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:*

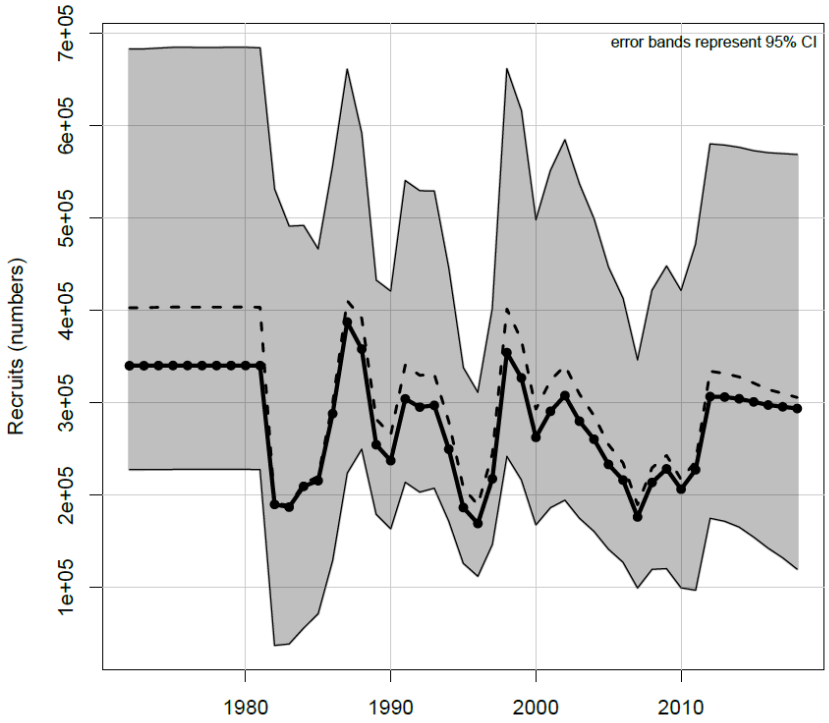


Figure 1. Estimated time series of recruitment. Shaded region represents 95% confidence bands from the MCBE runs (n = 4050). Solid line represents point estimates from the BAM base run; dashed line represent median from the MCBE runs.

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.

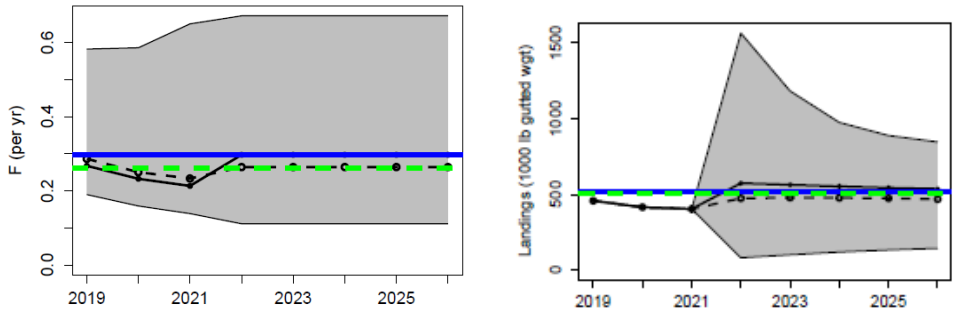
- *Truncation of the commercial longline index to 2006 leaves this assessment without a highly informative index of abundance in the latter years of the assessment when index information is needed most to inform estimation of recent recruitment. The SSC noted that management actions have unintentionally 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?

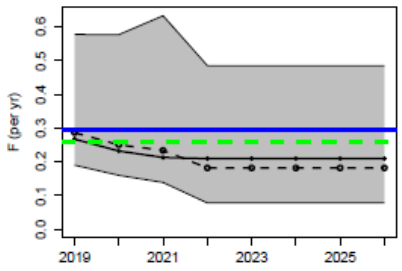
- ❖ *Yes, the methods of addressing uncertainty are consistent with SSC expectations and the available information.*
- ❖ *Standard MCBE practices were used to characterize uncertainty.*

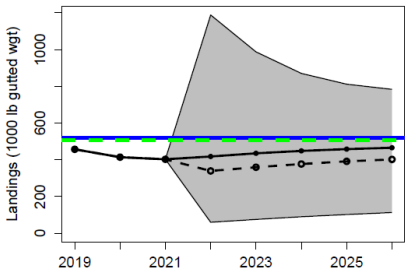
- Provide fishing level recommendations
  - ❖ *The SSC recommends an OFL based on P*= 50%*
  - ❖ *To set the ABC, the SSC recommends a total adjustment to the OFL of 17.5% resulting in a P* of 32.5% (50-17.5)*
    - *Assessment Tier – 2 (2.5% adjustment) given that steepness was specified as a model 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	