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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.

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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).

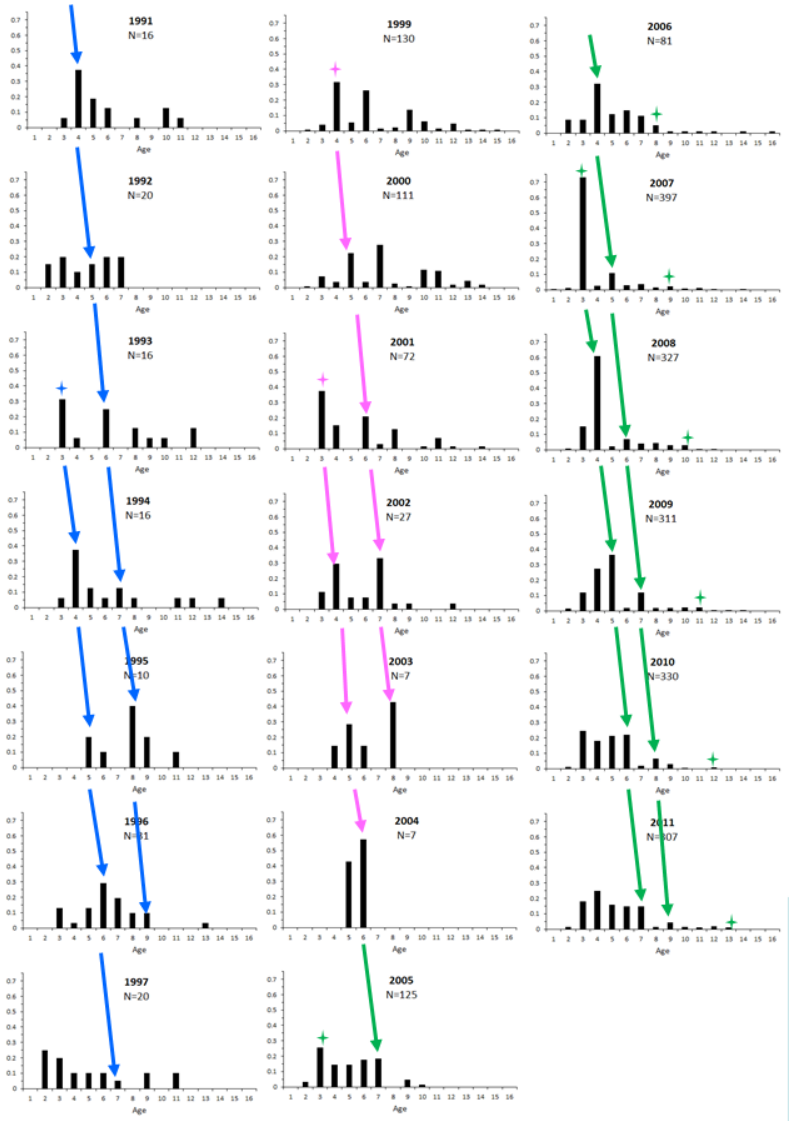

Figure 4.1.1. Cobia. Illustration of tracking cohorts in the recreational fishery for Atlantic cobia (taken from the original presentation by Kevin Craig, NMFS Beaufort to SEDAR 28 Review).

