Center for Independent Expert (CIE) review report on the 2013 STAR Cowcod and Pacific Sanddab Stock Assessments

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Prepared for

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Executive Summary

The 2013 assessments of stocks of cowcod (*Sebastes levis*) cowcod in the Southern California Bight and Pacific sanddab (*Citharichthys sordidus*) along the US Pacific Coast were reviewed by a Stock Assessment Review (STAR) Panel. The STAR Panel met at the Southwest Fisheries Science Center (SWFSC), Santa Cruz, CA, from Aug 5 - 9, 2013. The assessments of the stock done by the stock assessment team (STAT) (comprised of stock assessment scientists from the Southwest Fisheries Science Center) were presented to the STAR Panel. The validity of the data, biological and geographical characteristics, assessment procedures and historical assessments, and results were discussed. The Panel operated under the U.S. Pacific Fishery Management Council's Terms of Reference (ToR) for the Groundfish and Coastal Pelagic Species Stock Assessment and Review Process for 2013-2014 (PFMC 2012).

The review aimed to evaluate the newly developed stock assessment models illustrated in the draft reports to ensure that the Pacific Fishery Management Council (PFMC) bases its decisions on the best available information when managing these species, including providing a scientific basis for setting OFLs and ABCs as mandated by the Magnuson-Stevens Act. The SWFSC provided all the necessary logistic support, background information, documents, and further data and model exploration that were requested by the review panel. The STAR Panel chair, Dr. Tom Jagielo, assigned reporting duties to each of the STAR panel members before the meeting. He then led the STAR Panel report, and communicated the draft report with the STAT panel members, the STAR Advisory Panel, and other attendees before the end of the meeting to avoid possible confusion. The STAR Panel Report was then finalized after the meeting. CIE members then prepared their individual reviews.

The last stock assessment for cowcod was done in 2009 (Dick et al. 2009). A benchmark assessment for this species with several sensitivity runs were presented by Drs. E.J. Dick and Alec MacCall. The draft stock assessment was well prepared with a short review on historical stock assessments and changes in the newly developed stock assessment. The STAT team stated that there was not enough length/age composition data to inform cohort signals, so instead of continuing using an age-structured production model implemented in SS3, the STAT team moved to a new modelling platform: XDB-SRA. The new stock assessment presented is a production model fitted to age aggregated abundance index data but the productivity function is based on McAllister et al. (2000), comparing with commonly used logistic or Pella-Tomlinson (Dick et al. 2011). The new benchmark assessment was discussed with three runs from requests by the STAR panel. The recommended base model was further modified by excluding the CPFV index. I put details and rationales on the suggestions in the TORs.

The STAR panel requested a list of questions to explore the influence and rationale of using different abundance indices, especially the CPFV and CalCOFI indices, different priors, and different A values (maturity-at-age used as the time lag in the XDB-SRA). Quite some time was spent to explore the potential hyperstability of CPFV index. The cowcod assessment was considered to be based on the best available data, and

constitutes the best available information on this species along the U.S. West Coast. Some key recommendations for cowcod assessment are summarized below:

- Continue the exploration of the CPFV data to investigate its potential to be used as a relative abundance to calibrate the population abundance.
- Time lag A (Age-at-50%maturity and Age-at-50%selectivity) used in the model influences the model behaviour largely. Future assessments should consider incorporating the uncertainty associated with A.
- Continue the effort on the historical catch reconstruction analysis.
- Continue the effort on life history studies and length composition data collection.
- More detailed descriptions of model equations, symbols used in the equations, submodels used in different scenarios, and the priors used should be provided in future reports. They should help understand the data used, model structure, and uncertainty considered in a much better way.

A benchmark assessment with several sensitivity runs were conducted and presented for Pacific sanddab by the STAT team (Drs. Xi He, Donald Pearson, John C. Field, Lyndsey Lefebvre, and Meisha Key) on Aug 6. Pacific sanddab stock assessment provided for this review is the first formal stock assessment. The newly provided benchmark assessment in the draft report was an age structured stock assessment model implemented in Stock Synthesis platform version 3.24o. The model included four fisheries fleets. The types of observations used to calibrate the population dynamics included four abundance indices, six length frequencies, two age frequencies, one conditional age-at-length, and three types of discard rates. The model estimated sex-specific growth parameters, sex-specific asymptotic selectivities for all these surveys and fisheries, catchability, retention function, stock-recruit steepness, natural mortality and virtual recruitment R_0. The models included in the draft stock assessment report and those done during the review were solved using the Stock Synthesis platform version 3.24o.

The STAR panel discussion and requests focused on better understanding the data, the influence of the selectivity curves, catchability and natural mortality, and retention changes on the stock assessment results. There was a significant difference (around 20 times) between the survey based biomass estimate and the estimate from the proposed stock assessment model. Both the STAT and STAR panel members agreed that tremendous work was done in the draft report and during the review week, and these model runs and diagnostics helped to facilitate the conclusion of the population status, but none of the proposed model runs are ready for stock assessment.

The Pacific sanddab assessment done by STAT was considered to be the best scientific information and adequate for evaluating stock status but not adequate to estimate population size or OFL, etc. Some key recommendations for Pacific sanddab assessment are summarized below:

- The major uncertainty for this stock assessment is that the scale of the population size estimated based on the model is largely different from the survey

based estimate. Beyond the explorations suggested during the STAR panel (see the request list in the STAR panel), a few more suggestions include:

- The STAT team should look into the survey based biomass estimate thoroughly.
- The current model estimated h, sex specific M and growth, catchabilities and selectivities. Whether these parameters are estimable inside of the model should be explored in the future.
- The STAT may also consider simpler methods or model structure that may provide relatively stable advice. For example, the current model used both sex specific growth, but also sex specific size based selectivity.
- Collect life history data over time and space to examine whether they vary over time given the large differences observed in age-at-maturity between Arora (1951) and Lefebvre (2012).
- Uncertainties of the historical trawl catch and discard rate observed were two of the major uncertainties discussed during the review. Beyond continued effort on historical data reconstruction/synthesis, incorporating uncertainty of catch in the model should probably be explored.
- Explore approaches, including surveys, to index the abundance of sanddab in water areas shallower than 55m, where there was no information in this stock assessment.
- The influence of the conditional age-at-length is tremendous. A simulation study is suggested to test the influence of using both length composition and conditional age-at-length.
- A more detailed description on model equations, symbols used in the equations, submodels used in different scenarios, and the priors used should be provided in future reports.

