Minutes of the Groundfish Plan Teams

North Pacific Fishery Management Council
605 W 4th Avenue, Suite 306
Anchorage, AK 99501

Held at
Alaska Fishery Science Center
Seattle WA

The meeting was convened at the Alaska Fisheries Science Center in Seattle on September 23rd 2014 and adjourned on the 26th. The combined Teams met all day on the 23rd and again on the morning of the 25th to accommodate analysts' schedules. Plan Team members are listed below in sections specific to each Team.

BSAI and GOA Joint Plan Team Discussions

Administration

The Team reviewed the meeting agenda, noted timing changes to the agenda and assigned minutes for the first day. The GOA Team added an agenda item to discuss GOA pollock within-year reallocation to their Wednesday discussions. Diana Stram provided a brief update on Council staff's intent to use the Granicus system (in use by the Council currently) for drafting the November Team agenda and for posting relevant files for/from the November meeting. She will work with Jim Ianelli and Angie Grieg to adapt this to current procedures for assessments and revisions for use at the November Team meeting. It will be a useful place to upload all Powerpoint presentations and help facilitate dissemination of these during the meeting for use in writing minutes and summaries by Team members.

Team procedures

Grant Thompson reported on three items related to Team procedures. First was a policy adopted by the Team chairs and communicated to SAFE chapter authors by AFSC program leaders Anne Hollowed and Phil Rigby, dealing with deadlines for submission of documents. After considerable discussion, the Teams made several modifications.

The Teams recommend that the following policy be used in future meetings:
Except for emergency cases, the Teams will take action only on items that have been placed on the agenda, and for which sufficient documentation has been received, well ahead of time; specifically:

- If possible, each potential action item should be on the preliminary agenda distributed to the Teams ahead of the meeting, and in all cases must (at least) be on the final agenda as adopted by the Teams at the beginning of the meeting.
- For November SAFE report chapters, "sufficient documentation" means a stock assessment that has been certified by the AFSC as complying with the SAFE chapter guidelines. For all other potential action items, "sufficient documentation" means a reasonably detailed Word or Powerpoint file.
- The Teams expect that sufficient documentation for any potential action item will be provided at least 7 days prior to the start of the meeting. If exceptional circumstances make it impossible to meet this deadline, the Teams expect such documentation to be provided as soon as possible, and in no case later than 5:00 p.m. on the day before the presentation is to be given.
- In the event that a document is revised prior to its presentation at the meeting, the author must provide the Team(s) with an efficient means of identifying which tables, figures, or pieces of text

have been revised (e.g., use of redline/strikeout format, or a written description or list of changes, or a description of revisions during presentation).

Second was a review of existing Team procedures for formatting of recommendations to chapter authors and others:

- Use stand-alone paragraph(s)
- Use bold font throughout
    - Except that items in a list need not be bolded if they follow a bolded paragraph clearly indicating that the items in the list are part of the recommendation
- Use the word "recommend" (joint Teams) or "recommends" (single Team)

Third was a suggestion regarding the timing of Team chapter summary preparation for inclusion in the Introduction of the November SAFE Report.

The Teams recommend that rapporteurs consider preparing the first drafts of their respective chapter summaries in advance of the November Team meeting, and that Team deliberation on each chapter include an explicit check as to whether the rapporteur has been given all of the information necessary to complete his or her respective summary.

Economic SAFE report update

Ben Fissel (AFSC) provided an overview of the draft Economic SAFE report. The full report will be provided in November for the Teams and reviewed by the SSC in February. He provided an overview of the revisions and updated information in the report. The 2013 data are still being finalized and validated. New data collection as a result of halibut observer coverage requires modification of algorithms to process. Ben noted that he welcomes feedback on any anomalies in the data. He provided an overview of information to be included in the November draft SAFE. He requested feedback from the Teams on additional things that would be useful for inclusion in the SAFE, in terms of what information is included, how data are stratified, etc. Dana Hanselman requested that, to the extent possible, additional value information broken down for rockfish would be useful.

Recruitment Working Group

Grant Thompson summarized this year's report of the Recruitment Working Group. Following review of last year's "Phase III" working group report, the Teams asked for further analysis of seven items. Because the working group was able to address only two of these items this year, the report is labeled as an "interim" report rather than a full Phase IV report.

Item B1 ("Establishing criteria for excluding individual within-regime year classes from estimates"). The working group responded to the Teams' requests for "further analysis," inclusion of the first age with at least 50% survey selection (A50%) as an alternative to A10%, and basing an alternative on a wide range of examples from current stock assessments. Assessment authors provided the working group with values of M, A10%, A50%, and the first age for which the recruitment corresponding to the model's estimated abundance in the current year is included in the recruitment series ("first_age"). Seven models were fit to these data, and evaluated in terms of AIC, R^2, and the proportion of the data where the predicted value of "first_age" is less than the cutoff age (A10% or A50%). In cases where "first_age" was less than A10% were excluded from the data, Model 7 did very well by all three measures. The working group's recommendation was to use Model 7 (with A10% as the cutoff age), and parameter a7 set at a value of 0.05: first_age = round(0.05/M + A10%).

Team discussion included the following comments: 1) There is no need to rush adoption of a particular rule; maybe it would be better to let authors have an opportunity to give feedback on the working group's recommendation. 2) Perhaps basing a rule on existing practice simply enshrines bad practice. 3) Rather

than requiring that the same rule be used for all assessments, maybe it would be better to establish a default procedure for use whenever authors cannot identify a preferable alternative.

The Teams recommend postponing a final decision on item B1 for at least one more year. In the meantime, authors considering a change in the number of year-classes to exclude are encouraged to consider the working group's recommendation. The Teams also recommend that the working group consider how to handle assessments with time-varying survey selectivity (where the value of A10% might change from year to year).

Item B7 ("Preferred measure of central tendency in recruitment"). The working group responded to the Teams' requests for "further analyses" and expansion of Appendix F to include real-time updating of estimates of the mean and median (rather than assuming that the true values are always known). In the revised Appendix F, use of the median was found to result in higher long-term average catch and exploitation rates, lower long-term average biomass, and faster rebuilding times (however, the working group was careful to note that, given the assumptions used in Appendix F, any measure that causes leftward movement of the Tier 3 control rule inflection point would be expected to yield similar results). The working group's recommendation was to retain the existing policy (as prescribed in the FMPs) of using the mean to estimate the central tendency in recruitment.

The Teams recommend retaining use of the mean to estimate the central tendency in recruitment, at least for the time being, and folding this issue into the AFSC's ongoing management strategy evaluation of alternative control rules in a multispecies context.

Survey Averaging Working Group

Paul Spencer presented a progress report of the survey averaging working group. The primary tasks of the group were to evaluate methods to: 1) produce reliable estimates of biomass for Tier 5 stocks from survey data, 2) use survey data for apportionment, and 3) produce estimates for areas not sampled in years with incomplete surveys. In many cases the random effects model for determining overall biomass for Tier 5 stocks produced reasonable fits. In cases when survey CVs are very low (e.g., GOA shortspine thornyhead) or when CVs and survey biomass estimates vary widely (e.g., GOA spiny dogfish), the estimated process error variance was high and resulted in modeled survey biomass estimates with high interannual variability that may not be realistic, although it was also noted that process error in this model also encompasses time variability in survey catchability and selectivity. A possible remedy is to constrain the estimate of process error variance with information on longevity or the ratio of observation to process error variances. There is a trade-off between having a consistent method and allowing flexibility to address unusual situations. Next steps are to continue evaluating survey averaging methods for apportionment with new spatial simulations that include more variability in recruitment between areas, and evaluate methods for estimating survey biomass for missing areas.

The Teams recommend that stock assessment authors calculate biomass for Tier 5 stocks based on the random effects model and compare these values to status quo. In addition, the Teams recommend that the working group examine autocorrelation in subarea recruitment when conducting spatial simulations for evaluating apportionment.

Stock-specific Ecosystem Considerations (SEC)

Dana Hanselman (and Kalei Shotwell by phone) provided a presentation on stock-specific ecosystem considerations (SEC). This is in response to recent ecosystem initiatives which reinforce NMFS' mandate to sustain marine fish populations and their associated habitats, including RFPs for FATE, HAIP, and IERPs. The authors are proposing a stock prioritization approach to explore ecosystem, habitat, and climate linkages; to coincide with an anticipated Stock Assessment Improvement Plan (SAIP) update focus on ecosystem integrations. The primary goals for a proposed SEC framework are to 1) identify

trends in population assessments for exploring ecosystem, habitat, or climate (E/H/C) linkages, and 2) establish feedback loops between assessment scientists and ecosystem scientists. The specific objectives of SEC are to establish priority species, create a draft conceptual model of interactions between the various life history stages and other elements of the ecosystem for each priority species, and use pre-existing report card information in a stock-specific manner.

There are 2 main components for integrated ecosystem assessment (IEA) activities. The first component is a comprehensive ecosystem assessment, which is fulfilled by the Ecosystems Consideration Chapter. The second component is the assessment of a changing environment on species in the fishery (i.e., the SECs). Each SEC will explore the E/H/C linkages. A document with guidelines for E/H/C data will provide assessment scientists with an "indicators table" to show the types of E/H/C information available, and a "linkage table" for linking the E/H/C information to single-species stock assessments. Draft indicator and linkage tables were provided in the plan team document.

The proposed framework for an SEC is to 1) prioritize stocks with a categorization process, 2) perform a stepwise evaluation and describe E/H/C data and linkages to develop a conceptual model, and 3) identify relevant proxy indicators using a pre-existing report card format to explain assessment trends. A Google fillable form for assessment authors has been drafted to organize assessment input trends by life history stage and connect E/H/C data and subsequent potential mechanisms to each life history stage. The final form is ordered by stage for visualization. The form is to be used to develop the initial base conceptual model, and to provide relevant proxy indicators for the report card. Dana showed draft categorization, indicator and linkage tables, conceptual model templates, a life history table, and a habitat suitability map for sablefish.

The assessment authors would have the responsibilities of categorization (i.e., determining stock priorities) and developing draft conceptual models using the templates and fillable form. The ecosystem scientists would have the responsibilities to update and improve the conceptual model, and update the report cards (proxy indicators and mechanism evaluation). The Teams discussed how often this information would be updated (perhaps every year for the report card, but 5 years or more for the other E/H/C tables). The Teams also discussed how this information could inform research priorities.

The Teams were in agreement that the overall SEC proposal is a good idea, but acknowledged that it is very ambitious and expressed concern about added burden on assessment authors. Some Team members suggested that we have something ready for the NMFS National Ecosystem Review scheduled for 2016.

The Teams recommend that the Ecosystem Committee be informed about this project, and that the possibility of bringing this into the research priorities database be explored. The Teams also recommend that, as a first step, that an SEC be developed for at least one stock for the 2015 September Groundfish Team meeting.

Research on groundfish recruitment indices

Ellen Yasumiishi presented work that uses ocean condition, fish condition, and proxy species to predict recruitment for Alaska sablefish and Bering Sea walleye pollock. Ecosystem indicators collected during oceanographic fisheries surveys and commercial fisheries were used as model inputs. Inputs that are being used to predict recruitment include climate indices, competitors, predators, and proxy species. Three examples were provided for sablefish and walleye pollock.

For Alaska sablefish, late summer sea surface temperature, phytoplankton biomass, and juvenile pink salmon abundance indices collected during the Southeast coastal monitoring survey, and indices of juvenile pink salmon abundance (proxy for survival) and adult pink salmon abundance (predator) based on commercial harvest were used to construct a model to predict age-2 sablefish recruits. Results compare well to recruitment estimates from the stock assessment model.

