DRAFT SUMMARY MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
Hyatt Regency Orange County
Terrace A-C (South Tower)
11999 Harbor Blvd.
Garden Grove, CA 92840
Telephone: 714-750-1234
November 13-14, 2015

Members in Attendance

Mr. John Budrick, California Department of Fish and Wildlife, Belmont, CA
Mr. Alan Byrne, Idaho Department of Fish and Game, Boise, ID
Dr. Martin Dorn, National Marine Fisheries Service Alaska Fisheries Science Center, Seattle, WA
Dr. John Field, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Owen Hamel, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Galen Johnson, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Peter Lawson, National Marine Fisheries Service Northwest Fisheries Science Center, Newport, OR
Dr. Todd Lee, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Kevin Piner, National Marine Fisheries Service Southwest Fisheries Science Center, La Jolla, CA
Dr. André Punt, University of Washington, Seattle, WA
Dr. David Sampson, Oregon Department of Fish and Wildlife, Newport, OR
Dr. William Satterthwaite, SSC Chair, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Cameron Speir, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA

Members Absent

Dr. Andrew Cooper, Simon Fraser University, Vancouver, B.C.
Mr. Tom Jagielo, Seattle, WA

SSC Recusals for the November 2015 Meeting		
SSC Member	**Issue**	**Reason**
Dr. John Field	I.3 Final Approval of Stock Assessments	Dr. Field supervised the STAT for the black rockfish assessments
Dr. Owen Hamel	I.3 Final Approval of Stock Assessments	Dr. Hamel supervised the STAT for the black rockfish assessments
Dr. Galen Johnson	D.2 Salmon Methodology Review	Dr. Galen was an analyst who helped develop the Chinook FRAM.
Dr. David Sampson	I.3 Final Approval of Stock Assessments	Dr. Sampson was on the STAT for the Oregon black rockfish assessment
Dr. Theresa Tsou	I.3 Final Approval of Stock Assessments	Dr. Tsou was on the STAT for the Washington black rockfish assessment

A. Call to Order

Interim Chair Will Satterthwaite called the meeting to order at 0800. Dr. Donald McIsaac provided an overview of the agenda.

D. Salmon Management

2. Salmon Methodology Review

The SSC Salmon Subcommittee (SSCSS) held a joint Salmon Methodology Review meeting with the Salmon Technical Team (STT) and the Model Evaluation Workgroup (MEW) in Portland, Oregon, on October 20-22, 2015. Topics reviewed included proposed additional management area boundaries in harvest models used for California Chinook salmon stocks, an updated base period for the Chinook Fishery Regulation and Assessment Model (FRAM), and changes in the algorithms used in Chinook FRAM to calculate growth and proportion legal. The SSCSS also discussed a proposed forecast methodology for Sacramento River winter Chinook and a test fishery proposal for the Klamath Management Zone.

<u>Evaluation of Management Lines at Point Reyes and Point Sur in the Klamath Ocean Harvest Model, Sacramento Harvest Model, and the Winter Run Harvest Model</u>

Dr. Mike O'Farrell (Southwest Fisheries Science Center) presented an analysis of the potential for subdividing the current San Francisco management area (SF) at Point Reyes and the existing Monterey management area (MO) at Point Sur (Agenda Item D.2, Attachment 4). The analysis assessed whether the coded-wire tag (CWT) recovery data were sufficient to maintain acceptable precision in the face of increased stratification for three stocks: Sacramento River winter

Chinook (SRWC), Klamath River fall Chinook (KRFC), and Sacramento River fall Chinook (SRFC). The authors examined the historical number of CWT recoveries across time, area, and fishery (commercial and recreational) strata. They also compared stock-specific relative density within the existing management areas using Genetic Stock Identification (GSI) data from published studies and original analysis of more recent GSI data. The analysts recommended that the existing management areas remain in place with no further stratification.

The SSC agrees that the existing management areas should not be further subdivided in the salmon harvest models. In the case of SRWC and KRFC stocks there were too few CWTs recovered in the proposed strata to provide acceptable stratum-specific precision as defined by the Pacific Salmon Commission (PSC). These standards are not met in many current strata; adding additional boundaries in the SRWC and KRFC models' management areas would mean that these guidelines would be met in an even smaller proportion of strata. If anything, the existing models may already be more finely stratified than the available data can support, especially for SRWC. It should also be noted that, in strata where density is very low or fishing effort minimal, the PSC guidelines may be unachievable.

In the case of SRFC, CWT recoveries were sufficient to allow the proposed increase in stratification. However, constructing the three harvest models with different area stratifications could lead to inconsistencies among the models. The benefits of increasing the stratification of the SRFC harvest model alone are unclear.

The SSC notes that the GSI data are suggestive of differences in stock distributions within the SF and MO management areas at certain times. The GSI data are currently not sufficient to quantify these differences for management purposes, and these differential stock distributions appear to vary by month and year. Examination of catch per unit effort for CWT recoveries may provide a complementary metric for examining the distribution of stocks across proposed management lines. The SSC supports further data collection and analysis to provide information on fine-scale spatial distribution of managed stocks.

Chinook FRAM Base Period Update

The SSC found the proposed update to the Chinook FRAM base period (Agenda Item D.2. Attachment 1) and the modified methodologies for growth and sublegal contacts presented in Agenda Item D.2, Attachments D2 and D3, respectively, to be technically sound and improvements over current practices. The SSC found no technical obstacles to use of the updated base period in 2016. Full documentation is essential, but not yet available. The SSC anticipates reviewing FRAM documentation at the 2016 Salmon Methodology Review.

Mr. Larrie LaVoy (National Marine Fisheries Service) gave a presentation of the FRAM Base Period update that began in 2013. The current base dataset in the Chinook FRAM was derived from CWT recoveries and fishery information using catches from 1979 to 1982 (brood years 1974 to 1979). The proposed new base period was derived from catches from 2007 to 2013 (brood years 2005 to 2008). The new data should more accurately reflect current Chinook salmon stock distribution, abundance, and fisheries, and thus the SSC supports using more recent data to derive an updated base period. The existing FRAM structure, algorithms, data processing, and inputs and outputs are unchanged with the exception of estimates of stock specific fishing mortality for sublegal fish and derivation of growth functions. The

implementation of the new base period should be expected to change base period exploitation rates of stocks and modeled stock proportions (proportion of the total catch accounted for by FRAM stocks) in fisheries.

Growth function: Dr. Pete McHugh (Eco Logical Research) presented a proposed new growth function for use in the FRAM model (Agenda Item D.2. Attachment 2). The proposed method for modeling growth is an improvement on the existing method because it accounts for the truncated size distributions provided by fisheries with minimum size limits, increases the coverage of stock aggregates, and fits empirical data better than the values provided by the old model. The methodology is clearly documented along with the algorithm code. The SSC supports adoption of this method as an improvement over the existing model. Future refinements could explore seasonal variability in size/growth, effects of years or other covariates, and more efficient (single-step) estimation procedures.

Sublegal contacts: Dr. Galen Johnson (Northwest Indian Fisheries Commission) presented updated algorithms for apportioning sublegal contacts among stocks and ages (Agenda Item D.2. Attachment 3). Total sublegal catch (all stocks combined) is estimated based on empirical estimates of the legal:sublegal catch ratio in particular fishery strata. Sublegal catch is then apportioned among stocks and ages based on assumptions of equal contact rates and distributions. The method is appropriate mechanistically and an improvement on the approach used previously. Therefore the SSC supports adoption of this method. Future work should compare model outputs with empirical data on the stock and age composition of sublegal catch whenever such data are available.

Mr. Jon Carey (Washington Department of Fish and Wildlife) presented comparisons of stock composition estimates for the old base period, the proposed new base period, and recent GSI results from select fishery strata. Such comparisons are useful for identifying extreme discrepancies, but it should be realized that the base period is meant to represent an average over multiple years whereas the GSI results shown were year-specific. Regional expert review may also help explain or resolve particular discrepancies, such as generally lower Central Valley stock proportions output from the new base period compared to GSI results.

