

**REPORT ON THE
PETRALE SOLE AND SPLITNOSE ROCKFISH
STOCK ASSESSMENT REVIEW (STAR) PANEL**

May 4-8, 2009,
Northwest Fisheries Science Center
Hatfield Marine Science Center,
2032 SE Oregon State University Drive,
Newport, Oregon, 97365

By

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Executive Summary

- i. A review of Splitnose rockfish and Petrale sole stock assessments was conducted in Newport, Oregon, from 4-8th May 2008. The review was based on draft assessments circulated prior to the meeting. The reviewer actively participated in the meeting and acted as rapporteur for the Splitnose rockfish assessment.
- ii. The assessment for both species had been well prepared and documents were made available in time for pre-review. Presentations made at the review meeting were of good quality and facilitated the work of the panel.
- iii. Both assessments use Stock Synthesis as the main assessment tool, using catch, length frequency, age compositions and survey data. Much of the older catch data is derived from reconstructions from incomplete historical records. This contributes to uncertainty in the assessment. A definitive set of historical catches needs to be established for both species.
- iv. The assessments represent the best science available given the limitations of the data. It would be desirable to consider simpler methods of assessment alongside Synthesis to investigate other model assumptions and hence better evaluate model uncertainty.
- v. For Splitnose rockfish the principal uncertainties relate to the estimation of recruitment and the use of tuning in the assessment. Model runs during the review demonstrated that the estimated stock depletion was highly sensitive to the choice of the point in time when recruitment deviations are estimated and this was further altered by the tuning process. Further work is required to understand these issues and investigate possible solutions.
- vi. For Petrale sole the choice of stock recruitment function had a large effect on the perceived depletion of the stock by changing the estimate of virgin biomass. In addition the ending biomass was sensitive to the final survey observation which means that the estimate of stock status is influenced by the least robust estimates of

spawning biomass (virgin and ending biomass). This suggests that the reference points for this stock should be reviewed.

- vii. The calculated values of MSY for Petrale sole were very similar for both the Beverton-Holt and Ricker models indicating that MSY is less sensitive to the recruitment function than virgin biomass. The MSY reference values may provide a more robust choice of reference point.
- viii. The assessments are heavily dependent on survey data. The surveys are conducted from commercial fishing vessels, which means that controlling catchability is more difficult. There is a need to consider using a dedicated research vessel for West Coast fish stocks given the reliance of so many stock assessments in the region on these data and the general lack of detailed information from other sources.
- ix. Many of the details of the Stock Synthesis Program and the model appear to be known by very few people other than the software developer. The question of tuning that arose during the review is an example where neither the STAT teams nor the panel had a clear understanding of what the program was doing. There needs to be a wider understanding of the program and more experience of its use by the STAT teams especially in relation to tuning.
- x. The STAR process and meeting arrangements functioned very well. The one limitation on the meeting was the absence of access to a local area network which meant that files had to be exchanged using memory sticks. This is not particularly efficient and also makes printing documents more difficult. All STAR panel meetings should have access to at least a local area network, internet access and access to a network printer.

Background

1. The STAR panel is part of the Pacific Fishery Management Council's process to provide peer review. Petrale sole was last assessed in 2005, with separate models for northern and southern areas. The current assessment is an integrated coast-wide assessment for the second most valuable flatfish species on the west coast. The assessment for splitnose rockfish is the first full stock assessment following a preliminary assessment in 1994. It is an important species in the slope rockfish fishery and may serve as an indicator species for unassessed slope rockfish species. These two benchmark stock assessments 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 took place during a formal, public, multiple-day meeting of fishery stock assessment experts in Newport, Oregon, between 4-8th May 2009.

Description of the Individual Reviewer's Role in the Review Activities

2. Prior to the panel review in Newport, Oregon, documents relating to the two stock assessments were made available through FTP. The materials included full draft reports of the assessments of the two stocks, earlier assessments and related material (see Appendix 1). These documents were reviewed prior to the commencement of the meeting. During the meeting the reviewer actively participated in the discussions and suggested improvements to the baseline runs and sensitivity runs to evaluate uncertainty. The reviewer acted as rapporteur for the Splitnose rockfish assessment and provided a first draft to the Chair for the STAR panel report section dealing the requests to the STAT team for additional runs.

