North Pacific Fishery Management Council

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Minutes of the Gulf of Alaska Groundfish Plan Team

September 17-19, 2019

Gulf of Alaska Groundfish Plan Team Membership

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

Administrative

The GOA Groundfish Plan Team convened on Tuesday, September 17, 2015, at 2:30 pm. The Team acknowledged two new members, Sara Cleaver, NPFMC coordinator, and Marysia Szymkowiak, NMFS REFM.

Not all attendees signed the sign-in sheet. Attendees may have attended one or more meetings for groundfish throughout the week. List of attendees included in Appendix A in attachments. Remote participation via WebEx was available for all sessions.

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.

Dover sole and CIE Review

Dr. Carey McGiliard presented the outcome of a CIE review for rex, flathead, and Dover sole. The assessments use stock synthesis (transitioned over from ADMB at the last (2015) assessment). The models have strong similarities between them and the CIE reviewers were in general agreement that the age-structured models were appropriate given available data. The reviewers did have some concerns about the utilization of some survey data due to lack of standardization of the survey in the 1980s. These data were examined and excluded from the base models. The reviewers requested specific model runs for the three assessments. These requests were addressed and presented to the Team. The author's "clean up" model performed better than the reviewer requested runs and it was proposed for moving forward. The Team agreed that the author's preferred model was appropriate to present on in November.

The author also presented on four exploratory models that are being developed to explore movement, spatially variable selectivity, variability in growth rates, and estimating growth within the model. While it was not proposed to put these models forward in November, some of the results do look promising. A new assessment will be done this year with another assessment due in four years. The group appreciated the work and look forward to seeing it come out as a publication or part of a future SAFE report chapter. In particular it was thought that the critical review of the survey data was a valuable examination and a number of other assessments could benefit from this type of examination. It was noted that this topic could be taken up in a partial assessment

The Team commends the author for the substantial work put into developing the exploratory models and looks forward to seeing the appendix and published manuscript(s).

The Team recommends that, time permitting, the exploratory two-box model be included in the assessment as an appendix.

GOA Shortraker RE effects model

Tiers 4 and 5 stock assessment use the area-swept biomass from bottom trawl surveys performed by the Alaska Fisheries Science Center in a random effects model to estimate total biomass from which management quantities of Acceptable Biological Catch and the Overfishing Limit are determined. Adding additional population indices into the random effects model is possible. As an example of the development of this method, Pete Hulson presented work on the incorporation of the AFSC longline survey Relative Population Weights (RPW) index into the random effects model for GOA shortraker rockfish. Although this builds on the work conducted for shortspine thornyhead (SST) stocks last year, shortraker has different and more variable trawl survey and longline survey estimates. Estimated catchability that is shared across all regions in the GOA (as done for SST) resulted in poor fit to the regional RPW indices and using the same relative weight for the bottom trawl and longline survey indices resulted in biomass estimates that did not have much contrast across time on the regional scale. After exploration, the authors showed that a weight of 0.5 for the longline survey resulted in greater change across time in the random effects model estimates of biomass and estimating regional-specific RPW index coefficients improved model fit. The authors also showed that this method stabilizes apportionment among GOA regions.

The Team recommended that this approach with new data be presented for consideration in November.

Multi-Species Model

Kirstin Holsman and Grant Adams presented an overview of the multi-species CEATTLE models. Kirstin discussed the EBS model which includes walleye pollock, Pacific cod, and arrowtooth flounder in a climate enhanced, age-based model with temperature-specific trophic linkages and energetics. Weight at age and predator-prey relationships are implemented as functions of temperature. An application of CEATTLE has been a supplement to the EBS pollock assessment since 2016. Discussion centered around how to elevate this from a supplement ("shadow assessment") to a more central application in the assessment. Grant Adams provided on overview on the GOA multi-species CEATTLE model. Data used in the multi-species model is the same as what is currently used in single species assessments. Comparisons between current assessment results and CEATTLE results were provided for estimated biomass, spawning stock biomass, and recruitment for several species. Some key differences do exist from the assessment results but the work is still under development. Preliminary results were shown for how these indices change when predation is included. Next steps are to refine results, include halibut as a predator, and conduct a MSE to see if predation matters. The Team encourages further development of the GOA CEATTLE model and looks forward to future results.