In the Bering Sea, age-0 walleye pollock energetic data collected during BASIS surveys were used to construct a model to predict the recruitment of age-3 walleye pollock. Age-0 walleye pollock diets change between warm water and cold water years, and higher energy density is present in cold years, but these things alone do not seem to be correlated with recruitment. However, in some cold years the fish are smaller, and when that is accounted for a stronger relationship exists with age-3 fish survival.

A final example used the annual growth in body weight of chum salmon as a proxy factor for environmental conditions utilized by age-0 walleye pollock. For salmon, relationships exist between body weight and energy density, and energy density and survival. Use of chum salmon growth as a proxy for growing conditions for age-0 walleye pollock is based on a relationship between high energy (lipid reserves) and improved overwinter survival. Chum salmon samples were opportunistically collected in the Bering Sea from the walleye pollock fishery. Using chum salmon growth, seasonal sea surface temperature, and adult pink salmon abundance (predator), a model was constructed to fit age-1 walleye pollock abundance. Data from 2013 were used to forecast age-1 abundance in 2014.

Some highlights from the 2014 BASIS survey were provided to the Teams. These include warmer sea surface temperatures, larger age-0 walleye pollock and juvenile salmon feeding on smaller age-0 pollock, shifts to warm-year distribution patterns of walleye pollock and juvenile salmon, high catches of juvenile sablefish and Atka mackerel, and large body size and high numbers of juvenile sockeye salmon being caught. Some of the observations from the 2014 BASIS survey and results of these modeling efforts will be included in the Ecosystem Chapter in November.

The Teams recommend that the author consider using new data and parameters for the years 2011 and 2012 to validate model performance of the walleye pollock model using chum salmon growth. The Teams also recommend looking at alternative species to model, in particular Pacific cod, if the necessary data are available.

The Teams agree this type of information is useful for stock assessment applications and recommend further ecosystem modeling collaboration between the author and stock assessment authors.

Sablefish research

Dana Hanselman gave an overview of sablefish research and preliminary longline survey results. The longline survey in 2014 occurred in the Gulf of Alaska and the Aleutian Islands. The Aleutian Islands and the Bering Sea slope are surveyed in alternate years.

GOA relative population numbers (RPN) were presented, with changes from the previous year: 1) grenadiers -3%, 2) Pacific cod 39%, 3) halibut 39%, 4) rougheye 37%, 5) sablefish 18%, 6) shortraker -18%, 7) arrowtooth 8%. Longline and trawl biomass estimates from 1989 to 2014 seem to track very well for GOA Pacific cod. Also, BS/AI relative population numbers (RPN) were presented: 1) grenadiers 63%, 2) Pacific cod 89%, 3) sablefish 11%. Examining sablefish lengths from 2012-2014, there was no clear new large incoming year classes. Fisherman have been saying anecdotally that coho salmon have been found to have young of the year sablefish in their stomachs and there have been other reports of small sablefish being caught in surface trawl surveys in the BS and GOA.

Information on accounting for whale depredation was presented next. Megan Peterson is going to help continue some research as an NRC post doc. The question exists as to how to incorporate whale depredation information into the stock assessment model. A suite of model runs was presented that considered whale depredation as different factors in the model. 1) Whale depredation is a source of fishing mortality, and it occurs on longline gear; 2) whale depredation increases natural mortality related to the vulnerability to predators; 3) whale depredation began in 1998; and 4) whale depredation has occurred throughout the modeled time series.

A graph was presented on a sperm whale correction to the abundance index from 1990 to 2013 based on a recent GLMM model. The correction increased sablefish the all Alaska RPN from the base from 1-5% since 1998 (when sperm whale data started being recorded). The author is going to look at these corrections by area and compare sensitivity results of incorporating these effects in different ways. The sensitivity analysis was conducted as a way to capture the range of possible outcomes when including depredation as a factor in the stock assessment model.

The author did not recommend using the sperm whale correction for this year's model, he still needs to estimate the increase in fishery mortality and deal with the issues of potentially reducing the TAC. Another issue is how to incorporate the information into any new apportionment algorithm. The process needs to be done carefully because of potentially increasing the ABCs when including a sperm whale correction in survey estimates. Annual analytical CVs for the sablefish abundance index were presented from 1990-2013, most of them being under 5%. Variance estimates are now possible for all other species where RPNs are calculated.

New area sizes were estimated area using GIS and updated bathymetry. Comparing the old area sizes with the new ones, most areas did not have large changes but may be these changes may be more important with apportionments. The area in depths between 200-300 meters increased but other depth ranges did not. When examining the effect of new area sizes on sablefish RPNs, all years would be less than the previous calculations. In general, this decrease in RPN will not change the model results much because it will be scaled by catchability. However, the new area sizes could affect regional abundance estimates.

There are missing years of data from the BSAI. To adjust for the missing years, the traditional method has been to scale the previous estimate in the BS or AI by the trend in the GOA for the current year. Unfortunately, the GOA is not really correlated well with other areas. Options of models to use are random effects and ARIMA (time-series). When these were run, they had an effect on the sablefish RPN. Random effects changed estimates some and the ARIMA did not affect it as much. Questions were asked as to why the GOA was used to adjust and why other areas were not used.

There is ongoing research going on standardizing fishery CPUE. Observer data standardization is nearly complete, logbook data is being examined, and estimating whale depredation in the fishery is a project in early stages. There is a new post-doc doing work on this research. Research on maturity and spawners is ongoing including validating utility of summer visual scans versus winter histological data, locating spawning locations with satellite tags, and there is a publication in the works.

Research on movement with tagging information includes a Ph.D student looking at age-specific movement for sablefish spatial model, examining annual covariates affecting movement, and including tags from other locations. There is juvenile sablefish tagging in Sitka and satellite tagging at spawning locations. Tagging information from SE Chatham and Clarence Strait was used in the model this year.

There was a food habits study was done on juvenile sablefish and found that they were often lacking food in the early part of the summer, and full in the fall. Herring were an important diet item but they were also opportunistic feeders.

No new alternative methods for apportionment have been developed. A graduate student has developed a preliminary spatial model. Some potential objectives of apportionments to examine will include: 1) reduce annual variation in TAC changes, 2) maximizing economic yield by region and for the total fishery, 3) maximizing sustainable yield by region and for the total fishery, and 4) maintaining a minimum level of harvest in every region.

Some potential methods include the: 1) status quo (5 year exponential average of fishery and survey abundance), 2) Apportion from terminal year abundance of a spatially explicit model, 3) apportion based

on a longer term (e.g., 10 year) average, 4) random effects fit to survey and fishery data, and 5) apportion based on size or numbers (to protect spawning biomass).

In November, the author will provide more documentation on sensitivity scenarios and whale corrections as an appendix. In 2015-2016, an NRC post-doc will be working on fishery whale depredation estimates for SW, there will be a more thorough evaluation on filling in missing years data. Spatial model results will be presented and apportionment changes will be recommended.

Questions from Team members included when the sensitivity model run results will be available. The author would like to present representative models of different ways to account for depredation, potentially 5 of the best.

The author commented that there is confidence in the area sizes but wants to look closer at the effects on the model; he is not bringing forward new models. There will be recommendations in a year. In November, he will show some of the effects of the sensitivity list on the model. This information is not intended to impact harvest specifications for 2015.

The area that was calculated in the Aleutians concerned one of the audience members. Response included that the catch rates are low but the area is large and deep and the CPUE expands a lot because of the area. The new bathymetry data came from the RACE surveys.

The assessment of sperm whales was discussed. The NPFMC had sperm whale stock assessment 2013/14 on their list of high priorities. The rationale was that updated sperm whale abundance estimates are needed. Sperm whale depredation interactions with longline fisheries have increased, but little is known about sperm whale populations.

Other information is being collected about sperm whales. Jan Straley estimated 165 sperm whales in Southeast, a snap shot from mark recapture, no trend information. Megan Peterson noted that for killer whales, there is some observer data on whale depredation but not a lot and it is not used in the model. Acoustic detection of sperm whales may provide information in the future. Nancy Friday commented that there has been no progress on sperm whale population estimates.

NMML update

Lowell Fritz presented an update on Steller sea lion and Northern fur seal abundance and stock structure based on data collected in the 2014 field season. Two large breeding stocks of Steller sea lions occur in the North Pacific, with 45% of the total population east of 144 W longitude and 55% of the total population in the western area. In December 2013, the eastern stock was delisted from threatened status while the western stock is still listed as endangered with signs of recovery east of Samalga Pass and decline west of Samalga Pass in the Aleutian Islands; summer 2014 counts indicate continued steep declines in the western Aleutians (RCA 1) and RCA 2 in the central Aleutians. One of the recovery criteria for the western stock to be delisted is 3% growth per year for 3 generations (totaling about 30 years), which is similar to the growth pattern contributing to the eastern stock's recovery, as well as other factors related to patterns of recovery by area. Overall, the western stock in Alaska is growing at ~2% per year since 2000. New data and analyses include survival estimates of sea lions in the eastern Aleutian Islands through the eastern Gulf, which have rebounded to pre-decline rates; estimates of extinction risk by area (all essentially 0 except for the western Aleutians, which has a 46-100% risk of extinction within 50 or 100 years, depending on the model); and early brand resight data and pup:non-pup ratio trends in the western Aleutians, which indicate that first-year survival is relatively high while reproductive rates may be compromised in the western Aleutians.

Comparison of adult female fur seal foraging data collected during the summer indicates that animals dependent on the eastern Bering Sea shelf (Pribilof Island breeding animals) forage 3X farther and 3X

longer in duration than those on Bogoslof. This is despite considerable growth of the Bogoslof breeding rookery (12% increase per year in pup production since 1997, which would increase intra-specific competition) and a decline of the Pribilof Islands rookeries (~ -5% per year since the mid-1990s, but this followed a large decline that began in the late 1950s, which would decrease intra-specific competition). These observations suggest that carrying capacity for fur seals on the eastern Bering Sea shelf has also dropped substantially over the last 50 years.

Observer Annual Deployment Plan

Craig Faunce provided a summary of the 2015 Draft Annual Deployment Plan (ADP) for observers in the groundfish and halibut fisheries off Alaska. NMFS released the 2013 Annual Report evaluating the first full year of the restructured observer program in June 2014. The report identified several issues regarding the vessel selection stratum used in 2013 and 2014. Changes in annual fishing effort and the high level of conditional releases within the vessel selection pool resulted in low sampling rates, substantial data quality concerns, and decreased sampling efficiency.

In response, the trip selection method will be the sole method to assign observers to fishing activities in 2015. Observers will be deployed across three partial coverage strata:

- *No Selection:* The no selection pool includes catcher vessels less than 40 feet in length or vessels using jig gear. The 10 vessels selected for the EM cooperative research project will also fall under the "no selection" stratum.
- *Small vessel trip-selection*: This pool includes catcher vessels from 40 feet to 57.5 feet in length using hook-and-line or pot gear. Vessels in this stratum were formerly in the vessel-selection pool in the 2013 and 2014 ADPs.
- *Large vessel trip-selection:* This pool includes trawl catcher vessels, hook-and-line or pot vessels greater than or equal to 57.5 feet, and catcher-processor vessels exempted from full coverage requirements.

The 2015 ADP will set selection rates at 12% for vessels in the small vessel trip-selection stratum which is identical to the 2014 selection rate for vessels in the former vessel-selection stratum and 24% for vessels in the large vessel trip-selection, which represents a 50% increase in the selection rate for the large vessel-selection pool relative to 2014. The 2015 selection rates balance program data needs with logistical challenges and impacts of observers on small vessel operators. In response to the high number of conditional releases in 2013, the Council directed NMFS to evaluate if vessels longer than 40 feet would better define the sample frame for the new small vessel trip-selection pool. The analysis did not indicate that changing the 40 foot lower bound of the small vessel trip-selection pool would better inform the conditional release policy. However, to reduce the number of conditional releases, NMFS does not plan to grant releases for vessels in the large vessel pool and will limit releases in the small vessel pool only to vessels that have insufficient life raft capacity to accommodate an observer. The small vessel conditional release will apply only to vessels that have a four-person life raft and a history of operating with a four-person crew.

