Center for Independent Experts (CIE) Independent External Peer Review
South East United States yellowtail snapper
SEDAR 64

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For the Center For the Independent Experts
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Executive Summary

The South East Data, Assessment, and Review (SEDAR) is the cooperative process by which stock assessment projects are conducted in NMFS' Southeast Region. The review workshop SEDAR 64 assessment of South East United States yellowtail snapper was held in St. Petersburg, FL, February 24-26, 2020.

The data and modelling decisions made by the Data Workshop and the Assessment Workshop are sound and appropriate. While there are no reasons to doubt the data choices that were made, more detailed information on these choices in the assessment report would be helpful for reviewers.

Data uncertainties are acknowledged and within the expected "normal" in this region encompassing the nature of the life histories of reef fish species (e.g., protracted spawning, smearing of year-class signals), which lead to uncertainties in growth estimations and inferences on natural mortality. Yellowtail snapper is distributed across a wide geographic range from Brazil through the Caribbean and Gulf of Mexico and along the US SE Atlantic coastline. It is not clear how the concept of unit stock applies to yellowtail snapper for the assessment unit if there is little exchange from one reef to the other once individuals have settled in a given area.

Data are appropriately used in the SS main model and in the ASAP supporting model. However, there are conflicting signals between the length and age compositions data.
The assessment models are properly configured and consistent with standard practices, the methods are appropriate for the available data.

The assessment provides reliable estimates of abundance, biomass, and exploitation, consistent with input data and population biological parameters, which can be used to infer status and inform management based on proxy reference points. The stock is not overfished and overfishing is not occurring. Quantitative, management-related estimates are reliable to the extent that the stock definition is appropriate, and data from the Florida Keys and SE Florida are representative of the USA stock as a whole.

The projections methods are consistent with accepted practice and available data and appropriate for the assessment model and outputs. The projection results are informative and useful to support inferences of possible future conditions in the fisheries. Past estimates of recruitment have showed fluctuations and recruitment can be expected to continue to fluctuate more than what is predicted from the stock-recruitment relationship as used in the projections.

Uncertainties were addressed through a variety of methods including sensitivity runs, retrospective runs, parametric bootstrap runs, jackknife and MCMC. These methods are all appropriate for exploration of uncertainties related to data inputs, model assumptions, and observation error. Note that the jackknife analyses indicate the sensitivities of the results to the inclusion (or not) of specific indices.

There is a need to consistently outline reasoning behind decisions made in the assessment process, reference relevant information sources such as data workshop reports, and make those easily accessible and searchable.

It would be useful to provide presentation files (PowerPoints) in advance of workshop sessions and include file name and page number on every slide to facilitate referencing of slides in discussions.

While webinars are a cost-effective way of doing business, they do not provide the same in-depth peer review that face-to-face meetings do. There is more engagement in the process when participants are in a physical meeting.

All information on the current and previous assessment should be made available on a web site, including all relevant runs of the current assessment. The North East Fisheries Science Center has such a web site (https://www.nefsc.noaa.gov/saw/reviews_report_options.php) and it makes the review process considerably more efficient. Interested reviewers can dig through the material at their leisure.

The assessment constitutes the best available science.

Background

The National Marine Fisheries Service (NMFS) is mandated by the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage the nation's marine living resources based upon the best scientific information available (BSIA). NMFS 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. (http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf). Further information on the CIE program may be obtained from www.ciereviews.org.

Scope

The South East Data, Assessment, and Review (SEDAR) is the cooperative process by which stock assessment projects are conducted in NMFS' Southeast Region which includes the southeast Atlantic, the US Gulf of Mexico, and the US Caribbean. SEDAR was initiated to improve planning and coordination of stock assessment activities and to improve the quality and reliability of assessments.

SEDAR 64 was a compilation of data, a stock assessment and CIE assessment review conducted for the South East United States yellowtail snapper. The review workshop was held in St. Petersburg, Florida, February 24-26, 2020. It provided an independent peer review of the SEDAR 64 stock assessment. The stock assessed through SEDAR 64 is within the jurisdiction of the Gulf of Mexico and South Atlantic Fisheries Management Councils.

Review activities

I downloaded the documents when they became available around February 10, 2020 and reviewed them prior to the review meeting. In the meeting, I participated actively in the discussions, prepared initial drafts of Term of Reference 2 and 4 for the panel review report and contributed to drafting of the other ToRs in the plenary and in finalizing the report by e-mail subsequent to the meeting.

Summary of findings

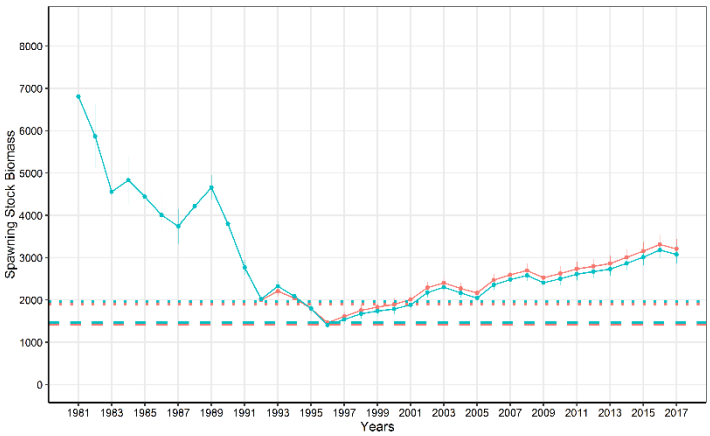
SEDAR 64 Yellowtail Snapper Assessment Review

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 sound and robust?

I agree with the conclusions of the review panel that the data and modelling decisions made by the Data Workshop and the Assessment Workshop are sound and appropriate.

