External Independent Peer Review

Center for Independent Experts

SEDAR

Southeast Data, Assessment, and Review

SEDAR 25 South Atlantic Black Sea Bass and Golden Tilefish Review

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Executive Summary

- This report is a peer review of assessments of South Atlantic black sea bass and golden tilefish presented at the SEDAR 25 Review Workshop.
- A forward projecting statistical catch-at-age model (BAM) was used as the main assessment approach for both species, incorporating recreational and commercial landings data, length and age composition data and both fishery-dependent and fishery-independent abundance indices. Final assessment results were driven by abundance indices rather than catch composition. The assessment method is appropriate to the nature of the stocks and the available data and provided a good basis for inferences about stock status and for fishery management.
- Uncertainty runs of the main assessment model used a Monte Carlo Bootstrap (MCB) approach, which also provided the basis for incorporating stochasticity into projections of future stock status. MCB and projection methods are adequate and appropriate for investigating uncertainty around current and future stock status.
- A biomass-dynamic assessment model (ASPIC) was used as an alternative assessment approach for both species, providing qualitative corroboration of conclusions about relative stock status.
- Equilibrium expectations of MSY-based reference points were derived from the base run of the BAM assessment model. These provide a suitable basis for assessment of relative stock status by comparison of SSB and fishing mortality estimates from the same model run.
- There is currently a rebuilding program for black sea bass. The assessment indicates that SSB is likely above MSST but has not yet fully rebuilt to SSB_{MSY}. There is greater uncertainty about relative exploitation, with the most likely value of fishing mortality being close to F_{MSY}.
- SSB for golden tilefish is likely well above SSB_{MSY} and MSST and exploitation is likely lower than F_{MSY}. This conclusion is supported by both BAM and ASPIC models and by MCB and sensitivity runs of the BAM model, despite a mismatch between the outcome of the BAM base run and the central tendency of outcomes from the MCB runs.
- There are limitations in both available data and biological knowledge of both species. Improved knowledge on age-dependent spawning frequency in both species and on sexual transitions in black sea bass would provide an improved basis for calculating SSB in the assessments. Improved quality of recreational landings data would benefit the black sea bass assessment, whilst the golden tilefish assessment would benefit most from the development of a fishery-independent abundance index, providing information on both trends and scaling of abundance.
- Information is lacking on spatial structure in the stocks and fisheries of both species and on patterns of fish movements and migrations.
- The quality of the assessment is very high for both species, and the Review Panel considered that the assessments are the best possible given currently available data and biological knowledge.

Background

South East Data Assessment and Review (SEDAR) is a Fishery Management Council process to conduct and review all stages of fishery stock assessments in the South Atlantic, Gulf of Mexico and US Caribbean. SEDAR involves Data, Assessment and Review Workshops, with participation of both stakeholders and scientists and with peer review of assessment outcomes. This report is an independent peer review of stock assessments for South Atlantic black sea bass and South Atlantic golden tilefish presented at the SEDAR 25 Review Workshop meeting held in Charleston in October 2011. The Review Panel (Appendix III) consisted of a chair, three reviewers appointed by the Center for Independent Experts (CIE) and two SEDAR reviewers representing the South Atlantic Fisheries Management Council Scientific and Statistical Committee (SAFMC SSC). This report constitutes my own personal review of the assessments. It is designed to be read as a stand-alone document, but there are strong overlaps with the assessment summary report for each species to which I contributed. Given the similarity of assessment approach applied to the two species (choice of assessment models, uncertainty runs, projection methods, estimation of biological reference points), many of the comments on methodology apply equally to black sea bass and golden tilefish; relevant material has been repeated between the species sections in the Summary of Findings so that each section can be read alone without reference to the other species. The report also contains the Statement of Work for the review (Appendix II), which includes Terms of Reference (ToR) and a meeting agenda.

Previous assessments for these species were conducted during SEDAR 2 (black sea bass) and SEDAR 4 (golden tilefish). SEDAR 25 extended beyond update assessments, considering alternative assessment model formulations and sensitivity analyses for the main assessment model, but did not constitute full benchmark assessments.

Description of Review Activities

Data and Assessment Workshop reports and background working papers for SEDAR 25 (see Appendix I) were made available to the Review Panel on the SEFSC secure FTP site three weeks before the meeting, with a corrected version of the golden tilefish assessment report provided ten days before the meeting. This allowed generous time for the reviewers to become familiar with the overall context of the SEDAR process and with the material to be covered at the meeting. Terms of Reference and a draft agenda were also available at an early stage.

The SEDAR 25 Review Workshop was held at the Crowne Plaza, North Charleston, South Carolina, starting at 9:00 am on Tuesday 11 October and finishing at 1:00 pm on Thursday 13 October 2011 (see Appendix II). Review Panel members met with Anne Lange, the Workshop chair, at 8:15 am on the Tuesday to discuss procedures and responsibilities ahead of the meeting. Data summary and stock assessment presentations for South Atlantic black sea bass and golden tilefish were made by the lead assessment scientists on Tuesday morning. The presentations were structured similarly, covering:

- biological parameters of the stock;
- commercial catch data and sampling of catch composition;
- abundance indices;
- main analytical age-based assessment model and its outcomes in terms of stock status;
- sensitivity of status determination to alternative formulations of the assessment model;
- uncertainty associated with assessment outcomes;
- projections of future stock status; and
- comparison of assessment outcomes from a different assessment model.

Some questions were fielded during the presentations, with full discussions immediately after the presentations. Discussions included requests for further analyses for both species. Responses to the golden tilefish requests were made during the afternoon of Tuesday 11 October and to the black sea bass requests during Wednesday 12 October. These discussions were held in plenary, with input from industry and SAFMC SSC representatives as appropriate.

Responsibilities for drafting the assessment summary report sections were divided among the three CIE reviewers and two SEDAR reviewers representing SAFMC SSC (see Appendix III). Drafting of the main points in bullet point form commenced on the afternoon of Tuesday 11 October. These points were agreed in Review Panel discussions during Wednesday 12 October and a draft of the full text was agreed by the close of the meeting on Thursday 13 October. Corrections and amendments to the text were made by exchange of emails among the Review Panel immediately following the meeting and the final text was agreed prior to submission of the report on 26 October (ahead of the 28 October deadline).

No consensus among Review Panel members was required or sought, but there was a broad level of agreement about the extent to which the TORs for each assessment were met. Panel members made their views clear during the open sessions, so that the teams responsible for each assessment were aware of the likely conclusions with respect to each TOR.

Summary of Findings

South Atlantic black sea bass

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

The South Atlantic black sea bass stock between Cape Hatteras and the Florida Keys is well defined according to biogeographic boundaries and genetic studies. Life-history parameters underlying the assessment were reviewed and updated as appropriate, the most notable change being the adoption of age-dependent natural mortality estimates. Black sea bass are protogynous hermaphrodites; a fixed relationship between sexual transition and age was assumed in the absence of information on sources of variability.

Fishery removals are dominated by general recreational landings, with commercial pots also being important. Landings data are not complete for all fleets, but years without data were bridged in the assessment model using geometric mean fishing mortality values. Discarding is significant for both recreational and commercial fleets. Data on quantities and size and age composition of both landings and discards were included in the assessment.

Five abundance indices were included in the assessment, of which three were fishery-dependent (vertical line commercial fleet CPUE, headboat landings WPUE and headboat discards DPUE) and two were fishery-independent (Florida blackfish/snapper trap CPUE and MARMAP chevron trap CPUE). These series provided varying extents of temporal coverage over the assessment period, and correlations among the indices provided some support for their use as a basis for interpreting underlying trends in stock abundance.

Overall, whilst information is lacking on some aspects of life-history, and data on landings and discards are incomplete, I fully share the view of the Review Panel that the assessment has made best use of all the available information, making informed and intelligent choices about treatment of data sources.

