Minutes of the Joint 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 November 17th 2014 and adjourned on the 21st. The combined Teams met until 3pm on the 17th. Plan Team members are listed below in sections specific to each Team.

BSAI and GOA Joint Plan Team Discussions

BSAI Team		GOA Team	
Mike Sigler	AFSC ABL (BSAI co-chair)	Jim Ianelli	AFSC REFM (GOA Chair)
Grant Thompson	AFSC REFM (BSAI co-chair)	Jim Armstrong	NPFMC (Coordinator)
Kerim Aydin	AFSC REFM	Sandra Lowe	AFSC REFM
Lowell Fritz	AFSC NMML	Chris Lunsford	AFSC ABL
Chris Siddon	ADF&G	Jon Heifetz	AFSC ABL
Alan Haynie	AFSC REFM	Mike Dalton	AFSC REFM
Diana Stram	NPFMC (Coordinator)	Kristen Green	ADF&G
Bill Clark	IPHC (retired)	Obren Davis	NMFS AKRO
Brenda Norcross	UAF	Mark Stichert	ADF&G
Mary Furuness	NMFS AKRO Juneau	Paul Spencer	AFSC REFM
David Barnard	ADF&G	Nancy Friday	AFSC NMML
Leslie Slater*	USFWS	Jan Rumble	ADFG
Dana Hanselman	AFSC ABL	Craig Faunce	AFSC FMA
Vacant	WDFW	Ian Stewart	IPHC
		Vacant	WDFW

* absent

Administration

The Team reviewed the meeting agenda, noted timing changes to the agenda, and assigned minutes for the first day. The GOA Team noted a modification in the order of presentations and the BSAI Team added the octopus presentation after the squid presentation.

Diana Stram provided a brief update on Council staff's use of the Granicus system (in use by the Council currently) as a 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. Links to the assessments are also posted there to facilitate downloading documents to ipads. The REFM site will maintain the SAFE report through the various drafting stages: 1) the chapters drafted for this meeting; 2) post Plan Team drafts including the introduction and summary section prepared by the the Teams for SSC/Council consideration, and 3) the final SAFE report that is accepted by the SSC/Council.

The Teams noted additions and modifications to the agenda. The Teams welcomed new GOA Plan Team member Jim Armstrong (NPFMC staff).

Terms of reference

The Teams reviewed their Terms of Reference and made minor changes to reflect the timing of the fall Plan Team and Council meeting. The Teams indicated officers would be reviewed annually at the September meeting and review terms of reference in even years. The terms of reference for Council Plan Teams are posted on the Council's website.

Research priorities

Diana Stram provided the Teams with an overview of the subgroup's progress on revising research priorities and requested Team input on applicable examples to frame the prioritization into the definitions provided by the Council/SSC at the October meeting. The Teams discussed some of the proposed examples from the subgroup to help establish the best example for the second highest category "urgent" in the new definitions with 'critical on-going monitoring' being the highest. The Teams concurred with the subgroup that once 'urgent' was appropriately understood as a prioritization that the other categories below it would be easier for placing specific research priorities. Individual Teams were requested to provide Diana input to existing (or new) research priorities during the course of assessment review and a checklist for information to include was sent out. The subgroup will reconvene after the Plan Team meetings are concluded and review/fill in new research priorities, revise according to Team suggestions and prioritize based on examples. The report of all the changes will be emailed to the Joint Teams for review and comment. The SSC will take this up in February.

Team procedures

Grant Thompson reported on suggested formats for writing Team summaries including:

1. If a rapporteur is unsure what the Team's recommendation was, including uncertainty as to whether any recommendation was made in the first place, it is better to include a comment to this effect than to hide a pseudo-recommendation in the text by using language such as "the Team suggests" or "the Team agreed that authors should" (as opposed to the established format for Team recommendations).
2. Edits should reflect the Team's discussion
3. Suggestions for how to write SAFE Intro summaries under the current process: Use standard subheadings (in the same order for each stock):
   - o Changes from previous assessment
     Distinguish between those items that have an impact on reference points or specifications from those that are presented for information only (alternatively, the latter items may be omitted entirely)
   - o Spawning biomass and stock status trends
     Mention something about spawning biomass if the stock is managed under Tiers 1-3
     Discussion of recruitment strengths under this subheading is also useful for stocks managed under Tiers 1-3, as it helps to explain the described trends
   - o Tier determination/Plan Team discussion and resulting ABCs and OFLs
   - o Status determination
   - o Ecosystem considerations (this one is optional)

If assessment authors change their estimates of reference points or specifications so that they differ from the values in the chapter that the Team was provided, summary writers should include a comment to that effect in the initial draft of the Intro.

In general, but especially for "off-year" assessments, the amount of text should be roughly proportional to the amount of new information or degree of controversy in the assessment (as opposed to, e.g., making the amount of text proportional to the particular summary writer's personal interest in the particular stock)

The fact that a sentence may have been important in some previous year's summary does not mean that it must be retained for all time (e.g., if a stock was split from a complex, this fact probably does not need to be mentioned once the first year of split management scrolls off the top of the summary table).

For off-year assessments of stocks managed under Tier 3, make sure to distinguish between the *assessment* model and the *projection* model (e.g., do not say, "The model was re-run…").

Change the "Spawning biomass and stock status trends" subheading by deleting the word "status," so as not to confuse this subheading with the "Status determination" subheading.

The Teams recommend that the first recommendation under "Team procedures" in the September 2014 minutes be amended by striking the last seven words, so that the fourth bullet reads, "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)."

Observer Program Annual Deployment Plan Update

Craig Faunce of the North Pacific Observer Program at AFSC presented a summary of the 2015 Observer Annual Deployment Plan (ADP). The ADP was presented at the October 2014 Council meeting. The purpose of the presentation to the Plan Teams was to ensure that the Teams understand the impact of the ADP on data flows for different fleets and species. The main change for 2015 is that deployment on small vessels is now also trip-based.

Like previous ADPs, the 2015 ADP assigns vessels into one of 3 categories – 1) full coverage, 2) large-vessel partial coverage (catcher vessels >57.5 ft LOA and all trawl vessels not in #1), and 3) small-vessel partial coverage (catcher vessels between 40 and 57 ft LOA). Boats using jig gear or boats under 40' in length are not observed under this or previous ADPs.

In 2013 and 2014, observers were deployed into fishing activities in the small-vessel group according to "vessel selection". Vessels were selected to be observed for 2-month periods. In 2015 the ADP will utilize the same selection protocol for all partial coverage vessels: "trip selection." Under trip-selection, all vessels in partial coverage must declare their planned fishing trips in the Observer Declare and Deploy System (ODDS) – website odds.afsc.noaa.gov. The selection probabilities for the partial coverage vessels are approximately 12% for small-vessels and 24% for large-vessels.

Vessels can be released from observer responsibility for several reasons, with 9 vessels granted "conditional releases" because they participate in electronic monitoring programs, and the potential for 62 vessels if they have a history of taking 4-POB, including the vessel's master, and have a 4-person capacity life rafts. This could amount to 16% of this class of vessels, resulting in a drop in the expected rate of coverage for the small-vessel trip selection group from 12% of trips to 10% of trips.

Under the 2015 ADP, there is a high likelihood that vessels in the small-vessel partial coverage category using pot or hook-and-line gear may not be observed in some NMFS areas in the Bering Sea because of low fishing effort and the observer coverage levels in this class of vessels.

One challenge for the Observer Program is "tender deliveries", when a vessel offloads to a tender vessel and returns to port to begin a new fishing trip. Fishing trip definitions allow a vessel to deliver multiple loads to a tender as one fishing trip. The Council is investigating this topic and has requested further analysis in discussion papers.

Craig added some information for the Teams on the current 2014 trip-selection performance. He noted that the Observer Program is currently within 10% of the 2014 ADP goal/estimate of 4,718 days observed made in December 2013. With several weeks of fishing remaining in 2014, the Observer Program feels that their original forecast was very good. (In 2013, the Observer Program adjusted the deployment rate downward to ensure that they did not exceed their forecast, but this was not done in 2014 and the annual target is still being met.)

Julie Bonney asked if the Observer Program could make the ODDS system more user-friendly and mentioned that it can be challenging to reconcile fish tickets and trips. Craig noted that they have made changes to ODDS in version 1.4 to make it more user-friendly. Julie noted that people should know the upcoming outreach meetings will discuss ODDS improvements. Craig noted that Glenn Campbell from the Observer Program is also at the Marine Expo this week with a working version of the updated ODDS software and these changes are a part of several outreach meetings scheduled in coming weeks.

Stock structure and spatial management policy

Grant Thompson presented an update on recent Team and SSC comments regarding stock structure. He reviewed two "scales of concern:" 1) a three-level scale, which was adopted for provisional use by the BSAI Team in September 2013; and 2) a four-level scale (shown below), which was discussed but not adopted by the Joint Teams in November 2013, but which was used at the same meeting by the BSAI Team.

The Teams recommend that the following scale of concern be adopted in the context of the Council's stock structure and spatial management policy (with the understanding that all actions described here would be contingent on SSC concurrence):

1. *Little or no concern*, in which case no action needs to be taken
2. *Moderate concern*, in which case special monitoring (e.g., frequent updating of the template) is required at a minimum and Steps 2 and 3 of the Council's process may be activated
3. *Strong concern*, in which case Steps 2 and 3 of the Council's process must be activated
4. *Emergency*, in which case the Team will recommend separate harvest specifications at the ABC level, the OFL level, or both, for the next season (straight to Step 4 of the Council policy)

In October of this year, the SSC requested that the Teams assign a level of concern to all stocks for which the stock structure template has already been completed.

The Teams recommend assigning the following levels of concern to stocks for which the stock structure template has already been completed (shaded cells indicate levels established at this meeting):

FMP	Chapter	Stock	Author	Level
BSAI	1A	AI pollock	Barbeaux	Little
BSAI	2	BS Pacific cod	Thompson	Little
BSAI	4	Yellowfin sole	Wilderbuer	Little
BSAI	6	Arrowtooth flounder	Spies	Little
BSAI	13	Northern rockfish	Spencer	Little
BSAI	14	Blackspotted/rougheye rockfish	Spencer	Strong
BSAI	15	Shortraker rockfish	Spencer	Moderate
BSAI	16	Other rockfish	Spies	Moderate
BSAI	17	Atka mackerel	Lowe	Little
BSAI	18	Skates	Ormseth	Little
BSAI	21	Sharks	Tribuzio	Little
GOA	1	Pollock	Dorn	Little
GOA	7	Arrowtooth flounder	Spies	Little
GOA	9	Pacific ocean perch	Hanselman	Little
GOA	12	Dusky rockfish	Lunsford	Little
GOA	13	Rougheye/blackspotted rockfish	Shotwell	Little
GOA	17	Atka mackerel	Lowe	Little
GOA	18	Skates	Ormseth	Strong
GOA	20	Sharks	Tribuzio	Little

The Teams noted that, in some cases, "little" concern was identified in part because sufficient data were lacking to indicate otherwise.

In October 2014, the SSC also made the following recommendation:

> "The SSC recommends that the current stock structure policy include a requirement for a recommended maximum area specific catch level when a stock or stock complex is elevated to the level of 'concern.' This would provide a clear guide to industry regarding what reductions in catch would be needed to alleviate the 'concern.' This area specific catch level would likely be estimated by the assessment author with review and comment by the Plan Teams and SSC."

The above request was prompted by the case of BSAI blackspotted/rougheye, in which the fishing fleet expressed an interest in voluntarily taking steps for reducing incidental catch in the WAI for 2014, but a WAI ABC had not been adopted. In fall of 2013, a representative of the fishing fleet obtained an unofficial potential WAI catch level directly from the assessment author, and interpreted this number as a *de facto* ABC to guide fishing operations. Team members felt that it is laudable for the fishing industry to have taken steps to reduce catch. However, the process followed in 2013 resulted in a recommended harvest level that was not scientifically reviewed and was inaccessible to the general public.

The Teams noted that, since the policy in question is a Council policy, it will be up to the Council to consider the SSC's request for an amendment to that policy. However, the Teams did discuss some features that such an amendment might include.

The Teams recommend that any suggested subarea catch level be reviewed by the respective Team, be obtained in a transparent process, and be accessible to the public so that progress in meeting management goals can be easily monitored. The term "maximum subarea species catch" was proposed as a label for subarea harvest recommendations that are not included in the OFL/ABC specifications.

The Teams also noted that several of the outstanding issues and questions of clarification identified at the November 2013 Joint Team meeting do not appear to have been addressed.

The Teams recommend that the following outstanding issues and questions of clarification be forwarded to the appropriate body (SSC, Council, or both):

- Does the Council's policy apply only to spatial structure, or does it also apply to stock structure? For example, does it apply to the process of splitting a stock out from a complex, or only to spatial management of the complex?
- Need for specific guidance on the role of the Teams.
- Need for a proactive default policy that covers both of the following cases: 1) data are insufficient to determine whether a biological concern exists, and 2) sufficient data exist to make such a determination but time or other resource constraints are anticipated to prevent those data from being analyzed for several years.
- Clarification of whether the current inconsistencies in spatial management between the two FMP areas that were summarized by the Stock Structure Working Group should be further examined or revised (and to whom such a charge would be assigned).
- How much time is allowed for acceptance (by the Council or SSC) of an industry response to a management concern?
- What is the relationship between evidence of stock structure and degree of concern? Two possibilities have been discussed: 1) degree of concern is synonymous with strength of evidence of stock structure, and 2) degree of concern is a function of both the strength of evidence of stock structure and the extent to which the fishery is impacting that structure.

