Observations and Recommendations from the SEDAR 28 Assessment Workshop

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Executive summary

A CIE contractor was employed to observer the assessment workshop, held in Miami, Florida, for Gulf of Mexico and South Atlantic Spanish Mackerel and Cobia as part of the SEDAR 28 process. During the Assessment workshop two groups, NMFS in Beaufort and Miami, came together to discuss model formulation and to explore aspects of surplus production, length-based, and age based cohort analysis. However, finalized data were not available to the analysts until just prior to the meeting. Despite the hard work of participants and staff, the lack of base runs made for a highly inefficient and frustrating meeting. Additionally the lateness of the data resulted in a delay of the process. These inefficiencies were further compounded by a lack of meeting leadership. To address these difficulties and to help avoid further problems, a number of observations are described and some recommendations are proposed.

Description of activities and Summary

The SEDAR 28 Assessment Workshop was held May 7th-11th, 2012 in Miami, Florida. The stocks under assessment at SEDAR 28 include Cobia and Spanish mackerel for both the SE US (South Atlantic) and the Gulf of Mexico; a total of four stocks. The assessment team comprised of two Main groups; those from NMFS Beaufort, NC and those from NMFS Miami, FL.

The general format for most SEDAR assessments is to first conduct a data workshop (held earlier this year), followed by an assessment workshop (this meeting), with a peer review scheduled later in the year. After the assessment process and findings from the peer review are finalized, that information is then passed to the respective management council's Scientific and Statistical committees who further deliberate on quotas and or management measures to be implemented.

During the assessment workshop, each team presented assessments for their respective stock and gathered comments from all present (excluding this observer). After gathering comments and suggestions each group would go back and make changes during the overnight or one of the many work sessions.

Each stock had at least two modeling approaches applied. Generally approaches consisted of a type of equilibrium surplus production model (ASPIC) and either a length (SS3) or age (BAM) based cohort analysis using maximum likelihood estimators (as outlined below). Bayesian alternatives were not suggested nor discussed.

Area	Species	Method
South Atlantic	Spanish Mackerel	BAM
		ASPIC
	Cobia	BAM
		ASPIC
Gulf of Mexico	Spanish Mackerel	Stock Synthesis 3
		ASPIC
	Cobia	Stock Synthesis 3
		ASPIC

By the end of the assessment workshop, however, ASPIC was dropped for both Gulf of Mexico Spanish Mackerel as well as South Atlantic Cobia. Further a number of problems were apparent in both SS3 and well as the BAM models. For example convergence issues still plague the SS3 configuration for Gulf of Mexico Spanish Mackerel, while the BAM model, if not highly constrained, is hitting bounds for South Atlantic Cobia. Further the group has started to explore other options for South Atlantic Cobia; including catch curve and other, more simplistic and less data hungry approaches.

It is nearly impossible to comment on the technical merits of the remaining model formulations given the difficulties encountered during this workshop. It became clear in the first few hours of the meeting on Monday the 7th that tangible results from this workshop were not going to materialize. Analysts had not gotten final 2011 data until the Friday before, after the close of business. As a result, neither group was able to have fully formulated base runs completed prior to the start of the meeting.

Additionally the data were not in the correct format needed for easy input into the above modeling approaches. This coupled with a lack of attendance by primary data handlers/analysts painfully slowed progress during the workshop. As a result, between a third and half of the workshop time was spent having the analysts incorporate the data rather than going over model diagnostics, or running sensitivity analyses. Even to date, the groups are still working on estimates of shrimp bycatch, an important mortality source for these stocks.

Progress was also hampered by a lack of meeting leadership. While staff performed admirably and to the best of their ability given their roles, the lack of a strong chair during the meeting resulted in a re-hashing of issues and frustratingly circular debate. While such can be useful in vetting all of the issues, when coupled with the lack of progress due to data difficulties, the leadership void compounded the inefficiencies.

That said, staff and the other participants performed well and professionally given the situation. In the end it was determined that more time was going to be needed between assessment and peer review (approximately 6 weeks) and that much of the work would be conducted via conference call/web meeting given budget constraints.

Recommendations

Again it is nearly impossible to make any recommendations on technical aspects with regard to the assessments. The work continues and what was presented during the workshop may look very different by the time the assessments are ready for review in the early to mid-fall 2012. However, some recommendations on the process and the role of the observer can be made at this time.

Process

It is critical that Assessment workshops not be conducted until the data are fully vetted, analyzed, and made available to the analysts. Assessment workshops should be where models are tested, diagnostics are examined, sensitivity analyses are performed, and consensus on modeling approaches and base runs finalized. This cannot happen if the analyst does not have

preliminary base runs completed prior to the start of the workshop. Analysts cannot complete that work unless the data are in hand and fully incorporated into the analysis well prior to the meeting. *As such, it is recommended that Assessment workshops not be scheduled prior to completion of the data report from the Data Working Group.* Further, adequate time from data working meeting to assessment meeting should account for lateness of the final data report, and subsequent data requests by the analysts. The current SEDAR guidelines suggest at least three months between data and assessment workshop. It is recommended that the guidelines be changed from "meeting" to "final report availability".

One apparent difficulty noted during the workshop was a lack of participation from the primary data handlers. In many other venues those individuals responsible for querying data bases and performing important analyses attend the assessment workshop as well. Often these individuals can provide insight to the modelers and, if need be, re-analyze the raw data at the request of the primary model analyst. These important people were noticeably absent during the meeting, presumably due to budget constraints. The result was that often the primary model analysts had to request data and further modifications from someone in a remote location; who may or may not have been in the office at the time. In short, assessments, despite sophisticated modeling approaches used, are only as good as the data streams going into them. The data are an important element and often need to be manipulated during the assessment workshop. *As such, it is recommended that those responsible for much of the data handling be present at the assessment meeting with their respective raw data.* Such will allow the model analysts the ability to make requests and changes to the data inputs as the need arises.

Lack of strong leadership during the meeting hampered progress. It was clear that further time was lost as a result of circular and tangential discussions. This difficulty can be found in many workshops, but became an added burden given the data difficulties. Staff, while excellent at facilitating the meeting, simply does not have the authority to forge consensus and direct the discussion away from well-meaning, but fruitless areas. *Therefore it is recommended that the primary analyst(s) chair the meeting rather than SEDAR/SAFMC staff.*

<u>CIE participation as observer</u>

From the beginning it was not clear what the goal was for having a CIE observer at the workshop. In the current system CIE reviewers act as independent scientists that review and critique assessments used for management purposes. The purpose of having an "observer" who could not comment or shape the discussion versus their current role is still unclear. However, it should be noted that this may have not been the best assessment to gauge if an observer is worthwhile, given the data difficulties encountered.

If the goal is to increase communication between assessment and review workshops, then the report format and content should be re-appraised. If the goal is to provide expert advice during the assessment workshop, then an independent contractor could assist in model formulation and analysis.

Assuming that the goal was to provide a link between assessment and review workshop, some of that could be accomplished by a more detailed assessment workshop report. Some utility in having an observer, who also serves as reviewer, can be apparent, particularly for complex or

assessments containing a large number of species (ex., The Northeast Grounfish Assessment Review Meeting). Given that, a number of recommendations are outlined below should the need for CIE observers become apparent.

It is recommended that the CIE observer be embedded in the whole process, and not just part of it. Often available models and potential analyses are discussed at the data workshop or the conference calls before and after the assessment workshop. Having an observer only at the assessment defeats the purpose of an observer, as they are only observing a very small part of the process. As such if observation is the goal then the observer should be present at the data workshop, and all conference calls/web meetings.

It is recommended that the report from that observer be made available to the other reviewers with the assessment workshop report. This would allow reviewers to get insight from the observer as to where problems have come up, and how issues to date have been resolved. Further the observer could make suggestions of what diagnostics and sensitivity analyses might be appropriate.

If possible, it is recommended that the primary analysts and the reviewers meet via conference call/web meeting prior to the start of the review workshop. On that call reviewers, after digesting the assessment report and the observer's comments/recommendations, can give suggestions on what diagnostics and sensitivity analyses could be run prior to the review workshop. This would certainly shorten the review workshop, and allow the analysts to have some diagnostics and sensitivity analyses prepared ahead of time; rather than presenting them on Day 2. It should be noted that this will require some restraint on the reviewers/observers part; to not overload the primary analyst prior to the review workshop.

Some final thoughts and personal opinions

Overall it was an enjoyable meeting, despite the difficulties encountered. Staff and both assessment groups did a great job under difficult conditions. Also, I was impressed with the progress made during the meeting. However one has to wonder about the waste of resources, given that much of the time at the meeting was spent doing work that should have been accomplished beforehand. As such this may have not been the best meeting to explore the use of CIE observers.

I am uncertain as to the utility of having CIE observers. While it may be useful under certain limited situations and with some limited reviewers, overall my take was rather negative. As it is inappropriate for an art critic to review a painting in progress, it may be inappropriate for a CIE reviewer to witness the development of an assessment. All that truly matters, in my opinion, is the final product, and not how it was created.

Appendix 1: Statement of Work

Statement of Work for Dr. Matthew Cieri

External expert observer by the Center for Independent Experts

SEDAR 28 South Atlantic and Gulf of Mexico
Spanish mackerel and cobia assessment workshop review

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE expert is selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. The CIE expert is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee. For this contract, the CIE expert will serve as an observer during the SEDAR assessment workshop to provide further scope and context to the subsequent peer review to be conducted during the SEDAR review meeting. This SoW describes the work tasks and deliverable of the CIE expert, and **Annex 1** provides a summary report format for the CIE expert's observations and recommendations from the SEDAR 28 assessment workshop. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description The SEDAR 28 will be a compilation of data, an assessment of the stock, and the assessment review conducted for South Atlantic and Gulf of Mexico Spanish mackerel and cobia. The stocks assessed through SEDAR 28 are within the jurisdiction of the South Atlantic and Gulf of Mexico Fisheries Management Councils and the states of Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina, and North Carolina. The SEDAR review process includes a data workshop, assessment workshop, and assessment review. This contract is for a CIE expert to attend the assessment workshop as an observer. The intent for contracting the CIE observer during the assessment workshop is to provide additional scope and context from the SEDAR 28 assessment workshop schedule 7-11 May 2012 for the subsequent CIE peer review to be conducted at the SEDAR 28 review scheduled in August 2012. During this contract, the CIE observer shall not participate in any manner with the development of the science and shall not serve as a peer reviewer during the SEDAR 28 assessment workshop. During the SEDAR assessment workshop, an Assessment Panel will be conducting analyses, error corrections and sensitivity runs for the assessment. The CIE observer shall not be involved with providing any feedback to the Assessment Panel as it makes assumptions and models the data during the assessment workshop process. However, the CIE observer shall write a summary of observations and recommendations from the assessment workshop, and this summary shall be attached to the CIE expert's independent peer review report resulting from the subsequent

SEDAR 28 review scheduled in August 2012. The CIE expert will serve as an observer during the SEDAR 28 assessment workshop, and the agenda for the SEDAR 28 assessment workshop is attached as **Annex 2**. The Terms of Reference (ToRs) are attached in **Annex 3** to provide background information for the SEDAR 28 assessment workshop.

Requirements for the CIE Observer: The contract is for one CIE expert who shall attend as an observer in the SEDAR 28 assessment workshop scheduled in Miami, Florida during 7-11 May 2012. The intent for contracting the CIE observer is to provide scope and context for the CIE peer review scheduled at a later date. During this contract, the CIE observer shall not participate in any manner with the development of the science and shall not serve as a peer reviewer during the SEDAR 28 assessment workshop. A subsequent contract will require this CIE expert to participate and conduct peer review during the SEDAR 28 assessment review scheduled in Atlanta, Georgia during 6-10 August 2012.

The CIE observer shall be thoroughly familiar with various subject areas involved in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the primary task of providing peer-review advice in compliance with the workshop Terms of Reference. The CIE observer's duties shall not exceed a maximum of 10 days to complete all work tasks described herein.

Location of tasks associated with the SEDAR 28 assessment workshop: The CIE observer shall attend the SEDAR 28 assessment workshop scheduled in Miami, Florida during 7-11 May 2012.

Statement of Tasks: The CIE observer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE observer selection by the CIE Steering Committee, the CIE shall provide the CIE observer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE observer with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the SEDAR 28 assessment workshop meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the meeting.

Foreign National Security Clearance: If the CIE observer is required to attend the meeting held at a government facility, the NMFS Project Contact will be responsible for obtaining the Foreign National Security Clearance approval for the CIE observer if the observer is a non-US citizen. For this reason, the CIE observer shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control

Program NAO 207-12 regulations available at the Deemed Exports NAO website:
http://deemedexports.noaa.gov/
http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html

Pre-review Background Documents: Two weeks before the meeting, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE observer the necessary background information and reports to prepare for the meeting. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE observer is responsible only for the pre-review documents that are delivered in accordance to the SoW scheduled deadlines specified herein. The CIE observer shall read all documents designated as mandatory reading in preparation for the meeting.

SEDAR 28 assessment workshop meeting: The CIE observer shall attend the SEDAR 28 assessment workshop scheduled in Miami, Florida during 7-11 May 2012. The CIE observer shall make the necessary observations to provide additional scope and context to the following SEDAR 28 review scheduled in Atlanta, Georgia during 6-10 August 2012. However, the CIE observer shall not participate in any manner with the development of the science and shall not serve as a peer reviewer during the SEDAR 28 assessment workshop. The NMFS Project Contact is responsible for providing necessary meeting information to the CIE observer. The NMFS Project Contact is also responsible for ensuring that the Chair understands the contractual role of the CIE observer as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any meeting arrangements for the CIE observer.

Contract Deliverables – Addendum to the independent CIE Peer Review report: The CIE expert shall complete a summary of observations and recommendations from the SEDAR assessment workshop during 7-11 May 2012, and this summary will be attached as an addendum to the CIE expert's independent peer review report resulting from the SEDAR review in 6-10 August 2012.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material provided by the NMFS Project Contact in advance of the assessment workshop.
2) Attend as an observer during the SEDAR 28 assessment workshop in Miami, Florida during May 7-11, 2012.
3) Produce a summary of observations and recommendations from the SEDAR 28 assessment workshop.
4) This summary will be attached as an addendum to the independent CIE peer review report from the SEDAR 28 review scheduled in Atlanta, Georgia during August 6-10, 2012 (the CIE observer will be contracted to participate as a CIE peer reviewer during the SEDAR 28 review).
5) No later than August 24, 2012, the CIE expert submit the summary as an addendum to the independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to

shivlanim@bellsouth.net, and Dr. David Sampson, CIE Regional Coordinator, via email to david.sampson@oregonstate.edu.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

2 April 2012	CIE sends the selected CIE expert contact information to the COTR, who then sends this to the NMFS Project Contact
30 April 2012	NMFS Project Contact sends the CIE expert the pre-meeting documents
7-11 May 2012	The CIE expert attends as an observer during the SEDAR 28 assessment workshop in Miami, Florida
30 May 2012	The CIE expert submits a summary of observations and recommendations from the SEDAR 28 assessment workshop to the CIE Lead Coordinator and CIE Regional Coordinator; the CIE steering committee will review this as an addendum to the CIE peer review report in September.
6-10 August 2012	The CIE expert will participate as a peer reviewer during the SEDAR review scheduled in Atlanta, Georgia (this will be a subsequent contract)
12 September 2012	The CIE summary from the SEDAR 28 assessment workshop will be attached as an addendum to the independent peer review report resulting from the SEDAR 28 review (as specified in the subsequent contract)

Modifications to the Statement of Work: This 'Time and Materials' task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council's SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE expert to complete the deliverable in accordance with the SoW is not adversely impacted.

Acceptance of Deliverables: The CIE summary from the SEDAR assessment workshop shall be attached as an addendum to the CIE independent peer review report resulting from the SEDAR review. The report will be reviewed by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, and then the final report shall be sent to the COTR for final approval as the contract deliverable. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverable to the COTR (William Michaels, via William.Michaels@noaa.gov).

Distribution of Approved Deliverables: Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE report in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

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Key Personnel:

NMFS Project Contact:

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Annex 1: Format for the CIE observer's summary report

SEDAR 28 South Atlantic and Gulf of Mexico
Spanish mackerel and cobia assessment workshop review

Executive summary

1. Description of activities

2. Observations and findings
    a. Summary of items discussed at meeting
    b. Observations on the technical quality of assessment
    c. Observations on the process used in developing and improving the assessment
    d. Other observations

3. Recommendations
    a. Recommendations as related to the assessment
    b. Recommendations as related to the assessment process
    c. Recommendations on the use of a CIE observers

Annex 2. Tentative SEDAR 28 assessment workshop agenda with daily schedule and tasks. Gulf and South Atlantic Cobia and Spanish Mackerel Assessment Workshop Goals: (1) resolve any data issues and document data changes; (2) select base model and sensitivity configurations; (3) estimate population parameters; (4) select preferred model; (5) develop projections; (6) estimate SFA benchmarks and evaluate stock status; (7) prepare a 1st draft Assessment Workshop report;

	Monday, May 7	**Tuesday, May 8**	**Wednesday, May 9**	**Thursday, May 10**	**Friday, May 11**
Daily Overview	*Review & resolve data issues, present initial models.*	*Approve continuity runs & base configuration; ID sensitivity runs.*	*Evaluate sensitivities; select preferred run; projection & benchmark methods*	*Compare & contrast models; SFA parameters & Status Determination*	*Review results & conclusions in draft reports; Research recommendations.*
AM I 8:00 – 9:45		1. Finish model presentations 2. Continuity Model Presentations	Discussion - compare models and review new information	- Consensus, preferred, Status determination	Continue discussions…
9:45 - 10:00	***AM Break***				
AM II 10:00 - 11:30		Discussion - continuity - base configurations	Discussion - compare models and review new information	Depending on progress – discuss uncertainty, projections	- Make research recommendations - Wrap up
11:45 - 1:00	***LUNCH***				
PM I 1:00 – 3:30	1. Introduction 2. Data review 3. Model Presentations	Discussion - continuity - base configurations	Discussion - compare models and review new information	Continue discussions…	**ADJOURN by 1:00 PM**
3:30-3:45	***PM BREAK***				
PM II 3:45 - 5:30	1. Continue Model presentations	Discussion - sensitivities - precision & uncertainty	- Finalize base run, sensitivities	Continue discussions…	
Milestones	1. Final data decisions 2. Assign roles & tasks	1. Base configuration 2.Sensitivity/Uncertainty run list	Preferred models. Consensus Discussion Stock Status	Stock Projections.	1. **Final base run and sensitivities** 2. **All files on server**
Homework	Review Materials Data Section text	Finish Base & Continuity Runs. Sensitivity Runs.	Final preferred runs.	Any final runs.	

Annex 3: Terms of Reference

SEDAR 28 South Atlantic and Gulf of Mexico
Spanish mackerel and cobia assessment workshop review

The terms of reference for the SEDAR 28 assessment workshop will be provided to the CIE observer as background information.

Center for Independent Experts

SEDAR 28 Review Workshop

South Atlantic Spanish Mackerel and Cobia

Matthew D. Cieri

Executive Summary

The SEDAR 28 Review Panel Workshop was held in Atlanta Georgia The Week of October 29th 2012. Prior to this meeting there initially were supposed to be four stocks under consideration: Gulf of Mexico and South Atlantic Spanish Mackerel and Gulf of Mexico and South Atlantic Cobia. All Gulf of Mexico stocks were removed from review a few weeks prior to the review.

Both Spanish mackerel and Cobia used a statistical catch at age model called the Beaufort Assessment Model (BAM) as a primary tool. However both assessments also had alternative runs using a surplus production approach (ASPIC) as a secondary method. The Cobia assessment in addition had a catch curve method that was also considered.

The Spanish mackerel and Cobia assessments had many similar flaws, namely the data. For Spanish mackerel the size and/or age distribution for the shrimp discards was problematic. For Cobia the difficulty was a lack of adequate age sampling for the commercial catch. Both stocks had indices of abundance, but only Spanish mackerel had a fishery independent index.

Overall, however, both assessment teams brought the best analytical assessment possible to the workshop. While the data and uncertainty surrounding the stock-recruitment and steepness were issues, the assessments for both stocks showed overfishing not occurring, and each stock as not overfished. Additionally both the data that went into these assessments, and the methods used represent the best available and were appropriate for management use. Despite that, a number of improvements can still be made, and research recommendations are listed for both stocks.

Background

The Review workshop was held during the week of October 29th 2012 in Atlanta, Georgia, USA. The stocks under review were South Atlantic Spanish Mackerel and Cobia. Initially this review was supposed to examine a total of four stocks; South Atlantic Cobia and Spanish mackerel, as well as Gulf of Mexico Cobia and Spanish mackerel. However just prior to the review workshop, the Gulf stocks were pulled from the Review as they were not ready.

One facet of this Review workshop, in addition to the reduction in the number of stocks reviewed, was that the assessment workshop held in Miami earlier this year did not produce a finalized model or approach. Because the data for the assessment workshop were submitted later than anticipated, the bulk of the model design, testing, and evaluation by the assessment team was conducted in a series of Webinars, from June through October.

Another complicating factor was the development of a very large storm that was impacting the US east coast exactly at the time of review. This weather event delayed one member of the panel until Wednesday that week, as well as impacting my own family at home.

Both the Cobia and Spanish mackerel assessments had the Beaufort Assessment Model (BAM) as the primary analytical tool. However for both stocks a surplus production model (ASPIC) was also run. Both assessments and methods had multiple sensitivity analysis associated with them, to test some of the assumptions that went into model development.

It should be noted that, where possible, comments on the process and overall conclusions are presented for both stocks simultaneously in this report. However the Terms of Reference are separated by stock to clearly distinguish one from the other. At the end of each stock's TOR is a list, with justification and results, of the sensitivities and additional runs suggested by the Panel.

Reviewer's Role

As an independent reviewer my role was to evaluate each assessment with regards to the Terms of reference and provide an examination of deficiencies and strengths. Also, I was to provide comment not only on the merits and deficiencies, but also on the process and other aspects of this Review workshop

Unlike the other independent reviewers on the panel, I was also present as an observer during the assessment workshop held in Miami earlier his year. Additionally, I reviewed the reports and materials pertaining to a series of webinars held between Assessment and Review workshops; as well as the audio files of the Webinars.

Summary of Findings

<u>Terms of Reference for Cobia</u>

1. Evaluate the quality and applicability of data used in the assessment.

The review panel concluded, and I concurred, that the data used in the assessment were overall the best available; however there was some concern that the assessment team may have tried to make more use of the data than the quality would allow. For example, the lack of age data on the surface suggested that an age structured assessment may not be the correct tool for this stock. However, after careful consideration I agreed with my colleagues that there was, in fact, a progression of cohorts through the catch-at-age data, and therefore the data were probably useful enough to complete an age structured assessment.

Another concern was the minimum size in the recreational fishery and how that impacted the results. The assessment team used a Diaz correction to infer length comps given the minimum size regulations. And while this correction is probably appropriate for selectivity calculation, the translation of number of fish, back to weight can be difficult when used for management purposes; if the numbers at length are calculated as an intermediary step.

