Cefas

2008 SEDAR 17 Stock Assessment Review for:

CIE Independent System for Peer Review

Dr. Beatriz Roel

October 2008

Spanish mackerel, *Scomberomorus maculatus*

Vermillion snapper, *Rhomboplites aurorubens*

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Executive Summary

The SEDAR 17 Review Panel provided an independent peer review of key decisions and outputs from the Data and Assessment Workshops for South Atlantic Spanish mackerel and vermillion snapper. The review was held from 20 to 24 October 2008, in Savannah, Georgia. Data and assessment reports were presented to the Panel, and issues considered against the Review Panel's Terms of Reference through open discussion. Additional analyses were requested at the review, and the results were considered. The Panel examined whether the Data and Assessment Workshop responses to their Terms of Reference (ToRs) were adequate, complete, and scientifically sound, and determined whether base-case analyses were preferred for determining stock status and developing management references.

The base run for Spanish mackerel was not considered adequate to address all ToRs, so the assessment was only accepted in part as a consequence. Concerns raised are documented in the Review Panel's consensus report. The base run for the vermillion snapper assessment was appropriate for providing management advice, but the results were conditioned on the assumptions made within that assessment model. Moreover, there were a number of uncertainties, which are fully documented within the SEDAR 17 Review Panel consensus report. Results from sensitivity runs illustrated the levels of uncertainty.

This reviewer supports the contents of the Review Panel consensus report, where all ToRs were addressed followed by a summary of the Panel discussions. A *Summary of findings* where this reviewer felt further clarification or additional comments could be helpful is provided below under the corresponding heading. Main issues considered in relation to the Review Panel ToRs are the following:

1. Adequacy, appropriateness and application of data:
    a. Extrapolations to fill in missing historical recreational and discard landings data;
    b. Lack of a fishery-independent index for the adult Spanish mackerel stock.
2. Stock assessment methods:
    a. *Ad hoc* weighting of the likelihood components;
    b. Partial bootstrapping, where only uncertainty in the assumed stock–recruitment relationship was taken into account;
    c. Limited use of catch curves;
    d. A need to compare the main assessment results with those from models of comparable complexity.
3. Estimates of stock abundance, biomass and exploitation measures:
    a. Sensitivity to model assumptions;
    b. In the case of Spanish mackerel, no annual estimates of fishing mortality were accepted.
4. Methods used to estimate population benchmarks and management parameters:
    a. Robustness tests highlighted the sensitivity of these estimates to the assumptions;
    b. Uncertainty in the estimates needs to be taken into account when determining the state of the stock in relation to reference points.

5. Adequacy and application of methods to project future population status:
   a. A wider range of uncertainty needs to be incorporated in 20-year projections, for the outcome to have utility.
   b. Uncertainty in the Spanish mackerel assessment prevented endorsement of the forecast of future stock condition prepared by the assessment workshop.
6. Adequacy and application of methods used to characterize uncertainty:
   a. Only estimates of precision for benchmarks and the stock–recruitment parameters by means of partial bootstrapping are provided for the primary assessment model (statistical catch-at-age, SCA). This is not adequate.

Background

The South East Data, Assessment, and Review (SEDAR) is a process for fisheries stock assessment development and review conducted by the South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils; NOAA Fisheries Southeast Fisheries Science Center (SEFSC) and Southeast Regional Office (SERO); and the Atlantic and Gulf States Marine Fisheries Commissions. SEDAR is organized around three workshops: data, assessment, and review. Input data are compiled during the data workshop, population models are developed during the assessment workshop, and an independent peer review of the data, assessment models, and results is provided by the review workshop. SEDAR documents include working papers prepared for each workshop, supporting reference documents, and a SEDAR stock assessment report. The SEDAR stock assessment report consists of a data report produced by the data workshop, a stock assessment report produced by the assessment workshop, and a peer review consensus report prepared by the review workshop.

SEDAR is a public process conducted by the Fishery Management Councils in the Southeastern US. All workshops, including the review, are open to the public and noticed in the Federal Register. All documents prepared for SEDAR are freely distributed to the public upon request and posted to the publicly accessible SEDAR website. Verbal public comment during SEDAR workshops is taken on an "as needed" basis; the workshop chair is allowed discretion to recognize the public and to solicit comment as appropriate during Panel deliberations. Written comments are accepted in accordance with existing Council operating procedures. The names of all participants, including those on the Review Panel, are revealed.

The review workshop provides an independent peer review of SEDAR stock assessments. The term "review" is applied broadly, because the Review Panel may request additional analyses, error corrections and sensitivity runs of the assessment models provided by the assessment workshop panel. The Review Panel is ultimately responsible for ensuring that the best possible assessment is provided through the SEDAR process. The Review Panel task is specified in the form of terms of reference (ToRs).

The SEDAR 17 review panel consisted of three Center for Independent Experts (CIE)-appointed reviewers and a chair appointed by the SEFSC director. Council staff, Council members, and Council AP and SSC members were allowed to attend as observers. Members of the public were also permitted to attend SEDAR review workshops.

This document represents the individual CIE Reviewer Report on the results of the Review Panel deliberations on the assessments of South Atlantic Spanish mackerel and vermillion snapper on which the reviewer sat, at the request of the Center for Independent Experts (see Appendix 1). This reviewer was provided with the Data and Assessment Workshop reports for each species (see bibliography), and participated fully in the SEDAR Review Panel process.