Arrowtooth flounder model development

Ingrid Spies presented efforts to standardize the arrowtooth flounder models for the GOA and BSAI. She focused specifically on the BSAI model for this presentation because it is an on-cycle year for the BSAI. Current differences between models used in each area include catchability and selectivity choices, and age binning structure. Logistic selectivity is assumed for the GOA survey, as it is for the BSAI slope and AI surveys, but the BS shelf survey curve is allowed to be dome-shaped. Catchability in the BSAI is linked to temperature. She investigated the temperature profiles in the GOA and concluded that it was too heterogeneous to incorporate into GOA catchability. Ingrid also said she was interested in basing selectivity functions for the Gulf of Alaska based on a 2007 gear selectivity paper by Somerton et al. She

presented length frequency data from the GOA, AI, EBS slope, and EBS shelf surveys to determine the age at which to start each model. Team members commented that: 1) survey selectivity for 3-4 year old halibut is highly variable, so perhaps arrowtooth will behave likewise; selectivity in the current assessment is at least 30% for 3 year olds, so the younger age classes should be included; and the SSC has recommended that the Pacific cod model structure should be the same in each area and based on biology. Ingrid made the distinction that GOA ATF have been a target since the 1990s, but not in the BSAI. It was noted that the logistic assumption for a non-target is a bad one because it is probably not being harvested proportionally to abundance. She compared models using logistic selectivity and selectivity-by-age for the fishery in both the GOA and BSAI. The selectivity-by-age model seemed to perform better than the logistic in the GOA, but the reverse was the case in the BSAI. However, some Team members felt that the selectivity-by-age model in the BSAI may not have converged, because the model with more parameters fit the data much worse than the model with fewer parameters.

The Teams recommend that Ingrid bring forward a model to the BSAI Team in November that further explores selectivity shapes for both the survey and the fishery, including a model with non-parametric selectivity-by-age as an alternative to the logistic model. For the selectivity-by-age model, the weightings used in the smoothing penalties should also be explored.

The GOA Team made no recommendation for the 2015 full assessment and will wait until the BSAI model is further developed to make a recommendation.

Catch projections

Dana Hanselman provided an update on how current catch is estimated by authors for the full year and different strategies for addressing this in assessments. Methods vary by authors. Future year catch projections are based variously on the full ABC, past ratios of catch to maxABC, average fishery mortality rates, or expert judgment. Most authors estimate only one year ahead in projections.

The Teams recommend that authors choose a method that appears to be appropriate for their stock, and this method be clearly documented. The Teams recommend authors establish their best available estimate of catch in the current year and the next two years. The Teams recommend that authors should also document how those projected catches were determined in the Harvest Recommendations section (ideally Scenario 2).

EFH 5-year review and fishing effects

A group of analysts is addressing the required 5-year review of Essential Fish Habitat (EFH) in 2015. The purpose of this presentation is to inform the Teams of their plans and to show advances made since 2010. In 2010, the HAPC process was synchronized with the 5-year review. This will be a parallel review of EFH, LEI (long-term effects index), and HAIP (habitat assessment improvement plan). These are two different plans and structures (i.e., looking at stocks versus prioritizing habitats). EFH species descriptions have four increasingly data-demanding levels that require the best available information on habitat characteristics: 1) distribution of fish within habitats; 2) habitat-related densities of species; 3) growth or survival within habitat; and 4) production by habitat. For their respective stock assessment species, authors will be asked to review EFH information. Specific criteria to set regional priorities for habitat assessment are needed. Accurate habitat knowledge is needed to improve stock assessment and update EFH. An Alaska habitat assessment prioritization tool using drop-down options is available online, which filters species and assigns scores. The scope of the project is to focus on stocks managed under federal FMPs. The designers intended for only one person to complete criteria for each stock, but agreed that each region may have its own approach. If more than one person were to fill in the form, the responses would have to be averaged. The objective is to recognize stocks that need more information. A flowchart is used to sort managed stocks into high, medium, or low priority categories.

The Teams recommend that the filter not automatically exclude all species that are not "in the fishery;" others, such as grenadier and some forage fishes, should be included in this habitat research prioritization process.

The fishing effects model (Fujioka) is being updated to better reflect uncertainty and to allow simulations of management scenarios. To develop the fishing effects model, there must be a workflow that generates data products, and then describes how the data go together. An updated fishing gear effects database is being modeled after that used at the Northeast Fisheries Science Center.

The EFH group presented a time frame in which the output from the new descriptions will be made available by April 2015. They proposed holding a 2-day workshop in April or May 2015 to discuss modeling approaches. Anne Hollowed suggested that it would be better to hold the workshop much earlier, perhaps in January. The last time the EFH review was done, it used something readily available that was already an approved measure of sustainability (MSST). If each author has to come up with a new definition of "sustainable" that will be applied individually to fish species, then more time will be needed. Team members suggested that workshop participation be limited to a small group. The EFH group suggested that there may be an internal report ready by the Council meeting in June 2015. By the October 2015 Council meeting, the group hopes to have the EFH review finished.

The Teams' role is to address several questions and make recommendations. Do changes in fishing activities since 2010 warrant re-evaluation of impact of fishing on species? What studies are underway that may be relevant for habitat in future? What habitat research is needed? What are the data gaps? Give HAPC recommendations. Give EFH conservation recommendations.

Research priorities

Diana Stram updated the Teams on action taken by the Council in June 2014 to recommend revised research priorities, as well as progress towards refining prioritization categories for organizing research priority recommendations in 2015. The SSC and the Council formed a sub-group of members over the summer of 2014 discuss and refine the categories and definitions used for the NPFMC research priorities. The subgroup recommendations were reviewed by the Joint Teams. The subgroup report recommendations revolve around a four-category prioritization system consisting of:

- Critical ongoing monitoring
- Urgent
- Important
- Useful

Definitions and examples were provided for each category.

The Teams recommend that the category "Important" be reclassified as "Essential," with "Useful" being replaced by "Important". The Teams expressed concern with characterizing surveys as "research" (because this might give the impression that they are optional) but did not make a recommendation to remove them for the list. The Teams appreciated the definitions as laid out and recommended that they be employed. However the Teams expressed concern with the examples listed and would like to provide suggested revisions in November.

The Teams recommend that a subgroup of JPT members work between now and November to take the first cut at providing revised language for the examples listed in the document as well as to review and revise the current priorities and group them according to the suggested categories.

This workgroup is comprised of Diana Stram, Kerim Aydin, Chris Siddon, Sandra Lowe, Mary Furuness, Alan Haynie and Mike Dalton. Diana will contact the group to set up a meeting and schedule for the

proposed workplan. The group will report back to the Teams in the November JPT meeting as to their suggested revisions.

Squid harvest specification methods

Olav Ormseth presented a discussion paper covering responses to a CIE review on squid assessment and management. The CIE review suggested that the management approach should be similar in the GOA and BSAI. There also was general skepticism of the use of catch for setting harvest specifications (Tier 6 approach) and the time period for the catch time series used as a basis for the Tier 6 recommendation. There are three general possibilities for future management: status quo, identical Tier 6 approaches for GOA and BSAI, or develop a new approach. Olav presented several catch-based and fishing-mortality-times-biomass-based approaches. Olav suggested that choosing a period of potential targeting (1978-1985) and using the average would be a reasonable approach for a catch-based approach in the BSAI. Olav also described use of Baranov's catch equation as a potential alternative, because the "B" in the Tier 5 MxB limit control rule is supposed to represent the average biomass that would be experienced during the year if the stock were exploited at F=M (an assumption which is grossly violated for both BSAI and GOA squid if current biomass is used to estimate B). Based on three lines of evidence, current catch is likely less than MSY. Another approach is to move squid to the Ecosystem Component category, which would not limit squid catches but could prohibit directed fishing and require catch reporting and monitoring, and periodic review. Mary Furuness pointed out that in the BSAI, the non-specified reserve TAC provides some relief when the squid TAC is exceeded (up to the recommended value of ABC), and that any alternative that increases the BSAI squid TAC substantially is likely to be highly controversial due to the 2 million t cap. Kerim Aydin pointed out that the ecosystem model is inappropriate to use for estimating squid biomass (as contrasted with the case of BSAI octopus) for three reasons: 1) the consumption of squid is very episodic; 2) squid species identification and locations of predation indicate that there may be low overlap between the population caught by the the fishery versus those caught by groundfish predators; and 3) there is high uncertainty associated with high estimated consumption by marine mammals.

The Teams recommend that consideration be given to moving squid into the Ecosystem Component category and, in the meantime, the Tier 6 approaches currently used in the BSAI and GOA continue.

Bering Sea / Aleutian Islands Groundfish Plan Team minutes

This Team convened at 9 am on Wednesday September 24. Team members present were Grant Thompson, Mike Sigler, Chris Siddon, Dave Barnard, Liz Chilton, Brenda Norcross, Bill Clark, Kerim Aydin, Dana Hanselman, Lowell Fritz, Leslie Slater, and Mary Furuness. Dave Witherell was the Council staff representative. Alan Haynie was absent on Tuesday and Wednesday.

Bering Sea Project update

Mike Sigler presented a summary of the completed work of the Bering Ecosystem Study and the Bering Sea Integrated Ecosystem Research Program (BEST/BSIERP). In particular, he highlighted the work performed for Bering Sea pollock in determining reasons for fluctuations in pollock recruitment over the last 14 years. Cold years seem to lead to higher copepod and euphausiid abundance (in part through grazing on ice algae), leading to better foraging conditions for YOY pollock, as indexed by caloric content of fish in September. However, there are both positive and negative indicators for the 2012 year class. Additional results included the finding that pollock fleets tend to move north along the outer shelf in cold conditions, as pollock are pushed off shelf by the ice; this was opposite of the investigators' original hypothesis. A related, important result is that the northern Bering Sea is expected to stay "stable" in terms of conditions over the next 50 years, and not see an increase in the presence or abundance of subarctic species, while the southeast Bering Sea will see temperature and ice-related fluctuations, which may include a long-term (but highly uncertain) decrease in pollock recruitment.

Bering Sea shelf bottom trawl survey

Bob Lauth presented an overview of the 33rd annual eastern Bering Sea (EBS) shelf bottom trawl survey. The survey vessels were the chartered F/V Vesteraalan and F/V Alaska Knight. Over 8,000 otoliths were collected. An additional 200 Pacific cod otoliths were randomly collected to examine patterns of cod size-at-age across the shelf. Nearly 150,000 length measurements were collected. An ongoing project to collect acoustic data with a Simrad ES60 was continued for the ninth consecutive year. Additional midwater tows were conducted this year for acoustic verification and to determine whether midwater sampling with the EBS bottom trawl survey net is feasible. The bottom trawl deployed at midwater successfully captured pollock (average of 380 pollock/tow), after being modified with weights on the footrope to increase the vertical opening. One hiccup during routine survey operations was more frequent failures of the CTDs that have been mounted on the headropes since 2008. Light intensity data have been collected since 2005 and spectral irradiance loggers were added to those data collection efforts in 2014. A variety of special collections were supported (skate eggs, male snow crab maturity, etc.). This year was the third warmest year in the time series since 1982 and is a departure from the cold years that have occurred since 2006.

