Center for Independent Experts (CIE) Independent Peer Review Report

SEDAR 38 South Atlantic and Gulf of Mexico King Mackerel Assessment Review

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Executive Summary

The assessments for both the U.S. South Atlantic and Gulf of Mexico King Mackerel stocks indicated that both stocks are not overfished and overfishing is not occurring. The FSPR30% fishing mortality benchmark and the SSB_SPR30% biomass benchmark were chosen by the review panel based on accepted practice when there is no evidence of a stock recruit relationship. Status conclusions based on SPR40% are the same. This new assessment constitutes the best available information on King Mackerel in the U.S. South Atlantic and Gulf of Mexico**.**

Fishing at FSPR30% is expected to reduce the South Atlantic stock below the lowest observed SSB and the stock response to exploitation in this case is unknown. FSPR30% should not be used as a proxy for Fmsy for this stock, nor should the implied yield by fishing at FSPR30% be used a proxy for MSY.

Background

SEDAR 38 South Atlantic and Gulf of Mexico King Mackerel Assessment Review was held in Miami, Florida from August 12-14, 2014. The purpose of the meeting was to conduct an assessment review for South Atlantic and Gulf of Mexico king mackerel. The review panel was ultimately responsible for ensuring that the best possible assessments are provided through the SEDAR process. Each reviewer was required to conduct the independent peer review in accordance with the Statement of Work (SoW) and stock assessment Terms of Reference (ToRs).

The Panel was composed of three independently appointed Center for Independent Experts (CIE) reviewers (Dr. N. Cadigan, Canada; Dr. A. Magnusson, Iceland; Dr. S. Kupschus, UK), and reviewers from the GMFMC SSC (Dr. J. Tolan), the SAFMC SSC (Dr. L. Barbieri, Dr. C. Grimes), and the chair, (Dr. J. Berkson, USA) of the SAFMC SSC. SEDAR 38 was supported and assisted by Dr. J. Neer (SEDAR Coordinator). Assessment documents were prepared by stock assessment teams and presented by Dr. J. Walter (NMFS Miami) for the South Atlantic stock and Dr. M. Schirripa and Dr. M. Lauretta (NMFS Miami) for the Gulf of Mexico stock. The support of all of these scientists and staff to the SEDAR 38 process is gratefully acknowledged.

The CIE reviewers were required to have expertise in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the tasks of the scientific peer-review. Approximately two weeks before the review meeting the reviewers were given background documents and reports from the data workshop. The reviewers were required to read all documents in preparation for the peer review. During the review meeting each reviewer was required to actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks were focused on the stock assessment ToRs.

After the meeting each reviewer was required to prepare an independent peer review report formatted as described in Annex 1. Each CIE reviewer's duties were not to exceed a maximum of 14 days to complete all work tasks.

Role of reviewer

All assessment documents and most supporting materials were made available to the Panel via an ftp server about two weeks before the meeting. These documents are listed in Appendix 1. I reviewed the backgrounds documents I was provided. I attended the entire SEDAR 38 Panel review meeting in Miami, Florida from August 12-14, 20143. I reviewed presentations and reports and participated in the discussion of these documents, in accordance with the SoW and ToRs (see Appendix 2). I also contributed draft text for ToRs 3 and 4 for the review panel summary report. My CIE report is structured according to my interpretation of the required format and content described in Annex 1 of Appendix 2. After the meeting I participated in email discussions dealing with the review panel report.

Summary of findings

A brief summary of the review panels (RPs) findings is presented for each ToR, followed by my assessment of whether the ToR was successfully completed, and the strengths and weakness of the research conducted where appropriate.

Typically in a stock assessment review the focus is on the weakness of the research. However, these assessments have many research strong points. Most notably is the extensive documentation on assessment inputs, model assumptions, and outputs. I appreciated the thorough review and recommendations on discard mortality provided by the DW. The SS3 integrated assessment model is 'state of the art' in stock assessment. It is always debatable at what level data inputs should be aggregated and I feel the fleet structure used for commercial and recreational fisheries was good. The assessment team conducted an enormous amount of work in preparation for the RP, and I greatly appreciate and respect this. I was impressed with the high skill level of the assessors and I feel the end products are high quality and the realistically best possible advice based on all relevant science information for these stocks.

ToR 1. Evaluate the data used in the assessment, addressing the following:

a) Are data decisions made by the DW and AW sound and robust?
b) Are data uncertainties acknowledged, reported, and within normal or expected levels?
c) Are data applied properly within the assessment model?

d) Are input data series reliable and sufficient to support the assessment approach and findings?

a) Are data decisions made by the DW and AW sound and robust?

Peer review summary report findings

Overall, data decisions made by the DW and AW were sound and robust **for both stocks**. The RP felt the reallocation of landings due to the reconfiguration of the 'Winter Mixing Zone' was a major change in the basic structure of the assessment **for both stocks**, with potential significant impact on assessment outcomes and stock status determination. Substantial reconsideration and re-estimation of growth parameters was conducted at the AW **for both stocks** resulting in different parameter estimates than presented at the DW. It appears that insufficient gonad samples are being collected for a more complete assessment of the reproductive biology **for both stocks**.

My additional findings

I conclude that this part of the ToR was completed **for both stocks**.

For **both stocks** I agree with the AW use of a 2 phase model. However, there remains evidence of a lack of fit that needs to be addressed in the future. The change in linear growth for immature fish to Von Bertanlanffy (VonB) growth for mature fish could be accommodated for using a 2-component (linear and VonB) mixture model with the mixture probability depending on the probability of being mature at length. This would be instead of the abrupt 2 phase model recommended in which all fish change from linear to VonB growth abruptly. In addition, there still seems to be some evidence of non-VonB growth dynamics for larger fish and alternative growth models or possibly time-varying growth models should be explored for the next assessment to better model the size at age data.

Temporal variability in maturities and fecundities should also be investigated for **both stocks**. Large changes in maturities have been documented for some stocks. Recent recruits per spawner were estimated to be low **for both stocks** in the AW recommended SS3 models. One possible cause of this could be a decline in stock reproductive potential.

Landings from the winter mixing zone were allocated equally to both stocks. The changes to the new mixing zone resulted in an overall 6% increase in landings for the Atlantic stock and a 7% decrease for the Gulf relative to the SEDAR 16 stock definitions. Size and age compositions from the mixing zone were not used. This means that the size and age of fish in the mixed zone for each stock were inferred from size and age samples from non-mixed samples. This may not be entirely appropriate if, as indicated in the DW report, most of the seasonal migrants are small young fish.

b) Are data uncertainties acknowledged, reported, and within normal or expected levels?

