

MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
The Riverside Hotel
Cinnabar Room
2900 Chinden Boulevard
Boise, Idaho 83714
Telephone: 208-343-1871
September 12-13, 2017

Members in Attendance

Dr. Aaron Berger, National Marine Fisheries Service Northwest Fisheries Science Center, Newport, OR
Dr. Evelyn Brown, Lummi Nation, Bellingham, WA
Dr. John Budrick, California Department of Fish and Wildlife, Belmont, CA
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. Michael Harte, Oregon State University, Corvallis, OR
Dr. Dan Holland, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Galen Johnson, Northwest Indian Fisheries Commission, Olympia, WA
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. Ole Shelton, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
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

Mr. Alan Byrne, Idaho Department of Fish and Game, Boise, ID

SSC Recusals for the September 2017 Meeting		
SSC Member	Issue	Reason
Dr. Aaron Berger	Agenda Item E.8 – Adopt Final Stock Assessments	Dr. Berger was the lead STAT on the OR BDR assessment
Dr. John Budrick	Agenda Item E.8 – Adopt Final Stock Assessments	Dr. Budrick was on the STAT for the CA scorpionfish assessment
Dr. John Field	Agenda Item E.8 – Adopt Final Stock Assessments	Dr. Field supervised staff who prepared the CA BDR and CA scorpionfish assessments
Dr. John Field	Agenda Item E.3 – Stock Assessment Methodology Review Topic Selection	Dr. Field is one of the sponsors of a methodology topic (Attachment 1) proposed for review
Dr. John Field	Agenda Item I.1 – Climate Vulnerability Assessment	Dr. Field scored some climate vulnerabilities
Dr. Owen Hamel	Agenda Item E.8 – Adopt Final Stock Assessments	Dr. Hamel supervised staff who prepared the OR BDR, POP, lingcod, yelloweye, and yellowtail assessments
Dr. Dan Holland	Agenda Item I.2 – FEP Initiatives: Scoping and Selection	Dr. Holland is a principal investigator on Fishery Participation Choices
Dr. André Punt	Agenda Item E.9 – Initial Harvest Specifications and Management Measure Actions for 2019-2020 Management	Dr. Punt co-authored the sigma analysis prepared by Kristin Privitera-Johnson
Dr. André Punt	Agenda Item I.2 – FEP Initiatives: Scoping and Selection	Dr. Punt is a principal investigator on Fishery Participation Choices
Dr. Theresa Tsou	Agenda Item E.8 – Adopt Final Stock Assessments	Dr. Tsou was on the STAT for the northern lingcod assessment

A. Call to Order

Chairman Will Satterthwaite called the meeting to order at 8:00 a.m. Chuck Tracy briefed the Scientific and Statistical Committee (SSC) on the issues to be discussed this week. Chuck provided an update on plans for the Sixth National Meeting of Scientific Coordination Subcommittee of the Council Coordination Committee. For Future Meeting Planning, the SSC discussed plans for the Marine Stewardship Council review of select conditions for certifying the

west coast bottom trawl fishery. Chuck explained the protocols memo he sent to advisory bodies. The protocols highlighted include minority reports in advisory body statements and the need to have sensitivity to different political views. All advisory bodies need to appear objective. The Research and Data Needs document needs to be prepared for early next year. The five-year review of the Fishery Ecosystem Plan is scheduled for next year. There are four nominees for two at-large SSC seats. Additionally, there are four nominees for four vacant non-SSC advisory body seats. Chuck then provided an overview of the SSC agenda and highlighted the tasks under each item.

The June minutes were approved with the recommendation to append the Groundfish Subcommittee report to the end of the minutes.

Aaron Berger volunteered to serve as chair of the Highly Migratory Species Subcommittee. Ole Shelton volunteered to serve on the Salmon and Ecosystem subcommittees.

John DeVore will facilitate the scheduling of the stock assessment process review meeting recommended for early December.

There was a discussion on preparing the five-year Research and Data Needs (R&D) document. Martin Dorn explained how the NPFMC SSC prepares their R&D document which is a matrix of prioritized R&D needs and also outlines those endeavors that are ongoing, etc. It is a much more involved process but it can be useful in preparing grant proposals, etc. Martin will send his recommendations to John DeVore who will take the first shot at drafting and organizing the R&D document.

The SSC then went into closed session to discuss nominees to vacant advisory body seats.

C. Coastal Pelagic Species Management

1. Acoustic Trawl Survey Methodology Review Terms of Reference

Dr. André Punt (Scientific and Statistical Committee [SSC] Coastal Pelagic Species [CPS] subcommittee chair) summarized the proposed Terms of Reference for the January 2018 methodology review of the Southwest Fisheries Science Center's acoustic trawl survey methodology (ATM) for coastal pelagic species ([Agenda Item C.1, Attachment 1](#)). The methodology review panel will be focused on the approach used to develop biomass indices for Pacific sardine, Pacific mackerel, two sub-stocks of northern anchovy, and jack mackerel. This will be the second Council-sponsored methodology review for the ATM (the first was conducted in February 2011), and is needed to address the eight items in the proposed Terms of Reference.

All eight items in the proposed Terms of Reference are very important for interpreting and applying resulting biomass indices for CPS management. The SSC recommends lengthening the methodology review to 4.5 or 5 days to adequately address all eight items. Specific recommendations on review item changes or refinements include:

- Item 1 (documentation) and 8 (use for assessment) should both include an additional sub-item to address how echogram backscatter is analyzed to exclude non-CPS backscatter.

- Item 3 should focus on using the habitat model to select the region to be surveyed, whereas the use of the habitat model to split historical catches between the northern and southern subpopulations should be dealt with at Stock Assessment Review panels.
- Item 5 should not take up a large amount of time during the review. It should focus on summarizing the conclusions of workshops on comparing outputs from the EK60 and EK80 echo sounders.
- Item 8 essentially represents a synthesis of the other seven items, and thus will be the most relevant to the Council for understanding ATM survey use for CPS management. Item 8c should read “use the most recent estimate of absolute biomass to directly inform harvest management without the use of a formal integrated assessment.”

The SSC endorses the scope of the proposed ATM methodology review, including review report expectations and the breadth of the review topic items.

SSC Notes:

The CPSMT indicated ([Agenda Item C.1.a, Supplemental CPSMT Report 1](#)) that item 3 was less of a priority as it should be dealt with at the STAR panel. The SSC suggested that decisions about splitting the catches to subpopulation could be dealt with at STAR panels, but the acoustic detection and targeting issues identified under item 3 should be addressed at the methodology review if time permits.

The CPSMT indicated ([Agenda Item C.1.a, Supplemental CPSMT Report 1](#)) that item 5 was less of a priority because the EK80 provides generally comparable data as the EK60, and the additional benefits of using the EK80 have not been fully evaluated at this time and are not ready for review. The SSC noted that item 5 should remain in the terms of reference and, given the likely available information, will be a relatively quick but important review item.

The following SSC members were identified to be on the review panel: panel chair (Punt), first additional reviewer (Hamel), and second additional reviewer (Brown). Three CIE reviewers will also need to be selected.

F. Salmon Management

1. Methodology Review Final Topic Selection

Ms. Robin Ehlke (Council staff) briefed the Scientific and Statistical Committee (SSC) on the list of proposed topics for the 2017 Salmon Methodology Review tentatively scheduled for an October 17 webinar. Only one item is anticipated to be ready for review this year:

Technical Revision to the Marine Survival Index of the Oregon Coastal Natural Coho Work Group Harvest Matrix ([Agenda Item F.1.a, Supplemental ODFW Report 2, September 2017](#)), with Oregon Department of Fish and Wildlife the responsible party.

Although documentation related to the Chinook Fishery Regulation Assessment Model and the base period update were previously identified as topics for review, complete documentation will not be ready this year ([Agenda Item F.1.a, Supplemental MEW Report 1, September 2017](#)). A

proposed change to a management line in Oregon was identified by the Salmon Technical Team (STT) as a data change that does not require methodology review ([Agenda Item F.1.a, Supplemental STT Report 2, September 2017](#)). A proposed change to the southern boundary of the Klamath Management Zone in California would require a methodology review to implement, but no analysis will be ready for review this year ([Agenda Item F.1.a, Supplemental STT Report 2, September 2017](#)).

Materials submitted for review should be technically sound, comprehensive, clearly documented, and identified by author. Materials to be reviewed should be submitted no later than October 3, 2017, to Robin Ehlke. If this deadline cannot be met, it is the responsibility of the author to contact Robin Ehlke, the SSC Salmon Subcommittee Chair, and the SSC Chair prior to the deadline, so appropriate arrangements, rescheduling, and cancellations can be made in a timely and cost-effective manner. The SSC plans to review reports on this topic at the November 2017 meeting.

SSC Notes:

Changes made to historical data as proposed under [Agenda Item F.1.a, Supplemental ODFW Report 1, September 2017](#) should be accompanied by appropriate documentation or changes uploaded to RMIS so that these changes will be transparent to third-party users of the data.

