Minutes of the Gulf of Alaska Groundfish Plan Team

North Pacific Fishery Management Council
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Administrative

The GOA Groundfish Team convened on Monday, November 14, 2016, at 3:15 pm.

GOA Ecosystem considerations

Stephani Zador presented an update of Gulf of Alaska ecosystem considerations. Ecosystem report cards were developed for western and eastern GOA. While some indicators were updated through 2016, most extend through 2015, many of which derive from the trawl survey, which is conducted biennially and did not occur in 2016. Separate report cards are part of a transition to evaluating the western and eastern GOA as separate ecosystems (divided at 144° W. longitude and western GOA is essentially NPFMC Central Gulf). The report cards are formatted in accordance with those used for the Bering Sea Aleutian Islands. The report cards were discussed separately, although some of the indicators are shared between the two regions. There are more data (and indicators) available in the western GOA (indicators for oceanography, copepods, motile epifauna, and apex fish biomass are not yet determined). The capelin index for forage fish in the western GOA is new this year.

The overall conclusion was that it is complicated to summarize ecosystem status due to variability across seasons. Moving forward, the report cards will continue to be improved and gaps in indicators will continue to be filled.

Alternative indicators were discussed such as the Alaska small mesh survey for forage fish, multivariate indicators for forage fish and seabirds, and different emphasis for the human indicator. The potential split into two separate (Western and Eastern) report cards was noted in 2015, and the Ecosystem team will incorporate additional, area-specific data sets as available.

The Team discussed methods for developing aggregated trawl survey indicators and noted that they may not have considered depth stratification, particularly when characterizing species diversity and richness.

The Team confirmed that it is appropriate to evaluate the eastern and western GOA as separate ecosystems. However, the Team also discussed whether to consider connectivity between the western GOA and Aleutian Islands. There appears to be good separation between the western GOA and eastern Aleutians so this connectivity may not be an issue.

The Team recommends that aggregated trawl survey indicators (e.g., species richness and diversity) consider survey depth stratification.

The Team recommends that the two different GOA report cards continue to be refined and augmented with additional datasets, as well as GOA trawl survey results, in 2017.

GOA Pollock

Martin Dorn presented a summary of this year's walleye pollock assessment which was updated with new data. The new data include the 2016 Shelikof Strait biomass and age composition, the 2016 ADF&G survey biomass, and the summer acoustic index biomass and age-composition data from 2013 and 2015. Five models were presented based upon last year's assessment model (15.1a).

Model configurations were:

15.1a – base,
16.1 – 15.1 + fishery weight at age estimated using random effects (RE),
16.2 – 16.1 + delta GLM instead of area swept for ADF&G trawl survey biomass estimate,
16.3 – 16.2 + revisions to acoustic survey estimates for net selectivity,
16.4 – 16.2 + a spatial GLMM index for NMFS bottom trawl instead of area swept.

Pollock this year were quite a bit smaller at age – previously weight at age was estimated using a 5-year average. The 5-year average would lead to overestimating weight at age this year, which would lead to overestimating the ABC. Therefore the authors looked at using the random effects model for weight at age. A delta GLM model was utilized to provide a standardized index of abundance from the ADF&G trawl survey, which now facilitates a measure of variance. These survey estimates have declined sharply in contrast to other indices, but variance in recent years was relatively high. Examinations of net selectivity were explored to address SSC comments; these examinations did not yield parameters with reasonable properties and the approach was not included for this year's assessment. The geostatistical model was also not used in this assessment pending an improved understanding by the authors on the implications of incorporating the model design and the appropriate treatment of composition data from the survey.

The assessment authors recommend Model 16.2; the Team agreed to this and had some recommendations for the weight at age random effects and delta-GLM models.

The author began with the smaller size of walleye pollock in the GOA relative to recent years. Further, he cautioned that the recommended ABC is declining, and that the stock is comprised primarily of a single strong year class; thus, further declines in ABC are expected, barring stronger recruitment.

An economic evaluation was conducted and highlighted the drop in price/pound, but other indicators were relatively stable. Variability in the number of vessels participating relate to Bering Sea boats occasionally fishing in the GOA.