Peer review summary report findings

In general, uncertainty in data inputs was appropriately acknowledged. However, a clearer framework for documenting known or potential data quality issues would be very helpful for assessment analysts and reviewers. The RW panel expressed considerable concern regarding uncertainty in selectivities for each of the different fleets.

My additional findings

I conclude that this part of the ToR was completed for the **South Atlantic stock,** and partially completed for the **Gulf of Mexico stock**. Catches of **Gulf of Mexico King Mackerel** in Mexican waters may represent a missing fleet in the stock assessment, or some of the catches in the US waters may be from a Mexican stock. The DW (LHG) recommended two sensitivity runs to address this, but this was not considered at the review meeting and only considered in the AW report as a research recommendation.

c) Are data applied properly within the assessment model?

Peer review summary report findings

Data were applied properly within the assessment model. However, changes in the size and configuration of the Winter Mixing Zone may warrant a re-evaluation of how landings were assigned to **South Atlantic** or **Gulf of Mexico stocks** in future assessments.

My additional findings

I conclude that this part of the ToR was completed **for both stocks.**

d) Are input data series reliable and sufficient to support the assessment approach and findings?

Peer review summary report findings

Input data series were considered reliable and sufficient to support the assessment methods and findings.

My additional findings

I conclude that this part of the ToR was completed **for South Atlantic stock,** and partially completed for the **Gulf of Mexico stock.** I am uncertain how reliable the total landings are for the **Gulf of Mexico stock** because of uncertainty of how much of this stock is caught in Mexican waters or, alternatively, how much of the US catch is from a Mexican stock(s).

ToR 2. Evaluate the methods used to assess the stock, taking into account the available data.

a) Are methods scientifically sound and robust?
b) Are assessment models configured properly and used consistent with standard practices?
c) Are the methods appropriate for the available data?

a) Are methods scientifically sound and robust?

Peer review summary report findings

The proposed assessment model for both the Gulf and South Atlantic King Mackerel stocks was SS3, but continuity VPAs were also provided. SS3 is widely used and accepted as a state of the art assessment tool. In principle it presents a scientifically sound, robust and flexible method to assess a wide range of stock dynamics and data. This flexibility is its main strength but it also makes it time consuming to gain the necessary understanding of the linkages between different likelihood components and their effects on parameter estimates required to develop a balanced assessment.

My additional findings

I conclude that this part of the ToR was partially completed **for both stocks**. All of the model specifications that were documented and presented at the review panel (RP) meeting seemed scientifically sound. However, evaluating robustness is more difficult and depends on the definition of robustness. This is often taken to mean that small changes in assumptions and data only produce small changes, and not large changes, in important model outputs. This is further complicated because it is often not clear what a small change in an input is. For example, is changing M from 0.16 to 0.10 a small or large change?

The proposed assessment model, SS3, is quite flexible and sometimes changes in input data and model assumptions had counter-intuitive impacts on model outputs. Neither the assessment experts nor the RP members could quickly determine or explain such results. I conclude that it is uncertain whether the SS3 stock assessment models for **both the Gulf and South Atlantic King Mackerel stocks** were robust.

b) Are assessment models configured properly and used consistent with standard practices?

Peer review summary report findings

The strongly dome shaped selectivity pattern estimated for most fleets in **both the Gulf and South Atlantic model** were of concern to the panel because of the potential for a sizeable cryptic biomass. Because of this concern the assessment team constrained one fleet to have asymptotic logistic selectivity for each stock: South Atlantic - tournament males; Gulf - handline males.

This practice is often necessary to aid convergence in the model. The strongly domed selectivity patterns also results in substantial cryptic biomass. Around 40% of current SSB was cryptic for the **both stocks**; however, there was evidence of domed selectivity in the continuity VPA run for the **South Atlantic stock** which suggests that this dome is likely real. Evidence for dome-shaped selectivities in the **Gulf of Mexico stock** VPA was weaker.

The RP found evidence of misspecification of the SS3 growth model **for both stocks**. This was evident in fits to the length composition data and external estimation of the Von Bertalanffy growth model for both stocks. It seems that growth for these stocks does not conform to the assumptions of the Von Bertalanffy model. In addition, there is a problem with how SS3 estimates growth for the 11+ age group.

The RP also felt that the SS3 model configuration was somewhat over-parameterized by modelling length selectivity separately for males and females. There was little statistical or empirical evidence of sex-specific length selectivity for the various fishing fleets.

My additional findings

I conclude that this part of the ToR was partially completed. Dome shaped fishery selectivity may be confounded with the magnitude of fishing mortality (e.g. high dome + low F versus low dome + high F). In some assessment fora, best practice is to model selectivity as asymptotic unless there is good evidence for a dome. Some ancillary information was presented that some of the fleets may have domed selectivity because of size-based price differentials and size stratification (at times and places) in the stock. However, I suggest a better assessment model configuration would be to include priors on selectivity parameters that penalized against domed selectivity, and then choose the prior variances as the smallest values such that the fit to length and age composition data was almost as good as models with no priors. This would be in the spirit of keeping selectivity as flat as possible but still fitting the data well.

However, for the **South Atlantic stock** I suspect that using priors to penalize against the amount of dome may not change the assessment model results much because it seems that there is a strong dome signal in the length and age composition data. A sensitivity run where selectivity was fixed to be asymptotic for the handline fleet (males) resulted in a very poor fit to the length and age compositions.

For the **Gulf of Mexico stock** the situation may be reversed because the assumption of asymptotic selectivity for handline males may not be true, and some penalized dome could result in a much improved fit for this fleet.

I conclude that the SS3 growth model was not properly specified **for both stocks**. However, I do not think that a better configured growth model will change status results substantially **for either stock** because the mis-specification resulted in residual patterns and possibly not a biased assessment.

In additional to the possible over-parameterization of the assessment model due to sex-specific length selectivity models, I also conclude that the models were over-parameterized because separate fishing mortality parameters were estimated for each fleet and year. For example, of the 523 parameters estimated in the AW base case model for the **South Atlantic stock**, 452 active parameters were annual fleet specific fishing mortality rates. State-space stock assessments models are becoming best practice in some stock assessment fora (e.g. ICES) and it is common in such models to include some type of time-varying stochastic model for how fishing mortalities evolve over time. For example, a random walk within fleets and time-periods of relatively constant management measures could be used. This may not be easy to implement in SS3 and I conclude this was not a realistic option for **either stock**. Over-parameterized models can be numerically unstable and can sometimes produce spurious results that appear to be well estimated. This is because it is well known that variance parameter estimates in over-parameterized models can be biased low.

c) Are the methods appropriate for the available data?