2. Sacramento River Winter Chinook Control Rule, Preliminary Recommendations

Dr. Michael O'Farrell (Southwest Fisheries Science Center) presented an evaluation of Sacramento River Winter Chinook (SRWC) salmon control rules ([Agenda Item F.2.a, SRWCW Report 1](#)) to the Scientific and Statistical Committee (SSC). This analysis is an update of the management strategy evaluation (MSE) presented to the SSC in April 2017 ([Agenda Item E.1.a, SRWCW Report 1, April 2017](#)) and continues to build upon a previous analysis reviewed and endorsed by the SSC in March 2014 ([Agenda Item F.8.a, Attachment 2, March 2014](#)), as well as preseason abundance forecast approaches reviewed in November 2016 ([Agenda Item D.2, Attachment 1, November 2016](#)).

The analysis evaluates nine control rules using scenarios that differ in assumptions regarding productivity and forecast error. The SSC commends the analysts for this MSE work, which represents an important step in evaluating these control rules.

At the April 2017 SSC meeting, the SSC recommended two changes to the analysis: adding scenarios to explore alternative assumptions regarding productivity, and reporting the proportion of years with allowable impact rates within ranges to illustrate both the frequency and magnitude of changes in allowable impact rates. The updated analysis incorporates both recommendations. In particular, the updated evaluation contains alternative scenarios that include longer droughts, more frequent droughts, and overall warmer river temperature, each of which affects egg-to-fry survival.

The analysis represents the best available science for differentiating between the effects of alternative control rules, and for evaluating the tradeoff between conservation benefits and harvest

constraints if the harvest control rule is based on the median versus mode of the abundance forecast.

SSC Notes:

It would be useful to present results for the less productive scenarios in tabular form as well as the figure (Figure 5).

Figure 5 could be easier to interpret if it included bars for 20% and >20% allowable impact rates, and included results for control rules 1-3. It could also be informative to subdivide the 10-19.9% category, e.g. into 10-4.9% and 15-19.9%.

It appears that the scenario with autocorrelation has lower realized productivity than the base scenario, possibly because the mean value was not adjusted to account for the effects of adding autocorrelation. This does not present a problem for comparing across control rules within scenarios.

It was suggested that a scatterplot could be a more informative way of comparing the forecasted median and mode versus the modeled truth, but the important criteria for choosing among control rule inputs are their performance (i.e., how they trade off conservation against fishery constraints) rather than their statistical fit to the modeled truth.

The method for estimating SRWC impacts does not allow for the estimation of fishery impacts on age-2 fish. Therefore, the model results could be understating the conservation benefits of reduced (or zero) fishing, since a lower allowable impact rate on age-3+ fish would presumably lower contact rates with age-2 fish as well.

E. Groundfish Management

2. Off-Year Science Improvements

The Scientific and Statistical Committee (SSC) reviewed possible topics for off-year science workshops related to improving groundfish science informing Council decision-making. The SSC considered the recommendations from recent Stock Assessment Review (STAR) panels (Agenda Item E.8, Attachments 1-12) and previous workshops. Successful workshops require a volunteer to take the lead in organizing the workshop, the commitment of resources to conduct dedicated research, and post-meeting work to prepare scientific reports, all of which come at a cost of time and resources. There is a trade-off between the number of workshops that are held and the amount of progress that can be made on other projects to improve data inputs and stock assessments.

Rather than making a final recommendation at this meeting, the SSC would prefer to revisit this agenda item at the November meeting. The assessment cycle for this year is not yet complete, and by November the mop-up review and the Center for the Advancement of Population Assessment Methodology workshop on recruitment will have occurred, so the SSC may have a better perspective on priorities. The SSC also sees considerable benefit to making the selection of off-year science workshops a two meeting process in which an initial list is developed at the September meeting, and a final decision is made at the November meeting.

The SSC identified three high priority topics for off-year science workshops, and one topic that was regarded as important but can be better addressed through the methodology review process:

- **Follow-up workshop on catch reconstruction.**

A catch reconstruction workshop was held in November 2016. While the workshop made important progress, additional work is needed to improve historical catch estimates. The Washington catch reconstruction may be completed by next year, and should be reviewed. Work to separate aggregated skate catches into catch by species will be available to review by next year. Finally, a review has been proposed for an approach involving Bayesian hierarchical statistical models and model averaging to estimate catches and catch uncertainty in sparsely sampled mixed stock fisheries (See [Agenda Item E.3, Attachment 1, September 2017](#)). The proposed workshop could also review this analytical approach.

- **Workshop on transboundary issues in groundfish stock assessments.**

Several assessments in this assessment cycle and in previous cycles have made recommendations that transboundary assessments be developed for stocks that extend across international boundaries. This workshop would use Canadian catch and assessment data provided this year to explore sensitivity of assessments restricted to solely U.S. waters to alternative assumptions regarding stock distribution. Simulation modeling should also be used to evaluate model sensitivity. Canadian scientists would be invited to participate in the workshop. This workshop would be focused exclusively on assessment issues, and would be intended as a step towards fostering cooperation between U.S. and Canadian scientists on stock assessment issues.

- **Workshop on conditional age-at-length data.**

Many West Coast stock assessments use conditional age-at-length data in stock assessments, which inform growth, recruitment strength, and natural mortality. The ability to use this type of input data is a relatively recent feature of the stock synthesis model. A number of important issues were raised during this assessment cycle concerning how these data are collected and prepared for use in stock assessments. Conditional catch-at-age data are robust to length-based processes, but they can be influenced by age-based processes, such as age-dependent movement to deeper water. The goal of this workshop would be to provide guidelines on best practices for using conditional age-at-length data in stock assessments.

- **Research topic on the characterization and propagation of stock assessment uncertainty for use in acceptable biological catch (ABC) calculations.**

The SSC discussed this topic under this agenda item, but eventually concluded that it would be better dealt with as a methodology review rather than a full workshop. Two projects were reviewed at the August 29 Groundfish Subcommittee meeting: a project to update the sigmas for the ABC buffer using uncertainty in overfishing limits (OFLs) rather than in ending biomass, and a project to propagate uncertainty using the low and base scenarios in decision tables. This research is ongoing and should be reviewed next year as part of the methodology review process. In addition, the SSC intends to develop additional guidelines for developing decision tables for inclusion in the revised stock assessment terms of reference. This year a variety of methods were used to develop decision tables and it is unclear whether some methods are better than others.

Other potential workshops were discussed but given lower priority. These were:

- Workshop on recreational catch per unit effort (CPUE) standardization.

Nearshore stock assessments, such as the California scorpionfish and blue/deacon rockfish assessments this year, depend upon CPUE standardization using several techniques, such as that of Stephens and MacCall (2004). A review of alternative methods of standardizing recreational CPUE would be useful to provide advice for future assessments.

- Workshop on spatial models in stock assessments.

This workshop would review alternative methods to incorporate spatial structure in assessments and provide guidance for future stock assessments.

- Workshop on differential mortality by sex and/or availability in West Coast rockfish.

Several West Coast rockfish assessments have to contend with a situation where one sex (usually females but not always) is much less common than the other sex at older ages. Most often this is dealt with by assuming (or estimating) a higher natural mortality for the less common sex. However other hypotheses, such as low selectivity or availability, may be impossible to rule out based on available data. This workshop would use different approaches, such as life history theory, data analysis, and simulation modeling to explore this situation and develop guidelines for future assessments.

- Follow-up productivity workshop to address issues that remain from the December 2016 productivity workshop.

Some of the issues that were addressed but not resolved at the productivity workshop include the use of three-parameter stock recruit curves in stock assessments, and the consistency of the fishing mortality and biomass reference points in the Council's harvest policy.

- Workshop on the carry-over provisions of the revised National Standard 1 (NS1) guidelines.

The revised NS1 guidelines include provisions for carrying over the unused portion of the annual catch limit, but require that a comprehensive analysis be done to demonstrate that the ABC control rule with carry-over provisions still prevents overfishing. To hold this workshop, an analytical framework would have to be developed that would meet the criteria established in the NS1 guidelines, and resources would be needed to conduct the analysis. The Council and advisory bodies would have to propose or agree to a set of alternative carry-over provisions for analysis.

SSC Notes:

Another topic is to comprehensively evaluate the appropriateness of using the Triennial survey in assessments and whether the survey should be split into early and late segments. These issues routinely come up in stock assessments, and a consistent approach should be used.

Data for lingcod off Canada were collected and made available to the analysts, but not included in the assessment. Analysis of these Canadian lingcod data and comparison to data from US waters should be easy to accomplish. Such an analysis should be included in the "Workshop on transboundary issues in groundfish stock assessments".

The COP should be modified so that selection of off-year workshops occurs over two Council meetings, to give time to determine the availability of assessment scientists and their timelines for producing results to inform proposed workshops.

Stevens, A. and A. MacCall (2004). A multispecies approach to subsetting logbook data for purposes of estimating CPUE. Fisheries Research 70, 299-310.

