

Minutes of the Joint Plan Teams for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea Aleutian Islands

August 30 - September 1, 2011
North Pacific Fishery Management Council
605 W 4th Avenue, Suite 306
Anchorage, AK 99501

BSAI Team

Loh-Lee Low	AFSC REFM (BSAI chair)
Mike Sigler	AFSC (BSAI Vice chair)
Kerim Aydin	AFSC REFM
Lowell Fritz	AFSC NMML
David Carlile*	ADF&G
Alan Haynie	AFSC REFM
Jane DiCosimo	NPFMC (Coordinator)
Yuk. W. Cheng	WDFW
Brenda Norcross	UAF
Mary Furuness	NMFS AKRO Juneau
Grant Thompson*	AFSC REFM
David Barnard	ADF&G
Leslie Slater*	USFWS
Dana Hanselman	AFSC ABL
Bill Clark	IPHC

GOA Team

Jim Ianelli	AFSC REFM (GOA co-chair)
Diana Stram	NPFMC (GOA co-chair)
Sandra Lowe	AFSC REFM
Chris Lunsford	AFSC ABL
Jon Heifetz	AFSC ABL
Mike Dalton	AFSC REFM
Kristen Green	ADF&G
Tom Pearson	NMFS AKRO Kodiak
Nick Sagalkin	ADF&G
Paul Spencer	AFSC REFM
Leslie Slater*	USFWS
Nancy Friday	AFSC NMML
Yuk. W. Cheng	WDFW
Ken Goldman*	ADF&G
Bob Foy*	AFSC Kodiak
Sarah Gaichas	AFSC REFM
Steven Hare*	IPHC

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Introduction: The Joint meeting of the Gulf of Alaska (GOA) and Bering Sea Aleutian Islands (BSAI) Groundfish Plan Teams convened Tuesday, August 30, 2011 at 1:00 pm at the Alaska Fisheries Science Center in Seattle, Washington. Introductions were made. Ten members of the public, 14 agency staff, and 6 observers from the Ministry for Food, Agriculture, Forestry and Fisheries of the Republic of Korea attended.

Agenda: The Joint Plan Teams adopted the agenda with the following revisions: 1) added a report of the NMFS stock assessment prioritization working group, 2) the timing of the presentation of GOA survey results was revised in the GOA Plan Team agenda, and 3) review of the EBS Pacific cod model will be discussed and questions will be forwarded to Grant Thompson through the minutes for a subsequent response due to his absence.

Administrative issues: The Teams will coordinate potential changes or modifications to the introductory chapters for the BSAI and GOA SAFE reports for November to make them as consistent as possible. Team members were assigned topics for preparing the minutes from this meeting and reminded of the use of google docs for compiling the Plan Team minutes and proposed revisions to research priorities.

Observer Program restructuring: Craig Faunce provided an overview of the Council's preferred alternative to restructure the North Pacific Groundfish Observer Program (NPGOP) including the current nested sampling design with proposed randomization of observers at the trip and vessel level of sampling. To gain efficiency in deployment of observers, observers would not be deployed onto small catcher vessels (e.g. those under 40' using fixed gear). Electronic monitoring (EM) has been proposed as an alternate tool for the Agency to employ in lieu of a physical observer to monitor this portion of the fleet. EM data would be used to test the hypothesis that the

unobserved fleet represents a portion of the observed fleet (and thus discard rates from observed vessels can be applied to landings of unobserved vessels). It is intended that EM will be functional and ready for implementation for these unobserved vessels at the same time as when the restructured observer program would be implemented. The draft proposed rule will be reviewed by the Observer Advisory Committee at its September meeting and by the Council at its October meeting. This schedule would allow for publication of a proposed rule in January 2012 and final rule by September 2012. Implementation is scheduled for the start of the 2013 calendar year. One provision of the Council's preferred alternative is the production of an annual observer report. This report would be annually available for Plan Teams to review beginning in September 2012. Craig also noted the creation of an observer restructure analysis group for advising the Fisheries Monitoring and Analysis Division of the AFSC in the design of an efficient observer deployment strategy to support in-season management and the annual stock assessments.

Team members requested clarification on how stock assessment projections would fit into effort projections for the next year's assessment. Craig noted a new hire will be evaluating past fleet effort and future funding interactions to develop a model for anticipated coverage rates, and anticipated available quota being a considered factor. Craig reported that he will forward the Plan Teams' interest in how restructuring would affect stock assessment needs with the observer restructuring analytical group. Team members noted that the data collected by observers on previously unobserved portions of the fleet (e.g. < 60' catcher vessels including those targeting Pacific halibut) are very important to current and future stock assessments. How these data will be incorporated into annual assessments will continue to be a topic of discussion by the Teams. While historical estimates are available better estimates will be available soon and this will have a potentially substantial positive effect on species such as those in Tier 6 management.

Proposed changes in GOA and BSAI Halibut PSC limits: Jane DiCosimo briefed the Teams on the Council's schedule to take initial review and select a preliminary preferred alternative on GOA halibut prohibited species catch (PSC) limits at its October meeting in order to implement changes through the 2012 annual harvest specifications. She reported that the Council has noted its intent to consider revising BSAI halibut PSC limits in the future. BSAI halibut PSC limits are established in regulation while GOA limits are set in the annual harvest specifications. Under a separate action the Council may amend the GOA Groundfish FMP to put halibut PSC limits in regulation, similar to the BSAI FMP, in order to remove them from annual harvest specifications.

Jane reviewed the Council's June 2011 action plan for proposed GOA halibut PSC limit changes. The timing of the development of the analysis (released two weeks prior to the Council meeting) did not permit review by the Team (which met weeks earlier than typical and four weeks before the Council meeting). She referenced, but did not present, the findings of an analysis that IPHC staff prepared on the effects of the proposed (0/5/10/15 percent) reductions of trawl and hook-and-line PSC limits. The Team discussion generally noted 1) the GOA Team has not traditionally advised the Council on halibut PSC limits, 2) timing did not allow review of the analysis, and 3) the current schedule does not account for 2011 GOA trawl survey results or harvest specification recommendations from the GOA PT or SSC in the analysis.