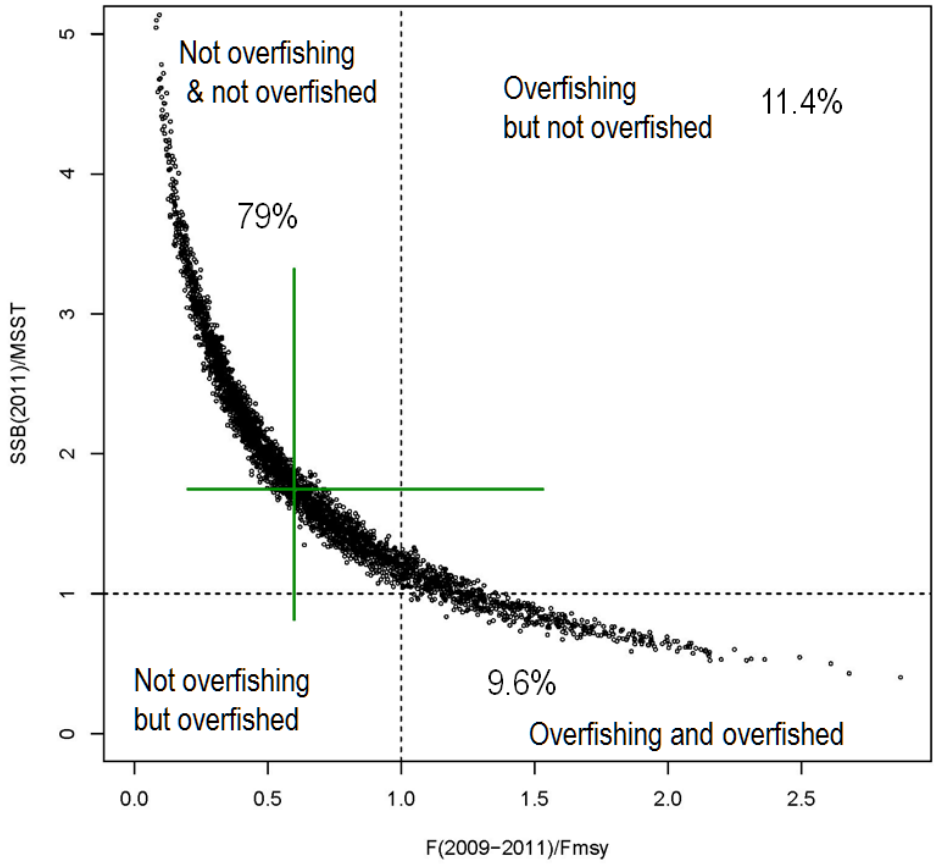

Figure 4.1.2. Cobia. Phase plot of terminal status estimates from MCB analysis of the BAM. Length of green cross hairs indicate 5th and 95th percentiles. (taken from the original presentation by Kevin Craig, NMFS Beaufort to SEDAR 28 Review, also Figure 3.29 in SEDAR28-RW02). Figures in % denote the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

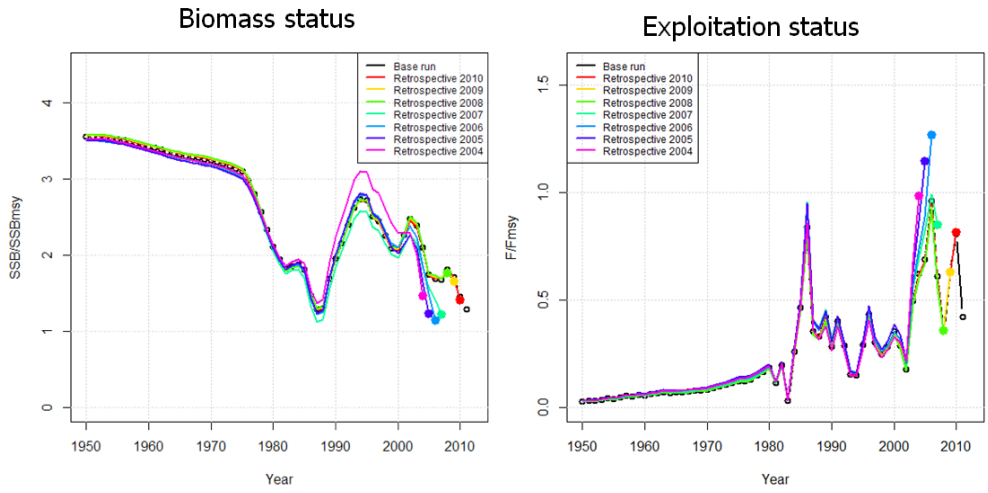

Figure 4.1.3. Cobia. Retrospective analysis (sensitivity to terminal year of data) of biomass status and exploitation status (taken from the original presentation by Kevin Craig, NMFS Beaufort to SEDAR 28 Review, also Figures 3.44 and 3.45 in SEDAR28-RW02).

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.

