Center for Independent Experts (CIE)
Independent Peer Review Report

On

Southeastern U.S. Mutton Snapper Review (SEDAR 79)

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Executive Summary

The Stock Assessment Review Workshop met in St. Petersburg, Florida, from Tuesday, September 10 through Thursday 12, 2014, to review the Southeastern U.S. Mutton Snapper assessment. The SEDAR 79 Review Panel Report presents a consensus review of the assessment and scientific advice. As an independent reviewer at the SEDAR 79 review workshop, this report reflects my findings and reviewer activities.

The review concluded that the assessment represents the best scientific information currently available to assess the Southeastern Mutton Snapper. The base assessment model transitioned from ASAP (Age Structured Assessment Program) to SS (Stock Synthesis), incorporating 10 additional years of data since the previous assessment. This update addressed concerns from the prior model, including less processing of data inputs, additional options for model configuration, and improved diagnostics tools.

The base Model used catches from two commercial fleets and two recreational fleets, a fishery-dependent index of biomass, six fishery-independent abundance indices, and fishery-dependent conditional age-at-length data series.

I acknowledge the significant effort compiling all the information and data inputs. There was openness for discussions and constructive dialogues between the Review Panel (RP) and all the participants during the review. All documents provided as well as the presentations were clear, comprehensive and of high quality.

The main findings, recommendations and conclusions are:

- Solid basis for Scientific Advice: The data and assessments reported by the review panel form a solid basis for scientific advice. The analytical assessment provided by the base model was accepted. While there are uncertainties associated with and reported by the assessment, these do not obscure the overall results, which represent the best scientific advice available for the stock.
- Sound and robust stock assessment methods: The decisions made by the Data Workshop (DW) and Assessment Workshop (AW) concluded that the stock assessment methods used were sound and robust. Uncertainties were evaluated and reported, and methods were correctly applied.
- Stock status: The stock is not overfished, and overfishing is not occurring. However, the choice of 30% SPR as a reference point proxy for MSY was not supported. Following the meeting, the Review Panel recommended the use of MSY and SPR 40% as reference points.
- Uncertainties: Several key uncertainties were addressed and discussed including assumptions about stock structure, two indices of abundance, recreational removals, mortality rates from fish releases, and the estimated selectivity curves in the recreational East fleet.
- Projection methods: The projection methods used in the assessment were accepted as appropriate. However, it was recommended that further work to enable stochastic projections should be prioritized.
- Key recommendations: recommendations include investigating the stock structure through tagging experiments and genetics, using spatial models to estimate abundance from survey indices, reconsidering the use of the CPUE index from

the fishery, improving the sampling design in the recreational fleets that seem to under-sample large fish sizes, and that could lead to overestimation of the stock size.

Background

The SEDAR 79 Southeastern U.S. Mutton Snapper assessment workshop process took place over a series of four webinars held from November 2023 to July 2024. The SEDAR 79 Assessment Review Workshop itself was held on September 10-13 in St. Petersburg, Florida. This review workshop is part of the Southeast Data, Assessment, and Review (SEADAR 79) cooperative process for assessments conducted in NMFS' Southeast Region.

The Review Panel was composed of three scientists appointed by the Center for Independent Experts: Dr. John Nielsen, Dr. Paul Regular and Dr. Adriana Nogueira and two other reviewers appointed by SEDAR: Dr. Mike Allen and Dr. Alexei Sharov. As Chair of the Panel, Dr. Amy Schueller ensured that all terms of reference were reviewed by the Panel and led the preparation of the Panel Summary Report.

The draft stock assessment report and all associated background documents (see Appendix 1) were available on a public website two weeks before the meetings. Prior to the in-person meeting, the Review Panel met remotely for a pre-review call to discuss initial impressions and to request clarifications or additional analysis. This assessment was conducted using the Stock Synthesis modelling software and all questions raised during the workshop were answered clearly and satisfactorily.

This report has been prepared for the CIE and represents my personal views which are consistent with the Review Panel's conclusions.

Description of the individual reviewer's roles:

I was contacted to participate as a CIE reviewer to conduct an impartial, objective, peer review without conflict of interest for the SEDAR 79 Southeastern U.S. Mutton Snapper Review Assessment. Approximately two weeks before the meeting, I received the draft Assessment Workshop (AW) report. The Data Workshop report and all working documents were made publicly available on the website https://sedarweb.org/assessments/sedar-79/. A remote pre-review call was held a week before to discuss the main concerns and request extra documentation and sensitivity runs.

The Review Assessment Workshop was held in-person from September 10-12, 2024, in St. Petersburg, Florida. During the meeting the assessment team provided presentations, and the reviewers participated actively identifying key issues in the data and model specification. There was general consensus among the review panel (RP) regarding the main discussions and findings. Some additional analyses were requested before the end of the meeting and the Assessment Team provided them via email the following week. Final decisions related to the use of reference points and recommendations were agreed upon the week after the meeting.

I contributed to the review panel's summary report and independently authored this review report.

Summary of the findings

Specific comments on each ToR

1. Evaluate the data used in the assessment, including discussion of the strengths and weaknesses of data sources and decisions, and consider the following:

a. Are data decisions made by the DW and AW panels sound and robust?

b. Are data uncertainties acknowledged, reported, and within normal or expected levels?

The data decisions made by the Data Workshop (DW) and Assessment Workshop (AW) panels appear to be sound and robust and based on the best information available. Data uncertainties were acknowledged and reported throughout the assessment process.

Before the meeting all the materials (DW report, AW report and all working documents related to the related to the data) used in the assessment were available. During the first day of the meeting, all data inputs were presented, including life history inputs, landings and releases, indices, length compositional and, age available.

This assessment included 10 additional years of data compared to the previous assessment and several changes in the data processing were implemented. These changes were mainly made in the survey indices estimates and the combination of different fleets. Sampling intensity has improved over the years, but the data is still predominantly fishery-dependent data, which tends to underrepresent certain age classes. As a result, both younger fish and the oldest individuals are infrequently sampled (86% of the samples comprised 2-9 ages). Younger fish are not sampled due to a minimum size limit, while older fish come mostly from the commercial fishery, which represents only a small portion of the samples and are not from recreational fleets. The current sampling design would benefit from improvements, particularly by increasing the proportion of fishery-independent sampling. This would provide a more comprehensive representation of all age classes and reduce biases inherent in fishery-dependent data.

The model incorporates the 40 + age class, however, it was discussed that using a 25+ group might better address data limitations and improve model performance. A sensitivity analysis exploring this option was not presented in this assessment due to the significant workload it would require, and it was decided to retain the 40+ class to ensure older individuals are represented in the assessment, despite their lower occurrence in the data. In my opinion, this decision should be reconsidered in the next assessment to optimize model performance.

