SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

SCIENTIFIC AND STATISTICAL COMMITTEE

SSC Meeting Report

April 27-29, May 3, 2021

Meeting via Webinar

VERSION
FINAL With SEP Report
June 2, 2021

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1. INTRODUCTION

1.1. Documents

Agenda
Attachment 1. Minutes of the October 2020 meeting
Attachment 2. Minutes of the January 2021 meeting

1.2. Action

- *Introductions - After general introductions, the SSC was briefed on the pending resignation of Dr. Tracy Yandle. The SSC expressed great appreciation for her 10 years of service on the SEP and SSC and wished her well. The SSC looks forward to the appointment of new members to the SEP/SSC.*
- *The agenda was approved with the addition of one item under Other Business.*
- *Minutes from the October 2020 and January 2021 meetings were approved.*

2. PUBLIC COMMENT

Public comment provided in writing (available here) was read aloud by Dr. Chip Collier. Additional verbal public comment was provided. See meeting minutes.

3. SEDAR 73 RED SNAPPER ASSESSMENT REVIEW

3.1. Documents

Attachment 3. SEDAR 73 Assessment Report
Attachment 3a. SSC SEDAR 73 ABC Workgroup Report
Attachment 4. SEDAR 73 Assessment Presentation

3.2. Presentation

SEDAR 73 Assessment Overview: Dr. Kyle Shertzer, SEFSC

3.3. Overview

The Committee was asked to review the Red Snapper assessment prepared through the SEDAR 73 (Attachment 3), identify and characterize the impacts of assessment uncertainties, and provide fishing level recommendations. Red Snapper was last assessed in 2016 during SEDAR 41, where the stock was found to have been overfished and undergoing overfishing. A working group of the SSC met to provide preliminary feedback on potential pstar levels and projection scenarios that the SSC might want to consider when setting the ABC (Attachment 3a).

3.4. Public Comment

Public comment was provided. See meeting minutes.

3.6. Action

- Review assessment
  - Does the assessment address the ToRs to the SSCs satisfaction?
  - ❖ *Yes*

  - Does the assessment represent Best Scientific Information Available?
  - ❖ *Yes. This assessment approach continues to be BSIA. The SSC would like to highlight several improvements made with SEDAR 73, including (but not limited to):*
    - *Incorporation of new, alternative data sources (e.g., FWRI repetitive timed drop survey, FWRI charterboat observer data, headboat measurements, MyFishCount, and shark BLL observer program data).*
    - *An updated natural mortality vector that was scaled using lutjanids data only from Then et al.*
    - *Updated batch size for spawning females calculated as a function of body size*
    - *Splitting of the SERFS trap and video indices and application of appropriate selectivities*
    - *Incorporation of the Dirichlet multinomial*
    - *Estimation of mean recruitment with lognormal deviations*
    - *Calculation of additional measures of exploitation rate*
    - *Thorough exploration of model sensitivity to assumptions and new data sources.*

  - ❖ *The SSC would like to highlight several key strengths of SEDAR 73 with regards to its use in providing robust management advice:*
    - *Coherence of abundance index trends in recent years*
    - *Ability of the model to track year class strength despite limited data in recent years*
    - *Coherence of MCBE estimates of stock status (97.8% of runs resulted in the same stock status)*

  - Does the assessment provide an adequate basis for determining stock status and supporting fishing level recommendations?

  - ❖ *Yes, for the reasons stated above. However, the SSC agreed to table decision-making on OFL/ABC recommendations until the details of the new two-step forecasting method for ABC-setting (especially the methodology for the estimation of descending device usage) can be thoroughly reviewed and discussed at a future meeting.*

- Identify, summarize, and discuss assessment uncertainties
  - Review, summarize, and discuss the factors of this assessment that affect the reliability of estimates of stock status and fishing level recommendations.
    - Qualitatively characterize these factors in terms of their influence on assessment uncertainty and fishing level recommendations.

- List the risks and describe potential consequences of assessment uncertainties with regard to status, fishing level recommendations, and future yield predictions.

❖ *The SSC echoes statements made on page 40 of the SEDAR 73 assessment report: "The scale and age dependence of natural mortality were estimated using meta-analytical methods, as is common in SEDAR assessments. While such methods describe relationships between M and other life-history characteristics (growth, maximum age) averaged across species, they may not describe well the natural mortality of any particular species. Results of this assessment are sensitive to natural mortality." In particular, the SSC noted that stock status is sensitive to natural mortality assumptions (SEDAR 73 Table 28).*

❖ *The SSC added that natural mortality may be density-dependent and may therefore change with year class.*

❖ *The SSC noted that the proportion of mature females is estimated to be relatively high at young ages for a long-lived fish and is also high compared to red snapper in the Gulf of Mexico. Histological analysis of maturity in hundreds of age-1 female red snapper collected by SERFS in the South Atlantic indicated ~43% were mature. This points towards a true difference between regions regarding maturity and not an artefact of low sample size from the South Atlantic. The SSC noted that this life history characteristic may be plastic (i.e., a density-dependent response to previously low stock size). If so, such high productivity may not be sustained when the stock is fully rebuilt.*

❖ *The SSC noted that current recruitment is estimated to be at an all-time high, but that stock composition is still an important consideration because egg viability may be low for young fish (see research recommendation below) and environmental conditions may be influencing recruitment success. High productivity may not be sustained if the age structure is not allowed to expand further.*

❖ *Several changes were made to data sources used in this model, in particular the use of revised MRIP estimates and separation of the SERFS trap and video indices. Revised MRIP estimates likely had a significant quantitative impact on model estimates. Although sensitivity runs indicated there was little impact of alternative weighting schemes or removal of individual indices (trap and video) from the model, correlation among the separated indices should be properly accounted for in the likelihood function (see research recommendations) in future assessments.*

❖ *Magnitude of stock size and fishing mortality estimates as well as stock status characterization prior to 1990 (SEDAR 73 Figure 44) differ across assessments. However, recent stock status and trends are similar qualitatively across assessments. Differences are due to several changes described above (under improvements to the model).*

❖ *The SSC noted that fits to the catch-at-age for older fish appeared to be either over- or under-estimated, which could indicate potential model misspecification and may impact accuracy of the model.*

- ❖ *The model assumes an average discard mortality rate that is not age- or size-dependent, which may impact accuracy of overall fishing mortality estimates.*

- Review of the last assessment indicated there were significant uncertainties associated with released Red Snapper. Have the uncertainties associated with released fish changed, and if so, how have they changed and how does this affect the fishing level recommendations?
- ❖ ***TABLED** – The SSC will finalize the response to this question when we have had the opportunity to more thoroughly review discard mortality and descender device usage data and assumptions used in the model and forecasts at our next meeting.*
- Are methods of addressing uncertainty consistent with SSC expectations and the available information?
- ❖ *Yes, uncertainty was well characterized with the use of a mixed Monte Carlo/Bootstrap Ensemble (MCBE) procedure.*

- Provide fishing level recommendations
  - The last assessment indicated the stock was overfished and overfishing was occurring. How has the stock status changed since the last assessment?
  - ❖ *Stock status has not changed. The stock is still overfished and experiencing overfishing.*
  - The stock is under a rebuilding plan. Is the stock responding as expected to the rebuilding plan? If not, comment on reasons why stock rebuilding is proceeding differently than predicted.
  - ❖ *The stock may be responding to the rebuilding plan as evidenced by some of the highest recruitment and abundance in recent years. The age structure of the population is expanding, but is estimated in recent years to still be composed primarily of young fish (ages 1-4). Although total biomass and spawning stock biomass have been increasing in the last decade, rebuilding of spawning stock biomass to $SSB/SSB_{F30\%}$ has not yet occurred; therefore, the stock is not yet rebuilt.*
  - ❖ *Although total fishing mortality dropped after 2010, losses due to discarding are hindering rebuilding to this reference point. The major source of mortality is dead discards (number of live releases * discard mortality).*
  - Discuss the appropriate recruitment scenario to project future fishing level recommendations. Should fishing level recommendations and management be based on the recent high recruitment?
  - ❖ *Although the stock has demonstrated exceptionally strong year class strength in recent years, there is no guarantee that recent high recruitment will continue to occur in upcoming years. Since the mid-2000s, the stock has demonstrated 9 years of exceptional recruitment and 5 years of below average recruitment. Given the overfished/overfishing status of the stock and the fact that the stock has not yet rebuilt, the SSC recommends average recruitment be used in projections to set fishing level recommendations. However, alternative approaches were also discussed.*

- ❖ *The SSC recommends forming a working group to develop best practices for making recruitment assumptions in projections. Previously, the SSC has recommended alternatives to assuming average recruitment in projections when the assessment indicated a long-term declining trend or extended time period of recruitment below R_{MSY} (Red Grouper, Red Porgy, Black Sea Bass). The SSC would like to form a working group in order to explore this topic across species in order to determine the best path forward provided the data and science. The working group would provide a consistent decision-making process for all species considered. The SEFSC noted they have an active working group exploring projection issues; the SSC would appreciate being briefed on their progress and requests participation of members of the Center's working group in the SSC's working group.*
- ❖ *The SSC noted that the typical data we would use to monitor recruitment and look for evidence of year class strength in years following the terminal year of the model (e.g., SERFS index and age composition of the catch) were not available for 2020 due to the covid-19 pandemic.*
- ❖ *The retrospective analysis conducted for this stock indicated the recruitment estimates in two of the peels were outside of uncertainty bounds (lower than the lower bound of the MCBE uncertainty band; SEDAR 73 Figures 54), suggesting recruitment may not be estimated with the reported level of certainty.*

- Apply the ABC control rule and complete the fishing level recommendations table.
- ❖ *Final recommendations **TABLED**. However, some preliminary decisions that will contribute to the final ABC recommendation were made at the meeting as described below.*
- ❖ *Regarding which overall forecast scenarios to use when setting the OFL/ABCs*
  - *Recommend OFL projections at proxy F_{MSY} (a.k.a. $F_{30\%}$, Scenario 1)*
  - *Recommend ABCs based on $P_{rebuild}$ =67.5% (Scenario 5).*
  - *The Center may also wish to estimate ABCs based on $P_{rebuild}$= 50% (Scenario 3) in anticipation of this potential request from the Council.*
- ❖ *Regarding use of the two-step approach to forecasting*
  - *The SSC has tabled this decision until we have an opportunity to review the following information:*
    - *A presentation on the newly proposed two-step approach to forecasts with more detailed information on methods and assumptions.*
    - *A presentation on available descender device usage data (e.g., S73-WP15), and any critical information used to characterize discard mortality and uncertainty by block.*
    - *Comparison of SSB, total kills, discard mortality, and landings for Scenarios 1 and 5 with management starting in 2021 (start date requested by the Council – adjusted accordingly if Council makes alternative request)*
      - *With circle hooks +25% descender device use (block 3)*
      - *With circle hooks +75% descender device use (block 4)*

        - *With (2 step approach) and without reallocation of dead discards to retained catch*
    - *Calculate exploitation rate in terms of SSB for the base run for comparison with other new alternative exploitation rate metrics*

- Comment on any difficulties encountered in applying the Control Rule, including any required information that is not available.
- ❖ *The SSC had extensive discussion regarding whether recent high recruitment should be used (vs average recruitment) in forecasts for a stock that is undergoing rebuilding. A summary of that discussion is provided above, as well as a request to form a working group to explore this topic across species.*

- Provide advice on monitoring the stock until the next assessment
    - What indicators or metrics should be monitored as an indicator of Red Snapper rebuilding?
    - ❖ *Recruitment signal in the SERFS trap and video data*
    - ❖ *Change in age composition of catches (evidence of expanding age structure, e.g., frequency of occurrence of oldest age classes)*
    - ❖ *As suggested in Section 5.4 of the assessment report:*
        - *Continued and improved monitoring of recreational landings and discards*
        - *Increased sampling with stereo video cameras*
    - ❖ *Results of the Great Red Snapper Count in the US South Atlantic*

- Provide research recommendations and guidance on the next assessment
    - Review the included research recommendations and indicate those most likely to reduce risk and uncertainty in the next assessment.
    - ❖ *Obtain empirical estimates of natural mortality for all ages of red snapper in the US South Atlantic. The SSC recommends a special focus on fish ≤ age 7 for which there is the greatest uncertainty.*
    - ❖ *Monitor the usage of descending devices, venting, circle hooks, and depths fished over time to reduce uncertainty in discard mortality assumptions used in the assessment and projections.*
    - ❖ *Account for non-independence (autocorrelated error) of the SERFS trap and video indices in the likelihood function.*

    - Provide any additional research recommendations the SSC believes will improve future stock assessments, evaluation of uncertainty, or application of the ABC Control Rule.
    - ❖ *Conduct retrospective review of projections from the last assessment to see how well they match with the new assessment.*
    - ❖ *Explore alternative start years in future assessments. Estimates of stock age structure prior to 1980 are uncertain due to a lack of length and age composition data, which could impact estimation of fishing mortality, stock size, and reference points.*
    - ❖ *Study timing of peak spawning with potential changes in temperature due to climate change and examine impact on projections. Incorporate if found to be important.*

- ❖ *Quantify egg size and quality as well as batch size by age, especially for young females, and incorporate into the reproduction/fecundity assumptions, if found to be important.*
- ❖ *Investigate size dependence of discard mortality using descending devices (e.g., small fish may be less affected by embolism but more subject to predation).*
- ❖ *Investigate the impact of climate warming on red snapper distribution.*

- Provide guidance on the next assessment, addressing its timing and type.
- ❖ *Timing of the next assessment should align with incorporation of new data and estimates obtained from the US South Atlantic red snapper count scheduled for completion in 2023.*

4. SEDAR 66 TILEFISH ASSESSMENT REVIEW

4.1. Documents

Attachment 5. SEDAR 66 Assessment Report
Attachment 6. SEDAR 66 Assessment Presentation

4.2. Presentation

SEDAR 66 Assessment Overview: Dr. Nikolai Klibansky, SEFSC

4.3. Overview

The Committee was asked to review the Tilefish assessment prepared through SEDAR 66 and provide fishing level recommendations (Attachment 5). Tilefish was last assessed in 2016 during the SEDAR 25 Update, where the stock was found to be undergoing overfishing but was not overfished.

4.4. Public Comment

Public comment was provided. See meeting minutes.

4.6. Action

- Review assessment
  - Does the assessment address the ToRs to the SSCs satisfaction?
  - ❖ *Yes*

  - Does the assessment represent Best Scientific Information Available?
  - ❖ *Yes*

  - Does the assessment provide an adequate basis for determining stock status and supporting fishing level recommendations?
  - ❖ *Yes. This assessment approach continues to be BSIA. The SSC would like to highlight several assessment strengths and improvements made with SEDAR 66, including (but not limited to):*

- *Truncation of the commercial longline index due to concerns with changes in the definition of effort and shifts in the fishery in response to management.*
- *Incorporation of selectivity time blocks for commercial longline and commercial handline fleets.*
- *Incorporation of the Dirichlet multinomial.*
- *Natural mortality was randomly drawn from a narrower uniform distribution of 0.08 − 0.14 in the MCBE analysis.*
- *Thorough exploration of model sensitivity to model assumptions.*

- Identify, summarize, and discuss assessment uncertainties
  - Review, summarize, and discuss the factors of this assessment that affect the reliability of estimates of stock status and fishing level recommendations.
    - Qualitatively characterize these factors in terms of their influence on assessment uncertainty and fishing level recommendations.
  - List the risks and describe potential consequences of assessment uncertainties with regard to status, fishing level recommendations, and future yield predictions.
  - ❖ *A large portion of the uncertainty in this assessment is driven by uncertainty in natural mortality. Sensitivity analysis indicated that natural mortality had a large impact on stock status.*
  - ❖ *The estimated recruitment values from 2003 to 2011 were below R_{MSY}. Estimated recruitment values from that time period were accounted for in the Monte Carlo Bootstrap Ensemble (MCBE) uncertainty analysis. An additional plot that was not included in the original stock assessment report was requested from the lead analyst:*

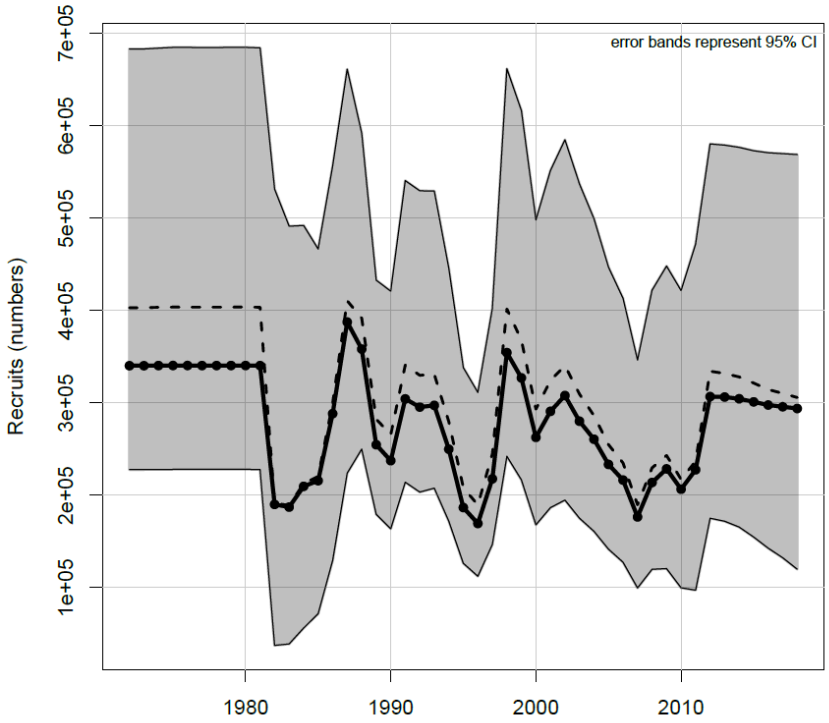


Figure 1. Estimated time series of recruitment. Shaded region represents 95% confidence bands from the MCBE runs (n = 4050). Solid line represents point estimates from the BAM base run; dashed line represent median from the MCBE runs.

