MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
Hyatt Regency Orange County
Royal C Room
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Garden Grove, CA 92840
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June 19-20, 2013

Call to Order and Scientific and Statistical Committee (SSC) Administrative Matters

The meeting was called to order at 8 a.m. on Wednesday, June 19, 2013. Council Executive Director, Dr. Donald McIsaac briefed the SSC on priority agenda items.

Members in Attendance

Mr. Robert Conrad, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Martin Dorn, National Marine Fisheries Service, Seattle, WA
Dr. Owen Hamel, SSC Chair, National Marine Fisheries Service, Seattle, WA
Dr. Selina Heppell, Oregon State University, Corvallis, OR
Dr. Daniel Huppert, University of Washington, Seattle, WA
Mr. Tom Jagielo, Seattle, WA
Dr. Peter Lawson, National Marine Fisheries Service, Newport, OR
Dr. Todd Lee, National Marine Fisheries Service, Seattle, WA
Dr. Charles Petrosky, Idaho Department of Fish and Game, Boise, ID
Dr. André Punt, University of Washington, Seattle, WA
Dr. David Sampson, Oregon Department of Fish and Wildlife, Newport, OR
Dr. William Satterthwaite, National Marine Fisheries Service, Santa Cruz, CA
Ms. Cindy Thomson, National Marine Fisheries Service, Santa Cruz, CA
Dr. Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA

Members Absent

Dr. Vladlena Gertseva, National Marine Fisheries Service, Seattle, WA
Ms. Meisha Key, SSC Vice-Chair, California Department of Fish and Wildlife, Santa Cruz, CA

SSC Recusals for the June 2013 Meeting.		
SSC Member	**Issue**	**Reason**
Dr. André Punt	Adjustments to Sardine Harvest Parameters	Dr. Punt's student did the analysis.

Scientific and Statistical Committee Comments to the Council

The following is a compilation of June 2013 SSC reports to the Pacific Fishery Management Council (Council) in the order they were discussed by the SSC. (Related SSC discussion not included in written comment to the Council is provided in *italicized text*).

D. *Highly Migratory Species Management*

   5.   North Pacific Albacore Tuna Precautionary Management Framework

The Scientific and Statistical Committee (SSC) reviewed the Highly Migratory Species Management Team (HMSMT) report to the Council on a precautionary management framework for North Pacific Albacore Tuna (Agenda Item D.5.b, HMSMT Report). Dr. Sippel from the HMSMT presented the report to the SSC. Dr. Kit Dahl was also available to answer questions. The SSC discussion focused on elements that should be included in the precautionary management framework for North Pacific Albacore Tuna being developed by the Northern Committee of the Western and Central Pacific Fisheries Commission.

Overall, the SSC supports the use of this document as a starting point for management discussions. The current interim reference point, $F_{SSB-ATHL}$, is effort-based and provides a status quo reference point that assumes that the current mix of gear types remains constant. The definition of effort is key to any reference point based on fishing effort, and some effort metrics may be more informative than others (e.g., number of vessels or vessel-days vs. number of hooks in the water). Currently, fishing effort for this species is not measured to the degree needed to support reference points based on fishing effort.

The SSC agrees with the HMSMT that management reference points should consider the availability and quality of catch data and biological information for the stock. Reference points can be based on biomass or fishing mortality, or proxies for F_{MSY}. The SSC has previously recommended that spawning potential ratio (SPR) reference points be considered as potential fishing mortality proxies for North Pacific albacore. Biomass-based reference points, which are a fundamental part of the control rules currently proposed, are problematic given the high uncertainty associated with biomass estimates for this species.

Harvest Control Rules (HCRs) need to consider data quality and the implementation of management recommendations. A more effective presentation of the information in Figure 1 of the HMSMT report would be to plot stock status versus catch and stock status versus effort/F separately because the interpretation of these plots depends greatly on the definition of the y-axis. The SSC recommends against considering the more complex sliding scale harvest control rule, as illustrated in the right-hand panel of Figure 1, because the high uncertainty associated with this stock's parameter estimates and status do not support implementation of a more complex HCR.

The SSC notes that the biomass-based HCRs currently proposed are not robust to the effects of decadal scale environmental variability on North Pacific albacore biomass and distribution.

F. Groundfish Management

5. Approve Stock Assessments

The Scientific and Statistical Committee (SSC) was briefed by its groundfish subcommittee regarding five items pertaining to groundfish stock assessments and Stock Assessment Review (STAR) Panel reviews for the 2015-2016 management cycle. These items included: 1) a report regarding assessments for data-moderate species, 2) an updated bocaccio rockfish assessment, 3) catch reports for three rockfish species, 4) a full assessment for petrale sole, and 5) a full assessment for darkblotched rockfish.

The data-moderate process produced successful assessments for eight species, none of which were estimated to be overfished. The full assessments for petrale sole and darkblotched rockfish, and the assessment-update for bocaccio rockfish, show that all three species are still rebuilding, and all are predicted to be rebuilt by 2015. Rebuilding analyses are not needed for these three species, given the 1 to 2-year timeframe for rebuilding. The catch reports for Pacific ocean perch, canary, and yelloweye rockfish show catches have been below the annual catch limit (ACL) for the last three years, and no new rebuilding analyses are needed for these three species. The SSC reiterates the importance of conducting data methodology review meetings in advance of STAR Panel reviews.

Key points following from the full SSC discussion, along with associated SSC recommendations follow.

Data-moderate Assessments

The Stock Assessment Team (STAT) considered applying one or both of the data-moderate assessment methods (XDB-SRA and exSSS) to each of the nine groundfish stocks that were recommended for data-moderate assessment: brown rockfish, China rockfish, copper rockfish, English sole, sharpchin rockfish, stripetail rockfish, rex sole, vermilion rockfish, and yellowtail rockfish; but this task proved to be overly ambitious. During the STAR Panel meeting it was agreed that the STAT would focus its efforts and apply the XDB-SRA method to the nearshore species (brown, China, and copper rockfish) and apply the exSSS method to the offshore species (sharpchin, stripetail, and yellowtail rockfish; and English and rex sole).

The assessment for vermilion rockfish was abandoned due to time-constraints and because recent research has established that the species previously known as vermilion rockfish is in fact a complex of two species with geographic overlap south of 40°10' N. lat. There is potential for developing separate data-moderate assessments for the vermilion stock complex in future assessment cycles based on indices from the Northwest Fisheries Science Center (NWFSC) hook-and-line survey. The STAT also attempted, but abandoned, a data-moderate assessment for yellowtail rockfish south of 40°10' N. lat., because the index data for this stock are too limited.

A document summarizing the compositional data available for the nine stocks that were assessed with data-moderate methods in 2013 is not yet complete. This document is intended to evaluate the availability of information to conduct full assessments for data-moderate stocks. A revised document will be reviewed at the September SSC meeting.

The SSC views the data-moderate assessment methods as being very useful tools for assisting the Council's groundfish management process and a substantial improvement over the Council's data-poor methods. The SSC concludes that 1) the assessments described in the table below represent the best available science, 2) they should be accepted as valid data-moderate stock assessments, and 3) they should be used as the basis for management decisions in the 2015-2016 groundfish management cycle.

Summary table of data-moderate stock assessment results.

Stock	Depletion [a]	Status	OFL [b]
Nearshore stocks:			
Brown rockfish (coastwide)	40%	Above target	Yes
China rockfish (N of 40°10')	33%	Below target, not overfished	Yes
China rockfish (S of 40°10')	72%	Above target	Yes
Copper rockfish (N of 34°27')	42%	Above target	Yes
Copper rockfish (S of 34°27')	84%	Above target	Yes
Shelf-slope stocks:			
Sharpchin rockfish (coastwide)	73%	Above target	Yes
Stripetail rockfish (coastwide)	> 77%	Above target	No
Yellowtail rockfish (N of 40°10')	69%	Above target	Yes
English sole (coastwide)	88%	Above target	Yes
Rex sole (coastwide)	80%	Above target	Yes

[a] Estimates for start of 2013; percentages reflect proportion of unfished spawning biomass.
[b] The assessment can be used to calculate OFL or OFL contribution.

The assessment for stripetail rockfish did not produce a reliable estimate for the scale of the stock's biomass. As a consequence, an OFL could not be estimated. However, the SSC agrees with the STAT and STAR Panel that the available data provide strong evidence that the stock is not below the biomass target and can be used for status determination.

In conclusion, the SSC regards the process of developing and reviewing the data-moderate assessments in the current assessment cycle has been highly successful. Data-moderate

assessments fill an important gap in the assessment tools available to assessment scientists, and improve the Council's ability to assess and manage the stocks in the Council's groundfish FMP. These stocks have varying economic and ecological importance, and different types of data available for assessment. A range of assessment tools gives the Council and National Marine Fisheries Service (NMFS) the flexibility to set priorities for assessment and at the same time ensure that there is some minimal level of assessment that can be conducted for all stocks.

Bocaccio Rockfish

The most recent full assessment of bocaccio rockfish was conducted in 2009. Subsequently, updated assessments have been prepared in 2011 and again in 2013. The present assessment estimates depletion in 2013 of 31.4 percent; an improvement over that forecasted by the 2011 assessment (approximately 28 percent). Improvement in stock status is attributed to higher estimates of 2010 recruitment.

Bocaccio is predicted to be rebuilt by 2015; however, the SSC recommends that this be confirmed with a full assessment during 2015. For 2015 and 2016 management, the SSC recommends continuing to use the current rebuilding spawning potential ratio (SPR) to define the ACL. A rebuilding analysis is unnecessary and would provide no new information given the projected two-year timeframe for rebuilding.

The bocaccio update complies with the terms of references for assessment updates and represents the best available science for use in developing 2015-2016 management measures as a category 1 assessment.

Groundfish Catch Reports

The SSC discussed the groundfish subcommittee's review of catch reports that update the overfishing status of canary rockfish, Pacific ocean perch, and yelloweye rockfish off the US Pacific coast using data through 2012. Fishing mortality was reported in the West Coast Groundfish Observer Program total mortality reports for 2010 and 2011, and was based on the scorecards developed by the Groundfish Management Team for 2012. The scorecards for yelloweye and canary rockfish are based on harvest guidelines and probably are the upper bound of potential catch. The 2010-2012 fishing mortalities for all three species are estimated to be less than the annual catch limits (ACLs) as set by PFMC and approved by NMFS.

Given these results, and the lack of new information on biomass and recruitment, updated rebuilding analyses are not necessary for these three species.

Petrale Sole

Full assessments of petrale sole were conducted in 2009, 2011, and again in 2013. The 2009 assessment found the stock to be overfished; while the 2011 and present (2013) assessments concluded that the stock is above the Minimum Stock Size Threshold (MSST), but not yet rebuilt to B_{MSY}.

The base model from the 2013 stock assessment predicts that the stock will be rebuilt in 2014.

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Depletion in spawning biomass is estimated to be 22 percent at the start of 2013, above the 12.5 percent MSST for flatfish, but below the 25 percent B_{MSY} proxy. Compared to the 2011 assessment, which estimated that depletion was 18 percent in 2011, the new stock assessment indicates a less optimistic view (depletion of 13 percent in 2011).

The catch per unit of effort (CPUE) data are a key input to the assessment. The 2013 STAR Panel made two recommendations which reduced the weight assigned to these data. This down-weighting was in part due to the STAR Panel's lack of confidence in the CPUE data as an index of abundance; however, this was not explicitly stated in either the assessment document or the report of the STAR Panel. By contrast, the STAR Panel for the 2011 petrale sole assessment recommended that the CPUE index be included in the assessment. Use of CPUE indices in stock assessments is a topic where there is a range of scientific opinion, and STAR Panels may differ in what they consider to be the best approach. The SSC recommends that the CPUE index and its use in the assessment should be a major focus for the next assessment; any decision to not assume constant catchability and the coefficients of variation implied by the fit of the model to the data must be very clearly specified. Although the Panel justified its recommendation regarding the CPUE index, the SSC wishes this matter to be explored in more detail as part of the next assessment.

