Minutes of the Gulf of Alaska Groundfish Plan Team

North Pacific Fishery Management Council
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Ecosystem Chapter Review

Stephani Zador presented pertinent indices and hot topics to the Team. A new Gulf of Alaska ecosystem assessment was delayed in order to capitalize on the results of the synthesis stage of the GOAIERP and is planned for 2014. In 2014, a summary of the previous year's pertinent indices will be included in the annual presentation. This should alleviate confusion that is caused by the presentation combining information from the present year and the past year when current year indices are not always available.

The North Pacific climate is currently in a neutral ENSO stage. There were three hot topics for this year. There were few reports of "mushy" halibut syndrome in 2013 compared to 2012 implying that foraging conditions were good for halibut this year. There was a large pulse of larval/age-0 walleye pollock found along the south side of the Alaska Peninsula indicating a strong 2013 year class. There was a record high pink salmon harvest (and record high numbers) in 2013 (219 million fish) which could indicate favorable environmental conditions in the past two years while these pink salmon were at sea.

Water temperature in the GOA was similar to 2011 exhibiting a cool temperature pattern with a deeper thermocline and cooler surface waters. The NMFS GOA bottom trawl survey encountered shortraker rockfish in shallower depths. Greater numbers of poachers were found in the central Gulf than in past years despite slight changes in mean water temperature. Sponges and anemones were caught in 50% of bottom trawl tows and are more abundant in the western Gulf. Gorgonians were common everywhere, but more prevalent in the eastern Gulf. Jellyfish abundance was high but variable in the central and eastern Gulf. Echinoderms were consistently captured in about 50% on the trawls. During this survey, a new time series was initiated to collect data on pH, dissolved oxygen, salinity, and turbidity. A study using data collected in Icy Strait in Southeast Alaska found that recruitment of age-0 to age-3 sablefish was correlated to sea surface temperature and chlorophyll levels during those recruitment years. Based on measurements of sea surface temperature and chlorophyll in 2013, sablefish recruitment in Southeast is predicted to be above average in 2013. Researchers are working on the spatial and temporal distribution of euphausiids as a potential indicator of prey availability and biomass of lower trophic levels. One topic being investigated is the potential correlation of correlation of the abundance of euphausiids with walleye pollock recruitment/abundance. This is because data on euphausiid abundance from 2011 and 2013 have

been processed and there are differences between years. Data from 2003 and 2005 is planned to be added to this analysis.

Pollock

2013 GOA summer acoustic-trawl survey results

Darin Jones presented a summary of the 2013 GOA summer acoustic-trawl survey results for walleye pollock. Most of the biomass was on the shelf (i.e., the areas outside of bays and gullies) and in Shelikof Strait, with 55% of the shelf biomass located in INPFC strata 630 (Kodiak). The biomass was largely concentrated in INPFC areas 620 (Chirikof) and 630. With the exception of Area 649 (Prince William Sound), each of the INPFC subareas had large numbers of age 1 pollock, particularly area 630. The distance between transects in the shelf locations was increased to 25 nmi apart from the 20 nmi spacing used in previous surveys; this change was made in order to complete the 2013 summer survey in the allotted time. The estimates of biomass from this survey are based upon acoustic backscatter data that does not include the nominal ½ m nearest to the ocean bottom. This survey is not directly used in the 2013 assessment and is provided for informational purposes. A summer acoustic-trawl survey is expected to be conducted in 2015.

Assessment model results

The assessment model is largely an update of the 2012 assessment with some minor changes to respond to CIE reviewer comments. The 1992 and 1993 Biosonics acoustic survey estimates were removed because they were based on different acoustic sampling methodology, and the remaining estimates for this survey were assigned a CV of 20%. In addition, the ADFG survey length composition data was removed and the survey age composition data were given additional weight.

The 2013 Shelikof Strait acoustic survey biomass estimate is 2.7 times larger than the biomass estimate for 2012, and is the largest biomass estimate since 1985. In addition, the GOA biomass estimate from the 2013 AFSC bottom trawl survey is the largest in the time series, and is a 43% increase from the 2011 estimate. Higher variability was observed for the 2013 AFSC bottom trawl survey estimate (CV= 23%) relative to previous years, which likely reflects the 1/3 reduction in survey tows. The estimated abundance of age 1 fish from the combined Shumagin and Shelikof acoustic surveys show a positive relationship to age 1 recruitment as estimated from the assessment model, and offers potential for improved forecasting of recruitment strengths.

The 2012 year class (observed as 1 year-olds in 2013) is estimated to be the strongest since the 1978 year class. Two options were presented for computing reference points and harvest projections: Model 1 includes the point estimate of the 2012 year class as estimated in the assessment model, and Model 1A sets the 2012 year class to the average of post-1977 recruitment. In both of these models, the $B_{40\%}$ reference point excludes the 2012 year class. Although Model 1 can be viewed as somewhat inconsistent in how the uncertainty of recently observed year classes in addressed between the calculation of $B_{40\%}$ and the harvest projections, it does follow the approach used in previous assessment. Furthermore, it is not clear that setting the recent year classes equal to average recruitment values for harvest projections would satisfactorily address this uncertainty. In addition, the 2012 year class has been observed as being strong in several surveys, and appears to be well distributed throughout the Gulf of Alaska. Thus, the Plan Team agrees with the authors' recommendation of Model 1 which includes the 2012 year class.

The Team recommends considering the results from the Plan Team stock-recruitment working group when determining which year classes to use when computing reference points.

Southeast Alaska pollock

The ABC and OFL recommendations for southeast Alaska are based on Tier 5 methods applied to trawl survey biomass estimates. A random effects model was applied to the survey biomass time series, and was found to give satisfactory results. The Team agrees with the author that the random effects model be used to compute biomass for Tier 5 ABC and OFL calculations.

Pacific cod

Teresa A'mar presented the Pacific cod assessment stock. The 2013 assessment is an update that uses 2013 data with the 2012 model, which is the 2011 model with the <27cm length data omitted.

