Center for Independent Experts (CIE) Independent Peer Review Report

On

Caribbean Yellowtail Snapper and Stoplight Parrotfish Review (SEDAR 84)

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Executive Summary

The Stock Assessment Review Workshop (RW) met in Fort Lauderdale, Florida, from Tuesday, July 14 through Friday 18, 2025, to review three Caribbean stock assessments: St. Croix Stoplight Parrotfish, St. Thomas/St. John Yellowtail Snapper, and Puerto Rico Yellowtail Snapper. The SEDAR 84 Review Panel Report presents a consensus review of the assessment and scientific advice. As an independent reviewer at the SEDAR 84 RW, this report reflects my findings and reviewer activities.

The last assessment for the three stocks, in 2016, used data-limited methods but it was not used for management advice. This was the first time analytic models were developed using Stock Synthesis for these data-limited stocks. The Analyst Team did appropriate work compiling all available data and developing the models, but many concerns were raised about model configurations and key assumptions. The Review Panel (RP) concluded that the data were too limited for such a complex model, and none of the models presented could be used to provide scientific advice. Diagnostics and additional model runs revealed model instability and high sensitivity to assumptions. During the RW, following the RP's recommendations, the Analyst Team incorporated some changes to the model configuration and presented several sensitivity runs, but none of the models could ultimately be used to support management decisions.

Main finding, recommendations and conclusions:

Summary of the findings:

- Scientific advice: The current assessments do not support the development of annual catch recommendations for management in the U.S. Caribbean.
- Assessment methods: Stock Synthesis models were developed for the three stocks and correctly applied, but the decisions made by the DW and AW were not robust enough to support the models. The RP raised many concerns regarding the models' configurations, and assumptions. The base models for the three stocks were replaced following some modifications requested by the RP. The new base models are still sensitive to assumptions (initial equilibrium catch, recruitment steepness, selectivity). An additional model that combines the data from the two Yellowtail snapper stocks was also developed during the meeting. Further work is required to refine this combined model to inform management advice. The combined model represents the most promising pathway toward achieving a valid model.
- Stock status: the stock status is unknown, because the results are too sensitive to model assumptions.
- Uncertainties: diagnostics were properly completed for the three stocks in the assessment report; however, models were too sensitive to main assumptions (fits to the catch vs index data, estimation of growth) and there are many sources of uncertainty (M, initial equilibrium catch, steepness). This sensitivity makes it difficult reach clear conclusions or to isolate and identify the most influential sources of uncertainty.
- Key recommendations: investigating the stock structure of the assessed stocks; to use spatial models to estimate abundance from survey indices, improve sampling design and increase sample size; consider alternative modelling approaches such as data-limited methods; and to continue developing the combined model for Yellowtail Snapper in St. Thomas/St. John/Puerto Rico.

Background

The SEDAR 84 Caribbean Yellowtail Snapper and Stoplight Parrotfish assessment workshop process took place over a series of four webinars held from April 2024 to October 2024. The SEDAR 84 Assessment Review Workshop (RW) itself was held on July 14-18, 2025, in Fort Lauderdale, Florida. This RW is part of the Southeast Data, Assessment, and Review (SEDAR 84) cooperative process for assessments conducted in NMFS's Southeast Region.

The RP was composed of three scientists appointed by the Center for Independent Experts (CIE): Dr. Adriana Nogueira, Dr. Ernesto Jardim, and Dr. Lisa Chong, and two other reviewers appointed by SEDAR. The list of participants can be found in Appendix 3.

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 (RP) met remotely for a pre-review call to discuss initial impressions, and to request clarifications or additional analysis. The three assessments were conducted using the Stock Synthesis modelling software.

This report has been prepared for the CIE and represents my personal view which is consistent with the RP'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 84 US Caribbean Yellowtail Snapper and Stoplight Parrotfish Review Assessment. Approximately two weeks before the meeting, I received the draft of the assessment workshop (AW) report. The data workshop (DW) report and all working documents were made publicly available on the website https://sedarweb.org/assessments/sedar-84-caribbean-yellowtail-snapper-and-stoplight-parrotfish/. A remote pre-review call was held two days after receiving the AW report to discuss the main concerns and request additional documentation. During this call, some concerns were raised regarding model configuration and assumptions that were not clearly addressed in the documents. In addition, no base model was presented in the assessment. The RP requested that the Analyst Team select a single base model to provide advice for each stock and submit additional documentation on the model's configuration.

The Review Assessment Workshop was held in-person from July 14-18, 2024, in Fort Lauderdale, Florida. During the meeting the assessment team provided presentations, and the CIE reviewers participated actively identifying key issues in the data and model specification. There was general consensus among the RP regarding the main discussions and findings.

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

Specific comments on each ToR

1. Evaluate the data used in the assessment, addressing the following:

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

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

Overall, I conclude that not all data decisions made by the DW and AW panels appear to be sound and robust. Not all 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. All data inputs and configurations were documented but the model assumptions were not.

It was the first time trying to develop analytic models for those species, so several changes in the data preparation were implemented since the last data-limited assessment in 2016.

St. Croix Stoplight Parrotfish

It was stated that the population is part of a larger connected system, but no connectivity studies were presented, leading to uncertainty in the stock biomass estimates, fishing mortality and recruitment dynamics. The proper identification of the population structure it is a key priority for most management strategies.

Catch data has been reported from 1996 for a parrotfish complex that included six other species. However, catches were not reported by species until 2011. Although there is uncertainty in the species split for other parrotfish, it was acknowledged that the spotlight parrotfish is easy to recognize, so uncertainties in the species split might be negligible. The model used the 2012–2022 time series, which is considered short for this type of model.

The sample size for the fishery-dependent length composition data is very low (66 trips), so the data were aggregated across all years using the super-period approach in Stock Synthesis. This method groups data from multiple years and treats them as originating from a single time point, rather than fitting age or length compositions year by year. While this approach is commonly used to reduce model complexity and stabilize fits, especially in long time series with sparse data, it is less suitable in this case due to the very short time series. Collapsing the data into a single period significantly reduces the number of effective observations, making it difficult to estimate time-varying dynamics such as changes in selectivity, recruitment, or fishing mortality. Another problem of this approach is that if selectivity actually changes within the super-period, the model may average across changes, biasing estimates. With this approach and this low sample size, we lose the temporal resolution; thus, masking interannual variation in selectivity, recruitment, or fishing mortality. This leads to biased estimates of selectivity or recruitment trends, particularly if changes happened within a super-period. In this context, the combination of a short time series and limited sample size results in a loss of temporal resolution, making it difficult to detect potential interannual variability or trends in the length composition data.

The Assessment Team explained that a catch-per-unit-effort (CPUE) index could not be used as an indicator of stock abundance because CPUE in this fishery is strongly influenced by market dynamics, such as demand and price, rather than actual fish availability in the water. As a result, fluctuations in CPUE may reflect changes in fishing behavior or economic conditions rather than underlying changes in stock abundance, making it an unreliable index for assessment purposes.

A research survey under the National Coral Reef Monitoring Program (NCRMP) began in 2001. The survey design changed in 2017, and a calibration method was applied to account for this change. The resulting index is design-based. While this method appears valid, alternative spatial modeling approaches could be explored to improve index estimation. In particular, spatial or spatio-temporal models can incorporate seasonal variability, helping to account for shifts in species distribution or catchability throughout the year. This is especially relevant given that, as discussed during the RW, survey observations show high variability due to weather conditions and potentially shifting sampling times. Incorporating season or environmental variables as a covariate, modeling time-varying spatial fields, or standardizing predictions to a consistent seasonal window could help separate true abundance signals from observation noise and enhance the robustness of the survey index.