Economic SAFE report

Ron Felthoven and Ben Fissel of AFSC presented the Economic Stock Assessment and Fishery Evaluation (SAFE) report to the Joint Plan Team. Ron Felthoven provided an overview of the document, new elements, planned new work, and on-going research efforts by the Economics and Social Sciences Research Program. Ron mentioned that many people contributed to the report, although Ben and Jean Lee of AKFIN have done the lion's share of the work.

New for 2014 is a section providing price predictions and nowcasts for seafood products for 2014-2016 based on COAR data through 2013 and conditional on U.S. export data through the first half of 2014. Also new is additional information on the halibut fishery. In supplementary tables, data are also presented in different formats (e.g., breakouts by rockfish species). The Econ SAFE also includes updates on several sections introduced in last year's report: data from the National Catch Shares Report for Alaska catch share fisheries and information for 2008-2013 from the Amendment 80 economic data report (EDR).

Ben Fissel presented updated changes in index share across the GOA and BSAI for ex-vessel and wholesale markets for catcher vessels and catcher processors. These indices provide insight into: 1) how product value is changing from year to year; and 2) to what degree changes in price versus quantity impacted the change in value.

In the November 2013 Joint Plan Team meeting, the Teams discussed whether it would be helpful to include information from the Economic SAFE Report in individual stock assessments. At that point, the Teams recommended that this discussion be continued at the September 2014 meeting, The Teams also noted that it may be helpful to compare how information from the Ecosystem Considerations section is included in individual stock assessments, but did not take this up.

The Teams again recommend that we more formally discuss how economics should be incorporated into individual stock assessments at the September 2015 meeting.

Sablefish

Dana Hanselman presented the sablefish assessment. New data included updated catch from 2005-2013, new 2014-2016 estimates for projections, relative abundance data from the 2014 longline survey and 2013 longline fishery, ages from the 2013 longline survey and 2013 fixed gear fishery, and lengths from the 2014 longline survey and the 2013 fixed gear and trawl fisheries. There were no changes to the assessment model. Some selected SSC and Plan Team comments were addressed in the presentation. Updated catches included an increase of about 1,500 t in the fixed gear fishery for the period 2006-2012; this update resulted in some changes to the retrospective analyses. The longline survey index had been declining since 2011, but showed a 15% increase from 2013 to 2014, largely in the central and western GOA. The IFQ fishery index has been on a sharp decline since 2008 (-13% in 2013). The GOA trawl fishery has shown a moderate declining trend since 2006.

Killer whale depredation was up in the Bering Sea and down in the Aleutian Islands. Sperm whale depredation was similar to the past few years. Sensitivity analyses show that including depredation results in an increase in the ABC. The problem then becomes how to account for that mortality in the fishery. Sperm whale expansion indices differ by area and ranged from 10-11% at the west Yakutat slope to about 1% for the NW and NE Aleutian slope, where sperm whales were observed for the first time. Overall expansion was 6% in 2011, 2-3% in 2012-2014.

Longline survey RPNs were up in the western and eastern GOA, Bering Sea, and the Aleutian Islands; little changed in the central GOA. Model fit to the longline survey index was trending down despite an increased survey estimate. The longline survey ages indicated the 2008 year class was average and not as strong as hoped for. The year class strength differed by area, being strongest in the western GOA/AI/BS. The model fits to the survey ages were relatively good, while fits to survey lengths were better for males than females. Weighted average CPUEs for all areas showed significant drops in recent years. Model fit to the domestic fishery RPW followed a fast decline. Fits to all area fishery ages were not as good for 2013 as previous years, especially for the plus group (age > 30). The probable cause was more than 60% of the fish from the western Aleutians being in the plus group, an area that is not surveyed, resulting in the poor model fit to the data. The discrepancy involved few boats and warrants further investigation. Other indices, (the gullies, the Aleutian Island survey, and the IPHC survey) show the same general trend of decreased CPUE.

Results from the model indicate decreases in total and spawning biomasses. Ten-year retrospective analyses show improvement since 2013 due to the additional 2005-2010 catch data and the exclusion of the 2003 data from the analysis. The revised Mohn's Rho decreased from 0.11 to 0.019. For recruitment, 1997, 2000, and 2008 are the largest in recent years, but 2008 has turned out to be about average. There are anecdotal reports of young of the year sablefish in surveys, but these won't be seen in the fishery for a few years. Spawners by year class indicate that 2008 accounts for about 10% of the spawning biomass, which is still dominated by the 2000 year class at about 16%. The 2015 biomass is projected to be at $B_{35\%}$. The longline survey had a small rebound from a time series low in 2013. and that low was confirmed by the 2013 fishery CPUE index; the stock is at 35% of unfished spawning biomass; 2014 ABC was 13,722 t and the 2015 ABC is 13,657 t (12,400 t was projected); future projection is declining for several years.

Dana presented the ABC apportionment for 2015. The goals of apportionment are to take into account actual changes in the population distribution and reduce interannual variability in area ABCs. Two options are to 1) use the most recent survey and fishery CPUE distributions, or 2) use a 5-year exponential-like average. The current apportionment scheme (5-year exponential average) has become too volatile and changes in apportionment are probably too large to reflect actual distributional shifts. Also, the approach does not take into account measurement error and this can lead to very rapid changes in some area apportionments, which leads to large swings in apportionments. A third option is to go with the model ABC using the fixed standard apportionment that was used in 2013 and 2014. The author

recommends continuing with the fixed apportionment. This is an interim measure to smooth out ABC variability. Small changes in the apportionment for sablefish are not a biological concern. There is a PhD project with UAF to do a management strategy evaluation of apportionment strategies to maximize spawning biomass, minimize volatility, and consider economic yield. Hopefully this will provide guidance by September 2016.

The future will see continued use of the current assessment model while analyses are conducted on apportionment, a spatial model, estimating mortality of depredation in the fishery, recruitment processes (GOAIERP), and species-specific ecosystem considerations. Existing research priorities include apportionment, depredation, and recruitment processes.

Grenadiers

Pete Hulson presented an update of the grenadier stock assessment. Grenadiers are now in both FMPs as Ecosystem Component species. New data in the abbreviated assessment presented this year included updated catch, updated estimation of Aleutian Islands biomass, and updated longline survey results. In addition, use of the random effects model for estimation of biomass is new for the Gulf of Alaska. Unofficial Tier 5 values for ABC and OFL are substantially greater than current catches.

The Teams recommended that an abbreviated assessment be produced every other year (even years) for both regions (BSAI, GOA).

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The Gulf of Alaska Team convened on Monday, Nov 17th 2014 at 3pm through the 21st. Writing/rapporteur assignments were provided for the afternoon and the remaining list to be distributed later that day.

GOA Ecosystem Considerations

Stephani Zador presented the Gulf of Alaska Ecosystem Considerations Report. This year's version contains 50 Ecosystem Status and Management Indicators. A new Gulf of Alaska ecosystem assessment following the procedure and format of the Eastern Bering Sea and Aleutian Island assessments, has been delayed due to unanticipated Paperwork Reduction Act approval processing time.

The "hot topic" feature of the presentation this year was the "Warm Blob", or the area of abnormally high sea water temperatures in the Gulf of Alaska. In addition, seabird reproduction in the western Gulf was abnormally successful. Birds nested earlier in the year which led to good survival of the offspring possibly due to favorable winter pre-conditioning or summer foraging. Murres in the eastern Gulf had less success with these parameters.

There is evidence that the state of the ecosystem may have changed in 2006. These include: 1) salmon, halibut, arrowtooth flounder and shrimp PCA indicator changes after this year, 2) Southeast Alaska (SEAK) pink salmon odd year strong year class pattern, 3) SEAK herring reached a historical abundance in 2005 (and has been higher), 4) the percent by number of sand lance that are delivered to puffin chicks changes direction in Principal Components Analysis (PCA) in 2005 and beyond, 5) there is a shift to more cold pattern in the GOA after this time, 6) changes in PDO (shift to negative in 2006), 7) changes in North Pacific Gyre Oscillation (shift to positive in 2006), 8) the Papa trajectory index endpoint latitude exhibits a drop in latitude during 2000-2009, and 9) there has been a decline in total biomass since 2007 recorded in the ADF&G GOA trawl survey.

A PCA of temporal variability of sand lance in the diet of puffins provisioning chicks was presented. The first Principal Component (PC1) reflected interannual variability in sand lance in the central and western GOA, PC2 reflected sand lance in the central and western GOA, and PC3 reflected environmental variability, particularly annual SST. Sand lance captured by puffins show that sand lance were most prevalent from the mid-1990s to the mid-2000s in the central and western GOA. In contrast, sand lance were most prevalent in the mid-1990s and have been decreasing since in the eastern GOA.

Salmon and groundfish indices were also presented. The total number of salmon harvested in 2013 was the largest going back to 1962 and twice the values from 2012. However, ecosystem indicators predict a low pink salmon harvest in 2014. Notable among groundfish was that there were no reports of mushy halibut in 2013 and 2014; this is a condition that is considered a result of nutritional myopathy/deficiency. New to this year is an index of groundfish condition factors, which are derived from length and weight relationships during the NMFS surveys. The Plan Team thought that the time it takes to complete the survey, combined with the movement of the survey from south to north could explain observed patterns in this index.

Other Plan Team discussions

The presenter brought up a possible NPRB proposal to coordinate 2015 survey efforts in the GOA with efforts in the California Current Ecosystem and in waters off British Columbia to provide a synoptic view of the impacts of the warm blob which is expected to continue into 2015. The goal of the project is to identify which species move deeper, which move north/south, and which species stay in the presence of the warm pool that provides an acute natural experiment simulating chronic environmental conditions. The Plan Team supported the development of this proposal.

GOA Pollock

Kresimir Williams presented his research on the use of "pocket nets" to evaluate escapement from survey trawl nets. The trawl data are used to convert acoustic backscatter to length frequency values. This study is important because if there are length-specific patterns in escapement, the length frequency of fish retained in the net could be biased. Experiments were conducted in 2007 on the NOAA ship Miller Freeman and in 2008 and 2013 on the NOAA ship R/V Oscar Dyson. They found a vessel effect with poor retention of age-1 pollock and possibly age-2 on the R/V Miller Freeman and improved retention on the R/V Oscar Dyson. However retention of age-1 pollock by the R/V Oscar Dyson was less than 100%, indicating that a correction was still needed for net selectivity. Their experiments resulted in a corrected time series for the biomass index and the age-composition estimates from 1993 to the present. The Team asked if there were plans to continue the study, and Kresimir responded that it depends on funding and feedback. The Team noted that the model with the revised data (Model 10) used the same CV for the index as was used in the other models (e.g., Model 9).

Martin Dorn presented a summary of this year's assessment. New data include the 2014 Shelikof Strait biomass, the 2014 ADFG survey biomass, and the 2013 summer acoustic survey relative index. The summer acoustic index was not incorporated into the model because a single data point from relative survey index would be uninformative about stock trends. Model changes included: starting in 1970, removing old survey data (as recommended by the CIE review), using a random walk for the changing fishery selectivity parameter, estimating an age-specific natural mortality schedule, and modeling age-1 and age-2 pollock in the winter acoustic survey as separate indices.

Martin then presented the assessment in greater detail. While reviewing and thinning out the data used in the assessment, he also recompiled all of the catch data (including catch at age). The Team discussed the seasonality of the pollock fishery and the extent of targeting pre-spawning pollock historically relative to recent years.

The approach for estimating age-specific natural mortalities was presented. Three estimates were calculated from multispecies models that included GOA pollock and three estimates were calculated from theoretical/empirical methods. All six estimates were averaged, and the average was rescaled so that the average mortality from the age of maturity and older was set equal to 0.3; the value previously used for all ages in the stock assessment. The Team discussed that although this is a big change to the assessment, there were minor differences in the results. Martin noted plans to re-examine time-varying changes in natural mortality as had been done in the late 1990s.

A series of ten models were presented where each involved changes that were evaluated in a stepwise, cumulative manner. Model 10 included the correction for net selectivity, which the author indicated was new and would benefit from further evaluation. Therefore, he recommended Model 9 that included all of the other incremental model changes. The Team agreed with this, but would have preferred to see more diagnostics on the relative trade-offs on goodness of fit for each model.

To help understand the potential impact of the cumulative model changes on management recommendations, the Team requested running last year's model with only the new data added to see the effect if any on the ABC. The author agreed and provided this to the group during the week. The

estimated 2015 ABC for Model 9 was 17% higher than a model with only new data added, but the percent difference in ABC declined to less than 10% by 2017.

The Southeast Alaska assessment was the same as last year. For apportionment, a random effects model was applied by area to the NMFS trawl survey summer biomass distribution. The random effects model performed poorly for the winter acoustic surveys on pollock spawning aggregations due to estimates that were sparse and occasionally very low (due to sampling and survey timing, perhaps). The Team noted that the survey average working group has discussed this and is considering some alternative specifications for default process to observation error ratios (or priors on those ratios).

Based on Model 9 results, the author's recommended ABC for 2015 represents an increase from last year at 191,309 t (for W/C/WYAK region). Spawning biomass is estimated to be slightly below B40% and thus the stock in Tier 3b. The estimated number of mature fish is projected to remain stable over the next five years.

The Team discussed the how to handle the Prince William Sound GHL. In the past, we have deducted it from the ABC in the summary table and the full ABC is only available in the assessment document. However, this gives the impression that ABC has been exceeded when the GHL is added to the federal TAC. Based on guidance from NMFS Regional Office, the Team decided to treat the ABCs in the summary tables similar to what is done for Pacific cod. The State GHL for Pacific cod is deducted from the Western, Central, and Eastern management area ABCs prior to establishing the TACs for those areas.

If the PWS GHL is still equal to 2.5% of W/C/WYAK pollock ABC, then 0.025*191,309=4,783 t =GHL. For the record, values of ABC = 191,309 - 4,783 = 186,526 t would have been the ABC presented in the specifications tables using previous years' approach.

