

**Report for the Center of Independent Experts
on the Stock Assessment Review (STAR) Panel
for Cabezon and Lingcod
(July 27 to 31, 2009)**

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Stock Assessment Review Panel for Cabezon and Lingcod

Hotel Deca
Seattle, Washington
July 27 to 31, 2009

Executive Summary

Assessments of stock status of cabezon and lingcod stocks on the western coast of the United States in 2009 were reviewed by a STAR Panel. Stock synthesis version 3 was used to model population trends for both species. For both species the models did not fit recent trends in abundance indices very well and instead current trends in the model appeared to be more influenced by information from the length composition data. The cabezon and lingcod assessments were judged to be the best available science given the data and time available, and were determined to be adequate for management purposes. A number of research recommendations were developed for both species, including the development of abundance indices for cabezon. In addition, investigation of the impact of nest-guarding behavior by the males of both species on reproductive output was recommended.

Background

A STAR Panel (Panel) was convened at the Hotel Deca in Seattle, Washington from July 27–31, 2009 to review draft assessments of cabezon and lingcod. Cabezon and lingcod were last assessed in 2005. While the 2005 cabezon stock assessment was limited to waters off California, the 2009 assessment will include the Oregon substock for the first time. Similar to the 2005 assessment, the 2009 assessment will continue to use two separate models for northern and southern areas but will also include a small change in boundaries for these areas.

Reviewer's Role in Review Activities

Summary of Findings

- 1. Become familiar with the draft cabezon and lingcod stock assessments and background materials. Along with other members of the Panel, determine if the stock assessment document is sufficiently complete according to the Pacific Fishery Management Council's Terms of Reference for West Coast Groundfish Stock Assessment and STAR Panels (to be included once finalized).*

All of the documents were made available by June 30th via ftp (see appendix 1). Both stock assessment documents for cabezon and lingcod were well written, for the most part detailed and complete. Discussion on the sensitivity runs on the base model for lingcod was sparse but probably adequate given that more time was spent on these during the presentation — inevitably the panel always asks for more runs to be done. Both STAT teams should be acknowledged for the impressive amount of work that went into these

two very large documents. Based on template in Appendix B of the Fishery Management Council's Terms of Reference, I would say that the documents for cabezon and lingcod were sufficiently complete for the purpose of the review.

The background material covering previous assessments in 2003 and 2005 were adequate for information on the recent history of issues and approaches to population modeling attempted to date. While it was good to have the executables and manuals for SS3, there was really no time for the reviewers to familiarize themselves with the package. There are subtleties in the settings and analysis that would only become evident after working through a complete stock assessment. SS3 is a newer version, and both STAT teams said that they were still working things out with the software. During the lingcod assessment re-runs, it was discovered that the lengths-at-age were actually treated as beginning of year estimates by SS3 rather than mid-year estimates as assumed by the STAT. At some of the previous meetings that I have attended for the CIE, I have seen similar subtleties identified with previous versions of stock synthesis once there were many eyes looking at the same output.

Jason Cope supplied pdf versions of two papers in press before the meeting that were referred to in the cabezon stock assessment.

2. *Evaluate, data collection operations and survey design and make recommendations for improvement*

Lingcod

The 2003 and 2006 NWFSC survey estimates for the northern stock were quite high relative to the other points in the same series. In addition, the 2003 NWFSC point was also high relative to the 2004 NMFS triennial survey estimate. The NWFSC survey series was the only abundance series with direct trend information for the period from 2004 to the present, but the stock synthesis model did not fit these points very well. The STAT investigated the 2003 survey catches during the meeting and discovered that three tows comprised 63.5% of the total catch of lingcod in the northern part of the survey. While the first tow appeared to be adequately sampled for lengths, sex and weights, the second and third tows were large dogfish tows and were subsampled with respect to the dogfish. In the case of the second tow, this subsampling only resulted in two lingcod being measured (one male and one female) and then this catch of two fish was scaled up to the total catch. All three tows had large lingcod in them. There was no time during the meeting to evaluate to what degree this subsampling biased the lingcod estimate but correcting poor subsampling protocols during the stock assessment is arbitrary and inappropriate. We could not assess if subsampling procedures have been modified since 2003 to avoid this problem but if not, then these should be revisited before the next survey. There was no time to investigate the 2006 point, but something similar may have occurred that year as well.