Only three years of fishery-independent survey length composition data were available for the assessment, in addition to the aggregated commercial length composition data treated under the super-year approach. This is concerning because such limited data severely constrains the model's ability to estimate key population processes, such as recruitment patterns, growth, and selectivity, over time. Length composition data are critical for informing the age or size structure of the stock, and relying on such a short and potentially unrepresentative time series increases uncertainty and the risk of biased parameter estimates. Without adequate temporal coverage, the model may fail to detect important trends or changes in the population.

The model includes a 26+ age group to represent the oldest individuals in the population. During the review, there was discussion about whether a more aggregated plus group (e.g., 10+ or 15+) would be more appropriate. A sensitivity analysis was performed for Yellowtail Snapper comparing different plus group definitions, and it showed no significant differences in model outputs. Based on this result, the 26+ age group was retained in the assessment. However, in my opinion, this issue warrants further exploration. Using such a high plus group (26+) may introduce unnecessary uncertainty, particularly if there is limited data to support age estimates beyond 15 years. Overly fine resolution in older age classes can create parameter estimation challenges and may not improve model performance if those ages are poorly sampled or uncertain. Additional sensitivity analyses with alternative plus group structures would help ensure the model is not overfitting or misrepresenting the contribution of older fish to the population.

Natural mortality (M) was estimated using a longevity-based method following Hamel and Cope (2022), with a maximum age of 20 years used as input. While this approach is reasonable, the estimate remains uncertain. On one hand, the maximum age value appears inconsistent, most sampled individuals were relatively young, and the available age data come from shallow-water studies, which may not reflect the full lifespan of the species. On the other hand, this species is hermaphroditic, and empirical methods for estimating M typically do not account for such life-history traits. Additionally, available data primarily reflect females, further limiting the accuracy of M estimates. In my view, alternative approaches for estimating age-specific natural mortality should be explored.

St. Thomas/St. John and Puerto Rico Yellowtail Snapper

Yellowtail snapper is part of a large population and the stock unit has not been explored. The three islands, St. Thomas/St. John/Puerto Rico are on the same platform. No connectivity studies were presented during the meeting, and it appears they are treated separately because the management decision was to adopt island-based management. Since the time-series used for the model is so short, only 10 years, it was recommended to combine this stock with Puerto Rico, and treat it as a single stock. I fully support this recommendation, so the assessment fully reflects the biology of the species and its dynamic of the stock.

St. Thomas/St. John Yellowtail Snapper

Catch data for the fishery are available from 1996, but species- and gear-specific reporting for snappers only began in 2011. As a result, the stock assessment time series starts in 2012. This decision seems appropriate, given the uncertainty and lack of species-specific information prior to 2011. However, beginning the model in 2012 results in a very short time series, which is concerning. Short time series limit the model's ability to estimate long-term population trends, recruitment variability, and historical fishing impacts, potentially increasing uncertainty in key parameters.

Due to the small sample size in the fishery-dependent length composition data, a super-period approach was used to collapse data across years. While this helps stabilize model fits with sparse data, it results in the loss of temporal resolution, limiting the model's ability to detect trends in size structure, cohort strength, recruitment variability, and changes in mortality over time.

A commercial CPUE index was not included in the model, as it was considered unreliable due to its dependence on market demand rather than reflecting true fish availability. This is valid since economic drivers can decouple effort from abundance, biasing CPUE. However, in my opinion, this should be further explored, as a CPUE index might still provide useful information on older individuals that are not well represented in survey data. Including it in a sensitivity run could help evaluate its potential utility, especially given the limited data sources currently informing the model.

Two fishery-independent survey indices are available for Yellowtail Snapper: NCRMP (0–30 m depth) and the Deep Coral Reef Conservation Program (DCRMP) (<60 m). However, only DCRMP data from depths <45 m were used in the model. It was unclear why this depth cut-off was applied, and further clarification would be helpful, especially since survey design and depth coverage affect catchability and representation of the population. Additionally, no large individuals are observed in either survey, raising concerns that the surveys may not fully represent the population's age or size structure. The survey index peaked in 2013, but the Assessment Team could not determine whether this reflected a strong year class (recruitment event) or an aggregation event. This limits the ability to interpret the index and assess its reliability.

Several uncertainties related to life-history parameters were raised during the RW. The model currently incorporates a 26+ age class to represent the oldest individuals, but it was discussed whether a more aggregated plus group (10+ or 15+) would be more appropriate given the limited age data available. A sensitivity analysis was conducted to explore this alternative, and it showed minimal differences in model outputs. However, the use of a lower plus group may be more appropriate considering the apparent lack of individuals in the older age classes and the uncertainty surrounding maximum age estimates.

Overestimating the resolution of older age classes can introduce unnecessary complexity and may reduce model stability if those ages are poorly sampled.

In addition, uncertainties in age-specific natural mortality and fecundity were identified as areas needing further investigation. The current model assumes fixed values, but both parameters may vary with age and sex.

Puerto Rico Yellowtail Snapper

The model for Yellowtail Snapper in Puerto Rico used a longer time series of data, which is beneficial for improving model stability and the estimation of population dynamics over time. Yellowtail Snapper has been consistently reported since the beginning of the time series, providing a continuous record of catch and biological information. Although some uncertainty in the early fishery data, (particularly regarding the split between gear types has been acknowledged), the inclusion of the full time series helps the model better estimate long-term trends in recruitment, fishing mortality, and biomass.

As for the St. Thomas/St. John stock, a CPUE index was not estimated, and I also think that this could provide an estimate of the older individuals, although I understand the limitation of estimating this index. In Puerto Rico, recreational data are important and no data are reported. There are not length compositions from the recreational data. I agree with the RP recommendation to start sampling and collecting data from the recreational fishery.

The fishery-independent survey (NCRMP) in Puerto Rico began in 2001, providing over a decade of valuable data on stock trends. However, only data from 2014 onward were included in the assessment, based on the justification that sampling coverage improved starting that year, when the survey became island-wide. While this change enhanced spatial consistency, the decision to exclude all pre-2014 data is problematic and, in my view, not appropriate. As highlighted by the RP, removing a substantial portion of the time series limits the model's ability to capture long-term trends in stock abundance, recruitment variability, and potential regime shifts. This is especially important given that the post-2014 survey index shows a relatively flat trend, which may not accurately reflect the stock's historical dynamics. Also, only data from < 30 meters were included and data from 30-65 m were excluded, and this is where older fish are. So, not enough length compositions are included in the model.

There is additional uncertainty surrounding the unexplained peak in survey biomass observed in 2013. It remains unclear whether this spike was due to a strong recruitment event, a temporary aggregation of fish, or another factor. This uncertainty is compounded by data gaps: the survey was not conducted in St. Thomas/St. John in 2012, nor in Puerto Rico in 2013, making it difficult to determine whether similar peaks occurred across regions or whether the trend was localized. These inconsistencies underscore the importance of maintaining full temporal coverage and utilizing all available data, even if some components are treated separately within the model framework.

c. Are data applied properly within the assessment model?

Yes, I agree with the RP that data are properly applied within the assessment model requirements. The best available data is used appropriately.

d. Are input data series reliable and sufficient to support the assessment approach and findings?