For the life-history data, the use of tagging information greatly enhanced this assessment, for both stock identification and movement. However I wonder, like my colleagues, if the tagging data might have also been used to monitor fishing mortality and natural mortality. Additionally the data that went into the maturity ogive were quite limited. This is an important aspect that should be addressed in the future, as it relates to calculation of the Spawning stock biomass, recruitment and reference points. Overall the natural mortality vector based on the Lorenzen model was appropriate, and the use of sensitivity analysis by the assessment team further clarified this uncertainty satisfactorily.

Commercial landings data were available to 1950, and a combination of MRFSS and the new MRIP were used to calculate recreational removals. The calibration, in my opinion, between MRFSS and the MRIP was appropriate. However, discard information, particularly discards and age, were sorely lacking in this assessment. Likewise the commercial discards were generated using a static kept-to-discarded ratio from 1983 to 1993, and were not very well estimated prior to that. However it is duly noted that the commercial landings and discards are a small fraction of the overall removals, and as such did not impact the results significantly.

Age and length composition data were very poor for an age structured assessment, in my view. Commercial length and age compositions were pooled across years (1982-2011) despite landings data back to 1950. The result was that, for the commercial data, there was no contrast of varying strengths of cohorts. As such the model was fitting to simply one overall age composition, rather than by year. This is a serious flaw in the assessment, but given the lack of data, unavoidable. Recreational length and age data were better by far than the commercial; however sample sizes were still very small. This contributes to a major uncertainty in the assessment as almost all cohort information is derived from the recreational age and length composition data.

Three fishery independent indices were used in the assessment, a recreational head boat index, the Marine Recreational Fishery Statistical Survey (MRFSS) index and the South Carolina Department of Natural Resources (SCDNR) charter boat index. Together these indices covered the range of the stock well and had a moderately long time series. While these indices were standardized, cobia is usually not targeted by fishermen recreationally and as such is only incidentally caught. Further the two fish bag limit, which is rarely constraining, suggested that the data might be a better indication of presence/absence. Overall, the indices were not very correlated and didn't give a very clear picture of the overall abundance.

It should be clearly realized that there was no fishery independent index for this stock, and as such no direct measure of stock abundance. Such a lack of fishery independent data can be problematic for some assessments; but for Cobia it appeared not to be the case.

2. Evaluate the quality and applicability of methods used to assess the stock.

Overall I agreed with the rest of the Panel that the Beaufort Assessment Model (BAM), a statistical catch at age formulation, was superior to the surplus production model also presented. That said, there is a high degree of uncertainty associated with the BAM, both model and data derived. Sensitivities that were both requested and run by the assessment team prior to the workshop adequately highlighted this uncertainty, in my view. But the use of an age-structured assessment model for this stock is tenuous at best, given the lack of age data. However, given the poor performance of the surplus production model, my view is that this is the best available method.

In addition the assessment team also ran a standard catch curve analysis as a third alternate. While the catch curve did provide some limited information that supported the BAM results, overall it was not an appropriate model for this stock.

3. Evaluate the assessment with respect to the following:

- *Is the stock overfished? What information helps you reach this conclusion?*
- *Is the stock undergoing overfishing? What information helps you reach this conclusion?*
- *Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?*
- *Are quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and condition?*

The Panel concluded, and I concurred, that there is only a small probability that this stock is experiencing overfishing. However, the biomass reference points, and status as to overfished, is less certain. The plethora of sensitivity analyses performed prior to and during the workshop helped frame this question and provided some solutions.

The stock recruitment relationship and steepness were highly uncertain in this assessment. While the uncertainty is well captured, managers should be aware of this uncertainty and take appropriate caution. This uncertainty has significant impact on stock status and projections into the future (see below). It is noted that while there is much uncertainty surrounding the stock recruitment relationship, overall this stock is not experiencing reduced recruitment in any way. Recruitment, though uncertain, seems fairly robust.

Given the lack of correlation in the fishery dependent indices and a lack of fishery independent indices, there are no other indicators of stock status other than this assessment. However this assessment does

represent the best available determination of status, and the conclusions drawn are robust analytically and provide a sound basis for management.

Given that, and with the Help of Steve Cadrin and Marcel Reichert, the Panel was able to make the following advice to the SCC and managers

- For P* use SAFMC tiered approach, applying additive penalties to P* =0.5: for cobia (P* = 0.325 = 0.5 - 0.175).
- Assessment Information – Tier 2: Quantitative assessment provides estimates of either exploitation or biomass, but not MSY benchmarks; requires proxy reference points. (P* penalty=-0.025; steepness was fixed at h=0.75)
- Uncertainty – Tier 3: Medium: This tier represents assessments in which key uncertainties are addressed via statistical techniques and sensitivities, but the full uncertainties are not carried forward into the projections and reference point calculations. Projections may, however, reflect uncertainty in recruitment and population abundance. Although outputs include distributions of F, FMSY as in the 'High' category above, in this category fewer uncertainties are addressed in developing such distributions. One example for this level is a distribution of FMSY which only reflects uncertainty in recruitment. (P* penalty = -0.05).
- Stock Status – Tier 1: Neither overfished nor overfishing, and stock is at high biomass and low exploitation relative to benchmark values. (P* penalty = 0).
- Productivity-Susceptibility Analysis – Tier 3: High Risk. Low productivity, high vulnerability and susceptibility, score >3.181 (P* penalty = -0.1; PSA score = 3.29, MRAG 2009).

4. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status with regard to accepted practices and data available for this assessment.

The methods used for projection were adequate and appropriate. I found that a major source of uncertainties in the projections derived from steepness. As these were fully analyzed using sensitivity analyses, the uncertainties in the projections are well captured.

5. If there are significant changes to the base model, or to the choice of alternate states of nature, then provide a probability distribution function for the base model, or a combination of models that represent alternate states of nature, presented for review. Provide justification for the weightings used in producing the combinations of models.

Despite extensive testing, both prior to and during this workshop, significant changes to the base model were not suggested. Further work and research should continue as outlined in the research recommendations (see below).

6. Consider how uncertainties in the assessment, and their potential consequences, have been addressed.

- *Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty.*
- *Ensure that the implications of uncertainty in technical conclusions are clearly stated.*

Uncertainty was considered and analyzed using two separate methods in this assessment. First MCMC was used to examine variability in the input parameters. Additionally sensitivity runs were conducted to examine the potential for stable states of nature and to explore the model's sensitivity. These included changes to natural mortality, steepness, discard assumptions, indices, stocking, fecundity, changes in the likelihood weighting, and examination of catchablity in the survey indices. Of these the model seemed most sensitive to changes in natural mortality and steepness, as expected.

In addition the assessment team conducted a retrospective analysis; where the last year of the assessment data were removed sequentially to examine bias in the estimated status. The results of this examination suggested that the model did not have a persistent bias, but changes were seen when the model was "peeled" back to years in which the data were even more limiting.

These uncertainties are all well captured in the report, and further requests by the panel are outlined below.

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

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

A. Discarding

One deficiency that should be addressed in regards to Cobia is discarding. Age and length data, and even simple discard rate observations, could be important, as these are a major source of uncertainty in the current assessment. Data on discarding, particularly as a result of recreational management measures, could help inform not only the assessment, but management actions as well. In addition to the age/length data and rates, the reason for discarding would also be an important aspect to capture. This might inform managers as to the effectiveness of measures imposed, but would also help to inform the assessment of this stock.

B. Age, Length, and maturity

Overall there is a real need to gather more data with regards to age, length, and maturity. Such information could vastly improve the assessment allowing, for example, the fitting of age or length compositions in the BAM structure. Additionally data on age at maturity as well as weight by length could vastly improve the model's performance in future years; while simultaneously increasing the precision of the reference points currently used to manage this stock.

C. Tagging

Both the Assessment and the Data workshops suggested that tagging might help inform and improve the state of knowledge of Cobia in the South Atlantic. The Panel supported this suggestion. Overall, tagging can not only improve estimates of stock identification, but also directly improve estimates of discards in the recreational fishery. Further, survivability and fishing/natural mortality can also be estimated and examined. Given this and the relatively low cost of such a program, tagging can be an effective way of improving this stock's data quality in the short term.

Additional Model Runs and Sensitivities Requested by the Panel

1. Evaluation of dome-shaped selectivity for cobia assessment

Rational: It was noted that the proposed assessment model was based on an assumption that the dominant fishery, the recreational fishery, was modeled with a selectivity at age based on a logistic curve asymptotic to full selection. However, the fishery was reported to be diverse with respect to variation in population density, season, latitude and onshore offshore variability. Such variability might be expected to characterized by a dome shaped selection function even though the gear interaction could be considered logistic. Also the evaluation would explore the sensitivity of F/Fmsy and SSB/SSBmsy to the selectivity assumption.

Outcome: Initially a fixed decline in selection with age was tested and secondly some alternative fitting methods were tested. The alternative assumption on selection resulted in very similar residual patterns and very similar overall fit, indicating that the data may not be sufficient to differentiate between the two alternatives. Further exploration using a single parameter to determine the rate of decline in selection above the fitted peak suggests a rather flat likelihood surface but does show a minimum that occurs with some doming. Dome shaped selection does not change the general perception of stock status with respect to the 'over fished' or 'over fishing' criteria. However, use of dome shaped selection supports a perception that F/Fmsy is lower and SSB/SSBmsy is greater.

2. Time varying selectivity

Rational: The Review Panel requested a sensitivity analysis to evaluate the effects of assuming constant selectivity. The most reasonable basis for a change in selectivity was the 1990 regulation for a two-fish bag limit. Accordingly, an alternative BAM configuration was developed with two selectivity periods (1950-1990 and 1991-2011) for the recreational fleet.

Outcome: The additional model parameters produced only a slightly improved fit to early age composition data, and minor changes in relative stock size and fishing mortality in the late 1990s, but negligible changes to more recent estimates and no change in stock status. Therefore, the Review Panel concluded that the constant selectivity assumption was the most parsimonious model, and results were not sensitive to a change in selectivity from the bag limit regulation.

3. Evaluation of alternative (Ricker) S-R model.

Rational: It was noted that the proposed assessment model was based on an assumption that the S-R model was the Beverton/Holt form. Examination of the SSB Rec pairs indicate a significant fall in recruitment with increasing SSB and a difficulty in the S-R model fitting with an inability to estimate steepness for the BH model. Also the evaluation would explore the sensitivity of F/Fmsy and SSB/SSBmsy to an alternative S-R assumption.

Outcome: The alternative assumption on the S-R model resulted in a closer fit to the S-R pairs and slightly poorer overall fit, but because an additional parameter estimating steepness could now be fitted in the model, the number of fitted parameters increased. However, the steepness parameter does not come from information on slope to the origin, but rather from the mathematical construct of the Ricker model and the information on the decline in recruitment at high biomass that mathematically implies the steepness. The perception of stock status with respect to the 'over fished' or 'over fishing' criteria was unchanged, however, the use of Ricker S-R model results in a perception that F/Fmsy is slightly lower and SSB/SSBmsy is slightly greater. It is suggested that S-R model choice is best selected based on an understanding of population biology rather than just fit criteria alone.

4. Exploration of growth model assumptions.

Rational: There were a number of interlinking issues associated with data preparation and the modeling of growth, the maturation ogive and the fraction discarded. There were some indications in the data that mean weight at age 3 might be underestimated as growth before and after maturation appears to fit different V-B growth models. The truncation should also be linked to estimated discard rates and the uses of the maturity data.

Outcome: The change in the model results in small changes in selectivity and stock status. The changes in context of stock status are negligible.

Terms of Reference for Spanish mackerel

1. Evaluate the quality and applicability of data used in the assessment.

The data used in this assessment were deemed by the Panel, and myself, as the best available given the current state of data collection. It is important to note that shrimp bycatch and the lack of information surrounding this avenue of removals is of major concern to the Panel and me. The lack of discard information, and in particular the lack of size/age at discarding, can be seen an issue that needs improvement.

Life history information was the strength for this particular assessment. The use of age varying natural mortality was a feature I thought useful for this particular stock. Further stock identification and growth were also important strengths in this assessment. However the identification, while sound, relied on very old techniques that should be updated in the near future. It's also very apparent that this stock is

wide ranging, and as such mixing between this stock and the Gulf of Mexico stock should be considered in the next study. Weaknesses were noted however. And it was clear that time varying weight, growth, and maturity could not be included due to a lack of requisite data.

Catch and landings were mixed for this stock. While commercial landings were available back to the 1950's, discard information was lacking, and samples sizes of observed trips were low. However, it should be noted that commercial discards are small. Recreational catch and discards were estimated from a combination of MRFSS and the newer Marine Recreational Information Program (MRIP) back until 1983. Again, as with Cobia, the calibration between these two methods of recreational estimates of catch is an important factor that needs more investigation.

Age and length data for the catch were not very well developed. Age data were very much lacking in this assessment with better age related data being collected most recently. However even the most recent data were sparse for an age-structured assessment, in my opinion. Further, the age at maturity data, as mentioned above were also sparse. And discards by age were unavailable and reconstructed based on observed landings. The most profound effect of missing age data was on selectivity. With the recent Florida net ban it is clear that selectivity in this fishery is changing. Yet age sampling data by the different fleets used in this model were lacking.

Indices of abundance were better for Spanish mackerel than for Cobia. In this assessment, Spanish mackerel benefited from two fishery dependent and one fishery independent index. All indices were standardized using conventional statistical analyses (e.g., delta-GLM with bootstrapping), and the assessment results (e.g., stock status) are relatively robust to the relative weighting of indices. However, catchablity assumptions, particularly for the recreational CPUE indices, were more problematic. The assumption was that catchablity is linearly related, which may not be true given the non-targeting nature of the recreational fishery. Linearity also doesn't account for changes in technology or regulatory changes.

2. Evaluate the quality and applicability of methods used to assess the stock.

The assessment team brought forth two analytical models during the Review Workshop. The Beaufort Assessment Model (BAM) and a surplus production model (ASPIC). Of the two, the Panel concluded, and I agreed, that the BAM was the more appropriate method despite some difficulties in the age data. However, it should be clearly understood that both models produced similar results, lending credence to the findings of stock status. While the ASPIC model seems more precise, this is actually a false perception. The BAM model produced more variability, which I found more realistic. In many cases the boot-strap methodology utilized in ASPIC underestimates the true variability and uncertainty in my opinion.

The Panel supported sex specific modeling as presented by the assessment team. However, given its treatment and the small impact of sex-specific differences (i.e. growth), the Panel was not certain that it was a useful addition; and it further complicates the model by adding in parameters. Future

benchmarks should re-examine the need to model the sexes in the stock separately; and if so re-examine the treatment of sex-specific growth and its impact on selectivity.

3. *Evaluate the assessment with respect to the following:*
    - *Is the stock overfished? What information helps you reach this conclusion?*
    - *Is the stock undergoing overfishing? What information helps you reach this conclusion?*
    - *Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?*
    - *Are quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and condition?*

The Review Panel and I agreed that there was a low probability that the stock was overfished and that overfishing was occurring. The multitude of sensitivity analyses and the overall uncertainty bounds helped us reach this conclusion. Further the results of the ASPIC model also indicated that the stock was not depleted.

Recruitment in this stock has been moderate over the past few years. Overall, the stock-recruitment relationship was uncertain, but there was no indication that the stock was undergoing substantially reduced recruitment due to stock depletion or environmental factors. As such the recruitment was certain enough that managers could base decisions on using an MSY-type approach. It is important to remember however that steepness is not well estimated in this model, and uncertainties in that MSY-based approach should be accounted for.

Overall the BAM and the data used were the best available. Given that, and with the Help of Steve Cadrin and Marcel Reichert the Panel was able to give the following advice to the SCC and managers:

- For P*'s using SAFMC tiered approach, applying additive penalties to P*=0.5: Spanish mackerel (P*=0.425=0.5-0.075)
- Assessment Information – Tier 1: Quantitative assessment provides estimates of exploitation and biomass; includes MSY-derived benchmarks. (P*penalty=0; steepness was freely estimated)
- Uncertainty – Tier 2: High. This tier represents those assessments that include re-sampling (e.g. Bootstrap or Monte Carlo techniques) of important or critical inputs such as natural mortality, landings, discard rates, age and growth parameters. Such re-sampling is also carried forward and combined with recruitment uncertainty for projections and reference point calculations, including reference point distributions. The key determinant for this level is that reference point estimates distributions reflect more than just uncertainty in future recruitment. (P*penalty=-0.025)
- Stock Status – Tier 1: Neither overfished nor overfishing, and stock is at high biomass and low exploitation relative to benchmark values. (P*penalty=0)

- Productivity-Susceptibility Analysis – Tier 2: Moderate Risk. Moderate productivity, vulnerability, susceptibility, score 2.64-3.181 (P*penalty=-0.05; PSA score=2.74, MRAG 2009)

4. *Evaluate the adequacy, appropriateness, and application of the methods used to project future population status with regard to accepted practices and data available for this assessment.*

The methods used for projection were adequate and appropriate. I found that a major source of uncertainties in the projections derived from steepness. As these were fully analyzed using sensitivity analyses, the uncertainties in the projections are well captured. This uncertainty however should be recognized, particularly if long term projections are used as a basis for management.

5. *If there are significant changes to the base model, or to the choice of alternate states of nature, then provide a probability distribution function for the base model, or a combination of models that represent alternate states of nature, presented for review. Provide justification for the weightings used in producing the combinations of models.*

The Review Panel and I did not recommend any changes to the base model as presented, although a number of alternative sensitivity analyses were requested to examine model behavior (see below).

6. *Consider how uncertainties in the assessment, and their potential consequences, have been addressed.*
    - *Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty.*
    - *Ensure that the implications of uncertainty in technical conclusions are clearly stated.*

Uncertainty was considered and analyzed using two separate methods in this assessment. First, MCMC was used to examine variability in the input parameters. Additionally sensitivity runs were conducted to examine the potential for stable states of nature and to explore the model's sensitivity. These included changes to natural mortality, steepness, discard assumptions, indices, stocking, fecundity, changes in the likelihood weighting, and examination of catchablity in the survey indices.

Some concerns were raised by other Panel members that the natural mortality used in the MCMC was drawn from a very wide range, giving the appearance of more uncertainty than appropriate. We agreed that the methods and sensitivities chosen were appropriate, but we also requested additional runs for this stock to explore potential alternate states of nature.

Overall uncertainty was well captured in this assessment, but as always the true nature of uncertainty is in part based on the model and dynamics chosen. While best practices were followed, a note of caution is always warranted, that the true underlying uncertainty may never be fully captured by any analytical assessment.

7. *Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.*
    - *Clearly denote research and monitoring needs that could improve the reliability of, and information provided by, future assessments.*

Given the difficulties encountered in the life-history section of the assessment, the Review Panel and I suggest more detailed work on stock structure. Currently the genetic analysis used to define this stock is quite old and based on more primitive techniques than are currently available. As such we recommended an update to these genetic studies using more recent methodologies.

Additionally more work is needed on the collection of age and length samples; particularly in the shrimp fishery as this is an important component of removals as bycatch or discards. Further work by at-sea observers may be needed to quantify this removal source and to examine the age and size structure of those discard losses.

Some further work could also be devoted to examination of the stock-recruitment relationship; in particular steepness. However such studies are usually expensive in nature and may not yield tangible results after data collection. Still, such studies, in my opinion could help in giving another picture of recruitment especially in the face of changing environmental conditions.

Additional Model Runs and Sensitivities Requested by the Panel

1. Examine aggregate selectivity over time

Rational: It was noted that modeling the fishery required separate selectivity models by fleet and that the age sampling was relatively sparse. The combined catch at age matrix might be more precise than the combined fisheries. Examination of changes with time would inform the decisions on use of separate or combined fleets.
Outcome: The modeled selectivity at age suggests a change in the fishery following the Florida net ban and has resulted in substantial change in selectivity from the 1990s onwards. The selection at age is still changing by year due to changes in proportions of catch among different gear categories. Overall the model was only moderately sensitive to selectivity.

2. Examination of priors on selectivity functions

Rational: It was noted that modeling the fishery resulted in some rather rapid change of selection at age particularly for pound-net and recreational fisheries. These steep sided dome shaped functions are thought to be the result of age dependent spatial interactions and not gear related technical interactions. The selection patterns also exhibit correlation in the residuals at age among years. The examination was conducted in order to better understand the plots of model fit, prior probability, parameter bounds and fitted ML values.

Outcome: The comparison of priors and fitted values showed that none were at the parameter bounds, though the gillnet L50 was close to the limit. The Pound net L50 and Rec L50 were close to the mean values of their priors and could be checked for sensitivity to the assumed priors.

Final Thoughts, SEDAR process and suggestions

The Review Workshop was held In Atlanta, Georgia, at the Doubletree Hotel in Buckhead. It was an interesting place, with lots of hotel construction and other such inconveniences. Perhaps the most interesting part was that concurrent storm that was plaguing the East Coast at the time. This delayed one reviewer (Steve Cadrin) and occupied some of my thoughts as my family was in Massachusetts and Maine.

The process itself was also rather interesting. I did not receive the TOR or the contract until very late in the process and much later than normal. This is of course understandable as both Cobia and Spanish mackerel in the Gulf were removed from the Review workshop just prior to the meeting.

After observing both the assessment workshop and the Review workshop, I have to again impart my admiration to the staff and especially the assessment team for all of their hard work. It was clear that by the end of the Assessment workshop, much work was needed in order to complete these assessments. Clearly the Gulf assessment team simply wasn't able to complete the task, given the lateness of the data during the Assessment Workshop.

More time with the data, however, would not have helped this assessment team to be more thorough, as the work they produced was well more than adequate. In fact I have seen other assessment teams with more time that were not as meticulous and thorough as this team. But, clearly the process was hurried, and may have caused some undue stress on both assessment team and staff. Additionally, after reviewing the webinar files, it was clear that meeting remotely was not the most efficient way to conduct a series of assessment working meetings. Had a full workshop been convened, or had the data been available at the initial workshop, the removal of the Gulf stocks may have happened earlier in the process; allowing for other stocks to take their place.

The removal of the Gulf stock was unexpected for most reviewers with the exception of myself, who had gone over the audio files of the assessment webinars. Further, the removal of the Gulf of Mexico stocks, allowed the Review Panel to spend more time crafting the report, coming to consensus, and allowed the SSC members to fully provide advice to management.

Most of the other CIE reviewers indicated that having only two stocks to review was a fairly light workload. I am unconvinced. The Gulf stock assessments at the end of the assessment workshop, as well as the webinars, were not complete. As such, had they gone forward, the Review Panel would have spent the majority of their time reviewing the Gulf stocks, with little time available for the South Atlantic

stocks. Having communicated that point, even I found the workload lighter than other assessments I have reviewed.

The addition of SSC members as Chair and as a full reviewer was a great asset. Because of their familiarity with both the stocks and the process, they were instrumental in answering questions and reminding the CIE reviewers of how the assessments are used to craft management advice.