Jan Rumble presented the State of Alaska's plans to open a Commissioner's permit seine fishery for pollock in Cook Inlet starting December 1. There is also a proposal for a similar seine fishery in Prince William Sound. Observers and sampling are mandatory on every trip, so data on catch composition including bycatch species will be collected. The Team looks forward to an update next September. The Team noted that the expected catches of pollock would be relatively small and further discussion was unnecessary, especially given the planned monitoring and reporting to the Teams in future.

The Team recommended that a presentation of the summer 2015 acoustic survey be provided in September with an indication on whether a new data series would be included in November 2015.

GOA Pacific Cod

Teresa A'mar presented three sets of models: Model 1 was identical to the final model configuration from 2013. Model 2 identical to Model 1 but used the recruitment variability multiplier. The two new models (S1a and S1b) also used the recruitment variability multiplier and:

1. treat the bottom trawl survey as a single source of data instead of splitting the sub 27 and 27-plus data for lengths and ages,
2. include survey age data as conditional age-at-length data;
3. instead of incorporating 12 blocks of logistic survey selectivity (Models 1 and 2), Model S1a uses 3 blocks of non-parametric survey selectivity and Model S1b uses cubic spline based survey selectivity.

The Team agreed with the Teresa's proposal to use S1a as the preferred model primarily because it fit the data better than S1b.

Teresa presented results from additional age-composition data (2013 GOA bottom trawl survey) that was provided after the assessment was completed. She noted that when incorporated, these data reduced the estimated abundance at age (~ 8% of biomass) relative to the selected model in the assessment without the 2013 survey age data.

The Team discussed how this could affect accepting the maximum permissible ABC level. After much deliberation considering a number of alternatives (including rolling over last year's ABC) they concluded that although the model configuration was acceptable, recommending an ABC less than the maximum permissible would be prudent. Therefore, an ABC for 2015 set halfway between the maximum permissible ABC in the assessment and the 2014 ABC would be reasonable for the following reasons:

- Model runs including the 2013 survey age composition resulted in an ABC that was about 10,000 t lower (the data were made available only one day before the Team meetings and hence were unavailable for the assessment).
- Concern over retrospective pattern
- New survey information in 2015 will be available and the 2016 recommendation will be updated

Other comments and discussions led to the following recommendations:

The Team recommended cross checking length composition figures for inconsistency (e.g., data presented in Fig. 2.6 appeared inconsistent with that shown in Fig. 2.17).

The Team recommended examining the longline survey RPN and length frequency data for use within the model.

GOA Shallow Water Flatfish

Jack Turnock presented the non-rock sole components of shallow-water flatfish.

Teresa A'mar presented the Northern and Southern rock sole assessment. The **Team recommended that for 2015 the species composition sampling be weighted not just to the haul level, but also to reflect the total catch and sampling rates within sectors of the fishery**. This may help reduce or explain the high level of variability observed in the ratio of the catches. This should also help explain how comprehensive the observer sampling has been, how many vessels are being sampled from each sector of the fishery, and how the spatial and temporal distribution of the fishery may compare to that of the survey.

The Team noted that the predicted variability of length-at-age, especially for smaller rock sole, appeared to be appreciably higher than in the observed data. **Therefore the Team recommended that adjustment of the Amin value downward should be explored to see if it might alleviate this problem.** Further, there was a pronounced lack of fit to strong modes in some of the survey length data, particularly the male distributions. The Team identified some descending limb selectivity parameters that appeared to be poorly estimated, and **recommended these values be re-estimated in 2015**.

The Team noted that for some flatfish species there is a probable relationship between trawl survey catchability and water temperature. **Therefore, the Team recommended that the authors evaluate similar species and investigate whether this relationship should be considered in the shallow water flatfish assessment and how it might be implemented.**

In 2013, the Team recommended a full assessment for the Tier 5 contribution to the SWF complex including in-depth consideration of relative catch by fishery and survey biomass estimates by area. The executive summary noted that this will be addressed in the next full assessment for SWF in 2015.

In 2013, the Team recommended that an evaluation of relative trends provided ADF&G survey data. The assessment noted that this work is still ongoing.

The Team recommended that the random effects approach to survey biomass smoothing be used for the apportionment calculations in 2015.

GOA Rex sole, Flathead sole, Deepwater, and Dover sole

The Team discussed catch-reporting in summary tables and distinction with end-of-year projections and how best to clarify distinctions. This included discussion of "best estimates" from authors for the current year for use in making recommendations in the subsequent year and a protocol for year to date catches in the summary table as compiled by Teams.

The Team recommends examining the using the random effects model for area apportionment estimation for the 2015 assessments.

Research priorities for this group of flatfish include:

- Use stock synthesis assessment framework to facilitate exploration:
    - Examine survey and fishery selectivity patterns
    - Estimate growth based on more recent data, if possible
    - Account for ageing error
    - Explore data weighting
- Consider using ADF&G small mesh survey data
- Explore ways to better account for uncertainty (e.g. uncertainty in natural mortality and catchability)

GOA Arrowtooth

There were no changes in assessment methodology since this was an off-cycle year. Arrowtooth flounder are managed as a Tier 3a stock, using a statistical age-structured model as the primary assessment tool. The model was used with the same configuration as the 2013 full assessment. Parameter values from the previous year's assessment model and projected total catch for 2014 and updated 2013 catch were used to make projections to recommend ABC and OFL. Projections are based on estimated catches of 39,744 t for the 2014 total catch, and in place of maximum permissible ABC for 2015 and 2016.

The projected age 3+ biomass estimates are essentially unchanged for the current update. Female spawning biomass in 2015 was estimated at 1,957,970 t, which is <1% higher than the projected 2015 biomass from last year's assessment. Age 3+ biomass is expected to decrease in 2016. The 2014 catch of arrowtooth was the highest on record which is partially due to recent changes in regulations (Amendment 95) of the halibut trawl prohibited species catch (PSC) limits. For the Amendment 80 fleet in the GOA, unused halibut PSC limits are now allowed to be rolled from one season to the next, which allows catcher processors to spend more time targeting arrowtooth flounder without constraints due to halibut PSC. In addition, new regulations have moved the deep-water flatfish fishery closure date later in the year for all trawl vessels. These changes will likely result in continued higher arrowtooth flounder catches than previous years, similar to the current year.

The market is improving for arrowtooth flounder. "Arrowshimi" is being marketed successfully from arrowtooth flounder.

The Team recommends that the assessment authors evaluate a range of plus group ages, and start the model at age 1 as is done in the BSAI model.

The Team recommends that the random effects apportionment be presented in 2015 along with the status quo apportionment.

In general, for all flatfish assessments, the Team recommends that new maturity information be evaluated and incorporated as appropriate.

GOA Pacific Ocean Perch

Pete Hulson presented the 2014 assessment of the Pacific Ocean Perch stock in the Gulf of Alaska. Although GOA rockfish assessments are planned for odd years to coincide with the availability of new survey data, a full assessment was conducted in 2014 to present alternative models that incorporate new maturity information. The Team's discussion focused on two topics: 1) the use of length composition data in the assessment model and 2) apportionment methods.

In response to recommendations last year, a sensitivity analysis including/excluding the most recent year's survey length composition was performed (Appendix 9B). The POP assessment uses an age-structured model. However, age composition data from the most recent survey were unavailable in time for this assessment. Length composition data were available and could have been used, but the sensitivity analysis concluded that using most recent survey length composition data as a proxy for the age composition data significantly affects results, with recruitment being overestimated. The question arises of whether the fishery length composition data should also be excluded from the model until the cause of the model sensitivity to including length data can be identified, as both fishery and survey length data are being fit with the same transition matrix that converts modeled ages to lengths.

The Team therefore recommends examining the binning scheme for length data, **the effect of the plus group when computing the aging error matrix and alternative ages for the plus group.**

Also, the Team recommended examining effect of length-stratified otolith sampling (vs. assumption of a random sample) on growth parameters and the transition matrix

The Team noted that this analysis of the relationship between age and length data in the model overlaps with a recommendation from the CIE review to estimate growth inside the model.

Apportionment of POP is split first into Western, Central, and Eastern (W/C/E) areas of the GOA. In addition, the Eastern area is further divided into a West Yakutat (WYAK) and East Yakutat Southeast Outside (EYAK/SEO) area. A random effects model was used for area apportionment in the W/C/E area. Data limitations precluded estimating apportionment for WYAK and EYAK/SEO with the random effects model in time for this assessment. A preliminary analysis of the WYAK- EYAK/SEO split with the random effects model was presented to the Team. The Team agreed with the author's recommendation to use the random effects model for the W/C/E area apportionment and the status quo method for the WYAK-EYAK/SEO split until further analysis using the random effects model for the latter can be completed.

Guidance was requested on the use of the upper 95% confidence interval for the WYAK- EYAK/SEO apportionment. This approach is intended to reduce variability in the apportionment fraction. **The Team recommends examining alternative ways of computing the 95% confidence interval**. The current approach uses confidence intervals for the mean of the ratios from the 3 most recent surveys. An alternative approach could use the random effects model to compute the 95% confidence intervals. **Another recommendation was to analyze catches in each area and examine whether catches were disproportionately large relative to the fishable biomass in each area.**

Other comments:

- Aging of sample otoliths is a constraint for this assessment. Fishery age compositions are typically only available every other year because aging survey samples takes precedence over fishery samples in survey years. **The Team recommends that samples should be aged from the fishery every year.**
- Otoliths from surveys are not a random sample. **The Team recommends that surveys begin collecting random samples for aging.**

GOA Northern Rockfish

This assessment was an executive summary with updated projections and catches. The Teams accepted the methods and results.

GOA Shortraker Rockfish

Chris Lunsford gave a brief presentation on the shortraker rockfish assessment as part of a presentation of other rockfish species. This is a Tier 5 stock and there was no trawl survey this year, so there is a rollover of ABC (1,323 t) for the next two years. The catch (649 t) in 2014 was well below ABC (1,323 t). At this low level, there is not a big concern about harvest by management area for shortraker. The Western GOA rockfish fisheries did not open until October 15, but for shortraker that did not have an appreciable effect on catch. Next year, the authors will have new survey data and will produce a full assessment that will include exploration of the random effects model and other suggestions brought up at the September meeting.

In response to SSC and Team recommendations, the authors attempted to explore the overlap between the catch-in-areas and halibut fishery incidental catch estimation (HFICE) estimates. However, the HFICE authors recommended waiting for more years of the restructured observer program data so that a comparison between the two procedures can be made. Efforts are underway to determine the most appropriate approach for survey averaging for this species following the workgroup report and will be presented in the next full assessment. An appendix of "other" removals will be included in the next full assessment. Various approaches to calculate biomass based on the random effects model were presented to the Team in September 2013. Continued efforts are underway to determine the most appropriate approach for estimating biomass for this species and will be presented in the next full assessment. Authors continue to use status quo methods of area apportionments while the Plan Team's working group on survey averaging is evaluating alternative methods. Authors agree that the longline survey may provide a better abundance index for shortraker rockfish. Work continues to be done addressing this problem and will be included in the next full assessment. Ongoing efforts to validate current aging methodology continue, but no method has yet been approved.

GOA Dusky Rockfish

Chris Lunsford presented the GOA dusky rockfish stock assessment. This is an off-year assessment in which the projection model is run with updated catch information. In 2014, the directed fishery for rockfish in the Western GOA began on October 15, whereas in previous years directed fishing in the Western GOA occurred earlier in the summer. The stock assessment authors made appropriate adjustments in estimating the 2014 catch to account for the recent seasonal change in catch.

The authors note several modeling issues that will be examined in the 2015 full assessment, including: 1) setting the lower bound for the age-plus group; 2) computation of the age-error matrix; and 3) inclusion of the survey length composition data. The Team supports the planned work to address these issues.

GOA Rougheye and Blackspotted Rockfish

Dana Hanselman presented the assessment for the GOA rougheye complex. There were no changes to the model, but several changes to the data. The length-at-age, weight-at-age, and aging error matrix were all updated. The assessment now uses the Relative Population Numbers (RPNs) from the longline survey rather than the Relative Population Weights, which follows the practice in the sablefish assessment.

The 2013 bottom trawl survey biomass estimate was the lowest on record, and was decreased 37% from the 2011 survey estimate. However, the 2014 longline survey RPN value increased 40% from the 2013 value. Several changes to the longline survey were made, including new area estimates for the survey data and a full revision of longline survey estimates for rougheye/blackspotted rockfish.

Genetic studies were conducted during the bottom trawl surveys in 2009 and 2013 to examine the error rates in distinguishing blackspotted rockfish from rougheye rockfish. The error rate has declined to 13% in the 2013 study, with blackspotted rockfish generally identified correctly but some blackspotted rockfish being mis-identified as rougheye rockfish. The Team noted that it would be helpful to conduct a special project to assess whether the fishery disproportionately catches either of the two species.

Differences in life-history parameters, species distribution, and length distribution between the two species were presented. Rougheye rockfish have a higher von Bertalanffy *K* parameter than blackspotted rockfish. Rougheye rockfish have a broad length distribution, whereas the blackspotted rockfish length distribution consists primarily of larger fish, which may result from small blackspotted rockfish occurring in rocky habitats that are difficult to trawl. Blackspotted rockfish show higher trawl survey biomass estimates in the western GOA, whereas rougheye rockfish have higher abundances in the eastern GOA.

The current plus group of 25+ contains a high proportion of the age composition, particularly for the fishery. Additionally, the age composition data for the ages immediately preceding the plus group (i.e. ages 23 and 24) are consistently overestimated by the model, which likely reflects the age error being overestimated for the plus group. The assessment authors note that the choice of the plus group age, and the computation of the age error for the plus group, will be addressed in the 2015 assessment. The Plan Team supports the planned work to address these issues.