The MACE survey group has been experimenting with upward-looking sounders for monitoring abundance and tracking movement of spawners to help determine survey timing. Three deployments have been done in Shelikof Strait to get a comparable estimate of biomass using the sounders to augment the vessel survey. Two deployments have been done in Resurrection Bay to optimize the timing for survey.

Two deployments were done near Sanak Island to check for when pollock aggregate in the area to determine when best to conduct the survey. These sounders have been used to adjust survey timing and more extensive analyses in Shelikof Strait would be possible with 5 moorings rather than 3 – need a fair amount of overlap time to determine effective analysis - these could also be used to look at catchability. Further, these sounders could assist in quantitative scaling up the surveys for areas that timing of peak spawning is missed.

The random effects model for weight at age was proposed instead of the previously used 5-year average for projections. The reasoning for this was that pollock this year were quite a bit smaller at age and using the 5-year average would be overestimating the ABC - need good consistency to use the mean values. The Team accepted this methodology and encouraged the authors to examine prediction errors related to the weight at age random effects model.

Pollock CPUE in the ADF&G survey declined substantially in 2015 and 2016. Total CPUE has been up a little though Pacific cod and pollock were way down. Pollock age composition also shows a broader range of ages than the acoustic survey. The ADF&G survey is likely being scaled back though it can be synced with the alternate year NMFS bottom-trawl surveys. A delta GLM analysis was explored for the ADF&G survey in order to provide annual variance estimates that allow for better model fit characteristics. The ADF&G survey delta GLM index standardization was supported by the Team, but the Team recommends the author continue to research and develop this method, including an exploration of environmental covariates.

The author considered application of Model 16.3 as premature since selectivity estimates in the Shelikof survey were based on one study, and the results were inconsistent with other data. A survey net redesign is in progress and selectivity may become more of an issue in future assessments. The Team supported the authors' choice but encouraged additional examinations of net selectivity and continued work with the MACE group on the redesign of net.

GOA pollock is slated for CIE review in 2017. Model 16.4 – could benefit from an examination during the CIE review, pending further review it could possibly be brought forward as a viable model. During the CIE review the Team encouraged the authors to consider age comp changes associated with a spatial GLMM index standardization.

The Team discussed whether there should be a recommendation for an increase in conservation to protect future biomass and catch, and decided that usurping the stock status assessment was inappropriate. The Team also discussed an analysis of overlap between NMFS and ADF&G trawl surveys from year to year to compare trends and distributions in commonly sampled areas.

The Team appreciated the summary table on economic performance and recommends the template to be used in future assessments.

The Team recommends continued development of the ADF&G survey delta-GLM model, examining interactions and the possible inclusion of environmental covariates.

The Team recommends an evaluation of prediction error of the weight-at-age random effects model.

Team recommends coordinated evaluation of annual change in ADF&G survey biomass estimates relative to the NMFS bottom trawl survey for both Pacific cod and walleye pollock.

GOA Pacific cod

Steven Barbeaux presented the assessment of GOA Pacific cod. In re-compiling all the information and data for this stock, the authors developed a simple model and incrementally added complexity. Changes

to the models reviewed at the September 2016 Plan Team meetings were presented. These included the response to SSC comments that the number of age classes be expanded up to 20 including a 20+ group. This was to avoid growth issues for Pacific cod older than age 12 (previously the model was specified to have only 12 age classes). Stock Synthesis 3.24U was used for this assessment.

The 1990-2016 NMFS longline survey index of relative population numbers (RPN) and length compositions for GOA Pacific cod were used in model fitting for the first time.

In reviewing results from past assessments, the author noted a high degree of variability mostly attributed to how natural mortality and catchability were treated. The estimates of FSSB from the 70s and 80s made in the 2014 and 2015 assessments were outside the bounds of other past assessment estimates.

The Team discussed that the survey age composition data is sparse and the fact that fishery otoliths have never been aged. It was noted that ageing of this species has recently been validated.

Retrospective patterns for all models were positively biased as determined from Mohn's rho (a measure of consistency in the most recent years). Models that included sub-27 cm survey length compositions outperformed (based on retrospective pattern) models that excluded them.