Cabazon

This assessment is highly dependent upon recreational fishing data for abundance trends, length compositions and catch data. There have been issues in the past about how catch and effort is recorded for the different modes in the recreational fishery (i.e., shore and boat modes), but little time was spent on these during the meeting with only the brief mention that recording accurate removals from this sector remained a challenge.

3. *Comment on quality of data used in the assessment.*

Lingcod

See above for discussion of NWFSC survey data, and see below for a discussion about issues with the length-at-age data.

Cabazon

The MRFSS database reports uncharacteristically large removals of cabazon in the recreational fishery in 1980. Total catches for many other species were also very high in 1980 leading to the suggestion that the telephone survey estimates of effort may have been biased that year. In this assessment, everyone agreed to go ahead with replacing the 1980 catch with the average of the catches in 1979 and 1981.

Actual length compositions from the RECFIN database for the 1980 to 1989 period unavailable for the last assessment were included in this year's assessment. Previously lengths had been inferred from weights in the database. The addition of these data did not appreciably affect the results for northern California substock relative to either the 2005 assessment or the current assessment without these data. However, for the southern substock, there were substantial differences between the current assessment with these data and the current assessment without these data and with the 2005 assessment. In particular, there was a sharp increase in spawning stock biomass prior to 1980 as well as a much more rapid increase in recent years. Stock depletion for the current year with the data was 64%, while it was 40% without the data. Note that the target SB proxy for this substock is 40% depletion.

There is no doubt that actual length data is to be preferred over using derived length data, but it was alarming just how sensitive the model was to the addition of these data. The concern that I have with this situation is that while it is natural to assume that adding real and hopefully better data will result in a more accurate picture of stock status, we do not really know based on the data at hand. There really does not seem to be evidence in the catch data to explain why this rapid increase declined even more rapidly after 1980.

4. *Evaluate and comment on analytic methodologies*

Lingcod

Overall the analytical methods used by the STAT for lingcod were appropriate and, apart from confusion over mid-year versus beginning of year lengths in SS3, no issues were raised with their application.

Cabezon

Many Pacific assessments, especially rockfish assessments, use CPFV CPUE data to construct population abundance indices. The CPFV CPUE series was the only abundance index used for the California substocks for cabezon in this assessment. STAR Panels have discussed the merits of using the CPFV CPUE in the past noting that the fishery "...is focused primarily on marketing a successful "fishing experience" that is related to the desirability of the species caught, quantity, body size, and fighting characteristics." (Cowcod STAR Panel Report 2005). Proportionality between CPUE and abundance may not exist under these kinds of conditions. The use of zero-augmented statistical models (Δ -lognormal, Δ -gamma) to standardize these kinds of CPUE series according to month and area appears to have become standard practice. However, the models appear to be fit in two separate steps with the presence/absence events fit to a binomial model and then a gamma or lognormal model used for the non-zero catch rate data. The standardized series is then calculated from the product of the predicted series from each model. As far as I can tell, bootstrapping is used to estimate standard errors for this product and these estimates have been determined to be underestimates by previous STAR Panels. Greatly inflated guesses are used in the SS3 run.

It is possible to derive the full likelihood for zero-augmented distributions to come up with model specific standard errors (e.g., Kelvin et al. 2002) and this should be explored. There is also the compound Poisson-lognormal model to be considered. This model is part of the Tweedie family of distributions and is available as an R package at CRAN¹ (authored and maintained by Peter K. Dunn, see also Dunn and Smyth 2008).