Natural mortality (M) was estimated using the Lorenzen length-inverse (scaled) model which provided a longevity-based estimate of natural mortality (Hamel and Cope, 2022), allowing M to vary with fish size. While this was a sound choice, it may also be useful to explore the internal estimation of M within the integrated model. That will allow the parameter to be dynamically adjusted based on the available data, reducing bias and accounting for the specific population dynamics and environmental factors influencing the stock.

The stock is treated as a single unit, appropriate for both assessment and management purposes. A summary of the findings from different genetics (mitochondrial and microsatellites DNA) studies was presented and did not find evidence of heterogeneity

using samples from Florida to Cuban waters, aside from potential demographic independence among localities, possibly due to different responses to overexploitation. On the other hand, larval drift studies suggest that the Florida Current may serve as an effective barrier to recruitment. Preliminary results from acoustic tagging studies were not presented, and most genetic studies were conducted before the last assessment (2013). The uncertainty about the stock structure in the model was acknowledged and further investigation was recommended through the use of tagging and genetics. To complement these efforts, I recommend evaluating the stock trajectories with multivariate state-space models (MARSS) (Holmes et al, 2014). MARSS can be used to evaluate different stock structures and the influence of covariates to examine the effect of climate (environmental variables), predators and prey, and commercial catch.

Fishery-dependent data accounted for 82.98% of recreational fishery and 17.02% of commercial fishery removals. The Review Panel requested the analysts to provide a plot with both fleets in the same units to have a better overview of total removals. This was provided on the first day of the meeting (in numbers and in weight), offering visual comparison of the contribution of each fleet. Information on changes in spatial closures, regulation affecting the size limit, fishing effort and quota limits was presented helping to interpret the fishery-dependent data. Information on spatial distribution would have been helpful.

Commercial landings were grouped into two categories: longline and "other". This assessment has removed several fishery-dependent CPUE time-series from the previous assessment. While uncertainties in the commercial landings were reported, they were finally ignored because the model fit these data exactly. I do not have major concerns since the proportion of the data to the total removals is low, and it is compiled via a reliable logbook system.

The recreational fleet, representing the majority of removals, focused on a geographic distinction and was split into two regions East and West, reflecting differences in selectivity (smaller sizes are found in East than in West). Different methods were considered for estimating the recreational fleet removals focusing on estimates from two different surveys: Marine Recreational Information Program (MRIP) and Florida's State Reef Fish Survey (SRFS). The analysts found SRFS more reliable because they considered that they have a better and more consistent sampling and coverage. By applying a calibration factor based on three years of concurrent data, MRIP estimates were converted to SRFS units, significantly lowering the overall removal estimates. While this reduction might be linked to differences in survey methodologies, the exact cause remains unclear. I agree with the Review Panel that SRFS estimates should be considered provisional, with a sensitivity run recommended.

Because recreational catch represents a significant portion of total removals, catch uncertainty is high. Future efforts should focus on reducing recreational catch uncertainty.

Uncertainty regarding releases of discarded fish in both commercial and recreational fleets was discussed, particularly why the same mortality rate was used for both fleets. The rate was estimated based on another species from the group complex, which introduces additional uncertainty. That should be reconsidered in a future assessment.

Six different abundance indices with varying spatial coverage were included. At the pre-review call, I requested a distribution map of all surveys, which was satisfactorily presented during the first day of the meeting. The various indices primarily covered the area from West Florida in the Gulf of Mexico and the eastern part from Cape Hatteras, NC to St. Lucie, Florida in the Atlantic Ocean, but no survey covered the entire distribution of the stock. The new assessment added additional fishery-independent indices. Concerns were raised regarding two indices in the West region, and I agree with those concerns First the Gulf video survey had experienced changes in survey design and area coverage, which have likely impacted the trend, resulting in a different trend compared to other surveys.
The second index of concern is the longline CPUE index derived from fishery-dependent data, which was questioned for its reliability. While it covers larger sizes not captured by other surveys, it was truncated at 2010 due to management changes affecting selectivity. This index did not fit well with the model results, raising concerns about potential hyperstability.

During the meeting, the panel suggested, and I fully agreed, to produce a better combined GULF index, which would provide more accurate abundance estimates and account for spatial variability. A spatial model will account for the spatial distribution of data allowing a better understanding of how the abundance varies across different locations. This often results in more accurate estimates compared to models that do not consider spatial structure. Those models can account for the spatial variability inherent to each data set and can integrate them to produce more reliable outcomes, also making informed predictions in areas where no direct data was collected. Also, spatial models could integrate covariates such as climate or habitat type and identify how these factors could affect changes in distribution. In my opinion, reliable estimates from a spatial model for the combined Gulf survey could effectively replace the CPUE longline index in the long term.

Concerns about sampling in the recreational East fleet were discussed. The model estimates a pronounced dome-shape selectivity curve, suggesting that larger fish are not caught in this fleet. The sampling from this fleet should be reviewed and efforts on equally sampling all modes from recreational fleets should be considered.

Also, biological sampling comes mostly from fishery-dependent surveys. Efforts on fishery-independent sampling would decrease the uncertainty in maturity data and the younger ages that are not collected with the commercial and recreational fisheries due to limits on minimum sizes.

c. Are input data series reliable and applied properly within the assessment model?

Yes, the data series were reliable and properly applied within the model.
Due to high uncertainties in the recreational landings surrounding the data prior to 1986 -where catch estimates were based on the average reported landings over the first five years- a sensitivity run starting from that year was requested. The output showed almost no difference compared to the original run. Additionally, the Southeast Reef Fish Survey (SERFS) survey also presented high uncertainty during the first three years, so I requested a sensitivity run excluding those years. While the uncertainty associated with this index decreased considerably, the overall results remained unchanged. Therefore, I recommend

considering starting the catch time series in 1986 and removing the three years of the SERFS survey in the next assessment.

2. Evaluate and discuss the strengths and weaknesses of the methods used to assess the stock, taking into account the available data, and considering the following:
a. Are methods scientifically sound and robust?

The assessment of Mutton Snapper has transitioned from ASAP version 3 to Stock Synthesis (SS) version 3.30.22.1. SS is a well-tested standard modelling package, which is used for numerous stocks worldwide by fisheries scientists. SS has been developed over decades and has undergone significant validation, improvements, and peer review. It is an integrated stock assessment model that combines multiple data types, and it makes the most use of all available information, and it is sufficiently flexible to incorporate newer information when available.

The SS model has been appropriately applied to the data, with all diagnostics indicating a good fit for the observed data. Additionally, sensitivity runs have been conducted and the results are consistent and robust, supporting the reliability of the model's outcomes.

<u>The method has been applied in a scientifically sound and robust manner, following the best practices in stock assessment.</u>

b. Are assessment models configured properly and consistent with standard practices?

The model configured is a one-stock, one-area version with an annual time-step starting January 1 as age, 1 with an annual time-step starting January 1 and with spawning occurring June 1. Data were fitted from 1981 (the year when the catch observations are first available) to 2023 assuming continuous fishing operations.