Of those species that are well sampled by the survey gear and that are "in the fishery" of the FMP, biomass estimates increased this year for all but one (Alaska plaice). Walleye pollock survey biomass jumped 62% from 2013 to 2014, constituting the second highest biomass of the survey time series. Walleye pollock were more widely distributed across the shelf this year than last year; their distribution typically is affected by the size of the cold pool. Age-1 pollock were abundant this year (2013 year class). Other strong year classes in the age data are the 2007, 2008, and 2009. Pacific cod survey biomass increased 35% from 2013 to 2014. The survey group continued their examination of the vertical distribution of cod, which is a critical factor in scaling biomass estimates in the stock assessment model. The results continue to imply that the EBS net captures most of the cod, rather than the 0.47 value generally assumed in the stock assessment. The survey group plans to analyze an additional 50 tows from 2006-2014 to continue this study.

The survey group investigated a new variance estimator for their biomass estimates in response to a 2012 CIE review that pointed out that the systematic survey design should be considered in the variance

computation. However, in responding, the survey group analyses showed that species-specific catchability and its effect on variance is more important than a technical adjustment for the systematic design, so future research will focus on understanding catchability rather than developing alternative variance estimators.

Bering Sea acoustic-trawl survey

Taina Honkalehto presented an overview of the eastern Bering Sea shelf acoustic-trawl survey, which usually is conducted biennially. The survey covers about 5,000 miles of track line, and nearly 150 tows were conducted for acoustic verification. The survey was extended into Russia this year, but alternate transects were dropped in Russia because of mechanical problems on the R/V Oscar Dyson. More juvenile pollock were found east of 170 W longitude than usual (40% of biomass overall was in this area and many were age 2). In general, pollock were widespread in the outer domain. The 2014 biomass estimate was the highest observed since 2004. The proportion of biomass in Russia was 3% this year, and has varied from 1-15% during past surveys.

A preliminary euphausiid density estimate was completed by Patrick Ressler. The estimate continues to decline following the peak in 2009, and now is similar to the value estimated for 2004. An acoustic-trawl survey was also conducted for the Bogoslof Island area in March 2014. This area has not been commercially fished since 1991. Thirty-one of 35 planned transects were completed; weather prevented completion of the westernmost ~4 transects. The measured biomass in 2014 was 112,000 metric tons, which is an increase from the 2012 estimate of 67,000 metric tons. The next survey is planned for 2016.

Taina also presented some analyses of near-bottom backscatter. The purpose of the analysis is to determine if the portion of the water column excluded from acoustic-trawl survey pollock population estimates (currently the near-bottom 3 m zone) can be reduced. The 3-m cut-off is used for pollock because historically the acoustic-trawl survey assessed midwater pollock from near surface down to the effective fishing height of the bottom trawl, and the bottom trawl survey assessed the remaining demersal component of the population. The acoustic survey population estimates have not been extended below 3 m to date because of concerns about pollock potentially mixing with other species near bottom. The approach is to compare simultaneous acoustic and bottom trawl catch composition measurements from the bottom trawl survey to determine the proportion of near bottom backscatter contributed by different species. To date, 791 hauls have been extracted and preliminary models fit. So far, pollock is the biggest contributor to near-bottom backscatter. Final results are anticipated by the end of 2015.

Eastern Bering Sea Pacific cod

The candidate models considered at this meeting were those discussed by the Joint Team Subcommittee on Pacific Cod Models (JTS) at a meeting in March and finalized by the SSC in April, plus one model put forward by the author, Grant Thompson. They were:

1. Model 1. This was the model chosen for specifications in 2011-2013 (for 2012-2014), with the following main features:

(i) M fixed at 0.34.

(ii) Length-specific commercial selectivities for all fisheries, some forced to be asymptotic, estimated for blocks of years.

(iii) Age-specific survey selectivity with annually varying left limb.

(iv) Survey catchability fixed at the value obtained in the 2009 assessment (0.77), where it resulted in the product of catchability and selectivity equal (on average, over the 60-81 cm size

range) to the desired value of 0.47 in the EBS. The desired value was based on a small number (11) of archival tags.

(v) A single growth schedule estimated for all years.

(vi) Intercept and slope of age reading bias estimated internally.

(vii) Standard deviation of length at age estimated internally.

(viii) Mean length at age data left out of the fit.

(ix) All age and length composition data included in the fit.

Models 2-5. In the 2012 assessment cycle the authors reported on an exploratory model, then called Model 4, that had a number of attractive features, but was not ready for production use for the 2012 assessment. It has been in the mix since then. The vanilla version of this model was designated Model 2 at this meeting and Models 3-5 were variants of it. The main differences between Model 2 and Model 1 are:

(i) Annually varying length-weight relationship.

(ii) 10 (rather than 3) initial abundances at age estimated.

(iii) Richards (4-parameter) growth curve.

(iv) σ_R estimated freely.

(v) Length-specific survey selectivity.

(vi) Double normal fishery selectivities estimated for five seasons but not by gear; one season's selectivity forced to be asymptotic.

(vii) Input catch composition sample sizes tuned to be no less than the output effective sample sizes.

(viii) 2 (rather than 1) survey selectivity parameters have annual devs.

(ix) Survey catchability Q re-estimated iteratively (not as a free parameter).

Model 3. Model 2 with survey catchability Q = 1.

Model 4. Model 2 with a single, internally estimated variance term added to the estimated sampling variance of each survey CPUE.

Model 5. Model 2 with Q = 1, asymptotic survey selectivity, and freely estimated M.

Model 6. This new exploratory model was brought forward by the author. It includes some of the technical improvements made in Model 2 (e.g., items i-iii in the list above) and implements a flexible, empirical selectivity schedule (Stock Synthesis pattern 17). It is similar to the models used for the Aleutian Islands assessment. The main differences between Model 6 and the base Model 1 are:

1. The technical improvements shared with Model 2, described above.
2. A single fishery and fishing season instead of nine season-and-gear-specific fisheries.
3. The natural mortality rate M was estimated internally.
4. The mean value of survey catchability Q was estimated internally.
5. Length at age 1.5 was allowed to vary annually (penalized devs estimated).

6. Survey catchability was allowed to vary annually (penalized devs estimated).
7. Selectivity for both the fishery and the survey were potentially allowed to vary annually (penalized devs estimated).
8. Selectivities for both the fishery and survey were modeled as random walks with respect to age instead of the usual double normal (SS selectivity-at-age pattern 17). Priors are set on the age-specific parameters such that the form tends to a logistic if the data are uninformative, but the priors have large standard deviations (minimum CV of 0.5).

Due the number of priors and penalties, fitting Model 6 requires a laborious manual process of iterative tuning, and convergence can be a challenge, especially in the early stages of the various iterations (e.g., attempting to estimate unconstrained devs for all survey parameters is difficult, due to the very large number of free parameters involved).

The six models produce a wide range of estimates of present spawning biomass (96,000-439,000 t) and depletion (0.15-0.49). Interestingly, the best estimates of M in likelihood profiles all fell in a fairly narrow range (0.36-0.44). On the basis of a number of measures, Models 4 and 6 achieve the best fits, but the fit of Model 4 has some anomalous and unexplained features, namely a growing divergence from the survey CPUE values at the end of the series and much lower recruitment estimates than all the other models, also at the end of the series. Model 2 fits the worst of all the models.

Commenting on the results, Grant noted that all the models that allowed (but did not require) dome-shaped survey selectivity estimated a domed shape. He found the empirical selectivity function useful and in most ways preferable to the parametric alternatives. He was also pleased that Model 6 appeared to estimate both Q and M pretty well. The Model 6 estimate of Q is very near 1, substantially higher than the fixed value of 0.77 in the base Model 1.

The Team discussed various features of the models, including the possibility of senescent mortality, the effect of new weightings of the length composition data in Model 6, and especially whether or not to continue to rely on the fixed value of survey catchability that has been the anchor of the base model for the last three years. This value is based on archival tag data on the vertical distribution of only 11 fish, which indicated that only 47% of 60-81 cm fish were at or below the height of the survey trawl headrope when swimming freely. All of the recent field work done by RACE has indicated that the bulk of the cod are very near the bottom when the survey trawl passes, contradicting the conclusion from the tag data. This suggests that catchability is near 1, as estimated by Model 6. It was also noted that the time-varying estimates of the L1 parameter did not match empirical data well in Model 6, and that a single estimate might be more appropriate.

Grant informed the Team that he would be able to present only one or two models in November. In view of the relatively poor performance of Models 2-5, the Team requested that Models 1 and 6 be presented in November. The Team believes that the issue of whether to fix survey catchability at a low value (rather than at 1, or near 1 as estimated by Model 6) should be resolved by next year at the latest.

The Team recommends that the author present fits of Models 1 and 6 in November. The L1 parameter of Model 6 should be estimated as a single rather than time-varying value to stiffen the fit and eliminate the questionable values in the series of annual estimates of L1.

Aleutian Islands Pacific cod

Grant Thompson reported on the latest batch of models, which share a common structure that is simpler than the base Bering Sea model (Model 1) but is very similar to this year's Model 6 in the Bering Sea. In most respects, they are also very similar to models developed and presented in 2013, which failed to produce acceptable fits. The main common features are:

(i) A single fishery and a single fishing season each year.

(ii) Fishery and survey selectivities modeled as random walks with respect to age (Stock Synthesis pattern 17), with priors that tend to produce a logistic fit if the data are uninformative.

(iii) Potentially time-varying selectivity parameters.

(iv) Survey catchability estimated internally, but with a prior centered at 1 and having a standard deviation equal to the mean of the standard deviations used in comparable priors in other assessments. (In Bering Sea Model 6, there is no prior on Q, and annual variation is allowed.)

Three variants of this model were presented:

Model 1: recruitment offset set to zero.

Model 2: recruitment offset estimated freely.

Model 3: same as Model 2 but with survey selectivity forced to be asymptotic (equal to 1 after the age where it peaks in Model 2).

All of the models achieved very satisfactory fits to all data series, without any of the implausible features of last year's fits of nearly the same model (very high F in some early years, very low abundance in those years, extremely peaked selectivity). The fit of Model 3, while good, was not as good as Models 1 and 2. The estimates of survey catchability, all around 0.63, were not influenced by the prior centered at 1.

The key difference between last year's poor fits and this year's satisfactory fits appears to be the exclusion of all data before 1991. The survey data had been eliminated last year; fishery size compositions and catch amounts were eliminated as well this year. The Team had a lengthy discussion of the propriety of leaving out all of these data. The survey data are generally regarded as suspect because of non-standard gear and stations, so that was not an issue. Leaving out the early fishery size compositions was suggested at a meeting of the JTS, but the rationale is not recorded in the minutes. From a practical point of view, leaving out all the early data as Grant did is very attractive because it results in usable fits that otherwise proved very difficult to achieve. In the end, the Team concluded that Grant should continue to leave out the early data but conduct further research and spell out the rationale for doing so in November (see recommendation below).

Grant noted a number of possible criticisms of the fits, but the Team considered all of them to be well within the range of doubt common in other assessments that are used for specifications for other stocks. Specifically:

(i) The lack of synchrony between estimated year class strengths in the Bering Sea and Aleutian Islands is not necessarily suspicious, as these may be different stocks.

(ii) The paucity of age data (i.e., one year of survey data) is by no means fatal; there are other assessments with few age data.

(iii) The somewhat peaked estimate of survey selectivity is perhaps questionable but not beyond belief; more age data will likely improve the results.

(iv) The implausibly low estimate of M (0.11) when it is estimated freely in Models 1 and 2 is not unusual; that is why most assessments use a credible fixed M, as do the candidate versions of this model.

