

**Report on the  
SEDAR 18 – Atlantic Red Drum**

Prepared for  
The Center for Independent Experts

By

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## EXECUTIVE SUMMARY

Three CIE appointed reviewers participated in SEDAR 18, review of Atlantic Red Drum, as part of the Review Panel. All three CIE reviewers are contributing to the Review Panel Consensus Report which is still in preparation and due for submission on 2<sup>nd</sup> October. This report is an independent and individual report to the CIE on SEDAR 18 and the Atlantic Red Drum assessments. It has been prepared as contracted on a schedule in advance of the Review Panel Consensus Report and support material (an Addendum to the Atlantic Red Drum Assessment Workshop Report). The findings of this independent report and the agreed basis for the Review Panel Consensus Report are convergent.

Data available for Atlantic Red Drum assessment include commercial landings, recreational take and live-release, biological information, proportions-at-age, multiple fishery independent survey indices, and, for the Northern stock, tag release and returns. For neither stock are the data comprehensive and numerous assumptions are needed when constructing stock assessment models.

The assessment models used for both Northern and Southern red Drum are standard statistical catch-at-age formulations. This is appropriate given errors in the removals-at-age data. The models are complex, fitting multiple data sets and requiring numerous assumptions. For both stocks, the models have been implemented using the ADMB package; this is appropriate and allows great flexibility and exploration.

The Review Workshop found a number of errors and made a number of suggested changes which resulted in new base case assessment for both stocks. Both assessments are “weak”. The Northern assessment is effectively dominated by externally estimated fishing mortality estimates derived from tagging data. Excluding those fishing mortality estimates results in a model which does not converge to a fit. It would be more appropriate to include the tagging data directly in to the statistical catch-at-age model, the better to characterize uncertainty, especially in derived parameters of interest to management. However, recognizing that more could be done in the future, the Review Workshop revised base case stock assessment is a sufficient basis to provide a declaration on the state of the stock. The stock is likely above the sSPR target of 40% and above the 30% threshold with very high probability.

The Southern assessment is sensitive to the way the model is structured, has poor convergence performance and is highly uncertain with respect to absolute levels of abundance and mortality. It does, however, provide robust indications as to trends and it is reasonable overall to conclude that the stock is likely above the 30% sSPR threshold.

For neither stock is it possible to derive a meaningful indicator of biomass because of the large “cryptic” biomass of older fish.

Generally, the Review Panel did not support the recommendations made by the Data and Assessment Workshops. It did make a number of alternative recommendations. These recommendations include

suggestions that would improve the stock assessments and a recommendation that the next assessments would ideally be scheduled for no sooner than five years hence.

## DESCRIPTION OF CIE REVIEWER ROLE AND COMMENTS ON THE REVIEW PROCESS

### **ROLE**

The role of the CIE reviewer (one of three CIE appointed reviewers) as stated in the CIE SOW (Appendix 2) was to participate in the SEDAR 18 Review Panel meeting held at the Doubletree Buckhead, 3342 Peachtree Rd, Atlanta, Georgia, from 24<sup>th</sup> to 28<sup>th</sup> August 2009; to contribute to the Consensus Report of the Review Panel; and to provide an independent report to the CIE.

### **SEDAR PROCESS**

*... reviewers shall provide a critique of the NMFS process including suggestions for improvements of process and products...*

The SEDAR review process is well established and clearly well organised. The coordinator, Dale Theiling, made contact more than a month in advance of the Review Meeting and kept all Review Panel members well informed of progress, availability of documents, access to the ftp site, teleconference arrangements, etc. The early appointment of the chair, Dr Bob O'Boyle, and his quick and thorough engagement, ensured a strong early engagement of all Review Panel members and good early dialogue with the analytical team. Together with the early availability of clear documentation from the Assessment Workshop, including computer code and explicit inputs, extensive preparatory work was able to be carried out. Particular note should be made of the CIE reviewers Gibson and Hall who in advance noticed, respectively, a coding error and a data input error when compared to the documentation. This highlights the thorough nature of the reviewers but is testament to the thoroughness and openness of those being reviewed. Further, the willingness of those being reviewed to check and redo analyses even at that early stage is worthy of mention.