1. BACKGROUND

This report reviews the 2013 stock assessments of cowcod in the Southern California Bight and Pacific sanddab, off the Pacific Coast under contract with the Center for Independent Experts (CIE). I was provided with draft stock assessment reports and web access to relevant files and documents (Appendix 1) and participated in the Stock Assessment Review (STAR) Meeting. Extra documents were provided during the review upon request from the CIE peer review panel (Appendix 1).

The last assessment for cowcod was in 2009, but the proposed stock assessment for this species changed fundamentally. The stock assessment for the Pacific sanddab is the first formal stock assessment. Both the newly developed stock assessments were expected to provide the basis for the management of these two species off the Pacific Coast.

The review committee was comprised of Drs. Tom Jagielo (Chair), Kevin Piner, Yan Jiao, and Beatriz Roel. The review was assisted by Drs. Stacey Miller, Jim Hastie, and John DeVore. The cowcod stock assessment report was prepared and was presented at the meeting by Drs. E.J. Dick and Alec MacCall; the Pacific sanddab stock assessment report was prepared and was presented at the meeting by Drs. Xi He, Donald Pearson, John C. Field, Lyndsey Lefebvre, and Meisha Key.

2. REVIEW ACTIVITIES

The STAR Panel meeting took place at the Southwest Fisheries Science Center, Santa Cruz, CA from Aug 5 – 9, 2013. The meeting followed the "tentative agenda" of the STAR review (Appendix 4). The meeting was open to the public and was attended by observers including members of the fishing industry.

About two weeks before the meeting, the assessment documents and supporting materials were made available to the review panel via emails and an ftp website. On the morning of Aug 5 before the meeting, the assessment review committee met with the STAT team to discuss the meeting agenda, reporting requirements, and meeting logistics. Dr. John Field welcomed everyone to the meeting. Dr. Tom Jagielo (chair of the STAR panel) reviewed the Terms of Reference for Assessment and Review Panel, and tasks/components of the STAR panel report, and assigned reporting duties to each of the STAR members. During the STAR meeting, all documents, including extra documents requested during the review, were made available electronically through an ftp site (Appendix 1).

The draft assessments of these two species were presented by the STAT team to the Panel and other attendees, and the input data, models, parameter estimates, fishery and population status were evaluated through open discussion. The STAT members were always available when required for further discussion, for additional model runs for clarification, and for clarification of how the STAR ToRs were addressed. The ToRs for each species/stock were reviewed to ensure they had been fully addressed. A

conclusion was then drawn on which model to recommend, which data scenario to use as the base scenario, and whether to accept the assessment as a basis for management of this fishery.

3. ROLE OF INDIVIDUAL REVIEWER

My role as a CIE independent reviewer was to conduct an impartial and independent peer review in accordance with the SoW and the predefined ToRs (Appendix 2) herein. I reviewed reports and related documents provided by the STAR meeting coordinator before the review meeting, and reviewed the presentations and report, and participated in the discussion on these documents/presentations during the panel review week. During the review, I helped the STAR panel to organize and prepare the Panel report. After the peer review meeting, I summarized the findings and recommendations according to the predefined ToRs. This review report is formatted according to my interpretation of the required format and content described in Annex 1 of Appendix 2.

4. SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS IN ACCORDANCE WITH THE TERMS OF REFERENCES

I participated in the Panel review meeting to conduct independent peer reviews of the assessments of cowcod and Pacific sanddab managed by the Pacific Fishery Management Council. Below I provide the summary of findings of each ToR for each species reviewed in which the weaknesses and strengths are described and conclusions and recommendations are presented in accordance with the ToRs.

4.1. Cowcod

4.1.1 *ToR 1* – Become familiar with the draft stock assessment documents, data inputs, and analytical models along with other pertinent information (e.g., previous assessments and STAR panel report when available) prior to review panel meeting.

I reviewed reports and related documents provided by the STAR meeting coordinator before the review meeting, which mainly included the draft STAT stock assessment report, historical stock assessment reports, the last STAR panel reports, the ToRs and the supporting documents on data syntheses, prior elicitations, and the Stock Synthesis technical document and user manual.

4.1.2 *ToR 2* – Discuss the technical merits and deficiencies of the input data and analytical methods during the open review panel meeting.

The newly developed CPFV index was based on cowcod only trips, and the STAT team indicated the possibility of hyperstability in their draft report and presentation. After intensive discussion on this question with multiple ways to deal with this dataset, e.g., cowcod trip only, rockfish trip without tuna trips etc.,

were explored, the STAT team decided to remove this index because of the potential of hyperstability and its heavy influence on the model results. STAR agreed with this change on the base model scenario because of the difficulty to explore the alternative filters on the dataset in such a short time. However, the STAR panel did suggest that this dataset should be further explored for its potential to be used for the future stock assessment.

Uncertainty about the CalCOFI index was brought up multiple times during the meeting. The CalCOFI index is based on larval surveys. Among these trips only 1.8% are with positive tows and 80% of these positive stations are with one larva and 13% are two larvae. There were many years with no larvae observed, so the whole dataset was binned for every five years except 1976 to 1996 which was binned to be one time block. The STAR panel requested data and plots on number of larvae by tow, and number of tows by station. However, the STAT team felt that this was a well-designed survey although the data for cowcod are sparse. The influence of data binning was not able to be explored because of the time limitation. It was suggested by STAR that binning need to be explored in the future.