In the panel report we do not comment on the robustness of these decisions. Most sensitivity runs led to the similar conclusions with respect to status (i.e., the resource is not overfished and overfishing is not occurring), except for the assumed maximum age. When an older maximum age (age 28 vs 20) is assumed, the resource remains not overfished from the early 2000s onwards, but overfishing is estimated to have occurred in most years of the assessment. This is discussed further under ToR 3. The assessment is focused on data from Florida (specifically, the Keys), where the bulk of the fishery occurs although the area of distribution of the species extends outside of the assessment area in the Gulf of Mexico, on the US Atlantic coast and in international waters where older fish are found.



Previous assessments started in 1981 while this assessment starts in 1992. This appears justified as the 1981-1991 data appear to behave differently than data from 1992 onwards. The graphs on the left show that the relatively low fishing mortality estimated in the 1980s led to substantial declines in biomass while similar higher fishing mortalities in the 1990s led to slowly increasing biomass.

While there are no reasons to doubt the data choices that were made, more detailed information on these choices in the assessment report would have been helpful for reviewers, but I understand that a choice had to be made between documenting completely every decision and keeping the report to reasonable number of pages.

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

I agree with the review panel report that data uncertainties are acknowledged and within the expected "normal" in this region, encompassing the nature of the life histories of reef fish species (e.g., protracted spawning, smearing of year-class signals), which lead to uncertainties in growth estimations and inferences on natural mortality. These uncertainties are not unique to yellowtail snapper.

Yellowtail snapper is distributed across a wide geographic range from Brazil through the Caribbean and Gulf of Mexico, and along the US SE Atlantic coastline. But little is known through the documents about large scale information. The USA stock is treated as a single, closed stock found along the entire USA Gulf of Mexico coastline, around Florida, and along the Atlantic coastline. However, the fishery is largely centered around southern and southeastern Florida. The linkage with yellowtail snapper in other areas is not clear. Spawning is believed to occur throughout the year, which may be challenging for age determination. It is not clear how the concept of a unit stock applies to yellowtail snapper for the assessment unit if there is little exchange from one reef to the other once individuals have settled in a given area.

Yellowtail snapper in USA waters are fast growing and long-lived, but with plastic life history depending on environmental conditions - growth rates and longevity are highly variable across regions, even within Florida. This plastic life history creates problems in defining appropriate parameters in stock assessment, or appropriate data to include in the modelling. Females are 50% mature at 1.7 years and 100% mature at age 4.

c) Are data applied properly within the assessment model?

I agree that the data are appropriately used in the SS main model and in the ASAP supporting model. However, there are conflicting signals between the length and age compositions data. The typical SS approach (as was used here) was to explore this through weighting likelihood components and by inclusion/rejection of individual components in sensitivity analyses. Letting the model "decide" may not be the best approach. Ultimately there needs to be a better understanding of the underlying data processes that would allow informed choices to be made by experts outside the confines of the model. ASAP may be more stable than SS3.

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

Yes, the data are sufficient to support the assessment approaches, status determinations and subsequent ACL determinations.

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

a) Are methods scientifically sound and robust?

The main method is SS3, a widely available software used worldwide. SS3 is sound, but small changes in data, parameters, or constraints can result in unexpected changes in results: the method is therefore not necessarily robust and requires skilled users. The assessment team also used ASAP, another widely used software, which was used as the main assessment tool in the previous assessment. ASAP is less sensitive to small changes in data, parameters, and constraints; it produced results broadly similar to those from SS3 for fishing mortality, biomass, and recruitment.

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

The assessment models are properly configured and consistent with standard practices. As indicated earlier, there appears to be tension between the length compositions and the age

compositions. When both are included in modelling, the model may average the results, which may not produce correctly estimated stock and fishing mortality trends. Generally speaking, if there is confidence in the stock size indices, those should be given more weight than age or length compositions. Similarly, more weight should be given to either length or age compositions, whichever is considered more reliable. Note that it may not be straightforward to determine which of the length or age compositions is more reliable. In that case, the assessment team should provide the implications of using either one or both of them.

c) Are the methods appropriate for the available data?

The methods are appropriate for the available data. SS3 is a very flexible modelling platform that can be run either with very limited data or with considerable amounts of data, as is the case here. When limited data are available, SS3 assumptions are used for parameters that are not possible to estimate given the available data.

The assessment analyses also included a simpler approach (ASAP), which is also used widely and was used historically for this stock. ASAP is less flexible but generally more stable and it can provide a basic check of the consistency of results with SS3. In the next assessment, ASAP results should be analyzed and compared more extensively with those from SS3. As ASAP does not use length composition information, this would be one way of analyzing the apparent tension in SS3 between the length and age compositions. With better understanding of these tensions, there might be a possibility of using ASAP as the main assessment in the future.

The jitter analysis produced bi-modal distributions for R0, steepness, and sigma R with the left-hand side mode suggesting constant recruitment (i.e., sigma R = 0). This suggests that the stock-recruitment parameters are not well defined. See TOR 3.

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?