Strengths

- The stock is well defined as a biogeographical unit and appears genetically distinct based on studies of mitochondrial DNA.
- Estimates of M incorporate age-dependence and the range of estimates taken forward into the assessment model is based on life-history invariants and other objective methods.
- Treatment of data sources is statistically rigorous, in terms of GLM and delta GLM approaches used to standardize the abundance indices and avoiding double-counting of fish in inclusion of age and length data.
- Both fishery-dependent and fishery-independent abundance indices are available, with positive correlations among the indices indicating that they are responsive to the same underlying stock trends.
- Informed and pragmatic choices are made about biological parameters when information is limited. This relates, for example, to assumptions about female maturity at age and spawning frequency.
- The measure of spawning potential (SSB) is couched in terms of egg production, using the best available information on fecundity-at-weight and spawning frequency.

- Likely changes in selection owing to changes in size limit are known and accounted for in the assessment model structure.
- Information exists on gear-specific discard mortality, upper and lower bounds being provided by tagging data and previously (SEDAR 2) assumed values.

Weaknesses

- Coarse levels of reporting of headboat landings resulted in unrealistically low CVs around abundance indices, which needed to be inflated for use in the assessment model.
- The assessment assumed a fixed age-based transition from females to males. This was based on analyses which showed little difference in age at transition between different periods, but it is likely that there may be environmental and population cues which could modify this transition under some circumstances. This is unlikely to have limited the current assessment, but it is worth considering in future whether model-based measures of spawning potential may be sensitive to this issue.
- The Data Workshop included a review of migrations and movements, but spatial structure in the stock and fishery was not included in the assessment. Given the implications particularly for availability of fish of different ages to the fishery, it will be important to consider movement patterns.

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

The main analytical assessment model used was the Beaufort Assessment Model (BAM) which is a forward-projecting statistical catch-at-age model implemented in AD Model Builder. The model is extremely flexible and sophisticated in the way in which all available data on catch quantities and composition (both length and age) and abundance indices can be incorporated within the assessment, and with appropriate account taken of uncertainty in the data sources. The analysts chose to treat the landings data as being known with high accuracy, fitted closely by the assessment, and an iterative procedure was used to derive weightings for the abundance indices and length and age composition data. The aim was to represent the age-based dynamics implied by the composition data without compromising the fit to the abundance indices. Primacy was given to age data for inclusion in the assessment model, but where length data could be included without double counting of sampled fish, these were incorporated into the age-based dynamics through use of age-length conversion matrices. This strategy ensured efficient and rational use of all data on catch compositions, but the final model was driven largely by abundance rather than age structure, thus sharing much in common with the biomass dynamic (ASPIC) model considered as an alternative.

In my view, the analytical assessment procedures were appropriate to the nature of the stock and of the information available on stock and fishery trends, were statistically rigorous, made efficient use of all available data on stock abundance and dynamics and were impeccably applied by the analysts in terms of treatment of data sources, uncertainty and weightings.

Strengths

- The BAM model has a history of use in a number of previous assessments, has been well tested, verified using simulated data and has been peer-reviewed on a number of previous occasions. Full documentation of AD Model Builder code for the model was given in a working paper for the Review Workshop.

- The BAM model allows incorporation of all appropriate data sources, including removals quantities and composition, abundance indices and life-history information. Use of age-length conversion matrices allowed incorporation of available length data into the model for strata where age data were missing or inadequate. Inclusion of length data was made with due regard to avoidance of double counting of sampled fish.
- The BAM model is statistically rigorous, accounting for error structures, uncertainties and data weightings.
- The age-based structure of the BAM model, and the way in which stock-recruitment processes are modelled, provide a strong structural basis for stock projections and investigations of uncertainties.
- A biomass dynamic (ASPIC) model was used as an alternative assessment approach, providing some confidence that assessment outcomes are not merely artefacts of the particular assessment model used.
- Methods used to bridge gaps and extend time series of landings and discard data were rational and efficient, being based on geometric means of adjacent fishing mortalities for landings and average discard rates for discards.

Weaknesses

- Both the BAM and ASPIC assessments were driven largely by the abundance indices, thus the alternatives do not provide a strong contrast in terms of stock dynamic processes and effectively provide only weak support for consistency of assessment outcomes between different information sources. Age and length composition data are not strongly informative of stock dynamics.
- Spatial structure is not included in the assessment model. Whilst it is recognised that a spatially structured assessment is probably an unrealistic aspiration for the immediate future, nevertheless some attention should be paid to methods for accounting for spatial pattern in the assessment and to the possibility of assessment biases stemming from spatial patterns.
- Flat-topped selectivity curves were fixed in the assessment. The use of logistic curves is parsimonious in terms of parameter estimation, and probably justified given the lack of evidence for gear effects or spatial availability patterns that may cause dome-shaped or other selectivity patterns, but it would be worth considering the implications of freely estimated selectivity curves for outcomes in terms of stock status in relation to MSY-based indicators.
- Missing landings and discard data in the time-series of the assessment required a 'bridging' strategy within the assessment model.

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

Estimates of SSB and fishing mortality from the BAM base run are recommended as the best current estimates for the South Atlantic black sea bass stock. Although these are the best estimates, caution should be exercised in comparing absolute estimates with those from other methods; the BAM base run estimates are most meaningfully compared with biological reference points derived from the same model.

South Atlantic black sea bass are currently in a rebuilding program. The base run of BAM, supported also by outcomes from the alternative ASPIC assessment, indicates that the stock has not yet rebuilt, the most recent (2010) estimate of SSB being below SSB_{MSY}. SSB is estimated to be above MSST, however,

indicating that the stock is not currently overfished according to this criterion. Recent fishing mortality appears to be close to F_{MSY}, with uncertainty (Monte Carlo Bootstrap, MCB) runs indicating a slightly higher than 50% probability of $F_{2009\text{-}2010}$ being above than this reference point.

Strengths

- Conclusions about stock status relative to MSST, SSB_{MSY} and F_{MSY} are supported by both the base run of the BAM model and the alternative ASPIC model. Uncertainty runs and sensitivity runs of the base BAM model indicate reasonable symmetry of uncertainties around the outcomes.

Weaknesses

- MCB runs indicate appreciable uncertainty of relative stock status, particularly with regards to fishing mortality relative to F_{MSY}.

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

Estimates of MSY, F_{MSY} and SSB_{MSY} were based on equilibrium expectations from the base run of the BAM model. This method is standard practice and appropriate for the stock and the available data. Analyses conducted at the request of the Review panel indicated that equilibrium expectations are sufficiently close to the outcomes of long-term stochastic projections to make no difference to status determination. This also confirms that the equilibrium estimate of SSB_{MSY} is an appropriate rebuilding target.

Strengths

- Estimation of biological reference points was based on an established and accepted methodology, appropriate to the stock and available data.
- Equilibrium estimates of biological reference points are consistent with long-term stochastic projections.

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).*

Projections of future stock status were undertaken by rolling forward the population model of the BAM base run, with stochasticity provided by sampling from the uncertainty (MCB) runs. Given the adequacy of the BAM model (ToR 2) and the characterization of uncertainty (ToR 6) the projection method is also adequate and appropriate. Choice of scenarios for future fishing mortality was also considered appropriate, based on geometric mean fishing mortality for the terminal two years of the assessment, quota or over-quota landings for the intermediate year and future landings according to current quota, $F_{rebuild}$ and $L_{rebuild}$. As would be expected projections based on $F_{rebuild}$ showed rebuilding of the stock to SSB_{MSY} by 2016 with 50% probability.

At the request of the Review Panel, additional projections were run using a reduced standard deviation of log recruitment, based on recruitment residuals from 1990 onwards. This was based on the observation by the Review Panel that variability of estimates around the fitted stock-recruitment

relationship appeared lower for recent years. As expected, these projections showed a slightly lower probability of rebuilding by 2016 (~42% rather than 50%). However, it was pointed out that under the reduced recruitment variability scenario SSB_{MSY} would also be revised downwards, so in reality the impacts of a change in recruitment variability may be small to negligible. It was also suggested that there is some evidence for more frequent negative recruitment residuals in recent years, perhaps indicating a change in stock productivity. However, it should be emphasized that model-based estimates are a hazardous basis for this type of inference and a more direct understanding of the sources of this pattern in the data would be needed before any conclusions could be drawn about shifts in the recruitment regime.