St. Croix Stoplight Parrotfish

The input data series are not sufficient to fully support the assessment approach and findings. The overall time series is short, and there are substantial uncertainties in key inputs. The fishery-dependent length composition data consists of only 66 samples collected over six years, which is a very limited dataset for informing population structure or trends. The fishery-independent survey index is also short and exhibits high variability, likely influenced by environmental conditions rather than reflecting true stock abundance. These limitations reduce the model's ability to provide robust estimates of stock status.

St. Thomas/St. John's Yellowtail Snapper

The input data series are not sufficient to fully support the assessment approach and findings. The available data are not sufficient to support the assessment independently. The time series is very short, and there is significant uncertainty regarding stock structure. Based on life-history traits and geographic proximity, it is highly likely that this stock is part of a broader population. The limited data and unresolved stock structure reduce the reliability of any stand-alone assessment. I fully support the RP's recommendation to combine the data from St. Thomas/St. John with Puerto Rico's Yellowtail Snapper and conduct a combined assessment. This would allow for better data integration, improved parameter estimation, and a more realistic representation of stock dynamics.

Puerto Rico Yellowtail Snapper

The input data series are not sufficient to fully support the assessment approach and findings. While the model benefits from a longer time series of historical catch data, the survey index used in the assessment only includes data from 2014 to 2022. This narrow time window omits valuable historical information and does not reflect longer-term trends in the population. Earlier survey data (available since 2001) were excluded due to changes in survey coverage, but they still contain important insights into historical stock dynamics. I fully support the Review Panel's recommendation to incorporate pre-2014 survey data as a separate index. Doing so would strengthen the model's ability to characterize recruitment variability, stock trends, and potential regime shifts over time.

2. Evaluate the methods used to assess the stock, taking into account the available data.

a. Are methods scientifically sound and robust?

The last assessment, conducted in 2016 using data-limited methods, was not used for management advice, and this was the first time an analytic model was developed for these three stocks, using Stock Synthesis (SS) version 3.30.22.1. SS is a well-tested standard model, which is used for several 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, it can make use of most available information, and it is flexible to incorporate newer information when available. Although it is traditionally associated with data-rich assessments, in data limited applications Simple Stock Synthesis (SSS) is an assessment method for application to data-limited stocks

that estimates catch limits. The SS-DL ((https://github.com/shcaba/SS-DL-tool) tool incorporates the SSS approach into a suite of methods ranging from data-limited to data-rich methods all in one framework/package. The Continuum tool framework was initially built to implement several standard data-limited assessment methods within the SS3 modeling framework. The tool was created to match the appropriate assessment method to the available data. This tool now has been expanded to be able to implement more complex and data-rich configurations. The model also accommodates key biological traits, including hermaphroditism, which is particularly important for the St. Croix Stoplight Parrotfish.

I agree with the RP that the method has been applied in a scientifically sound and robust manner, following the best practices in stock assessment.

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

Before the RW, there were concerns about undocumented model configurations in Stock Synthesis (SS3), particularly regarding parameter estimation choices and selected model options. These issues were clarified during the RW, and the RP recommended some changes in the model configuration for the three assessments the first day of the meeting:

1- F method: the method used to model fishing mortality in SS3 (the "F method") was changed. Initially, the model used F method 3 (Hybrid F), that it is recommended is most cases. This method applies fishing mortality as tuning coefficients to closely match the observed catch data, rather than estimating fishing mortality as a model parameter. In this case, early runs revealed a sensitivity: while the model fit the catch data almost exactly, it provided a poor fit to the abundance index. To address this, the RP asked the Analyst Team to explore how different data weights affected the model, by adjusting the standard errors (SE) — using SE = 0.3 to increase the weight (tighter fit) and SE = 2 to reduce it (looser fit). To improve flexibility in how catch data were fitted, and to not reproduce the catch levels exactly, the team switched to F method 2, which estimates annual fishing mortality using the Baranov catch equation. This allows the model to balance fits to both catch and abundance indices, especially when they conflict.

2-Survey SE correction: The standard error units for the NCRMP surveys in SS3 were corrected to better balanced fits.

3-Sex structured: The St. Thomas/St. John and Puerto Rico Yellowtail Snapper models were supposed to have a single sex configuration, but two sexes were turned on for all model runs by mistake.

The base models were changed including the three recommendations mentioned above and sensitivity test are documented in Appendix 4. For each specific stock here are the configurations:

St. Croix Stoplight Parrotfish:

The assessment configures with one-area, one season, one commercial fleet, and one fishery-independent survey. Data were fit from 2012 to 2022. The plus group was defined to be 30+ and because it was questioned due to the lack of older fish, 12+ was tested in the Yellowtail Snapper model and no effect was

observed, so it was kept at 30+. A double normal function was used to model the selectivity. This was questioned thinking that it was the due to the large plus-group, but the double-normal function was kept. The model has some issues and after the RW it remained unclear if other model configurations were properly specified or the issues were due to a problem of data quality (e.g., high uncertainty in fishing mortality, poor Fmsy convergence).

St. Thomas/St. John Yellowtail snapper:

The assessment configures with one-area, one season, one commercial fleet, and two fishery-independent survey. Data were fit from 2012 to 2022. Again, the model's use of a 26+ group was questioned given the limited data for older fish, and 12+ was tested. Other issues were also found: high uncertainty in fishing mortality and recruitment estimates and, poor F_{MSY} convergence.

Puerto Rico Yellowtail snapper:

The assessment configures with one-area, one season, one commercial fleet, and one fishery-independent survey. Data were fit from 1983 to 2022. Similar concerns as for the St. Thomas /St. Johns were raised. Despite longer time series, high uncertainty in key parameters indicated potential data quality issues.

The most critical sensitivity tests were the fitting of commercial catch vs survey indices and the growth estimation due to the absence of age composition data. Growth parameters had to be estimated to improve model convergence.

In conclusion, while key model assumptions were clarified and tested, the three stock assessments exhibited high uncertainty in fishing mortality and recruitments estimates, poor convergence of F_{MSY} and ongoing concerns about whether model configurations and data quality were sufficient for robust estimation. Given all that, I agree with the Review Panel that in general, the models were not configured appropriately.

c. Are the methods appropriate given the available data?

I agree with the RP that the methods used by the Assessment Team are not appropriate given the limitations of the available data. There are significant uncertainties regarding key parameters (initial equilibrium catch, natural mortality, and steepness) as well as important population processes like growth and recruitment.

In my view, the team has made a commendable effort to compile the data and begin developing an SS3 model for these stocks. SS3 is a powerful and flexible stock assessment tool, and it does allow for data-limited configurations and enables an easy transition from simple to more complex models, and is highly flexible to accommodate additional data whenever available. However, for these particular data-limited stocks, alternative approaches specifically designed for low-information scenarios may be more suitable at this stage.

Before further development of complex models, the quality and quantity of input data should be improved. This could be achieved through better survey design, increased sampling effort, and a re-evaluation of key model assumptions.

For the Spotlight Parrotfish and the St. Thomas/St. John Yellowtail Snapper, extending the time series of data would likely enhance model performance and reliability. Finally, I support the idea of combining the two Yellowtail Snapper stocks, as they likely belong to the same biological population and would be better assessed together.

3. Evaluate the assessment findings with respect to the following:

a. Can the results be used to inform management in the U.S. Caribbean (i.e., develop annual catch recommendations)?

b. Is it likely the stock is overfished? What information helps you reach this conclusion?

c. Is it likely the stock is undergoing overfishing? What information helps you reach this conclusion?