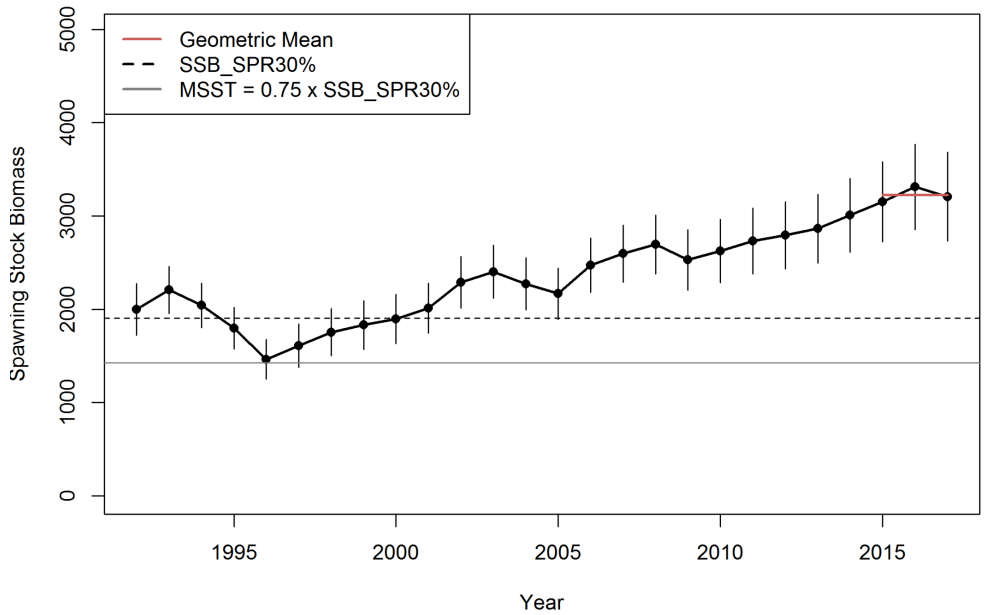
The base case stock assessment is implemented using SS3 and is tuned using standard procedures. The assessment provides reliable estimates of abundance, biomass, and exploitation, consistent with input data and population biological parameters, which can be used to infer status and inform management based on proxy reference points.

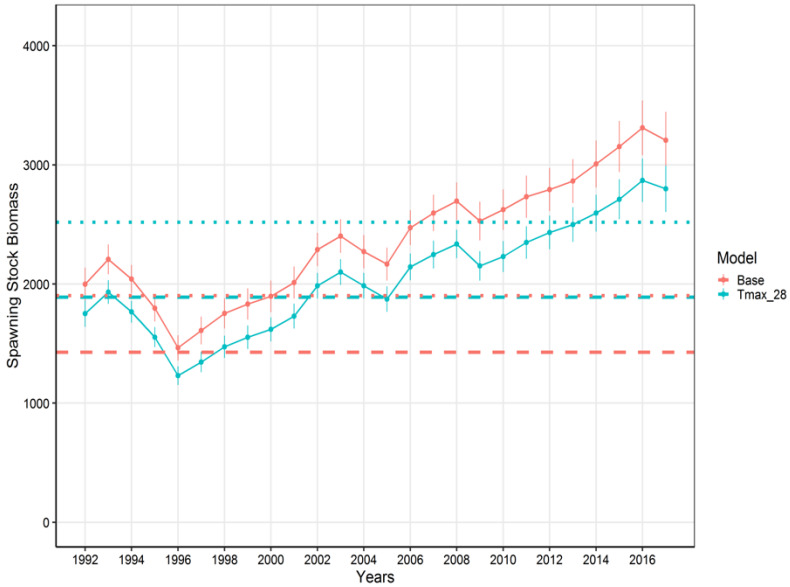
The assessment area accounts for approximately 96% of the catch of yellowtail snapper from the GoM and SE Atlantic, with the majority of the catch coming from the Florida Keys.

The base case stock assessment model includes landings and discards split by fleet (commercial, head boat, and recreational), fishery-dependent and -independent indices, and age and length compositions.

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

The stock is not overfished. The base case assessment estimates SSBF30%SPR as 1,904 mt and SSBcurrent as 3,223 mt.