The other issue that came up, with using generalized linear models to standardize CPUE series for cabezon, was that the models only use main effects (i.e., month, area and year) and ignore the possibility of interaction terms. The standardization model works by assuming that month and area effects are strictly additive and constant over years, hence the standardized catch rate series is parallel over time for any month/area combination just offset by the difference in the joint mean. Interaction terms where month or area or both effects change over time for particular combinations result in a non-additive model and the annual trends will not be parallel for all combinations. Differences in the direction of the trend between the standardized series and mean of the log transformed catch rate without a model suggested that the generalized linear model fits were not behaving as expected.

1 <http://cran.r-project.org/>

Further investigation by the STAT during the meeting on the Northern California stock area indicated there were significant interaction terms in the models for cabezon complicating the interpretation of the standardized series as an abundance index. Dealing with interaction terms in these kinds of models is not straightforward (see Maunder and Punt 2004) but the impact of these interactions on using the standardized catch rate series as an abundance index should be investigated.

5. *Evaluate model assumptions, estimates, and major sources of uncertainty. Specifically, recommend improvements including alternative model configurations or formulations as appropriate during the panel meeting and comment on the primary sources of uncertainty in the assessment model.*

Lingcod

There were a number of major changes made to the original base case model for lingcod over the course of the meeting. In the original model, the estimation of recruitment was started in 1970, but the resultant recruitment series did not fit the length composition for the commercial data prior to 1970 very well. There was evidence in the length compositions that a number of year-classes were recruiting to the fishery in the mid to late 1960s and these were not being well-estimated by the stock/recruitment relationship. The panel recommended changing estimation of recruitment to start in 1950. This change resulted in a much better fit to length compositions in the 1960s/70s but also resulted in a lower depletion estimate in the current year. In addition, the standard error estimated for SB_0 came directly from the stock recruitment curve and was judged to be too small given the lack of data from the early period of the fishery (catches starting in 1928). Having recruitment estimated from the beginning of the fishery resulted in larger standard errors for both the north and south stock areas and these were felt to be more realistic by the panel.

The length-at-age data was problematic with a number of outliers evident. These outliers may indicate gender differences, area differences and area/month differences in catches but little insight into the underlying causes was obtained during the meeting. In the end, removal of the age data from the model resulted in higher recruitment estimated for the years 2000 to the present than estimated using ages in the model for the northern model. In the south there was less of a consistent pattern for the recruitment series estimated with and without ages. These panels suggested that the no age option should be retained as a sensitivity run for the final base case.

Sensitivity runs presented to the panel suggested that removal of the NWFSC survey from the northern model gave results very similar to the original base case. In fact removal of all of the abundance indices from the base case for the north model resulted in little change in stock status from the base case model, probably reflecting the poor fit to the abundance indices, especially in the most recent years. Therefore current trends and stock status appear to be a consequence of the trends in the length compositions only. There was no time during the meeting to determine how robust this result was to how the different sources of length composition data were treated in the assessment.

In the southern model, the commercial and recreational abundance indices were not used past 1997 to reflect changes in the management system. The fit of the model to the length compositions and survey trend from the NWFSC survey in the south were problematic and the survey series appeared to be random and without trend. Removal of the triennial survey series from the model resulted in no change in stock status relative to the original base case while removal of the CPUE series resulted in lower overall biomass, especially in the most recent years. The possibility that the trends in the CPUE data relative to those in triennial survey prior to 1998 may compensate in the model for the decrease in the triennial survey after 1998 was discussed, but it was not clear what the mechanism was for this behavior.

