7. RED GROUPER ASSESSMENT REVIEW

7.1. Documents

Attachment 11. SEDAR 53 SAR, Red Grouper
Attachment 12. Projections from SEDAR 19
Attachment 13. Assessment Overview Presentation*
Attachment 14. ABC Control Rule

7.2. Presentation

Assessment Overview: Dr. Kyle Shertzer, SEFSC

7.3. Overview

The Committee is asked to review the Red Grouper Standard assessment prepared through SEDAR 53 and provide fishing level recommendations (Attachment 11).

Red Grouper was assessed in SEDAR 19, and was determined to be overfished and experiencing overfishing. This led to the Council developing a rebuilding plan in Amendment 24. Rebuilding began in 2011 and ends in 2020. The SSC set ABC equal to the yield at the F value which results in a 70% chance of the stock rebuilding to SSB_{MSY} by 2020 ($F_{Rebuild}$). The Council chose the yield at 75% of F_{MSY} for the rebuilding plan since this value was below $F_{Rebuild}$. The yield at F_{MSY} was set as the OFL for the stock. The projections for Red Grouper in SEDAR 19 predicted the stock rebuilding to SSB_{MSY} with a 50% probability by 2016 and an 81% probability by 2020 under the chosen rebuilding strategy (Attachment 12).

7.4. Action

- Review assessment
  - Does the assessment address the ToRs to the SSCs satisfaction?
  - Does the assessment represent Best Scientific Information Available?
  - Does the assessment provide an adequate basis for determining stock status and supporting fishing level recommendations?
- Identify and discuss assessment uncertainties
  - Are key uncertainties identified, and if not, indicate additional uncertainties and comment on their possible impacts on the assessment and fishing level recommendations
  - Are risks and consequences of uncertainties identified and evaluated? Summarize the major uncertainties.
  - Are methods of addressing uncertainty consistent with SSC expectations?
  - List and comment on the effects of those uncertainties that most contribute to risk and impact status determinations and future yield predictions.
  - Is adequate rebuilding progress being made? Comment on reasons why progress differs from projections.
- Provide fishing level recommendations
  - Apply the ABC control rule and complete the fishing level recommendations table.
- Provide advice on monitoring the stock until the next assessment
  - What indicators or metrics should the council monitor and could the SSC evaluate to evaluate the stock until the next assessment?
  - Is there a recommended trigger level for these metrics? How should the Council respond if a trigger is activated?
- 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.
  - Provide any additional research recommendations the SSC believes will improve future stock assessments.
  - Provide guidance on the next assessment, addressing its timing and type.

SSC RECOMMENDATIONS:

- Review assessment
  - Does the assessment address the ToRs to the SSCs satisfaction?
    - *The ToRs were addressed to the satisfaction of the Committee.*
  - Does the assessment represent Best Scientific Information Available?
    - *This assessment represents BSIA.*

- Does the assessment provide an adequate basis for determining stock status and supporting fishing level recommendations?
  - *Overall, the assessment is robust given the consistency in model outputs (estimates of stock size, fishing mortality, and recruitment) in all of the sensitivity runs.*
  - *This assessment provides an adequate basis for determining stock status and supports fishing level recommendations.*

- Identify and discuss assessment uncertainties
  - Are key uncertainties identified, and if not, indicate additional uncertainties and comment on their possible impacts on the assessment and fishing level recommendations
    - *Public comment suggested that episodic larval transport or movement of older stages from the Gulf into the South Atlantic may have caused the high recruitment levels seen in the SEDAR 53 assessment, such as the recruitment spike in 2003-2004. A 2004 genetic study found that there was no genetic difference between the Gulf of Mexico stock and the South Atlantic stock, suggesting there is enough mixing between the Gulf and South Atlantic to cause genetic homogeneity. In other words, although the information available is incomplete and no formal analysis has been conducted, some lines of evidence seem to point to the fact that the dynamics of Red Grouper in the South Atlantic Region is not completely independent of episodic inputs from the Gulf. Although at this point the SSC considers this just as a working hypothesis, this might explain the fact that Red Grouper SSB has been under SSB_{MSY} and F above F_{MSY} for pretty much the entire time series used in this assessment.*
    - *The causes and periodicity of the episodic high recruitment events are unknown, and a source of uncertainty in this assessment and the projections. Sensitivities were run removing the highest recruitment spikes, showing little effect to stock status and model estimates. Multiple recruitment scenarios were presented, attempting to address this recruitment uncertainty in the projections.*
    - *Uncertainties in parameters such as M and h are well characterized within the MCB analysis.*
    - *Although uncertainty in landings is characterized in the MCB analysis, a CV was used that is smaller than the actual CV of the data. This resulted in an overly narrow range of uncertainty.*
    - *There is uncertainty due to unmeasured effects of lionfish.*
    - *Although the level of exploitation during the earlier part of the time series do not match the trajectory of the SSB, the value of F_{MSY} in this assessment was computed from the terminal years of*

the assessment. This value will be different in different periods of selectivity back in time.