As shown in Figure 1 above, the uncertainty in recruitment from 2012 to the terminal year of the model had a wide envelope, which encompassed the values estimated for 2003-2011. This MCBE uncertainty was then used in the projection analyses. Thus, the uncertainty related to future recruitments has been accounted for in both the MCBE and projection analyses, which will be used to provide management advice. The SSC would like to point out that uncertainty exists and that if the recruitment values continue to be estimated below R_{MSY}, then the sensitivity analysis that was provided regarding recruitment in Figure 33 may come to fruition.

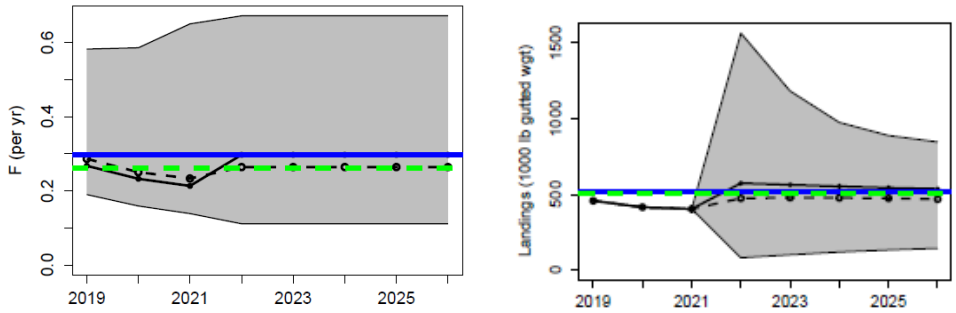
- *Truncation of the commercial longline index to 2006 leaves this assessment without a highly informative index of abundance in the latter years of the assessment when index information is needed most to inform estimation of recent recruitment. The SSC noted that management actions have unintentionally resulted in loss of information available to the assessment.*
- *The SSC expressed concern with MCBE runs having nearly as many runs in the overfished and overfishing as sustainable quadrant (Figure 27); thus, the terminal status of the stock is highly uncertain.*
- *Steepness could not be estimated reliably within the model and sensitivity analysis indicated that the values used to specify steepness as a model input had a considerable effect on stock status.*

- ❖ *Sensitivity analyses showed that increasing weight on the MARMAP/SEAMAP index affected stock status as well. However, placing a large weight on this index may not be appropriate given intermittent sampling and limited spatial coverage relative to the stock's range (sampling area focused mainly on southern SC and northern GA).*
- ❖ *In general, indices available for this assessment are patchy in spatial coverage and demonstrate high variability with little trend.*
- ❖ *The terminal year of this assessment is 2018, so uncertainty in current stock status is already higher than characterized in the assessment.*

- Are methods of addressing uncertainty consistent with SSC expectations and the available information?

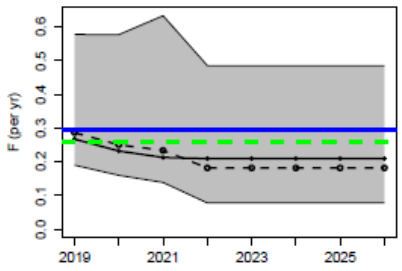
- ❖ *Yes, the methods of addressing uncertainty are consistent with SSC expectations and the available information.*
- ❖ *Standard MCBE practices were used to characterize uncertainty.*

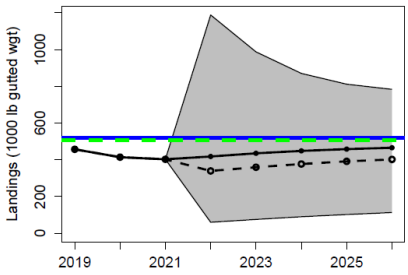
- Provide fishing level recommendations
  - ❖ *The SSC recommends an OFL based on P*= 50%*
  - ❖ *To set the ABC, the SSC recommends a total adjustment to the OFL of 17.5% resulting in a P* of 32.5% (50-17.5)*
    - *Assessment Tier – 2 (2.5% adjustment) given that steepness was specified as a model input*
    - *Uncertainty Tier – 2 (2.5% adjustment) given environmental conditions were not explicitly included*
    - *Stock Status Tier – 2 (2.5% adjustment) given that the stock is in close proximity to benchmark values*
    - *PSA Tier – 3 (10% adjustment) given that the stock has low productivity, high vulnerability, and high susceptibility*
    - *Projections should assume management starting in 2022.*
  - ❖ *Note that the resulting OFL declines over time, whereas the ABC increases. This is due to an increase in fishing mortality in the first year of management at the OFL to $F=F_{MSY}$ (relative to current management which is based on an ABC projection using $F=75\%_{FMSY}$). This increase in fishing mortality results in higher initial landings which cannot be sustained while still remaining at or below P*=50%; hence, landings decline over time.*



In contrast, the ABC is based on P=32.5 which results in a lower fishing mortality in the first year of management relative to current estimated fishing mortality. With*

this lower fishing mortality, spawning stock biomass is projected to increase over time and thus landings are allowed to increase over time as well.





- Was past management successful in reducing F or ending overfishing? Comment on potential reasons for a change in stock status, if needed.
  - ❖ *The stock is no longer experiencing overfishing, but there is a high degree of uncertainty in the stock status determination. For a stock being fished at or close to MSY, uncertainty around stock status may be expected.*
  - ❖ *The distributional assumption for natural mortality used for MCBEs and uncertainty in recruitment contributes to high uncertainty in stock status.*

- Apply the ABC control rule and complete the fishing level recommendations table.
  - The buffer between the OFL and ABC recommended by the SSC in 2016 for Tilefish was the largest buffer for an assessed species in the South Atlantic. Is the new buffer produced by the ABC Control Rule appropriate for this species and fishery?
  - ❖ *There is high uncertainty in recruitment for this assessment due to our inability to estimate recruitment in the last 7 years of the time series. This contributes to a higher buffer compared to other stocks (see Figure 1 above).*
  - ❖ *The SSC's recommended P* adjustment decreased with this assessment from 20% (2016 update assessment) to 17.5%. This was due to the stock status Tier 3 adjustment being reduced from 5% to 2.5% given overfishing was no longer occurring (but the stock may be close to benchmark values).*
  - ❖ *This assessment includes a narrower range of natural mortality in the MCBEs than previous assessments, which contributes to the smaller recommended buffer.*

- Comment on any difficulties encountered in applying the Control Rule, including any required information that is not available.
  - ❖ *No difficulties were encountered.*

- Provide advice on monitoring the stock until the next assessment
  - What indicators or metrics should be used to monitor the stock until the next assessment?
  - ❖ *Current sources of data should be regularly updated: landings, index of abundance from MARMAP/SEAMAP, length and age composition from longline, handline, and general recreational fisheries as well as MARMAP/SEAMAP. Assuming the next assessment will not be conducted in*

less than five years, the SSC recommends a midterm review of these indicators to monitor for major changes in fishery or stock trends.

- ❖ *The SSC encourages monitoring and data collection for tilefish with the new fishery independent South Atlantic Deepwater Longline Survey (SADLS).*

- Provide research recommendations and guidance on the next assessment
  - Review the included research recommendations and indicate those most likely to reduce risk and uncertainty in the next assessment.
  - ❖ *Although all of the research recommendations included in the assessment report are important for improving the assessment in the future, those highlighted below should be given the highest priority.*
  - ❖ *Research recommendations 2a and 2b in the assessment report would be important for reducing risk and uncertainty in the next assessment.*
    - *"(2a) Explore alternative distributional assumptions for natural mortality for MCBE uncertainty analysis". This would help to reduce uncertainty in the spread of the MCBE runs, which results in a wide buffer between the OFL and ABC.*
    - *"(2b) Consider incorporation of new fishery independent abundance data and/or life history data from: CRP Coop Bottom longline survey data, deepwater survey data, SCDNR vertical longline survey, SA Deepwater Longline Survey". Collectively, these could provide new abundance index data to indicate population trajectory and inform estimation of recent recruitment.*
  - ❖ *The SSC also supports research recommendation "(2d) Increase age sampling to improve composition data". Increasing available age data is a high priority for this stock.*

  - Provide any additional research recommendations the SSC believes will improve future stock assessments.
  - ❖ *The SSC recommends investigating the relationship between recruitment and environmental variability to predict/project recruitment using currently available environmental data given the lag between the terminal year of the assessment and timing for use in management.*
  - ❖ *Collect information on pre-recruit (<age7) abundance, acknowledging this information may be difficult to collect given lack of knowledge on where younger fish are located and what gear could be used to collect them. Consider the use of sonar or ROVs to assess the density of occupied burrows (e.g., Wolcott's work on ghost crabs).*
  - ❖ *Identify any current, ongoing, or recent studies regarding stock structure along the east coast of the US. If none exist, collect genetic data on golden tilefish related to the Cape Hatteras stock boundary.*
  - ❖ *Diet composition (likely using DNA information) from samples collected in the region could be useful to inform the South Atlantic EwE model (low priority).*

  - Provide guidance on the next assessment, addressing its timing and type.

- *The next operational assessment should occur in 3-5 years. The next assessment should include the pilot survey work that is currently being collected, with the thought that 3-5 years of data might provide an index of abundance.*

SSC RECOMMENDATION:

Table 1. Tilefish Recommendations

Criteria	Deterministic	Probabilistic
Overfished evaluation ($SSB/SSB_{MSY)}$	0.927	0.803
Overfishing evaluation	0.947	1.122
MFMT (F_{MSY})	0.282	0.249
SSB_{MSY} (gonad wt metric tons)	19.9	22.4
MSST (gonad wt metric tons)	14.9	16.8
MSY (1000 lbs., gutted wt)	541.6	531.6
Y at 75% F_{MSY} (1000 lbs.)	534	522.7
ABC Control Rule Adjustment	17.5	
P-Star	32.5	
M	0.1038	

OFL RECOMMENDATIONS				
Year	Landed LBS (GW, 1,000 lb)	Discard LBS	Landed Number (1,000s)	Discard Number
2022	573		70	
2023	562		69	
2024	552		68	
2025	543		67	
2026	535		66	

ABC RECOMMENDATIONS				
Year	Landed LBS (GW, 1,000 lb)	Discard LBS	Landed Number (1,000s)	Discard Number
2022	418		51	
2023	435		53	
2024	448		54	
2025	458		55	
2026	466		56	

5. COMPREHENSIVE ABC CONTROL RULE AMENDMENT

5.1. Documents

Attachment 7a. ABC CR Category 4 Stocks Workgroup Final Report

Attachment 7b. ABC CR Category 4 Stocks Workgroup Presentation
Attachment 8a. Draft Table 1 Landings Trends ABCs Unassessed Data Matrix
Attachment 8b. Draft Table 2 Data Availability and Methods Matrices Updated
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Attachment 11. ABC CR Amendment Presentation

5.2. Presentation

Category 4 Stocks Presentation: Dr. Genny Nesslage, Workgroup Chair
Carry-Over Presentation: Dr. Mike Schmidtke, SAFMC

5.3. Overview

The Council has resumed development of its comprehensive amendment to revise the Acceptable Biological Catch (ABC) Control Rule, to address flexibility for phase-ins and carry-overs as allowed by the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and to address issues raised over the last few years by the SSC with the existing rule.

At the October 2020 meeting, the SSC reviewed comments they previously provided on the proposed alternatives for revising the ABC Control Rule, determining the acceptable risk of overfishing, determining the probability of rebuilding success for overfished stocks, and allowance of phase-ins of changes to the ABC. The SSC also provided additional comments on these topics and formed a Workgroup to investigate current literature on methods for determining ABC for stocks without data to support an assessment and their effectiveness and uncertainty. Such stocks would potentially be considered as Only Reliable Catch Stocks (ORCS) (under the current Control Rule) or Category 4 stocks under the SSC's recommended alternative. Results of this literature review and recommendations for deriving ABC for applicable stocks will be presented by the Workgroup Chair.

Since the October 2020 meeting, the Council has also directed staff to combine alternatives for the ABC Control Rule with complementary risk tolerance and rebuilding alternatives. Staff will review drafted changes.

The SSC had not yet reviewed or provided updated recommendations on the amendment's alternatives concerning carry-overs of unused portions of the Annual Catch Limit (ACL) since resumption of amendment development. Guidance on use of phase-in and carry-over provisions was published by the National Marine Fisheries Service (NMFS) in July 2020 (Holland et al. 2020). Previous SSC comments supported carry-overs if applied to stocks that are neither overfished nor undergoing overfishing and have catch close to the ACL, among other factors described in the guidance document.

At this meeting, the SSC was asked to provide comments and recommendations on the ABC Control Rule as applied to ORCS and Category 4 stocks, as well as review and provide any updated recommendations on the revised (combined) ABC Control Rule alternatives and carry-overs. These recommendations will help the Council decide the range of feasible alternatives, and request analyses for the alternatives.

5.4. Public Comment

Public comment was provided. See meeting minutes.

5.6. Action

- Category 4 Stocks Workgroup
  - Review the findings of the Category 4 Stocks Workgroup.
  - ❖ *The SSC was very impressed with the workgroup and Council staff's efforts on this document and associated tables.*

  - Are these findings suitable for consideration in the Comprehensive ABC CR Amendment?
  - ❖ *Yes, the findings are suitable for addition to the Comprehensive ABC CR Amendment with the addition of a standard Statement of Work as described in the recommendation below.*

  - Recommend any needed edits or clarifications to the handling of unassessed/data-limited stocks in currently considered ABC Control Rule alternatives.
  - ❖ *Be careful to distinguish between catch and landings given the growing importance of discards in the US South Atlantic.*
  - ❖ *Identify stocks with large discard components that are either characterized with data or described in other sources of information.*
  - ❖ *Schedule regular review of data-limited literature every 3 to 5 years that would be conducted by the Workgroup and reviewed by the SSC and Council.*
  - ❖ *Develop a standard Statement of Work for the Working Group that would include the following:*
    - *Provide research recommendations on improving ABC setting or SEDAR process*
  - ❖ *Attention should be paid to the directed vs non-directed nature of each fishery for unassessed/data-limited stocks given that some data-limited approaches may not be applicable for species caught as bycatch.*
  - ❖ *Species identification is an issue for several of these stocks (e.g., black grouper and gag grouper). ABC-setting for complexes rather than individual stocks may address this issue.*

- Combined ABC Control Rule Alternatives
  - Does the SSC want to add to, revise, or remove any of the previously provided recommendations for Action 1?
  - ❖ *Define a Category 4 stock as "a stock for which there is no formal stock assessment accepted to provide OFL and ABC recommendations (reviewed through SEDAR or SSC)".*
  - ❖ *Action 1 Alternative 2:*
    - *The SSC recommends more careful separation of values used to determine scientific uncertainty vs management risk*
    - *The SSC recommends maintaining the ability to consider susceptibility scores in their portion of the control rule given scientific uncertainty is the SSC's purview. The SSC would like an opportunity to re-evaluate the process being proposed to establish the P* and would appreciate a review presentation on how Action 1 Alternative 2 would be applied to establish the P*.*

  - *The language describing risk and uncertainty in the first column (low, medium, or high overfishing risk) of Table 4 under Action 1 Alternative 2 is ambiguous and should be clarified. The SSC was unsure if the Council intends to use PSA for this or an alternative.*
- ❖ *Both assessment uncertainty and biological uncertainty need to be considered in establishing the P*.*
- ❖ *The document indicates there were plans for the SSC to review preliminary stock risk ratings at the Fall 2021 SSC meeting. The SSC requests that this be placed on the agenda for that meeting (if not before).*

- Carry-Over
  - Review previous recommendations and provide additional feedback on when carry-overs of unused ACL are allowable, also considering recent guidance from NMFS.
  - ❖ *A simpler process than what has been proposed would be to have a buffer between the ABC and the ACL. This would enable the Council to act without requiring the SSC to meet and consider a temporary ABC revision. The SSC recognizes, though, that adding or expanding a buffer may be problematic because it will increase the likelihood of exceeding the ACL.*
  - ❖ *The SSC is concerned that the proposed process will take too long to be effective. Consider that data indicating an underage in Year 1 would not be available until partway through Year 2. At that point, for a species without a buffer, the Council would have to request the SSC consider a temporary increase in the ABC. The SSC would have to then meet, review new projections provided by the SEFSC, and approve the new ABC. That new ABC would then need to be reviewed and acted upon by the Council in order to increase the ACL. At this point in the process, Year 2 may be mostly over.*
  - ❖ *Timeliness of stock assessment advice might not be adequate for this new process.*
  - ❖ *The SSC agreed with NMFS Guidance on Carry-Overs (pdf page 33).*
  - ❖ *If carry-overs are allowed in situations for which species distribution changes have occurred, this may lead to localized depletion.*
  - ❖ *Changing the ACL/ABC may increase the uncertainty in stock projections. For complexes where bycatch is an issue, this may create greater uncertainty in other species and their projections and assessments.*

  - Are there recommendations on how precision of catch estimates should be considered with respect to carry-overs?
    - Is there a threshold of imprecision beyond which carry-over should not be allowed (e.g. no carry-over for stocks with a PSE greater than X)?
  - ❖ *The Council should look to the Center for more information on how best to include the PSE into projections provided to the SSC for any carry-over request given this may vary from stock to stock due to differences among stocks with regards to productivity, generation time, stock assessment frequency, etc.*

  - How should uncertainty of catch estimates be considered in determining the allowable carry-over amount?