Three assessment models were evaluated. Model 0 is the last full assessment base model from 2011. Model 1 is an intermediate model which uses new and updated data but keeps the previous longline survey abundance index. Model 2 uses new and updated data, a new longline survey abundance index, and the updated conversion matrices.

The authors and Team recommend Model 2 for the 2014 assessment based on improved overall model fit to the data and the recommendation from the 2009 sablefish CIE to use the RPN index for the longline survey.

GOA Demersal Shelf Rockfish

Kristen Green (ADF&G) presented the Demersal Shelf Rockfish (DSR) assessment. The DSR assessment has incorporated density data for yelloweye rockfish from submersible surveys and subsequently remotely operated vehicle (ROV) surveys. Although the East Yakutat (EYKT) and Northern Southeast Outside (NSEO) regions were planned to be surveyed in 2014 (which would result in ROV data available for all DSR management areas in 2014), this was not possible due to weather. The authors noted that 2015 will be last year of State Funding for this survey project.

This year's assessment used updated average weight data and habitat area estimates. The authors removed old 1994 NSEO survey data and used 2012 CSEO as a proxy instead. Projected biomass of 10,933 t, new survey data and a decrease in average weights have influenced a new 2015 ABC of 225 t. This was reduced by 8 mt for subsistence yielding 217. In accordance with the State Board of Fisheries allocation directive, 182 t is allocated to commercial and 35 t to sport fishing.

Kray Van Kirk presented revisions to the draft age-structured assessment in SEO presented to the Team in September. Data, recruitment, M, survey data and CPUE data have changed since September. Earlier years of IPHC survey CPUE and directed commercial catch, and halibut fishery bycatch from fish tickets have been added. Survey density estimates that are used to scale the model to abundance are incomplete. IPHC survey age composition since 2008 was used. Estimates of M where age data are present is close to the prior mean of 0.02, while M values for the no-data period are approximately twice this value. Estimates of Z were generated from Catch-Curve from all ages all areas, and then these estimates used as a prior to partition F and M in the model. While creative, the Team thought this represented "double-dipping" of the data, since data used for the prior determination of Z are then used again in the model. Since the survey used for this species discriminates between mature, sub-adult, and immature fish, the

prior age-structured model had assumed that these proportions could be derived from the maturity at age curve. CPUE data from both commercial and IPHC survey data are now transformed differently and separated by area.

Results of this model show a strong recruitment signal in EYKT around age 20 that is not seen in other areas. Spawning biomass within SSEO is showing the largest decline among the three areas. Selectivity curves show that recruitment to the fishery occurs after sexual maturity.

There was some discussion about the possibility that some areas have higher harvest than others relative to the biomass estimates. Discussion revealed that the age error matrix provided to the authors was based on POP.

The Team recommends that an age error matrix for yelloweye rockfish be developed (perhaps using the software and methods provided by Punt et al. 2008[1]).

The Team supports the SSC recommendation to form a small, informal model-development working group.

The Team also recommends that the working group evaluate the feasibility of developing a southeast Alaska yelloweye/DSR age structured model and a GOA wide yelloweye/DSR age structured model.

GOA Thornyhead Rockfish

Chris Lunsford gave a brief presentation on the thornyhead rockfish assessment as part of a presentation on other rockfish species. This is a Tier 5 stock and there was no trawl survey this year, so there is a rollover of ABC for the next two years. The catch in 2014 was well below ABC. Next year, the authors will have new survey data and will produce a full assessment which will include exploration of the random effects model and other suggestions brought up at the September meeting. A member of the public asked whether the incidental catch of thornyheads would decline if the sablefish longline fishery in the GOA were to switch to pots. While there was not a definitive answer to this question at this time, Team members and the author surmised that the incidental catch of thornyheads would decline because they are not common in other pot fisheries. A Team member pointed out that there may be some data from British Columbia where there has been a long history of sablefish pot fishing.

The Team noted that for thornyheads (and a number of other species), it is critically important to the assessment that the GOA trawl surveys continue, and that survey depths extend to 1000 m in order to more completely cover rockfish habitat. Full stock assessment surveys have not been completed and usually the deepest stations are the ones that are not completed.

Development of ageing methods continues to be a research priority for shortspine thornyheads.

GOA Other Rockfish

Cindy Tribuzio presented an overview of the Other Rockfish update. There were no changes in assessment inputs or methodology since this was an off-cycle year. The estimated biomass of Other Rockfish of 83,383 t is based on an average from the three most recent GOA trawl surveys. The ABC of Other Rockfish was exceeded in the WGOA area in 2013. In response, the SSC combined the ABC for the Western and Central GOA for the 2014 and 2015 fisheries. The ABC in the combined Western/Central GOA management areas was not exceeded in 2014, as of November 8, 2014. However,

[1] Punt, A.E., Smith, D.C., KrusicGolub, K., and Robertson, S. 2008. Quantifying age-reading error for use in fisheries stock assessments, with application to species in Australia's Southern and Eastern Scalefish and Shark Fishery. Can. J. Fish. Aquat. Sci. 65:1991-2005.

the 2014 Other Rockfish catch was lower in the Western Gulf than previous years as the rockfish trawl fishery in this region was not opened to directed fishing in July, due to concerns of exceeding rockfish TACs. The Pacific ocean perch, northern rockfish, and dusky rockfish fisheries were subsequently opened to directed fishing on October 15, and the associated Other Rockfish catch in the Western/Central GOA management area is expected to increase as a result of those rockfish fishery openings. The authors noted that the combined 2014 Western/Central GOA Other Rockfish catch was the second highest since 2003.

In agreement with the SSC request, the Team recommends that a stock structure template be compiled for Other Rockfish.

The Team recommends that the assessment authors evaluate the IPHC survey data to look at the distribution of yelloweye/DSR in the Gulf of Alaska.

Jon Heifetz noted that yelloweye rockfish are very poorly assessed by the trawl survey and suggested looking in to Tier 6 options. Martin Dorn suggested evaluating other data poor options for assessments.

Concerns were expressed from the ADF&G biologist from PWS and Cook Inlet that yelloweye rockfish are being combined with "Other Rockfish" but the areas that are used to develop harvest levels are not areas that yelloweye inhabit. State biologists often mirror management actions by the Federal government on species that they assess. With new efforts to develop yelloweye assessments, the possibility that yelloweye is taken out of this aggregate exists.

GOA Atka Mackerel

Sandra Lowe presented the assessment update. Atka mackerel presence in the GOA remains primarily due to spillover of large year classes from the Aleutians. Catches, which are entirely bycatch in the GOA are down in 2014 (981 t) compared to 2013 (1,277 t) and occurred in the Shumagin and Chirikof areas. Age samples indicate that the 2006 and 2007 year classes dominate the bycatch data. The survey data reflect these dominant year classes as well, but also indicate a strong 2011 year class showing up. Maps showing the bottom trawl survey CPUE by station for 2011 and 2013 indicate a pattern of very few extremely large catches of Atka mackerel. Consistent with past years, OFL for Tier 6 is equal to average catch from 1978-1995 (6,200 t) and ABC (4,700 t) is defined as 75% of OFL. In the discussion, it was pointed out that the large 2006 and 2007 year classes are also dominating the catch in the Aleutians. It was also pointed out that a single (BSAI) stock has been suggested in the past as a management unit definition.

GOA Skates

For big skate catch estimates in the CGOA, the ABC was exceeded from 2010 to 2013, and in 2014, big skate was closed to retention early in the season in the CGOA, therefore the catch did not exceed the 2014 ABC. Catch estimates for longnose skates have exceeded the ABC in the WGOA four times since 2005 but these ABC's and catches are significantly lower than the CGOA.

Estimates of incidental catches increased substantially for longnose skates and "other skates" in 2013, mainly in the IFQ halibut target fishery. For longnose skates, most of the increased catch occurred in the EGOA. For "other skates" the increased catches occurred in the CGOA and EGOA. It is likely that this increased level of catch is due to the increased catch reporting from the halibut IFQ fishery as a result of increased observer coverage in 2013.

Currently, there are catch accounting issues with skates. Even though skates are a federally assessed and managed species, there have been problems incorporating skate catch information from the state waters. State waters catch information is available through the statewide catch accounting system but this information has not been incorporated in the federal total catch information. State managers mirror federal management actions for skates in state waters and had assumed until last year that their catch

information was included. State managers encourage that Federal catch accounting methods incorporate this information since skates are federally assessed and managed species.

There was significant discussion about how the random effect model should be used for skate biomass estimates for each area. The random effects model had results that fell between (mostly) the 3 year survey average and the biomass point estimate.

The Team recommended that the random effects model be used to estimate the gulf-wide ABC by species or species aggregate.

Also, the Team recommended that the apportionment be determined by the individual area random effects biomass estimates.

GOA Sculpins

Ingrid Spies presented the 2014 executive summary for the sculpin complex assessment. There were no clear trends in species abundance indices, and recent catches (2013 and 2014) are estimated to be far below the ABC levels. The 2013 aggregate survey biomass was slightly lower than 2011, and the 2014 biomass estimate is based on the 2013 estimate. There are no changes in OFL and ABC recommendations for 2015 and 2016.

The authors responded to a Team request to investigate whether species-specific ABC calculations could be compared with catch estimates. The authors calculated and presented a comparison of the proportion of plain, great, and bigmouth sculpin, and yellow Irish lord caught in the fishery versus the proportions present in the survey. The catch of the three sculpin species were below species-specific ABCs, while the catch of yellow Irish lord exceeded the species-specific ABC in 2013 and 2014. The latter species comprise the largest proportion of the sculpin complex.

The sculpin complex mortality rate is based on a biomass-weighted average of the instantaneous mortality rates for the four most abundant sculpins in the GOA; bigmouth, great, plain, and yellow Irish lord sculpins from the 2013 survey. As a result, the sculpin complex M was calculated as 0.222.

As requested by the Team in 2013, the author investigated the use of ABC-methods based on survey biomass-weighted M calculations for species complexes. This included using two alternative methods: 1) a strict average of species-specific M estimates for the complex, and 2) a biomass weighted M that includes biomass estimates for the entire biomass time series. The first alternative produced an M of 0.265, while the second produced an M of 0.221. The authors' preferred method uses the proportion of each species from the entire time series.

The author also examined, per the Team's request, the utility of using the random effects model for estimating survey biomass. This included two different approaches. The first included combining survey biomass and variance estimates for the four predominant sculpin species to input to the model, while the second included running the random effects model separately for each species and then combining the results. The two methods produced similar results. The first approach resulted in an estimated biomass of 32,744 t, while the second approach yielded an estimate of 32,614 t. These are comparable to the biomass estimate of 33,550 t, as derived from the standard method.

The Team recommended that the author use the random effects model to estimate sculpin biomass.

Finally, the author responded to Team comments regarding whether estimates of species-specific ABC calculations could be compared with catch estimates. The author calculated such estimates for plain, great, bigmouth sculpin, and yellow Irish lord. The catch of plain, great, and bigmouth sculpin were below species-specific ABCs in 2012, 2013, and 2014. The catch of yellow Irish lord exceeded the species-specific ABC in 2013 and 2014.

The Team recommended that they apply species-specific Ms to respective biomass estimates (summed) for ABC and OFL calculations.

GOA Sharks

The 2014 Gulf of Alaska shark stock complex (consisting of spiny dogfish, Pacific sleeper shark, salmon shark, and other/unidentified sharks) assessment was presented by Cindy Tribuzio. The 2014 assessment is an executive summary, and incorporated updated catch data from 2013 and 2014. Assessment methodology was not changed.

Because of the uncertainty surrounding the data quality for these species, sharks are classified within Tier 6. The ABC and OFL for spiny dogfish are calculated using a Tier 5 approach. The complex OFL is based on the sum of the Tier 5 and Tier 6 recommendations for individual species. The 3-year average of biomass is used to assess spiny dogfish populations, while all other species have only average catch history data for such estimates. The most recent bottom trawl survey (in 2013) yielded similar biomass results as in 2007 for spiny dogfish, which were most abundant near Kodiak. With respect to the 2013 survey, sleeper sharks also were most abundant around Kodiak, and in general, their numbers increased slightly over recent years. Recent catch was much less than ABC or OFL, and it appears shark catch in the IFQ fishery has decreased relative to 2013.

The authors addressed various SSC and Team comments in the 2014 assessment. This includes a consideration of incorporating shark catch from areas 649 and 659 into the model. This is described in the Appendix presented at the September 2014 Team meeting, which is also incorporated into the shark assessment. Shark catch from these two areas will be incorporated into the next full assessment.

The authors noted that the implementation of the restructured observer program in 2013 increased the recent catch estimates for shark species, as smaller vessels and vessels fishing for halibut IFQ are now subject to observer coverage.

The Team discussed why it wasn't feasible to use HFICE in the assessment. Cindy noted that there are issues associated with double-counting shark catch if the HFICE data is used, including that the data cannot be incorporated into the NMFS catch accounting system. The Team noted that comparing the two data sources could provide a valuable means of catch reconstruction.

The Team recommended that the authors revisit the use of HFICE in 2016, once additional data area available from a longer time series (2013-2016).

Cindy also noted that the authors are investigating shark discard mortality rates. They have begun a literature review, with little information acquired so far. Limited research has been done on mortality of sharks caught in trawl gear. As sharks are caught predominantly with hook-and-line gear, mortality research specific to that gear type is necessary.

Research priorities

Additional research is needed on sleeper sharks. More data are needed about size at maturity and natural mortality. The authors also noted the need for better aging methodology for sharks. In the future, it may be possible to collect improved age data from the "large" sleeper sharks that the authors believe are caught in IPHC surveys, so access to those animals could enhance size and maturity data.