Description of review activities

This review was undertaken by Dr Beatriz A. Roel at Cefas (Lowestoft, UK) and during the SEDAR Review Panel held in the Hampton Inn and Suites, Savannah, Georgia, October 20–24, 2008. The target species were South Atlantic vermilion snapper and Spanish mackerel.

The documentation (see bibliography) was reviewed prior to the meeting. I actively participated in the SEDAR panel meeting in Savannah and assisted with development of the SEDAR Review Panel meeting report. This separate report to CIE was completed on my return to Cefas.

The lead assessment scientists presented the individual data and assessment reports to the Panel, and issues were considered against the Review Panel's ToRs through open discussion. In turn, additional sensitivity runs were requested by the Review Panel, including by myself, and further consideration of these results was made in Savannah. The Review Panel examined whether the Data and Assessment Workshop's responses to their ToRs were adequate, complete, and scientifically sound, and determined whether the base-case analyses were appropriate for determining stock status and developing management references.

Summary of findings

The SEDAR 17 Review Panel for Spanish mackerel and vermillion snapper stock assessments met after a rigorous process of data gathering, collation and analysis had taken place. The data workshop (DW) and assessment workshops (AW), which preceded the Review, should be congratulated for their thorough, well-documented process leading to the assessment of the two stocks. Moreover, I personally thank the stock assessment team (AT) for their responsiveness and professionalism in providing additional analyses on the request of the Review Panel of which I was part.

My own review comments were fully incorporated in the SEDAR 17 Review Panel consensus report. Below, however, my summary of findings is presented as stipulated in my own Statement of Work against each of the Review Panel Terms of Reference (Appendix 1). Within these, generic and assessment-specific observations and recommendations have been and are developed. Note that only where I have noted additional relevant issues to those presented in the consensus report are they highlighted here. All my other comments can be found in the consensus report.

Numbered recommendations (emboldened below) are correspondingly numbered within the Conclusions/recommendations section of this report, later.

1. **Evaluate the adequacy, appropriateness, and application of data used in the assessment**

As part of the Review Panel, I share the concerns regarding extrapolations from a small number of data points to estimate the historical recreational and discard landings. The impact of those assumptions was explored by sensitivity testing to alternative landings streams, However, the uncertainty regarding the data, which were fitted exactly, did not propagate to the parameter estimates and associated CVs. Uncertainty in MSY-related benchmarks are not provided for Spanish mackerel (Figures 3.39 and 3.42 in the document for peer-review are the same).

In the case of Spanish mackerel, there is no fishery-independent index for adults. This is problematic for a schooling species where hyperstability in commercial cpue (catch per unit effort) would be expected (Hilborn and Walters, 1992).

Recommendation 1. To run the assessments for the period where reliable landings data are available (probably the early 1980s for both stocks) and compare the estimates, as well as the uncertainty on recruitment parameters and on MSY-related benchmarks.

Recommendation 2. Spanish mackerel produce pelagic eggs that hatch some 25 h after fertilization at water temperatures averaging 26ºC. Spawning is from April to September, and they are batch spawners. Given these features, an egg production survey could be used to estimate spawning-stock biomass (SSB). Several issues arise here (Steve Milligan (Cefas) pers. comm.):

(i)   If the spawning overlaps with that of *Scomber scombrus*, then the eggs would be indistinguishable from one another. DNA analysis may be required to separate the eggs of the two taxa.

(ii)   Whether Daily Egg Production (DEPM) or Annual Egg production (AEP) methods are implemented would depend on the determinacy of spawning. If there is *de novo* vitellogenesis, then a DEPM would be the recommended procedure.

(iii)   The total cost of an egg survey would depend on ship's time and analytical time requirements. To reduce analytical time, egg sorting could be done at sea depending on the stability of the vessel, the availability of expertise and confidence in the analysts, as well as the volume of other plankton caught. If the spawning distribution is tight and the season short, then egg survey time could be reduced considerably.

2. Evaluate the adequacy, appropriateness, and application of methods used to assess the stock

2.1. <u>Model uncertainty</u>

In all three assessments, a variety of assessment models was used. SCA was the main tool. In addition, a stock reduction analysis, a production model and catch curves were used. These models are less complex than SCA, and did not require the same input data. They were used for verifying the results and to provide insight into uncertainty attributable to model structure. However, for the analysis to be helpful, results should be comparable and presented in a manner that facilitates such comparison.

Recommendation 3. Decide on standard graphs for comparison between models. Time-series of absolute values of SSB, recruitment and *F* are useful for this purpose.

Recommendation 4. Compare the results from SCA with another catch-at-age model, preferably a published, well-tested method, e.g. Adapt VPA (Gavaris, 1988), Integrated Catch Analysis (ICA; Patterson, 1998), the ASAP model (Legault and Restrepo, 1998), or C++ algorithmic stock assessment laboratory (CASAL, Bull *et al*., 2005).

Recommendation 5. In the case of Spanish mackerel, there could be use in comparing the results from SCA with a much simpler model such as Catch Survey Analysis (CSA; Mesnil, 2003), which models recruitment separately from fully recruited ages. As input data, it requires recruitment and fully recruited population indices as well as catch data aggregated in a similar manner.

Catch curves can be used successfully for data exploration. In particular, year-class curve models (YCC), fitted to the log abundance-at-age of a cohort can be used to look at changes in total mortality over time, and to examine the internal consistency in both catch and survey data. Further, slightly more complex models can be used to explore the combination of selectivity/availability-at-age, geographical differences in total mortality and/or relative recruitment strength, and temporal variation in total mortality (see Cotter *et al*., 2007).

Recommendation 6. Explore the available age-disaggregated indices of abundance by means of year-class curve models.