GOA Pollock

Nathan Lauthenberger (MACE, AFSC) presented the winter 2019 survey effort noting that several areas typically surveyed were suspended due to the government shutdown. The Bell Shimada RV was used this year (the Oscar Dyson was undergoing repairs). The Shelikof area was completed and started a week earlier in order to catch peak spawning and went from north to south (in 2018 they went south to north). For the maturity, the length at 50% maturity shifted downwards in 2004 and 2017, and it was noted that this could be year-class effect or due to the marine heat-wave conditions. The spatial pattern was typical

through the north side of the strait and the biomass for the Shelikof Strait winter survey was about 1.2 million t. In 2020, plans are to survey spawning areas in the western GOA, and Bogoslof region (in mid February). The Shelikof Strait survey will be done as usual. The Prince William Sound/Kenai survey is planned for 2021. Martin talked about the survey estimates (acoustic and bottom trawl; also winter vs summer in the acoustic trawl) being somewhat divergent and that this will again present a challenge to fit.

The Team noted that the justification and target for gap analysis could change from one year to the next (e.g., if EM happens it could change the score for "catch" reliability/quality from 5 down to 4).

Darin Jones (MACE, AFSC) presented the summer 2019 survey effort, describing the two types of nets used. The AWT midwater (primary) net needs overhaul, and the new, smaller LFS net is still being tested for selectivity. Data are still being analyzed and eventually prior catches from AWT net will be adjusted in the time series.

Kalei Shotwell presented a review of the draft document for the GOA pollock Ecosystem and Socioeconomic Profile (ESP). The document follows the standardized format for ESPs and will be provided in November as an appendix to the GOA pollock SAFE report. This stock is a high priority for conducting an ESP as the stock interacts strongly with other ecosystem components and including these interactions is likely important to stock dynamics. Data presented in the ESP is not included in the operational stock assessment model and the ESP can be considered a testing ground for potential future use in the model. National metrics indicate high recruitment variability, early life stage habitat dependence, key role in the ecosystem, high commercial value, and high constituent demand for this stock. This information is used as a first pass for focusing more in-depth analyses of ecosystem and socioeconomic processes. Assessment of essential fish habitat distribution models, seasonal timing, energy allocation strategy, and predator/prey dynamics identified potential bottlenecks by life history stage. The authors summarized this information using a life history table coupled with a conceptual model that highlighted key ecosystem processes affecting pollock survival and associated relationships. The Economic Performance Report that was previously included in the GOA pollock SAFE has now been integrated within the ESP in an assessment of socioeconomic processes. A new section on community engagement was added to this section along with several potential measures to monitor over time. The authors choose Kodiak to report on engagement metrics as this port accounts for 80% of GOA delivered pollock volume.

Following the metric assessment, the authors provided a review of the ecosystem and socioeconomic indicator suite. Additional spatial temporal maps for the distribution indicators and a scaled index of the fishery performance indicators were included. The indicator assessment reviewed the traffic light analysis of the ecosystem and socioeconomic indicators. The large 2012 year-class was supported in the larval and young-of-the-year (YOY) surveys as well as in the seabird diets. Upon entering maturity and the fishery, this year-class experienced a substantial heatwave and low prey field that likely resulted in poor condition for these fish in 2015-2018. The spatial distribution of the adult population was spread out with an eastward shift in the center of gravity suggesting that some of the population was not in preferred habit. Major predators have been on a decreasing trend. Preliminary reports of current year surveys suggest very low larval and YOY CPUE in all areas. Additionally, the potentially above average 2018 year-class may experience similar poor conditions as the 2012 year-class in the future with very low prey field and another heatwave. For the socioeconomic indicators, fishery performance has been increasing since 2008 and percent of total revenue in Kodiak has recently jumped. Ex-vessel price and roe-per-unit-catch were low but increasing in 2018. A draft Bayesian Adaptive Sampling model was presented on a subset of indicators for explaining recruitment trends with high inclusion probability for the heatwave and fall condition indicators.