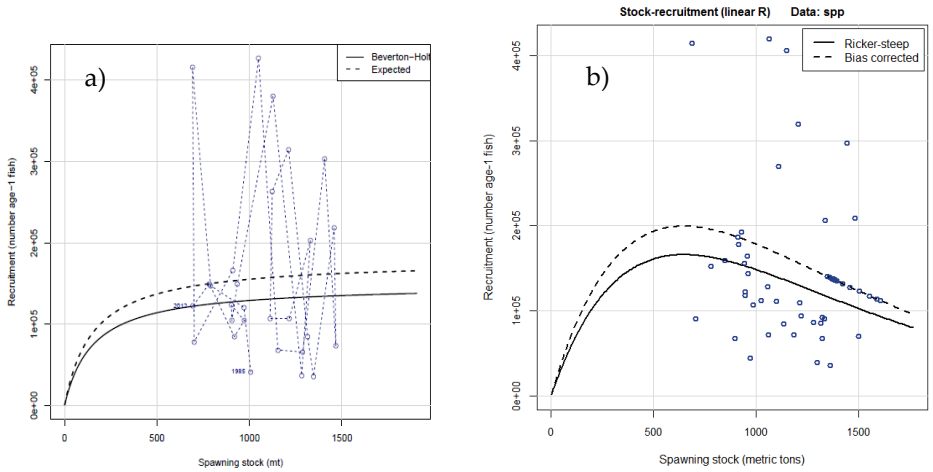

Figure 4.1.4. Cobia. Stock to recruit assumptions. a) the base run with a fitted Beverton and Holt model. b) the panel requested run with a Ricker model. (taken from the original presentation by Kevin Craig, NMFS Beaufort to SEDAR 28 Review, also Figures 3.20 in SEDAR28-RW02 and the second presentation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

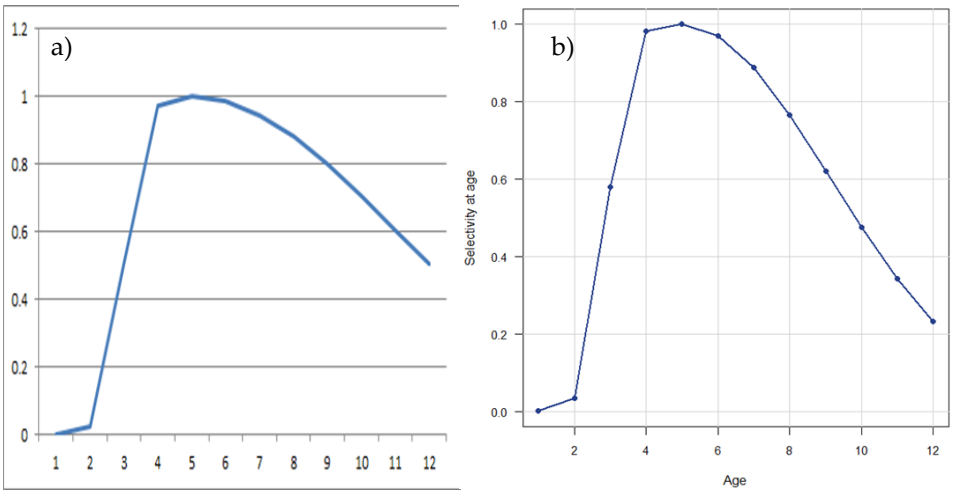

Figure 4.1.5. Cobia. Investigation of dome shaped selection patterns. a) imposed dome shape selection, b) fitted dome shape (taken from the extra presentations by Kevin Craig, NMFS Beaufort to SEDAR 28 Review).

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.

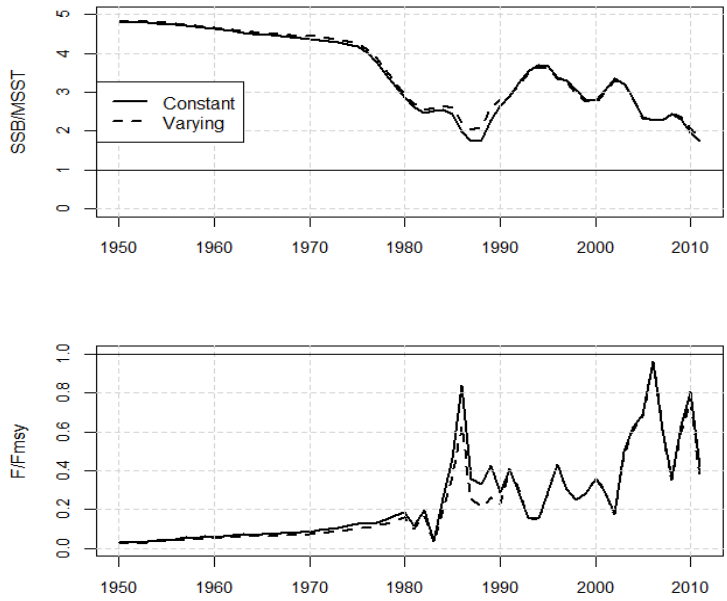

Figure 4.1.6. Cobia. Investigation of two periods with different selection patterns on stock status comnpared to the base run. (taken from the extra presentations by Kevin Craig, NMFS Beaufort to SEDAR 28 Review).

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.