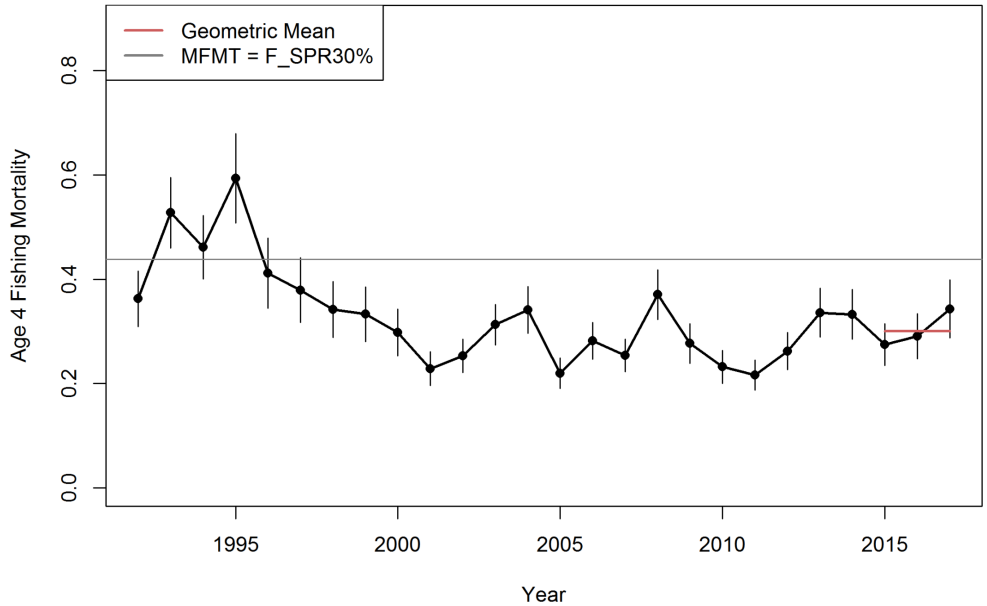


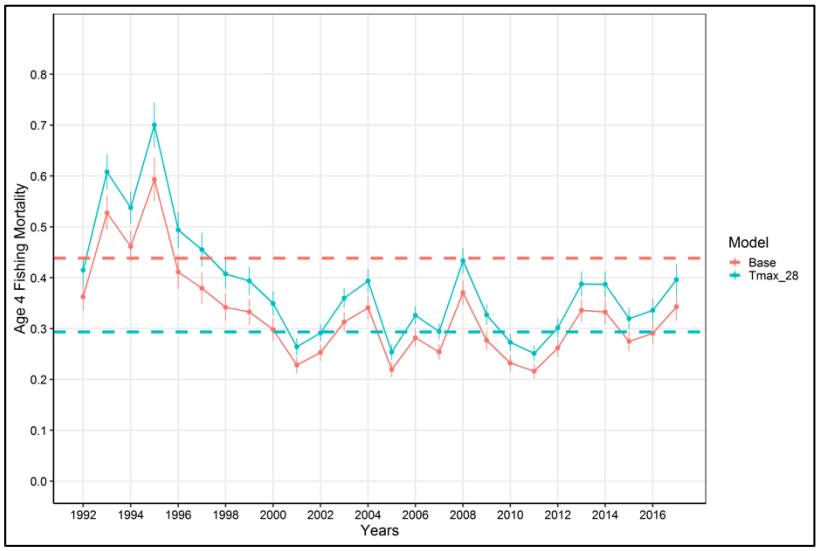
Sensitivity tests considering alternative selectivity, natural mortality, and steepness indicate the status determination (not overfished) is robust to these parameters.

However, as indicated under ToR 1, using a different maximum age (Tmax = 28) instead of age 20 suggests that the resource may have been overfished for a few years in the early 1990s, but not since the early 2000s.

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

The stock is not undergoing overfishing. The base case assessment estimates F30%SPR as 0.44 and Fcurrent as 0.30.

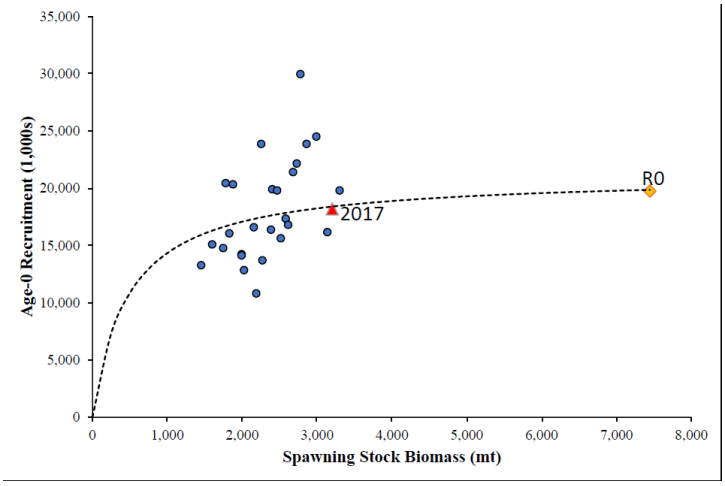




Sensitivity tests considering alternative selectivity, natural mortality, and steepness indicate the status determination (not undergoing overfishing) is robust to these parameters, but not the maximum age. Using a maximum age of 28 would imply that overfishing had been occurring in most years of the assessment.

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

A Beverton-Holt stock recruitment model was implemented within the SS3 framework and a solution (estimate) of steepness was obtained. However, the likelihood profile, the jitter analysis, the fact that the stock has not been reduced to levels where strong density dependence might occur, and the fact that steepness is confounded with natural mortality, all suggest that the stock-recruitment relationship is not informative for defining future productivity. In particular, the jitter analysis produced bi-modal distributions for R0, steepness, and sigma R with the left-hand side mode suggesting deterministic recruitment (i.e., sigma R = 0). This suggests that the stock-recruitment parameters are not well defined. Continuing to use the current 30% SPR as an MSY proxy seems appropriate.



Although the analysts chose to assume the Beverton-Holt model in the assessment, alternative recruitment approaches may be equally appropriate given the data (adjoining graph). Therefore, the determination of stock biomass, fishing mortality, and trends are expected to be robust to the S-R choice.

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?

See also ToR 5.

All indices and length/age composition data (from 1992-2017) have been used in the model with no forced weighting to give preference to a particular data set. The tuning of process and observation errors given the data presented has followed standard (Francis, 2011) approaches. Assessment sensitivity to maximum age (affecting growth function determination) and other inputs/assumptions was tested.

Resulting quantitative, management-related estimates are reliable to the extent that the stock definition is appropriate and data from the Florida Keys and SE Florida are representative of the USA stock as a whole.

There is concern, however, about the determination of a maximum age (Tmax) estimate for the stock within the assessment area and its use in the estimation of the natural mortality rate, M. The use of Tmax based on Florida data sources is justified, but only given the overall approach to the data treatment (i.e., exclusion of data from outside the assessment area, which included some older fish). There is some uncertainty in the estimate of natural mortality due to the choice of specific method of estimating M from Tmax. The method used is consistent with current practice in other assessments, but alternative methods suggest higher M values. As indicated above, assuming a different maximum age implies that the stock is not overfished, but that overfishing may have occurred over most the assessment period.

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 projection methods are included in the SS3 software; they are consistent with accepted practice and available data.

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

The projection method is entirely consistent with the assessment model and outputs and forms an integral part of the SS3 software used. Projections were done for a 5-year period from the last year in the assessment (2018 – 2022) extracting recruitment from the stock-recruitment

relationship under three fishing mortality scenarios: average fishing mortality of the last 3 years, F30%SPR, 0.75F30%SPR.

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

The projection results are informative and useful to support inferences of possible future conditions in the fisheries. Past estimates of recruitment have showed fluctuations and recruitment can be expected to continue to fluctuate more than what is predicted from the stock-recruitment relationship as used in the projections. Strong year-classes are estimated to have been produced in 2011 - 2014, but recruitment is estimated to have been about average for the 2015-2017 year-classes. This implies that spawning stock biomass is projected to decline and recruitment in the projection years, based on the stock-recruitment relationship, is also expected to decline slowly.

