Minutes of the Bering Sea and Aleutian Islands Groundfish Plan Team

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The BSAI Groundfish Plan Team convened on Tuesday, November 16, 2010, at 1:00 pm. All members contributed to assessment reviews. As many as 35 members of the public attended parts of the meeting.

Eastern Bering Sea Pollock

Jim Ianelli, senior author of the EBS walleye pollock assessment, presented an overview of this year's SAFE chapter. Major results include the following: Biomass estimates from both the bottom trawl survey and the acoustic-trawl survey were much higher this year than last year. Estimates of spawning biomass for recent years have gone up, and spawning biomass for 2011 is projected to be 25% above B_{MSY}. Weights at age from the 2009 fishery were much larger than the recent 10-year average, meaning that fewer fish were harvested in 2009 than estimated in last year's assessment. The estimated strength of the 2006 year class has gone up, more in line with the estimate from the 2008 assessment than last year's assessment. The 2006 year class is estimated to comprise more than half of the total spawning biomass in 2010 (typically, no more than about 30% of the spawning biomass is contributed by a single year class). In addition, the 2010 acoustic-trawl survey showed signs of a strong 2008 year class. Because the large 2006 year class was produced when spawning biomass was low, the estimated slope of the stock-recruitment relationship has increased, which led to an increase in the estimate of F_{MSY}. The estimate of F_{MSY} would have increased even more, but the authors chose to ignore the 2008 and 2009 year classes in estimating the stock-recruitment relationship. The preliminary 2011 ABC as specified last year is 1.11 million t, and the authors are recommending a final 2011 ABC of 1.27 million t (a 14% increase) based on a five-year average harvest rate, which is well below the maximum permissible value of 2.15 million t. This stock is been managed under Tier 1.

In addition to the final model, the assessment included partial results from several other models. Some of these models were developed to examine which of the recent data had the largest impacts on results. Some of the data examined in this context were updated total catch, updated 2009 fishery average weights, updated age composition from the 2009 acoustic-trawl survey, and inclusion of annual estimates of relative precision for the acoustic-trawl time series. Of these, the assessment showed that the relative precision estimates had the largest impact on estimates of recent year class strengths. Other exploratory models included use of an ageing error matrix (last evaluated in the 2003 assessment) and an "acoustic vessels of opportunity" index which is intended to be used in next year's assessment to compensate for the lack of a 2011 acoustic-trawl survey.

Some other factors noted in the assessment include the following: Catch taken west of 170W has been increasing almost continuously since 1995. This was another cold year in terms of bottom temperature,

marking five years in a row of such conditions (compared to three years in a row for below-average surface temperatures). Euphausiid backscatter increased every year from 2004 through 2009, but was down slightly in 2010. Of the overall biomass estimated by the acoustic-trawl survey this year, only about 5% occurred in Russian waters (the percentage has been as high as 15% in previous years).

Team discussion focused on two issues. The first was the issue of whether the two most recent year classes should be ignored in estimating the stock-recruitment relationship. During the discussion of this issue, the following points were made (these are comments by individual Plan Team members and do not necessarily reflect Plan Team consensus):

1. If the recent year classes are excluded, this should be because the point estimates are too uncertain, not because they are large (i.e., consistency would require excluding recent year classes that are small and uncertain as well as those that are large and uncertain).
2. There are precedents for dropping the most recent recruitments from the time series in the case of Tier 3 stocks.
3. If the estimates of uncertainty associated with recent year classes are accurate, this uncertainty should propagate appropriately into the buffer between OFL and the maximum permissible ABC.
4. The confidence interval for 2010 spawning biomass estimated in last year's assessment does not include the point estimate from this year's assessment, indicating that uncertainty surrounding recent year classes may be underestimated by the model.
5. The desired level of conservatism, if any, should be built into the prior distribution for steepness rather than achieved by an *ad hoc* decision to ignore certain year classes.
6. Last December, the SSC cited several precautionary elements that are built into the EBS pollock assessment; if those precautionary elements are acceptable, perhaps the decision to ignore recent strong year classes when estimating the stock-recruitment relationship is also acceptable.
7. Perhaps there should be a policy that authors must always exclude some specified number of recent year class estimates when estimating the stock-recruitment relationship (or average recruitment, in the case of Tier 3 stocks).
8. Adoption of such a policy (see above) would require a decision as to whether the same year class estimates should be excluded from model projections.

After much discussion, the Plan Team decided to accept the model recommended in the assessment with the 2008-2009 year classes omitted in the estimation of the stock-recruitment relationship, without passing judgment on whether omission of these two year classes is appropriate. There were two main reasons for this decision:

In terms of harvest specifications, the choice of whether to include the 2008-2009 year classes affects only the OFL and the maximum permissible ABC. Even when the 2008-2009 year classes are excluded, the OFLs and the maximum permissible ABCs for 2011-2012 are all greater than the 2 million t OY cap for the overall groundfish fishery, meaning that the decision is largely academic for the present assessment.