Cabazon

Separate assessments were presented for the Oregon area, northern California substock, southern California substock and for California combined. A number of issues were discussed with these assessments. The STAT drew attention to the fact that the sum of the separate California assessments did not match the combined California assessment. Recruitment dynamics appear to be very different in the two areas and the combined assessment presents a more pessimistic view of stock status. There did seem to be any reason to argue for the combined assessment as the substock view would probably be more helpful to management. A large number of sensitivity runs were presented for all of the areas. For the Oregon stock, the model was relatively insensitive to removal of many of the data sources except for the Oregon recreational boat survey (ORBS) which was the only abundance index used for this stock. Removal of the CPFV or the length composition data (and estimating selectivities) resulted in stock status falling below the target for the northern California stock.

6. *Insert an explicit statement as to whether this stock assessment represents the best available science.*

Lingcod

I believe that the assessment for lingcod represents the best available science given the data at hand. The lack of agreement between current trends (since 2004) and the NWFSC survey estimates are worrying and if this pattern continues one wonders what will be available to inform the model of current trends over the next few years apart from trends in the length compositions.

Cabazon

The assessment for cabazon represents the best available science given the data at hand. The value of future assessments will be greatly enhanced if more abundance indices can be developed for this species throughout its range.

7. *Recommendations for any further improvements*

A number of research recommendations were put forward by the STAT for both species and endorsed by the STAR Panel. The Panel had some additional recommendations that were added to the list in the Panel report. While I agree with all of recommendations made, I would like to highlight the following.

Lingcod

Further investigation of the age and length data needs to be done to understand if seasonal or area differences or some other causes are behind the outliers observed in the length-at-age data.

Maps of landings by area indicate that the northern population continues north of the Canadian border, and a joint assessment with Canada should be encouraged to improve knowledge of the population dynamics of this stock in the Washington/British Columbia area.

Cabezon

With respect to the use of generalized linear models to develop standardized catch rate series there are two recommendations. 1) The impact of these interactions on using the standardized catch rate series as an abundance index should be investigated. See Maunder and Punt (2004) for a number of approaches for dealing with interactions in these kinds of models. 2) Consideration should be given to deriving likelihood-based or posterior-based estimates of the year effects and their associated errors.

The abundance indices used for cabezon do not include a fishery independent series as this species is rarely caught in the coast-wide NMFS surveys. Given the issues noted with the analysis of the CPFV data it would be very helpful to have an alternate source of abundance/trend information.

The fact that cabezon and lingcod males are nest-guarders was ignored when determining reproductive output. A cursory look at the proportion of sex ratio in the catch did not appear to indicate any serious changes for either species in recent years. However, we do not know what kind of change in sex ratio would indicate a serious change in reproductive success. The impact of nest-guarding on reproductive output should be investigated.

8. *Brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations*

At the meeting, I was assigned the rapporteur role for the additional work assigned to the lingcod STAT while Jean-Jacques Maguire (CIE) was responsible for cabezon. John DeVore did an excellent job taking the minutes each day. The panel worked well

together (Appendix 3) with an efficient chair and two very cooperative STAT teams. PowerPoint presentation files were supplied to the panel members during the meeting in advance of the presentations by the STAT teams.

The complete documentation, efficient committee and quick response on the part of the STAT teams resulted in the meeting ending Thursday morning. The panel spent Friday on their own working on the report and related matters. I have contributed my sections to the report but I have yet to see a draft of the complete STAR Panel report.

I do not have any recommendations with respect to the operation of the panel review.

Appendix 1: Bibliography of review materials

I. Meeting Materials

1. Cover letter with details on venue, dates etc.
2. Meeting participants.
3. Terms of reference for the groundfish stock assessment and review process for 2009–2010.

II. Previous Assessments, STAR Panel Reports and SSC Reports

Cope, Jason M., Kevin Piner, Carolina V. Minte-Vera and Andre E. Punt. 2003. Status and future prospects for the cabezon (*Scorpaenichthys marmoratus*) as assessed in 2003. 147 pp.

Cope, Jason M., et al. 2003. Addendum. SSC Requests from the November PFMC meeting. 10 pp.