Summary of Findings for each ToR

Become familiar with the draft Petrale sole and splitnose rockfish 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.

3. Draft preliminary assessment documents were circulated before the STAR panel meeting for both stocks. In each case the documents were as complete as would be expected in draft form. They contained an Executive Summary and detailed descriptions of the data, model configuration, results and sensitivity analysis.
4. The documents were reviewed before the meeting and discussed in detail during the first two days of the meeting.

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

Splitnose Rockfish

5. There is relatively little data for this species. There are few length frequency data for the landings and very few observations on discards. There is some age data from landings but these were not used in the assessment due to high variability and bias in age reading. Much of the catch data for the period up to the 1960s is based on reconstructions from mixed rockfish landings and most of this comes from California. More recent landings data are based on official data from PACFIN and CALCOM and are considered more reliable.
6. Survey data are available from four surveys:
 - AFSC shelf triennial: 1977-2004
 - AFSC slope: 1988-2001
 - NWFSC shelf-slope: 2003-2008
 - NWFSC slope: 1999-2002
7. The AFSC triennial survey is based around transects running from the shelf out to the edge and down the slope. This survey has changed in its geographical coverage, timing and depth range during the time series. The AFSC slope survey also shows changes in geographical coverage. Other surveys are of a standard stratified random design and are consistent in coverage by area and depth.

8. There is generally a need for more age data. Age reading methodology needs to be validated and in particular to ensure that there is consistency within and between age readers.
9. The surveys are critical elements of the available data because there is very little other data for the assessment to use. The surveys appear to be conducted along standard lines except that they are dependent on a differing variety of commercial vessels which will inevitably lead to variability in survey sampling efficiency, q , with consequences for the noise in the abundance estimates. It would be desirable, if possible to establish a survey series based on a dedicated research vessel to minimize this problem.

Petrale sole

10. Detailed data on landings length frequencies and ages are available for this species from the mid 20th century onwards. There is some data for discards on fraction discarded and length frequencies from 2002 onwards. As with the Splitnose rockfish, landings from the period prior to the mid 20th century are largely based on reconstructed catches. More recent landings data are drawn from PACFIN and CALCOM.
11. The same surveys that pertain to Splitnose are potentially available for Petrale assessments, but given the higher abundance of sole on the shelf, only the triennial and AFSC shelf-slope surveys were used. The same comments on these surveys as described for Splitnose apply for this species.

Comment on quality of data used in the assessment.

Splitnose Rockfish:

12. Much of the catch data are reconstructed from historical information and have been revised from previous assessments. They are dependent on deriving estimates from splitnose rockfish from records of mixed rockfish landings and it is difficult to determine how reliable this process is. There appears to be more work required to finally arrive at a definitive series for the older landings. Age data from landings were not used in the assessment due to bias and inconsistency between age readers. The most recent age data from the surveys was used as there appeared to be little bias and greater consistency between readers. Given the longevity of the species (~80 years) age determination is always likely to be subject to relatively high variability and will make the estimation of year class strength more difficult.
13. The survey data are probably the most important for the assessment. Splitnose is a minor species and it is difficult to evaluate how effective the survey is at sampling its relative abundance. There is anecdotal information that Splitnose can occur in dense concentrations at times, and this may affect the abundance estimates that assume a more or less random distribution. A GLMM model was used, where vessels are treated as random effects, to post stratify the survey catches to derive

abundance estimates. This appeared to be a desirable approach to account for changes in survey vessel.

Petrale sole:

14. Both age and length information appear to be satisfactory for this species. Comparison of age readings with radio-carbon analyses suggests that there is both consistency and low bias in the data.
15. The survey data are an important source of information for the assessment especially for the most recent years. As with Splitnose, a GLMM model was used to post stratify the survey before estimating abundance and is appropriate.
16. Catch data for the early period up to the mid 20th century are subject to high uncertainty as they are based on reconstructions from historical records.