Peer review summary report findings

AW-recommended assessment models for **both the Gulf and South Atlantic stocks** were set up to try to estimate steepness within the modelling process. The **Gulf of Mexico** model required a beta-prior (mean=0.7, sd=0.11) to avoid hitting the upper bounds estimate of steepness, while the **South Atlantic** model converged at an estimated steepness of 0.5 without priors. However examination of the SSB and recruitment results from either model did not provide convincing evidence of a stock recruitment relationship. In addition, the **South Atlantic model** indicated very sporadic changes in the likelihood profile across various values of steepness in the sensitivity analysis suggesting convergence issues. An external likelihood profile analysis for steepness favored steepness values close to one for **both stocks**.

The panel concluded an alteration to the AW-recommended model was required to remove the stock recruitment relationship assumption and base stock status estimation on spawning potential ratios, rather than MSY criteria. This was achieved by fixing steepness at 0.99. The panel emphasized that this should not be interpreted as a measure of high recruitment productivity at low stock sizes, but it is was merely a method for implementing a short-term forecast with random recruitment.

My additional findings

I conclude that this part of the ToR was completed.

ToR 3. Evaluate the assessment findings with respect to the following:

a) Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support status inferences?
b) Is the stock overfished? What information helps you reach this conclusion?
c) Is the stock undergoing overfishing? What information helps you reach this conclusion?
d) Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?
e) Are the 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 conditions?

a) Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support status inferences?

Peer review summary report findings

The RP concluded that estimated trends in abundance and biomass for the **South Atlantic stock** are consistent with tuning indices. The reliability of the scale of abundance, biomass and exploitation rate estimates is more difficult to assess; however, they were broadly consistent between the SS3 and VPA models, although the VPA model estimated higher exploitation rates in the last 5 years. Total exploitation rates estimated using the RW recommended model were about 7% since 1980. The panel concluded that the estimates of stock size and exploitation rates are useful to provide status inferences.

The RP concluded that estimated trends in abundance and biomass for the **Gulf of Mexico stock** are somewhat consistent with tuning indices. The fit to the Seamap larval SSB index was not good overall, however this index had wide standard errors and it is not clear if this lack of fit represents serious model mis-specification. The fit to the commercial handline cpue index was poor with fairly different trends although not in opposite directions. This fleet represents the second largest source of landings overall in the Gulf. It is also the fleet in which the selectivity was fixed to be asymptotic for males. This may suggest that this is not a valid assumption for this fleet, and in the South Atlantic stock this fleet was estimated to have a domed selectivity pattern for both males and females. Total exploitation rates were about 17% since 1980 which is higher than for the South Atlantic stock. These exploitation rates were fairly similar but a little lower than the comparison VPA results. The panel concluded that the estimates of stock size and exploitation rates are useful to provide status inferences.

My additional findings

I conclude that this part of the ToR was completed.

b) Is the stock overfished? What information helps you reach this conclusion?

Peer review summary report findings

For **both the South Atlantic and Gulf of Mexico stocks**, the SSB_SPR30% reference point was chosen by the RP based on accepted practice when there is no evidence of a stock recruit relationship. The RP concluded that **both stocks** are not overfished. Status conclusions based on other SSB reference points (e.g. SSB_BB30%, SSB_SPR40%) are the same.

My additional findings

I conclude that this part of the ToR was completed.

c) Is the stock undergoing overfishing? What information helps you reach this conclusion?

Peer review summary report findings

For **both the South Atlantic and Gulf of Mexico stocks**, the FSPR30% reference point was chosen by the RP based on accepted practice when there is no evidence of a stock recruit relationship. The RP concluded that **both stocks** are not undergoing overfishing. Status conclusions based on FSPR 40% are the same.

My additional findings

I conclude that this part of the ToR was completed.

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

Peer review summary report findings

The RP concluded that the AW recommended stock recruitment curves were unreliable for **both the South Atlantic and Gulf of Mexico stocks**. External estimates of steepness approached one.

My additional findings

I conclude that this part of the ToR was completed. There was only a narrow range of estimated SSB's in the time period with tuning indices for **both the South Atlantic and Gulf of Mexico stocks**, and there did not seem to be any effect of SSB on recruitment in this same period. I have no idea why the SS3 model for the **South Atlantic stock** estimated a fairly low value of steepness (0.5) with high precision (i.e. low bootstrap and hessian-based standard errors). However, likelihood profiles and jitter analyses suggested there may be convergence issues, and external estimation of steepness indicated a much higher value was appropriate. In the SS3 model for the **Gulf of Mexico stock,** steepness was estimated to be close to one when no prior was used. For **both stocks,** because of the narrow range of estimated SSB's and the lack of a stock-recruitment relationship within this narrow range, I conclude that this relationship was not

reliable and useful for evaluation of productivity and longer-term future stock conditions and MSY benchmarks.

e) Are the 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 conditions?

Peer review summary report findings

The RP concluded that the MSY benchmarks for the **South Atlantic and Gulf of Mexico stocks** provided by the AW were not reliable because of the uncertainty about the stock-recruitment relationship. Therefore, a fishing mortality reference point based on the 30% SPR reference level was chosen based on past practice for this stock. The uncertainty of FSPR30% recommended benchmark estimates with respect to the relevant estimated productivity processes (i.e. weights, maturities, selectivities) was not evaluated.

For the **South Atlantic stock** the RP emphasized that fishing at FSPR30% is expected to reduce the stock below the lowest observed SSB and the stock response to exploitation in this case is unknown. The RP did not recommend that FSPR30% be used as a proxy for F_{msy} for this stock, nor that the implied yield by fishing at FSPR30% is a proxy for MSY. The RP did not consider whether FSPR30% could be used as a proxy for F_{msy} for the **Gulf of Mexico stock**.

My additional findings

I conclude that this part of the ToR was partially completed. Uncertainty in the SPR30% benchmarks was not evaluated nor was rationale for choosing the 30% depletion level evaluated. Nonetheless, the overfished and overfishing status was the same if benchmarks were based on SPR40%. Uncertainty in FSPR30% could be substantial. In the VPA document for the **South Atlantic stock** the maturity and fecundity life history assumptions in the continuity VPA (Table 1 in SEDAR38-RW-03) were somewhat different than in the base run (Table 10 in SEDAR38-RW-03). These differences were greater for the **Gulf of Mexico stock** (compare Tables 1 and 10 in SEDAR38-RW-04). Uncertainty about natural mortality (M) was evaluated via some sensitivity analyses. The assessment team indicated that the maturity and fecundity values used in the current assessment were more reliable than those values used in previous assessments, but there does seem to be potential uncertainty in the future life-history values that are appropriate for SPR reference point calculations. Due to time constraints, retrospective variability in status evaluations based on the RW recommended approach were not produced. This variability was substantial for the AW recommended approach but this seems to be due to high retrospective variability in steepness which is not an issue with the RW approach.