The author-recommended model was 16.08.25, which produced the best fit and overall AIC. This model includes sub 27 fish, block time-varying selectivity, no input sample size retuning, *M* estimated with a prior mean of 0.38 and CV of 0.1 (based on the Stark 2007 study), and survey catchability estimated with a diffuse uniform prior. This model converged consistently (for randomized parameter starting values) and retrospective bias was low. The result of this model yielded a higher estimate of natural mortality (0.47) than the fixed value of 0.38 used in the previous assessment and consequently a higher *Fmsy* proxy.

The Team discussed the accepted model and appreciated the approach taken in providing support for its configuration. It was noted that this year the assessment presents a new characterization of this stock. Whereas previously a large component of the stock was considered cryptic (i.e., large numbers of older (>20 years) effective spawners that were not observed by any of the survey and fisheries), this new assessment characterizes the stock as more productive but with a lower abundance than from prior assessments. This new characterization is consistent with newly available age determination samples that have not found fish older than age 12.

The Team discussed other potential data sources that may help with this assessment. In particular, the IPHC annual setline surveys likely cover Pacific cod habitat and might prove useful. The ADFG summer bottom trawl survey data may also provide evidence of changes in Pacific cod distribution and density.

The Team recommends that the author examine and incorporate where possible relevant data from the IPHC and ADFG surveys.

Specific to the ADFG survey, the Team recommended coordinating with planned studies for alternative evaluation of these data to develop a refined index for pollock.

The Team recommends that fishery otoliths be aged to support this stock assessment and this should include resolving past data which may have been subjected to biased age-determination methods.

In particular, the Team recommends that the otoliths used in the Stark 2007 maturity-at-age study be re-evaluated for potential bias in the age-determination method used.

GOA Rex sole

Carey McGilliard presented the rex sole assessment. Rex sole is currently managed as a Tier 5 species because reliable estimates of $F_{35\%}$ and $F_{40\%}$ are not available for this stock. This assessment uses an age-structured model to estimate total adult biomass for use in Tier 5 calculations. This is an off-year assessment in which the projection model is run with updated catch information for 2015 and estimated catch for 2016 and 2017. This year's ABC and OFL are slightly higher than the 2017 projected values from the 2016 assessment because projected catches were different than realized catches. Area apportionments of rex sole are based on the random effects model applied to GOA bottom trawl survey biomass in each area.

For next year the analyst plans to include new ages from archived otolith collections, update growth estimates and maturity information, and include new ageing error estimates. The Team looks forward to seeing these developments.

GOA Flathead sole

Carey McGilliard provided an update on flathead sole. Flathead sole are managed as a Tier 3a stock using age structured assessment model. This is an off-year assessment in which the projection model is run with updated catch information for 2015 and estimated catch for 2016 and 2017. This year's ABC and OFL are slightly higher than the 2016 values and the 2017 projected values from the 2016 assessment. Area apportionments of flathead sole are based on the random effects model applied to GOA bottom trawl survey biomass in each area.

For 2017, the analyst hopes to analyze ageing error data following previously recommended methods, explore the relationship between natural mortality and catchability in the assessment model, and perform a sensitivity analysis to better account for uncertainty in parameters that are currently fixed in the model.

GOA Deepwater Flatfish Complex

Carey McGilliard presented the deepwater flatfish stock complex. Greenland turbot and deepsea sole are managed as Tier 6 species. Historical catch levels are used to set ABC and OFL for these species, thus no changes were made for 2017. Dover sole is assessed using an age-structured model and Tier 3 determination. This is an off-year assessment in which the projection model is run with updated catch information for 2015 and estimated catch for 2016 and 2017. ABCs and OFLs are specified at the complex level. Since Dover sole comprises approximately 98% of the deepwater flatfish complex they are considered the main component for determining the status of this stock complex. This year's ABC and OFL are slightly higher than the 2016 values and the 2017 projected values from the 2016 assessment. Catches are very low compared to ABC.

For apportionment, the analyst provided a new alternative method. Previously, apportionment was based on the relative survey biomass of each of the three species in the complex found within each management area averaged over the last ten years. For this year, the analyst presented an alternative method which combines using the random effects model estimate of Dover sole with the 10 year survey average for Greenland turbot and deepsea sole. The ABC by area for the complex is then the sum of the species-specific portions of the ABC.