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

The projections are deterministic assuming constant weights at ages, selectivity, and fishing mortality. Stock recruitment parameters were assumed to be constant and recruitment for the first year of the projections was set to the average of the most recent three years in the assessment. Uncertainties are acknowledged and discussed but not explicitly taken into account in the projections other than by providing confidence intervals on projected quantities. Future stock size will depend on realized recruitment for the 2017 and subsequent year-classes whose sizes are unknown and unlikely to be equal to assumed values calculated from the stock and recruitment relationship. Alternative approaches could involve re-sampling from past recruitment estimates for a given period and repeating the process several times to have an idea of expected variability given past recruitments.

5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.

- 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.

Uncertainties were addressed through a variety of methods including sensitivity runs, retrospective runs, parametric bootstrap runs, jackknife, and MCMC. These methods are all appropriate for exploration of uncertainties related to data inputs, model assumptions, and observation error. Note that the jackknife analyses indicate the sensitivities of the results to the inclusion (or not) of specific indices.

Several sensitivity runs were completed by the analytical team but were not included in the report. In the future, including a suite of those additional runs, in addition to the runs that were already included, would be useful for the review workshop panelists. For example, runs related to weighting of the data components, selectivity, growth options, natural mortality, and stock-recruitment configuration would all have been useful. These could be included in the report or made available on a web site.

Parametric bootstrap runs are informative for looking at uncertainty related to data input components, and are thus worthwhile for exploring uncertainty. However, the runs that were provided in the workshop report needed more work to improve convergence and to decrease the

number of runs with parameters hitting bounds. Given these two problems, it is difficult to discern the uncertainty characterized by the parametric bootstrap runs.

MCMC is likely to provide minimum estimates of uncertainty for this assessment and is a good first step towards acknowledgement of uncertainty. However, MCMC does not account for uncertainties outside of the base run model framework; thus, the uncertainty estimates should be viewed as a minimum versus an indication of the true uncertainty in the stock assessment.

The work provided for this assessment only speaks to the uncertainties as set up and as compared to the base run, but doesn't address data or structural uncertainties such as stock structure and maximum age.

6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.

Webinars are a good way of saving money but not the strongest approach for peer-review.

- Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments.

More analysis and synthesizing of existing biological information pertaining to spatial stock structure and dynamics are needed. The stock occurs at the edge of the species' range and cursory analysis suggests that movement, migration, and life history plasticity are important factors in stock dynamics. Additionally, further investigation of stock structure, spawning areas, larval transport and juvenile/adult movement, using methods such as otolith microchemistry or stable isotopes, would be useful.

Age validation studies are needed to test whether growth checks are laid down consistently throughout the area of distribution and sampling (which includes tropical and temperate habitats) and reflect annual increments.

Age-length sampling among areas of the stock distribution is needed. Altered age-length sampling may require re-allocating sampling effort from the FL Keys and Southeast FL to other areas. These samples would improve growth information, representing data throughout the range of the stock. This may be informed by outcomes of the analyses suggested above.

Improve sampling of discards, particularly in the commercial and headboat sectors.

Consider options for improving fisheries independent sampling of the yellowtail snapper stock.

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

There is a need to consistently outline reasoning behind decisions made in the assessment process, reference relevant information sources such as data workshop reports, and make those easily accessible and searchable.

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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.

Appropriate: The Assessment model SS3 is an appropriate tool to provide the outputs necessary to determine catch levels.

Relevance: The SS3 assessment tool is highly relevant for analysis of the available data in this fishery.

Inclusiveness: At the review meeting, all stakeholders were invited and all participants were invited to comment.

Objectivity: The model outputs are based on the best available data inputs, and the shortcomings of these inputs are recognized and acknowledged.

Transparency: The assessment model was subjected to various adjustments and the differences in the outputs were candidly explained.

Timeliness. The data inputs and SS3 input files were supplied about two weeks before the meeting. The Assessment model outputs were supplied two days before, which is satisfactory.

Verification: The current data was analyzed in SS3 and also ASAP, the model used in the previous SEDAR 27a assessment.

Validation: The assessment outputs were compared for the chosen model, SS3, and ASAP. Although each model had its strengths, the continued use of SS3 is considered satisfactory provided ASAP continues to be used for comparison of outputs.

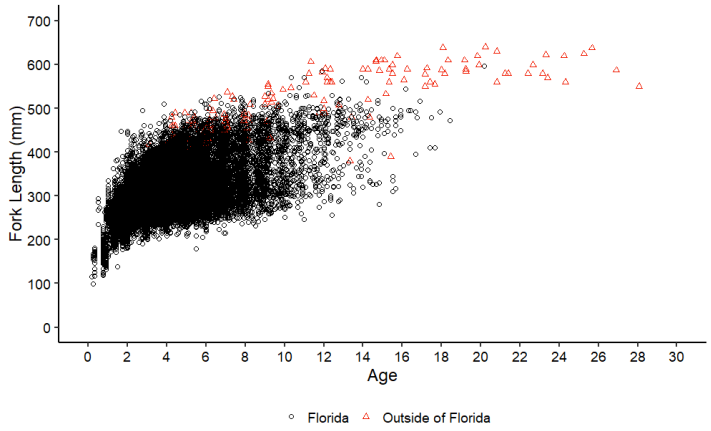
Peer Review: the data sources used were reviewed at a Data Workshop and the outputs of the assessment model were reviewed at an Assessment Workshop.

I conclude that the assessment constitutes the best available scientific information for yellowtail snapper in the Southeast United States.