Cabezón STAR Panel Meeting Report. 15–19 September, 2003. 7 pp.

Cope, Jason M. and André E. Punt. 2005. Status of cabezon (*Scorpaenichthys marmoratus*) in California Waters as Assessed in 2005. 190 pp.

Cabezón STAR Panel Meeting Report. May 16–20, 2005. 7 pp.

Jagiello, Thomas H., Farron R. Wallace, and Yuk Wing Cheng. 2003. Assessment of lingcod (*Ophiodon elongatus*) for the Pacific Fishery Management Council in 2003. 66 pp.

Lingcod STAR Panel Meeting Report. 15–19 September, 2003. 8 pp.

Appendix I. Base Model Output. Assessment of lingcod for the Pacific Fishery Management Council in 2003. 47 pp.

Appendix II. Coastwide lingcod Rebuilding Analysis. Assessment of lingcod for the Pacific Fishery Management Council in 2003. 16 pp.

Addendum to “Assessment of lingcod for the Pacific Fishery Management Council in 2003” Prepared February 1, 2004. 23 pp.

Jagiello, Thomas H. and Farron R. Wallace. 2005. Assessment of lingcod (*Ophiodon elongatus*) for the Pacific Fishery Management Council in 2005. 68 pp.

Lingcod STAR Panel Meeting Report. 15–19 August 2005. 7 pp.

Lingcod STAR Panel Meeting Report. 26–30, 2005. 7 pp.

Appendix I. Northern Area (LCN) Base Model Output. Assessment of lingcod for the Pacific Fishery Management Council in 2005. 28 pp.

Appendix Ia. Northern Area (LCN) Base Model Output. Assessment of lingcod for the Pacific Fishery Management Council in 2005. 22 pp

Appendix II. Southern Area (LCS) Base Model Output. Assessment of lingcod for the Pacific Fishery Management Council in 2005. 17 pp.

Appendix IIa. Southern Area (LCS) Base Model Output. Assessment of lingcod for the Pacific Fishery Management Council in 2005. 18 pp.

III. Documents for 2009 STAR Panel.

Cope., J.M. and M. Key. 2009. Status of cabezon (*Scorpaenichthys marmoratus*) in California and Oregon Waters as Assessed in 2009. 390 pp.

Hamel, O.S., S.A. Sethi and T.F. Wadsworth. 2009. Status and future prospects for lingcod in waters off Washington, Oregon, and California as assessed in 2009. 474 pp.

IV. SS3 Documentation

StockSynthesis3.zip file which included an executable file for SS3, Readme.txt and supplementary materials (e.g., manual).

V. Additional material

Cope, J.M. and A.E. Punt. 2009. Length-Based Reference Points for Data-Limited Situations: Applications and Restrictions. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*. (in press).

Cope, J.M. and A.E. Punt. 2009. Drawing the lines: resolving fishery management units with simple fisheries data. *Can. J. Fish. Aquat. Sci.* 66: (in press).

VI. Material supplied by the reviewer

Dunn, P. K. & Smyth, G. K. (2008). Evaluation of Tweedie exponential dispersion model densities by Fourier inversion. *Statistics and Computing*, 18, 73–86.

Maunder, M.N. and A.E. Punt. 2004. Standardizing catch and effort data: a review of recent approaches. *Fish. Res.* 70: 141–159.

Yau, Kelvin K.W., Andy H. Lee and Angus S.K. Ng. 2002. A zero-augmented gamma mixed model for longitudinal data with many zeros. *Australian and New Zealand Journal of Statistics.* Volume 44: 177–183.