The plus group is defined as 40 + , but the panel discussed using a 25+group instead (ToR1) due to the lack of ages greater than 25. A single growth pattern was assumed, and it was estimated within the model using the Von Bertalanffy growth function. Biological parameters were configured using the best information available. A Beverton-Holt curve was chosen as the stock-recruitment relationship and deviations were estimated.

The selectivity is assumed to be constant over time and the base model used length-based selectivity for all fleets, and two survey indices (GULF and RVC surveys), age-based selectivity for the SERFS survey, with full selectivity for ages 3 and older. The recruitment survey, Indian River Young (FIM YOY) assumed full selectivity at age 0. Retention is modeled using a logistic function (assuming release of fish according to the minimum size limit), for all fleets except the Commercial longline, and the model incorporates time-varying retention to account for changes in regulation over time. This adjustment allows the model to reflect how the sizes of retained or released fish change as regulations are updated. The model has also implemented time-varying retention allowing it to adapt to changes in minimum size limits set by the federal regulations.

The performance of the model has been investigated via a suite of diagnostics. Sensitivity runs performed prior to the meeting and others proposed by the Review Panel, helped to illustrate the choice of the base model, leading to several recommendations.

In addition, a model to compare the results from SS with the model used in previous assessments was presented. Given all that, I agree with the Review Panel that the models were configured appropriately and consistent with standard practices.

c. Are the methods appropriate for the available data?

The methods used by the Assessment Team to conduct the assessment are sound and robust, and in general they are appropriate for the available data. The change from the ASAP model to the SS model is an appropriate decision for the available data. The assessment team decided to use conditional age-at-length. When age data are not limited, choosing conditional age-at-length over catch-at-age or a length-based method is particularly useful. This method incorporating ages when available, allows for better estimations of growth patterns in a population by combining age and length information. It accounts for the variability in growth among individuals, allowing the model to track how fish grow over time more precisely. This method also reduces bias in length-at-age and selectivity parameters. The model can use the data to better estimate the relationship between size and age, improving predictions for selectivity**,** natural mortality, and the size distribution of the population over time.

3. Evaluate the assessment findings and consider the following:
a. Are population estimates (model output – e.g. abundance, exploitation, biomass) reliable, consistent with input data and population biological characteristics, and useful to support status inferences?
b. Is the stock overfished? What information helps you reach this conclusion?
c. Is the stock undergoing overfishing? What information helps you reach this conclusion?

I agree with the Review Panel that the population estimates, in general, are reliable, consistent with input data and population biological characteristics and useful to support status inferences. A suite of diagnostics was evaluated and the results were satisfactory. The retrospective analysis, bridging analysis, and most of the sensitivity runs did not impact seriously the model outputs.

I wrote this section in the summary report, so the same ideas are reported here. Results from the AW and the presentation made during the meeting concluded that the stock is not overfished and is not undergoing overfishing, using SPR30% as a proxy for MSY to illustrate the stock status. Given that the steepness was estimated within the model, the RP requested the analysts to estimate MSY. The calculated MSY was very close to SPR 40% and the panel requested updates to the figures (see tables 1 and 2 below). This was done after the meeting and included in an addendum. It was discussed whether to use MSY or SPR 40% as reference point. On the one hand, the MSY-based approach is more aligned with long-term sustainability, and more suitable in cases where fishing pressure could affect recruitment dynamics. On the other hand, SPR-based reference points do not account for fishing-induced recruitment changes. The assumption that recruitment is unaffected by fishing in a per-recruit analysis can overlook potential long-term impacts on stock productivity, especially in the case of variable environments. In this case, both

values are very close and F = 0.11 for both reference points. I agree with the choice of F = 0.11 and the decision to keep MSY and SPR 40% as it provides a middle ground that incorporates yield optimization while still accounting for uncertainties in recruitment and environmental variability. Given the significant uncertainty surrounding the stock-recruitment (S-R) relationship, the steepness estimate in the base model also carries some uncertainty, as evidenced by the likelihood profile.

Given the new tables, we also concluded that the stock is not overfished. The geometric mean SSB for 2021 - 2023 is above 75% of SSB at 40% SPR and 75% of SSB at MSY. And the stock is not undergoing overfishing. The geometric mean fishing mortality for age-3 for 2021 - 2023 is below the F associated with SPR40% and MSY. That was also supported by all the diagnostics and most sensitivity runs, except for two, the two sensitivity runs investigating alternative selectivity assumptions for the recreational fleets: 1) Flat-topped selectivity for both recreational fleets and 2) Fixing the eastern recreational fleet selectivity to match the western recreational selectivity curve as estimated by the base model. Those sensitivity runs showed a more depressed status. I agree with the RP that investigating this pattern should be a priority for the next assessment. The stock may be overestimated if larger sizes are underrepresented.

The panel also requested the analysts to provide confidence intervals around SSB at MSY. In the days after the meeting, the assessment team provided updated calculations. These were performed in two ways: internally within the Stock Synthesis base model and through long-term projections assuming equilibrium was obtained, and recruitment followed the stock-recruitment curve. Only the internal SS calculations could include confidence intervals, with reasonably narrow estimates around MSY, F at MSY, and SSB at MSY. While the results were largely similar, differences arose because SS uses total dead biomass (retained + dead discards), whereas the projections used only retained biomass. I agree to favouring the internal calculations since they account for both retained removals and discards, and they allow for the estimation of the uncertainty.