Evaluate and comment on analytic methodologies

17. Both assessments use Stock Synthesis as the core assessment method. The approach is well established in the region and has been used before in assessing these and similar species. The version of Synthesis used was updated during the meeting from 3.02e to 3.03a. The later version is said to deal with minor problems in the earlier version. Standard model runs using each version did not differ materially.
18. Synthesis is a statistical model using a likelihood approach. A forward projection population dynamics model is used to generate observed quantities such as length frequencies, abundance indices and catches which are compared with actual observations of these quantities to obtain a best fit. Given the overall paucity of data on these stocks this is a suitable approach which makes best use of the available information. Its potential weakness is that because so little data exist a number of important assumptions have to be made about selectivity and the stock-recruitment relationship for which there is no real information.
19. In both stocks a GLMM approach was used to derive survey abundance estimates. The reasons for this are twofold. Firstly because the surveys are conducted using commercial fishing vessels, it is difficult to control for survey catchability. Secondly, because the surveys are general purpose their stratification may not suit the estimation of abundance for the species concerned. The GLMM modeling offers a means for removing the random effects of the survey vessels and to define more appropriate strata for abundance estimation. For both species the approach appeared to have been applied appropriately and should provide improved abundance indices over the raw data.

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.

20. For both species an age structured population dynamics model was assumed with constant natural mortality (M), variable selectivity by length, constant growth, fixed age/size dependent maturity and a Beverton-Holt stock recruitment function. Selectivity and growth were estimated within the model while maturity was estimated externally. For Splitnose, natural mortality was estimated externally using the Hoenig method while for Petrale sole a Hoenig based prior was derived and the model was allowed to estimate M . For sole M was sex dependent. In both assessments a discard retention curve was estimated.
21. The general assumptions made above are standard for age structured fish populations. It is important to note, however, that the stock recruitment curve assumption is a default in the absence of data that offer a clear choice of function. The stock-recruit function can have an important bearing on the estimation of depletion levels in relation to reference points and this is material to the discussion on Petrale sole (see below).

Splitnose rockfish:

22. All model runs showed a qualitatively similar trend in spawning output over the period of estimation. This was high in the early years, reached a minimum in the 1990s followed by a rapid increase during the 21st century. Typically the depletion level is estimated in the region of 0.5. However, two notable features of the assessment emerged during the panel discussion as a result of additional runs requested. These showed that the assumptions about recruitment estimation, and the use of tuning had a large effect on the model results.
23. The initial baseline run had estimated recruitment deviations from the start year when only total catch data are available. When this was changed to starting recruitment deviation estimation from 1960 there was a very substantial downward revision of virgin biomass and ending biomass. If in addition, steepness was estimated within the model, then the overall depletion was 0.71 compared with the baseline value of 0.49. Runs which substituted a Ricker curve for the baseline Beverton-Holt model gave a depletion value of 0.31. Since there is very little signal in the early data to estimate recruitment deviations, and similarly there is no real information on the form of the stock recruitment curve, these differences are a measure of the uncertainty in the depletion level.
24. The runs described above were all non-tuned. When tuning was applied (i.e. iteratively re-calculating the effective sample size and variance of the recruitment deviations, σ_r) there were substantial revisions to the population estimates. In these runs the spawning output trends were much more similar in shape but differed in their scale. For these runs the range of estimated depletion was lower (0.51-0.73).
25. There was considerable discussion about the appropriateness of tuning with no real conclusion reached and it remains an issue which needs further investigation. The large impact that tuning has on the results means that understanding the reasons for this difference is of some importance.
26. One of the reasons why recruitment estimation appears to be problematic is that the values for the early years when biomass is high are lower than the values for more

recent years when biomass is low. This is somewhat contradictory to the assumption in the Beverton-Holt curve in the baseline model. However, the use of a Ricker curve, which could explain this problem, did not resolve the issue. It also appears that the very large recruitment deviations apparent in recent years contribute to this problem since the model generally tried to estimate values of σ_r greater than the input value. It may be that the model has difficulty in reconciling the inconsistency between the early and more recent recruitment trends (and deviations) which manifests itself as a high level of sensitivity when assumptions are changed.

27. Overall, although the stock general trend appears to be robust, the speed and strength of the recent recovery is unprecedented and needs to be treated with caution given the sensitivity of the assessment to various assumptions.