Appendix 2: CIE Statement of work

Statement of Work for Stephen Smith

External Independent Peer Review by the Center for Independent Experts

Stock Assessment Review Panel for Cabezon and Lingcod

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract to provide external expertise through the Center for Independent Experts (CIE) to conduct impartial and independent peer reviews of NMFS scientific projects. This Statement of Work (SoW) described herein was established by the NMFS Contracting Officer's Technical Representative (COTR) and CIE based on the peer review requirements submitted by NMFS Project Contact. CIE reviewers are selected by the CIE Coordination Team and Steering Committee to conduct the peer review of NMFS science with project specific Terms of Reference (ToRs). Each CIE reviewer shall produce a CIE independent peer review report with specific format and content requirements (**Annex 1**). This SoW describes the work tasks and deliverables of the CIE reviewers for conducting an independent peer review of the following NMFS project.

Project Description: Cabezon and lingcod were last assessed in 2005. The cabezon stock assessment, however, was limited to waters off California. A new integrated assessment for the entire west coast will be undertaken in 2009. Lingcod was last assessed during 2005, using two separate models for northern and southern areas. That assessment was the basis for declaring the coast-wide stock rebuilt, however, the rate of recovery in the southern area was much lower. This assessment will focus on developing an integrated assessment for the entire west coast. These two benchmark stock assessments 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 STAR panel is part of the Pacific Fishery Management Council's process to provide peer review as referenced in the 2006 Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act, which states that " the Secretary and each Regional Fishery Management Council may establish a peer review process for that Regional Fishery Management Council for scientific information used to advise the Regional Fishery Management Council about the conservation and management of the fishery (see Magnuson-Stevens Act section 302(g)(1)(E)). If a peer review process is established, it should investigate the technical merits of stock assessments and other scientific

information used by the Council's Scientific and Statistical Committee (SSC). The peer review process is not a substitute for the SSC and should work in conjunction with the SSC."

The Pacific Fishery Management Council's Terms of Reference for the West Coast Groundfish Stock Assessments and STAR Process for 2009-2010 requires that some reviewers be appointed from the Center for Independent Experts (CIE). The Council's terms of reference document will be included as background material. The Terms of Reference (ToRs) specific to the CIE 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 are required with one of the reviewers participating in all 2009 STAR panels (other than hake) to provide a level of consistency between the panels. The CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein. CIE reviewers shall have the expertise, background, and experience to complete an independent peer review in accordance with the SoW and ToRs herein. CIE reviewers shall have expertise and work 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.

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Seattle, Washington on July 27-31, 2009.

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 (name, affiliation, and contact details) 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 information concerning other 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., name, contact information, birth date, passport number, travel dates, and country of origin) to the NMFS Project Clearance 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 the CIE reviewers all 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 on where to send documents. 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;
- The most recent previous Cabezon and Lingcod stock assessments and STAR Panel 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).

This list of pre-review documents may be updated up to two weeks before the peer review. Any delays in submission of pre-review documents for the CIE peer review will result in delays with the CIE peer review process, including a SoW modification to the schedule of milestones and deliverables. Furthermore, the 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.

Panel Review Meeting: Each CIE reviewers shall conduct the independent peer review in accordance with the SoW and ToRs. **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 in the contract SoW. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

In most circumstances a STAR Panel will include a chair appointed from the SSC's Groundfish Subcommittee and three other experienced stock assessment analysts. The STAR panel chair is responsible for: 1) developing an agenda for the STAR panel meeting, 2) ensuring that STAR panel members and STAT teams follow the Terms of Reference, 3) participating in the review of the assessment, 4) guiding the STAR panel and STAT team to mutually agreeable solutions, and 5) coordinating review of final assessment documents.

The CIE reviewer's role includes being an active panel participant and participants are strongly encouraged to voice all comments regarding the assessment data, model configurations, and uncertainty during the STAR Panel so the assessment teams can address the comments during the Panel meeting and incorporate changes when appropriate. The assessments are finalized by the end of the Panel meeting and comments made after the fact will not be able to be included in the final assessment document. The CIE reviewer should also contribute to the final STAR Panel Review Report. Additional details regarding the STAR Panel reviewer's responsibilities will be included in the Pacific Fishery Management Council's final Terms of Reference for Groundfish Stock Assessments and STAR Panel meetings.