A draft summary of ecosystem and socioeconomic considerations were provided in the document along with suggestions for future indicator improvement and modeling applications. The authors plan to update this draft ESP with new survey data and include recommendations from the Team in the November

document, including consideration of the implications of the community engagement indicator and changes in it over time.

For November, the Team recommends including the conceptual model in the ESP as a helpful visual summary and companion to the life history table and suggests the authors consider alternative community engagement indicators in the future to better capture the impact of shifting pollock distributions on the community.

In general, the Team has concerns over the nature of future updates for ESPs after the cycle and the associated increase in review time required. The Team encourages the authors consider potential avenues for updating ESPs rather than producing full ESPs in the future.

The Team thanks the authors for this thorough and detailed draft ESP and looks forward to the final updated version with the most recent data in November.

GOA Pacific cod

Steve Barbeaux presented updates to the 2018 model that included a series of adjustments without structural model changes. He also covered three exploratory models which incorporated climate data.

Model estimates indicate that the bottom trawl survey prediction and observation indicate a slight increase in biomass for 2019 (size composition data were unavailable). However, the 2019 survey estimate was the second lowest in the time series. Additionally, the 2019 longline survey abundance estimate was the lowest on record. Steve presented a heatwave analysis that focused on the central Gulf. The updates from the 2018 model included the following:

- Reduce the plus-age group from 20+ to 10+
- Using temperature anomaly estimates from the 1982-2012 average to be consistent with the marine heatwave index (MHI)
- Use the data from the IPHC longline survey (1998-2018) along with the available length composition data (2018 only)
- Including ageing error
- Adding back pre-2007 age data (excluded from 2018 model) and including ageing error
- switching from size to age based selectivity and freely fit growth parameters
- Ageing bias from re-ageing of Stark(2007) dataset for pre 2007, model fit age bias 2007+
- model fit ageing bias for pre 2007 – no bias 2007+ (set to 0)
- pre 2007 ageing bias fixed to previous fit, estimate post 2007 data as having bias as estimated in the model

Detailed plots were shown on the impact of each of these changes. The largest changes were on early (before 1990) estimates of biomass. Notably, the IPHC LL length composition and most recent index values fit poorly. Steve noted that the Stark dataset, when age-determinations were redone, indicated previous estimates were biased high and that the new ages were in agreement with an independent analysis using a stable oxygen isotope method (Kastelle et al, 2017).

The Team agrees with the author and recommends for the November meeting that models addressing aging error, aging-bias, the 10+ age group, asymptotic selectivity for age, further explore whether inclusion of the IPHC length composition data are appropriate (how many tows/sample sizes, etc.).

Steve presented some exploratory work evaluating climate enhanced models. This approach incorporates climate data by scaling mortality, recruitment, and growth parameters with a marine heatwave climate index (MHCI). This model allows for sensitivity of Pacific cod biological parameters to temperature to be assessed, as well as forecasting population states using different future climate scenarios. In addition,

mortality was modeled as age specific, allowing for earlier age classes to encounter higher mortality similar to other assessments such as pollock.

The climate-enhanced models hold potential for evaluating changes in stock productivity for forecast and reference points. Different assumptions about climate regime for forecasting Pacific cod abundance will affect reference points for evaluating stock status and guidance is sought from the Team and the SSC, especially should considerations of rebuilding be required. Also related to reference points, it was noted that low Pacific cod biomass (below B20%) could trigger other fishery management measures designed to protect prey items for Steller Sea Lions.

It was noted that developments of GOA CEATTLE model (as noted above and still preliminary) may be helpful in addressing shifting reference points for the Pacific cod population.

Research priorities for GOA Pacific cod were discussed and included addressing cod age estimation issues (perhaps combined with tagging studies) and genetic stock structure studies to evaluate potential mixing with Being Sea, Aleutian Islands. Typically, research priorities are addressed at the beginning of the meeting and items come up during presentations that are then not incorporated into the priorities. The Team discussed potential for changing timing of research priorities to the end of the meetings.

