Review of South Atlantic Greater Amberjack, Red Snapper, and Mutton Snapper stock assessments

SEDAR 15
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1 EXECUTIVE SUMMARY

This report presents results of an independent peer review of three southeast stock assessments (South Atlantic greater amberjack, South Atlantic red snapper, and South Atlantic and Gulf of Mexico mutton snapper) conducted for the Center for Independent Experts, University of Miami. The primary review activity was participation in the SEDAR 15 review workshop held January 28 – February 1, 2008 in Raleigh, North Carolina.

The SEDAR process was thorough, rigorous, and well-designed to ensure management is based on scientifically sound analyses. The review process includes three workshops to: 1) review the relevant data, 2) conduct analytical assessments, and 3) reviewing results from the first two workshops. Well-defined terms of reference for each workshop ensure that objectives are met and that end products are useful for managing the resource.

The three assessments reviewed - red snapper, greater amberjack, and mutton snapper - are based on theoretically sound analyses and as such they provide a reasonable basis to inform management decisions. Stock status relative to population benchmarks differed among the stocks: red snapper is highly overfished and overfishing is occurring; greater amberjack is not overfished and overfishing is not occurring; and for mutton snapper overfishing is not occurring but status relative to overfished is equivocal.

For all three assessments, the available data were thoroughly reviewed during the data workshops and reasonable decisions made on how to use the data and fill data gaps. A common issue through the assessments was uncertainty in landings and discard data, in particular the historical components of the data series. The working groups did not fully address these uncertainties and future assessments would be improved if the effect of alternative catch time series on assessment results were examined.

Catch-age models were the primary assessment tools for all three stock assessments. These methods are appropriate as they can accommodate a broad range of data and structural assumptions about the fishery and stock dynamics. However, the methods used to weight the various data components were *ad hoc* and as such not repeatable or transparent. A more objective basis for weighting data sources should be developed.

Uncertainty in base run catch-age model results were examined with sensitivity analyses that modified assumptions of the base model runs, and with analyses using alternative non-age structured models (e.g., surplus production models). Results from these analyses provide a realistic portrayal of the uncertainty in current stock status relative to benchmarks. Stock projections were based on parameters from the base catch-age model runs, and as such are conditioned on those runs. Uncertainty about future stock conditions, based on these runs, reflect only a small component of the full uncertainty.

2 BACKGROUND

This document reports on an independent peer review of three southeast stock assessments (South Atlantic greater amberjack, South Atlantic red snapper, and South Atlantic and Gulf of Mexico mutton snapper), conducted for the Center for Independent Experts (CIE), University of Miami. The primary review activity was participation in the January 28- February 1,2008 South East Data, Assessment, and Review (SEDAR) stock assessment process in Raleigh, North Carolina. To prepare for the SEDAR 15 review meeting, I reviewed draft assessment documents and other pertinent background materials (Appendix A).

The CIE *Statement of Work* (Appendix B) defines the scope of this review. In addition to participation in the SEDAR 15 review and contribution to the peer review consensus summary report, the *Statement of Work* requests distinct, independent analyses of the technical issues of the assessments and of the SEDAR process.

3 DESCRIPTION OF REVIEW ACTIVITIES

The activities undertaken for this review include: 1) assimilation of draft assessment documents and other pertinent background materials prior to the SEDAR 15 meeting; 2) participation in the SEDAR 15 review workshop discussions addressing the terms of reference (TOR); 3) contribution to a Peer Review Consensus Summary; and 4) preparation of this CIE report.

The materials provided to prepare for the SEDAR15 meeting included the draft assessment documents, which summarized discussion and outcomes of the Data Workshops (DW) and Assessment Workshops (AS) that had been held in the months prior to the Review Workshop (RW). Additional reference documents and documents prepared for the DW and AW were also available for review (Appendix B).

The primary focus for the SEDAR 15 review during the January 28 – February 1, 2008 workshop included:

- Evaluating the adequacy, appropriateness and application of the data and analytical methods used to assess the stocks and conduct stock projections.
- Evaluating methods used to estimate population benchmarks and recommending appropriate estimates of stock abundance and exploitation relative to benchmarks.
- Preparation of Peer Review Consensus Summaries of RW findings relative to the TOR and preparation of Advisory Reports for each of the assessments.

During the SEDAR 15 RW additional analyses were requested to examine the consistency of modeling results and to explore a fuller range of uncertainty in estimates of current stock conditions.

The SEDAR 15 Peer Review Consensus Summary report was drafted by the CIE reviewers during the review meeting and finalized in the two weeks following the review. RW members agreed all major issues and recommendations for the three assessments, and the report represents the consensus view. This report, prepared for the CIE, focuses on the findings of the RW that I found most pertinent to the conclusions resulting from the analytical assessments.

4 SUMMARY OF FINDINGS

4.1 SOUTH ATLANTIC RED SNAPPER

The red snapper assessment treats the south Atlantic waters from North Carolina to Monroe County, Florida as a unit stock. Although catches of red snapper have been reported for more northerly States, these have been small and are not included in the assessment.

The red snapper stock assessment is based on catch-age analysis; fisheries data are partitioned into two commercial fisheries (handline and dive) and two recreational fisheries (headboat and MRFSS). Three fishery-based CPUE abundance indices (handline, headboat, and MRFSS) are fitted in the analyses.

In the past, red snapper was declared overfished, but the status was changed to unknown because the method used for the original determination (SPR based analysis), was not considered compliant with criteria specified in the Sustainable Fisheries Act (1996).

4.1.1 Data

The primary data used for the red snapper assessment are: landings and discard data; age and length frequencies of fishery landings; and three fishery dependent abundance (CPUE) indices. In general, the available data are adequate for stock assessment purposes, and the data were used appropriately in the analytical models.

Commercial landings data are reasonably complete and consistently reported for the time period of the analysis (1946-2006). Commercial landings in weight were converted to numbers using average weight from TIP data, which are generally available for 1984-2006. Because average weight data are not available pre-1984, estimates of landings in number will be more uncertain for the earlier years.