The random effects model is preferred for Dover sole as it fills in depth and area gaps in the survey biomass in each area. For Greenland turbot and deepsea sole, these are Tier 6 species and catch reconstruction which would typically be used but is not readily available at the species level. Therefore, the 10 year survey average for Greenland turbot and deepsea sole was used. This apportionment method assigns a larger ABC to the Western GOA compared to the original method and better represents

Greenland turbot distribution, namely because few Dover sole are found in the Western GOA but Greenland turbot are found exclusively in this area.

The Team recommends using the new alternative apportionment method based on the random effects model for Dover sole combined with the 10 year survey average for Greenland turbot and deepsea sole.

GOA Arrowtooth flounder

Ingrid Spies presented an update for arrowtooth flounder. The projection model was used to predict the status of the Gulf of Alaska arrowtooth stock for 2017 and 2018. The projection model incorporated the parameter values from the 2015 assessment model, updated catch from 2015, and projected catches for 2016 and 2017. Projected 2017 age 1+ biomass is 2.1 million t, essentially equal to the estimate projected for 2016 last year. The area apportionments for the 2017 and 2018 ABCs were based on the proportion of survey biomass projected for each area using the random effects model and are unchanged. She noted that several SSC and Team comments will be addressed in the next full assessment.

GOA Shallow water flatfish, GOA Northern and southern rock sole

Northern and southern rock sole are assessed separately but are part of the shallow water flatfish complex. The only changes for shallow water flatfish are the projected values for northern and southern rock role. Biomass, OFL, and ABC values for the other shallow-water flatfish species are the same as last year; biomass was estimated using the random effects model.

Changes to the input data include updated 2015 catch data for rock sole and projected catches for 2016 and 2017. Catches of rock sole in 2015 and 2016 were split evenly between northern and southern rock sole for projections. The total catch in 2016 for rock sole was estimated based on the fraction of the total catch in the past 10 years. This estimate was used as the catch in 2017 for projections. This is a change from previous assessments which assumed projected catches equal to the maximum permissible ABC.

The 2017 northern and southern rock sole biomass, OFL and ABC estimates were higher than projections from the 2015 assessment because the previous estimates were calculated assuming projected catches equal to ABC.

The recommended 2017 ABC apportionment for shallow water flatfish is calculated using the random effects model estimates of biomass for the shallow water flatfish complex by management areas. This is the same methodology used last year.

The northern and southern rock sole part of the complex represents 78% of catch in 2016 and the Team agrees that this Tier 3a component is not overfished. Most recently, the catch has been less than 15% of the ABC. Northern and southern rock sole is not being subjected to overfishing and is neither overfished nor approaching an overfished condition. Information is insufficient to determine stock status relative to overfished criteria for the rest of the shallow water flatfish stock complex. However, catch levels for this complex remain well below the TAC and below levels where overfishing would be a concern. The Team notes that the shallow water complex status determination is not overfished.

There will likely be a new northern and southern rock sole assessment author next year.

GOA Pacific Ocean Perch

Jon Heifetz presented the GOA Pacific ocean perch stock assessment. This is an off-year assessment in which the projection model is run with updated catch information. In 2016, the directed fishery for rockfish in the Western GOA began on October 15, whereas in previous years directed fishing in the Western GOA occurred earlier in the summer. The stock assessment authors made appropriate adjustments in estimating the 2016 catch to account for the recent seasonal change in catch.

The authors noted several modeling issues that will be examined in the 2017 full assessment, including:

1. the effect of different plus group specification for the length composition data;
2. alternative length bin designation;
3. different data-weighting methods;
4. application of geostatistical models to standardize the bottom trawl survey biomass indices; and
5. a comparison of WYAK harvest rates relative to F_{abc}.

The Team looks forward to seeing the results of investigations to address the above issues.

GOA Northern rockfish

Jon Heifetz presented the GOA northern rockfish stock assessment. This is an off-year assessment in which the projection model is run with updated catch information. The stock is projected to below $B_{40\%}$ in 2018, and the stock status will be monitored in future years.