2.2. Model likelihood weighting

Weights of the various components of the likelihood were determined by means of a stepwise procedure that aimed at achieving the best possible fit to the landings, discards and bycatch time-series. The weights of remaining input data, age and length composition and indices, were determined by considering trade-offs between best possible fits to each set of data. There are two main issues here:

(i)   The uncertainty in the landings data was not taken into account in the fitting process, so could not be propagated to model estimates;

(ii)   The weighting is subjective and does not allow computation of variances of the likelihood components. Standardized residuals cannot be computed as a result.

Recommendation 7. Further develop the existing model to incorporate the main features of a statistical catch-at-age (SCA) assessment model.

2.3. Estimates of the stock–recruitment relationship

The SCA estimates of recruitment were conditioned on a Beverton and Holt model. Examination of the historical stock and recruitment estimates did not suggest a strong relationship. Sensitivity tests performed during the review workshop showed that the model was sensitive to the functional form assumed.

Recommendation 8. Condition recruitment on the geometric mean of historical estimates, then fit the stock and recruitment pairs using a segmented regression approach (Barrowman and Myers, 2000).

3. **Recommend appropriate estimates of stock abundance, biomass, and exploitation measures**

Estimates of stock abundance, biomass and exploitation presented by the assessment workshop were based on the SCA base run for both stocks. Terminal values were sensitive to model assumptions. The Review Panel only partially accepted the base run for Spanish mackerel, and I fully endorse the Panel reservation that there is no basis to recommend appropriate estimates of stock abundance, biomass and exploitation for this stock. In the case of vermillion snapper, where the assessment was accepted by the Review Panel, the SCA base run provides appropriate estimates of stock abundance, biomass and exploitation.

4. **Evaluate the methods used to estimate population benchmarks and management parameters (e.g. MSY, Fmsy, Bmsy, MSST, MFMT, or their proxies); provide estimated values for management benchmarks, a range of allowable catches (ABC), and declarations of stock status relative to benchmarks**

The Review Panel did not endorse the use of MSY-based metrics of stock status for either stock, and instead recommended the use of proxies. The MSY-based metrics depend on the stock and recruitment function assumed, steepness in particular. This dependence was underscored by the results from the sensitivity tests. The stock and recruitment relationship appeared weak for both stocks, so the use of proxies which seemed more stable was justified.

Although the assessment workshop presented the probability density function (pdf) for the MSY-related benchmarks, those were not taken into account directly when determining stock status. The application of the precautionary approach adopted both in ICES (ICES, 1997) and NAFO (Gabriel and Mace, 1999) indicates that for stocks and fisheries to be within safe biological limits, there should be a high probability that SSB is above a limit $B_{\lim}$ below which recruitment becomes impaired or the dynamics of the stock are unknown, and that fishing mortality is below a value $F_{\lim}$ that will drive the spawning stock to that biomass limit. Because of uncertainty in the annual estimation of F and SSB, ICES defines the more conservative operational reference points, B_{pa} (higher than $B_{\lim}$) and F_{pa} (lower than $F_{\lim}$), where the subscript "pa" accounts for precautionary approach (ICES, 1997). In short, precautionary reference points allow for uncertainty in estimates to be taken into consideration, and their aim is to ensure that the stock is kept away from limit reference points, with high probability.

Recommendation 9. Take into account uncertainty in the benchmark estimates and in the assessment terminal SSB and F to determine the state of the stock in relation to reference points which will trigger management action.

5. **Evaluate the adequacy, appropriateness, and application of the methods used to project future population status; recommend appropriate estimates of future stock condition (e.g. exploitation, abundance, biomass)**

The stocks were projected forward 20 years from the starting population numbers estimated by the assessment. Stochasticity was introduced by a Monte Carlo simulation taking into account uncertainty in the stock and recruitment relationship. This approach basically ignores other sources of error, such as process error, measurement error and estimation error relative to key model parameters. Further, long-term prediction (20 years or more) of the stock condition will be highly dependent on the stock and recruitment function assumed, which may be questionable (see comments under 2.3 above). Appropriate estimates of future stock condition cannot be recommended for Spanish mackerel because of uncertainty in the assessment. Estimates of future condition for vermillion snapper as presented by the assessment team were appropriate given that overfishing is taking place.

Recommendation 10. Perform long-term predictions to evaluate recovery plans or management plans. This would best be done in the context of Management Strategy Evaluation (MSE), which uses computer simulations to identify strategies that can satisfy multiple objectives and are robust to uncertainty (Butterworth and Punt, 1999; De Oliveira *et al.*, 2008).

6. Evaluate the adequacy, appropriateness, and application of methods used to characterize uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters. Ensure that the implications of uncertainty in technical conclusions are clearly stated

Uncertainty in benchmarks (SCA, both stocks) was determined by bootstrapping log-residuals from the stock-and-recruitment fit. Structural uncertainty was examined by performing the assessment on the basis of two additional models. Robustness to assumptions was tested through sensitivity runs. Although this approach is not incorrect and seems to meet advisory requirements, the precision of parameter estimates should reflect a wider range of uncertainty.

In the case of the stock reduction analysis, Figure 3.65 for Spanish mackerel, posterior distributions of parameters estimated by stock reduction are not very helpful. For vermillion snapper, examination of Figure 3.76, the posterior distributions of estimated parameters suggest that both steepness and σ_R were bound by the specified priors.