The SAFE chapter does not include a complete set of results for the model with all year classes included, so there was really no other choice.

The Plan Team emphasized that this is a purely pragmatic decision for this year only and does not necessarily constitute a standing policy. The Plan Team also recalled its recommendation from last November that a workshop be held, or a working group be formed, to develop guidance regarding how to decide when a stock qualifies for management under Tier 1. The Plan Team believes that this recommendation should definitely be acted upon this year, with the terms of reference expanded slightly to develop guidance regarding which year classes to include in estimation of the stock-recruitment

relationship (for Tier 1 stocks) and which year classes to include in estimation of average recruitment (for Tier 3 stocks).

The other main item of discussion was the recommended ABC for 2011 and 2012. The assessment authors recommend setting ABCs for 2011 and 2012 below the maximum permissible level, specifically, at values corresponding to the average harvest rate over the most recent five complete years (0.332). Projected harvesting at this rate gives ABCs for 2011 and 2012 equal to 1.27 million t and 1.60 million t, respectively. Following discussion of the authors' recommendations and the maximum permissible ABCs, the Plan Team agreed with the authors' recommended ABCs. The Plan Team's primary reason for recommending ABCs well below the maximum permissible is the large hole in the age structure created by poor recruitments from the 2002-2005 year classes. While the Plan Team has recommended ABCs in excess of 2 million t in previous years when biomass was very high, the stock contained multiple large cohorts in those years, whereas about half of next year's catch is likely to come from a single year cohort (2006). Because recruitment is largely driven by environmental conditions, the Plan Team also felt that it would be advisable to take advantage of the present large biomass as a hedge against the possibility that the environment might return to the conditions that produced poor recruitment during the 2002-2005 period.

The Plan Team adopted the authors' values for 2011 and 2012 OFL, 2.45 million t and 3.17 million t, respectively. This stock is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

In the context of ecosystem considerations, multiple sources of information indicate that EBS pollock biomass is increasing. Relative abundance of euphausiids, a key item in the diet of pollock, increased for several years through 2009. This indicates that pollock prey is generally abundant, while the slight downturn in euphausiid abundance observed in 2010 may indicate the beginning of top-down control resulting from increased pollock abundance. The current draft of the BiOp does not indicate that reductions in the EBS pollock ABC are necessary to avoid jeopardizing the recovery of species listed under the ESA.

Aleutian Islands Pollock

Steve Barbeaux presented an update of the Aleutian Islands pollock assessment. In 2003, Congress determined that the AI pollock TAC would be set at 19,000 mt or less and allocated to the Aleut Corporation by Congress and the CDQ groups. In 2010, only 55 t of pollock were taken in the directed fishery. About 1,000 mt of pollock were taken as incidental catch, primarily in the cod fishery.

New data for this year's assessment include a summer bottom trawl survey estimate, new age data and 2010 catch data. The author noted that Aleutian Island pollock otoliths are harder to read than Bering Sea pollock otoliths. Trawl survey biomass estimates indicate that over time pollock abundance has diminished in the western and central Aleutians, and increased in the eastern area.

The author presented two versions of the assessment model. One model was similar to models presented in previous assessments. The second version added an ageing error matrix. Biomass estimates for the most recent years are somewhat less than values estimated in the previous assessment, most likely due to the addition of the 2010 trawl survey biomass estimate. Biomass currently is at about 30% of the unfished value because recruitment has been low. Biomass has been increasing for about a decade and approaching the value expected with no fishing.

The Team accepted the revised assessment model with ageing error included. In general, the Team recommends inclusion of an ageing error matrix in the assessment model if ageing error information is available. The preference is known age comparison because a reader-tester comparison may underestimate the error rate and the statistical distribution of the error rate.

The Plan Team determined that there are no ecosystem considerations that would cause the Plan Team to recommend an ABC different from the author's recommendation for 2011 of 36,700 t.

Bogoslof Walleye Pollock

Steve Barbeaux presented a brief update of the Bogoslof pollock assessment. No survey was conducted in 2010. The ABC and OFL values are the same as last year. There is a Bogoslof survey planned for 2011.

Pacific cod

The joint Teams accepted the author's preferred Model B (see Joint Team Minutes). Therefore the remaining issue for the BSAI Team was the OFL and ABC recommendations and ABC area apportionments.

Mike Sigler accepted the model, but suggested that the values of natural mortality and trawl survey catchability were uncertain; he noted that the stock size estimates included a lot of small fish from incoming year classes. Bill Clark observed that the uncertainty of M and q were not very different from other assessments and had been fully discussed in September. Grant Thompson said that small fish were only a small part of the author's recommended ABC for 2011. The Team approved the author's recommended OFL and ABC, set according to the standard control rule for a Tier 3b stock. Still, because of the influence of the incoming 2006 and 2008 year classes on projected biomass, the Team notes that the 2012 estimate may be lower next year than projected this year.