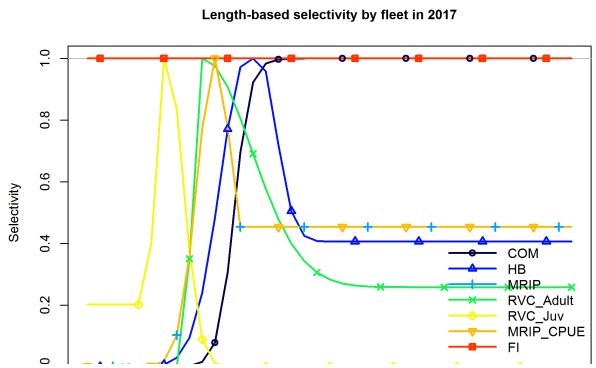
8. Provide suggestions on key improvements in data or modeling approaches that should be considered when scheduling the next assessment.

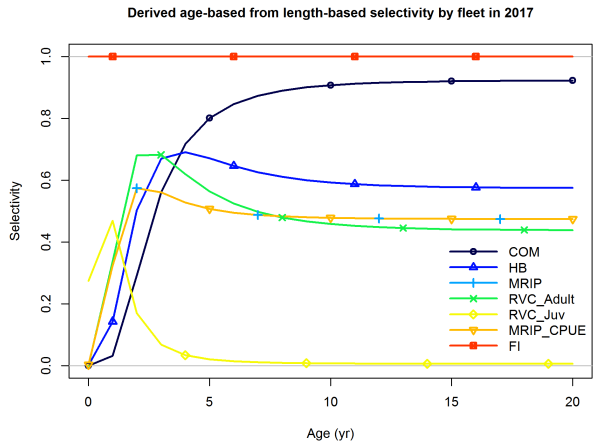
Additional information is needed on stock structure and movements within the unit of the assessment (Florida Keys and Southeast Florida) and outside of the assessment area – North of Florida (Georgia – North Carolina waters) and west of Florida (Mississippi to Texas). Otolith microchemistry (stable isotope analysis) analysis could be used to inform on the origin of the fish and their potential movements. Explore potential sources of data on spawning areas, larval distribution, and transport to justify current definition of the assessment unit.

Complete age validation of otolith-based age readings to increase confidence in the age information. As the adjoining graph of length and age shows, except for very small fish, a fish of a given length can correspond to a large number of ages (e.g., 300mm fish can be age 2 to 8). This illustrates the plasticity mentioned earlier with the differences in ages for a given length possibly related to year, year-class, area, or season in any combination. Given that spawning may occur over a protracted period and that the temperature signal related to seasons is likely less than in more northern areas, age determination by reading otoliths can be expected to be particularly challenging. This does not mean that the assessment should only use length data however, because it is growth that is expected to change because of the factors mentioned above. Often, given sufficient sampling, it is possible to follow the first 3-4 modes in length frequencies. This could provide an initial estimation of yearly changes in growth.



There is a perplexing difference between the selectivity at length and selectivity at age graphs. For the commercial fishery, fish around 32 cm appear to be fully selected while selectivity never reaches 100% by age. There are also curious differences for the other fleets, with the selectivity by age being considerably less domed than the selectivity by length. It would useful to better understand why this is happening.





Complete more detailed exploration of various data components weighting, including fitting the model separately to size and age composition data and compare the quality of fit and model outcomes. This could shed light on the tension between the age and length data.

For the likelihood profiling graph use only the results from runs that have converged. When the likelihood profile shows no change across a broad parameter space, that parameter should not be estimated [or they need a prior on it]. Make sure that the likelihood profile is evaluated with sufficient precision.

Continue using ASAP as an alternative assessment model to contrast and compare with SS3. Identify strength and weaknesses of each model performance and check for the consistency or lack thereof between two models.

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 Peer Review Summary was completed, as described in the section titled, "Review Activities". No further tasks are required.

Appendix 1: Bibliography of materials provided for review

Document #	Title	Authors	Date Submitted
Documents Prepared for the Data Workshop			
SEDAR64-DW-01	SEAMAP Reef Fish Video Survey: Relative Indices of Abundance of Yellowtail Snapper	Matthew D. Campbell, Kevin R. Rademacher, Michael Hendon, Paul Felts, Brandi Noble, Ryan Caillouet, Joseph Salisbury, and John Moser	20 Dec 2018
SEDAR64-DW-02	A model-based index of Yellowtail Snapper, *Ocyurus chrysurus*, in the Dry Tortugas using Reef Fish Visual Census data from 1999-2016	Christopher E. Swanson	1 March 2019
SEDAR64-DW-03	Juvenile Yellowtail Snapper, *Ocyurus chrysurus*, collected from short-term fisheries-independent surveys in Florida Bay and the Florida Keys from 1994 – 2003	Christopher E. Swanson, Kerry Flaherty-Walia, and Alejandro Acosta	1 March 2019
SEDAR64-DW-04	A model-based index of Yellowtail Snapper, *Ocyurus chrysurus*, for the Florida Reef Tract from Card Sound through the Florida Keys using Reef Fish Visual Census data from 1997-2016	Christopher E. Swanson and Robert G. Muller	1 March 2019
SEDAR64-DW-05	Fisheries-independent data for Yellowtail Snapper (*Ocyurus chrysurus*) from reef-fish visual surveys in the Florida Keys and Dry Tortugas, 1999-2016	Jennifer Herbig, Jeffrey Renchen, Alejandro Acosta	1 March 2019 Updated: 1 July 2019
SEDAR64-DW-06	A model-based index of Yellowtail Snapper, *Ocyurus chrysurus*, for the Northern Florida Reef Tract from Government Cut through Martin County using Reef Fish Visual Census data from 2012-2016	Christopher E. Swanson	1 March 2019 Updated: 13 June 2019
SEDAR64-DW-07	Accuracy and precision of Yellowtail Snapper (*Ocyurus chrysurus*) age determination	Jessica Carroll, Kristen Rynerson, Brittany Barbara	9 April 2019
SEDAR64-DW-08	Abundance and Distribution of Juvenile Yellowtail Snapper in Nearshore Seagrass Habitat in the Middle Florida Keys	Jennifer Herbig, Alejandro Acosta, Ariel Wile	23 May 2019 Updated: 28 June 2019
SEDAR64-DW-09	Standardized Catch Rates of Yellowtail Snapper (*Ocyurus chrysurus*) from the Marine Recreational Information Program (MRIP) in Southeast Florida and the Florida Keys, 1981-2017	Liz Herdter	28 May 2019 Updated: 28 June 2019
SEDAR64-DW-10	Overview of the Southeast Region Headboat Survey and Data Related to Yellowtail Snapper (*Ocyurus chrysurus*)	Shanae Allen, Liz Herdter, and Kelly Fitzpatrick	28 May 2019 Updated: 5 June 2019 Updated: 19 August 2019
SEDAR64-DW-11	Standardized Catch Rates of Yellowtail Snapper (*Ocyurus chrysurus*) from the U.S. Headboat Fishery in Southeast Florida and the Florida Keys, 1981-2017	Liz Herdter and Shanae Allen	28 May 2019
SEDAR64-DW-12	Recreational Survey Data for Southeast Yellowtail Snapper	Vivian M. Matter and Richard C. Jones	26 June 2019