3. Stock Assessment Methodology Review Topic Selection

The Scientific and Statistical Committee (SSC) reviewed two proposals for stock assessment methodology review included in the advance briefing book and another proposal submitted as a supplemental report. In addition, the SSC considered potential topics for which official proposals have not yet been submitted. The SSC recommends delaying final action on this agenda item until the November Council meeting. Many of the personnel that would have contributed to the development of proposals were occupied with finalizing stock assessments, providing limited time for proposal preparation. In addition, a second meeting would allow time for proponents to respond to preliminary comments by the SSC and prepare complete proposals. The SSC provides the following comments on each of the proposals reviewed and considered at this meeting.

New proposals for reviews included in the advance briefing book:

- ***Improving Catch Estimation Methods in Sparsely Sampled Mixed Stock Fisheries ([Agenda Item E.3, Attachment 1](#))***: The SSC recommends the proposed methodology move forward for review as it has the potential to help resolve historical catch compositions for which there are limited data to parse mixed market categories to species using methods that are more consistent, potentially more accurate, and that provide estimates of uncertainty. The recommended timing of the review is winter of 2018.
- ***Proposal for a Methodological Review of the Data-Limited Methods Toolkit (DLMtool) for Use in the Pacific Fishery Management Council's Stock Assessment Review (STAR) Process ([Agenda Item E.3, Attachment 2](#))***: The SSC acknowledges the potential benefit of evaluating the applicability of the DLMtool to the stocks in the groundfish fishery management plan (FMP) to improve assessments, conduct management strategy evaluations, and identify data that is most informative in assessing data limited stocks. Crafting specific Terms of Reference (TOR) for this methodology review is recommended to help focus efforts on aspects of the tool that are new to the Council process and compatible with the current management framework of harvest control rules.

New proposals for reviews provided in the supplemental briefing book:

- ***Oregon Department of Fish and Wildlife (ODFW) Remotely Operated Vehicles (ROV) Survey***: The ODFW submitted a proposal outlining ROV based surveys in nearshore waters as a supplemental report ([Agenda Item E.3.a, Supplemental ODFW Report 1](#)). The proposed methods could provide an index of abundance and potentially provide an absolute estimate of abundance for nearshore species. A need was identified for additional details prior to review on how to account for detection probability and expansion to unsampled habitat. In addition, the format and content of the proposal were not consistent with the requirements for proposals

under the TOR for Methodology Review. For example, the proposal should also contain the means by which the results would be used in assessment.

Postponing final action on this agenda item until November would provide the time necessary to address the outstanding questions.

Analyses initially reviewed by the groundfish subcommittee on August 29th:

- ***Adjustments to Sigma based on Age of Assessment ([Agenda Item E.9, Attachment 4](#)):*** At the August 29th SSC Groundfish Subcommittee meeting, methods accounting for the time since the last assessment based on projections from the base and low states of nature from decision tables were presented. The SSC agrees that this adjustment has value in better accounting for scientific uncertainty assessments and analyses should continue.
- ***Updating of Sigma Values for Scientific Uncertainty in Stock Assessments ([Agenda Item E.9, Attachment 5](#)):*** As part of the ongoing review efforts, updated estimates of sigma and potential additional methods for estimation were presented to the SSC Groundfish Subcommittee on August 29th. While updating estimates using the original method requires less scrutiny, new methods would require further review.

Other potential review topics were discussed by the SSC for which no proposals have been submitted. If complete proposals are developed for these topics they could be submitted for consideration at the November Council meeting:

- ***Washington Department of Fish and Wildlife (WDFW) Nearshore Setline Survey:*** The WDFW has been conducting gear testing in the past three years to develop an abundance survey for nearshore species. The proposed survey would provide an index of abundance, as well as length and age data for use in stock assessments. This study would help fill data gaps identified in recent assessments for fishery-independent data for nearshore species that inhabit rocky reef habitat.
- ***California Department of Fish and Wildlife (CDFW) ROV Survey:*** The CDFW and Marine Applied Research Exploration (MARE) have collected data from ROV surveys conducted as part of monitoring of fish size and abundance in marine protected areas and associated reference sites open to fishing.
- ***Updating and Improvement of Depth-Dependent Mortality Rates reflecting Surface Release of Rockfish and Mortality Rates for other Groundfish Species:*** In 2008, the Groundfish Management Team developed depth-dependent mortality rates currently applied in estimating discard mortality in catch estimates and stock assessments for the recreational and nearshore commercial fisheries. The greatly increased sample size and more representative estimates of long-term mortality now available would provide more accurate estimates of discard mortality. In addition, improved mortality rates for big skate and long-nosed skate are needed to improve historical catch estimates used in assessments.

The ODFW and CDFW ROV surveys as well as the WDFW setline survey could potentially be

combined into a single methodology review focused on enhancement of fishery independent data for stock assessments of nearshore species.

The SSC notes that the format, content and timeline for submission of proposals are defined in the TOR, which should be followed in the future to facilitate timely review.

SSC Notes:

- *Bill Venables' work on prawns to break out historical catch to species uses a spline in time to fill in gaps, which should be considered by the proponents of the proposal to improve catch estimation methods.*
- *Validation of the methods to improve catch estimation using synthesized data would be worthwhile to examine the ability of the method to identify appropriate splits under varying conditions.*
- *Tom Carruthers' DLM toolbox includes some methods that may not be compatible with Council policies and limiting evaluation to only methods that are most appropriate and that we have the data to apply should be identified in a TOR. The MSE aspect of the model is worthwhile, but the scope of the review should be limited to methods that have not been reviewed, i.e., not re-reviewing DB-SRA methods themselves, but rather the value added by the method. This provides a framework for comparing various methods to determine the circumstances where they are most appropriate.*
- *The methods for expansion and detection probability parameters for camera avoidance or behavior making species more cryptic, may affect the outcomes in ROV surveys and should be considered in more detail and a more detailed proposal submitted for November. Using visual methods for absolute abundance estimates can prove difficult especially for trap-shy or cryptic species. Habitat suitability and considerations of the need to stratify survey results will need to be considered on a species by species basis. Obtaining a good estimate of the CV will be important and development of variance estimates are also important to consider. Detectability and expansion to an absolute abundance estimate suggest outlining how these issues will be addressed for review as the primary complications. We can provide a methodology review contingent on these issues being addressed or a full proposal can be provided in November.*
- *Concern was expressed as to whether a proposal for the ROV survey was of sufficient detail regarding products for review. Future efforts by the SSC should focus on guidelines in the TOR to help inform the description of methods and articulation of the results with the implied purpose would help provide better direction to advocates in the future.*
- *The sigma analyses came before the SSC groundfish subcommittee earlier than originally planned due to a Council decision in June to accelerate the schedule, and the subcommittee recommended that the analyses be continued and looked at again in methodology reviews when more progress has been made. So even though there was not a formal proposal to review the sigma analyses under this agenda item, the GFSC recommended these analyses undergo a future methodology review.*
- *Demonstration of the DLM tool by the proponent prior to review would help guide scoping of the TOR and the appropriate timing of a review.*

I. Ecosystem-Based Management

1. Climate Vulnerability Assessment Report

Dr. Michelle McClure (Northwest Fisheries Science Center) briefed the Scientific and Statistical Committee Ecosystem Based Management Subcommittee (SSCES) on the National Marine Fisheries Service (NMFS) Climate Vulnerability Assessment framework, and the results of its application to species in the California Current Ecosystem at its meeting on September 11, 2017. The SSCES reported on its review to the Science and Statistical Committee (SSC).

The framework includes factors that determine the sensitivity of species to climate effects, the exposure of species to the consequences of climate change, and the capacity of species to adapt to climate effects. The species of highest risk are those that are exposed to the consequences of climate change, are highly sensitive to climate effects, and are unable to adapt. The framework is a component of the NMFS Climate Strategy and is being applied nationally.

The framework summarizes the available material in a systematic way, but is based primarily on expert judgement. The SSC had concerns about the use of criteria based on life history characteristics, population growth rate, and depletion levels. These criteria are relevant to understanding stock status, but may not reflect vulnerability specific to climate. A useful exercise would be to recalculate vulnerability scores with these criteria excluded. Validating the framework is currently not possible, but future applications could lead to refinements to the factors considered, how they are scored, and how they are ranked.

The SSC expected that coastal pelagic species would be classified as more at risk to climate effects while the rankings for rockfish appeared overly high owing to the use of the criteria on stock status. In addition, adding scores by criterion together to produce a final score may mask situations in which a species is very highly sensitive, but only on one criterion. The SSC consequently recommends that analysts examine the scores for individual criteria.

The framework can be applied at a finer taxonomic scale than species, which has been done for salmon. The outcomes for salmon at the evolutionary significant unit (ESU) level are broadly similar to those at the species level, but among-ESU variation in relative risk is clear.

In general, the framework is appropriate for ranking species in terms of their vulnerability to climate change although the criteria should be restricted to those that directly relate to such vulnerability. The framework is qualitative and does not provide estimates of extinction risk or predicted likely trajectories of population size. Care therefore needs to be taken when interpreting the results from the framework. The SSC considers the framework to be a triage tool. Ideally, more focused and quantitative analyses should be conducted for species identified to be at high risk. The value of the framework will be enhanced if applied at regular (5-10 year) intervals, and subsequently used to identify priority species for monitoring.