Commercial discard data are available for the handline fishery beginning in 1984, and discarding is largely associated with undersized fish. For this reason, the assumption of no discarding prior to 1984 is reasonable, as is the assumption of no discarding for the dive fishery.

Length frequency sample sizes are generally adequate for generating annual length composition data for the handline fishery (1984-2006). Age composition samples sizes are smaller, though sampling has improved in recent years. Both length and age frequency data for the dive fishery are more limited.

Recreational fisheries data from the Headboat Logbook Survey (consistent data since 1981) and from the MRFSS data system (consistent data since 1982) provide reasonably accurate estimates of landings for the periods they cover. Two additional estimates of red snapper recreational catch, from U.S. Fish and Wildlife surveys conducted in 1965 and 1970, were included in the stock assessment analyses although the AW recommended they not be used. Catch estimates from these surveys are an order of magnitude larger than later estimates (i.e. 1980s), and as such they are influential in estimation of B_0 and current depletion. Anecdotal information provided during the review meeting supports accepting these two survey estimates as representative of historical recreational catch levels. Additional investigation of these survey data is warranted, as the reported mean red snapper weights (about 3.2 lbs/fish) appear to be low relative to the expectation that recent average size should be lower than historical average size.

Discard information is collected for the MRFSS program, and discard to landing ratios from this program (charter boat mode) applied to the headboat fishery. Sampling of length frequency of landings is adequate for the headboat program (1978-2006) and marginal for the MRFSS program (generally less than 100 fish/year). Size frequency of discards is not available for MRFSS, and is only available since 2003 for the headboat program.

Fisheries-based CPUE indices were calculated for three of the fisheries modelled in the red snapper assessment. For the commercial handline and recreational headboat fisheries, the method of Stephens and McCall (2004) was used to determine trips that potentially could catch red snapper (based on the assemblage of species caught on that trip), and standardized CPUE indices calculated using GLM methods. For the MRFSS, all trips that caught red snapper or were reported as targeting red snapper were included in the CPUE calculations. This approach will predominantly select trips with positive red snapper catches, and exclude fishing that occurred in habitats where red snapper could occur, but were not caught. The Stephens and McCall (2004) approach for selecting records is likely superior to that used for the MRFSS data because it should not be biased to trips where red snapper were caught.

A small number of ageing structures (100) have been aged by both labs involved in red snapper ageing (SCDNR and NMFS), with reasonable agreement in age estimates between them (95% agreement to within 0 to 2 years). The conclusion that two labs were using consistent methodology may not be justified, given there appears to be consistent differences in mean lengths-at-age from the two labs (Figure 2.3 of the DW report). Further work to compare age estimates between the two labs seems to be warranted.

Although there are recent studies designed to estimate mortality rates for released red snapper, appropriate discard mortality rates to use in the assessment remain uncertain. The mortality rate of discarded red snapper is related to depth of capture and handling procedures, which will be variable across the fishing sectors. For recreational fisheries, discards are considerably higher than landings, so assumed discard mortality rates are a significant factor in the assessment. This may become more important if management measures move to further restrict landings and result in greater numbers of live releases.

4.1.2 Analytical methods

A catch-age model, developed for SEDAR stock assessments, is the primary analytical tool for the assessment. The model has been tested and validated, using simulated data. The model is structured consistently with the data that are available, and as such is an appropriate method for assessing the red snapper stock. Areas where the analytical approach could be improved in future assessments are described here.

An *ad hoc* process was used to weight the various data components that contributed to the objective function. Component weights were iteratively adjusting until an “acceptable” fit to certain data series was obtained. The process is not repeatable or transparent, and statistical properties of likelihood-based estimation are lost. More objective approaches are commonly used in fisheries catch-age analyses in other jurisdictions. These include: conditioning on catch data (explicitly fitting the catch equations) to eliminate this component of the likelihood function; estimating a process error term for data components with many observations (eg. length or age composition data, see Bull et. al. 2003); and examining standardized residuals and adjusting weights so they are close to expected values.

A von Bertalanffy (vB) growth model is used translate the predicted age compositions to length distributions in the catch-age model (mean lengths-at-age from growth model and c.v. of length-at-age is estimated). Parameters of the vB model are estimated externally and treated as known values in the catch-age analysis. Estimation of the vB growth parameters used a method that accounts for size-selective data, which results in unbiased estimates of the population growth curve. However, in the catch-age analysis the vB model is used to predict length distributions of fishery catches, not population size distributions, so correction for size-selective data is not appropriate.

Fits to the age and length composition data show strong patterns in the residuals, suggesting persistent lack of fit. For length composition data the pattern is positive residuals for length classes below the minimum legal size (MLS) and negative residuals above the MLS. For age composition data the pattern is negative residuals for younger age classes and positive for older age classes. Reasons for these patterns could be: conflict between the signals in the age and length data; bias in mean length-at-age for younger age classes due to the use of the bias-corrected vB growth model (see above); or inflexibility of the logistic growth functions to model the selectivity process. Further exploration of these residual patterns is warranted.

Commercial landings in weight were converted to landings in numbers for fitting in the catch-age model. The TIP weight data used for these conversions were sparse for some gear types. Changing the model to fit to catch in weight rather than catch in numbers could simplify the data processing and requisite assumptions.

The assessment document reports evidence for older fish in northern areas (Carolinas). If differences between areas are large, model fitting may be improved with spatial partitions for the catch and composition data so that different selectivity patterns can be estimated.

The catch-age model initializes the population in the first year of the analysis with an unfished equilibrium age structure. To allow the initial population to be less than the unfished level, the abundance of all age classes are reduced by a constant proportion (fixed or estimated). This approach is consistent with the assumption that historical recruitment was lower than recruitment during the period the analysis covers. A preferable approach is to initialize the population assuming a constant level of fishing mortality (and selectivity pattern) prior to the first year of the analysis.