A member of the public expressed concern that the GOA Plan Team was not being adequately consulted in the Council's current schedule for action compared to implementation for 2013 which would allow inclusion of new trawl survey data and stock assessment results in the EA. The GOA Team will take up this agenda separately on Friday to discuss what comments may be provided to the Council at this time and a plan for potential further review in November, although similar timing issues may occur.

Salmon bycatch actions: Diana Stram provided a brief overview of recent Council actions on salmon bycatch management in the BSAI and GOA pollock fisheries. In the Bering Sea the Council is scheduled to develop revised management measures for non-Chinook (chum) salmon bycatch measures in April 2012. The Council had previously taken action in 2009 to recommend PSC limits by season and sector in the BS pollock fishery for Chinook salmon under Amendment 91. The fishery is in the first year of operation under this new management program. In the GOA, the Council took final action in June to recommend area-specific limits in the WGOA and CGOA for Chinook salmon PSC limits. These limits are intended to be implemented in mid-2012. Other measures to be implemented in conjunction with this action include full retention of salmon in the GOA and observer coverage modifications. A follow up action will be discussed by the Council in December 2012 for more comprehensive Chinook salmon bycatch management measures in the GOA.

Pollock survival: Ellen Martinson (AFSC) presented a talk titled “Connecting Ecosystem to Stock Assessment: BASIS Project”. BASIS is a collaborative effort and is a fisheries, oceanography and acoustic survey in the eastern Bering Sea. The strategy is to evaluate the interaction between climate and biological controls on commercially important species. Ellen described information from the survey and other sources (e.g., fish energy density) on pollock early life survival. The primary hypothesis is that the fitness and abundance of age-0 pollock during late summer are predictors for overwintering survival to age-1 and thus year class strength. Recent warm (2001-2005) and cold (2006-2010) years provide contrasting conditions that inform these relationships. For example, large crustacean zooplankton, which are important age-0 pollock prey, were more abundant during cold years and were more important in age-0 pollock diet as well. In cold years, age-0 pollock began winter with higher energy reserves. A comparison of observed pre-winter energy content and year class strength indicates that energy density is a predictor of year class strength. Ron Heintz derived this relationship, which predicts that the 2010 year class strength (at age-1) is 39 billion fish. In a separate analysis by Ellen of temperature as a predictor, the 2010 prediction is 48 billion fish. In turn, these values can be compared to the stock assessment model update expected for November 2011. Finally, age-0 pollock vertical and horizontal distributions are affected by the locations of the cold pool (<2 deg C) and the pycnocline (rapidly changing water density) from year-to-year.

Pacific cod: The Teams reviewed the model chosen for the EBS and GOA assessments in November 2010 (called “Model B” at the time) which had the following main features:

1. M fixed at 0.34.
2. Length-specific commercial selectivities for all fisheries, some forced to be asymptotic, estimated for blocks of years.
3. Age-specific survey selectivity with an annually varying left limb. Survey catchability fixed at the value obtained in the 2009 assessment, where it resulted in the product of catchability and selectivity at 60-80 cm equal to the desired value of 0.47.
4. Assigning aging bias +0.4 y at all ages.
5. A single growth schedule for all years (previously cohort-specific).
6. Five fishing seasons (previously three).
7. 1 cm length bins (previously 3 cm).

Another candidate (“Model C”) had the same features but made no use of the age data. It matched the survey length modes much better than Model B but was rejected due to an odd feature of the Stock Synthesis software whereby it estimated lengths at age that were off by a year. It also produced impossible estimates of abundance in the GOA. Both models converged weakly, with a CV of 10-20% for the estimate of 2011 biomass in perturbation trials in the neighborhood of the maximum likelihood estimate. Treatment of possible age reading bias in Model B also remained a concern. It was hoped at the time that this problem might be resolved by estimating age reading error distributions within Stock Synthesis, which was expected to be implemented in 2011.

A CIE review of the Pacific cod assessment occurred in March 2011, and the Plan Teams held an online meeting in May 2011 to formulate a suite of models for consideration at this meeting, based on earlier concerns about Model B and recommendations from the CIE reviewers. The Teams also referenced SSC recommendations from June 2011. The Teams requested that last year’s preferred model (“Model B”) be carried forward as Model 1. In addition they requested the author (Grant Thompson) try the following new models:

1. Model 2a: same as Model 1 but with selectivity schedules parameterized as cubic splines. (Grant used 5-knot splines to approximate the number of parameters in the double normal.)
2. Model 2b: same as Model 1 but with pre-1982 survey data omitted. This model produced estimates of recruitment and present biomass very similar to Model 1, and it is simpler, so it became the base model for the remaining candidates.
3. Model 3: same as Model 2b but with aging error estimated internally.
4. Model 4: same as Model 2b but without using the age data.
5. Model 5: same as Model 2b but with the blocks of years adopted for estimating selectivities (including survey selectivity) chosen on the basis of AIC.

In fact Model 5 was suggested by a member of the public, and it was requested that it be run as a modification of “the author’s preferred model”, so Grant first developed his preferred model, which turned out to be quite different

from Models 1-4. He called it Model A, and it differed from Model 2b in the following major ways. Model 5 inherited these features, except for the temporal treatment of selectivities.