Kerim Aydin observed that in the absence of an area apportionment between the Bering Sea and Aleutian Islands, the exploitation rate of cod in the Aleutian Islands continued to be about twice that in the Bering Sea (based on simple ratios of catch and survey abundance), and biomass continued to decline in the Aleutian Islands. A member of the public commented that for various reasons (including Steller sea lion mitigation measures) cod catches in the Aleutians were unlikely to increase and were very likely to decline in 2011. The Team is nonetheless still concerned about the disproportionate exploitation of cod in the Aleutian Islands and recommends the earliest possible implementation of separate area ABCs.

Applying the Kalman filter approach to the updated (through 2010) time series indicates that the best estimate of the current biomass distribution is 91% EBS and 9% AI, replacing the previous proportions of 84% and 16% respectively.

The author informed the Team of his plans to develop a separate AI Pacific cod assessment in the near future.

Yellowfin sole

Tom Wilderbuer summarized the results of the assessment, noting changes to the input data. In contrast to last year's gender specific model, this year's model incorporated both gender and time specific selectivities. Catch history was reviewed, noting the particularly high foreign catches during the early years of the fishery. Plots of cumulative weekly catch indicated the similar pace of the fishery over the last few years, with the exception of 2007 when there were a number of closures due to halibut bycatch. A progression of maps displayed monthly changes in commercial catch locations for yellowfin, with catches distributed broadly near the western edge of the shelf early in the year, and becoming more focused toward the southern end of the shelf, and to the east of the shelf edge, as the year progressed. In 2009, 95% of yellowfin sole was retained.

Tom highlighted the utility of a gender-specific model by showing plots of differential growth patterns for males and females, females becoming heavier at age than males. The bottom trawl survey biomass estimate for yellowfin sole increased 36% between 2009 and 2010. Age composition plots indicated generally greater proportions of older fish in the fishery, compared to the survey. Tom noted the large 2003 year class.

Alternatives for using three different stanzas of spawner-recruit data to define the S-R relationship were mentioned. As a precautionary measure, data from the 1978-2003 period were used in estimating the relationship. The benefit, and success, of using bottom temperatures to model catchability was emphasized. Nine alternative models were used to evaluate the influence of different approaches for determining natural mortality (M) and catchability (q). The authors recommended - and the Plan Team supported - the use of the 2010 BASE model in which M was fixed (0.12) and q estimated based on bottom temperature.

Tom elaborated on the use of a fixed vs. estimated M as part of the model evaluation. An alternative model, which allows M for males to be estimated with the M for females fixed, yielded a good fit to the observed sex ratio. But the observed sex ratio during the survey is influenced by spawning in inshore areas and fitting the model to these sex ratios may not provide the most representative indication of the actual sex ratio. Therefore, the preferred model estimates q from the relationship between bottom temperature and survey catchability, with M fixed (=0.12) for both males and females.

The estimated selectivity for 2010 was used to estimate the 2011 ABC. Mike Sigler suggested the possibility of estimating selectivity in 4-year blocks (as was done by Paul Spencer for the POP assessment), rather than annually. Grant Thompson mentioned that for EBS pollock, constraints were placed on annual estimates of selectivity, and Tom indicated that constraints were also used in estimating annual selectivity for yellowfin sole.

In examining the fit of the modeled to observed biomass it was noted that the model estimate below both the 2010 survey point, and lower bound of the interval, estimates. Estimated female spawning biomass continues to trend toward the B40% level. Addressing recruitment, the strength of the 1981 and 1983 year classes and their continued contribution to the fishery was noted, along with suggestion that the 2003 year class would hopefully be fairly strong.

The Plan Team discussed the potential merits and ramifications of different approaches to estimating time varying fishery selectivity. The author estimated time-varying selectivity on an annual basis. This was contrasted with the approach used for some other species, such as Pacific Ocean perch, in which fishery selectivity was estimated in 4-year blocks. For population projections, the selectivity from the most recent year was used by the author. One reason given for using the most recent year was that this approach provided the largest buffer between the OFL and the ABC. The merits of this approach versus alternatives such as using an average of years were discussed at some length. A few Plan Team members (Cheng, Clark, Sigler, Hanselman) suggested considering the use of a mean of selectivities from recent (e.g. 2-5) years. Dana Hanselman suggested that retrospective analyses, using different sets of years for average selectivity, might be useful in evaluating the merits of averaging selectivities. Grant Thompson pointed out that the use of average selectivities would not affect the buffer between OFL and ABC, although it would affect the projections.

The Plan Team concurred with the use of the authors-recommended model, OFL and ABC. No specific ecosystem considerations were noted.

Plan Team recommendations For the next yellowfin sole assessment the Plan Team recommends that the author investigate using averaging selectivities for purposes of making projections.

Greenland turbot

Jim Ianelli highlighted recent trends in Greenland turbot abundance indices, catch, and quota. Quotas and catches have been at low levels. Catches increased from 2008 to 2010 due largely to greater catch of Greenland turbot in the arrowtooth flounder fishery. Survey catches from the 2010 Bering Sea shelf and slope surveys increased, substantially on the shelf. The longline survey index and AI trawl survey estimates of abundance declined. The AI index is not used in the assessment but is used for apportioning the biomass.