The authors noted several modeling issues that will be examined in the 2017 full assessment, including:

1. the effect of different plus group specification for the length composition data;
2. alternative length bin designation;
3. different data-weighting methods; and
4. application of geostatistical models to standardize the bottom trawl survey biomass indices.

The Team looks forward to reviewing research to address the above issues.

GOA Shortraker rockfish

Katy Echave presented the shortraker rockfish assessment. There is no new survey data and no new changes to the assessment. Catch has been updated and is up 20% from last year as of Oct 9th but is at 55% of ABC. WGOA and CGOA catch is over ABC for those regions. Shortraker catch in the pollock fishery in the CGOA has averaged around 2t a year and has shot up to 147t. The Team had a brief discussion on how estimation methods may have caused this large value, but records are being updated and the year is not yet complete. Team recommendations on this stock assessment were limited to its discussion of stock structure and can be found in that section of these notes.

Katy also provided an evaluation of shortraker rockfish stock structure following the standard template as an appendix to this year's SAFE report chapter. The biomass estimates have been trending downward in WGOA and CGOA while the overall population has been increasing. Evidence of larger sized fish in the EGOA based on trawl survey data compared to other regions was presented. Genetics studies indicated no significant isolation by distance and geographic partitions are consistent with current management units.

The Team looked at length distributions and biomass estimates from the BSAI assessment for comparison with the data presented for the GOA and discussed several possibilities for size differences among regions, but more information is needed before a conclusion could be reached.

The Team concluded that there is little concern - although harvest of this species in the WGOA and CGOA have exceeded quotas, in-season spatial management has been effective at preventing excessive over-harvest.

The Team recommends examining the shortraker exploitation rates (F) over time from each area and gear type.

Also, since there are size differences between regions:

The Team recommends the author examine fishery and survey length distributions, especially for longline gear.

If longline fishery catch is seeing bigger fish than the comparable survey, for example, this may represent failure of survey gear to detect larger fish rather than differential size distributions of the shortraker population.

The Team reiterates their recommendation to examine the trawl survey and longline survey (within depth strata) for the purposes of improving the area apportionment and understanding of spatial structure.

GOA Dusky Rockfish

Dusky rockfis--h are a Tier 3a stock assessment. Fishery catch was updated for 2016 with updated 2016-2018 catches. The recommended ABC for 2017 is 9% lower than the 2016 ABC but is nearly identical to last year's projected 2017 ABC. The stock is projected to decrease slightly through 2018 but is expected to remain above B40. For 2017, the authors expect to investigate the geospatial alternative survey biomass estimator through the Team Working Group.

GOA Rougheye and blackspotted rockfish

Jon Heifetz presented the GOA rougheye and blackspotted rockfish stock assessment. This is an off-year in which the projection model is run with updated catch information. Issues to be examined in the 2017 full assessment were noted, including: 1) investigating the geostatistical GLMM application to RE/BS rockfish; 2) evaluating life history characteristics of rougheye versus blackspotted rockfish; 3) evaluating retrospective patterns and data weighting alternatives. The Team supports the planned work to address these issues. The Team accepted the updates and results.

An update on a genetic study was presented to the Team. Rougheye and blackspotted rockfish are managed as a complex due to uncertainty in identification. Genetic samples were collected on trawl surveys to help improve species identification and examine species-specific growth. Results show continued improvement in correctly identifying blackspotted rockfish over the last three trawl surveys but that an increase in mis-identification of rougheye rockfish has occurred. Further investigation to evaluate why the quality of species ID is variable may be needed to help establish a guide for future surveys.

The RE/BS complex biomass is well above target, but it may be prudent to consider species-specific analyses. The Team discussed examining Tier 5 calculations for each species using trawl survey estimates of each species composition relative to the overall catch for the complex. This approach would provide a worst case scenario of stock status for the individual species if catch was severely disproportionate between species. Additionally, species composition in the fishery could be examined by collecting genetic samples concurrent with existing otolith collection.

The Team recommends evaluating a Tier 5 approach by species with "worst-case" scenarios that consider total catch comprised of one species.

The Team recommends the authors work with the observer program program to request a one year sampling program to collect tissue for genetic analysis during otolith collection in the fishery.