Sacramento Winter Chinook Stock Projections From Jack Returns

Mr. Brett Kormos (California Department of Fish and Wildlife, CDFW) briefed the SSCSS on a proposed forecast method for SRWC escapement based on jack returns from the previous year. A general description of the proposal was available in a letter dated April 1, 2015 from Charlton H. Bonham (CDFW) to Ms. Dorothy Lowman (Council) (Agenda Item D.2, Attachment 6). The letter contained insufficient detail for a technical review.

For a full review, details on the specific fitting algorithm used must be provided, along with goodness of fit measures, and consideration of alternate model formulations (such as ratio estimator, non-zero intercept, log transformation, and an autoregressive error term as used in the current SRFC forecast). Details regarding how jacks were identified and how or if age-3 and age-4 adults were distinguished should be presented. The data sources used should be clearly identified. A useful analysis would include a management strategy evaluation (MSE) of the relative costs and benefits of various forecasting methodologies.

Test Fishery

Mr. Brett Kormos (CDFW) briefed the SSCSS on a proposed test fishery, based on CWTs, to evaluate potential differences in KRFC and SRFC contribution rates north and south of the Klamath River mouth. The proposed sampling design was not developed sufficiently for the SSC to evaluate if it would achieve its goals. CWT sampling should be coordinated with GSI sampling proposed for the same area and genetic samples should be collected from both clipped and unclipped fish for straight-forward estimation of total stock proportions from GSI and to provide measures of genetic stock assignment accuracy. A more specific sampling plan will be needed for review by the SSC in March.

SSCSS Notes

Management Lines:
To meet guidelines developed by the Pacific Salmon Commission (PSC) for acceptable precision of estimated catch, there must be at least 10 CWTs from each significant age-class recovered in each stratum (time/area/fishery) contributing at least 2.5% of the total exploitation rate in 8 out of 10 years.

Within the CWT program there is potential to increase mark/tag rates of KRFC and sampling rates to increase tag recovery rates and improve the resolution of exploitation rate estimates. Currently, 100% of the SRWC are marked/tagged and practically achievable increases in sampling rate would not yield sufficient increases in recoveries.

There may be, on average, differences in density north and south of Point Reyes for both KRFC and SRWC, and north and south of Point Sur for SRWC. A longer, systematic time series of observations is needed to quantify what these differences may be.

FRAM Base Period:
• Opportunities for future work on growth model: better stock resolution; explore seasonal effects, in particular the loss of large fish following the return of maturing spawners; investigate whether a better characterization of the proportion legal is obtained based on a standard deviation in length estimated based on all data for stocks in an aggregation combined across all years (resulting in an increased spread around the common mean) versus the typical spread around a single stock/year.
• The proposed method of generating a value for sublegal contacts with an age for which no legal catch is observed should be considered for incorporation into the KOHM, SHRM, and WRHM as well.
• It would be useful to generate year-specific stock composition outputs from FRAM to compare to year-specific GSI data. Some inconsistencies in the boundaries among FRAM stock aggregates as opposed to genetic reporting units would still complicate this comparison.
• Although the new base period is likely more representative of current fishery configuration and stock abundances, it does include atypical events for Sacramento Fall Chinook and Upriver Brights. There are cases where the Modeled Stock Proportion estimated by FRAM is lower than what would be expected or what is suggested by GSI. Some of this discrepancy may be driven by FRAM under-estimating the proportion of Central Valley Fall. Consultation with regional experts and verification of correct expansion factors might reduce this discrepancy.

Sublegal contacts detail:
Sublegal catch is apportioned among stocks and ages assuming equivalent contact rates of legal and sublegal fish of the same stock and age (or older ages, when no legal catch of a particular age is observed and at least 50% of the stock at that age is estimated to be of sublegal size). The method assumes that if there is no legal catch of a stock at any age in a particular stratum, that stock is not present. Further, it assumes that legal- and sublegal-sized fish of the same stock and age are similarly distributed in space, and when sharing contact rates among age classes it assumes that different ages of the same stock are similarly distributed. These are strong assumptions, but the available data do not provide an alternative. Conditioned on these assumptions, the method for apportioning sublegal catch among stocks and ages is mechanistically sound, and an improvement on the approach used previously.

Growth model detail:
The approach involves a multi-step procedure where data on size and age of fish sampled from the ocean fishery, along with minimum size limits in effect at the time of harvest, are aggregated across years and similar stocks to estimate the mean and standard deviation in length of fish of a particular stock (aggregate) and age present in the ocean in a particular month. Von Bertalanffy growth functions are then fit to the series of mean length at age data for each stock in a Bayesian hierarchical model that allows for some sharing of information among stock aggregates. Finally, age-specific coefficients of variation in fish length are estimated for each stock aggregate.

SRWC Forecast:
• Because of the unique run timing of SRWC, a forecast of current year escapement does not reflect the abundance of fish subject to the current year ocean fishery. Maturing SRWC enter the river from January through April the same year a forecast is made, and then hold in the river until spawning later in the year.
• Method for adding back in "forecasted" jacks is novel.
• With this method one more recent year could be included in the three year geometric mean used in the SRWC harvest control rule, presumably at the cost of reduced precision of the escapement forecast used in place of a previous escapement estimate. This might allow a somewhat more rapid response to sustained trends, but due to the timing issues mentioned above this would not react in time for action in response to conditions affecting the specific cohort currently in the ocean and subject to fishery management.
• In the current control rule, the escapement estimates used represent the parents of age-2, age-3, and age-4 fish still in the ocean during the upcoming fishing season. If the oldest escapement estimate is replaced with a forecast, information on the parents of the age-4 fish subject to the fishery is lost.
• SRWC phenology (per Exhibit C.7.b, March 2004 Briefing Book): winter Chinook are believed to enter the San Francisco Bay between November and May. Spawning occurs between April and July. Fry emerge in the fall and emigrate to the ocean during the winter and spring.

H. Coastal Pelagic Species Management

1. Pacific Sardine Distribution Workshop

Dr. Owen Hamel (NWFSC) presented on a report (Agenda Item H.1.a, Pacific Sardine

Distribution Workshop Report) on the Pacific Sardine Distribution Workshop that convened at the Southwest Fisheries Science Center in La Jolla, CA on August 17-19, 2015.

The SSC finds that the Distribution Workshop did not produce a better estimate of Distribution (operationally defined by the SSC as the long-term, seasonally-averaged proportion of the northern subpopulation present in U.S. waters) than the current fixed value of 0.87 obtained from spotter data. However, the current approach has several shortcomings. There are no comparable spotter data since 2001, data from the Pacific Northwest, nor data from high abundance years, and the approach based on spotter data does not base the estimate of Distribution on data for the northern subpopulation alone. In the near-term, some refinement may be possible by applying modern regression models and apportioning the spotter data between subpopulations. Over the longer term, the SSC finds that the most promising source of an improved estimate of Distribution would be an expanded and coordinated coastwide acoustic-trawl sampling program that includes Canadian and Mexican waters, integrates across seasons, and accumulates data over years covering the range of low to high total stock biomass.

The SSC agrees with the workshop conclusion that landings do not provide direct information on the Distribution parameter. Consideration of catch in Canada and Mexico in the Harvest Control Rule (HCR) may reduce the incidence or severity of catches exceeding 'total' or 'coastwide' HGs and Overfishing Limits. However, modifying allowable U.S. harvest on the basis of projected international harvest could have significant consequences for U.S. fisheries.

The SSC agrees with the Workshop report that the analyses conducted to date are not adequate to evaluate the effects of changes in the HCR. Properly comparing the performance of alternative measures of Distribution, an assessment based on U.S. biomass only, or a HCR that depended on projected international catch would require an integrated treatment through a Management Strategy Evaluation (MSE). This involves accounting for uncertainty regarding current biomass, uncertainty in projecting international catch, and using a population model which accounts for the feedback of changes in catches due to the changed HCR upon stock dynamics. This would require a substantial investment of time and resources. Were such an analysis performed in the future, the SSC would review it at the Council's request.

The SSC endorses the research recommendations contained in the report.