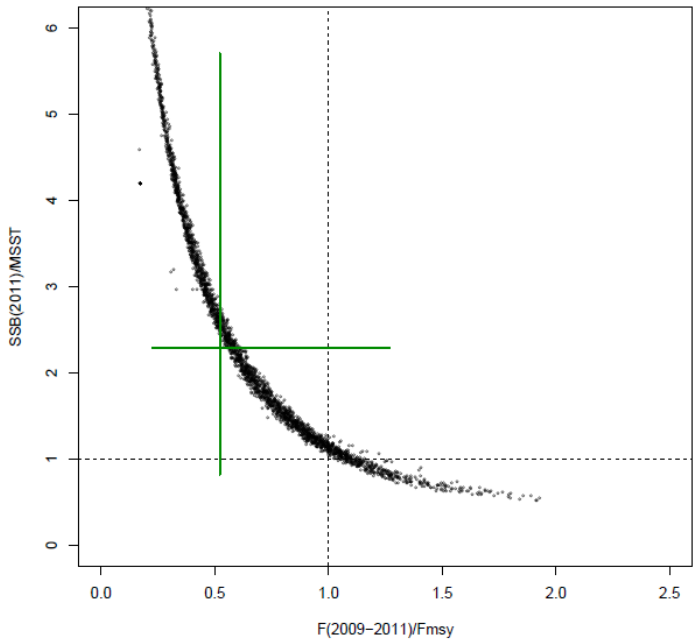

Figure 4.2.1 Spanish mackerel. Phase plot of terminal status estimates from MCB analysis of the BAM. Length of green cross hairs indicate 5th and 95th percentiles. (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review, also Figure 3.39 in SEDAR28-Section3 assessment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

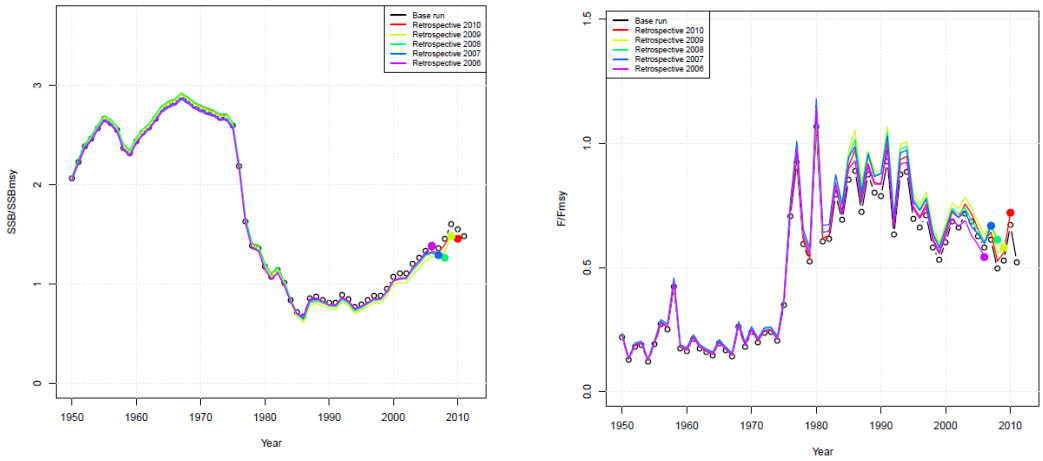

Figure 4.2.2 Spanish mackerel. Retrospective analysis (sensitivity to terminal year of data) of biomass status and exploitation status. (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review, also Figures 3.53 and 3.54 in SEDAR28-Section3 assessment workshop report).

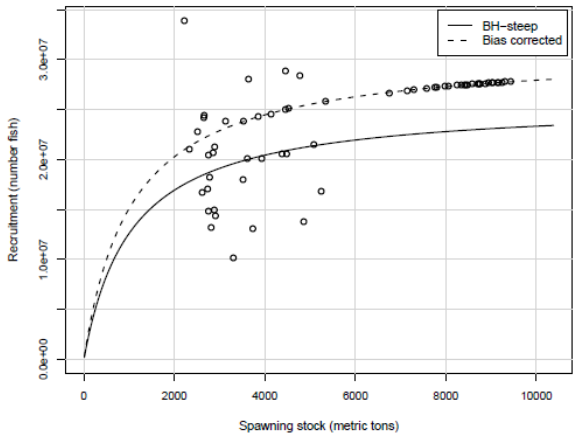

Figure 4.2.3. Spanish mackerel. Beverton-Holt spawner recruit curves, with and without lognormal bias correction. (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review, also Figure 3.31 in SEDAR28-Section3 assessment workshop report).