Recommendation 11. The SCA could be developed so that it provides measures of precision for all estimable parameters. Uncertainty in input data should be propagated to the uncertainty in the assessment results. I suggest that missing data be estimated within the assessment model, so that the missing data model parameters and their uncertainty are part of the model output.

7. Ensure that the stock assessment results are clearly and accurately presented in the stock assessment report and advisory report, and that reported results are consistent with Review Panel recommendations

The stock assessment results have been reported as requested.

8. Evaluate the SEDAR process. Identify any terms of reference which were inadequately addressed by the data or assessment workshops; identify any additional information or assistance which will improve review workshops; suggest improvements or identify aspects requiring clarification.

My opinions and views are fully reflected in the evaluation of this ToR presented in the Review Panel consensus report.

9. Review the research recommendations provided by the data and assessment workshops, and make any additional recommendations warranted. Clearly indicate research and monitoring needs that may appreciably improve the reliability of future assessments. Recommend an appropriate interval for the next assessment.

A review of the research recommendations is presented in the Review Panel consensus report, and my views are adequately reflected. Additional, numbered recommendations are specified in the preceding text.

Recommendation 12. Interval for the next assessment. Given the uncertainty in the Spanish mackerel assessment and the status of vermillion snapper, where the assessment workshop base model estimates that overfishing is occurring and that stock size is close to the overfished threshold, the interval for the next assessments should be shorter than anticipated under "normal" circumstances. I suggest that the Spanish mackerel be re-assessed once the key problems identified in the assessment are addressed and that this is followed by a peer-review process similar to that undertaken here. An update assessment in the near future to keep track of the development of the stock is suggested for vermillion snapper.

Conclusions/Recommendations

I support the conclusions and recommendations of the Review Panel as reflected in the consensus report. Additional comments and key outcomes from the review process are outlined in the text above under *Summary of findings*. Further to the recommendations provided by the Review Panel, recommendations arising from the comments provided by this reviewer are:

Recommendation 1. To run the assessments for the period where reliable landings data are available (probably the early 1980s for both stocks) and compare the estimates, as well as the uncertainty on recruitment parameters and on MSY-related benchmarks.

Recommendation 2. An egg production survey is likely to be appropriate to estimate spawning-stock biomass for Spanish mackerel. The main issues for consideration are outlined in full in the previous section.

Recommendation 3. For the purpose of comparison between the results from different models, present standard graphs. Time-series of absolute values of SSB, recruitment and *F* are useful for this purpose.

Recommendation 4. Compare the results from SCA with another catch-at-age model, preferably a published, well-tested method, e.g. Adapt VPA (Gavaris, 1988), Integrated Catch Analysis (ICA; Patterson, 1998), the ASAP model (Legault and Restrepo, 1998), or C++ algorithmic stock assessment laboratory (CASAL, Bull *et al*., 2005).

Recommendation 5. In the case of Spanish mackerel, there could be use in comparing the results from SCA with a much simpler model such as Catch Survey Analysis (CSA; Mesnil, 2003), which models recruitment separately from fully recruited ages. As input data, it requires recruitment and fully recruited population indices as well as catch data aggregated in a similar manner.

Recommendation 6. Explore the available age-disaggregated indices of abundance by means of year-class curve models.

Recommendation 7. Further develop the existing model to incorporate the main features of a statistical catch-at-age (SCA) assessment model.

Recommendation 8. Condition recruitment on the geometric mean of historical estimates, then fit the stock and recruitment pairs using a segmented regression approach (Barrowman and Myers, 2000).

Recommendation 9. Take into account uncertainty in the benchmark estimates and in the assessment terminal SSB and *F* to determine the state of the stock in relation to reference points which will trigger management action.

Recommendation 10. Perform long-term predictions to evaluate recovery plans or management plans. This would best be done in the context of Management Strategy Evaluation (MSE), which uses computer simulations to identify strategies that can

satisfy multiple objectives and are robust to uncertainty (Butterworth and Punt, 1999; De Oliveira *et al.*, 2008).

Recommendation 11. The SCA could be developed so that it provides measures of precision for all estimable parameters. Uncertainty in input data should be propagated to the uncertainty in the assessment results. I suggest that missing data be estimated within the assessment model, so that the missing data model parameters and their uncertainty are part of the model output.

Recommendation 12. Interval for the next assessment. Given the uncertainty in the Spanish mackerel assessment and the status of vermillion snapper, where the assessment workshop base model estimates that overfishing is occurring and that stock size is close to the overfished threshold, the interval for the next assessments should be shorter than anticipated under "normal" circumstances. I suggest that the Spanish mackerel be re-assessed once the key problems identified in the assessment are addressed and that this is followed by a peer-review process similar to that undertaken here. An update assessment in the near future to keep track of the development of the stock is suggested for vermillion snapper.

Appendix 1: Bibliography

Primary documentation

SEDAR17-RW01 SEDAR 17 South Atlantic Vermilion Snapper Document for Peer Review, 401pp.

SEDAR17-RW02 SEDAR 17 South Atlantic Spanish Mackerel Document for Peer Review, 377 pp.

Additional documentation received or used by the reviewer

Barrowman, N. J., and Myers, R. A. 2000. Still more spawner-recruitment curves: the hockey stick and its generalizations. *Canadian Journal of Fisheries and Aquatic Sciences*, 57: 665–676.

Bull, B., Francis, R. I. C. C., Dunn, A., McKenzie, A., Gilbert, D. J., and Smith, M. H. 2005. CASAL (C++ algorithmic stock assessment laboratory): CASAL user manual v2.07-2005/08/21. *NIWA Technical Report 127.* 272 pp.