I have a number of suggestions for the process that some might find useful:

1. Ensure that data are on time for the Assessment Workshop, and delay the in-person meeting if there are substantial delays with the data. The Assessment workshop seemed relatively in-efficient in the use of time without the data being present.
2. If some stocks are not complete and/or ready for review, early detection can only help.
3. The use of webinars, while feasible and seemingly inexpensive, cannot replace in-person meetings. Much time and expense could have been saved had the Gulf of Mexico stocks been removed sooner.
4. Allow flexibility with CIE contracts to shorten the review workshop and, if needed, the length of the contract and compensation received. Reviewing only two stocks that were fairly thoroughly complete allowed for a lot of free time at the review workshop. This seemed somewhat inefficient given the cost of the meeting. An alternative would have been to bring existing information on the Spanish Mackerel and Cobia from the Gulf of Mexico, and allow us to comment on it informally to provide direction.

Appendix 1: Bibliography of materials provided for review

Document #	Title	Authors
Documents Prepared for the Data Workshop		
SEDAR28-DW01	Cobia preliminary data analyses – US Atlantic and GOM genetic population structure	Darden 2012
SEDAR28-DW02	South Carolina experimental stocking of cobia *Rachycentron canadum*	Denson 2012
SEDAR28-DW03	Spanish Mackerel and Cobia Abundance Indices from SEAMAP Groundfish Surveys in the Northern Gulf of Mexico	Pollack and Ingram, 2012
SEDAR28-DW04	Calculated discards of Spanish mackerel and cobia from commercial fishing vessels in the Gulf of Mexico and US South Atlantic	K. McCarthy
SEDAR28-DW05	Evaluation of cobia movement and distribution using tagging data from the Gulf of Mexico and South Atlantic coast of the United States	M. Perkinson and M. Denson 2012
SEDAR28-DW06	Methods for Estimating Shrimp Bycatch of Gulf of Mexico Spanish Mackerel and Cobia	B. Linton 2012
SEDAR28-DW07	Size Frequency Distribution of Spanish Mackerel from Dockside Sampling of Recreational and Commercial Landings in the Gulf of Mexico 1981-2011	N.Cummings, J. Isely
SEDAR28-DW08	Size Frequency Distribution of Cobia from Dockside Sampling of Recreational and Commercial Landings in the Gulf of Mexico 1986-2011	J. Isely and N. Cummings
SEDAR28-DW09	Texas Parks and Wildlife Catch Per unit of Effort Abundance Information for Spanish mackerel	N. Cummings, J. Isely
SEDAR28-DW10	Texas Parks and Wildlife Catch Per unit of Effort Abundance Information for cobia	J. Isely, N. Cummings
SEDAR28-DW11	Size Frequency Distribution of Cobia and Spanish Mackerel from the	J Isely and N Cummings

	Galveston, Texas, Reef Fish Observer Program 2006-2011	
SEDAR28-DW12	Estimated conversion factors for calibrating MRFSS charterboat landings and effort estimates for the South Atlantic and Gulf of Mexico in 1981-1985 with For Hire Survey estimates with application to Spanish mackerel and cobia landings	V. Matter, N Cummings, J Isely, K Brennen, and K Fitzpatrick
SEDAR28-DW13	Constituent based tagging of cobia in the Atlantic and Gulf of Mexico.	E. Orbesen
SEDAR28-DW14	Recreational Survey Data for Spanish Mackerel and Cobia in the Atlantic and the Gulf of Mexico from the MRFSS and TPWD Surveys	V. Matter
SEDAR28-DW15	Commercial Vertical Line and Gillnet Vessel Standardized Catch Rates of Spanish Mackerel in the US Gulf of Mexico, 1998-2010	N. Baertlein, K. McCarthy
SEDAR28-DW16	Commercial Vertical Line Vessel Standardized Catch Rates of Cobia in the US Gulf of Mexico, 1993-2010	K. McCarthy
SEDAR28-DW17	Standardized Catch Rates of Spanish Mackerel from Commercial Handline, Trolling and Gillnet Fishing Vessels in the US South Atlantic, 19982010	K. McCarthy
SEDAR28-DW18	Standardized catch rates of cobia from commercial handline and trolling fishing vessels in the US South Atlantic, 1993-2010	K. McCarthy
SEDAR28-DW19	MRFSS Index for Atlantic Spanish mackerel and cobia	Drew et al.
SEDAR28-DW20	Preliminary standardized catch rates of Southeast US Atlantic cobia (Rachycentron canadum) from headboat data.	NMFS Beaufort
SEDAR28-DW21	Spanish mackerel preliminary data summary: SEAMAP-SA Coastal Survey	Boylan and Webster
SEDAR28-DW22	Recreational indices for cobia and Spanish mackerel in the Gulf of Mexico	Bryan and Saul
SEDAR28-DW23	A review of Gulf of Mexico and Atlantic	Palmer, DeVries, and

	Spanish mackerel (Scomberomorus maculatus) age data, 1987-2011, from the Panama City Laboratory, Southeast Fisheries Science Center, NOAA Fisheries Service	Fioramonti
SEDAR28-DW24	SCDNR Charterboat Logbook Program Data, 1993 - 2010	Errigo, Hiltz, and Byrd
SEDAR28-DW25	South Carolina Department of Natural Resources State Finfish Survey (SFS)	Hiltz and Byrd
SEDAR28-DW26	Cobia bycatch on the VIMS elasmobranch longline survey:1989-2011	Parsons et al.

Documents Prepared for the Assessment Workshop

SEDAR28-AW01	Florida Trip Tickets	S. Brown
SEDAR28-AW02	SEDAR 28 Spanish mackerel bycatch estimates from US Atlantic coast shrimp trawls	NMFS Beaufort

Documents Prepared for the Review Workshop

SEDAR28-RW02	The Beaufort Assessment Model (BAM) with application to cobia: mathematical description, implementation details, and computer code	Craig
SEDAR28-RW03	The Beaufort Assessment Model (BAM) with application to Spanish mackerel: mathematical description, implementation details, and computer code	Andrews

Reference Documents

SEDAR28-RD01	List of documents and working papers for SEDAR 17 (South Atlantic Spanish mackerel) – all documents available on the SEDAR website	SEDAR 17
SEDAR28-RD02	2003 Report of the mackerel Stock Assessment Panel	GMFMC and SAFMC, 2003
SEDAR28-RD03	Assessment of cobia, *Rachycentron canadum*, in the	Williams, 2001

	waters of the U.S. Gulf of Mexico	
SEDAR28-RD04	Biological-statistical census of the species entering fisheries in the Cape Canaveral area	Anderson and Gehringer, 1965
SEDAR28-RD05	A survey of offshore fishing in Florida	Moe 1963
SEDAR28-RD06	Age, growth, maturity, and spawning of Spanish mackerel, *Scomberomorus maculates* (Mitchill),	Schmidt et al. 1993

Appendix 2: A copy of the CIE Statement of Work

Attachment A: Statement of Work for Dr. Matthew Cieri

External Independent Peer Review by the Center for Independent Experts

SEDAR 28 South Atlantic Spanish mackerel and cobia assessment review

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description SEDAR 28 will be a compilation of data, an assessment of the stocks, and an assessment review conducted for South Atlantic Spanish mackerel and cobia. The CIE peer review panel is ultimately responsible for ensuring that the best possible assessment has been provided through the SEDAR process. The stocks assessed through SEDAR 28 are within the jurisdiction of the South Atlantic Fisheries Management Councils and states of Florida, Georgia, South Carolina, and North Carolina. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The agenda of the panel review meeting will be attached in **Annex 3**.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review during the SEDAR 28 review scheduled in 29 October - 2 November 2012, and the CIE reviewers shall have the necessary qualifications to complete the tasks in accordance with the SoW and ToRs herein. *One of the selected CIE reviewers will be the CIE observer contracted to attend the SEDAR 28 assessment workshop in May 2012.* The CIE reviewers shall have expertise in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the tasks of the peer-review described herein. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

Location of Peer Review: Each CIE reviewer shall participate and conduct an independent peer review during the panel review meeting scheduled in Atlanta, Georgia during October 29 through November 2, 2012.

Statement of Tasks: Each CIE reviewer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website:
http://deemedexports.noaa.gov/
http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs shall not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can

contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2. *One of the selected CIE reviewers will be the CIE observer contracted to attend the SEDAR 28 assessment workshop in May 2012, and the CIE observer's report will be reviewed and distributed as an addendum to the final independent CIE peer review report for that CIE reviewer.*

Other Tasks – Contribution to Summary Report: Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. The Summary Report is not reviewed by the CIE, therefore is not a CIE product. Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Participate during the panel review meeting at the Atlanta, Georgia during October 29 through November 2, 2012.
3) In Atlanta, Georgia during October 29 through November 2, 2012 as specified herein, conduct an independent peer review in accordance with the ToRs (**Annex 2**).
4) No later than November 16, 2012, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, via email to Dr. David Sampson david.sampson@oregonstate.edu. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

21 September 2012	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
15 October 2012	NMFS Project Contact sends the CIE Reviewers the pre-review documents

29 October – 2 November 2012	Each reviewer participates and conducts an independent peer review during the panel review meeting
16 November 2012	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
30 November 2012	CIE submits CIE independent peer review reports to the COTR
7 December 2012	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: This 'Time and Materials' task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council's SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:
(1) The CIE report shall completed with the format and content in accordance with **Annex 1**,
(2) The CIE report shall address each ToR as specified in **Annex 2**,
(3) The CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

William Michaels, Program Manager, COTR
NMFS Office of Science and Technology

1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
William.Michaels@noaa.gov Phone: 301-427-8155

Manoj Shivlani, CIE Lead Coordinator
Northern Taiga Ventures, Inc.
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Roger W. Peretti, Executive Vice President
Northern Taiga Ventures, Inc. (NTVI)
22375 Broderick Drive, Suite 215, Sterling, VA 20166
RPerretti@ntvifederal.com Phone: 571-223-7717

Key Personnel:

NMFS Project Contact:

Ryan Rindone, SEDAR Coordinator
2203 N. Lois Avenue, Suite 1100
Tampa, FL 33607
Ryan.Rindone@gulfcouncil.org Phone: 813-348-1630

Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a brief summary of findings, of the science, conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

SEDAR 28: South Atlantic Cobia and Spanish Mackerel
Review Workshop Terms of Reference

5. Evaluate the quality and applicability of data used in the assessment.
6. Evaluate the quality and applicability of methods used to assess the stock.
7. Evaluate the assessment with respect to the following:

- Is the stock overfished? What information helps you reach this conclusion?
- Is the stock undergoing overfishing? What information helps you reach this conclusion?
- Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?
- Are quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and condition?

4. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status with regard to accepted practices and data available for this assessment.
5. If there are significant changes to the base model, or to the choice of alternate states of nature, then provide a probability distribution function for the base model, or a combination of models that represent alternate states of nature, presented for review. Provide justification for the weightings used in producing the combinations of models.
6. Consider how uncertainties in the assessment, and their potential consequences, have been addressed.
   - Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty.
   - Ensure that the implications of uncertainty in technical conclusions are clearly stated.
7. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.
   - Clearly denote research and monitoring needs that could improve the reliability of, and information provided by, future assessments.

8. Prepare a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Develop a list of tasks to be completed following the workshop. Complete and submit the Peer Review Summary Report in accordance with the project guidelines.
    - Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review.
    - Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

The review panel may request additional sensitivity analyses, evaluation of alternative assumptions, and correction of errors identified in the assessments provided by the assessment workshop panel; the review panel may not request a new assessment. Additional details regarding the latitude given the review panel to deviate from assessments provided by the assessment workshop panel are provided in the SEDAR Guidelines and the SEDAR Review Panel Overview and Instructions.

** The panel shall ensure that corrected estimates are provided by addenda to the assessment report in the event corrections are made in the assessment, alternative model configurations are recommended, or additional analyses are prepared as a result of review panel findings regarding the TORs above.**

Annex 3: Agenda for the SEDAR 28 Review

Atlanta, GA - October 29 through November 2, 2012

Monday		
1:00 p.m.	**Convene**	
1:00 – 1:30	**Introductions and Opening Remarks** *- Agenda Review, TOR, Task Assignments*	**Coordinator**
1:30 – 5:00	**Assessment Presentations and Discussions**	**TBD**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**
Tuesday		
8:00 a.m. – 11:30 a.m.	**Assessment Presentations**	**TBD**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion** *- Assessment Data & Methods* *- Identify additional analyses, sensitivities, corrections*	**Chair**
3:30 p.m. – 3:45 p.m.	**Break**	
3:45 p.m. – 5:00 p.m.	**Panel Discussion** *- Continue deliberations* *- Review additional analyses*	**Chair**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**

***Tuesday Goals*:** Initial presentations completed, sensitivities and modifications identified.

Wednesday		
8:00 a.m. – 11:30 a.m.	**Panel Discussion** *- Review additional analyses, sensitivities* *- Consensus recommendations and comments*	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion**	**Chair**
3:30 p.m. – 3:45 p.m.	**Break**	
3:45 p.m. – 5:00 p.m.	**Panel Discussion**	**Chair**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**

Wednesday Goals: Final sensitivities identified, preferred models selected, projection approaches approved, Summary report drafts begun

Thursday		
8:00 a.m. – 11:30 a.m.	**Panel Discussion** *- Final sensitivities reviewed.* *- Projections reviewed.*	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion or Work Session**	**Chair**
3:30 p.m. - 3:45 p.m.	**Break**	
3:45 p.m. - 6:00 p.m.	**Panel Work Session** *- Review Consensus Reports*	**Chair**

Thursday Goals: Complete assessment work and discussions. Final results available. Draft Summary Report reviewed.

Friday		
8:00 a.m. – 1:00 p.m.	**Panel Work Session**	**Chair**
1:00 p.m.	**ADJOURN**	

Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

SEDAR 28
Gulf of Mexico and South Atlantic
Spanish Mackerel and Cobia
10-11-12

Data Workshop Participants

GC – Gulf of Mexico Cobia GSM – Gulf of Mexico Spanish Mackerel

SAC – S. Atlantic Cobia SASM – S. Atlantic Spanish Mackerel *Workshop Panel*

Analytical Team

- Katie Andrews Lead Analyst SASM NMFS Beaufort
- Kevin Craig Lead Analyst SAC NMFS Beaufort
- Nancie Cummings Lead Analyst GSM NMFS Miami
- Jeff Isely Lead Analyst GC NMFS Miami
- Meaghan Bryan Data compiler GC, GSM NMFS Miami
- Rob Cheshire Data compiler SASM NMFS Beaufort
- Eric Fitzpatrick Data compiler SAC NMFS Beaufort

Life History Workgroup

- Jennifer Potts *Workgroup leader, SA* NMFS Beaufort
- Doug Devries *Workgroup leader, GC* NMFS Panama City
- Chris Palmer *Workgroup leader, GSM* NMFS Panama City
- Karl Brenkert SAC data SC DNR
- Chip Collier Data provider SA SSC
- Tanya Darden SAC data SC DNR
- Mike Denson SAC data SC DNR
- Jim Franks GC data USM
- Randy Gregory Data provider NC DMF
- Read Hendon Data provider USM
- Chris Kalinowski SAC data GA DNR
- Tom Ogle AP, Recreational SC
- Bill Parker Charter SC
- Ernst Peebles Data provider USF
- Matt Perkinson SAC data SC DNR
- Marcel Reichert Data provider SA SSC
- Joe Smith Data provider NMFS Beaufort
- John Ward Gulf socioeconomics Gulf SSC
- Erik Williams Data provider NMFS Beaufort
- Justin Yost SAC data SC DNR

Commercial Workgroup

- Kyle Shertzer *Workgroup leader, SA* NMFS Beaufort
- Dave Gloeckner *Workgroup leader, Gulf* NMFS Miami
- Neil Baertlein Data provider NMFS Miami
- Donna Bellais Data provider GSMFC
- Steve Brown Data provider FL FWC
- Julie Califf* Data provider GA DNR
- Joe Cimino Data provider VMRC
- Julie Defilippi Data provider ACCSP
- Tim Sartwell Data provider ACCSP
- Amy Dukes Data provider SC DNR
- Dave Donaldson* Data provider GSMFC
- Rusty Hudson AP, comm. and rec. FL
- Stephanie McInerny Data provider NC DMF
- Alan Bianchi* Data provider NC DMF
- Liz Scott-Denton Data provider NMFS Galveston
- Refik Orhun Data provider NMFS Miami
- Kevin McCarthy Data provider NMFS Miami

Recreational Workgroup

- Ken Brennan *Workgroup leader, SA* NMFS Beaufort
- Vivian Matter *Workgroup leader, Gulf* NMFS
- Julia Byrd Data provider SC DNR
- Kelly Fitzpatrick Data provider NMFS Beaufort
- Robert Johnson AP, Charter FL
- Doug Mumford* Data provider NC DMF
- Bob Pelosi AP, Recreational FL
- Bob Zales II AP, Charter FL
- Mike Nugent AP, Charter TX
- Beverly Sauls* Data provider FL FWC

Indices Workgroup

- Amy Schueller *Workgroup leader, SA* NMFS Beaufort
- Walter Ingram *Workgroup leader, Gulf* NMFS Pascagoula
- Jeanne Boylan SASM data SC DNR
- Shannon Calay Gulf data NMFS Miami
- Lew Coggins Data provider NMFS Beaufort
- Pearse Webster SASM data SC DNR

Council Representation

- Ben Hartig Council Rep SAFMC

Staff

- Kari Fenske SEDAR 28 Coordinator SEDAR
- Ryan Rindone Coordinator SEDAR
- Rachael Silvas Administrative support SEDAR
- Tyree Davis IT support SEFSC Miami

- Mike Errigo SAFMC
- Gregg Waugh SAFMC
- Appointees marked with an * are appointed to the workshop panel as noted but are not expected to attend the workshop. They will provide data and review use of the data provided, and be available via email or phone for questions as needed.
- Assessment Workshop Participants

Workshop Panel

- Katie Andrews Lead Analyst SASM NMFS Beaufort
- Kevin Craig Lead Analyst SAC NMFS Beaufort
- Nancie Cummings Lead Analyst GSM NMFS Miami
- Jeff Isely Lead Analyst GC NMFS Miami
- Meaghan Bryan Data compiler GSM, GC NMFS Miami
- Rob Cheshire Data compiler SASM NMFS Beaufort
- Eric Fitzpatrick Data compiler SAC NMFS Beaufort
- Michael Schirripa NMFS Miami
- Mike Denson SC DNR
- Read Hendon* Gulf SSC
- Marcel Reichert SA SSC
- Scott Crosson SA SSC
- Bob Muller FL FWRI
- Clay Porch NMFS Miami
- Joe Powers Gulf SSC
- Sean Powers Gulf SSC
- Greg Stunz Gulf SSC
- John Walter NMFS Miami
- John Ward Gulf SSC
- Erik Williams NMFS Beaufort

Council Representation

- Ben Hartig Council Rep SAFMC

CIE Observers

- Matt Cieri CIE

Observers

- Rusty Hudson AP, comm. and rec. FL
- Tom Ogle AP, recreational FL
- Bill Parker Commercial charter SC

Staff

- Kari Fenske SEDAR 28 Coordinator SEDAR
- Ryan Rindone Coordinator SEDAR
- Patrick Davis IT support SEFSC
- Julie O'Dell Administrative Support SAFMC/SEDAR
- Mike Errigo SAFMC
- Sue Gerhart SERO

- Jack McGovern SERO
- Andy Strelcheck SERO
- Gregg Waugh SAFMC
- Mike Larkin SERO

***** Appointees marked with an * are appointed to the workshop panel as noted but are not expected to attend the workshop. They will provide data and review use of the data provided, and be available via email or phone for questions as needed.

Review Workshop Panel

- Luiz Barbieri Review Panel Chair Gulf and SA SSC
- Steve Cadrin Reviewer SA SSC
- Matt Cieri Reviewer CIE
- Mark Dickey-Collas Reviewer CIE
- John Simmonds Reviewer CIE

Assessment Workshop Representatives

- Katie Andrews Lead Analyst SASM NMFS Beaufort
- Kevin Craig Lead Analyst SAC NMFS Beaufort
- Kyle Shertzer NMFS Beaufort
- Erik Williams NMFS Beaufort

Council Representation

- Ben Hartig Council Rep SAFMC

Staff

- Ryan Rindone SEDAR 28 RW Coordinator SEDAR
- Julia Byrd SEDAR Coordinator SEDAR
- Andrea Grabman Administrative Support SEDAR
- Mike Errigo SAFMC
- Sue Gerhart SERO
- Jack McGovern SERO
- Andy Strelcheck SERO
- Mike Larkin SERO
- Gregg Waugh SAFMC

Definitions

GC – Gulf of Mexico cobia
GMFMC – Gulf of Mexico Fishery Management Council
GSM – Gulf of Mexico Spanish mackerel
GSMFC – Gulf States Marine Fisheries Commission
NC DMF – North Carolina Division of Marine Fisheries
NMFS – National Marine Fisheries Service
SAC – South Atlantic cobia
SAFMC – South Atlantic Fishery Management Council
SASM – South Atlantic Spanish mackerel
SA – South Atlantic

SC DNR – South Carolina Department of Natural Resources
SERO – Southeast Regional Office
SSC – Science and Statistics Committee
USF – University of South Florida
USM – University of Southern Mississippi
VIMS – Virginia Institute of Marine Science

MARK DICKEY-COLLAS

DENMARK

CIE Independent Peer Review Report of: SEDAR 28- South Atlantic Cobia and Spanish Mackerel Review

2 November 2012

Atlanta, GA, USA

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The document is a CIE Independent Peer Review Report.

Contents

Executive Summary

This report is the independent peer review report from Mark Dickey-Collas in accordance with the Center for Independent Experts (CIE) statement of work. Mark Dickey-Collas was a CIE reviewer for the SEDAR 28 on the South Atlantic Spanish Mackerel and South Atlantic Cobia. The review took place 29th October to 2nd November 2012 in Atlanta, GA, USA.

The assessment model for cobia presented to the review was the Beaufort Assessment Model (BAM). Both the review panel and I viewed that the BAM was used effectively with regards to the quality and availability of the data and that the stock assessment method was appropriate. The presented approach was the most appropriate to characterise the stock status for management purposes. The current stock status in the base run was estimated to be SSB2011/MSST=1.75. The current level of fishing is F2009-2011/FMSY = 0.599, with F2011/FMSY = 0.423. Thus is it highly likely that the stock is not overfished and is not undergoing overfishing. The exploration and quantification of uncertainty did not change this conclusion.

For South Atlantic Spanish mackerel, the primary model presented to the review group was the Beaufort Assessment Model (BAM), while a secondary, surplus-production model (ASPIC) was presented to provide comparison of model results. Considering the available input data and the characteristics of the stock and the many fisheries that exploit the stock, the presented stock assessment was the most appropriate method to characterise the stock status for management purposes. The current stock status was estimated to be SSB2011/MSST=2.29. The current level of fishing is F2009-2011/FMSY = 0.526, with F2011/FMSY = 0.521. Thus is it highly likely that the stock is not overfished and is not undergoing overfishing. The exploration and quantification of uncertainty did not change this conclusion. In general, stock status results from ASPIC were qualitatively similar to those from BAM.