The SSC endorses the use of the 2013 petrale sole assessment as the best scientific information available for status determination and management in the Council process. The petrale sole spawning stock biomass is projected to be above the B_{MSY} proxy by 2014 under the "base case" and by 2016 under the "low" state of nature. However, the SSC recommends that this change in status should be confirmed by a new full assessment.

The SSC recommends that petrale sole be treated as a category 1 stock because the assessment is based on a fully developed age-structured model. There is no reason to conduct a rebuilding analysis for petrale sole this year given that it is predicted to rebuild to B_{MSY} in 2014 under current management.

Darkblotched Rockfish

A new full assessment of darkblotched rockfish was conducted in 2013. The most recent prior full assessment was conducted in 2007, which was subsequently updated in 2009 and again in 2011.

The new assessment results indicate that the west coast stock is currently at 36 percent of the unexploited level. This assessment estimates that the 2012 SPR is 86 percent, while the SPR-based management fishing mortality target is 50 percent. Overfishing has not occurred in the last 10 years. Natural mortality was used to bracket uncertainty in the states of nature in the decision table.

The SSC notes that the estimate of current depletion is highly uncertain and the assessment likely underestimates the extent of this uncertainty. The NWFSC trawl survey indices are relatively variable for darkblotched and show no overall trend over the past 10 years in contrast to the sharp increase in stock status estimated in the model over that period. It appears that the modeled improvement in stock status can be attributed primarily to: 1) reduced fishing mortality since the onset of the rebuilding program in 2000, 2) inferences that follow from more favorable perceptions of steepness, fecundity, and age at maturity of the stock, and 3) length and age data indicating

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relatively large recruitments in 1999, 2000 and 2008.

The SSC endorses the use of the 2013 darkblotched rockfish assessment as the best scientific information available for status determination and management in the Council process. The SSC recommends that darkblotched rockfish should be treated as a category 1 stock because the assessment is based on a fully developed age-structured model. The SSC is currently evaluating whether the default category 1 sigma value (vs. another approach) is appropriate for darkblotched rockfish.

Because the darkblotched rockfish assessment indicates that the stock will be rebuilt within 2 years (by 2015), the SSC recommends that the next assessment be a full assessment. The SSC notes that a new rebuilding analysis is not needed at this time, as the current assessment already provides the population projections needed to forecast population status through the next two years, and a new formal rebuilding analysis would be redundant. For 2015 and 2016 management, the SSC recommends continuing to use the current rebuilding SPR to define the ACL.

SSC Notes:

Data-moderate assessments

The SSC reviewed the document "Data-moderate stock assessments for brown, China, copper, sharpchin, stripetail, and yellowtail rockfishes and English and rex soles in 2013" (Agenda Item F.5.a, Attachment 1) and the accompanying report of the Data-Moderate STAR Panel (Agenda Item F.5.a, Attachment 2), and received a summary presentation of the assessments delivered remotely by Dr. Jason Cope (NWFSC and member of the STAT) and a verbal report of the STAR meeting from the panel chair, Dr. Martin Dorn (AFSC).

The STAR Panel recommended that the coastwide assessment for brown rockfish should be used for status determination, but that the two regional models (split at Point Conception) should be used for apportioning the coastwide OFL to the management regions. The SSC concurs. Also, the OFLs for copper rockfish need to be revised because the assessment boundary does not align with the Council's 40°10' management boundary. The STAT proposed several approaches for deriving the OFLs in Appendix B of the stock assessment document, but the SSC did not have time during its meeting to review the methods and choose which one would be most acceptable. This review and method selection will occur during a special summer meeting of the GFSSC or in conjunction with the September SSC meeting.

The GFSSC asked the STAT representative (Dr. Jason Cope) to revise the stock assessment document to include the estimated uncertainty for the estimated OFL values in a summary table so that it will be clear when calculating ABCs which stocks have greater scientific uncertainty than the default level for category 2 stocks.

The STAR Panel report describes some of the explorations that were conducted to understand the differences between the XDB-SRA and exSSS methods. The SSC concurs that this is an important avenue of future research and recommends that the Council sponsor an off-year science workshop to more fully explore the differences and similarities between these two data-moderate assessment methods, and to develop guidance on the circumstances under which one or the other method would provide the better scientific estimates of stock status.

- *The GFSSC notes that the STAR Panel Request H (compare the Stephens and MacCall approach for treating recreational CPUE data with the new approach developed this year for the data moderate assessments of the nearshore stocks) was not accomplished during the STAR Panel meeting. This topic should be explored prior to conducting any new assessments of recreationally harvested groundfish stocks.*
- *The biomass scale in the coastwide XDB-SRA model for China rockfish was much larger than the sum of the biomass scales from the two regional models, presumably because of conflicts in the regional indices. However, this same phenomenon could well be occurring at smaller spatial scales within the separate regional models. A better understanding of the phenomenon (where the parts do not sum to the whole) and the conditions that create it would be helpful in providing guidance on how to choose an appropriate spatial scale for conducting data-moderate assessments.*

Bocaccio

Dr. John Field of the Southwest Fisheries Science Center (SWFSC) presented the updated bocaccio rockfish stock assessment. The last full assessment was conducted in 2009, although a number of modifications were made during an assessment update in 2011.
The current update was conducted version 3.20b of Stock Synthesis, the same version used for the 2011 assessment. New data used in the assessment include:
- *The 2011 and 2012 catch data.*
- *The 2011 CalCOFI index (the index for 2012 was not yet available).*
- *The 2011 and 2012 NWFSC Southern California Bight hook and line survey indices and length frequencies.*
- *The 2011 and 2012 SWFSC juvenile index.*
- *The 2011 and 2012 power plant impingement index.*
- *The 2011 and 2013 NWFSC trawl survey.*

Petrale sole

Dr. Melissa Haltuch, of the National Marine Fisheries Service Northwest Fisheries Science Center (NMFS/NWFSC), and the lead author of the Stock Assessment Team (STAT), presented the stock assessment for petrale sole that had been reviewed by the STAR Panel held during 13-17 May 2013 in Seattle, WA. Dr. Theresa Tsou (SSC and WDFW), chair of that STAR Panel, summarized the STAR Panel report. The GFSSC also had the reports from the two CIE reviewers who were members of the STAR panel.

The basic structure and assumptions of the assessment model are unchanged from the 2011 assessment. The major changes from that assessment, in addition to the inclusion of data for 2011 and 2012, are (a) the Washington and Oregon fleets are combined into a single northern fleet, (b) the assessment uses the Oregon catch reconstruction, (c) the CPUE indices are updated based on application of new methodology, and (d) the pre-1990 ageing data are included in the assessment with a new ageing error matrix.

The GFSSC notes that the assessment authors spent considerable time refining the approach for standardizing the CPUE data, including accounting for targeting and increasing the spatial

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resolution of the analysis. The CPUE indices resulting from the standardization were a focus for the STAR Panel. The STAR Panel recommended that the coefficient of variation (CV) for the least precise NWFSC survey estimate be added to the CVs estimated from the variability in the CPUE data. The Panel also recommended that catchability for the CPUE series be assumed to change between 2003 and 2004 to account for the impact of the buyout on catch rates. The GFSSC notes, however, that the impact of the buyout was explored in the tests of sensitivity to the construction of the CPUE index and found to be minor, although the CPUE standardization cannot fully account for changes in, for example, the behavior of skippers following the buyout. These recommendations, along the assumption carried over from the previous assessment that CPUE need not be linearly proportional to abundance, mean that any information in the CPUE data is effectively ignored. As expected, making these changes led to better fits to the NWFSC survey and to the CPUE data. The estimated change in catchability indicates that catchability approximately doubled between 2003 and 2004, which seems a very large change. In addition, the implication that the southern CPUE index is unrelated to abundance index seems implausible.

The GFSSC understands that the adjustments to the CVs were to reflect a general concern by the STAR Panel with CPUE as an index of abundance. However, this is not explicitly stated in either the assessment document or the report of the STAR Panel. The STAR Panel for the 2011 petrale sole assessment recommended that the CPUE indices be included in the assessment, but the use of CPUE indices in stock assessment is a topic where there is a range of scientific opinion, and STAR Panels may differ what they consider to be the best approach. The GFSSC recommends that the CPUE index and its use in the assessment should be a major focus for the next assessment; any decision to not assume constant catchability and the CVs implied by the fit of the model to the data must be very clearly specified.

The GFSSC endorses the research recommendations in the assessment document, and recommends that the research topics identified by the CIE reviewers be added to the assessment document. The GFSSC was encouraged to hear that some of the early otoliths are planned to be read using break-and-burn methods.

Requested Modifications to the assessment document:
1. *Update assessment document to include details of how the species covariates used in the CPUE standardization are developed and provide diagnostics for the associated PCA methods.*
2. *Remove the projection from the SPR time-trajectory.*

Analyses for inclusion in the next assessment:
1. *Conduct the following sensitivity tests to explore the interaction between the treatment of q and the parameter which governs the extent of non-linearity in the relationship between CPUE and abundance using the original approach for estimating additional variance:*
   a. *Assume no change in q and no non-linearity coefficient*
   b. *Assume no change in q and a non-linearity coefficient*
   c. *Assume a change in q only.*
   d. *Assume a change in q and in the non-linearity coefficient*
2. *Conduct a more thorough evaluation of the sensitivity of the CPUE index to the effect of the buyout by restricting the CPUE data to vessels with multiple years of data before and after the buyout.*

General issues

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1. *Clarify whether Synthesis adjusts length- and weight-at-age in a non-seasonal model when a fleet is specified to occur at a time other than the middle of the year.*
2. *The TOR for stock assessments should be updated to include responses to SSC and GFSSC recommendations.*
3. *Synthesis adds CVs rather CV²s. This procedure needs to be justified – alternatively the code should be modified so that the CV for an index is the square root of the sum of the input and additional CV_2s.*

Darkblotched Rockfish

Dr. Owen Hamel, of the National Marine Fisheries Service Northwest Fisheries Science Center (NMFS/NWFSC) presented the stock assessment for darkblotched rockfish that had been reviewed by the STAR Panel held during 13-17 May 2013 in Seattle, WA. The assessment was conducted by Drs. Vlada Gertseva and Jim Thorson of the NWFSC. Dr. Thorson was available remotely to answer questions from the SSC groundfish subcommittee. Dr. Theresa Tsou (SSC and WDFW), chair of that STAR Panel, summarized the STAR Panel report. The SSC also had the reports from the two CIE reviewers who were members of the STAR panel. The most recent prior full assessment was conducted in 2007, which was subsequently updated in 2009 and 2011.

Significant changes made during the 2013 assessment include:
1. Washington historical landings were updated, and the Oregon and California landings were reconstructed by the SWFSC and ODFW in collaboration with NWFSC.
2. Instead of one fleet, fishery removals were divided between two fisheries; a directed trawl fishery, and a fishery which does not discard that included historical foreign removals in the Pacific Ocean Perch fishery as well as recent landings from the Pacific hake fishery.
3. Survey abundance indices were reconstructed with new GLMM software.
4. Fecundity and maturity parameters were updated, including consideration of atresia in the maturity function.
5. Male natural mortality (M) was estimated in the model, with female M fixed at 0.05.
6. A fixed value for steepness (h=0.779) was assumed, which is the mean of the prior from Thorson et al 2013.

During the discussion period by the full SSC, it was questioned what the potential numerical impact of the shrimp bycatch is to the stock (vs. biomass), given the small size of darkblotched juveniles taken in this fishery. Information to evaluate this question were not available at the time of the discussion.

2. Status of the Rationalized Trawl Fishery

The Scientific and Statistical Committee (SSC) received a presentation by Dr. Todd Lee and Ms. Erin Steiner, National Marine Fisheries Service Northwest Fisheries Science Center (NWFSC) regarding the mandatory Economic Data Collection (EDC) program for participants in the groundfish catch shares program. The EDC was reviewed by the Economics and Groundfish Subcommittees on April 7, 2013 in Portland.