ToR 4. Evaluate the stock projections, addressing the following:

a) Are the methods consistent with accepted practices and available data?
b) Are the methods appropriate for the assessment model and outputs?
c) Are the results informative and robust, and useful to support inferences of probable future conditions?
d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?

a) Are the methods consistent with accepted practices and available data

Peer review summary report findings

The methods for both the **South Atlantic and Gulf of Mexico stocks** were options in the SS3 package and were consistent with accepted practices. They were consistent with the available data.

My additional findings

I conclude that this part of the ToR was completed.

b) Are the methods appropriate for the assessment model and outputs?

Peer review summary report findings

For both the **South Atlantic and Gulf of Mexico stocks,** short-term projections with constant recruitment seemed reasonable given the lack of a stock-recruit relationship in the AW recommended model. This was implemented by fixing steepness at 0.99 in the RW recommended model. These methods were appropriate for the assessment model and outputs.

My additional findings

I conclude that this part of the ToR was completed.

c) Are the results informative and robust, and useful to support inferences of probable future conditions?

Peer review summary report findings

The robustness of the projection results for the **South Atlantic stock** was not specifically evaluated but there was no evidence of a lack of robustness. However, the RP emphasized that projection yield and stock size calculations should be interpreted with caution because the FSPR30% value of 0.16 is outside of the observed exploitation range in the assessment. Projected yields are substantially greater than ever observed in the fishery, and such extrapolations may not be realized.

Projection results for the **Gulf of Mexico stock** based on the RW recommended model could not be computed during the RW because of insufficient time.

My additional findings

I conclude that this part of the ToR was partially completed. For **both stocks** it seemed reasonable to base short-term projections on recent estimated recruitment, independent of projected SSB. For **both stocks** recruitment in the last 5-6 years was estimated to be below average, although industry representatives indicated that they saw evidence of recent improvements in the abundance of very young fish.

This was addressed in short-term projections for the **South Atlantic stock** by performing projection scenarios in which: a) recruitment was essentially randomly re-sampled from the last five years (2008-12); b) recruitment was resampled from a longer time-series (1980-2012); c) an intermediate option in which recruitment was basically in the middle of the short and long time series. These scenarios may likely adequately reflect the range of recruitment that may occur in the near future. However, because projections were based on a fishing mortality level (FSPR30% = 0.16) that was outside of the observed exploitation range in the assessment, the projection extrapolations may not be realized. These results may not be robust and useful to support inferences of probable future conditions.

The recent below average recruitment in AW results for the **Gulf of Mexico** stock was not addressed in AW projections for this stock.

d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?

Peer review summary report findings

Uncertainty about the initial stock size was propagated through the projections for the **South Atlantic stock**, along with uncertainty about future recruitment. This was achieved using the parametric bootstrap procedure and resampling of projected recruitments using the estimated recruitment variability. Potential autocorrelation in recruitment was accounted for by adjusting projection recruitment deviations downward by 0, 50 and 100% of the average deviation during 2008-2012. In these scenarios the deviations to adjust were randomly generated. However, the uncertainty in the projections did not include all key sources of variation. In particular, uncertainty about M was not included.

My additional findings

I conclude that this part of the ToR was partially completed for the **South Atlantic stock**, and not completed for the **Gulf of Mexico stock**. Missing from both assessments was an investigation of the impact of uncertainty about M on projection results.

ToR 5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.

a) Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods.

b) Ensure that the implications of uncertainty in technical conclusions are clearly stated?

a) Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods?

Peer review summary report findings

A variety of methods were used to evaluate the uncertainty about the AW model structure, key parameters, stock status, projections, and reference points. These are summarized in Table 1.

Table 1. List of main issues of uncertainties that were examined.

Model structure	SS3 vs. VPA, excluding data components, unisex selectivities, profile likelihoods
Key parameters	dome-shaped selectivities, steepness, M
Stock status	SSB CIs, F CIs, retrospective analysis
Projections	SSB, catch
Reference points	$B_{SPR30\%}$, $F_{SPR30\%}$, $B_{SPR40\%}$, $F_{SPR40\%}$, B_{MSY}, FMSY

Uncertainty related to model structure was evaluated for **both stocks**. The shape and amount of dome in the selectivity of various fishing fleets was identified as a key type of parameter. Uncertainty in this was evaluated via comparison to VPA (**both stocks**) and a sensitivity analysis for the **South Atlantic stock** in which the selectivity of the handline fleet for males was fixed to be asymptotic. Steepness was another key parameter, and uncertainty of this was evaluated using standard errors (hessian and bootstrap), profiling, jittering, using retrospective analyses, and using external profiling. Uncertainty related to M was evaluated using the low and high scenarios identified by the DW. Uncertainty about stock status and projections were evaluated using the delta method and parametric bootstrapping. Retrospective analysis was also performed for the stability of recent stock status evaluations.

My additional findings

I conclude that this part of the ToR was completed **for both stocks**. However, it is important to note that there was insufficient time at the RW to apply most of these methods to the recommended RW assessment models.

b) Ensure that the implications of uncertainty in technical conclusions are clearly stated?

Peer review summary report findings

The panel did not make a specific conclusion on this part of ToR 5.

My additional findings

I conclude that this part of the ToR was partially completed **for both stocks**. The impact of uncertainty in M on projection results was not considered at the RW.

ToR 6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.

a) Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments.
b) Provide recommendations on possible ways to improve the SEDAR process?

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

Peer review summary report findings

Panel members reviewed research recommendations provided by the Data and Assessment workshops and made further recommendations. Most of the discussion dealt with possible improvements to the SS3 model and also how an extensive tagging program could improve the assessment and management of **both stocks**.

My additional findings

I conclude that this part of the ToR was completed **for both stocks**.

b) Provide recommendations on possible ways to improve the SEDAR process?

Peer review summary report findings

This was not considered by the RP.

My additional findings

It would be helpful if the SEDAR review had been structured so that RP conclusions (bullets) were formulated in plenary. More meeting time needs to be devoted to writing the summary report. It is much more difficult to do this after the review. I think the last day of the review should be exclusively reserved for this purpose and we should not be reviewing new model runs on the last day. A balance needs to be achieved between the reviewers' interests in the best assessment model formulation and the meetings objectives of addressing all ToRs.

ToR 7. Provide guidance on key improvements in data or modeling approaches which should be considered when scheduling the next assessment.