The 2013 assessment compared: i) a model configuration with estimated age-0 recruits for 1977-2011 (and sets the 2012-13 age-0 recruits to the average level of age-0 recruitment) and ii) a model configuration with estimated age-0 recruits 1977-2009 and sets age-0 recruits for 2010-13 to the median age-0 recruitment. The 2011 year-class estimate for model configuration i) was "higher than the average level and highly uncertain" and Teresa indicated there is little information on age-2 fish in the 2013 data. Therefore, Teresa recommended model configuration ii) as the preferred model. The Team agreed with this recommendation. The Team noted that a comparison of likelihood components showed relatively small differences between the two model configurations, suggesting that estimation of the 2 additional recruitment parameters in model configuration i) is not warranted.

The Team does not recommend setting recruitment to its average level as a general procedure for avoiding anomalous recruitment deviations at the end of a time series. A better approach is to use the optional multiplier for σ_r in Stock Synthesis, which provides a rough diagnostic for recruitment strength, and allows some uncertainty in recruitment to be projected forward.

The Team recommends continuing work on the September 2013 recommendations:

- **Using empirical weight-at-age without estimating growth parameters,**
- **Exploring fewer fishery/survey selectivity blocks; different fishery and survey selectivity curves,**
- **Working with ADFG to examine (age, length, maturity) data from the GHL fishery**.

In addition, the Team recommends including plots of likelihood profiles over a population scale parameter.

In an effort to incorporate all of the survey data, the Team recommends analyzing the spatial distribution of smaller cod. Additionally, the Team recommends trying alternatives to the current truncation threshold being set at 27cm. This includes a) omitting length data and constructing a bin for age-1 fish, b) smoothing data in the <27cm group outside the model, c) examining correlations between age-1 and recruitment, and d) investigating a smaller value for effective sample size for age-1 (with a larger effective sample size for the remaining age classes) so that additional uncertainty in the survey estimates for age-1 can be accounted for within the same likelihood for the entire survey age composition time series.

Arrowtooth flounder

Ingrid Spies presented the arrowtooth flounder (ATF) assessment. The 2013 NMFS GOA trawl survey biomass and length data were added to the model. In addition, catch for 2011 was updated, and catch for 2012 and 2013 was added. Fishery length data was updated for 2011 and fishery length data from 2012 and 2013 were added to the model. No new age data were available. Total biomass (age 3+) has been increasing over time, with a slight downturn the last several years. The highest fishery CPUE is in the central GOA, which is also the area with the highest proportion of ATF biomass. The assessment also

shows a slight shift in biomass to the West Yakutat area. With respect to catch and retention, the author noted that the percent of ATF retained has been increasing over time, as industry has more successfully addressed ATF's mushy flesh syndrome.

The Team recommends that the author consider examining how estimating catchability affects the model. In addition, the author is encouraged to examine inclusion of age 1+ fish in the model, versus using only ages 3+. This suggested change would incorporate additional data about size at age for these younger fish.

The Team also recommends incorporating new maturity data into the model, following the methodology currently used in the northern and dusky rockfish assessments.

The Team recommends completing an executive summary for 2014 rather than a full assessment, unless new maturity data becomes available or if substantial model changes are adopted.

The Team requests the author complete the stock structure template for review in September.

Flathead sole

Carey McGilliard presented the flathead sole assessment. Substantial progress was made on many previous Plan Team and SSC recommendations. In addition to the author's recommended model, alternative models were evaluated with and without natural mortality estimated within the model and with and without estimation of early recruitment deviations. The transition from the previous assessment model was presented at the September meeting and was included in the stock assessment but was not presented.

The assessment model produced slightly lower estimates of spawning stock biomass relative to the 2011 assessment.

Natural mortality was estimated in an alternative model; the estimated value was approximately 50% larger than the fixed value for natural mortality (0.2) in the author's recommended model and in previous assessment models. Additionally, there was a constraint placed on fishery selectivity to prevent low selectivity at older ages at older ages in the recommended model (with fixed natural mortality), but the constraint was found to be unnecessary when natural mortality was estimated.

There was some discussion about whether the large age-3 estimate in the terminal year was a function of recent (and therefore poorly informed) recruitments.

The Team endorses the use of the author's preferred model (Model 0) for setting catch limits for 2014.

The Team agreed with the author and recommends that the next assessment should include exploration of natural mortality and survey catchability. This effort might also include how selectivity is treated, and potentially place a prior on natural mortality based on maximum observed age. Additional model development should include estimation of a stock-specific ageing error matrix and exploration of strong patterns exhibited in early recruitment deviations.

The survey averaging working group will continue to explore apportionment methods and the authors may consider incorporating their recommendations for apportionment contingent on the findings of this group.

Deepwater flatfish

Carey McGilliard presented the deepwater flatfish assessment. Greenland turbot and deepsea sole analyses are based on average catch (Tier 6 calculations). Catches for both of these species have been far below the ABC levels. Dover sole was managed under Tier 5 specifications in 2011 and 2012, based on

the recommendation of the previous author and Plan Team and SSC. For 2013, Dover sole was assessed as a Tier 3a stock.

A full description of the transition from the previous Dover sole stock assessment model to Stock Synthesis was presented at the September 2013 meeting and therefore not repeated. An attachment was provided in the SAFE chapter to document this work.

Many previous GPT and SSC suggestions were addressed in developing the final 2013 model. Data inputs were extended to include newly available observations, and to account for a number of logical inconsistencies in previous analyses (e.g., treatment of incomplete depth coverage in some survey years). Catch data were extended back to 1978. Random effects averaging was applied to each survey stratum and then aggregated to create a "full depth-coverage" survey time-series. Interpolated index predictions were disconnected from the biological data collected in those years. The "shallow survey" length and age data were treated as a separate time-series, with independently estimated selectivity parameters. The shallow surveys are treated separately because Dover sole exhibit ontogenetic movements, and older, larger fish are observed in deeper waters. Maturity curves were investigated, and an interim approach was developed pending collection of new data. Years with very sparse fishery data were excluded. The Plan Team agreed with the changes and improvements made to address these issues.