The SSC agrees with the report recommendation that there would be benefit in initiating discussions with Mexico and Canada toward more coordinated research and management of this transboundary stock. The SSC also notes the importance of understanding the stock structure of Pacific sardine, and that the results of this workshop are conditional upon the current hypotheses regarding stock structure as well as the ability to allocate catches and biomass to subpopulation using environmental data.

SSC Notes

Over time, models could be developed relating changes in measured Distribution to environmental conditions and stock size. It is likely more appropriate to estimate Distribution for groups of years or categories of environmental state rather than attempting to generate year-specific values.

Currently, the AT survey is only conducted in spring and summer, lacks data from low abundance years, and is not conducted with comparable methods in the U.S. and Mexico.

Ichthyoplankton surveys reflect only the distribution of spawners, and do not distinguish the northern subpopulation.

Landings do not reflect distribution without supplemental information on fishing effort. The total area of model-identified habitat does not directly indicate the distribution of fish.

Dr. Richard Parrish (retired) was unable to present a model that incorporates both environmental and stock size effects, so the workshop did not review it.

The workshop also considered an alternative that would replace the percent-based Distribution term in the Harvest Guideline (HG) with an absolute amount of biomass assumed to be unavailable for U.S. harvest:

$$HG = \{(Biomass - Cutoff) - Distribution\} * Fraction$$

The workshop did not discuss in detail how such an alternate Distribution term would be derived.

Rather than modifying the Distribution term, an assessment might be performed estimating stock biomass in U.S. waters only. However, estimating U.S. biomass using a spatially- and seasonally-structured stock assessment method is currently infeasible because key tagging and international data are lacking. An estimate based on U.S.-only data would be biased to an unknown extent by ignoring catches off Canada and Mexico.

3. Anchovy General Status Overview

Mr. Dale Sweetnam from the Southwest Fisheries Science Center presented "A summary of the current information on coastal pelagic species with an emphasis on northern anchovy," that included preliminary results from 2015 surveys. There is evidence that the northern anchovy stock has declined in recent years and is at low abundance. However, preliminary results from 2015 show that there was record high abundance of young of the year and larval anchovy in the juvenile rockfish survey and the Newport Hydrographic line off the coast of Oregon. The Scientific and Statistical Committee (SSC) recommends that an anchovy stock assessment be conducted to evaluate all sources of information. An assessment should consider area weighting or other means of addressing the unequal sampling densities of different habitats within the CalCOFI grid.

To obtain reliable estimates of the stock status for short-lived species such as anchovies, monitoring and assessments should be done frequently. For monitored species in the Coastal Pelagic Species Fishery Management Plan, a routine process for evaluating trends in data, even in the absence of stock assessments, should be implemented. The SSC recognizes that assessing the central subpopulation of northern anchovy will be challenging, and a workshop on methods to assess short-lived species focusing on this subpopulation may be beneficial to provide guidance to assessment authors.

SSC Notes:

Anchovy assessments should be done annually for reliable estimates of current biomass.

4. 2016 Methodology Review Preliminary Topic Selection Including Data-Limited Assessment Methods

Council Operating Procedure 26 describes the procedure for considering new methodologies related to the assessment and management of coastal pelagic species (CPS) and groundfish. The Scientific and Statistical Committee (SSC) reviewed two proposals for methodology reviews.

Southern California Coastal Pelagic Species Aerial Survey

Mr. Kirk Lynn (CDFW) outlined a proposal to review the Southern California Coastal Pelagic Species Aerial Survey (Agenda Item H.4.a, CDFW Report). The survey involves coastal and offshore sampling, and data have been collected since 2012. The survey includes areas not covered by the acoustic-trawl method (ATM) survey, and provides estimates for several coastal pelagic species, although the focus has been on Pacific sardine. The survey was suggested for a methodology review in November 2013 and an informal review was conducted in April 2014.

The design of the survey, as well as the data collection procedures, are well-specified. However, it is necessary to specify how the results from the survey can be used in stock assessments. The SSC notes that the major value of the survey is that estimates of biomass from its coastal portion during spring could be combined with the results of the ATM survey to provide an estimate of the absolute biomass of Pacific sardine and potentially other CPS.

It is necessary to show that the estimates of biomass from the survey are measures of absolute rather than relative biomass if they are to be combined with the results of the ATM survey. The SSC therefore recommends that the review of the aerial survey be deferred until analysis methods are developed that can be used to estimate quantities for use in stock assessments. In addition, the estimates of species-specific biomass by the pilots will need to be validated if the survey is to be used to provide estimates of absolute abundance.

Acoustic-Trawl Method

Mr. Dale Sweetnam (SWFSC) introduced Agenda Item H.4.a, SWFSC Report 1 that outlined the status of plans to conduct a second review of the ATM survey for assessing CPS. He noted that the Northwest Fisheries Science Center (NWFSC) and SWFSC need time to collect and analyze data using the new research vessel to explore issues raised during earlier reviews, and that the earliest a review could take place would be late 2016 or early 2017.

The SSC recommends that the NWFSC and SWFSC staff be given adequate time to conduct the analyses to inform a review meeting, and consequently that the review of the ATM survey be deferred until 2017. It was noted that the next full assessment of Pacific sardine is scheduled for March 2017, which means that the ATM index for that assessment would need to be based on the current rather than new acoustic systems.

Assessment methodology for data-limited CPS species

The SSC reviewed a white paper from the SWFSC on approaches to assessing data-limited CPS

stocks (Agenda Item H.4.a, SWFSC Report 2). The methods included in the white paper were those used for data-limited groundfish stock assessments, which are most appropriate for longer-lived species with well-defined stock-recruitment relationships. In contrast, CPS are short-lived with very variable recruitment that is substantially influenced by environmental conditions.

The SSC recommends a workshop be held to consider potential assessment methods that could be applied to short-lived species, with a focus on the central subpopulation of northern anchovy (see Agenda Item H.3.a, Supplemental SSC Report). The workshop should consider methods applied to other data-limited CPS and consider both model-based assessment approaches as well as approaches that use only a recent empirical estimate of biomass in a harvest control rule. The workshop will be most successful if the SWFSC is able to process the existing ichthyoplankton samples to assess whether it is possible to provide an updated Daily Egg Production Model estimate of the biomass of northern anchovy. The results of the workshop could be used to develop recommendations for future assessments, including the next assessment of northern anchovy.

I. Groundfish Management

3. Final Approval of Stock Assessments

Dr. Andi Stephens of the National Marine Fisheries Service (NMFS) Northwest Fisheries Science Center (NWFSC) presented the draft Oregon black rockfish assessment to the Scientific and Statistical Committee (SSC). A coastwide assessment of black rockfish was conducted this year, with independent assessment models developed for black rockfish in coastal waters in California, Oregon, and Washington. The black rockfish assessments were reviewed by a Stock Assessment Review (STAR) Panel during the week of July 20-24, but only the California and Washington assessments were recommended by the STAR Panel. An acceptable Oregon black rockfish assessment could not be developed during the STAR Panel meeting. In September, the SSC recommended that the Oregon assessment be sent to the mop-up review panel. The SSC also delayed final approval of the California and Washington assessments to allow for potential changes to provide consistency among all three assessments.

The mop-up panel met September 28-October 2. Two draft assessment models for Oregon were reviewed, a model developed by the Stock Assessment Team (STAT) lead Dr. Jason Cope, and an alternative assessment developed by Dr. David Sampson, a member of the STAT. Development of an acceptable model proved challenging, not only because of the two draft assessment models, but also because the data available for assessment of Oregon black rockfish, such as age-composition data and catch per unit of effort (CPUE) indices, were not informative concerning the stock trend and overall abundance. Major issues dealt with by the panel included treatment of natural mortality for the males and females, whether or not recruitment deviations are estimated, dome-shaped vs asymptotic selectivity for various fisheries, treatment of catchability for the Oregon Department of Fish and Wildlife (ODFW) tagging study, and data weighting for age-composition data.