Strengths

- The projection methodology was consistent with the assessment model and with the treatment of uncertainty in the assessment. Comprehensive sources of uncertainty were incorporated in the MCB runs and included in the projections.
- The BAM base run provides adequate structure and stock estimates for meaningful projection of future stock status.
- Examination of possible changes in recruitment pattern indicated little impact on rebuilding.

Weaknesses

- There is some (weak) evidence of temporal changes in recruitment pattern, although this appears to have had little influence on the projections.

6. *Evaluate the adequacy, appropriateness, and application of methods used to characterize uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters. Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty. Ensure that the implications of uncertainty in technical conclusions are clearly stated.*

The Monte Carlo Bootstrap (MCB) method for exploring uncertainty in the assessment outcomes has been tried and tested and peer-reviewed in other assessments and is recommended in SEDAR guidance. Comprehensive sources of uncertainty were included, with rational choices made for characterizing uncertainty around individual parameters. In my opinion the MCB runs of the BAM base model provide a strong basis for characterizing uncertainty around the assessment outcomes for black sea bass and for including stochasticity in projections of future stock status. The ASPIC assessment considered fewer sources of uncertainty and provided correspondingly narrower confidence intervals around outcomes.

In addition to parameter uncertainties, sensitivity runs were conducted to investigate uncertainties stemming from the model configuration. These considered alternative steepness and M values, truncation of the headboat index, a continuity run for consistency with the previous assessment, differences in weightings and increases in catchability. Overall, the sensitivity runs provided similar results to the base BAM run with respect to lack of rebuilding, but tended to be more positive about relative stock status with the exception of runs incorporating higher M or lower steepness of the stock-recruitment relationship.

Analysis of truncated time-series indicated that retrospective bias in recent assessment outcomes appears not to be an important issue, although there is slight evidence that SSB may be revised upwards and fishing mortality downwards as additional years are added to the assessment. Any such bias is

considered too small to warrant adjustment of estimates and insignificant in relation to overall uncertainty of outcomes encompassed by the MCB runs.

Strengths

- The MCB methodology is appropriate and well tested, sources of uncertainty were comprehensively considered in the MCB runs, the overall characterization of uncertainty is good and would provide an adequate basis for probabilistic approaches to risk-based fishery-management.
- Sensitivity runs address the main sources of uncertainty in model configuration.

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

The Review Panel was very appreciative of the quality and clarity of presentation in the Stock Assessment Report. Background, methods and results were clearly and concisely reported, allowing easy appreciation of the main outcomes and the methods, data and assumptions on which these depended. Clear reference was made to the Data Workshop report and the working papers that provided the background to the assessment. Unnecessary repetition of information between reports was avoided, whilst at the same time providing adequate synthesis of information to understand how the assessments were underpinned by data and methodology – this is much appreciated by reviewers! Section 1.2 of the report, setting out the ToRs for the assessment and providing short statements about how each ToR was addressed, was a useful preface to the main report sections.

8. *Evaluate the SEDAR Process as applied to the reviewed assessment and identify any Terms of Reference which were inadequately addressed by the Data or Assessment Workshops.*

ToRs for the Assessment Workshop were met in full. ToRs for the Data Workshop were met with the exception of providing distribution maps for catch statistics. This omission was due to lack of time, but given uncertainties about spatial patterns in the fishery and stock it is recommended that this ToR be addressed in future. From the perspective of a reviewer, the SEDAR process appears highly effective, showing a well-organized, well-reported and logical progression of analysis and discussions leading to the final assessments presented at the Review Workshop. SEDAR is also to be commended for inclusion of stakeholders in the process and it is recommended that even greater incorporation of stakeholder input be included in future. This might include inputs to survey design and interpretation as well as choice of the main features to be considered in assessment model configurations.

9. *Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring needs that could improve the reliability of future assessments. Recommend an appropriate interval for the next assessment, and whether a benchmark or update assessment is warranted.*

The Data and Assessment Workshops provided an extensive list of recommendations, with which the Review Panel was in full agreement. The only criticism that I can offer is that the recommendations were scattered through the reports and often somewhat cryptic. I would prefer to see a collected synthesis of recommendations, given full context and justifications and rationalizing across similar recommendations given at different points in the reports.

The Review Panel provided in the summary report their own synthesis of recommendations from the Assessment and Data Workshops, prioritized according to urgency of need in addressing important limitations in the assessment. I fully concur with this synthesis and assessment of priorities. In particular I would like to emphasize the following topics

- Improvements in understanding of the elements of spawning potential would have a direct impact on how SSB is treated in the assessment. These elements include understanding of environmental and demographic sources of variability in the transition from females to males and age/size-specific spawning frequency and seasonality.
- Extension of historical catches before 1978 is a high priority because it would provide an improved perspective on stock productivity.
- Given the importance of the general recreational fishery, any improvements in recreational statistics would have a strong beneficial influence on the stock assessment.
- Although it was not emphasized in the summary report, I believe that collection of better spatial statistics for the fishery is an important task, particularly if this can be set against an improved background of information on movements and migrations of black sea bass. Local depletion and the targeting of fishing effort are important processes in determining the relationship between fishery catch rates and abundance, and although the assessment does not rely wholly on fishery-dependent data, it is still a high priority to understand the spatial dynamics of the stock and fishery.

The appropriateness of new benchmark assessments for South Atlantic black sea bass depends on addressing these and other research recommendations outlined in the Assessment and Data Workshop reports. In practice, it is likely that significant new data and information on life-history will not be available for some considerable time, in which case it will be more appropriate to provide updates of the current assessment. The current assessment format, which considered wider issues and assessment options beyond what would normally constitute an update assessment, is however very useful particularly in view of the fact that the stock still requires rebuilding, and it is recommended that this type of assessment be repeated in future. It is difficult to recommend a specific interval for assessment, but as noted in the summary report, the Review Panel took the view that normal SEDAR policy should be followed with regards to the usual intervals for assessment of a high-risk stock.

10. *Prepare a Peer Review 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 Peer Review Summary Report no later than October 28, 2011.*

All reviewers at the Review Workshop contributed to an assessment summary report, each reviewer taking responsibility for drafting a different section. Summary points and text were agreed during the meeting and the final text was agreed and proof-read by all reviewers after the meeting and well ahead of the submission deadline.

South Atlantic golden tilefish

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

The South Atlantic golden tilefish stock was treated as occurring between the Florida Keys and the border of North Carolina and Virginia. This appears to a large extent to represent a natural biogeographic unit, and the Review Panel noted that there was corroboration of the northern boundary from the most recent assessment of a northern stock, indicating different life-history characteristics in the Mid-Atlantic and Southern New England region. Life history parameters underlying the assessment were extensively reviewed and updated, notably including an upward revision of natural mortality rates based on improved age-determinations and natural mortality being modeled as an inverse function of weight using the approach of Lorenzen (1996).

Good data exist on commercial (longline and some handline) fishery removals, and recreational landings contribute small quantities. Discards are considered negligible. Length and age compositions of catches have been well sampled in many years, particularly for the commercial longline fleet, although the extent to which the sampling is spatially comprehensive is unclear. The main abundance index was fishery-dependent, based on CPUE of the commercial longline fleet. A fishery-independent index is based on MARMAP longline data, but low sample sizes led to the data being treated in blocks rather than individual years.

Overall, whilst there are limitations in terms of both knowledge of golden tilefish life-history and information on stock trends, I fully share the view of the Review Panel that the assessment has made best use of all the available information, making informed and intelligent choices about treatment of data sources.

Strengths

- Stock definition follows a natural biogeographic unit, defensible in terms of information on life-history.
- Estimates of M are based on the latest age determinations, with account taken of likely declines in natural mortality with age.
- Treatment of data sources is statistically rigorous, in terms of standardization of commercial longline CPUE, avoiding double-counting of fish in inclusion of age and length data and treatment of low sample sizes in the fishery-independent index.

- Informed and pragmatic choices are made about biological parameters when data are limited, e.g. assumptions about maturity ogives. This allows maximal use of available information in the assessment, ensuring that it is the best possible assessment based on the current state of knowledge.