1. All commercial gear types were combined into a single commercial fishery with a single composite selectivity in each of the five seasons. Selectivity in Season 4 was forced to be asymptotic.
2. All length frequency data were used. (In Models 1-3 length frequencies were not used in places where age data were available.)
3. Mean size-at-age data were omitted (unlike Models 1-3).
4. The Richards growth equation was used (rather than the von Bertalanffy).
5. Aging bias and variance were estimated internally, as in Model 3.
6. The standard deviation of log R (σ_R) was estimated internally. (It was fixed at last year's value in Models 1-4.)
7. Survey selectivity was modeled as a function of length rather than age.
8. The base (average) value of survey catchability was estimated iteratively to locate the value where the average of catchability times selectivity at 60-80 cm was equal to 0.47.
9. Zero-sum annual deviations (devs) of survey catchability from the base value were estimated iteratively to locate the values where the standardized residuals of the survey abundance predictions were equal to one. (In effect, survey catchability was allowed to vary as much as necessary to fit the data as closely as the sampling variances suggested should be possible.)
10. Six of the double normal selectivity parameters (two each in Season 1, Season 3, and the survey) were modeled as random walks, with σ_{dev} tuned iteratively to make the input and output standard deviations equal.
11. Age composition variance scalars were estimated iteratively to make the scaled input sample sizes equal to the effective sample sizes.

Model performance and Team discussion

Because Grant was unable to attend this meeting Jim Ianelli led the Teams through the models and results. Much of Grant's paper, and the Teams' discussion, concerned the convergence behavior of the various models. Henry mentioned the use of retrospective analysis for model selection because forecasting is one of the primary objectives in model fitting. A well fit model may not perform well in retrospective analysis. A three to five years timeframe should be considered to verify the performance of all proposed models.

The convergence tests consisted of locating the maximum likelihood estimates (by slightly perturbing successive converged MLEs) and then refitting the model with an initial parameter vector obtained by adding larger or smaller random deviations ("jitters") to the MLE vector. The deviations were logit values drawn from a normal distribution with mean zero and standard deviation equal to twice the nominal jitter rate, either 0.1 or 0.01. The random logits were added to the MLE parameter values on the logit scale, which in conjunction with the lower and upper bounds on each parameter determined the random initial values.

Performance of a model was measured by: (i) how often the fits with random starting points reached the MLE (match rate), (ii) the root mean squared deviation of the negative log likelihood from the minimum (likelihood variation), and (iii) the CV of the estimate of present biomass. By these measures of robustness, most of the new candidate models were inferior to Model 1. Model 2a showed high likelihood and biomass variability. Model 2b had a higher match rate than Model 1 and a similar biomass CV but higher likelihood variation. Model 3 had a zero match rate and astronomical variability. Models A and 5 seldom even converged at a jitter rate of 0.1, but performed quite well at a jitter rate of 0.01. The exception was Model 4, which was substantially more robust than every other model in every respect. The extent that the variability shown by some models was due to a few extreme values rather than a lot of moderate deviations was raised and should be examined in future presentations of this sort.

A number of concerns about the models and the convergence tests were raised during the Teams' discussion:

- (i) The jitter tests, at least with a jitter rate of 0.1, are not necessarily meaningful because they can produce wild and perhaps even impermissible starting values. In particular, it seems possible that the the hugely variable performance of Model 3 in jitter tests is the result of some quirk.

- (ii) In Model A (and Model 5), the catchability and selectivity deviations are treated as random effects but they are not properly integrated out. The MLEs are therefore suspect, and the iterative tuning may produce pathological results.
- (iii) Allowing survey catchability to vary from year to year, perhaps substantially, achieves a better fit to the data but at the expense of discounting the relative abundance data. Some members felt strongly that this was a mistake. The survey catchability estimates produced by Model A seemed to be missing in the presentation.
- (iv) The great variability of survey selectivity estimates from Model A is a clear indication that the model is overfitting the data.

In view of the many new features in Model A and several concerns about it, the Teams do not favor including it (or Model 5) as one of the candidates in November. The Teams requested Models 2b and 4 in November, and requested a brief investigation into the reasons for the wild performance of Model 3. If it turns out that the uneven performance of Model 3 was the result of some quirk in the jitter tests, the Teams requested would like Model 3 included as well. (If a short investigation is unproductive, the Teams recommend dropping Model 3 rather than taking time this year for a long investigation.)

There was some discussion of adding other survey series to the cod assessment, specifically the halibut and sablefish longline surveys. The Teams recalled that both surveys had poor coverage of the EBS cod stock, and Grant had found the IPHC survey data to be at odds with other data in the assessment. While the other survey data do not appear promising at present, the Teams recommended that the IPHC continue to collect cod length frequencies on its survey.

Sablefish: Dana Hanselman presented a brief update of the status of the sablefish assessment for November 2011. The 2011 longline survey was just completed and CPUE numbers are relatively strong with good evidence of an above average 2008 year class again, as occurred in the 2010 survey. Sperm whale depredation was not heavy in the GOA, but there was substantial killer whale depredation in the Bering Sea. The length frequency histogram from the survey showed a recruitment pulse with a mode at about 500 mm; this information is preliminary but indicates a year class that appears larger than the 2000 or 1997 year classes.

For survey index modeling, a global model including all areas at once may be intractable, but a model by area is under consideration. In the future, Central and Eastern Gulf of Alaska may be modeled with the inclusion of sperm whale data and western Gulf of Alaska and Bering Sea/Aleutian Islands may be modeled with killer whale data. A general linear mixed model (GLMM) may best capture the uncertainty for this type of modeling but it will be harder to fit to large data sets. Three regional GLMMs will likely be used initially with simulation tests for the method selected.

Movement model update: The movement model incorporates data from 1979-2009 in an AD Model Builder program with time-varying reporting rates. The model updates a previous analysis by Heifetz and Fujioka based on about 10 years of tag data. ADF&G tag data for inside waters (Southern Southeast Inside and Northern Southeast Inside) were added. The model updated the fishing mortality rate with relative population weight) and stock assessment catchabilities. There are a total of 305,000 tag releases and 27,000 recoveries in 31 years. For time varying reporting rates, the tag recovery rate for the survey is compared to the fishery. Reporting rates generally have increased, but there has been an unexplained decrease in reporting rate in the past few years.