1 Introduction

This report is the independent peer review report from Mark Dickey-Collas in accordance with the Center for Independent Experts (CIE) statement of work. Mark Dickey-Collas was a CIE reviewer for the SEDAR 28 on the South Atlantic Spanish Mackerel and South Atlantic Cobia. This report reflects the views of Mark Dickey-Collas.

Common acronyms used in this report

ACFM	ICES Advisory Committee of Fisheries Management
ACOM	ICES Advisory Committee
ASPIC	A Stock Production Model Incorporating Covariates
BAM	Beaufort Assessment Model
CIE	Centre for Independent Experts
EU	European Union
F	Fishing Mortality
FAO	Food & Agriculture Organisation of the United Nations
h	Steepness of Stock to Recruit Relationship
ICES	International Council for the Exploration of the Sea
ID	Identity
IMARES	Institute for Marine Resources and Ecosystem Studies
M	Natural Mortality
MCB	Monte Carlo Bootstrap
MSST	Minimum Standing Stock Threshold
MSY	Maximum Sustainable Yield
NMFS	USA National Marine Fisheries Service
SEDAR	South East Data, Assessment & Review
S-R	Stock Recruitment Relationship
SRA	Stock Reduction Analysis
SSB	Spawning stock biomass
STECF	EU Scientific Technical & Economic Committee n Fisheries
UK	United Kingdom
USA	United States of America
Z	Total Mortality

2 Background of the Reviewer

Mark Dickey-Collas is a fisheries and marine scientist with 20 years' experience in stock assessment, fisheries management evaluations, pelagic fish ecology, recruitment processes and the utility of ichthyoplankton surveys in fisheries management. He completed his PhD in Marine Biology in 1991 and then worked as a UK government fisheries scientist in Belfast (1992-2003) and as a Fisheries Researcher and Advisor at Wageningen IMARES (www.imares.nl, 2003-2012). At IMARES, he was chief advisor on pelagic fisheries and fish to the Dutch government. Mark is currently employed by the International Council for the Exploration of the Sea (ICES) in Denmark as Professional Officer for Ecosystem Integrated Advice.

Mark has a track record of providing fisheries advice to both national and international organisations. He is a core member of the FAO panel on CITES listing of commercially exploited aquatic species and the FAO working group on the exploitation

status of world fish stocks. He has been a member of fisheries science advisory committees in Europe (ICES ACFM, ACOM and the EU STECF). Mark has chaired many stock assessment, review, benchmark workshops and management plan evaluation groups. Mark is known for his expertise in pelagic fisheries especially herring, mackerel, sprat, sardine and anchovy. He has acted as an independent reviewer for Germany, Canada, Portugal and the UK. Mark has over 60 peer reviewed publications (www.researcherid.com/rid/A-8036-2008) in marine ecology and fisheries.

3 Description of the Reviewer's Role in the Review Activities

As a reviewer, Mark Dickey-Collas considered the data and assessment reports that were sent in advance of the review meeting. During the meeting Mark paid particular attention to the data provision and the assumptions about life history strategies of the fish. Mark reviewed the appropriateness of the stock assessment models for the provision of advice on stock status. Mark has limited expertise in the area of uncertainty around model parameters and thus felt that he could not fully comment on how appropriate the incorporation of uncertainty was to the provision of advice.

4 Terms of Reference

The following section addresses the terms of reference given in the statement of work for South Atlantic Cobia and then Spanish Mackerel.

4.1 Cobia

South Atlantic cobia has not been previously assessed under the SEDAR process. The most recent assessment of South Atlantic cobia was done in 1995 and used a VPA method to estimate that Z was equal to M (assumed to be 0.4). This thus suggested a very low fishing mortality (Thompson 1995).

4.1.1 Evaluate the quality and applicability of data used in the assessment.

It was concerning to see the paucity of age or individual size data. However overall, the model appeared to use the data to its full potential and find signals which could be used to advise on stock status. The clear progression of cohorts in the age composition data provided enough contrast to suggest trends and patterns in the population. The lack of analysis of the selectivity of the discarded fish and the impact of the minimum landing size on the catch and age estimates of younger fish needs to be further explored (despite the use of the Diaz correction).

I was perplexed that as the maturity ogive was determined by just 41 out of 765 fish, why was the maturity ogive assumed to be precisely known in the assessment?

The strengths and weaknesses that I noticed in the data are listed below.

Type of data	Strength	Weakness
Life History Strategy	Stock ID considered	Tag information not fully used
	Age varying M considered	Age sampling poor
	Discard mortality considered	Discard selectivity not considered
	Sexual dimorphism considered	Size in cacth and size in population considered synonymous

		Maturity ogive driven by few fish
		No information on time trends in growth, maturity and weight at age
Landings data	Commercial & recreational catch	Reconstructed discards
	Long time series	Use of multiannual age comp data
		Too few recreational trips sampled
Indices of abundance	3 lengthy series available	No fisheries independent series
	Series cover centre or entire stock	Catchability assumed linear
	Series from untargeted fleets	Problems as rarely caught species
		No correlation between series
		Series weighting impacts assessment

4.1.2 Evaluate the quality and applicability of methods used to assess the stock.

The proposed assessment model was the Beaufort Assessment Model (BAM) which is a statistical catch-age model. Previous versions of this assessment model have been used in SEDAR assessments of reef fishes in the U.S. South Atlantic, such as red porgy, black sea bass, tilefish, snowy grouper, gag grouper, greater amberjack, vermilion snapper, Spanish mackerel, red grouper, red snapper, as well as for assessments of Atlantic and gulf menhaden.

One of the strengths of this modelling approach is that the whole process- the assessment, projections, sensitivities, estimates of precision and estimating benchmarks and references points - can be carried out within the one model.

I felt that a BAM and presented methods were appropriate considering the quantity and qualities of the available data. BAM can utilize the dynamics between cohorts (Figure 4.1.1) and the provided estimates of uncertainty and sensitivity analysis that appeared generally reasonable. The alternative approach, the ASPIC model, is only biomass based and failed to operate well. This was probably due to a lack of contrast in the data and it could not use information provided by the following of cohorts. I do have some concern still that the proposed benchmarks resulting from BAM are heavily dependent on the assumptions, especially steepness.

4.1.3 Stock status, recruitment and reference points

Evaluate the assessment with respect to the following:

Is the stock overfished?

I conclude that the stock is not overfished.

What information helps you reach this conclusion?

The BAM stock assessment and associated sensitivity analyses and estimates of precision are the basis for this conclusion (Figure 4.1.2), including the robust outcome of the retrospective analysis (Figure 4.1.3).

Is the stock undergoing overfishing?

There is a good probability that stock is not undergoing overfishing.

What information helps you reach this conclusion?

The BAM stock assessment and associated sensitivity analyses and estimates of precision are the basis for this conclusion (Figure 4.1.2), including the robust outcome of the retrospective analysis (Figure 4.1.3).

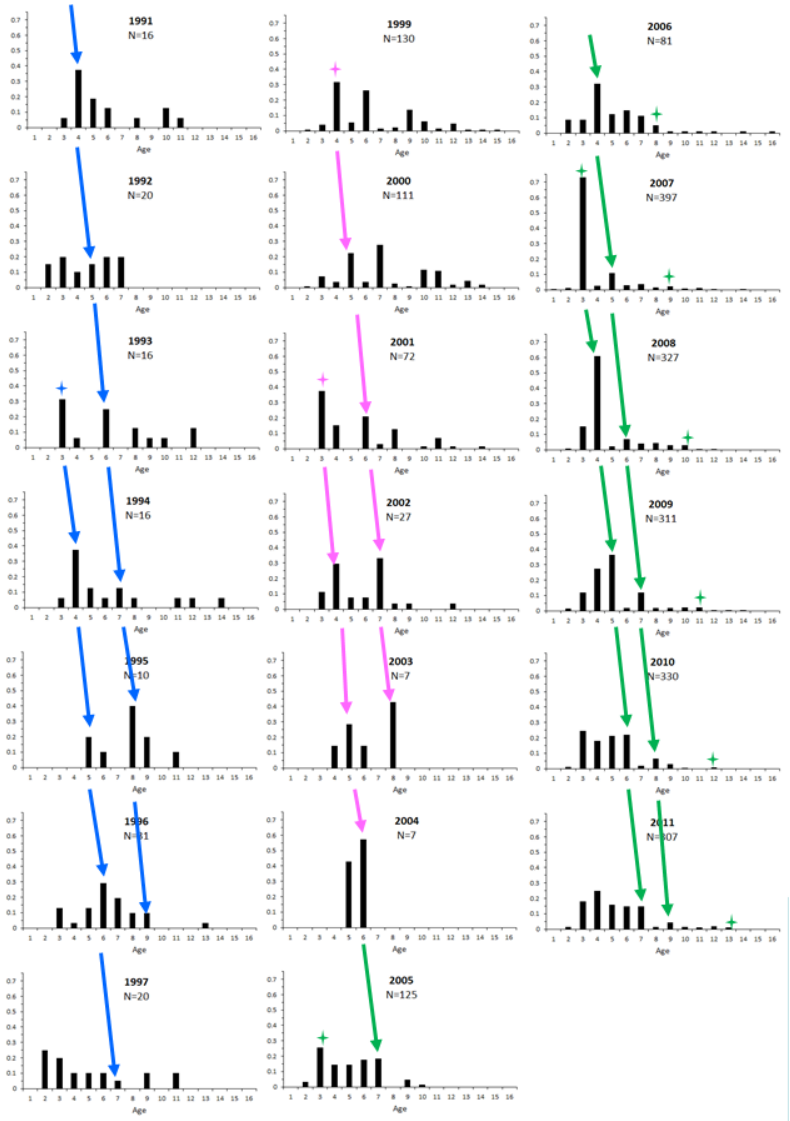


Figure 4.1.1. Cobia. Illustration of tracking cohorts in the recreational fishery for Atlantic cobia (taken from the original presentation by Kevin Craig, NMFS Beaufort to SEDAR 28 Review).

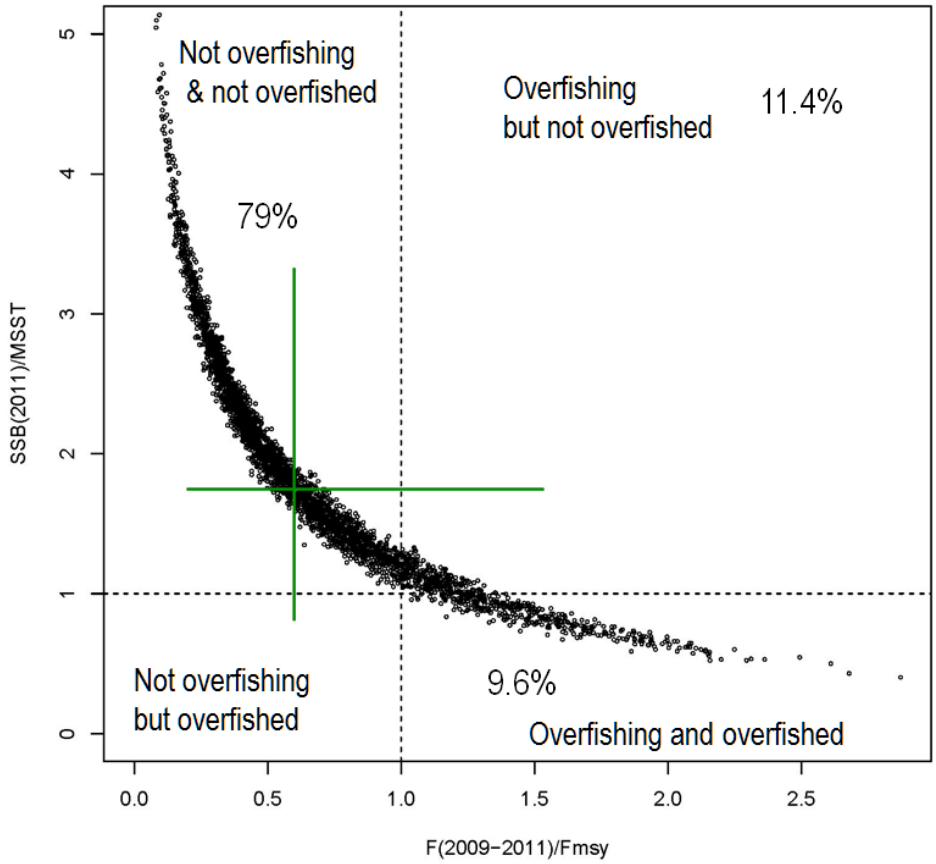


Figure 4.1.2. Cobia. Phase plot of terminal status estimates from MCB analysis of the BAM. Length of green cross hairs indicate 5th and 95th percentiles. (taken from the original presentation by Kevin Craig, NMFS Beaufort to SEDAR 28 Review, also Figure 3.29 in SEDAR28-RW02). Figures in % denote the number of runs in each segment.

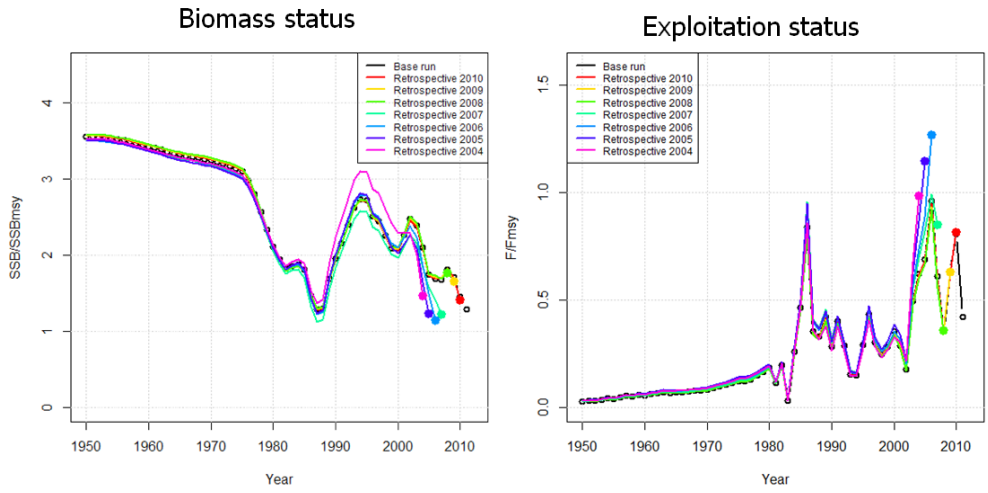


Figure 4.1.3. Cobia. Retrospective analysis (sensitivity to terminal year of data) of biomass status and exploitation status (taken from the original presentation by Kevin Craig, NMFS Beaufort to SEDAR 28 Review, also Figures 3.44 and 3.45 in SEDAR28-RW02).

Is there an informative stock recruitment relationship?

Like the rest of the review panel, I found that the stock recruit relationship was not informative in the context of the parameters needed for management against MSY criteria. However, the stock seems to be in state of reasonable, not impaired recruitment, and in that sense, it is informative.

Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?

The stock to recruitment relationship does not provide information to evaluate future stocks trends other than suggesting in the current regime the recruitment is not impaired by either spawning potential or the environmentally driven productivity.

It was noted that the proposed assessment model was based on an assumption that the S-R model had the Beverton/Holt form. Examination of the SSB Recruitment pairs indicated a significant fall in recruitment with increasing SSB (Figure 4.1.4). Thus I agreed and encouraged the analysts to evaluate the sensitivity of F/F_{msy} and SSB/SSB_{msy} to an alternative S-R assumption, namely a Ricker model (Figure 4.1.4). The alternative assumption of a Ricker S-R model resulted in closer fit to the S-R pairs, slightly poorer overall fit in the stock assessment, but because an additional parameter estimating steepness could now be fitted in the model, the number of fitted parameters increased. However, the steepness parameter does not come from information on the slope near the origin, but rather from the mathematical construct of the Ricker model. Information on the decline in recruitment at high biomass mathematically implies the steepness value. The perception of stock status with respect to 'over fished' or 'over fishing' criteria was unchanged, however, the use of Ricker S-R model results in a perception that F/F_{msy} is slightly lower and SSB/SSB_{msy} is slightly greater. It is suggested that S-R model choice is best selected based on an understanding of population biology rather than just fit criteria alone.

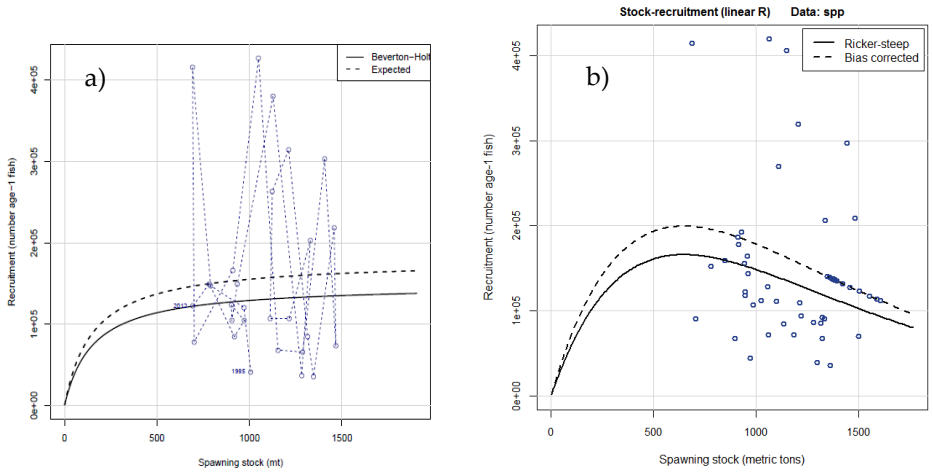


Figure 4.1.4. Cobia. Stock to recruit assumptions. a) the base run with a fitted Beverton and Holt model. b) the panel requested run with a Ricker model. (taken from the original presentation by Kevin Craig, NMFS Beaufort to SEDAR 28 Review, also Figures 3.20 in SEDAR28-RW02 and the second presentation by Kevin Craig, NMFS Beaufort to the review panel)

Are quantitative estimates of the status determination criteria for this stock reliable?

The status is sensitive to steepness estimates. The assumed estimates of steepness appeared to be justified when the characteristics of cobia were compared to other estimates given in the literature.

The analysis of different stock recruit relationship did not have an effect on trends, but did change F/SSB status (see above).

How reliable are the reference points?

This is one of the major issues of uncertainty, as the reference points are so dependent on the assumptions about steepness.

If not, are there other indicators that may be used to inform managers about stock trends and condition?

N/A

4.1.4 Projections of future population status

Having reviewed the data used, the methods and the diagnostics, and given that accepted practices were followed, I conclude that the methods used to project future population status were adequate and appropriate.

4.1.5 Changes to the base model or alternate states of nature

As an individual reviewer, and as a member of the review panel, I did not ask for any changes to the base model.

4.1.6 Consider how uncertainties in the assessment, and their potential consequences, have been addressed

The uncertainties and their potential consequences were addressed within the BAM through bootstrapping the observed data and Monte Carlo sampling of the parameters. The assessment was also used to explore sensitivity to retrospective bias (the impact of the choice of terminal year).

I am not an expert in model precision and model uncertainty. However I followed the logic of other members of the review panel and I conceptually agree with the panel's outcome that the approaches were sufficient to address scientific uncertainty for management recommendations. However, the assessment estimates are conditional on the overall choice of the model dynamics, but this is acceptable practice.

Any management uncertainty is not included, but this was also not required at this stage of the process. The implications of uncertainty in technical conclusions were clearly stated in the assessment document.

The panel asked for further examination of the shape of the selectivity curve, temporal changes in selectivity, the impact of assumptions about growth and the starting point of the time series.

I agreed with the suggestion that a dome shaped selectivity pattern should be explored in contrast to the base model logistic curve. The fishery was reported to be diverse with respect to variation in population density, season, latitude and onshore offshore variability. Such variability might be expected to be characterized by a dome

shaped selection function even though the gear interaction could be considered logistic. Thus the analysts were asked to evaluate the sensitivity of F/F_{msy} and SSB/SSB_{msy} to the selectivity assumption.

Two model runs (one with an imposed dome shape and one with a fitted dome; Figure 4.1.5) were carried out. The first alternate run resulted in no major differences. The second run suggested that dome shaped selection does not change the general perception of stock status with respect to 'over fished' or 'over fishing' criteria however, use of dome shaped selection supports a perception that F/F_{msy} is lower (0.60 to 0.19) and SSB/SSB_{msy} is greater (1.75 to 3.58). Thus I concluded that the choice of selection pattern shape does not impact on the exploitation status of the fish stock.

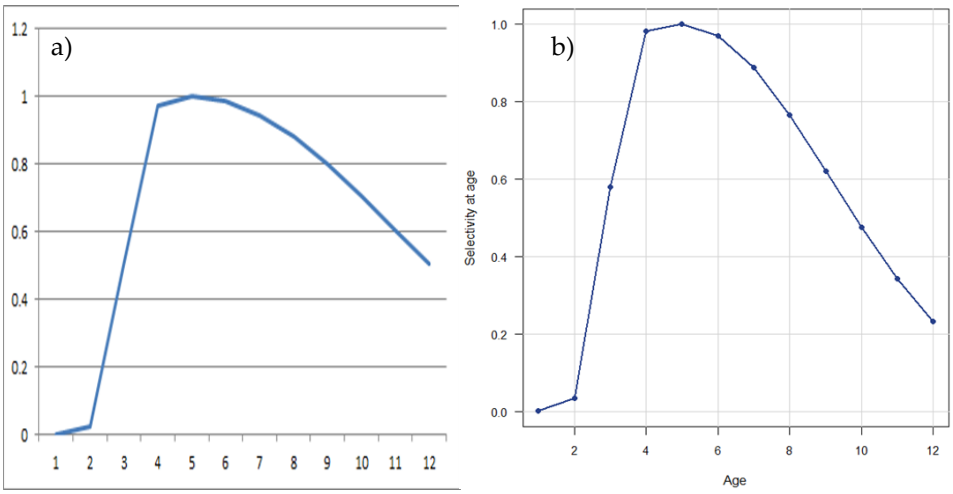


Figure 4.1.5. Cobia. Investigation of dome shaped selection patterns. a) imposed dome shape selection, b) fitted dome shape (taken from the extra presentations by Kevin Craig, NMFS Beaufort to SEDAR 28 Review).

I also requested an examination of time varying selectivity to evaluate the effects of assuming constant selectivity. The most reasonable basis for a change in selectivity was the 1990 regulation for a two-fish bag limit. Thus an alternative BAM configuration was developed with two selectivity periods (1950-1990 and 1991-2011) for the recreational fleet. The additional model parameters produced only a slightly improved fit to early age composition data, and minor changes in relative stock size and fishing mortality in the late 1990s, but negligible changes to more recent estimates and no change in stock status (Figure 4.1.6). Thus I concluded that the constant selectivity assumption was the most parsimonious model, and results were not sensitive to a change in selectivity from the bag limit regulation.