The author reviewed how a previous version of the stock synthesis model accounted for the influence of high historical catches in the foreign fishery by introducing a single large recruitment. That feature was lost in subsequent versions of SS until the most recent version in which it is again incorporated.

The BS shelf trawl survey abundance increased markedly, apparently due to a very big recruitment, which is strongly suggested by a high proportion of small fish (most likely age 1 fish) from the survey. This greater abundance is also reflected in the percentage of survey tows which had Greenland turbot; this percentage has generally ranged around 15 to 20%, but increased to more than 35% in the 2010 survey.

The patchy and yearly variation in the distribution of Greenland turbot is probably influenced partly by the extent of the cold pool with a heavy concentration of fish along the 0 degree isotherm. In the AI most of the turbot biomass is concentrated in the eastern AI, as evidenced by higher bottom trawl survey CPUEs.

In contrast to last year's relatively conservative ABC recommendation, this year the author recommends a full Tier 3a ABC designation. The author highlighted the dual length frequency modes in the fishery attributable to growth differences between sexes. The differential growth of males and females is reflected in surveys, contributing to varying sex ratios among years. In recent years there have been more males in the trawl survey. The proportion of females in the catch has varied considerably over time with males more prevalent in trawl catch and females, in longline catch. More fish have been consistently caught in the EBS trawl surveys in the 400-600 m depths which may be attributable to sexual segregation of fish, with males aggregating in that depth range. Sex specific changes from year to year contributed to variability in the area swept survey results.

With reference to the apparently strong recruitment reflected in the age compositions, Mike Sigler asked whether there could be some smearing of strong year classes, with contribution from more than a single year class to the apparent strong recruitment. The author responded that this level of recruitment has not been seen in awhile so this is probably not a case of smearing of more than one age class. Jane DiCosimo called attention to the differing trends of the surveys, with the trawl surveys showing varying degrees of increase, while the longline survey continued to show declines and was at the lowest level on record. Given the trends in abundance, and other changes taking place in the AI noted by Kerim Aydin and Mike Sigler, Jane stressed the importance of having future surveys in the AI. Kerim commented that the changes in the AI noted during the discussion provided impetus for him to revisit a guild analysis for the area. Mary Furuness noted that the OFL was applied to the BS/AI while the ABCs were applied to separate areas – i.e., EBS and AI.

The Team noted updates of the model, including modifications to the SS3 version from last year. The main modification was a change from using individual recruitments during the 1960s, to applying an expected recruitment value to 1960-1969. It was noted that the ABC - similar to last year – was appropriate given the model results. The substantial increase in new recruits was again noted, along with the apparent influence of these recruits on overall increased abundance of Greenland turbot. The Team supported the author's recommendations for ABC and OFLs for 2011 and 2012.

Plan Team recommendations. The Team strongly recommended that the 2012 AI trawl survey be conducted.

Arrowtooth Flounder

Input data of the present assessment includes arrowtooth flounder only as this assessment is no longer for the *Atheresthes* complex. Input data were updated with the inclusion of fishery catch and discards through 15 Oct. 2010. New data also included 2010 shelf, slope and Aleutian Islands surveys size composition and biomass point-estimates and standard errors. Estimates of retained and discarded portion of the 2009 catch were added. The current model includes the Aleutian Islands, Bering Sea slope and Bering Sea shelf. The biomass is modeled with 76% of the stock on the shelf, 14% in the Aleutian Islands and 10%

on the Bering Sea slope. The author presented the same model as last year. There is no comment from Plan Team.

Kamchatka Flounder

Tom Wilderbuer presented the first stock assessment model of Kamchatka flounder with Tier 5 status. In the eastern part of their range, Kamchatka flounder overlap with arrowtooth flounder which are very similar in appearance and were not routinely distinguished in the commercial catches until 2007. Until about 1992, these species were also not consistently separated in trawl survey catches and were combined in the arrowtooth flounder stock assessment. However, managing the two species as a complex became undesirable in 2010 due to the emergence of a directed fishery for Kamchatka flounder in the BSAI management area. Since the ABC was determined by the large amount of arrowtooth flounder relative to Kamchatka flounder (complex is about 93% arrowtooth flounder) the possibility arose of an overharvest of Kamchatka flounder. ABC exceeded the Kamchatka flounder biomass. In addition, observers can distinguish between arrowtooth and Kamchatka flounders when they have it in hand. He proposed to use 7 years running average of biomass. Due to the high catch of Kamchatka flounder in a small area around the eastern AI, the Plan Team recommended the authors report the catch and exploitation rate of both EBS and AI in the next year stock assessment and explore the option of apportionment between the above two areas.

Northern Rock Sole

The 2009 fishery and survey age comps were added to the model. The survey biomass is 34% higher than last year. The catch last year was ~53,000, 25% of ABC, an exploitation rate of <0.04. Rock sole are heavily fished for roe in February and March. Catch is limited by the demand for row. Otherwise rock sole is bycatch of the yellowfin sole fishery.