In summary, including all 31 years of tag data affected the movement model more than any other changes. Changes in absolute movement rate occurred where most fish now have a higher probability of movement than before; for example, large fish now have a 40% higher probability of moving than in previous models. The previous paradigm was that small fish moved west, and large fish moved east. The probability of small fish moving east has now doubled. These results show that movement directionality is more ambiguous than previously shown. AD Model Builder can examine the uncertainty of the probability of fish moving out of an area through MCMC simulation. In Chatham Strait, sablefish have a precise low probability of moving. In contrast, western Gulf fish have a precise and high probability of moving. There is also the potential in the future for determining age- and sex-specific movement rates for sablefish.

Dana also developed a mortality model (not stock assessment based) using time at liberty, similar to following cohorts with catch curve analysis. In this mortality model, the independent Z values (total mortality) estimated

from tag data ($Z = 0.173$ in this model) was similar to the mean stock assessment value $Z = 0.185$ over the same time period.

Directionality of overall movement patterns is more ambiguous than previously thought, with the western GOA seeming to be inhospitable for sablefish (i.e. high annual movement). The sablefish population center seems to be in CGOA, and the one unit stock (Aleutian Islands, Bering Sea to GOA) hypothesis is strongly supported by these movement data. Dana is preparing a publication on these results.

Other future research includes: 1) fishery whale depredation estimation, 2) socioeconomic reapportionment effects, 3) whale depredation deterrents, 4) environmental forcing on sablefish recruitment, and 5) satellite pop up tags for spawning locations.

Dana plans to continue with the current model for the next assessment cycle. There will be a major update to the model in the next several years; Dana anticipates that the next model update will include or consider 1) movement, 2) whale depredation, 3) new age misclassification, and 4) use of environmental data in projections.

Henry Cheng noted that the location of where fishing occurs can result in bias in a movement model. Dana noted that Bering Sea sablefish tend to stay in the Bering Sea. Evidence of larger fish in the Bering Sea may indicate these fish are growing to maturity in this area. Loh-Lee Low noted that the IPHC analyzed different tag types and was moving to a coastwide halibut model at the same time Dana was considering a regional movement model for sablefish. Dana responded that he still plans to retain an all Alaska model, but the inclusion of movement data would provide a better representation of the population dynamics within Alaska. Jon Heifetz mentioned some preliminary genetic analysis that had recently been done which showed some correspondence of allele frequencies within areas when looking at samples from the Bering Sea and Gulf of Alaska. Loh asked if there is much movement of Washington/Oregon sablefish north; Dana said historically there has not been. Jon noted that there is not much movement north in most years, but maybe more occurred in El Nino years (Kimura analysis). The sablefish stock break is at Vancouver Island in BC. Not as much tagging has been done in Washington or Oregon in recent years.

Sablefish Ageing: Bill Clark provided an update on sablefish aging analysis. Known-age fish are required to get good estimates of ageing error; these are not usually available. NOAA has been releasing tagged known age fish (have recovered 172 known-age fish of the 23,000 known-age tagged fish that have been released). Age readers strive for accuracy, but there are sometimes discrepancies. Without known-age fish, it is difficult to estimate the mean, variance, and the form of the distribution. One assumes the modal age is equal to the true age and the distribution of misclassifications is symmetric. Sablefish are not symmetric in ageing errors; younger fish tend to be over-aged and older fish tend to be under-aged. This probably occurs because one cannot underage young fish by that much. One can estimate the distribution of the ageing error from the variance of multiple reads, or from known-age fish. The ageing of not known-age sablefish appears reasonable, but the bias becomes worse with the age of fish (> 10 year old fish). Errors in ageing affect estimates of recruitment. Age reading errors tend to follow a geometric distribution rather than a discrete normal distribution.

Jim Ianelli commented that he was surprised that the naive models are considered doing 'well' relative to the correct data. Dana responded that this is due to the effect of ageing on stock assessment. If you remove ageing error, recruitment estimates are much less variable. Dana said the standard methods of creating an age classification matrix for sablefish work well, but since we have uniquely known ages, we can test those standard methods. Dana will probably incorporate this known age data into the model in the future. Jim Ianelli commented that at young ages biases may not be observed but as those fish get older, the ageing bias may have more effect.

Research priorities: The Teams assigned leads to review and revise the June 2011 research priorities. Later in the meeting the Teams collectively reviewed and approved proposed changes to the Council's June 2011 research priorities. The recommended revisions are appended to the joint minutes and will be available to the SSC during its next scheduled iteration of research priorities scheduled for June 2012.

TSC and groundfish survey workshop: Mark Wilkins presented an update on the Technical Sub-Committee (TSC) of the Canada-US Groundfish Committee. This is a working group of scientists and fishery managers from

all Pacific Coast fisheries agencies. The original responsibilities of the TSC were to review changes and effectiveness of existing regulations, exchange information on the status of Pacific coast bottomfish stocks, and to recommend the continuance and further development of research programs. Currently, TSC functions to ensure consistent and high-quality management and science of Pacific Coast Groundfish across all Canadian and US agencies/jurisdictions. The TSC meets annually, recommends courses of action, and sponsors working groups and workshops to improve scientific knowledge.