Petrale sole:

28. Biomass trends in Petrale sole show a long term decline with fairly rapid reduction in the first half of the 20th century but a much slower gradual decline post WWII. The more recent years show a modest increase.
29. Additional runs requested during the panel discussions focused mainly on the stock-recruitment assumption, changes in selectivity and sensitivity to the most recent survey data. These runs all indicate that during the period when detailed data exist from the mid 20th century onwards, the estimated stock trajectory remains well defined and is relatively insensitive to changing model assumptions.
30. Changing the recruitment function from a Beverton-Holt curve to a Ricker curve makes a substantial difference to the scale of the stock size in earlier years. Given that the more recent stock trends are well defined, the effect of this change is to make a large difference to the perceived depletion of the stock. While the Beverton-Holt configuration implies the stock is overfished (depletion of 0.12), the Ricker run indicates that the stock at close to non-overfished limit (depletion of 0.22). The Ricker formulation fits the data almost as well the baseline Beverton-Holt run and there is nothing to choose between the runs on the basis of the model fit, suggesting equally plausible models. This is of particular significance for the derivation and choice of reference points, discussed below.
31. Sensitivity runs that omitted the most recent survey data show that the estimate of ending biomass is heavily influenced by the survey observations. This is to be expected, but it means that the uncertainty in the survey will translate directly into uncertainty in the ending biomass and its status with respect to virgin biomass.
32. The initial baseline run estimated selectivity separately in a series of time blocks to allow for changes in the fishery. The choice and need for these blocks was questioned by the panel and various additional runs looked at alternative 'blocking' regimes. Initially it was thought that no blocking would lead to equally good model fits. This did not prove to be the case where there was a clear loss of goodness of fit by fixing selectivity over the whole time period. However, it did not prove possible to identify time blocks that corresponded to distinct management changes. In the

end a regime based on ten year blocks appeared to capture the changes in selectivity without increasing the number of estimated parameters unduly.

33. Perhaps the two most important features of the sensitivity runs are the effect of changing the stock-recruitment curve and the influence of the survey data on the most recent year. The particular significance of these features is that they both directly affect the assessment of the status of the stock in relation to reference points. In effect, the status of the stock is being judged against the two least reliable estimates of stock size. The definition of the overfished biomass threshold is conditioned on the assumed stock recruitment curve which is unknown. Importantly, the estimates of B_{msy} and F_{msy} appear to be relatively insensitive the choice of stock-recruitment curve. This is because MSY occurs within the range of observed spawning biomass in the region of stock history when there is most data and the assessment most robust. By contrast virgin biomass, that defines the stock depletion threshold, is dependent on recruitment values that are generated from biomass values extrapolated well beyond the observed range.
34. Current fishing mortality is estimated to be very close to estimated F_{msy} and it would appear fishing close to MSY has prevailed for many years. This would suggest that the present definition of reference points based on virgin biomass needs to be reviewed with a view to defining more robust values.

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

35. The assessments for Splitnose rockfish and Petrale sole both represent the best available science but the interpretation of the assessments requires care, as indicated in the foregoing discussion.

Recommendations for any further improvements

Splitnose rockfish

36. Further work is required on the use of tuning in the assessment to understand why the effects on the outputs are so large and what the most appropriate way to tune the assessment is.
37. The problems with recruitment estimation in the assessment need to be investigated. In particular the very large recruitment deviations in recent years need to be better understood especially if there are associated problems with age reading information

Petracle Sole

38. The change in selectivity of the commercial fleets over time needs to be further investigated. It is clear that important changes have occurred that affect the assessment and work is required on how best to account for these in the model configuration.
39. There are good reasons to question the present reference point definitions and research is required on more robust reference points.

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

40. Much of the panel review proceeding and discussion have been noted above. Overall there was good agreement between the panel, the STAT teams and observers on the uncertainties and issues relating to each of the stocks. The principal issues that arose were:
- Recruitment estimation for splitnose rockfish
 - The use of tuning in the splitnose assessment
 - The influence of stock-recruitment function on reference points for Petrale sole
 - The choice of blocking regime for selectivity estimation in Petrale sole
41. Discussions during the meeting were constructive and the STAT teams responded very efficiently to the panel requests. Significant progress was made on the questions that arose during the review and all participants felt that improvements had been made to the baseline models in each case.

