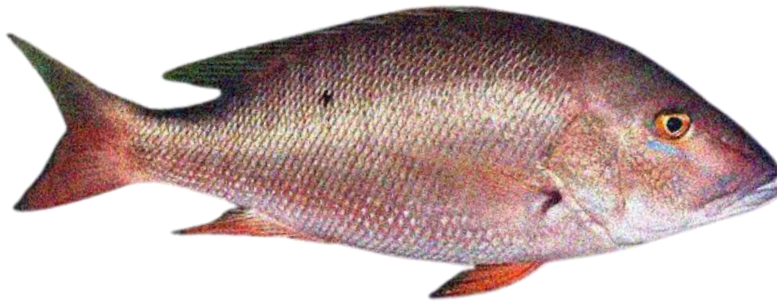Center for Independent Experts (CIE)

Independent Peer Review Report for SEDAR 79

Southeastern US Mutton Snapper

St. Petersburg, Florida, from September 10-12, 2024

Paul Regular

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Executive Summary

The SEDAR 79 Southeastern U.S. Mutton Snapper Stock Assessment was deemed to be comprehensive, well-documented, and conducted with rigorous attention to detail. The assessment team followed best practices, applying the Stock Synthesis (SS3) model to integrate a wide range of fishery-dependent and fishery-independent data. This approach provided reliable population estimates and a solid foundation for stock status determination.

Data and Methodology: The data decisions made were sound and the assessment methods were robust, applying a conditional age-at-length model to minimize assumptions and incorporate as much raw data as possible. However, concerns remain about the sampling of the recreational fishery as larger snapper may be underrepresented, particularly for the eastern fleet, which could lead to overestimation of the stock.

Uncertainty and Sensitivity: Uncertainty was thoroughly examined in both the data and the model using a variety of diagnostic tools, including residual plots and likelihood profiles. Key sources of structural uncertainty – such as assumptions regarding selectivity, recruitment, discard mortality, and natural mortality – were all explored through sensitivity tests. Recommendations under ToR 6 and 8 are focused on reducing these uncertainties. In addition, I propose two further considerations: 1) conduct analyses to identify the environmental drivers behind recruitment deviations, which could help explain the unexplained variability and enhance the accuracy of the assessment and projections; and 2) explore the use of ensemble analyses to better capture uncertainty surrounding the rate of natural mortality.

Stock Status: The assessment concluded that the Mutton Snapper is neither overfished nor undergoing overfishing. Spawning stock biomass (SSB) has been increasing, with recent estimates exceeding 75% of the levels associated with 40% Spawning Potential Ratio (SPR) and Maximum Sustainable Yield (MSY). Fishing mortality also remained below the threshold associated with 40% SPR and MSY. Though there are concerns regarding uncertainties in the recreational data and selectivity curves, the conclusions appear to be robust given the current understanding of the data and stock dynamics.

Projections: The stock-recruitment relationship was modeled using a Beverton-Holt curve, with recruitment deviations playing a key role in capturing residual dynamics. Although recent years have seen positive recruitment deviations, there is uncertainty about whether this trend will persist. As a result, projections were conducted using both recent recruitment averages and the stock-recruitment curve, with the latter providing more conservative estimates. Evaluating both scenarios is crucial, as the projections lack uncertainty around key factors such as recruitment and fishing mortality, being deterministic rather than stochastic. While MCMC methods were intended to generate stochastic projections, technical difficulties prevented their use in this assessment. Resolving these issues should be a priority in the near term to improve future projections.

Conclusion: The SEDAR 79 assessment was found to represent the best available science. While some uncertainties remain, particularly around recreational selectivity and natural mortality, the overall findings regarding stock status are considered reliable. Moving forward, the

inclusion of stochastic projections and further refinement of selectivity assumptions and data collection methods should enhance the robustness of future assessments.

Background

As part of a Southeast Data, Assessment, and Review (SEDAR) cooperative process, an independent peer review of the Mutton Snapper Research Track Stock Assessment, labeled SEDAR 79, was conducted during an in-person Review Workshop from September 10-12, 2024, in St. Petersburg, Florida. The review aimed to ensure that the assessment adhered to the highest scientific standards and provided reliable information for effective fisheries management. The workshop brought together experts from the South Atlantic and Gulf of Mexico Fishery Management Councils (SAFMC and GMFMC), along with independent reviewers from the Center for Independent Experts (CIE).