Uncertainty in the base run catch-age model results were explored through sensitivity analyses. A broad range of alternative assumptions were explored, and provide a reasonable portrayal of the uncertainty in the assessment results.

In addition to catch-age analysis, the ASPIC surplus production model from the NMFS tool box was used to analyse the red snapper catch (1901-2006) and abundance index data. This analysis employs less complex assumptions about the stock dynamics and provides an independent verification that results from the catch-age analysis are plausible. In general, the surplus production results are consistent with the catch-age model: the red snapper stock is overfished and overfishing is occurring.

4.1.3 Population benchmarks and projections

For South Atlantic red snapper, MSY-based population benchmarks are not reliable because parameters of the stock-recruitment curve are not well determined by the available data. All the stock and recruitment data points are at low spawning stock biomass, so neither virgin recruitment levels nor steepness can be reliably estimated. SPR-based proxies are therefore preferable for developing red snapper population benchmarks. The review panel suggested $F_{40\%}$ and $SSB_{F_{40\%}}$ as appropriate for limit benchmarks.

The conclusion that the red snapper resource is overfished and that overfishing is occurring is robust to the range of sensitivity trials explored with the catch-age model. For the surplus production model similar conclusions are reached, but the magnitude of overfishing and of stock depletion are not as severe. It is worth noting that for the base run of the catch-age model, the overfished and overfishing status have been continuous since the early 1960s. This result is largely dependent on the 1965 and 1970 estimates of recreational catch, and assumptions about catch trends around these points. Additional verification of these data is warranted, given their influence in assessment of the status of the red snapper resource.

Uncertainty in benchmarks was estimated using a parametric bootstrap approach to determine uncertainty in the stock-recruit relationship. The bootstrap procedure assumed known parameters of the stock-recruit relationship and the time series of spawning stock biomass (as estimated for the base run) to simulate alternative recruitment series. This approach will capture only a limited component of the uncertainty, and grossly underestimates uncertainty in the population benchmarks. The variability in benchmarks across the catch-age model sensitivity runs provides a more realistic assessment of the uncertainty in these parameters.

Stochastic stock projections were based on the base run of the catch-age model, incorporating uncertainty in future recruitment. Projections were made through 2040, double the time required for stock rebuilding under a no fishing scenario. Methods used for stock projections were appropriate, though uncertainty in future stock status is conditioned on the base model run.

4.2 GREATER AMBERJACK

The greater amberjack resource along the US Atlantic coast to Monroe Country, Florida is treated as a unit stock (slightly different boundaries used for recreational fisheries). There is some evidence for mixing with Gulf of Mexico greater amberjack, but this is minor. Within the southeast US waters there appear to be resident and migratory population sub-units.

The greater amberjack stock assessment is based on catch-age analysis: fisheries data are partitioned into two commercial fisheries (handline and dive) and two recreational fisheries (headboat and MRFSS); and three fishery-based CPUE abundance indices (handline, headboat, and MRFSS) are fitted in the analyses.

4.2.1 Data

The primary data used in the greater amberjack stock assessment includes: landings and discard data from commercial and recreational fisheries; age and length composition data from fisheries;

and fishery-based relative abundance indices (CPUE). Landings and discard time series are not complete so assumptions about patterns and trends are used to fill in missing data, increasing the uncertainty in the data series.

Historical catch estimates are uncertain (commercial and recreational fisheries) because amberjack were not reported to species level until recently. Historical time series of commercial landings are generated by assuming recent proportions of greater amberjack to total amberjack are representative of historical proportions. The uncertainty in these estimates is investigated by considering the inter-annual variability in the proportion of greater amberjack, but this will underestimate uncertainty because it does not consider temporal trends in amberjack species composition that could arise through changes in fishing practices or changes in species abundance.

Indentifying greater amberjack to the species level is also an issue for landings estimates from the headboat survey program and discards from the MFRSS program. The DW made appropriate assumptions in creating the greater amberjack recreational catch and discards, but uncertainty in these estimates is not evaluated. To estimate recreational catch prior to 1980, anecdotal information was examined to guess at catch trends. On this basis, a zero catch in 1946 was assumed with a linear trend in catches to 1980.

Data on commercial discards of greater amberjack are available from the logbook program (1991-2006). During this period discards were relatively minor and primarily associated with undersized fish. The analysis assumes there were no greater amberjack discards prior to 1991, because there was a smaller minimum legal size.

Information on greater amberjack discards is available from the MRFSS recreational fishery system, albeit with some species identification issues. Discard ratios calculated from the MRFSS data were applied to the headboat fishery for which there was no discard information.

Incomplete time series and species identification introduce uncertainty to the greater amberjack landings and discard data. While reasonable assumptions were made to fill in the gaps and generate the “best” available time series, this does not capture the uncertainty in the estimates. A useful process would be to develop “low” and “high” times series, based on alternative assumptions about patterns and trends in landings and discards, to bound the plausible range in these estimates. These alternative data series could then be used in sensitivity trials of the analytical assessment model to determine how robust the assessment conclusions are to uncertainty in these data.

Length frequency sampling is adequate to represent the commercial handline catch for the period 1990 – 2006, but is limited for other gear sectors. For most years, direct ageing sample sizes are inadequate to characterize landings.

Annual length frequency sample sizes for the MRFSS and headboat programs are often less than 100 fish, and these sampling levels are marginal for characterizing the length frequency of these fisheries. Age composition sample sizes also tend to be small, and only data from recent years (1998 – 2006) are used because of concern that ageing criteria have changed.

Data on greater amberjack discard mortality rates are scarce, and a rate of 0.2 was adopted for the assessment, with sensitivity analyses using rates of 0.1 and 0.3.