GOA Squids

Olav Ormseth presented the assessment of the squid complex in the Gulf of Alaska. This assessment was an executive summary with updated catches. The Team concurred with the author to continue to set catch limits for squid based on Tier 6. Consistent with past years, OFL for tier 6 is equal to maximum catch from 1977-2007 (1.530 t) and ABC (1,148 t) is defined as 75% of OFL. In the discussion, it was pointed

out by the author that squid could be reclassified as an Ecosystem Component (EC). The Team discussion focused on whether GOA squid meet the definition of an EC. A substantial proportion of squid are retained for sale as bait or for human consumption. Thus it is uncertain whether squid meet the definition of EC.

GOA Octopus

The author was unavailable to present the results of the octopus assessment so it was presented by Olav Ormseth. For management purposes, all octopus species are grouped into a single assemblage. The author is trying to develop a size-based assessment for octopus which she will bring forward next September. Catch limits for octopus for 2011-2014 were set under Tier 6 with an alternative method based on using the average of the last 3 surveys as a minimum biomass estimate. This method will continue to be used in 2015 – 2016.

The estimated state and federal catch has increased the last 4 seasons, from 2011-2014 with the catch in 2014 at 709 tons. Octopus is caught incidentally to other fisheries; the Pacific cod fishery caught 83% of the octopus in 2014.

There are no new biomass estimates for this year. While much information is carried over from the previous assessment, the only change this year is the inclusion of updated catch information.

The Team continues to recommend that a stock structure template be completed by next September.

Minutes of the BSAI Groundfish Plan Team

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

Held at
Alaska Fishery Science Center
Seattle WA

Bering Sea and Aleutian Islands Groundfish Plan Team Minutes

The Bering Sea and Aleutian Islands Team convened on Monday, November 17 at 3pm. Writing/rapporteur assignments were provided.

In attendance: Diana Stram, Mary Furuness, Liz Chilton, Lowell Fritz, Brenda Norcross, Kerim Aydin, Dana Hanselman, Bill Clark, Chris Siddon, Dave Barnard, Alan Haynie, Mike Sigler (co-chair), and Grant Thompson (co-chair)

Ecosystem considerations

Stephani Zador presented the Ecosystem Report Cards, Assessment, and Ecosystem Considerations. This year indices were presented to give "annual" pictures, completing the picture for 2013, and presenting a 2014 summary and a 2015 outlook; key highlights are presented in the Introduction. The 2015 outlook is based on projections of a newly-developed Regional Oceanographic Model with included ice and plankton dynamics (ROMS-NPZ), built as part of BSIERP and continued as part of NOAA Integrated Ecosystem Assessments and in conjunction with AFSC's Recruitment Processes Alliance. Only temperature results were presented, but the authors expect to expand predictions to other areas in coming years. The authors expect to make detailed results available for individual stock assessment scientists to develop indicators suited to specific results.

Concern was expressed that the index of Trawl Disturbance Area should be better examined, as known decreases in effort in the Aleutian Islands did not show a corresponding change in the index. The index counts any spatial cell that was "touched once" by a trawl; thus, if trawling effort is substantially reduced but spread out, this index would not capture that.

The Team recommends exploring alternate versions of the index, including versions that count the number of times a particular cell was fished in, to produce a (potentially) more meaningful indicator.

Eastern Bering Sea pollock

Jim Ianelli presented the EBS pollock assessment.

Highlights from data:

- 40% catch taken in A season (proportion has been consistent since 1992)
- Catch of pollock in other fisheries exceeds catch of all non-pollock species taken in the pollock fishery
- Consistent 50:50 sex ratio in both A and B seasons
- Roe production since 2010 has been below average from 2011-2014
- This year's fishery was finished by the end of September
- Fishery age compositions show that the 2008 year class is very strong
- 2014 was a warm year in the EBS

- Kotwicki and Lauth (2013) examined pollock distribution relative to temperature: pollock tend to avoid the "cold pool," although there appears to be some exceptions in 2012-2013
- Bottom trawl survey (BTS) biomass in 2014 is second highest in the time series
- This year's BTS age compositions also show that the 2008 year class is very strong (more fish at age 6 this year than at age 5 last year; this has not occurred since the 1992 year class
- Acoustic-trawl survey (ATS) shows above average biomass in 2014, up from 2012
- This year's ATS found unusually high densities of small fish in the vicinity of Unimak
- This year's BTS age-length key applied to this year's ATS size composition also shows that the 2008 year class is strong (ATS selectivity of age 6 is much lower than in BTS); 2007 year class also appears strong
- This year's "acoustic vessels of opportunity" index has not been processed yet (because the resources were needed to process the ATS index instead), but it will be available for next year's assessment
- The 2008 year class continues to be 10-20% lighter than average at ages 3-5, based on fishery data through 2013
- BTS also shows 2008 year class to be lighter at age, although less so than in the fishery

Highlights from this year's model explorations:

- Models in the "Model 0.x" series explored the effects of adding one piece of new data at a time, cumulatively, to last year's model. For example, addition of the 2014 BTS data had a large impact on the fit to the data (Model 0.2). Model 0.3 incorporates all of the new data, and is the authors' recommended model.
- Models in the "Model 1.x" series explored alternative schedules of age-specific natural mortality rates. Model 1.0 is the same as Model 0.3, and Models 1.1 and 1.2 use schedules based on Lorenzen's and Gislason's approaches, respectively. Model 1.1 performed about as well as Model 1.0, whereas Model 1.2 performed poorly and resulted in unrealistically high biomass estimates.
- Model 2.0 explored the use of the "Kotwicki index." This index, which was introduced last year, attempts to correct for the effect of fish density on the efficiency of the net used in the shelf bottom trawl survey. In general, the method estimates that efficiency varies inversely with density. Because fish density varies with space, so does the effect. Overall, high survey estimates tend to get corrected upward, and low survey estimates tend to get corrected downward. Coefficients of variation are higher than for the raw (uncorrected) estimates. Age composition data also get revised as a result of this method. The authors view Model 2.0 as preliminary, and do not recommend moving to this model at present.

Highlights from assessment results:

- The estimated strengths of the four most recent above-average year classes (2006, 2008, 2010, 2012) all increased (by 3%, 19%, 25%, and 67%, respectively).
- Spawning biomass is projected to be 39% above B_{MSY} in 2015 .
- Maximum permissible ABC for 2015 is 2.9 million t
- 5-year average F would give a 2015 ABC of 1.409 million t
- Annual surplus production ("replacement yield") for 2015, which is the authors' recommended ABC, is 1.35 million t.
- If the stock were managed under Tier 3, the maximum permissible ABC for 2015 would be 1.637 million t.

Highlights from discussion (including public comments):

- Authors' rationale for a 2015 ABC of 1.35 million t:
    - Keeps spawning biomass stable

    - Tier 1 maxABC is very high, and would result in high catch variability in the long run if implemented
    - ABC of 1.35 million t is similar to long-term average yield in Tier 3 (1.39 million t)
    - Recent large ABCs (1.5 million or so) in 2002-2006 were followed by the lowest ABCs in the time series
    - 2008 year class will account for over half the 2015 spawning biomass
    - Salmon bycatch may increase under a higher ABC
    - Medium-term effects of anticipated warmer conditions
- Member of the public: Why should ABC go down for 2015, given such big increases in all indicators?
- Member of the public: Back in 2009-10, biomass was at a low point, so we switched to a 5-year average F harvest strategy, and now the stock has recovered. This is a Tier 1 stock; we should be fishing at a rate at least equal to the 5-year average F. A spawning biomass greater than 3 million t is likely to produce low recruitment; we need to get spawning biomass down to the range where good recruitments are likely.
- Jim: This year's F was much lower than the 5-year average; an ABC of 1.35 million t would keep next year's F closer to what it was this year.
- Team member: The analysis of alternative M schedules in the assessment was helpful.
    - Jim: The SSC wants time-varying M examined, too.
- Team member: Very little impact (about 8,000 t) on 2015 spawning biomass from going with 5-year average F.
- Team member: Warmer years may be good for older fish to feed; we now have a series of cold years transitioning to warm, which is different than neutral years transitioning to warm; all ages now have refuges from predation; transitioning to warm is not necessarily bad (no need to be extra precautionary).
    - Team member: It is true that warm years are not always bad, but our most recent experience was bad.
- Team member: We do not need to be as precautionary as we were in the past when we first instituted the 5-year average F strategy; going with the maximum permissible ABC under Tier 1 will, in the long term, result in occasional low biomass and high catch variability; however, going with maximum permissible Tier 3 ABC is reasonable. Going forward, a Tier 3 calculation of ABC can be expected to be more predictable and rational than either an average-F policy or the constant-biomass policy suggested by the author for 2015.
- Team member: Under what circumstances would we feel confident in using the Tier 1 maxABC?
    - Jim: We need to take account of how recruitment behaves under different "stanzas"—did high recruitment occur at low spawning biomass because there was less cannibalism or because of good environmental conditions? It was probably both. If it were just the former, then Tier 1 maxABC might be OK.
    - Team member: If we could truly quantify all the uncertainty, Tier 1 maxABC would be OK.
- Team member: Going with Tier 3 maxABC keeps spawning biomass above B_{MSY}.
- Team member: There has always been a single dominant year class.
    - Jim: We have had even higher concentrations of spawning biomass in a single year class (2008 year class is about 3rd or 4th in rank).
- Team member: This is the only stock where we use 5-year average F; why not go with Tier 3 maxABC like most of our other age-structured model stocks?
- SSC member: You should base your harvest policy on the best estimate; then increase the buffer between OFL and ABC if needed.
    - Team member: We should say that Tier 3 maxABC is our best estimate; then increase the buffer between OFL and ABC.
    - Team member: The SSC decides which Tier the stock is in, and they have decided that

this is a Tier 1 stock; any ABC recommendation other than the Tier 1 maxABC already increases the buffer.

- Team member: It would be nice to see at least two years of increase in the survey, given that all species except plaice went up in this year's survey.
- Team member: The retrospective pattern suggests that the model tends to underestimate spawning biomass, which suggests that an increase in ABC is OK.

Decision: The majority of Team members supported basing the 2015 and 2016 ABCs on the maximum permissible harvest rate associated with Tier 3, the stock's Tier 1 classification notwithstanding, giving values of 1.637 million t and 1.554 million t, respectively. A minority preferred staying with the current (since 2010) 5-year average F strategy.

Research priorities:

- Methods for combining acoustic and bottom trawl indices in a more integrated way. The area of overlap between the two indices is problematic, as is time-varying catchability; authors would like to get one consistent index of abundance every year; also, authors would like to conduct both surveys on the same vessel.
- Role of the environment in Tier 1 calculations is an urgent research priority

Bogoslof pollock

Jim Ianelli presented an update of the Bogoslof pollock stock assessment. The most recent survey occurred during winter 2014. At the request of the SSC, Jim re-evaluated the natural mortality value used in the Tier 5 calculation. He did so using an age-structured model since survey age composition data were available from 1988 to 2012. The estimated natural mortality was 0.3 rather than the previous assumed value of 0.2. Jim also evaluated the random effects model for use in the Tier 5 calculation. The previous method of ABC recommendation resulted in a value of about 17,000 t, compared to the author's ABC recommendation of about 16,000 t (random effects model, M = 0.2). In contrast, the value is about 24,000 t for the random effects model and M=0.3. For this assessment, the Plan Team seconds the author's recommendation for use of the random effects model and M=0.2.

For the next assessment, the Team recommends that the author re-estimate M using the age-structured model, in the anticipation that the resulting value will be used in the next specifications cycle.

Aleutian Islands pollock

Steve Barbeaux presented an update of the Aleutian Islands pollock stock assessment. There has not been a directed fishery since 2010, only incidental catch, which has not exceeded 3,000 mt since 1999. The 2014 trawl survey biomass estimate doubled since the last survey. Three models were presented: model 1, which is the same as the 2013 preferred model; model 2, which added age-1 within the model; and model 3, which included age-varied natural mortality. All 3 models overestimate earlier trawl survey biomass estimates, as well as the last two estimates, which are low. All 3 models provide similar fits to the age compositions. Steve recommended model 2 as the preferred model. This model indicates low biomass with below average recent recruitment. Current status is about 34% of unfished biomass. The Plan Team agreed with Steve's preference for Model 2.

EBS Pacific cod

Grant Thompson reported that survey biomass was higher again in 2014, continuing an upward trend that began around 2006 and has been sustained by several good year-classes. Spawning stock biomass is now estimated to be in the vicinity of $B_{40\%}$.

As requested by the Team/SSC at their September/October meetings, Grant had fitted two candidate models for this meeting. Model 1 was the base model, used for specifications in 2011-2013, with these main features:

(i) M fixed at 0.34.

(ii) Length-specific commercial selectivities for all fisheries/seasons, 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 von Bertalanffy 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.

Model 2 had been presented as an exploratory model in September. It differed from the base model in many respects, all of them regarded as desirable features of a succession of alternative models that had been developed and discussed over the last few years:

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

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

(viii) A single fishery and fishing season instead of nine season-and-gear-specific fisheries.

(ix) Natural mortality M estimated internally.

(x) The mean value of survey catchability Q estimated internally.

(xi) Survey catchability allowed to vary annually (penalized devs estimated).

(xii) Selectivity for both the fishery and the survey potentially allowed to vary annually (penalized devs estimated).

(xiii) Selectivities for both the fishery and survey 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).

Both models achieved satisfactory fits. Model 2 naturally fitted the survey times series better because Q was allowed to vary annually. Both models fitted the survey age and size composition data well, matched the first three modes in the average survey length compositions, and estimated similar survey selectivities. The time series of recruitments and spawning biomass were also similar except for the last few years, where the Model 1 estimates rose above the Model 2 estimates, which was somewhat puzzling. The freely estimated value of M in Model 2 was 0.34, equal to the fixed value in Model 1. A likelihood profile showed that the best value of M in Model 1 would be 0.40. The freely estimated value of survey Q in Model 2 was close to 1, consistent with recently reported field work on survey trawl catchability.