SSC Notes:

- *The population growth rate and stock status factors are useful to understand the status and characteristics of the species being assessed, but their inclusion in the sensitivity score means that overfished low productivity species will be ranked as “highly sensitive”.*
- *Consideration should be given to formally including “unknown” in the scores within the factors (as is the case for the early life history survival and settlement: factor).*
- *Dr. McClure noted that future analyses may extend to fish communities, fisheries and fishing communities. However, no methods to conduct such analyses were presented and would need to be developed.*
- *The time horizon for the evaluation should be more explicit as risk to climate effects may differ among time horizons for some species.*

2. Fishery Ecosystem Plan Initiatives: Scoping and Selection

The Scientific and Statistical Committee Ecosystem Based Management Subcommittee (SSCES) Chair reported to the Science and Statistical Committee (SSC) on its review of the Ecosystem Workgroup Report ([Agenda Item I.2.a. Ad Hoc Ecosystem Workgroup Report 1, September 2017](#)). The SSC has noted that the choice of initiative is a policy decision by the Council. However, initiatives also include a scientific or analytical component that may involve review by the SSC. The SSC provides the following comments on the three initiatives under consideration by the Council at this meeting.

Cross-Fishery Management Plan (FMP) Climate Shift Initiative (A.2.8)

This initiative would build an understanding of climate science, develop management approaches for responding to climate change and climate variability, and evaluate potential impacts of climate change and climate variability on fishing communities. Activities associated with this include a webinar series to build understanding followed by two workshops. The first workshop would address productivity changes and management responses. The second workshop would address fishing community impacts. The range of topics covered by the workshops may be overly ambitious because the issues are complex. Approaches to dealing with climate change may also be quite different from approaches to dealing with climate variability and should be clearly distinguished when that is the case. It may be worthwhile to plan a meeting (or meetings) concerned with scoping the issues associated with climate change, with the goal of identifying a set of carefully defined issues that can be addressed individually. Several issues that seemed reasonably distinct to the SSCES included:

- 1) How to modify harvest control rules and reference points to account for projected climate change. Management strategy evaluation (MSE) will likely be necessary to address this issue appropriately, which may involve a 2-4 year process even if the technical expertise is available. There are only a few examples in the scientific literature of MSEs used to address climate change impacts, and none as yet are being used for management.
- 2) Assess whether Council management policies create impediments to adaptation by fishermen, the fishing industry, and fishing communities to both shorter term climate variation and longer term climate change. Climate variation is variability that is driven by

inter-annual and decadal processes, such as the El Niño and Pacific Decadal Oscillation, while climate change refers to directional change in climate due to increased greenhouse gas concentrations in the atmosphere and (as used here) associated changes in ocean chemistry. Effective adaptation strategies for climate change may be quite different than strategies for climate variability, and these should be distinguished. This topic is strongly linked to the Fishing Community initiative.

- 3) Develop a set of indicators to monitor economic and social conditions in fishing communities. These indicators would be designed to evaluate potential impacts of climate change on fishing communities. This topic is also strongly linked to the Fishing Community initiative.

Effects of Fisheries Management on Fishing Communities Initiative (A.2.7)

This initiative would evaluate how different fisheries management systems, including Federal, state, and tribal, interact to affect how fishing fleets operate in fishing communities. Although state- and tribal-managed fisheries are mentioned in the description of this initiative, this initiative should emphasize importance of these fisheries to participants in Federally-managed fisheries across all FMPs. Again, the SSC is concerned that the list of potential topics in this initiative is too broad in scope. A scoping workshop should be held to identify a more limited set of issues, each of which can be individually addressed.

The SSC also discussed the potential utility of the "Models of Fisheries Participation Choices under a Variable Climate" research project presented to the ecosystem subcommittee earlier in the day. This is a 4-year project funded by the National Science Foundation involving economists, social scientists, and quantitative modelers from the Northwest Fisheries Science Center and several academic institutions. This project will model connectivity between state-, Federally-, and potentially tribal-managed fisheries that arises due to cross-participation by fishermen. The project would be a valuable component to this initiative, and potentially to initiative A.2.8, when coupled bioeconomic models will be developed during the third and fourth year of the project. The Council may want to request that the analysts provide the Council an initial briefing on the project, and look for ways to incorporate this research in the fishing community initiative.

Human Recruitment to the Fisheries Initiative (A.2.6)

This initiative would evaluate whether there are obstacles for new participants to enter the fishing industry and would develop proposals to support young or new fisheries participants becoming established members of fishing communities. The SSC regards this initiative as being more specific in focus than the other two initiatives. In addition, there are concrete actions that the Council can take if a problem is identified such as the adaptive management provisions of the West Coast Groundfish Trawl Catch Share Program. The Council may consider collaborating with one or more regional Sea Grant programs if it decides to move forward with this initiative. This topic may be of interest to Sea Grant, and regional Sea Grant programs have long-standing connections with local communities that would be useful for outreach activities.

The membership of an advisory group working on this issue will need to be carefully considered. If the goal is to get the perspective of potential entrants into the fishery, membership should not be limited to those already active in the Council process. The advisory group should include

individuals who are considering or recently became active in west coast fishing businesses. Outreach in fishing communities may be needed for contacting appropriate individuals.

SSC Notes:

There is a need to collect information from crew members, who are not being surveyed effectively by existing programs. The SSC have previously recommended that analysis of available demographic data on participants in Council-managed fisheries would be facilitated by data collected by states on fishing crews (e.g., crew and commercial fishing license applications). This will require cooperation with the states.

E. Groundfish Management, continued

8. Adopt Final Stock Assessments

The Scientific and Statistical Committee (SSC) was briefed by members of 2017 stock assessment teams and stock assessment review (STAR) panel chairs on benchmark assessments reviewed this summer. The benchmark stock assessments reviewed include Pacific ocean perch, lingcod, yelloweye rockfish, yellowtail rockfish, combined blue and deacon rockfishes, and California scorpionfish. The SSC commends the assessment authors and STAR panel reviewers for their extensive and thorough work. In addition, the SSC reviewed catch-only updates for chilipepper and canary rockfishes, which were conducted primarily to address errors in historical catch series that were introduced when these assessments were conducted in 2015. The SSC provides the following comments and recommendations regarding these assessments:

Catch-only Updates

In June 2017, the SSC's Groundfish Subcommittee (GFSC) was informed that errors had been identified in the California catch reconstructions used in the Council's 2015 stock assessments for chilipepper rockfish and canary rockfish. The Subcommittee and full SSC recommended that these assessments be rerun using the corrected as well as updated catch streams to revise overfishing limits (OFLs) and annual catch limits (ACLs) for 2019-2020. The catch-only updates involved re-applying the assessment models using revised historical catches.

Chilipepper Rockfish

The SSC received a presentation by Dr. John Field (SWFSC) of the catch-only update stock assessment for chilipepper rockfish ([Agenda Item E.9, Attachment 3, September 2017](#)). Compared to the 2015 assessment update, the revised historical catches were reduced by about 18,550 mt, representing 30 percent of the total previously used for the period 1916-1968, leaving 44,194 mt of catches during that period. In addition, the new catch-only update assessment used catches for 2014-2015 based on West Coast Groundfish Observer Program (WCGOP) Total Mortality Reports and for 2016 based on landings data from CalCOM with an adjustment to account for discarded fish. The changes in the catch series resulted in a maximum relative change of up to 10 percent in spawning output during the 1916-1968 period, but only up to 3.5 percent changes in recent (1980-2015) depletion estimates. The 2017-18 ACL and OFL estimates from the 2017 model are greater than the corresponding estimates from the 2015 model, primarily because recent catches were less

than previously assumed.

The SSC considers the new catch-only update assessment for chilipepper rockfish to be the best available science and suitable to support management decision-making.

Canary Rockfish

The SSC received a presentation by Dr. James Thorson (NWFSC) of the catch-only update stock assessment for canary rockfish ([Agenda Item E.9, Attachment 2, September 2017](#)). The revisions to the historical catches of canary rockfish, which were mostly landed in Oregon and Washington, were very small relative to the changes in the chilipepper assessment. In addition to using the corrected historical catch reconstruction for California, the catch-only update replaced previously assumed catches for 2015 with total mortality estimates from WCGOP.

During explorations of the model, the Stock Assessment Team (STAT) found a set of parameter estimates that produced a slightly better fit than the original 2015 assessment. This better fitting model was used as the base model for the catch-only update. The changes to the catch series and the better fit led to relative declines of 2 percent in the estimates of spawning biomass and depletion in 2015. The estimate of the 2018 OFL from the 2017 model is 1,596 mt, representing a 5 percent decline from the corresponding estimate of 1,677 mt in the 2015 assessment.

The SSC considers the new catch-only update assessment for canary rockfish to be the best available science and suitable to support management decision-making.