In addition to the concern on the binning of CalCOFI, the influence of the binning of Sanitation District Trawl survey was discussed but not explored. The full consequences of the data binning in the base model was not fully evaluated during the STAR panel because of the time limitation. It was suggested by STAR that future stock assessment should at least explore this binning effect when the influence of the index is investigated.

Historical catch, especially pre-1981 of the recreational fishery and the pre-1969 commercial fishery was high. The model turned out to be sensitive to assumptions used in reconstructing these catches.

4.1.3 *ToR 3* – Evaluate model assumptions, estimates, and major sources of uncertainty.

The STAR panel mainly explored the influence from the priors and then further suggested priors to be used in the base model after discussing with STAT. I personally feel that three things are of concern:

1. The time lag used in the base model assumed age 11, which is based on a knife-edge age-at-maturity at 11 years. The model was sensitive to this assumption. Since this is a full Bayesian model, this parameter may be treated as unknown as a reasonable prior between age 8 and 14, for example, to reflect the variation of maturity and selectivity of the fishery.
2. Process error of the biomass dynamics was not considered in the model. More and more studies recommend considering both process error and observation error in these types of state-space models.

3. Posterior distributions of multiple key parameters of interest are very flat or non-informative. A full understanding of the posterior probability distribution is needed rather than just looking at the mean and credible intervals.

4.1.4 *ToR 4* – Provide constructive suggestions for current improvements if technical deficiencies or major sources of uncertainty are identified.

The CPFV dataset should be further explored for its potential to be used for the future stock assessment. To avoid the possible hyperstability, the temporal changes of the spatial heterogeneity or factorial influences need to be considered (Higdon et al. 1999 and Fuentes 2002).

Uncertainty of the historical catch is one of the major uncertainties for many species along the Pacific Coast. For cowcod, some sensitivity runs with a reasonable level of uncertainty on historical catch may help.

The influence of binning of the indices should be explored by using 1) no bins, and 2) different binning time intervals.

The time lag A in the production model may be treated as unknown with a reasonable prior distribution, to reflect the variation of maturity and selectivity of the fishery.

Comparison with a process-observation error model may be done by adding process error in the biomass dynamics equation. This also would avoid some of the shortcomings by assuming deterministic population dynamic processes.

For posterior distributions of key parameters that are very flat or non-informative, full understanding of their posterior probability distributions is needed rather than just looking at the mean and credible intervals.

4.1.5 *ToR 5* – Determine whether the science reviewed is considered to be the best scientific information available.

I consider the assessment represents the best scientific information available for the stock assessment of cowcod. The panel endorsed the base case model as the best available science for use in determining stock status and management decisions.

4.1.6 *ToR 6* – When possible, provide specific suggestions for future improvements in any relevant aspects of data collection and treatment, modeling approaches and technical issues, differentiating between the short-term and longer-term time frame.

Suggestions for short-term improvement include 1) reanalyse CPFV data by considering its temporal changing of the spatial heterogeneity and factorial influences; 2) analyze the influence of time binning on the relative abundance indices by using different binning intervals including no bins; 3) explore the influence of the catch by providing some alternative sensitivity runs with reasonable levels of uncertainty; and 4) incorporate uncertainty on the time lag A used in the production model.

Suggestions for long-term improvement include 1) develop a process-observation state-space model by incorporating process error in the production equation, and compare the performance between process-observation model with the current observation error only model; and 2) continue length frequency data collection and life history information collection.

4.1.7 *ToR 7* – Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

The STAR Panel meeting took place at the Southwest Fisheries Science Center, Santa Cruz, CA, from Aug 5 – 9, 2013. The meeting followed the "tentative agenda" of the STAR review (Appendix 4) with some flexibility on the time for each species.

On the morning of Aug 5 before the meeting, the STAR panel met with the STAT team to discuss the meeting agenda, reporting requirements, and meeting logistics. Dr. Tom Jagielo (chair of the STAR panel) reviewed the Terms of Reference for Assessment and Review Panel, and tasks/components of the STAR panel report, and assigned reporting duties to each of the STAR members.

Dr. Jagielo also requested to post online all the presentations, the updated presentations, requests from the STAR panel, and the responses from STAT teams. Dr. John DeVore and the STAT teams posted all the materials from both the STAT and the STAR panels.

The STAT team for cowcod stock assessment then started their presentations on the draft stock assessment. The presentation and discussion extended all day. During their presentations, questions were asked from the STAR instead of waiting until the end of the presentation. The presentation was prepared according to biological and geographic characteristics of cowcod, data and model structure, base case and sensitivity runs, and then model results. Because the last stock assessment in 2009 was implemented in SS3 and was an age-structured model, comparison with the 2009 stock assessment was presented and discussed throughout the first day meeting. Questions were asked throughout the presentations by the STAR panel. In total, two rounds of requests on this stock assessment were given by the STAR panel. The request from the STAR panels and the responses from the STAT team are listed in Appendix 5. I list the major pertinent discussions and recommendations below.

Questions on the influence of the informative priors on the model results:

How do the priors of delta, F_{msy}/M, and B_{msy}/B_0 influence the model results? Which prior should be used for each parameter?

The discussion on this issue was very useful. After intensive discussion on this question and based on the sensitivity runs provided by the STAT team, the STAR agreed with the STAT team on their preference for using the priors proposed in the draft report.

Questions on the appropriateness of relative abundance indices of CPFV and CalCOFI to be used to calibrate population dynamics:

The STAT team explained their original cowcod-trip-based CPFV data analysis but also indicated the possibility of hyperstability of this index. Given this concern, the STAR panel requested plots on CPFV by region by year based on rockfish-trip-based (trips with rockfish present) dataset, and CPFV by regions based on cowcod trips only dataset. The STAT team provided multiple data filtering approaches and concluded that using positive cowcod only trips likely produced a hyper-stable index. The discussion on this issue was very useful but the problem was not solved. The STAT team recommends not using the CPFV index in the assessment model because of the difficulty in the CPFV data filtering. The STAR Panel accepted this decision. Future exploration on this dataset is recommended by the STAR panel for its potential to be used for the future stock assessment.