The final model included both a step increase in female natural mortality at the age of maturity and dome-shaped age-based fisheries selectivity, and thus applies both the “kill them” and “hide them” approaches simultaneously. Male and immature female natural mortality was assumed to be equal to the mean of the California and Washington estimates (0.17), while natural mortality

for the mature females was increased to 0.20. Alternative estimates of natural mortality, such as those estimated by the tagging study, were not considered plausible by the panel, given the longevity of black rockfish (>35 years). The catchability for the ODFW tagging study (tag Q) was considered the most important aspect of uncertainty, and a decision table was developed where the low state of nature was a model with tag Q estimated, the base case model assumed tag Q = 0.25, and the high state of nature assumed tag Q = 0.125 (the point estimate of a habitat-based prior). It was not possible to assign specific probabilities to these states of nature, but they were intended to subjectively span the range of uncertainty in assessment results.

The SSC notes a number of concerns regarding the Oregon black rockfish assessment. Fits to some indices and to the composition data are relatively poor, suggesting that there may be model misspecification. Model results were highly sensitive to assumptions about natural mortality, selectivity patterns, catchability for the tagging study, and data-weighting for composition data. During the course of the mop-up panel there was extensive exploration of alternative model configurations, and it was not obvious what changes could be made to the model to improve model fits and reduce sensitivity. Assessment results for Oregon indicate that the stock has been relatively stable, and above the B_{MSY} proxy levels throughout the exploitation history of the stock. No changes were made to either the California or Washington assessments during the mop-up panel meeting.

The SSC endorses the use of the 2015 black rockfish assessments for California, Oregon, and Washington as the best scientific information available for status determination and management. The California and Washington black rockfish assessments are considered to be category 1 assessments, while the Oregon black rockfish is considered to be a category 2 assessment. The category 2 designation is because recruitment deviations were not estimated in the model, as well as the greater overall uncertainty associated with the Oregon black rockfish assessment. The spawning stock biomass for black rockfish in 2015 is estimated to be above the B_{MSY} proxy of $B_{40\%}$ in both Washington and Oregon, and in the precautionary zone (below the B_{MSY} proxy but above the limit of $B_{25\%}$) in California, but with an increasing trend in recent years. The SSC recommends that the next assessment of black rockfish be a full assessment.

SSC Notes:

Recruitment deviations for the Oregon model were not estimated because 1) there was a strong unexplained autocorrelation in recruitment on a decadal scale, 2) the stock abundance showed a dip downwards at the end of the assessed period that was difficult to explain, 3) turning on recruitment deviations did not markedly improve fits to the composition data, but instead improved fits to indices and mean weight data, 4) turning on recruitment deviations created a strong residual pattern when data were sequentially deleted.

4. Biennial Harvest Specifications for 2017-2018 Groundfish Management Including Final Overfishing Limits and Acceptable Biological Catches)

BIENNIAL HARVEST SPECIFICATIONS FOR 2017-2018 MANAGEMENT

The Scientific and Statistical Committee (SSC) reviewed a revised table of 2017-2018 groundfish overfishing limits (OFLs) and category assignments, updated from September 2015. The SSC endorses the OFLs and accompanying category designations in Table 1 of this report.

In this table, the highlighted cells refer to OFLs and category designations that were recommended at this meeting; all other values were adopted during the September 2015 meeting. The rationale for only those OFLs, category designations, or sigma values that might be considered non-standard (e.g., not documented in the most recent assessment or assessment update) are provided below, with corresponding analyses included in the various attachments in the briefing book. Additional discussion of the analyses conducted for yelloweye rockfish, arrowtooth flounder, and big skate are provided as Appendix A (October 2015 "mop up" panel report). The SSC reiterates the 2018 OFLs are conditioned on the 2017 removal assumption. In cases where there are alternative ACLs being considered that are different than those based on default harvest control rules as shown in Table 1, the SSC endorses those 2018 OFLs that correspond with the final preferred ACLs.

For yelloweye rockfish, the last full assessment was done in 2009, with an update assessment conducted in 2011. The 2011 update used a preliminary 2010 catch estimate of 13.1 mt, however the actual catch is now estimated to be 7.6 mt for that year. To incorporate these new data, as well as the actual realized catches from 2012 and 2013, the 2011 update was projected forward with actual rather than estimated catches for the 2010-2014 period (Agenda Item I.4, Attachment 3).

For arrowtooth flounder, the last full assessment was conducted in 2007. A data-moderate assessment was developed and reviewed at the June 2015 Council meeting, but was not approved. Consequently, the OFL estimates for the 2017-2018 assessment cycle are based on catch-only projections (Agenda Item I.4, Attachment 3).

For black rockfish in California, Oregon and Washington, the recommended OFL values are based on the 2015 stock assessment (Agenda Item I.3, Attachment 1). The SSC determined that the Oregon black rockfish should be considered a category 2 stock (with the default sigma of 0.72), while the California and Washington Stocks should be considered category 1 stocks.

For California scorpionfish, catch-only projections based on the 2005 assessment model and estimates of recent catches by California Department of Fish and Wildlife are provided in Agenda Item I.4, Attachment 3. The SSC recommends that for the 2017-2018 OFL estimates, California scorpionfish should be considered a category 2 stock, since the assessment was conducted over 10 years ago. The SSC noted that the increase in the OFL relative to the 2015-2016 values (289 and 256 mt for 2017-2018 OFLs, relative to 114 and 111 mt for 2015-2016 OFLs) is a consequence of using realized catches in the 2005-2014 period, rather than the projected catches in the 2005 model. Specifically, the 2005 model projected a 2015 depletion level of 48 percent if total catches were realized, but as actual catches in that period were lower than the 2005 projections, the revised projection led to an estimated 2015 depletion of 74 percent. This more optimistic (albeit, considerably uncertain given the age of the assessment) perception of stock status is the primary contributing factor to the increase in estimated OFL relative to the ten-year projections from the 2005 model.

For starry flounder, the recommended OFL values represent a "rollover" of the 2016 OFL, with an associated change to a category 3 assessment. For this stock, catch-only projections were not readily available given workload constraints and time delays associated with obtaining total mortality estimates at the appropriate spatial scale (consistent with the 2005 assessments).

For gopher rockfish, the SSC has concerns regarding the utility of catch-only projections given the age of the last assessment (also 2005). As a consequence of this concern and associated time constraints, a rollover of the 2016 OFL was recommended, with an associated change from category 1 to a category 3.

For Oregon kelp greenling, the SSC notes that based on an analysis of uncertainty from the decision table in the most recent stock assessment, a sigma greater than the default (0.44, rather than default 0.36 for category 1) is warranted. For Washington kelp greenling, a stock that has not previously had an OFL value, a DB-SRA analysis was developed using catches provided by Washington and the "low vulnerability" prior to inform relative stock status in the DB-SRA simulation (Agenda Item I.4, attachment 4). As with other DB-SRA estimates, the Washington kelp greenling DB-SRA model is a category 3 assessment.

For big skate, the SSC notes that the provided OFL was approved in 2014 based on an estimate of trawl survey biomass and natural mortality. However, in the 2015-2016 assessment cycle, this species was designated an "ecosystem component" (EC) species, and subsequently did not require an OFL. Since that time, it has been realized that this species is targeted in some fisheries, and reconsideration of the EC status is ongoing. Consequently, the SSC recommends that if this stock is removed from EC status, the OFLs from the 2014 analysis should be adopted, with a category 2 designation. The SSC notes that a presentation on a new methodology for deriving an OFL for big skate was reviewed at the 2015 "mop up" panel (see Appendix A of this report). The mop-up panel found the proposed method to be sufficiently promising that it recommends a data-moderate methodology review be convened to more fully review this and potentially other emerging data moderate methods.

For all stocks in Table 1, the SSC recommends that all sigma values be set at the default level for the corresponding category, except for Oregon kelp greenling (sigma = 0.44 based on the rationale above) and Aurora rockfish (sigma = 0.39 as specified in September 2015 Agenda Item H.5.a, Supplemental SSC Report).