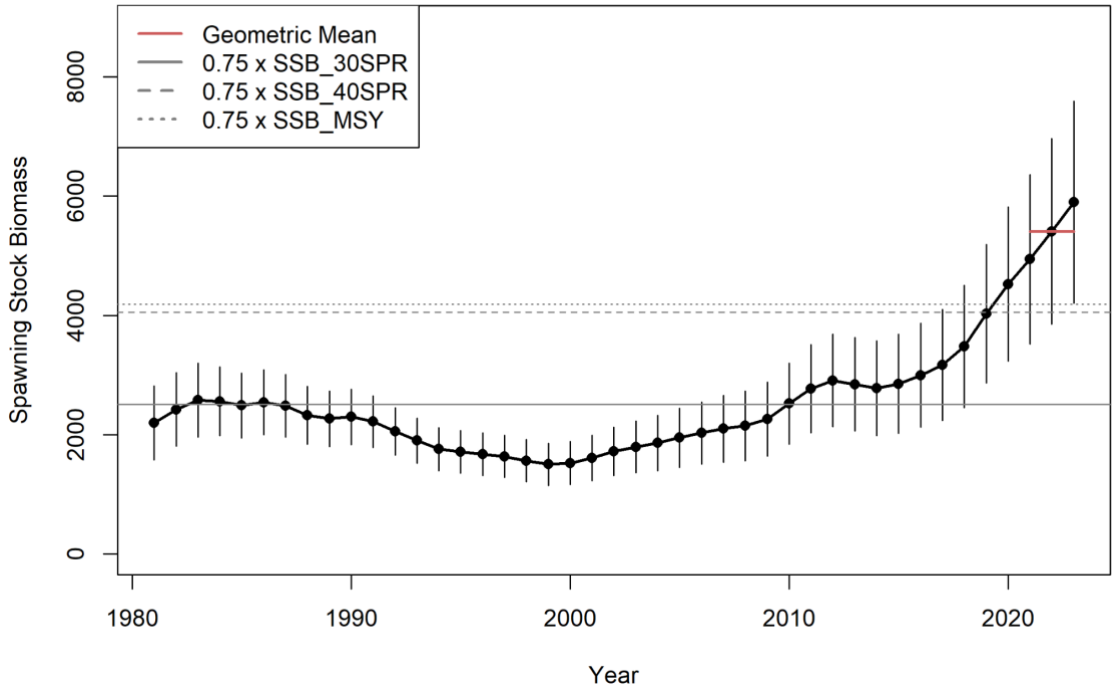

Figure 1: Spawning stock biomass over time with the different reference points that were requested by the RP.

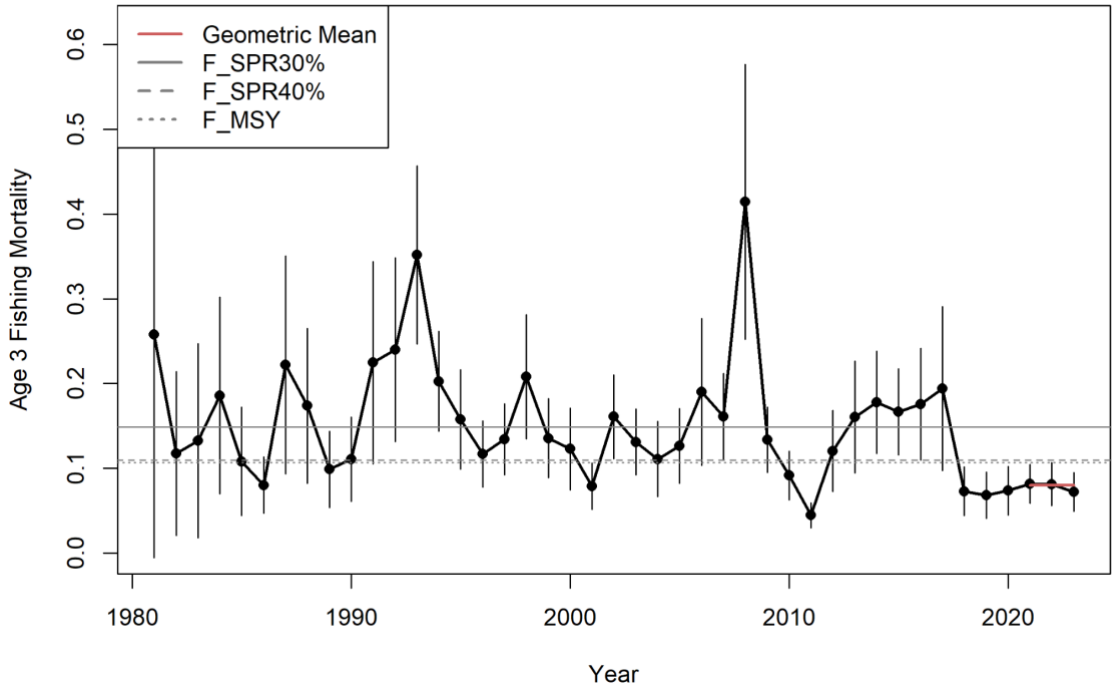

Figure 2: Age 3 fishing mortality over time with the different reference points that were requested by the RP.

d. Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?

A Beverton-Holt curve was selected as the stock-recruitment relationship, and recruitment deviations were estimated. Steepness was estimated within the model to be

0.63 indicating a moderate relationship between SSB and recruitment. It was discussed to fix the steepness, and when it was set to 1 it resulted in a sharp decrease of virgin recruits and SSB. However, this adjustment did not significantly change the overall population dynamics estimates, including SSB and fishing mortality.

There is considerable uncertainty in the SR curve, making it challenging to predict future stock conditions, particularly if assuming that the higher recruitment in recent years will continue in the future. It is rare to find a stock with a clearly defined SR relationship. Given that steepness was estimated within the model it was discussed whether to use SPR or MSY as reference points.

The stock-recruitment relationship in this case provides some information, but it cannot be considered highly informative due to the considerable uncertainty surrounding it. This uncertainty may be influenced by environmental factors or interactions with other stocks., or ecological dynamics. To address these challenges, it would be beneficial to incorporate environmental covariates, investigate study species interaction or predation effects, and also to improve the biological data collection from the fishery-independent surveys.

e. Are the quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and conditions?

The stock status determination methods for the stock are robust and appropriate. Therefore, the quantities estimated for this stock are reliable.

4. Evaluate the stock projections, including discussing strengths and weaknesses, and consider the following:
a. Are the methods consistent with accepted practices and available data?
b. Are the methods appropriate for the assessment model and outputs?
c. Are the results informative and robust, and useful to support inferences of probable future conditions?
d. Are key uncertainties acknowledged, discussed, and reflected in the projection results?

The methods used in the projections were consistent with accepted practices and available data. The projections methods were developed by the assessment team as it is available in https://github.com/SEFSC/SFD-AllocationForecasting.

It was extensively discussed whether a 3-year average recruitment or the stock-recruit curve would be more appropriate, and finally any specific scenario was picked. Recent recruitment deviations were higher than the values predicted by the stock-recruit curve. However, it is uncertain whether this trend of high recruitment will persist. On the other hand, the stock-recruit curve, with estimated steepness, predicted much lower recruitment compared to the recent average, resulting in more conservative projections.

The methods were appropriate for the base model and alternate model outputs were requested. The additional results requested were:

1) Numbers-at-age estimated by the Base Model: showing an increase in age-1 recruits in recent years and also of older ages (8+).

2) The maximum fishing mortality rate associated with commercial longline fleet.

Yes, uncertainties were acknowledged and discussed, but they are not fully incorporated in the current projections. The current projections are deterministic giving a fixed outcome based on set assumptions, not accounting for uncertainties in the terminal year estimates. The assessment team tried to capture the uncertainties with MCMC analysis but unfortunately, this method did not work. It was suggested to show two alternative deterministic projections:

- One is based on recent average recruitment (assuming recent patterns continue).
- One is based on the stock-recruit curve (a theoretical relationship between stock size and recruitment).

This was clearly presented as alternative views of the future stock trend.