As stated in section 4.1.1, I felt that slightly more exploration was required about growth assumptions as there were a number of interlinking issues associated with data preparation and modelling of growth, the maturation ogive and the fraction discarded. There were some indications in the data that mean weight at age 3 might be underestimated as growth before and after maturation appears to follow fit different von Bertalanffy growth models. The truncation should also be linked to estimated discard rates and the uses of maturity information. So the analysts were asked to evaluate the sensitivity of F/F_{msy} and SSB/SSB_{msy} to alternative growth assumptions. The change in the growth model resulted in small changes in selectivity and stock status. The changes in the context of stock status were negligible.

I did not agree with the panel request for the change in start date in the time series, so I will not report it here, although the results of the assessment were not sensitive to the assumption about start date being 1950 or 1981.

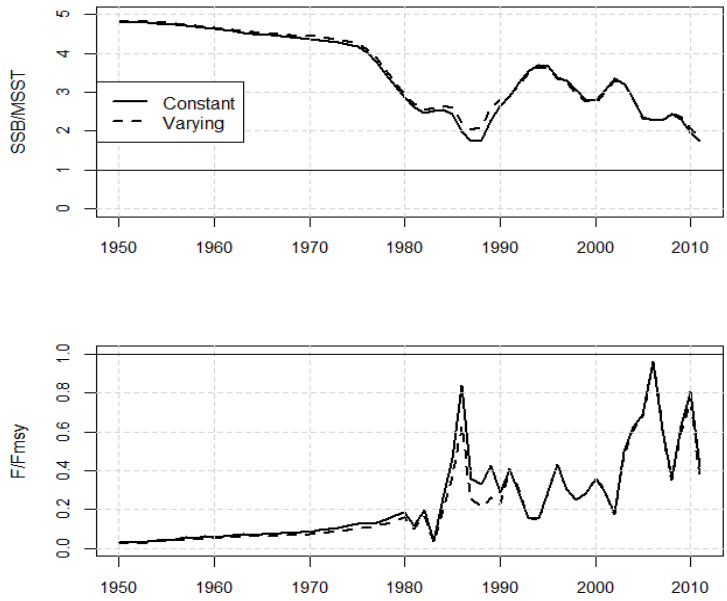


Figure 4.1.6. Cobia. Investigation of two periods with different selection patterns on stock status comnpared to the base run. (taken from the extra presentations by Kevin Craig, NMFS Beaufort to SEDAR 28 Review).

4.2 Spanish mackerel

Full stock assessments of the south Atlantic Spanish mackerel have been conducted in 1996, 1998, 2003 and 2007, the most recent being SEDAR 17. This 2007 assessment investigated three separate models: ASPIC, BAM, and SRA and the review panel was presented with the BAM. The SEDAR 17 Review Panel was presented with a base model using BAM, as neither ASPIC nor SRA were considered appropriate to produce standalone advice on stock status. The Review panel did not accept the base model of the assessment as appropriate for making biomass determinations but they accepted model results that the stock was not undergoing overfishing. The 2007 panel remarked that the major issues with the assessment were the shrimp bycatch uncertainty, the historical recreational catch derivation, and the lack of an objective likelihood weighting method.

4.2.1 Evaluate the quality and applicability of data used in the assessment.

The data are the best available and appropriate for the use in the assessment. The data are just sufficient to describe the individual fleets. I personally felt that the way the indices were described was a little unclear in the report, but the indices were clearly described in the presentation by the analyst. The ability of the data to inform on changes in the selectivity of the fleets (between fleets and overtime) was probably marginal. The use of a model that requires separable modelling of the fishery data must allow for multiple fleets or a time varying selection function of some consider-

able flexibility. This emphasises the need for sufficient age samples to characterize multiple fleets, in other words, the approach is data hungry.

By comparing the model outputs with the total mortality estimates from age data by gear, the selectivity of the gears (or the spatial interaction of gear, fishing behaviour, fish movement and regulation) could be investigated. This was a useful investigation of the basic catch data to attempt to understand the selectivity curves of the different fisheries. It did lead to some very challenging assumptions, such as the steepness of the cast net and pound net selectivity (figures 3.21 to 3.26 in the SEDAR 28 South Atlantic Spanish mackerel Section III Assessment workshop report). The extra analysis increased the confidence in using a fleet based statistical catch at age model, with a separable assumption by fleet, to understand the dynamics of this stock.

TYPE OF DATA	STRENGTH	WEAKNESS
Life History Strategy	Stock ID considered	Stock identify considerations used relatively out of date techniques
	Age varying M considered	Selection & maturity length dependent but length sampling is poor
	Discard mortality considered	Discard selectivity not considered
	Sexual dimorphism considered, although may not be necessary	For any alternative reproductive potential proxies, the existing information base appears weak.
	Age of total catch well sampled	No information on time trends in growth, maturity and weight at age
Landings data	Commercial & recreational catch	Poorly estimated discards & reconstruction
	Long time series	Poor coverage in some fleets/fisheries
Indices of abundance	2 lengthy fishery dependent series avialable	No accounting for technological improvements in fishing efficiency in indices
	Series cover centre or entire stock	Catability assumed limear
	Series from untargeted fleets	Regulatory changes influence fishery CPUE
	One fisheries independent series	No correlation between series
	Stock status is relatively robust to relative weighting of indices	

4.2.2 Evaluate the quality and applicability of methods used to assess the stock.

The proposed assessment model was the Beaufort Assessment Model (BAM) which is a statistical catch-age model. Previous versions of this assessment model have been used in SEDAR assessments of reef fishes in the US South Atlantic, such as red porgy, black sea bass, tilefish, snowy grouper, gag grouper, greater amberjack, vermilion snapper and was used for the last Spanish mackerel assessment. An ASPIC production model was also presented. As mentioned above, one of the strengths of the BAM approach it that the whole process is integral to the model - the assessment, projections, sensitivities, estimates of precision and estimating benchmarks and references points can be carried out within the one model.

I was convinced by the report, the presentation and the subsequent questioning that the BAM was appropriate and the preferred model. The ASPIC approach provided

supporting information as to the stock status, with an unrealistically narrow estimate of precision as many uncertainties cannot be included in the approach.

I supported the panel view that although the assessment was modelled with sex specific processes, the benefit of this extra complexity was marginal as it appeared to have little impact on the outcome of the assessment. I have a long research history of working in reproductive potential of fish, but I do not suggest bringing in extra factors when not necessary. I welcome the exploration of sex specific approaches but feel that the future benchmark should examine the need to model sexes separately; and also re-examine the treatment of sex-specific growth and its impact on selectivity.

The panel as a whole explored why the precision of the ASPIC model seemed to be much higher relative to the BAM (Figures 3.37 and 3.58 in SEDAR28-RW04). This higher precision, however, is fake and an artefact of the limited bootstrapping in ASPIC. ASPIC uses a bootstrapped methodology to resample the residuals of predicted versus fitted index values. In contrast, BAM uses a Monte Carlo approach and accounts for uncertainty in the many assumed and estimated parameters not considered by ASPIC. It was clear the BAM estimates of uncertainty were more appropriate than the ones from ASPIC; with the later underestimating the true variable.

4.2.3 Stock status, recruitment and reference points

Evaluate the assessment with respect to the following:

Is the stock overfished?

It was evident from the BAM that the probability of the stock being overfished is low.

What information helps you reach this conclusion?

The Monte Carlo Bootstrap runs incorporated and investigated the major sources of uncertainty. I concluded that the assessment provides an adequate amount of information to provide advice with associated uncertainty and that this uncertainty was well quantified.

Is the stock undergoing overfishing?

The probability of overfishing is low.

What information helps you reach this conclusion?

The BAM stock assessment and associated sensitivity analyses and estimates of precision are the basis for this conclusion (Figure 4.2.1), including the robust outcome of the retrospective analysis (Figure 4.2.2).

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

The stock recruit relationship has information, but steepness was not well estimated. However, there is sufficient information in the context of the parameters needed for management against MSY criteria. In addition, it is informative in the sense that the stock seems in state of reasonable, not impaired recruitment (Figure 4.2.3).

Are quantitative estimates of the status determination criteria for this stock reliable?

The status is sensitive to steepness estimates. The series of sensitivity runs described in the assessment report (Table 3.12 in the assessment report) highlight that the assumptions about natural mortality M and the steepness have the greatest effect on the determination of F/F_{MSY} and B/B_{MSY}. Accounting for the likely range in steepness provides the biggest range in potential biomass status indicators compared to all the other sensitivity runs (Figure 4.2.4). However terminal Fs are still below F_{MSY} and the terminal SSB are above B_{MSY}. Thus I would conclude that the estimates of status are reliable.

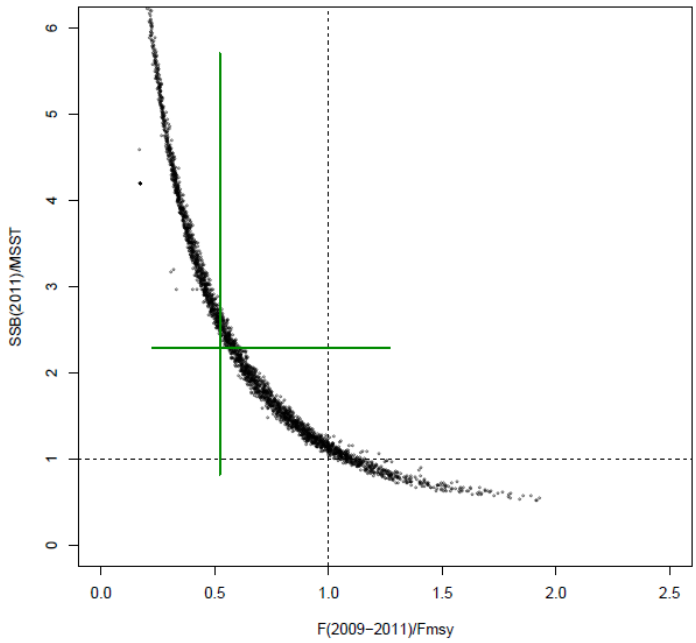


Figure 4.2.1 Spanish mackerel. Phase plot of terminal status estimates from MCB analysis of the BAM. Length of green cross hairs indicate 5th and 95th percentiles. (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review, also Figure 3.39 in SEDAR28-Section3 assessment workshop report).

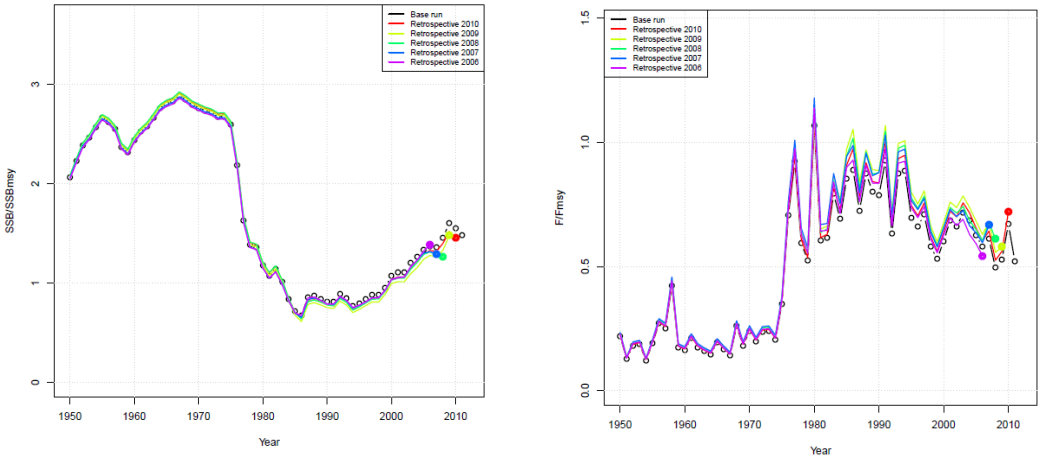


Figure 4.2.2 Spanish mackerel. Retrospective analysis (sensitivity to terminal year of data) of biomass status and exploitation status. (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review, also Figures 3.53 and 3.54 in SEDAR28-Section3 assessment workshop report).

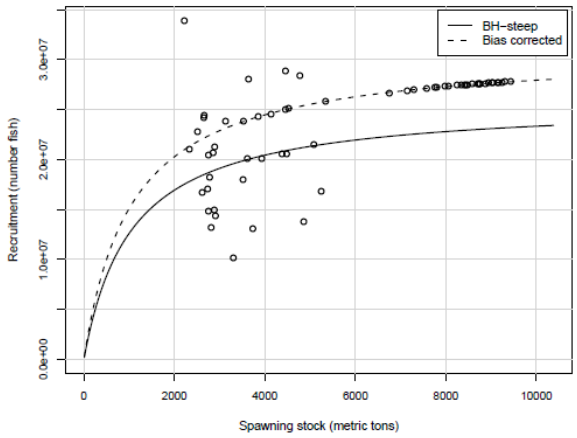


Figure 4.2.3. Spanish mackerel. Beverton-Holt spawner recruit curves, with and without lognormal bias correction. (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review, also Figure 3.31 in SEDAR28-Section3 assessment workshop report).

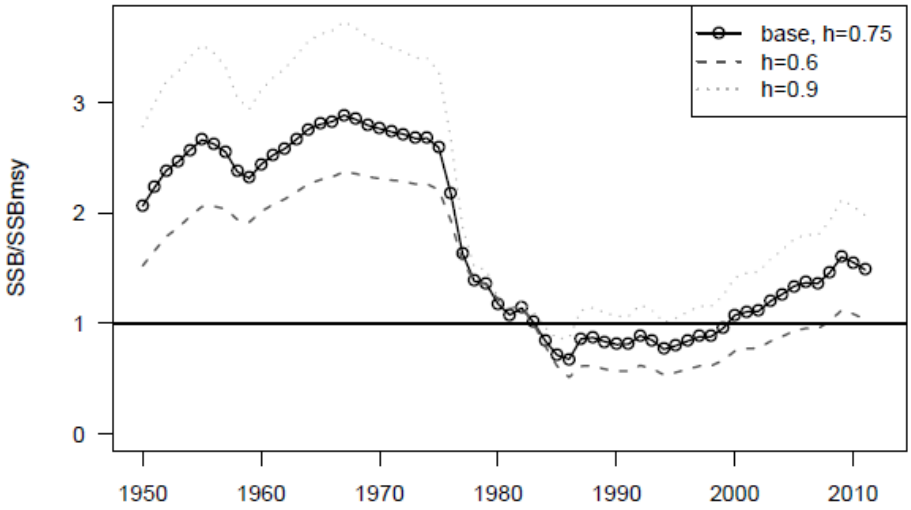


Figure 4.2.4. Spanish mackerel. Sensitivity of results to fixed values of steepness (h= 0.6. 0.75 and 0.9) shown as ratio of SSB to SSB_{MSY} (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review, also Figure 3.46 in SEDAR28-Section3 assessment workshop report).

How reliable are the reference points?

This is one of the major issues of uncertainty, as the reference points are dependent on the assumptions on steepness. The assessment provides the best available estimates of reference points.

If not, are there other indicators that may be used to inform managers about stock trends and condition?

N/A

4.2.4 Projections of future population status

Having reviewed the documents and questioned the presenters, and because accepted practices were followed, I conclude that the methods used for projecting future population status were adequate and appropriate.

4.2.5 Changes to the base model or alternative states of nature

None of the panel suggested that the base model be changed.

4.2.6 Consider how uncertainties in the assessment, and their potential consequences, have been addressed.

The uncertainties and their potential consequences were addressed within the BAM through bootstrapping the observed data and Monte Carlo sampling of the parameters. The assessment was also used to explore sensitivity to retrospective bias (the impact of the choice of terminal year).

As stated above, I am not an expert in model precision and model uncertainty. However I followed the logic of other members of the review panel and I conceptually agree with the panel's conclusion that the approaches were sufficient to address scientific uncertainty for management recommendations.

I raised some concerns that the natural mortality values in the MCB were drawn from a very wide range, giving the appearance of more uncertainty than appropriate. After a period of further questioning and exploration, my concern eased as it became clear that the methods and sensitivities chosen were appropriate.

The implications of uncertainty in technical conclusions are clearly stated in the assessment document.

Assessing the impacts of the fishery in BAM required separate selectivity models by fleet and the age sampling was relatively sparse in some fleets. To justify the need to model the separate fleets, rather than carry out an assessment assuming one fleet, we requested an exploration of the total selectivity on the fish stock over time. We termed this the aggregate selectivity over time. Examination of changes in selection with time would inform the decisions on use of separate or combined fleets. So the analyst was requested to present the selectivity at age by year for the aggregate fishery.

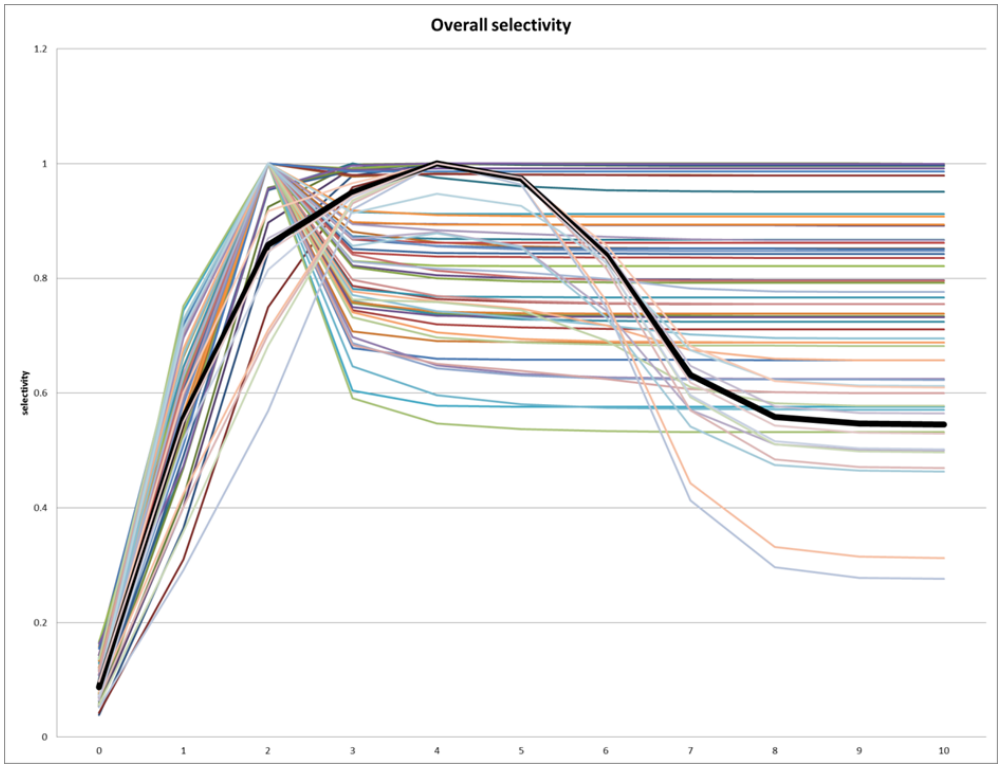


Figure 4.2.5. Spanish mackerel. Selectivity at age by year for the aggregate fishery. The dark line represents the terminal year. (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review).

The modelled selectivity at age showed substantial changes in selectivity following the closure in the gillnet fishery from the 1990s onwards. The selection at age changes by year due to changes in proportions of catch among different gear categories. This means that the use of a model that requires separable modelling of the fishery data must allow for multiple fleets or a time varying selection function of some considerable flexibility. This reinforces the need for sufficient age samples. Changing selec-

tivity with time implies changing MSY targets with time which limits the utility of target values into the future. If the changes in the relative contributions of the different gears does continue into the future it is expected the MSY targets will change.

In response to the steepness of changes with age in the selectivity of some gears (cast net and pound net) some of the panel asked to see the priors on the selectivity functions. Also the selection patterns exhibit correlation in the residuals at age among years, reinforcing the request. As this is not my area of expertise, I cannot comment further about the appropriateness of the exploration and the panel's findings.

4.3 Recommendations

4.3.1 Research

Cobia

Motives and selectivity of discarding fish by fishers.

The current data compilation exercises appear to concentrate on estimating discard mortality, without any consideration of the selective impact of discarding. It would be beneficial to broaden our understanding of the motives for discarding and the selectivity imposed by the behaviour to aid considerations of size at age and what appropriate assumptions could be included in the assessment model.

Further analysis of the interactions of length/age and maturity of Cobia.

The number of observations that drive the maturity ogive is very low, even relative to the total number of Cobia aged. The minimum landing length appears to impact on the collection of potential samples and is above the likely length of 50% mature. A research approach needs to be developed that strengthens the estimation of the maturity ogive by considering the interaction of size and age and the impact of variability in female maturity on the estimation of benchmarks/reference points. This research will probably have to increase the number of observations of maturity status of 1, 2, 3 and 4 year old fish by sex.

Use of tagging information

The Data Workshop recommended tagging to study movement patterns. I suggest that a tagging programme may also help to inform the cobia stock assessment. The fishery and biology of cobia seems to be conducive for a successful tagging programme. The fishery for cobia is currently dominated by a recreational fishery with a two-fish bag limit and a minimum landing size, resulting in a large portion of discarded catch. Discarded cobia appear to have high survival (e.g., 95% discard survival assumed in the assessment). Therefore, a tagging programme conducted as an industry partnership could release tagged fish from normal fishing operations. Few cobia are discarded per trip, so the additional costs and resources required per trip would be expected to be small, and the data recording aspects at sea would be minimal. The impact on the fishing operations would be anticipated to be negligible. The major costs would be organization, tags, data collation, outreach, a reporting system for recaptured tags, and subsequent data analysis. Industry participation rates might be high if information is provided back to participants, and their collaboration improves stock assessment and fishery management.

Estimates of discard mortality may be possible from initial Z from early returns compared with Z on later returns, though this will be compounded with selection. Estimates of Z or tag recovery rate on older ages, helping to inform on the appropriate

selection function to be used in the assessments could be obtained from the ratio of tag returns from one year to the next.

If resources are available consideration should be given to coupling two types of tagging: 1) high volume, low cost tagging would be most informative for estimates of Z that would help with population level estimates of total mortality and possibly selection and natural mortality; 2) high cost, electronic tagging might give more detail on migration. Of the two methods, the high volume approaches are more likely to be informative for management parameters at a population level.

Spanish mackerel

Stock structure

I would recommend that recently developed genetic techniques be utilized to investigate the stock structure of Spanish Mackerel. The studies cited are relatively old, and use techniques that could be now considered antiquated and may not have the power to distinguish population structure in highly migratory species. Microsatellite information should be explored to consider both stock identity and internal population structure.

Investigation of the dynamics of selectivity by fleet

As selectivity of the total fishery has changed greatly over time, the fleet based approach used in the assessment is appropriate and justified. However this approach does result in extremely steep selectivity patterns (by age) and probably correlations by age in the residual patterns. I would recommend that further research be carried out into the likely mechanisms for these selectivities, as a mechanism to justify this approach.

4.3.2 Other

It became clear during the review that the process behind SEDAR 28 was quite chaotic and the analysts delivered two well thought out stock assessments in spite of the previous steps in the process (the data and assessment workshops) rather than as a result of the previous steps. I would recommend that an evaluation of the SEDAR procedures be carried out, to ensure that resources are not wasted and that the process is efficient for all parties.