IFQ CATCH PROJECTION MODEL

The SSC reviewed a model to project catch in the west coast limited entry trawl fishery for the shorebased individual fishing quota (IFQ) sector. The model was presented by Dr. Sean Matson (National Marine Fisheries Service West Coast Region) via webinar on November 9, 2015. The model was first reviewed at the June 2015 meeting of SSC Groundfish and Economics subcommittees. The subcommittees provisionally endorsed the model and made technical comments at that time.

The SSC endorses the revised catch projection model for use in the groundfish harvest specifications for 2017-2018. The model represents the best available science for forecasting species-specific catch in the IFQ fishery. The SSC recommends that work continue to improve this model for use in future management decisions and provided technical comments to the analyst. The current model relies exclusively on recent catch histories to generate forecasts and therefore assumes that past conditions and behavior will continue. This method may not be capable of generating reliable forecasts under changing conditions, and future models should incorporate additional information.

BOOTSTRAP ANALYSIS FOR ANALYZING ROCKFISH BYCATCH IN THE AT-SEA WHITING SECTOR

Mr. Patrick Mirick (Oregon Department of Fish and Wildlife) presented an analysis of bycatch of darkblotched rockfish in the at sea whiting fishery to the SSC. The analysis uses bootstrap methods to assign a probability of exceeding darkblotched rockfish allocations in the mothership and catcher-processor sectors. This analysis would be used in analyzing alternative harvest specifications in the whiting fishery. Previously, the GMT used historical bycatch rates (pounds of darkblotched rockfish per pound of whiting) to project darkblotched rockfish allocation required by the fishery. The GMT would like to improve the analysis of projected bycatch impacts on the whiting fishery by calculating the probability of exceeding alternative proposed allocations as well as allocation levels that do not exceed desired thresholds.

The SSC agrees that simulating bycatch outcomes using bootstrap methods is a promising method. The SSC recommends three general modifications to the proposed method.

1. Observations should not be separated into zero/positive darkblotched hauls in a two-stage resampling procedure. Instead, each draw should occur from a pool of all observed outcomes.
2. The mothership and catcher-processor sectors should be analyzed separately. The current model combines sectors to re-sample positive darkblotched hauls.
3. The procedure should first randomly choose a historical year, then re-sample from the chosen year. The result would be a distribution of yearly aggregate outcomes. This method incorporates the fact that there appears to be a strong year-dependence in bycatch.

Table 1. SSC-endorsed 2017 and 2018 OFLs (mt), and stock category designations for west coast groundfish stocks and stock complexes (overfished stocks in CAPS; stocks with new assessments in bold; component stocks in status quo stock complexes in italics; stocks scheduled for harvest specification decisions (i.e., those with specifications not already decided) are highlighted).

Stock	Cat.	2017 OFL	2018 OFL
OVERFISHED STOCKS			
BOCACCIO S. of 40°10' N. lat.	**1**	**2,139**	**2,013**
COWCOD S. of 40°10' N. lat.		**69.5**	**71.4**
COWCOD (Conception)	2	*57.9*	*59.4*
COWCOD (Monterey)	3	*11.6*	*12.0*
DARKBLOTCHED ROCKFISH	**1**	**671**	**693**
PACIFIC OCEAN PERCH	1	961	985
YELLOWEYE ROCKFISH	2	57	58
NON-OVERFISHED STOCKS			
Arrowtooth Flounder	2	16,571	16,498
Black Rockfish (CA)	**1**	**349**	**347**
Black Rockfish (OR)	**2**	**577**	**570**
Black Rockfish (WA)	**1**	**319**	**315**
Cabezon (CA)	1	157	156
Cabezon (OR)	1	49	49
California scorpionfish	2	289	286
Canary Rockfish	**1**	**1,793**	**1,661**
Chilipepper S. of 40°10' N. lat.	**1**	**2,727**	**2,623**
Dover Sole	1	89,702	90,282
English Sole	2	10,914	8,255
Lingcod N. of 40°10' N. lat.	1&2	3,549	3,310
Lingcod S. of 40°10' N. lat.	2	1,502	1,373
Longnose skate	1	2,556	2,526
Longspine Thornyhead (coastwide)	2	4,571	4,339
Pacific Cod	3	3,200	3,200
Petrale Sole	**1**	**3,280**	**3,152**
Sablefish (coastwide)	**1**	**8,050**	**8,329**
Shortbelly	2	6,950	6,950
Shortspine Thornyhead (coastwide)	2	3,144	3,116
Spiny dogfish	2	2,514	2,500
Splitnose S. of 40°10' N. lat.	1	1,841	1,842
Starry Flounder	3	1,847	1,847
Widow Rockfish	**1**	**14,130**	**14,511**
Yellowtail N. of 40°10' N. lat.	2	6,786	6,574
STOCK COMPLEXES			
Nearshore Rockfish North		118	119
Black and yellow	3	*0.01*	*0.01*
Blue (CA)	2	*34.1*	*34.8*
Blue (OR & WA)	3	*32.3*	*32.3*
Brown	2	*2.0*	*2.0*
Calico	3	-	-
China	**2**	***30.2***	***29.3***
Copper	2	*11.2*	*11.6*
Gopher	3	-	-
Grass	3	*0.7*	*0.7*
Kelp	3	*0.01*	*0.01*

Stock	Cat.	2017 OFL	2018 OFL
Olive	3	*0.3*	*0.3*
Quillback	3	*7.4*	*7.4*
Treefish	3	*0.2*	*0.2*
Shelf Rockfish North		2,303	2,302
Bronzespotted	3	-	-
Bocaccio	3	*284.0*	*284.0*
Chameleon	3	-	-
Chilipepper	**1**	***205.2***	***197.4***
Cowcod	3	*0.4*	*0.4*
Flag	3	*0.1*	*0.1*
Freckled	3	-	-
Greenblotched	3	*1.3*	*1.3*
Greenspotted 40°10' to 42° N. lat.	2	*9.4*	*9.3*
Greenspotted N. of 42 N. lat. (OR & WA)	3	*6.1*	*6.1*
Greenstriped	2	*1,299.6*	*1,306.4*
Halfbanded	3	-	-
Harlequin	3	-	-
Honeycomb	3	-	-
Mexican	3	-	-
Pink	3	*0.004*	*0.004*
Pinkrose	3	-	-
Puget Sound	3	-	-
Pygmy	3	-	-
Redstripe	3	*269.9*	*269.9*
Rosethorn	3	*12.9*	*12.9*
Rosy	3	*3.0*	*3.0*
Silvergray	3	*159.4*	*159.4*
Speckled	3	*0.2*	*0.2*
Squarespot	3	*0.2*	*0.2*
Starry	3	*0.004*	*0.004*
Stripetail	3	*40.4*	*40.4*
Swordspine	3	*0.0001*	*0.0001*
Tiger	3	*1.0*	*1.0*
Vermilion	3	*9.7*	*9.7*
Slope Rockfish North		1,897	1,896
Aurora	1	*17.5*	*17.5*
Bank	3	*17.2*	*17.2*
Blackgill	3	*4.7*	*4.7*
Redbanded	3	*45.3*	*45.3*
Rougheye/Blackspotted	2	*210.7*	*214.6*
Sharpchin	2	*364.0*	*358.4*
Shortraker	3	*18.7*	*18.7*
Splitnose	1	*1,026.7*	*1,027.1*
Yellowmouth	3	*192.4*	*192.4*
Nearshore Rockfish South		1,329	1,344
Shallow Nearshore Species		*NA*	*NA*
Black and yellow	*3*	*27.5*	*27.5*
China	***2***	***13.3***	***13.8***
Gopher (N of Pt. Conception)	*3*	*144.0*	*144.0*
Gopher (S of Pt. Conception)	*3*	*25.6*	*25.6*
Grass	*3*	*59.6*	*59.6*
Kelp	*3*	*27.7*	*27.7*