St. Croix Stoplight Parrotfish

I agree with the RP that the results from the RW cannot be used to inform management in the U.S. Caribbean or to develop annual catch recommendations. The status of the stock is unknown for the three stocks.

The suite of diagnostics revealed poor performance of the model. In addition, there were conflicts among the index, length compositions, and commercial catch data, likely due to the short time series. The RP requested sensitivity runs to examine how the model responded to assumptions about catch uncertainty and key parameters. Notably, the model produced different stock status outcomes. With a catch SE= 0.3 the stock is overfished (STX_RW_1) and when increasing the catch SE = 2 and allowing the model to estimate growth parameters, the stock is underfished (STX_RW_2) (Figure 1).

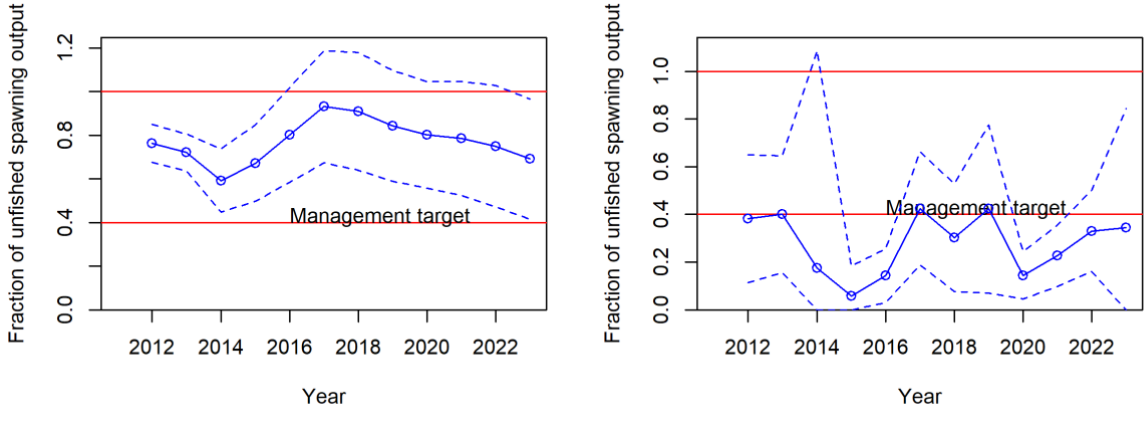

Figure 1 - Depletion level (i.e., fraction of unfished spawning output) estimated by the base run (STX_RW_1; left) and sensitivity run (STX_RW_2; right).

In my opinion, given the short time-series, and the uncertainty on the data, the model results are too sensitive to model assumptions and are not conclusive.

St. Thomas/St. John Yellowtail Snapper

I agree with the RP that the results from the RW cannot be used to inform management in the U.S. Caribbean or to develop annual catch recommendations. The status of the stock is unknown.

The reliability of the assessment is limited by the short time series available and significant uncertainty surrounding the definition of the stock unit.

Diagnostic results indicate that the model exhibits instability and high sensitivity to input assumptions. Model performance appears highly dependent on the relative fit between catch data and the abundance indices, as well as on assumptions surrounding growth parameters. The two principal fishery-independent surveys (NCRMP and DCRMP) provide conflicting trends, which the current modeling structure cannot reconcile without arbitrarily prioritizing one dataset over the other. The three sensitivity runs tested indicated an overfished status. However, when the catch SE was increased to 2 and the model was allowed to estimate growth parameters (model STTJ_RW_2), the SPR fluctuated around the threshold between overfished and not overfished throughout the time series (Figure 2).

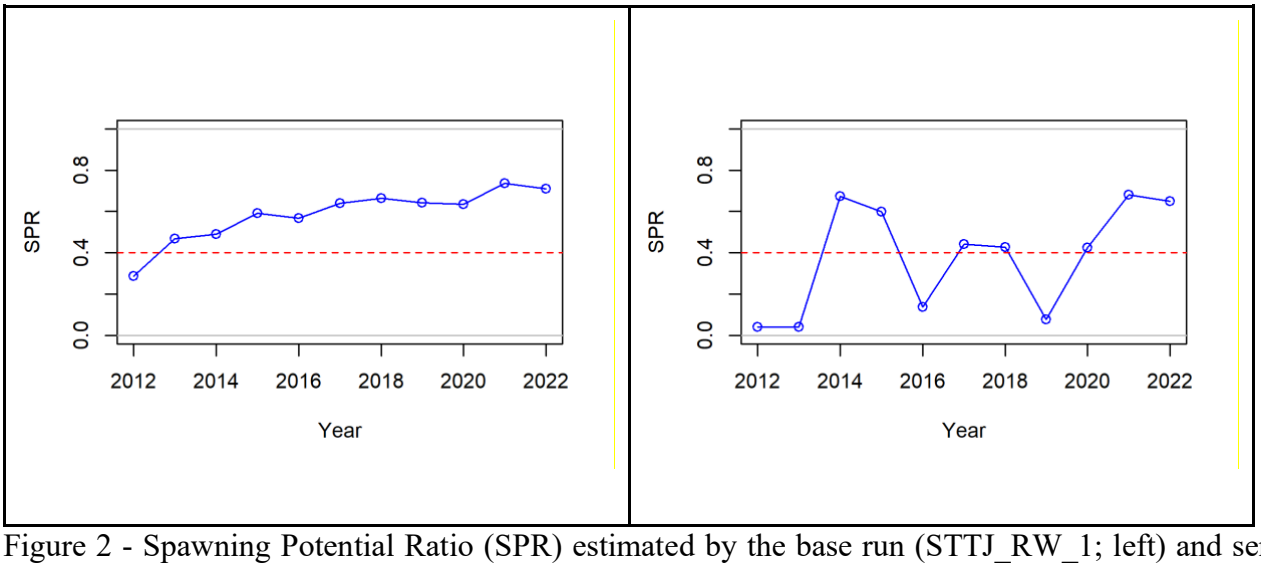

Figure 2 - Spawning Potential Ratio (SPR) estimated by the base run (STTJ_RW_1; left) and sensitivity run (STTJ_RW_2; right).

In my opinion, given the short time-series, and the uncertainty in the data, the model results are too sensitive to model assumptions and are not conclusive.

Puerto Rico Yellowtail Snapper

I agree with the RP that the results from the RW cannot be used to inform management in the U.S. Caribbean or to develop annual catch recommendations. The status of the stock is unknown.

As for the St. Thomas/St. John's stock, the stock definition is uncertain since both might belong to the same population. The model also shows conflict among some data-inputs (among commercial catch, length composition, and fishery-independent survey data)

Diagnostic results indicate that the model exhibits instability and high sensitivity to input assumptions, suggesting that it is not providing reliable estimates. Four runs were tested and while all converged to a similar fishing intensity level, the model could not reliably determine overfished status due to instability, with all runs converging to a similar fishing intensity level (around the management target in 2022), the runs produced differing historical SPR patterns, and PR_RW_2 showed high uncertainty in estimating fishing intensity.