The quality of the CalCOFI larvae index was of concern to the STAR panel because of the low proportion of positive tows (average 1.8% among years) and low number of larvae observed in the positive tows (1 larvae in 80% positive stations and 2 larvae in 13% positive stations). The STAT team preferred to include CalCOFI in the based model because CalCOFI is a well-designed survey and the index has a long time series. The STAR panel agreed with this preference but suggested that future evaluation on the appropriateness of this index is still needed.

Questions on the uncertainty of the historical catch and its influence on the stock assessment of cow cod:

Uncertainty about the catch history was discussed in the draft document and during the review. The historical catch of cow cod is uncertain for recreational fisheries prior to 1981 and for commercial fisheries prior to 1969. The STAR requested two sensitivity runs on the historical catch uncertainty and also requested a comparison of the likelihood values given different catch scenarios. The model results are sensitive to the catch history shown as changes in the estimated B_0s and depletion levels. The STAT team

presented the posterior distribution (shown as boxplots) of total and likelihoods of the relative abundance indices given three historical levels (1: the base level of historical catch; 2: half the base level; and 3: twice the base level). There were essentially no differences in the likelihoods of the data for each of the catch series, which implied that the model cannot help determine the magnitude of historical catches. The STAR panel recommended that further exploration on the method to consider historical catch uncertainty is needed.

Questions on the appropriateness of using a fixed time lag (A, which is determined based on knife edge maturity and selectivity) in the production equation:

The discussion on this issue was very useful. The STAR panel requested a sensitivity run on the assumption of A. It turned out that the model results, such as depletion levels and biomass, are sensitive to the assumption of A. The STAT team addressed that the current assumption, A=11, is consistent with available data, although the maturity curves and selectivity patterns are not fully knife edge. The STAR panel suggested that future stock assessment of cowcod should consider incorporating the uncertainty on the time lag used in the production equation.

The discussion on the approaches to quantify the uncertain state of nature in the decision table turned out to be easy, since the model was based on the Bayesian paradigm. The 75% credible interval of the posterior distribution of SSB and depletion were used to present the uncertain state in the decision table.

4.2. Pacific sanddab

4.2.1 *ToR 1* – Become familiar with the draft stock assessment documents, data inputs, and analytical models along with other pertinent information (e.g., previous assessments and STAR panel report when available) prior to review panel meeting.

I reviewed reports and related documents provided by the STAR meeting coordinator before the review meeting, which mainly included the draft STAT stock assessment report, the ToRs and the supporting documents on data syntheses or prior elicitations. The STAT draft report was well prepared.

4.2.2 *ToR 2* – Discuss the technical merits and deficiencies of the input data and analytical methods during the open review panel meeting.

The STAR panel discussion and requests focused primarily on better understanding the details of the maturity curve used in the model, fishery and survey selectivities modelled and estimated, length compositions and age compositions, historical catch time series and the time blocks used to define the

time varying retention curves, and SSB estimated from the model and from the surveys. Both the STAT and STAR panel members agreed that these discussions were very useful to eliminate data not appropriate to be used.

The age-at-maturity functions/curves between Arora (1951) and Lefebvre (2012) are largely different. The STAR panel wondered whether there were observed differences in length-at-age also. The STAT team provided mean length-at-age from both studies but also indicated that these comparisons may not be appropriate because the ageing methods used in these two studies are different. The mean length-at-age for 3+ ages from the two studies is close. There are some differences in the mean length at age 1 and 2 however. Dr. John Field indicated that these could be because of the survey season differences. Apparently, further data collection on maturity and growth are needed to further validate the maturity and growth functions.

Concerns on how to use the triennial survey exist for many groundfish species. For this species, the STAT team removed the index of the triennial survey but did not remove the length composition data or provide a sensitivity run to test the influence of the length composition data in the triennial stratification. The STAR felt that if the quality of the index is questionable, it is probably also questionable for the length composition data from the same survey. Two sensitivity runs were requested by the STAR. Run 1 was to remove the early triennial data, both index and length composition; Run 2 was to remove the whole dataset of triennial survey, both early and late triennial surveys. The results are sensitive to the early triennial length composition, but the results without the whole triennial survey data actually resulted in similar results when the whole triennial data (both indices and length compositions) were used. It seems that there are interactions between the early and late triennial length composition datasets. The STAT team and the STAR agreed to continue to use the early and late triennial surveys as used in the proposed base case model until the mechanism can be further explored.

The STAR panel showed its concern about using both length and age composition, and/or using both length composition and conditional age-at-length data. A few sensitivity runs were requested and presented. Because the age composition was with lower sample size and much less bins, the model results, such as SSBs and depletion, were less sensitive to the age compositions. However, the model results, such as SSBs and depletion, were very sensitive to the existence/absence of conditional age-at-length, which is understandable because of data structure (number of length bins times number of age groups/length bin). The STAR panel recommended that further study is needed to validate using both length composition and conditional age-at-length.

A few datasets were suggested not to be used in the base model and they included: remove the 2003 OR/WA discard rate estimate which is extremely high and was regarded as an outlier, remove Wallace (1996) length composition data

which was from a mesh size study and was thought to be inappropriate for use in the new base model.

Uncertainty about the catch history of Pacific sanddab was discussed in the draft document and during the review. The concern focused on the historical catch of CA prior to 1930. The STAT used the historical catch time series from the Staff of the Bureau of Marine Fisheries (1949). Two sensitivity runs were requested and provided. High historical catch resulted in higher estimated SSB, R_0 and M, but low depletion level. The STAR agreed with STAT to use the Staff of the Bureau of Marine Fisheries (1949) in the base model but suggested further investigating the historical catch of CA.

4.2.3 *ToR 3* – Evaluate model assumptions, estimates, and major sources of uncertainty.