An improvement to the model this year is the addition of time-varying length at age. Rock sole size stanzas were used. NRS were larger in 1982-91 and smaller in 1992-2003. There appears to be a density dependent component in the size changes. Length-at-age changes the model results. This is critical; it is important in the model and is only done for NRS and Pacific halibut. Weight changes at age 6-7, maturity. At that time females become larger than males. Bill Clark asked for an explanation of the length-at-age model. It is summarized as a plot of length converted back to age. There are a lot of small fish out there in both the fishery and the survey.

Author recommends Model 1, the base model fixes q=1.5. The split -sex model that was implemented last year is used. Sex ratio = 50:50 in survey. In summer during the survey, NRS are spread across shelf feeding, evenly distributed. In winter spawning is at the shelf break. There was good recruitment early 2000s and low recruitment late 1990s. Time varying changes in model for fishery selectivity makes the population estimate appear to go up 34%.

The SSC expressed concern over the narrow range between the ABC and OFL estimates in the past few years. They recommended convening a workshop to explore formal procedures to address the situation. A workshop has not yet been scheduled, but the authors addressed the issue through the use of a time-varying fishery selectivity, which increased the buffer between ABC and OFL from 1.4% in 2009 to 9.6% in 2010.

There are no ecosystem effects of concern. There is little to no information on availability of food, which is polychaetes; production levels are unknown. The team noted that there appears to be a density-dependent effect that caused length-at-age differences.

Flathead Sole

The flathead sole/Bering flounder stock assessment was presented by Buck Stockhausen. Recent trends in the fishery show catch has decreased slightly from 2008 and retention has increased. Prohibited species catches were similar to those in recent years. Additional information on bycatch of non-prohibited species and catch by gear type and statistical area were also presented.

Bill Clark asked about field identification of Bering flounder and was told gill raker count was the definitive characteristic. Color and shape are also used in areas away from species overlap. Current estimates of misidentification are about 1%. The patterns of fishery and survey catches do not match well. This may be due to the patchy distributions of both species, possibly an association with undersea canyons. Fishery size compositions showed little change in the pattern of sizes with no clear evidence of recruitment.

The 2010 Bering Sea survey included an extension into the northern Bering Sea. Bottom temperatures were slightly warmer than the last few surveys. The biomass estimate of just over 507,000t represents a 19% increase from 2009, possibly a temperature effect. There was about a 2% increase in biomass in the Aleutian Islands of which about 2% is Bering flounder. No flathead sole were observed in the northern Bering Sea and Bering flounder were most abundant west of St. Lawrence Island. There was little difference in age and size composition from the 2009 survey.

The base assessment model was the same as last year and the authors are developing a new model they hope to present next year. Data updates included updated 2009 and size compositions and the most recent 2010 age and size data, and data from the 2010 eastern Bering Sea and Aleutian Islands surveys. Four models were examined: 1) the base model from last year, 2) the base model without temperature-dependent catchability (TDQ), 3) the base model with a Ricker stock recruitment function, and 4) the base model with a Beverton-Holt stock recruitment function. Except differences in biomass estimates, all four models get near identical results. Generally, the base model which included TDQ gave the best fit and Buck recommended remaining in Tier 3.

The model results showed different size selectivity curves for the survey and fishery with the 50% selectivity occurring at a larger size in the fishery. The spawning biomass remained flat and there was a slight decrease in the total biomass. There appeared to be good recruitment from the 2007 year class. The current assessment differed little from recent past assessments. A five year projection of average fishing mortality indicated overfishing is not occurring. The authors recommend an OFL of 83,321t and an ABC of 69,348t for 2011.

Abundance of Bering flounder is trending down, but estimates from the northern Bering Sea are equal to the standard surveys which may help to offset the decline. Size compositions for Bering flounder indicated a possible recruitment from the 2010 year class which was absent otherwise. This recruitment event was present in all three survey areas.

Mike Sigler asked if there was a problem with average recruitment in the model relative to Tier 3. Kerim noted there were similarities with other flatfish. Buck pointed to differences in breaks in the time series.

The Plan Team agreed with remaining in Tier 3 and accepted with the author recommended OFLs and ABCs.

Alaska Plaice

Changes to the assessment this year are added shelf survey data and age composition. Because there is no fishery for Alaska plaice, there are no fishery data. The exploitation rate is <1%. The survey area in 2010 was expanded to include not only the standard EBS and the NW (Northwest) areas, but also the north Bering Sea (NBS) where 38% of the biomass was found. The total survey biomass estimate decreased slightly from last year.

Last year a split sex model was assessed. The SSC requested the authors to estimate sex-specific natural mortality. In the past, the authors always used 0.25 based on northern rock sole. AK plaice live long so that M should be lower. Wilderbuer tried to figure out what M really was by first examining literature values for M. numbers. Bill Clark asked if he fixed q to estimate M. Tom did not do that; he did profiling. The result was that M was revised downward from 0.25 to 0.13 for both sexes. This makes F lower, more like a flatfish. These fish live long and should have lower F.