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Cotter, A. J. R., Mesnil, B., and Piet, G. J. 2007. Estimating stock parameters from trawl cpue-at-age series using year-class curves. *ICES Journal of Marine Science*, 64: 1–14.

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Gabriel, W.L. and Mace, P.M. 1999. A review of biological reference points in the context of the Precautionary Approach. NOAA Tech. Memo. NMFS-F/SPO-40. 12pp.

Gavaris, S. 1988. An adaptive framework for the estimation of population size. Canadian Atlantic Fisheries Science Advisory Commission Research Document, 88/29.

Hilborn, R., and Walters, C. J. 1992. Quantitative Fisheries Stock Assessment, choice, Dynamics and Uncertainty. Kluwer Academic, Boston. 570 pp.

ICES. 1997. Report of the Study Group on the Precautionary Approach to Fisheries Management, February 1997. ICES Document CM 1997/Assess: 7.

Legault, C. M., and Restrepo, V. R., 1998. A flexible forward age-structured assessment program. ICCAT Working Document SCRS/98/58. 15 pp.

Mesnil, B. 2003. The catch-survey analysis (CSA) method of fish stock assessment: An evaluation using simulated data. *Fisheries Research*, 63: 193–212.

Patterson, K. R. 1998. Integrated Catch at Age Analysis Version 1.4. *Scottish Fisheries Research Report*, 38.

APPENDIX 2: Statement of Work

Overview of CIE Peer Review Process:

The Office of Science and Technology implements measures to strengthen the National Marine Fisheries Service's (NMFS) Science Quality Assurance Program (SQAP) to ensure the best available high quality science for fisheries management. For this reason, the NMFS Office of Science and Technology coordinates and manages a contract for obtaining external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of stock assessments and various scientific research projects. The primary objective of the CIE peer review is to provide an impartial review, evaluation, and recommendations in accordance to the Statement of Work (SoW), including the Terms of Reference (ToR) herein, to ensure the best available science is utilized for the National Marine Fisheries Service management decisions.

The NMFS Office of Science and Technology serves as the liaison with the NMFS Project Contact to establish the SoW which includes the expertise requirements, ToR, statement of tasks for the CIE reviewers, and description of deliverable milestones with dates. The CIE, comprised of a Coordination Team and Steering Committee, reviews the SoW to ensure it meets the CIE standards and selects the most qualified CIE reviewers according to the expertise requirements in the SoW. The CIE selection process also requires that CIE reviewers can conduct an impartial and unbiased peer review without the influence from government managers, the fishing industry, or any other interest group resulting in conflict of interest concerns. Each CIE reviewer is required by the CIE selection process to complete a Lack of Conflict of Interest Statement ensuring no advocacy or funding concerns exist that may adversely affect the perception of impartiality of the CIE peer review. The CIE reviewers conduct the peer review, often participating as a member in a panel review or as a desk review, in accordance with the ToR producing a CIE independent peer review report as a deliverable. At times, the ToR may require a CIE reviewer to produce a CIE summary report. The Office of Science and Technology serves as the COTR for the CIE contract with the responsibilities to review and approve the deliverables for compliance with the SoW and ToR. When the deliverables are approved by the COTR, the Office of Science and Technology has the responsibility for the distribution of the CIE reports to the Project Contact.

CIE Reviewer Requirements:

The CIE shall provide three CIE reviewers to conduct independent peer reviews in accordance with the Statement of Tasks, Schedule of Milestones and Deliverables, and SEDAR ToR herein. Each CIE reviewer's duties shall not exceed a maximum of 14 days for pre-review preparations, conducting the peer review at the SEDAR 17 panel review meeting, completion of the CIE independent peer review reports in accordance with the ToR, and assurance that final review comments and edits are provided to the chair. The CIE reviewers shall participate as technical reviewers on the SEDAR 17 review panel that will consider assessments of South Atlantic vermilion snapper and South Atlantic Spanish mackerel, and these stocks are assessed within the jurisdiction of the South Atlantic Fishery Management Council and the states of North Carolina, South Carolina, Georgia, and Florida. The CIE reviewers shall have expertise in stock assessment, statistics, fisheries science, and marine biology to complete their primary task of conducting an impartial and independent CIE peer review report in accordance with the ToR to determine if the best available science is utilized for fisheries management. The CIE reviewers shall not provide comments on fisheries management decisions.

Statement of Tasks for CIE Reviewers:

The CIE reviewers shall complete the following tasks and responsibilities as described in the SoW and Schedule herein.

1. CIE shall provide the CIE reviewers' contact information (name, affiliation, address, email, and phone) to the Office of Science and Technology COTR no later than the date as specified in the SoW, and the COTR will forward this information to the Project Contact.

2. Approximately two weeks before the peer review, the Project Contact will send the CIE reviewers the necessary documents for the peer review, including supplementary documents for background information. The CIE reviewers shall read the pre-review documents in preparation for the peer review to gain an in-depth understanding of the stock assessment, the resources and information considered in the assessment, and responsibilities as reviewers. Meeting materials will be forwarded electronically to review panel members and made available through the internet (http://www.sefsc.noaa.gov/sedar/), and printed copies of any documents are available by request. The names of reviewers will be included in workshop briefing materials. The list of pre-review documents may be updated prior to the panel review meeting.

3. Each CIE reviewer shall participate on the SEDAR 17 workshop panel (refer to attached agenda) to conduct an impartial and independent peer review with the purpose of determining whether the best available science was utilized. CIE reviewers shall conduct an independent peer review and participate in panel discussions on assessment methods, data, validity, results, uncertainties, recommendations, and conclusions as guided by the terms of reference.