For November, the Team recommends that Grant supply three candidate models, all based on data from 1991 onward, which means that there is no need to estimate a recruitment offset (because the data do not span an environmental regime shift):

1. **Model 1 from this meeting (same as Model 2 when the recruitment offset is disregarded).**
2. **A variant of Model 1 with the priors tightened enough that the survey selectivity schedule is smoother and more like a logistic curve.**
3. **Tier 5.**

Blackspotted/rougheye rockfish spatial analysis

Paul Spencer presented an update on the spatial analysis of BSAI blackspotted/rougheye rockfish catch in fishery and trawl survey tows. Additional genetic samples were collected since the last analysis in 2010 primarily from the from BS slope and AI surveys, and commercial fisheries. This increase in samples (n ~1,000) resulted in the relationship between genetic distance and geographic distance being no longer statistically significant (P = 0.113). However, the non-genetic information supporting spatial fishery management units includes high rates of exploitation of blackspotted rockfish in the Western AI occurring in the 1990s, followed by decreasing abundance and no replenishment of blackspotted rockfish from neighboring areas. This suggests some population structure on temporal scales of interest relevant to fisheries management.

The Team reminded itself of the categories it adopted last September "while awaiting future guidance on the Council's future spatial management policy." These (including the examples given last September) were: 1) *monitor* (e.g., AI pollock); 2) *alert* (e.g., shortraker rockfish); and 3) *concern* (e.g., blackspotted/rougheye rockfishes).

Although an increased number of genetic samples no longer showed statistically significant isolation by distance in the BSAI, the Team recommends continued annual reporting on the status of the population in each AI management area. The Team continues to express concern regarding this stock complex

Shortraker rockfish biomass estimation

Ingrid Spies presented a comparison of alternative Tier 5 biomass estimators for BSAI shortraker rockfish: the survey point estimate, the random effects model recommended by the Survey Averaging Work Group, and a surplus production model (the Kalman filter implementation of the Gompertz-Fox model that has been used in several previous assessments). The random effects model and the surplus production model gave very similar results, and appeared to provide effective methods for smoothing the survey time series appropriately. The surplus production model has more parameters than the random effects model. The available data do not contain enough information to estimate all of the parameters of the surplus production model freely, so some of them end up being estimated by imposing very tight prior distributions. The Team noted that this is the only stock for which the Gompertz-Fox model is used. Given the similar performance of the two models, it seems reasonable to prefer the random effects model, which has been recommended for general use across Tier 5 assessments. The Team also noted that, contrary to an assertion contained in the document, the Gompertz-Fox model does provide estimates of uncertainty.

The Team recommends that the random effects model be included in the November assessment, and anticipates that this will be the Team's preferred model for use in setting ABC and OFL.

Pacific ocean perch models with spline-based selectivity

Paul Spencer presented some responses to CIE and SSC comments about BSAI Pacific ocean perch (POP). One of the main things was to evaluate why the age-plus group was fit so poorly. The CIE

reviewers believed that fishery selectivity was the likely cause. The two main selectivity issues to consider were whether selectivity is time-varying and whether it could be dome-shaped. Paul explored this by examining fishery and survey trends, and age data independently of the model. Looking at the catch data historically by depth and area, he found there have been large changes over time. In 1997, sub-area ABCs were adopted, and catch has been steady by area over time. Paul also showed that the fishery has been fishing slightly deeper in recent years. He showed that the survey catches a higher proportion of old fish than the fishery, particularly in the years prior to 1997. Reviewers had suggested it is unlikely that the plus group could have grown so much, given the rates of exploitation that were applied to the stock in the 1960s. A Team member suggested that the age structure could have been fished in proportion to abundance and there would still be a large age-plus group relative to the immediately preceding age groups. Others thought that if the stock was fished persistently at high rates, as in the 1960s, there should be some age truncation. Paul discussed the history of selectivity over time in the BS and AI POP models. Back in 2000, it was dome shaped, modeled by a double logistic curve. As of 2013, selectivity was time-varying in 4-year blocks. There was much discussion on how the spline function is implemented in AD Model Builder.

Paul explored using bicubic splines (varying with respect to age and year) to model fishery selectivity as an alternative to logistic selectivity in time blocks. He presented 4 model alternatives using splines. Applying splines (Model 1) seemed to give a sharp dome-shape selectivity in the 1960s, which gradually moved closer to asymptotic in 2013. It fit the plus group better than before, but still had a bad residual pattern. Models 2 and 3 dropped the AI cooperative survey data and Model 3 rescaled the age/length data to a higher sample size, which further improved the fit to the plus group. Paul suggested that catchability is badly estimated because it changes each time length and age data are added to the model and that he may consider fixing it at some value in the future. A Team member asked how these spline functions affect estimation of other parameters (e.g., fishing mortality) if they are not rescaled relative to a maximum of 1. Paul said that the fishing mortality scale is free during estimation, but he scales it relative to a maximum of 1 for presentation of results. His models incorporated a penalty on the splines that constrain the first and second differences between ages (as in Assessment Model for Alaska software) because an unconstrained spline model was deemed too "bumpy." The amount of smoothness imposed by the penalties is subjective. There was much discussion about choosing selectivity models and how to do it objectively. He suggested that the spline models had more pros than cons. One of the pros was avoiding discontinuities associated with time blocks. Paul suggested 4 candidate models that could be applied to all of the BSAI age-structured rockfish models. A Team member mentioned that previous experiences with splines in two other BSAI assessments (Pacific cod in 2011 and Greenland turbot last year) were not successful, suggesting that they may not work well in every case.

The Team recommends that at least one model with spline-based fishery selectivity be included in the November POP assessment, and encourages the authors to include a spline-based model for other age-structured BSAI rockfish assessments to the extent that time permits. In the event that the model with spline-based selectivity proves to be unsatisfactory, then the Team recommends further exploration of alternative models (either spline-based or something else) in the future.

Arrowtooth flounder stock structure

Ingrid Spies gave a presentation on information related to stock structure of arrowtooth flounder. A similar presentation was provided to the GOA Team, and the one document covered all management areas. Guidelines were developed by the Stock Structure Working Group several years ago to promote a rigorous and consistent procedure for making management decisions on stock structure for Alaska stocks. In November 2013, the Team recommended application of the template to the GOA and BSAI arrowtooth flounder stocks to evaluate the appropriateness of existing stock categorizations and management boundaries. Very little research has been done pertaining to stock structure in arrowtooth flounder. Ingrid presented aspects of the template relevant to GOA and BSAI arrowtooth flounder, including exploitation

rates, spatial concentration of fishery relative to abundance, and pairwise genetic differences/isolation by distance.

Specific to the BSAI, Ingrid noted that the exploitation rates are generally proportional to abundance, with one exception: In 2010, the Eastern AI had a higher exploitation rate of 0.546, more than twice the FABC value of 0.235. The highest abundance of arrowtooth is in the Bering Sea, and exploitation rates have been very low (F<0.03). To date, there have been no genetic studies on arrowtooth flounder (or any other flatfish in Alaska). In Europe, genetic differences have been observed on very large scales for a few flatfish species (e.g., differences between turbot (*Scophthalmus maximus*) stocks in the Northeast Atlantic, Baltic, and North Sea). In evaluating the sum total of this information, Ingrid did not see a concern, as arrowtooth flounder were generally lightly exploited. The Team thanked Ingrid for her concise presentation.

The Team recommends that area-specific harvest rates of arrowtooth flounder continue to be monitored (i.e., the level of concern is low).

Flathead sole

Carey McGilliard will be the new author of the flathead sole assessment. She presented several possible changes to the flathead sole assessment for 2016. She began her presentation with the major characteristics of the current assessment, such as: flathead sole and Bering flounder are in one assessment, no stock-recruitment curve, mean catchability = 1, and growth estimated outside the model. She proposes moving the flathead sole model to Stock Synthesis (SS), which will allow growth to be estimated inside the model, experimentation with the number of fleets and alternative selectivity functions, inclusion of a stock-recruitment curve, and (potentially) calculating Tier 1 reference points. Additional updates to the model may include changing data weights and effective sample sizes, estimating ageing error matrices, and interpolating between AI survey years. It was pointed out by one Team member that interpolation is probably not necessary in SS. Another Team member suggested that interpolation may be useful anyway. Also proposed was development of separate models for flathead sole and Bering flounder instead of a single model for the complex. A Team member pointed out that Bering flounder comprise only about 3% of the complex and are mostly found in the northern part of the complex's range, with a substantial portion of the stock potentially outside the standard survey area.

The Team thanked Carey for her presentation and looks forward to seeing the 2016 assessment.

Ecosystem considerations

Stephani Zador presented the September draft of the Ecosystem Considerations report for the BSAI. In November, she will present updated versions of the Report Cards, Ecosystem Assessment, and an update of 2013 conditions. Thirty-one indicator updates were received for the September report, with 20 pertaining to the BSAI.

The North Pacific showed a weak Aleutian low last winter, with positive SST anomalies south of Alaska, abnormally high SLP, and a PDO transition to positive. The ENSO forecast is for a weak to moderate El Nino. The "blob" of warm water in the North Pacific led to the warmest SST anomalies for the GOA on record. Transition Zone ChlA Front was 240km north of normal, which impacts the distribution of subarctic animals. Warmth spread across the north Pacific by 2014. Warm anomalies correspond to a positive PDO pattern. However, conditions were also anomalously upwelling-favorable, which kept the coasts of the GOA from experiencing the higher temperatures. Seasonal projections from the NMME indicate continued warming and weak-moderate El Nino effects going forward.

There was one short-tailed albatross take in September, with a possible second bird in the same haul. The last documented takes were in 2010-2011.

On the EBS survey, average bottom and surface temperatures were warm with an early ice retreat. The OSCURS wind-drift model shows unfavorable indications for flatfish recruitment from 2012-2014, although that relationship has broken down a bit in recent years. Eddy kinetic energy has been low since 2012, with low water and nutrient fluxes for the last few years. Euphausiid abundance was lower in 2014 (similar to 2004 levels). A new regime shift indicator shows the salmon indicator shifting to negative in 2009. These PCAs show possible differences in biological responses to temperature in different time periods.

The pre- and post-winter temperature change index predicts a strong 2012 year class. The energetic predictions, on the other hand, predict a weaker 2012 year class. The Teams discussed these predictions and look forward to examining their respective success.

The Team discussed the reporting of bycatch rates, in particular the fact that this information is reported in several places (the Ecosystem SAFE, the Economic SAFE, and individual stock assessments). Some Team members felt that each report provided enough difference in context to justify continued reporting of these data in multiple documents.

"Other rockfish" stock structure

Ingrid Spies presented evidence of potential over-exploitation in this complex (excluding shortspine thornyhead (SST)) and proposed splitting the complex into SST species and non-SST species with the non-SST moving to Tier 6. This potential over-exploitation in non-SST species was noted in November 2013. The fishing fleet was made aware of the potential issue, and is attempting to reduce the catches of non-SST. Dusky rockfish make up the majority of non-SST catch and appear to be caught disproportionately to their estimated abundance, most likely due to concentration of fishing effort in areas of high dusky rockfish density. Additionally, dusky and harlequin rockfishes are the species that show extremely high estimated exploitation rates. However, many of the non-SST exploitation rates exceed 1, suggesting that the survey does not adequately sample these non-SST species adequately, which is corroborated by large coefficients of variation (CVs) for a number of species in the complex. Additionally, the biomass estimates of this complex vary widely among the western, central, and eastern Aleutian Islands. The authors propose splitting the complex and moving the non-SST species to Tier 6, given their conclusion that these species lack reliable estimates of biomass. Moving them to Tier 6 would require the OFL to be calculated using average catch from 1978-1995, unless an alternative measure is adopted by the SSC. If the 1978-1995 range had been implemented in the past, the catch of non-SST species would have exceeded the OFL consistently since the mid-1990s.

Team discussion highlighted: 1) the difficulty of lumping all these species into one complex in light of the extremely different life history and ecology among the species; and 2) the very high survey CVs, which may reflect a lack of vulnerability to the trawl survey.

The Team recommends further detailed examination of fishery catch data by subarea and season for the non-SST species. The Team recommends elevating this to "alert" status (on the monitor/alert/concern scale adopted by the Team last year).