The review panel for the SEDAR 79 assessment was required to produce a report that reflected the panel's consensus perspectives on the stock assessment, with detailed evaluations of how each Term of Reference (ToR) was addressed. All reviewers on the panel were expected to have expertise in stock assessment, fisheries science, statistics, and marine biology to ensure a thorough evaluation. Approximately two weeks before the review meeting, all panel members were provided with background documents and reports from the data workshop, which they were required to read in preparation. During the meeting, each reviewer actively participated in discussions, contributing professionally and respectfully to the panel's review of the assessment.

In addition to contributing to the consensus report, CIE reviewers had the additional responsibility of producing independent written reviews of the assessment. These independent reviews allowed the CIE reviewers to offer their own perspectives on the assessment's findings, data, and methods, complementing the collective review from the panel. This report presents my independent perspective on the assessment.

Responses to the 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 Data Workshop (DW) and Assessment Workshop (AW) sound and robust?

The review panel concluded that the data decisions made by the Data Workshop (DW) and Assessment Workshop (AW) were sound and robust. Notably, the decision to treat Southeastern U.S. Mutton Snapper as a single population was supported by genetic and biological evidence. The panel also endorsed the choice to use SRFS data over MRIP for estimating recreational removals, as SRFS provides more reliable estimates for rare-event species like Mutton Snapper, although the source of discrepancies between SRFS and MRIP data remains unclear. In addressing adjustments to the Gulf video survey, the model's catchability coefficient was modified to account for changes in survey design, which the panel deemed appropriate. However, the panel recommended further investigation into these survey discrepancies and differences in recreational data sources.

I agree with the panel's conclusions but have additional observations on the trends seen in the Gulf video series. This series notably differs from other survey indices by not showing an

increasing population trend. While I support the decision to address this anomaly through adjustments to the catchability coefficient, I believe an alternative approach could involve generating an index using data from core Mutton Snapper habitat exclusively. This might align the Gulf video series more closely with other indices, potentially reducing the need for catchability breakpoints. That said, a more effective long-term solution would be to develop a spatiotemporal index, as it would better capture potential shifts in the distribution of Mutton Snapper over time.

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

The review panel concluded that data uncertainties were thoroughly acknowledged and addressed throughout the assessment, which employed a conditional age-at-length model incorporating a range of fishery-dependent and fishery-independent data sources. Key uncertainties, such as those related to recreational removals, were carefully considered, with added flexibility in the model to account for variations in these estimates. Another significant uncertainty involved discard mortality, where Mutton Snapper were assumed to have similar release mortality rates as Red Snapper, given the lack of species-specific data. Fishery-independent indices also presented challenges, especially the Gulf video survey, which faced issues due to changes in survey design and catchability. Additionally, the longline CPUE series showed potential hyperstability and was poorly fit by the model. Overall, the panel concluded that the assessment appropriately addressed data uncertainties, with key factors like survey estimates, connectivity, and anomalous data points explicitly recognized and accounted for.

I agree with the panel's conclusions and particularly appreciate the careful consideration given to data uncertainties throughout the assessment. The assessment team diligently accounted for observation error levels for each data input in the model by providing estimates of uncertainty to the model. I commend the team for conducting sensitivity tests to address structural uncertainties not fully captured by external estimates of uncertainty. The SRFS vs. MRIP recreational removals sensitivity test was particularly important given the large difference in the scale of the estimates provided by these two methods. This thorough approach to accounting for data uncertainties contributes significantly to the robustness and reliability of the overall assessment, giving greater confidence in the model's outputs.

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

The review panel found the input data series generally reliable and effectively applied within the assessment model. Despite some uncertainties, particularly around recreational catch estimates due to differences between the SRFS and MRIP surveys, the assessment's reliance on MRIP data made it relatively insensitive to the scale of recreational removals. Though no single fishery-independent index fully captures stock-wide changes, the model's integration of seven indices provided comprehensive coverage across the stock range through well-considered selectivity curves. Challenges related to the combined Gulf video index were addressed by allowing the model to estimate changes in catchability. Similarly, issues of potential hyperstability in the truncated longline CPUE series were acknowledged, with suggestions for future improvements in standardization methods, such as subsetting data for index fishermen or considering the

exclusion of this series. Overall, the panel concluded that the input data were correctly applied, providing meaningful contributions to the assessment.