4. Each CIE reviewer shall produce an independent peer review report addressing each of the ToR 1-9 specified herein. The CIE independent peer review report shall be completed in accordance with the Schedule of Milestones and Deliverables

specified herein. These reports shall be submitted to the CIE regional coordinator, Dr. David Sampson, via email to David.Sampson@oregonstate.edu, and to CIE lead coordinator, Mr. Manoj Shivlani, via email to shivlanim@bellsouth.net. See Annex II for complete details on the independent peer review report outline.

5. The CIE reviewers will also participate in development of a peer review consensus report for each assessment reviewed, in accordance with ToR 10 and as described in Annex I. CIE reviewers may be asked to serve as an assessment leader during the review to facilitate preparing first drafts of review summary reports. Following the review workshop, CIE reviewers will assist the chair in the development of the peer review consensus reports.

The review workshop will take place at the Hampton Inn and Suites, Savannah Historic District, 201 Martin Luther King Boulevard, Savannah, GA, from 1:00 p.m. Monday, October 20, 2008 through 1:00 p.m. Friday, October 24, 2008. The Project Contact is responsible for the facility arrangements.
Please contact Dale Theiling (SEDAR Coordinator); (843) 571-4366, Dale.Theiling@safmc.net) or John Carmichael, (Science and Statistics Program Manager); (843) 571-4366, John.Carmichael@safmc.net) for additional details.

Hotel arrangements:

Hampton Inn and Suites, Savannah Historic District
201 Martin Luther King Boulevard
Savannah, GA 31401
(912) 721-1600
"SEDAR" Group rate: $ 111.24; rate is guaranteed through September 8, 2008.

SEDAR Review Workshop Panel Tasks:

The SEDAR 17 review workshop panel will evaluate assessments of South Atlantic vermilion snapper and South Atlantic Spanish mackerel. During the evaluation the panel will consider data, assessment methods, and model results. The evaluation will be guided by terms of reference that are specified in advance. The review workshop panel will document its findings regarding each assessment in a peer review consensus report (Annex I). (Note that the consensus report is a SEDAR product, not a CIE product.) CIE reviewers shall participate on the SEDAR 17 workshop panel, conduct independent peer reviews, and produce CIE independent peer review reports to provide distinct, independent analyses of the technical issues and of the SEDAR process (refer to Statement of Tasks for CIE Reviewers). Each CIE reviewer shall contribute to a SEDAR consensus report in accordance with Annex I that will be compiled by the review panel Chair, and shall produce a CIE independent peer review report in accordance with Annex II.

Terms of Reference:

SEDAR 17 Review Workshop Terms of Reference (apply to each stock):

1. Evaluate the adequacy, appropriateness, and application of data used in the assessment[*].

2. Evaluate the adequacy, appropriateness, and application of methods used to assess the stock[*].

3. Recommend appropriate estimates of stock abundance, biomass, and exploitation[*].

4. Evaluate the methods used to estimate population benchmarks and management parameters (*e.g., MSY, Fmsy, Bmsy, MSST, MFMT, or their proxies*); provide estimated values for management benchmarks, a range of ABC, and declarations of stock status[*].

5. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status; recommend appropriate estimates of future stock condition[*] (e.g., exploitation, abundance, biomass).

6. Evaluate the adequacy, appropriateness, and application of methods used to characterize uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters[*]. Ensure that the implications of uncertainty in technical conclusions are clearly stated.

7. Ensure that stock assessment results are clearly and accurately presented in the Stock Assessment Report and Advisory Report and that reported results are consistent with Review Panel recommendations[**].

8. Evaluate the SEDAR Process. Identify any Terms of Reference which were inadequately addressed by the Data or Assessment Workshops; identify any additional information or assistance which will improve Review Workshops; suggest improvements or identify aspects requiring clarification.

9. Review the research recommendations provided by the Data and Assessment workshops and make any additional recommendations warranted. Clearly indicate the research and monitoring needs that may appreciably improve the reliability of future assessments. Recommend an appropriate interval for the next assessment.

10. Prepare a Peer Review Consensus Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Develop a list of tasks to be completed following the workshop. Complete and submit the Consensus Report within 3 weeks of workshop conclusion.

[*] The review panel may request additional sensitivity analyses, evaluation of alternative assumptions, and correction of errors identified in the assessments provided by the assessment workshop panel; the review panel may not request a new assessment. Additional details regarding the latitude given the review panel to deviate from assessments provided by the assessment workshop panel are provided in the *SEDAR Guidelines* and the *SEDAR Review Panel Overview and Instructions*.

[**] The panel shall ensure that corrected estimates are provided by addenda to the assessment report in the event corrections are made in the assessment, alternative model configurations are recommended, or additional analyses are prepared as a result of review panel findings regarding the TORs above.

These Terms of Reference may be modified prior to the Review Workshop. If so, final terms of reference will be provided to the reviewers with the workshop briefing materials.

SEDAR Review Workshop Panel Supplementary Instructions

The review panel chair is responsible for reviewing documents prior to the workshop, conducting the workshop in an orderly fashion, compiling and editing the peer review consensus report for each species assessed and submitting it to the SEDAR Coordinator by a deadline determined by the SEDAR Steering Committee and specified in the Schedule of Deliverables. The review panel chair will work with SEDAR staff to complete the SEDAR summary report. The review panel chair may participate in panel deliberations and contribute to report preparation.