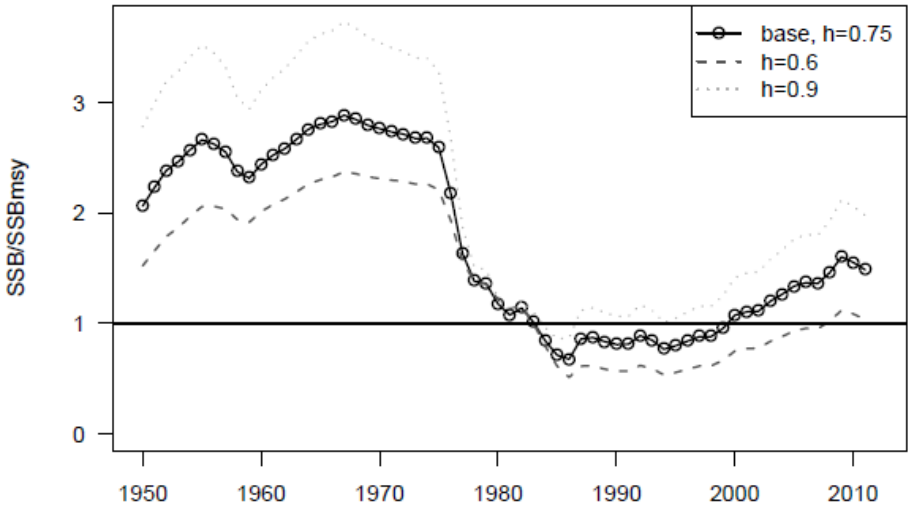

Figure 4.2.4. Spanish mackerel. Sensitivity of results to fixed values of steepness (h= 0.6. 0.75 and 0.9) shown as ratio of SSB to SSB_{MSY} (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review, also Figure 3.46 in SEDAR28-Section3 assessment workshop report).

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.

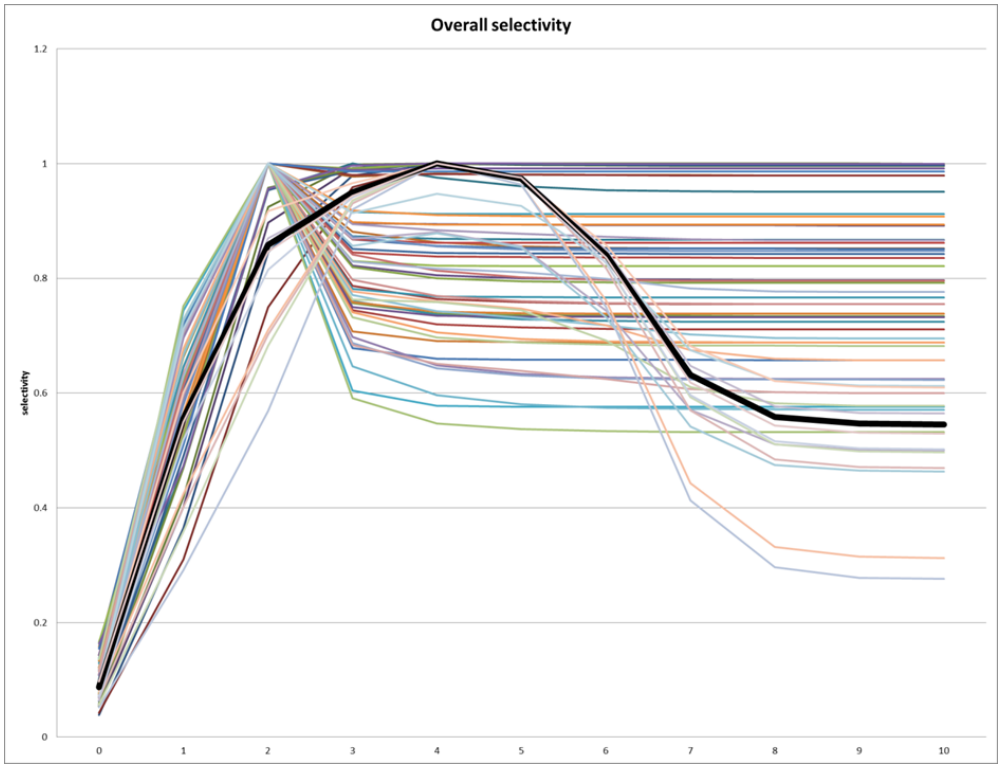

Figure 4.2.5. Spanish mackerel. Selectivity at age by year for the aggregate fishery. The dark line represents the terminal year. (taken from the original presentation by Katie Andrews, NMFS Beaufort to SEDAR 28 Review).

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
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Roger W. Peretti, Executive Vice President
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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**	**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