The methods used to develop fishery-based relative abundance indices were the same as those used for the red snapper assessment, and the same conclusions apply to the greater amberjack analyses. The use of the Stephens and McCall (2004) species association methodology to determine fishing events which had the potential to catch greater amberjack, as applied to the commercial handline and recreational headboat logbook data, is appropriate. For the MRFSS data set, trips where greater amberjack were caught, or where they were recorded as the target species were included in the CPUE calculations. As suggested for the red snapper assessment, use of the Stephens and McCall procedure for selecting MRFSS trips to include in the CPUE analysis would likely be superior to the approach that was used. Additionally, a GLM analysis of selected trips would allow standardization across some potentially important covariates (e.g., fishing mode).

4.2.2 Analytical methods

The primary analytical tool for the amberjack assessment is a catch-age model, developed for SEDAR stock assessments. The model has been tested and validated, using simulated data. The model is structured consistently with the data that are available, and as such is an appropriate method for assessing greater amberjack. Areas where the analytical approach could be improved in future assessments are described here. This model was also used for the red snapper assessment, and many of my comments are similar to those made for that assessment.

The process used to weight the various data components of the catch-age analysis was *ad hoc*. It was essentially a process of iteratively adjusting weights until an “acceptable” fit to certain data series was obtained. This process is not repeatable or transparent, and statistical properties of likelihood-based estimation are lost. Suggestions for alternative approaches are provided in the red snapper portion of this document (Section 4.1.2).

The model fits to the landings data are poor, with a strong tendency to under-predict the landings. While there is uncertainty in the landings data, it is unlikely that there is information in the other data sources to allow errors in the landings to be estimated. A preferable approach is to condition on the landings data (i.e. fit landings exactly), and examine robustness of the model results to uncertainty through sensitivity runs using alternative landings data streams.

The residual patterns in the composition data show some strong, persistent trends that suggest either conflicts among data sources or other model misspecifications. The length composition residuals tend to be positive below the MLS and negative above the MLS, for both the commercial and recreational fisheries. Age composition residuals tend to be negative for younger fish and positive for older fish, though few age composition data are fitted in the analysis. These patterns could result from: conflict between the length and age composition data; inflexibility of the logistic function to describe the selectivity process; or bias in the vB relationship used to model mean length-at-age in the fisheries (see below). Further investigation of these patterns is warranted.

A method that corrects for skewed length-at-age due to size selective sampling (i.e. fisheries) was used to estimate von Bertalanffy growth parameters. The mean lengths at age from this vB model were then used to convert model predicted fishery age compositions to length compositions. This is inappropriate because the bias-corrected vB model represents mean length at age in the population, not in the fishery. A better approach would be to provide fishery-specific mean lengths-at-age to the model for converting the predicted age compositions to length compositions.

Uncertainty in the base run catch-age model results were explored through sensitivity analyses. A broad range of alternative assumptions were explored, and provide a reasonable portrayal of the uncertainty in the assessment results.

In addition to catch-age analysis, the ASPIC surplus production model was used to analyse the greater amberjack catch and abundance index data. This analysis employs less complex assumptions about the stock dynamics and provides an independent verification that results from the catch-age analysis are plausible. In general, the surplus production results are consistent with the catch-age model.

4.2.3 Population benchmarks and stock projections

Population benchmarks and stock projections are based on the base run of the catch-age model. Benchmarks (MFMT and MSST) are MSY based. The recruitment estimates from the catch-age analysis are over a broad range of spawning stock biomass, so the estimated stock recruitment steepness value of 0.74 is potentially well determined giving some credence to MSY-based reference points.

The catch-age model base run results indicate the greater amberjack stock is not overfished and overfishing is not occurring. These conclusions are supported by the catch-age model sensitivity runs, with the exception of two of the runs (lower natural mortality rates and larger increases in the fishery catchability coefficients). The conclusions about greater amberjack stock status relative to benchmarks are reasonably well supported across the analyses that were conducted.

Uncertainty in benchmarks was estimated using a parametric bootstrap approach to determine uncertainty in the stock-recruit relationship. The bootstrap procedure assumed known parameters of the stock-recruit relationship and the time series of spawning stock biomass (as estimated for the base run) to simulate alternative recruitment series. This approach will capture only a limited component of the uncertainty, and grossly underestimate uncertainty in the population benchmarks. The range in benchmark values obtained through the catch-age model sensitivity runs and the alternative assumptions of the surplus production model provide a more useful indication of uncertainty in these parameters.

Stochastic stock projections were based on the base run of the catch-age model, incorporating uncertainty in future recruitment. Methods used for stock projections were appropriate, though uncertainty in future stock status is conditioned on the base model run.

4.3 MUTTON SNAPPER

The mutton snapper assessment treats the waters of the southeast Atlantic and the Gulf of Mexico off the US mainland as a unit stock. The main assessment tool is a catch-age model, but a number of alternative analytical models were also used to provide independent verification of the catch-age model results.

4.3.1 Data

The primary data for the mutton snapper assessment are: fisheries landings and discard data, partitioned into three commercial and two recreational fisheries; age composition data (converted from length frequency data; and 10 abundance indices (six fishery-independent and four fishery-based).

Commercial catch estimates appear fairly reliable, although there are some differences between alternative data sources (i.e. FWC trip tickets and NMFS logbooks). The commercial catch time series begins in 1902 although annual estimates are not available until 1959. Models run from 1902 use interpolated catch to fill in missing year estimates.

Discard data for the commercial fishery are only available for 2002 to 2006. The average ratios of discards to landings for that period are used to create synthetic discard estimates for earlier years; this requires additional assumptions about size-specific discards in years prior to the 16-inch size limit, and results in higher uncertainty in these estimates. Commercial discard rates are low so the impact of this source of uncertainty on the assessment should be minor.

Recreational catch data are available from the headboat and MRFSS survey programs, which have consistent survey designs since 1981. MRFSS estimates of landings in numbers should be fairly reliable, but landings in biomass are less reliable due to small samples sizes for average weight estimates (particularly in early years). Discards have been consistently reported in the MRFSS survey. Historical headboat discards are extrapolated from 2005 and 2006 discard data, making these less reliable than other discard estimates.

