NCDMF Stock Assessment Program
External Peer Review

Assessment Information

Assessment Species:	Southern flounder (*Paralichthys lethostigma*)
Stock Assessment Report:	Stock Assessment of Southern Flounder, *Paralichthys lethostigma*, in North Carolina Waters—2014
Date Sent:	November 10, 2014

Dear Reviewer-

Thank you for agreeing to review the 2014 stock assessment of the North Carolina southern flounder stock. The purpose of the external peer review process is to ensure that the assessment and results presented are scientifically sound and that decision makers are provided adequate advice. Peer reviewers are asked to address the terms of reference in the terms of reference report that follows. Please be as specific as possible in recording your comments and suggestions for revision and improvement. Any additional suggestions to improve the stock assessment are appreciated. Reviewers are also welcome to make comments directly in the assessment report using the Track Changes feature in Microsoft Word.

Please return this form, the terms of reference report, and any additional comments to laura.lee@ncdenr.gov. We would like to have your review by December 5, 2014. A copy of the final report will be provided after it has been presented to the North Carolina Marine Fisheries Commission.

Thank you,

Laura M. Lee
Senior Stock Assessment Scientist
North Carolina Division of Marine Fisheries

TERMS OF REFERENCE REPORT FOR EXTERNAL PEER REVIEW

Reviewer Information

Reviewer Name:	Steve Midway
Business Mailing Address:	Bio Dept., Coastal Carolina University, Conway, SC 29528
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1) Evaluate the thoroughness of data evaluation and presentation including:
   a) Justification for inclusion or elimination of available data sources

      Overall I thought the use of data was well presented and all efforts were made to include relevant data. Obviously when merging several data sources into one assessment there will be questions, but I have no major comments on the data sources and refer to my minor comments and questions in the text.

   b) Consideration of survey and data strengths and weaknesses (e.g., temporal and spatial scale, gear selectivities, sample size)

      The main strength I see is the diversity of sampling programs that capture southern flounder, which not only helps describe a wider size/age range, but also permits increased inference (even when some programs, like larval sampling, are excluded). Obviously a weakness is the lack of (survey) data for offshore adults who have either moved offshore seasonally or are permanent offshore residents (and the distinction is important, too). Clearly this demographic will need future efforts toward description to address major questions about life history, habitat use, and spatial dynamics beyond the unit stock.

   c) Calculation and standardization of indices and other statistics

      I'm less familiar with standard methods for calculation of indices, and would defer to the comments of other reviewers. However, I have made some minor comments throughout the text where I was unclear or uncertain about a specific aspect of estimation or statistical procedures.

2) Evaluate the adequacy, appropriateness, and application of data used in the assessment.

   Again, the offshore adults is a lingering question for this species; however, I was impressed with the changes made from the previous assessment. I think based on the existing sampling programs used and substantial improvements made in this assessment, the data are adequate and appropriate for an improved assessment of southern flounder.

3) Evaluate the adequacy, appropriateness, and application of method(s) used to assess the stocks.

   Coming into this review I was unfamiliar with Stock Synthesis. However, based on the description of this method (both in the assessment text and from the citations) it appears to be

a good choice for this species, namely in its generation of uncertainty and accommodation of selectivity patterns for multiple sampling programs, which is clearly the case. The flexibility of Stock Synthesis (i.e., use with varying amounts and types of data) also would appear to be something that is a strength as southern flounder assessment could potentially stay with this model in future assessments (as opposed to changing assessment models each assessment).

4) Evaluate the methods used to estimate stock status determination criteria. Evaluate the adequacy and appropriateness of recommended stock status determination criteria.

   Obviously based on the information and rates presented in Section 4, the designation of overfished with overfishing occurring makes sense. However, I would like to see more effort made to reconcile the historically high *F* values and extremely low SPR with the fact that biomass has not appreciably varied over 2 decades. For at least 10 years, *F* was 2–3x the threshold value, yet biomass did not perceptibly respond (decline), nor has it in the most recent decade of continued overfishing. (And most of the abundance indices are variable, but not strongly declining.) I have thought about this before, and would direct you to Chapter 4 (http://sites.psu.edu/fishresearch/wp-content/uploads/sites/10599/2014/03/Midway-Dissertation.pdf). I don't think the answer is explicit in this chapter, but without a reliable stock-recruit relationship some type of larval subsidy is perhaps the most parsimonious answer regarding the persistence and stability of biomass in the face of very high harvest. (I will also note that this chapter is in preparation for submission to a peer-reviewed journal, and I should soon be able to provide a revised version of the population modeling presented in the dissertation.) So, to circle back to the question, I think the stock status determination is analytically defensible, but needs continued thought.

5) Does the stock assessment provide a valid basis for management for at least the next five years given the available data and current knowledge of the species stock dynamics and fisheries?

   ○ Yes

   ○ No

   Comment on response.

   I have selected Yes, but the circle does not fill in electronically. While questions remain, I see this assessment as both the best available information for managing the NC unit stock of southern flounder, as well as advancement from previous assessments.

6) Evaluate appropriateness of research recommendations. Suggest additional recommendations warranted, clearly denoting research and monitoring needs that may appreciably improve the reliability of future assessments.

   Overall, the research recommendations are comprehensive and appropriate. One minor recommendation I might put forth would be to consider the squash-mount maturity preparations/slides that were extremely precise in classifying maturity stages in southern flounder (see Midway et al. 2013). In addition to the utility of the method presented in the paper, I have had discussions with multiple biologists at SCDNR who are successfully

exploring this approach for other species. This method does not rely on histology, yet produces near-histological quality data with minimal effort.

Continuing to elucidate patterns of inshore habitat use, demographics, and harvest (and discards, etc.) is important, but I think that focusing on recommendations 7–9 will serve the critical mission of completing the understanding of the southern flounder life cycle and inform the assessment process more than other areas. (That being said, I know these are likely the most difficult research objectives in addition to the fact that they have been recently worked on.) I would also encourage you to reference the dissertation chapter linked above for my attempt at your Analysis recommendation. In the coming weeks/months as I prepare this chapter for submission, I would be happy to have a discussion with NCDMF for your thoughts on my approach, and how it might be improved and potentially used in this assessment document.

7) Are you aware of any reference material not cited in this report that should be included?

References seem comprehensive and largely match the literature I have used for southern flounder.

8) Would you be willing to act as an external peer reviewer for a future NCDMF stock assessment?

○ Yes

○ No

Again, Yes, but the bubble is not active.

9) Do you have any additional comments?

Overall, I wish I were able to comment more thoroughly on the assessment model; however, my knowledge of assessment models is more academic than practical. I trust other reviews are more assessment-minded and have provided good comments. I do feel qualified to comment on the biology of the species, and in general this assessment, to me, presents a significant step forward with respect to integrating biology into the assessment.