GOA Demersal shelf rockfish

Andrew Olson presented an executive summary for the SE Alaska demersal shelf rockfish stock assessment. The assessment is based on total biomass of yelloweye rockfish estimated by density by area, average weight by area, and area of rocky habitat by area. New survey data was collected in NSEO and CSEO during 2016 and SSEO is expected to be surveyed in 2017. These data will be used in the 2017 full assessment. Total DSR catch has been stable to decreasing in recent years. The recommended 2017 ABC (227 t) is slightly lower than the previous assessment. For management purposes, the ABC is reduced by 7 t to account for subsistence catch then further allocated to commercial (84%) and sport (16%) fisheries.

Kray Van Kirk provided an update to the yelloweye rockfish age-structured model. While addressing recommendations from September concerning overestimates of *M*, underestimates of uncertainty, and the need for additional constraints in density likelihood penalties the author identified and corrected a coding error in density likelihood. For comparison, 3 model configurations were presented: 1) the uncorrected model from September, 2) a corrected global model with estimated natural mortality and 3) a corrected global model where natural mortality is fixed at the Tier 4 assumption of $M = 0.026$.

The corrected global and fixed *M* models both resolved the issues identified in September. Estimates of density, spawning biomass, and recruitment from both models were similar. Overall abundance was lower compared the uncorrected model and fits to commercial CPUE were improved and similar between corrected models.

The Team recommends the authors bring forward updated configurations for the corrected global (status quo) and fixed *M* models for September, 2017.

The Team also recommends the authors coordinate with Auke Bay Lab staff to review model code and determine the appropriate application of Tier 3 FMP control rules.

GOA Thornyhead Rockfish

Katy Echave presented the Tier 5 update assessment for shortspine thornyhead (SST), and an update on the SST tagging project. There were no changes to assessment methodology, and the recommended Tier 5 ABC and subarea ABCs are identical to those from the 2015 assessment.

The 2016 catch of 984 t (through 10/3/16) is approximately 5% lower than the 2015 total catch of 1,033 t, and approximately 50% of the GOA ABC of 1,961 t.

Thornyheads have been tagged since 1992 and consistently since 1997. All of the SST on designated skates on longline survey were tagged resulting in 5% of the survey catch of SST were tagged, about 500-1,000 fish per year. A total of 13,694 tags were released and 203 archival tags were released. There were 226 and 2 archival tags recovered. A majority of the recovered tags (160) have come from longline gear with a relatively small number of recoveries (38) from trawl gear. The higher number of recoveries from longline gear likely reflects the greater visibility (relative to trawl gear) as fish are visually examined at the roller.

Fish tagged in EGOA show the most movement to other areas, whereas none of the recoveries of fish tagged in the EBS were recovered outside of the EBS. Seventy-five percent of tag recoveries from AI

fish, and 76% from EGOA fish, were obtained in the tag release area. The distance traveled ranged from 0.3 nautical miles (nmi) to 990 nmi. The average distance traveled was approximately 47 nmi, and was similar between males and females. Approximately 9% of the recoveries occurred in a relatively small area in British Columbia, although it is not clear if this results from a concentration of SST or a concentration of fishing effort.

GOA Other Rockfish

Jon Heifetz presented the other rockfish assessment. As this was an update, the Team had no discussion.

GOA Atka mackerel

Sandra Lowe presented an update of the Gulf of Alaska (GOA) Atka mackerel stock assessment. GOA Atka mackerel are managed as a Tier 6 stock. This assessment is conducted on a biennial schedule to coincide with the availability of new survey data from the biennial trawl survey. A full assessment was conducted in 2015 using data from the 2015 GOA bottom trawl survey. Stock projections for this year's update are based on parameters from the 2015 assessment using updated catches for 2015 and 2016. The Team discussed the source of Atka mackerel in the western GOA. Nesting areas are present in the western GOA but use of these depends on environmental conditions. Tagging data have demonstrated that adults settle and do not move much and larval dispersal is responsible for movement out of Aleutian Islands spawning areas. Higher levels of bycatch occur in the GOA when strong year classes occur in the AI. A strong 2011 year class was detected in 2014, but was not seen in 2015.