Length and age-frequency data for many of the fisheries are limited, particularly in earlier years of the time series.

The method used to develop CPUE indices from the MRFSS recreational fishery is a standard approach used for this type of data, and is based on all records (i.e. trips) where mutton snapper were caught or where mutton snapper was stated as the target species. This could result in a biased index because it includes all cases where mutton snapper were caught but does not consider trips that had the potential to catch mutton snapper (i.e. suitable habitat) but did not. It was noted that the methods used for this assessment are the standard approach for calculating CPUE indices from the MRFSS database. The Stephens and MacCall (2004) method for identifying species assemblages associated with a target species may be a better approach for identifying fishing trips for inclusion in CPUE calculations.

The GLM CPUE standardization for the longline and hook and line fisheries included *year/area* interaction terms. Generally GLM CPUE standardizations do not include interaction terms with *year* because the objective is to have the *year* term capture all inter-annual variability in catch rates. There is ongoing debate in the southeast region about the appropriateness of the approach that includes *year* interaction terms. The procedures are experimental and still being explored and developed for stock assessment in general. During the review meeting the GLM was re-run without the interaction term and this had only minor effect on the CPUE indices.

The headboat data were partitioned into two time series for conducting the CPUE standardization to account for the changes in legal size limit. This approach is appropriate when using the index in models that are not age-structured, but for age-structured models the selectivity function should account for changes in minimum legal size.

The DW developed a series of abundance indices from nine fishery independent surveys. From these, the Assessment Workshop (AW) selected six indices to include in the assessment models. Indices were rejected based on lack of survey design, short time series, and local geographical coverage. The panel agreed with the reasons for rejecting indices, and noted that all of the surveys encompass only a fraction of the geographical range covered by the assessment. Thus, they potentially represent local mutton snapper abundance rather than stock abundance.

Two indices are developed for the FWC Visual Survey, a “pre-exploited” and an “exploited” index, based on fish size relative to the minimum legal size. Because the size range of 3-year-olds spans the minimum legal size, age 3 is included in the age range associated with both indices. A more consistent approach would be to develop the two indices based on a size that effectively separates age 2 and age 3 fish.

4.3.2 Analytical methods

The primary assessment tool was a statistical catch-age model from the NMFS toolbox (ASAP version 1.4.2). There were several features of this model that limited the assumptions that could be investigated.

ASAP is strictly an age-based model and is not structured to fit length composition data. For the mutton snapper assessment, fisheries length frequency data were converted to age compositions using fishery-specific age-length keys. That is, the age-length keys used data combined across years (with consistent size limits), rather than annual fishery-specific age-length keys. This approach will smooth the age composition data, and relative year class abundance signals will be lost.

ASAP has limited flexibility in the parameterization of the fishery selectivity ogives. Parametric parameterizations cannot be specified and model fits resulted in highly domed age-specific selectivity for all fisheries. *A priori*, asymptotic selectivity for the longline fishery would be expected. The concern with allowing domed selectivity is that cryptic biomass is generated potentially resulting in overly optimistic assessment of stock status. During the review meeting, a run that resulted in asymptotic selectivity for the longline fishery was generated; estimates of fishing mortality rates were generally the same for this run as the base run but the biomass trajectory was substantially different. I did not feel that the sensitivity of model results to the assumption of asymptotic selectivity for the longline fishery could be properly explored with the ASAP software.

Limitations of the ASAP model constrained the time period of the analysis to 1981-2006. The DW had compiled longer data time series, and it would be desirable to run the age structured analysis using the full data series.

For fitting to the fishery-based abundance indices the range of ages associated with each index is specified. The entire age range should be used and the estimated age-specific selectivity functions used to calculate the vulnerable biomass associated with each fishery.

Estimates of fishing mortality rates are low for the base run and sensitivity runs (generally in the range of 0.10 – 0.25), relative to the estimate from catch curve analysis (Z=0.53 for ages 4 to 14). This warrants further examination, in particular, whether an assumption of asymptotic selectivity for the longline fishery increases the fishing mortality rate estimates from a catch-age analysis.

As with the catch-age model used for the red snapper and greater amberjack stock assessments, the ASAP model does not condition on catch, rather estimating annual fishing mortality rate multipliers. For the mutton snapper assessment high weights were applied for fitting to landings, resulting in close fits to the landings data. A lower weight was specified for fitting to discards on the basis that these estimates are less reliable, and model fits to the discard data are poor. It is unlikely that there is information in the data used for the assessment to estimate errors in the discard data, so it is better to fit the catch (landings and discards) exactly. The effect of uncertainty in these data is better examined with sensitivity runs using alternative catch data series.

All of the fishery-independent surveys used in the assessment are limited in geographic range, and none of the surveys spans the entire range of the mutton snapper stock. Additionally, age-composition data are not available for the surveys so assumptions are required about the range of age classes that are captured in the surveys. All abundance indices (fishery independent and fishery-based) are given equal weighting in the assessment model, but some are more likely to monitor stock abundance than others. An evaluation of the expected reliability of each of the surveys, based on factors such as spatial and temporal coverage relative to the stock, could be used to develop a more rigorous weighting scheme.

The mutton snapper assessment model fits a number of fishery-independent abundance indices, and this should allow changes in catchability for the fishery-based indices to be estimated directly. In the current assessment, changes in catchability are assumed known (2% per year).

A number of alternative analytical models (surplus production, VPA, DeLury model, stock reduction analysis) were also used to analyze the mutton snapper data sets. The alternative assumptions and data sets used in these analyses result in a wider range of stock reconstructions, which better reflects the true uncertainty relative to the uncertainty generally estimated for a single model.

Of the alternative analytical models, the Bayesian implementation of Stock Reduction Analysis (SRA) was the most promising. The SRA was fit to the longest mutton snapper catch series (1901-2006) and to the MRFSS abundance index. The Bayesian approach used for parameter estimation provides realistic (and large) estimates of uncertainty in the stock trajectory and stock parameters.