I agree with the panel's conclusions regarding the reliability and application of the input data series. One of the primary challenges in the assessment involved selectivity decisions, particularly given the clear differences in Mutton Snapper length distributions observed across surveys and regions. These differences prompted considerations about ontogenetic deepening, as it appears that larger Mutton Snapper may inhabit deeper waters. Based on discussions about the depth coverage of the Reef Visual Census (RVC) surveys, there is some evidence supporting this ontogenetic behavior. The variation in length distributions between the East and West regions raised additional questions about whether adjustments to selectivity assumptions in the South East Reef Fish Survey (SERFS) might be warranted. While differences between the RVC surveys in these regions could offer a rough approximation of availability, supporting a potential downward adjustment in SERFS selectivity, further detailed length composition data would be necessary to justify any alternative assumption.

I recognize the risks associated with introducing another dome-shaped selectivity curve, which could create cryptic biomass concerns. During the meeting, the truncation in length distribution was clarified to be mostly confined to southeastern Florida, affirming that the current selectivity assumptions were appropriately structured. The selectivity assumptions appear well-grounded in a thorough understanding of the data and population distribution. Nevertheless, I share the panel's concerns regarding recreational fishery sampling, where under-sampling of larger snapper could potentially misrepresent their presence in the Eastern region, and I agree that this issue merits further attention.

Finally, I support the panel's recommendation for further improvements to the CPUE standardization. However, in contrast to panel consensus, I would also support the exclusion of this series from the model given concerns regarding hyperstability. It is widely known that CPUE is best used as a fishery performance indicator rather than an indicator of changes in stock size.

2) Evaluate and discuss the strengths and weaknesses of the methods used to assess the stock, taking into account the available data. Consider the following:

a) Are the methods scientifically sound and robust?

Review Panel Findings:

The stock assessment used a state-of-the-art approach (Stock Synthesis) applied in a scientifically sound and robust manner, following best practices. A comprehensive suite of diagnostic tests, including residual diagnostics, retrospective analyses, and likelihood profiling, demonstrated the model's robustness, with satisfactory results for most diagnostics. Sensitivity runs were also conducted to assess the impact of different assumptions.

My Perspective:

I agree with the panel that the methods used in the assessment are scientifically sound and robust. The assessment team applied a rigorous approach to analyzing the available data, supported by extensive testing. It is a commendable and thorough piece of work. However, I understand the frustration with some signs of instability, such as:

- The jitter analysis revealed sensitivity to starting values.
- MCMC sampling appeared to land on a slightly different solution, possibly due to an insufficient burn-in period.
- The jagged likelihood profiles indicated frequent convergence issues.

The jaggedness in the likelihood profiles seems to be largely driven by the length and discard components. Additionally, aspects of the recreational fishery selectivity were fixed to aid convergence. While I agree that the team successfully found an optimum solution, and the model is impressive given its complexity, I wonder if certain simplifications could resolve some of these issues.

The question is, which simplifications might help? The correlation analysis suggests that some parameters defining inflection points for the recreational fisheries are problematic. Interestingly, many of these inflection points could be specified since the underlying value—size limits—is known. While there is uncertainty around adherence to size limits, the width of the logistic curve could capture this. It might even be reasonable to fix the width, assume a near knife-edge implementation of regulations and allow the variance parameters to account for noise from imperfect adherence to the size limits. Such simplifications might reduce convergence issues.

Another potential simplification is the removal of the CPUE index. There are indications that the index is hyperstable, a common issue with CPUE data. While this index provides information on older snapper, much of this is already captured in commercial removals, making it possible to track cohorts without the index.