Future projection methods could include a distribution of recruitment to incorporate uncertainty. It is crucial to investigate why the MCMC analysis did not function as intended to provide a full range of uncertainties. The RP also recommended adding discards to the projection tables for comparison with estimates of F, yield, and SSB. These additions were subsequently included in the report's addendum.

5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.
a. Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods
b. Ensure that the implications of uncertainty in technical conclusions are clearly stated

The assessment team put a lot of effort into assessing uncertainties. The uncertainty in the input data was reported as estimates of standard error (SE) and coefficient of variation (CV), and was investigated using sensitivity analysis. Stock Synthesis provides a set of standard diagnostic tools to evaluate the uncertainty. A series of diagnostics were presented and discussed during the meeting to identify whether the model fits the data adequately, where the assumptions are reasonable, and how the uncertainties in the data, model structure, and parameters might affect the assessment outcomes. The tools used in SEDAR 79 included examination of jitter analyses, residual plots, likelihood profiles, sensitivity runs, and retrospective analyses. The Review Panel also requested additional sensitivity runs and extra outputs.

Model convergence was explored using jitter analysis. Those results suggested that the base model has converged on a global solution but was sensitive to the initial parameter values. While the jitter analysis indicates that the model converged, the fact that only 48% of the jittered runs had a maximum gradient below 0.05 indicates some sensitivity to initial conditions. This highlights one source of uncertainty related to parameter estimation, but it suggests that the base model is fully converged.

Correlation analysis revealed some parameters that were highly correlated. However, since they were structurally correlated, I agree that these model results did not indicate instability.

In general, residuals and overall root mean square error (RMSE) analysis suggest good model fits to various data sources, though some issues persist, particularly in certain periods and indices. Residual patterns did not indicate major data conflicts, but overestimation occurred in several key periods, such as for indices between 1993-2000 and 2010-2022, and for conditional age-at-length data from 1981-2007. Despite these overestimations, the RMSE values for most model components remained within or near acceptable limits (below 30%). However, the RMSE values for two surveys, FIM YOY and SERFS, were extremely high at 74% and 85%, respectively. Additionally, the CVs for SERFS from 2011-2013 were around 50%, while the CVs for FIM YOY were near 40%. These high RMSE values indicate poor model fit, likely due to the limited power of the FIM YOY index to detect changes in Mutton Snapper abundance, as revealed by a simulation-based power analysis. The poor fit of these indices contributed to the elevated overall RMSE for the indices (51.2%).

The model fit commercial landings data exactly, but it tended to underestimate landings for recreational fleets before the early 1990s and overestimate values after the mid-2000s. The fit to recreational releases also displayed patterns of overestimation in earlier years and underestimation in more recent years. Uncertainty surrounding the recreational fleets should be investigated.

Regarding indices of abundance, the model fit the RVC Dry Tortugas index reasonably well but struggled with fitting the Commercial Longline CPUE data and Gulf Combined Video index. Some indices showed trends where predicted values consistently over- or underestimated observed data, such as in the SERFS video index (2011-2013) and FIM YOY recruitment index.

The model performed reasonably well for length compositions, with RMSE values ranging from 1.9% to 5.2% for most fleets and surveys, though slight misfits were noted for larger fish lengths and bimodal distributions for certain fleets (e.g., Commercial Other and Rec West). Similarly, the model fit the conditional age-at-length data with acceptable RMSE values (6.3% to 11.3%), though over- and underestimation occurred for certain fleets like Rec East and Rec West.

The base model is largely robust as indicated by the signs of good convergence, parameter stability and the quality of the Hessian matrix. However, the model exhibits some challenges in fitting certain indices and time periods, particularly for surveys with high uncertainty or low data quality. In ToR1, I already made comments on the use of the Commercial Longline CPUE and suggested producing better estimates of the Gulf Combined index with spatial modeling.

Likelihood profiles were employed to explore the support for key parameter estimates, such as steepness**,** unfished recruitment (R0)**,** and average natural mortality over ages 3-40. This helped gauge the model's sensitivity to variations in these parameters and identify any conflicts between different data components.
However, the insensitivity of key population metrics (SSB and fishing mortality) to changes in steepness suggests that, despite uncertainty in steepness, the overall model outputs remain robust across a wide range of values.

A retrospective analysis was presented where successive years from the model for seven years were removed. The forecasting bias was assessed alongside the retrospective analysis to determine how accurately the model predicted future conditions, and the ASPM (Alternative Stock Production Models) was used as an alternative model to assess uncertainty in stock dynamics. For the estimates of fishing mortality and SSB the model results displayed acceptable levels of bias. However, the elevated forecast bias for fishing mortality indicates some underestimation of future fishing pressure. The alternative ASPM model revealed that while the production function largely aligned with the base model after 1998, discrepancies in the earlier time series highlighted some uncertainty, particularly regarding early recruitment dynamics and fishing mortality.

The assessment team presented a range of sensitivity runs to explore the S-R curve, the release mortality, MRIP-FES Private Modes Landings and the effect of each index of abundance (Jack-knife analysis) and supplemented them with additional requests made by the RP during the pre-review meeting and the meeting.

Those extra sensitivity runs that were requested are:

- Starting year 1986 due to the uncertainty in the associated recreational landing prior to that year.
- Remove the 3 first years of the SERFS video index, due to the poor fit of those years.
- Estimate F parameters for all fleets.
- Alternative selectivity assumption for Rec fleets: 1) Flat-topped selectivity for both recreational fleets and 2) fixing the eastern recreational fleet selectivity to match the western recreational selectivity curve as estimated by the base model.

Most results appear to be fairly robust to the different fixed inputs and value changes. However, a few runs led to a less optimistic stock status, when excluding the commercial longline CPUE and the YOY index, or when altering the selectivity assumption of the recreational fleets for a less dome-shaped curve.

No uncertainty was included in the projections. The team attempted to run MCMC analysis, but those analyses were not ready for the meeting. Instead, deterministic projections were presented without accounting for the uncertainties in the estimates of number of age and fishing mortality. To advance these analyses, this is a high-priority recommendation.

<u>The procedure to characterize uncertainties in the technical conclusions is clearly stated and was explored and quantified as well as possible.</u>

6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.
a. Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments
b. Provide recommendations on possible ways to improve the SEDAR process

The DW and AW produced a good summary of research recommendations and whether they need to be addressed, which were all supported by the Review Panel. The summary report suggested a list of additional recommendations that were agreed upon by the Review Panel. I support these recommendations:

1) To push forward the analysis to estimate the uncertainties in the projections through MCMC samples to ensure appropriate linkage between uncertainties in the assessment and those in the forecast.

2) To investigate the concerning dome-shape selectivity in the Recreational East fleet, to decrease uncertainty about why no larger fish are caught, why they are missing from that fleet's data.

3) To investigate the use of spatial models for indices estimates.