The EDC program provides comprehensive economic data for shorebased catcher vessels which was previously collected through voluntary cost-earnings surveys and new, previously unavailable

data for motherships, catcher vessels delivering to motherships, catcher processors, and first receivers/shorebased processors. The EDC achieved a 94 percent response rate in 2011; survey data are subject to double-key entry and other data validation methods. The data represent best available science and are directly relevant to evaluating the economic performance of the catch share program and for analyzing management alternatives considered in the Specs process.

Dr. Lee briefed the SSC regarding the Pacific Coast Groundfish Trawl Social Study, a study conducted separately from the EDC by NWFSC social scientist Ms. Suzanne Russell. This study involved voluntary surveys and interviews of groundfish fishery participants in 2010 and 2012 and may be a good source of information regarding the short-term social impacts of the catch share program. The SSC would like to review this study as a potential source of information for the five-year review of the catch share program.

6. Trawl Rationalization Trailing Actions

Mr. Jim Seger (PFMC) and Mr. Colby Brady (NWR) briefed the Scientific and Statistical Committee (SSC) regarding the "Initial Draft White Paper: Electronic Monitoring and Performance Standards". The SSC also reviewed the "Final Report for the Electronic Monitoring Program: Review of the 2012 Season" prepared by the Pacific States Marine Fisheries Commission.

The white paper provides a synthesis of considerations regarding the use of performance standards versus more traditional types of regulations. This is a rather large and complex topic, and the authors of the white paper should be commended for their efforts to clearly summarize many of the relevant issues. In theory, regulating through performance standards may be relatively advantageous in terms of cost effectiveness. However, as the white paper points out, the verification of compliance with performance standards may be difficult or costly to implement. The SSC recommends that the next draft of the white paper, expected at the September 2013 Council meeting, focus more sharply on this issue.

The white paper indicates there is little information available regarding similar regulations in other fisheries, or analyses that compare the costs and outcomes associated with different regulatory approaches. Given the enormity and importance of these topics, the SSC recommends the authors make a concerted effort to discover any relevant information, if it exists. Without more information it is difficult to provide guidance on how these regulatory approaches may work in actual practice.

The cost of the human observer program is an important driver in the exploration of electronic monitoring. A comprehensive benefit-cost analysis of the alternatives, taking into account all significant factors, would be necessary to determine the net relative advantages of the various options. The total cost should be evaluated, including a delineation of costs borne by industry and costs borne by the public. This is necessary so the total societal cost and its distribution can be evaluated.

The Final Report for Electronic Monitoring does not address the primary question the SSC raised in our April 2013 statement, namely why are there differences between catch (both retained and discarded) measured by electronic monitoring and human observers. In addition, because no

additional information was provided to the SSC for this Council meeting, it is unclear whether the electronic monitoring testing being conducted this summer will address the comments we provided previously regarding the efficacy of the system at the April 2012 Council meeting (Agenda Item I.4.c, Supplemental SSC Report, April 2012).

7. Consideration of 2015-2016 and Beyond Harvest Specifications and Management Measures

The Scientific and Statistical Committee (SSC) reviewed and discussed topics relating to Agenda Item F.7 "Consideration of 2015-2016 and Beyond Harvest Specifications" including the proposed process and schedule (Agenda Item F.7.a, Attachment 3), the proposed analytical framework (Agenda Item F.7.a, Attachment 1), and a report from the Economics and Groundfish subcommittees of the SSC (Appendix A, attached to this report). Dr. Kit Dahl and Mr. John DeVore of the Council staff were available to answer questions and contributed to the discussions.

Proposed process and schedule

The list of SSC tasks in the proposed process and schedule is similar to previous harvest specification cycles, and the SSC expects that it will be able to fulfill its review and advisory role as before. The schedule indicates that the SSC will make recommendations regarding a default F_{MSY} proxy for elasmobranchs at its September meeting. A review of available information that were thought to provide a basis for developing a suitable F_{MSY} proxy proved to be less informative than anticipated. The SSC is planning to work on this issue this summer with the goal of providing a recommendation to the Council in September.

Proposed analytical framework

The SSC focused on Chapter 4 "Impacts of the Alternatives" of the "Draft Annotated Outline for the Harvest Specifications EIS". The Council's approach to managing groundfish is an adaptive approach, in which new information from stock assessments is used to assess status and modify ACLs appropriately. The proposed approach for the EIS is to use catch projections from alternative "states of nature" contained in decision tables in stock assessments. These catch projections will be used to evaluate economic and ecological impacts. The high and low stock projections represent extreme cases, but should be adequate for the purposes of the EIS.

There was discussion of whether the EIS should include quantitative analyses of the potential impacts of management measures to the ecosystem or to essential fish habitat (EFH). The SSC recommends that this approach only be used after careful consideration. The available ecosystem and EFH impact models that might be used for this task have not been reviewed by the SSC and may not show useful distinctions across the range of EIS alternatives. While fully tested and reviewed models of these sorts may eventually inform cumulative impacts, qualitative evaluations of impacts on the environment and essential fish habitat are more suitable for the EIS.

Economic Subcommittee review of projection models

In 2012 and 2013 the SSC Economics and Groundfish Subcommittees (SSC-E/GF) conducted a series of reviews of datasets and models that underlie the specifications socioeconomic analysis. The purpose of these reviews was to provide a more thorough evaluation of each socioeconomic component than could be accomplished within a single specifications cycle. Details of these reviews are provided in the SS-E/GF's report (Appendix A attached to this statement). The SSC endorses the results of those reviews.

Two types of analysis are desirable for analyzing the socioeconomic effects of management alternatives considered in the specifications process: (1) an analysis of community effects, including impacts on regional employment and income that occur as money generated from commercial and recreational fisheries circulates through the economy, and (2) an analysis of costs and benefits incurred by affected commercial and recreational participants (rather than the economy as a whole). In past specifications cycles, the socioeconomic analysis focused largely on economic impacts. In recent years, economic survey data have become available that also allow analysis of costs and benefits for all commercial fishery sectors.

Models and datasets reviewed by the SSC-E/GF in 2012-13 are as follows:

- projection models for California, Oregon and Washington recreational fisheries developed by the three states and used by the Groundfish Management Team (GMT)
- projection models for nearshore and non-nearshore fixed gear fisheries used by the GMT
- a regional economic impact model (IO-PAC) developed by Northwest Fisheries Science Center (NWFSC) economists
- the mandatory Economic Data Collection (EDC) program developed by NWFSC economists for participants in the groundfish catch share program.

A key input for socioeconomic analysis of recreational fisheries is fishing effort, which combined with economic data collected in specialized angler surveys, is used to estimate the economic effects of each management alternative. Recreational effort projections provided by the GMT have formed the basis for socioeconomic analysis in past specifications cycles. Underlying these projections are assumptions regarding how effort is affected by regulations such as depth closures. It is important to note that a basic purpose of the GMT models is to avoid exceeding species allocations; while less attention has been paid to verifying the accuracy of effort projections.

A key input for socioeconomic analysis of commercial fisheries is harvest by sector, which combined with available economic data, is used to estimate economic effects of each management alternative on each sector. A major purpose of the nearshore and non-nearshore models used by the GMT is to provide projections of bycatch, discard, and discard mortality by fixed gear vessels. Catch projections are based on data collected in the West Coast Groundfish Observer Program and pooled across years due to small samples of overfished species encounters. The sample size issue (and thus the need for pooling) makes it difficult to determine trends that could be useful for

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evaluating model performance; this is most problematic for the nearshore model.

The recent availability of EDC data makes it possible to analyze socioeconomic effects not just for shoreside catcher vessels but also for motherships, catcher vessels delivering to motherships, catcher-processors, and shorebased first receivers/processors. EDC data are important inputs into the IO-PAC model, which was previously reviewed by the SSC in 2009. IO-PAC has been subject to a number of improvements, including addition of a recreational component and additional commercial sectors, data updates, and changes in model construction and assumptions.

The SSC endorses the three recreational models, the nearshore and non-nearshore models, the updated IO-PAC model and the EDC as best available science and appropriate for use in the 2015-16 specifications process. Use of these models in the 2015-16 specifications process should be accompanied by adequate documentation, including documentation of the behavioral assumptions underlying the comparison of alternatives and indicators of past model performance. Over the longer term recreational effort and commercial catch projection methods should be specifically designed to reflect potential effects of management regulations; these may differ from the methods used by the GMT to avoid exceeding species allocations. A new trawl catch model is being developed to replace the trawl bycatch model that the SSC reviewed a decade ago. The SSC looks forward to reviewing that model when it is completed.

The SSC also has some procedural recommendations:

- Given the various models and analyses that have to be integrated in the specifications socioeconomic analysis, the SSC recommends that planning for the 2015-16 specifications EIS include identification of responsible parties, a central coordinator, and a schedule that provides adequate opportunity to review the socioeconomic analysis.
- Some of the longer-term issues identified in reviews conducted by the SSC-E/GF (e.g., improved methods of projecting recreational effort) should be included among the candidate topics for off-year discussion.
- The GMT and NWFSC provided considerable documentation regarding the data and models reviewed in 2012 and 2013. The SSC recommends that these documents be made publicly available on the Council website. In addition, documentation is needed regarding how effort and landings projections provided by the GMT are distributed among ports for use in the IO-PAC model (i.e. documentation of the landings distribution model).
- The SSC-E/GF met with the GMT on April 2, 2012 to discuss issues raised by the GMT regarding socioeconomic as well as biological effects of rebuilding plans. Some of the issues raised at that time should also be considered as candidates for further discussion in off-years of the specifications cycle.

The SSC thanks all of the individuals who provided documentation and participated in the reviews, and also thanks Council staff for their involvement in planning these reviews.
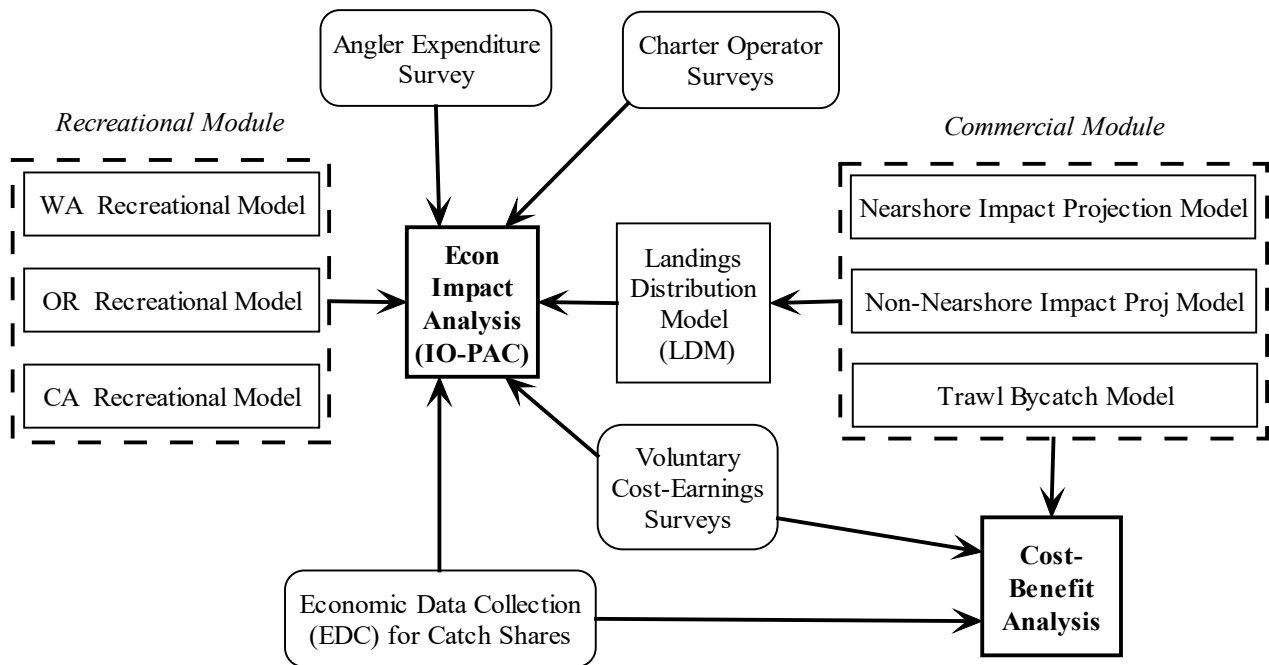
Recalculating Sigmas for Stock Categories

The schedule for developing the new harvest specifications indicates that the SSC would recommend the default measures of scientific uncertainty (sigma) for calculating ABCs at the September meeting. While the sigma for category 1 stocks could be redone using information from more recent stock assessments and the original method, it would be unlikely to change substantially. The original method needs improvement because the analysis was based on ending biomass rather than the OFL, and does not reflect increased uncertainty due to the stock projection. The SSC would like to defer work on recalculating sigma to next year. The SSC recommends that the ABC calculations for the 2015-2016 harvest specifications use the existing Category 1, 2 and 3 default sigma values.