4.4 A brief description on panel review proceedings

The documents (codes, data reports, assessment reports etc.) were made available to the reviewers a few weeks in advance of the review workshop. The workshop was held with the stock assessment analysts from Monday to Wednesday and then the panel operated alone on the Thursday and Friday. The chair of the panel left on the Thursday.

The review was conducted in good humour and the stock assessment analysts were extremely helpful and accepting of questions. The analysts responded to all extra requests in a very effective and professional manner. Inputs from the fishing industry representative were welcome and useful.

The use of the WEBinar for the first day was sub-optimal. This was required because one panel member was delayed by Hurricane Sandy. But the work was still carried out and the delayed panel member's contributions were communicated to the rest of the panel in a reasonable manner.

5 Conclusions

With regards to cobia, the assessment model presented to the review was the Beaufort Assessment Model (BAM). I felt that the BAM was used effectively with regards to the quality and availability of the data and that the stock assessment method was appropriate. The presented approach was the most appropriate to characterise the stock status for management purposes. The current stock status in the base run was estimated to be SSB2011/MSST=1.75. The current level of fishing is F2009-2011/FMSY = 0.599, with F2011/FMSY = 0.423. Thus is it highly likely that the stock is not overfished and is not undergoing overfishing. The exploration and quantification of uncertainty did not change this conclusion.

For South Atlantic Spanish mackerel the primary model presented to the review group was the BAM, while a secondary, surplus-production model (ASPIC) was presented to provide comparison of model results. Considering the available input data and the characteristics of the fish and the many fisheries that exploit the stock, I feel that the presented stock assessment was the most appropriate method to characterise the stock status for management purposes. The current stock status was estimated to be SSB2011/MSST=2.29. The current level of fishing is F2009-2011/FMSY = 0.526, with F2011/FMSY = 0.521. Thus is it highly likely that the stock is not overfished and is not undergoing overfishing. The exploration and quantification of uncertainty did not change this conclusion. In general, stock status results from ASPIC were qualitatively similar to those from BAM.

6 References

Thompson, N.B. 1994. An assessment of cobia in southeast U.S. waters. Miami Laboratory Contribution No. MIA-94/95-31.

Appendix 1: Bibliography of provided materials

Primary Documents

SEDAR28-RW01 The Beaufort Assessment Model (BAM) with application to cobia: mathematical description, implementation details, and computer code. Author Craig

SEDAR28-RW02 Development and diagnostics of the Beaufort assessment model applied to Cobia. Author Craig

SEDAR28-RW03 The Beaufort Assessment Model (BAM) with application to Spanish mackerel: mathematical description, implementation details, and computer code. Author Andrews

SEDAR28-RW04 Development and diagnostics of the Beaufort assessment model applied to Spanish mackerel. Author Andrews

SEDAR28-SAR1 Assessment of Spanish mackerel in the US South Atlantic SEDAR 28

SEDAR28-SAR3 Assessment of cobia in the US South Atlantic SEDAR 28

Background documents

Documents Prepared for the Data Workshop

SEDAR28-DW01 Cobia preliminary data analyses – US Atlantic and GOM genetic population structure Darden 2012

SEDAR28-DW02 South Carolina experimental stocking of cobia Rachycentron canadum Denson 2012

SEDAR28-DW03 Spanish Mackerel and Cobia Abundance Indices from SEAMAP Groundfish Surveys in the Northern Gulf of Mexico Pollack and Ingram, 2012

SEDAR28-DW04 Calculated discards of Spanish mackerel and cobia from commercial fishing vessels in the Gulf of Mexico and US South Atlantic K. McCarthy

SEDAR28-DW05 Evaluation of cobia movement and distribution using tagging data from the Gulf of Mexico and South Atlantic coast of the United States M. Perkinson and M. Denson 2012

SEDAR28-DW06 Methods for Estimating Shrimp Bycatch of Gulf of Mexico Spanish Mackerel and Cobia B. Linton 2012

SEDAR28-DW07 Size Frequency Distribution of Spanish Mackerel from Dockside Sampling of Recreational and Commercial Landings in the Gulf of Mexico 1981-2011 N.Cummings, J. Isely

SEDAR28-DW08 Size Frequency Distribution of Cobia from Dockside Sampling of Recreational and Commercial Landings in the Gulf of Mexico 1986-2011 J. Isely and N. Cummings

SEDAR28-DW09 Texas Parks and Wildlife Catch Per unit of Effort Abundance Information for Spanish mackerel N. Cummings, J. Isely

SEDAR28-DW10 Texas Parks and Wildlife Catch Per unit of Effort Abundance Information for cobia J. Isely, N. Cummings

SEDAR28-DW11 Size Frequency Distribution of Cobia and Spanish Mackerel from the Galveston, Texas, Reef Fish Observer Program 2006-2011 J Isely and N Cummings

SEDAR28-DW12 Estimated conversion factors for calibrating MRFSS charterboat landings and effort estimates for the South Atlantic and Gulf of Mexico in 1981-1985 with For Hire Survey estimates with application to Spanish mackerel and cobia landings V. Matter, N Cummings, J Isely, K Brennen, and K Fitzpatrick

SEDAR28-DW13 Constituent based tagging of cobia in the Atlantic and Gulf of Mexico waters E. Orbesen

SEDAR28-DW14 Recreational Survey Data for Spanish Mackerel and Cobia in the Atlantic and the Gulf of Mexico from the MRFSS and TPWD Surveys V. Matter

SEDAR28-DW15 Commercial Vertical Line and Gillnet Vessel Standardized Catch Rates of Spanish Mackerel in the US Gulf of Mexico, 1998-2010 N. Baertlein, K. McCarthy

SEDAR28-DW16 Commercial Vertical Line Vessel Standardized Catch Rates of Cobia in the US Gulf of Mexico, 1993-2010 K. McCarthy

SEDAR28-DW17 Standardized Catch Rates of Spanish Mackerel from Commercial Handline, Trolling and Gillnet Fishing Vessels in the US South Atlantic, 1998-2010 K. McCarthy

SEDAR28-DW18 Standardized catch rates of cobia from commercial handline and trolling fishing vessels in the US South Atlantic, 1993-2010 K. McCarthy

SEDAR28-DW19 MRFSS Index for Atlantic Spanish mackerel and cobia Drew et al.

SEDAR28-DW20 Preliminary standardized catch rates of Southeast US Atlantic cobia (Rachycentron canadum) from headboat data. NMFS Beaufort

SEDAR28-DW21 Spanish mackerel preliminary data summary: SEAMAP-SA Coastal Survey Boylan and Webster

SEDAR28-DW22 Recreational indices for cobia and Spanish mackerel in the Gulf of Mexico Bryan and Saul

SEDAR28-DW23 A review of Gulf of Mexico and Atlantic Spanish mackerel (Scomberomorus maculatus) age data, 1987-2011, from the Panama City Laboratory, Southeast Fisheries Science Center, NOAA Fisheries Service Palmer, DeVries, and Fioramonti

SEDAR28-DW24 SCDNR Charterboat Logbook Program Data, 1993 – 2010 Errigo, Hiltz, and Byrd

SEDAR28-DW25 South Carolina Department of Natural Resources State Finfish Survey (SFS) Hiltz and Byrd

SEDAR28-DW26 Cobia bycatch on the VIMS elasmobranch longline survey:1989-2011 Parsons et al.

SEDAR28-AW01 Florida Trip Tickets S. Brown

Appendix 2. Statement of Work

External Independent Peer Review by the Center for Independent Experts

SEDAR 28 South Atlantic Spanish mackerel and cobia assessment review

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description SEDAR 28 will be a compilation of data, an assessment of the stocks, and an assessment review conducted for South Atlantic Spanish mackerel and cobia. The CIE peer review panel is ultimately responsible for ensuring that the best possible assessment has been provided through the SEDAR process. The stocks assessed through SEDAR 28 are within the jurisdiction of the South Atlantic Fisheries Management Councils and states of Florida, Georgia, South Carolina, and North Carolina. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The agenda of the panel review meeting will be attached in **Annex 3**.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review during the SEDAR 28 review scheduled in 29 October - 2 November 2012, and the CIE reviewers shall have the necessary qualifications to complete the tasks in accordance with the SoW and ToRs herein. *One of the selected CIE reviewers will be the CIE observer contracted to attend the SEDAR 28 assessment workshop in May 2012.* The CIE reviewers shall have expertise in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the tasks of the peer-review described herein. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

Location of Peer Review: Each CIE reviewer shall participate and conduct an independent peer review during the panel review meeting scheduled in Atlanta, Georgia during October 29 through November 2, 2012.

Statement of Tasks: Each CIE reviewer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Programme NAO 207-12 regulations available at the Deemed Exports NAO website:
http://deemedexports.noaa.gov/
http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs shall not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The NMFS Pro-

ject Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2. *One of the selected CIE reviewers will be the CIE observer contracted to attend the SEDAR 28 assessment workshop in May 2012, and the CIE observer's report will be reviewed and distributed as an addendum to the final independent CIE peer review report for that CIE reviewer.*

Other Tasks – Contribution to Summary Report: Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. The Summary Report is not reviewed by the CIE, therefore is not a CIE product. Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Participate during the panel review meeting at the Atlanta, Georgia during October 29 through November 2, 2012.
3) In Atlanta, Georgia during October 29 through November 2, 2012 as specified herein, conduct an independent peer review in accordance with the ToRs (**Annex 2**).
4) No later than November 16, 2012, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, via email to Dr. David Sampson david.sampson@oregonstate.edu. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

21 September 2012	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
15 October 2012	NMFS Project Contact sends the CIE Reviewers the pre-review documents
29 October – 2 November 2012	Each reviewer participates and conducts an independent peer review during the panel review meeting
16 November 2012	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
30 November 2012	CIE submits CIE independent peer review reports to the COTR
7 December 2012	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: This 'Time and Materials' task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council's SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:
(1) The CIE report shall completed with the format and content in accordance with **Annex 1**,
(2) The CIE report shall address each ToR as specified in **Annex 2**,
(3) The CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

William Michaels, Programme Manager, COTR
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
William.Michaels@noaa.gov Phone: 301-427-8155

Manoj Shivlani, CIE Lead Coordinator
Northern Taiga Ventures, Inc.
10600 SW 131st Court, Miami, FL 33186
shivlanim@bellsouth.net Phone: 305-383-4229

Roger W. Peretti, Executive Vice President
Northern Taiga Ventures, Inc. (NTVI)
22375 Broderick Drive, Suite 215, Sterling, VA 20166
RPerretti@ntvifederal.com Phone: 571-223-7717

Key Personnel:

NMFS Project Contact:

Ryan Rindone, SEDAR Coordinator
2203 N. Lois Avenue, Suite 1100
Tampa, FL 33607
Ryan.Rindone@gulfcouncil.org Phone: 813-348-1630

Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a brief summary of findings, of the science, conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review

   Appendix 2: A copy of the CIE Statement of Work

   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review

SEDAR

SEDAR 28: South Atlantic Cobia and Spanish Mackerel

Review Workshop Terms of Reference

1. Evaluate the quality and applicability of data used in the assessment.
2. Evaluate the quality and applicability of methods used to assess the stock.
3. Evaluate the assessment with respect to the following:
   - Is the stock overfished? What information helps you reach this conclusion?
   - Is the stock undergoing overfishing? What information helps you reach this conclusion?
   - Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?
   - Are quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and condition?
4. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status with regard to accepted practices and data available for this assessment.
5. If there are significant changes to the base model, or to the choice of alternate states of nature, then provide a probability distribution function for the base model, or a combination of models that represent alternate states of nature, presented for review. Provide justification for the weightings used in producing the combinations of models.
6. Consider how uncertainties in the assessment, and their potential consequences, have been addressed.
   - Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty.
   - Ensure that the implications of uncertainty in technical conclusions are clearly stated.
7. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.

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

8. Prepare a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Develop a list of tasks to be completed following the workshop. Complete and submit the Peer Review Summary Report in accordance with the project guidelines.
   - Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review.
   - Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

The review panel may request additional sensitivity analyses, evaluation of alternative assumptions, and correction of errors identified in the assessments provided by the assessment workshop panel; the review panel may not request a new assessment. Additional details regarding the latitude given the review panel to deviate from assessments provided by the assessment workshop panel are provided in the SEDAR Guidelines and the SEDAR Review Panel Overview and Instructions.

** The panel shall ensure that corrected estimates are provided by addenda to the assessment report in the event corrections are made in the assessment, alternative model configurations are recommended, or additional analyses are prepared as a result of review panel findings regarding the TORs above.**

Annex 3: Agenda for the SEDAR 28 Review

Atlanta, GA - October 29 through November 2, 2012

Monday		
1:00 p.m.	**Convene**	
1:00 – 1:30	**Introductions and Opening Remarks**	**Coordinator**
	- Agenda Review, TOR, Task Assignments	
1:30 – 5:00	**Assessment Presentations and Discussions**	**TBD**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**
Tuesday		
8:00 a.m. – 11:30 a.m.	**Assessment Presentations**	**TBD**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion**	**Chair**
	- *Assessment Data & Methods*	
	- Identify additional analyses, sensitivities, corrections	
3:30 p.m. – 3:45 p.m.	**Break**	
3:45 p.m. – 5:00 p.m.	**Panel Discussion**	**Chair**
	- Continue deliberations	
	- Review additional analyses	
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**

***Tuesday Goals*:** Initial presentations completed, sensitivities and modifications identified.

Wednesday		
8:00 a.m. – 11:30 a.m.	**Panel Discussion**	**Chair**
	- Review additional analyses, sensitivities	
	- Consensus recommendations and comments	
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion**	**Chair**
3:30 p.m. – 3:45 p.m.	**Break**	
3:45 p.m. – 5:00 p.m.	**Panel Discussion**	**Chair**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**

Wednesday Goals: Final sensitivities identified, preferred models selected, projection approaches approved, Summary report drafts begun

Thursday

8:00 a.m. – 11:30 a.m.	**Panel Discussion**	**Chair**
	- Final sensitivities reviewed.	
	- Projections reviewed.	
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion or Work Session**	**Chair**
3:30 p.m. - 3:45 p.m.	**Break**	
3:45 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**
	- Review Consensus Reports	

Thursday Goals: Complete assessment work and discussions. Final results available. Draft Summary Report reviewed.

Friday

8:00 a.m. – 1:00 p.m.	**Panel Work Session** **Chair**	
1:00 p.m.	**ADJOURN**	

Appendix 3: Participants

NAME	ROLE	AFFLIATION
Panelists		
Marcel Reichert	Review Panel Chair	SA SSC
Steve Cadrin	Reviewer	SA SSC
Matt Cieri	Reviewer	CIE
Mark Dickey-Collas	Reviewer	CIE
John Simmonds	Reviewer	CIE
Analytical Team		
Katie Andrews	Lead Analyst SASM	NMFS Beaufort
Kevin Craig	Lead Analyst SAC	NMFS Beaufort
Kyle Shertzer	Analyst	NMFS Beaufort
Erik Williams	Analyst	NMFS Beaufort
Council Members		
Ben Hartig	Council Rep	SAFMC
Anna Beckwith	Council Rep	SAFMC
Observers		
None		
Staff & Agency		
Ryan Rindone	SEDAR 28 RW Coordinator	SEDAR
Julia Byrd	SEDAR Coordinator	SEDAR
Andrea Grabman	Administrative Support	SEDAR
Mike Errigo	Fishery Biologist	SAFMC

Center for Independent Experts Independent Peer Review Report of: SEDAR 28: South Atlantic Cobia and Spanish Mackerel Review Workshop

Double Tree Hotel
Atlanta Georgia
Oct 29-Nov 2, 2012

E J Simmonds

Table of Contents

1. Executive summary

The meeting to review the assessments of South Atlantic Cobia and Spanish Mackerel was held in Atlanta, Georgia, from October 29 to November 2, 2012, and the main conclusions are given separately by species.

The South Atlantic cobia stock assessment presented by the SEDAR 28 Assessment Workshop (AW) provided the Review Panel (RP) with outputs and results from two assessments models. The primary model was the Beaufort Assessment Model (BAM), while a secondary, surplus-production model (ASPIC) provided a comparison of model results. The RP concluded that the BAM was the most appropriate model to characterize the stock status for management purposes.

The current stock status in the base run was estimated to be $SSB_{2011}/MSST=1.75$. The current level of fishing is $F_{2009\text{-}2011}/F_{MSY} = 0.599$, with $F_{2011}/F_{MSY} = 0.423$. Therefore, the RP concludes that the stock is not overfished and is not undergoing overfishing. The qualitative results on terminal stock status were similar across presented sensitivity runs, indicating that the stock status results were robust given the provided data and can be used for management. The outcomes of sensitivity analyses were in general agreement with those of the Monte Carlo Bootstrap analysis in BAM. The RP concluded that the ASPIC model results were not informative for stock status determination and fisheries management.

The South Atlantic Spanish mackerel stock assessment presented by the SEDAR 28 AW provided the RP with outputs and results from two assessments models. The primary model was the Beaufort Assessment Model (BAM), while a secondary, surplus-production model (ASPIC) provided a comparison of model results. The stock status results from ASPIC were qualitatively similar to those from BAM. The RP concluded that the BAM was the most appropriate model to characterize the stock status for management purposes.

The current stock status in the base run from the BAM was estimated to be $SSB_{2011}/MSST=2.29$. The current level of fishing is $F_{2009\text{-}2011}/F_{MSY} = 0.526$, with $F_{2011}/F_{MSY} = 0.521$. Therefore, the RP concluded that the stock is not overfished and is not undergoing overfishing. The qualitative results on terminal stock status were similar across presented sensitivity runs, indicating that the stock status results were robust given the provided data and can be used for management. The outcomes of sensitivity analyses carried out with BAM were in general agreement with those of the Monte Carlo Bootstrap analysis in BAM.

Evaluation of research requirements suggests that a tagging program for cobia and increased age sampling for both stocks would be particularly beneficial.

2. Background

SEDAR 28 provided compilation of data, an assessment of the stocks, and an assessment review conducted for South Atlantic Spanish mackerel and cobia. The Center for Independent Experts (CIE) peer review panel is ultimately responsible for ensuring that the best possible assessment has been provided through the SEDAR process. The stocks assessed through SEDAR 28 are within the jurisdiction of the South Atlantic Fisheries Management Council and states of Florida, Georgia, South Carolina, and North Carolina. The Terms of Reference (ToRs) of the peer review are attached in Annex 2 to Appendix 2. The agenda of the panel review meeting is attached in Annex 3 to Appendix 2 and the participants list is in Appendix 3.

Three CIE reviewers conducted an impartial and independent peer review during the SEDAR 28 review scheduled 29 October to 2 November 2012, The CIE reviewers were required to have the necessary qualifications to complete the tasks in accordance with the SoW and ToRs (Appendix 2). One of the selected CIE reviewers also participated as the CIE observer and was contracted to attend the SEDAR 28 assessment workshop in May 2012. The CIE reviewers were required to have expertise in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the tasks of the peer-review.

3. Description of the reviewer's role in the review activities

I am an expert in both Fisheries Surveys and Stock Assessment and their use in fish stock management. My background is that of a senior fisheries scientist currently carrying out contracts for the European Commission dealing with management strategy evaluation (MSE) and Impact Assessment of fishery management plans. I obtained BSc. and MSc. degrees in the UK. Before recently joining the European Commission I had worked in fisheries research for 37 years at the Government Fisheries Research Laboratory Aberdeen in Scotland. I have worked with acoustic surveys for more than 30 years and carried out stock assessments involving acoustic-trawl, trawl and egg surveys for more than 16 years. I am co-author of books on Fisheries Acoustics (1991 and 2nd Edition 2005) and Geostatistics (2000). In addition to work in Aberdeen, Scotland, I have been involved in surveys off Morocco, Ecuador, Peru the South China Sea and in the Persian Gulf. Since 1990 I have developed extensive experience of fish stock assessment and fisheries management, chairing among other groups the ICES herring survey planning group 1991-95, the ICES Fisheries Acoustics working group 1993-96, the ICES Herring Assessment working group 1998-2000, and the ICES study group on Management Strategies from 2004-2009. In addition to a wide range of assessment work as part of the ICES assessment process, I have been responsible for developing approaches for combining acoustic-trawl, trawl and ichthyoplankton surveys in assessments for North

Sea herring North East Atlantic mackerel and Peruvian Anchovetta. I currently chair the European Commission STECF group that prepares evaluations of historic performance of management plans and the impact assessments for new multi-annual fisheries management plans.

I participated in all aspects of the review, paying particular attention to the stock assessment and the sensitivity analyses and Monte Carlo (MC) analyses, and the utility of the results for management of the populations of Spanish mackerel and cobia.

4. Findings by ToR

The report is organized as two individual sections that relate to the assessments of the two stocks; South Atlantic Cobia (*Rachycentron canadum*) Section 4.1 and South Atlantic Spanish Mackerel (*Scomberomorus maculatus*) Section 4.2. Issues for both species are dealt with in common in discussions of research recommendations (Section 5) and review of meeting process (Section 6). The detailed ToR that provided the structure for section 4.1 and 4.2 are provided in Appendix 2 Annex 2. The list of participants who attended the review is given in Appendix 3.

4.1. Cobia

Quality and applicability of data used in the assessment

In summary it was concluded that the data used in the assessment were the best available, but there was some concern that the limited age and discard information could be a problem and may make the assessment rather sensitive to additional data. However the clear progression of several cohorts through the time series of age composition in recreational catch was sufficient to support the view that an age based model could be appropriate considering the data sources. Some concern was expressed about the impact of the minimum landing size on the bias of the data, despite the use of the Diaz (2004) correction. The impact of the minimum landing size on the selectivity of discards and estimation of fraction mature should also be considered.

Life history strategies of cobia

Strengths

- Stock identity was considered and movement was also examined though tag studies.
- Estimates of age varying natural mortality were considered and provided.
- Discard mortality was considered and estimates used.
- The report highlighted and provided information on sexual dimorphism in growth.
- Information to derive alternative stock reproductive-potential indices was considered

Weaknesses

- The potential for tag studies or juvenile release events to monitor mortality was not fully explored, which is discussed below in the section on research recommendations.
- Age sampling was very poor and barely adequate even in recent years, the resources currently allocated to age-reading and sampling for age seem to be inadequate with respect to the utility of the information.
- Whilst discard mortality was considered, discard selectivity was not assessed well, weights, fraction mature and discarding should be estimated together with the Diaz (2004) bias correction.
- The number of observations that drive the maturity ogive was very low, even relative to the total number of Cobia aged.
- The growth modelling approach did not accommodate the potential for time trends in growth, maturity and weight to inform on environmentally driven changes.

Catch and landings data for cobia

Strengths

- The assessment included commercial and recreational landings.
- Commercial landings were available back to 1950.
- A combination of Marine Recreational Fisheries Statistical Survey (MRFSS) and Marine Recreational Information Program (MRIP) indices were used to examine recreational removals back to 1983.

Weaknesses

- The absence of commercial discard data was of concern. However, it was noted that commercial landings represented a small part of the recent catch with discards a smaller portion of that. Discarding would not be a concern for stock assessment provided that they have a similar discard survival to the recreational fishery.