GOA Skates

Olav Ormseth presented the assessment update for skates. He noted that OFLs and ABCs are specified separately for big skate and longnose skate, and all other skate species are treated as a single "other skates" assemblage. Survey biomass estimates of longnose skates have been variable but trendless. Biomass estimates of big skate, however, declined recently, especially in the CGOA. That is the most variable management area in terms of big skate biomass and where the majority of the fishery catch occurs.

The analyst pointed out that the CGOA ABC had been exceeded four years in a row in the past (2010-2013). This occurred again in 2016. The management response to the overages has been to reduce MRAs, which in 2016 were set at 5%. Nevertheless, the Regional Office had to prohibit retention of big skate in CGOA in September 2016 when the catch was approaching ABC. The overage for 2016 was considered to be fairly minor (71 t). An overage of longnose skate in the WGOA also occurred in 2016. The explicit goal of the MRA approach for skates has been to allow some retention throughout the year while and still not exceed ABC. It was pointed out that skate was put on PSC status very early in the year before the management action to reduce the skate MRA was implemented. The 2016 CGOA big skate overage likely was likely influenced by the regulatory change not going into effect until very late January. Evaluating retention rates by gear type could help explain fishery behavior relative to discarding and use of MRA.

The analyst commented that an SS model for big and longnose skates is in development and may be presented by next September.

The Team recommended that the analyst expand the depiction of skate retention to include retention rates by gear type.

GOA Sculpins

Ingrid Spies presented the executive summary for the sculpin complex assessment. Assessment methodology was unchanged from 2015 full assessment which applies the random effects model to the four most abundant sculpin species in the GOA: bigmouth, great, plain, and yellow Irish lord.

The overall biomass trend for the complex is stable to positive. The author noted biomass trends differed among species with bigmouth sculpin showing a decline since the mid-1980s. The cause of this decline is unknown, however, the author presented data from the most recent four years showing fishing mortality is low and fishery catch composition is similar to that of the trawl survey.

The Team recommends further examination into potential causes for the apparent bigmouth sculpin decline by evaluating the utility of including pre-1990 survey estimates as well as investigating inclusion of IPHC survey data.

GOA Sharks

The GOA shark stock complex (consisting of spiny dogfish, Pacific sleeper shark, salmon shark, and other/unidentified sharks) executive summary was presented by Cindy Tribuzio. Assessment methodology was not changed but catch data for 2015 and 2016 was updated. Estimates from the 2015 full assessment are rolled over for the next two years yielding a recommended OFL of 6,020 t and ABC of 4,514 t.

Total shark catches in 2015 and 2016 continue to be low relative to the TAC/ABC although salmon and blue shark catches increased. Highest catches occurred in the Central and Eastern GOA during pelagic trawl and IFQ longline fisheries. Catches from federal fisheries in NMFS areas 649 and 659 (Prince William Sound and Southeast Alaska) are not included in the assessment, however, catches in those areas are tracked in the assessment because a substantial portion of the shark catch occurs in those areas. Work planned for the next full assessment includes investigating Tier 6 alternatives, exploring means to estimate biomass in NMFS areas 649 and 659 for inclusion in the assessment, improving estimates of catchability, and incorporating shared process error into random effects. The author additionally noted ongoing issues concerning catch observations in numbers (sleeper sharks, salmon sharks, and infrequently encountered shark species) but no associated weights and the difficulty of obtaining average weights of large sharks from the longline fishery. The outcome of this difficulty is that CAS is missing catches of large shark species in the HAL sector. The analyst is working with members of the Observer Program and Catch Accounting to resolve this issue. A number of alternatives to direct measurement of weight could be explored including, L-W conversion based on estimated length bins, length transformations (e.g., eye diameter to total length), and average weights from trawl-caught sharks could be used. Access to animals and drop offs pose challenges for obtaining any measurement. It is possible that future management of large sharks will be done in terms of numbers of animals rather than weight.

Improved ageing techniques for all sharks is being addressed, as well as genetic differentiation of potential subpopulations of sleeper sharks. Catchability of spiny dogfish is also being worked on and may be ready in 2017.

The Team recommends the author continue with efforts to estimate catch by numbers including expanding the time series back to 2003 and pursue investigations into the average weight estimates used for larger sharks as well as instances where no weights are available for observed sharks.