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

The review panel concluded that the Mutton Snapper models were configured appropriately and aligned with standard practices. The assessment was data-rich, using the best available information for key biological parameters and adopting a novel approach to estimate post-release and delayed mortality in the recreational fishery. A Beverton-Holt stock-recruitment relationship was chosen, and recruitment was estimated at age 1. There was extensive discussion on the selectivity curves, particularly the dome-shape assumption for the reef visual and recreational surveys. While sensitivity tests showed that assuming a flat-top shape decreased stock size estimates but fit the length-composition data poorly, the panel agreed that the dome-shape best explained the data, though they cautioned that stock size might be overestimated if larger snapper are underrepresented in monitoring programs. The use of age 40 as the plus group was also questioned, but the panel agreed it was appropriate given the limited data at older ages.

I agree with the conclusions of the review panel and appreciate the thoroughness of the assessment, especially the careful considerations that went into modeling discard mortality, selectivity, and recruitment.

Given the dominance of the recreational fishery, and the prevalence of discarding, it is important to properly account for post-release mortality to capture the full extent of removals from the population. Although the rates of post-release mortality were based on estimates from Red Snapper, I appreciated the sensitivity tests the team ran to evaluate the potential consequences of this uncertainty.

As discussed above under ToR 1c, I consider the careful configuration of the selectivity curves to be notable. For each survey and fishery, the shape chosen was logical and based on the best available information.

Finally, the use of a Beverton-Holt stock-recruitment relationship was valuable for estimating reference points such as maximum sustainable yield, but I think the real strength of the configuration lay in the choice to estimate recruitment deviations. These deviations played a crucial role in explaining changes in the population over time and allowed the assessment to capture variations in recruitment that may not have been immediately apparent with a static stock-recruitment assumption.

c) Are the methods appropriate for the available data?

The review panel considered the methods appropriate given the available data. Instead of using an age-structured model that would have required significant pre-processing of the data, the team chose a conditional age-at-length method. This approach allowed them to integrate both length and age data as available, reducing the need for assumptions and making full use of raw data. This method is consistent with best practices in stock assessment. However, there may be additional opportunities to improve the CPUE index, potentially by limiting the standardization analysis to fishermen with a known history of targeting Mutton Snapper.

I agree with the conclusions of the review panel.

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?

The review panel considered the population estimates to be reliable and consistent with the inputs. Most fisheries-independent indices show an increasing population trend, and this is mirrored in both the base-case model and simpler production models. Retrospective estimates also align well, with no signs of patterns or bias over time. While the base model converges optimally, its sensitivity indicates there may be room for further refinement.

I agree with the conclusions of the review panel; I just simply add that the leave-one-survey-out analysis also provides consistent results, further supporting the conclusions.

b) Is the stock overfished? What information helps you reach this conclusion?

The review panel concluded that the stock is not overfished. The assessment shows that the spawning output has been increasing in recent years, with the geometric mean spawning stock biomass (SSB) for 2021-2023 exceeding 75% of the SSB at 40% SPR and 75% of SSB at MSY. Retrospective and sensitivity analyses largely confirmed this conclusion, except for two sensitivity runs that assumed different recreational selectivity, which suggested a more depressed stock status and warrant further investigation.

I agree with the conclusions of the review panel and from the assessment team; however, such conclusions would benefit from probabilistic statements (i.e., what is the probability that the stock is overfished?). Efforts to obtain reliable MCMC samples from this model should continue to enable the calculation of such probabilities and support risk-based management decisions.

c) Is the stock undergoing overfishing? What information helps you reach this conclusion?

The review panel concluded that the stock is not undergoing overfishing. The geometric mean fishing mortality for age-3 fish during 2021-2023 is below the fishing mortality rate associated with both 40% SPR and MSY. Sensitivity tests and retrospective analysis supported this conclusion, with no signs of overfishing. However, the review panel did raise concerns about the recreational selectivity curve, particularly for the eastern recreational fleet, suggesting further examination in future assessments to ensure accurate representation of large fish in that fishery.

I agree with the conclusions of the review panel; however, like ToR 3b, it would be useful to present probabilities along with such conclusions.

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

The review panel concluded that the Beverton-Holt stock-recruitment relationship was reliable and useful. The model estimated a steepness of 0.63, indicating a moderate relationship between SSB and recruits. While fixing steepness to 1 caused a decrease in virgin recruits and SSB, it did not significantly affect overall estimates of population dynamics. However, there is considerable uncertainty in the stock-recruitment curve, making it difficult to predict future stock conditions, especially if recent high recruitment levels do not persist.