4) Efforts on mark-recapture experiments:
    - It will decrease the uncertainty about stock structure.
    - It will enable the incorporation of movement patterns in the model by incorporating those data.
    - It will decrease the uncertainty in mortality release.

5) The model could also try to focus on combining landings and discards in total removals since the SS internal projection calculation maximizes dead biomass (retained + dead discards), and that leads to different calculations in the projections since the MSY long-term projections maximized dead biomass.

6) To investigate the effect of environmental variables. Like many other stocks, Mutton Snapper could be affected by environmental factors that could affect the stock status, recruitment, and SSB.

7) I recommend the use of Multivariate State-Space Models to ask questions about the spatial structure of the population. Those models allow one to combine multiple time series with potentially different scales (different vessels, sampling design, or different regulatory periods), allow missing values and can include covariates in the analyses (e.g., environmental variables or catches) (Holmes et al. 2014; Nogueira at al., 2018; Ubeda et al., 2023)

Holmes, Elizabeth E., Eric J. Ward, and Mark D. Scheuerell. "Analysis of multivariate time-series using the MARSS package." NOAA Fisheries, Northwest Fisheries Science Center 2725 (2014): 98112.

Nogueira, A., Tolimieri N., and González-Troncoso D. "Using multivariate state-space models to examine commercial stocks of redfish (Sebastes spp.) on the Flemish Cap." Canadian Journal of Fisheries and Aquatic Sciences 76.2 (2019): 208-216.

Úbeda, J., Nogueira, A., Tolimieri, N., Vihtakari, M., Elvarsson, B., Treble, M., & Boje, J."Using multivariate autoregressive state-space models to examine stock structure of Greenland halibut in the North Atlantic." Fisheries Management and Ecology 30.5 (2023): 521-535.

The SEDAR process was well organized and the meeting efficient with a dynamic participation from all the participants. All background material provided to the panel was appropriate and delivered on time.

The Assessment Team did an excellent job presenting all the work and answering all the questions, also providing extra analysis and documentation. I learned a lot from the other reviewers, the Chair and the Assessment Team.

7. Consider whether the stock assessment constitutes the best scientific information available using the following criteria as appropriate: relevance, inclusiveness, objectivity, transparency, timeliness, verification, validation, and peer review of fishery management information.

The stock assessment constitutes the best scientific information available and provides an adequate basis for fisheries management decisions. The methods, findings and conclusions are strongly supported by extensive analysis that adhere to established best practices for stock assessment. The work represents the best available science.

8. Provide suggestions on key improvements in data or modeling approaches that should be considered when scheduling the next assessment.

I wrote this part in the summary report, and I agree in this section with the Review Panel. As already mentioned in the summary report, all recommendations listed in TOR6 will improve the data and the model.

Here are key improvements that should be addressed in the next assessment.

Improvement in data:

- Further exploration of the uncertainties in the Commercial LL CPUE, and consideration of excluding this index from the assessment.
- The use of spatial-temporal models to combine different surveys, especially the GULF survey, will decrease the uncertainties in the indices estimates.
- Redesign the survey design for data collection in the recreational fleet, to ensure that samples are collected from all the different modes.
- To consider starting the catch time series in 1986 and removing the three years of the SERFS survey.

Improvement in modeling approaches:

- Explore the selectivity in the recreational east fleet. The strong dome-shaped estimated selectivity for this fleet was extensively discussed because the model suggests that larger fish sizes are either underrepresented in catches or not adequately sampled. That would lead to more accurate data on population structure.
- To adopt stochastic projections that would help to account for and propagate uncertainty, enabling a more comprehensive evaluation of the risks associated with different fishing scenarios.

9. 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 in accordance with the project guidelines.

This task has been completed.

Conclusions

Based on the material and information reviewed, I found that the Assessment Team had adequately addressed the ToRs for the Mutton Snapper assessment.

Regarding the uncertainty discussed during the meeting, the stock assessment results are robust, and constitute the best science available. I support all research recommendations provided in the DW, AW, and summary report. I also proposed additional ones (above).

Appendix 1: Bibliography of materials provided for review

The following documents were provided for peer review and are available on the SEDAR 79 website (https://sedarweb.org/assessments/sedar-79/), along with additional reference materials:

SAFMC Snapper Grouper Advisory Panel, 2021. Mutton Snapper Fishery Performance Report. SEDAR79-DW-01, April 2021.

Nuttall, M.A., Binion-Rock, S., 2023. General recreational survey data for Mutton Snapper in the Southeast. SEDAR79-DW-02, May 10, 2023. Updated: September 22, 2023.

Vecchio, J., Carroll, J., Lazarre, D., Sauls, B., Corbett, E., Cermak, B., 2023. Size and age information for Mutton Snapper (*Lutjanus analis*) collected in association with fishery-dependent monitoring along Florida's coast. SEDAR79-DW-03, January 25, 2022. Updated: August 11, 2023.

Vecchio, J., Lazarre, D., Sauls, B., Kappos, M., 2023. Descriptions of Florida's Mutton Snapper recreational fishery assessed using fishery-dependent survey data. SEDAR79-DW-04, January 25, 2022. Updated: August 16, 2023.

Lee, M., Harrington, K., Neidig, C., Schloesser, R., 2023. Electronic monitoring documentation of Mutton Snapper (*Lutjanus analis*) in the Eastern Gulf of Mexico bottom longline fishery. SEDAR79-DW-05, February 25, 2022. Updated: August 2, 2023.

Cheshire, R.T., Brennan, K., Green, M.E., 2023. Headboat data for Mutton Snapper in the Southeast U.S. Atlantic and Gulf of Mexico. SEDAR79-DW-06, August 2, 2023. Updated: August 24, 2023.

Atkinson, S., 2023. Estimated discards of Southeastern Mutton Snapper (*Lutjanus analis*) from vertical line commercial fishing vessels. SEDAR79-DW-07, June 2, 2023.

Sustainable Fisheries Branch, 2023. Preliminary standardized catch rates of Mutton Snapper from the United States Gulf of Mexico and South Atlantic commercial handline and longline fisheries, 1993-2022. SEDAR79-DW-08, June 13, 2023. Updated: August 31, 2023.

GMFMC Staff, 2023. Fisherman feedback: Mutton Snapper response summary. SEDAR79-DW-09, June 13, 2023.

Bacheler, N., Cheshire, R., Shertzer, K., 2023. Standardized video counts of Southeast US Atlantic Mutton Snapper (*Lutjanus analis*) from the Southeast Reef Fish Survey. SEDAR79-DW-10, July 20, 2023.

Keller, J., Olson, J., Tobin, A., Acosta, A., 2023. Abundance and distribution of juvenile Mutton Snapper in nearshore seagrass habitat in the Middle Florida Keys. SEDAR79-DW-11, July 31, 2023.

Lowerre-Barbieri, S., Friess, C., 2023. Mutton Snapper reproduction. SEDAR79-DW-12, August 2, 2023.