In addition to the author's recommended model, three alternative models were presented. These encompassed treatment of early recruitment, and the exclusion of the 1984 and 1987 survey estimates.

There was some discussion of the dome-shaped selectivity for the fishery. The dome-shaped selectivity occurred only for lengths somewhat greater than the largest lengths observed. Although preliminary model evaluation indicated an improvement in fit, the need for these additional parameters may be worth investigating in future assessments.

There was some evidence of trade-off between fitting male and female size data. The model fit to conditional age-at-length appeared to be reasonable with no strong patterns in lack of fit.

The Plan Team endorsed the use of Model 0, the author's recommended model, for setting catch limits.

Following a clarification of the reasons for the large increase in the OFL/ABC between the Tier 5 and Tier 3a calculations, the Plan Team suggested that for the next assessment "effective catchability" be calculated (for the survey; as a product of selectivity and catchability for some well-represented age range) to compare with the Tier 5 calculations. This would help address the question of the proportion of the population that is observed by the survey. Fishery selectivity should be considered as a function of depth.

The apportionment for Dover sole is based on the biomass distribution from the most recent survey observation for apportionment. Greenland turbot and deepsea sole are apportioned based on the distribution of the most recent catch. There was considerable discussion about standardizing apportionment methodologies among species and whether survey averaging over several years would be an improvement over using only the most recent survey. Precise biomass estimates might be a rationale for this, but there was a 22% CV for Gulf-wide Dover sole survey biomass in 2013.

The Team recommended that the random effects survey averaging approach be explored for potential application to the apportionment calculations for this stock assessment.

Based on suggestions from the author, **the Team recommended that the next assessment include additional investigation of catchability, and natural mortality (perhaps not assuming a fixed value).**

The Team requests the author complete the stock structure template for review in September.

The Team also recommended that the items listed for future research by the author be pursued.

Shallow water flatfish and northern/southern rocksole

The Team reviewed the executive summary shallow water flatfish assessment. Teresa A'mar presented the assessment of the northern/southern rock sole model results. For the Tier 5 species in the SWF complex, the Team noted that the survey biomass estimates of butter sole and yellowfin sole had declined. Some noted that the biomass seems to be trending toward the WGOA from the historical concentration in the CGOA. It was unclear whether spatial patterns in the survey were consistent with what has been observed in the fishery.

The Team recommends a full assessment for the Tier 5 contribution to the SWF complex including in-depth consideration of relative catch by fishery and survey biomass estimates by area.

For northern and southern rocksole models, the Team discussed recommendations compiled in September as presented by the author. These include:

- Work with fishery observer program on U/N/S rock sole catch recalculation
- Continue with SS models for U, N, and S
- Investigate empirical growth (weight-at-age)
- Investigate data weighting
- Investigate methods to address (male) M
- Investigate methods for calculating ABCs based on U, N, and S model estimates

The Team notes that estimation of natural mortality is a lower priority than other considerations to be evaluated.

The Team recommends that the author provide a suite of models and discussion points for Team review in September and an updated full assessment in November. Prioritization should be given to evaluation of empirical weights at age followed by species and sex ratio assumptions, in particular as it relates to catch.

The Team further recommends the author look at the ADF&G survey data as an alternate data source. The author should also consider a realistic estimate of catch in the current year for calculating the ABC as estimating catch = ABC for these species does not seem reasonable when observed catches are far below this consistently.

The Team recommends the authors complete the stock structure template for northern and southern rock sole for September and provide additional information as requested above regarding the relative biomass and catch of the other species in the complex.

Rex Sole

This year an executive summary of the rex sole assessment was presented due to the government shutdown. The author updated the assessment by running the single-species projection model using parameter values from the accepted 2011 assessment model, together with updated catch information for 2011–2013, to predict adult biomass for rex sole in 2014 and 2015. The assessment model biomass estimates (age 3+) decreased from 86,684 t in 2013 to 84,702 t in 2014 and a continuing decrease into 2015 is expected. The model estimate of female spawning biomass in 2014 is 52,807 t, which is greater

than $B_{35\%}$ (19,434 t). The 2013 trawl survey information was not incorporated into this executive summary assessment. However, a preliminary examination of the survey results indicates that total survey biomass for rex sole increased by 6% from 95,134 t in 2011 to 100,978 t in 2013. Most of this increase occurred in the Southeast region. The 2014 area apportionments are based on the 2011 survey biomass results. The Team discussed that the 2013 survey results could have been used for apportionment but accepted what the author presented for this year.

The Team agrees with using the hybrid Tier 3a/Tier 5 approach as has been done in previous years and endorses the author's recommended ABC and OFL.

The survey averaging working group will continue to explore apportionment methods and the authors may consider incorporating their recommendations for apportionment contingent on the findings of this group.

General rockfish:

The Team discussed the practice in age-structured GOA rockfish assessments of not including the length composition data from the most recent trawl survey in the assessment model. In general, the length composition from the most recent survey would be expected to contain information on the relative strengths of cohorts currently in the population. **For the GOA age-structured rockfish assessments, if length composition data are withheld, the Team recommends exploratory model runs to test sensitivity. This should include any year of fishery or survey length composition data which could serve as a proxy for the age composition, not simply the most recent survey year.**

Pacific ocean perch

Pete Hulson presented the 2013 Pacific ocean perch assessment. The 2013 assessment is a full assessment but only updates the 2011 model with 2013 data. Due to the government shutdown, alternative models were not explored. The 2013 bottom trawl survey biomass estimate is the largest in the time series and the variance is second smallest (CV = 16%). A large haul in the West Yakutat (WYAK) area had a major influence on the ABC apportionment.