Weaknesses

- A lack of information on the sex composition of the catches requires a crude treatment of sex ratio in the assessment, assumed fixed at 50:50 in the population. In particular, growth is known to vary between males and females, but this is not accounted for in the assessment.
- Possible spatial structure in the stock and fishery is not considered in the assessment. A spatial mismatch between the MARMAP index and the main fishery area appears to result in conflicting signals between the fishery-dependent and fishery-independent abundance indices. There appears generally to be a lack of information about movement and migration, although such data as exist appear to show little movement of adults. Sedentary stocks are subject to local depletion and spatial targeting of effort, which has implications for the responsiveness of CPUE to underlying stock trends. Migratory movements are thought not to occur, but any such movements might have important implications for selection curves if the distribution of the stock with respect to the fishery changes with age. Fish movements between areas open and closed to the fishery may also be important to consider. Given currently available data resources it is unlikely that spatial structure could be included in the assessment in the near future, but it will be important to examine the potential sensitivity of the assessment to spatial patterns in the stock and fishery and spatial biases in survey data, and for new information to be collected both on these patterns and on movements and migrations in the species.

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

The main analytical assessment model used was the Beaufort Assessment Model (BAM) which is a forward-projecting statistical catch-at-age model implemented in AD-Model Builder. The model is extremely flexible and sophisticated in the way in which all available data on catch quantities and composition (both length and age) and abundance indices can be incorporated within the assessment, and with appropriate account taken of uncertainty in the data sources. The analysts chose to treat the landings data as being known with high accuracy, fitted closely by the assessment, and an iterative procedure was used to derive weightings for the abundance indices and length and age composition data. The aim was to represent the age-based dynamics implied by the composition data without compromising the fit to the abundance indices. Primacy was given to age data for inclusion in the assessment model, but where length data could be included without double counting of sampled fish, these were incorporated into the age-based dynamics through use of age-length conversion matrices. This strategy ensured efficient and rational use of all data on catch compositions, but the final model was driven largely by abundance rather than age structure, thus sharing much in common with the biomass dynamic (ASPIC) model considered as an alternative.

In my view, the analytical assessment procedures were appropriate to the nature of the stock and of the information available on stock and fishery trends, were statistically rigorous, made efficient use of all available data on stock abundance and dynamics and were impeccably applied by the analysts in terms of treatment of data sources, uncertainty and weightings.

Strengths

- The BAM model has a history of use in a number of previous assessments, has been well tested, verified using simulated data and has been peer-reviewed on a number of previous occasions. Full documentation of AD Model Builder code for the model was given in a working paper for the Review Workshop.
- The BAM model allows incorporation of all appropriate data sources, including removals quantities and composition, abundance indices and life-history information. Use of age-length conversion matrices allowed incorporation of available length data into the model for strata where age data were missing or inadequate. Inclusion of length data was made with due regard to avoidance of double counting of sampled fish.
- The BAM model is statistically rigorous, accounting for error structures, uncertainties and data weightings.
- The age-based structure of the BAM model, and the way in which stock-recruitment processes are modelled, provide a strong structural basis for stock projections and investigations of uncertainties.
- A biomass dynamic (ASPIC) model was used as an alternative assessment approach, providing some confidence that assessment outcomes are not merely artefacts of the particular assessment model used.

Weaknesses

- Both the BAM and ASPIC assessments were driven largely by the abundance indices, thus the alternatives do not provide a strong contrast in terms of stock dynamic processes and effectively provide only weak support for consistency of assessment outcomes between different information sources. Age and length composition data are not strongly informative of stock dynamics.
- Spatial structure is not included in the assessment model. Whilst it is recognised that a spatially structured assessment is probably an unrealistic aspiration for the immediate future, nevertheless some attention should be paid to methods for accounting for spatial pattern in the assessment and to the possibility of assessment biases stemming from spatial patterns.
- Flat-topped selectivity curves were fixed in the assessment. The use of logistic curves is parsimonious in terms of parameter estimation, and probably justified given the lack of evidence for gear effects or spatial availability patterns that may cause dome-shaped or other selectivity patterns, but it would be worth considering the implications of freely estimated selectivity curves for outcomes in terms of stock status in relation to MSY-based indicators.

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

Estimates of SSB and fishing mortality from the BAM base run are recommended as the best current estimates for the South Atlantic golden tilefish stock. Although these are the best estimates, caution should be exercised in comparing absolute estimates with those from other methods; the BAM base run estimates are most meaningfully compared with biological reference points derived from the same model. There is less uncertainty associated with relative than absolute stock status determined for this stock.

Both BAM and ASPIC models provided assessment outcomes indicating SSB (couched in terms of gonad weight) above SSB_{MSY} and MSST and fishing mortality below F_{MSY}. Sensitivity runs of the BAM model, examining sensitivity of outcomes to M, steepness of the stock-recruitment relationship, inclusion of indices, gear selectivity and changes in catchability, also showed favorable stock status with respect to MSST and F_{MSY}, but it is worth noting that the base model run was the most optimistic with the exception of a run with high M. Estimates from the base run were also not central to the distribution of estimates from uncertainty (Monte Carlo Bootstrap) runs, tending again to be relatively optimistic. The reasons for this apparent bias are not clear, but it nevertheless seems safe to conclude that the South Atlantic golden tilefish stock is likely not overfished and not undergoing overfishing.

Whilst stock status seems reasonably clearly established in relative terms, there is much less certainty about absolute levels of SSB and fishing mortality. A comparison of BAM and ASPIC estimates, undertaken during the Review Workshop at the request of the Review Panel, showed similar stock trends but with higher biomass and lower fishing mortality from the BAM model. A comparison of implied production curves between the models was revealing, indicating that the scaling of biomass estimates for the early years of the fishery was highly dependent on assumptions about starting conditions.

Strengths

- The conclusion that SSB is higher than MSST and fishing mortality is lower than F_{MSY} is supported by alternative assessment approaches, by sensitivity runs of the base model and by investigation of uncertainty associated with base model outcomes.

Weaknesses

- Whilst relative stock status is well determined, absolute levels of biomass and fishing mortality remain uncertain and may be dependent on assumptions about conditions during the early years of the assessment time-series. It is recommended that direct estimates of stock biomass be sought based on fishery-independent surveys, providing a strong scaling factor for future assessments.
- The base assessment model run provided outcomes that appear optimistic in relation to the range of outcomes from uncertainty runs of the model. This has not been an issue for status determination in the present assessment, but any bias may be more important if biomass and fishing mortality estimates were close to the biological reference point values. It is recommended that a rigorous analysis be undertaken to determine the source in the data of the discrepancy between base run outcomes and the central tendency of uncertainty run outcomes. If appropriate, this should result either in adjustment of data and assumptions in the base model or of the dealing with sources of uncertainty in the MCB runs.

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

Estimates of MSY, F_{MSY} and SSB_{MSY} were based on equilibrium expectations from the base run of the BAM model. This method is standard practice and appropriate for the stock and the available data. It is expected that values derived from long-term stochastic projections would be sufficiently close to these equilibrium values to make no difference to status determination (as shown for black sea bass).

The chief source of uncertainty in the biological reference points relates to the steepness of the stock-recruitment relationship. The value of 0.84 was fixed at the mode from a meta-analysis by Shertzer & Conn (in press). When allowed to be estimated, the model forced the steepness value to its upper bound, which was deemed unrealistic. It is worth noting that sensitivity runs involving steepness set to lower (0.74) and higher (0.94) values yielded outcomes very similar to the base BAM run in terms of relative stock status.

Strengths

- Estimation of biological reference points was based on an established and accepted methodology, appropriate to the stock and available data.
- Relative assessment outcomes appear reasonably insensitive to different choices of steepness value for the stock-recruitment relationship, which is the main source of uncertainty in the biological reference points.

Weaknesses

- The steepness of the stock-recruitment relationship was not well determined. It is recommended that research be continued into appropriate steepness values and the implications of their choice for assessment outcomes.
- Choice of form for the stock-recruitment relationship was limited to Beverton-Holt. This may be justified in terms of the likely effects of available habitat limiting recruitment to the adult stock, and the lack of evidence for cannibalism and other sources of overcompensation in stock-recruitment relationships, but it would be worth exploring the use of other stock-recruitment curves such as Ricker.