In March, 2011, the TSC sponsored a trawl and setline survey workshop held at AFSC. This workshop was well attended by numerous agencies from the west coast and east coast and represented multiple gear types in addition to trawl gear. The first day consisted of participants providing written and oral summaries of their surveys. These have been compiled and are available through the PSMFC website. The second day consisted of discussions on unique issues and operational problems commonly encountered. Future goals are to put together a website that will showcase what occurred at the workshop. Group consensus was that this effort should be done every five years. TSC reports and the trawl and setline survey workshop results are available through the PSMFC website: <http://www.psmfc.org/tsc2/>

The Plan Team asked about specifics regarding sampling of rockfish in rocky habitats and inquired how the east coast surveys compared to the Pacific surveys. Some rockfish work by Rooper and Martin (AFSC) was presented at the workshop but specifics were not discussed. The majority of the east coast surveys are conducted by the NEFSC and details are available in the workshop summaries.

Sharks: Cindy Tribuzio presented updates on stock assessments for BSAI and GOA sharks. Some improvements planned for the 2011 GOA assessment includes analysis of spatial and seasonal catch distribution and estimated catch of sleeper sharks from the halibut IFQ fishery. Authors also plan to evaluate a demographic model for sleeper sharks and estimating natural mortality (M). For spiny dogfish the spatial distribution of catch will be evaluated.

Cindy proposed to the Teams that the shark assessments be conducted on a biennial cycle. This year would be a full assessment in the GOA and an off-year for the BSAI. The Teams accepted her rationale that there is not new data for assessment every year, and alternating the assessments to coincide with trawl surveys would provide authors more time to devote toward improving assessments.

The Teams recommended that Tier 5 and Tier 6 stock assessments be conducted for the GOA in 2011 and for the BSAI in 2012. Only executive summaries will be prepared in the off years. The Teams recommended that the AFSC include this recommendation in its "Instructions to Authors."

For the 2013 assessment the authors are planning several substantial projects including analysis of pop up tags from spiny dogfish, particularly time spent inshore versus offshore. Harvest of sharks before 1997 is not compiled by species so work is being done to reconstruct this harvest. The authors are developing a dogfish model (Pella-Tomlinson), but some issues have been discovered during early testing of the model. Reconstructed catch has some problems and methods need to be reviewed again. There is correlation among parameters, and resulting carrying capacity estimates are very different than Rice (2007). Also, the model required a tight prior on r for convergence, and there are a large number of parameters. Cindy requested suggestions to assist modeling efforts.

The Teams recommended a biomass model, but Jon Heifetz suggested that size data should be incorporated if possible. Henry Cheng pointed out that this type of model will not allow forecasting. In last year's assessment the GOA Plan Team used the author's recommended M, but the SSC adopted a 3 year average biomass and $F=M$ because the author's estimate had not been peer-reviewed. Jim Ianelli asked why there were two different catch histories. Cindy explained that harvest data prior to 1997 was not compiled by species and they were attempting to reconstruct this harvest using ratio estimators. Jim suggested making the catch history part of the model. Some Team members also mentioned that current catch data may be suspect because of high bycatch and mortality in the halibut fishery which is poorly observed.

Stock assessment prioritization: Rick Methot (OST) provided the Teams with an overview and update on the developing process within NMFS to develop methods to rank stocks regionally and nationally for the purpose of

allocating potential increased funding to improve stock assessment across the nation. This request was made of NMFS from OMB. NMFS created the Stock Assessment Prioritization Working Group chaired by Rick. Three levels of progress were identified in the Stock Assessment Improvement Project (SAIP 2000). These are

- Baseline monitoring for all stocks
- Standardized assessments for “core” stocks; subsequently defined as the 230 FSSI stocks
- Advanced, ecosystem-linked, “next generation” assessments for key stocks.

The Teams recommended a balanced national and regional prioritization. ‘Regional’ for purposes of this initiative is defined at the scale of the Fishery Management Councils. Factors for goal setting and prioritization are fishery importance, ecosystem importance, stock status, stock biology and assessment history. For fishery importance the concept is to rank values of commercial catch and recreational catch within each region and rank together for a combined score. For ecosystem importance, score proposed to be based on either bottom up or top down approach. Stock status based upon a scoring system combining fishing rate and stock abundance scores. Stock biology factors in when setting the target period of assessment updates. For assessment history, the issue is whether to do a first-time assessment, a simple assessment update, or a full time-demanding benchmark assessment.

Simple tools are needed to begin to prioritize stocks currently not assessed. For stocks for which information exists there are target assessment levels for prioritization. NMFS intends to provide guidance for each region to assess their needs. The target assessment period should be stock-specific and based both on information available and fishery importance.

Feedback and acceptance of the planned approach from regional councils would occur at the upcoming Council Coordination Committee meeting. Results of the national stock prioritization will be used to inform allocation of national funding for stock assessments. Follow up efforts underway to evaluate new research and data needs for supporting the priority assessment. The Teams expressed concern that shifting prioritization nationally for lesser assessed stocks may inadvertently take resources away from stocks of national importance that are already well assessed and this prioritization could be used to decrease current levels of support for North Pacific stocks that are recognized as very well assessed and managed.

The Teams and members of the public had several suggestions for consideration in further developing this scoring mechanism. Concerns were raised regarding development of the scores and the utility of those scoring mechanisms, necessity of doing sensitivity analysis on those scores. Rick indicated that more evaluations will be done in conjunction with the development of the scoring system. One suggested approach to this would be quantifying, e.g., EBS pollock, the economic implications of losing one year of survey data. The concern is that the true net national benefit evaluation will be lost in translating this to a single number for prioritizing stocks nationally. The Teams suggested that trying to do a one size fits all scoring truly may be neither feasible nor advisable. The Teams suggested considering groups of fisheries together such as major commercial fisheries separately from more diverse smaller regions with lesser commercial fisheries but more stocks. Questions were posed regarding including some metric for social value, e.g. number of vessels participating, social/cultural importance, etc. There should be some consideration as well on a cost-benefit standpoint factored in as well when identifying the most critical priority stocks. The concern is not only that this ranking will be used to allocate additional funds but may also be employed as a means of informing where to cut funding when necessary. The current scoring system may also serve to advantage less conservatively managed regions where higher fishing rates are occurring and disadvantage more conservatively managed regions such as the North Pacific. This could also incentivize conducting poor assessments due to the nature of the prioritization.