- *If catch PSE is high, it may be difficult to determine whether an underage has actually occurred. To be confident that an underage occurred, estimated catch should be more than two standard deviations below the ACL. To thoroughly address this question, though, a formal analysis of projection methodologies and their associated assumptions used to set ABC/ACLs would need to be conducted that involved the Center.*

  - Other considerations of catch uncertainty for carry-overs?
- *No other considerations were identified.*

6. DOLPHIN WAHOO AMENDMENT 10

6.1. Documents

Attachment 13 Summary of DW Amendment 10
Attachment 8. Geometric Mean Information Paper
Attachment 15. Summary of DW 10 and the Use of Geometric Mean Presentation

6.2. Presentation

Summary of DW 10 and the Use of Geometric Mean Presentation: John Hadley and Dr. Chip Collier, SAFMC staff

6.3. Overview

Amendment 10 includes actions that incorporate updated catch level recommendations from the SSC and revise the ACLs for dolphin and wahoo accordingly (Attachment 13). The amendment also contains actions that consider various other management changes in the fishery including revising recreational accountability measures (AMs); accommodating possession of dolphin and wahoo on vessels with trap, pot, or buoy gear onboard; removing the operator card requirement, reducing the recreational vessel limit for dolphin, reducing the recreational bag limit or implementing a recreational vessel limit for wahoo, and allowing filleting of dolphin at sea onboard for-hire vessels in the waters north of the Virginia/North Carolina border.

As part of the Council's review of recreational AMs, the Council has chosen to examine various measures that would trigger the need for an AM to go into place. Among these measures is the use of a three-year geometric mean in comparison to the ACL as one of the potential triggers. The Council has not used the geometric mean in the past to trigger AMs and will further explore this as a potential measure in Dolphin Wahoo Amendment 10 as well as potentially in other future amendments.

At this meeting, the primary request of the SSC was to comment on the Council's potential use of geometric mean as a trigger for AMs in the Dolphin Wahoo recreational fishery. To facilitate this discussion, Council staff presented a summary of a white paper covering the use and effects of geometric mean in comparison to arithmetic mean and point estimates (Attachments 14 and 15). Additionally, staff presented a general summary of all actions that the Council is considering in the amendment (Attachment 13), which the SSC was encouraged to comment on as appropriate.

6.4. Public Comment

No public comment was provided.

6.5. Action

- Comment on the use of the geometric mean as a trigger for accountability measures in the Dolphin Wahoo recreational fishery.
    - Discuss uncertainty associated with different methods to trigger accountability measures.

❖ *Smoothing of recreational data might be needed and either the arithmetic mean or geometric mean could be a beneficial tool. The SSC highlighted several properties of the geometric mean that should be considered when using it to trigger AMs:*

- *The geometric mean will always be lower than arithmetic mean, and will thus be less likely to trigger AMs, whether the point estimate is accurate or not. The arithmetic mean will always lie between the point estimate and geometric mean.*
- *The geometric mean decreases with increases in spread (i.e., how far numbers in the time series are away from the mean); therefore, the geometric mean will be reduced when there is greater variability in the time series.*
- *This approach assumes relative stationarity/stability in effort, the fish population, and the environment over 3 years and that high variability is due to random error.*
- *The arithmetic mean is typically used to find the "average" value of numbers that are added together; whereas the geometric mean is used to find the "average" value of numbers that are multiplied together. Because we would typically add catches (for example, to find cumulative catch over multiple time periods) and not multiply catches, the arithmetic mean might be more appropriate for catch.*
- *If catch is not normally distributed, the formula used to calculate the arithmetic mean of catch needs to be adjusted. Details on performing this adjustment have been provided to Council staff.*
- *In contrast, the geometric mean is typically applied to rates, such as growth, mortality, or catch-per-unit effort rates, not levels or point estimates. The geometric mean of growth rates that vary across multiple time periods yields the equivalent "average" growth rate that, if applied to all periods, would yield the same final level. For example, suppose a population increased by 80% in one year and by an additional 25% the next year; this is equivalent to increasing at an average growth rate of 50% per year for both years. The geometric mean of 1.80 and 1.25 is 1.50.*
- *Any type of mean approach (arithmetic or geometric) has the potential to be carried forward multiple years based on one anomalously high year in the data.*

❖ *The SSC suggested exploring alternatives to what was presented, including:*

- *Examining a shorter time series of recreational catches might be more appropriate. There are many factors that could contribute to changes in the estimates over time that might not be relevant to consider when determining if an AM should be triggered.*
- *Calculating the geometric mean over a longer period than 3 years. Log-normally distributed data typically need a longer time series (e.g., >10 years) to approach a normal distribution.*

o What diagnostics should be reviewed when deciding on an accountability trigger?

❖ *The SSC recommended:*
- *An alternative method that may be more appropriate than the geometric mean: characterizing the probability of observing a particular point.*
- *Conducting a post-hoc analysis of the recreational data any time the AM would have been triggered (had the point estimate been used but use of the geometric mean prevented it) to collect information on the performance of this approach and highlight stocks for which MRIP estimates might be problematic.*
- *Comparing charter boat to recreational data trends when determining if the AM should be triggered.*

o Are there stock or fishery conditions when a method for an accountability measure trigger is more appropriate?

❖ *The SSC recommended a) exploring the use of order statistics to characterize the probabilities of events such as "the third highest over ten years", and b) considering life history (e.g., PSA) of these species. For highly productive, low vulnerability stocks such as dolphin, there would be less concern with using the geometric mean to determine an AM trigger.*

- Review and comment on any other part of the amendment, as necessary.

7. SOCIOECONOMIC PANEL (SEP) REPORT

7.1. Documents

Attachment 9. 2021 SEP Report

7.2. Presentation

SEP Report Overview: Dr. Scott Crosson, SEFSC

7.3. Overview

The SSC reviewed the 2021 SEP report.

7.4. Public Comment

No public comment was provided.

7.5. Action

- ❖ *The SSC expressed appreciation for the work conducted by the SEP and had no comments.*
- ❖ *The SEP report was approved.*

8. ALLOCATIONS DECISION TREE REVIEW

8.1. Documents

Attachment 17. Allocations Decision Tree
Attachment 18. Allocation Decision Tree Presentation

8.2. Presentation

Allocations Decision Tree Overview: Dr. Mike Schmidtke, SAFMC staff

8.3. Overview

Making sector allocation decisions is a difficult and complicated process. To help the Council incorporate other sources of information, in addition to landings, when making sector allocations, the Council is exploring the use of a Decision Tree Approach to help them determine salient issues when discussing sector allocations and develop an objective and organized approach to allocations (Attachment 17). At the September 2020 meeting, the Council endorsed the concept of the Decision Tree Approach and directed staff to work on developing the approach with input from its advisors. The Council did express concerns over establishing an approach that would be overly prescriptive in nature and wanted to maintain flexibility in allocation decisions on a species-by-species basis. As such, the approach design seeks to be informative in a methodical and objective manner without being prescriptive in the exact outcome that the Council is obligated to take in deciding allocations.

8.4. Public Comment

Public comment was provided. See meeting minutes.

8.5. Action

Discuss and provide feedback on the draft Allocation Decision Tree Blueprint Document (Attachment 17), with a focus on draft decision tree questions and outcomes.

- ❖ *The SSC made the following recommendations:*
  - *Consider adding releases, as appropriate, for some species.*
  - *Consider the potential social and biological net gain of reallocation among sectors for two different species or geographic locations (see SEP report for details).*

- *Consider tournaments and festivals in development of the tree because they represent potentially significant socioeconomic and cultural dimensions not otherwise captured.*
- *Change the name to a "decision matrix" (as opposed to decision tree) given the decision-making process is not linear and there are multiple parallel aspects to consider.*
- *Consider a traffic light approach similar to that used for Spot and Atlantic Croaker by the ASMFC.*
- *Consider consulting the SSC if the use of indices is needed. Many of these data sources are informative, but should be interpreted with appropriate ancillary information and caveats.*
- *Keep in mind that the magnitude of landings can be impacted by factors other than management decisions.*
- *Order of questions does not matter.*
- *Weighting tree components is unnecessary*
- *Additional analyses will need to be conducted during development of an amendment, but this tree is designed to see if allocation is needed.*
- *In general, please keep in mind that changes in the management regime, sector allocations in particular, will change fishing mortality and selectivity for each sector, potentially changing projections used to set fishing level recommendations significantly.*

9. SOUTH ATLANTIC RESEARCH AND MONITORING PLAN REVIEW

Due to lack of time, feedback on the plan will be solicited via desk review.

10. SEDAR 71 GAG ASSESSMENT REVIEW

10.1. Documents

Attachment 19. SEDAR 71 Assessment Report
Attachment 20. SEDAR 71 Assessment Presentation

10.2. Presentation

SEDAR 71 Assessment Overview: Dr. Kevin Craig, SEFSC

10.3. Overview

The Committee was asked to review the Gag assessment prepared through SEDAR 71 (Attachment 19) and provide fishing level recommendations. Gag was last assessed during the 2014 Update to SEDAR 10, where the stock was found to be not overfished nor undergoing overfishing. However, overfishing had been occurring since 1980 and had just dipped below F_{MSY} in the terminal year. The SSB had been below MSST for the previous 5 years of the assessment but had risen above MSST in the last 2 years of the assessment.

10.4. Public Comment

Public comment was provided. See meeting minutes.

10.6. Action

- Review assessment
  - Does the assessment address the ToRs to the SSCs satisfaction?
  - ❖ *Yes*

  - Does the assessment represent Best Scientific Information Available?
  - ❖ *Yes. Stock status is robust to all sensitivities that were explored.*

  - Does the assessment provide an adequate basis for determining stock status and supporting fishing level recommendations?
  - ❖ *Yes. This assessment approach continues to be BSIA. The SSC would like to highlight several assessment strengths and improvements made with SEDAR 71, including (but not limited to):*
    - *Updated growth, natural mortality, and maturity information are improvements over SEDAR 41*
    - *Population and fishery growth curves separated*
    - *Incorporation of the SERFS video index*
    - *Incorporation of the Dirichlet multinomial*
    - *Thorough exploration of model sensitivity to model assumptions.*
- Identify, summarize, and discuss assessment uncertainties
  - Review, summarize, and discuss the factors of this assessment that affect the reliability of estimates of stock status and fishing level recommendations.
    - Qualitatively characterize these factors in terms of their influence on assessment uncertainty and fishing level recommendations.
  - ❖ *The status of the stock is robust to estimates of natural mortality and methods used to estimate natural mortality. Alternative natural mortality sensitivity runs in which steepness was re-estimated did not result in biomass/F ratios that bound the base run ratios as is typically expected.*
  - ❖ *Recruitment in the last 10 years of the assessment was low and retrospective analysis indicated recruitment may be overestimated. If this recruitment pattern continues, the stock may not be able to rebuild in 10 years. The SSC recommends an additional model run be completed which sets recruitment levels at those observed during the previous 10 years to evaluate if recovery is possible with this higher level of recruitment. See below.*
  - ❖ *A sharp drop was observed in the estimated number of discards from the private recreational and headboat sectors that may be the result of recruitment levels having been low for a longer period of time (i.e., fewer undersized fish to be released). See research recommendation below.*
  - ❖ *The SSC highlighted the fact that modelling protogynous species is very difficult. Although the assessment incorporated several aspects of gag life history well (e.g., SSB = sum of male and female mature biomass), there is the potential for sperm limitation, temporal variation in age at sexual transition,*

and time-varying maturity, etc. that may not be well characterized given the lack of appropriate data.

- List the risks and describe potential consequences of assessment uncertainties with regard to status, fishing level recommendations, and future yield predictions.

❖ *Considering sensitivity run results, assessment uncertainties are unlikely to affect the status of the stock, but could potentially play a role in fishing level recommendations and future yield predictions.*
❖ *The amount of uncertainty in recruitment is unknown. Thus, the SSC has requested projections using both the average recruitment of the last 10 years and recruitment based on the previous assessment.*
❖ *The model responded in an atypical fashion to changing natural mortality assumptions (i.e., when natural mortality was increased, the model estimated a much higher F/F_{MSY} ratio) likely due to the estimation of steepness. The SSC recommended examining recruitment estimated in sensitivity runs to see if the range of values was similar to that of the base model.*

- Are methods of addressing uncertainty consistent with SSC expectations and the available information?

❖ *Yes, the methods of addressing uncertainty are consistent with SSC expectations and the available information.*
❖ *Standard MCBE practices were used to characterize uncertainty.*

- Provide fishing level recommendations
  - The last assessment indicated the stock was close to management thresholds. Has the stock condition improved? Comment on potential reasons for a change in stock status, if needed.

❖ *No, the stock condition has worsened.*
❖ *Continued low recruitment during the last decade has contributed to poor stock condition*
❖ *Downward stock trends indicated by continued declines in indices of abundance (headboat and video indices)*
❖ *Discard mortality has peaked in the past twenty years*

- Discuss the appropriate recruitment scenario to project future fishing level recommendations. Should fishing level recommendations and management be based on the recent low recruitment?

❖ *Yes, consistent low recruitment estimates have been observed for the last 10 consecutive years. This period of low recruitment is the lowest in the time series and there is no indication that high recruitment pulses have occurred.*
❖ *As mentioned above, the SSC requests formation of a working group to explore this topic across species, including gag grouper.*

- Apply the ABC control rule and complete the fishing level recommendations table.

- ❖ *The SSC recommends an OFL based on $F=F_{MSY}$.*
- ❖ *To set the ABC, the SSC recommends a total adjustment to the OFL of 20% resulting in a P* of 30% (50-20) and recommended $P_{Rebuild}$ of 70% (50+20).*
  - *Assessment Tier – 1 (0% adjustment) given that MSY was estimated*
  - *Uncertainty Tier – 2 (2.5% adjustment) given that environmental conditions were not explicitly included*
  - *Stock Status Tier – 4 (7.5% adjustment) given that stock is overfished and overfishing is occurring*
  - *PSA Tier – 3 (10% adjustment) given that the stock has low productivity, high vulnerability, and high susceptibility (see MRAG and SEDAR 10 Update)*
- ❖ *Projections should assume management starting in 2023.*
- ❖ *Alternate rebuilding projections should consider both average recruitment from the stock recruitment relationship and a low recruitment scenario assuming a fixed recent 10-year average spanning 2010 to 2019 projected out 10 years.*

  - Comment on any difficulties encountered in applying the Control Rule, including any required information that is not available.

- ❖ *The SSC discussed overall uncertainty in recruitment, both natural variability and the apparent recent time period of low recruitment. As mentioned above in the red snapper section of this report, the SSC recommends a working group be formed to developed best practices for making recruitment assumptions in projections.*

- Provide advice on monitoring the stock until the next assessment
  - What indicators or metrics should be used to monitor the stock until the next assessment?
  - ❖ *Current sources of data should be updated regularly (landings, discards, indices of abundance from SERFS video and headboat, length and age composition) and examined for evidence of good recruitment.*
  - ❖ *Discard mortality and the use of descending devices should be monitored.*

- Provide research recommendations and guidance on the next assessment
  - Review the included research recommendations and indicate those most likely to reduce risk and uncertainty in the next assessment.
  - ❖ *As indicated in the report, "This assessment highlighted the need for continued and increased age sampling."*
  - ❖ *Monitoring recruitment through non-traditional datasets such as bridge net surveys and channel net sampling*
  - ❖ *As indicated in the report, "The utility of the SERFS video index for future assessment could be improved if length information of observed fish were available to inform the selectivity of the index."*
  - ❖ *"Better characterize the reproductive dynamics of gag including sex ratio [age at sexual transition], maturity schedule, batch fecundity, spawning seasonality and spawning frequency, as well as the potential for sperm limitation" and incorporate, if possible, into future assessments.*

- Provide any additional research recommendations the SSC believes will improve future stock assessments.

❖ *Protogynous reproductive strategy should be incorporated into the model with time varying maturity, if necessary.*
❖ *Characterize changes in discard mortality associated with descending devices and compliance rates.*
❖ *The SSC recommends exploring the sharp drop in MRIP estimated number of discards from the private recreational and headboat sectors to determine if this drop is genuine and not an artifact of the survey.*
❖ *Consider examining trends in live releases for inland waters as an indicator of recruitment.*
❖ *Investigate the apparent decline in estuarine and coastal water live releases of gag. Look for bottlenecks in the population such as loss of submerged aquatic vegetation beds, oyster reefs, and essential fish habitat as has been documented in some states. Consider use of estuarine habitat traps (oyster shell traps), Witham collectors, and oyster culture trays to develop a recruitment index.*
❖ *Consider Chevron trap catches of ages 1-3 as a possible recruitment index*
❖ *Conduct retrospective review of projection performance using trends in empirical data from years following the terminal year of the assessment*
❖ *Conduct genetic analysis of gut contents of gag and its predators to examine potential causes of low recruitment*
❖ *Characterize egg viability with age.*

- Provide guidance on the next assessment, addressing its timing and type.