Alaska skate

Olav Ormseth presented a revision of the Alaska skate model. This revision was motivated, in part, by CIE review comments, as well as Olav's desire to improve the model. One big change was to lengthen the time series used in the model. The revision also addressed the pattern of growth implied by the length frequencies (determinant growth with a distinct maximum size). A Team member suggested that Olav investigate whether determinant growth has been found for other skate species. One challenge has been explaining why biomass doubled from about 1985 to 1995 (e.g., was it immigration or recruitment?). Olav concluded that the pattern of average weight through time is more consistent with a recruitment

event, rather than movement. Olav made some simplifications in the model, including removal of the embryonic period, removal of age selection, and modeling recruitment as deviations from a constant mean (simplified from the 3-parameter "survivorship" stock-recruitment relationship used previously). Olav examined the spatial distribution by age and found that skates move shoreward from ages 0-9 and, once mature, they spread out and for the most part return to the outer shelf.

The revised model starts at the beginning of the catch time series (1950s). The longline catch data are problematic because reliable identification of Alaska skate requires an in-hand examination. For all catches, the species composition is inferred from survey data on an area-specific basis. In addition, for the pre-1990 trawl fishery data, the skate catch is inferred from the reported Other Species catch and the proportion of skates in Other Species catches from 1997-2013. In addition, skate catch is partitioned into longline and trawl catches based on the ratio of Pacific cod catch to yellowfin sole catch. One Team member suggested that Olav evaluate how the initial numbers-at-age vector is specified in SS; if individual age groups are estimated, it may not be necessary to extend the catch series so far back in time.

Olav presented four alternative models. The models tested how variability in annual recruitment and selectivity, and increased emphasis on length-at-age data, affected the model results. Models 1-3 fit the length compositions well, in particular the final peak in the length compositions, which has not occurred in previous model versions. Model 4 did not, which is a reason for disregarding this model. Models 1 and 2 have similar selectivity curves (dome-shaped) whereas Model 3 is forced to be asymptotic and Model 4 dramatically drops to zero at lengths greater than about 100 cm. The dome-shape patterns of Models 1 and 2 for the trawl and longline fisheries are consistent with Alaska skates being taken as bycatch, and with the fact that the shelf trawl survey does not sample the slope where bigger skates might be found (although it was noted that few Alaska skates are caught in the slope survey). All four models produced a large recruitment(s) in the early 1980s. One Team member suggested that Olav explore further how the early recruitment deviations (before the years with survey data) are set up in SS, as SS has options for treating those years differently from the main part of the time series. The models generally represent the lengthened time series of survey biomasses included in this revision. Compared to the previous model version (2012), the reference spawning biomass is somewhat lower (about 30%). Olav reported that the two parameters governing variability in length at age ended up being constrained by the bounds, and that moving the bounds tended to result in unbelievable estimates of those parameters. One Team member suggested that there may not be enough data to estimate those parameters internally, so perhaps specifying them *a priori* would be a preferable alternative to letting the parameters hit the bounds.

The Team recommends that the last accepted version of the model (2012) be included in November as a base model for comparison with the author's preferred model.

Harvest specifications

The Team recommends a rollover of 2015 OFL and ABC to 2015-2016 for proposed specifications.

Mary noted some regulatory changes that will be reflected in the proposed specifications, but these are all for TAC-setting purposes and do not affect the OFL and ABCs. The Team discussed indications of higher pollock abundance based on the survey results, but did not adjust the ABC for proposed specifications at this time. Mary indicated that there will likely be some TAC overages at the end of the year (e.g., pollock), but that catches will still be well within the ABC. These overages are related to incidental catch allowance estimates being estimated low in 2014. Mary also recommended that consideration be given to renaming ABCs as "subarea ABCs" when they are allocated by area.

Gulf of Alaska Groundfish Plan Team minutes

Diana Stram	NPFMC (co-chair)	Jim Ianelli	AFSC REFM (co-chair)
Sandra Lowe	AFSC REFM	Paul Spencer	AFSC REFM
Chris Lunsford	AFSC ABL	Leslie Slater	USFWS
Jon Heifetz	AFSC ABL	Nancy Friday	AFSC NMML
Mike Dalton*	AFSC REFM	Craig Faunce	AFSC FMA
Kristen Green (phone)	ADF&G	Jan Rumble	ADF&G
Obren Davis	NMFS AKRO	Mark Stichert	ADF&G
		Ian Stewart	IPHC

* absent

GOA Arrowtooth stock structure

Ingrid Spies presented an overview of stock structure for GOA arrowtooth flounder and provided a document following the existing stock structure template. This information is designed to help evaluate the appropriateness of existing stock categorizations and management boundaries for arrowtooth flounder.

The highest concentration of arrowtooth flounder is in the central GOA and has been stable over time. Catch is proportional to abundance in all areas, but is significantly less than the ABC. Exploitation rates are low and are an order of magnitude lower on average than the ABC specified in the GOA. There is no evidence that disproportionate fishing is occurring in any of the three regions of the GOA. Within the GOA there is very little difference in age or size structure among areas although there is some evidence of differences in size structure between the GOA and EBS.

To date, no studies on genetic population structure of arrowtooth flounder have been undertaken. Genetic population structure has been identified in other flatfish species, but this information does not imply that stock structure exists in arrowtooth flounder. The Team agreed future genetic population structure studies of Alaskan flatfish species would be beneficial to management and for determining stock structure in arrowtooth flounder.

GOA Skate Stock Structure

Olav Ormseth presented the results of a Plan Team request made last year. Analyses of big and longnose skate are based on W(610)/C(620:630)/E (640:650) Gulf divisions. The author has specified two catch scenarios for the eastern GOA: EGOA_1 does not include inside waters (649 & 659), EGOA_2 includes inside waters. Currently catches in 649 & 659 do not accrue to the TAC.

Big Skate

Fishing mortality varies by area but $F>F_{abc}$ in CGOA, where fishing is concentrated, especially around Kodiak Island. The ratio of $F>F_{abc}$ was greater than 1 during 2010-2013. The spatial distribution of landings is fairly similar to the spatial patterns in survey CPUE. Population trends vary by area. Big skate in the central and western GOA are larger than those in the EGOA and appear to represent the mature portion of a gulf-wide population (lengths are greater than $L_{50\%}$). Most of the skates in the EGOA are smaller than $L_{50\%}$. $A_{50\%}$ for females is 5 years. Big skate biomass decline in CGOA is a major concern- abundance trend in the CGOA is dome shaped during 1990-2015, with a peak in 2000. Since 2003, when there was a directed fishery, dramatic declines have been observed (directed fishing ended in 2005). Historical catch in other GOA regions is more variable. For reference, OFL is specified on a gulfwide basis.

Movement of big skate is unknown. It is thought that skates return to discrete nursery areas to release their eggs. Extensive tagging in British Columbia suggests big skates make only small, localized movements (~10 km), with a few skates making large-scale movements (~1000 km, e.g. BC to central Aleutian). Limited tagging of big skates in Alaska waters is so far inconclusive, with skates making small- and large-scale movements.

The limited data available suggest that the big skate population has a gulfwide stock structure, with ontogenetic movement from the east, where few mature animals exist, to central and western GOA where big skates are mostly mature. Having area-specific ABCs seems appropriate due to differences in size and this perceived movement.

There was disagreement among members about whether or not discard mortality for skates, particularly in the H&L fishery, should be assumed to be 100% since it is likely that this is overly conservative. Adjustments to this mortality rate may result in lower F/F_{ABC} ratios in the CGOA. However, the author presented alternative calculations for 2012 and 2013 where catch was reduced by assuming that some proportion of discarded skates survive (75% and 50% discard mortality); even after applying these rates, F/F_{ABC} in the CGOA remained above 1.0.

Longnose skates

Fishing mortality of longnose skate differs by area. F/F_{abc} exceeded 1.0 in the WGOA in 2009-2010, 2013 and EGOA_2 in 2013. The pattern of landings is centered on Kodiak, disproportionate to the survey CPUEs which are distributed more evenly throughout the GOA. Length compositions are fairly similar between areas and (in contrast to big skates), have been relatively stable over time, and are not related to L50%. A50% is 12.3 years. In contrast, biomass has increased in all areas, especially between 1990 and 2000, but the increase in the CGOA has been much greater than in the other areas.

The author concluded that there is potential for separation of stocks in the GOA, and that this should be a priority for research. The use of area-specific ABCs appears warranted- this species has an unknown stock structure with localized removals. He concluded by describing how skate stocks in British Columbia are managed on a much smaller spatial scale (~100 km) relative to the GOA (~1000 km). The smaller scale of management in BC has been supported by tagging studies that suggest limited dispersal.

Sablefish Maturity

Cara Rodgveller presented work she and collaborators are doing on sablefish maturity in the GOA. Information on sablefish maturity is quite old, defined by macroscopic methods and collected in the summer- outside of the spawning season.

Sampling on the shelf and slope outside of Kodiak was conducted prior to the winter 2011 spawning season to identify spawning locations, observe movements, estimate maturity using histological methods, and compare maturity at age estimates from the winter to those from summer longline surveys. Length frequencies showed increasing size with depth. Skipped spawning (fish that had spawned in the past but not in current season) was documented for the first time in this species. Skip spawning was observed in 20% of the mature fish; 43% on shelf, 5% on slope.

Maturity curves change dramatically depending on if skip spawners are considered mature or not, and differences between historical and maturity ogives based on the winter 2011 collections may have implications for the stock assessment. Most notable is that the proportions of fish mature from the summer were somewhat greater at young ages than winter proportions. Since a considerable portion of of the population belongs to these younger age classes (age 2-5), data collected during the winter may produce lower estimates of spawning biomass than summer sampless. More comprehensive winter sampling over a wider geographic area is needed before conclusions can be made.

Two fish that were fitted with pop-off satellite tags and released on the shelf stayed on the shelf a month after release. Two others were captured on the slope, released on the shelf, and returned nearby the original capture location on the slope, suggesting potential site fidelity during the spawning season. Methods to incorporate skip spawners into maturity ogives, post-spawning season histology, future tagging, and management strategy evaluations for different scenarios are planned.

GOA Northern and Southern Rock sole

Teresa A'mar presented a summary of data and modelling analyses for northern and southern rock sole. Specifically, all of the recommendations from previous Plan Team meetings and the SSC were either addressed in some form, or progress is underway. These included: catch partitioning by species, exploring differentiated vs. species-specific models, using empirical weight-at-age, data weighting, estimation of male natural mortality, the calculation of ABCs for undifferentiated and species-specific assessments, investigating available ADF&G survey data, and performing a stock structure template-based evaluation.

Empirical weight-at-age was not feasible, due to a lack of any data for estimating fishery weights-at-age. Instead conditional age-at-length (AAL) was calculated for survey data, allowing growth and growth variability parameters to be estimated internally in the assessment models. **The Plan Team recommends using the AAL approach for models to be considered in November.** Investigating the use of length-based selectivity (rather than age-based) might also be helpful in understanding why CVs of length at age were found be quite low (<5%) for age-3 rock sole.

The number of fish is being used as the input sample size for length and conditional AAL data. Data weighting was investigated via adding weight to the survey biomass index.

The Plan Team recommends using the number of hauls as initial values and continuing to explore weighting from there.

Estimating male natural mortality was found to produce slightly better fits to the data (conditioned on the existing weighting), and estimates were slightly higher than the assumed value of 0.2 for females. This is generally consistent with life history theory and the approaches and results from other flatfish assessments. **The Plan Team recommends estimating male natural mortality in models considered for November**.