STATEMENT OF THE SSC ECONOMICS AND GROUNDFISH SUBCOMMITTEES'
REVIEWS CONDUCTED IN 2012-13 OF DATA AND MODELS TO BE USED
IN THE SOCIOECONOMIC ANALYSIS FOR THE 2015-16 GROUNDFISH BIENNIAL
SPECIFICATIONS PROCESS

The Council's groundfish harvest specification (Spex) process requires preparation of an extensive regulatory analysis. The socioeconomic portion of that analysis is broad in scope – covering all relevant commercial and recreational fishery sectors – and relies on a sizeable number of datasets and models. In 2012-2013 the SSC Economics and Groundfish Subcommittees (SSC-E/GF) conducted a series of reviews of the datasets and models that underlie the Spex socioeconomic analysis. The purpose of those reviews was to provide a more thorough evaluation of each socioeconomic component than could be accomplished within a single Spex cycle.

Two types of analyses are desirable for analyzing the socioeconomic effects of management alternatives considered in the Spex process: (1) an analysis of community effects, including economic impacts on regional employment and income that occur as money generated in commercial and recreational fisheries circulates through the regional economy, and (2) an analysis of costs and benefits incurred in affected commercial fisheries (measured by net revenues) and recreational fisheries (measured by net revenues for charter boat operators, and consumer surplus for recreational anglers). In past Spex cycles, the socioeconomic analysis focused largely on economic impacts. In recent years, economic survey data have become available that allow costs and benefits of management alternatives to be analyzed for the trawl, fixed gear, catcher-processor and processor sectors of the commercial fishery.

The following chart describes the data and models that will serve as the basis for the economic impact analysis and the cost-benefit analysis in the 2015-16 Spex process.

In 2012-13 the SSC-E/GF reviewed a number of the datasets and models shown in the chart, as follows:

- Oregon Recreational Model – reviewed March 3, 2012

- Washington and California Recreational Models – reviewed September 15, 2012
- Non-Nearshore and Nearshore Impact Projection Models – reviewed March 8, 2013
- IO-PAC Model and Economic Data Collection (EDC) Program – reviewed April 7, 2013

SSC recommendations regarding components of the chart that were not reviewed in 2012-13 are as follows:

- The SSC Economics Subcommittee reviewed the Landings Distribution Model in September 2011. Results of that review are provided in the SSC Minutes in the Council's November 2011 Briefing Book. **Based on that review, the SSC-E/GF recommends that the 2015-16 Spex socioeconomic analysis include information regarding the predictive performance of LDM projections by port area and sector.**
- The SSC reviewed the voluntary cost-earnings surveys in November 2009. Further review of these surveys is a low priority at this time, given that the methodologies have not changed substantially since 2009.
- The SSC reviewed an earlier version of the Trawl Bycatch Model a decade ago. Due to major changes in the fishery since that time (most notably catch shares), **review of the current Trawl Bycatch Model is a high priority.**
- The most recent NMFS angler expenditure survey was completed in 2011. A charter operator survey was completed in Oregon and Washington in 2007 and a similar survey is currently underway in California. **Reviews of the angler expenditure and charter operator surveys remain to be done, but are a lower priority than the Trawl Bycatch Model.**

SSC statements regarding each of the reviews conducted during 2012-13 are attached. In addition to the specific recommendations in these reviews, the SSC-E/GF has some additional procedural recommendations as follows:

- The attached reviews include recommendations regarding analyses that the SSC-E/GF would like to see in the EIS for the 2015-16 Spex. **The SSC-E/GF recommends that planning for the 2015-16 Spex EIS include identification of responsible parties and a schedule that provides adequate opportunity to review the socioeconomic analyses.**
- The attached reviews identify data and modeling issues that could more feasibly be resolved over the longer term. The Council has a process for considering technical issues to be addressed in off-years of the Spex cycle. **The SSC-E/GF recommends that some of the longer-term issues identified in the 2012-13 reviews be included among the candidate topics for off-year discussion.**
- The SSC-E/GF met with the GMT on April 2, 2012 to discuss issues raised by the GMT regarding socioeconomic as well as biological effects of rebuilding plans. **The SSC-E/GF recommends that technical issues raised by the GMT in the context of rebuilding also be considered as candidates for discussion in off-years of the Spex cycle.**
- The GMT and NWFSC have provided considerable documentation regarding the data and models reviewed in 2012-13. **The SSC recommends that these documents be made publicly available on the Council website or some other suitable venue.**

The SSC-E/GF thanks all of the individuals who provided documentation and participated in reviews, and also thanks Council staff for their involvement in the planning these reviews.

ATTACHMENT 1
Statement of SSC Economics and Groundfish Subcommittees

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The Economic and Groundfish Subcommittees of the Scientific and Statistical Committee (SSC-E/GF)[1] met on 3 March 2012 in Sacramento, California to review a report on models for estimating groundfish impacts by the recreational fisheries off the coast of Oregon. The *Oregon Recreational Groundfish Model* report, prepared by staff from the Oregon Department of Fish and Wildlife (ODFW), was circulated to the SSC-E/GF several weeks prior to the meeting. Mr. Patrick Mirick (ODFW) presented slides summarizing the ODFW report, and answered questions about Oregon's recreational groundfish models. During the first few hours of the meeting Ms. Lynn Mattes, ODFW's representative on the Groundfish Management Team (GMT), and some other members of the GMT were also available to address questions. The SSC-E/GF discussed topics for future socioeconomic model reviews prior to concluding the meeting.

The ODFW report discussed several models involved in calculating harvest impacts (landings plus mortal discards). Most of these models are used internally by ODFW to inform pre- and in-season management decisions, but some of them also feed into the IO-PAC model. Included in the report, and discussed during the review meeting, were models for (1) estimating harvest and discard mortality, (2) projecting harvest and discard mortality in the recreational fishery for non-halibut groundfish, (3) projecting harvest and discard mortality in the recreational fishery for halibut, and (4) projecting the impacts of changes to bag limits. There was also an exploration of models that used multiple independent variables (e.g., gas prices, weather conditions, and landings in other recreational fisheries) to predict harvest impacts for yelloweye rockfish, a major constraining species. The report and presentation included example applications of the models and some evaluations of model performance.

Oregon's Recreational Boat Survey

The fundamental source of information for all the Oregon recreational fishery models is the Oregon Recreational Boat Survey (ORBS). The survey crews interview anglers at Oregon ports to collect data by species on angler catch rates and discard rates (fish per angler-day), as well as to measure biological characteristics of the landed fish. Daily logbooks from charter vessels and counts of bar crossings by private boats together provide a near census of the boat-level fishing effort. However, the ORBS program conducts limited sampling from minor ports or during winter months. Also, ODFW has not collected data on estuary or bank fishing activities since 2002.

Estimating harvest and discard mortality

The ORBS samplers have collected information on fishing depths since March 2009. Prior to March 2009, data on fishing depths were only available from a limited number of observed charter boat trips. The availability of fishing depth information has allowed ODFW to use the GMT's "death-by-depth" mortality rate table to estimate the depth-specific numbers of released fish that subsequently died. To estimate the overall weight of the dead fish by species, the mortality numbers for a species are multiplied by the average weight of released fish for that species. The average fish weights by species, which are based on a long-term accumulation of data, are

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[1] SSC participants included Vladlena Gertseva, Owen Hamel, André Punt, David Sampson, Cindy Thomson, and Theresa Tsou.

periodically re-estimated as more data become available.

The ODFW calculations of harvest and discard mortality do not include estimates of standard errors or other measures of variability. Given the design of the ORBS system, it should be feasible to develop approximate variance estimators that could then be used to evaluate sampling efficiency. It may be possible to achieve increased sampling efficiency by rebalancing of sampling effort (e.g., shifting sampling effort among months or ports). **The SSC-E/GF therefore recommends that measures of uncertainty be developed and reported.**

Projecting harvest and discard mortality

The availability of fishing depth information from ORBS also allowed ODFW to project the potential effects of changing the maximum fishing depth restriction, which is the primary management tool that ODFW uses to reduce impacts by the recreational fishery on overfished species, particularly yelloweye rockfish. For example, if fishing were to be restricted to waters shallower than 30 fathoms, the proportion of fishing effort that ORBS found in depth-bins deeper than 30 fathoms would be redistributed to the shallower depth-bins to project the resulting landings and associated release mortalities. The model does not attempt to project changes in fishing effort resulting from a new depth restriction, but instead uses the average value from recent years. This procedure may over-estimate impacts if the number of angler days declines when regulations become more restrictive. However, the procedure is intended for purposes of conservative management rather than accuracy in effort projections. Also, the model works on a statewide basis rather than projecting port-level impacts. **The SSC-E/GF recommends that ODFW consider whether the distribution of effort by depth-bin varies by port. If so, effort projections may be better done at the port level, with port-specific results aggregated to derive statewide estimates.**

Projecting harvest and discard mortality in the halibut fishery

The recreational fishery for halibut in the waters off Oregon, which is limited to a few short open seasons each year, has some impacts on the overfished stocks of yelloweye rockfish and canary rockfish. However, linear regressions of yelloweye rockfish bycatch versus halibut harvest and canary rockfish bycatch versus halibut harvest indicate no significant relationships. Given that the halibut fishery would not catch rockfish if there was no halibut season, it would be sensible to force the regression line to go through the origin. Nonetheless, the scatterplot of the data indicates that the projections of rockfish bycatch during the halibut fishery will be highly uncertain irrespective of the chosen model.

Projecting the effects of bag limit changes

The ODFW also uses daily bag-limits to regulate the pace of the marine recreational fishery off Oregon. There is an overall bag-limit for an angler's daily landed catch of rockfish, greenling and cabezon (the RGC limit), and there are separate daily bag-limits for lingcod and flatfish other than Pacific halibut. Given that Oregon's recreational fisheries are primarily constrained by the catch limits available for yelloweye rockfish and canary rockfish, the RGC bag-limit is the one most pertinent for current conditions. The RGC bag-limit was 10 fish-per-angler-day for all of 2004, 8 fish-per-angler-day at the start of 2005, 6 fish-per-angler-day at the starts of 2006-2009, and 7 fish-per-angler-day at the starts of 2010 and 2011. There were mid-season downward adjustments of

the bag-limit in 2005 and 2008, and an upward adjustment in 2009.

The ODFW report described an approach for predicting the effects of bag-limit changes that used a multiplier table derived from observed angler catches under different bag-limits. The approach produced some unusual predictions. The multiplier table for black rockfish, for example, predicted that dropping the bag-limit from 5 fish to 4 fish would produce an increase in the harvests of black rockfish. **A smoothing or interpolating model should be applied to the observed angler catch data to fill in cells in the multiplier table for which there were no data and thereby avoid illogical results.** However, predictions for cells that lie outside the range of the observed data are likely to be highly uncertain no matter what prediction method is used.