- *The selectivity of the Chevron Trap survey was changed from dome-shaped to flat-topped based on analyses that had not been conducted during the previous assessment. This changed the magnitude of the peaks and valleys in the index.*

- Are risks and consequences of uncertainties identified and evaluated? Summarize the major uncertainties.
- Are methods of addressing uncertainty consistent with SSC expectations?
  - *The SSC agrees that the uncertainties were addressed in a manner consistent with the Committee's expectations.*
- List and comment on the effects of those uncertainties that most contribute to risk and impact status determinations and future yield predictions.
  - *Recruitment levels in the years after the SEDAR 19 stock assessment were lower than predicted by the SEDAR 19 stock-recruitment curve. Alternative recruitment strategies are needed and were provided in the SEDAR 53 assessment.*
  - *Due to the low variability in the rest of the recruitment time series, the effect of the occurrence of the two recruitment spikes is relatively small, as demonstrated in the Spawner-Recruit plots.*
- Is adequate rebuilding progress being made? Comment on reasons why progress differs from projections.
  - *Rebuilding has not progressed as projected in SEDAR 19 due to lower than expected recruitment since the terminal year of SEDAR 19. In retrospect, the projections from SEDAR 19 used an overly optimistic level of recruitment that was not realized.*
  - *The exploitation rate has remained above F_{MSY} since the terminal year of SEDAR 19, adding to the decline in SSB and lack of progress in stock rebuilding.*
  - *Uncertainty in connectivity between Gulf and South Atlantic and episodic recruitment might lead to incorrect conclusions on status. Recruitment from the Gulf, or inestimable episodic recruitment, can cause the model to underestimate or overestimate stock productivity at MSY levels, which can lead to false determinations of overfishing and being overfished or can cause the model to estimate a healthy population when it is overfished.*

- Provide fishing level recommendations
  - Apply the ABC control rule and complete the fishing level recommendations table.
    - *Level I. Assessment Information: 2 (2.5%)*
    - *Level II. Uncertainty Characterization: 2 (2.5%)*

- *Level III. Stock Status: 4 (7.5%)*
- *Level IV. PSA: 3 (10%)*
- *Overall correction: 22.5%*
- *P* = 27.5%*
- *$P_{Rebuild}$ = 72.5%*
- *The projections show rebuilding is not possible within the current rebuilding timeline (ending in 2020), even under an F=0 scenario.*
- *Under the low recruitment scenario, the projections show rebuilding is not possible under an F=0 scenario out to 2030.*
- *When management starts in 2019, rebuilding with a fishery present is only possible beyond 2030. The stock is predicted to rebuild by 2032 with a 50% probability at F=75% F_{MSY}. Under the SSC's $P_{Rebuild}$, the predicted year of rebuilding is 2037. This is under the assumption that recruitment has returned to the average level by 2019.*

- Provide advice on monitoring the stock until the next assessment
  - What indicators or metrics should the council monitor and could the SSC evaluate to evaluate the stock until the next assessment?
    - *Close monitoring of discards and indices of age-1 fish to give an indication of recruitment.*
    - *Increased landings may indicate a higher abundance of Red Grouper, especially since current landings of both the commercial and recreational sectors are significantly below their ACLs*
    - *Need to combine the monitoring of landings with the fishery distribution. The Fishery Performance Reports may be very helpful here.*
    - *Size and age structure of catch and survey.*
    - *Need to protect SSB until higher recruitment is realized.*
  - Is there a recommended trigger level for these metrics? How should the Council respond if a trigger is activated?

- 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.
  - Provide any additional research recommendations the SSC believes will improve future stock assessments.
    - *A review of stock structure and early life history is needed to account for recruitment and connectivity between the Gulf of Mexico stock and the South Atlantic stock.*
    - *Compare age structure of Red Grouper between northern areas and southern areas in the South Atlantic.*

- *Explore the episodic recruitment events for Red Grouper and investigate if these events co-occur for other species in the South Atlantic. In particular, the 2003-2004 recruitment events that followed Hurricane Charlie may indicate immigration of several species from the Gulf of Mexico after such events.*
- *Examine annual changes in sex ratio and size/age at maturity and transition.*
- *Investigate other methods to estimate M.*

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

- *Due to the status of the stock and recent low recruitment, an Update or Standard assessment (based on the availability of new information) should be performed within the next 3-5 years.*
- *This recommendation is contingent on successful completion of some of the research recommendations to advance the knowledge of this species.*

Table 3. Red Grouper Recommendations

Criteria	**Deterministic**	**Probabilistic**
Rebuilding evaluation (SSB/SSB_{MSY})	0.29	0.27
Overfished evaluation (SSB/MSST)	0.38	0.37
Overfishing evaluation	1.54	1.58
MFMT (F_{MSY})	0.12	0.13
SSB_{MSY} (1000 lbs. total mature biomass)	7,018	6,934
MSST (1000 lbs, 75% SSB_{MSY})	5,264	5,201
MSY (1000 lbs.)	794.3	806.7
Y at 75% F_{MSY} (1000 lbs.)	772.0	779.7
ABC Control Rule Adjustment	22.5%	
P-Star	27.5%	
P-Rebuild	72.5%	
M (Average across ages)	0.14	

- *The above table reflects the output from the SEDAR 53 assessment model. For stock status and management reference points, the Deterministic estimates should be used. Projection streams for OFL and ABC were not provided here for several reasons.*

  i. There are two recruitment scenarios presented and two different years for when management could take affect for this stock.

ii. Red Grouper is in a rebuilding plan and per all the projection runs, none of them will rebuild the stock within the current rebuilding timeframe. Therefore, the Council will need to implement a new rebuilding plan for Red Grouper for new projections to be run.

iii. The SSC can recommend a probability of rebuilding success, but it is the Council that ultimately decides on what that probability of success will be.