Lingcod

The last full assessment of lingcod was conducted in 2009, which divided the west coast population into northern (Washington and Oregon) and southern (California) stocks. The 2017 assessment ([Agenda Item E.8, Attachment 1, September 2017](#)) also uses this delineation by conducting separate stock assessments for each of these regions. A number of revisions were made to the data used for the current stock assessment including 1) shifting the start of the assessment to 1889, 2) splitting the commercial fleet into trawl and fixed gear components and the northern recreational fleet into Oregon and Washington components, 3) re-analysis of commercial fishery CPUE data and the Alaska Fisheries Science Center Triennial survey index using VAST software, 4) addition of three fishery-dependent and one fishery-independent catch per unit effort (CPUE) indices, 5) updating length-weight relationships and the prior on natural mortality, 6) new maturity relationship based on recent data collections, 7) re-estimating ageing error from double read age data, and 8) updating landings and composition data.

The main model structure changes from the last assessment were the addition of selectivity parameters for fleets that were split by gear or geographic area, altering the plus and minus groups for length and age composition bins, and constructing a broader set of time blocks for selectivity. Also, conditional age-at-length composition data were directly incorporated into the model.

Current spawning stock biomass is estimated to be 57.9 percent in the northern region relative to unfished spawning biomass, and has continued to increase over the last five years as a result of high recruitment in 2008 and 2013. Current spawning stock biomass is estimated to be 32.9

percent in the southern region relative to unfished, and is currently in the precautionary zone. Although spawning biomass in the southern region is estimated to have been increasing in recent years, and above the minimum stock size threshold by 2016 as a result of high recruitment in 2013, it remains a concern that recruitment is estimated to have been well below average over the last 10-15 years.

The SSC endorses the use of the 2017 north and south lingcod stock assessments as the best scientific information available for status determination and management as a category 1 assessment. While the 2009 south lingcod stock assessment was deemed a category 2 assessment, the additional eight years of data in the current assessment provided an adequate basis for a category 1 designation. The SSC recommends that the next assessment of lingcod be an update assessment.

Pacific Ocean Perch

The last full assessment of Pacific ocean perch was conducted in 2011. Similar to the 2011 assessment, the 2017 assessment ([Agenda Item E.8, Attachment 3, September 2017](#)) models the population as a single stock off of the U.S. west coast from northern California to the Canadian border. The STAR Panel approved the assessment ([Agenda Item E.8, Attachment 4, September 2017](#)). The SSC reviewed the assessment at the August 28 meeting and again at the September Council meeting. During these reviews, the SSC, while approving most of the features of the assessment, requested further work to be reviewed by the GFSC prior to the November Council meeting.

A number of revisions were made to the data used for the current stock assessment including 1) disaggregating the one combined fleet used in 2011 to four component fleets, 2) using new historical catch reconstruction landings for Washington, 3) starting the model in 1918, 4) re-analyzing all of the fishery-independent indices using VAST, 5) dropping the fishery CPUE logbook index, 6) updating maturity and fecundity relationships, and 7) updating landings and composition data.

There remains considerable uncertainty associated with the steepness parameter, which is the main driver of the large change in status and scale between the 2011 assessment and the 2017 assessment. The assessment approved by the STAR Panel fixed steepness at 0.72 (the mean of the steepness prior), which constitutes a substantial change from 0.4 used in the previous assessment. When the 2011 assessment model is run with a steepness value of 0.72, the results also indicate a stock status above the management target.

The SSC revisited Pacific ocean perch (POP) on September 12 after receiving documentation and results from further analyses. The SSC commends Dr. Wetzel for the extensive work conducted and reported to the SSC for its August 28 meeting and September 11-12 meeting. This work allowed the SSC to better understand the differences between the 2011 and 2017 models, and to determine what additional analyses are necessary to approve at a final assessment.

The SSC found there was inadequate consideration given to the rationale for the removal of the triennial survey index from the assessment. This survey index was influential in the evaluations that ultimately led to the treatment of steepness in the 2011 assessment, and the rationale given for

removal was conflict with other data sources rather than flaws in the survey itself. Therefore, the SSC requests some additional model runs to be reviewed by the GFSC prior to the November Council meeting, where the SSC will make a final recommendation.

Yelloweye Rockfish

The last full assessment of yelloweye rockfish was conducted in 2009, with an update assessment conducted in 2011. The results of the 2017 assessment ([Agenda Item E.8, Attachment 5, September 2017](#)) indicate that the stock is at 28 percent depletion and progress toward rebuilding to the 40 percent target level has continued. The base model estimates higher productivity than the previous assessment due to the higher value for steepness from the updated meta-analysis and strong recent recruitment, which result in larger yield estimates.

Yelloweye was again modeled as a single stock with shared stock-recruitment relationship, but between two rather than three assessment areas. Oregon and Washington were combined in a single area due to difficulties separating the catch and compositional data of fish caught in one state but landed in the other, with California as a second area. A comparison to a single area assessment showed no appreciable differences in outcomes. A state-specific assessment with three areas was not evaluated, but the results from the two-area base model showed close correspondence to the results for the model for 2011.

This assessment was the first for yelloweye to combine sexes due to similar growth parameters. The assessment period was extended back to 1889 as a result of updates to the historical catch series. Indices of abundance from fishery-dependent and fishery-independent data sources were found to be uninformative (although they were retained) with the catch, age and length composition data driving the results of the assessment. Steepness was fixed at the 0.718 based on the meta-analysis for rockfish species. The previous assessment allowed natural mortality and steepness to be estimated, while this assessment fixed both of these key parameters, which allowed recruitment deviations to be estimated for this species.

The assessment was also sensitive to steepness and whether selectivity was allowed to be estimated freely. There is continued uncertainty regarding the differences in otolith reading between institutions, which has implication for estimates of natural mortality. Additional uncertainty results from uninformative indices of abundance and assumed values of steepness.

The SSC endorses this assessment, which constitutes the best available scientific information on the current status of the stock and provides a suitable basis for management decisions as a category 1 stock. The SSC recommends that the next assessment of yelloweye rockfish be an update assessment. The results of the rebuilding analysis, which will be done in accordance with the

Terms of Reference and based on the approved base model, will be reviewed at the September 28 GFSC meeting.

Yellowtail Rockfish

The yellowtail rockfish stock north of Cape Mendocino (40° 10' N. latitude) was most recently assessed as part of a 2013 data-moderate stock assessment that did not include any length or age composition data. The 2017 stock assessment ([Agenda Item E.8, Attachment 7, September 2017](#)) was conducted using Stock Synthesis (SS) and resulted in an estimated depletion of 75 percent of the unfished spawning output. The stock south of 40° 10' N. latitude has never been assessed other than with data-poor methods (DB-SRA). Though attempts were made to assess the southern stock using stock synthesis, a southern model sufficiently robust for use in management could not be developed. Additional age and length data should be collected and developed prior to attempting another full stock assessment.

The estimate of natural mortality (M) of females for the northern model was 0.174, and that for males was 0.15. Steepness was fixed at the mean of the prior (0.718). The final base model is heavily reliant on compositional data, although fishery-independent survey indices are somewhat informative.

The SSC concluded that the assessment for the northern yellowtail rockfish stock constitutes the best available scientific information and provides a suitable basis for management decisions, as a category 1 assessment. The SSC recommends that the next assessment of yellowtail rockfish north of Cape Mendocino be an update assessment.

Blue and Deacon Rockfish Complex

The last full assessment of blue rockfish was conducted in 2007 and covered the stock in California north of Pt. Conception. Subsequent to that assessment, deacon rockfish has been recognized as a separate species. It is not possible to assess these two species independently, since most historical and recent data are for the two species combined. In the current assessment ([Agenda Item E.8, Attachment 9, September 2017](#)), blue and deacon rockfishes (BDR) were assessed as a complex, with separate assessments conducted for Oregon and California, north of Point Conception. While genetic studies have found that, at least in recent decades, deacon rockfish are more common north of Monterey Bay, and blue rockfish more common to the south, catch and index data were separated at the Oregon/California border due to management history. The two species appear to be mixed to some degree throughout the entire range of the two areas assessed.

The California assessment includes several fishery-dependent and –independent sources, though no comprehensive survey of adults. There is a general lack of recent age data, and the assessment is sensitive to the inclusion or exclusion of age information in the form of conditional age-at-length data from relatively recent research projects.

Steepness and natural mortality were both estimated in this assessment. While estimation of steepness is unusual, especially for a species without a strong fishery-independent index, the “two-way trip” pattern of depletion history may provide more information on steepness, and the estimation of steepness and natural mortality provides for more realistic quantification of uncertainty coming out of the assessment for use in the decision table. The estimated value of steepness, 0.65, is close to the mean of the prior distribution for rockfish, 0.72. This assessment estimates that the BDR population reached a low depletion level of 15.6 percent in 2007, and had

recovered nearly to the target level, being at 37.3 percent of the unfished spawning output in 2017. A strong 2013 year class appears to be entering the population.