The STAR discussion on this TOR focused on the possible strategies to explain the differences between the huge difference between the base model estimated low biomass and the trawl survey estimated high biomasses. Alternative model assumptions were recommended and explored by the STAT team to see whether some of them could be used to explain the biomass discrepancy. These alternative model assumptions explored include: 1) whether the use of the conditional age-at-length is the problem, 2) whether early life history has a higher natural mortality and whether this can be the reason, 3) whether the use of the asymptotic selectivities for both the surveys and the fisheries are the problem, and 4) whether the use of an informative prior of q of the NWFSC shelf/slope survey can help solve this discrepancy. All these alternative model assumptions were exercised by the STAT team but none of them resolves the discrepancy between the NWFSC and the model estimated biomass estimates of population scale.

The catch is assumed to be deterministic without uncertainty but at the same time historical catch was one of the major uncertainties discussed during the review. So, beyond continued effort on historical data reconstruction/ synthesis, measuring and incorporating uncertainty of catch in the model should probably be explored.

Estimation uncertainty seems high for this stock because the scale of the population size changed dramatically with limited changes on the model or data structure. The scale of this population is the biggest problem. It can be because of the overall scale of the population size is less estimable.

4.2.4 *ToR 4* – Provide constructive suggestions for current improvements if technical deficiencies or major sources of uncertainty are identified.

The large differences in the maturity patterns between Arora (1951) and Lefebvre (2012) are of great concern. I suggest that further collection on life history data

over time and space to examine whether life history traits change over time, such as maturity at age or length at age, given the large differences observed in these two references provided.

Uncertainties of the historical trawl catch and discard rate observed were two of the major uncertainties discussed during the review. Beyond continued effort on historical data reconstruction/synthesis, estimating the reasonable uncertainty from historical catch reconstruction and incorporating uncertainty of catch in the model should probably be explored.

There was no information for the abundance of sanddab in water areas shallower than 55m. Future data collection or extracting information from other shallow water surveys, if any, is suggested for future stock assessments.

The influence of the conditional age-at-length is tremendous. A simulation study is suggested to test the influence of using both length composition and conditional age-at-length.

The major uncertainty for this stock assessment is that the scale of the population size estimated based on the model is largely different from the survey based estimate. Beyond the explorations suggested during the STAR panel (see the request list in the STAR panel, and also ToR3), a few more suggestions include revisiting the survey based biomass estimation process and model structure modification by balancing model complexity and parameter estimability. The current model estimated h, sex specific M and growth, catchabilities and selectivities. Whether these parameters are estimable inside of the model should be explore in the future. The STAT may also consider simpler methods or model structure that may provide relatively stable advice. For example, the current model used both sex specific growth functions, but also sex specific size-based selectivity.

4.2.5 *ToR 5* – Determine whether the science reviewed is considered to be the best scientific information available.

I consider the assessment represents the best scientific information available for the stock assessment of Pacific sanddab. Both the STAT and STAR panel members agreed that tremendous work was done in the draft report and during the review week, and these model runs and diagnostics help to facilitate the conclusion of the population status; however, none of the proposed model runs were ready as a base model for stock assessment purposes.

4.2.6 *ToR 6* – When possible, provide specific suggestions for future improvements in any relevant aspects of data collection and treatment, modeling approaches and technical issues, differentiating between the short-term and longer-term time frame.

Suggestions for short-term improvement include: 1) collect biological sampling data, such as maturity, fecundity and growth more frequently given the concern about its possible variation across time and space (a couple of years here) if possible to validate the functions, at least the maturity and growth functions; 2) continue the effort on catch data reconstruction and update; 3) explore influences from each dataset on model results; and 4) revisit the survey based biomass estimation process/approach.

Suggestions for long-term improvement are mainly possible on the approaches to interpret the scale of the population size by considering: 1) developing an index to calibrate abundance of sanddab in water areas shallower than 55m; 2) simplifying model structure reasonably or step by step. For example, the current model used both sex specific growth, but also sex specific size based selectivity; and 3) further explore the influence of the conditional age-at-length which seems to have a high influence on the model results. A simulation study is suggested to test the influence of using both length composition and conditional age-at-length.

4.2.7 *ToR 7* – Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

The STAT team for Pacific sanddab stock assessment, Drs. Xi He and John Field started their presentations on the draft stock assessment on Tuesday morning, Aug 6. The presentation and discussion extended for most of the day. During their presentations, questions were asked from the STAR instead of waiting until the end of the presentation. The presentation was prepared according to biological and geographic characteristics of Pacific sanddab, model structure (base case and sensitivity runs), and then model results. Questions were asked throughout the presentations by the STAR panel. The request from the STAR panel and the responses from the STAT team are listed in Appendix 5. Overall, the discussions were mainly on the possible mechanisms of the large differences between the model estimated biomass and the survey estimated biomass. Other discussions included details of the historical catch data, maturity function used, selectivity curves, time blocks on the retention curves, and data that may be outliers or not appropriate to be used. Because the significant differences (around 20 times) between the survey based biomass estimate and the estimate from the proposed stock assessment model cannot be explained, none of the proposed model runs are thought to be ready for stock assessment purposes. Below, I list the major pertinent discussions and recommendations.

Questions on the unusual maturity pattern changes from between Arora (1951) and Lefebvre (2012):

> The discussion on this issue was very useful. The difference of length at 50% maturity between the 1950s (Arora 1951) and the recent period (Lefebvre 2012) is almost 6 cm, which is very unusual. The STAR panel wondered whether there were observed time-varying life history characteristics, so requested the differences in length-at-age also between the two studies. The

STAT team provided mean length-at-age from both studies but also indicated that these comparisons may not be appropriate because the ageing methods used in these two studies are different. The mean length-at-age for 3+ ages from the two studies is close. There are some differences in the mean length at age 1 and 2 however. Dr. John Field indicated that these can be because of the survey season differences. Apparently, further data collection on basic life history parameters are needed to further validate the maturity and growth functions, and whether they are changing temporally and spatially.