In past assessments, the authors assumed there was a herding effect and q was changed to compensate for that. Last year q was 1.2. However, because 38% of the total survey biomass was in northern Bering Sea, they now assume the 2010 survey actually sampled all AK plaice distribution area. Everything is based on past estimates when they had to adjust for stock being outside of survey area. Bill Clark suggests that the stock is not mixed and because there is no fishery there is a huge unexploited component in the NBS. He suggested that the unexploited component should not be considered part of stock assessment.

Recruitment has been flat over recent years, not going up. There was good stock recruitment 2002-2003, coherent with yellowfin sole, northern rock sole and Greenland turbot. Cause unknown.

Grant Thompson said that the big F before (reference) not just because M was high, but because AK plaice mature ~5 years before recruit to fishery and have spawned a lot before caught. FOFL change to 0.19 from 0.77 because age comp estimate of M is now much lower. It now fits idea of a flatfish kind of species. Mike Sigler noted that trawl catchability is now reduced 1.2 to 1.0 and it does not matter because it is lightly fished. Now we know there appears to be a northward limit to distribution. Discuss if there are biological limits or catchability limits. This time it is balanced. Consider if the stock was being fished. AFSC plans to do expanded fishery survey to this northward area in 2013 so that will add more data to examine this concept. Henry Cheng believes M = 0.25 is really high; the new estimate of M is more realistic because of examining the growth parameters. Male k is estimated low, because t0 = -4. The team discussion whether to force it through 0.

Other Flatfish

This is a non-target species complex with an annual catch of ~2000 T captured as bycatch. From 1982 to 2009 there was change in trends of species caught. Originally it was composed mostly of longhead dab, but now it is mostly starry flounder. In the past the SSC expressed concern about catches of butter sole; the Plan Team determined it is not a concern. The exploitation rate of butter sole decreased from 0.31 in 2009 to 0.08 in 2010. An Aleutian Island survey was conducted in 2010.

The author showed data and plots on Sakhalin sole in northern Bering Sea. We pondered if they are moving north. Tom thinks they are a western species. There is little ecosystem knowledge about Sakhalin sole in the Bering Sea.

Pacific Ocean perch

Paul Spencer presented the BSAI Pacific ocean perch (POP) assessment results. Paul first showed a summary slide to show that the major model changes were an evaluation of time varying fishery selectivity, updating of growth curves, and recomputing the age/length conversion matrix. New data added were the 2010 AI survey biomass estimate and length composition, 3 years of fishery age composition, and a survey age composition. He then showed that there was a large increase in AI survey biomass (46%). Since 2002 there has been an increase in biomass estimates. This increase was seen in all areas of the AI. The largest area of increase was in the Southern Bering Sea. He showed that in the survey age compositions, there were signs of fairly consistent strong recruitment recently. He looked at three potential models where Model 1 is the 2008 model, Model 2 is time varying fishery selectivity in four year blocks, and Model 3 uses a constant fishery selectivity curve. He looked at the models based on the AIC and found that Model 2 performed best because of far fewer parameters. The patterns of time varying selectivity looked consistent between Models 1 and 2. POP are generally caught in deep water when they