Peer review summary report findings

The RP did not make specific conclusions on this ToR. However, my sense was that there was agreement among panel members that in the next assessment **for both stocks** the VPA comparison model should be replace with a statistical catch at age model.

My additional findings

In addition, **for both stocks**, I recommend that a statistical catch at age model be investigated that includes options for modelling time-varying fishing mortalities, perhaps within blocks of years with constant management measures.

Tournament landings for the **Gulf stock** should be quantified similar to the **South Atlantic stock** before the next assessment.

ToR 8. Prepare a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference.

a) 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.
b) 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.?

ToR8a was started at the review meeting. I drafted the RP summary text for TORs 3 and 4. ToR8b was completed as per my CIE SoW.

Conclusions and Recommendations

ToR 1. Evaluate the data used in the assessment, addressing the following:

a) Are data decisions made by the DW and AW sound and robust?

Overall, data decisions made by the DW and AW were sound and robust **for both stocks**. However, there remains evidence of a lack of fit in growth rates and size compositions that needs to be addressed in the future.

b) Are data uncertainties acknowledged, reported, and within normal or expected levels?

Uncertainty in data inputs was appropriately acknowledged overall; however, uncertainty about mixing of King Mackerel between US and Mexico waters in the Gulf of Mexico was not reported on at the assessment workshop and not considered at the review workshop.

c) Are data applied properly within the assessment model?

Data were applied properly within the assessment model.

d) Are input data series reliable and sufficient to support the assessment approach and findings?

Input data series were considered reliable and sufficient overall to support the assessment methods and findings. However, it is unclear how reliable are the total landings for the **Gulf of Mexico stock** because of uncertainty in how much of this stock is caught in Mexican waters or, alternatively, how much of the US catch is from a Mexican stock(s). Also, it appears that insufficient gonad samples are being collected for a complete assessment of the reproductive biology **for both stocks**. Temporal variability in maturities and fecundities should also be investigated for **both stocks**.

ToR 2. Evaluate the methods used to assess the stock, taking into account the available data.

a) Are methods scientifically sound and robust?

The proposed assessment model for **both the Gulf and South Atlantic King Mackerel stocks** was SS3 which is a flexible and scientifically sound method to assess a wide range of stock dynamics and data. All of the model specifications that were documented and presented at the review panel meeting seemed scientifically sound. However, I conclude that it is uncertain whether the SS3 stock assessment models for **both the Gulf and South Atlantic King Mackerel stocks** were robust. This depends on the definition of robust.

b) Are assessment models configured properly and used consistent with standard practices?

The strongly dome shaped selectivity pattern estimated for most fleets in **both the Gulf and South Atlantic models** were a great concern to me because of the potential for a sizeable cryptic biomass and confounding with the level of fishing mortality. Around 40% of current SSB was cryptic for the **both stocks**; however, there was evidence of domed selectivity in the continuity VPA run for the **South Atlantic stock** which suggests that this dome is likely real. Evidence for dome-shaped selectivities in the **Gulf of Mexico stock** VPA was weaker.

There is evidence of misspecification of the SS3 growth model **for both stocks**, and also that the SS3 models were over-parameterized. However, these issues are not expected to alter conclusions on stock status.

c) Are the methods appropriate for the available data?

AW-recommended assessment models for **both the Gulf and South Atlantic** were set up to estimate steepness within the modelling process. Examination of the SSB and recruitment results from these models for **both stocks** did not provide convincing evidence of a stock recruitment relationship. Alterations to AW-recommended models were required to remove the stock recruitment relationship assumption. The RP also recommended that stock status determination be based on spawning potential ratios (i.e. SPR30%) rather than MSY criteria. Removing the stock recruitment relationship from the models was achieved by fixing steepness of 0.99. This should not be interpreted as a measure of high recruitment productivity at low stock sizes. This modification was recommended merely as a method for implementing a short-term forecast with random recruitment.

ToR 3. Evaluate the assessment findings with respect to the following:

a) Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support status inferences?

Estimated trends in abundance and biomass from the RW recommended model for the **South Atlantic stock** are consistent with tuning indices. Estimated trends in abundance and biomass for the **Gulf of Mexico stock** are somewhat consistent with tuning indices. Recommended estimates of stock size and exploitation rates are useful to provide status inferences **for both stocks**.

b) Is the stock overfished? What information helps you reach this conclusion?

For **both the South Atlantic and Gulf of Mexico stocks**, the SSB_SPR30% benchmark was chosen based on accepted practice when there is no evidence of a stock recruit relationship. **Both stocks** are not overfished. Status conclusions based on other SSB reference points (e.g. SSB_BB30%, SSB_SPR40%) are the same.

c) Is the stock undergoing overfishing? What information helps you reach this conclusion?

For **both the South Atlantic and Gulf of Mexico stocks**, the FSPR30% reference point was chosen based on accepted practice when there is no evidence of a stock recruit relationship. **Both stocks** are not undergoing overfishing. Status conclusions based on FSPR40% are the same.

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

AW recommended stock recruitment curves seemed unreliable for **both the South Atlantic and Gulf of Mexico stocks**. External estimates of steepness approached one. For **both stocks,** because of the narrow range of estimated SSB's and the lack of a stock-recruitment relationship within this narrow range, this relationship was not reliable and useful for evaluation of productivity and longer-term future stock conditions.

e) Are the 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 conditions?

The MSY benchmarks for the **South Atlantic and Gulf of Mexico stocks** provided by the AW were not reliable because of the uncertainty about the stock-recruitment relationship. Therefore, a fishing mortality reference point based on the 30% SPR reference level was chosen based on past practice for this stock.

For the **South Atlantic stock** it is emphasized that fishing at FSPR30% is expected to reduce the stock below the lowest observed SSB and the stock response to exploitation in this case is unknown. FSPR30% is not recommended as a proxy for F_{msy} for this stock, nor is the implied yield by fishing at FSPR30% a proxy for MSY.

Uncertainty in the SPR30% benchmarks was not evaluated nor was rationale for choosing the 30% depletion level evaluated. Nonetheless, the overfished and overfishing status was the same if benchmarks were based on SPR40%

ToR 4. Evaluate the stock projections, addressing the following:

a) Are the methods consistent with accepted practices and available data?

The methods for both the **South Atlantic and Gulf of Mexico stocks** were options in the SS3 package and were consistent with accepted practices. They were consistent with the available data.

b) Are the methods appropriate for the assessment model and outputs?

For both the **South Atlantic and Gulf of Mexico stocks,** short-term projections with constant recruitment seemed reasonable given the lack of a stock-recruit relationship in the AW recommended model. This was implemented by fixing steepness at 0.99 in the RW recommended model. These methods were appropriate for the assessment model and outputs.

c) Are the results informative and robust, and useful to support inferences of probable future conditions?