The retrospective behavior of Model 1 was poor. It persistently produced biomass estimates that subsequently were revised downward by 50% or more when fitted to later data. The retrospective behavior of Model 2 was good.

Grant recommended sticking with Model 1 this year because it avoids changes in methods and because he feels there are some properties of SS selectivity pattern 17 that need further investigation. The Team is willing to go along for this year, but we feel that the assessment should advance to Model 2 or something similar next year. Model 2 implements many technical improvements on Model 1, fits the data better, has good retrospective performance, and does not rely on the fixed value of survey Q based on archival tags, which is no longer very credible. We suspect that the divergence between Model 1 and Model 2 biomass estimates in the last few years is associated with the poor retrospective behavior of Model 1 rather than with any problem in Model 2. Moving from Model 1 to Model 2 would be a wholesale change, but we think it would be a change for the better in many ways.

The Team therefore recommends Model 1 for this year but urge Grant to resolve his remaining questions about selectivity and bring Model 2 back next year as the presumptive reference model for 2016.

While recommending that Model 1 be chosen again as the reference model, Grant regarded the model point estimates of ABC and OFL as risky because of the model's retrospective record of persistent downward revisions of current biomass estimates. As a way of accounting for that, Grant proposed holding the 2015 ABC at the 2014 level of 255,000 mt rather than adopting the Model 1 estimate of 295,000 mt.

The Team endorses this downward adjustment as a reasonable measure in the circumstances. We also recommend a provisional ABC of 255,000 mt for 2016.

AI Pacific cod

Grant Thompson reported that the survey biomass index has been flat and below the long-term average for the last ten years.

The Team and SSC at their September/October meetings had asked Grant to fit three models for November, all of them excluding data before 1991 as recommended by an advisory committee last spring. (Grant had also done some research to recall the exact reasons for excluding the pre-1991 data.) Model 1 was Tier 5, specifically a random effects model that filters the survey biomass estimates. Model 2 was nearly identical to Model 2 in the EBS assessment (which see) except that a constant rather than annually varying value of survey Q was estimated, the standard von Bertalanffy growth equation was used (i.e., the fourth ("Richards growth") parameter was not included), and sigmaR was estimated internally rather than by the method of Thompson and Lauth (2012). Model 3 was the same as Model 2 except that the priors on survey selectivity were tightened until estimated selectivity at the oldest age was midway between one and the value estimated by Model 2.

In the fits, Model 1 naturally tracked the survey biomass estimates closely. (That's all it does.) Models 2 and 3 both fitted the age and size compositions well, but Model 2 achieved a better overall fit. Models 2 and 3 produced similar estimates of present biomass, but the estimates are on the order of three times the swept-area estimates from the survey, which seems suspiciously high. Models 2 and 3 both displayed poor retrospective performance; historical estimates of abundance were revised upward by 100% or more when the models were fitted to later data.

Grant recommended sticking with Model 1 (ABC=17,600 mt) for this year because of the very high Model 2&3 biomass estimates relative to the swept-area estimates, the poor retrospective patterns, and the same concerns about SS selectivity pattern 17 as in the EBS assessment.

The Team concurred, but at the same time we recommend that Grant continue work on the problems with Model 2 so as to make progress toward an age-structured AI assessment. Specifically, the Team recommends examining NMFS trawl survey data, IPHC longline survey data, AFSC longline survey data, and commercial data to investigate the distribution of AI Pacific cod relative to the NMFS trawl survey stations.

BSAI Yellowfin sole

Tom Wilderbuer presented the yellowfin sole assessment. One minor change to the maturity schedule was made to the stock assessment this year, and the model was updated with most current survey and fishery data available. In general, the model fits the survey biomass estimates quite well. Yellowfin sole female spawning biomass is ~1.5 times above Bmsy, but declining since the 1980s. However, total biomass has been stable over the last number of years. Additionally, the average exploitation rate (1978 – 2014) is only 0.05 and the catch is only, on average, 75% of the ABC. The Team noted that this is a textbook stock assessment and commended the author for his effort. There was some discussion about the new maturity schedule and its seeming lack of significant difference from the previously used maturity data; the new maturity data increased the FSB by 2%.

The Team recommends testing for differences of maturity curves, and if no significant differences are found pooling all maturity data for next assessment.

In 2011, the authors examined four models of weight at age for yellowfin sole (the below model numbers refer to the 2011 assessment models, not the current year):

Model 0: parametric fit of time-invariant and age-specific growth increments to the year-and-age-specific survey data

Model 1: year-and-age-specific mean weights from the survey

Model 2: growth increments from Model 0 multiplied by random year-and-age effects

Model 3: growth increments from Model 0 multiplied by random year-and-age effects and temperature-dependent year effects

The Team recommends that the 2011 weight-at-age analysis be revisited with the following modifications:

1. Model 1 in the 2011 analysis was regarded as the "truth," meaning that it was determined to be the preferred model *a priori*. Because the weights at age in Model 1 were empirical estimates obtained from the survey, the Team feels that they necessarily contain some amount of sampling error, and so should not be viewed as perfect estimates.

2. Models 2 and 3 contain more nominal parameters than data, and are unnecessarily conditioned on the results from Model 0. The Team feels that one or more models with fewer parameters should also be considered (e.g., some sort of random effects model or other smoother, where the growth increments are not tied to the results of Model 0).

BSAI Greenland Turbot

Steve Barbeaux presented the Greenland Turbot stock assessment. There were a few data changes from the previous year, which included: addition of 2014 data, updated catch data, addition of Northwest area length composition, and increased female length at 50% maturity from 55 to 60cm. In addition to the accepted model from last year (Model 1) an alternative model (Model 2) was put forth (and subsequently accepted) that included autocorrelation in recruitment and fixed catchabilities for slope and shelf surveys. A long discussion occurred debating the relative appropriateness of both models. Model 2 was ultimately

selected based on: 1) better results from retrospective analysis and 2) the large increase in q over time in Model 1. However, the fixed q's in Model 2 and the unknown ramifications of using autocorrelation in recruitment for Model 2 caused substantial concern about its efficacy, though there is evidence that this approach is reasonable (Thorsen et al. 2014). Although Model 2 was ultimately accepted by the Plan Team, the length and detail of the discussion suggests that further evaluation of this model is warranted.

Utilizing Model 2, B_{100} increased from ~100K to 130K from 2014 to 2015. Similarly, the ABC increased from about 2K to 3K from 2014 to 2015. Strong recruitment in the late 2000s will likely continue the increase in turbot biomass over the next few years. The author also noted the importance of the slope survey for informing the model and suggested that its continuation is critical for continued improvements. Additional research priorities include projects on stock structure, movement, and maturity schedule updates.

The Team recommends fitting Model 1 with recruitments since at least 2007 estimated freely in order to confirm or reject the supposition that the large increase in survey q is attributable to the recruitment dispersion and/or autocorrelation parameters.

Arrowtooth Flounder

Ingrid Spies presented the arrowtooth flounder stock assessment. Changes to the assessment inputs included: survey size composition, biomass, and standard deviations for the 2013 and 2014 EBS shelf survey and 2014 AI survey; fishery size compositions from 1992-1999 and for 2012. 2013, and 2014; estimates of catch through 10 October 2014; and age data from the 2010 EBS and AI surveys and the 2004 shelf survey. Changes to the assessment methodology included estimating fishery selectivity non-parametrically rather than with a 2-parameter logistic, and adding an additional likelihood component to incorporate the new AI age data. Results of the preferred model included small decreases in projected biomass relative to last year's assessment as well as decreases in female spawning biomass, OFL, and ABC.

Two models for fishery selectivity were evaluated: In Model 1, selectivity was estimated separately for each age and the shape was constrained to be a smooth function; whereas in Model 2, where selectivity was modeled as a two-parameter ascending logistic function. Model 1 was the preferred model on the basis of a lower AIC, even though the number of "effective" parameters is overstated for Model 1 in the AIC calculation. The differences in the resulting estimates of biomass between the models were small.

Observed trends include slight declines in total biomass in the EBS slope and shelf surveys and the AI survey since 2006, increasing female spawning biomass, and stable size composition. Estimated total biomass shows a slight downturn in the last few years and estimated female spawning biomass shows a continued increase and is above $B_{35\%}$. Also examined was a new maturity at age relationship (Stark 2011, BSAI) with maturity at older ages that significantly brings down female spawning biomass but does not affect total biomass.

Sex specific mortality was discussed. In data from the 2010 EBS shelf survey, there were no male arrowtooth older than 10 years, while data from the AI survey of the same year had males over 30 years. This is a pattern also seen in halibut. This discrepancy may confound estimation of natural mortality and selectivity. The proportions of males in the Al survey tend to be higher than those of the EBS shelf and slope. A discussion of catchability by area as a function of temperature followed with comparisons to Greenland turbot.

In summary, non-parametric fishery selectivity is recommended, the current likelihood weightings are better than the single alternative that was presented, the new maturity based on Stark (2011) is better than Zimmerman (1997), and new AI age data indicate males may not have higher natural mortality.

The Team felt the authors' preferred model (Model 2) was reasonable and accepted the authors' recommended OFL and ABC.

The Team recommends that retrospective analyses be conducted for the next assessment.

Research priorities suggested included investigating selectivity by age for the survey and fishery, and conducting population structure and movement studies (medium importance).

BSAI Kamchatka Flounder

Tom Wilderbuer presented the Kamchatka flounder stock assessment. Changes to the assessment inputs included: estimates of catch for 2012-2014, fishery length compositions for 2012 and 2013, shelf survey length compositions for 2013 and 2014, shelf survey biomass estimates and standard error estimates for 2013 and 2014, 2014 Aleutian Island survey biomass and standard error estimates and length compositions, and 2012 slope survey age compositions. There were no changes made to the assessment methodology. Tier 3 and Tier 5 assessment models were prepared as requested by the SSC. Tom noted the Tier 5 numbers in the report differ from those presented, which are corrections.

Kamchatka flounder were lumped with arrowtooth flounder until 1991 when they were identified as a separate species. The fishery catches from 2007-2014 were included in the model. Catches from 1991-2006, years when Kamchatka and arrowtooth were not identified to species, were calculated by assuming that Kamchatka flounder comprised 10% of the catch during that time period. The 2014 catch to date is about 90% of the ABC.

Abundance estimates are up in 2014 shelf and AI surveys. There are good estimates of length and weight at age. Males do not grow as fast as females. The 22 year average survey biomass proportions are 37% for the shelf, 20% for the slope, and 42% for the Aleutian Islands. The assessment started with catchability apportioned by the relative survey biomass estimates for the three survey areas. Examination of the results from the initial model run indicated that fishery selectivity is poorly determined (presumably due to the low sample sizes) and that there are males present in the fishery length records that are larger than those observed in any survey data. It is suspected that this is the result of some mis-sexing of Kamchatka flounder in the commercial fishery sampling. This was resolved by fixing the slope of the logistic curve (age at 50% selection is still estimated for each sex) which produced more sensible results and estimated reference F values similar to other Bering Sea flatfish species. Based on selectivity patterns, the shelf survey showed big differences in the ages of fish available to these different surveys. The slope survey selectivity estimates seemed most stable, hence alternative values of q were fixed for the slope survey and freely estimated the q values for the shelf and Aleutian Islands surveys. M is confounded with q and was discerned through profiling to have a value around 0.11. With the model configured in this way (slope survey q=0.18, M = 0.13 and fishery selectivity logistic slope fixed) the model was run to estimate the status and the population dynamics of the Kamchatka flounder stock over the period 1991-2014.

Model fits to the surveys are reasonable and indicate an increased stock size. Estimates of total biomass and female spawning biomass showed slight increases and female spawning biomass is 13% above $B_{40\%}$. Estimates of age 2 recruitment showed previously identified strong year classes for 2001 and 2002, and possible strong recruitment in 2008 and 2010. Projections of female spawning biomass remain above the $B_{40\%}$ level for the foreseeable future.

There was no retrospective analysis due to the short time series for this model. The assessment is reasonable and is a straightforward update of what was presented to the Plan Team last year. The Team accepts the authors' recommended Tier 3 OFL and ABC estimates.

There were no research priorities specific to Kamchatka flounder.

The Team recommends that retrospective analyses be conducted for the next assessment.

BSAI Northern Rock Sole

Tom Wilderbuer presented the northern rock sole assessment. There was not a full assessment of this stock in 2013 because of the furlough, so two years of data were added. The 2014 biomass estimates are down from the last estimates calculated in 2012.

This is a highly desirable species and 95% of catch was retained in 2013. Female spawning biomass has been increasing steadily since 2009. The age data show a sex difference; females are longer and heavier than males.

The SSC and Plan Team recommended retaining the base model for setting ABCs and OFLs for 2015 and 2016.

In 2012 an alternative model with a temperature relationship was presented. The SSC wanted to see a more complete analysis of the performance of the base and temperature model. In November 2013, the Plan Team recommended that the authors provide a full assessment including the temperature-dependent model with new data (Model 7 herein), which is described in the next paragraph.

The author calculated seven models with variations of q and M. Model 1 is the base model used in 2012 and 2013. The alternative models do not fit the observed sex ratio from the survey age composition as well as using the fixed M values in Model 1. Model 7 (with male and female M fixed at 0.15) sets average q equal to 1.4 by fixing the alpha value in the temperature-q equation and then allows the beta value to co-vary with annual bottom temperature. The result is an improved fit to the survey biomass time-series and fits the experimental value of q better than models which estimate q as a free parameter. Model 7 gives results similar to Model 1, but does not fit the observed age compositions as well and is not selected as the model of choice from an AIC analysis. This result is different from two years ago; the author no longer recommends the model (7) that incorporates bottom temperature.