4.3.3 Population benchmarks and projections

The two councils responsible for management of mutton snapper (the South Atlantic Fishery Management Council and the Gulf of Mexico Fishery Management Council) have adopted the $F_{30\%}$ proxy for managing this resource. The use of a SPR-based proxy for F_{msy} (and associated benchmarks) is appropriate because there is considerable uncertainty in the spawn-recruit relationship for this stock and hence a high level of uncertainty in F_{msy}.

The mutton snapper ASAP model runs support the conclusion that overfishing is not occurring, and fishing mortality rates are well below the $F_{30\%}$ limit. Results relative to the overfished limit are equivocal with some runs indicating the 2006 spawning stock biomass is above the MSST $\left(0.89\,SSB_{F_{30\%}}\right)$ and others indicating 2006 spawning stock biomass is below the threshold.

The stock projections conducted for mutton snapper stock were deterministic, reflecting no uncertainty in current conditions or future recruitment. Projections (through 2056) were conducted based on the base model run and one of the sensitivity runs (*M=0.08*, one of the most pessimistic runs). Under the base model run, the stock is projected to remain above the MSST for all the harvest scenarios examined $\left(F_{msy}, F_{OY}, F_{2006}\right)$. Under the *M=0.08* run and $F_{msy}, F_{OY},$ or F_{2006} fishing levels, spawning stock biomass increases over the projection period but does not necessarily attain the MSST level.

Given uncertainty relative to the overfished threshold and scope for improving analytical methods, it would be prudent to reassess the mutton snapper stock within a relatively short time frame (3 years).

4.4 SEDAR PROCESS

The SEDAR process is thorough, rigorous, and well-designed to ensure management is based on scientifically sound analyses. The review structure has three separate workshops directed to: 1) compiling, reviewing, and evaluating relevant data; 2) conducting analytical assessments and drafting advice; and 3) reviewing results of the two previous workshops, with particular focus on the analytical methods and resulting conclusions. The individual workshops involve a broad range of individuals with specific expertise in the areas under discussion. Well-defined terms of reference for each workshop ensure that objectives are met and that end products are useful to the overall process. The documents arising from the first two workshops were comprehensive and provided the appropriate background for participating in the SEDAR review workshop.

My main suggestion for improving the SEDAR process is to conduct workshops that focus on generic issues relevant to many of the assessments. Suggestions for possible topics come from some common issues that arose for all the assessments reviewed for SEDAR 15. These include: development of methods to frame the uncertainty in historical landings and discard data; methodology for developing abundance indices for fishery-based CPUE data (including alternative approaches for MRFSS data); evaluation of changes in fisheries catchability; and development of objective methods for data weighting in catch-age analyses.

5 SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

The three assessments reviewed - South Atlantic red snapper, South Atlantic greater amberjack, and South Atlantic and Gulf of Mexico mutton snapper - are based on theoretically sound analyses and as such they provide a reasonable basis to inform management decisions. Stock status relative to population benchmarks differed among the populations: red snapper is highly overfished and overfishing is occurring; greater amberjack is not overfished and overfishing is not occurring; and for mutton snapper overfishing is not occurring but status relative to overfished is equivocal.

For all three assessments, the available data were thoroughly reviewed during the DWs and reasonable decisions made on how to use the data and fill data gaps. A common issue through the assessments was uncertainty in landings and discard data, in particular the historical components of the data series. None of the working groups fully addressed these uncertainties. A suggested approach is to adopt a broad set of hypotheses about the trends and patterns in catch, and use these to develop potential time series (landings and discards) the reflect the plausible “low” and “high” range in historical catch. These can then be used in sensitivity analyses to investigate whether assessment conclusions are sensitive to uncertainty in the catch data.

Catch-age models were the primary assessment tools for all three stock assessments. These methods are appropriate as they can accommodate a broad range of data and structural assumptions about the fishery and stock dynamics. However, the methods used to weight the various data components were *ad hoc* and as such not repeatable or transparent. A more objective basis for weighting data sources should be developed.

Uncertainty in base run catch-age model results were examined with sensitivity analyses that modified assumptions of the base model runs, and with analyses using alternative non-age structured models (e.g., surplus production models). Results from these analyses provide a realistic portrayal of the uncertainty in current stock status relative to benchmarks. Stock projections were based on parameters from the base catch-age model runs, and as such are conditioned on those runs. Uncertainty about future stock conditions, based on these runs, reflect only a small component of the full uncertainty.

The statistical catch-age model used for the mutton snapper assessment (ASAP) had several features that limited the assumptions that could be investigated, and thus its utility for the assessment. In particular, length composition data could not be fit, parametric selectivity functions could not be modelled, and there were limitations to the length of time series that could be accommodated. These limitations restricted the range of sensitivity runs that could be conducted for the mutton snapper assessment.

APPENDIX A. BIBLIOGRAPHY

I. Current Draft Stock Assessments:

A. SEDAR 15 Stock Assessment Report 1. South Atlantic red snapper. Peer Review Document. January 2008. 340p.
B. SEDAR 15 Stock Assessment Report 2 (SAR 2). South Atlantic greater amberjack. Peer Review Document. January 2008. 344p.
C. SEDAR 15 Stock Assessment Report 1. South Atlantic and Gulf of Mexico mutton snapper. Section III. Assessment Workshop. 141p.
D. SEDAR 15 South Atlantic and Gulf of Mexico mutton snapper Data Workshop report. 215p.