The large survey biomass estimate for 2013 caused an increase in the estimated 2006 Age-2 recruitment, with a very wide uncertainty interval. Previously, the Team has recommended using length data from the most recent survey. However, due to time constraints the 2013 assessment has applied the same modeling methodology as used in the 2011 assessment. **The Team recommends additional analyses with the survey length data for 2014 to evaluate effects on the 2006 recruitment estimate. Other contributing factors to the large uncertainty estimate for 2006 recruitment could be related to sample size specified of age data (max at 100).**

The recommended ABC for 2014 in WYAK is an increase of almost 70% relative to the 2013 ABC, based on the apportionment formula for this stock. This increase disproportionately benefits a small area based on a single large survey haul. The Team discussed stability of the apportionment formula and considered changes in apportionment rules to reflect biological factors including productivity of the stock. The current apportionment formula is based on the "4-6-9" weighted average of the most recent three surveys. These weights are based on a statistical model, and not the biological characteristics of the stock. An alternative formula for survey averaging based on a random effects model was discussed, but this approach would also be statistical, and not based explicitly on biological factors. The random effects model could potentially make apportionment more sensitive to new survey results. One idea was to work productivity into a constraint on process error based, for example, on a surplus production sub-model. Another suggested approach was based on separating adults and young instead of using a biomass average. **The survey averaging working group will continue to explore apportionment methods and**

the authors may consider incorporating their recommendations for apportionment contingent on the findings of this group.

Northern rockfish

Pete Hulson presented the northern rockfish assessment. The 2013 assessment is a full assessment but only updates the 2011 model with 2013 data.

Due to the government shutdown alternative models were not explored. The 2013 biomass estimate was higher than the 2011 estimate, but had large uncertainty (CV = 60%). The model does not fit the 2013 survey estimate well, likely due to the large uncertainty associated with it, which is common in northern rockfish. The Team discussed alternative methods of fitting models to unreliable estimates of biomass and suggested investigating alternative approaches to constructing the trawl survey biomass index.

The Team agreed with the authors' recommendations and recommends a 2014 ABC of 5,324 t and OFL of 6,349 t.

Shortraker rockfish

Because of the Government shutdown, an enhanced executive summary format was provided for shortraker rockfish that incorporated new 2013 trawl survey biomass estimates for determining ABC and apportionment. Shortraker rockfish are a Tier 5 species for specifications, and the ABC is based on the average biomass from the three most recent surveys. There was a 22% increase in biomass for shortraker relative to the last full assessment. This is because a low 2007 biomass estimate drops out of the 3-year survey estimate leaving two large estimates (2011 and 2013) and a moderate estimate (2009). Catches were updated for 2012 and 2013. Reported shortraker catch has gone down in all fisheries except halibut and in most regions except the central Gulf. The majority of shortraker catch is still taken in the sablefish fishery. The authors identified the need to examine the implications of the observer restructuring and its effects on shortraker catch estimation.

Apportionment is based on a 4:6:9 weighting of biomass of last three biomass estimates. Shifts in distribution for shortraker are evident in the 2013 survey, and result in apportionment of the ABC with decreases in the western and central Gulfs and an increase in the eastern Gulf. Two random effects model results were presented for discussion; 1) a model fit to the total GOA summed biomass estimates and 2) a model fit by region and then summed over all areas. The model fit by region seemed to incorporate the high uncertainty estimates better than the model fit to the summed total.

The Team discussed the differences in the bottom trawl survey time series including differences in gear type, changes in tow length, changes in survey timing, etc. The time series has been standardized since 1996. Analyses underway indicate that CPUE changes with trawl duration and that the magnitude and direction of these changes vary by species.

The Team recommends that the random effects survey averaging approach be explored for future apportionment calculations. The Team also recommends the author provide an executive summary for the 2014 assessment as no new data will be available, and to include any outstanding Team or SSC recommendations with the summary.

The Team agrees with the author's recommendations for future research priorities.

Dusky rockfish

Dusky rockfish are assessed with full assessments in odd years to coincide with Gulf of Alaska bottom trawl survey years. Due to the government shutdown, this year's assessment consists of updating the data to include the 2013 GOA trawl survey, updated catch data, updated fishery length composition data, and survey length composition data. The 2013 GOA trawl survey biomass estimate increased 19% from the

2011 estimate, with a CV of 36%. The modeled proportion of the fishery catch for the ages close to the age-plus group are consistently higher than the observed data. A presentation on the computation of the ageing error matrix suggests that this effect is likely caused by the ageing error matrix not accounting for the multiple ages within the plus group.

The Team recommends exploration of extending the modeled ages beyond the plus group in the data in order to improve the fits to the age composition data.

The area apportionments were computed using the status quo method of a weighted average of the most recent three trawl surveys, and showed a higher proportion this year in the West Yakutat area due to a large estimate of survey biomass in this region.

In order to evaluate the relative precision of area-specific biomass estimates, the Team recommends that the authors include the survey CVs by region when presenting apportionment estimates.

This stock is a good candidate for applying a random effects model to compute apportionments, as it would consider the interannual variation in the uncertainty of subarea survey biomass estimates. The survey averaging workgroup plans to conduct additional research on computing apportionments, and should specifically evaluate survey apportionment methodologies for dusky rockfish.

Rougheye and blackspotted rockfish complex

Kalei Shotwell provided a summary and updated projection model for rougheye and blackspotted rockfish. A large amount of new and updated data are available for this stock complex including 1) fishery catch, size, and age data, 2) new trawl survey biomass and age data, and 3) fully revised longline survey estimates for the time series of RPWs and length frequencies. New biological data on growth are also available, including size-at-age and aging error data to update conversion and error matrices, as well as new weight-at-age data.