Questions on unusual catch history prior to 1930:

Uncertainty about the catch history of Pacific sanddab was discussed during the review. The concern focused on the historical catch of CA prior to 1930. The STAT used the historical catch time series from the Staff of the Bureau of Marine Fisheries (1949). Two sensitivity runs were requested and provided. High historical catch resulted in higher estimated SSB, R_0 and M but low depletion level. The STAR agreed with STAT to use the Staff of the Bureau of Marine Fisheries (1949) in the base model but suggested further exploration on the historical CA catch is needed.

Questions on the influences of using both length and age compositions, using both length composition and conditional age-at-length:

The discussion on this issue was very useful although this question was not solved during the review. A few sensitivity runs were requested and presented. Because the age composition was with lower sample size and much less bins, the model results, such as SSBs and depletion, were less sensitive to the age compositions. However, the model results, such as SSBs and depletion, were very sensitive to the existence/absence of conditional age-at-length, which is understandable because of data structure. The STAR panel recommended that further study is needed to validate using both length composition and conditional age-at-length.

The biggest concern for this stock assessment from both STAR and STAT was the scale of the population size or the large difference between the stock assessment model estimated biomass and the survey estimated biomass. The STAR discussion mainly focused on the possible strategies to explain the huge difference between the two types of biomass estimates. Alternative model assumptions were recommended and explored by the STAT team to see whether some of them could be the mechanisms to explain the biomass discrepancy. These alternative model assumptions explored include: 1) test the influence of the conditional age-at-length; 2) whether size specific Lorenzen M can help solve this problem; 3) whether the use of the asymptotic selectivities for both the surveys and the fisheries are the problem; and 4) whether the use of an informative prior of q of the NWFSC shelf/slope survey can help solve this discrepancy. All these alternative model assumptions were exercised by STAT

team but none of them resolves the discrepancy between the scales of the NWFSC and the model estimated biomass. The failure to find the mechanisms to explain the scale differences in biomass estimations frustrated both the STAR panel and the STAT team.

Quality of a few datasets was questioned during the review. After intensive discussions on the backgrounds of these datasets, STAR suggested that the following datasets not be used in the base model: remove the 2003 OR/WA discard rate estimate which is extremely high and was regarded as an outlier; remove Wallace (1996) length comp data which was from a mesh size study and was thought to be inappropriate to be used in the new base model.

Extra explorations and discussions on model fitting and results included model fits to the observation data of length/age compositions, conditional length-at-age and relative abundance indices, Pearson residual plots for length/age compositions, likelihoods from each dataset given different sensitivity runs, likelihood profiles, and retrospective analyses. The exploration and discussion went very well and I found them to be useful and to contribute to the overall successfulness of the stock assessment review.

Because none of the model runs was endorsed by the STAR panel, no further discussions on quantifying the uncertain state of nature or the decision table. Although there was no model endorsed for Pacific sandab, the STAR panel observed tremendous work from the STAT team, and they had tried very hard during the review week. These exploratory model runs and diagnostics helped to facilitate the conclusion of the population status which is a very important conclusion for such a fishery.

5. SUGGESTIONS FOR IMPROVEMENTS OF NMFS REVIEW PROCESS AND PRODUCTS

The current review process looks very well designed. I consider the review proceedings and discussions effective and I believe that they will improve the stock assessment in the future. The review can be further improved if the presentations used in the review meeting can be distributed to the STAR panel a few days earlier before the meeting, and if a follow-up review can be conducted in the near future. The STAR review and discussion should be implemented more effectively by this extra follow-up review.

6. Acknowledgements

I would like to thank all the Stock Assessment Team members contributing to the meeting for their informative presentations on the stock assessments of these two species and for providing helpful and patient responses to the review panel's questions. Many thanks also to the Panel Advisors and observers at the meeting for their contribution to the discussions throughout the meeting. Special thanks

also go to the other members of the review panel for productive discussions on the assessments.

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Appendix 2: Statement of Work for Dr. Yan Jiao

External Independent Peer Review by the Center for Independent Experts

Stock Assessment Review (STAR) Panel for Pacific Sanddabs and Cowcod

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description: A benchmark assessment will be conducted for cowcod which is a species that is considered "overfished" or below their minimum stock size threshold and is currently managed under a rebuilding plan. A new assessment will be conducted for Pacific sanddabs, which are harvested by the trawl fleet and are regularly encountered by the west coast bottom trawl survey.

Assessments for these two stocks will provide the basis for the management of the groundfish fisheries off the West Coast of the U.S. including providing scientific basis for setting OFLs and ABCs as mandated by the Magnuson-Stevens Act. The technical review will take place during a formal, public, multiple-day meeting of fishery stock assessment experts. Participation of external, independent reviewer is an essential part of the review process. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements for CIE Reviewers: Two CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. One of the CIE reviewers will participate in all STAR panels held in 2013 to provide a level of consistency between the STAR panels. The CIE reviewers shall be active and engaged participants throughout panel discussions and able to voice concerns, suggestions, and improvements while respectfully interacting with other review panel members, advisors, and stock assessment technical teams. The CIE reviewers shall have excellent

communication skills in addition to working knowledge and recent experience in fish population dynamics, with experience in the integrated analysis modeling approach, using age-and size-structured models, use of MCMC to develop confidence intervals, and use of Generalized Linear Models in stock assessment models. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Santa Cruz, California during the dates of 5-9, August 2013.

Statement of Tasks: Each CIE reviewers shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/sponsor.html).

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Documents to be provided to the CIE reviewers prior to the STAR Panel meeting include:

- The current draft stock assessment reports;
- Previous cowcod stock assessments and STAR panel review reports;
- The Pacific Fishery Management Council's Scientific and Statistical Committee's Terms of Reference for Stock Assessments and STAR Panel Reviews;
- Stock Synthesis (SS) Documentation
- Additional supporting documents as available.
- An electronic copy of the data, the parameters, and the model used for the assessments (if requested by reviewer).

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Other Tasks – Contribution to Summary Report: Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.