II. Background and additional reference documents:

A. SEDAR15-DW1. Discards of greater amberjack and red snapper calculated for vessels with Federal Fishing Permits in the US South Atlantic. K. McCarthy. 11p.
B. SEDAR15-AW1. Stock assessment model – Statistical catch-at-age model. P. Conn, K. Shertzer, and E. Williams. 11p.
C. SEDAR15-RD01. Age, growth, and reproduction of greater amberjack, *Seriola dumerili*, off the Atlantic coast of the southeastern United States. P. Harris, D. Wyanski, D.B. White, P.P. Mirkell, and P.B. Eyo. 46p.
D. SEDAR15-RD02. A tag and recapture study of greater amberjack, *Seriola dumerili*, from the southeastern United States. MARMAP Unpublished Report. 26p.
E. SEDAR15-RD03. Stock assessment analyses on Atlantic greater amberjack. C.M. Legault and S.C. Turner. 32p.
F. SEDAR15-RD04. Age, growth, and reproduction of the red snapper, *Lutjanus Campechanus*, from the Atlantic waters of the southeastern U.S. D.B. White and S.M. Palmer. 26p.
G. SEDAR 15-RD05. Atlantic greater amberjack abundance indices from commercial handline and recreational charter, private, and headboat fisheries through fishing year 1997. N.J. Cummings, S.C. Turner, D.B. McClellan and C.M. Legault. 77p.
H. SEDAR 15-RD06. Age and growth of red snapper, *Lujanus Campechanus*, from the southeastern United States. S. A. McInerny. MS Thesis. Dept. of biology and marine biology. University of North Carolina Wilmington. 89p.
I. SEDAR 15-RD07. Characterization of commercial reef fish catch and bycatch off the southeast coast of the United States. P.J. Harris and J. Stephen. 30p.
J. SEDAR 15-RD08. The 1960 salt-water angling survey. USFWS Circular 153. J. R. Clark. 37p.
K. SEDAR 15-RD09. The 1965 salt-water angling survey. USFWS Resource Publication 67. D.G. Deuel, and J. R. Clark. 52p.
L. SEDAR 15-RD10. 1970 salt-water angling survey. NMFS Current Fishery Statistics Number 6200. D.G. Deuel. 57p.

III. Additional References:

Bull, B., R.I.C.C. Francis, A. Dunn, A. McKenzie, D. J. Gilbert, and M.H. Smith. 2003. CASAL (C++ algorithmic stock assessment laboratory): CASAL User manual v2.01-2003/8/01. NIWA Technical Report 124. 223 p.

Stephens, A. and A. MacCall. 2004. A multispecies approach to subsetting logbook data for purposes of estimating CPUE. Fisheries Research 70: 299-310.

APPENDIX B. STATEMENT OF WORK

Statement of Work for Vivian Haist

SEDAR 15 Stock Assessment Review
South Atlantic Greater Amberjack, Red Snapper, and Mutton Snapper
January 28 - February 1, 2008
Raleigh, North Carolina

SEDAR Overview:

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 Southeast 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 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, as 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 terms of reference.

The SEDAR 15 review panel will be composed of three Center for Independent Experts (CIE)-appointed reviewers, one reviewer appointed by the South Atlantic Council, and a chair appointed by the SEFSC director. Council staff, Council members, and Council AP and SSC members will attend as observers. Members of the public may attend SEDAR review workshops.

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 ToR and Schedule herein, and each CIE reviewer's duties shall not exceed a maximum of 14 days for pre-review preparations, conducting the peer review at the SEDAR 15 panel review meeting, and completion of the CIE independent peer review reports. The CIE reviewers shall participate as technical reviewers on the SEDAR 15 review panel that will consider assessments of South Atlantic greater amberjack, red snapper, and mutton snapper, 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 decisions. The CIE reviewers shall not provide comments on fisheries management decisions.

Statement of Tasks for CIE Reviewers:

Roles and responsibilities:

1. Approximately 3 weeks prior to the meeting, CIE reviewers shall be provided with stock assessment reports, associated supporting documents, and review workshop instructions including terms of reference. CIE reviewers shall read these documents to gain an in-depth understanding of the stock assessment, the resources and information considered in the assessment, and responsibilities as reviewers.
2. During the review panel meeting, reviewers shall participate in panel discussions on assessment methods, data, validity, results, uncertainties, recommendations, and conclusions as guided by the terms of reference. Each CIE reviewers shall conduct an independent peer review and participate in development of a peer review consensus summary report for each assessment reviewed, 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.
3. Following the review panel meeting, reviewers shall work with the chair to complete and review the peer review consensus summary reports. Reports shall be completed, reviewed by all panelists, and comments submitted to the Chair by February 15, 2008.
4. Following the review panel meeting, each reviewer appointed by the CIE shall prepare an individual CIE reviewer report. These reports shall be submitted to the CIE no later than February 22, 2008, addressed to the "University of Miami Independent System for Peer Review," and sent to Dr. David Sampson, via email to David.Sampson@oregonstate.edu, and to Mr. Manoj Shivlani, via email to mshivlani@ntvifederal.com. See Annex II for complete details on the report outline.

The duties of each review panelist shall not exceed a maximum of 14 workdays; several days prior to the meeting for document review; five days at the SEDAR meeting; and several days following the meeting to complete the independent peer review in accordance with the ToR, and to ensure final review comments and document edits are provided to the Chair.

The CIE reviewers shall conduct necessary preparations prior to the peer review, conduct the peer review, and complete the deliverables in accordance with the ToR and deliverable dates herein.

Prior to the Peer Review: The 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.

Pre-review Documents: 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. This list of pre-review documents may be updated prior to the panel review meeting. Meeting materials will be forwarded electronically to review panel participants and made available through the internet (http://www.sefsc.noaa.gov/sedar/); printed copies of any documents are available by request. The names of reviewers will be included in workshop briefing materials.

Panel Peer Review Meeting: The CIE reviewers shall participate and conduct the peer review participate during a panel review meeting as specified in the dates and location of the attached Agenda and Schedule of Deliverable.

The review workshop will take place at the Holiday Inn Brownstone in Raleigh, North Carolina, from 1:00 p.m. Monday, January 28, 2008 through 1:00 p.m. Friday, February 1, 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:

Holiday Inn Brownstone
1707 Hillsborough Street
Raleigh, NC 27605
Phone: (919) 828-0811 / (800) 331-7919

Group “SEDAR” Rate: $80 + (12.75% tax of 10.20) = $90.20; rate is guaranteed through December 14, 2007.