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 will assist the Chair of the panel review meeting with contributions to the Summary Report. CIE reviewers are not required to reach a consensus, and should instead provide a brief summary of their 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 Seattle, Washington during July 27-31, 2009, as called for in the SoW, and conduct an independent peer review in accordance with the ToRs (Annex 2);
- 3) No later than August 14, 2009, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shrivani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, via email to David Die

- at 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;
- 4) CIE reviewers shall address changes as required by the CIE review in accordance with the schedule of milestones and deliverables.

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

29 June 2009	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
13 July 2009	NMFS Project Contact sends the CIE Reviewers the pre-review documents
27-31 July 2009	Each reviewer participates and conducts an independent peer review during the panel review meeting in Seattle, Washington.
14 August 2009	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
28 August 2009	CIE submits CIE independent peer review reports to the COTR
4 September 2009	The COTR 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 made through the Contracting Officer's Technical Representative (COTR) who submits the modification for approval to the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the CIE 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 Terms of Reference (ToR) of the SoW as long as the role and ability of the CIE reviewers to complete the SoW deliverable in accordance with the ToRs and deliverable schedule are not adversely impacted. The SoW and ToRs cannot 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. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (the 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 have 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 notification of 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 approved CIE reports to the NMFS Project Contact and regional Center Director.

Key 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.
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, 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 detailed summary of findings, 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 proceedings and findings of the meeting, 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 as separate appendices as follows:
 - 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 Panel for Cabezon and Lingcod

1. *Become familiar with the draft Cabezon and Lingcod stock assessments and background materials. Along with other members of the Panel, determine if the stock assessment document is sufficiently complete according to the Pacific Fishery Management Council's Terms of Reference for West Coast Groundfish Stock Assessment and STAR Panels (to be included once finalized).*
2. *Evaluate, data collection operations and survey design and make recommendations for improvement*
3. *Comment on quality of data used in the assessment.*
4. *Evaluate and comment on analytic methodologies*
5. *Evaluate model assumptions, estimates, and major sources of uncertainty. Specifically, recommend improvements including alternative model configurations or formulations as appropriate during the panel meeting and comment on the primary sources of uncertainty in the assessment model.*
6. *Insert an explicit statement as to whether this stock assessment represents the best available science.*
7. *Recommendations for any further improvements*
8. *Brief description on panel review proceedings highlighting pertinent discussions, issues, effectiveness, and recommendations*

Note – CIE reviewers typically address scientific subjects, hence ToRs usually do not involve CIE reviewers with regulatory and management issues unless this expertise is specifically requested in the SoW.

Annex 3: Tentative Agenda

LINGCOD AND CABEZON STOCK ASSESSMENT REVIEW (STAR) PANEL

July 27-31, 2009,
Hotel Deca
4507 Brooklyn Avenue NE,
Seattle, Washington 98105

Monday, July 27, 2009

- 8:30 a.m. Welcome and Introductions (Jim Hastie, NMFS)
- 8:45 a.m. Review the Draft Agenda and Discussion of Meeting Format
(Vidar Wespestad, Panel Chair)
- Review Terms of Reference for Assessment and Review Panel
 - Assignment of reporting duties
- 9:00 a.m. Stock Assessment Team (STAT-1) Presentation of the Cabezon assessment
(Jason Cope and Meisha Key)
- Overview of Data and Stock Synthesis Modeling
- 10:15 a.m. Coffee Break
- 10:30 a.m. STAT Presentation Continued
- 12:00 p.m. Lunch (On Your Own)
- 1:30 p.m. Q&A session with the STAT-1 & Panel discussion
- 3:30 p.m. Coffee Break
- 3:45 p.m. Panel develops request for additional model runs / analyses for STAT 1
- 4:30 p.m. Panel provides written requests for additional model runs / analyses to STAT 1
- 5:30 p.m. Adjourn for day