Predicting how anglers will react to a change in bag-limit is difficult. Past fishing seasons only provide observations for a limited number of particular bag-limit change combinations (e.g., from 10 fish to 8 fish, but not from 10 to 9, 10 to 7, or 10 to 6, etc.). Further, with an aggregate bag-limit such as the RGC group of species, the limit is most likely to affect fishing behavior associated with the most abundant species, for which the bag-limit is most likely to become binding. The aggregate limit will have only an indirect effect on rare species. Also, a decrease in a bag-limit may have little effect on fishery impacts of constraining species if anglers discard the fish that put them over the bag-limit or if they high-grade their retained catch. **The SSC-E/GF recommends that ODFW consider the effects of bag limit changes on discarded as well as retained catch.**

There are relatively few published works that address the issue of predicting the effects of changes in bag-limits. The workshop that explored Recreational CPUE Statistics, held in Santa Cruz during June 2004, included a presentation by Dr. Alec MacCall that reviewed several approaches to adjusting CPUE data for changes in bag-limits. Predictions outside of the range of the observed data are likely to be highly uncertain, however.

Overall conclusion of review

Of the three ODFW projection models reviewed during this meeting, the SSC-E/GF conclude that **the model for projecting harvest and discard mortality uses appropriate data and methods and provides a sound basis for making management decisions. The model for projecting harvest and discard mortality in the halibut fishery, with some small modifications as indicated above, also uses appropriate data and methods and provides a sound basis for management decisions.** Projecting the effects of bag limit changes, however, is a difficult task for which there is little theory and limited empirical data. **This projection model requires additional development and review.** Of the recommendations made above, the **highest priority is the development of variance estimates for harvest and discard mortalities**.

Issues for future reviews

Several questions arose during the meeting that could not be answered by anyone present. It would be beneficial if the questions below could be addressed during the process of documenting the Council's groundfish harvest specification process.

- What information (e.g., raw data, estimates of impacts and effort, or projected impacts for different scenarios) do the state fishery agencies provide to the IO-PAC model? What is the process used for moving the states' data into IO-PAC?

- How does RecFIN estimate the recreational fishery landings of groundfish for each of the states? Are RecFIN estimates of impacts and effort different from the data that underlie the

IO-PAC projections? The SSC-E/GF understands that ODFW staff had been unable to exactly reproduce the discard mortality that RecFIN had estimated for Oregon.

- How do methods used by the GMT for pre-season projections differ from the methods used for projections in the IO-PAC model?

ATTACHMENT 2
Statement of the SSC Economics and Groundfish Subcommittees
Washington and California Recreational Groundfish Models

The SSC Economics and Groundfish Subcommittees (SSC-E/GF)[2] met on September 15, 2012 in Boise, Idaho to review the Washington and California recreational groundfish models. These models are important inputs to the estimation of groundfish economic impacts, and their review is part of a continuing SSC review process that began with the Oregon recreational groundfish model in March 2012. There were three separate presentations at the review meeting. Dr. Ed Waters described how fishery projections from the state models feed into regional (community) economic impact assessments. Ms. Heather Reed of the Washington Department of Fish and Wildlife (WDFW) presented the Washington model. Mr. John Budrick of the California Department of Fish and Wildlife (CDFW) presented the California RecFISH model. The SSC-E/GF thanks all three presenters for providing review materials and for their clear and informative presentations.

Information and Process Used for Regional Impact Estimation

Dr. Ed Waters provided the SSC-E/GF with a presentation to clarify the information and process used to estimate regional economic impacts. These include the key inputs to the NWFSC's IO-PAC model, which is the model used in the Council process to estimate regional economic impacts. The IO-PAC model itself will be reviewed by the SSC at the April 2013 Council meeting.[3]

For recreational fisheries, the regional economic impacts resulting from alternative management actions are driven by changes in angler trips, which in turn drive changes in angler expenditures, which are then fed into the IO-PAC model. Thus, changes in IO-PAC outputs (income and employment) are only affected by alternatives that affect (or are modeled to affect) the number of angler trips (days fished).

Each state forecasts changes in angler trips by mode for each management alternative. Total trip expenditures are estimated by multiplying the angler trip forecast for each state and mode by an estimate of expenditures per angler trip for the same state and mode. The per-angler-trip estimates are based on an angler expenditure survey conducted by NMFS Headquarters, with the assistance of NMFS Science Centers, and license files provided by the states. The most recently available survey data are from 2008. The survey was updated in 2011, and thus more current expenditure data are expected to be available for the next Spex cycle (2015-16). One potential source of bias in the expenditure data is incomplete license files for some modes in some states. For example, charter operators in the state of Washington may issue licenses to charter anglers without recording the angler's address or other contact information. If anglers who purchase their licenses through the charter operator have different expenditure profiles (e.g., are more likely to reside out of state or to be less avid) than anglers who purchase licenses through the state's computerized system, their expenditure profile will be biased. The size and direction of any possible bias is not known.
Recommendations:

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[2] SSC participants included Dan Huppert, Todd Lee, André Punt, David Sampson, Cindy Thomson,

[3] The review of the IO-PAC Model is contained in Attachment 4.

- In order to facilitate future SSC reviews of recreational economic impacts, **all analyses and procedures need to be fully documented.** The documentation should be sufficient to allow a third party to replicate the analysis and results. **Such documentation should include a description of state effort projections and any modifications made to those projections before they are relayed to the NWFSC for input into the IO-PAC model.** This work would likely need to be coordinated by Council staff and should be completed in time to be included in the draft EIS for the 2015-16 Spex.

- Angler expenditure data collected during 2011 will be used to estimate regional economic impacts for the recreational fishery in the 2015-16 Spex process. **Documentation should include a description of potential sources of bias in the data and bias correction procedures – or an explanation why such procedures cannot be applied.**

<u>Washington Model</u>

The SSC-E/GF reviewed the WDFW report "Recreational Impact Projection Methods", dated August 2012. Ms. Heather Reed provided the SSC-E/GF with a presentation.

WDFW's Ocean Sampling Program (OSP) is the primary data input to Washington estimates of catch (retained and released) and effort. Sampling is stratified by port (primarily four ports) and day type (weekday and weekend), and post-stratified by state management area (Areas 1-4) and trip type. Yelloweye and canary rockfish are the most constraining stocks in the Washington recreational fishery. Catch of these species is managed through ACLs, depth restrictions and area closures. Regulations tend to be more restrictive in the North Coast area, due to higher yelloweye encounter rates. Regulations within each management area have been fairly stable in recent years.

Washington has relied on an *ad hoc* approach to estimate the effects of management measures on catch and effort, based on historical data. If the ACLs for overfished species do not change, it is assumed that catch will not change. This was the approach used in the 2013-14 Spex cycle. If the ACLs changes, or if depth or area restrictions change, as was the case during the 2011-12 Spex cycle, changes in catch, driven by changes in overfished species catch, are projected using historical data.

Effort projections are not linked to catch. Instead, changes in depth restrictions are assumed to affect the spatial distribution of effort but leave the overall level of effect unchanged. Thus, effort projections tend to be very similar from one year to the next.

The SSC-E/GF agrees that this approach is reasonable so long as fishery-related drivers of effort are relatively constant. These drivers include not just area/depth restrictions but also catch rates, bag limits, size distribution, catch composition, season length, and conditions in other (substitute or complimentary) fisheries. Economic impacts are also insensitive to fishery-related drivers and thus relatively invariant among the alternatives because the effort projections are the basis for estimating the regional economic impacts of management alternatives considered in the Spex cycle,

Recommendations:

- **The SSC-E/GF recommends a retrospective analysis of how effort projections based on this approach compare with post-season effort estimates for past Spex cycles to better understand the past performance of Washington's *ad hoc* approach to projecting effort. The SSC-E/GF would like to see the results of this retrospective analysis when it reviews the draft EIS for the 2015-16 Spex.**
- Even if the *ad hoc* approach has projected effort fairly well in recent Spex cycles (due to stable trends in fishery-related drivers), the approach may not work so well if area/depth restrictions and other drivers were to change more substantially in future years. **Over the longer term, it would be useful to develop models that predict the effect of fishery-related drivers on angler effort.** Such models would allow the Council to more accurately consider the economic impacts of management alternatives.

California RecFISH Model

The SSC-E/GF reviewed the "California Recreational Groundfish Model for 2013/14". Mr. John Budrick provided the Economic Subcommittee with a presentation.

The California RecFISH model is a catch-based model which is used to estimate catch (mortality) and effort for alternative management scenarios, or conversely determine what season and depth restrictions would be necessary to constrain mortality within management limits. The data for the model are primarily from the Marine Recreational Fishery Statistics Survey (1980-2003) and the California Recreational Fisheries Survey (CRFS) (2004-present), supplemented with some data from Oregon to provide sufficient data coverage for California's Northern management area.

The general catch projection framework involves determining what the baseline catch would have been without depth and time closures. Baseline catch is determined for each of the five management areas, four modes and six two-month waves on the basis of historical catch data collected in years prior to depth and time closures. The depth and time closures are then applied, which redistribute catch to open depths within a management area. Mortality is calculated using depth-dependent mortality rates.

The effects of effort shifts on mortality are calculated only when depth closures occur at 30 fathoms (fm) or less. Specifically, effort and mortality are assumed to increase in open shallower-water areas by 27.6% and 39.3% when depth restrictions occur inside 30 fm and 20 fm, respectively. This is intended to help predict potential effects of such closures on shallow water species. Effort also changes when the duration of the season changes, based on the assumption that effort that would have occurred in a management area during closed months disappears rather than shifting to an open month. Other factors that affect catch such as size and bag limits and area closures (e.g., Yelloweye Rockfish Conservation Area) may be taken into account, though not in a systematic manner.

Recommendations:

- The California RecFISH model includes a number of assumptions regarding how effort is influenced by regulations pertaining to season length, depth restrictions, and the like. These assumptions are important, as the effort projections are what drive the projections of regional economic impacts of management alternatives considered in the Spex cycle. The

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assumption that **certain types of depth closures cause effort to increase in shallower waters by specific percentages** originates with the contractor who developed the RecFISH model; the basis for this assumption is unclear. The assumption that **all of the effort that historically occurred in a given month would disappear if the fishery were closed in that month** is rather restrictive. **Both of these assumptions should be validated. This validation could be extended to more broadly examine how the proportion of effort varies by time (month) and depth, using recent historical data.**

- The SSC-E/GF appreciated the work that went into the retrospective analysis, which was very informative. However, to better understand how the model performs in relation to its use in IO-PAC, it would be necessary to **redefine the areas so that they correspond to the areas used in the Spex process and focus the analysis on effort rather than catch.** The SSC-E/GF also recommends other model diagnostics and reporting as follows:

    ➢ Since there are a large number of projections (bins) in the model, **a useful summary statistic is the number of correct predictions (with "correct" defined within a given bound).**

    ➢ **Since there are CVs associated with the data used in the model, these could be carried through the model to show measures of uncertainty in the final output.**

The SSC-E/GF would like to receive an analysis showing progress-to-date for implementing the above recommendations when it reviews the draft EIS for the 2015-16 Spex.

ATTACHMENT 3
Statement of the SSC Economics and Groundfish Subcommittees
Non-Nearshore and Nearshore Impact Projection Models

Members of the SSC Economics and Groundfish Subcommittees (SSC-E/GF)[4] met on March 8, 2013 in Tacoma, Washington to review the Non-Nearshore and Nearshore Impact Projection Models used by the Groundfish Management (GMT). Key participants at the meeting included Messrs. Corey Niles (WDFW), Dan Erickson (ODFW), and Bob Leos (CDFW). Additional substantive input was also provided by Ms. Marlene Bellman and Mr. Jason Jannot (NWFSC West Coast Groundfish Observer Program). The SSC appreciates the time spent by each of these individuals in preparing for and participating in these reviews.