Conclusions and Recommendations in accordance with the ToRs

42. The assessment for both species had been well prepared and documents were made available in time for pre-review. Presentations made at the review meeting were of good quality and facilitated the work of the panel.
43. Both assessments make extensive use of very old catch data where records are incomplete and estimates of landings have had to be based on reconstructions that by necessity make assumptions about species composition and fill-in rules. These records influence the estimates of early stock history and therefore need to be treated with caution. **There is a need to arrive at a single definitive work up of these historical data so the future assessments are based in a unique reference data set.**
44. The assessments are heavily dependent on survey data. In general these appear suitable for Petrale sole, perhaps less so for Splitnose rockfish where the model fit is less convincing. The surveys are conducted from commercial fishing vessels which means that controlling catchability is more difficult. **There is a need to consider using a dedicated research vessel for West Coast fish stocks given the reliance of so many stock assessments in the region on these data and the general lack of detailed information from other sources.**
45. Stock Synthesis is the main assessment tool for nearly all the groundfish stocks in the region. It is a very effective method, but the dependence on a single method means that the full range of model uncertainty is not adequately explored. It would be useful to apply models which made different assumptions, especially on stock dynamics to investigate alternative explanations of the data. **There is a need to**

consider simpler methods of assessment that require fewer detailed structural assumptions to examine the range of model uncertainty.

46. Many of the details of the Stock Synthesis Program and the model appear to be known by very few people other than the software developer. The question of tuning that arose during the review is an example where neither the STAT teams nor the panel had a clear understanding of what the program was doing. **There needs to be a wider understanding of the program and more experience of its use by the STAT teams especially in relation to tuning.**
47. The sensitivity of the Petrale sole assessment to assumptions about the stock recruitment relationship highlights the need to review the robustness of the choice of reference points that are conditioned on virgin biomass. At least for the sole, it would appear that more robust reference points could be derived directly from MSY calculations. **There is a need to review reference points for Petrale sole in the light of sensitivities to recruitment assumptions.**
48. The STAR process and meeting arrangements functioned very well. There was a constructive dialogue between all participants and the STAT teams responded very efficiently to panel requests. The one limitation on the meeting was the absence of access to a local area network which meant that files had to be exchanged using memory sticks. This is not particularly efficient and also makes printing documents more difficult. **All STAR panel meetings should have access to at least a local area network, internet access and access to a network printer.**

Appendix 1: Materials provided for the review

Terms Of Reference For The Groundfish Stock Assessment And Review Process For 2009-2010

Melissa A. Haltuch and Allan Hicks. DRAFT Status of the U.S. petrale sole resource in 2008

Gertseva, V, Cope, J. and Pearson D. Status of the US splitnose rockfish (*Sebastes diploproa*) resource in 2009

Jean Beyer Rogers. Preliminary status of the splitnose rockfish stock in 1994

Petrale sole- Southern stock STAR panel report April 2005

Petrale sole STAR panel report September 2005

User Manual for Stock Synthesis Model Version 3.02B

Zipped files containing the input files for stock synthesis runs

Executable files of the Synthesis version used in initial baseline runs.

Appendix 2: Statement of Work for Dr. Robin Cook

Stock Assessment Review Panel for Petrale Sole and Splitnose Rockfish

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: Petrale sole was last assessed in 2005, with separate models for northern and southern areas. This assessment will focus on developing an integrated coast-wide assessment for the second most valuable flatfish species on the west coast. This will be the first stock assessment for splitnose rockfish, which is an important species in the slope rockfish fishery and may serve as an indicator species for unassessed slope rockfish species. 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 is also included as background material.

The Terms of Reference (ToRs) for the CIE 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, with one of the reviewers participating in all 2009 STAR panels (other than hake) to provide a level of consistency between the panels. 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 reviewer 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 Newport, Oregon during May 4-8, 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 Petrale sole stock assessment and STAR Panel report;
- 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 reviewers' responsibilities are 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 Newport, Oregon, from May 4-8, 2009, as called for in the SoW, and conduct an independent peer review in accordance with the ToRs (Annex 2);
- 3) No later than May 22, 2009, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivilani, 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.