Tuesday, July 28, 2009

- 8:30 a.m. Stock Assessment Team (STAT-2) Presentation of the Lingcod assessment
(Owen Hamel)
- Overview of Data and Stock Synthesis Modeling
- 10:15 a.m. Coffee Break
- 10:30 a.m. STAT Presentation Continued
- 12:00 p.m. Lunch (On Your Own)
- 1:30 p.m. Q&A session with the STAT-2 & Panel discussion
- 3:00 p.m. Coffee Break
- 3:15 p.m. Panel develops written requests for additional model runs / analyses for STAT 2
- 4:00 p.m. Panel check in with STAT-1 if needed

5:30 p.m. Adjourn for day

Wednesday, July 29, 2009

- 8:30 a.m. STAT-1 presentation of first set of model runs for Cabezon
- Q&A session with the STAT-1 & Panel discussion
 - Panel develops written request for second round of model runs / analyses for STAT-1
- 10:15 a.m. Coffee Break
- 10:30 a.m. STAT Presentation Continued
- 12:00 p.m. Lunch (On Your Own)
- 1:30 p.m. STAT-2 Presentation of first set of model runs for Lingcod
- Q&A session with the STAT-2 & Panel discussion
 - Panel develops written request for second round of model runs / analyses for STAT-2
- 3:30 p.m. Coffee Break
- 3:45 p.m. Continue Panel discussion with STAT-2
- 5:30 p.m. Adjourn for day

Thursday, July 30, 2009

- 8:30 a.m. STAT-1 Presentation of Second Set of Model Runs for Cabezon
- Q&A session with the STAT-1 & Panel discussion
 - Identification of preferred model and elements for the decision table
 - Panel develops third list of model runs for decision table and begins drafting STAR report
- 10:15 a.m. Coffee Break
- 10:30 a.m. STAT Presentation Continued
- 12:00 p.m. Lunch (On Your Own)
- 1:30 p.m. STAT-2 Presentation of Second Set of Model Runs for Lingcod
- Q&A session with the STAT-2 & Panel discussion
 - Identification of preferred model and elements for the decision table
 - Panel develops third list of model runs for decision table and begins drafting STAR report
- 3:30 p.m. Coffee Break
- 3:45 p.m. Panel discussion or report drafting continues
- 5:30 p.m. Adjourn for day

Friday, July 31, 2009

- 8:30 a.m. Consideration of remaining issues
- Review decision tables for Cabezon and Lingcod

11:00 a.m. Panel agrees to process for completing final STAR report by Council Briefing Book deadline (08/26 for Council's September Briefing Book).

Review Panel Adjourns When Business is Completed

Appendix 4: Panel Membership or other pertinent information from the panel review meeting.

Panel Reviewers

Vidar Wespestad, STAR Chair and SSC representative

J.J. Maguire, Center for Independent Experts

Stephen Smith, Center for Independent Experts

Jim Ianelli, National Marine Fisheries Service Alaska Fisheries Science Center

Panel Advisors

Joanna Grebel, California Department of Fish and Game, GMT Representative

Dan Platt, GAP Representative

John DeVore, PFMC Representative

Cabezon STAT

Jason Cope, National Marine Fisheries Service Northwest Fisheries Science Center

Meisha Key, California Department of Fish and Game

Lingcod STAT

Owen Hamel, National Marine Fisheries Service Northwest Fisheries Science Center

Suresh Sethi, School of Aquatic and Fisheries Sciences, University of Washington

Thomas Wadsworth, Moss Landing Marine Laboratories, Moss Landing, California

Dr. Hamel was present and presented for the STAT

Others present:

Jim Hastie, National Marine Fisheries Service Northwest Fisheries Science Center

Lynn Mattes, Oregon Department of Fish and Wildlife

Tom Jagielo

Jim Likes

Pete Leipzig, Fisherman's Marketing Association