Team members also suggested that this issue be discussed at the upcoming national SSC workshop. Rick indicated that it is not scheduled to be reviewed at that meeting.

Octopus Natural Mortality Rate: Kerim Aydin presented estimates of Bering Sea octopus consumption by Pacific cod for estimating the natural mortality rate for octopus, which is being proposed as an alternative to current Tier 6 harvest specifications. Octopus bycatch has been relatively low and harvest specifications based on tier 6 methods may be unduly conservative relative to harvest rates based upon natural mortality estimates. The estimates of cod consumption are interpreted as an alternate Tier 6 harvest specification that reflects a

conservative estimate of octopus natural mortality. Estimates of octopus consumption by cod in the Bering Sea, which is equated to the product of cod predation mortality on octopus and octopus biomass, were derived as a function of cod ration (based upon a generalized von Bertalanffy equation), cod abundance (based upon survey data), and proportion of octopus in Pacific cod diet. Pacific cod predation mortality was used as a proxy for octopus natural mortality, which is conservative because other major predators of octopus exist (such as pinnipeds). A harmonic mean across the annual consumption estimates was substantially larger than current harvest specifications based on traditional Tier 6 methods. *The Plan Teams support this method and requested potential harvest specifications from this method be presented alongside the traditional Tier 6 methods for the November Plan Team meeting, with the addition of consumption estimates for the Aleutian Islands area in order to obtain a BSAI consumption estimate.*

Grenadier Management: Jon Heifetz and Jane DiCosimo updated the Teams on the status of Council action for including grenadiers in the two groundfish FMPs. In April 2010, the Council requested a discussion paper on the impacts of including grenadiers in either the fishery (which would require ACLs) or the ecosystem component category (along with other management issues), but this task has not been prioritized and FMP amendments have not been scheduled. The Plan Teams request that any discussion paper in the FMP analysis include evaluation of alternative management measures, and staff at Regional Office and ABL have agreed to contribute to a discussion paper in 2012. *The Plan Teams continue to recommend that grenadiers be placed in the groundfish FMPs.*

Halibut fisheries incidental catch estimation: The Teams' discussion of this topic was linked to additional discussions of Total Catch Accounting and Annual Catch Limits (see below). Cindy Tribuzio presented final methods for the estimation of non-target species catches in the unobserved IFQ halibut fishery. These methods were developed by a Plan Team working group and presented to the Plan Teams in November 2010 and approved by the SSC in February 2011. A database will be available for 2001-2010 by October 1, 2011 for use by stock assessment authors. The Plan Teams thanked this working group for their efforts at filling a critical data gap to comply with ACL requirements until the restructured observer program expands observer coverage to the now unobserved halibut IFQ fishery

The method uses both fishery-independent and fishery-dependent data. IPHC fish-ticket data identifies catch by NMFS area while logbook data provides depth bins for stratification. Bycatch rates are derived from the IPHC halibut survey using a systematic sub-sample of the survey catch (with no variance estimate). Survey landings are weighted by IFQ landings apportioned to ADF&G statistical areas; the proportional weighting eliminates stations with zero catch or no survey, but eliminates far fewer stations than previously-proposed methods. The result is an estimate of stratum CPUE and confidence intervals, where a stratum is NMFS management subregions x depth (the EBS is combined into a single management subregion). This method gives numbers rather than weights; weights are derived from species-specific average weights provided by AKRO and FMA.

The Teams raised a few caveats; the estimation method does not distinguish between retained and discarded catch, and may be biased by the seasonal difference between survey and fishery timing. It was recommended that, as a check of the method in the future, it be used to estimate halibut catch and compare to the direct measure of halibut catch in groundfish fisheries under the restructured observer program to be implemented in 2013. See the ACL summary for Plan Team recommendations on the use of this database.

Total catch accounting: Mary Furuness presented preliminary total commercial catch and survey/research catch for 2010, as an example of the development of an AKFIN database for use by authors in groundfish stock assessments. The Magnuson Act requires accounting for all removals. The Teams discussed how best to incorporate total catch (from all sources including scheduled surveys conducted by all agencies, research permits, experimental fishing permits, the commercial halibut fishery, recreational fishing, etc.) into the stock assessments. In some cases the ABC for a stock is calculated and then adjusted downward in anticipation of additional removals, such is the case with the ABC for the pollock in the W/C/WYK where the GHL established by the State for the pollock fishery in PWS. In most cases these catch estimates are incorporated into the stock assessments, when known, but there is not a consistent application of total removals. NMFS intends to make estimates of total catch for 2010 available to the stock assessment authors by October 1, 2011 for incorporation into the stock assessments for the 2011 SAFE report for the 2012 and 2013 groundfish fisheries. *The Teams recommended that the total catch be taken into account in the stock assessment determination of OFL and ABC so that*

downward adjustments of the TAC are not necessary. The Teams felt that the Council should not make allocative decisions between research removals and commercial catch. See additional discussion under ACLs.

NMML report: Lowell Fritz summarized Steller sea lion and northern fur seal population trends in Alaska through 2010. There are significant differences in regional sea lion trends since 2000, with declining populations in the Aleutian Islands west of 178W, increasing populations in the eastern Aleutians, and western and eastern Gulf of Alaska, and stable populations in the central Gulf. Eastern stock sea lions in SE Alaska are continuing to increase and are a candidate for removal from the list of threatened and endangered species. Western stock sea lions appear to be responding to regional factors that do not span their range in Alaska.