Stock	Cat.	2017 OFL	2018 OFL
Deeper Nearshore Species		*NA*	*NA*
Blue (assessed area)	*2*	*234.5*	*239.4*
Blue (S of 34°27' N. lat.)	*3*	*72.9*	*72.9*
Brown	*2*	*170.0*	*174.0*
Calico	*3*	-	-
Copper	*2*	*310.9*	*316.7*
Olive	*3*	*224.6*	*224.6*
Quillback	*3*	*5.4*	*5.4*
Treefish	*3*	*13.2*	*13.2*
Shelf Rockfish South		1,917	1,918
Bronzespotted	3	*3.6*	*3.6*
Chameleon	3	-	-
Flag	3	*23.4*	*23.4*
Freckled	3	-	-
Greenblotched	3	*23.1*	*23.1*
Greenspotted	2	*78.9*	*78.5*
Greenstriped	2	*238.4*	*239.6*
Halfbanded	3	-	-
Harlequin	3	-	-
Honeycomb	3	*9.9*	*9.9*
Mexican	3	*5.1*	*5.1*
Pink	3	*2.5*	*2.5*
Pinkrose	3	-	-
Pygmy	3	-	-
Redstripe	3	*0.5*	*0.5*
Rosethorn	3	*2.1*	*2.1*
Rosy	3	*44.5*	*44.5*
Silvergray	3	*0.5*	*0.5*
Speckled	3	*39.4*	*39.4*
Squarespot	3	*11.1*	*11.1*
Starry	3	*62.6*	*62.6*
Stripetail	3	*23.6*	*23.6*
Swordspine	3	*14.2*	*14.2*
Tiger	3	*0.04*	*0.04*
Vermilion	3	*269.3*	*269.3*
Yellowtail	3	*1,064.4*	*1,064.4*
Slope Rockfish South		827	829
Aurora	1	*74.4*	*74.5*
Bank	3	*503.2*	*503.2*
Blackgill	2	*143.0*	*146.0*
Pacific ocean perch	3	-	-
Redbanded	3	*10.4*	*10.4*
Rougheye/Blackspotted	2	*4.3*	*4.4*
Sharpchin	2	*91.0*	*89.6*
Shortraker	3	*0.1*	*0.1*
Yellowmouth	3	*0.8*	*0.8*
Other Flatfish		11,165	9,690
Butter sole	3	*4.6*	*4.6*
Curlfin sole	3	*8.2*	*8.2*
Flathead sole	3	*35.0*	*35.0*
Pacific sanddab	3	*4,801.0*	*4,801.0*
Rex sole	2	*5,476.0*	*4,001.0*

Stock	Cat.	2017 OFL	2018 OFL
Rock sole	3	*66.7*	*66.7*
Sand sole	3	*773.2*	*773.2*
Other Fish		537	501
Cabezon (WA)	3	*4.5*	*4.8*
Kelp greenling (CA)	3	*118.9*	*118.9*
Kelp greenling (OR) assuming sigma = 0.44	**1**	***239.1***	***203.2***
Kelp greenling (WA)	3	*7.1*	*7.1*
Leopard shark	3	*167.1*	*167.1*
Big skate	2	*541*	*541*

SSC Notes:

OFLs for 2017-2018 management cycle notes:

With respect to alternative OFLs for 2018 relative to decisions regarding 2017 ACLs, there are four species with alternative ACLs decided by the Council for analysis in September. Agenda Item I.4, Attachment 4 shows the alternatives OFLs and ACLs for these four species as follows: Tables 2 and 3 for canary rockfish, Table 4 for China rockfish, Table 7 for darkblotched rockfish, and Table 14 for widow rockfish. The SSC endorses those 2018 OFLs that correspond to the final preferred ACLs that are decided for these four species. Further SSC review of 2018 OFLs may be needed if new ACL alternatives are decided for any stocks at this meeting.

Discussion included how to ensure that the basis for apportionment values and updated projections are captured and discoverable for the future, as briefing book archives or appendices to assessments. Additional discussion of this topic was recommended for the post-mortem workshop (tentatively scheduled for mid-December). In addition to better planning and anticipation of needs to deal with "stale" assessments, there could also be a more formalized means of changing assessment categories commensurate with different assessment longevities- a general rule with options to consider specific context for a given stock.

It was noted that the 2017-2018 OFL values for yelloweye rockfish were based on a catch-only projection to the stock assessment, rather than from a rebuilding analysis. In the future, for rebuilding stocks any revised OFL estimates that incorporate actual catch histories (rather than projections) should be based on rebuilding analyses rather than assessment model projections.

For starry flounder, A DB-SRA or a new assessment should be used to inform the OFLs for 2019 and beyond. The SSC notes an ongoing need to have more forward thinking planning at the initiation of each assessment cycle to evaluate the needs to conduct catch-only projections, new data-poor OFL estimates or other analyses to support OFL determination in the beginning of the assessment cycle to aid in planning, this should be discussed further at the post-mortem workshop).

It was also noted that Arrowtooth flounder and blue rockfish- assessments were also 2007, may be last time we can use those assessments

IFQ catch projection model notes:

1. The current method for characterizing uncertainty around projected catch is problematic and should be improved as new data becomes available. The SSC acknowledges that generating uncertainty estimates in this context is difficult, given the availability of only four years of historical data that is suitable for the model. Alternative methods for characterizing and validating uncertainty estimates should be investigated. Specifically, observed outcomes should be compared to the model's prediction intervals.

2. The current model relies exclusively on recent catch histories to generate forecasts and therefore assumes that past conditions and behavior will continue. This method may not be capable of generating reliable forecasts under changing conditions. For example, forecasted catch implicitly assumes current allocation levels for canary rockfish. Future canary rockfish allocations will be outside the range of the historical data and it is unclear how these allocation levels will affect the catch of both canary rockfish and co-occurring species. The SSC recommends that future versions of the model incorporate variables that describe conditions in the fishery such as: prices, relative allocation levels for different species, and availability of alternative fishing opportunities (e.g. conditions in the Dungeness crab fishery).

3. In future versions of the model, the attainment threshold parameter and year-weighting parameters should be optimized jointly using a numerical estimation procedure.

4. The current version of the model attempts to predict catch at the vessel-species level, which is useful for projecting fleet-wide catch. However, many of the economic analyses are performed at the port level, including IO-PAC. Given this, the SSC recommends that future work investigates how well the model performs for predicting catch at the port level, and whether estimates at the port level can be improved.

5. Improved documentation of the model is necessary. More detail on all aspects of the model would be helpful. In particular, more detail on the specific bootstrap methods used to characterized uncertainty is needed.

GMT Bootstrap Analysis notes:

There is reason to believe that there are a number of confounding factors working in this system: Trends in darkblotched abundance, relative abundance of both the target and bycatch species, spatial distribution of effort/species.

The GMT representatives indicated that preliminary results from formal models show no relationship between haul duration (and whiting catch) and darkblotched bycatch in the form of non-significant regression coefficients. Non-significant coefficients do not necessarily imply no correlation.

The proposed method does not perform any predictive accuracy checks (suggestions?). This should be performed in future analyses and is an important component because the method's purpose is to project future year impacts. Also, an assumption of the bootstrap is that all possible outcomes fall within the range of existing outcomes.

The GMT wants to get this method pre-approved for use in specs. Specs come back to SSC in April.