A major source of uncertainty in this assessment is the partitioning of fishery catches into species-specific values. Catches are used from 1977 to the present, but estimates of the ratios of northern to southern are only available for some of the catches, from 1998 onward. There were no clear trends in these ratios over time. Previous analyses have used 60% and 40% of the total rock sole catches in each of the species-specific assessments in order to recognize the variability in observed ratios. **The Plan Team recommends that values of 50:50 be used for the base case.** If time permits, a sensitivity analysis using catches of 40% and/or 60% in the historical period would be a helpful check on how the results might differ under alternative assumptions.

ADF&G survey data for rock sole did not include sex-specific information, and therefore is unlikely to be useful for the assessment. **However, the Plan Team is still interested in the relative trends provided by those data, and recommends evaluating ADF&G survey data for model application (time permitting).**

These recommendations may need to be re-prioritized relative to those to be made for the GOA Pacific cod assessment.

GOA Pacific ocean perch

Pete Hulson provided an overview on the forthcoming Pacific ocean perch (POP) assessment. The author conducted a full assessment in 2013, but was unable to include POP maturity data. The 2014 assessment will be a full assessment, including maturity data, even though 2014 is a non-survey year. The assessment also will address the December 2013 SSC comments regarding the POP assessment. Those comments included requests for evaluating the effects of new maturity data, survey length data on recruitment estimates, and sample size specified for age data. In addition, the SSC recommended incorporating recommendations of the survey average working group, as well as past recommendations by the CIE, Plan Team, and SSC.

The author's plan for the November POP assessment includes updating weight and size at age data, and adding new maturity data. The author is also seeking guidance on the approach for apportioning biomass across management areas, specifically, whether to use the status quo or the random effects model for the apportionment.

The author noted that updating weight-at-age and size-at-age data with survey age-length-weight through 2011 resulted in a percentage change to POP biomass of less than 2 percent. He will also pay close attention to forthcoming results and recommendations from the CAPAM workshop, and respond to CIE review and input, with respect to growth estimation. With respect to maturity, the author evaluated two recent POP maturity studies with respect to the assessment model's approach. The model's maturity fit is intermediate to each study, and reflected a less than 10 percent difference in spawning biomass compared to the studies.

The discussion about area apportionment included a review of the current practice of using a "4-6-9" weighting based on the 3 most recent survey biomass estimates, applied to the W/C/E GOA management areas, respectively. For the EGOA split between WY and SEO, a weighted average of the upper 95 percent CI is used for the WYAK apportionment. This methodology yields a historically larger proportion in WYAK due to one large haul in that area in 2013. An alternative approach would be to use a random-effects model for area apportionment. That approached yielded similar apportionments to the status quo method, but smoothed the WYAK spike that was introduced in 2013.

The Team recommends using the random effects model, rather than the weighted survey average approach to the extent practical for POP and for rockfish in general.

The author also discussed his evaluation of length data. The overall request per the SSC was to evaluate survey length composition data influences on recruitment. The author investigated and compared three different approaches. The first was the status quo, the second was to add the final year survey lengths to the model, and the third was to include the full time series of survey lengths.

The results of the comparisons included the finding that adding just the last year of length data was problematic. Doing so caused the 2006 year class to drop out, which influenced the model to ignore that year class, although other data indicates the class to be very strong. The strong effect on recruitment estimates from adding the final year of survey lengths may be related to the input weight given to these data.

The Plan Team recommends evaluation of the how the data weights given to the various fishery and survey age and length composition data affect the estimates of recruitment and age composition.

Evaluation of the issue of including the final year of survey lengths should be analyzed in a general manner, apart from the effect obtained from either including or excluding survey length data from any particular year. The length data from the survey can be considered an initial indicator of demographic structure, which is later updated when age composition data becomes available (and which itself is

calculated from the length composition). Provided that the assessment model is converting modeled ages to lengths in a reasonable manner, the use of the length data would be expected to generally provide some improvement relative to not using the most recent survey lengths.

The Plan Team recommends the following test to evaluate the value of information contained in the survey length data and the transition matrix. Consider model estimates of age structure obtained when survey age composition is included as a standard for comparison. For each survey year, conduct two additional model runs: 1) without either the age or length composition data for that survey year; and 2) with the length composition from that survey year. Finally, evaluate which of these two runs comes closest to producing the age composition estimates obtained when the survey age composition are used. Evaluating this comparison across multiple survey years should provide a more general view of the effect of including survey length data.

Finally, the Plan Team recommends that the author consult with the Age and Growth Lab about the possibility of obtaining the most recent, additional POP age information to incorporate into the model, in order to supplement the survey length data. Additional age at length data for recent year classes would add to the model's accuracy.

GOA Pacific cod stock assessment

Teresa A'mar presented an exploration of a wide variety of model assumptions as applied to data used in the 2013 Pacific cod stock assessment with updated fishery data. Five different model configurations were presented based on comments from the Plan Teams and SSC.

The PT concurred with the author to bring forward three models to the November Plan Team meeting: Models P1, S1a, and S1b. These three models give a reasonable portrayal of stock dynamics. The major differences in the S1 models compared to the P1 model (last years model) is the use of a conditional age at length key for survey data, treating bottom trawl survey data as one source (i.e. sub 27 and 27 plus size groups combined), and the inclusion a recruitment variability multiplier (sigma r multiplier) applied to recent recruitment estimates,. Model P1 omits the sub 27 survey data. Model S1b includes the use of splines to estimate selectivity curves.

For all models, the Plan Team recommends that starting values for sample weights for compositional data (i.e. age and length data) be based on the number of hauls or trips rather than the number samples. These starting values should be the upper limit of sample weights.

The Plan Team recommends that the authors explore the use of the "10% selectivity rule" presented by Grant Thompson as the year class to start applying the sigma r multiplier.

The Plan Team also recommends exploration of the use of longline survey data as an additional source of abundance index data for adult Pacific cod.

Shark assessment issues for 2014

Cara provided an overview of plans for the November shark assessment. The authors will not be providing a full assessment in November but are responding to SSC comments in this September document. Four primary issues are addressed from the SSC comments.

The first issue was the indication of a large increase in the 2013 shark catch data using an approach in which the assumptions are more reasonable. It is unclear the extent that historical data should be reconstructed until more data are available under the restructured Observer Program. More data should provide a more robust approach for re-scaling the extent adjustment needed. It was noted that regardless of additional years data, comparisons between current and historical data will be difficult. Perhaps looking at catch trends in conjunction with biomass would provide some insight on the reliability of the

catch series (relative to effort as well). The HFICE method could be also be used for comparison against new estimates for contrast and in developing alternative plausible catch scenarios to evaluate stock status and fishing impacts. Authors indicate that total catches are not comparable. To make comparisons, authors recommend calculating catch from non-halibut IFQ fishery only, then compute the rates with halibut data not in the denominator. This calculation is not currently possible with CAS. The second issue was regarding the treatment of catch in inside waters (Areas 649/659). The authors evaluated these data and indicate that including these catch in the estimates for specifications would have a minimum impact on the overall OFL and ABC estimates. The third issue was to what extent there was connectivity across regions for shark populations. Authors indicate evidence that neither spiny dogfish nor sleeper sharks have distinct populations across the North Pacific thus there is most likely connectivity across regions. Finally, the fourth issue was to evaluate how all of these issues might impact the Tier 6 specifications for sharks. As noted in the document, the overall OFL and ABC are largely driven by the Tier 5 biomass-based approach for spiny dogfish and that the relative contribution to overall catch estimates from inside waters would have a minimal impact on the specifications.

The authors requested feedback from the Plan Team on what to do with inclusions of 649/659 in catch estimates as well as whether or not there were suggestions for reassessing the catch time series. The Team refers back to detailed issues raised in the November 2013 report regarding catch being deducted off of the federal TAC. The Plan Team requests clarification from the Regional Office as to why this catch does not accrue and whether or not progress can be made to ensure that it could accrue in the future. The Team notes that it would be important for the assessments to address these issues (biomass based data or time series of catch) to evaluate the implications for the assessment to be consistent with the catch accruing towards the federal TAC.

The Team recommends that both the shark and skate assessments include a table of catches in inside waters for an historical time frame as available. If survey data exist in those areas then those data should also be included in the assessment.

With respect to the historical catch time series, the Team recommends the authors complete an evaluation of a comparison of HFICE estimates to the new time series. Team members also suggested that the authors look into the feasibility of establishing discard mortality rates for shark species and summarize what data and studies have evaluated this.

GOA Skate MRA

Obren Davis provided an overview of the initial review draft of an EA/RIR/IRFA to modify the MRA for combined skate species. This analysis will be reviewed by the Council in October. Based on information in the analysis the reduction of MRAs would not be expected to confer any additional benefit to the skate populations in question. Team members expressed some concerns with basing this assumption on not exceeding an OFL given concerns noted in many years with localized depletion. In order to not exceed ABC and TAC the reduction must be to 5% to dis-incentivize topping off but the Team notes that the overall catch would continue to occur and discards rates would in fact increase. Under the assumption of 100% mortality there is no conservation benefit to doing this. The stock assessment author and the Team continue to raise concerns regarding catch > ABC in some areas, particularly for Big skates in the CGOA. For discussion purposes, the stock assessment author evaluated a range of discard mortality rate assumptions in relation to calculating proportion catch > ABC in CGOA. Regardless of the range of mortality rates evaluated, catch remained > ABC in the CGOA. To evaluate the significance of exceeding area-specific ABCs, Team members suggested considering whether OFLs would have been exceeded as if they had been apportioned by area (noting that OFLs would still apply GOA-wide since it's likely that big skate form a single stock within the region.).

The Team noted that the modification in the MRA may not address any of the Team's previously discussed concerns regarding the impact of catch exceeding ABCs in some areas and potential for conservation concern for Big and Longnose skate stocks. The Team reiterated that the most likely impact of a lower MRA would be an increase in discards while overall catch remains the same. The Team has been concerned about the overages in the CGOA and it does not seem likely that this action will address that issue. The Team also continued to discuss potential stock structure issues for skates and potential conservation concerns raised by the author and the Teams for successive years.

GOA Demersal Shelf Rockfish

The ADF&G research coordinator for SE Alaska gave an overview of the SE demersal shelf rockfish stock assessment for 2015. The stock assessment has been based on biomass of yelloweye rockfish estimated by density by management area (ROV and submarine), average weight, and area of rocky habitat by management area.

Updates include fish density data from 2001, 2005, and 2009 sub and 2012 and 2013 ROV surveys with updated average weight and habitat area estimates. Updated results in OFL and ABC for this upcoming year, with 2015 ABC = 225 t which is allocated by the state to be 84% (183 t) commercial and 16% sport (35 t). Research plans include a May 2015 ROV survey (summer 2014 survey was canceled due to weather) and further ASA model developments.

Kray Van Kirk presented the current age-structured model for yelloweye rockfish applied separately to 4 management areas: EYKT, NSEO, CSEO, and SSEO. The model uses data from 1992-2013. For each management area, model output includes: total annual abundance/biomass, total annual catch (commercial, halibut bycatch, sport/subsistence), annual abundance-at-age, catch-at-age (commercial fishery), female spawning biomass (assuming 50:50 sex ratio), natural mortality, predicted CPUE (commercial, IPHC survey), and fishery selectivity estimates. These are based on data from the surveys, commercial catch, commercial age composition, commercial CPUE, halibut longline bycatch, sport and subsistence catch, and IPHC survey CPUE.

The author requested advice from the Team on how to treat the directed commercial fishery CPUE and halibut IPHC information. The commercial CPUE data comes from logbooks required by the directed rockfish commercial fishery and the halibut fishery. The CPUE in the commercial fishery was standardized via a GLM relative to hook size, hook spacing, and number of commercial boats in the directed fishery. It was noted that because catch is being estimated from logbooks this implies that there are no discarded fish. Consequently, there may be substantial differences in logbook catch and catch estimated from the Federal CAS. There was discussion about how the effort was reported (e.g., by trip or specific skates of longline operations). Apparently there is variability in the resolution of available data. Regarding whether rockfish targeting or halibut targeting could be distinguished it was noted that the ADF&G has begun to develop a way to differentiate between the fisheries. CPUE data from the IPHC was already standardized relative to numbers of hooks. Data were screened to use only skates (units of longline effort) that had at least one yelloweye observed with the goal of focusing on where yelloweye rockfish occur and data were further transformed.