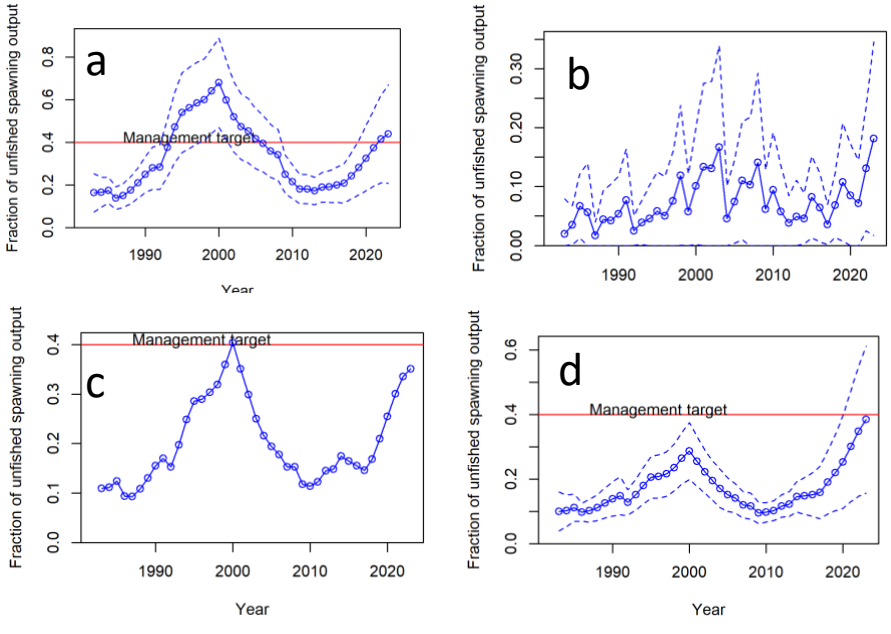

Figure 3 - Depletion level (i.e., fraction of unfished spawning output) estimated by the base run a) Base model, PR_RW_1; b) sensitivity run PR_RW_2; c) sensitivity run PR_RW_3; d) sensitivity run PR_RW_4

4. 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. Ensure that the implications of uncertainty in technical conclusions are clearly stated.

I wrote this section in the summary report, so the same ideas are reported here. A full set of set of diagnostics (included checks for convergence, correlation analysis, variance evaluation, jitter analysis, residuals analysis, retrospective analysis, and likelihood profiles) was properly applied in the Assessment report to evaluate model stability for the three stocks. In general, the diagnostics revealed concerning patterns and revealed instability and sensitivity within the model. For the three stocks, several key uncertainties were identified during the RW, particularly regarding initial equilibrium catch, natural mortality, and steepness, with the model showing strong sensitivity to these parameters. The RP identified some errors in configurations, and the base models of the three stocks were modified (see TOR 2). The base models were changed, and sensitivity runs for the new bases models were presented (Appendix 4).

US Caribbean Stoplight Parrotfish

Several key uncertainties were identified during the RW, particularly regarding initial equilibrium catch, natural mortality, and steepness, with the model showing strong sensitivity to these parameters. While the base model (m3_v7, in the AW report) converged and jitter analysis results were acceptable, other diagnostics revealed structural and data-related issues, including a strong correlation among commercial selectivity parameters. Likelihood profiles indicated conflicts between equilibrium catch and length composition data, and the model struggled to estimate equilibrium catch reliably. Fits to length composition data were reasonable, but the model could not simultaneously fit commercial catch and survey index data well.

During the RW, several assumptions about population dynamics and configuration were clarified, and sensitivity runs were conducted to test the effects of catch uncertainty, growth parameters, and selectivity formulations. However, other sources of uncertainty, such as estimating fixed parameters (e.g., catchability) or alternative model structures could not be explored due to limited time.

The new base model (single-sex structure, F method 2, corrected survey SE) still exhibited high sensitivity to assumptions about catch uncertainty and von Bertalanffy growth parameters, likely due to the absence of age composition data. Sensitivity runs (STX_RW_1 and STX_RW_2, Appendix 4) produced divergent stock status outcomes (overfished to not overfished) further complicating interpretation.

St. Thomas/St. John Yellowtail Snapper

The diagnostics of the base model (m3_ v19, in the AW report) were properly applied in the Assessment report but revealed both structural and data conflicts. Although the model converges, the jitter test revealed instability, as it did not consistently converge to the same maximum likelihood estimate (MLE), suggesting potential model misspecification or conflicting data sources. The likelihood profile for equilibrium catch also showed signs of instability, indicating a conflict between equilibrium catch estimates and the length composition and index datasets. Additionally, the retrospective analysis revealed poor patterns, further pointing to structural or data-related issues.

The new base models remained highly sensitive and were unable to fit catch and survey data simultaneously. Runs STTJ_RW_1 (SE = 0.3) and STTJ_RW_2 (catch SE = 2 with estimated growth) exhibited strong correlations among commercial selectivity parameters, raising concerns about parameter identifiability. Fmsy showed poor convergence, suggesting insufficient contrast in the data to reliably estimate fishing mortality. Conflicts were evident between the two fishery-independent surveys and between commercial catch and length composition data, indicating uncertainty in population trends, suggesting deep conflicts between key datasets, possibly due to inconsistent trends or differences in spatial/temporal coverage. A sensitivity run (STTJ_RW_3) tested a 12+ plus group to improve selectivity estimation, but no improvement was observed. By the close of the meeting, the suitability of alternative configurations remained unresolved.

Puerto Rico Yellowtail Snapper

Although this model has a longer time-series (1983-2022), the complete set of diagnostics for the initial base model (m3_v31 in the AW report), suggests either a misspecified model configuration or issues with data quality. While the model achieved convergence, the jitter analysis indicated instability, the likelihood profiles revealed instability in total and equilibrium catch estimates, and the retrospective analysis showed inconsistent terminal year estimates.

Four sensitivity runs were conducted for this species (PR_RW_1, PR_RW_2, PR_RW_3, PR_RW_4), but model outputs were highly sensitive to key assumptions. Strong correlations among growth parameters suggested that growth could not be estimated reliably, likely due to the absence of age data. Additionally, conflicts between catch data, length compositions, and survey indices indicated uncertainty in population trends, possibly stemming from differences in spatial or temporal coverage among datasets or inconsistencies in data quality. Although this model benefits from a longer time series and includes a survey index dating back to 2001, only data from 2014 onward were used in the assessment without clear justification. A key recommendation was to reintroduce the historical time series as a separate survey to account for its different coverage; however, the corresponding sensitivity run (PR_RW_3) failed to converge. I recommend further investigation of this model.

Combined St. Thomas/St. John/Puerto Rico Yellowtail Snapper

During the meeting, it was recognized that the St. Thomas/St. John and Puerto Rico stocks likely belong to the same population, as they share the same platform. Although no connectivity analyses were presented, the RP recommended initiating genetic and tagging studies. A key recommendation during the RW was to explore a combined St. Thomas/St. John/Puerto Rico model for Yellowtail Snapper. Data were available, and the model was developed during the meeting. The first combined run (PR_STTJ_RW_1) did not converge, but a second attempt (PR_STTJ_RW_2, with fixed selectivity and steepness) successfully converged. While the model was not stable, I agree with the RP that it warrants further investigation.

I agree with the RP that while appropriate diagnostics and sensitivity runs were conducted, the combination of model instability and interacting uncertainties made it difficult to confidently attribute outcomes to specific sources. This makes it difficult to reach clear conclusions due to the various sources of uncertainty. All models were found to be highly sensitive and not found appropriate to use as a basis for advice, making it difficult to isolate and clearly identify the most influential sources of uncertainty.

5. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments.