The Oregon assessment does not display a two-way trip like the California assessment, and is based on fewer and shorter indices. Thus both steepness and natural mortality are fixed in the base model. The Oregon population of BDR is estimated to have been relatively lightly exploited, and to be at a historically low level of depletion, 68.6 percent of the unfished spawning output in 2017. The 2013 year class is estimated to be strong in Oregon waters, as in California.

The SSC endorses the use of the BDR stock assessments as the best scientific information available for status determination and management as Category 2 assessments due to BDR being a complex of two species. The sigma values derived from the decision tables for both the California and Oregon assessments are larger than the Category 2 sigma of 0.72 (being 0.783 and 0.803 respectively) and these values should be used in calculating the scientific uncertainty buffer. The SSC recommends that the next assessment of BDR be an update assessment.

The SSC recommends consideration of the potential impacts of including BDR in the minor nearshore complexes, where it currently (in 2017) composes over half of the OFL in the north and nearly a quarter of the OFL in the south. Approaches that could be investigated include alternative complex designation and alternative calculation of ACL contributions for such dominant species within complexes.

California Scorpionfish

The last full assessment of California scorpionfish was conducted in 2005. The current assessment ([Agenda Item E.8, Attachment 11, September 2017](#)) updates catches back to 1916, uses a more disaggregated fleet structure, includes additional indices of abundance, and adds conditional age-at-length data. Indices of abundance as well as composition data were derived from 1) Publicly-Owned Treatment Works (POTW) trawl surveys, 2) the NWFSC trawl survey, 3) the Southern California Bight regional monitoring program trawl survey, and 5) the onboard observer survey for retained catch. Additional composition data was derived from a nuclear power generating station impingement survey.

The nearly sinusoidal pattern in recruitments and biomass, which were of some concern to the STAR panel, was found to be moderately correlated with water temperature (the CalCOFI temperature index used for Pacific sardine), indicating that the patterns in recruitment are at least partially driven by environmental factors.

California scorpionfish is estimated to be at a depletion level of 54.3 percent of the unfished spawning output in 2017. The 2015 year class is estimated to be the highest in over 20 years. The SSC endorses the California scorpionfish assessment as the best scientific information available for status determination and management as a Category 1 assessment. The sigma value derived from the decision table is 0.582, larger than the Category 1 sigma of 0.36, and this larger value should be used in calculating the scientific uncertainty buffer. The SSC recommends that the next assessment of California scorpionfish be an update assessment.

SSC Notes:

Catch-only update and other ToR notes:

Although the current Terms of Reference document includes information on how to conduct and review “catch-only projections” (to produce projections based on recent fisheries catch information rather than assumed catches), the document does not cover the case of a “catch-only update”, such as applied in the revised Chilipepper Rockfish and Canary Rockfish assessments described below. Specific guidance on catch-only updates should be added. The TOR should also be revised to provide guidance on calculation of sigmas based on asymptotic uncertainty estimates and decision tables, and standard practices with respect to significant figures and rounding when using point estimates from priors, applying buffers, and reporting assessment outputs.

Lingcod Notes:

The STAT needs to check into the forecast table presented in the assessment document as it appears as though depletion is not going to the HCR target as it should.

The STAT needs to check the decision table values as they seem incorrect for some rows. One issue that would be good for the SSC to discuss (perhaps initially at the stock assessment process review meeting) is on choosing the best methods for dealing with the issue of age data that have been collected in a non-representative fashion (e.g., over-sampling of small and large fish). Any recommendations (such as pros/cons on approaches for dealing with this issue within and outside of the assessment model) would be beneficial to help STAT teams in the future.

Fishery-dependent index data (e.g., recreational onboard surveys) may not necessarily be representative of population-level changes when the species under consideration is not strictly associated with nearshore habitat, despite the fact that such an index may cover good habitat for lingcod. Without informative auxiliary data (e.g., design-based fishery-independent survey that covers the full population extent), it could be hard to distinguish between changes in overall population size and changes due to local depletion when a survey covers only a segment of the overall species range.

The California recreational onboard observer time series may need to be split into two (early and late) because of differences in selectivity as a result of fishery area closures.

The next assessment could be an update for both the northern and southern models, unless there is some new information on data that were not included in the 2017 assessment (particularly the commercial age data that was removed in the 2017 model), or if survey trends (particularly for the south region) are pessimistic, or if a spatial model is undertaken.

The sigma for lingcod south should be based on a revised decision table (but is likely to be near 0.6).

The stock assessment terms of reference should be revised to provide guidance on estimating alternative values of sigma based on the asymptotic uncertainty estimates generated by Stock Synthesis as well as by the states of nature/decision table, and provide guidance on how STATs

should handle projections when either of these values is greater than the default sigma for the anticipated category (this applies across multiple assessments).

POP notes:

There was concern over the interpretability of survey catchability when using the VAST software, because the results are not as intuitive as when using the design-based approach. This remains a concern for this assessment because catchability seems too low for the survey (using VAST), and is much lower than survey catchability in the 2011 assessment (using the design-based approach). Differences in selectivity between the 2011 and 2017 assessment could also contribute to some of the differences in catchability.

Concern remains over the use of conditional age-at-length data when the sampling of ages (and/or lengths) may be non-representative of the population. There should be careful consideration of how conditionals are constructed to ensure minimal bias. One concern raised is that age sub-sampling may be not representative, thus the combined conditional age-at-lengths will have a mismatch. It was indicated that the stock assessment debriefing meeting would be a good place to start a discussion on this topic.

It would be helpful to the STATs if the SSC could provide guidance on potential best practices for setting early recruitment deviates (e.g., start when data are informative or at the beginning of the model time period). This was identified as something the groundfish subcommittee could evaluate when reviewing the groundfish terms of reference, or alternatively discussions could begin at the 2017 stock assessment debriefing meeting.

There is good evidence that 2008 is a strong year class given sensitivity runs during STAR panel. There should be consistency across assessments on how catch from surveys is handled (e.g., Pacific Ocean perch and canary rockfish have included research catch while other groundfish assessments have implied that it was negligible).

The STAT argued that including or removing the triennial shelf survey (as an index, not its catches) didn't make a substantive difference in model outcomes. It would be informative to know what proportion of positive tows are in the area where the triennial shelf survey samples (i.e., < ~120 fm and > 300 fm) versus the combo survey.

The STAR panel report needs the following fix: page three should say 1.1 kmt instead of 1.1 mmt.

Yelloweye notes:

- *A question was raised whether landings should have been stratified by state for the northern assessment area. This was the justification for conducting an assessment that combined Oregon and Washington rather than a state specific assessment. Additional discussion should be undertaken in the stock assessment debriefing meeting to bear out the extent of limitations as not to limit the ability of future assessment authors to consider alternative spatial stratifications.*
- *There was considerable discussion regarding sensitivity runs relative to the uncertainty of the base model that were quantified and presented in a graphical format that has not been used in*

previous assessment documents (and that was not well described in the assessment document). This graphical format was developed to provide the review panel with a broader perspective on the relative sensitivity of the base model across a large number of data sources, model parameters and assumptions. While it does not substitute for examining the results of any particular run or model fit more closely, it is something to consider including in future assessments via the TOR or best practices document. Its applicability can be considered further in the stock assessment debriefing with caveats regarding what information it does provide and what more should be done following its interpretation.

- In the likelihood profile of natural mortality over the various data sources, the recruitment deviation vector is strongly informing the value of M , which is a feature not typically seen in M profiles. This is likely because M and recruitment are intertwined in the biomass trajectory, with a higher M requiring a higher recruitment to maintain an upward trajectory.
- The retrospective pattern shows a systematic change in the terminal year spawning output, with almost the same level of spawning output being estimated each year as data are removed. This may in part be due to the loss of the recent age data. Collection of additional length and age data would help resolve this.
- It was suggested that the likelihood value for M corresponding to 5 likelihood units difference above and below the prior could be used to select the values of M that could be used in defining the axis of uncertainty to obtain a broader range. The current method reflects the potential variability in max age given potential error in estimation of maximum age, which is more closely tied to the values bracketing the value used in the assessment. This is another example of how one might construct a decision table and why the Terms of Reference or Accepted Practices Guidelines should include more comprehensive instructions on constructing decision tables.
- The OR onboard recreational index showed poor Q - Q plot results indicating poor fits, but was retained since it was not influential and retaining it would allow further examination in the future, though the STAR panel leaned toward removing it.
- Providing an estimate of M with a 99% percentile for max age was discussed. Many ways were considered for determining the value to use. Further evaluation of criteria for selection may be beneficial in the stock assessment debriefing, as guidelines in the best practices document may be helpful in this regard. Inter-lab ageing error documentation may also be useful in future consideration of what constitutes a reliable value and the results included in the assessment as well as the panel report to ensure it is accessible as it is currently in Andre Clayborn's presentation on the ftp site, which may not be sufficiently accessible for posterity.
- Time varying recruitment parameters indicate that the decline was more severe in the south. The southern portion of the stock may sometimes receive dispersal of recruits from the north. A model that links the two areas may be informative.
- Yelloweye rockfish appear to be less vulnerable to the bottom trawl surveys in the south, as also appeared to be the case for yellowtail rockfish. The potential causes of these differences should be examined further.