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).*

Projections of future stock status were undertaken by rolling forward the population model of the BAM base run, with stochasticity provided by sampling from the uncertainty (MCB) runs. Given the adequacy of the BAM model (ToR 2) and the characterization of uncertainty (ToR 6) the projection method is also adequate and appropriate. Choice of scenarios for future fishing mortality was also considered appropriate, based on geometric mean fishing mortality for the terminal three years of the assessment, current fishing mortality for the intermediate year and five future fishing mortality scenarios. The treatment of recruitment deviations for the final years of the assessment was also considered rational and appropriate by the Review Panel. As would be expected, fishing under a F_{MSY} scenario resulted in biomass tending towards SSB_{MSY} in the long-term, lending confidence in the application of the projection method.

The main uncertainty in the projections relates to recruitment patterns. A very large (implausible?) estimate was made for the strength of the 2000 year-class, whereas it is more likely that strong recruitments were spread out over several years.

Strengths

- The projection methodology was consistent with the assessment model and with the treatment of uncertainty in the assessment. Comprehensive sources of uncertainty were incorporated in the MCB runs and included in the projections.
- Projections at F_{MSY} tended towards SSB_{MSY}, corroborating the correct application of projection methodology.

Weaknesses

- Poor information was available on the stock-recruitment relationship. Given the starting position of relatively high stock sizes it is unlikely that this would have caused biases in the mean projected SSB, but uncertainty in projection outcomes may be skewed or otherwise not properly represented.

6. *Evaluate the adequacy, appropriateness, and application of methods used to characterize uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters. Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty. Ensure that the implications of uncertainty in technical conclusions are clearly stated.*

The Monte Carlo Bootstrap (MCB) method for exploring uncertainty in the assessment outcomes has been tried and tested and peer-reviewed in other assessments and is recommended in SEDAR guidance. Comprehensive sources of uncertainty were included, with rational choices made for characterizing uncertainty around individual parameters. In my opinion the MCB runs of the BAM base model provide a strong basis for characterizing uncertainty around the assessment outcomes. As noted above, it is puzzling that the central tendency of MCB outcomes relative to reference points was less optimistic than the base BAM run; the sources of this pattern in terms of data and assumptions will be worth exploring in the future, with a view to adjusting either the base model configuration or the treatment of uncertainty. The MCB methodology does not account for any covariance structure among the assessment parameters. This will be an important topic to consider for the future, but given the current state of data and knowledge there is little basis for revision of the current MCB approach. The ASPIC assessment considered fewer sources of uncertainty and provided correspondingly narrower confidence intervals around outcomes.

In addition to parameter uncertainties, sensitivity runs were conducted to investigate uncertainties stemming from the model configuration (see ToR 3). As with the MCB runs, the base run outcomes relative to reference points were not central to the distribution of those from sensitivity runs, but in this case it is worth pointing out that not all the sensitivity runs were equally plausible. The range of sensitivity runs considered was rational and adequate, given the main uncertainties in the setting up of the assessment model. Sensitivity runs also indicated that there was no major issue with retrospective bias.

Strengths

- The MCB methodology is appropriate and well tested, sources of uncertainty were comprehensively considered in the MCB runs, the overall characterization of uncertainty is good and would provide an adequate basis for probabilistic approaches to risk-based fishery-management.
- Sensitivity runs address the main sources of uncertainty in model configuration.

Weaknesses

- Non-centrality of relative outcomes from the BAM assessment model among those of the uncertainty runs is a puzzling feature that warrants further investigation.

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

The Review Panel was very appreciative of the quality and clarity of presentation in the Stock Assessment Report. Background, methods and results were clearly and concisely reported, allowing easy appreciation of the main outcomes and the methods, data and assumptions on which these depended. Clear reference was made to the Data Workshop report and the working papers that provided the background to the assessment. Unnecessary repetition of information between reports was avoided, whilst at the same time providing adequate synthesis of information to understand how the assessments were underpinned by data and methodology – this is much appreciated by reviewers! Section 1.2 of the report, setting out the ToRs for the assessment and providing short statements about how each ToR was addressed, was a useful preface to the main report sections.

8. *Evaluate the SEDAR Process as applied to the reviewed assessment and identify any Terms of Reference which were inadequately addressed by the Data or Assessment Workshops.*

ToRs for the Assessment Workshop were met in full. ToRs for the Data Workshop were met with the exception of providing distribution maps for catch statistics. This omission was due to lack of time, but given uncertainties about spatial patterns in the fishery and stock it is recommended that this ToR be addressed in future. From the perspective of a reviewer, the SEDAR process appears highly effective, showing a well-organized, well-reported and logical progression of analysis and discussions leading to the final assessments presented at the Review Workshop. SEDAR is also to be commended for inclusion of stakeholders in the process and it is recommended that even greater incorporation of stakeholder input be included in future. This might include inputs to survey design and interpretation as well as choice of the main features to be considered in assessment model configurations.

9. *Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring needs that could improve the reliability of future assessments. Recommend an appropriate interval for the next assessment, and whether a benchmark or update assessment is warranted.*

The Data and Assessment Workshops provided an extensive list of recommendations, with which the Review Panel was in full agreement. The only criticism that I can offer is that the recommendations were scattered through the reports and often somewhat cryptic. I would prefer to see a collected synthesis of recommendations, given full context and justifications and rationalizing across similar recommendations given at different points in the reports.

The Review Panel provided in the summary report their own synthesis of recommendations from the Assessment and Data Workshops, prioritized according to urgency of need in addressing important limitations in the assessment. I fully concur with this synthesis and assessment of priorities. I would like to emphasize three topics in particular:

- There is generally a lack of information on movement and spatial structure. I would emphasize the importance of tagging studies to elucidate the scale of movements and the existence and nature of any migratory behavior. This would be informative about, among other things, selectivity effects mediated by availability to the fishery and the likelihood of exchange of fish between areas open and closed to the fishery. Given that the main abundance index is fishery-dependent, it is also important to consider the inter-relatedness of fish movements, targeting of fishing effort and local depletion in order better to understand the relationship of commercial CPUE with abundance.
- Sex structure is rather crudely incorporated in the current assessment, particularly in terms of sex ratios and growth patterns. I would particularly support recommendations to consider the possibility of protogynous hermaphroditism in South Atlantic golden tilefish, and any research that improves the basis for formulating measures of spawning potential. This particularly includes research into size/age-dependent spawning frequency.
- The assessment depends crucially on abundance indices. Whilst the currently available indices appear adequate for the assessment of *relative* stock status, there is plenty of room for improvement. This relates particularly to fishery-independent indices, and I would encourage resources to be put into developing new and improved (better spatial coverage, larger sample sizes) indices of this type. I would also emphasize the importance of direct estimates of abundance and biomass (e.g. from underwater video monitoring of burrow densities, similar to *Nephrops* assessments in the NE Atlantic) – these would provide the basis for absolute scaling of assessment outcomes.

The appropriateness of new benchmark assessments for South Atlantic golden tilefish depends on addressing these and other research recommendations outlined in the Assessment and Data Workshop reports. In practice, it is likely that new indices and important new information on life-history will not be available for some considerable time, in which case it will be more appropriate to provide updates of the current assessment. This is particularly the case given the favorable current and projected stock status indicated by this assessment. The current assessment format, which considered wider issues and assessment options beyond what would normally constitute an update assessment, is however very useful for a stock and fishery limited by available data and life-history information, and it is recommended that this type of assessment be repeated in future. It is difficult to recommend a specific interval for assessment, but a major new assessment within the next 3-5 years would be unwarranted unless new information comes to light on the nature of stock or fishery trends. As noted in the summary report, the Review Panel took the view that normal SEDAR policy should be followed with regards to the intervals for assessment of a low-risk stock.

10. *Prepare a Peer Review 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 Peer Review Summary Report no later than October 28, 2011.*

All reviewers at the Review Workshop contributed to an assessment summary report, each reviewer taking responsibility for drafting a different section. Summary points and text were agreed during the

meeting and the final text was agreed and proof-read by all reviewers after the meeting and well ahead of the submission deadline.