2) Participate during the panel review meeting in Santa Cruz, California during the dates of 5-9 August, 2013 as specified herein, and conduct an independent peer review in accordance with the ToRs (**Annex 2**).
3) No later than 23 August 2013, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and to Dr. David Die, CIE Regional Coordinator, via email to ddie@rsmas.miami.edu. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

July 1, 2013	CIE sends reviewer contact information to the COR, who then sends this to the NMFS Project Contact
July 22, 2013	NMFS Project Contact sends the CIE Reviewers the pre-review documents
August 5-9, 2013	Each reviewer participates and conducts an independent peer review during the panel review meeting
August 23, 2013	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
September 6, 2013	CIE submits CIE independent peer review reports to the COR
September 13, 2013	The COR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: Requests to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract

deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:
(1) each CIE report shall completed with the format and content in accordance with **Annex 1**,
(2) each CIE report shall address each ToR as specified in **Annex 2**,
(3) the CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

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Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a brief summary of findings, of the science, conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review

Stock Assessment Review (STAR) Panel for Pacific Sanddabs and Cowcod

1. Become familiar with the draft stock assessment documents, data inputs, and analytical models along with other pertinent information (e.g. previous assessments and STAR panel report when available) prior to review panel meeting.
2. Discuss the technical merits and deficiencies of the input data and analytical methods during the open review panel meeting.
3. Evaluate model assumptions, estimates, and major sources of uncertainty.
4. Provide constructive suggestions for current improvements if technical deficiencies or major sources of uncertainty are identified.
5. Determine whether the science reviewed is considered to be the best scientific information available.
6. When possible, provide specific suggestions for future improvements in any relevant aspects of data collection and treatment, modeling approaches and technical issues, differentiating between the short-term and longer-term time frame.
7. Provide a brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations.

Appendix 3: Panel Membership or other pertinent information from the panel review meeting

Participants
Stock Assessment Review Panel for
Cowcod and Pacific Sanddab

NOAA Fisheries, Southwest Fisheries Science Center
110 Shaffer Road
Santa Cruz, California 95060
August 5-9th, 2013

Technical Reviewers

Tom Jagielo, Scientific and Statistical Committee (SSC), Panel Chair
Yan Jiao, Center for Independent Experts (CIE)
Beatriz Roel, Center for Independent Experts (CIE)
Kevin Piner, Southwest Fisheries Science Center (SWFSC)

Panel Advisors

John DeVore, Pacific Fishery Management Council (PFMC), Staff Officer
Bob Leos, PFMC Groundfish Management Team (GMT)
Gerry Richter, PFMC Groundfish Advisory Subpanel (GAP)

Stock Assessment (STAT) Teams

Cowcod STAT

E.J. Dick, Southwest Fisheries Science Center (SWFSC)
Alec D. MacCall, Southwest Fisheries Science Center (SWFSC)

Pacific Sanddab STAT

Xi He, Southwest Fisheries Science Center (SWFSC)
Donald Pearson, Southwest Fisheries Science Center (SWFSC)
John C. Field, Southwest Fisheries Science Center (SWFSC)
Lyndsey Lefebvre, Southwest Fisheries Science Center (SWFSC)
Meisha Key, California Department of Fish and Wildlife (CDFW)

Appendix 4: Agenda - Stock Assessment Review (STAR) Panel for Longspine Thornyhead and Shortspine Thornyhead

Stock Assessment Review (STAR) Panel for Cowcod and Pacific Sanddab

NOAA Fisheries, Southwest Fisheries Science Center
110 Shaffer Road
Santa Cruz, California, 95060
August 5-9th, 2013

Monday, August 5, 2013

8:30 a.m.	Welcome and Introductions (John Field, SWFSC)
9:15 a.m.	Review the Draft Agenda & Discuss Meeting Format (Tom Jagielo, Chair) - Review Terms of Reference (TOR) for assessments and STAR panel - Assign reporting duties - Discuss and agree to format for the final assessment document and STAR Panel report - Agree on time and method for accepting public comments
9:30 a.m.	Presentation of Cowcod Assessment (E.J. Dick) - Overview of data and modeling
12:30 p.m.	Lunch *(Boxed lunches onsite)*
1:30 p.m.	Q&A Session with Cowcod-STAT STAR Panel discussion - Panel develops written request for additional model runs / analyses
3:30 p.m.	Presentation of Pacific Sanddab Assessment (Xi He) (if time allows) - Overview of data and modeling
5:30 p.m.	Adjourn for Day.

Tuesday, August 6, 2013

8:30 a.m.	Continue Presentation of Pacific Sanddab Assessment (Xi He) - Overview of data and modeling
12:00 p.m.	Lunch *(Boxed lunches onsite)*
1:00 p.m.	Q&A Session with P.Sanddab-STAT Panel Discussion - Panel develops written request for additional model runs / analyses
4:30 p.m.	Check in with Cowcod-STAT
5:30 p.m.	Adjourn for Day.

Wednesday, August 7, 2013

8:30 a.m.	Presentation of First Set Model Runs for Cowcod Assessment (E.J. Dick) - Q&A session with the Cowcod-STAT & Panel discussion - Panel develops written request for second round of model runs / analyses for STAT

12:00 p.m. Lunch (On Your Own)

1:30 p.m. Presentation of First Set Model Runs for P. Sanddab Assessment (Xi He)

- Q&A session with P.Sanddab-STAT & Panel discussion
- Panel develops written request for second round of model runs / analyses for STAT.

5:30 p.m. Adjourn for day.

Thursday, August 8, 2013

8:30 a.m. Presentation of Second Set Model Runs for Cowcod Assessment (E.J. Dick)

- Q&A session with the Cowcod-STAT & Panel discussion
- Agreement of preferred model and model runs for decision table
- Panel continues drafting STAR report.

12:00 p.m. Lunch (On Your Own)

1:30 p.m. Presentation of Second Model Runs for P. Sanddab Assessment (Xi He)

- Q&A session with the P. Sanddab-STAT & Panel discussion
- Agreement of preferred model and model runs for decision table
- Panel continues drafting STAR report.

4:00 p.m. Continue Panel Discussion or Drafting STAR Panel Report

5:30 p.m. Adjourn for day.