Appendix A: Scientific and Statistical Committee's Groundfish Subcommittee

Mop-up Stock Assessment Review Panel Meeting

Report on Arrowtooth Flounder catch-only projections, Yelloweye Rockfish yield projections, and a proposed new methodology for deriving OFLs and ACLs for Big Skate and other data moderate stocks

National Marine Fisheries Service
Western Regional Center's Sand Point Facility
Alaska Fisheries Science Center
Building 4, Traynor Room 2076, September 28 – October 1
Building 4, Observer Training Room 1055, October 2
7600 Sand Point Way NE
Seattle, WA 98115

September 28 – October 2, 2015

Monday, September 28

Reviewers Present:
Dr. John Field, NMFS Southwest Fisheries Science Center, SSC, Chair
Dr. Andy Cooper, Simon Fraser University, SSC
Dr. Martin Dorn, NMFS Alaska Fisheries Science Center, SSC
Dr. Theresa Tsou, Washington Department of Fish and Wildlife, SSC
Mr. John Budrick, California Department of Fish and Wildlife, SSC
Dr. Neil Klaer, Center of Independent Experts
Dr. Owen Hamel, NMFS Northwest Fisheries Science Center, SSC

STAT Present:
Mr. John Wallace, NMFS Northwest Fisheries Science Center
Dr. James Thorson, NMFS Northwest Fisheries Science Center

Advisors Present:
Ms. Lynn Mattes, Oregon Department of Fish and Wildlife, GMT
Mr. Gerry Richter, Pt. Conception Groundfishermen's Association, GAP
Mr. John DeVore, Pacific Fishery Management Council

Overview of Arrowtooth Flounder and Yelloweye Rockfish Projections

The SSC groundfish subcommittee received a presentation from John Wallace (NWFSC) concerning arrowtooth flounder and yelloweye rockfish stock assessment projections using realized catches to inform harvest specifications for 2017 and 2018. Since catches for these stocks have tended to be lower than their specified ACLs, updating projections with realized catches can improve the accuracy the yield projections. When catches are lower than originally

assumed, stock size will be higher than in the original projections, resulting in an increase in the OFLs, ABCs, and ACLs. The magnitude of this effect depends on several factors, including the intended harvest rate, the degree to which the catches are lower than assumed, and the productivity of the stock. Notwithstanding, it should be recognized that both of these assessments are approaching the end of their useful life for informing management decisions, and any projections should be regarded as highly uncertain.

Arrowtooth flounder yield projections

The last full assessment of arrowtooth flounder was done in 2007. A data-moderate assessment was developed for arrowtooth flounder and reviewed by the SSC groundfish subcommittee during a one-day meeting immediately prior to the June 2015 Council meeting. Unfortunately the assessment could not be approved by the SSC without opportunity for further model exploration and evaluation.

The SSC groundfish subcommittee had no technical concerns regarding the yield projections for arrowtooth flounder, but had the following recommendations concerning the document. In Table 2, it should be verified that the column indicating catch includes also includes discards. The heading for this column should be changed in the final draft to indicate that total catches are reported (i.e., including discards). Table 2 should also include additional columns that report the actual adopted OFLs and ABCs during in historical period. The subcommittee also requests that a plot showing the abundance trend from NWFSC trawl survey be added to the document. This information may be helpful to gauge the need for a new assessment.

The SSC groundfish subcommittee also discussed how to estimate expected catches for the projections in 2015 and 2016. Rather than using ad hoc methods such as consulting with knowledgeable individuals, the subcommittee recommends that Groundfish Management Team provide these estimates for the current management biennium. The GMT is the most authoritative source for expected catches during the current management biennium. Projections with expected catches should be the basis for developing OFL and ABC recommendations since these are the best estimates of the actual removals (i.e., they are risk-neutral estimates of these quantities).

Yelloweye rockfish yield projections

The last full assessment of yelloweye rockfish was done in 2009, and an update assessment was subsequently conducted in 2011. Yelloweye rockfish is an overfished stock that is currently managed under a rebuilding plan with a rebuilding SPR of 76%. Stock projections for yelloweye rockfish used actual catches when available and the existing rebuilding SPR for future catches. It is important to note that these stock projections should not be regarded as new rebuilding analysis for yelloweye rockfish, rather these represent deterministic projections of the assessment model only.

A preliminary 2010 catch estimate of 13.1 t was used in the 2011 yelloweye update, however the actual catch is now estimated to be 7.6 t for that year. To incorporate this new estimate, as well as the actual realized catches from 2012 and 2013, in the assessment, it was necessary to rerun the model before doing yield projections. The yield projection used an estimated catch in 2014 of 16.8 t from the GMT scorecard, which will likely be revised lower. The SSC groundfish

subcommittee recommends that a sensitivity run be done with an assumed 8.8 t catch in 2014, which was the lowest catch during the 2011-2014 period. The impacts on 2017 and 2018 ACL for this scenario (which are likely to be minimal) should be reported in the text rather than adding a new table.

A comparison of ACLs for the old and new projections indicated that the new projections with realized catches in 2010-2014 increased the cumulative 2017-2018 ACLs by 1.4 t, an increase of 3.7%. Table 4 should include a column for the actual rebuilding ACLs for the historical period. Table 5 showing yelloweye rockfish projections for a "maximum expected catch" is potentially confusing, and should be removed.

A member of the public noted that in-season management has routinely limited yelloweye rockfish catches to levels considerably below the ACLs associated with the rebuilding plan, and wondered whether it would be possible to incorporate underachievement of the ACL into the design of rebuilding plans. It is certainly possible to include implementation error (including a consistent positive or negative bias) into a rebuilding analysis. There would need to sufficient information to adequately model implementation error and bias, and it would be necessary to extend those assumptions throughout the duration of the rebuilding period. There may be legal issues that would need to be addressed before adopting such an approach.

A proposed new methodology for setting OFLs and ABC for big skate and other data-moderate stocks

The SSC groundfish subcommittee received a presentation from Dr. James Thorson (NWFSC) on a new assessment method for estimating OFLs and ABCs for stocks without full assessments. The method relies on a time series of assessment surveys where catch per area-swept at survey stations can be considered unbiased estimates of local fish density. Therefore the method is likely to be most useful for species that are surveyed effectively in the NWFSC bottom trawl survey, such as common flatfish and shelf rockfish species, and other skate species. Under the PFMC assessment classification scheme, the proposed assessment method would be considered a data-moderate method because it relies only on survey abundance data and recent catches, and provides estimates of an aggregated population where individual year-class abundances are not distinguished.

The method is spatially-structured production model that incorporates movement. Population dynamics follow a non-age-structured Gompertz production model with a term for fishing mortality and an observation equation that links stock abundance to survey information. Stock dynamics are spatially structured and spatially correlated. Finally, the model allows for migration according to a diffusion process.

The method can be regarded as an evolutionary development of more familiar assessment tools that are used for West Coast groundfish. For example, XDB-SRA, an SSC-endorsed data moderate method, is a Bayesian production model fit to survey data, but is not spatially structured. The survey biomass * FMSY/M * M method to estimate OFL for some stocks also uses a survey time series, but total biomass estimates are used rather than tow-by-tow information. Finally, the geostatistical approach approved by the SSC for index development is also fits a density surface to tow-by-tow survey data, but without the production model constraints on year-to-year dynamics.

The SSC groundfish subcommittee had a number of technical recommendations concerning the proposed method:

The simulation experiment to evaluate model performance may give over-optimistic results because the simulation model matches the assumptions of estimation model. It may be more appropriate to operate on a finer scale spatial grid than the estimation model.

The assumption that catchability equals one is major assumption. Some means of incorporating uncertainty in catchability, for example, by estimating catchability but incorporating a prior on catchability into the objective function, could be an improvement to the method.

A step-by-step approach to model evaluation should be adopted so that a range of models with increasing complexity can be contrasted. For example, it should be possible to compare model results for non-spatial Gompertz production model, a model with spatial structure, and model with spatial structure and migration. Area-swept estimates should be compared to geostatistical methods of analyzing survey data with and without production model dynamics.

Diagnostic plots are needed to evaluate model fit. No diagnostics were included in the presentation, which posed a challenge in trying to assess the extent to which the model was or was not fitting the data. Some consideration of a range of diagnostics and criteria that could help to assess the robustness of model estimates would be helpful.

The SSC has adopted a policy that proposed methods for stock assessment need to go through methodology review before being used for stock assessment. The purpose of this process is not to stymie scientific progress, but rather to give proposed methods careful scrutiny and to understand their strengths and weaknesses. Since data moderate methods are intended to have greater throughput than full assessments, pre-approving the methodology allows STAR panels to focus more on stock-specific issues and less on modeling questions. Ideally, data moderate methods should be robust and reasonably transparent, and the complexity of approach should be matched to the data that are available. The SSC groundfish subcommittee found the proposed method to be sufficiently promising that it recommends a data-moderate methodology review be convened to review this method and other proposed data moderate methods.