Review panel members are responsible for: (1) reviewing documents prior to the workshop, (2) participating in workshop discussions addressing the terms of reference, (3) preparing assessment summaries and consensus reports during the workshop, and (4) finalizing SEDAR documents within three weeks of the conclusion of the workshop. Each reviewer appointed by the CIE is responsible for preparing an independent CIE peer review report.

The chair and SEDAR coordinator will work with the appointed reviewers to assign tasks during the workshop. For example, the chair may appoint one panelist to serve as assessment leader for each assessment covered by the review, with the leader responsible for providing an initial draft consensus report text for consideration by the panel. Reviewers may alternatively be assigned particular terms of reference to address initially. Regardless of how initial drafting is accomplished, all panelists are expected to participate in discussion of all terms of reference and contribute to all aspects of the review.

The review panel's primary responsibility is to determine if assessment results are based on sound science, appropriate methods, and appropriate data. During the course of the review, the panel is allowed limited flexibility to deviate from the assessment provided by the assessment workshop. This flexibility may include: (1) modifying the assessment configuration and assumptions, (2) requesting a reasonable number of sensitivity runs, (3) requesting additional details and results of the existing assessments, and (4) requesting correction of any errors identified. However, the allowance for flexibility is limited, and the review panel is not authorized to conduct an alternative assessment or to request an alternative assessment from the technical staff present. The review panel is responsible for applying its collective judgment in determining whether proposed changes and corrections to the presented assessment are sufficient to constitute an alternative assessment. The review panel chair will coordinate with the SEDAR coordinator and technical staff present to determine which requests can be accomplished and to prioritize desired analyses.

Any changes in assessment results stemming from modifications or corrections solicited by the review panel will be documented in an addendum to the assessment report. If updated estimates are not available for review by the conclusion of the workshop, the review panel shall consult with technical staff present and the SEDAR coordinator to develop an acceptable process for reviewing the final results within the time allotted for completion of the project.

The review panel should not provide advice addressing specific management actions. Such advice will be provided by existing Council committees, such as the Science and Statistical Committee and advisory panels, following completion of the assessment. The review panel is free to point out items of concern regarding past or present management actions that relate to population conditions or data collection efforts.

If the review panel finds an assessment deficient to the extent that technical staff present cannot resolve the deficiencies during the course of the workshop, or the panel deems that desired modifications would result in a new assessment, then the review panel shall provide in writing the required remedial measures, including an appropriate approach for correcting and subsequently reviewing the assessment.

Workshop Final Reports:

The SEDAR coordinator will send copies of the final review panel consensus report and the complete SEDAR stock assessment report for each stock assessed to Mr. Manoj Shivlani at the CIE.

Submission and Acceptance of CIE Reports:

Upon review and acceptance of the CIE reports by the CIE Coordination and Steering Committees, CIE shall send via e-mail the CIE reports to the COTR (William Michaels William.Michaels@noaa.gov at the NMFS Office of Science and Technology by the date in the Schedule of Deliverables. The COTR will review the CIE reports to ensure compliance with the SoW and ToR herein, and have the responsibility of approval and acceptance of the deliverables. Upon notification of acceptance, CIE shall send via e-mail the final CIE report in *.PDF format to the COTR. The COTR at the Office of Science and Technology have the responsibility for the distribution of the final CIE reports to the project contacts.

The COTR shall provide the final CIE reviewer reports to:

SEFSC Acting Director: Bonnie Ponwith, NMFS Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149 (email, Bonnie.Ponwith@NOAA.gov)

SEDAR Coordinator: Dale Theiling, SAFMC, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405 (email, Dale.Theiling@safmc.net). (SEDAR shall provide the final CIE Reviewer Reports to the SEDAR Steering Committee and Executive Directors of those Councils having jurisdiction over the included stocks.)

Schedule of Milestones and Deliverables:

September 15, 2008: CIE will provide the CIE reviewer contact information to the COTR who will in turn forward this to the Project Contact.

October 6, 2008: The CIE reviewers will receive the pre-meeting documents from the Project Contact in preparation for the SEDAR 17 panel review meeting.

October 20-24, 2008: The CIE reviewers shall participate during the SEDAR 17 panel review meeting, and conduct an independent peer review in accordance with the ToR.

October 24, 2008: The CIE reviewers shall assist Chair in the development of the first draft of review panel consensus report(s) at the conclusion of the review workshop.

November 7, 2008:	Review panel members submit final review panel consensus report(s) contributions to workshop Chair.
November 14, 2008:	Workshop Chair submits final review panel consensus report(s) and SEDAR summary reports to SEDAR Coordinator.
November 14, 2008:	CIE reviewers shall submit their independent peer review reports to CIE.
December 1, 2008:	SEDAR Coordinator submits final review panel consensus report(s) and SEDAR stock assessment report(s) to CIE.
December 1, 2008:	CIE submits individual CIE reviewer reports to the COTR.
December 5, 2008:	COTR notifies CIE regarding individual reviewer report acceptance.
December 8, 2008:	CIE provides final individual CIE reviewer reports to COTR.
December 15, 2008:	COTR provides final CIE reviewer reports to SEFSC (Acting) Director and SEDAR Coordinator.
December 19, 2008:	SEDAR submits individual CIE reviewer reports to the SEDAR Steering Committee and Councils.