The RP supports, and I agree with, the research recommendations outlined in the DW and AW reports for the U.S. Caribbean Stoplight Parrotfish and Yellowtail Snapper assessment processes, and with all provided by the RP in the SEDAR summary report. Among the recommendations the RP provided, I believe some should be prioritized. First, connectivity should be investigated through tagging, genetic studies, otolith microchemistry or modeling to investigate the stock structure. For Stoplight Parrotfish and St. Thomas/St. John Yellowtail Snapper, it is strongly recommended to extend the catch time series by applying proportions to split the catches prior to 2012, when reporting began by species and gear. Improvements in data collection and sampling design are also recommended, along with studies of environmental drivers that could influence uncertainty in index estimates and recruitment deviations.

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

I agree with the recommendations provided by the RP. All recommendations listed under TOR 5 will improve the model, particularly through enhanced data collection and sampling design to investigate stock connectivity, recruitment dynamics, and their implications for informing steepness. Understanding stock connectivity will help ensure that modelled stock units match the biological population structure, reducing bias in parameter estimates and improving the reliability of management advice. It is also recommended to explore alternative modeling approaches (e.g., data-limited methods) for these stocks, given the limited data available and the associated uncertainties. If the plan is to continue developing SS3 models, I strongly recommend converting the length distributions from certain years into ages, as this would assist the model in estimating growth. The conditional age-at-length approach in SS3 allows the incorporation of both length and age data when available. I also support the recommendation to improve survey index estimates by adopting model-based approaches with spatial modeling, as these methods can account for uneven survey coverage and habitat-related variability, producing more representative and precise abundance indices. Finally, I fully support continued exploration of the combined St. Thomas/St. John/Puerto Rico model for Yellowtail Snapper, as these stocks may belong to the same biological population, and a joint model would reduce uncertainty by integrating all available data and avoiding potential biases from splitting a single stock into separate assessments.

7. Provide recommendations on possible ways to improve the SEDAR process.

The RP concluded that many decisions made during the DW were not appropriate, and these decisions are closely tied to model configuration. Furthermore, much of the work completed during the RW (base model modifications, development of a combined St. Thomas/St. John/Puerto Rico model for Yellowtail Snapper, and most of the sensitivity runs) could have been addressed during the AW if an expert had been present. This would have expedited the RW process and allowed more time to clarify other model configurations that remained unresolved after the meeting. Therefore, it is recommended that experts, or at least one RP member, participate in the DW or AW meetings.

8. Prepare a Peer Review Summary summarizing the Panel's overall conclusions and recommendations.

The report written by the review panel completes the task in ToR 8.

Conclusions:

Based on the material and information reviewed, I found that the Assessment Team properly implemented Stock Synthesis for the three stocks. However, despite substantial effort in modifying configurations and running several sensitivity analyses, the Analyst Team was unable to produce a robust base model due to limited data, model instability, and high sensitivity to key assumptions. As a result, I agree with the RP that none of the models were considered suitable for providing scientific advice or supporting management decisions. I also support all research recommendations provided by the DW, AW and summary reports.

Appendix 1: Bibliography of materials provided for review

Document #	Title	Authors	Date Submitted
Documents Prepared for the Data Workshop			
SEDAR84-DW-01	Radiocarbon Age Validation for Caribbean Parrotfishes	Jesus Rivera Hernández and Virginia Shervette	9 January 2024 Updated: 5 March 2024
SEDAR84-DW-02	SEDAR 84 Commercial fishery landings of Yellowtail Snapper (*Ocyurus chrysurus*) in St. Thomas and St. John, US Caribbean, 2012-2022	Stephanie Martínez Rivera, Kimberley Johnson, and M. Refik Orhun	18 January 2024 Updated: 21 February 2024
SEDAR84-DW-03	SEDAR 84 Commercial fishery landings of Stoplight Parrotfish (*Sparisoma viride*) in St. Croix, US Caribbean, 2012-2022	Stephanie Martínez Rivera, Kim Johnson, and M. Refik Orhun	18 January 2024 Updated: 21 February 2024
SEDAR84-DW-04	Analysis of SEAMAP-C hook and line survey data for yellowtail snapper in Puerto Rico (1992-2020)	Walter Ingram, Refik Orhun, and Carlos M. Zayas Santiago	19 January 2024
SEDAR84-DW-05	Summary of Management Actions for Stoplight Parrotfish (*Sparisoma viride*) from St. Croix (1985 - 2021) as Documented within the Management History Database	G. Malone	22 January 2024 Updated: 21 February 2024
SEDAR84-DW-06	Summary of Management Actions for Yellowtail Snapper (*Ocyurus chrysurus*) from Puerto Rico and St. Thomas/St. John (1985 - 2021) as Documented within the Management History Database	G. Malone	22 January 2024 Updated: 21 February 2024
SEDAR84-DW-07	Addressing Critical Life History Gaps for U.S. Caribbean Yellowtail Snapper: Bomb radiocarbon of age estimation method and a summary of the regional demographic patterns for size, age, and growth	Virginia Shervette, Jesus Rivera Hernandez, Sarah Zajovits	22 January 2024 Updated: 15 February 2024
SEDAR84-DW-08	U.S. Caribbean Yellowtail Snapper Population Demographics, Growth, and Reproductive Biology: Addressing Critical Life History Gaps	Virginia Shervette, Jesus Rivera Hernandez, Noemi Pena Alvarado	18 February 2024

SEDAR84-DW-09	SEDAR 84 Trip Interview Program (TIP) Size Composition Analysis of Yellowtail Snapper (*Ocyurus chrysurus*) in Puerto Rico, U.S. Caribbean, 1983-2022	**Katherine Godwin, Adyan Rios, Kyle Dettloff**	21 February 2024
SEDAR84-DW-10	SEDAR 84 Trip Interview Program (TIP) Size Composition Analysis of Yellowtail Snapper (*Ocyurus chrysurus*) in St. Thomas/St. John, U.S. Caribbean, 1983-2022	Katherine Godwin, Adyan Rios, Kyle Dettloff	21 February 2024
SEDAR84-DW-11	SEDAR 84 Trip Interview Program (TIP) Size Composition Analysis of Stoplight Parrotfish (*Sparisoma viride*) in St. Croix, U.S. Caribbean, 1983-2022	Katherine Godwin, Adyan Rios, Kyle Dettloff	21 February 2024
SEDAR84-DW-12	SEDAR 84 Commercial fishery landings of Yellowtail Snapper (Ocyurus chrysurus) in Puerto Rico, US Caribbean, 2012-2022	Stephanie Martínez Rivera, Kimberley Johnson, and M. Refik Orhun	21 February 2024
SEDAR84-DW-13	Length-Frequency Snapshot of Yellowtail Snapper from Image Analysis in Puerto Rico	Derek Soto, Alejandro Carrera Montalvo, Todd Gedamke	22 February 2024
SEDAR84-DW-14	Fishery-Independent Reef Fish Visual Survey Population Density and Length Composition for Stoplight Parrotfish in the St. Croix	Laura Jay W. Grove, Jeremiah Blondeau, and Jerald S. Ault	16 February 2024
SEDAR84-DW-15	Fishery-Independent Reef Fish Visual Survey Population Density and Length Composition for Yellowtail Snapper in the Puerto Rico	Laura Jay W. Grove, Jeremiah Blondeau, and Jerald S. Ault	16 February 2024
SEDAR84-DW-16	Fishery-Independent Reef Fish Visual Survey Population Density and Length Composition for Yellowtail Snapper in St. Thomas/John	Laura Jay W. Grove, Jeremiah Blondeau, and Jerald S. Ault	16 February 2024
Documents Prepared for the Assessment Process			
SEDAR84-AP-01	Report on the status of U.S. Caribbean stoplight parrotfish *Sparisoma viride* age, growth, and reproductive biology for the SEDAR84 Stock Assessment	Jesús M. Rivera Hernández and Virginia Shervette	6 July 2024
SEDAR84-AP-02			
SEDAR84-AP-03			