			Updated: 15 August 2019 Updated: 28 August 2019
SEDAR64-DW-13	Historical Commercial Fishery Landings of Yellowtail Snapper in Florida and the Southeastern U.S.	Steve Brown and Chris Bradshaw	17 June 2019 Updated: 22 July 2019
SEDAR64-DW-14	Length frequency distributions for yellowtail snapper collected by TIPS in the Southeast from 1984 to 2017	Chris Bradshaw and Steve Brown	17 June 2019
SEDAR64-DW-15	Length distribution and release discard mortality for southeastern yellowtail snapper	Sarina F. Atkinson, Kevin J. McCarthy, Allison C. Shideler	21 June 2019 Updated: 18 July 2019
SEDAR64-DW-16	A Summary of Observer Data Related to the Size Distribution and Release Condition of Yellowtail Snapper from Recreational Fishery Surveys in Florida	Dominique Lazarre	24 July 2019
SEDAR64-DW-17	Social Dimensions of the Recreational Fishery for Yellowtail Snapper (*Ocyurus chrysurus*) in Florida	Steven Scyphers and Kelsi Furman	7 July 2019
SEDAR64-DW-18	Calculated discards of yellowtail snapper from commercial vertical line fishing vessels in southern Florida	Kevin McCarthy and Jose Diaz	19 Sept 2019
Documents Prepared for the Assessment Process			
SEDAR64-AP-01	Weighted Length Compositions for U.S. Yellowtail Snapper (*Ocyurus chrysurus*) from 1981-2017	Shanae D. Allen	20 December 2019
Final Stock Assessment Reports			
SEDAR64-SAR	SE US Yellowtail Snapper	S64 Panels – to be completed after the Review Workshop	
Reference Documents			
SEDAR64-RD01	Coral Reef Conservation Program (CRCP) Local Action Strategy (LAS) Project 3B "Southeast Florida Coral Reef Fishery-Independent Baseline Assessment" - 2012-2013 Interim Report	Florida Department of Environmental Protection - Coral Reef Conservation Program	
SEDAR64-RD02	Implementing the Dry Tortugas National Park Research Natural Area Science Plan - The 10-Year Report	Florida Fish and Wildlife Conservation Commission	
SEDAR64-RD03	Examining movement patterns of yellowtail snapper, *Ocyurus chrysurus*, in the Dry Tortugas, Florida	Jennifer L Herbig, Jessica A Keller, Danielle Morley, Kristen Walter, Paul Barbera, Alejandro Acosta	
SEDAR64-RD04	Yellowtail Snapper Fishery Performance Report	SAFMC Snapper Grouper Advisory Panel	
SEDAR64-RD05	Reflex impairment and physiology as predictors of delayed mortality in recreationally caught yellowtail snapper (*Ocyurus chrysurus*)	Francesca C. Forrestal, M. Danielle McDonald, Georgianna Burress and David J. Die	
SEDAR64-RD06	Preliminary Observations of Abundance and Distribution of Settlement-Stage Snappers in Shallow, Nearshore Seagrass Beds in the Middle Florida Keys	Claudine T. Bartels and Karole L. Ferguson	

SEDAR64-RD07	*Lutjanus Ambiguus* (Poey), a Natural Intergeneric Hybrid of *Ocyurus Chrysurus* (Bloch) and *Lutjanus Synagris* (Linnaeus)	William F. Loftus
SEDAR64-RD08	A Laboratory Produced Hybrid Between *Lutjanus Synagris* and *Ocyurus Chrysurus* and a Probable Hybrid Between *L. Griseus* and *0. Chrysurus* (Perciformes: Lutjanidae)	M. L. Domeier and M. E. Clarke
SEDAR64-RD09	A Survey to Characterize Harvest and Regulatory Discards in the Offshore Recreational Charter Fishery off the Atlantic Coast of Florida	Beverly Sauls and Oscar Ayala
SEDAR64-RD10	Seagrass Habitats as Nurseries for Reef-Associated Fish: Evidence from Fish Assemblages in and Adjacent to a Recently Established No-Take Marine Reserve in Dry Tortugas National Park, Florida, USA	Kerry E. Flaherty-Walia, Brett Pittinger, Theodore S. Switzer, Sean F. Keenan
SEDAR64-RD11	Fish assemblages in seagrass habitats of the Florida Keys, Florida: spatial and temporal characteristics	A. Acosta, C. Bartels, J. Colvocoresses, and M. F. D. Greenwood
SEDAR64-RD12	Model-estimated conversion factors for calibrating Coastal Household Telephone Survey (CHTS) charterboat catch and effort estimates with For Hire Survey (FHS) estimates in the Atlantic and Gulf of Mexico with application to red grouper and greater amberjack	Kyle Dettloff and Vivian Matter

Appendix 2: A copy of this Performance Work Statement

Performance Work Statement (PWS)
National Oceanic and Atmospheric Administration (NOAA)
National Marine Fisheries Service (NMFS)
Center for Independent Experts (CIE) Program
External Independent Peer Review

SEDAR 64 Yellowtail Snapper Assessment Review

Background

The National Marine Fisheries Service (NMFS) 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). NMFS 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. (http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf). Further information on the CIE program may be obtained from www.ciereviews.org.