Overall catch is relatively stable, and only about 47% of the GOA ABC is caught annually. The rougheye and blackspotted complex is in Tier 3a and the Plan Team recommends an ABC of 1,244 t and OFL of 1,497 t for 2014 which are slight increases over 2013. The projection model shows the 2014 biomass remaining stable resulting in similar ABC and OFL projections for 2014 and 2015. Biomass estimates from the 2013 survey were not included in the projection model but provided to the Team as reference. The combined biomass estimate from the 2013 survey was at an all-time low for the time series with the largest decline occurring in the central GOA.

The Team recommends a full stock assessment with updated assessment and projection model results for 2014. **The Team also recommends further exploration into the effects of reduced trawl survey effort in relation to the all-time low biomass recorded in 2013.**

Thornyhead rockfish

Kalei Shotwell presented the thornyhead stock assessment. This is a Tier 5 species. Because of the government shutdown, an enhanced executive summary format was provided that incorporated new 2013 trawl survey biomass estimates for determining ABC and apportionment. As with previous assessments, the most recent year biomass estimate is used to calculate these values.

In 2013, the trawl survey biomass estimate increased 11% compared to 2011 but only depths less than 700 m were sampled. This estimate was, therefore, inflated to account for the lack of sampling in the deep strata following the methods described in the 2011 assessment. The Gulf-wide catch of thornyheads increased 49% from 2012, but still was only 63% of the ABC. The majority of the increase occurred in the western Gulf and central Gulf and this increase caused an overage in the western Gulf of over 133 t.

There was a 30% decrease in thornyhead catch in rockfish fisheries which was likely due to the western Gulf of Alaska Pacific ocean perch rockfish fishery closure in 2013, and a 58% increase of catch in the sablefish fishery. It is unknown if this increase may be a consequence of catch estimation from the new observer restructuring coverage on the sablefish fleet.

For information purposes, Pete Hulson presented two alternative biomass estimates using the random effects model. The first alternative fit the trawl survey biomass for the entire GOA. The second alternative fit biomass time series broken up by strata (1-500 m, 501-700 m, and 701-1,000 m) and region (EGOA, CGOA, WGOA) and then summed the stratum- and region-specific estimates to obtain GOA-wide biomass estimates. The results from the random effects model broken up by strata and region seems more reasonable because it accounts for missing strata in the years in which the trawl survey only covered the shallower strata.

The 2014 ABC is 1,841 t, an increase from 1,665 t in 2013. This includes an 85 t increase to the western GOA, due to a shift in survey biomass to this region. The 2014 OFL is 2,454 t.

The Team recommends the author explore the longline survey as an alternative or additional index to the trawl survey and to consider impacts of the trawl survey sampling fewer stations and restricting depth to shallower than 700m in recent surveys.

The Team also recommends further exploration of the random effects model for estimating thornyhead biomass.

Finally, the Team recommends the author provide an executive summary for the 2014 assessment as no new data will be available, and to include any outstanding Team or SSC recommendations with the summary.

Other rockfish

An enhanced executive summary was produced this year due to the government shut-down.

This year the species composition of Other Rockfish was updated to include the seven demersal shelf rockfish (DSR) species when occurring outside of NMFS Area 650 (East Yakutat/Southeast Outside). The DSR stock complex comprises seven species (copper, rosethorn, quillback, China, tiger, canary, and yelloweye rockfish), and applies only to those seven species occurring in Area 650. Catches of these seven species outside of Area 650 (Areas 610-640) have been accounted for in the AKRO CAS in the Other Rockfish category, but have not been included in the assessment. An appendix was presented in the stock assessment evaluating the inclusion of these DSR species in the Other Rockfish assessment. However, due to the government shut down and abbreviated timeline for work, the “split fractions” for the Eastern Gulf of Alaska (EGOA) have not been updated to include these seven species. These “split fractions” are calculated by the Resource Assessment and Conservation Engineering (RACE) division at the Alaska Fisheries Science Center as part of trawl survey biomass estimation procedures. This computation is used to account for Amendment 41 that prohibited trawling east of 140° W longitude in the EGOA. Thus, for 2014, the authors only included these species in the Central GOA (CGOA) and Western GOA (WGOA).

Biomass estimates were updated to include the 2013 GOA trawl survey and Tier 4 (sharpchin) and Tier 5 calculations were updated to incorporate the new survey biomass estimates. The average of the sum of the component species of the Other Rockfish complex for the last three surveys (2009, 2011, and 2013) was used to estimate exploitable biomass and determine the recommended ABCs and OFLs. The average biomass estimates for Other Rockfish are down slightly overall, and more uncertain than the 2011 estimates for the major species (i.e. higher *CV*s in 2013). Of the major species, the greatest change was

observed for silvergray rockfish which was down significantly from 2011 which was the highest on record. Harlequin biomass was over 2 times higher than the 2011 biomass estimate.

The ABC and OFL calculations for Other Rockfish remain the same, but some life history parameters have been updated: natural mortality for darkblotched, widow, and sharpchin rockfish were updated, and growth parameters for sharpchin rockfish were updated. Further, the seven DSR species were added to the calculations. The ABCs and OFLs for each individual species was calculated and summed for the complex ABC and OFL. The 2014 ABC and OFL increased slightly relative to 2013,

The fishery catches of Other Rockfish are dominated by harlequin rockfish. The ABC for Other Rockfish has been exceeded in the WGOA consistently since 2009. During this period, harlequin rockfish comprised an average of 77% of the Other Rockfish catch in the WGOA. The estimated survey biomass for harlequin rockfish is substantially lower than the other species in the Other Rockfish complex. Harlequin rockfish are caught in only 7% of survey hauls on average in the CGOA, and 4% of hauls in the WGOA. This is in contrast to the fishery where harlequin is the primary Other Rockfish species caught. However, harlequin is not a target species and is usually caught with dusky or northern rockfish or Pacific ocean perch. Harlequin rockfish inhabit high relief and rocky substrates. Because of their habitat preferences for untrawlable areas, it is likely that survey biomass estimates are underestimated for harlequin rockfish and the fishery catches are not likely a conservation concern. As such, the assessment authors propose combining the Other Rockfish ABC for the WGOA and CGOA. It was noted that changes in fishing practices are not likely to occur because of a combined western-central ABC, and there is currently no market for Other Rockfish. This proposal will help to reduce waste and avoid unnecessary placement of Other Rockfish on PSC status.