Northern fur seal pup production was assessed in 2010 on the Pribilof Islands, and continues to decline on St Paul Island (at about 5% per year) and has been relatively stable on St George for the last 6 years. Pup production in 2010 on the Pribilof Islands is now as low as it has been in almost 100 years. By contrast, pup production on Bogoslof Island (a new rookery since the mid-1980s) is increasing rapidly and a preliminary estimate for 2011 is approximately 23,000 pups.

Lowell also described habitat modeling being conducted by Kate Call. In September 2004, 40 adult female northern fur seals (with pups onshore) were captured, tagged and tracked on the Pribilof Islands to determine foraging habitat and resulting weight gain. Call used these data as well as physical, oceanographic, and fisheries data to develop habitat a suitability model of the eastern Bering Sea. The modeling indicates the potential for competitive overlap with the pollock fishery. Females that foraged on the shelf and in areas frequented by the pollock fishery were more likely to lose weight during the summer than those that foraged off the shelf or in the inner shelf.

Spatial management: A stock structure working group (SSWG) was formed in 2009 to provide guidelines for the evaluation of stock structure and spatial harvest specifications. The SSWG developed a report that contains a "template" of the types of data that may be considered in evaluating stock structure, with some guidelines on interpretation of these data. To assist in the application of this template the Joint Plan Teams requested in the September 2010 meeting: 1) a comprehensive table of area management of all stocks, and; 2) criteria for prioritizing stock structure analyses. Paul Spencer provided tables of BSAI and GOA area harvest specifications, and presented the criteria proposed by the SSWG for prioritizing stocks to analyze, which included region-wide ABC/OFL, high vulnerability scores from PSA analysis, and existing information and/or questions regarding stock structure. Rockfish and elasmobranchs have high vulnerability scores. The Joint Plan Teams also proposed in the September 2010 meeting that high catch levels relative to ABC may also be a criterion, but making this comparison over a large spatial area (i.e., BSAI or GOA) may mask subareas where catch is disproportionate to biomass. The SSWG template incorporates detailed examination of catch data, and was thus not viewed by the SSWG as a criterion for application of the template.

Proposed stocks for application of stock structure template:

- BSAI yellowfin sole, BSAI skates, BSAI northern rockfish
- GOA Atka mackerel, GOA pollock
- GOA and BSAI sharks

The SSWG agreed that using fishery and scientific information on a case-by case basis is preferred, and noted that proposing a protocol for this evaluation has been the focus of the SSWG. The goal was to develop a default policy that would be applied in the absence of a detailed analysis. If the stock structure template was applied and it was determined that sub-area ABCs produced little benefit, then this more detailed analysis would take precedence. To date, many (perhaps most) area harvest specifications are implemented without this detailed analysis. Development of a consistent default policy has been the goal of the group. Paul reviewed previous recommendations from the Plan Team and SSC on the utility of a default guideline on spatial partitioning of ABC. The Plan Team recommended "...allocating the Acceptable Biological Catch across subsets of NMFS areas within the BSAI and GOA management area as a precautionary measure to the extent practicable".

The SSC recommended "...proposals for subdivision of ABCs within a stock, along with supporting scientific and fishery information, should be considered on a case by case basis in the annual stock assessment process." A policy would help avoid inconsistencies between the GOA and BSAI.

The Plan Teams support the application of the stock structure template as a consistent policy for evaluating the spatial partitioning ABC/OFL, and agrees with the initial stocks proposed by the SSWG for application of the SSWG. The Plan Team also noted that a systematic evaluation of stock structure will highlight data gaps, and aid in developing research priorities and planning the collection of additional data. The Teams also discussed the possibility that application of the stock structure template may indicate that management subareas smaller than those currently used may be recommended, and discussed the history of BSAI and GOA spatial allocations.

The Plan Teams thanked the SSWG for development of the template and example applications to various stocks, and will undertake the task of prioritizing stocks for future applications of the template.

Bering Sea Integrated Ecosystem Research Program and Gulf of Alaska Integrated Ecosystem Research Program

BEST – BSIERP Mike Sigler (AFSC) summarized recent developments in the eastern Bering Sea shelf integrated ecosystem studies. Field studies were completed in 2010, and investigators are currently in analysis and synthesis modes, which are scheduled to be completed in 2012. Core hypotheses addressed production control (bottom up vs top down), competition between consumers, and how location matters (e.g., central place foragers). The Program occurred during cool years that followed a series of warm years, a situation that has occurred at other times over the last 100 years. Ice coverage in the northern Bering Sea remained high regardless of whether it was a warm or cold year, and this presents a barrier to movement of more temperate species (e.g., pollock, cod) to the north (this result was counter to one of their hypotheses at the beginning of the study). Fur seal foraging trajectories and other ecosystem simulations were shown.

GOA IERP Olav Ormseth (AFSC) summarized recent developments in the Gulf of Alaska integrated ecosystem studies. The Program is organized by trophic levels, with upper trophic level components organized first and led to development of lower trophic level components. Upper trophic level involves investigations of life histories and population dynamics of 5 focal groundfish (Pacific ocean perch, arrowtooth flounder, sablefish, Pacific cod and walleye pollock), supported by studies and modeling of middle and lower trophic levels and oceanography. Core spatial comparison is between SE Alaska (eastern Gulf of Alaska) and Kenai/Kodiak (western Gulf of Alaska). Fieldwork is scheduled for 2011 and 2013, and the project is scheduled for completion in 2014. Sampling is from shoreline out to edge of continental shelf. Observations from 2011 indicate spring phytoplankton bloom was later than expected and spring samples were 'pre-bloom'; herring is a dominant forage fish in bays, with Pacific cod, pollock, sand lance, and sandfish regularly encountered (eulachon and capelin less so); upper trophic level surveys (predominately near-surface tows) found juvenile salmon to be abundant and nearly ubiquitous, while the five focal groundfish species were encountered less frequently. Ecosystem and habitat modeling/mapping projects were also initiated.