Conclusions

The final conclusion of this review is that the stock assessments for South Atlantic black sea bass and golden tilefish are the best possible given the available data and biological knowledge. The assessments are a sound basis for estimating stock status in relation to MSY-based biological reference points and for projecting future stock status under possible fishing scenarios, and also provide an adequate description of uncertainty in both current and future stock status. Limitations in data and knowledge are clearly identified, and recommendations from the Data and Assessment Workshops provide a good roadmap for future improvements in stock assessment.

NMFS Review Process

The Statement of Work for CIE reviewers (Appendix II) asks for a critique of the NMFS review process, with suggestions for improvements of both process and products. The review process worked particularly well during SEDAR 25, largely owing to good organization of the stream of tasks and outputs between the Data, Assessment and Review Workshops. The Data and Assessment Reports were clear and concise, showed clear evidence of addressing the ToR, were effectively cross-referenced, avoided unnecessary repetition and were well fitted to efficient review. Everyone involved in the SEDAR process should be commended for this well-coordinated and efficient effort.

I have previously (CIE reviews for SARC 48 and SARC 50) commented on the review process, and the same points are generally applicable to SEDAR 25. Re-iterating, the strengths that should be emphasized include:

- availability of documentation well in advance of the review meeting;
- effective chairmanship of the review meeting, ensuring that discussions remained on-topic and included the views of all interested parties;
- effective guidance from SEDAR during the meeting, ensuring that the required outcomes of the review were kept in mind;
- early availability during the meeting of presentation material and effective rapporteur reports;
- willingness of assessment scientists to undertake additional analyses when required;
- an atmosphere of scientific rigor coupled with a pragmatic, 'real world' approach to producing required outputs;
- precise terms of reference for the meeting and precisely defined requirements for reviewer outputs.

More specific to SEDAR 25, I would like to comment on the length of the meeting and the amount of material to review: the meeting was short, only two and a half days long, yet there was still generous time available for presentations, discussions, additional analyses and preliminary drafting of summary reports. In large part this was due to the stock analysts doing a good job – scientifically sound assessments, well supported by supplementary material, well presented in reports and during the meeting and fast response to requests for additional analyses. This is certainly not a problem for the reviewer! However, it occurs to me to wonder whether a slightly longer meeting, involving more stocks, would provide NMFS with better value from the reviewers. If increasing the number of stocks would make Data and Assessment Workshops unwieldy, would it be possible to combine more than one SEDAR in the same Review Workshop?

Recommendations

Both species

- The BAM model provides a highly effective stock assessment method for South Atlantic sea bass and golden tilefish and should continue to be used in future assessments.
- The Monte Carlo Bootstrap method provides an effective method for considering uncertainty in assessment outcomes and for providing stochasticity in projections of future stock status. This approach should continue to be used in future assessments, but attention should also be paid to the incorporation of parameter covariance.
- Equilibrium expectations of MSY-based biological reference points provide a good basis for fishery management. These should continue to be used in the future but with checking for consistency with long-term stochastic projections. Estimates of biological reference points should only be used in the context of the model from which they were derived, i.e. both reference points and stock estimates should be treated as relative rather than absolute.
- Research should continue into estimating or finding likely values for steepness in the stock-recruitment relationships. While these remain uncertain, the implications of different values for the assessments should be rigorously explored in sensitivity analyses.
- Spatial fishery patterns should be investigated with a view to understanding how fish movements might affect availability to the fishery and how fishery-dependent indices are likely to reflect local and regional stock abundance.
- Investigation of selectivity patterns should extend beyond the assumption of flat-topped curves applied in the current assessments. This will require consideration of the biological basis for fishery selectivity (notably spatial availability to the fishery), trials with unconstrained estimation of selectivity patterns and examination of implications in terms of relative assessment outcomes.
- The report structures used by the Data and Assessment Workshops were highly effective for the purposes of review. These reports should serve as a model for future assessments.

Black sea bass

- Research relating to measurement of SSB should be given a high priority, notably studies of age-dependent spawning frequency and of environmental and demographic sources of variation in sexual transitions.
- The assessment would benefit from improvements in the quality of recreational fishery statistics and from extending the time-series of historical landings data before 1978.
- Possible temporal changes in the stock-recruitment relationship should be considered, paying particular attention to sources in the data giving rise to apparent changes in the level and variability of recruitment evident in model estimates.

Golden tilefish

- Research related to measurement of SSB should be given high priority, notably studies of age-dependent spawning frequency.

- Effort should be made to improve the modeling of sex-specific dynamics in the assessment, concentrating on sex ratios and sexual differences in growth. This is likely to be dependent on improved sampling of sex ratios in the catches.
- Development of a good fishery-independent abundance index for golden tilefish should be a high priority in considering future survey plans. Particular attention should be paid to the spatial coverage of abundance indices in relation to the stock and the fishery and to gaining direct estimates of abundance that could be informative of abundance and biomass scaling in the assessment. Depending on the identifiability and visibility of golden tilefish burrows, burrow counting using towed underwater video would be a good candidate method to consider for such surveys.
- Reasons for disparity between outcomes of the BAM base run and the central tendency of outcomes of uncertainty runs should be investigated, considering both data and model formulations and identifying any adjustments appropriate for future assessments to improve both point estimates and the coverage of confidence intervals.

Acknowledgments

I would like to thank all members of the data and assessment teams for their hard work before and during the SEDAR 25 Review Workshop and for their willingness to respond to questions and requests for analyses during the meeting. Thanks also to SEDAR staff generally, and to Kari Fenske in particular, for good organization, sending out review material in good time and efficient running of the meeting. I am grateful to my fellow review panel members Anne Lange, Paul Medley, Mike Smith, Jim Berkson and Steve Cadrin for being great to work with, and particularly to Anne for excellent chairmanship. Many thanks also to Manoj Shivlani for excellent arrangements and administration.

References

Lorenzen, K. 1996. The relationship between body weight and natural mortality in juvenile and adult fish: a comparison of natural ecosystems and aquaculture. *Journal of Fish Biology*, **49**, 627-642.

Shertzer, K.W. & Conn, P.B. in press. Spawner-recruit relationships of demersal marine fishes: Prior distribution of steepness. *Bulletin of Marine Science*.

APPENDIX I: Bibliography of materials provided for review

Document #	Title	Authors
Documents Prepared for the Data Workshop		
SEDAR25-DW01	Black sea bass length frequencies and condition of released fish from at-sea headboat observer surveys, 2004-2010	Sauls, Wilson, and Brennan 2011
SEDAR25-DW02	Standardized CPUE of black sea bass (*Centripristis striata*) caught in blackfish and Florida snapper traps deployed by MARMAP	Bacheler, Shertzer, Reichert, Stephen, and Pate 2011
SEDAR25-DW03	Standardized CPUE of black sea bass (*Centropristis striata*) from chevron trapping by MARMAP	Bacheler, Shertzer, Reichert, Stephen, and Pate 2011
SEDAR25-DW04	Catch-per-unit-effort of golden tilefish from MARMAP bottom longlining	Bacheler, Reichert, Stephen, and Pate 2011
SEDAR25-DW05	Klibansky and Scharf batch fecundity methods	Klibansky and Scharf 2011
SEDAR25-DW06	The Regulations that have already affected the Black Sea Bass rebuilding	Fex 2011
SEDAR25-DW07	Commercial Longline Vessel Standardized Catch Rates of Tilefish in the US South Atlantic, 1993-2010	McCarthy 2011
SEDAR25-DW08	The potential for using the sea bass pot fishery to assess changes in abundance of black sea bass (*Centropristis striata*) in the South Atlantic region	Hull and Hester 2011
SEDAR25-DW09	Fisheries-dependent landings data for the east Florida golden tilefish (L*opholatilus chamaeleonticeps*) fishery	Hull and Barile 2011
SEDAR25-DW10	Black sea bass and tilefish discard mortality working paper	Collier, Fex, Rudershausen, and Sauls 2011
SEDAR25-DW11	Bottom longline fishery bycatch of golden tilefish from observer data	Hale 2011
SEDAR25-DW12	Abundance indices of black sea bass collected during SEAMAP shallow water trawl surveys in the South Atlantic Bight (1990-2010)	Ingram 2011
SEDAR25-DW13	Standardized discard rates of US black sea bass (*Centropristis striata*) from headboat at-sea observer data	Sustainable Fisheries Branch, NMFS 2011
SEDAR25-DW14	Preliminary standardized catch rates of Southeast US Atlantic black sea bass (*Centropristis striata*) from headboat data	Sustainable Fisheries Branch, NMFS 2011
SEDAR25-DW15	South Carolina Department of Natural Resources State	Hiltz and Byrd 2011