The Plan Team supports the authors' proposal for combining the Other Rockfish ABC for WGOA and CGOA. The Plan Team recommends continued monitoring and an emphasis on research on trawlable and untrawlable habitat.

Atka Mackerel

Sandra Lowe presented the assessment for Atka mackerel. This stock is in Tier 6 as biomass estimates are unreliable from the trawl survey. Age data continues to indicate the dominance of the 2006 and 2007 age classes which comprise the majority of the GOA stock and are also prevalent in the Aleutian Islands stock. No changes were made to the assessment methodology. The Team made no additional recommendations for the author for the next assessment cycle.

Demersal shelf rockfish

Kristen Green, ADF&G, presented the Demersal Shelf Rockfish (DSR) assessment. The DSR assessment historically has incorporated density data for yelloweye rockfish from submersible surveys. Submersible estimates are no longer possible, but remotely operated vehicle (ROV) surveys are now being conducted. The first ROV survey was conducted in 2012 in the Central Southeast Outside (CSEO) region. The Southern Southeast Outside region (SSEO) was surveyed in 2013 but results are not yet available. The East Yakutat (EYKT) and Northern Southeast Outside (NSEO) regions are planned to be surveyed in 2014 which would result in ROV data available for all DSR management areas in 2014.

For this year, catch information, habitat area (for CSEO), and average weights for yelloweye rockfish from the fishery were updated. Yelloweye rockfish density was derived from available survey data for all management areas including the most recent ROV estimate from 2012 in CSEO. Changes in average weight computations resulted in small decreases in the biomass estimates in the SSEO and EYKT areas. The Northern Southeast Outside (NSEO) area remained the same as no new fishery weights were available in 2013. There was a relatively large decrease in biomass in the CSEO due to a decrease in average weight as well as a decrease in the most recent 2012 density estimate (4,051 to 3,247 t).

Two options were presented for calculating DSR biomass for 2014. The historical methodology uses the most recent survey derived yelloweye rockfish density estimates to calculate the total available DSR biomass. The point estimate used is derived from the lower 90% confidence interval of the density estimate. An alternative option was provided based on the Team's recommendation in September to apply a random walk time series model using the historical fish density estimates. The biomass estimate based on the random effects model was lower and the estimated projected ABC is substantially different between the historical method (274 t) and the random effects model (206 t).

The Team commends the authors for providing a random effects model estimate.

The random effects model should provide a better measure of the uncertainty than the historical method and may be preferred since some of the survey data are at least four years old. The comparability of the ROV density estimates to the submersible estimates is unknown without a vehicle comparison study; however this was impossible. The Team noted abnormal patterns in the random effects confidence intervals for the NSEO region, the area that reflects the biggest differences between approaches. Additionally, further work on the random effects model is warranted to investigate whether region specific density estimates should be treated independently or grouped together. Use of the lower 90% confidence interval for density estimation should also be evaluated with respect to the random effects model output.

The Team noted the preliminary catch for 2013 is quite a bit higher than catch in 2012 (36t). Since full retention of DSR caught in the halibut fishery in this region exists, changes in observer requirements on halibut vessels were not expected to have an effect on catch. Evaluation of observer and catch data in future years may help explain the impact of new observer requirements on halibut vessels on DSR catch estimates.

While the DSR biomass trend overall is fairly flat, the Team discussed a potential concern regarding the decreasing biomass trend in the CSEO, the area where the most recent survey occurred. The Team suggested that an evaluation of catch trends in the CSEO in comparison to other areas may be warranted.

The authors plan to have an age structured model for yelloweye rockfish available for the 2014 stock assessment. The Team agreed that more work on the random effects model for all assessments in general is warranted, and therefore, agrees with the authors' recommendation of using the historical method for calculating biomass and ABC. This equates to a 2014 DSR ABC of 274 t and OFL of 438 t. The Team looks forward to seeing the age structured model results in September 2014.

For September 2014, the Team recommends the authors present preliminary results of the age structured model if available. Contingent on the working group's efforts on the random effects model, the authors may consider including the results of the random effects model incorporating the new recommendations. The Team also recommends that recreational harvest (16% of the allocation) be footnoted in the catch table of the assessment to reflect the total DSR catch and to help clarify apportionments.

Skates

Olav Ormseth presented the overview of the skate assessment. An enhanced executive summary, rather than a full assessment, was presented this year due to the 2013 government shutdown. The 2013 survey estimate for big skate was reduced relative to 2011, while the survey biomass estimates for longnose skate and "other skates" increased substantially compared to 2011. The estimate for longnose skates is the highest observed in the 1984-2013 time series. The author described several notable features associated with the big skate biomass assessment, including an almost 50 percent decrease of the big skate biomass in the CGOA, where the majority of the big skate biomass is typically observed.

Olav also provided an overview of skate bycatch in the different fisheries, and noted a marked increase in incidental catches in the halibut IFQ target fishery. This corresponds with increased catch reporting due to fisheries observer deployment into a previously unobserved fishery. He also noted that the 2013 ABC for CGOA big skates and WGOA longnose skates were exceeded. Finally, Olav discussed issues related to a possible directed fishery for skates.

There was considerable discussion about the inclusion of skate catch in state waters (Areas 649 and 659) in total catch, as well as whether the survey estimates are expanded to Prince William Sound and Southeast inside waters. The additional skate catch data available from expanded observer coverage is a large component of skate catch in the EGOA, and gives rise to potential conservation concerns for skates. The Team also discussed the potential development of skate discard mortality rates, rather than assuming 100 percent mortality.