Friday, August 9, 2013

8:30 a.m. Consideration of Remaining Issues (Tom Jagielo, Chair)

- Review decision tables for assessments

10:00 a.m. Panel Report Drafting Session

12:00 p.m. Lunch (on your own)

1:30 p.m. Review First Draft of STAR Panel Report

4:00 p.m. Panel Agrees to Process for Completing Final STAR Report by Council's September Meeting Briefing Book Deadline (August 21, 2013)

5:30 p.m. Review Panel Adjourn.

Appendix 5: list of requests from STAR panel

Requests by the STAR Panel for the cowcod stock assessment

Request 1: Investigate the influence of the delta model parameter prior on the model results by modeling a non-informative prior.
Rationale: To examine the influence of the delta model parameter prior.

Request 2: Investigate the F_{MSY}/M model parameter prior by 1) using a non-informative prior; and 2) using the prior based only on Sebastes data.
Rationale: To examine the influence of the F_{MSY}/M model parameter prior.

Request 3: Investigate the use of a more informative prior for B_{MSY}/B0 based on the life history of cowcod by modeling the data-moderate prior.
Rationale: To examine the impact of a more informative B_{MSY}/B0 prior.

Request 4: Plot the proportion positive (in log and arithmetic space) in the regions in the CPFV index by year (with rockfish present) to see if there are spatial changes over time.
Rationale: To investigate possible hyperstability.

Request 5: Plot the proportion positive (n-1 dataset) in log and arithmetic space of the cowcod-only trips in CPFV regions using the dataset in the base model index.
Rationale: To investigate possible hyperstability.

Request 6: Plot the number of CalCOFI larvae by tow and number of tows by station using the five-year block stratification.
Rationale: To better understand the quality of the data behind the binomial model and validate the binomial model used to represent abundance.

Request 7: Profile on q (range from 0.375-1.5) for the visual survey.
Rationale: To determine the influence of the estimated q for the visual survey.

Request 8: Provide sensitivity runs of historical catch uncertainty (recreational: pre 1981; commercial: pre 1969) by doubling and halving the catches in these years. Do these runs with and without the CPFV index included.
Rationale: To determine how historical catch uncertainty influences the production model.

Request 9: Based on the findings of request 4, continue filtering the data informing the CPFV index based on rockfish trips only(with further filtering criteria explored by the STAT) and including regions and seasons in the CPFV dataset to produce new delta GLM estimates of CPUE.
Rationale: To explore more representative CPUE data for cowcod.

Request 10: Provide a table of all likelihood components for alternative historical catch scenarios.
Rationale: To get a better understanding of model fits to these alternative catch scenarios.

Request 11: Examine the sensitivity to the assumption of time-lagged (i.e., knife-edge) maturity and selectivity with 8-year and 14-year time lags.
Rationale: To explore the sensitivity to a reasonable range of time lag assumptions.

Request 12: Present base model with 10-year projection with 3 mt future catch. Provide the full diagnostics, especially the fit to the indices. Present a series of runs with each index included as the only index in the model.

Rationale: To complete the stock assessment report.

Requests by the STAR Panel for the Pacific sanddab stock assessment

Request 1: Compare growth differences between Arora (1951) and Lefebvre (2012) or simply compare mean length-at-age.
Rationale: To determine whether fishing caused life history changes were also observed in estimated growth and maturity.

Request 2: Use the new recreational CPUE index, the revised mink food fishery catches, put a retention time block at 2011, use empirical discard estimates, and remove the 2003 OR/WA discard rate estimate in the new base model. All additional analyses should use this new base model.
Rationale: These data changes are technical fixes to the model and, in the case of the 2003 discard rate estimate, provide a better fit to the discard estimates. Approximately 100% of the 2011-12 trawl fishery was observed; therefore, model-estimated discard rates should not apply.

Request 3: Sensitivity run for the pre-1930s CA catch history by doubling and halving the CA trawl catches prior to 1930.
Rationale: Explore model sensitivity to uncertain historical catches.

Request 4: Clarify Wallace (1996) mesh size study data were filtered adequately to inform fishery discard rates and catch composition.
Rationale: Justify whether these data are appropriate to be used in the assessment.

Request 5: Justify why only triennial survey index data were removed in the sensitivity run. Explore removing the length comp. data as well. Additionally, provide a sensitivity run removing the early triennial survey index and comp. data.
Rationale: To explore the overall influence of the triennial survey.

Request 6: Test the influence of the fishery age composition and survey conditional age-at-length data by 1) removing age comps., 2) fixing growth parameters from the base model and removing conditional age-at-length data, and 3) fixing growth parameters from the base model and removing all these data to explore reasons for the variable scale of the SSB.
Rationale: Examine the influence of the age comp. data on the estimated SSB.

Request 7: Profile on ln(R0) with each likelihood component (by fleet, survey, and data component).
Rationale: To understand which components are most influential on the estimated scale of SSB.

Request 8: Simple production model to test R0 scale.
Rationale: to explore the impact of age and length composition on the model scaling.

Request 9: Using the new base model (provisions from requests 2 and 4, use the 2011 trawl discard rates for 2012 for both CA and OR/WA fleets), provide a run exploring a Lorenzen M or some other modeling structure to allow higher Ms for younger fish. Show the total likelihood, including the number of estimated parameters.
Rationale: This is consistent with the NMFS M workshop recommendations and allows exploration of how this modeling treatment affects the scale of the population.

Request 10: Provide a sensitivity analysis that allow dome-shaped selectivity for all surveys except for one fishery (which selects for the largest fish), which should remain asymptotic. M should be fixed according to the new base model. Provide fits to the comps. aggregated across all years. Show the total likelihood, including the number of estimated parameters.

Rationale: This analysis may provide a better understanding of the role of asymptotic selectivity on biomass scaling.

Request 11: If requests 9 and/or10 do not result in significant changes to model results, provide these runs with removal of conditional age-at-length (fix growth parameters according to the new base model).

Rationale: This will provide better insight into the parameters affecting biomass scale.