GOA Squids

Olav Ormseth began his presentation by reminding the Team that in 2015 as part of the full assessment, he suggested and the Team agreed to, using a modified Tier 5 approach using survey biomass. However, the SSC was not supportive of that proposal. Therefore, for this update, the analyst presented status quo Tier 6 recommendations for OFL/ABC which come from maximum 1997-2007 catch. One thing that changed even under Tier 6 is that the maximum historical catch, which occurred in 2006, was recently adjusted by the Region from 1,530 t to 1,516 t. The Team agreed that the adjustment to OFL andABC should be made, but was concerned that the adjustment might not occur for other stocks if other authors weren't aware that changes had been made. This concern lead to a general recommendation (below).

The analyst further reported that the catches of squid are variable and without trend. The majority of the squid catch occurs in the CGOA. Most of the retained catch is used for fishmeal or bait. The Team also discussed the Council's consideration of moving squid to the Ecosystem Component and looks forward to further development of that issue.

The Team recommends OFL (1,516 t) and ABC (1,137 t) for this Tier 6 stock complex that reflects the updated maximum catch from the catch history (1,516 t) rather than status quo max catch (1,530 t).

GOA Octopus

Liz Connors presented the octopus assessment update. There are no new data for the octopus species complex. The analyst reminded the Team that there was a big increase in survey catches of octopus in 2015 in the GOA. Catches so far in 2016 are much lower than other recent years. The squid OFL ABC are based on a modified Tier 6 approach in which a minimum biomass estimate is generated using survey data and an assumed M is applied. There was concern by the Team about the results of the RE model that was applied to survey data. The model appeared to follow the data too tightly given the error. The analyst will review the data used for the figures depicting RE in the report. The analysts does not see any potential for moving beyond the current Tier 6 approach without a concerted effort in survey work, and possibly a fishery EFP.

GOA Forage Fish

Olav Ormseth presented the Forage Fish Report. This report is conducted every other year, and complements information contained in the Ecosystem Report. Species and species groups that are included in this report are not necessarily those that are of Alaska Federal management importance but may be vital components of the ecosystem. This report is the only source of information on some species such as herring in Alaska. The author asked the Team for input on the content of the report which is organized into three parts: catch information, GOA assessment survey results, and a GOAIERP research summary.

Catch information- Nine FMP forage species and species groups are included in catch records produced by the AKRO. The majority of osmerids are Eulachon. Catches of Pandalid shrimp by NMFS area are not sold but are also being monitored. Herring (PSC) catches are very episodic and there have been spatial closures for conservation concerns.

GOA Assessment Survey results- The GOAIERP survey (hereafter GOA Assessment Survey) has two major grids in the East and West Central Gulf of Alaska for comparison. CPUE relative abundance information from a surface trawl and acoustic information (2011 and 2013) data were presented. Both Capelin and Herring are found nearshore in the most shallow isobaths stratum examined. Capelin

distributions in the summer during 2011-2013 are only present in both areas in 2011. Herring distributions during the same time were more widespread than Capelin.

The GOA Assessment Survey recorded acoustic transects along with the surface trawl. Summer 2013 data show that Capelin density center of abundance is in the Central GOA and not the EGOA areas of the survey. Seasonal length information on Herring show peaks at 17 mm, 49 mm and 109 mm with the largest fish shown at 300 mm.

The Team discussed whether or not we have a cause for concern for forage fish. This led to a discussion of what data is useful. While we have information on the availability of forage fish to birds in ecosystem chapter, it's not linked to the data presented here in this report. The author noted that he would be alarmed if he saw a series of years in a row with high bycatch amounts relative to historical values. This warrants comparison to a temporal mean with some uncertainty. The Team then discussed the value of having the forage fish chapter in with the Ecosystem chapter since greater meaning could be gained from just looking at catch trends- for example food availability for birds. To avoid duplication, and increase the interpretability of the forage fish data, the Team recommends that the forage fishes report be incorporated into the Ecosystem Chapter and include bycatch rate information as well as bycatch amount, and include frequency of occurrence information from the surveys with density information. A cause for concern would be if bycatch rate was declining without a corresponding decline in catch amounts. Caution should be used when using the term 'abundance' when discussing density.