The Team requested that the author separate inside state waters catch in the catch tables to give a clearer depiction of the proportion of skates caught between inside and outside waters. In addition, the author should examine the "survival fraction" methodology used to assess skates that are caught incidentally in the B.C. trawl fisheries.

The Team recommends the stock assessment author fill out the stock structure template for skates as well as to bring back any additional information regarding conservation concerns for skates by area and catches for the Team's consideration in September 2014.

The Team recommended that the author consider conducting a full assessment for 2014.

Sculpins

Ingrid Spies presented the sculpin complex assessment. Because of the Government shutdown, an enhanced executive summary format was provided that incorporated new 2013 trawl survey biomass estimates for determining ABC and apportionment. There were no clear trends in species abundance indices, and recent catch (2012-2013) is estimated to be far below the ABC levels. The 2013 aggregate survey biomass for the sculpin complex was slightly lower than the estimate in 2011. The weighted-natural mortality calculation produced a slightly lower value than the value used last year. These inputs produced a minor decrease in OFL and ABC recommendations for 2014-2015. Alternate calculations based on the random effects (RE) method for smoothing survey biomass estimates were provided for comparison. There was some discussion of whether species-specific TAC calculations could be compared with catch estimates, but it appeared that delineating catches to individual species would require substantial additional effort due to a lack of comprehensive species identification.

The Team agrees that the sculpin complex ABC for 2014 be based on the previous method of using a four-year survey average.

The Team recommends species-specific catch estimates be presented along with species specific ABCs next year.

The Team also recommends the author provide an executive summary for the 2014 assessment as no new data will be available but to include any outstanding Team or SSC recommendations with the summary.

The Team discussed the utility of using the random effects model for estimating survey biomass. Because the survey trend has been relatively flat over time, this approach produces results that are very similar to those from a four-year survey average. The Team discussed the need for a default method recommendation for applying the random effects approach for survey biomass estimation to species

complexes. At issue is whether to apply this method to the aggregate survey data (which may provide a longer time-series in some cases where speciation was incomplete in early years), or to the individual species and then sum the results. A suggestion was made to explore simultaneous estimation for the individual species, and that this approach might be equally applicable to spatial strata for individual species.

The Team recommends the survey averaging working group reconvene and provide guidance to authors regarding how to apply the random effects approach to species complexes and to regionally stratified estimates (i.e. Demersal Shelf Rockfish assessment) before the Team endorses the random effects method.

The Team encourages the author to use the random effects approach, contingent on the survey averaging working group's recommendations.

The Team made a general recommendation that there should be an investigation into the use of ABC-methods based on survey biomass-weighted *M* calculations for species complexes. This approach appears to respond to declines in less productive species by increasing the target harvest rate for the complex, an undesirable response. An alternative to this biomass-weighted M approaches may be desirable for the sculpin complex.

Shark complex

The shark stock complex (consisting of spiny dogfish, Pacific sleeper shark, salmon shark and other/unidentified sharks) assessment was presented by Pete Hulson.

Because of the uncertainty surrounding the data quality for these species, they are classified as Tier 6. The 3-year survey average of biomass is used to assess spiny dogfish populations, while all other species have only average catch history data for such estimates. Bottom trawl surveys in 2013 yielded similar biomass results as in 2007 for spiny dogfish. In 2013, sleeper sharks were most abundant around Kodiak, and in general, their numbers have increased slightly in recent years. There were several large hauls of sleeper sharks in southeast Alaska in 2013. The random effects model was presented for spiny dogfish and will be examined further in the next full assessment.

Bycatch in the halibut IFQ fishery appeared to be greater in 2013 than 2012 and may, in part, be a reflection of the new 2013 requirement to have observers aboard these vessels. The majority of spiny dogfish was caught near Kodiak in both 2012 and 2013. 2013 catch data for spiny dogfish (50 t) and sleeper sharks (125 t) was available from state waters in Prince William Sound and southeast Alaska. This harvest is a significant increase from the approximate 1 t that was taken annually in past years and is likely from observer estimates on halibut vessels being included in the Catch Accounting System.

The complex OFL and ABC are the sum of the OFL and ABCs for the individual species, which resulted in: OFL = 7,986 t; ABC = 5,989 t. The Team recognized that halibut bycatch data could be incorporated in the model to improve assessments.

Catch is generally much less than ABC or OFL. Longline surveys (IPHC and AFSC sablefish) indicate a long-term decline in sleeper shark numbers since 2002.

The Team recommends that the catch information from state waters be incorporated in the model in 2014.

Squid

The Gulf squid assessment was presented by Olav Ormseth. Squids are managed in the Tier 6 category because AFSC trawl surveys do not appear to yield reliable estimates of biomass. Subsequently, there were no changes in harvest recommendations from 2012.

The 2013 catch was 199 t as of September 28, which is higher than the 2012 catch (22 t) but otherwise similar to catches in the years 2007-2013. Catch patterns have not shifted very much in recent years, with the majority of catches occurring in the pollock fishery. The survey biomass estimate for squids in 2013 increased relative to 2011, but is generally similar to past years.

The Team noted that the non-target CIE reviewers criticized the lack of consistency between Tier 6 approaches for squids in the GOA and the BSAI. The resulting OFL for 2014 and 2015 is 1,530 t and the ABC is 1,148.

Octopus

Liz Conners presented the octopus assessment. The new 2013 bottom trawl survey biomass estimate of octopus was 2,686 t. Ninety percent of the octopus caught in this year's survey were *E. dofleini*. Results from the 2013 trawl survey showed a decrease in biomass from 2011 to 2013. The survey does not catch many octopus in the Eastern GOA. Most of the sampled octopus biomass is in the Central GOA with some in the Western GOA., Overall, 10 % of the survey tows catch octopus.

Octopus harvest from bycatch in other directed fisheries was lower in 2013 than in recent years (214 t). There is probably some discard mortality that was not recorded. Bycatch information collected from the new observer program seems to mirror information collected previously. Fishery catch information was collected mostly from pot gear in shallower waters. Spatial distribution of catch may not reflect the distribution of the species and is most likely correlated with the distribution of the pot cod fishery effort.