	Finfish survey (SFS)	
SEDAR25-DW16	SCDNR Charterboat Logbook Program Data, 1993-2010	Errigo et al. 2011
SEDAR25-DW17	A note on the occurrence of bank sea bass (*Centropristis ocyurus*) in the Florida hook and line and black sea bass pot fisheries	Nelson 2011
SEDAR25-DW18	Commercial vertical line vessel standardized catch rates of black sea bass in the US South Atlantic, 1993-2010	McCarthy 2011
SEDAR25-DW19	Calculated discards of black sea bass and tilefish from commercial fishing vessels in the US South Atlantic	McCarthy
SEDAR25-DW20	Summary of black sea bass (*Centropristis striata*) length composition sampling from the Gulf and South Atlantic Fisheries Foundation observer program, 2007-2009	Gloeckner 2011
SEDAR25-DW21	Summary of black sea bass (*Centropristis striata*) length composition sampling from the Trip Interview Program (TIP) 1981-2010	Gloeckner 2011
SEDAR25-DW22	Summary of golden tilefish (*Lopholatilus chamaeleonticeps*) length composition sampling from the Trip Interview Program (TIP) 1981-2010	Gloeckner 2011
SEDAR25-DW23	Revised working paper: SCDNR Charterboat logbook program data, 1993-2010 (replaces SEDAR25-DW16)	Errigo et al 2011
SEDAR25-DW24	Standardized catch rates of black sea bass from commercial fish traps in the US South Atlantic, 1993-2010	McCarthy 2011
Documents Prepared for the Assessment Workshop		
SEDAR25-AW01	Is pooling MARMAP chevron trap data justifiable for Black Sea Bass (*Centropristis striata*) in the South Atlantic Region?	Hull and Hester 2011
Documents Prepared for the Review Workshop		
SEDAR25-RW01	Comments and notes received during the data, assessment and review for SEDAR 25	Multiple authors
SEDAR25-RW02	Comments and notes received during the assessment and review for SEDAR 25	Multiple authors
SEDAR25-RW03	The Beaufort Assessment Model (BAM) with application to black sea bass: model description, implementation details, and computer code	Sustainable Fisheries Branch, NMFS 2011
SEDAR25-RW04	The Beaufort Assessment Model (BAM) with application to tilefish: model description, implementation details, and computer code	Sustainable Fisheries Branch, NMFS 2011
SEDAR25-RW05	Development and diagnostics of the Beaufort assessment model applied to black sea bass	Sustainable Fisheries Branch, NMFS 2011

SEDAR25-RW06	Development and diagnostics of the Beaufort assessment model applied to tilefish	Sustainable Fisheries Branch, NMFS 2011
SEDAR25-RW07	Use of MARMAP age compositions in SEDAR 25 – Methods of addressing sub-sampling concerns from SEDAR 2 and SEDAR 17	Ballenger, Reichert, and Stephen, 2011
SEDAR25-RW08	Fisheries management actions confound the ability of the Beaufort Assessment Model (BAM) to explain dynamics of the Golden Tilefish fishery off of east Florida	Hull and Barile, 2011
SEDAR25-RW09	A note on the use of flat-topped selectivity curves in SEDAR 25	Hull and Hester, 2011
SEDAR25-RW10	On steepness	Hull and Hester, 2011
SEDAR25-RW11	Some considerations of area interactions	Hull and Hester, 2011
Final Assessment Reports		
SEDAR25-SAR1	Assessment of Black Sea Bass in the US South Atlantic	To be prepared by SEDAR 25
SEDAR25- SAR2	Assessment of Golden Tilefish in the US South Atlantic	To be prepared by SEDAR 25
Reference Documents		
SEDAR25-RD01	Tilefish off South Carolina and Georgia	Low et al. 1983
SEDAR25-RD02	Temporal and spatial variation in habitat characteristics of tilefish (*Lopholatilus chamaeleonticeps*) off the east coast of Florida	Able et al. 1993
SEDAR25-RD03	The fishery for tilefish, *Lopholatilus chamaeleonticeps*, off South Carolina and Georgia	Low et al. 1982
SEDAR25-RD04	The complex life history of tilefish *Lopholatilus chamaeleonticeps* and vulnerability to exploitation	Grimes and Turner 1999
SEDAR25-RD05	South Carolina Sea Grant Project: To investigate and document legal and undersized fish (Black Sea Bass) and injuries to released fish.	D. Lombardi 2008
SEDAR25-RD06	The 1882 tilefish kill – a cold event in shelf waters off north-eastern United States?	March et al. 1999
SEDAR25-RD07	Contributions to the life history of black sea bass, *Centropristis striata*, off the Southeastern United States	Wenner et al. 1986
SEDAR25-RD08	Population characteristics of the black sea bass *Centropristis striata* from the Southeastern US	Vaughan et al. 1995

SEDAR25-RD09	The summer flounder, scup, and black sea bass fishery of the Middle Atlantic Bight and southern New England waters	Shepherd and Terceiro 1994
SEDAR25-RD10	Estimating discard mortality of black sea bass (*Centropristis striata*) and other reef fish in North Carolina using a tag-return approach	Rudershausen et al. 2010
SEDAR25-RD11	List of working papers for SEDAR 4 (Atlantic and Caribbean deepwater snapper and grouper) – all documents are available on the SEDAR website	SEDAR 4
SEDAR25-RD12	List of reference documents for SEDAR 4 (Atlantic and Caribbean deepwater snapper and grouper) – all documents are available on the SEDAR website	SEDAR 4
SEDAR25-RD13	Evaluation of multiple survey indices in assessment of black sea bass from the US South Atlantic Coast	Vaughan et al. 1997
SEDAR25-RD14	Seasonal distribution and movement of black sea bass (*Centropristis striata*) in the northwest Atlantic as determined from a mark-recapture experiment	Moser and Shepherd 2009
SEDAR25-RD15	Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic) – Black sea bass	Mercer et al. 1989
SEDAR25-RD16	Black sea bass	Shepherd 2006
SEDAR25-RD17	Seafood Watch – Black Sea Bass (*Centropristis striata*), northeast region	Kerkering 2004
SEDAR25-RD18	Dispersal of black sea bass (*Centropristis striata*) larvae on the southeast US continental shelf: results of a coupled vertical larval behavior – 3D circulation model	Edwards et al. 2008
SEDAR25-RD19	List of working paper for SEDAR 2 (SA Black sea bass) – all documents are available on the SEDAR website	SEDAR 2
SEDAR25-RD20	Catch rates and selectivity among three trap types in the US South Atlantic black sea bass commercial trap fishery	Rudershausen et al. 2008
SEDAR25-RD21	Lead-radium dating of golden tilefish (*Lopholatilus chamaeleonticeps*)	Andrews 2009
SEDAR25-RD22	Black sea bass, *Centropristis striata*, life history and habitat characteristics (second edition)	Drohan et al. 2007
SEDAR25-RD23	Spawning locations for Atlantic reef fishes off the Southeastern US	Sedberry et al. 2006
SEDAR25-RD24	Growth of black sea bass (*Centropristis striata*) in recirculating aquaculture systems	Perry et al. 2007
SEDAR25-RD25	American food and game fishes. A popular account of all the species found in America north of the equator, with keys for ready identification, life histories and methods of capture – *Tilefish excerpt*	Jordan and Evermann 1908
SEDAR25-RD26	American fishes: A popular treatise upon the game and food fishes of North America with especial reference to habits and methods of capture – *Sea*	Goode and Gill 1903