Yellowtail notes:

- Splitting catch data at $40^{\circ}10'$ N lat. in California was difficult given the lack of information on these strata prior to 2004.

- *If more data were available in the future, a southern assessment could be conducted successfully, but at present it does not appear feasible without additional age composition data. The NWFSC Hook and Line Survey, as well as SWFSC reproductive ecology research efforts both have archived otoliths that could be aged to support future assessments. Additional structures could be collected in the future and the assessment revisited thereafter if the need arises given harvest levels.*
- *Alternatively, a simpler model may have been a more appropriate approach given the available data. Given more time a usable model may have been derived from the process.*
- *In the future, if there are separate assessment areas for a given stock, assigning separate STATs for each assessment may have also allowed a more complete model for review increasing the chances of success.*
- *Considering the use of multiple area models reflecting differing demographic structure identified in previous research in addition to genetic structure is a topic for the stock assessment debriefing discussion.*
- *The 99th percentile of the raw set of ages was used to estimate the prior on M. Potential outliers were avoided through this method as opposed to selecting the oldest fish. The Accepted Practices Guidelines should clarify what “best” approach should be used to select the maximum age used to derive the prior on M.*
- *Recruitment deviations were started in 1932 prior to any significant catch. The choice was ad hoc and a sensitivity to selecting an earlier start year for estimating recruitment deviations was analyzed providing the same estimates, but a greater uncertainty.*
- *There was some skepticism regarding whether exclusion of the Hake Bycatch index due to possible bias due to heterogeneity of the fleet was justified. A concern with using this index is the possible redistribution of effort when targeting hake based on the quota for hake as well as constraints from overfished species over time.*
- *There was interest in the proportional contribution of data from the area north of 40°10' N lat. from California vs. points north for the northern model originating from the fishery independent trawl surveys. John Field indicated that a very high proportion of catch came from Oregon and Washington swamping the data available from California in the trawl survey. In the stock assessment debriefing, further analysis of the distribution of data and where insufficient data is available and where sampling should be intensified if catch ramps up especially with regard to data for the commercial fishery.*
- *Recurrence of a dearth of data from the north and south of 40°10' N lat. for the trawl survey is a topic for further examination as is additional discussion of why there appears to be such lower efficiency in sampling to the south.*
- *If a model is not accepted, there is no need for an executive summary (i.e., for the southern model) and all of the runs examining the assessment are considered a sensitivity. The Terms of Reference document should clarify how STATs should write up results for a spatially split assessment where the STAR Panel rejects the results from one (or more) of the regions.*
- *Martin Dorn advocated prioritizing the model in the next assessment cycle or when the necessary data became available, since it is a major contributor to the shelf complex in the south. The subcommittee supports collecting additional commercial data should the fishery resume to ensure a full assessment can be completed to facilitate the potential to manage the stock effectively whether in or out of the existing complex.*
- *Consideration of an acoustic mid-water survey was broached by Jim Hastie, though resources are not available at present and would not be possible without additional funding. This is even*

more essential for the south in that the southern stock tends to be more closely associated with rocky reef and more poorly represented by the trawl surveys.

- *Among other future research needs, one priority is further examination of the difference in sex ratios at age apparent in yellowtail rockfish to address associated concern regarding whether differential natural mortality rates throughout the lifespans of populations are reasonable. Additional investigations that better quantify the phenomena, and evaluate potential causal mechanisms would be beneficial for this and other species such as canary rockfish and black rockfish.*

BDR notes:

CALIFORNIA:

- *There is a need for more work evaluating the filtering mechanism for Stephens-MacCall method – there is a standard method but it is not perfect.*
- *Discard was modeled as a separate fleet. There was only a small difference when it was removed altogether. In general, it is important to be careful to consider whether to remove data taken from areas that were subsequently closed when developing CPUE indices. Analysis done in the STAR panel showed that this can have an effect on the index.*
- *Being able to estimate steepness and M are an unusual feature of this assessment, but were included to better evaluate uncertainty.*

OREGON

- *The Oregon model appeared to have greater uncertainty in scale than to stock status, in contrast to CA.*
- *There was less data overall with than for California indices, but shorter periods*
- *The strong recruitment in the mid-1990s corresponds to large catches, but the 2013 recruitment is even larger and is based on compositional data.*
- *Recommend fishery independent survey of nearshore stocks.*
- *The STAT attempted to address the issues raised by advisors regarding the scale of the BDR population (as inferred from ROV and acoustic surveys) through sensitivity analyses*
- *There is a much larger percentage of females in catch in BDR than male. Currently the model assumes that this difference is due to growth and higher male M (for both assessments).*

Scorpionfish notes:

- *Although all available otoliths from the NWFSC survey were aged from 2005 to the present, there is a need for additional age data (particularly from depths not sampled by the survey).*
- *There is little information on the stock in Mexico.*
- *Uncertain why there is a sex ratio skewed toward males in NWFSC survey,*
- *Need for information on aggregating behavior, fecundity/maturity, discard mortality, and ageing validation, error and bias.*
- *The spawning biomass and total biomass time series from the assessment display an almost sinusoidal pattern over time, as do the recruitments. To investigate the cause of this and to consider the potential for an environmental correlate for recruitment (and growth potentially), the model output recruitment deviations were plotted vs. the annual CalCOFI sea surface temperature index which is used in the Pacific sardine assessment. This showed moderate level*

of correlation ($R^2 = 0.136$) and in the expected direction with larger average recruitment at higher temperatures.

- *Publically Owned Treatment Works trawl survey could collect more info such as sex, otoliths, depth.*

9. Initial Harvest Specifications and Management Measure Actions for 2019-2020 Management

Review of Analysis of New Default Sigma Based on Past Assessments

The Scientific and Statistical Committee (SSC) reviewed a report by the SSC Groundfish Subcommittee (GFSC) of their August 2017 meeting to review several new analyses of the sigma values that quantify scientific uncertainty in stock assessments, and are used to calculate the buffer between the overfishing limit (OFL) and acceptable biological catch (ABC). Based on the results of those analyses (Agenda Item E.9, Attachments [4](#) and [5](#)), and subsequent discussions, the SSC recommends that there be no change in the default sigmas used to develop ABCs for the 2019-2020 management cycle. The methods reviewed are promising approaches to evaluate how uncertainty and sigma values increase in the future as assessments become older. Consequently, specification of OFLs in future management cycles will likely include some type of calculation to scale sigma values relative to the age of the assessment.

Sigma values for the 2019-2020 Harvest Specifications

The SSC notes that several stock assessments developed during the 2017 cycle had greater uncertainty than the default sigmas, when inferred from either the decision table or the model-estimated confidence intervals. In these cases, the SSC adopted sigma values that reflect the maximum of these three values. The SSC will revise its Terms of Reference for Stock Assessment to clarify this practice.

OFL Determinations for the 2019-2020 Harvest Specifications

The SSC evaluated OFLs for each stock and area (including contributions to managed stock complexes) compiled by Council staff based on 2017 and previous stock assessments and analyses. The OFLs are provided in Table 1 in [Agenda Item E.9, Supplemental Revised Attachment 1](#). OFL values from stock assessments (including updates and catch-only updates) developed and recommended for management in this past assessment cycle were taken directly from those assessments. For all values in the table that were based on past assessments or data-limited methods, two scientists (either assessment analysts and/or members of the SSC GFSC) reviewed the original document and confirmed that the numbers in the table were correct, and thus represented the best scientific information available.

The precise origin of several values was unclear at the time Attachment 1 was provided to the briefing book. These values were investigated by SSC members over the past several weeks, and

discussed at the SSC meeting. Based on those discussions, the SSC recommends the following changes to Supplemental Revised Attachment 1:

- For cowcod south of 40° 10' N. latitude, the 2019 and 2020 OFL values were updated to 13.3 mt for the Monterey management area, based on Appendix C of the 2013 cowcod assessment.
- For lingcod, the stock assessment team (STAT) provided revised OFLs to correct a technical error in the way in which the projections were conducted in Stock Synthesis for the 2017 California basemodel. Specifically, when there are time blocks used in selectivity estimations, care must be taken to ensure that the model does not revert to applying the earliest selectivity patterns to the projection period. The revised value for 2019 for the California model (area south of 42° N.) is now 1,253 mt. As there were some additional technical issues associated with providing the 2020 OFL in time for SSC review, including that the OFL will also be dependent upon the P-star value chosen by the Council for lingcod, the 2020 OFL will be provided for final adoption in November. The 2019 OFL for the California model leads to 2019 OFLs north and south of 40° 10' N. of 4,957 and 986 mt, respectively. The basis for the apportionment of the California model OFL is the five-year average percentage of the NWFSC bottom trawl survey biomass in California waters between 40° 10' and 42° N. latitude, which is estimated to be 21.3 percent.
- For blue/deacon rockfish in Washington state, as catches and other data were not included in the most recent assessment (which was limited to Oregon), contributions to the northern OFL were based on an analysis developed by the STAT and recommended by the SSC as the best available science. Those contributions are 8.7 and 8.4 mt for 2019 and 2020, respectively. This leads to final OFLs for “nearshore rockfish north” of 203 and 200 mt for 2019 and 2020, respectively. The analysis will be included as an appendix in the final blue deacon rockfish stock assessment.
- For blue/deacon rockfish in California south of Point Conception, catches and other data were not included in the most recent assessment. Consequently, a depletion corrected average catch (DCAC) analysis, informed by change in biomass in the recent (2007-2017) time period from the base California model, was undertaken subsequent to the assessment review. The analysis indicated an OFL of 21.8 mt for both years in the 2019-2020 management cycle. The analysis will be appended to the final stock assessment document. The adoption of this OFL leads to values for nearshore rockfish south equal to 1,300 and 1,322 mt for 2019 and 2020, respectively.
- For gopher rockfish, the 2005 assessment is no longer considered reliable for OFL projections. However, given that the stock was estimated (and projected) to be well above B_{MSY} in that assessment, and catches have generally been below the equilibrium maximum sustainable yield (MSY) level since the assessment was adopted, the OFL is based on the equilibrium MSY proxy estimated in that assessment, of 101 mt. This contribution remains a category 3 assessment, based on the age of the assessment.