Annual Catch Limits: Grant Thompson's discussion paper described three issues related to improvements to ACL management in groundfish FMPs. Anne Hollowed provided background information on the first issue, which would expand or otherwise change the role of scientific uncertainty in determining the buffer between ABC and OFL. The implementation of ACLs for groundfish is complicated by the relationships of ACLs across stocks. A project at the University of Washington, funded by NMFS, will update a technical interactions model (developed for the groundfish PEIS) and use it to investigate implementation of decision-theoretic and P* approaches. The second issue, lack of a numeric value for MSST, did not generate much discussion but is expected to proceed with the SSC recommendations.

Under the third issue the Teams continued their discussion of the incorporation of new databases for TCA (Total Catch Accounting) and HFICE (Halibut Fishery Incidental Catch Estimates). The availability of the HFICE introduces additional sources of removals to the existing CAS (catch accounting system) estimates (including research, sportfish, etc.). *The Teams recommended that AKFIN provide a single source of removals to address potential double counting across the HFICE and CAS databases. Stock assessment authors are encouraged to include a risk analysis of potential overages of harvest specification benchmarks in their assessments to determine how the use of TCA and HFICE in particular may affect the determination of ABCs.*

The Teams recommended that the AFSC provide the following supplemental "Instructions to Authors" for the 2011 assessment cycle. The Teams recommended that all authors provide the 2001-2010 HFICE and the 2010

CAS total catch estimates as an appendix to each assessment chapter in November 2011. Since these estimates are preliminary and the Teams have not reviewed the complete database or assessed the potential effects on determination of OFL and ABC for each stock, further analysis is needed before the Teams can recommend incorporation of these estimates in their OFL/ABC recommendations. The Teams posed some issues regarding how authors should use the databases in the future: 1) how to use catch estimates with no size/age composition information in the models (similar issues occur in the Pacific halibut stock assessment), 2) how the AKRO could or would incorporate these estimates into in-season management (to avoid overharvesting) and 3) development of a single catch estimation time series incorporating all data components.

For November, several components are recommended to be included in a table in an appendix in each assessment chapter:

1) the 2010 total catch removal estimates along with research catch estimates reported in previous assessments. The major sources of removals should be noted along with any large deviations in total catch between previously used research catches and the new estimates.

2) HFICE estimates should be tabulated for the years 2001-2010 (from Cindy Tribuzio). Comparisons should be made to the corresponding CAS estimates from the AKRO. The impacts of including HFICE estimates on the total catch estimates currently used in the assessments should be discussed and the implications of these estimates on the ABC and OFL recommendations should be explored.

An agenda item will be scheduled in September 2012 to investigate the implications on ABCs. Depending on the implications and discussions that occur, the HFICE estimates may be used in stock assessments in November 2012 for the 2013 /2014 assessment cycle **but the Teams do NOT intend to use the data for determining OFLs and ABCs in November 2011 for the 2012/2013 assessment cycle.**

Ecosystem chapter: Stephani Zador presented the highlights of the draft Ecosystems Considerations chapter of the SAFE Report for 2012. She reported that she will update the EBS report card in the final draft that will be available in November 2011. The next draft will also include a new Aleutian Islands assessment and report card. The ecosystem status and management indicators include 21 updated contributions and six new contributions.

Highlights of 2010 physical parameters were presented. There was a La Nina in 2010-11; the ENSO forecast is for a weak La Nina or normal conditions in 2012 with cool upper water temperatures. The deep to moderate cooling from La Nina and the cold summer water coincided with a negative PDO state. The winter 2011 sea level pressure anomaly was the highest since 1955-56; summer was opposite, i.e., low. There was a shift during the mid-2000s in surface drift conditions from Ocean Station Papa to predominantly southerly flow, resembling drift conditions prior to the 1977 regime shift.

Biological measurements include new and updated parameters. In 2010 the phytoplankton biomass and size in the Eastern Bering Sea (EBS) was the highest on the inner shelf and the outer shelf, near the Pribilof Islands, and lowest in the northern EBS. Warm and cold years manifest a differential in biomass and size of phytoplankton in the north vs. south Bering Sea. Jellyfish biomass was highest mid shelf, double the previous estimates. The diversity was lower as it was mostly *Chrysaora melanster*. The Plan Team noted that plots of jellyfish bycatch were recent and not related to early catches, therefore no basis of comparison for this earlier than 2000.

Indicators of fish were updated for fishes. The temperature change index was as predictor of age-1 pollock and age-1 Pacific cod in the EBS. Cool summer followed by warm spring is good for age-1 survival. There was a cool summer in 2010 followed by a normal spring 2011. The EBS slope survey data was used to create a Hills index of Biodiversity.

The ADF&G trawl survey around Kodiak mostly captures arrowtooth flounder, flathead sole, other flatfishes. In the ADF&G small mesh trawl surveys low numbers were captured of all forage fishes except eulachon.

There was discussion among Plan Team members as to why a pink salmon forecast was generated when we do not do stock assessment for salmon. The answer is that age-0 pink salmon are forage fish for many species.

Seabird index for the EBS revealed a declining trend in kittiwake abundance. Time series analysis indicates that prey supply and bottom temperature may influence reproduction but effects may not be seen for 1-2 years.

A new approach was used to compare past seabird bycatch in the Alaska groundfish fisheries. In decreasing order of abundance, the following birds were captured: fulmars, shearwaters, gulls and albatrosses. The index will now be updated annually. Two short-tail shearwaters were caught recently; however the extrapolation of this low number to an estimated to 15 was noticed and commented on by the Plan Team.

Fish stock sustainability index is a performance measure for sustainability of stocks selected for commercial and recreational fishing,

The Plan Teams recognized that they should distinguish between information that is useful and information that is not useful in the chapter. This chapter is comprehensive and not related to specific stock assessments. The Teams concurred that the individual stock assessment authors should highlight important factors in the assessments.