I agree with the conclusions of the review panel, especially their point regarding the difficulty to predict future recruitment. As noted above, the recruitment deviations estimated by the model explain a considerable amount of variability in recruitment that is not explained by the Beverton-Holt relationship. There are also signs of temporal dependence in these deviations and recent levels of recruitment have been above expected levels through the last five years. While these positive deviations may continue in the near future, they could just as easily shift in a negative direction. Since the drivers behind these deviations remain unclear, forecasting future recruitment remains difficult and uncertain. This represents a large knowledge gap and I encourage further research into the factors that may be driving these recruitment deviations.

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 review panel concluded that "[t]he stock status determination methods for the stock are robust and appropriate. Therefore, the quantities estimated for this stock are reliable."

I agree with the conclusions of the review panel. The data and assessment workshops thoroughly evaluated a wide range of available data and did an excellent job integrating as much information into the assessment model as possible. Given the model uses the best available information, I believe the quantitative estimates of the stock's status are as reliable as they can be with the current data. As a result, I do not think there are any additional indicators that would provide more reliable insights into stock trends or conditions beyond what has already been captured in the model.

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?

The review panel agreed that robust methods were used for the projections, though there was debate over whether to base projections on the 3-year average recruitment or the stock-recruit curve. Recent recruitment has been higher than predicted by the stock-recruit curve, but it is uncertain if this will continue. The stock-recruit curve, with estimated steepness, provided more conservative projections. Both scenarios were retained to evaluate a range of possible future trends, which was important as the projections are deterministic and do not account for model uncertainties. The panel suggested that future methods should include a distribution of recruitment to better capture uncertainty and recommended adding discard estimates to the projection tables, which was done in an addendum.

I agree with the conclusions of the review panel and echo their recommendation to integrate uncertainty around recruitment, and all other core estimates, into the projections. The current deterministic projections cover a range of possibilities from the expected levels from the stock-recruit curve to the above average levels observed in recent years. What is missing is any possibility that levels of recruitment will drop below expected levels. This would be accounted for in stochastic projections. The assessment team noted that the plan was to leverage MCMC samples to produce stochastic projections; however, technical difficulties precluded these calculations. I therefore support the recommendation to continue efforts to produce MCMC samples.

b) Are the methods appropriate for the assessment model and outputs?

The review panel concluded that the methods and base model were considered appropriate. Alternative model outputs were requested, reviewed, and thoroughly discussed, ultimately confirming that the base model was suitable and required no changes to its structure or parameters.

I agree with the conclusions of the review panel and appreciated the responsiveness and efficiency of the assessment team in providing alternative model configurations during the review workshop. Their flexibility allowed for a thorough evaluation, ensuring confidence in the chosen model approach.

c) Are the results informative and robust, and useful to support inferences of probable future conditions?

"The review panel felt that the results were robust and informative, and the inferences were supported regarding future conditions, pending the SSC decision on the future recruitment scenario."

I agree with the conclusions of the review panel.

d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?

The review panel concluded that uncertainties are fully recognized and discussed, but they are not entirely captured in the deterministic projections. Although MCMC-based projections would have better accounted for these uncertainties, the MCMC results were considered unreliable and were not used. Instead, alternative projections based on recent average recruitment and the stock-recruit curve were provided as a clear substitute for stochastic projections.

I agree with the conclusions of the review panel, but reiterate considerations I provide under ToR 4a.

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

The review panel concluded that uncertainty in the SEDAR 79 assessment was thoroughly investigated using a range of standard methods, including residual plots, likelihood profiles, sensitivity runs, and MCMC analyses. While uncertainty in recreational landings and fishery-independent indices was well-represented, uncertainty in commercial landings was underrepresented due to the model's configuration to fit these data exactly. However, the panel deemed this to have minimal impact on overall results given the relatively low contribution of commercial removals. Correlation analyses, residual evaluations, and parameter profiling further supported the robustness of the model, although there was some sensitivity to initial parameter values, especially around steepness and natural mortality.