30 March 2009	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
20 April 2009	NMFS Project Contact sends the CIE Reviewers the pre-review documents
4-8 May 2009	Each reviewer participates and conducts an independent peer review during the panel review meeting
22 May 2009	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
5 June 2009	CIE submits CIE independent peer review reports to the COTR
12 June 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 Petrale Sole and Splitnose Rockfish

1. Become familiar with the draft Petrale sole and splitnose rockfish 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.
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

PETRALE SOLE AND SPLITNOSE ROCKFISH STOCK ASSESSMENT REVIEW (STAR) PANEL

May 4-8, 2009,
Northwest Fisheries Science Center
Hatfield Marine Science Center,
2032 SE Oregon State University Drive,
Newport, Oregon, 97365

Monday, May 4, 2009

- 8:30 a.m. Welcome and Introductions (Stacey Miller, NMFS).
- 8:45 a.m. Review the Draft Agenda and Discussion of Meeting Format
(Theresa Tsou, Panel Chair, SSC rep).
- Review Terms of Reference for Assessment and Review Panel
 - Assignment of reporting duties
 - Discuss and agree to format for the final assessment document
- 9:15 a.m. Stock Assessment Team Presentation of Petrale Sole (Melissa Haltuch and Allan Hicks)
- Overview of Data and Stock Synthesis Modeling
- 12:00 p.m. Lunch (On Your Own)
- 1:30 p.m. Q&A session with the Petrale sole STAT & Panel discussion
- 3:30 p.m. Coffee Break
- 3:45 p.m. Panel develops request for additional model runs / analyses for Petrale sole STAT
- 4:30 p.m. Panel provides written requests for additional model runs / analyses to Petrale sole STAT
- 5:30 p.m. Adjourn for day.

Tuesday, May 5, 2009

- 8:30 a.m. Stock Assessment Team Presentation of Splitnose Rockfish (Vladlena Gertseva and Jason Cope)
- Overview of Data and Stock Synthesis Modeling
- 12:00 p.m. Lunch (On Your Own)
- 1:30 p.m. Q&A session with the Splitnose Rockfish STAT & Panel discussion
- 3:00 p.m. Coffee Break
- 3:15 p.m. Panel develops written request for additional model runs / analyses for Splitnose rockfish STAT
- 4:00 p.m. Panel check in with Petrale sole STAT
- 5:30 p.m. Adjourn for day.

**PETRALE SOLE AND SPLITNOSE ROCKFISH
STOCK ASSESSMENT REVIEW (STAR) PANEL**

Wednesday, May 6, 2009

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

Thursday, May 7, 2009

- 8:30 a.m. Petrale sole STAT Presentation of Second Set of Model Runs
- Q&A session with the Petrale sole STAT & 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.
- 12:00 p.m. Lunch (On Your Own)
- 1:30 p.m. Splitnose rockfish STAT Presentation of Second Set of Model Runs
- Q&A session with the Splitnose rockfish STAT & 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, May 8, 2009

- 9:00 a.m. Consideration of remaining issues
- Review decision tables for Petrale sole and Splitnose rockfish
- 11:00 a.m. Panel agrees to process for completing final STAR report by Council Briefing Book deadline (05/27 for Council's June Briefing Book).

Panel Adjourns When All Business Is Completed.

Appendix 3 Participants for the Petrale sole and Splitnose rockfish Stock Assessment Review (STAR) Panel

May 4-8, 2009,
Northwest Fisheries Science Center
Hatfield Marine Science Center,
2032 SE Oregon State University Drive
Newport, Oregon, 97365

Panel Reviewers

Theresa Tsou, Scientific and Statistical Committee (SSC) Representative, Panel Chair
JJ Maguire, Center for Independent Experts (CIE)
Robin Cook, Center for Independent Experts (CIE)
Xi He, Southwest Fisheries Science Center (SWFSC)

Panel Advisors

Brad Pettinger, Groundfish Advisory Subpanel (GAP) Representative
Daniel Erikson, Groundfish Management Team (GMT) Representative
John DeVore, PFMC Representative

Stock Assessment (STAT) Team

Petrable sole

Melissa Haltuch and Allan Hicks, NMFS Northwest Fisheries Science Center (NWFSC)

Splitnose rockfish

Vladlena Gertseva and Jason Cope, NMFS, NWFSC