SEDAR84-AP-04			
Documents Prepared for the Review Workshop			
SEDAR84-RW-01			
Final Stock Assessment Reports			
SEDAR84-SAR1	US Caribbean Yellowtail Snapper – Puerto Rico	SEDAR 84 Panels	
SEDAR84-SAR2	US Caribbean Yellowtail Snapper – St. Thomas & St. John	SEDAR 84 Panels	
SEDAR84-SAR3	US Caribbean Stoplight Parrotfish – St. Croix	SEDAR 84 Panels	
Reference Documents			
SEDAR84-RD01	Selectividad Pesquera del Buche (Seno) en Chinchorros de Playa con mallas de 2.5, 2.0 y 1.0 pulgadas, a lo largo de la costa Oeste y Noreste de la Isla de Puerto Rico	Edgardo Ojeda Serrano, Omayra Hernandez Vak, and Samuel Garcia Vazquez	
SEDAR84-RD02	Monitoring of Mesophotic Habitats and Associated Benthic and Fish/Shellfish Communities from Abrir la Sierra, Bajo de Sico, Tourmaline, Isla Desecheo, El Seco and Boya 4, 2018-20 Survey	Jorge R. Garcia-Sais, Stacey Williams, Evan Tuohy, Jorge Sabater-Clavell and Milton Carlo	
SEDAR84-RD03	Population Size, Growth, Mortality and Movement Patterns of Yellowtail Snapper (*Ocyurus chrysurus*) in the U.S. Virgin Islands Determined Through a Multi-institutional Collaboration	St. Thomas Fishermen's Association	
SEDAR84-RD04	S8-DW-09: An Update on the Reported Landings, Expansion Factors and Expanded Landings for the Commercial Fisheries of the United States Virgin Islands (with Emphasis on Spiny Lobster and the Snapper Complex)	Mónica Valle-Esquivel and Guillermo Díaz	
SEDAR84-RD05	SEDAR68-DW-13: Marine Recreational Information Program Metadata for the Atlantic, Gulf of Mexico, and Caribbean regions	Vivian M. Matter and Matthew A. Nuttall	

SEDAR84-RD06	Nearshore habitats as nursery grounds for recreationally important fishes, St. Croix, U S. Virgin Islands	Ivan Mateo
SEDAR84-RD07	Seasonal Patterns of Juvenile Fish Abundance in Seagrass Meadows in Teague Bay Bank Barrier Reef Lagoon, St. Croix, U.S. Virgin Islands	Ivan Mateo and William J. Tobias
SEDAR84-RD08	The Distribution of Herbivorous Coral Reef Fishes within Fore-reef Habitats: the Role of Depth, Light and Rugosity	Michael Nemeth and Richard Appeldoorn
SEDAR84-RD09	The Use of Vertical Distribution Data in the Identification of Potential Spawning Sites and Dispersal Pathways for Parrotfish (Genera *Sparisoma* and *Scarus*) within Territorial Waters of the U.S. Virgin Islands	Kristen A. Ewen
SEDAR84-RD10	Evaluating the impact of invasive seagrass *Halophila stipulacea* on settlement, survival, and condition factor of juvenile yellowtail snapper, *Ocyurus chrysurus*, in St. Thomas, USVI	Sophia Victoria Costa
SEDAR84-RD11	The Commercial Yellowtail Snapper Fishery off Puerto Rico, 1983-2003	Nancie J. Cummings
SEDAR84-RD12	S8-DW-08: The commercial reef fish fishery in Puerto Rico with emphasis on yellowtail snapper, *Ocyurus chrysurus*: landings and catch per unit of effort from 1983 through 2003	Nancie J. Cummings and Daniel Matos-Caraballo
SEDAR84-RD13	The Net Buyback and Ban in St. Croix, U.S. Virgin Islands	Juan J. Agar, Flavia Tonioli, Chloe Fleming
SEDAR84-RD14	Best practices for defining spatial boundaries and spatial structure in stock assessment	Steven X. Cadrin[a], Daniel R. Goethel[b], Aaron Berger[c], Ernesto Jardim[d]
SEDAR84-RD15	Good practices, trade-offs, and precautions for model diagnostics in integrated stock assessments	Maia S. Kapur [a,*], Nicholas Ducharme-Barthe [b], Megumi Oshima [b], Felipe Carvalho [b]

Appendix 2: Statement of Work

Performance Work Statement (PWS)

National Oceanic and Atmospheric Administration (NOAA)
NOAA Fisheries
Center for Independent Experts (CIE) Program
External Independent Peer Review

SEDAR 84 US Caribbean Yellowtail Snapper and Stoplight Parrotfish
July 15-18, 2025

Background

The 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, and that peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards[1].

Scope

The **SouthEast Data, Assessment, and Review (SEDAR)** is the cooperative process by which stock assessment projects are conducted in NMFS' Southeast Region. SEDAR was initiated to improve planning and coordination of stock assessment activities and to improve the quality and reliability of assessments.

SEDAR 84 will be a compilation of data, an assessment of the stock, and CIE assessment review conducted for U.S. Caribbean yellowtail snapper and stoplight parrotfish. 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. The review panel is ultimately responsible for ensuring that the best possible assessment is provided through the SEDAR process. The stock assessed through SEDAR 84 is within the jurisdiction of the Caribbean Fisheries Management Council and the Commonwealth of Puerto Rico and the Territory of the U.S. Virgin Islands.

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

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

NMFS requires three reviewers to conduct an impartial and independent peer review in accordance with the Performance Work Statement (PWS), OMB guidelines, and the ToRs below. The reviewers shall have expertise in data limited assessment methods and a working knowledge of Stock Synthesis as applied to model data limited species. Additionally, reviewers should have familiarity with U.S. fishery management requirements (e.g., Magnuson Stevens Fishery Conservation and Management Act and National Standard Guidelines).

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.

Each reviewer will write an individual review report in accordance with the PWS, OMB Guidelines, and the TORs below. Modifications to the PWS and TORs cannot be made during the peer review, and any PWS or TORs modifications prior to the peer review shall be approved by the Contracting Officer's Representative (COR) and the CIE contractor. All TORs must be addressed in each reviewer's report.

Tasks for Reviewers

1) Pre-review Background Documents: Review the following background materials and reports prior to the review:
   Working papers, reference documents, and the Data Workshop and Assessment Process Reports will be available on the SEDAR website: https://sedarweb.org/assessments/sedar-84-caribbean-yellowtail-snapper-and-stoplight-parrotfish/
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 ToRs, 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 NMFS 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 Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days in advance. For additional information, please see the following

link: https://www.commerce.gov/osy/programs/foreign-access-management. The contractor is required to use all appropriate methods to safeguard Personally Identifiable Information (PII).

Place of Performance
The place of performance shall be in Fort Lauderdale, FL.

Period of Performance
The period of performance shall be from the time of award through ~~**April**~~ August 2025. Each 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.

Schedule	**Milestones and Deliverables**
Within 2 weeks of award	Contractor selects and confirms reviewers
Approximately 2 weeks prior to the review	Contractor provides the pre-review documents to the reviewers
July 15-18, 2025	Panel review meeting
Approximately 2 weeks later	Contractor receives draft reports
Within 3 weeks of receiving draft reports	Contractor submits final reports to the Government

* The Peer Review Summary Report will not be submitted to, reviewed, or approved by the Contractor.