are abundant. This is likely why there are changes in fishery selectivity over time as older fish are deeper. Grant Thompson asked why some assessments are doing different things, some use oceanographic regimes, constant increments or blocks, or annual varying. Paul does not think that is sensible to do this every year when the fishery is not likely changing every year. Bill Clark said that the goal is to best estimate catch-at-age, so in some cases annually varying can be good, but thinks this approach is good too. Paul next showed exploratory runs to evaluate the effect of new information. A total of six additional runs were conducted with different sets of data. Dave asked what the difference was between A1 and 2008 model. 2008 is the actual 2008 model run through 2008, A1 is run through 2010. The survey biomass estimate in 2010 does not change the catchability, but the age and length comps do. He is recommending Model 2 where the catchability goes down relative to the 2008 model value of 1.57. Dana Hanselman asked why there is no model excluding the 2010 length composition. Paul described that one of the reasons for the abrupt change in results was not having an AI survey in 2008. He said a 2008 biomass estimate might have mediated this change. He showed a time series of recruitment for Model 2 compared to the 2008 model where the whole series of recruitments shifted up with the addition of new data. He then showed the phase plane plot. He then showed summary table. Paul and his coauthor think that this increase is real based on age and length compositions and survey biomass increases. He then showed the apportionment and noted that the EBS increased pretty substantially. The apportionment is based only on the Aleutian survey, with no population status estimates from the EBS. Mike Sigler suggested we review the evidence for the big jump in ABC. Mike asked if the previous predicted biomass went above the historic points as it does now. Paul said he thought so. Dana asked about what new data supports the large increase in historic recruitment. Paul thought that while the model doesn't fit the new composition data perfectly, there is probably some information in there. Paul showed that when you compare the fishery and survey data from 2006, the same year classes show up. Jon Warrenchuk thinks the methodology for apportionment to the BS is looking at a small part of the BS that extrapolates over the whole Bering Sea. There is some concern that level of apportionment could lead to localized depletion in the northern Bering Sea. Second, this large increase in ABC could have potential impacts on EFH or other ecosystem analyses that did not consider this much take in the Aleutian Islands. Lastly, on the discussion of bycatch, this fishery catches a lot of Atka mackerel, which could be problematic due to the SSL Biological Opinion (BiOp). Mary Furuness said the unallocated bycatch is minimal. The SSL BiOp is likely to prevent retention of Atka mackerel, so there won't be targeting. She said it was still possible that an increase could occur. She thinks a lot of the incidental catch you see of Atka is actually topping off, not accidental bycatch in 543. Steve Whitney said that the historical catch of Atka in the POP fishery is not high. Mary said that bycatch from 2008 onward is the relevant data set because of changes in regulations. Paul corrected from earlier, the apportionment does not use the EBS slope survey to apportion catch. Mary said we did not open POP in the Bering Sea this year to the Amendment 80 fleet, and will probably do it again next year with this high of a TAC. Jane DiCosimo reiterated that if we had an AI survey in 2008, this might not have looked so abrupt. Paul presented that the average of survey projections until 2023 as an intermediate value. Grant suggested that we have used stair steps in the past. Dana said he would like to see some type of intermediate value based on the sensitivity of the model and the catchability estimate to one new survey biomass estimate and new compositional data. Henry said that there is either a problem with the survey or the model to predict such a large change for a long-lived species. Mike said that we would like to see a confirmatory survey to go to the full ABC. It was noted that it has been said that we are not supposed to give best estimates and not conservative estimates. Dana said that when a model gives you an answer that is outside the bounds of biology, then it is sometimes necessary to choose a different model or to make a temporary adjustment whether up or down. Grant said stair step numbers were one way to do this. Mike suggested a stair step to be flat for two years until we get an additional AI survey. Dana said to use the 2013 full ABC when doing specifications in 2011. The group agreed to a stair-step half-way to 2011 ABC for two years until we see a new 2012 AI survey.

Northern Rockfish

Paul Spencer presented the 2010 northern rockfish assessment; the last full assessment was presented in 2008 with an updated assessment in 2009. Changes to the current assessment relative to the 2008 assessment included data updates and some changes in methodology. Data updates were the 2010 catch, biomass and length composition for the 2010 Aleutian Islands (AI) survey, the 2006-2007 fishery age compositions, and the 2008-2009 fishery length compositions. Changes to the assessment methodology consisted of estimating the fishery selectivity curve without constraining the parameters to be similar to the survey selectivity curve, re-estimation of the growth parameters, and reducing the years in which recruitment for recent year classes is not estimated from 7 years to 3 years.

The 2010 AI survey biomass estimate of 217,319t was very similar to the 2006 estimate (217,975t), the spawning biomass has been slowly increasing over the past decade and F has been decreasing. The spatial pattern of the 2010 survey CPUE is similar to previous surveys. The age of 50% selectivity for the fishery is 12 years relative to 6.4 years for the survey. Changes in selectivity have resulted in increases in FOFL and FABC of 39% and 35%, respectively.

Bill Clark noted that the model consistently underestimates the early fishery age compositions and overestimates the age compositions for ages 20 and above. Paul responded that this discrepancy is due to the influence of the 23+ age group which is typically quite large.

Grant Thompson pointed out that the error bars for the estimated recruitment graph had the same height as the number of recruits for several years and asked about the window of exclusion. Mike Sigler noted that the CVs are consistent so all the data should be retained. Paul responded that the years of strong recruitment behave well in the model.

The Plan Team accepted the model which was similar to last year's model. Ecosystem considerations concerning the AI/Bering Sea split were noted. The author-recommended 2011 and 2012 OFLs and ABCs were accepted by the Plan Team.

Blackspotted/Rougheye rockfish complex

Given the uncertainty in recent recruitments and their influence on B40%, Spencer considered various options: i) adjusting the input weight on the 2009 fishery and 2010 survey length compositions; ii) adjusting the input variance of recruitment residuals; and iii) excluding recent high uncertain recruitment estimates from the computation of B40%. The Plan Team decided to use only the recruitment estimates of the 1977-1995 year classes in the calculation of B40% because the uncertainty of recruitment estimates after 1995 increases greatly. The Plan Team recommends that this stock qualifies for management under Tier 3 due to the availability of reliable estimates for B40%, F40%, and F35%. Because the female spawning biomass of 5,800 t is over B40%, (4,739 t, AI only), sub-tier "a" would be applicable, FFOL=0.041 and FABC=maxFABC=0.034., and is different from the sub-tier "b" adopted last year. The Plan Team recommends allocating the ABC to two areas: 1) Western and Central AI area and 2) Eastern AI and EBS area. The rationale for this recommendation is that the available information on stock structure for blackspotted rockfish indicates an 'isolation by distance' pattern without clear physical breaks in stock structure, and this division of the ABCs results in management areas that are more consistent with the available information on stock structure. Although the current pattern of harvest does indicate disproportionate harvesting within the western Aleutians, the Plan Team did not feel the scale of harvests in this area warranted a separate western AI ABC at this time.