The robustness of the projection results for the **South Atlantic stock** was not specifically evaluated but there was no evidence of a lack of robustness. Projection yield and stock size calculations should be interpreted with caution because the FSPR30% value of 0.16 is outside of the observed exploitation range in the assessment. Projected yields are substantially greater than ever observed in the fishery, and such extrapolations may not be realized.

Projection results for the **Gulf of Mexico stock** based on the RW recommended model could not be computed during the RW because of insufficient time.

For **both stocks** recruitment in the last 5-6 years was estimated to be below average, although industry representatives indicated that they saw evidence of recent improvements in the abundance of very young fish. This was addressed in short-term projections for the **South Atlantic stock** by performing projection scenarios using low, medium and high levels of recruitment. The recent below average recruitment in AW results for the **Gulf of Mexico** stock were not addressed in AW projections for this stock.

d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?

Uncertainty about the initial projection stock size was propagated through the projections for the **South Atlantic stock**, along with uncertainty about future recruitment. This was partially completed for the **South Atlantic stock**, and notably did not include an investigation of the impact of uncertainty about M on projection results. Projections for the RW recommended model were not completed for the **Gulf of Mexico stock**.

ToR 5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.

a) Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods.

An extensive variety of methods were used to evaluate the uncertainty about the AW recommended model structure, key parameters, stock status, projections, and reference points. However, there was insufficient time at the RW to apply most of these methods to the recommended RW assessment models.

b) Ensure that the implications of uncertainty in technical conclusions are clearly stated?

This part of the ToR was partially completed **for both stocks**. The impact of uncertainty in M on projection results was not considered at the RW.

ToR 6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.

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

Research recommendations provided by the Data and Assessment were reviewed and a few additional recommendations were added. These dealt with possible improvements to the SS3 model and also how an extensive tagging program could improve the assessment and management of **both stocks**.

b) Provide recommendations on possible ways to improve the SEDAR process?

It would be helpful if the SEDAR review had been structured so that RP conclusions (bullets) were formulated in plenary.

ToR 7. Provide guidance on key improvements in data or modeling approaches which should be considered when scheduling the next assessment.

In the next assessment **for both stocks,** the VPA comparison model should be replace with a statistical catch at age model that includes options for modelling time-varying fishing mortalities, perhaps within blocks of years with constant management measures.

Appendix 1: Bibliography of materials provided for review

SEDAR 38

South Atlantic and Gulf of Mexico King Mackerel Document List

Document #	Title	Authors	Date Submitted
Documents Prepared for the Data Workshop			
SEDAR38-DW-01	King mackerel (*Scomberomorus cavalla*) larval indices of relative abundance from SEAMAP Fall Plankton Surveys, 1986 to 2012	David S. Hanisko and Joanne Lyczkowski-Shultz	10 Dec 2013
SEDAR38-DW-02	King mackerel abundance indices from SEAMAP groundfish surveys in the Northern Gulf of Mexico	Adam G. Pollack and G. Walter Ingram, Jr.	10 Dec 2013 Addendum – 30 Dec 2013
SEDAR38-DW-03	King mackerel abundance indices from NMFS small pelagics trawl surveys in the Northern Gulf of Mexico	Adam Pollack and G. Walter Ingram, Jr.	10 Dec 2013
SEDAR38-DW-04	Standardized catch indices of king mackerel from the U.S. Marine Recreational Fisheries Statistics Survey, 1981 to 2012	Matthew Lauretta and John F. Walter	22 Nov 2013
SEDAR38-DW-05	SEDAR standardized report cards used for review of indices of abundance for Atlantic and Gulf of Mexico king mackerel	SEDAR 38 Indices Working Group	7 January 2014
SEDAR38-DW-06	Standardized catch rates of Atlantic king mackerel (*Scomberomorus cavalla*) from the North Carolina	John Walter and Stephanie McInerny	22 Nov 2013

	Commercial fisheries trip tickets 1994-2013		
SEDAR38-DW-07	Analysis of environmental factors affecting king mackerel landings along the east coast of Florida	Peter J. Barile	22 Nov 2013
SEDAR38-DW-08	Analysis of annual, monthly and weekly king mackerel landings in the east FL "mixing zone" : evidence of stock migrations and a "resident" population on the east coast of FL	Peter J. Barile	22 Nov 2013
SEDAR38-DW-09	Sampling History of the King Mackerel Commercial Fisheries in the Southeastern United States by the Federal Trip Interview Program (TIP)	Courtney R. Saari	22 Nov 2013
SEDAR38-DW-10	Standardized catch rates of from commercial logbook data for king mackerel from the United States Gulf of Mexico, South Atlantic, and Mixing Zone, 1993-2013	John F. Walter and Kevin J. McCarthy	6 January 2014
SEDAR38-DW-11	King mackerel index of abundance in coastal US South Atlantic waters based on a fishery-independent trawl survey	Tracey I. Smart and Jeanne Boylan	22 Nov 2013 Addendum – 30 Dec 2013 Addendum Updated – 26 March 2014
SEDAR38-DW-12	Trends from Non-CPUE Standardized King mackerel Landing Logs from Long Bay, South Carolina Recreational Pier Fishery	Christian Johnson	22 Nov 2013
SEDAR38-DW-13	King Mackerel Historical Pictures Summary	Rusty Hudson	22 Nov 2013

SEDAR38-DW-14	SEDAR 16 King Mackerel Review Panel Information Provided by Ben Hartig	Ben Hartig	29 Nov 2013
SEDAR38-DW-15	A review of Gulf of Mexico and Atlantic king mackerel *(Scomberomorus cavalla)* age data, 1986 – 2013, from the Panama City Laboratory, Southeast Fisheries Science Center, NOAA Fisheries Service	Chris Palmer, Doug DeVries, Carrie Fioramonti, and Hannah Lang	3 Dec 2013 Addendum: 7 January 2014
SEDAR38-DW-16	Updated standardized catch rates of king mackerel (*Scomberomorus cavalla*) from the headboat fishery in the U.S. Gulf of Mexico and U.S. South Atlantic	Matt Lauretta and Shannon L. Cass-Calay	6 Dec 2013 Addendum: 3 January 2014
SEDAR38-DW-17	Historical For-Hire Fishing Vessels South Atlantic Fishery Management Council 1930s to 1985	Rusty Hudson	3 January 2014
SEDAR38-DW-18	Historical photographs of For-Hire Fishing Vessels 1930s to 1985	Rusty Hudson	3 January 2014
Documents Prepared for the Assessment Process			
SEDAR38-AW-01	Growth models for king mackerel from the south Atlantic and Gulf of Mexico	Linda Lombardi	7 March 2014 Addendum: 9 May 2014
SEDAR38-AW-02	Addendum to "SEDAR 38-10": New South Atlantic logbook index based upon revised mixing zone definition and new indices for the Gulf and South Atlantic using only trolling gear	John Walter	10 March 2014