Several OFLs could not be updated at the present meeting:

- For Pacific ocean perch (POP), OFL values are pending the results of additional analyses, and potential changes to the base model, as requested by the SSC to the POP STAT ([Agenda Item E.8.a, Supplemental SSC Report 1](#)), to be reviewed in the mop-up webinar in late September.
- For starry flounder, a data moderate assessment using Depletion-Based Stock Reduction Analysis (DB-SRA) has been developed and will be reviewed at the September mop-up webinar.
- For Washington cabezon, discussions of potential analyses are ongoing.

The SSC also notes that the OFLs adopted for 2020 are contingent on the assumption of ABC removals in 2019, which are in turn contingent on Council's choice of P-star (P*; the probability of overfishing), and may need to be revised based on Council decisions or changes to P-star values.

Stock Assessment Category Designations for the 2019-2020 Management Cycle

The category designations in Table 1 in [Agenda Item E.9, Supplemental Revised Attachment 1](#) have been confirmed by the SSC as consistent with the approach used to determine OFLs. Changes relative to past designations included a change for yelloweye rockfish from category 2 to category 1 (based on the fact that recruitment deviations are estimated and appear well informed), and California lingcod from category 2 to category 1 (based on the extended time series from the bottom trawl survey, including age-compositional data not included in the 2009 assessment, which help inform the model). Blue/deacon rockfish is designated a category 2 assessment, because it combines two cryptic species into one assessment complex.

SSC Notes:

The sigma analysis developed by Ms. Privitera-Johnson involved using custom-developed software to project biomass and OFLs forward from the population age-structure in different models from the same year under the OFL control rule. The value of sigma is then defined as the standard deviation of the projected OFLs. This approach captures uncertainty due to among-assessment variation in the F_{MSY} proxy as well as in biomass. The SSC recommended conducting the projections with variation in recruitment about the stock-recruitment relationship to capture another facet of uncertainty.

With respect to the sigma analysis by Dr. Chantel Wetzel, it is recognized that our current decision tables and sigmas do not account for changes in uncertainty as related to the age of an assessment, but that some general rules related to expected monotonic increases should ultimately be developed based on these results. Both analyses should be informative for future consideration of propagating uncertainty.

SSC Subcommittee Assignments, September 2017

Salmon	Groundfish	Coastal Pelagic Species	Highly Migratory Species	Economics	Ecosystem-Based Management
Galen Johnson	David Sampson	André Punt	Aaron Berger	Cameron Speir	Martin Dorn
John Budrick	Aaron Berger	Aaron Berger	John Field	Michael Harte	Evelyn Brown
Alan Byrne	John Budrick	Evelyn Brown	Michael Harte	Dan Holland	John Field
Owen Hamel	Martin Dorn	John Budrick	Dan Holland	André Punt	Michael Harte
Michael Harte	John Field	Alan Byrne	André Punt	David Sampson	Dan Holland
Will Satterthwaite	Owen Hamel	John Field	David Sampson		Galen Johnson
Ole Shelton	André Punt	Owen Hamel			André Punt
Cameron Speir	Tien-Shui Tsou	Will Satterthwaite			Will Satterthwaite
		Tien-Shui Tsou			Ole Shelton
					Cameron Speir
					Tien-Shui Tsou

Bold denotes Subcommittee Chairperson

Council Meeting Dates	Location	Likely SSC Mtg Dates	Major Topics
March 7-14, 2018 Proposed Subcommittees may meet Wed, Mar 7 Advisory Bodies may begin Thu, March 8 Council Session may begin Fri, March 9	DoubleTree by Hilton Sonoma One Doubletree Drive Rohnert Park, CA 94928 Phone: 707-584-5466	Half-day CPS Subcommittee Session Wed, March 7 Two-day SSC Session Thu, March 8 – Fri, March 9	Election of new SSC officers Identify salmon management objectives Salmon review/Pre I CA current & IEA report FEP Climate Shift Initiatives Report Sablefish Ecosystem Indicators MSE Groundfish initial stock assessment plan and Terms of Reference
April 4-11, 2018 Proposed Subcommittees may meet Wed, Apr 4 Advisory Bodies may begin Thu, April 5 Council Session may begin Fri, April 6	Sheraton Portland Airport Hotel 8235 NE Airport Way Portland, OR 97220 Phone: 503-281-2500	Two-day SSC Session Thu, April 5 – Fri, April 6	Pacific Sardine Assessment Salmon Methodology Topic Selection ATM Methodology Final Approval Process for Review of Ref. Points for Monitored Stocks
June 6-14, 2018 Proposed Subcommittees may meet Wed, Jun 6 Advisory Bodies may begin Thu, June 7 Council Session may begin Fri, June 8	DoubleTree by Hilton Spokane City Center 322 N. Spokane Falls Court Spokane, WA 99201 Phone: 509-455-9600	Two-day SSC Session Thu, June 7 – Fri, June 8	Final stock assessment plan and Terms of Reference Research and Data Needs, Prelim.
September 5-12, 2018 Proposed Subcommittees may meet Wed, Sept 5 Advisory Bodies may begin Thu, Sept 6 Council Session may begin Fri, Sept 7	DoubleTree by Hilton Hotel Seattle Airport 18740 International Boulevard Seattle, WA 98188 Phone: 206-246-8600	Two-day SSC Session Thu, Sep 6 – Fri, Sep 7	Groundfish Stock Assessment Methodology Review Topic Selection Research and Data Needs, Final Salmon Methodology Topic Priorities
November 1-8, 2018 Proposed Subcommittees may meet Thu, Nov 1 Advisory Bodies may begin Fri, Nov 2 Council Session may begin Sat, Nov 3	San Diego Marriott Del Mar 11966 El Camino Real San Diego, CA 92130 Phone: 858-523-1700	Two-day SSC Session Fri, Nov 2 – Sat, Nov 3	CPS Methodology Topic Selection Groundfish Stock Assessment Methodology Topic Priorities Salmon Methodology Review

Proposed Workshops and SSC Subcommittee Meetings for 2017 and 2018

	Workshop/Meeting	Potential Dates	Sponsor/ Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
1	Salmon Methodology Review	Oct. 17	Council/ Webinar	Salmon Subcommittee	None	STT SAS MEW	Ehlke
2	CAPAM Workshop on Recruitment	Oct. 30 – Nov. 3	CAPAM/ Miami, FL	Punt	TBD	None	None
3	2017 Groundfish Stock Assessment Process Review	Dec. 1	Council/ Webinar	Groundfish Subcommittee	Apostolaki	GMT GAP	DeVore
4	SCS6 Meeting	Jan. 17-19, 2018	Council & NMFS/ San Diego, CA	Satterthwaite, Holland, Punt, Berger, Budrick, Field, Hamel, Harte, Johnson, Sharma, Speir, Tsou	TBD	None	Tracy, DeVore Others? TBD
5	CPS ATM Methodology Review	Jan. 30 – Feb. 2, 2018	Council/ La Jolla, CA	Punt, Brown, Hamel	TBD	TBD	Griffin
6	Review of Sardine Update Assessment	March 7	Council/ Rohnert Park, CA	CPS Subcommittee	None	CPSMT CPSAS	Griffin
7	CPS Webinar on Reference Points for Monitored Stocks?	TBD	Council/ TBD	CPS Subcommittee	TBD	CPSMT CPSAS	Griffin
8	Sablefish Ecosystem Indicators MSE Review?	TBD	Council/ TBD	Ecosystem Subcommittee	TBD	GMT GAP	DeVore

Proposed Workshops and SSC Subcommittee Meetings for 2017 and 2018

	Workshop/Meeting	Potential Dates	Sponsor/ Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
9	CAPAM Workshop on Spatio-Temporal CPUE Indices	Feb. 26 – Mar. 2, 2018	CAPAM/ La Jolla, CA	TBD	TBD	TBD	TBD