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 (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Confidentiality and Data Privacy
This contract may require that services contractors have access to Privacy Information. Services contractors are responsible for maintaining the confidentiality of all subjects and materials and may be required to sign and adhere to a Non-disclosure Agreement (NDA).

Travel
All travel expenses shall be reimbursable in accordance with Federal Travel Regulations (Travel resources | GSA), and all contractor travel must be approved by the COR prior to the actual travel. Any travel conducted prior to

the receipt of proper written authorization from the COR will be done at the Contractor's own risk and expense. International travel is authorized for this contract. Travel is not to exceed $12,000.00.

Project Contacts

Shannon Cass-Calay – NMFS Project Contact
Sustainable Fisheries Director, Southeast Fisheries Science Center
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Annex 1: Peer Review Report Requirements

1. The independent Peer Reviewer report shall be prefaced with an Executive Summary providing a concise summary of whether they accept or reject the work that they reviewed, with an explanation of their decision (strengths, weaknesses of the analyses, etc.).

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 TORs.

   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 that they believe might require further clarification.

   d. Reviewers shall provide a critique of the agency 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: SEDAR 84 U.S. Caribbean Yellowtail Snapper and Stoplight Parrotfish Review Workshop Terms of Reference

December 2022

Review Workshop Terms of Reference

1. Evaluate the data used in the assessment, addressing the following:
    a. Are data decisions made by the DW and AW sound and robust?
    b. Are data uncertainties acknowledged, reported, and within normal or expected levels?
    c. Are data applied properly within the assessment model?
    d. Are input data series reliable and sufficient to support the assessment approach and findings?
2. Evaluate the methods used to assess the stock, taking into account the available data.
    a. Are methods scientifically sound and robust?
    b. Are assessment models configured properly and used consistent with standard practices?
    c. Are the methods appropriate given the available data?
3. Evaluate the assessment findings with respect to the following:
    a. Can the results be used to inform management in the U.S. Caribbean (i.e., develop annual catch recommendations)?
    b. Is it likely the stock is overfished? What information helps you reach this conclusion?
    c. Is it likely the stock is undergoing overfishing? What information helps you reach this conclusion?
4. 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. Ensure that the implications of uncertainty in technical conclusions are clearly stated.
5. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments.
6. Provide guidance on key improvements in data or modeling approaches that should be considered when scheduling the next assessment.
7. Provide recommendations on possible ways to improve the SEDAR process.
8. Prepare a Peer Review Summary summarizing the Panel's overall conclusions and recommendations.

Annex 3: Agenda - SEDAR 84 US Caribbean Yellowtail Snapper and Stoplight Parrotfish Assessment Review

July 15 – 18, 2025

Fort Lauderdale, Florida

Tuesday

8:30 am – 9:00 am	**Introductions and Opening Remarks** *- Agenda Review, TOR, Task Assignments*	**Coordinator**
9:00 am – 12:00 pm	**Assessment Presentations** **-** *Background* **-** *Assessment Data & Methods*	**Analytic Team**
12:00 pm – 1:30 pm	**Lunch Break**	
1:30 pm – 5:30 pm	**Assessment Presentations (continued)** **-** *Assessment Data & Methods* *- Identify additional analyses, sensitivities, corrections*	**Analytic Team**
5:30 pm – 6:00 pm	**Public Comment**	**Chair**

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

Wednesday

8:30 a.m. – 11:30 pm	**Assessment Presentations (continued)** **-** *Assessment Methods* *- Identify additional analyses, sensitivities, corrections*	**Analytic Team**
11:30 a.m. – 1:00 pm	**Lunch Break**	
1:00 pm – 5:30 pm	**Panel Discussion** *- Review additional analyses, sensitivities* *- Recommendations and comments*	**Chair**
5:30 pm - 6:00 pm	**Public Comment**	**Chair**

Wednesday Goals: Presentations completed, additional sensitivities identified, preferred models selected, Summary report drafts begun.

Thursday

8:30 a.m. – 11:30 pm	**Panel Discussion** *- Review additional analyses, sensitivities* *- Recommendations and comments*	**Chair**
11:30 a.m. – 1:00 pm	**Lunch Break**	
1:00 pm – 5:30 pm	**Panel Discussion** *- Final sensitivities reviewed.*	**Chair**
5:30 pm - 6:00 pm	**Public Comment**	**Chair**

Thursday Goals: Review final sensitivities, complete assessment work, and finalize discussions.

Friday

8:30 a.m. – 2:00 pm	**Panel Discussion or Work Session** *- Review Summary Reports*	**Chair**

Friday Goals: Final results available. Draft Summary Report reviewed.

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

LIST OF PARTICIPANTS

Review Panel

Adriana Nogueira Gassent ..... IEO-CSIC (Centro Oceanográfico de Vigo) / CIE Reviewer
Elizabeth Kadison ..... UVI/CFMC SSC

Ernesto Jardim ..... Independent Fisheries Consultant / CIE Reviewer
Jorge (Reni) Garcia-Sais ..... CFMC SSC

Lisa Chong ..... Michigan State University / CIE Reviewer
Vance Vicente ..... Vincent Associates / CFMC SSC

Analytic Team

Adyan Rios ..... SEFSC

Kevin McCarthy ..... SEFSC

Appointed Observers
Julian Magras ..... St. Thomas DAP

Staff
Emily Ott ..... SEDAR
Graciela Garcia-Moliner ..... CFMC Staff

Observers
Nathan Vaughan ..... SEFSC

Observers via Webinar
Anne Kersting ..... NOAA
David Behring ..... NOAA
Gerson Martinez ..... St. Croix DAP
Jesus Rivera Hernandez ..... USC
John Froeschke ..... GFMC
Katherine Godwin ..... NOAA
Kelly Klasnick ..... SAFMC
Maggie Rios ..... DPNRVI
Maria Lopez-Mercer ..... NOAA
Nelson Crespo ..... PR Industry
Nicole Greaux ..... CFMC

Rachael Silvas..... SAFMC
Rachel Banton..... NOAA
Refik Orhun ..... NOAA
Sarah Stephenson..... NOAA
Sennai Habtes..... DPNR VI
Suz Thomas..... SAFMC
Virginia Shervette USC

Appendix 4

Table A1. List of stock assessment model runs developed during the SEDAR 84 Review Workshop (RW).

Model Name	Description
STX_RW_1	single sex + F method 2 + catch standard error = 0.3 + corrected survey standard error
STX_RW_2	STW_RW_1 + catch standard error = 2 + estimated growth
STTJ_RW_1	single sex + F method 2 + catch standard = 0.3 + corrected survey standard error
STTJ_RW_2	STTJ_RW_1 + catch standard error = 2 + estimated growth
STTJ_RW_3	STTJ_RW_1 + plus group = 12+
PR_RW_1	Single sex + F method 2 + catch standard error = 0.3 + corrected survey standard error
PR_RW_2	PR_RW_1 + catch standard error = 2 + estimated growth
PR_RW_3	PR_RW_1 + La Paraguera survey + selectivity spline
PR_RW_4	PR_RW_3 + estimated growth
PR_STTJ_RW_1	PR_RW_3 + STTJ fleet and STTJ survey
PR_STTJ_RW_2	PR_STTJ_RW_1 + estimated length at maximum age + fixed selectivity + steepness = 0.8