Regarding assessment model uncertainty, the panel acknowledged the robust handling of process uncertainties, such as growth, natural mortality, and fishing mortality. However, the deterministic projections did not incorporate uncertainty from the terminal year estimates, as MCMC outputs could not be fully applied due to technical difficulties. The panel recommended that future

assessments address this issue by incorporating stochastic projections using posterior distributions to better reflect the uncertainty in recruitment, fishing mortality, and other key parameters.

I agree with the conclusions of the review panel and commend the use of annual CV estimates for survey indices and removals (except for commercial removals). This approach provided valuable information on data uncertainties, allowing the model to effectively weight the available information. As is often the case, uncertainties around fishery and survey selectivity, recruitment, and natural mortality remained. However, the assumptions made were well-grounded in the existing knowledge of the stock, and these structural uncertainties were thoroughly tested. Notably, the scale of the assessment was most sensitive to assumptions regarding natural mortality. In future assessments, it may be worthwhile to explore methods to account for this uncertainty, such as the ensemble approach used in another assessment I reviewed, which combined estimates from models with low, medium, and high natural mortality assumptions. MCMC samples were used in that assessment to generate the ensemble. As noted, MCMC samples could not be generated for the Mutton Snapper assessment due to technical difficulties. Resolving these issues would not only allow for more reliable estimates of uncertainty and the inclusion of stochastic projections, but it could also provide valuable options for addressing structural uncertainties in the model.

b) Ensure that the implications of uncertainty in technical conclusions are clearly stated

The review panel concluded that uncertainty in the data and assessment model was thoroughly examined and quantified where possible. The results of the assessment regarding the stock's status appear to be generally robust, considering the range of uncertainties addressed. However, exceptions arose in sensitivity runs, particularly when the commercial longline CPUE and Indian River Young of the Year indices were excluded, which resulted in a lower relative biomass trend. In this scenario, the stock remained overfished until 2017, rather than 2010 as in the base model, and the current stock status appeared less optimistic. Additionally, sensitivity runs that modified the selectivity configuration for the recreational east and west fleets, using a less dome-shaped selectivity curve, also produced less favorable stock outcomes.

I agree with the conclusions of the review panel. The assessment team clearly communicated key sources of uncertainty and their potential implications for the stock assessment results.

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

The review panel supported the research recommendations from the Data and Assessment stages and added their own. A near-term recommendation was to continue efforts to generate MCMC samples to improve parameter uncertainty estimates and support stochastic projections. For the longer term, the panel recommended improving data collection on the size and age composition

of Mutton Snapper in the recreational fishery, as current data, mainly from headboat monitoring, may not fully capture fish taken from private docks and offshore vessels.

I support the research recommendations from the Data and Assessment workshops as well as those from the review panel. The only additional longer-term item that may be worth considering is analyses aimed at identifying the environmental drivers of the recruitment deviations. These deviations are a large source of unexplained variation in the assessment, and a deeper understanding of the factors influencing recruitment could lead to improvements in both the assessment and future projections.

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

The review panel noted that the data review and assessment review processes are closely linked and data decisions affect model choices. Having at least one of the review panel members present at the data meeting may be useful for guiding discussions at the assessment review meeting. I support this recommendation.

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 review panel found the assessment to be thorough, well-documented, and conducted with care. The methods, results, and conclusions were well-supported by detailed analyses that align with established best practices for stock assessments. As a result, the panel concluded that the assessment represents the best available science, with no critical data gaps or analytical improvements identified by the participants.

I agree with the conclusions of the review panel.

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

The review panel stated that the research recommendations from ToR 6 aim to improve both data collection and modeling approaches and provided a few additional suggestions for improving the data or modeling approaches. For data, they suggest addressing uncertainties in the commercial longline CPUE index, exploring spatiotemporal models for survey indices (especially the Gulf survey), investigating spatial dynamics, and incorporating tagging and recreational mode data. On the modeling side, they recommend examining the selectivity in the recreational east fleet, where larger fish may be underrepresented, and implementing stochastic projections to account for uncertainty and assess the risks of different fishing scenarios.

I support the research recommendations from the review panel. The only additional item that may be worth considering is an ensemble approach to better account for uncertainty in the rate of natural mortality (see comments under ToR 5a).

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.

The report written by the review panel completes the task in ToR 9.

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.

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

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

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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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