SEDAR38-AW-03	The NMFS-SEFSC must account for climate change and inter-annual environmental variability in all South Atlantic stock assessments	Peter J. Barile	10 March 2014
SEDAR38-AW-04	Can climate explain temporal trends in king mackerel (Scomberomorus cavalla) catch-per-unit-effort and landings?	Harford, W.J, Sagarese, S.R., Nuttall, M.A., Karnauskas, M., Liu, H., Lauretta, M., Schirripa, M. & Walter, J.F.	20 March 2014 Updated 14 July 2014
SEDAR38-AW-05	Age frequency distributions, age length keys, length at ages, and sex ratios for king mackerels in the Gulf of Mexico and South Atlantic from 1986-2013	Ching-Ping Chih	20 March 2014
SEDAR38-AW-06	Length frequency distributions for king mackerels in the Gulf of Mexico and South Atlantics from 1978-2013	Ching-Ping Chih	20 March 2014
Documents Prepared for the Review Workshop			
SEDAR38-RW-01	South Atlantic Shrimp fishery bycatch of king mackerel	Walter, J. and J. Isely	6 August 2014
SEDAR38-RW-02	Methods Used to Compile South Atlantic Shrimp Effort Used in the Estimation of King Mackerel Bycatch in the South Atlantic Shrimp Fishery	Gloeckner, D.	5 August 2014
SEDAR38-RW-03	Virtual population analysis for Atlantic king mackerel	Matthew Lauretta	4 August 2014
SEDAR38-RW-04	Virtual population analysis of Gulf of Mexico king mackerel	Matthew Lauretta	4 August 2014

SEDAR38-RW-05	King Mackerel and Spanish Mackerel larval data on the northeast U.S. Shelf	Harvey J. Walsh, David E. Richardson, Katrin E. Marancik, and Jon A. Hare	22 July 2014
SEDAR38-RW-06	Public comments received during the SEDAR 38 Process		8 August 2014
SEDAR38-RW-07	NMFS- Trip Intercept Program (TIP) data indicates significant Atlantic King Mackerel recruitment of new age classes into the East Florida commercial handline fishery in April 2014	Peter J. Barile	7 August 2014
Final Stock Assessment Reports			
SEDAR38-SAR1	King mackerel: Gulf of Mexico Migratory Group	SEDAR 38 Panels	
SEDAR38-SAR2	King mackerel: South Atlantic Migratory Group	SEDAR 38 Panels	
Reference Documents			
SEDAR38-RD01	Spatial and temporal variability in the relative contribution of king mackerel (*Scomberomorus cavalla*) stocks to winter mixed fisheries off South Florida	Todd R. Clardy, William F. Patterson III, Douglas A. DeVries, and Christopher Palmer	
SEDAR38-RD02	King mackerel population dynamics and stock mixing in the United States Atlantic Ocean and Gulf of Mexico	Katherine E. Shepard	
SEDAR38-RD03	A Cooperative Research Approach to Estimating Atlantic and Gulf of Mexico	William F. Patterson III and Katherine E. Shepard	

	King Mackerel Stock Mixing and Population Dynamics Parameters	
SEDAR38-RD04	Contemporary versus historical estimates of king mackerel (*Scomberomorus cavalla*) age and growth in the U.S. Atlantic Ocean and Gulf of Mexico	Katherine E. Shepard, William F. Patterson III, Douglas A. DeVries, and Mauricio Ortiz
SEDAR38-RD05	Trends in Atlantic contribution to mixed-stock king mackerel landings in South Florida inferred from otolith shape analysis	Katherine E. Shepard, William F. Patterson III, and Douglas A. DeVries
SEDAR38-RD06	Coastal upwelling in the South Atlantic Bight: A revisit of the 2003 cold event using long term observations and model hindcast solutions	Kyung Hoon Hyun and Ruoying He
SEDAR38-RD07	FishSmart: An Innovative Role for Science in Stakeholder-Centered Approaches to Fisheries Management	Thomas J. Miller, Jeff A. Blair , Thomas F. Ihde , Robert M. Jones, David H. Secor & Michael J. Wilberg
SEDAR38-RD08	FishSmart: Harnessing the Knowledge of Stakeholders to Enhance U.S. Marine Recreational Fisheries with Application to the Atlantic King Mackerel Fishery	Thomas F. Ihde, Michael J. Wilberg, David H. Secor, and Thomas J. Miller
SEDAR38-RD09	SEDAR 16 Final Document List	SEDAR 16 Panels
SEDAR38-RD10	History of fishing in Ponce Inlet	The Quarterly Newsletter of the Ponce de Leon Inlet Lighthouse Preservation Association, Inc.
SEDAR38-RD11	Biological-Statistical Census of the Species Entering Fisheries in the Cape Canaveral Area	William W. Anderson and Jack W. Gehringer
SEDAR38-RD12	Impacts of Interannual Environmental Forcing and Climate Change on the Distribution of	W. J. Overholtz, J. A. Hare and C. M. Keith

	Atlantic Mackerel on the U.S. Northeast Continental Shelf	
SEDAR38-RD13	Characterization of the near-shore commercial shrimp trawl fishery from Carteret County to Brunswick County, North Carolina	Kevin Brown
SEDAR38-RD14	South Atlantic Shrimp System	
SEDAR38-RD15	SEAMAP (Gulf of Mexico) Field Operations Manual for Collection of Data	NMFS

Appendix 2: CIE Statement of Work

Attachment A: Statement of Work for The Fisheries and Marine Institute of The Memorial University of Newfoundland

External Independent Peer Review by the Center for Independent Experts

SEDAR 38 South Atlantic and Gulf of Mexico King Mackerel 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 Representative (COR), 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 38 will be a compilation of data, benchmark assessments of the stocks, and an assessment review conducted for South Atlantic and Gulf of Mexico king mackerel. The review panel is ultimately responsible for ensuring that the best possible assessments are provided through the SEDAR process. The stocks assessed through SEDAR 38 are within the jurisdiction of the South Atlantic and Gulf of Mexico Fishery Management Councils, and the state waters of Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina, and North Carolina. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**.