Commercial length and age of landings

Cobia commercial length compositions were updated to 2011. Annual length compositions (originally 1-cm bins) were combined into 3-cm bins with a minimum size of 20 cm and a maximum size of 149 cm. Commercial length compositions were pooled across all years (1982 - 2011) and weighted by the annual number of trips sampled due to low sample sizes. Commercial age compositions were also pooled across years (1986 – 2011) due to low sample sizes and weighted by the annual number of fish sampled (number of trips was not available for age compositions). Cobia aged 12-15 were pooled as a plus group.

Strengths and weaknesses

- This procedure removes any contrast in age and length data by year allowing only mean values for the period to be estimated. This is clearly a weakness but given

the proportion of catch taken in the commercial fishery it may not be a major problem.

Recreational catch Length and Age composition

Cobia recreational length compositions were updated to include 2011 data. Recreational age compositions from the headboat survey (SRHS) and MRFSS were combined. Following a review, unweighted age compositions with annual sample sizes equal to the number of fish were used in the statistical catch-at-age model.

Strengths and weaknesses:

- The provision of age data for the assessment is regarded as a particularly important part of the information on catches. Modeling population growth and mortality through length alone for cobia is unlikely to lead to precise estimates of population parameters as there is considerable overlap between length at age 2 and older making the separation of cohorts difficult.
- Information on catch at age in the recreational fishery has improved considerably with increased sampling to a level of 200 trips in 2007 onwards. Before this the numbers aged were lower and in some years inadequate. However, 200 trips with just over 1 fish per trip is still a relatively small number of aged individuals to apportion among 12 age classes. Increasing the number of individuals used to estimate age proportions in the recreational fishery is identified as one of the ways to improve the assessment.

Indices of Abundance

Strengths

- Three fishery dependent indices are available for potential use in the cobia stock assessment.
- Indices are available since 1981 (recreational headboat index).
- Two indices cover the entire stock area (recreational headboat and MRFSS indices) one the central portion of the stock (SCDNR charterboat index).
- Fishery-dependent indices are based on selected data (e.g., selected headboat vessels with consistent catches of cobia).
- Fishery-dependent indices are standardized to account for factors not related to relative abundance using conventional statistical analyses (e.g., delta-GLM with year, location, season effects and bootstrap estimates of precision).
- Trends in the recreational headboat index are considered to represent resource trends, because the fishery does not target cobia.
- The recreational headboat index and SCDNR charterboat logbook program are considered to be a census for those fleets.

Weaknesses

- There are no fishery-independent indices of abundance available. Such an index may be difficult to design given low catch rates in the fishery and the absence of concentrations that could be detected without fishing.

- Fishery catchability may not be constant or linear, as assumed in the assessment.
- Standardization of fishery-dependent indices may not remove the effect of technological improvements in fishing efficiency.
- Regulatory changes may influence fishery catch rates.
- MRFSS statistics for rarely caught species, like cobia, are less reliable than for other species.
- MRFSS and MRIP statistics have been combined into a single series, but CPUE from the two programs may not be comparable leading to a trend in the tuning series.
- Correlation among indices is poor, suggesting assumptions may not be as correct as assumed. This has led one index (MRFSS) to be removed from the stock assessment.

Quality and applicability of methods used to assess the stock

It is concluded that the BAM model in the configuration presented was the best available considering the data. BAM can utilize the dynamics between cohorts whereas the ASPIC model cannot, as it is biomass based. There was some concern that the conclusion on stock status and other assessment results from the BAM are dependent to some extent on the steepness assumption in the S-R function.

The assessment report provided an extensive range of sensitivity tests to validate the utility of the assessment. (4 options for M, 2 limit options for steepness, 2 alternative index weighting options, 2 inclusion of indices individually, 1 catchability trend in CPUE, and 1 accounting separately for a stocking program). In addition, a retrospective analysis indicated that the model gave stable results over the last 3-4 years, but not longer. A number of other aspects were requested during the review and considered.

Choice of domed or logistic selection function in the recreational fishery

Rationale: It was noted that the proposed assessment model was based on an assumption that the dominant fishery, i.e. the recreational fishery, was modeled with selectivity at age based on a logistic curve asymptotic to full selection. However, the fishery was reported to be diverse with respect to variation in population density with season, latitude and onshore offshore variability. The interaction of such in year variability in stock and fishery might be expected to be characterized by a dome shaped selection function even though the gear interaction could be considered logistic (Sampson and Scott 2011). To evaluate the sensitivity of F/Fmsy and SSB/SSBmsy to the selectivity assumption the analysts were requested to test this and the outcome indicated that the alternative assumption on selection resulted in very similar residual patterns between modeled and observed catch at age (Figure 1) and very similar overall fit, indicating that the data may not be sufficient to differentiate between the two alternative assumptions. Further exploration using a single parameter to determine the rate of decline in selection above the fitted peak suggests a rather flat likelihood surface but does show a minimum in the likelihood that occurs with some doming. Dome shaped selection does not change the general perception of stock status with respect to ‘over fished’ or ‘over fishing’ criteria

(see text table below). However, use of dome shaped selection supports a perception that F/Fmsy is lower and SSB/SSBmsy is greater.

	Fmsy	SSBmsy	MSY	Fend/Fmsy	SSBend/MSST	steep	R0
Logistic	0.46	536.8	808	0.599	1.75	0.75	136548
Dome-fit	0.466	1072.7	1624	0.188	3.58	0.75	288706

Figure 1 Residuals on dome shaped and logistic selection functions For recreational fishery data.

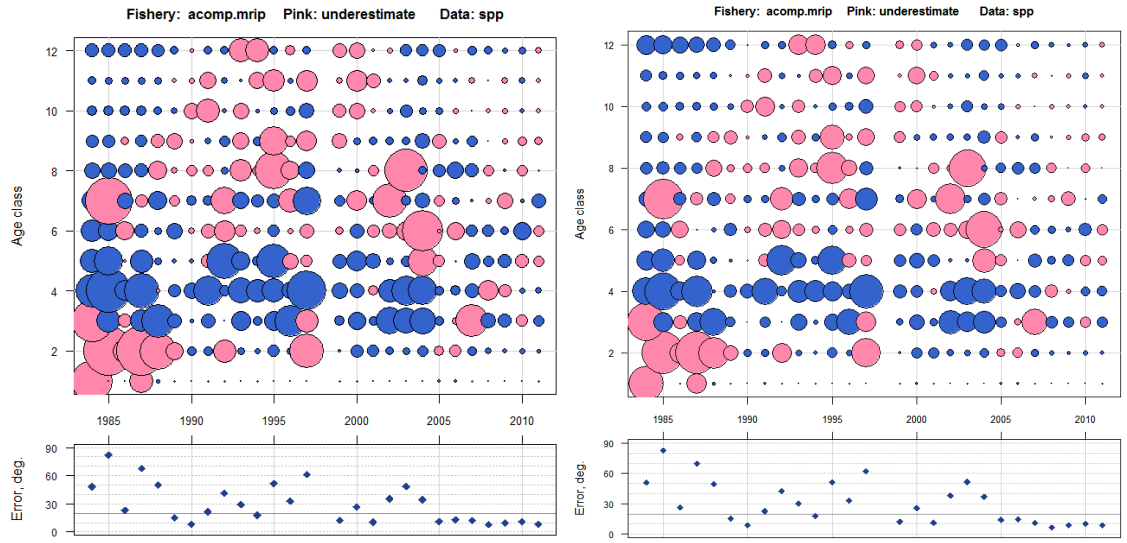


Figure 2 Mean F dome shaped selection logistic selection functions.

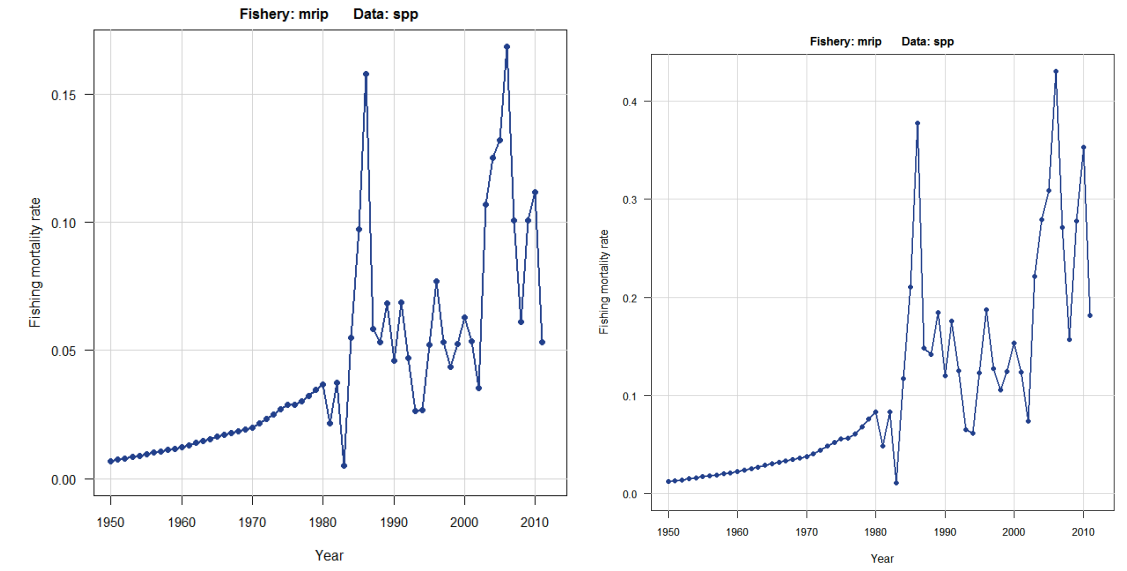
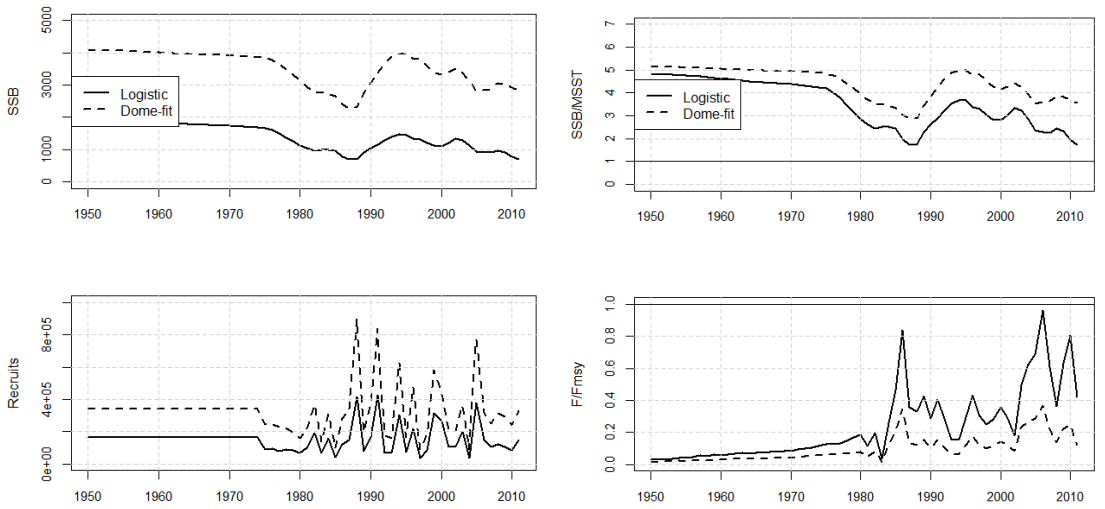


Figure 3 Comparison of stock and status parameters for domed and logistic functions



Evaluation of alternative S-R model (Ricker)

Rational: It was noted that the proposed assessment model was based on an assumption that the S-R model was the Beverton/Holt form. Examination of the SSB-R pairs with the BH model (Figure 4a) indicate a decline in recruitment with increasing SSB across the observed range of SSB and the resulting difficulty in fitting steepness for the BH model. The sensitivity of F/Fmsy and SSB/SSBmsy to an alternative S-R assumption was tested by choosing an alternative (Ricker) model in the assessment.

The alternative assumption on S-R model resulted in closer fit to the S-R pairs, a slightly poorer overall model fit but only because an additional parameter estimating steepness could now be fitted in the model. However, the value of the new steepness parameter, now fitted, does not come from information on slope to the origin, rather from the mathematical construct of the Ricker model and the information on the decline in recruitment at higher biomass, and only implies the steepness through the model formulation. With the Ricker model the perception of stock status with respect to 'over fished' or 'over fishing' criteria was unchanged, (See text table below) however, the use of Ricker S-R model results in a perception that F/Fmsy is slightly lower and SSB/SSBmsy is slightly greater. The greatest changes occur at low exploitation rates. It is suggested that S-R model choice is best selected based on an understanding of population biology rather than just fit criteria alone. However, the understanding of mechanisms for reduced recruitment at high biomass will be difficult to obtain in the near future. The other perhaps more appropriate approach would be to allow both (or more) S-R functional forms in the assessment model and simulate the bootstrap/MC with proportions of the populations coming from different models (Simmonds et al 2011)

Run	Fmsy	SSBmsy	MSY	Fend/Fmsy	SSBend/MSST	Steepness	R0
B-H	0.461	536.8	808	0.599	1.75	0.75	136548
Ricker	0.586	649.2	1182	0.405	1.77	2.15	-

Figure 4 Comparison of BH and Ricker S-R model fit and SSB and Recruit pairs

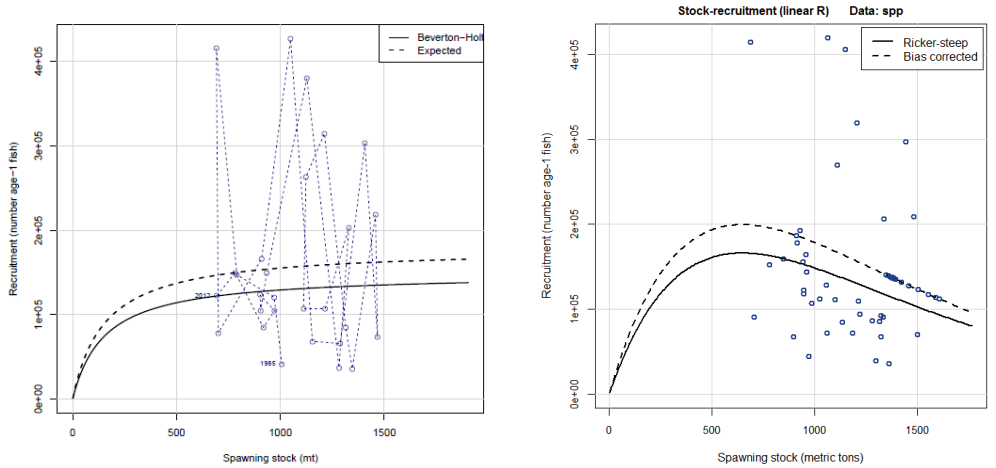
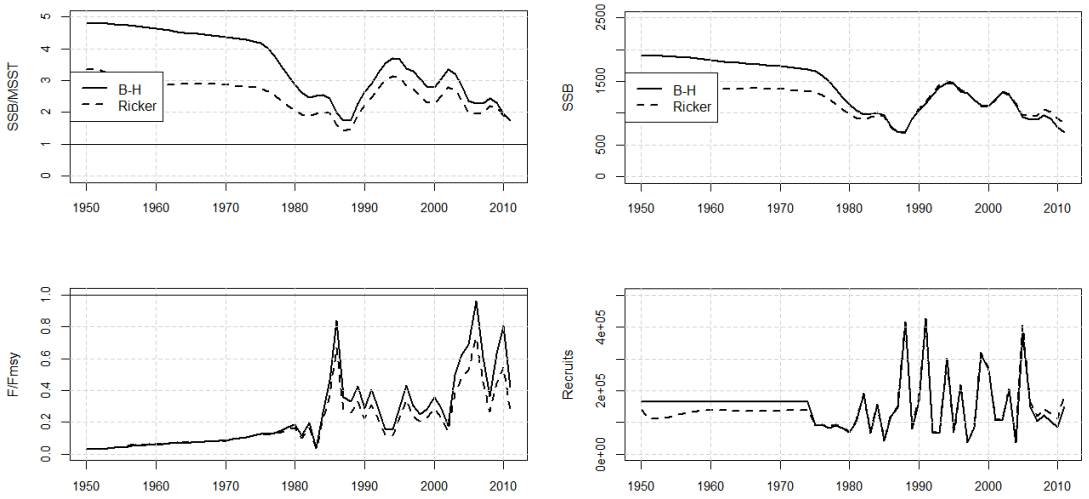


Figure 5 Comparison of stock status and exploitation status with alternative BH or Ricker S-R relationships



Evaluation of state of stock from the assessment

Is the stock overfished?

It is concluded that there is a high probability that stock is not overfished.
This is based on:

the BAM base model;
the sensitivity analysis presented in the AW report;
the additional sensitivity tests carried out at the meeting and presented above;
the MC/Bootstrap analysis using the BAM model.

Is the stock undergoing overfishing?

It is concluded that there is a good probability that stock is not undergoing overfishing, but the exploitation rate is less certain than the SSB.

This is based on:

the BAM base model;
the sensitivity analysis presented in the AW report;
the additional sensitivity tests carried out at the meeting and presented above;
the MC/Bootstrap analysis using the BAM model.

Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions? Are quantitative estimates of the status determination criteria for this stock reliable?

It is interpreted that the latter question is: How reliable are the (MSY) reference points?

The BAM model indicates that the stock recruit relationship was not informative in the context of some of the parameters needed for management against MSY criteria. However, the model does indicate that the stock seems to be in a state of unimpaired recruitment, and in that sense, it is informative. That conclusion is robust to both BH and Ricker assumptions.

The analysis of a different stock recruit relationship (given above) did not have an effect on modeled trends in SSB or F, but did change location of F and SSB status but did not change the conclusion that F <Fmsy and SSB>SSBmsy.

The analyses presented indicate that the status is sensitive to the steepness value chosen as input to the model. However, the MC/bootstrap analyses indicated that uncertainty within the range may not change status determination or lead to a perception that there is a high probability that stock status is different from the point estimate. The assumed estimates of steepness appeared to be justified when the characteristics of cobia were compared to other estimates given in the literature.

If not, are there other indicators that may be used to inform managers about stock trends and condition?

Not Applicable

Adequacy, appropriateness, and application of the methods used to project future population status

It is concluded that since accepted practices were followed, the model was adequate and appropriate. It is noted that with the use of the BAM model, which provides a coherent set of estimates, reference points and forward projections, the forward projections reflect directly the management options selected. For example any deviation of management, implementation 'error' is not included in the scientific evaluation of future population status. If managers are aware of such affects or wish to test for robustness to non-compliance or variability in uptake of allocated catch, this has not, but could be included in the MC analysis.

Significant changes to the base model, or to the choice of alternate states of nature

Several alternative model assumptions were considered including:

- Domed selectivity based on a perception that the fishery might better be based on a domed selection pattern rather than a logistic function. The domed function fitted very slightly better but with a very flat uninformative likelihood function.
- An alternative S-R function (Ricker) which potentially fitted better than the B-H function was tested. However, the biological basis for the function was weak.

There are no proposals to change the base model presented in the AW report so the results and probability distributions provided are considered to be an acceptable representation of estimated stock status and its uncertainty.

Uncertainties in the assessment, and their potential consequences

There were two ways in which this was addressed in the assessment:

1) MC/bootstrap analysis including both data and parameterization of the model.
2) Alternatives to base assumptions. (4 options for M, 2 limit options for steepness, 2 alternative index weighting options, 2 indices individually, 1 catchability trend in CPUE, and 1 accounting separately for a stocking program)

In addition several extra runs were requested to explore the issues dealing with the choice of selection function, choice of stock recruit function and alternate starting points for the assessment.

From these analyses it is concluded that the degree of uncertainty that is represented by these methods is sufficient to address scientific uncertainty for management purposes and sufficient to give catch recommendations in the context of stock status relative to MSY in the short term. However, the estimates are conditional on the overall choice of the model dynamics, but this is acceptable practice. It was also noted that the management uncertainty is not included, but this was also not required. As the analysis is based on a few years of data showing retrospective stability of only around 3-4 years it is not recommended to use the model for more that 3-4 years into the future.
The implications of uncertainty in technical conclusions are clearly stated in the assessment document and in the consolidated review report.

4.2. Spanish mackerel

Quality and applicability of data used in the assessment

In summary it is concluded that, overall, the data used are the best available and appropriate for use in the assessment. The catch data are sufficient to describe a number of individual fleets. However, the information on shrimp by-catch is weak and an improvement in monitoring could improve information to the model. Overall, it is concluded that the data are appropriate for short-term management based on the outcome of the assessment.

Bycatch in the Shrimp fishery and lack of monitoring of this fishery was of particular concern. The current shrimp bycatch data were deemed marginally acceptable. The main reason why such limited data could be accepted was because they did not have a large effect on model outputs. In general the methods to estimate these removals are adequate, but the quantity of data needs to increase. This can be accomplished by increased on-board observer coverage as suggested under research recommendations (Section 6).

It would be helpful to improve the estimate of the selectivity function. The modelled selectivity at age shows that the change in the fishery following the closure of the Florida gill net fishery has resulted in substantial change in selectivity from the 1990s onwards. The selection at age is still changing by year due to changes in proportions of catch among different gear categories. This has two consequences:

- It requires the use of a model that allows separable modelling of the fishery data for multiple fleets or a time varying selection function of some considerable flexibility. This reinforces the need for sufficient age samples to characterize multiple fleets.
- Changing selectivity with time implies changing MSY targets with time, which limits the utility of target values into the future. If the changes in the relative contributions of the different gears does continue into the future it is expected the MSY targets will change.

Strengths and weaknesses of catch data

The strengths included commercial and recreational landings information. Commercial landings were available back to 1950 and a combination of MRFSS and MRIP were used to extend recreational removals back to 1983. Commercial discards were a concern, as these are not well estimated due to low sample sizes. Additionally discards were reconstructed from 1993 to 1983 using a fixed discard/ retained ratio further compounding this uncertainty. However, it was noted that discards contribute only a fraction of the commercial catch. This suggests that the overall importance of discards was small with respect to other inputs.

Strengths and weaknesses of length and age composition data

Length Data

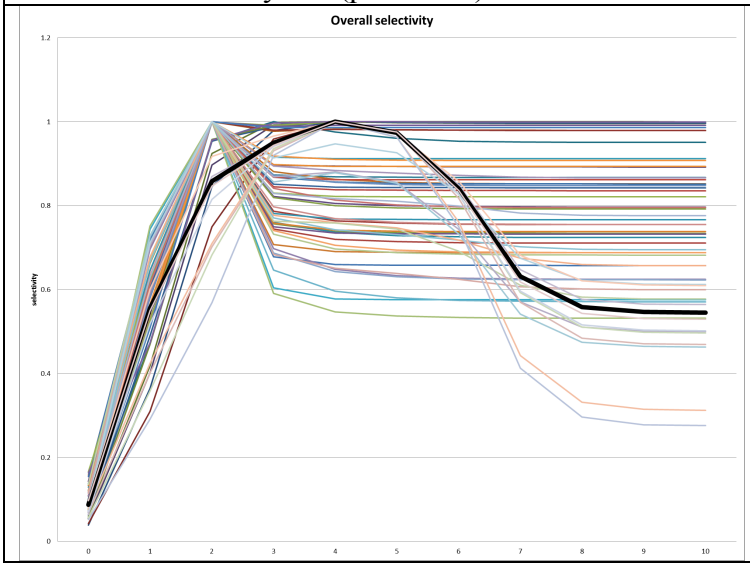
Length data were not used to inform the model for a number of reasons. The data are more noisy than informative, and lack any good information of distinct size classes moving through the population. Since age composition data are available, and are comprised of directly aged samples, the AW decided to not use the length compositions for the assessment.

