12:00 PST on Friday, November 19.