❖ *The SSC recommends the next assessment be operational and conducted in 5 years.*

SSC RECOMMENDATION:

Table 2. Gag Recommendations

Criteria	Deterministic	Probabilistic
Overfished evaluation ($SSB/SSB_{MSY)}$	0.15	0.14
Overfishing evaluation	2.15	2.27
MFMT (F_{MSY})	0.37	0.35
SSB_{MSY} (mt whole wt)	1563.9	1659.4
MSST (mt whole wt)	1172.9	1244.5
MSY (1000 lbs. gw)	1455.1	1453.5
Y at 75% F_{MSY} (1000 lbs.)		
ABC Control Rule Adjustment	20%	
P-Star	30%	
P rebuild	70%	
M	0.15	

OFL RECOMMENDATIONS				
Year	Landed LBS (GW, 1,000 lb)	Discard LBS	Landed Number (1,000)	Discard Number
2023	367		36	
2024	494		45	
2025	605		53	
2026	706		60	
2027	808		68	

ABC RECOMMENDATIONS				
Year	Landed LBS (GW, 1,000 lb)	Discard LBS	Landed Number (1,000)	Discard Number
2023	*see below		*see below	
2024				
2025				
2026				
2027				

***** *The SSC can recommend the catch level associated with $P_{Rebuild}$ based on the rebuilding scheduled selected by the Council.*

11. OTHER BUSINESS

Due to lack of time, the items below will be handled via email given they are largely informational and not related to management decisions.

11.1 The Council Coordinating Committee's Scientific Coordination Subcommittee (National SSC) will likely postpone this year's meeting until 2022. The following will be discussed: 1) incorporating ecosystem indicators into the stock assessment

process, 2) developing information to support management of interacting species in consideration of ecosystem-based fishery management, and 3) how to assess and develop fishing level recommendations for species exhibiting distributional changes. The SSC is requested to provide potential case studies for the three topics. More information will be shared with the SSC as it becomes available.

11.2 Two SSC members are needed to serve as reviewers of SEDAR 68 Scamp Research Track Assessment. Although there are two SSC members currently involved with the assessment, they cannot serve as reviewers of the assessment. The review workshop will occur in early October.

11.3 FWRI will be holding workshops this summer to apply the EwE model to two scenarios recommended by the SSC at its October 2020 meeting: 1) What impacts may be expected on stocks in the snapper grouper complex from decreased discard mortality; and 2) What is the impact of high episodic recruitment of Red Snapper on the snapper grouper complex. The SSC's EwE Workgroup will be invited to attend the FWRI workshops and the SSC will be presented the findings from workshops in October 2021.

12. PUBLIC COMMENT

The public provided final comments on SSC business. See meeting minutes.

13. CONSENSUS STATEMENTS AND RECOMMENDATIONS REVIEW

The Committee reviewed final consensus statements and recommendations. The Final SSC report will be provided to the Council by 9 am on Tuesday, May 25, 2021 for inclusion in the briefing book for the June Council meeting.

14. NEXT MEETINGS

14.1. SAFMC SSC MEETINGS

Potential 2021 Fall Meeting Dates/Venue – TBD

- SEDAR 68 Scamp Research Track Assessment is scheduled for release on October 1

14.2. SAFMC Meetings

2021 Council Meetings

June 14-18, 2021 webinar
September 13-17, 2021 in Charleston, SC
December 6-10, 2021 in Beaufort, NC

LITERATURE CITED:

Holland, D., D. Lambert, E. Schnettler, R. Methot, M. Karp, K. Brewster-Geisz, J. Brodziak, S. Crosson, N. Farmer, K. Frens, J. Gasper, J. Hastie, P. Lynch, S. Matson, and E. Thunberg. 2020. National Standard 1 Technical Guidance for Designing, Evaluating, and Implementing Carry-over and Phase-in Provisions. NOAA Tech. Memo. NMFS-F/SPO-203, 41 p.

Appendix I SEP Report

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

SOCIO-ECONOMIC PANEL OF THE SCIENTIFIC AND STATISTICAL COMMITTEE

SEP Meeting Report

April 13, 2021

Held via Webinar

PURPOSE

This meeting is convened to discuss and provide input to the Scientific and Statistical Committee (SSC) and the South Atlantic Fishery Management Council (Council) on:

- Recent and developing Council actions and amendments,
- Citizen Science Program
- A social census of Georgia's working waterfronts,
- Allocation Decision Tree Blueprint draft,
- Dolphin Wahoo Participatory Workshops,
- Using Fishery Performance Reports to evaluate management success.

CONTENTS

DOCUMENTS

Attachment 1a. Socio-Economic Panel Agenda Overview
Attachment 1b. Minutes from the April 2021 meeting

Attachment 2. Recent and Developing South Atlantic Council Amendments

Attachment 3. Citizen Science Program update presentation

Attachment 4. Social Census of Georgia's Working Waterfronts presentation

Attachment 5a. Allocation Decision Tree Blueprint
Attachment 5b. Allocation Decision Tree Blueprint presentation

Attachment 6. Dolphin Wahoo Participatory Workshops presentation

Attachment 7. Fishery Performance Report discussion document

1. Introduction

1.1. Documents

- **Attachment 1a**. Socio-Economic Panel Agenda Overview
- **Attachment 1b**. Minutes from the April 2021 meeting

1.2. ACTIONS

- Introductions
- Review and approve the agenda
- Approve April 2020 Minutes
- Opportunity for public comment

The SEP welcomed several new members, and approved the agenda and last year's meeting minutes. There was no public comment before the meeting.

2. Recent and Developing Council Actions

2.1. Document

- **Attachment 2**. Recent and Developing South Atlantic Council Amendments

2.2. Overview

Council staff will provide a briefing on recent and upcoming amendments and actions (***Attachment 2***). The following amendments may be of particular interest to SEP members.

Amendment 48 (Wreckfish ITQ Program Modernization)

The Council finished its second review of the Wreckfish ITQ program in September of 2019. As part of the review there were several recommendations made to modernize the program. This amendment begins development in September 2020 and will review the ITQ goals and objectives, and actions from the 2019 review such as electronic reporting, changes to allowable landing procedures, cost recovery, etc. In addition, the Council will consider adopting updated goals and objectives for the entire Snapper Grouper FMP as part of this amendment.

At the September 2020 Council meeting the Council directed staff to hold a meeting with the Wreckfish shareholders and wholesale dealers to discuss the potential actions for the amendments and timing for the amendment ahead of the December 2020 meeting. A meeting of the Wreckfish shareholders and wholesale dealers was held via webinar on October 26, 2020. At their December 2020 meeting the Council reviewed input from the shareholders and dealers, provided guidance to staff on actions and alternatives to develop, and approved the amendment for scoping at the March 2021 meeting. At the March 2021 meeting, staff presented a revised timeline for completion of Amendment 48. Moving to an electronic reporting system will require review of the entire CFR and will take a significant amount of staff time, as a result it is unlikely that this amendment will be ready for final approval by the end of 2021. Staff presented work completed to date, including draft actions and alternatives and received guidance to continue

development of the actions and alternatives, including those needed for consideration of a VMS requirement. The Council will review draft actions and alternatives for approval at the September Council meeting. A meeting of the wreckfish shareholders will be convened this summer.

Amendment 50 (Red Porgy Rebuilding and Allocations)

The Council received a report of the results of SEDAR 60 for Red Porgy at their June 2020 meeting. Red Porgy are overfished, and overfishing is occurring and the stock is not making adequate progress towards rebuilding. The Council also received an ABC recommendation from the SSC in June 2020 and directed staff to begin development of an amendment. The Council is required to establish a rebuilding plan for Red Porgy no later than June 12, 2022. In September 2020, the Council reviewed an options paper to address catch levels, rebuilding, management measures, and sector allocations. At the December meeting, the Council reviewed preliminary analyses, recommendations on management measures from the Snapper Grouper AP, and approved the amendment for scoping. Scoping hearings were held February 3 and 4, 2021. The Council will review updated analyses in June 2021 and approve the amendment for public hearings.

Amendment 49 (Greater Amberjack Catch Levels and Allocations and Snapper Grouper Recreational Annual Catch Targets)

In June 2020, the Council received the results of SEDAR 59 for Greater Amberjack. Greater Amberjack were determined to be neither overfished nor was overfishing occurring. This amendment will consider modifications to the annual catch limit, optimum yield, and sector allocations for Greater Amberjack. Additionally, this amendment considers removal of recreational annual catch targets that are not currently being used in management from the Snapper Grouper FMP. In March 2021, the Council approved Amendment 49 for scoping. Scoping hearings will be held on April 14 and 15, 2021. In June, the Council will review scoping comments, comments from the Snapper Grouper Advisory Panel, and preliminary analyses and provide guidance to the IPT on further development of the draft amendment.

Dolphin Wahoo 10 (Dolphin and Wahoo management measures)

As of the March 2021 Council meeting, the actions in Amendment 10 would accommodate updated recreational data from the Marine Recreational Information Program and new catch level recommendations from the SSC by revising the annual catch limits and sector allocations for Dolphin and Wahoo. The amendment also contains actions that implement various other management changes in the fishery including revising recreational accountability measures, accommodating possession of Dolphin and Wahoo on vessels with certain unauthorized gears onboard, removing the operator card requirement, reducing the recreational vessel limit for Dolphin, reducing the recreational bag limit for Wahoo, and implementing a recreational vessel limit for Wahoo.

Amendment 34(King Mackerel Assessment and Allocations)

In June 2020 the Council received the results of SEDAR 38 Update for King Mackerel. King Mackerel were determined to be neither overfished nor was overfishing occurring. This amendment will consider modifications to management measures and sector allocations. A

meeting of the Mackerel Cobia Advisory Panel was held via webinar on November 2, 2020. The AP reviewed the amendment and provided recommendations. At their December 2020 meeting the Council reviewed input from the AP and provided guidance to staff on actions and alternatives to develop. They also approved the amendment for scoping to be held during the March 2021 meeting. At their March 2021 meeting the Council reviewed scoping comments and approved actions and alternatives to be analyzed. In June 2021, staff will present preliminary analysis for the Council to consider when selecting preferred alternatives and approval for public hearings.

2.3. Presentation and Discussion

John Hadley and Christina Wiegand, SAFMC staff

2.4. ACTIONS

Discuss and make recommendations as appropriate. In general, this agenda item is meant to brief the SEP on potential Council actions that may be presented to the group for review later in the meeting or at a future SEP meeting.

SEP RECOMMENDATIONS:
The SEP thanked staff for the information, but had no specific recommendations.

3. Update on the Citizen Science Program

3.1. Documents

- **Attachment 3**. Citizen Science Program update presentation

3.2. Overview

Staff will present a brief update on the Council's Citizen Science Program and pilot projects, highlighting activities that have occurred since the Spring 2020 SEP meeting. Additionally, staff will provide an overview of a project to develop a customizable citizen science mobile application that encourages and supports the capture and sharing of information about Atlantic coast fish. The Council is partnering with ACCSP and NCDMF to host a series of scoping meetings this spring to develop a roadmap for the design and development of this app. A series of Town Hall meetings were held in March 2021 where fishermen, scientists, and managers were invited to share their ideas on what they would like to see out of a citizen science app.

3.3. Presentation and Discussion

Julia Byrd and Allie Iberle, SAFMC staff

3.4. ACTIONS

Provide feedback and guidance on some of the socio-economic issues and ideas raised during the citizen science mobile application town hall meetings.

Discussion Questions:

1. What niche can citizen science fill for social and economic information that is different from what we can learn through surveys and academic research?

2. How can it help inform decision making?

3. What information can't be collected through other means?

4. Which of the socio-economic town hall ideas may lend themselves well to inclusion in the customizable citizen science app?

SEP RECOMMENDATIONS:

The SEP agrees that citizen science could fill many ongoing data gaps in both commercial and recreational data collection, especially as it relates to socio-economic data. Initial concerns regarding citizen science are the amount of PII required to collect adequate data from stakeholders, as well as the idea of "app saturation," and how other reporting tools currently exist. The SEP did agree with the Council that those current apps do still have data gaps, and goals moving forward are to fill those gaps as best as possible.

In terms of the role citizen science can play, the SEP agreed that traditional research and surveys could likely cover the same information with sufficient budget, but a dedicated app may be a much easier and cheaper way to collect this data. Questions about angler decision-making were noted as difficult to obtain via traditional methods and highly suited for citizen science.

Examples of questions that the SEP posed for citizen science are:

- *Inventory of fishing infrastructure*
- *Ways to capture when fishermen couldn't go fishing due to storm events, water quality problems, etc.*
- *Did trip start at public or private location?*
- *If you weren't fishing today, what would you be doing instead?*
- *If you put your boat in at a public ramp, how long did it take you to get it in the water?*
- *What are the lengths of discarded fish caught today?*
- *How long do durable goods last? (as NOAA estimates that have not been updated recently)*
- *In general, would you rather have: (a) more days in the fishing season with a lower bag limit per day, or (b) fewer days in the fishing season with a higher bag limit per day?*
- *Do you use social media (such as Facebook, Instagram, Twitter, Flickr, etc.) to figure out *where* to go fishing?*
- *Do you use social media (such as Facebook, Instagram, Twitter, Flickr, etc.) to figure out *when* to go fishing?*
- *On this trip, did you have cell phone service while you were actually fishing, or were you out of range of cell service while you were actually fishing?*
- *Did your fishing trip start at a public access point (such as a public boat ramp or public marina) or did it start from a private location (such as a private boat dock or private marina)?*

- *For you personally, how many years does a <fill in name of a type of fishing equipment, such as "boat","boat trailer","fishing rod","electronic fish finder", "electronic depth finder"> last before it breaks or wears out and needs to be replaced?*
- *How much money did you spend at restaurants and bars on this fishing trip?*
  - *<Follow up:> How much money would you have spent on restaurants and bars during this time if you had not taken this fishing trip?*
- *How much money did you spend for lodging on this fishing trip?*
  - *<Follow up:> How much money would you have spent on lodging during this time if you had not taken this fishing trip?*

Another interesting topic that generated conversation and seemed well-suited for citizen science was shark interactions by anglers. The SEP noted that shark abundance and predation has been rising (qualitatively), which can be an interesting environmental indicator. A broader takeaway from this conversation was to consider less tangible issues such as this when designing citizen science questionnaires, as this is the type of information that is well suited to these methods.

Dr. Jennifer Sweeney-Tookes and Dr. Tracy Yandle have some existing data on fisher attitudes towards management and its impacts, and they would be happy to discuss further. As they have researched similar topics in Georgia and South Carolina, they may also be able to offer some experience/insight as the interview guides are created.

Lastly, Dr. Chris Dumas provided multiple suggestions for new or innovative uses of citizen science data. To combine citizen science data and survey data mentioned by Dr. Jennifer Sweeney-Tookes/Dr. Tracy Yandle, you could try Multi-frame survey methodology (start with Hartley 1962). Dr. Dumas also suggested linking a citizen science app to photography-based social media platforms in order to reduce app fatigue, and that there should be an attempt to come up with unique fisher/trip identifier number (a data "standard") that will be used by all apps, including both government apps and private sector apps. To reduce "angler saturation," or "fish app fatigue", you could try having your CitSci app automatically post on Facebook, Instagram, so anglers don't have to post both places. Finally, Dr. Dumas discussed an idea to use citizen science reporting to help fill in data gaps between MRIP wave estimates in order to support management. Dr. Dumas offered that if daily/weekly reporting data from citizen science appeared to correlate strongly to later MRIP wave estimates, they could be used to fill short-term data gaps and help manage quotas and closures. Council staff was interested in the idea, but noted current citizen science data collection methods would need to be updated in order to support that approach.

4. A Social Census of Georgia's Working Waterfronts

4.1. Documents

- **Attachment 4.** Social Census of Georgia's Working Waterfronts presentation

4.2. Overview

Current data on the Georgia seafood industry's demographics, economics, and social conditions is missing. This research project fills that gap through its investigation of 1) Current

demographic, economic, and social conditions of the seafood industry, and how these compare to historical trends, and 2) Labor supply conditions for the industry, and strategies that can address the distressed workforce and aging of the fleet. This project conducted a social census of Georgia's working waterfronts to provide a current snapshot of Georgia's seafood industry, and an assessment of changes in the industry over the last 20-40 years. This collaborative research engagement with the fishing community has produced findings that may prove useful to other working waterfronts around the nation. The project has identified labor force concerns voiced by the industry, and identified best practices to remedy these issues, assisted by case study analysis. Drawing on these case studies, the collaborative work with those in fishing communities, and analysis conducted in this project, project outreach has the potential to assist policymakers, businesses, and fishing families in identifying solutions to sustain Georgia's commercial seafood industry.

4.3. Presentation

Dr. Jennifer Sweeney-Tookes, Georgia Southern University/SEP Member

4.4. ACTIONS

Discuss and make recommendations as appropriate. In general, this agenda item is meant to update the SEP on research relevant to south Atlantic fisheries.

SEP RECOMMENDATIONS:

Dr. Chris Dumas asked what sorts of data was gathered from the small regional libraries and archives described in the presentation. Dr. Jennifer Sweeney-Tookes explained it often clarified ownership transitions and provided background data to the area. The experience also deepened undergraduate student researcher engagement with the project and region.

Dr. Adam Stemle asked about the reactions and perceptions of city and county governments to the idea of creating new municipal docks, in light of Brunswick's unsuccessful public dock at Mary Ross Waterfront Park (which became a bit of an eyesore/unsavory area when fishers were hanging out there, drinking, etc.). Dr. Sweeney-Tookes explained that these recommendations were still being developed into a format to share with county and city governments, but that she and the research team were cautiously optimistic that well-run municipal docks (like those in other regions) are possible in Georgia.