Key Personnel:

Contracting Officer's Technical Representative (COTR):

William Michaels
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
William.Michaels@noaa.gov   Phone: 301-713-2363 ext 136

Stephen K. Brown
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
Stephen.K.Brown@noaa.gov   Phone: 301-713-2363 ext 133

Contractor Contacts:

Manoj Shivlani, CIE Lead Coordinator
10600 SW 131st Court, Miami, FL 33186
shivlanim@bellsouth.net   Phone: 305-383-4229

SEDAR Project Contact (or Emergency):

Dale Theiling, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405
Dale.Theiling@safmc.net   Phone: 843-571-4366.

Request for Changes:

Requests for changes shall be submitted to the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the Contractor within 10 working days after receipt of all required information of the decision on substitutions. The contract will be modified to reflect any approved changes. The Terms of Reference (ToR) and list of pre-review documents herein may be updated without contract modification as long as the role and ability of the CIE

reviewers to complete the SoW deliverable in accordance with the ToR are not adversely impacted.

DRAFT AGENDA

SEDAR 17 REVIEW WORKSHOPS

South Atlantic Vermilion Snapper
South Atlantic Spanish Mackerel
<div align="center">

October 20 - 24, 2008
Hampton Inn and Suites, Savannah, GA

Dr. Gary Shepherd, Chair
</div>

<u>*Monday, October 20, 2008*</u>

1:00 p.m.	**Convene**
1:00 – 1:30	**Introductions and Opening Remarks Mr. Dale Theiling** *- Agenda review, TOR review, and Task assignments* **Chair**
1:30 – 3:30	**Vermilion Snapper Presentation** **Dr. Kyle Shertzer**
3:30 – 3:45	**Break**
3:45 – 6:00	**Vermilion Snapper Discussion Chair** *- Data, Methods and Results evaluation* *- Identify additional analyses, sensitivities, and corrections*

<u>*Tuesday, October 21, 2008*</u>

8:00 a.m. – 12:00 p.m.	**Vermilion Snapper Discussion Chair** *- Review additional analyses and sensitivities* *- Initial recommendations and comments*
12:00 p.m. – 2:00 p.m.	**Lunch Break**
2:00 p.m. – 4:00 p.m.	**Spanish Mackerel Assessment Presentation** **Dr. Paul Conn**
4:00 p.m. – 4:15 p.m.	**Break**
4:15 p.m. – 6:15 p.m.	**Spanish Mackerel Discussion Chair** *- Data, Methods and Results evaluation* *- Identify additional analyses, sensitivities, and corrections*

<u>*Wednesday, October 22, 2008*</u>

8:00 a.m. – 12:00 p.m.	**Spanish Mackerel Discussion Chair** *- Review additional analyses and sensitivities* *- Initial recommendations and comments*
12:00 p.m. – 2:00 p.m.	**Lunch Break**

2:00 p.m. – 4:00 p.m.	**Vermilion**	**Snapper**	**and**	**Spanish**	**Mackerel**
	Chair/				
	Discussion		**as**		**needed**
	Stock Leaders				

4:00 p.m. – 4:15 p.m.	**Break**				
4:15 p.m. – 6:15 p.m.	**Vermilion**	**Snapper**	**and**	**Spanish**	**Mackerel**
	Chair/				
	Discussion		**as**		**needed**
	Stock Leaders				

Thursday, October 23, 2008

8:00 a.m. – 12:00 p.m.	**Review**	**Workshop**	**Consensus**		**Summary**
	Chair/Stock				
	- Review	*draft*	*Consensus*	*Report*	*sections*
	Leaders				
12:00 p.m. – 2:00 p.m.	**Lunch Break**				
2:00 p.m. – 5:00 p.m.	**Review**	**Workshop**	**Advisory**		**Report**
	Chair/Stock				
	Review	*draft*	*Summary*		*Reports*
	Leaders				

Friday, October 24, 2008

8:00 a.m. – 12:00 p.m.	**Final Review of Panel Documents**
	Chair
	- Final review of Consensus Reports and Summary Reports
12:00 p.m.	**ADJOURN**

The timing of particular events is tentative, and the Chair may modify this schedule during the workshop as needed to complete stated tasks. However, to accommodate travel planning the workshop will start as scheduled and will conclude no later than the stated time.

SEDAR is a public process, and the public is welcome to attend SEDAR workshops. Although no formal public comment period is scheduled, the workshop Chair will allow opportunity during the meeting for the public in attendance to comment on discussion items.

Annex I. SEDAR Review Panel Consensus Summary Report Contents

I. Terms of Reference
List each Term of Reference and provide a summary of Panel discussions and recommendations regarding the particular item. Include a clear statement indicating whether or not the criteria in the Term of Reference are satisfied.

II. Further Analyses and Evaluations
Summary and findings of review panel analytical requests not previously addressed in TOR discussion above.

III. Additional Comments
Summary of any additional discussions not captured in the Terms of Reference statements.

IV. Recommendations for Future Workshops
Panelists are encouraged to provide general suggestions to improve the SEDAR process.

V. Reviewer Statements
Each individual reviewer should provide a statement attesting whether or not the contents of the Consensus Report provide an accurate and complete summary of their views on the issues covered in the review. Reviewers may also make any additional individual comments or suggestions desired.

ANNEX II: Contents of CIE Independent Peer Review Report

1. The reviewer report shall be prefaced with an executive summary of 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, a summary of findings, and summary of conclusions and recommendations in accordance with the ToR. Reviewers shall elaborate on any points raised in the Consensus Summary Report that they feel might require further clarification. Reviewers shall provide a critique of the SEDAR process including suggestions for improvements of both process and products. Reviewers should not simply repeat the contents of the consensus summary reports.

3. The reviewer report shall include as separate appendices a copy of the CIE Statement of Work and a bibliography that includes all materials provided for review.