The Team recommends using direct habitat measures (e.g., depth strata) rather than yelloweye presence as a means for screening data to be used for evaluating changes in yelloweye population density (CPUE index).

The model results for commercial catch, the halibut IPHC survey and the sportfish harvest fit well. Fits to the density estimates were poorer. It was noted that the general trends were reasonable as it seems unlikely that the population of such a long-lived species would vary dramatically over years. The Team noted that the fit to each of the CPUE data sets was unusually precise (showing high year-to-year variability).

The Team recommends that the assumed standard errors by year be presented for evaluation (e.g., the implied CV which results from the combination of the "weights" applied to the likelihood components and the annual specifications of the observation errors (if they vary by year).

The Team discussed how early recruitment estimates prior to 1992 were clearly more uncertain than those estimated in recent years and aspects of estimating natural mortality for all areas and models.

The Team recommends fixing natural mortality rates at acceptable values (the current prior mean?) during model development and explorations. The model is complex and adding mortality estimation may create more difficulties in interpreting how data are fitting and confound other aspects (e.g., movement among areas).

Regarding overall model design, the Team suggested (perhaps for future examinations) to evaluate a single model with the surveys split out by area and treated as separate (and conditioned to sum to one, perhaps). This would result in fewer parameters overall and provide an evaluation where there is a common recruitment signal.

The Team commends the authors and the work that has been accomplished in a relatively short period. They appreciated evaluating a catch curve analysis as a check on model estimates of M.

Rougheye and Blackspotted Rockfish Complex

Dana Hanselman provided an update on the Rougheye/Blackspotted (RE/BS) rockfish assessment. Gulf wide RE/BS catch is relatively stable and only about 46% of the GOA ABC is caught annually. The combined biomass estimate from the 2013 trawl survey was at an all-time low for the time series with the largest decline occurring in the central GOA. The 2014 longline index was also low in 2013, but increased 37% in 2014.

An off cycle full assessment will be presented in November. Authors do not anticipate changes to the model relative to the last full assessment. Large amounts of new and updated data are available for the 2014 model including 1) fishery catch, size, and age data, 2) new trawl survey biomass and age data, and 3) longline survey estimates for the 1993 to 2014 time series of RPNs and length frequencies. Similar to sablefish, the RE/BS assessment will switch to using relative population numbers instead of weights to avoid redundant calculations of growth. New biological data on growth and maturity are also available, including size-at-age and weight-at-age data to update conversion matrices.

Dana additionally explored the possibility of incorporating longline survey gully data into the model but concluded the standard survey area adequately described the data. Dana also initiated an analysis focusing on evaluating the effects of RE/BS and sablefish hook competition during the survey, and found that significant competition affecting the overall index was unlikely. Future work beyond the November full assessment will concentrate on further studying RE/BS aging error matrices, age binning, and the plus age group.

GOA Ecosystem considerations

This September version is a preliminary compilation of a relatively small number of indices updated so far; as usual, a more complete picture of "the state of the Gulf" will be presented in November. This presentation is also a recap of 2013 results. The first "report card" compilation, using the most illustrative data sets of trends in the Gulf of Alaska, will be produced.

The most obvious "hot topic" for the Gulf in 2014 was the "Warm Blob" which was a widespread mass of anomalously high surface water; it originated in the south and moved north and west across the Alaskan coast. This warm condition is predicted to exist through the winter resulting in a warmer and wetter

winter than normal in southeast Alaska, and a drier winter in Washington. The time-series on SST began around 1900. Effects of the "Warm Blob" included the advancement of the chlorophyll a (Chl a) front being detected 240 km farther north than usual in 2014. Unusual sightings of tuna, sunfish and Humboldt squid were also noted.

Elevated sea level pressure anomalies were also detected. The PDO transitioned to a positive state, while forecasters are still predicting (60-65% chance) that a weak to moderate El Niño will develop through the winter. Pressure prevented mixing, thereby moderating the increase in temperatures in coastal areas. Weak winds were measured in the Aleutian Islands in summer of 2013.

Climate indices showed the following: PDO shifted to a positive state, ENSO remained neutral, and North Pacific Gyre Oscillation (NPGO) was positive (resulting in reduced water flows).

Two physical indices were mentioned: Eddy Kinetic Energy (which influences nutrient transport) seems to have been high recently, and the trajectory index, measured by tracking a buoy released from the PAPA station, evaluates surface currents. There was a generally southerly flow over the past 5 years but the trajectory was northerly in 2014 (and similar to the flows recorded during the 1976 regime).

Biological indicators. Euphausiids generally showed patchy distributions with the exception of areas like Barnabas Gulch where euphausiids are found in consistently high densities with the highest recorded in 2011. Zooplankton in southeast Alaska and Icy Bay were anomalously low throughout the summer in 2013. Continuous Plankton Recorders in 2013 yielded smaller copepods, larger mesozooplanton biomass, and greater abundance of large diatoms in warm waters in the Alaskan Gulf. Small mesh trawl surveys along the south coast of the Alaska Peninsula and near Kodiak resulted in low catches of herring and pink salmon; juvenile pollock were found in the greatest numbers seen since 1979. Herring biomass peaked in 2011 and has declined since. Herring catches in Sitka Sound were the 6th lowest in 17 years of catch history. The strong 2013 year-class of pink salmon indicates a projected increase in sablefish numbers. The fish stock sustainability index shows that no stocks are currently subject to overfishing in Gulf. For non-target catch, jellyfish show alternating high and low years; seabird bycatch has declined from historic levels, and has leveled off to much lower levels in the past 5 years. No albatrosses have, so far, been observed as bycatch in the Gulf in 2014. Pollock trawl gear discards appear to be decreasing as well.

GOA pollock allocation

The SSC sets ABC below the OFL to account for scientific uncertainty in calculating OFL, and the Council sets TAC not to exceed the ABC to account for management uncertainty in controlling a fishery's actual catch. In the North Pacific, the groundfish ABC is the ACL, and TAC is a target set not to exceed the ABC. In-season accountability measures (AMs) are used to both prevent the TAC from being exceeded (e.g., directed fishing closures) and to respond if the TAC is exceeded (e.g., prohibition of retention).

For GOA pollock, one OFL is specified for the combined Western (610), Central (620 and 630), and West Yakutat (640) regulatory areas and a separate OFL for Southeast outside. The ABC is set for the combined 610/620/630/640 areas and then apportioned each area: 610, 620, 630, and 640. The TACs are set equal to the area ABCs. In the GOA, the only species that has a reallocation between areas is pollock. Regulation allows unused pollock TAC to be reallocated if a seasonal allocation is not harvested. Any unharvested TAC is first reapportioned within an area and second apportioned from one area to another area(s) by the Regional Administrator. Situations can arise when the reapportionment to an individual area (e.g., 620 or 630) would increase the TAC over the apportionment of the ABCs in those areas, but not over the overall 610/620/630/640 ABC. Under the current regulations TAC cannot exceed ABC. Without the ability to reapportion TAC to other areas, pollock quota can be left unharvested. These reapportionment regulations were part of the early 2000s Steller sea lion measures to distribute harvest

temporally and spatially while also allowing for unharvested pollock to be harvested in another season or area.

The GOA wide pollock TACs have not been exceeded; however, TAC and the respective ABCs have been exceeded within regulatory areas in some years. The Plan Teams discussed whether this raises a biological concern. The 2012 GOA pollock stock assessment states: With the possible exception of the split between the Eastern GOA and the Central/Western GOA, the current spatial and seasonal apportionment procedure for pollock in the GOA was not developed to account for stock structure. It was noted that overfishing levels are set at the stock level, and ABCs are used to manage harvest for regional subareas to reduce impacts on Steller sea lions. Harvesting proportionate to biomass is considered to provide the least impact on Steller sea lions. The Plan Team agreed that small departures from the area ABC apportionments do not raise a biological concern. Furthermore, the Plan Teams agreed that overages of the area ABCs do not raise a conservation issue given that any reapportionment of the TAC between the areas 610, 620, 630, and 640 would not result in exceeding the Gulf wide ABC.

Two proposed solutions were presented:
Alternative 1. The SSC clarifies that an overage of the area ABCs is not a conservation issue and any reapportionment of the TAC between the areas 610, 620, 630, and 640 would not be considered exceeding an area ABC.

Alternative 2. Change the name of area ABCs to apportionment of the ABC or subarea-ABCs. In the harvest specifications the apportionments of the ABC are called ABC. If they were called an apportionment of the ABC in the harvest specifications, this would help clarify the Alaska Region's definition of the ACL as the ABC area apportionments summed to the area that the OFL is specified.

The SSC would still set the combined Western/Central/West Yakutat ABC and the area apportionments. The Council would still set the overall TAC and area TACs less than or equal to the overall ABC and ABC apportionments. NMFS would still manage catch to not exceed the TAC, except for allowed under the GOA pollock reapportionment regulations.

The Plan Team recommends a combination of Alternatives 1 and 2 (i.e., SSC clarify that an overage of the area ABCs is not a conservation issue, and change the name of area ABCs to apportionment of the ABC or subarea-ABCs).

The Plan Team noted that a "biological red flag" may arise from exceeding OFL. For areas, even though OFLs are region-wide, a regional limit or "backstop" based on an area-apportioned OFL might be a reasonable proposal. Comparing TAC overages with putative regional OFLs might be considered when examining apportionments of TACs.

GOA Winter acoustic-trawl survey report

Abigail McCarthy presented results of the winter 2014 midwater acoustic trawl surveys for pollock in the Gulf of Alaska. The goal of the survey is to sample pre-spawning aggregations of pollock when biomass is expected to be at an intra-annual peak. The Shumagin and Sanak areas were sampled in late February, and the Shelikof and Marmot - Izhut areas were sampled in late March. The Pavlof, Morzhovoi, and Chirikof areas were not sampled due to ship delays. Samples in the Shumagin area were dominated by the 2012 year class (2 year olds; 15-30 cm), whereas older fish were found in Sanak; both areas showed an approximately 50% decline in estimated biomass from the 2013 estimates. In Shelikof area, most of the biomass occurred in the northwestern portion of the strait. The samples in the Shumagin area were primarily pre-spawning fish (73%). The Shelikof area samples showed a high proportion of developing fish (61%), which were thought to be primarily the 2010 year class. The 2013 year class did not appear strong in the Shelikof area, although the 2013 AFSC-FOCI larval surveys found large numbers of young-

of-year pollock. The 2012 year class was still very strong in both the Shumagins and Shelikof, as in the EBS. The biomass estimate for the Shelikof area was higher than any estimate since the mid-eighties and similar to the estimate from the 2013 survey. The biomass estimate for the Marmot-Izhut area was about average historically, and no spawners were found in this area. The winter acoustic survey planned for 2015 will include the areas sampled in 2014, and also the Pavlof, Morzhovoi, Chirikof, Kenai bays, and Prince William Sound areas. This extra effort is available since the Bogoslof region will not be surveyed.

Proposed specifications

The Team recommended rolling over the 2015 final specifications for the proposed 2015 and 2016 specifications. The Team discussed information in the DSR presentation indicating a lower OFL and ABC in 2015, but decided to wait until the final assessment is available in November to modify the specifications.

New business

The November Plan Team agenda will include a discussion of yelloweye rockfish catch in areas outside of SEO in conjunction with the discussion of the 'other' rockfish assessment.