The Team recommended that Pacific cod be a candidate species for a full ESP evaluation.

GOA Pacific Ocean perch

Pete Hulson provided an update on model investigations for GOA Pacific Ocean perch (POP). Investigations based on previous Team and SSC comments included: 1) a natural mortality sensitivity analysis; 2) Plus age group evaluations; 3) evaluation of methods for weighting compositional data; and 4) investigation of VAST biomass index. Additional investigations included: 5) evaluating acoustic survey biomass index and length composition as additional sources of information in the model; 6) a prior for the bottom trawl survey catchability based on stereo camera drops performed by the MACE acoustic survey; and 7) exploration of estimating time-dependent mean recruitment.

The current M that is used is 0.05 with a coefficient of variation of 10%. The sensitivity analysis indicates the model is very sensitive to prior assumptions about M. The model tends to estimate a higher M than the prior no matter what is input for the prior and as the CV increases the estimates of M reach an asymptote at about 0.18. Despite being sensitive to prior assumption of M, the model is producing reasonable estimates of M and q. Pete will provide empirical estimates of M and possibly present a model case with an alternative prior on M in November.

The plus-age group analysis investigated plus age groups from 18-50 (current is 25). As age groups are added the likelihood increases with the additional age bins. The analysis indicated the plus group could be extended to 35+ but doing this would introduce numerous zeroes and the current method of using 25+ is an appropriate plus age group for POP.

The Team agreed with the author and recommended using 25+ for the plus age group in November's assessment.

The Dirichlet-multinomial method was explored for weighting of compositional data. The range of effective sample sizes (ESS) was examined for survey ages, fishery ages, and fishery size. Investigations showed that the estimated ESS for the fishery size data was large for data prior to 1980, which the author wishes to explore further. Now that there are substantial age composition data in the model it may be worth consideration to remove this data and/or start the model at 1977. The author is planning to examine the fishery size data and continue evaluating using the Dirichlet-Multinomial method in the future. The Team concurred with the author and looks forward to seeing further exploration of this method.

The author provided a comparison of the bottom trawl survey design-based biomass data to the alternative VAST model-based index. For GOA POP, there are substantial differences in recent years between the design-based and model-based estimates of biomass. These differences indicate further evaluation of VAST for POP is warranted. For November, the authors plan to show biomass estimates for the two methods but not include the model-based biomass index in any models runs. The Team discussed that GOA POP is a stock with divergent biomass estimates between the two methods and is a good candidate for further exploration and agrees with the author to present model-based estimates of biomass but to not use this index in model runs in November.

The author provided preliminary results for adding an acoustic survey index to the model. Fits using the acoustic index are relatively good and show promise. Three years of length composition data are available for the acoustic index but not many lengths are collected within tows that catch POP. The Team appreciates the author's work on exploration of the acoustic survey index and looks forward to future analyses.

The Team discussed the acoustic survey selectivity and recommends further exploration of using the raw acoustic survey lengths, the acoustic abundance weighted length compositions, or using the bottom trawl survey selectivity as a proxy.

Pete also presented model runs with a prior of 1.15 for catchability which was derived from a manuscript in preparation by Darin Jones. Using this prior seems reasonable for the POP assessment.

To evaluate the use of a time-dependent mean recruitment, time blocks were created for three time periods determined by the PDO index (1961-1977, 1978-1997, 1998-current). When a time-dependent mean recruitment is used, the model estimates an increase in mean recruitment across the time series in order to explain the recent increase in survey biomass, but does not change recruitment estimates substantially. The author indicated using time varying R is encouraging and will be investigated further.

2020 and 2021 harvest specification recommendations

The Team approved the proposed harvest specifications for 2020 and 2021 by recommending the 2020 GOA final harvest specifications for OFLs and ABCs as published in the Federal Register in March 2019.

Adjourn

The meeting adjourned at approximately 12:30 pm.