Dr. Dumas described data emerging in one of his current projects, where they have found that approximately 25% of registered commercial fishers in North Carolina are commercially fishing without a fishing vessel (e.g. clams, oysters, shrimping from shore) and show positive levels of seafood sales. Dr. Sweeny-Tookes responded that this has never been mentioned in Georgia, and even the least active and financially successful crabbers and fishers seem to be operating from vessels (their own or not).

It was mentioned in the presentation that younger, more able commercial fisherman (especially related to shrimpers) are investing in the larger freezer boats and taking longer trips (outside state territorial waters), whereas older commercial fisherman are typically still taking day trips and their vessel are falling into disrepair.

This study has provided insight into the current demographic, economic, and social conditions of the commercial seafood industry of Georgia, which is in apparent decline and in jeopardy of local collapse.

This study has highlighted several key issues contributing to the overall decline of Georgia's commercial seafood industry since the 1970's. The issues should be further explored and prioritized in another research study to address the most pressing and immediate needs of the industry and the efficacy such as workforce training, vessel and gear triage, and direct payments has on the long-term sustainability of the industry.

5. Allocation Decision Tree Blueprint

5.1. Documents

- **Attachment 5a.** Allocation Decision Tree Blueprint
- **Attachment 5b.** Allocation Decision Tree Blueprint presentation

5.2. Overview

Making sector allocation decisions is a difficult and complicated process. To help the Council incorporate other sources of information, in addition to landings, when making sector allocations, the Council is exploring the use of a Decision Tree Approach to help the determine salient issues when discussing sector allocations and develop an objective and organized approach to allocations. At the September 2020 meeting, the Council endorsed the concept of the Decision Tree Approach and directed staff to work on developing the approach with input from its advisors. The Council did express concerns over establishing an approach that would be overly prescriptive in nature and wanted to maintain flexibility in allocation decisions on a species-by-species basis. As such, the approach design seeks to be informative in a methodical and objective manner without being prescriptive in the exact outcome that the Council is obligated to take in deciding allocations.

5.3. Presentation

John Hadley and Christina Wiegand, SAFMC staff

5.4. ACTIONS

Discuss and provide feedback on the draft Allocation Decision Tree Blueprint Document, with a focus on draft decision tree questions and outcomes.

Discussion Questions:

1. Economic
    a. Keeping in mind the need to focus on readily available data and completion of the decision tree in a relatively short time (several weeks to a few months), does the SEP feel that the set of questions presented covering economic topics is adequate?

The set of questions presented covering economic topics seems adequate given the need to focus on readily available data to complete a decision tree in a relatively short time.

b. Are there additional economic-related questions or topics that should be covered in this portion of the decision tree approach? Are there questions that should be removed?

The questions included are appropriate given data availability and time constraints.

c. Does the SEP feel that the outline potential data analyses are adequate? Are there other readily available analyses or data sources that should be examined?

The data analysis steps outlined are rather briefly described but seem to be designed to gather appropriate and available data and analyze the data in a manner that can provide beneficial information. Adequacy of analyses will require nuance; for example, using landings and dockside value to measure demand will involve considering the role and trends in other species targeted by the sector.

d. Are the resulting recommendations from the economic decision trees appropriate? Will they help guide allocation decisions without being too prescriptive?
The prescriptiveness of the allocation decision tree is decided by how it is used by the Council. That said, the allocation decision tree outlined is not overly prescriptive and can provide the Council the opportunity to consider other species-specific information not covered by the decision tree in making allocation decisions.

Additional economic comments on allocation trees:
*Staff mentioned that, for a given fish species, if it is possible to re-allocate ACL share to one sector without harming the other sector (a "Pareto improvement"), then the re-allocation should be made (all else equal). This same idea can be extended to "trading" ACL shares *across species*, and it might make *both* sectors better off. Consider the answer to this question for all species pairs A and B: "If the recreational sector gives some of its ACL share of species A to the commercial sector, and in exchange the commercial sector gives some of its ACL share of species B to the recreational sector, are *both* sectors made better off?" This can be true when the recreational sector values species B more highly than species A, and at the same time the commercial sector values species A more highly than species B. The same idea might apply *across states* (or other geographic regions) when ACL is allocated across states. "If the state X gives some of its ACL share of species A to the state Y, and in exchange state Y gives some of its ACL share of species B to state X, are *both* states made better off?"*

*The discussion in the points above referred to trades that would make both sectors or states better off *economically*, but, the same idea could be applied to trades that make two fish species better off *biologically*. For example, suppose there was a "trade" that transferred ACL share in species A from recreational sector to the commercial sector, and in exchange transferred ACL share in species B from the commercial sector to the recreational sector. Suppose, after this trade, that both sector were about as well off *economically* as they were before the trade, but suppose that one or both fish species*

*are better off *biologically*, then this is a trade that should happen. For example, suppose that the recreational and commercial sectors each get about the same economic value from each species A fish landed, but the recreational sector has more dead discards. Then, transfer some share from recreational sector to commercial sector. This helps the biology of species A. Now, in compensation, some share of species B is transferred from commercial sector to recreational sector, an amount of share so that both the recreational sector and the commercial sector are as well off economically as they were before the trade, but the biology of species A was helped by the trade. So, net gain to species A biologically with little net impact economically on either recreational sector or commercial sector.*

2. Social

a. Are there additional sociocultural-related questions or topics that should be covered in this portion of the decision tree approach? Are there questions that should be removed?

The sociocultural decision tree questions included seem appropriate given time and data constraints associated with the allocation decision process.

b. Does the SEP feel that the outlined data analyses are adequate? Are there other readily available analyses or data sources that should be examined?

The data analyses outlined is of appropriate scope given the data and time limitations associated with the decision tree process.

c. Given the need to complete any decision tree related analysis in a short amount of time, what is the best way to summarize and present available qualitative data?

The data seems to lend itself to summary reports with the data quantified where possible (for instance, presentations of local quotients and number of directed trips).

d. Should the vulnerability social indicators be incorporated into the social decision trees?

No.

e. Are the resulting recommendations from the social decision trees appropriate? Are they clear enough to guide allocation decisions without being too prescriptive?

The allocation decision tree outlined is not overly prescriptive and can provide the Council the opportunity to consider additional information not covered by the decision in making informed allocation decisions.

f. Should questions listed in the decision trees be posed to Advisory Panels when conducting Fishery Performance Reports?

This question is best decided by Council staff that are more familiar with the APs and the development of Fishery Performance Reports. If the data could be gathered in a manner

that did not impede the AP in other duties the additional information gathered seems valuable; however, such input should not be overweighted due to the small size of APs and the potential for AP representatives personal experiences not to be indicative of the broader fishery/stakeholder groups they represent on specific issues.

Additional social comments on allocation trees:
*In addition to community's *dependence* on fishing, and whether fishing plays an important role in the community's history/culture, might also want to consider whether there is some *unique* social/cultural/historical aspect of a fishing community *relative to other fishing communities*. (e.g., maybe the Gullah culture?)*

Other social questions to consider:
*What are the dimensions of social/cultural/historical *uniqueness*? What would be a good measure for each dimension of uniqueness? (speculation: answers to these questions might be found in the sociology/history/historical preservation literature, rather than in the economics/biology/fish management literature)*

3. Overall
    a. Given the overlap of some information that falls across multiple topics, such as landings or importance of a fishery to a given sector, does the SEP suggest the continued use of a "siloed approach" where the decision tree questions remain organized by subject (Social, Economic, Landings, and Stock Status) or should a more mixed approach be used where appropriate crossing multiple topics in one branch of the decision tree? For example, the overarching topic of Landings could be addressed using biologic, social, and economic questions.

    The SEP preferred a 'siloed approach'. While the data used and topics overlap, they are used differently for each decision tree and evaluate different criteria.

    b. Does the SEP feel that the use of a decision tree method as outlined would be useful for the Council to systematically and objectively examine allocations?

    The decision tree process outlined would be useful for the Council to systematically and objectively examine allocations. The decision trees created are not overly prescriptive and will provide the Council with basic inputs for making allocation decisions with the ability to gather and consider any additional decision specific information not included in the trees. That said, the process and trees should be routinely (every few years) assessed to determine if each tree is still relevant, if the data collected is the best available, and if new data analysis techniques might be better suited to the task.

    c. It is likely that the outcomes of working through the decision tree will vary by topic.
        i. To provide the Council more conclusive guidance, should some topics be weighted more heavily than others? If so, which ones should be prioritized?
        ii. Would it be better to not provide a weighting to the topics and rely on a "majority rules" approach where each topic has equal ranking and the Council should consider allocation decisions based on net outcome of the topics. For example, if

three of the five topics point towards additional allocation to the sector, the Council would be encouraged to prioritize additional ACL to that sector.

The question of weighting is hard to answer in a general sense and is likely to change with each decision based on the particulars of the fishery being analyzed and the data available. If, for example, social decision tree data is not available for an allocation decision providing a pre-determined weight would cause issues in the decision process. Based on the decision specific nature of the data, the Council should determine weights on a case-by-case basis.

SEP RECOMMENDATIONS:

Please see above responses.

6. Dolphin Wahoo Participatory Workshops

6.1. Document

- **Attachment 6.** Dolphin Wahoo Participatory Workshops presentation

6.2. Overview

In March 2020, the Southeast Fisheries Science Center (SEFSC), along with South Atlantic Council staff, conducted a series of participatory workshops with Dolphin Wahoo fishermen at locations in Beaufort, North Carolina, Manteo, North Carolina, and Virginia Beach, Virginia. These workshops gathered information on biological, social, economic, and regulatory factors affecting fisheries for Dolphin and Wahoo, risks to these fisheries, how changes in the ecosystem have affected fishing businesses and communities, and future research needs. This information was used to develop a social-ecological system conceptual model of the human dimensions and environmental factors that influence the fishery in the region.

A similar set of workshops was planned for locations in South Florida for the summer months of 2020 but were delayed and eventually cancelled due to complications related to COVID-19. In the spring of 2021, SEFSC and SAFMC staff made the decision to move the in-person workshops to a virtual format, first seeking input via phone from individuals conducted interviews with fishermen involved in the Dolphin Wahoo fishery from the South Florida region, and then bringing a larger group together over a webinar as a replacement for the in-person workshops. These efforts allowed researchers to gather similar types of information that was collected in North Carolina and Virginia and led to the development of a conceptual model for the Dolphin Wahoo fishery of South Florida.

In addition to the participatory workshops, SEFSC staff conducted an analysis of pictures posted on social media to collect information on for-hire vessels involved in the Dolphin Wahoo fishery including the seasonality of catch, variations in the general size of Dolphin and Wahoo landed, and other species commonly caught on for-hire trips. This research, when combined with findings from the data collected during the participatory workshops, has been used to identify emerging themes in the fishery and provide in-depth biological, social, and economic information not previously available on the Dolphin Wahoo fishery.

An overview and preliminary findings will be presented (***Attachment 6***) to the SEP by SEFSC staff.

6.3. Presentation

Dr. Mandy Karnauskas and Dr. Matt McPherson, SEFSC

6.4. ACTIONS

The cross-disciplinary research resulted in identifying several social, economic, and management factors driving the Dolphin Wahoo fishery. While there was also a notable biological component to the research, the conceptual models are heavily focused on the human dimension aspects of the fishery. As such, the SEP is being asked to review the work conducted and provide feedback.

Discussion Questions and Feedback Requests:

1. Please comment on the utility and appropriate application of the findings (i.e. inform managers, set research priorities, aid in analysis of social and economic effects of fishery management actions, etc.)

The SEP feels that this is a useful exploratory tool that could be brought into FMP process as a descriptive tool providing additional information on the effects of management. In particular, the SEP discussed how analysis of these meetings could systematically document a level of proof of what is heard informally providing evidence for more fine grain management (especially, localized differences). The most useful types of information gleaned seems to be information about what is harvested and when, how effort has changed over time, what is going on in the water and how species targeting substitutions occur in terms of seasonality and trends. This information could be useful as an early warning system since quantitative data provides information with a lag. In the future, another round of meetings might be useful for better understanding shifts in stock and the impacts of climate change.

But, it would be helpful to have been provided explicit examples describing how qualitative data and analysis could be used by the SSC and Council.

2. Please comment on the use of social media analysis to supplement findings.

The social media analysis is useful for supplementing and contextualizing the fishery but questions remain about how much to trust it given representative sample, etc. The social medial analysis process identified in this report is labor intensive, and would need to be automated. The SEP noted that the new reporting requirements for the for-hire sector might make social media analysis less useful.

3. Does the SEP recommend considering this approach for future research into other Council-managed fisheries?

a. Are there specific research topics or fisheries that the SEP would like to identify that could benefit from the application of similar research efforts?

These meetings, qualitative data and analysis are very applicable to Dolphin-Wahoo, which are popular, data limited species with no stock assessment. Results like these would be most useful to similar species that are in the same situation. The SEP noted that this analysis is less likely to be useful in a more commercial fishery. The committee also concurred with the presenters that the analysis is not yet complete. The SEP will review the final completed analysis to better assess the potential of this generated in this report and how that information can improve the flow of information between fishers and management. If further research in this area is conducted, the results could be useful for species that aren't responding to management measures very well. Finally, the next step might be a trial period with dolphin-wahoo management to determine its utility in that process before more research is conducted.

SEP RECOMMENDATIONS:

Please see above responses.

7. Fishery Performance Reports to Evaluate Management Success

7.1. Document

- **Attachment 7.** Fishery Performance Report discussion document

7.2. Overview

The purpose of fishery performance reports (FPR) is to assemble information from the South Atlantic Fishery Management Council (Council) fishery advisory panel members' experience and observations on the water and in the marketplace to complement scientific and landings data. The FPRs are used to complement stock assessment reports and aid in developing stock status recommendations, as well as inform future Council management decisions. Additionally, the FPRs are posted publicly on the Council's website.

Recently, Council staff has been discussing ways to better explore the efficacy of current and past management actions. Understanding what management measures have or haven't been successful in the past could help guide the Council as they discuss modifications to the regulatory system in currently place. To that end, staff would like to get fishermen's perspective on management success through the FPR process.

7.3. Presentation

Christina Wiegand, SAFMC staff

7.4. ACTIONS

Discuss and provide guidance to the staff on Fishery Performance Report questions to examine management success.

Discussion Questions

1. Should questions about management efficacy be roped into the other discussion questions? For example, how have management measures affected the price/demand? How have management measures influenced shifts in effort to/from the fishery?

2. What other additions or improvements could be made to the discussion questions to produce more valuable information on management efficacy?

3. How can staff work to address confounding changes that may influence perceptions successful/unsuccessful management has been such as changing environmental conditions, overall change in value of stock etc.

4. How should the information gathered during the FPR process be presented and incorporated into the management process?

SEP RECOMMENDATIONS:

The SEP remains pleased/excited/impressed with the development of FPRs and their potential for informing management. Committee members concur that it is appropriate to expand discussion with participants to include management effects. There was also agreement that it is appropriate for discussion to move beyond "effectiveness and be more specific "e.g., what measures are easier or more difficult to comply with". Extended discussion focused on the wide-ranging nature of these conversations and the need to let them develop organically for most effective information gathering (rather than treating them more strictly as one would with survey participants). The SEP also agreed that when discussing management effectiveness, it is best to consider adjectives other than "appropriate." Specifically, SEP recommends defining management success and effectiveness uniquely based on the fishery/measure being discussed. It is important for Council to design FPR questions in way that is most relatable to the respondent, not necessarily to managers.

The SEP argued that FPR's should be considered raw data, and that it is the responsibility of Council staff to connect dots, identify themes, and make assertions about overall management effectiveness. There was also discussion of the importance and value in making sure FPRs are continually updated over time, as the information from temporal trends or changes would be extremely useful for management.

Regarding reporting on findings, discussion focused on new developments in qualitative data visualization as well as the power of adding brief audio clips to presentation made to Council. Lastly, SEP member Dr. Jennifer Sweeney-Tookes mentioned that she recently attended an anthropology conference where new methods of data presentation and visualization were discussed and can discuss them with Council staff.

8. Other Business

The SEP bid farewell to longtime member Tracy Yandle and wishes her well in her future endeavors.

9. Opportunity for Public Comment

There was no public comment at the end of the meeting.

10. Report and Recommendations Review

11. Next SEP Meeting

- Spring 2022, Charleston SC

Appendix II: SEDAR 71 Gag Grouper Projections

Projections for South Atlantic
Gag Grouper SEDAR 71 Stock Assessment

Sustainable Fisheries Branch, National Marine Fisheries Service,
Southeast Fisheries Science Center,
101 Pivers Island Rd, Beaufort, NC 28516

May 18, 2021

This document responds to a request from the SAFMC (May 5th, 2021 email) for projections following the SEDAR 71 South Atlantic Gag Grouper stock assessment. The request described three projection scenarios. The first two projection scenarios are used to compute the minimum rebuilding time frame (T_{min}) under different assumptions about future recruitment. These projections are (1) F = 0 until the population rebuilds assuming mean recruitment during the projection years is that from the estimated stock-recruitment curve ("average recruitment"), (2) F = 0 until the population rebuilds assuming mean recruitment during the projection years is the average of that from the last 10 years (2010 – 2019) of the assessment ("low recruitment"). For both (1) and (2) the criterion for rebuilding is that SSB from 50% of projection replicates exceeds SSB_{msy}. New management was assumed to start in 2023 and landings from 2020 – 2022 were assumed the same as the average landings at the end of the assessment (2017 – 2019). The time series of recruitment from the Gag Grouper base run and from the Monte Carlo Bootstrap Ensemble (MCBE) are shown in Figure 1. The probability of rebuilding under scenario 1 (F= 0, average recruitment) and scenario 2 (F= 0, low recruitment) are shown in Figure 2. The stock rebuilds in 9 years assuming average recruitment and 11 years assuming low recruitment. Projection results for F= 0 under average recruitment are shown in Figure 3 and Table 1. Projection results for F= 0 under low recruitment are shown in Figure 4 and Table 2.