Allen, S., 2023. Standardized catch rates of Mutton Snapper (*Lutjanus analis*) from the Marine Recreational Information Program (MRIP) in Southeast Florida and the Florida Keys, 1981-2022. SEDAR79-DW-13, August 2, 2023.

Corbett, E., 2023. A summary of Mutton Snapper discard length data collected from at-sea observers in recreational fishery surveys in Florida. SEDAR79-DW-14, August 16, 2023.

Muller, R., 2023. Biscayne National Park Creel Survey index, 1978-2022. SEDAR79-DW-15, August 18, 2023.

Muller, R., 2023. Riley's Hump Visual Census Survey, Tortugas South Ecological Reserve, 2002-2015. SEDAR79-DW-16, August 18, 2023.

Muller, R.G., Allen, S.D., 2023. Standardized visual indices for Mutton Snapper (*Lutjanus analis*) for the Florida Keys (1997–2022), Dry Tortugas (1999-2021), and Southeast Florida (2013-2022). SEDAR79-DW-17, August 18, 2023.

Klimek, B., Christiansen, H., Allen, S., Switzer, T., 2023. Age-0 Mutton Snapper abundance index from inshore surveys of Indian River Lagoon on Florida's Atlantic coast. SEDAR79-DW-18, August 17, 2023. Updated: September 25, 2023. Not peer reviewed.

Bradshaw, C., 2023. Historical commercial fishery landings of Mutton Snapper in the Southeastern U.S. SEDAR79-DW-19, September 25, 2023.

Bradshaw, C., 2023. Length frequency distributions for Mutton Snapper collected by TIP in the Southeast from 1983 to 2022. SEDAR79-DW-20, September 25, 2023.

Christiansen, H.M., Thompson, K.A., Switzer, T.S., Keenan, S.F., Gardner, C., Overly, K.E., Campbell, M., 2023. Indices of abundance for Mutton Snapper (*Lutjanus analis*) using combined data from two fishery independent video surveys. SEDAR79-DW-21, August 23, 2023.

Swanson, C.E., Allen, S.D., Carroll, J.L., 2023. Descriptions of age, growth, and natural mortality of Mutton Snapper (*Lutjanus analis*) collected from fisheries-independent and -dependent sources in the Southeastern United States from 1977-2022. SEDAR79-DW-22, August 31, 2023.

SEDAR, 2023. Southeastern US Mutton Snapper, SEDAR 79, Section II: Data Workshop Report. Southeast Data, Assessment, and Review (SEDAR), North Charleston, SC. November 2023.

Allen, S.D., 2024. Weighted length compositions for U.S. Mutton Snapper (*Lutjanus analis*). SEDAR79-AP-01, June 18, 2024.

Ramsay, C., Cross, T.A., Shea, C.P., Sauls, B., 2024. A ratio-based method for calibrating MRIP-SRFS recreational fisheries estimates for southeastern US Mutton Snapper (*Lutjanus analis*). SEDAR79-AP-02, July 22, 2024.

SEDAR, 2024. Southeastern US Mutton Snapper, SEDAR 79, Section III: Assessment Process Report. Southeast Data, Assessment, and Review (SEDAR), North Charleston, SC. August 2024. Revised September 2024.

Appendix 2: Performance Work Statement

Performance Work Statement (PWS)

National Oceanic and Atmospheric Administration (NOAA) NOAA Fisheries

Center for Independent Experts (CIE) Program External Independent Peer Review

SouthEast Data, Assessment, and Review (SEDAR 79) Southeastern Mutton Snapper Assessment Review

Background

NOAA Fisheries is mandated by the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NOAA Fisheries science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. A formal external process for independent expert reviews of the agency's scientific products and programs ensures their credibility. Therefore, external scientific peer reviews have been and continue to be essential to strengthening scientific quality assurance for fishery conservation and management actions.

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. These expert(s) must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science, without influence from any position that the agency or constituent groups may have. Furthermore, the Office of Management and Budget (OMB), authorized by the Information Quality Act, requires all federal agencies to conduct peer reviews of highly influential and controversial science before dissemination. Specifically, science products that the agency can reasonably determine that will have, when disseminated, *"a clear and substantial impact on important public policies or private sector decisions*." Additionally, peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards [1].

Scope

The SEDAR is the cooperative process by which stock assessment projects are conducted in NOAA Fisheries' Southeast Region. SEDAR was initiated to improve planning and coordination of stock assessment activities and to improve the quality and reliability of assessments.

[1] https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/memoranda/2005/m05-03.pdf

SEDAR 79 will be a CIE assessment review conducted for Southeastern Mutton Snapper. 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 panel. There will be one model to be reviewed during the workshop. The review panel is ultimately responsible for ensuring the scientific basis of the assessment through the SEDAR process. The specified format and contents of the individual peer review reports are found in **Annex 1**. The Terms of Reference (ToR) of the peer review are listed in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3.**

Requirements

NOAA Fisheries requires three (3) reviewers to conduct an impartial and independent peer review in accordance with the PWS, OMB guidelines, and the ToR below. The reviewers shall have a working knowledge in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the primary task of providing peer-review advice in compliance with the workshop Terms of Reference fisheries stock assessment. Expertise the with Stock Synthesis modeling platform, and the associated model diagnostics would be helpful. The chair, who is in addition to the three reviewers, will not be provided by the CIE. Although the chair will be participating in this review, the chair's participation (e.g., labor and travel) is not covered by this contract.

Tasks for Reviewers

1) Two weeks before the peer review, the Project Contacts will send (by electronic mail) the necessary background information to the CIE reviewers and reports for the peer review. In the case where the documents need to be mailed, the Project Contacts will consult with the contractor on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance with the PWS scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

2) Attend and participate in an in-person review meeting. The meeting will consist of presentations by NOAA and other scientists, stock assessment authors and others to facilitate the review, to answer any questions from the reviewers, and to provide any additional information required by the reviewers.

3) After the review meeting, reviewers shall conduct an independent peer review report in accordance with the requirements specified in this PWS, OMB guidelines, and ToR, in adherence with the required formatting and content guidelines. Reviewers are not required to reach a consensus.

4) Each reviewer shall assist the Chair of the meeting with contributions to the summary report.

5) Deliver their reports to the Government according to the specified milestones dates.

Foreign National Security Clearance

When reviewers participate during a panel review meeting at a government facility, the NOAA Fisheries Project Contact is responsible for obtaining the Foreign National Security Clearance approval for reviewers who are non-US citizens. For this reason, the 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 NOAA Fisheries Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Foreign National Guest website. The contractor is required to use all appropriate methods to safeguard Personally Identifiable Information (PII).

Place of Performance

The places of performance shall be in St. Petersburg, FL.

Period of Performance

The period of performance shall be from the time of award through October 31, 2024. Each CIE reviewer's duties shall not exceed 14 days to complete all required tasks.