The author recommended Model 1 and the Team agreed. Model 1 results are presented in the summary. In that model, q is estimated subjectively at a value of 1.5, as in in the past. Model 1a uses q=1.4, but it is only based on one year of catchability data and would make ABC higher. Model 1 is the same as was approved last year.

The Team recommends that the author investigate the possibility of including the sex ratio as a likelihood component so as not to have to consider it independently.

The Team recommends that retrospective analyses be conducted for the next assessment.

Flathead Sole and Bering Flounder complex

Carey McGilliard presented the flathead sole and Bering flounder stock assessment. New data added to the assessment included: updated 2013 catch and 2014 catch to date, fishery age data for 2011 and 2012, 2013-2014 fishery length data, EBS shelf survey data for 2013 and 2014, AI survey biomass for 2014, 2013-2014 survey bottom temperatures, 2013 survey ages, 2014 survey length data, and minor changes in historical survey catch for the EBS shelf trawl survey database. There were no changes to the assessment methodology. The estimated OFL and ABC for 2015 are little changed from last year. The OFL and ABC increased by 3% to 79,419 t and 66,130 t, respectively. The stock is not overfished or being subjected to overfishing. Catch history shows a sharp increase around 1990 to fairly constant catches thereafter, ranging from about 15,000 to 25,000 t from 1990 to the present. Flathead sole are taken as both directed and incidental catch.

The distribution of flathead sole captured in the EBS trawl survey indicates that bottom temperatures may influence their abundance. Bering flounder are present in survey and fishery catches but are more abundant on the northwest Bering Sea shelf where temperatures are typically colder. Survey estimates show that the Aleutian Islands contribute very little to the total survey biomass, and similarly Bering flounder comprise a small fraction of the species complex. Survey biomass appears to be positively correlated with bottom temperatures. The length at age and weight at age relationships are the same as those used in the last assessment. At around age 7 years females become larger and heavier than males of the same age.

Model fits to the survey biomass estimates were generally choppy due to the relationship between temperature and catchability. Plots of model-predicted and observed age frequencies for the survey did not show any real trends or mismatches for either males or females. Similar plots for survey length frequencies indicated mismatches for males. For fishery data, plots of model-predicted and observed ages and lengths indicated mismatches for males and females for both measures. These mismatches indicate the model is missing some relationship with age and length, sex specific selectivity, or natural mortality. Selectivity was different for the survey and the fishery, with the selectivity occurring at a larger length in the fishery than the survey. Fishing mortality was much higher in the past and decreased during the 1980s to a nearly constant rate since 1990. Length at 50% selectivity is greater for the fishery than the survey by about 7 cm. The temperature-dependent catchability parameter was estimated to be 0.059. Trends in biomass estimates show a slowly decreasing total biomass and a relatively flat spawning biomass. Retrospective analyses resulted in a Mohn's rho equal to 0.021 with discrepancies in the 2004 and 2005 temperature-dependent catchability parameter being most notable.

Ecosystem considerations show walleye pollock to be the major predator of flathead sole, while numerous pelagic and benthic invertebrates are the major prey items. The major cause of flathead sole mortality is "unknown" (79.6%), followed by flatfish trawls, Pacific cod, walleye pollock, and other predators.

Potential data gaps and model improvements include: exploring methods to account for scientific uncertainty, investigating appropriate data weighting, exploring the use of a stock recruitment curve in the model, and exploring the use of survey averaging with random effects models to interpolate Aleutian Island biomass. Research priorities include investigating the causes of mismatches in observed and predicted length frequencies and an improved aging error matrix.

The Team accepts the author's OFL and ABC recommendations.

Alaska plaice

Alaska Plaice was presented by Tom Wilderbuer.

The author examined removing pre-1982 survey data from the assessment, given changes in catchability associated with the switch in survey gears, as well as a model fit with the full data so that the effect of this change could be evaluated. Both models were run and model output compared. Results of estimated female spawning biomass and fit to surveys indicate a small difference (4%) in estimates from the early part of the time series when 4 extra data points were included. Both models produce the same population trends. Given the unknown differences in catchability between the 2 survey trawls (estimates are all treated the same), the current assessment proceeds without the 1975 and 1979-1981 survey estimates (as do all other BSAI groundfish assessments). The Team agreed with this change.

A significant portion of the Alaska plaice biomass resides in the northern Bering Sea. The Team and author discussed this point and agreed that there is no way to address the biomass of Alaska Plaice in the

stock assessment model without conducting further trawl surveys in the northern Bering Sea, preferably at least every other year.

An NPRB-funded study estimated maturity from histological analysis of samples collected in 2012. The last such analysis was in 1985. The new maturity schedule which resulted was implemented in the assessment model and caused a 5% decrease in female spawning biomass.

This is a split-sex, age-structure model. There is a long time series of ages for Alaska plaice and the Age and Growth lab is starting to process 2014 fish. The survey biomass estimates were rather flat, with the total biomass in a gentle decline. The population of Alaska plaice has gone down since the last assessment; the shelf survey biomass decreased 22% from 2012 to 2014. Age-3 recruits are down. The projected female spawning biomass is expected to go up after 2020. There is little harvest on this stock and the FSB is well above B_{40}.

The Team recommends that retrospective analyses be conducted for the next assessment.

Other flatfish

Tom Wilderbuer presented this Tier 5 stock assessment. Catch is much less than the TAC. The majority of the fish caught are starry flounder, which is increasing in biomass. The biomass estimate of Other flatfish overall has also increased.

The change this year was that a random effects model was used to estimate biomass for all Other flatfish. Despite a 33% increase in stock of other flatfish, using the RE model estimate increased the ABC by only 7%.

We recommend that the random effects model continue to be used for this complex in future years' assessments.

BSAI Pacific Ocean Perch (POP)

Paul Spencer presented the BSAI POP assessment. Much of what he presented is an update of what he presented in September. The AI survey biomass was the third in a row near 1 million t. Paul is considering methods to add the biomass estimates from the EBS slope survey to the total, but the AI survey covers most of the biomass. The top ten year classes track well in both the fishery and survey ages. Paul presented 5 models, including two bridging models with data updates. The second bridging model removed the 1980s cooperative survey data and the new models also excluded these data. For the new models, he explored iterative reweighting of the compositional data and new selectivity functions. Excluding the 1980s cooperative surveys had little effect on model results.

The logistic selectivity model after reweighting increased the biomass substantially by lowering q. The double logistic gave a very low biomass with a very large q. Paul is recommending the bi-cubic splines that he showed in September. After reweighting, there was a very large increase in weight on age composition data. It was pointed out that there is much more length data than age data, but they are weighted similarly. The reweighting fit the survey biomass data similarly and deemphasized the fit to the length data. Paul thinks that the fishery CPUE data (1968-1979) may be unnecessary at this point and may consider removing it in future models. Paul was asked if the CPUE data were published. Paul said that they were in the assessment when he inherited it. Model 3 with bi-cubic splines provided a better fit to the biomass survey and the age composition data than the alternative models. The selectivity in Model 3 is dome-shaped through most of the time series, but is nearly asymptotic selectivity in the last few years. Paul was asked if these were natural splines or clamped splines. Paul said that they were natural. Part of the trend in selectivity may be explained by the fishery going deeper.

The retrospective trend (Mohn's revised rho) was about -0.343. Fixing q at 1.28 raises rho to -0.14. Paul presented some graphs showing the effect of the prior on estimating M. When fixing q at the 2014 estimate, and loosening the prior on M, M comes out at 0.07 which is similar to new methods shown in Then et al. 2014. The reason why q is higher than 1 is because of expansion of higher densities in trawlable ground to untrawlable ground. The fit to the survey biomass has a residual pattern that does not fit the early years (too high) or the recent years (too low). Recruitment estimates from the new model are similar to the 2012 model except that the 2000 year class has increased in magnitude. The CVs of the recruitment estimates are lower under the preferred model. The fits to the age compositions have improved, particularly the plus group. Biomass is high and total biomass has the same trend as spawning biomass. The phase plane plot showed that the ABCs are almost fully exploited, but the status is well above $B_{35\%}$. The reference points have changed a bit because of the different selectivity curves.

For apportionment, Paul applied the random effects model to the area biomass estimates and the results were very similar to the survey average approach previously applied.

Paul was asked whether the weights on the smoothing parameters of the spline were the same as in the preliminary assessment. It was suggested that the weighting on the position of the knots and the weighting on the smoothness be explored. Paul was asked why splines were not suggested for the BS/RE model. Paul suggested that there were not enough data to use them because BS/RE lack the historical data. It was noted that Paul uses a five year average for fishery selectivity for the projections. The Team was discussed whether it would be possible to be to use splines for all rockfish species. The Team also discussed whether survey selectivity should be forced asymptotic. Paul thinks that the survey is standardized and goes deep enough to get most of the fish. The Team discussed whether it was reasonable to have such a steep increase in selectivity for older fish from early years to recent years and whether that pattern might change back to dome-shaped in the future. Selectivity is time-varying both in time and age. Paul was asked whether changes in other target species were driving the POP change in depth. It was mentioned that work has been done in other assessments on the weighting on the spline selectivity by showing the point of diminishing returns of the fit to the data. The Team agreed with Paul's choice of Model 3 that uses bi-cubic splines and reweights the compositional data.

Paul was asked if it was better to choose the model that has a lower WAI ABC to avoid BS/RE. Paul said that maybe we should have been apportioning the ABCs for lower-biomass rockfish species all along. We could flag concerns regarding potential BS/RE bycatch as a possible rationale for setting a lower POP TAC for the WAI. It was also mentioned that we could use the weighted average approach because it gives a slightly lower ABC in the WAI. The Team agreed to use the RE model but expressed concerned about the effect of a high WAI ABC on WAI BS/RE. Paul's research priorities are to determine a better prior for catchability through empirical studies and to determine how to use the EBS slope survey biomass estimates. Paul also thinks periodic estimates of biological parameters like maturity would be useful to see if there are trends in these estimates.

BSAI Northern rockfish

Paul Spencer presented the BSAI Northern rockfish assessment. The trawl survey biomass estimate was up substantially from prior years, in the EAI and WAI, but not the CAI. The fishery catches more fish in the EBS than the EBS slope survey says are out there. The top ten year classes track well in both the fishery and survey ages. The depth comparison of the fishery and survey catches do not show much temporal variation. It was mentioned that the fishery may have been fishing shallower recently to avoid shortrakers in the BS. The fishery and survey seem to pick up the same age distribution of fish. Paul presented 6 models, including two bridging models with data updates. The second bridging model removed the 1980s cooperative survey data and the new models also excluded these data. For the new models he explored iterative reweighting of the compositional data and new selectivity functions. Excluding the cooperative survey data had a large effect on the scale of the biomass time series, particularly before 2000.

The iterative reweighting put more weight on age data than length data. In terms of root mean squared error, all selectivity options had similar fits. Paul generally preferred model 1 (logistic, time-invariant selectivity) because the increases in complexity found in Models 2-4 did not affect results or improve the fits very much. Paul was asked again whether he should use splines for all rockfish. Paul was asked whether the Deviance Information Criterion was also calculated as a metric of fit to the data. He said he didn't understand the output well enough to use it as a criterion at this point. Northern rockfish results did not meet the preponderance of evidence that would merit switching to a more complex selectivity function. It was noted that the Bayesian Information Criterion can be calculated in different ways depending on how one counts the number of parameters (for example, it might be better to add the input multinomial sample sizes than the number of length bins). Paul suggested that M cannot be estimated in the model, but it was pointed out that the freely estimated value was quite close to the 2012 model estimate. Paul does not think that q can be estimated either, as it goes to 0.1. There was little evidence of a retrospective pattern, with a Mohn's rho of -0.15, which is mainly influenced by the large 2014 biomass estimate. Most data sources were fitted well by the model, except the survey biomass index, where the model doesn't fit well because the biomass estimates are so imprecise. Area-specific exploitation rates look pretty low relative to BS/RE. The genetic data suggest structure, but there is not a stock structure concern at this point because of the low exploitation. Natural mortality has increased since the 2012 assessment. The Team concluded that Model 1 was the best choice based on AIC and an adequate level of complexity given the data. Natural mortality, when estimated, was the same as the natural mortality last year, but the prior (the same as last year) kept M at 0.049, which was higher than 201,2 which also resulted in a higher ABC. The ABC for 2015 represents about a 30% increase from 2014. The Team accepts the author's recommendations.

The Team expressed some concern about the substantial increase in the natural mortality estimate from 2012. The Plan Team recommends that Paul report back on what values for natural mortality were used in Then et al. (2014) to determine whether longevity-based estimators were superior.

BSAI Blackspotted/Rougheye Rockfish

Paul Spencer presented a full update of the blackspotted/rougheye assessment. The Team discussed questions about the difference between the model and survey and continued to express strong concern about the exploitation rate in the Western Aleutians sub-region. The AI portion of the assessment is conducted with Tier 3 methods while the Bering Sea portion is conducted with Tier 5 methods.

After an introduction, Paul showed catch data for 2011-2014 and showed that the survey was down quite a bit in 2014 from 2012, with the decrease primarily occurring in the Eastern Aleutians. There are no new fishery age data since 2011. There is some variation among recent assessments about the certainty of estimated strengths of the 1998 and 1999 are strong year classes. Some smearing across years leads to uncertainty about the strength of 1999 year class; also, perceptions of uncertainty can be influenced by the choice of metric (e.g., variance versus CV). This year the assessment also shows more strength in the 2002 year class in the survey ages. Despite the decline in this year's survey, there is considerable evidence of a growing stock. There is also no evidence of historical overfishing, indicating that the stock is overall in good shape relative to unfished levels.