The third scenario was (3) OFL: $F = F_{msy}$ extending through the longest rebuilding period identified from four alternative rebuilding time frames (T_{max}). The four alternative rebuilding time frames are shown below based on a computed generation time of Gag of 11 years.

(A) T_{max} = 10 years
(B) T_{max}= 2 generations = 2 x 11 = 22 years
(C) $T_{max} = T_{min}$ + 1 generation,
T_{max} = 9 years + 11 years = 20 years under average recruitment
T_{max} = 11 years + 11 years = 22 years under low recruitment
(D) T_{max} = time to rebuild with F = 75% of F_{msy}.
T_{max} under scenario D is 14 years.

Therefore, scenario (3), OFL = F_{msy} was run for 22 years (projection period: 2020 – 2041). The projection results for this scenario are shown in Figure 5 and Table 3. The projection results for (D) F = 75% Fmsy are shown in Figure 6 and Table 4 for completeness.

Table 1. Projection results with fishing mortality rate fixed at F = 0 starting in 2023 and average recruitment. R = number of age-1 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt), L = landings, and D = dead discards expressed in numbers (n, in 1000s) and in gutted weight (gutted, in 1000 lb). The extension 'base' indicates expected values (deterministic) from the base run. The extension 'med' indicates median values from the stochastic projections.

year	R.base (1000)	R.med (1000)	F.base	F.med	S.base (mt)	S.med (mt)	L.base (1000)	L.med (1000)	L.base (1000 lb gutted)	L.med (1000 lb gutted)	D.base (1000)	D.med (1000)	D.base (1000 lb gutted)	D.med (1000 lb gutted)	pr.recover
2020	301	264	1.01	0.99	225	224	49	49	539	539	25	22	104	93	0
2021	296	257	0.95	0.95	212	211	56	55	539	539	24	22	104	96	0
2022	287	244	0.75	0.77	241	234	56	55	539	539	19	18	82	79	0
2023	306	248	0	0	357	336	0	0	0	0	0	0	0	0	0
2024	364	283	0	0	617	577	0	0	0	0	0	0	0	0	0.019
2025	436	344	0	0	944	884	0	0	0	0	0	0	0	0	0.15
2026	481	386	0	0	1313	1233	0	0	0	0	0	0	0	0	0.333
2027	508	418	0	0	1718	1618	0	0	0	0	0	0	0	0	0.486
2028	527	437	0	0	2168	2044	0	0	0	0	0	0	0	0	0.617
2029	540	454	0	0	2662	2515	0	0	0	0	0	0	0	0	0.738

Table 2. Projection results with fishing mortality rate fixed at F = 0 starting in 2023 and low recruitment. R = number of age-1 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt), L = landings, and D = dead discards expressed in numbers (n, in 1000s) and in gutted weight (gutted, in 1000 lb). The extension 'base' indicates expected values (deterministic) from the base run. The extension 'med' indicates median values from the stochastic projections.

year	R.base (1000)	R.med (1000)	F.base	F.med	S.base (mt)	S.med (mt)	L.base (1000)	L.med (1000)	L.base (1000 lb gutted)	L.med (1000 lb gutted)	D.base (1000)	D.med (1000)	D.base (1000 lb gutted)	D.med (1000 lb gutted)	pr.recover
2020	301	179	1.01	0.99	225	218	49	49	539	539	25	18	104	78	0
2021	197	178	0.95	0.98	206	193	55	54	539	539	19	16	87	71	0
2022	197	178	0.77	0.93	225	195	55	53	539	539	14	15	61	67	0
2023	197	176	0	0	321	257	0	0	0	0	0	0	0	0	0
2024	197	178	0	0	535	423	0	0	0	0	0	0	0	0	0
2025	197	177	0	0	764	624	0	0	0	0	0	0	0	0	0.005
2026	197	178	0	0	994	847	0	0	0	0	0	0	0	0	0.035
2027	197	177	0	0	1220	1077	0	0	0	0	0	0	0	0	0.125
2028	197	177	0	0	1434	1300	0	0	0	0	0	0	0	0	0.263
2029	197	176	0	0	1630	1508	0	0	0	0	0	0	0	0	0.408
2030	197	177	0	0	1808	1698	0	0	0	0	0	0	0	0	0.532
2031	197	178	0	0	1966	1870	0	0	0	0	0	0	0	0	0.635
2032	197	177	0	0	2105	2026	0	0	0	0	0	0	0	0	0.716
2033	197	177	0	0	2227	2162	0	0	0	0	0	0	0	0	0.776
2034	197	176	0	0	2334	2284	0	0	0	0	0	0	0	0	0.82

Table 3. Projection results with fishing mortality rate fixed at F = F_{msy} starting in 2023 and recruitment from the stock-recruitment curve. The projection period was determined as the maximum of the alternative rebuilding time frames considered above. R = number of age-1 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt), L = landings, and D = dead discards expressed in numbers (n, in 1000s) and in gutted weight (gutted, in 1000 lb). The extension 'base' indicates expected values (deterministic) from the base run. The extension 'med' indicates median values from the stochastic projections.

year	R.base (1000)	R.med (1000)	F.base	F.med	S.base (mt)	S.med (mt)	L.base (1000)	L.med (1000)	L.base (1000 lb gutted)	L.med (1000 lb gutted)	D.base (1000)	D.med (1000)	D.base (1000 lb gutted)	D.med (1000 lb gutted)	pr.recover
2020	301	262	1.01	0.99	225	223	49	49	539	539	25	22	104	93	0
2021	296	254	0.95	0.95	212	210	56	55	539	539	24	22	104	96	0
2022	287	242	0.75	0.77	241	233	56	55	539	539	19	18	82	78	0
2023	306	249	0.36	0.35	333	315	36	32	367	329	10	8	42	36	0
2024	354	278	0.36	0.35	473	446	45	40	494	445	11	9	48	40	0.001
2025	402	316	0.36	0.35	603	572	53	47	605	549	13	10	54	45	0.006
2026	433	344	0.36	0.35	716	680	60	54	706	642	14	11	60	49	0.014
2027	452	368	0.36	0.35	822	781	68	62	808	739	15	12	64	53	0.029
2028	467	380	0.36	0.35	931	880	76	69	912	833	15	13	67	56	0.049
2029	479	393	0.36	0.35	1039	976	83	75	1011	925	16	13	69	58	0.071
2030	489	403	0.36	0.35	1139	1065	89	81	1098	1009	16	14	71	60	0.096
2031	497	417	0.36	0.35	1224	1141	94	85	1171	1077	17	14	72	61	0.122
2032	503	428	0.36	0.35	1295	1208	97	89	1230	1132	17	14	73	63	0.149
2033	507	432	0.36	0.35	1353	1264	100	92	1278	1179	17	14	74	64	0.176
2034	511	441	0.36	0.35	1399	1313	103	95	1317	1219	17	15	75	65	0.2
2035	513	445	0.36	0.35	1437	1357	105	97	1348	1249	17	15	75	66	0.225
2036	515	452	0.36	0.35	1467	1396	106	98	1372	1277	17	15	76	66	0.25
2037	516	456	0.36	0.35	1491	1432	107	100	1391	1298	17	15	76	67	0.274
2038	518	458	0.36	0.35	1509	1460	108	101	1405	1316	17	15	76	67	0.291
2039	518	462	0.36	0.35	1524	1486	109	102	1417	1332	17	15	76	68	0.309
2040	519	463	0.36	0.35	1535	1511	109	103	1425	1346	17	15	77	68	0.332
2041	520	464	0.36	0.35	1543	1531	110	104	1432	1360	17	15	77	69	0.35

Table 4. Projection results with fishing mortality rate fixed at F = 75%F_{msy} starting in 2023 and recruitment from the stock-recruitment curve. R = number of age-1 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt), L = landings, and D = dead discards expressed in numbers (n, in 1000s) and in gutted weight (gutted, in 1000 lb). The extension 'base' indicates expected values (deterministic) from the base run. The extension 'med' indicates median values from the stochastic projections.

year	R.base (1000)	R.med (1000)	F.base	F.med	S.base (mt)	S.med (mt)	L.base (1000)	L.med (1000)	L.base (1000 lb gutted)	L.med (1000 lb gutted)	D.base (1000)	D.med (1000)	D.base (1000 lb gutted)	D.med (1000 lb gutted)	pr.recover
2020	301	264	1.01	0.98	225	224	49	49	539	539	25	22	104	93	0
2021	296	256	0.95	0.94	212	211	56	55	539	539	24	22	104	96	0
2022	287	243	0.75	0.77	241	234	56	55	539	539	19	18	82	79	0
2023	306	248	0.27	0.26	339	321	27	24	282	254	7	6	32	27	0
2024	357	281	0.27	0.26	504	478	36	32	398	359	8	7	36	30	0.003
2025	411	323	0.27	0.26	671	639	43	39	505	458	10	8	42	34	0.017
2026	445	357	0.27	0.26	824	789	50	45	607	551	11	9	46	38	0.052
2027	467	378	0.27	0.26	972	928	58	52	710	646	12	9	50	41	0.108
2028	483	392	0.27	0.26	1123	1069	66	60	815	746	12	10	53	44	0.175
2029	496	406	0.27	0.26	1277	1209	73	66	918	843	12	10	54	45	0.248
2030	506	420	0.27	0.26	1422	1338	79	72	1012	930	13	11	56	47	0.323
2031	514	436	0.27	0.26	1551	1457	84	76	1093	1007	13	11	57	49	0.4
2032	520	445	0.27	0.26	1661	1559	88	80	1160	1070	13	11	58	50	0.476
2033	525	452	0.27	0.26	1753	1648	91	83	1215	1125	13	11	58	51	0.547
2034	528	457	0.27	0.26	1828	1726	93	86	1260	1169	13	12	59	51	0.615

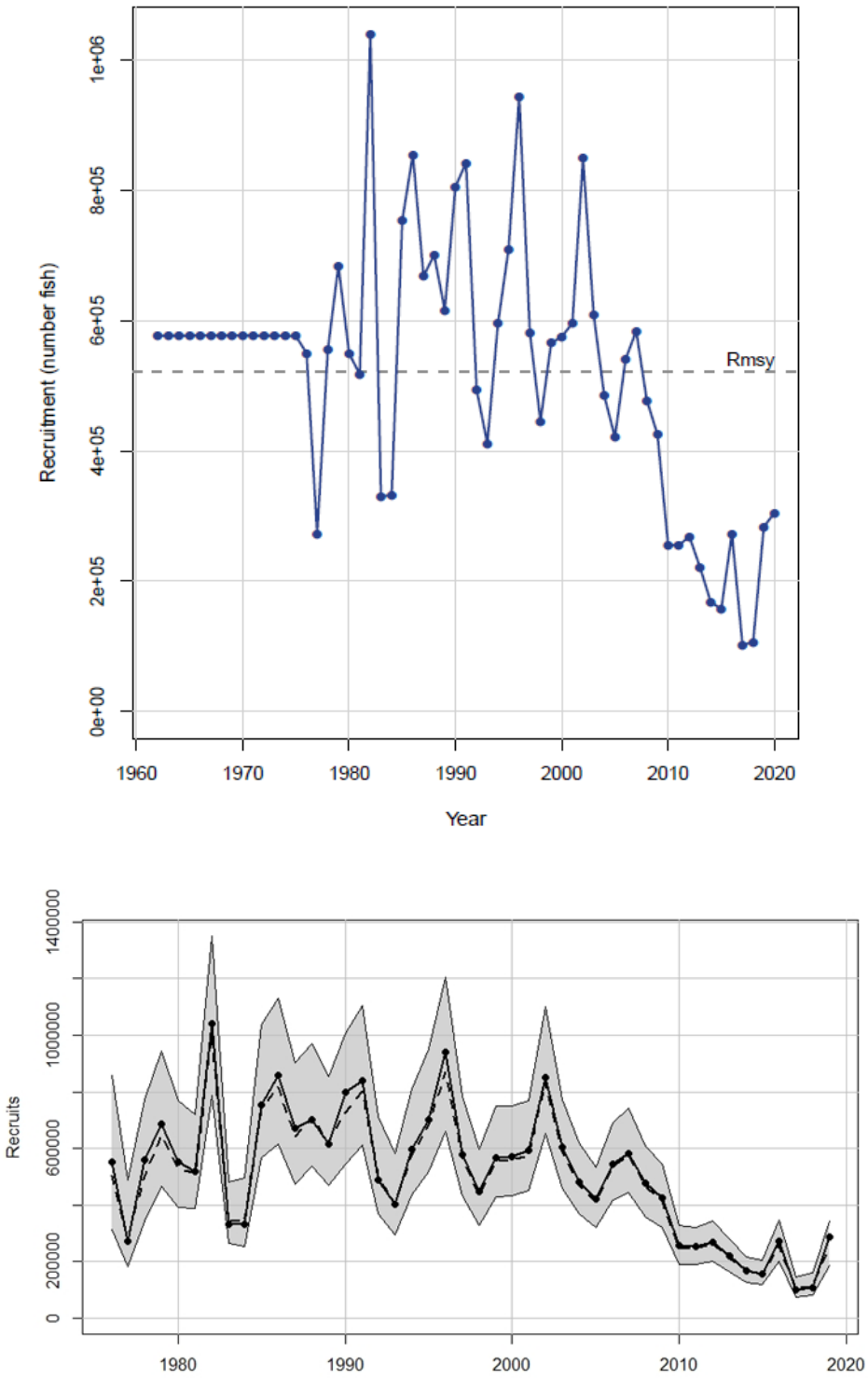
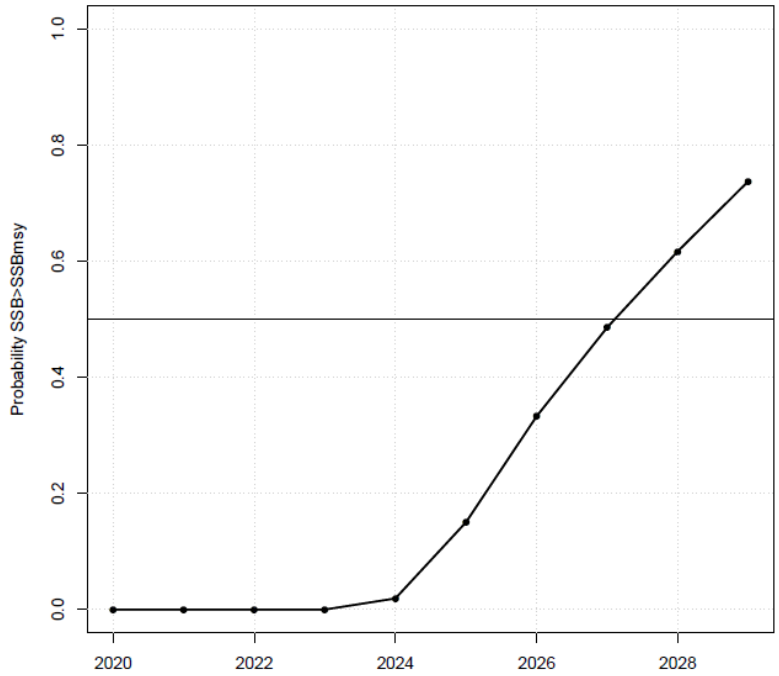


Figure 1. Age-1 recruitment from the base run (top panel) and the MCBEs (bottom panel).

(A) F = 0 with mean recruitment from the stock recruitment curve.



(B) F = 0 with mean recruitment from the last 10 years (2010-2019).

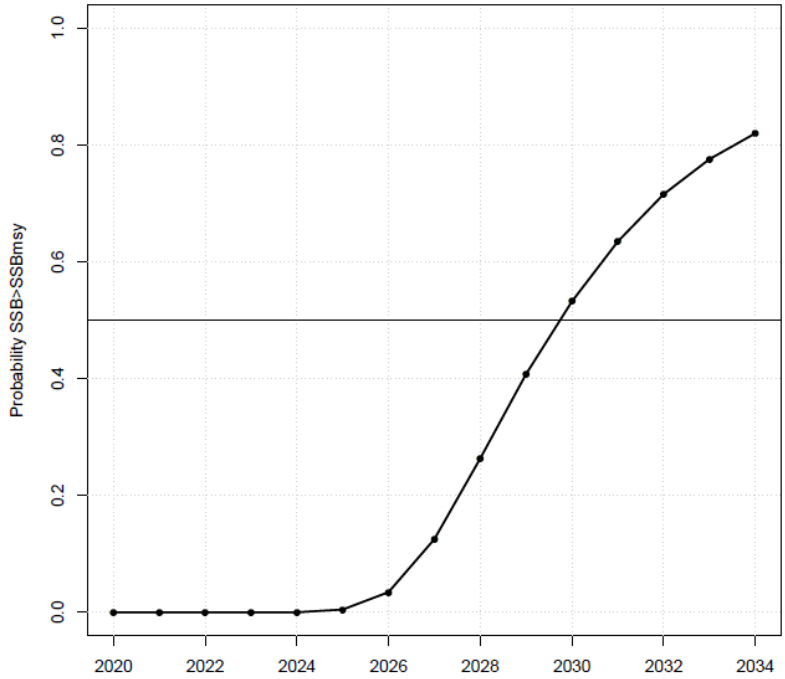


Figure 2. Probability of rebuilding with F = 0 for two different recruitment scenarios.