Schedule of Milestones and Deliverables: The contractor shall complete the tasks and deliverables in accordance with the following schedule.

Within two weeks of award	Contractor selects and confirms reviewers
Two weeks prior to the panel review	Contractor provides the pre-review documents to the reviewers
September 10 – 12, 2024	Panel review meeting
Approximately three weeks later	Contractor receives draft reports
Within two weeks of receiving draft reports	Contractor submits final reports to the Government

Applicable Performance Standards

The acceptance of the contract deliverables shall be based on three performance standards:

(1) The reports shall be completed in accordance with the required formatting and content; (2) The reports shall address each ToR as specified; and (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Travel

All travel expenses shall be reimbursable in accordance with Federal Travel Regulations (http://www.gsa.gov/portal/content/104790). International travel is authorized for this contract. Travel is not to exceed $13,000.00.

Restricted or Limited Use of Data

The contractors may be required to sign and adhere to a non-disclosure agreement.

Project Contacts:

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(386) 561-7080
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Julie Neer - SEDAR Program Manager Science and Statistics Program
South Atlantic Fishery Management Council
4055 Faber Place Drive, Suite 201 North Charleston, SC 29405
Julie.Neer@safmc.net

Annex 1: Peer Review Report Requirements

1. The report must be prefaced with an Executive Summary providing a concise summary of the findings and recommendations and specify whether the science reviewed is adequate.

2. The report must contain a background section, description of the individual reviewers' roles 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 ToR.

a. Reviewers must describe in their own words the review activities completed during the panel review meeting, including 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, but especially where there were divergent views.

c. Reviewers should elaborate on any points raised in the summary report they believe might require further clarification.

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

e. The 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 report shall represent the peer review of each ToR, and shall not simply repeat the contents of the summary report.

3. The report shall include the following appendices:

Appendix 1: Bibliography of materials provided for review

Appendix 2: A copy of this Performance Work Statement

Appendix 3: Panel membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review SEDAR 79 Southeastern Mutton Snapper Review Workshop Terms of Reference

1. Evaluate the data used in the assessment, including discussion of the strengths and weaknesses of data sources and decisions, and consider the following:
   a) Are data decisions made by the DW and AW panels sound and robust?
   b) Are data uncertainties acknowledged, reported, and within normal or expected levels?
   c) Are input data series reliable and applied properly within the assessment model?
2. Evaluate and discuss the strengths and weaknesses of the methods used to assess the stock, taking into account the available data, and considering the following:
   a) Are methods scientifically sound and robust?
   b) Are assessment models configured properly and consistent with standard practices?
   c) Are the methods appropriate for the available data?
3. Evaluate the assessment findings and consider the following:
   a) Are population estimates (model output – e.g. abundance, exploitation, biomass) reliable, consistent with input data and population biological characteristics, and useful to support status inferences?
   b) Is the stock overfished? What information helps you reach this conclusion?
   c) Is the stock undergoing overfishing? What information helps you reach this conclusion?
   d) Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?
   e) Are the quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and conditions?
4. Evaluate the stock projections, including discussing strengths and weaknesses, and consider the following:
   a) Are the methods consistent with accepted practices and available data?
   b) Are the methods appropriate for the assessment model and outputs?
   c) Are the results informative and robust, and useful to support inferences of probable future conditions?
   d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?
5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.
   a) Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods
   b) Ensure that the implications of uncertainty in technical conclusions are clearly stated
6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.
   a) Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments

b) Provide recommendations on possible ways to improve the SEDAR process

7. Consider whether the stock assessment constitutes the best scientific information available using the following criteria as appropriate: relevance, inclusiveness, objectivity, transparency, timeliness, verification, validation, and peer review of fishery management information.
8. Provide suggestions on key improvements in data or modeling approaches that should be considered when scheduling the next assessment.
9. 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 in accordance with the project guidelines.

Annex 3: Tentative Agenda - SEDAR 79 Southeastern Mutton Snapper Assessment Review September 10-12, 2024

St. Petersburg, Florida

Monday - Travel Tuesday

8:30 – 9:00 a.m. Introductions and Opening Remarks Coordinator

- Agenda Review, ToR, Task Assignments

- Take Breaks as needed throughout

9:00 a.m. – 12:00 p.m. Assessment Presentations TBD 12:00 p.m. – 1:30 p.m. Lunch Break

1:30 p.m. – 5:00 p.m. Panel Discussion Chair

- Assessment Data & Methods

- Identify additional analyses, sensitivities, corrections

- Review additional analyses

5:00 p.m. – 5:30 p.m. ToR Review & Daily Wrap-Up Chair

5:30 p.m. - 6:00 p.m. Public Comment Chair *Tuesday Goals*: Initial presentations completed, sensitivities and modifications identified. ***Wednesday***

8:30 a.m. – 12:00 p.m. Panel Discussion Chair

- Review additional analyses, sensitivities

- Consensus recommendations and comments

12:00 p.m. – 1:30 p.m. Lunch Break

1:30 p.m. – 5:00 p.m. Panel Discussion / Work Session Chair

5:00 p.m. – 5:30 p.m. Daily Wrap-Up Chair

5:30 p.m. - 6:00 p.m. Public Comment Chair

Wednesday Goals: Final sensitivities identified, preferred models selected, projection approaches approved, begin summary report drafts.

Thursday

8:30 a.m. – 12:00 p.m. Panel Discussion Chair

- Final sensitivities reviewed.

- Projections reviewed.

12:00 p.m. – 1:30 p.m. Lunch Break

1:30 p.m. – 5:00 p.m. Panel Discussion / Work Session Chair

	- Review Consensus Reports	
5:00 p.m. – 5:30 p.m.	**Daily Wrap-Up**	**Chair**
5:30 p.m. - 6:00 p.m.	**Public Comment**	**Chair**

Thursday Goals: Complete assessment work and discussions. Final results available. Draft Summary Report reviewed.

Friday - Travel

Appendix 3: Panel membership and meeting participants

Review Panel

Amy Schueller (Chair)	SAFMC SSC
Michael Allen	GMFMC SSC
Adriana Nogueira	CIE Reviewer
John Neilson	CIE Reviewer
Paul Regular	CIE Reviewer
Alexei Sharov	SAFMC SSC

Analytic Team

Shanae Allen	FWC
Bob Muller	FWC
Halie O'Farrell	FWC

Council Representation

Jessica McCawley	SAFMC
John Sanchez	GMFMC

Staff

Julie A Neer	SEDAR
Judd Curtis	SAFMC Staff
Ryan Rindone	SAFMC Staff
Emily Ott	SEDAR

Workshop Observers

NC State
NMFS SEFSC
NMFS SEFSC

Workshop Observers via Webinar

SAFMC Staff	SAFMC Staff
NC DNR	
NC DNR	