Age Composition

Age data were available from the commercial handline, pound net, gill net, cast net and recreational sampling programs. The annual age compositions were developed for Spanish mackerel by the SEDAR-28 DW. The AW preferred to weight the age composition by the length composition for years where adequate samples were available. Ages greater than 10 were pooled to age 10 creating a plus group.

Strengths and weaknesses:
Length data are clearly identified as insufficient for population modelling purposes, however, parameters such as selection and maturity are thought to be length dependant rather than age dependant. It seems unlikely that increased sampling for length will solve this issue, except where collected with the dependant variable such as maturity (see other section). Increased length sampling is not specifically recommended. In contrast, collection of age data is identified as critical for the assessment. An examination of the change in overall selection pattern with year (Figure 6) indicates that selection at age in the fishery has changed considerably in recent years due to changes in catch proportion by fleet following the closure of the gillnet fishery in Florida. This demonstrates the continuing need to obtain age data by fleet in order to model selectivity in the fishery. The current level of sampling seems adequate for this purpose, though for the smaller fisheries such as pound net, numbers of samples are low. It is noted that by taking such small numbers of samples it is difficult to characterize fisheries except at an annual and global scale. Increased sampling would allow for acknowledged spatial and seasonal aspects to be documented.

Figure 6 changes in selection with time, dome shaped selection in recent years, peaked selection in earlier years (pre 1990s)



Strengths and weaknesses of the data related to Life History Strategies

Strengths

- Stock identity was considered.
- Estimates of age varying natural mortality were considered and provided.
- Discard mortality was considered.
- Reasonable coverage of age sampling, but number of samples could be improved.
- The report highlighted, and provided information on, sexual dimorphism in growth.

Weaknesses

- Stock identity considerations reported using relatively out of date techniques.
- The considerations on natural mortality provided an estimate of generic variability in M, however justification for its use for sensitivity analysis for the total population was weak.
- Whilst discard mortality was considered, discard selectivity was not assessed.
- If management was to use an alternative reproductive-potential proxy than female biomass, the existing information base appears weak.
- There was no provision of information in the report of time trends in growth, maturity and weight to inform on environmentally driven changes in sustainable exploitation benchmarks.

Indices of Abundance

Strengths

- One fishery-independent index is used in the Spanish mackerel stock assessment (SEAMAP ages 0).

- Two fishery-dependent indices are used in the stock assessment (MRFSS and FL trip ticket handline/trolling).
- Indices are available since 1982 (MRFSS).
- Indices cover the entire stock area (SEAMAP age-0 and MRFSS) or the central portion of the resource (FL trip ticket handline/trolling).
- All indices are standardized to account for factors not related to relative abundance using conventional statistical analyses (e.g., delta-GLM with bootstrapping).
- Assessment results (e.g., stock status) are relatively robust to the relative weighting of indices.

Weaknesses

- Fishery and survey catchability may not be constant or linear, as assumed in the assessment.
- Standardization of fishery-dependent indices does not remove the effect of technological improvements in fishing efficiency.
- Regulatory changes may influence fishery catch rates.
- MRFSS statistics are not necessarily relevant to fishing effort directed toward Spanish mackerel.
- MRFSS and MRIP statistics are combined into a single series, but CPUE from the two programs may not be comparable.
- Correlation among indices is weak.

Quality and applicability of methods used to assess the stock

It is concluded that the BAM model was appropriate and the preferred model. The ASPIC approach provided supporting information as to the stock status, and indicated that the recent trends shown by BAM were also indicated by ASPIC. However, the ASPIC model delivered unrealistically narrow estimates of precision as the method does not provide facilities to include any of the uncertainties included in BAM.

The sex specific modelling as presented for this stock is acceptable. However, given the direct parameter links between the separate sex components and the small impact of sex-specific differences, it may not be a useful addition. As such it is suggested that future benchmarks examine the need to model sexes in the stock separately; and if so re-examine the treatment of sex-specific growth and its impact on selectivity.

It was observed that the confidence and precision of the ASPIC model was much higher relative to the BAM. This increased precision, however, is because ASPIC uses only a bootstrapped methodology to resample the residuals of predicted vs. fitted yield (Aspic manual) using the variability in the indices. Thus ASPIC assumes other sources of uncertainty do not exist. In contrast, BAM uses an MC approach and accounts for additional parameter uncertainty in many assumed and estimated parameters not included by ASPIC. Therefore it was concluded that the BAM estimates of uncertainty were more realistic than ASPIC; with the later underestimating the true variability.

The main reasons for accepting the model were that it was supported by a good sensitivity analysis covering a reasonable range of other options and, most importantly, it had good retrospective performance. It was noted that the report did not provide a comparison with the previous assessment. Normal practice should be to run the previous assessment with each element of input data updated in turn, and then with any new model being proposed. I understand this was not possible. Without this information the retrospective analysis was used to evaluate changes in the stock assessment over recent years' data and to conclude that the assessment was acceptably stable to use for advice.

Evaluate the assessment with respect to the following:

Is the stock overfished?

It is concluded that the probability of the stock being overfished is low.

This is based on:

the BAM base model;
the sensitivity analysis presented in the AW report;
the additional sensitivity tests carried out at the meeting and presented above;
the MC/Bootstrap analysis using the BAM model.

Is the stock undergoing overfishing?

It is concluded that the probability of overfishing is low.

This is based on:

the BAM base model;
the sensitivity analysis presented in the AW report;
the additional sensitivity tests carried out at the meeting and presented above;
the MC/Bootstrap analysis using the BAM model.

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

It is concluded that the stock recruit relationship has information, but steepness was not well estimated. However, there is sufficient information in the context of the parameters needed for management against MSY criteria. In addition, it is informative in the sense that the stock seems to be in a state where recruitment is not impaired.

Are quantitative estimates of the status determination criteria for this stock reliable?

The RP interpreted this TOR as: How reliable are the reference points?

A number of comments were provided above. In addition, it is suggested to investigate comparisons with other stock assessments giving MSY values for similar species.

The analyses presented indicate that the status is sensitive to steepness chosen as input to the model. However, the MC/bootstrap analyses indicated that uncertainty within the range may not change status determination or lead to a perception that there is a high probability that stock status is different from the point estimate. The assumed estimates of steepness appeared to be justified when the characteristics of Spanish mackerel were compared to other estimates given in the literature.

Some time was spent during the meeting establishing the magnitude of the variability in M that was applied, following some initial confusion over the actual variance applied in the MC evaluations. The description did provide the limits used, but not the variance applied in this context. It might be useful to state the CV or variance actually applied as well as the limits, thus reducing the possibility for confusion. There was some concern over whether the interpretation of variability in M should be applied as population variability or as annual variability. The cited reports giving values of M were examined (Hoenig 1982, Hewitt and Hoenig 2005, and NOAA 2011) and the basis for variability in M appears to vary among approaches perhaps expressing both among year and among population variability. However, following some clarification of the magnitude of the CV used and further discussion it was considered that the spread of M used was appropriate.

If not, are there other indicators that may be used to inform managers about stock trends and condition?

Not Applicable

Adequacy, appropriateness, and application of the methods used to project future population status

It was concluded that, since accepted practices were followed, the methods were adequate and appropriate. It was noted that, management of this stock, based on this current assessment, should be limited temporally. There are two reasons for this; the changes in selectivity with time are to be expected given the changes in catch proportion by fleet, and secondly the sparse catch at age data makes the assessment sensitive to the addition of a new year of data. However, retrospective performance indicates reasonable stability thus it is recommended to be acceptable to use this method for at least 4 years without further update or review.

Significant changes to the base model, or to the choice of alternate states of nature

Several options for the assessment model were discussed, changes in selectivity and priors on the selectivity parameters examined. However, no new model was proposed so there are no significant changes to the assessment model.

Uncertainties in the assessment, and their potential consequences

It was concluded that uncertainty was addressed well by the assessment team by analyzing both MCMC and sensitivity analysis. Some concerns were raised that the natural mortality used in the MCMC were drawn from a very wide range, giving the appearance of more uncertainty than appropriate (see above). However, following some clarification and discussion it was considered that the spread of M used was applicable. It is agreed that the methods and sensitivities chosen where appropriate. A comparison of the assumed distribution in estimates of M (mean of 0.35 with 95% confidence limits of 0.16 to 0.54) is generally consistent with the alternative estimates of M reported in the Data Workshop report.

The degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty

It is concluded that the degree of uncertainty included is sufficient to address scientific uncertainty for management (ABC) recommendations (see discussions above). However, they are conditional on the overall choice of the dynamics modeled, but this is regarded as acceptable practice. It is noted that management uncertainty is not included, though it will have an impact on the SSB and F predicted in the forecasts.

5. Research recommendations

Tagging program for cobia

It is suggested that a tagging program may also help to inform the cobia stock assessment. The fishery and biology of cobia seems to be conducive for a successful tagging program. The fishery for cobia is currently dominated by a recreational fishery with a two-fish bag limit and a minimum landing size, resulting in a large portion of discarded catch. Discarded cobia appear to have high survival (e.g., 95% discard survival assumed in the assessment). Therefore, a tagging program conducted as an industry partnership could release tagged fish from normal fishing operations. Few cobia are discarded per trip, so the additional costs and resources required per trip would be expected to be small, and the data recording aspects at sea would be minimal. The impact on the fishing operations would be anticipated to be negligible. The major costs would be organization, tags, data collation, outreach, a reporting system for recaptured tags, and subsequent data analysis. Industry participation rates might be high if information is provided back to participants, and their collaboration improves stock assessment and fishery management.

This information should improve estimates of discard numbers and potentially fish sizes. Estimates of discard mortality may be possible from initial Z from early returns compared with Z on later returns, though this will be compounded with selection. Estimates of Z or tag recovery rate on older ages will help to inform the appropriate

selection function to be used in the assessments. The Z could be obtained from ratio of tag returns from one year to the next. Using tag return data the total mortality Z(i,j,y) between year i and year j, of fish belonging to year class y is obtained using the Jolly-Seber estimator (see Ricker, 1975):

$$Z(i,j,y) = \log\{r(i,k,y)/r(j,k,y)*R(j,y)/R(i,y)\} \qquad (1)$$

where

R(i,y) is the number of tagged fish of year class y that were released in year i ,
R(j,y) is the number of tagged fish of the same year class that were released in year j (j>i)
r(j,k,y) is the numbers of such tagged fish that were recaptured in the years k summed over all k > j.

This approach solves some of the inherent distributional and sampling problems associated with tagging, however variability may still be caused by variation in initial tagging losses, small numbers of recovered tags and errors in ageing (Antsalo, 2006). The major issue for such a program is it requires a continued commitment to tag. Each missing year of tagging results in two missed mortality estimates. However, if the tagging and recovery is based on the recreational fishery it is possible that continuation will be easier (once agreed) than if tagging must be based directly on annually funded scientific programs.

If resources are available consideration should be given to coupling two types of tagging: 1) high volume, low cost tagging would be most informative for estimates of Z that would help with population level estimates of total mortality and possibly selection and natural mortality; 2) high cost, electronic tagging might give more detail on migration. Of the two methods, the high volume approaches are more likely to be informative for management parameters at a population level.

Discard data for Spanish mackerel

Improved discard data, in particular linked to bycatch in the shrimp fishery, would be helpful to be sure that this is not a significant source of mortality. Increased onboard sampling would be an appropriate data collection method.

Increased age sampling for cobia and Spanish mackerel

Both assessments are age based with a dependence on age sampling for the catch matrix. In the case of cobia 12 ages are estimated from around 200 fish per year. For Spanish mackerel the varying selectivity at age requires selection to be modeled by fleet, requiring more age samples. Superficially both assessments appear to be short of age samples; given the likely cost of aging such a small number of fish there seems considerable scope for increased sampling. Cost benefit analysis would indicate which sources of data would benefit from increased sampling.

Critically, for cobia more information on catch at age would allow better evaluation of mortality at older ages and potentially inform on the most appropriate form of the selection function.

Organization of data preparation and assessment workshops

From the reports provided to the RP on Data and Assessment it is clear that data preparation is not well coupled to the timing of assessment work. Quite extensive amounts of important 2011 data were being assembled after the data workshop and throughout the assessment modeling. This results in considerable reprocessing of information and quite a number of assessment runs with substantively incomplete data. From discussions there does not really seem to be any specific reason for this, and it results in less than optimal use of staff time. It may be worthwhile examining the timetabling of the data workshop. First, taking account of when the assessment results are required, obtaining agreement from all involved when the most recent data will be available and holding a data workshop to finalize all the assessment input data at that stage. This would maximize the benefit from the data workshop and allow the assessments to proceed more effectively, potentially freeing up resources for other assessments.

5.1. Panel review proceedings

I was impressed overall with the quality of this review and all who participated in it, I would like to thank all involved for their efforts. In particular I would like to thank the presenters for their clear and well prepared presentations and the chairman for his work guiding the review and for the work assembling and editing the RP report.

All the data and assessment reports were provided on time. Though some of the CIE information, such as ToR and the statement of work for the reviewers, arrived only shortly before the meeting, this did not have any direct impact as the ToR were fairly standard and could easily be anticipated.

6. Conclusion

The reports and presentations have provided an excellent basis to evaluate the performance of the assessment. The science reviewed was of a high standard and could be classed as 'of the best scientific information available'. Comments given through the report should not be read as direct criticism of what has been done, but rather ideas of areas for development. In retrospect one can always find room for improvement, and as such minor suggestions have been made throughout this report.

7. References

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Appendix 1: Bibliography of materials provided for review

Primary Documents

SEDAR28-RW02 Development and diagnostics of the Beaufort assessment model applied to Cobia

SEDAR28-RW04 Development and diagnostics of the Beaufort assessment model applied to Spanish mackerel

SEDAR 28-RW Southeast Data, Assessment, and Review South Atlantic Report for Cobia SECTION II: Data Workshop Report May 2012

SEDAR 28-RW Southeast Data, Assessment, and Review South Atlantic Report for Spanish mackerel SECTION II: Data Workshop Report May 2012

Background documents

SEDAR 25-RW-01 The Beaufort Assessment Model (BAM) with application to cobia: mathematical description, implementation details, and computer code

SEDAR 28-RW-03 The Beaufort Assessment Model (BAM) with application to Spanish mackerel: mathematical description, implementation details, and computer code
1

Appendix 2: Statement of Work

External Independent Peer Review by the Center for Independent Experts

SEDAR 28 South Atlantic Spanish mackerel and cobia assessment review

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description SEDAR 28 will be a compilation of data, an assessment of the stocks, and an assessment review conducted for South Atlantic Spanish mackerel and cobia. The CIE peer review panel is ultimately responsible for ensuring that the best possible assessment has been provided through the SEDAR process. The stocks assessed through SEDAR 28 are within the jurisdiction of the South Atlantic Fisheries Management Councils and states of Florida, Georgia, South Carolina, and North Carolina. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The agenda of the panel review meeting is attached in **Annex 3**.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review during the SEDAR 28 review scheduled in 29 October - 2 November 2012, and the CIE reviewers shall have the necessary qualifications to complete the tasks in accordance with the SoW and ToRs herein. *One of the selected CIE reviewers will be the CIE observer contracted to attend the SEDAR 28 assessment workshop in May 2012.* The CIE reviewers shall have expertise in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the tasks of the peer-review described herein. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

Location of Peer Review: Each CIE reviewer shall participate and conduct an independent peer review during the panel review meeting scheduled in Atlanta, Georgia during October 29 through November 2, 2012.

Statement of Tasks: Each CIE reviewer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website:
http://deemedexports.noaa.gov/
http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs shall not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room

for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2. *One of the selected CIE reviewers will be the CIE observer contracted to attend the SEDAR 28 assessment workshop in May 2012, and the CIE observer's report will be reviewed and distributed as an addendum to the final independent CIE peer review report for that CIE reviewer.*

Other Tasks – Contribution to Summary Report: Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. The Summary Report is not reviewed by the CIE, therefore is not a CIE product. Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Participate during the panel review meeting at the Atlanta, Georgia during October 29 through November 2, 2012.
3) In Atlanta, Georgia during October 29 through November 2, 2012 as specified herein, conduct an independent peer review in accordance with the ToRs (**Annex 2**).
4) No later than November 16, 2012, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, via email to Dr. David Sampson david.sampson@oregonstate.edu. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

21 September 2012	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact

15 October 2012	NMFS Project Contact sends the CIE Reviewers the pre-review documents
29 October – 2 November 2012	Each reviewer participates and conducts an independent peer review during the panel review meeting
16 November 2012	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
30 November 2012	CIE submits CIE independent peer review reports to the COTR
7 December 2012	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: This 'Time and Materials' task order may require an update or modification due to possible changes to the terms of reference or schedule of milestones resulting from the fishery management decision process of the NOAA Leadership, Fishery Management Council, and Council's SSC advisory committee. A request to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent changes. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on changes. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:
(1) The CIE report shall completed with the format and content in accordance with **Annex 1**,
(2) The CIE report shall address each ToR as specified in **Annex 2**,
(3) The CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR.

The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

William Michaels, Program Manager, COTR
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
William.Michaels@noaa.gov Phone: 301-427-8155

Manoj Shivlani, CIE Lead Coordinator
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Roger W. Peretti, Executive Vice President
Northern Taiga Ventures, Inc. (NTVI)
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Key Personnel:

NMFS Project Contact:

Ryan Rindone, SEDAR Coordinator
2203 N. Lois Avenue, Suite 1100
Tampa, FL 33607
Ryan.Rindone@gulfcouncil.org Phone: 813-348-1630

Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a brief summary of findings, of the science, conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

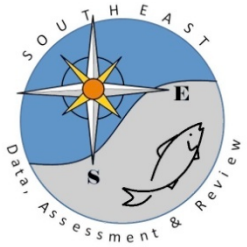
   c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.



Annex 2: Terms of Reference for the Peer Review

SEDAR

SEDAR 28: South Atlantic Cobia and Spanish Mackerel
Review Workshop Terms of Reference

1. Evaluate the quality and applicability of data used in the assessment.
2. Evaluate the quality and applicability of methods used to assess the stock.
3. Evaluate the assessment with respect to the following:
   - Is the stock overfished? What information helps you reach this conclusion?
   - Is the stock undergoing overfishing? What information helps you reach this conclusion?
   - Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?
   - Are quantitative estimates of the status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and condition?
4. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status with regard to accepted practices and data available for this assessment.
5. If there are significant changes to the base model, or to the choice of alternate states of nature, then provide a probability distribution function for the base model, or a combination of models that represent alternate states of nature, presented for review. Provide justification for the weightings used in producing the combinations of models.
6. Consider how uncertainties in the assessment, and their potential consequences, have been addressed.
   - Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty.
   - Ensure that the implications of uncertainty in technical conclusions are clearly stated.
7. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.

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

8. Prepare a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Develop a list of tasks to be completed following the workshop. Complete and submit the Peer Review Summary Report in accordance with the project guidelines.
    - Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review.
    - Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

The review panel may request additional sensitivity analyses, evaluation of alternative assumptions, and correction of errors identified in the assessments provided by the assessment workshop panel; the review panel may not request a new assessment. Additional details regarding the latitude given the review panel to deviate from assessments provided by the assessment workshop panel are provided in the SEDAR Guidelines and the SEDAR Review Panel Overview and Instructions.

** The panel shall ensure that corrected estimates are provided by addenda to the assessment report in the event corrections are made in the assessment, alternative model configurations are recommended, or additional analyses are prepared as a result of review panel findings regarding the TORs above.**

Annex 3: Agenda for the SEDAR 28 Review

Atlanta, GA - October 29 through November 2, 2012

Monday		
1:00 p.m.	**Convene**	
1:00 – 1:30	**Introductions and Opening Remarks** **Coordinator** *- Agenda Review, TOR, Task Assignments*	
1:30 – 5:00	**Assessment Presentations and Discussions**	**TBD**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**
Tuesday		
8:00 a.m. – 11:30 a.m.	**Assessment Presentations**	**TBD**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion** *- Assessment Data & Methods* *- Identify additional analyses, sensitivities, corrections*	**Chair**
3:30 p.m. – 3:45 p.m.	**Break**	
3:45 p.m. – 5:00 p.m.	**Panel Discussion** *- Continue deliberations* *- Review additional analyses*	**Chair**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**

***Tuesday Goals*:** Initial presentations completed, sensitivities and modifications identified.

Wednesday		
8:00 a.m. – 11:30 a.m.	**Panel Discussion** *- Review additional analyses, sensitivities* *- Consensus recommendations and comments*	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion**	**Chair**
3:30 p.m. – 3:45 p.m.	**Break**	
3:45 p.m. – 5:00 p.m.	**Panel Discussion**	**Chair**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**

Wednesday Goals: Final sensitivities identified, preferred models selected, projection approaches approved, Summary report drafts begun

Thursday		
8:00 a.m. – 11:30 a.m.	**Panel Discussion** *- Final sensitivities reviewed.* *- Projections reviewed.*	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion or Work Session**	**Chair**
3:30 p.m. - 3:45 p.m.	**Break**	
3:45 p.m. - 6:00 p.m.	**Panel Work Session** *- Review Consensus Reports*	**Chair**

Thursday Goals: Complete assessment work and discussions. Final results available. Draft Summary Report reviewed.

Friday		
8:00 a.m. – 1:00 p.m.	**Panel Work Session**	**Chair**
1:00 p.m.	**ADJOURN**	

Appendix 3: Participants

1.1.3 List of Participants

Panelists		
Marcel Reichert	Review Panel Chair	SA SSC
Steve Cadrin	Reviewer	SA SSC
Matt Cieri	Reviewer	CIE
Mark Dickey-Collas	Reviewer	CIE
John Simmonds	Reviewer	CIE
Analytical Team		
Katie Andrews	Lead Analyst SASM	NMFS Beaufort
Kevin Craig	Lead Analyst SAC	NMFS Beaufort
Kyle Shertzer	Analyst	NMFS Beaufort
Erik Williams	Analyst	NMFS Beaufort
Council Members		
Ben Hartig	Council Rep	SAFMC
Anna Beckwith	Council Rep	SAFMC
Observers		
None		
Staff and Agency		
Ryan Rindone	SEDAR 28 RW Coordinator	SEDAR
Julia Byrd	SEDAR Coordinator	SEDAR
Andrea Grabman	Administrative Support	SEDAR
Mike Errigo	Fishery Biologist	SAFMC