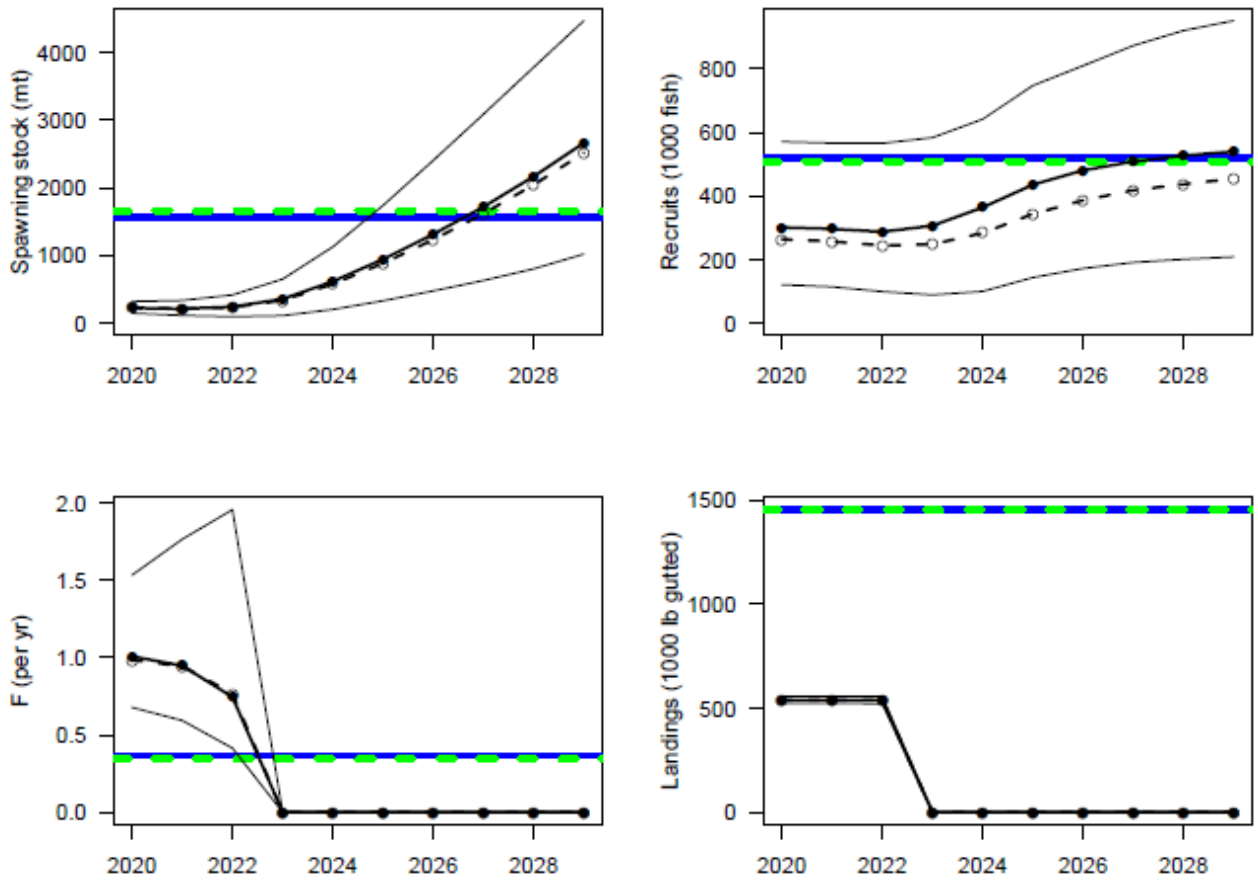


Figure 3. Ten year projection results with fishing mortality rate at F = 0 starting in 2023 and mean recruitment from the stock-recruitment curve. The interim years (2020-2022) use a mean of the 2017-2019 landings. In the top four panels, expected values (base run) represented by solid lines with solid circles, medians represented by dashed lines with open circles, and uncertainty represented by thin lines corresponding to 5th and 95th percentiles of replicate projections. Solid horizontal lines mark MSY-related quantities from the base run; dashed horizontal lines represent corresponding median values from the replicate projections. Spawning stock (SSB) is at time of peak spawning.

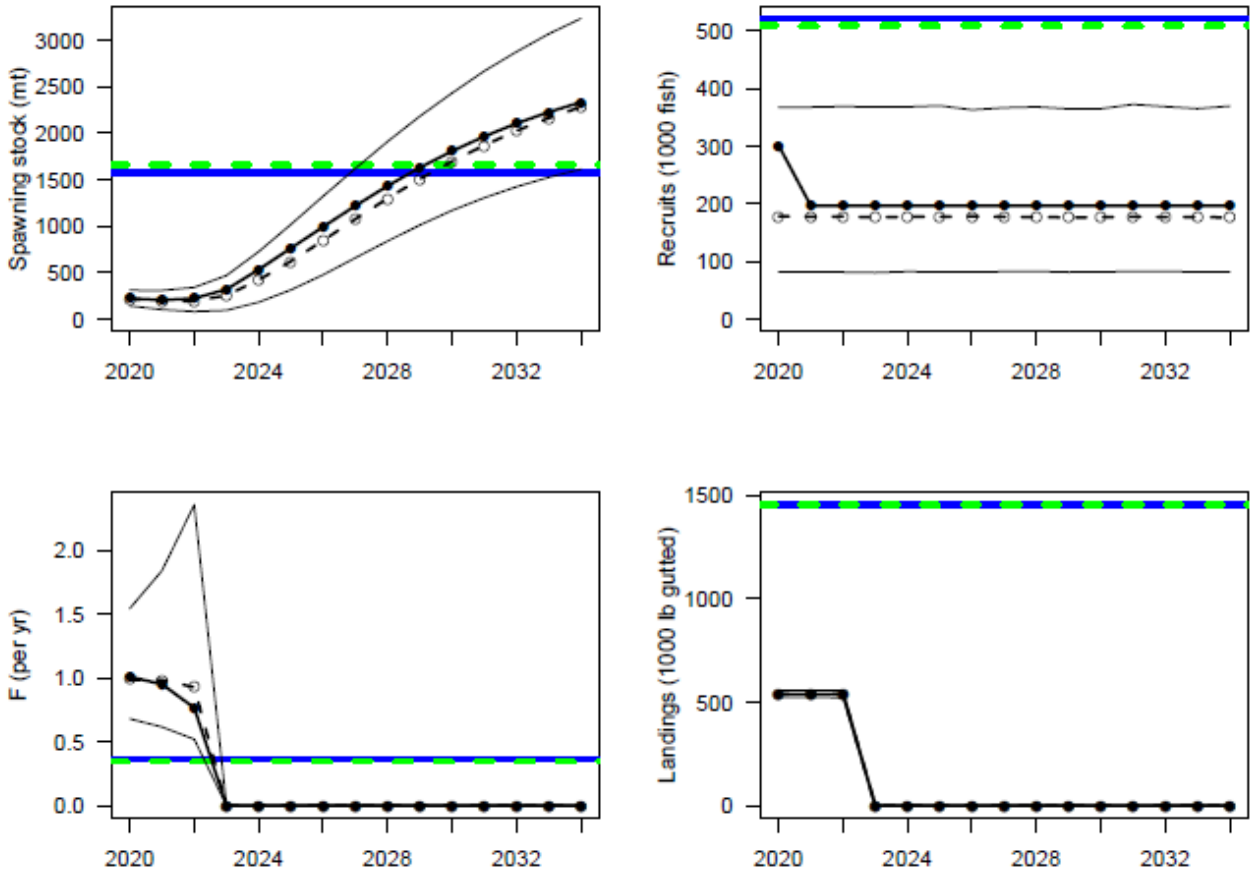


Figure 4. Ten year projection results with fishing mortality rate at F = 0 starting in 2023 and mean recruitment from the last 10 years of the assessment (2010-2019). The interim years (2020-2022) use a mean of the 2017-2019 landings. In the top four panels, expected values (base run) represented by solid lines with solid circles, medians represented by dashed lines with open circles, and uncertainty represented by thin lines corresponding to 5th and 95th percentiles of replicate projections. Solid horizontal lines mark MSY-related quantities from the base run; dashed horizontal lines represent corresponding median values from the replicate projections. Spawning stock (SSB) is at time of peak spawning.

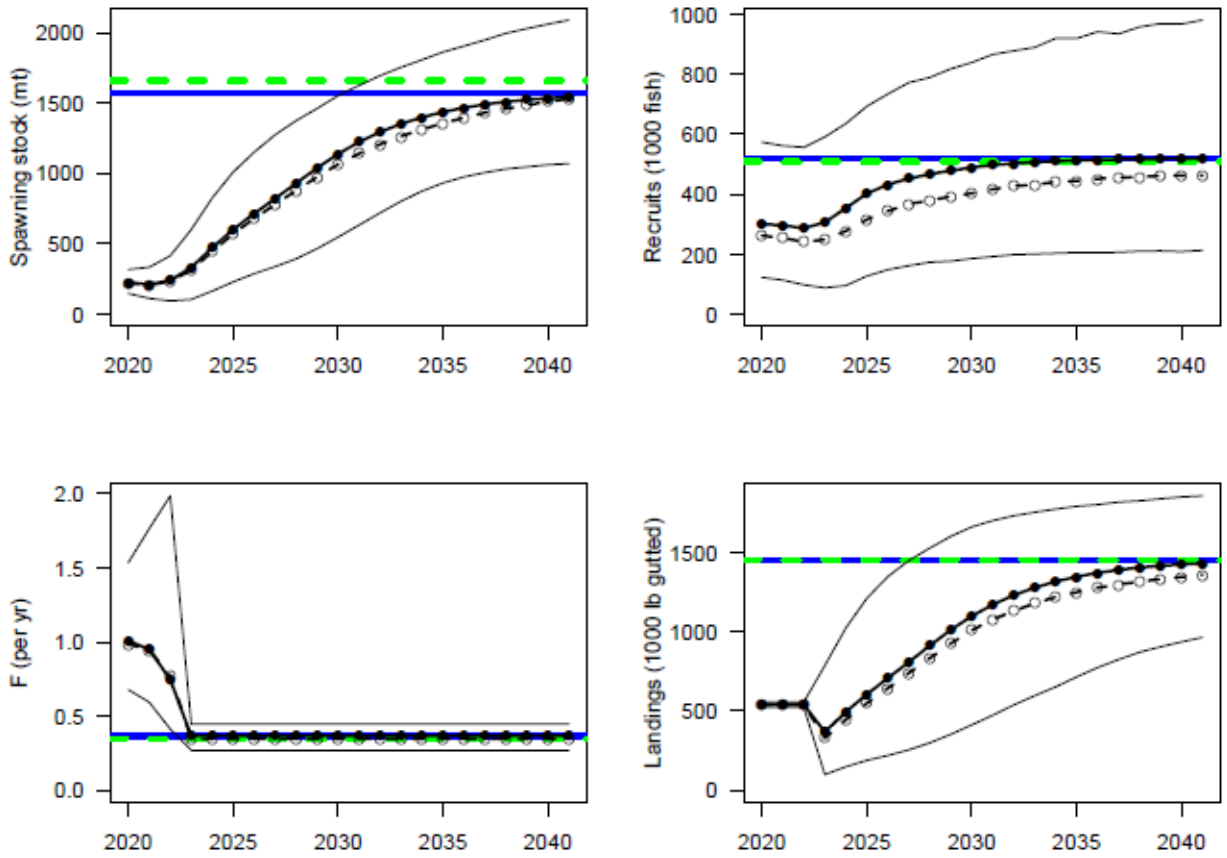


Figure 5. Projection results with fishing mortality rate at F = F_{msy} starting in 2023 and a projection time from of 2020 – 2041 based on the maximum of the alternative rebuilding time frames considered above. The interim years (2020-2022) use a mean of the 2017-2019 landings. In the top four panels, expected values (base run) represented by solid lines with solid circles, medians represented by dashed lines with open circles, and uncertainty represented by thin lines corresponding to 5th and 95th percentiles of replicate projections. Solid horizontal lines mark MSY-related quantities from the base run; dashed horizontal lines represent corresponding median values from the replicate projections. Spawning stock (SSB) is at time of peak spawning.

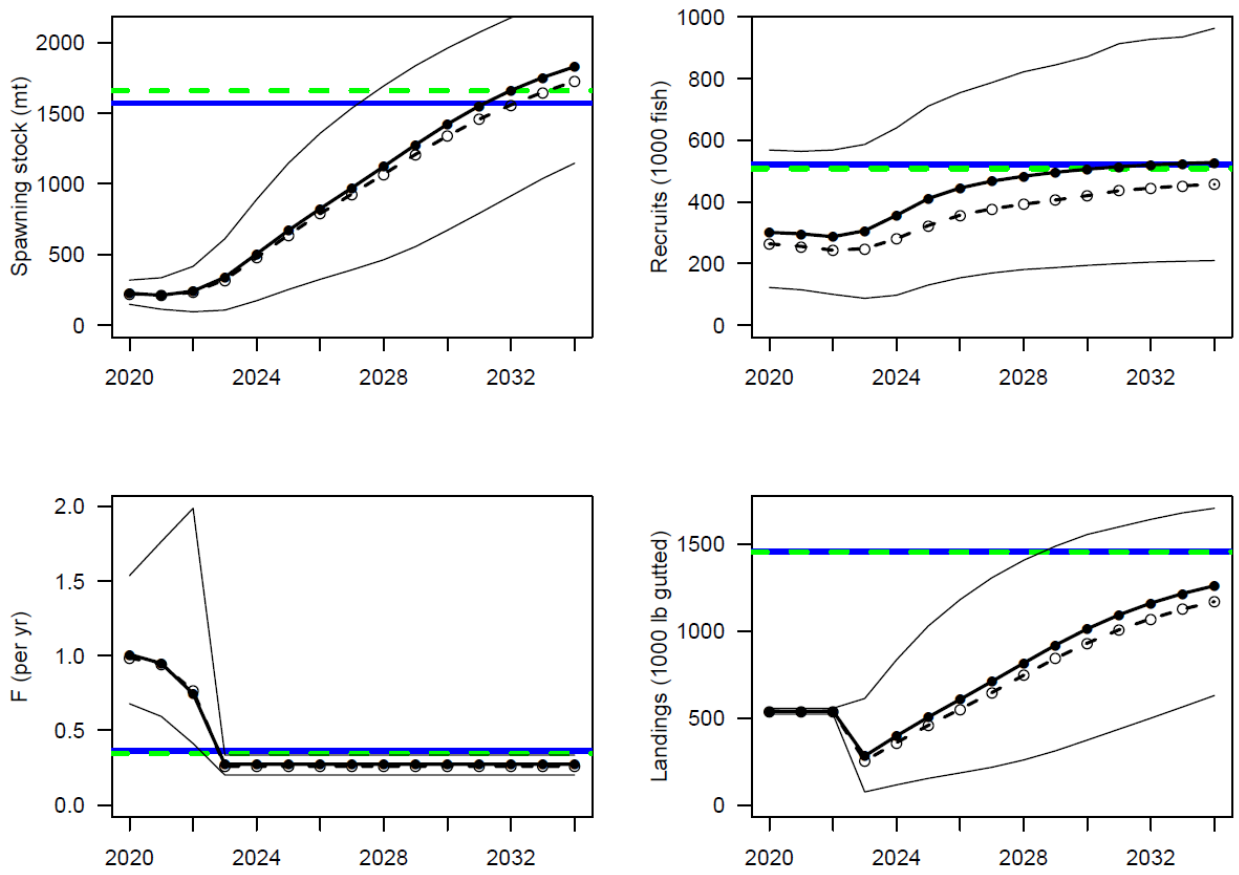


Figure 6. Ten year projection results with fishing mortality rate at F = 75%F_{msy} starting in 2023 and mean recruitment from the stock-recruitment curve. The interim years (2020-2022) use a mean of the 2017-2019 landings. In the top four panels, expected values (base run) represented by solid lines with solid circles, medians represented by dashed lines with open circles, and uncertainty represented by thin lines corresponding to 5th and 95th percentiles of replicate projections. Solid horizontal lines mark MSY-related quantities from the base run; dashed horizontal lines represent corresponding median values from the replicate projections. Spawning stock (SSB) is at time of peak spawning.

Appendix III: SEDAR 66 (Tilefish) Projections

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Stock Assessment of Tilefish off the Southeastern United States

SEDAR Update Assessment

Post SSC Meeting Projections 01

Southeast Fisheries Science Center

National Marine Fisheries Service

Last revision: May 17, 2021

List of Tables

List of Figures

Introduction

The document describes projections based on the SEDAR 66 Base model for South Atlantic Tilefish as requested by the South Atlantic via email (May 4, 2021). It has been written to complement previous documentation. For additional information please see the SEDAR 66 Assessment Report (2021).