Non-Nearshore Impact Projection Model

Mr. Corey Niles (WDFW) provided the SSC-E/GF with documentation regarding the Non-Nearshore Impact Projection Model (*Description of the Groundfish Management Team's Non-Nearshore Bycatch Projection Model, Prepared for the SSC Economics Subcommittee Review*) as well as a presentation summarizing highlights of the Model. The purpose of the model is to project bycatch under alternative Rockfish Conservation Area (RCA) configurations. The management use is to determine the smallest closed areas that are likely possible without exceeding the allocation of overfished species. Yelloweye is the most important overfished species addressed by the model, though projections for other species, primarily canary, are also calculated. The bycatch projections are for fixed gear vessels targeting sablefish (hook-and-line and pot) seaward of the RCA north of 36° N, though the model is primarily used to project changes in the RCA in four management areas north of 40° 10'. It covers both the limited entry and the open access fisheries. To date, the model has been successful at ensuring allocation of overfished species are not exceeded.

The model projections are currently based on observer data from 2002-11. The key mathematical calculation for the model projections is the ratio of observed catch of a particular bycatch species to the observed retained sablefish catch. Currently this ratio is calculated as a grand mean for the entire time span of the data (2002-11). The grand mean was used in the model initially because, when the model was first constructed, there was not an adequate sample of data without aggregating across all years. The practice of using the grand mean has continued.

Output from this model does not currently affect economic measures that are used as part of the biennial specification process, including IO-PAC regional economic impacts and vessel profitability. This is due to the fact that it is assumes the entire allocation of target species is caught. However, the SSC-E/GF notes that changes in the RCA could affect several variables that have a bearing on economic performance. These include changes in the ports of landing, fish quality or size, and the cost of fishing. A more complete analysis of these changes would better clarify the effects of changes in the RCA.

The SSC-E/GF has the following recommendations for investigating model performance and

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[4] SSC participants included Daniel Huppert, Todd Lee, André Punt, David Sampson and Cindy Thomson.

improving model reporting:

- **The SSC-E/GF recommends that further data analysis be conducted to determine if there is a trend in the data, and to also better understand the year-to-year variation in the data.** The outcome of this analysis should be used to determine which years of the data should be used and if data weighting should be used (e.g., weight more recent years higher that more distant years).
- **A measure of variability should be developed and included with the projection estimates.** This could be accomplished through a Monte Carlo analysis.
- The model uses retained sablefish catch. **Due to possible highgrading of the catch, this could be a source of error if retained catch has a different bycatch rate than discarded catch. This issue should be explored to the extent possible.**

Nearshore Impact Projection Model

Messrs. Dan Erickson (ODFW) and Bob Leos (CDFW) provided the SSC-E/GF with documentation regarding the Nearshore Impact Projection Model (*Groundfish Management Team's Commercial Nearshore Bycatch Projection Model, 02-13-2013*) as well as a presentation summarizing highlights of the model. The Nearshore Model is used to estimate bycatch, discard and discard mortality of overfished species that constrain fixed gear vessels operating shoreward of the non-trawl RCA in Oregon and California. Yellowtail and canary rockfish are the major constraining species for these vessels.

Bycatch estimates for overfished species are derived on the basis of landings of nearshore species in three area strata (from PacFIN). Landings in each area are allocated among three depth bins based on depth distribution data collected in the NWFSC's West Coast Groundfish Observer Program (WCGOP). Catch of overfished species as a proportion of total landings is estimated for each area and depth from available WCGOP data (currently 2003-2011) as a grand mean, that is by dividing the cumulative weight of each overfished species by the cumulative weight of retained nearshore species. Discard mortality by depth is estimated by applying recreational discard mortality rates to overfished species caught with 'recreation-like' gear (jig, rod-and-reel, pole) and a 100% mortality rate to catches made with 'non recreation-like' gear (i.e., all other commercial fixed gears). The proportion of 'recreation-like' versus 'non recreation-like' gear deployed at each depth is estimated for Oregon and California on the basis of 2004-2006 Oregon logbook data.

Due to the high degree of variability in nearshore species landings, multi-year averages are deemed to provide better estimates of future year's landings than landings in a single previous year. For the 2013-14 Spex, Oregon and California nearshore landings were projected by dropping the year with the lowest landings during 2008-2011 for each state and calculating an average for the remaining three years. This average was then adjusted upward as warranted to reflect fishing conditions expected for 2013-14 (e.g., if the 2013-14 annual catch limit for a particular species was higher than what was experienced during 2008-2011). This exercise was intended to help ensure that overfished species limits are not exceeded.

Comparison of Nearshore Model projections versus WCGOP estimates of yelloweye and canary rockfish mortalities (Table 2 of the Nearshore Model documentation) reveals an unusually large discrepancy for canary in 2011 (3.2 mt based on the Nearshore Model, 15.5 mt based on the WCGOP). However, the ability of CDFW to determine the cause of such discrepancy is limited by their lack of access to WCGOP data.

The SSC-E/GF has the following comments and recommendations regarding the Nearshore Model:

- Coverage of nearshore vessels in the WCGOP is hampered by factors such as the inability of some vessels to carry an observer. **The SSC E/GF recommends that the GMT consider ways of evaluating the representativeness of nearshore vessels included in the WCGOP – for instance, by comparing the species composition of their landed catch with species comps for non-WCGOP vessels.**
- Using a grand mean to estimate overfished species catch ratios implicitly gives greater weight to years with more WCGOP samples, and is not helpful for evaluating trends or determining what drives model outcomes. A better way to evaluate trends would be to take running averages of annual ratios. However, due to small sample sizes, outliers could have an undue influence on such calculations and also make interpretation of trends difficult.
- While the Non-Nearshore Model bases overfished species catch estimates on landings of a single and highly desired species (sablefish), the Nearshore Model bases its overfished species catch estimates on landings of multiple nearshore target species. Thus, interpreting changes in overfished species catch ratios is complicated by the fact that the denominator includes a mix of species that are differentially priced in the market and whose availability to the fishery is affected by depth restrictions that change over time.
- Small samples of nearshore vessels in the WCGOP have hampered the GMT's ability to evaluate and improve the performance of the Nearshore Model. Lack of access to WCGOP data is also an issue for CDFW.
- Increasing the number of area strata may allow management to be more finely tuned in terms of protecting overfished stocks while reducing negative community effects. However, finer stratification may also suggest that the model can do more than it actually can, given the sample size constraints.
- Relying on 2004-2006 Oregon gear compositions by depth to characterize the California fishery may be problematic, due to the interaction between gear type and depth-dependent mortality. However, CDFW lacks the data needed to make similar calculations of its own.
- The practice of deleting the lowest-of-four recent landing years in projecting future nearshore landings is an indirect way of demonstrating risk tolerance. **A more transparent way to do this would be to identify explicit buffers (e.g., one standard deviation) that are sufficiently wide to avoid exceeding allocations for overfished species.**
- Given the high degree of uncertainty in the Nearshore Model, it is important to explicitly address how that uncertainty affects the overfished species catch estimates. The GMT has devised a method of calculating coefficients of variation that are being reviewed by the WCGOP. **The SSC-E/GF welcomes this development and would like to review the method as well.**

ATTACHMENT 4
Statement of the SSC Economics and Groundfish Subcommittees
IO-PAC Model and the Economic Data Collection Program

Members of the SSC Economics and Groundfish Subcommittees (SSC-E/GF)[5] met with Northwest Fisheries Science Center (NWFSC) economists on April 7, 2013 in Portland, Oregon to review the IO-PAC model and the Economic Data Collection (EDC) Program.

IO-PAC Model

The IO-PAC model is used in the groundfish Spex process to evaluate the regional economic impacts of management alternatives. In October 2009, the NWFSC sponsored a CIE review of an earlier version of IO-PAC, which the SSC also reviewed in November 2009. Subsequent changes to the model have been substantial enough to warrant a new review at this time. Dr. Jerry Leonard (NWFSC) provided the SSC-E/GF with documentation and a presentation of the updated IO-PAC model.

A number of changes to IO-PAC have occurred since the SSC's last review. These changes include addition of a recreational component, data updates, addition of more commercial fisheries (at-sea groundfish, crab, salmon, and shrimp) and a processing sector, major changes in model construction, and some changes in model assumptions. **The SSC-E/GF supports these changes as improvements to the model and endorses use of the model for management.**

SSC-E/GF review focused on the accuracy of specific assumptions in IO-PAC, the sensitivity of model results to those assumptions, and which assumptions are likely to have the greatest influence on model outputs.

The SSC-E/GF makes the following recommendations regarding documentation and application of the IO-PAC Model:

- IO-PAC can be used to estimate income and employment impacts at port group, State and coastwide levels. **Impacts estimated for each port group within a state do not add up to state-level impacts, nor do state-level impacts add up to coastwide impacts.** This is a logical function of how IO-PAC (as well as other regional impact models) are structured. **This should be clearly explained whenever IO-PAC results are provided.**
- The geographical distribution of purchases by processors and the distribution of sales are difficult to track. **The SSC-E/GF recommends that the IO-PAC authors conduct a sensitivity analysis showing which assumptions regarding the underlying distribution of fishing and processing costs have the greatest influence on the economic impact estimates.**
- **Whenever major changes are made to the IO-PAC model, the SSC recommends that the authors demonstrate the effects of these changes by running the same fishery change through the older and newer versions of the model.**

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[5] SSC participants included Martin Dorn, Daniel Huppert, Todd Lee, André Punt, David Sampson and Cindy Thomson.

- IO-PAC (like other regional impact models) is based on assumptions such as constant returns to scale, no input substitution, no supply constraints, and no price or wage adjustments. Thus employment and income impacts produced by IO-PAC should be interpreted as a short-term response rather than a long-term adjustment to infusions of money into the economy. **This should be clearly explained whenever IO-PAC results are provided.**
- IO-PAC is sensitive to assumptions regarding fishing behavior (e.g., whether regulatory restrictions cause a decline in angler spending or a diversion of spending to other activities, whether spending on alternative activities occurs inside versus outside the local economy). **The IO-PAC analysis used in the 2015-16 Spex should include documentation and justification of the behavioral assumptions underlying the model.**

Economic Data Collection Program

The SSC-E/GF received presentations from Dr. Todd Lee and Ms. Erin Steiner (NWFSC) on the Economic Data Collection (EDC) Program, and discussed with them the progress the program has made to date. The EDC Program was established as part of the Council's trawl catch shares program, specifically to monitor the economic effects of the catch share program. The EDC Program has been collecting information from four classes of participants in the catch share program: (1) catcher vessels, (2) motherships, (3) catcher-processor vessels, and (4) first receivers and shore-based processors. All participants must submit economic information as requested by the EDC Program as a condition of the catch shares program. The EDC information base includes annual economic data submissions collected using survey forms, with follow-up interviews to resolve questions regarding the data. The EDC Program is a significant advance in scope and quality over previous activities to gather economic data, which were conducted using voluntary surveys of costs and earnings. The SSC-E/GF commends the hard work and diligence of the EDC staff members for developing this ambitious program and its impressive system for data quality assurance and quality control.

The SSC-E/GF reviewed five EDC draft reports: an *Administration and Operations Report*; a *Catcher-Vessel Report*; a *Mothership Report*; a *Catcher-Processor Report*; and a *First Receiver and Shorebased Processor Report*. The EDC Program will regularly publish similar reports as additional information accumulates. The types of summary information and analyses provided in the EDC reports, which have never previously been available, should be very useful in the Council's biennial process for developing groundfish management specifications.

The SSC-E/GF offers the following comments, suggestions, and recommendation to further improve the quality of the data that the EDC Program collects and the usefulness of the reports it produces.