A new experiment was conducted on discard mortality. Results indicate that the survival of octopus after capture in the pot fishery was almost 100%. The animals were handled as they would be on the pot boat, held for 24 hours and then released. There were 36 animals that were caught, held, and released. All specimens were in good condition after 24 hours. Additional research could be done that holds the octopus longer so long term effects of capture can be observed.

There were no changes in the assessment methodology. However, the consumption estimates were not included this year and the random effects model was applied to the time series. This approach smoothed the biomass estimates in the time series. The model appeared to perform well following the year to year variation yet smoothing the high and low years.

Two alternative approaches were presented for harvest recommendations; 1) the previous method of using a 3-year survey average to compute biomass, 2) the random effects model applied to the aggregate biomass of the octopus complex. The Team discussed the need for a default method recommendation for applying the random effects approach for survey biomass estimation to species complexes before endorsement of this approach. The author noted that speciation of octopus in the survey didn't occur until 2001 so applying the random effects approach to the complex is necessary if the entire survey biomass time series is to be incorporated. The Team encourages the author to use the random effects approach, contingent on the Working Groups recommendations.

The Team recommends using the 3-year averaging of survey biomass to estimate OFL and ABC for octopus. This approach results in an OFL of 2,009 t and an ABC of 1,507 t.

The Council had made a request that the Team present potential methods for determining area apportionment for octopus if directed fisheries were considered. The author provided a comparison of

spatial distribution of octopus catch in comparison to survey biomass. Management areas 610, 620, and 630 had the highest biomass and the highest catch. Management areas 640 and 650 had minimal catches and low biomass estimates. Survey biomass estimates appear to be fairly stable across management areas over time. The Team agreed a standardized approach is desirable and supported using the current three survey biomass averaging method for determining apportionment, if it were to be done. The most recent 3-year survey biomass percentages by area are: 35% in the Western, 63% in the Central, and 2% in the Eastern Gulf of Alaska.

The author presented several research priorities for 2014 including deriving a mortality rate estimated from tagging results, updated growth rates for octopus gathered from ongoing studies, and application of a size-structured model for octopus based on comments from the recent non-target CIE.

The Team recommends the stock assessment author fill out the stock structure template for octopus for the Team's consideration in September 2014.

State Waters catch issue

The GOA Team acknowledges that estimates of shark and skate catches in federal halibut and federal parallel Pacific cod fisheries in areas 649 (Prince William Sound) and 659 (Southeast Inside) increased in 2013 in part due to observer coverage of federal halibut and smaller longline vessels fishing Pacific cod in these areas. The catch of federally-specified incidental species taken by federal halibut and parallel Pacific cod vessels in areas 649 and 659 is currently not counted against the federal TAC. This is inconsistent with catch accounting practices in other areas.

The Team recommends that the State discuss how catch of FMP species should be accounted for in state-managed fisheries in state water areas 649 (Prince William Sound) and 659 (Southeast Inside). Considerations could include separate GHLs where biomass estimates are available or other catch limits. In the absence of any accounting by the State for catch of federal species during state-managed fisheries in these areas, consideration should be given to taking this catch off the federal TAC.

The Team recommends that a review of State managed GHL fisheries and relative bycatch estimates of skates and sharks in these fisheries be conducted for comparison against the bycatch of federal (halibut and parallel Pacific cod) fisheries in Areas 649 and 659.

After further discussion with the Gulf of Alaska Groundfish Plan Team, Council staff, ADF&G, and NMFS staff **it was proposed that the Federal catch accounting system will deduct the catch from areas 649 and 659 from the Federal TACs for federally specified species (50 CFR part 679, Table 2a FMP Groundfish Species) that do not have State GHL fisheries in Areas 649 and 659**. This includes catch during the halibut, parallel, and State waters GHL fisheries for non-GHL species. If further GHL fisheries develop for those species then that catch will not be deducted from the Federal TACs.

The State GHL fisheries in these areas include Southeast Inside (659) – Pacific cod, sablefish, shallow-water flatfish, DSR; and PWS (649) – pollock, Pacific cod, rockfish, and octopus:

Pollock - Prince William Sound (PWS) - GHL accounted for before setting the Federal ABC

Pacific cod
PWS (649) - GHL 25% of Eastern (640, 630) ABC
Southeast Inside (659) - separate GHL not deducted from 650 ABC, assessed by State

Sablefish - Cook Inlet and PWS - GHL adjusted to Central GOA ABC
Southeast Inside (659) - GHL, assessed annually

Shallow water flatfish - Southeast Inside (659) for Southeast flatfish (primarily starry flounder, English sole, etc, very little participation)

Rockfish - combined GHL in Cook Inlet and PWS.

Demersal Shelf Rockfish (659) GHL, not assessed with a survey in inside waters

Octopus - Cook Inlet GHL and PWS GHL started in 2012, each 35,000 lb.

The following table has been included following discussions held after the GOA Plan Team meeting. This table summarizes Alaska Region, CAS estimates of skates and sharks catch in Areas 649 and 659.

Area	Species	Average 2008-2012 total catch (t)	2013 total catch (t)
649	Skates	60	175
	Sharks	4	57
659	Skates	27	514
	Sharks	6	195

Stock structure suggestions for 2013

Octopus, skates, northern and southern rock sole, deepwater flatfish (Dover sole), and arrowtooth flounder

Retrospective analyses, ageing error and plus-group treatment in rockfish models

Pete Hulson presented analyses he's been conducting on treating ageing error and plus group (and the number of total length or age bins to use). The Team commended Pete for the retrospective work on the northern rockfish assessment. This provided a novel approach towards determining which factors contribute the most to retrospective patterns. The Team concurred with his conclusion that changes are likely needed and look forward to seeing the presentation of these investigations in next years' assessment.

The meeting adjourned at 1pm on Friday, November 22nd.