Methods

Projections from the SEDAR 66 Base Model were run to predict stock status and yield up from 2019 to 2026. These procedures were similar to those presented in §3.10 of the SEDAR 66 Assessment Report (2021). The main difference between the projection methods presented here and in the assessment report is in the way that landings and F were estimated for the interim years prior to new management (2019 − 2021). Contrasting with the projection methods presented in the SEDAR 66 Assessment Report (2021), interim landings were supplied to current projections as fixed values and the corresponding F values were computed with an optimization procedure. This method was used in both deterministic and stochastic projections. For the current projections, interim landings were computed from observed landings for the terminal year of SEDAR 66, and reported landings from the SERO ACL Monitoring webpage (https://www.fisheries.noaa.gov/southeast/commercial-fishing/southeast-region-annual-catch-limit-acl-monitoring).

Commercial landings
Values for 2018 are from SEDAR 66. Commercial handline (cH) and commercial longline (cL) landings for 2019 and 2020 were obtained from the NOAA Fisheries South Atlantic Historical Commercial Landings webpage in thousand pounds gutted weight (klb GW). Commercial landings data for 2021 had been reported but were not complete at the time of writing (cH = 68.973 klb GW, cL = 242.051 klb GW). Thus average landings from 2018 to 2020 were computed to estimate the final landings totals for cH and cL in 2021.

Recreational landings
Values for 2019 were obtained in numbers (from the NOAA Fisheries 2019 and 2018-2019 Preliminary South Atlantic Recreational Landings webpage. The resulting value of 15,638 fish was then multiplied by a mean weight of 5.7 lb GW to convert the 2019 recreational landings to lb GW. This mean weight value was computed from a mean length of 630 mm (25 inches; mean length of Tilefish in the 2018 recreational length composition data from SEDAR 66), converted to whole weight (WW) and then GW using Eq. 2 and Eq. 3 from the SEDAR 66 Assessment Report (2021). Recreational landings data for 2020 had been reported but were incomplete (1,234 fish reported for Jan-Apr 2020) and 2021 landings had not been reported at the time of writing. Thus the average of 2018 and 2019 recreational landings was used to estimate landings for 2020 and 2021.

Three sets of projections are provided in this document:

Scenario 1: $F = F_{\text{MSY}}$ from 2022 to 2026, with interim landings from 2019 to 2021.
Scenario 2: $F = F_{\text{P}^*_{32.5\%}}$ from 2022 to 2026, with interim landings from 2019 to 2021.
Scenario 3: $F = 75\% F_{\text{MSY}}$ from 2022 to 2026, with interim landings from 2019 to 2021.

Results and Discussion

Projection results are presented in Figs. 1, 2, and 3 and Tables 2, 3, and 4.

Comparing this analysis with the SEDAR 66 Assessment Report (2021) projections, estimated interim landings and F in these projections are higher in 2019 but lower in 2020 and 2021. This led to slightly more optimistic projections. In all scenarios, deterministic projections show spawning stock to be stable or increasing through 2026, but there is considerable uncertainty in the trend. In all scenarios, $P(\text{SSB} \geq \text{MSST})$ exceeds 0.6 in all years.

References

SEDAR 66, 2021. South Atlantic Tilefish Stock Assessment Report. SEDAR, North Charleston SC.

Table 1. Observed time series of landings (L) for the the terminal year of the assessment and the interim period, for commercial handline (cH), commercial longline (cL), and recreational (rA), and in total. All landings are in units of 1000 lb gutted weight. Values for 2018 are from SEDAR 66. Values for 2019-2021 were computed from additional sources (see text for details).

Year	L.cH	L.cL	L.rA	L.total
2018	50.49	235.64	50.74	336.86
2019	85.14	282.68	89.32	457.14
2020	87.62	256.64	70.03	414.28
2021	74.41	258.32	70.03	402.76

Table 2. Projection results with fishing mortality rate fixed at $F = F_{\mathrm{MSY}}$ starting in 2022 and projecting forward to 2026. From 2019 to 2021 landings were fixed and the corresponding fishing mortality rates were estimated in the projection analysis. R = number of age-1 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt), L = landings expressed in numbers (n, in 1000s) or gutted weight (GW, in 1000 lb*), P(≥* MSST*)= proportion of stochastic projection replicates with* SSB ≥ MSST*. The extension* b *indicates expected values (deterministic) from the base run; the extension* med *indicates median values from the stochastic projections.*

Year	R_b	R_{med}	F_b	F_{med}	S_b (mt)	S_{med} (mt)	L_b (n)	L_{med} (n)	L_b (GW)	L_{med} (GW)	$P(\geq$ MSST)
2019	294	245	0.27	0.29	19	18	56	57	457	457	0.602
2020	296	246	0.23	0.25	19	18	51	52	414	414	0.605
2021	297	246	0.21	0.23	20	19	50	50	403	403	0.614
2022	299	248	0.30	0.26	20	19	70	59	573	474	0.625
2023	300	248	0.30	0.26	20	18	69	59	562	478	0.641
2024	299	249	0.30	0.26	20	18	68	59	552	476	0.657
2025	298	252	0.30	0.26	19	18	67	58	543	474	0.668
2026	298	256	0.30	0.26	19	18	66	58	535	467	0.677

Table 3. Projection results with fishing mortality rate fixed at $F = F_{P^*_{32.5\%}}$ *starting in 2022 and projecting forward to 2026. From 2019 to 2021 landings were fixed and the corresponding fishing mortality rates were estimated in the projection analysis.* R *= number of age-1 recruits (in 1000s),* F *= fishing mortality rate (per year),* S *= spawning stock (mt),* L *= landings expressed in numbers (n, in 1000s) or gutted weight (GW, in 1000* lb*),* $P(\geq \text{MSST})$*= proportion of stochastic projection replicates with* $\text{SSB} \geq \text{MSST}$*. The extension* b *indicates expected values (deterministic) from the base run; the extension* med *indicates median values from the stochastic projections.*

Year	R_b	R_{med}	F_b	F_{med}	S_b (mt)	S_{med} (mt)	L_b (n)	L_{med} (n)	L_b (GW)	L_{med} (GW)	$P(\geq \text{MSST})$
2019	294	247	0.27	0.29	19	18	56	57	457	457	0.600
2020	296	247	0.23	0.25	19	18	51	52	414	414	0.603
2021	297	247	0.21	0.23	20	19	50	50	403	403	0.612
2022	299	245	0.21	0.18	21	19	51	42	418	339	0.633
2023	301	252	0.21	0.18	21	19	53	44	435	359	0.672
2024	302	253	0.21	0.18	22	20	54	46	448	377	0.708
2025	303	257	0.21	0.18	22	20	55	47	458	392	0.740
2026	304	261	0.21	0.18	23	20	56	48	466	402	0.766

Table 4. Projection results with fishing mortality rate fixed at $F = 0.75F_{\mathrm{MSY}}$ starting in 2022 and projecting forward to 2026. From 2019 to 2021 landings were fixed and the corresponding fishing mortality rates were estimated in the projection analysis. R = number of age-1 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt), L = landings expressed in numbers (n, in 1000s) or gutted weight (GW, in 1000 lb*), P(≥* MSST*)= proportion of stochastic projection replicates with* SSB ≥ MSST*. The extension* b *indicates expected values (deterministic) from the base run; the extension* med *indicates median values from the stochastic projections.*

Year	R_b	R_{med}	F_b	F_{med}	S_b (mt)	S_{med} (mt)	L_b (n)	L_{med} (n)	L_b (GW)	L_{med} (GW)	$P(\geq$ MSST)
2019	294	245	0.27	0.29	19	18	56	57	457	457	0.602
2020	296	248	0.23	0.25	19	18	51	52	414	414	0.605
2021	297	246	0.21	0.23	20	19	50	50	403	403	0.613
2022	299	248	0.22	0.20	21	19	54	45	442	363	0.633
2023	301	250	0.22	0.20	21	19	56	47	456	384	0.668
2024	302	252	0.22	0.20	22	19	56	48	466	398	0.701
2025	302	258	0.22	0.20	22	20	57	49	473	408	0.730
2026	303	257	0.22	0.20	22	20	58	50	479	414	0.754

Figure 1. Plots of SSB*, landings, recruits, F, and the probability that* SSB > MSST *for projections with fishing mortality rate fixed at* $F = F_{\mathrm{MSY}}$*. In all panels except the bottom right, expected values (base run) represented by solid lines with solid circles, medians represented by dashed lines with open circles, and uncertainty represented by thin lines corresponding to* 5^{th} *and* 95^{th} *percentiles of replicate projections. Solid horizontal blue lines mark* MSY*-related quantities; dashed horizontal green lines represent corresponding medians. Spawning stock (SSB) is at time of peak spawning. In the bottom right panel, the curve represents the proportion of projection replicates for which SSB exceeds the replicate-specific* MSST*.*

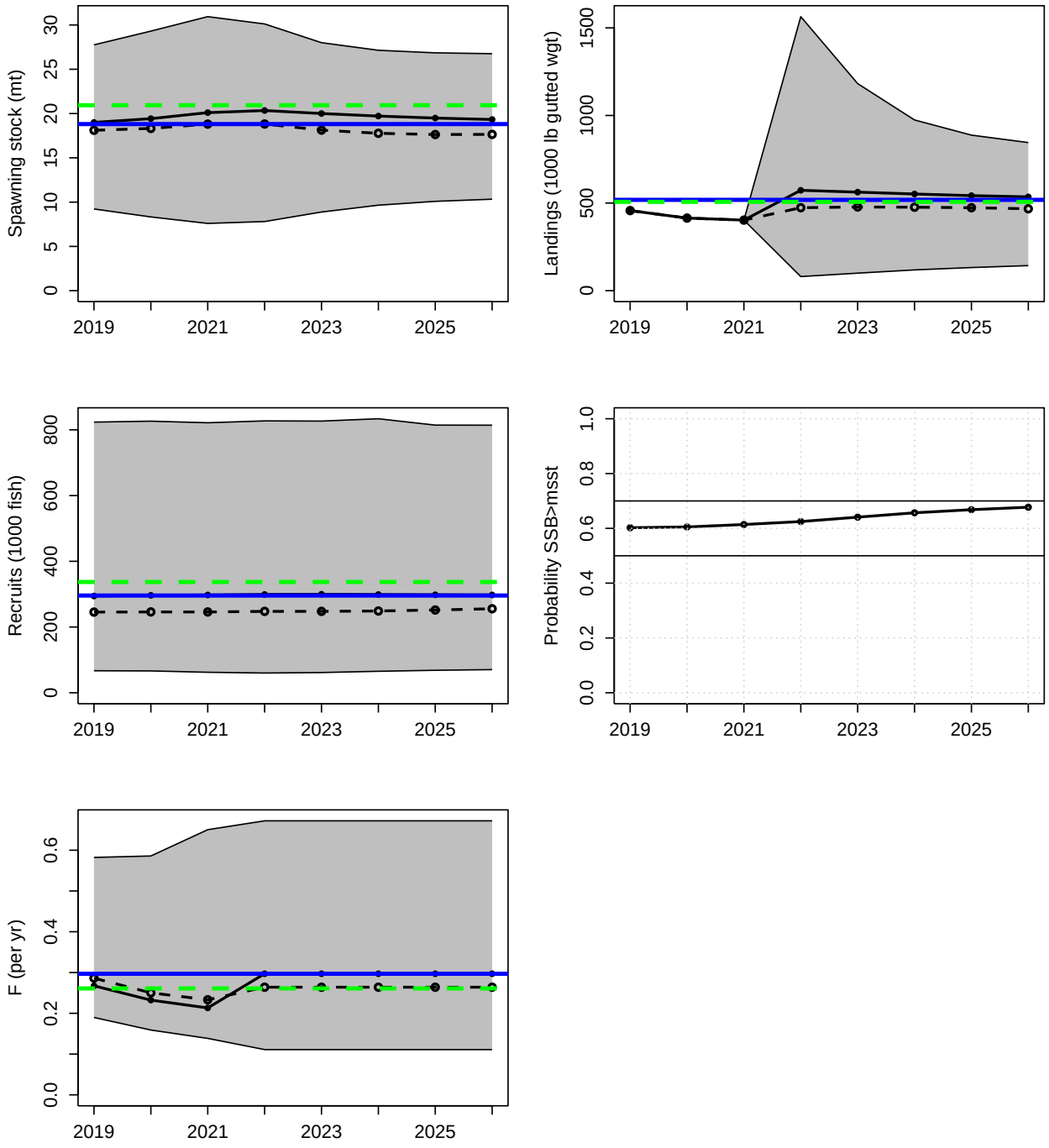

Figure 2. Plots of SSB*, landings, recruits, F, and the probability that* SSB > MSST *for projections with fishing mortality rate at fixed F that provides* $P^* = 32.5\%$*. In all panels except the bottom right, expected values (base run) represented by solid lines with solid circles, medians represented by dashed lines with open circles, and uncertainty represented by thin lines corresponding to* 5^{th} *and* 95^{th} *percentiles of replicate projections. Solid horizontal blue lines mark* MSY*-related quantities; dashed horizontal green lines represent corresponding medians. Spawning stock (SSB) is at time of peak spawning. In the bottom right panel, the curve represents the proportion of projection replicates for which SSB exceeds the replicate-specific* MSST*.*

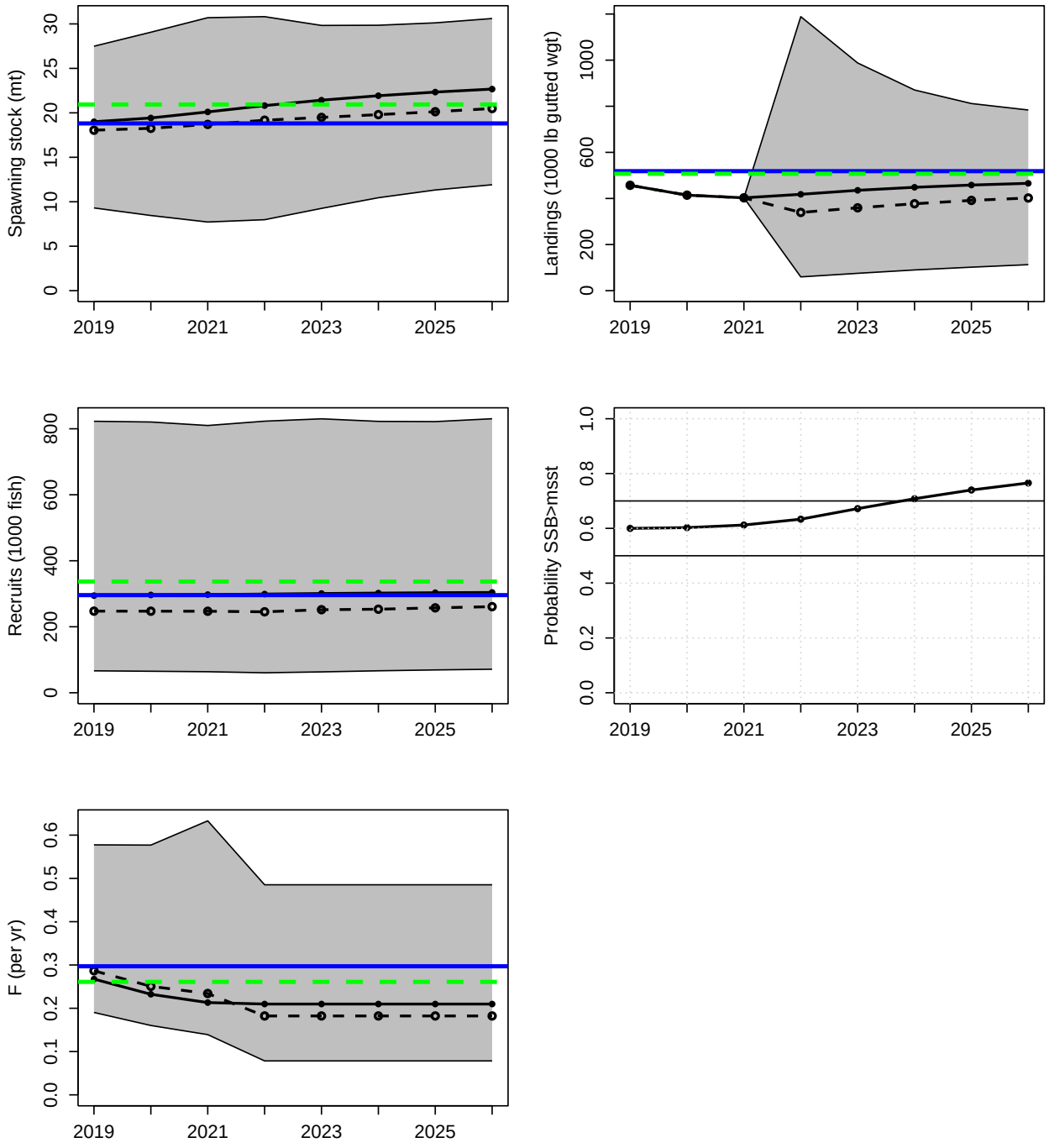

Figure 3. Plots of SSB*, landings, recruits, F, and the probability that* SSB > MSST *for projections with fishing mortality rate fixed at* $F = 75\%F_{\mathrm{MSY}}$*. In all panels except the bottom right, expected values (base run) represented by solid lines with solid circles, medians represented by dashed lines with open circles, and uncertainty represented by thin lines corresponding to* 5^{th} *and* 95^{th} *percentiles of replicate projections. Solid horizontal blue lines mark* MSY*-related quantities; dashed horizontal green lines represent corresponding medians. Spawning stock (SSB) is at time of peak spawning. In the bottom right panel, the curve represents the proportion of projection replicates for which SSB exceeds the replicate-specific* MSST*.*