Data Quality Assurance / Quality Control

- In general it is difficult to verify the accuracy of self-reported information, whether the data are collected by in-person interviews or by means of an on-line survey. One mechanism for verifying self-reported data is to collect information that can be cross-checked against other sources. For example, self-reported information on annual landings and value of groundfish could be compared to fish ticket information, and discrepancies could lead to follow-up interviews to resolve potential problems. The EDC program

currently uses a cross-check approach for data from motherships, first receivers and shore-based processors. **The SSC-E/GF recommends that the EDC Program implement some similar validation approach for the catcher vessels and catcher-processors.**

- **Ratios of different categories of costs could be used to flag potential outliers or misreported data in the collected information.**

Categories of Fisheries

- Because most fishing activities catch multiple species of fish, there is no single best approach for tabulating economic information by "fishery". The EDC reports summarize the available data for a relatively small number of different fisheries (e.g., at-sea whiting, shoreside whiting, DTS trawl, shrimp, crab, Alaska).

- It seems likely that many potential users of the EDC information would have their own special fisheries for which they would like summarized data. A flexible web-based system for querying the database would be advantageous to such users, but the software would need to be carefully constructed to protect the confidentiality of the information. **The SSC encourages the EDC Program to work towards providing the information as flexibly as possible.**

Disaggregating Costs to Fisheries

- The information on annual costs, which for catcher vessels is reported at the level of 23 expense categories (e.g., fuel, food, ice, freight, observer costs), cannot generally be assigned to a single type of fishing activity, such as fishing for canary rockfish. However, the anticipated future catches of limiting species such as canary rockfish provide the framework for analyzing the potential impacts of management alternatives. Hence, cost disaggregation is an important technical aspect of the biennial specifications analysis that underpins the Council's decisions for groundfish management. Cost disaggregation is also fundamental in calculations of fishery profitability (profits = net revenues = landed value minus costs).

- The EDC Program's cost accounting system does not assign to West Coast fisheries any of a vessel's transit costs for those vessels that operate in both West Coast and Alaskan fisheries. Nor does the program account for administrative costs (e.g., finance costs, taxes, legal fees). Thus estimates of net revenue provided by the EDC Program are over-estimates, since the only costs collected are those directly related to the operation of the vessels.

- The EDC Program staff explored four methods for developing estimates of the disaggregated costs of the fishing operations of catcher vessels, based on: (1) days-at-sea (trip-level assignment to fishery based on the dominant landed value); (2) ex-vessel landed value; (3) landings (weight); and (4) a mixed method that uses: (a) ex-vessel revenues to disaggregate one set of cost categories (e.g., wages for captain and crew); (b) retained catch weight to disaggregate a second set of cost categories (e.g., offload fees, trucking expenses); and (c) days-at-sea to disaggregate a third set of cost categories (e.g., food, ice, insurance). When applied to three fisheries (at-sea Pacific whiting, shoreside Pacific whiting, and DTS trawl), three of the four methods produced very similar estimates for fixed costs, variable costs, and net revenue. The days-at-sea approach produced somewhat divergent results.

- Cost disaggregation for the other classes of catch share participants (catcher-processors, motherships, and first receivers and shorebased processors) requires slightly different methods because of the types of information that are available. The weight of the fish caught or processed is the only data type that is available across all four classes of catch share participants.

- The EDC Program currently treats first receivers and shorebased processors as a single class of participants, but it seems likely that first receivers versus shorebased processors could have quite different economic impacts, especially at a regional scale. **The SSC-E/GF recommends that analyses of costs and net revenues of first receivers and shorebased processors be conducted separately to the extent practicable.**

- The SSC-E/GF recognizes the technical challenges associated with estimating disaggregated costs and endorses the approaches being considered by the EDC Program. Disaggregating processing costs by fishery or by individual species is particularly challenging. In addition to the methods explored to date by the EDC Program, there may be benefits to developing statistical models to estimate some cost categories, especially when information becomes available for additional years. **The SSC-E/GF recommends that analyses of costs and net revenue include some measure of the sensitivity of the results to the methodology used for cost-disaggregation** because there is unlikely to ever be a clear-cut "best" approach.

Reporting

- The tables in the draft reports that summarized the survey data did not include any measures of variability. **The SSC-E/GF recommends that future reports include some simple metric of dispersion, such as a code depicting the magnitude of the coefficient of variation.**

8. Adopt Preliminary Stock Complex Aggregations

Mr. John DeVore gave an overview of the preliminary alternative stock complexes and the basis for those alternatives to the Scientific and Statistical Committee (SSC), and Mr. Dan Erickson summarized the Groundfish Management Team (GMT) Report on this matter. The document has been modified since the April 2013 meeting by adding alternatives, adding figures highlighting species for which catches exceed their contribution to the overfishing limit (OFL), and by adding figures to summarize how species overlap in fishery catches.

In general, the alternatives are sufficiently well developed for public review. However, the SSC recommends removing the version of alternative 2 for the proposed Roundfish complex in which California scorpionfish is treated as an indicator stock because this species does not overlap greatly with the remaining members of the proposed complex.

The GMT is making progress towards developing effective metrics to quantify overlap among species. These metrics should help to select among the alternatives. The SSC recommends that plots and tables be developed based on catch or catch per unit of effort (CPUE) in addition to probability of occurrence. The SSC provided the GMT with an alternative approach for constructing tables quantifying overlap, which compares the results to a random distribution. A cluster analysis approach (Figures 4 and 5 of the GMT Report) is also presented as a way to

quantify overlap. However, this approach can lead to clustering by rarity regardless of co-occurrence. Consequently, the SSC recommends against this approach. The SSC recommends that the GMT conduct its analyses using catch-based (e.g., observer) data because these data provide the best appraisal of co-occurrence in the fishery and likely fishery impacts and because the trawl surveys are limited temporally. The SSC recommends that separate tables and figures be produced summarizing overlap north and south of 40°10' N. lat.

The SSC reiterates its recommendation from the April meeting that the metrics used to evaluate current stock complexes be refined to focus on the ratio of total cumulative catch to total cumulative component OFL and the mean difference between total catch and total component OFL.

There are some species which are found primarily north of 40°10' N. lat., but are caught in very small quantities south of 40°10' N. lat. and vice versa. The SSC recommends that such components should not be designated as ecosystem component (EC) species because they do not satisfy the requirements for EC species as the catches are landed. If a catch has exceeded its associated component OFL, the fraction of the coastwide species OFL assigned as component OFL in the complex should be taken into account before triggering a management response.

There needs to be a way to determine the status of stocks within complexes, or complexes as a whole, relative to being in an overfished state. The SSC identified three approaches: (a) using stock assessments for indicator stocks which are members of the complexes, (b) using the results of data-moderate assessments, and (c) using stock assessments for indicator stocks which are not members of the complexes but have similar vulnerability and co-occur with the species in the complex. Adding a stock to a complex simply to have an indicator stock could lead to the indicator stock becoming an inflator stock.

Notes
Suggestion for modification to the Tables 1 and 2 in Agenda Item F.8.b GMT Report.
1. *Add an extra row and column which lists the proportion of records by species.*
2. *Divide the values in the table (column i and row j) by the product of the fractions for species i and j.*
Apply a chi-square (or similar) test to assess whether overlap is larger or smaller than expected at random. It will be necessary to use a differ test if the overlap tables are based on catch or CPUE.

I. Coastal Pelagic Species Management

2. Pacific Mackerel Management Status and Management Measures

The Scientific and Statistical Committee (SSC) discussed the recent analysis of Pacific mackerel status with Mr. Kerry Griffin. The projection provides the best estimate of current biomass and hence the overfishing limit (OFL). However, it is based on an assessment conducted two years ago. Consequently, the recruitments are not individually estimated for several recent years but are instead taken directly from the estimated stock-recruitment relationship. This, along with the concerns raised about the stock assessment during the most recent Stock Assessment Review (STAR) Panel, suggests that scientific uncertainty is greater than the default sigma of 0.36 would

suggest. The SSC consequently recommends setting the sigma for computing the buffer between the OFL and acceptable biological catch (ABC) to 0.72 which is the sigma value for category 2 groundfish stocks. These are groundfish stocks for which recruitments are not estimated or the assessment is not considered as reliable as category 1 stock assessments. This change in sigma is included in Table 1 below.

Table 1. OFL ABC range, and harvest guideline (HG)

Biomass	272,932
OFL=Biomass*Fmsy*Distribution	57,316
$ABC_{0.45}$ = Biomass*buffer$_{0.45}$*Fmsy*Distribution	52,358
$ABC_{0.40}$ = Biomass*buffer$_{0.40}$*Fmsy*Distribution	47,759
$ABC_{0.30}$ = Biomass*buffer$_{0.30}$*Fmsy*Distribution	39,292
$ABC_{0.20}$ = Biomass*buffer$_{0.20}$*Fmsy*Distribution	31,269
HG = (Biomass - Cutoff) * Fraction * Distribution	53,494

The SSC recommends that the Terms of Reference for stock assessments be updated to include stock assessment categories for Coastal Pelagic Species (CPS) stocks, and that CPS stock assessments are formally assigned to a category in the future.

3. Sardine Fishery Start Date and Management Schedule
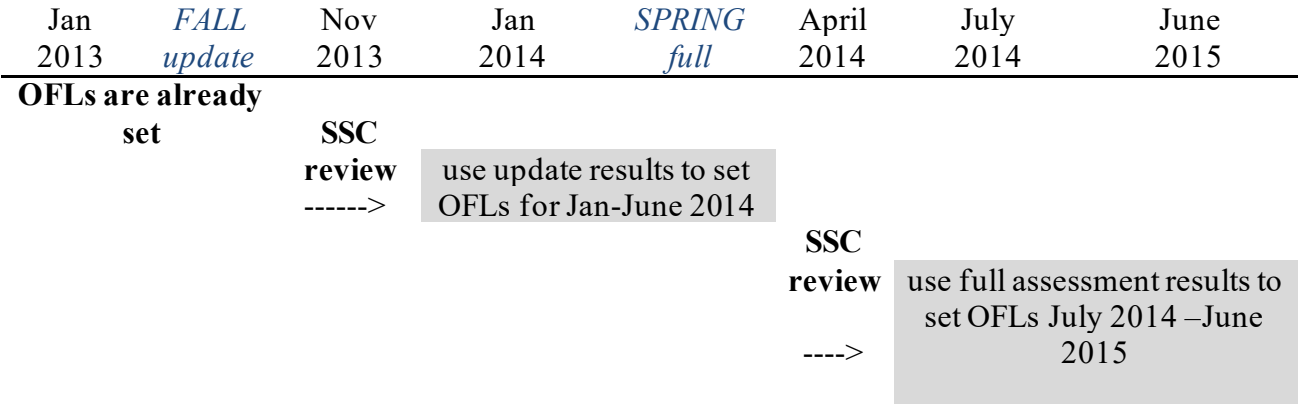
Sardine Fishery Start Date

The Scientific and Statistical Committee (SSC) continues to support a shift in the sardine fishery start date from January 1 to July 1 to allow more time for modeling and sensitivity analyses to estimate the stock size of Pacific sardine.

In transitioning to a new start date, the SSC supports the process (illustration provided below) to set catch specifications for the 2014 season that were outlined in the Coastal Pelagic Species Management Team (CPSMT) April 2013 statement as follows:

- Forego a full-scale update review by the SSC-Coastal Pelagic Species (CPS) Subcommittee in fall, 2013.
- Use the current assessment model to produce a simple catch-only projection update that would provide the basis for the first allocation period of 2014 (January 1 to June 30). The Stock Assessment Team (STAT) provides the update in an executive summary format.
- At the November 2013 Council meeting, the SSC reviews the abbreviated update, and the Council adopts management measures for January - June of 2014.
- In February 2014, conduct a full stock assessment review for the following July 1 start date. SSC reviews in April.
- In April 2014, Council adopts the full stock assessment and management measures for July 1, 2014 - June 30, 2015.

The recommendation to the STAT was to update the current assessment model with recent catches and forecast the biomass for 2014, using the biomass estimate at the beginning of the fishing season

to set the overfishing limit (OFL) for the January through June, 2014 time period. Forecasting should account for the uncertainty in recruitment rather than assuming that recruitment comes off the stock recruitment relationship.