In the past Paul weighted the age and length composition data entered in the model based on the number of otoliths read or lengths taken (e.g., using the square root of actual sample size), with fishery data given half the weight of the survey data. Model results are sensitive to how the data are weighted; Paul now uses an iterative reweighting procedure that attempts to get the standard deviations of the normalized residuals close to one. Paul looked at the proportion of the population that is in the plus group in the fishery and the survey across years and found it was relatively balanced across years. Iterative reweighting gives more weight to composition data and less to the noisy survey abundance data. Because of iterative reweighting, one cannot compare the AIC for model fit so Paul looks at RMSE.

The retrospective analysis showed a Mohn's rho of 0.78, which was higher than any assessment in the Retrospective Investigations Group report.

The Team discussed several models – an updated base model (Model 0), one with cooperative (i.e., pre-1991) survey data removed (0.1), and then 4 models with the cooperative survey data removed and with different selectivities.

Model 1) Logistic fishery selectivity, cooperative survey data removed, age/length composition weights iteratively reweighted.

Model 2) Model 1, but with double logistic selectivity.

Model 3) Model 1, but with selectivity parameterized as a time-invariant cubic spline

Model 4) Model 1, but with selectivity parameterized as a bicubic spline

Paul used the results of the iterative reweighting for Model 2 in Models 3 and 4 - the standardized deviations of normalized residuals didn't vary much for the different models.

Paul examined fishery selectivity across time and showed that the fishery in the past did not select older fish compared to the survey.

Paul examined the SSC request of whether M or q could be estimated inside the model. Allowing M to be freely estimated with q fixed at the 2014 estimate produced an M of 0.16, which seems implausible for a long-lived rockfish. Similarly, estimating q with fixed M gave an implausible estimate of 6.78.

Model 2 is the author's recommended model for the AI portion of the assessment. The Team accepts this model.

How should$B_{40\%}$ be estimated for this stock? Stock status is measured as B/(mean recruits & SPR($F_{40\%}$)) = $B/B_{40\%}$, so is a function of mean recruitment. If recruitment is increasing quickly for a long-lived species, this would suggest a decline in stock status even if the stock is actually increasing, which does not really make sense.

The 1998-2011 year classes now comprise 68% of the total biomass. Fish 34 cm and smaller comprised about 30% of the 2013 fishery length composition.

Paul proposed that mean recruitment be based on the 1977-1998 year classes. These classes have reached the age that they are 10% selected by the AI trawl survey. **After considerable discussion, the Team recommended that 1997 and 1998 also be excluded from the time series. This had a significant impact on the stock status, pushing it from Tier 3b to 3a. This seemed more in line with model results suggesting that projected spawning biomass would be at its highest historical level in 2015.**

The Team noted that the author's proposed cutoff for exclusion of recent year classes was a modification of the recommendation from the recruitment working group, which was to exclude recruitments corresponding to all age groups in the current numbers-at-age vector below age=round(0.05/M+A10%). Although the recommendation of the working group has not yet been accepted by the Team or SSC, it has been subject to analysis, comment, re-analysis, and revision over the last few years. The Team felt that it was therefore more appropriate to use the working group's recommendation in this case than the author's.

Members of the Team noted that the survey biomass data are flat or decreasing but spawning biomass as estimated by the model is sky-rocketing. The model is emphasizing the fit to fishery age and survey ages relative to survey abundance data.

An SSC member in the audience commented that the near-linear Model 2 selectivity was akin to a fishery catch curve and also pointed out that solutions to the reweighting process are not always unique.

Members of the Team also wondered why survey age data are so much more heavily weighted than survey length data. In the end, the Team expressed concerns with the selectivity curve in model 2, although the Team appreciated the logical process that Paul took to arrive at this model.

The Team also discussed the issue of sub-area apportionment and continues to express strong concern about the exploitation rate in the Western AI. Things look relatively similar to last year in terms of the status of the stock in the WAI. Members of the Team noted that more fishing will likely occur in the Western AI in 2015 because of the change in Steller Sea Lion Regulations.

At the September 2014 meeting, the Team noted that, although an increased number of genetic samples no longer showed statistically significant isolation by distance in the BSAI, **the Team recommended continued annual reporting on the status of the population in each AI management area. The Team reiterated this recommendation.**

With cooperation from industry, catch in the Western AI was close to the target exploitation rate this year. Informal communication between Paul and members of industry led to an industry goal of staying below 50 t in the WAI. An industry representative in the audience noted that the Amendment 80 fleet had caught 52 t, plus there had been more unobserved catch from other vessels, which matches the recorded catch of 56 t. One member of industry also suggested that it was very helpful to have a suggested number.

The Team recommends that we use the random effects model for sub-area allocation.

Last year the Team expressed "strong concern" about the exploitation of the Western AI sub-stock. According to the "Stock structure and spatial management policy" developed by the Council in 2013, after the Plan Team and SSC express concern about a stock, the following two steps should occur (from page 2 of the November 2013 Plan Team Minutes):

"*2. With input from the agency, the public, and its advisory bodies, the Council (and NMFS) should identify the economic and management implications and potential options for management response to these findings and identify the suite of tools that could be used to achieve conservation and management goals. In the case of crab and scallop management, ADF&G needs to be part of this process.*

3. To the extent practicable, further refinement of stock structure or other spatial conservation concerns and potential management responses should be discussed through the process described in recommendations 1 and 2 above."

While industry has taken steps to limit fishing effort, the Team notes that none of the other actions associated with steps 2 and 3 of the Council policy have been taken.

The Team expressed concern that the estimates of biomass from the model do not have much similarity to the trend in survey biomass estimates and recommend that the authors attempt to reconcile this discrepancy in future assessments.

The Team recommends continued attention to the exploitation rate in the WAI and that the author bring back the 7 metrics that he has previously shown the Team at the September 2015 meeting. At that meeting, the Team will review the WAI stock status again and evaluate the effect of any management response in 2015.

BSAI Shortraker Rockfish

Ingrid Spies presented an update of the shortraker rockfish stock assessment. Biomass estimates from the 2014 AI survey and 2002-2012 Bering Sea slope survey data were added to the model input data. At the request of the Team and SSC, the 2014 biomass was estimated using the random effects model and is the Team's preferred model to set ABC and OFL for this Tier 5 assessment. The recommended 2015 ABC and OFL are 518 t and 690 t, respectively, which are 40% increases from the 2014 ABC and OFL. The

shortraker rockfish biomass estimate increased to 23,009 t in 2015 from 16,447 t in 2014. This increase in biomass estimate is primarily due to including the EBS slope survey data along with the change to a random effects model.

The Team recommends including the 2002-2012 EBS slope survey biomass estimates of shortraker rockfish in future assessments.

BSAI Other rockfish

Ingrid Spies presented an update of the other rockfish complex stock assessment. New data in the 2014 assessment included updated catch and fishery lengths for 2014. Biomass estimates, CPUE, and length frequency compositions were also included from the 2014 Aleutian Island trawl survey and the 2013 and 2014 eastern Bering Sea shelf survey. In previous assessments, a 4-6-9 weighted average of the three most recent surveys for each region (Aleutian Islands, Bering Sea shelf, and Bering Sea slope) has been used to calculate the BSAI other rockfish biomass estimate. To remain consistent with other assessments, the Team recommends using a random effects model for each region to calculate the biomass estimate for the entire BSAI area.

The recommended 2015 ABCs for the other rockfish complex in the EBS and AI are 695 t and 555 t, respectively, with an OFL of 1,667 for the entire BSAI area.

The Team recommends using the random effects model to estimate the other rockfish complex biomass for future assessments.

BSAI Atka mackerel

Sandra Lowe presented an updated assessment of the Atka mackerel stock in the Bering Sea/Aleutian Islands. Significant new inputs to the model were the survey biomass estimate from summer 2014 and age data from the 2013 fishery. These new inputs combined to increase the strength of the 2006 and 2007 year classes, as well as the four large year-classes that were responsible for the peak in abundance in the mid 2000s (1998-2001). The Team approved the assessment and agreed with the author's recommendation for Tier 3a ABC, but had the following concerns: First, the 2012 survey biomass estimate may be an underestimate, yet it has a low CV, and the 2014 estimate is considerably higher (161% increase). The model does not fit either of these survey estimates very well. Second, the recommended ABC for 2015 is 65% greater than in 2014, yet there is only 1 year class in the last 12 that is estimated to be above average in size. The last time an ABC > 100,000 t was recommended was in 2005 and 2006, and this was supported by 4 above average year classes spawned in successive years, and three of these (1999-2001) were the among the largest ever estimated. The Team discussed the new fishing regulations that are proposed for 2015 that will re-open parts of area 543 to Atka mackerel directed fishing (TAC will be a maximum of 65% of the 543 ABC), as well as relax restrictions that were in place in areas 541 and 542. The new regulations and the significantly larger ABC could result in catch in area 543 increasing substantially (from an estimated 302 t in 2014 to as much as 22,360 t in 2015). Steller sea lions in area 543 continue to decline at ~7% per year and surveys in 2014 resulted in the lowest pup and non-pup counts in the time series.

BSAI Skates

Olav Ormseth presented the skates stock assessment. This was a scheduled "on-year" assessment because all three surveys were scheduled, but since the slope survey was cancelled, he used the 2012 data for biomass distribution. For Alaska skate, he presented four models. For "other skates" he presented a random effects model.

Additions to the Alaska skates model:

- The entire time series (1982-present) of EBS shelf bottom trawl biomass estimates.

- Reconstructed historical catch data beginning in 1954.
- Four length-at-age (LAA) datasets from the EBS shelf survey (2003, 2007-2009); a LAA dataset from the 2005 longline fishery was determined to be inadequate and was not included.
- Weight-at-length data from a dataset on Alaska skate tagging activities on the 2008-2010 EBS shelf survey.

Highlights from this year's model explorations:

- Model 1: Existing model with updated data (i.e., the model used in the 2012 assessment).
- Model 2: Author's preferred model, with features described in the chapter text. Model 3: Same as Model 2, except with selectivity parameter 6 fixed for both fisheries and the survey, creating asymptotic selectivity curves. This model offered a contrast to the dome-shaped selectivity curves generated in Model 2.
- Model 4: Same as Model 2, except starting in 1977 rather than 1950.

Model 2 provided the best overall fits when the data are considered as a whole and produced results that are consistent with the author's conceptual approach.

For Alaska skates, the Team concurred with the author and recommended Model 2. However, concern about the change in estimated spawning biomass between the two assessments led the Team to recommend rolling over the lower 2014 ABC for 2015 and 2016. The Team also recommends, for September 2015, an evaluation of the optimum starting year, age composition data, and recruitment variability. Recruitment variability may help explain the change in the estimates of spawning biomass. The Team reminds the author to include a retrospective analysis and harvest scenarios next year.

For "other skates", the random effects model is the Team's preferred model for estimates of biomass and recommends use of it to set ABC and OFL for this Tier 5 assessment.

BSAI Sculpins

Ingrid Spies presented the BSAI sculpins stock assessment. Biomass estimates and length compositions were included from the 2014 AI survey and 2013 and 2014 EBS survey. Two models were presented by Ingrid; the current model, which uses the average of the three most recent surveys to calculate the Tier 5 biomass estimate, and the author's prefer method, using a random effects model to calculate the biomass estimate. The Team recommends using the random effects model to calculate the 2014 Tier 5 biomass estimate. The recommended 2015 and 2016 ABC and OFL are 52,365 t and 39,725 t, respectively.

The Team recommends using the random effects model to estimate the sculpin biomass for future assessments.

BSAI Sharks

Cindy Tribuzio presented the shark assessment, incorporating the most recent catch and survey data. There was a steep decline in the IPHC longline survey and incidental catch rates of sleeper sharks beginning around 2000 and continuing for several years, but in recent years catch rates have been low and stable in both the surveys and bycatch fisheries.

Cindy stated that CIE reviewers had criticized the use of maximum historical catch as way to set OFL for sleeper sharks, but the individual reviewers' remarks on this point in fact showed a wide range of opinions, so there was clearly some support for the present practice and certainly no consensus in opposition. One Team member observed that setting a Tier 6 OFL (and ABC) involved picking a range of reference years and some catch statistic (e.g., maximum, average, or 95th percentile) as the OFL. In the case of sleeper sharks there was not a clear conservation issue because all the animals in the bycatch were juveniles and there was no new information to suggest a change in the procedure that the Team had

adopted before, after long discussion. The Team therefore favors continuing to set OFL and ABC at the same levels (1,363 and 1,022 t).

The Team recommends that both the reference period and OFL/ABC levels be re-evaluated after a few years of data from the restructured Observer Program have accumulated.

BSAI Squid

Olav Ormseth presented the squid stock assessment. This was a scheduled "on-year" assessment because all three surveys were scheduled, but the cancellation of the slope survey limited new information. The squid catch was low between 2009-2013, then has increased in 2014; it remains below the ABC but above the initial TAC. Most of this catch occurred near the Bering Canyon. Fishery catch data suggest multiple cohort fishing in 2007-2010, but unimodal in 2011-2013.

BSAI Octopus

Olav Ormseth presented the octopus assessment for Liz Conners. This was a full assessment year. There were no changes to the 2012 predation-based estimate of octopus mortality from 1984-2008 survey data on Pacific cod diets, which is used as an alternative Tier 6 estimate. The consumption methodology is based on extensive diet data and includes estimation of uncertainty. In the document, but not discussed during the Team presentation, the authors responded to comments from the May 2013 CIE review. Based on CIE comments, for the 2015 Team meetings the author has started to examine a size-based assessment model to use as a simulation model for identifying monitoring and management metrics, and for possible fitting to habitat pot data.