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 64 will be a compilation of data, an assessment of the stock, and CIE assessment review conducted for S.E. U.S. yellowtail 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. The review panel is ultimately responsible for ensuring that the best possible assessment is provided through the SEDAR process. The stock assessed through SEDAR 64 is within the jurisdiction of the Gulf of Mexico and South Atlantic Fisheries Management Councils.

The specified format and contents of the individual peer review reports are found in **Annex 1**. The Terms of Reference (TORs) of the peer review are listed in **Annex 2**. Lastly, the tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements
NMFS requires three (3) 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 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.

Tasks for Reviewers
1) Two weeks before the peer review, the NMFS Project Contacts will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project 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 to the PWS scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Working papers, reference documents, and the Data Workshop and Assessment Process Reports will be available on the SEDAR website: http://sedarweb.org/sedar-64

2) Attend and participate in the panel 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 should 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 NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control

Program NAO 207-12 regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/ and http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration- system.html. The contractor is required to use all appropriate methods to safeguard Personally Identifiable Information (PII).

Place of Performance
The place of performance shall be at the contractor's facilities, and in St. Petersburg, FL.

Period of Performance
The period of performance shall be from the time of award through April 2020. 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
2 weeks prior to the panel review	Contractor provides the pre-review documents to the reviewers
February 25-27, 2020	Panel review meeting
Approximately 3 weeks later	Contractor receives draft reports
Within 2 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 $12,000.

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 the best scientific information available.

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 NMFS 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 64 Yellowtail Snapper Assessment Review

1. Evaluate the data used in the assessment, including discussion of the strengths and weaknesses of data sources and decisions, and consider the following:
   e) Are data decisions made by the DW and AW sound and robust?
   f) Are data uncertainties acknowledged, reported, and within normal or expected levels?
   g) Are data applied properly within the assessment model?
   h) Are input data series reliable and sufficient to support the assessment approach and findings?
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:
   d) Are methods scientifically sound and robust?
   e) Are assessment models configured properly and consistent with standard practices?
   f) Are the methods appropriate for the available data?
3. Evaluate the assessment findings and consider the following:
   f) 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?
   g) Is the stock overfished? What information helps you reach this conclusion?
   h) Is the stock undergoing overfishing? What information helps you reach this conclusion?
   i) Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?
   j) 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:
   e) Are the methods consistent with accepted practices and available data?
   f) Are the methods appropriate for the assessment model and outputs?
   g) Are the results informative and robust, and useful to support inferences of probable future conditions?
   h) Are key uncertainties acknowledged, discussed, and reflected in the projection results?
5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.
   - 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

6. 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
   - 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: Agenda - SEDAR 64 Yellowtail Snapper Assessment Review

February 25-27, 2020
Saint Petersburg, Florida

Tuesday:

9:00 a.m.	**Introductions and Opening Remarks**	
	Coordinator	
	- Agenda Review, TOR, Task Assignments	
9:30 a.m. – 11:30 a.m.	**Assessment Presentations**	**Analytic Team**
	- *Assessment Data & Methods*	
	- Identify additional analyses, sensitivities, corrections	
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 6:00 p.m.	**Assessment Presentations (continued)**	**Analytic Team**
	- *Assessment Data & Methods*	
	- Identify additional analyses, sensitivities, corrections	
6:00 p.m. – 6:30 p.m.	**Public comment**	**Chair**

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

Wednesday:

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

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

Thursday:

8:00 a.m. – 11:30 a.m.	**Panel Discussion**	**Chair**
	- Final sensitivities reviewed.	
	- Projections reviewed.	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 5:30 p.m.	**Panel Discussion or Work Session**	**Chair**
	- *Review Reports*	
5:30 p.m. – 6:00 p.m.	**Public comment**	**Chair**
6:00 p.m.	**ADJOURN**	

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

Appendix 3: Panel membership and list of participants

Workshop Panel

Joseph Powers (Chair) ..... GMFMC SSC
Kai Lorenzen ..... GMFMC SSC
J.-J. Maguire ..... CIE
Amy Schueller ..... SAFMC SSC
Alexei Sharov ..... SAFMC SSC
Peter Stephenson ..... CIE
Kevin Stokes ..... CIE

Analytic Team

Shanae Allen, Co-Lead Analyst ..... FWRI, St. Petersburg
Chris Swanson, Co-Lead Analyst ..... FWRI, St. Petersburg

Appointed Observers

Ed Walker ..... GMFMC AP

Attendees

Dustin Addis ..... FL FWC, St. Petersburg
Luiz Barbieri ..... FL FWC, St. Petersburg
Martha Guyas ..... FL FWC, GMFMC Rep, Tallahassee
Jessica McCawley ..... FL FWC, SAFMC Rep, Tallahassee
Bob Muller ..... FWRI, St. Petersburg
Joseph Munyanderaro ..... FWRI, St. Petersburg
Joe O'hop ..... FWRI, St. Petersburg

Staff

Julie Neer ..... SEDAR
Mike Errigo ..... SAFMC Staff
Ryan Rindone ..... GMFMC Staff
Charlotte Schiaffo ..... GMFMC Staff