7. Stock Assessment Prioritization for the 2019-20 Management Cycle

The Scientific and Statistical Committee (SSC) reviewed the NOAA document "Stock Assessment Prioritization for West Coast Groundfish" (Agenda Item I.7.a, Attachment 1) and received a presentation on the topic by Dr. Jim Hastie (NWFSC). Ms. Kristan Blackhart (NOAA Affiliate) was also available to answer questions. The prioritization process will develop quantitative scores for ranking stocks to be assessed, with the aim of providing a more comprehensive and systematic basis for the rankings. Many elements of the process are similar to how the Council has prioritized stocks for assessment in recent groundfish assessment cycles. Final scores for ranking stocks will be derived by assigning weights to the different prioritization factors to calculate a weighted average for each stock. Developing these weights will require consultation with the Council and its advisory bodies, currently proposed for the March Council meeting. For these scores to be fully objective the weights should be assigned to the factors in advance of seeing the final scores. The SSC recommends that the score for recreational

importance of different stocks be based on the number of trips, which would approximate the value of the recreational fishery to anglers and regional economies.

SSC Notes:

In theory it might be possible to derive estimated weights based on past Council decisions on stock assessment priorities.

F. Council Administrative Matters

6. Future Council Meeting Agenda and Workload Planning

Mr. Jim Seger presented an overview of the "Draft Guidance for Conducting Reviews of Catch Share Programs" as well as draft Council staff comments on this document (Informational Report 1).

The Scientific and Statistical Committee (SSC) finds that the draft guidance contains a generally complete list of issues to be addressed in the 5- and 7-year reviews of catch share programs. However, the relative importance of the various portions of the guidance will vary by catch share program; data and resources are limited, and the particular focus of each review should be determined for each catch share program and for each review. The SSC recommends that the draft guidance document should be modified to make it clear that these are guidelines and not mandates; for instance, by changing "should" to "should consider" throughout the document as appropriate.

SSC Notes:

What happens to the 5 year review after they are done – these recommendations would be taken up by the Council, and this is mandated by the MSA.

These are topics that should be commented on/addressed, but we should be able to focus on the issues which are most important and for which we have the data and resources to address.

The review should speak to the likelihood of getting data in the future to address some of the questions within the guidelines, as well as the effort and cost involved.

SSC Subcommittee Assignments, November 2015

Salmon	Groundfish	Coastal Pelagic Species	Highly Migratory Species	Economics	Ecosystem-Based Management
Pete Lawson	**David Sampson**	**André Punt**	**Kevin Piner**	**Todd Lee**	**Martin Dorn**
Alan Byrne	John Budrick	Alan Byrne	Andrew Cooper	André Punt	John Field
Owen Hamel	Andrew Cooper	Owen Hamel	John Field	David Sampson	Pete Lawson
Galen Johnson	Martin Dorn	Tom Jagielo	André Punt	Cameron Speir	Galen Johnson
Will Satterthwaite	John Field	Will Satterthwaite	David Sampson		Todd Lee
Cameron Speir	Owen Hamel				Kevin Piner
	Tom Jagielo				André Punt
	André Punt				Will Satterthwaite
	Tien-Shui Tsou				Tien-Shui Tsou

Bold denotes Subcommittee Chairperson

PFMC
02/12/16

DRAFT Tentative Council and SSC Meeting Dates for 2016

Council Meeting Dates	Location	Likely SSC Mtg Dates	Major Topics
March 8-14, 2016 Advisory Bodies may begin Tue, March 8 Council Session begins Wed, March 9	DoubleTree by Hilton Hotel Sacramento 2001 Point West Way Sacramento, CA 95815 Phone: 916-929-8855	Two-day SSC Session **Tue, March 8 – Wed, March 9** One-day CPS Subcm Session **Thu, March 10**	Chinook FRAM base period co-manager update Identify salmon management objectives Salmon review/Pre I CA current & IEA report FEP indicators and climate shift initiatives update Groundfish gear changes
April 8-14, 2016 **Advisory Bodies may begin Fri, Apr 8** **Council Session begins Sat, Apr 9**	Hilton Vancouver Washington 301 W. Sixth Street Vancouver, WA 98660 USA Phone: 360-993-4500	One-day SSC Session **Sat, April 9**	Pacific sardine assessment and management measures Groundfish initial stock assessment plan and Terms of Reference Salmon methodology topic selection
June 22-28, 2016 **Advisory Bodies may begin Wed, June 22** **Council Session begins Thu, June 23**	Hotel Murano 1320 Broadway Plaza Tacoma, WA 98402 Phone: 253-627-3167	Two-day SSC Session **Wed, June 22 – Thu, June 23**	HMS biennial management measures, SDC, and ref. pts. Groundfish final stock assessment plan and Terms of Reference Sablefish ecosystem indicators 5-year IFQ program review
September 14-20, 2016 **Advisory Bodies may begin Wed, Sept 14** **Council Session begins Thu, Sept 15**	The Riverside Hotel 2900 Chinden Blvd Boise, ID 83714 Phone: 208-343-1871	Two-day SSC Session **Wed, Sept 14 – Thu Sept 15**	Anchovy assessment workshop report CPS MSST report Anchovy active management alts. Salmon methodology topic priorities SRWC control rule recommendations Groundfish EFH-RCA amendment PPA FEP indicators initiative FPA

November 15-21, 2016 **Advisory Bodies may begin Tue, Nov 15** **Council Session begins Wed, Nov 16**	Hyatt Regency Orange County 11999 Harbor Blvd. Garden Grove, CA 92840 Phone: 714-750-1234	Two-day SSC Session **Tue, Nov 15 – Wed, Nov 16**	CPS methodology topic selection Anchovy stock assessment CPS SAFE Groundfish stock assessment methodology topic priorities 5-year IFQ program review Sablefish ecosystem indicators Salmon methodology review

SSC meeting dates and durations are tentative and are subject to change in response to Council meeting dates, agendas, workload, etc.

Proposed Workshops and SSC Subcommittee Meetings for 2016

Tentative – Depended on funding, dates subject to change

□– Prep. Work Underway, Scheduled to Occur; ▭- Status of Supporting Analyses Uncertain, Remains a Priority;

▨ Setbacks exist, Questionable; ■ Funding or Prep. Not Avail, likely to be canceled or postponed

	Workshop/Meeting	Potential Dates	Sponsor/ Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
1	Nearshore Groundfish Assessment Workshop	March 22-23	ODFW/ Portland	?	?	?	DeVore
2	CPS Assessment Workshop	May 2-5	SWFSC/ La Jolla	2-3 CPS Subcommittee members	Outside experts	CPSMT CPSAS	Griffin
3	Evaluation of Stock Productivity Methodological Approaches/B_{MSY} Workshop	Summer 2016?	TBD	GF & CPS Subcommittees	TBD	GMT GAP	DeVore
4	Groundfish Historical Catch Reconstructions	Summer 2016?	TBD	GF Subcommittee	TBD	GMT GAP	DeVore
5	Alternative Anchovy Management Webinar	Late July?	TBD	CPS Subcommittee?	TBD	CPSMT CPSAS	Griffin
6	Anchovy STAR Panel (Contingent on an Assessment)	Oct.?	TBD/ La Jolla	CPS Subcommittee	CIE	CPSMT CPSAS	Griffin
7	Salmon Methodology Review	Late Oct.?	Council/ Portland	Salmon Subcommittee	None	STT SAS MEW	Burner
8	PICES/ICES Meeting on Small Pelagics	Nov. 1-13	PICES/ICES/ San Diego	TBD	TBD	TBD	TBD

Proposed Workshops and SSC Subcommittee Meetings for 2016

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▨ Setbacks exist, Questionable; ■ Funding or Prep. Not Avail, likely to be canceled or postponed

	Workshop/Meeting	Potential Dates	Sponsor/ Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
9	Recreational CPUE Standardization Workshop	TBD	PFMC/ TBD	TBD	TBD	GMT GAP	DeVore
10	Methods for Data Reweighting Workshop	TBD	NWFSC/ Council	GF & CPS Subcommittees	TBD	GMT GAP	DeVore
11	Transboundary Groundfish Stocks	?	Council	2 TBD?	?	GMT GAP	DeVore