SEDAR Review Workshop Panel Tasks:

The SEDAR 15 review workshop panel will evaluate assessments of South Atlantic greater amberjack, red snapper, and mutton snapper. 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 summary (Annex I). (Note that the consensus summary is a SEDAR product, not a CIE product.) Separate CIE reviewer reports will be produced as described in Annex II to provide distinct, independent analyses of the technical issues and of the SEDAR process.

Each CIE reviewer shall participate on the SEDAR 15 workshop panel to conduct an impartial and independent peer review with the purpose of determining whether the best available science was utilized. This review shall be conducted in accordance with SEDAR Guidelines and the specific Terms of Reference (ToR) specified below. Each CIE reviewer shall contribute to a SEDAR consensus summary 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 15 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 measures.
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 catch (ABC), and declarations of stock status relative to benchmarks.
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 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 each stock assessment and addressing each term of reference. (Reports to be drafted by the panel during the review workshop with a final report due two weeks after the workshop ends.)

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 (1) corrections are made in the assessment, (2) alternative model configurations are recommended, or (3) 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 meeting during the workshop in an orderly fashion, compiling and editing the peer review consensus summary for each species assessed and submitting it to the SEDAR Coordinator by a deadline specified by the SEDAR Steering Committee. The review panel chair will work with SEDAR staff to complete the SEDAR advisory 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 two weeks of the conclusion of the workshop. Each reviewer appointed by the CIE is responsible for preparing an additional CIE reviewer report as described in Annex II.

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, or (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 COTRs (William Michaels

William.Michaels@noaa.gov and Stephen K. Brown Stephen.K.Brown@noaa.gov) at the NMFS Office of Science and Technology by the date in the Schedule of Deliverables. The COTRs 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 COTRs. The COTRs 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: Alex Chester, NMFS Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149 (email, Alex.Chester@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 Deliverables:

February 1, 2008:	review panel completes first draft of review panel consensus reports (conclusion of review workshop)
February 15, 2008:	review panel submits final draft review panel consensus reports to workshop Chair.
February 22, 2008:	workshop Chair submits final review panel consensus reports and SEDAR advisory reports to SEDAR Coordinator.
February 22, 2008:	CIE technical reviewers submit individual reviewer reports to CIE.
February 29, 2008:	SEDAR Coordinator submits final review panel consensus reports and SEDAR stock assessment reports to CIE.
March 7, 2008:	CIE submits individual CIE reviewer reports to the COTR.
March 11, 2008:	COTR notifies CIE regarding individual reviewer report acceptance.
March 13, 2008:	CIE provides final individual CIE reviewer reports to COTR.
March 21, 2008:	COTR provides final CIE reviewer reports to SEFSC Acting Director and SEDAR Coordinator.
March 26, 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

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Contractor Contacts:

Manoj Shivlani, CIE Primary Coordinator
10600 SW 131st Court, Miami, FL 33186
mshivlani@ntvifederal.com Phone: 305-383-4229

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Northern Taiga Ventures, Inc., 814 W. Diamond Ave., Ste. 250, Gaithersburg, MD 20878
rperetti@ntvifed.com Phone: 301-212-4187.

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 15: South Atlantic Greater Amberjack, Red Snapper, and Mutton Snapper
January 28 - February 1, 2008

Monday

1:00 p.m.	**Convene**	
1:00 – 1:30	**Introductions and Opening Remarks** **Coordinator** *- Agenda Review, TOR, Task Assignments*	
1:30 – 3:30	**Assessment Presentation**	**TBD**
3:30 – 4:00	**Break**	
4:00 – 6:00	**Continue Presentation/Discussion**	**Chair**

Tuesday

8:30 a.m. – 11:30 a.m.	**Assessment Presentation**	**Chair**
11:30 a.m. – 1:30 p.m.	**Lunch Break**	
1:30 p.m. – 3:30 p.m.	**Panel Discussion** **-** *Assessment Data & Methods* *- Identify additional analyses, sensitivities, corrections*	**TBD**
3:30 p.m. – 4:00 p.m.	**Break**	
4:00 p.m. – 6:00 p.m.	**Panel Discussion** *- Continue deliberations* *- Review additional analyses*	**Chair**

Tuesday Goals**:** Initial presentations completed, sensitivities and modifications identified.

Wednesday

8:30 a.m. – 11:30 a.m.	**Panel Discussion** *- Review additional analyses, sensitivities* *- Consensus recommendations and comments*	**Chair**
11:30 a.m. – 1:30 p.m.	**Lunch Break**	
1:30 p.m. – 3:30 p.m.	**Panel Discussion**	**TBD**
3:30 p.m. – 4:00 p.m.	**Break**	
4:00 p.m. – 6:00 p.m.	**Panel Discussion**	**Chair**

Wednesday Goals: Final sensitivities identified, Preferred models selected, Projection approaches approved, Consensus report drafts begun

Thursday

8:30 a.m. – 11:30 a.m.	**Panel Discussion** *- Final sensitivities reviewed.* *- Projections reviewed.*	**Chair**
11:30 a.m. – 1:30 p.m.	**Lunch Break**	
1:30 p.m. – 3:30 p.m.	**Panel Discussion or Work Session**	**Chair**
3:30 p.m. - 4:00 p.m.	**Break**	
4:00 p.m. - 6:00 p.m.	**Panel Work Session** *- Review Consensus Reports*	**Chair**

Thursday Goals: Complete assessment work and discussions. Final results available. Draft Consensus Reports reviewed .

Friday

8:30 a.m. – 1:00 p.m.	**Panel Work Session**	**Chair**
1:00 p.m.	**ADJOURN**	

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's 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.

Please refer to the following website for additional information on report generation: http://www.rsmas.miami.edu/groups/cie.