Requirements for CIE Reviewers: Three CIE reviewers shall have the necessary qualifications to complete an impartial and independent peer review in accordance with the tasks and ToRs described in the SoW herein. The CIE reviewers shall have expertise in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the tasks of the scientific 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 SEDAR 33 panel review meeting scheduled in Miami, Florida during August 12-14, 2014.

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

Tasks prior to the meeting: The contractor shall independently select qualified reviewers that do not have conflicts of interest to conduct an independent scientific peer review in accordance with the tasks and ToRs within the SoW. Upon completion of the independent reviewer selection by the contractor's technical team, the contractor shall provide the reviewer information (full name, title, affiliation, country, address, email, and FAX number) to the contractor officer's representative (COR), who will forward this information to the NMFS Project Contact no later than the date specified in the Schedule of Milestones and Deliverables. The contractor shall be responsible for providing the SoW and stock assessment ToRs to each reviewer. The NMFS Project Contact will be responsible for providing the reviewers with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact will also be 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 COR prior to the commencement of the peer review.

Foreign National Security Clearance: The reviewers shall participate during a panel review meeting at a government facility, and the NMFS Project Contact will be responsible for obtaining the Foreign National Security Clearance approval for the reviewers who are non-US citizens. For this reason, the reviewers shall provide by FAX (not by email) the 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/.

Pre-review Background Documents: Approximately two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the COR the necessary background information and reports (i.e., working papers) for the reviewers to conduct the peer review, and the COR will forward these to the contractor. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the COR on where to send documents. The reviewers are responsible only for the pre-review documents that are delivered to the contractor in accordance to the SoW scheduled deadlines specified herein. The reviewers shall read all documents deemed as necessary in preparation for the peer review.

Tasks during the panel review meeting: Each reviewer shall conduct the independent peer review in accordance with the SoW and stock assessment 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 COR and contractor. Each 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 stock assessment ToRs as specified herein. The NMFS Project Contact will be responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact will also be responsible for ensuring that the Chair understands the contractual role of the reviewers as specified herein. The contractor can contact the COR and NMFS Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Tasks after the panel review meeting: Each reviewer shall prepare an independent peer review report, and the report shall be formatted as described in **Annex 1**. This report should explain whether each stock assessment ToR was or was not completed successfully during the SEDAR meeting. If any existing BRP or their proxies are considered inappropriate, each independent report shall include recommendations and justification for suitable alternatives. If such alternatives cannot be identified, then the report shall indicate that the existing BRPs are the best available at this time. Additional questions and pertinent information related to the assessment review addressed during the meetings that were not in the ToRs may be included in a separate section at the end of an independent peer review report.

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.

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 Miami, Florida during August 12-14, 2014.
3) Conduct an independent peer review in accordance with the ToRs (**Annex 2**).
4) No later than August 25, 2014, 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 at 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**.

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

6 July 2014	CIE sends reviewer contact information to the COR, who then sends this to the NMFS Project Contact
29 July 2014	NMFS Project Contact sends the stock assessment report and background documents to the CIE reviewers.
12-14 August 2014	Each reviewer shall conduct an independent peer review during the panel review meeting in Miami, Florida
25 August 2014	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
8 September 2014	CIE submits CIE independent peer review reports to the COR
15 September 2014	The COR 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 COR within 10 working days after receipt of all required information of the decision on changes. The COR 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 COR 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 COR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COR 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 COR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COR. The COR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

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Key Personnel:

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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. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed. The CIE independent report shall be an independent peer review of each ToRs.

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

Annex 2: Tentative Terms of Reference for the Peer Review

SEDAR 38 South Atlantic and Gulf of Mexico King Mackerel Assessment Review

1. Evaluate the data used in the assessment, addressing the following:
   a) Are data decisions made by the DW and AW sound and robust?
   b) Are data uncertainties acknowledged, reported, and within normal or expected levels?
   c) Are data applied properly within the assessment model?
   d) Are input data series reliable and sufficient to support the assessment approach and findings?
2. Evaluate the methods used to assess the stock, taking into account the available data.
   a) Are methods scientifically sound and robust?
   b) Are assessment models configured properly and used consistent with standard practices?
   c) Are the methods appropriate for the available data?
3. Evaluate the assessment findings with respect to the following:
   a) Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support status inferences?
   b) Is the stock overfished? What information helps you reach this conclusion?
   c) Is the stock undergoing overfishing? What information helps you reach this conclusion?
   d) Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?
   e) Are the 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 conditions?
4. Evaluate the stock projections, addressing the following:
   a) Are the methods consistent with accepted practices and available data?
   b) Are the methods appropriate for the assessment model and outputs?
   c) Are the results informative and robust, and useful to support inferences of probable future conditions?
   d) Are key uncertainties acknowledged, discussed, and reflected in the projection results?
5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.
   - Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods.

- Ensure that the implications of uncertainty in technical conclusions are clearly stated.

6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.
   - Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments.
   - Provide recommendations on possible ways to improve the SEDAR process.
7. Provide guidance on key improvements in data or modeling approaches which should be considered when scheduling the next assessment.
8. Prepare a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference.
   - 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.

Annex 3: Tentative Agenda for

SEDAR 38 South Atlantic and Gulf of Mexico King Mackerel Assessment Review

Tentative Agenda

Miami, Florida
12-14 August 2014

Tuesday

9:00 a.m.	**Introductions and Opening Remarks**	**Coordinator**
	- Agenda Review, TOR, Task Assignments	
9:30 a.m. – 11:30 a.m.	**Assessment Presentations**	**TBD**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 6:00 p.m.	**Continue Presentations/ Panel Discussion**	**Chair**
	- Assessment Data & Methods	
	- Identify additional analyses, sensitivities, corrections	

***Tuesday Goals*:** Initial presentations completed, sensitivity and base model discussion begun

Wednesday

8:00 a.m. – 11:30 a.m.	**Panel Discussion**	**Chair**
	- Assessment Data & Methods	
	- Identify additional analyses, sensitivities, corrections	
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 6:00 p.m.	**Panel Discussion/Panel Work Session**	**Chair**
	- Continue deliberations	
	- Review additional analyses	
	- Recommendations and comments	

***Wednesday Goals*:** sensitivities and modifications identified, preferred models selected, projection approaches approved, Report drafts begun

Thursday

8:00 a.m. – 11:30 a.m.	**Panel Discussion**	**Chair**
	- *Final sensitivities reviewed.*	
	- *Projections reviewed.*	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 5:00 p.m.	**Panel Discussion or Work Session**	**Chair**
	- *Review Reports*	
5:00 p.m.	**ADJOURN**	

Thursday Goals: Complete assessment work and discussions, final results available. Draft Reports reviewed.