Jan 2013	*FALL update*	Nov 2013	Jan 2014	*SPRING full*	April 2014	July 2014	June 2015
OFLs are already set		**SSC review ------>**	use update results to set OFLs for Jan-June 2014		**SSC review ---->**	use full assessment results to set OFLs July 2014 –June 2015	

Proposed Methodology Reviews

The SSC discussed the status of planning a proposed methodology review meeting to cover: 1) the Southwest Fisheries Science Center (SWFSC) Acoustic-Trawl (ATM) survey, and 2) the northwest sardine survey (NWSS). At the Council's request, other surveys targeting sardine could be reviewed at the proposed survey joint methodology review meeting.

The chair of the SSC-CPS Subcommittee has sent each of the lead scientists of the ATM and NWSS surveys a list of potential items to be discussed in a methodology review. In order to facilitate planning of the proposed methodology review, the SSC requests a formal, point by point response to these, in time for review at the September SSC meeting.

4. Adjustments to Sardine Harvest Parameters

The Scientific and Statistical Committee (SSC) reviewed the Coastal Pelagics Subcommittee report on a joint meeting with the Coastal Pelagic Species Management Team (CPSMT) to evaluate parameters in the harvest control rules (HCR) for Pacific sardine, held in La Jolla, May 21-23, 2013. Dr. Andre Punt gave a summary of the results presented at the meeting and subsequent changes to the report he co-authored with Felipe Hurtado-Ferrero (Agenda Item I.4.b, Attachment 1). The primary purpose of the meeting was to review new results related to environmental correlates of Pacific sardine recruitment and evaluation of parameter value choices in the overfishing limit (OFL) and harvest guideline (HG) control rules for Pacific sardine. These were largely based on requests made by the SSC, CPSMT, CPS Advisory Subpanel and Council at the April 2013 Council meeting, following the report from the Pacific Sardine Harvest Parameters Workshop held in February, 2013. In addition to members of the CPS Subcommittee, CPSMT, and CPS Stock Assessment Team, the meeting was joined by Dr. Richard Parrish, who was on the original working group that developed recommendations for Amendment 8 of the CPS Fishery Management Plan.

Three potential environmental co-variates of sardine productivity were considered: the Scripps

Pier temperature index (SIO), the California Cooperative Oceanic Fisheries Investigations (CalCOFI) temperature index for the California Current, and the Extended Reconstructed Sea Surface Temperature (ERSST) for the Baja, California region. The SIO index has been used in harvest control rules since 1998, but has been brought into question, as the index shows high temperatures since the mid-1990s deviating from other indices of conditions in the California Current. The ERSST index scaled the population to a higher average biomass in simulations, but the relative performance of control rule variants was robust to uncertainty in which temperature index (CalCOFI or ERSST) is used. The CalCOFI temperature index gave superior fits to spawner-per recruit estimates from the assessment.

If the CalCOFI index had been used for assessment and HGs in the past, the expected HG would have been lower in some years if all other parameters in the HG were derived with the current harvest control rules (Table 2 of Agenda Item I.4.b). However, interpretation of the effects of changing the temperature index is complicated because the CalCOFI data are not available for all years, and the original SIO relationship did not include recent years of temperature data and recruitment. Following a request made at the workshop, the SIO index relationship to the MSY harvest rate (E_{MSY}) was re-calculated, using the same data used to develop the CalCOFI index relationship (Figure 3 in Agenda Item I.4.b). Based on recent years, the stock has been less productive than estimated when the original FRACTION rules were developed. It is possible to conduct a retrospective analysis to determine what current stock status might be if lower HGs had been recommended; however, assumptions about recruitment deviations and catch levels each year would have to be made, potentially reducing the utility of such an analysis.

While not an ecosystem-level Management Strategy Evaluation (MSE), the simulations provide a useful tool for exploring the effects of different HG variants and the sensitivity of a wide range of model outputs to changes in biological and environmental conditions. Requests from the April Council meeting were completed and presented. The technical approach is sound and is a good way to compare alternative scenarios across potential HG control rules, including sensitivity analysis to better understand the robustness of the current HG (modified with the CalCOFI temperature index to determine FRACTION) to uncertainty in biological and management processes. Several model outputs are provided; these "performance measures" relate to several potential management objectives. The presentation of trade-offs between catch and stock biomass and variability in these outputs is valuable for discussion of management strategies and future analyses of alternative harvest control rules. These should be compared qualitatively, as there is still considerable uncertainty in model parameters and assumptions. Also, the work presented is a single species MSE that does not explicitly cover ecosystem issues, such as spatial or forage considerations for CUTOFF.

The SSC intends to adopt the CalCOFI temperature index as the environmental co-variate used to determine the sardine OFL, with an upper limit of 26 percent on the exploitation rate and using the 3-year average sea surface temperature. It would be logical to also apply this index to the HG if a temperature-based FRACTION parameter is included in the control rule.

The SSC recommends the following:
   (1) Estimated fish biomass at the start of the fishing season should be used in setting harvest quotas. The new model runs have been matched to assessment year and fishing season.
   (2) The DISTRIBUTION parameter (percent of stock biomass in US waters) was not evaluated in the analysis of HG variants and should be reviewed. Sensitivity analyses suggest that

the proportions of and fishing mortality rates experienced by the stock in Mexico and Canada have a large effect on model results.

(3) HGs should continue to include CUTOFF and MAXCATCH parameters, as these rules repeatedly improved average catch and reduced variance in catch in the simulations.

(4) Continued efforts to develop ecosystem-based levels of CUTOFF should be supported for sardine and other CPS.

SSC Subcommittee Assignments, June 2013

Salmon	Groundfish	Coastal Pelagic Species	Highly Migratory Species	Economic	Ecosystem-Based Management
Robert Conrad	**Vlada Gertseva**	**André Punt**	**Selina Heppell**	**Cindy Thomson**	**Martin Dorn**
Owen Hamel	Martin Dorn	Owen Hamel	Robert Conrad	Vlada Gertseva	Vlada Gertseva
Meisha Key	Owen Hamel	Selina Heppell	André Punt	Dan Huppert	Selina Heppell
Pete Lawson	Tom Jagielo	Dan Huppert		Todd Lee	Pete Lawson
Charlie Petrosky	Meisha Key	Tom Jagielo		André Punt	Todd Lee
Will Satterthwaite	André Punt	Meisha Key		David Sampson	André Punt
	David Sampson				Will Satterthwaite
	Tien-Shui Tsou				Cindy Thomson
					Tien-Shui Tsou

Bold denotes Subcommittee Chairperson

DRAFT Tentative Council and SSC Meeting Dates for 2013

Council Meeting Dates	Location	Likely SSC Mtg Dates	Major Topics
March 6-11, 2013 Advisory Bodies may begin Tue, March 5 Council Session begins Wed, March 6	Hotel Murano 1320 Broadway Plaza Tacoma, WA 98402 Phone: 1-888-862-3255	Two Day SSC Session **Wed, March 6 – Thur, March 7**	Final CPS EFP Groundfish Am24 FPA Policy for Data-Mod. Stock SDC Salmon Review/Pre I 5 yr Research Plan
April 6-11, 2013 Advisory Bodies may begin Fri, Apr 5 Council Session begins Sat, Apr 6	Sheraton Portland Airport Hotel 8235 NE Airport Way Portland, OR 97220 Phone: 503-281-2500	Two Day SSC Session **Fri, April 5 – Sat, April 6**	Rockfish Barotrauma Mitigation Groundfish EFH Salmon EFH FPA

June 20-25, 2013
Advisory Bodies may begin Wed, June 19
Council Session begins Thurs, June 20
	Hyatt Regency Orange County
	11999 Harbor Blvd.
	Garden Grove, CA 92840
	Phone: 714-750-1234
		Two Day SSC Session
		Wed, June 20 – Thurs, June21
			Mackerel HG & Mgt. Measures
			Review 2013 GF Stock Assess.
			Final Groundfish Stock
			   Complexes
			Final 2015 and Beyond Spex
			   Process
			Unmanaged Forage Fish
			   Protection

September 12-17, 2013 Advisory Bodies may begin Wed, Sept 11 Council Session begins Thurs, Sept 12	The Riverside Hotel – Boise 2900 Chinden Blvd Boise, ID 83714 Phone: 208-343-1871	Two Day SSC Session **Wed, Sept 11 – Thurs Sept 12**	Review 2013 GF Stock Assess. Plan Science Improvements Salmon Meth. Topic Select Halibut Bycatch Estimate
November 1-6, 2013 Advisory Bodies may begin Thurs, Oct 31 Council Session begins Fri, Nov 1	Hilton Orange County/Costa Mesa 3050 Bristol Street Costa Mesa, CA 92626 Phone: 714-540-7000	Two Day SSC Session **Thurs, Oct 31 – Fri, Nov 1**	Review 2013 GF Stock Assess. (if needed) & Reb. Analyses Salmon Methodology Rev Pacific Sardine Assess. Fishery Ecosystem Plan

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

	Proposed Workshops and SSC Subcommittee Meetings for 2013 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	Pacific Sardine Harvest Parameters Workshop	Feb 5-8	Council La Jolla	CPS Subcm	?	CPSMT/ CPSAS	Griffin
2	Review of Methods to Develop Groundfish Abundance Indices for Data-Moderate Assessments	March 5	Council Tacoma	GF Subcm	None	GMT GAP	DeVore
3	Groundfish Nearshore and Non-Nearshore Model Reviews	March 8	Council Tacoma	GF/Econ Subcms	None	GMT Reps	DeVore, Dahl
4	IOPAC and EDM Model Reviews	April 8	Council Portland	Econ Subcm	None	?	DeVore, Dahl
5	Data-Moderate STAR Panel	April 22-26	Council Santa Cruz	Dorn, Punt, Heppell	CIE: TBD	GMT GAP	DeVore
6	Petrale/Darkblotched STAR Panel	May 13-17	Council Seattle	Tsou	2 CIE & 1 additional reviewer	GMT GAP	DeVore
7	Groundfish Bocaccio Update and Catch Reports Review	June 18	Council Garden Grove	GF Subcm	None	GMT GAP	DeVore

	Proposed Workshops and SSC Subcommittee Meetings for 2013 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**
8	Integrated Ecosystem Assessment – Annual Report and App. to Stock Assessments	June 2013?	NWFSC/ SWFSC TBD	EBM Subcm	?	EPDT EAS	Burner
9	Rougheye/Aurora STAR Panel	July 8-12	Council Seattle	Sampson	2 CIE & John Field	GMT GAP	DeVore
10	Thornyheads STAR Panel	July 22-26	Council Seattle	TBD	2 CIE & 1 additional reviewer	GMT GAP	DeVore
11	Cowcod/Sanddabs STAR Panel	August 5-9	Council Santa Cruz	Gertseva	2 CIE & 1 additional reviewer	GMT GAP	DeVore
12	Mop-up STAR Panel	Sept 23-27	Council ?	GF Subcm	None	GMT GAP	DeVore
13	Salmon Methodology Review	Oct	Council	Salmon Subcm	None	STT SAS	Burner
14	Pacific Sardine Update Review	Oct	Council	CPS Subcm	None	CPSMT CPSAS	Griffin

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	Workshop/Meeting	**Potential Dates**	**Sponsor/ Tentative Location**	**SSC Reps.**	**Additional Reviewers**	**AB Reps.**	**Council Staff**
15	Reference Points (Bzero) Workshop II	?	Council Portland	GF Subcm	CIE/External 1-3:	GMT GAP	DeVore
16	Groundfish Historic Catch Reconstructions	?	Council Meetings - Wrkshp	2-3 TBD	None	GMT GAP	DeVore
17	Assessing Socioeconomic Impacts in Ecosystem-Based Fisheries Management	?	NWFSC Seattle?	Econ and EBM Subcms?	?	EPDT IEA	Burner
18	Transboundary Groundfish Stocks	?	Council	2 TBD?	?	GMT GAP	DeVore