	basses excerpt	
SEDAR25-RD27	American food and game fishes. A popular account of all the species found in America north of the equator, with keys for ready identification, life histories and methods of capture – *Centropristes excerpt*	Jordan and Evermann 1908
SEDAR25-RD28	Returns from the 1965 Schlitz tagging program including a cumulative analysis of previous results	Beaumariage 1969
SEDAR25-RD29	Source Document for the Snapper-Grouper Fishery of the South Atlantic region	SAFMC 1983
SEDAR25-RD30	FMP, Regulatory Impact Review, and final Environmental Impact Statement for the SG fishery of the South Atlantic region	SAFMC 1983
SEDAR25-RD31	Biological-statistical census of the species entering fisheries in the Cape Canaveral area	Anderson and Gehringer 1965
SEDAR25-RD32	Survey of offshore fishing in Florida	Moe 1963
SEDAR25-RD33	Southeastern US Deepwater reef fish assemblages, habitat characteristics, catches, and life history summaries	Parker and Mays 1998
SEDAR25-RD34	Sea bass pots: bigger mesh may yield larger fish	Lee 2007
SEDAR25-RD35	Migration and standing stock of fishes associated with artificial and natural reefs on Georgia's outer continental shelf	Ansley and Harris 1981
SEDAR25-RD36	The South Carolina fishery for black sea bass (*Centropristis striata*), 1977-1981	Low 1982
SEDAR25-RD37	Age sampling of the commercial snapper grouper fishery and age description of the black sea bass fishery in North Carolina	Collier and Stewart, 2010
SEDAR25-RD38	Black sea bass 2009 stock assessment update (Northeast Fisheries Science Center Reference Document 09-16)	Shepherd 2009
SEDAR25-RD39	The recreational fishery in South Carolina: The Little River story	Burrell
SEDAR25-RD40	Otolith and histology interpretation workshop for golden tilefish and snowy grouper	Joint agency report 2009
SEDAR25-RD41	Age workshop for black sea bass (*Centropristis striata*)	Joint agency report 2009
SEDAR25-RD42	Population genetic structure of black seabass (*Centropristis striata*) on the eastern US coast, with an analysis of mixing between stocks north and south of Cape Hatteras, North Carolina	McCartney and Burton 2011
SEDAR25-RD43	Delineation of tilefish, *Lopholatilus chamaeleonticpes*, stocks along the United States east coast and in the Gulf of Mexico	Katz et al 1982

SEDAR25-RD44	Foreign fishing off the southeastern United States under the currently accepted contiguous sea limitation	Fuss
SEDAR25-RD45	Black sea bass, managing a fishery. A case study. *website document*	Camblos et al. 2005
SEDAR25-RD46	SAFMC Science and Statistics Committee, Bio-Assessment sub-committee	SA SSC 2003

APPENDIX II: CIE Statement of Work

Attachment A: Statement of Work for Michael Bell (Heriot-Watt University)

External Independent Peer Review by the Center for Independent Experts

SEDAR 25 South Atlantic Black Sea Bass and Golden Tilefish Review

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

Project Description: SEDAR 25 will be a compilation of data, a benchmark assessment of the stock, and an assessment review conducted for South Atlantic Black Sea Bass and Golden Tilefish. 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 stocks assessed through SEDAR 25 are within the jurisdiction of the South Atlantic Fisheries Management Council and the states of Florida, Georgia, South Carolina, and North Carolina. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. CIE reviewers shall have working knowledge and recent experience in the application stock assessment, statistics, fisheries science, and marine biology sufficient to complete the primary task of reviewing the technical details of the methods used for the assessment. Expertise with data poor assessment methods would be preferable. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Charleston, South Carolina during October 11-13, 2011.

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

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

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

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

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

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

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

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

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Participate in the panel review meeting in Charleston, South Carolina during October 11-13, 2011.
3) In Charleston, South Carolina during October 11-13, 2011 as specified herein, conduct an independent peer review in accordance with the ToRs (**Annex 2**).
4) No later than October 27, 2011, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, via email to David Sampson david.sampson@oregonstate.edu. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

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

September 6, 2011	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
September 27, 2011	NMFS Project Contact sends the CIE Reviewers the pre-review documents
October 11-13, 2011	Each reviewer participates and conducts an independent peer review during the panel review meeting
October 27, 2011	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
November 10, 2011	CIE submits CIE independent peer review reports to the COTR
November 17, 2011	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

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

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

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

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

Support Personnel:

William Michaels, Program Manager, COTR
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

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Roger W. Peretti, Executive Vice President
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Key Personnel:

Kari Fenske, SEDAR Coordinator
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North Charleston, SC 29405
kari.fenske@safmc.net Phone: 843-571-4366

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

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

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

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

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

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

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

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

3. The reviewer report shall include the following appendices:

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

Annex 2: Tentative Terms of Reference for the Peer Review

SEDAR 25 Black Sea Bass Review Workshop Terms of Reference

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*); recommend appropriate management benchmarks, provide estimated values for management benchmarks, and provide 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. Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty. 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 that reported results are consistent with Review Panel recommendations.*
8. Evaluate the SEDAR Process as applied to the reviewed assessment and identify any Terms of Reference which were inadequately addressed by the Data or Assessment Workshops.
9. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring needs that could improve the reliability of future assessments. Recommend an appropriate interval for the next assessment, and whether a benchmark or update assessment is warranted.
10. Prepare a Peer Review 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 Peer Review Summary Report no later than October 28, 2011.

* 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.

SEDAR 25 Golden Tilefish Review Workshop Terms of Reference

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*); recommend appropriate management benchmarks, provide estimated values for management benchmarks, and provide 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. Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty. 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 that reported results are consistent with Review Panel recommendations.*
8. Evaluate the SEDAR Process as applied to the reviewed assessment and identify any Terms of Reference which were inadequately addressed by the Data or Assessment Workshops.
9. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring needs that could improve the reliability of future assessments. Recommend an appropriate interval for the next assessment, and whether a benchmark or update assessment is warranted.
10. Prepare a Peer Review 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 Peer Review Summary Report no later than October 28, 2011.

* 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.

Annex 3: Tentative Agenda

Tentative Agenda

SEDAR 25 South Atlantic Black Sea Bass and Golden Tilefish Review Workshop

Charleston, SC
11-13 October, 2011

Tuesday

9:00 a.m.	**Convene**	
9:00 – 9:30 a.m.	**Introductions and Opening Remarks** *- Agenda Review, TOR, Task Assignments*	**Coordinator**
9:30 – 12:00 p.m.	**Assessment Presentations and discussion**	
12:00 – 1:15 p.m.	**Lunch Break**	
1:15 – 6:00 p.m.	**Assessment presentations and discussion**	**Chair**

***Tuesday Goals*:** Initial presentations completed, sensitivity and base model discussion begun

Wednesday

8:00 a.m. – 11:30 a.m.	**Panel Discussion** *- Assessment Data & Methods* *- Identify additional analyses, sensitivities, corrections*	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:30 p.m. – 6:00 p.m.	**Panel Discussion/Panel Work Session** *- Continue deliberations* *- Review additional analyses* *- Recommendations and comments*	**Chair**

***Wednesday Goals*:** sensitivities and modifications identified, preferred models selected, projection approaches approved, Report drafts begun

Thursday

8:00 a.m. – 1:00 p.m.	**Panel Discussion** *- Final sensitivities reviewed.* *- Projections reviewed.* *- Review Reports*	**Chair**
1:00 p.m.	**ADJOURN**	

Thursday Goals: Complete assessment work and discussions, final results available. Draft Reports reviewed.

APPENDIX III: Panel Membership

SEDAR Chair

Anne Lange
South Atlantic Fishery Management Council
Science and Statistical Committee

SEDAR Reviewers (SAFMC SSC Representatives)

Jim Berkson
National Marine Fisheries Service
Southeast Fisheries Science Center
Blacksburg
Virginia

Steve Cadrin
School for Marine Science and Technology
UMASS Dartmouth
Fairhaven
Massachusetts

CIE Reviewers

Mike Bell
International Centre for Island Technology
Heriot-Watt University
Orkney
Scotland
UK

Paul Medley
Sunny View
Jack Hole
Alne
UK

Mike Smith
Cefas
Lowestoft
UK