Shortraker rockfish

Paul Spencer presented results from the 2010 shortraker rockfish assessment. He said there were no model changes for shortraker rockfish. He showed spatial maps of survey CPUE noting that it is patchy. The model is a Kalman filter fit of a surplus production model to the survey biomass estimates. The

survey biomass estimate increased about 50% from 2006. Estimated fishing mortality has been typically quite low, at about ½ of what you might expect F_{ABC} would be if it were managed under Tier 3. He thinks this would be a good candidate to look at for stock structure template because of the catch patterns in the Bering Sea versus the Aleutian Islands. The Plan Team approved the author's ABC and OFL recommendations.

Other rockfish

Paul Spencer presented other rockfish and proposed a new weighted average of the most recent surveys used to compute average biomass for apportionment which is similar to Gulf of Alaska apportionment using a 9:6:4 weighted average of the last three surveys. "Other rockfish" is all *Sebastes* and *Sebastelobus* species, except for Pacific Ocean perch, and rougheye, blackspotted, northern, and shortraker rockfishes. New data are 2010 estimates of survey biomass. The Aleutian Island biomasses decreased in 2010, while the slope survey increased. The largest proportion of both areas' biomass is short-spine thornyhead (SST). Both areas are on an upward trend overall. 0.03 is used for SST natural mortality and 0.09 for non-SST species. ABC and OFLS increased for 2010. The Plan Team endorses the ABCs and OFLs recommended by the authors.

Squid

Olav Ormseth presented an updated chapter, which included new information that described the seasonal pattern of incidental squid catches. The Plan Team agreed with the author's OFL and ABC recommendations, which were unchanged from last year.

Skates

Olav Ormseth presented an updated assessment. No changes were made to the Alaska skate assessment and other skate biomass was estimated from the three most recent surveys. The Bering Sea shelf has the lowest species diversity, the Aleutian Island area has mostly Aleutian and whiteblotched skates, and the slope has the highest species diversity. The Plan Team agreed with the author's OFL and ABC recommendations based on the sum of Tier 3 for Alaska skates and Tier 5 for other skates. The Plan Team scheduled a discussion of separate management of Alaska skates and "other skates" for September 2011.

Shark

During the joint Plan Team discussion the BSAI Team agreed to a Tier 6 rule with OFL set at the 90th percentile of the total shark catch. Later the Team agreed on a Tier 6 rule with OFL set at the maximum catch for octopus and decided to revisit the shark OFL. After some discussion the Team agreed that there was no good reason to use the maximum catch in one case and the 90th percentile in another, and that it would recommend OFL set at the maximum catch of all shark species. In the BSAI, the 90th percentile would have been 764 mt, taken in 2001. The maximum catch is 1,362 mt, taken in 2002. Since 2002, the annual shark catch has averaged 355 mt (Table 3 in the SAFE chapter). With OFL = 1,362 mt, ABC = 0.75*OFL = 1,022 mt.

The only species of concern in the BSAI is sleeper shark. Dogfish are rare this far north and caught in only small numbers. Salmon sharks are pelagic and therefore not vulnerable to most fisheries. Some are taken in the pollock fishery, but they constitute only about 10% of the total take. Sleeper sharks constitute 70% of the total catch, taken mainly in the pollock and Pacific cod fisheries. They are certainly vulnerable to those gears.

A Tier 5 OFL for sharks is not possible because sharks are rarely caught in trawl surveys except for the Bering Sea slope survey, where sleeper sharks are taken in about 10% of hauls. Salmon sharks are almost never seen in trawl survey catches. While the trawl survey estimates are not reliable, Henry Cheng suggested that it would be possible to calculate the average swept area estimate of absolute abundance

from all surveys (shelf, slope, Aleutians) to see whether it could provide the Tier 6 OFL. The average estimate is 10,000 mt (Table 12 of the SAFE chapter), almost all consisting of sleeper sharks. With $M = 0.097$, a Tier 5 OFL for sleeper sharks would be 970 mt, approximately equal to 70% of the OFL for all sharks. So while not usable for a Tier 5 determination, the survey data suggest that there is at least enough biomass to provide the OFL.

Sculpins

Olav Ormseth presented a straightforward update from last year, with revised catch data and 2010 survey results. The team endorsed the author's application of revised life-history information for separate M estimates for 7 species, and different M estimates for the EBS and AI. The Team accepted the author's recommendations.

Octopus

Liz Conners presented an update of the BSAI assessment. The author computed ABC and OFL values using tier 6 average and maximum 1997-2007 catch. The Plan Team felt that separating octopus into its own management category for 2011 provided sufficient conservation for this group at this point and that adopting an OFL based on average catch was not necessary given that this group is caught incidentally.

Adjourn The Team adjourned on Friday at 4:00 pm.