That same openness and willingness was evident also in the main review meeting in Atlanta. At all times the meeting was well chaired, coordinated, organised and supported. Thanks are due to Dale Theiling and his team for excellent support in all respects, to Bob O'Boyle for excellent chairing and to the analytical team for good humour, open minds and hard work, including preparation, presentations, and extensive analyses conducted during the meeting, even extending to substantial post-review work (an Addendum to be prepared for the Consensus Summary, though not readily available for preparation of the individual CIE reports). I consider this to have been a good review. It found some errors which were attended to in advance, enabled good discussion and suggested changes which were considered and accepted, but generally found that the work conducted was thorough and a sufficient basis to be used for advising management. In my view, the Atlantic Red Drum assessments have been improved by the process. I hope that those being reviewed have a similar perspective.

My only suggestion for the Red Drum assessment reporting is that it is simpler to consider stocks one at a time. The Red Drum Data Workshop and Assessment Workshop interleaved commentary on the Southern and Northern stocks. This is more efficient in some respects when dealing with biology, but it makes consideration of stock assessments more difficult, especially for anyone unfamiliar with the

stocks and data and when dealing with detailed investigations of model fits. I would have a preference for clear separation of the stocks in reports even though it might lead to repetition in reporting.

Overall, I have no criticisms of the SEDAR process.

Appendix 1 (bibliography) considers the availability of papers and presentations. Appendix 3 lists the Review Meeting participants and the final agenda.

From a CIE reporting perspective, it is slightly difficult that the Review Panel Consensus Report is scheduled for finalisation two weeks after individual CIE reports are due (2<sup>nd</sup> October *versus* 18<sup>th</sup> September), especially as much that was considered and agreed at the review meeting is being documented as an Addendum to the Assessment Report. Having that Addendum available in order to prepare CIE reports would have been useful.

[Late comment: the Addendum was circulated on the afternoon of 15<sup>th</sup> September, New Zealand time. This is good timing for completion of the Review Panel Consensus Report but difficult timing for preparation of the CIE reports. However, it did allow the late inclusion of final run results and graphics.]

In terms of meeting facilities, the Doubletree Buckhead meeting rooms were spacious and comfortable. The SEDAR administrative and IT support were excellent. Some minor IT problems arose for individuals but I believe these were efficiently dealt with; from my perspective the IT arrangements and support were first class. Nevertheless, in my view, it is generally preferable to have meetings of this type at or near the science or management institutes responsible; this makes data access and re-analysis easier and (usually) ensures better access to printing and copying facilities. It is in the nature of stock assessment and model fitting that much documentation is generated. It is useful to have ready access to hard copy – only so much information can be viewed at once on a laptop screen. From the perspective of a traveller, it is also preferable to work in a location separated from accommodation, giving opportunity to walk and get exposure to daylight. This is not just a matter of comfort, it is a matter of enabling clear thought and efficiency.

## SUMMARY OF FINDINGS BY TERM OF REFERENCE

1. Evaluate the adequacy, appropriateness, and application of data used in the assessment.  
*(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.)*

For ease, the following is organised as in the Consensus Summary Report. The Review Panel agreed it would try to make comment by stock but found this difficult. Comments are therefore mixed with some relating to stock than issue while others deal with issues making comments stock by stock. In this section, comments are organised by issue/subject.

### **Stock structure**

The stock splits used for the Northern and Southern Atlantic Red Drum stock assessments are sound.

Information on genetics, life histories, tagging and habitats was presented during the Review Meeting. The information on stock structure does not strongly support a clear north-south genetic differentiation though limited life history and tagging data suggest at least a functional stock separation and the lack of suitable Red Drum habitat around the northern South Carolina and southern North Carolina boundary appears to form a natural break between stocks. Whether or not there is a genetic difference between the north and south regions, there are fishery and administrative differences that suggest assessment at this level of separation is reasonable.

While it seems reasonable to separate the stocks as suggested for assessment purposes, it is of concern that the tagging studies suggest east-west movements of Red Drum and that little is known about estuary-offshore and offshore north-south movements. This is of concern because it is unclear how local depletion might affect recruitment at the local level or more widely. It is also an issue as management is effectively at the local scale while assessment is at a larger stock scale – an understanding of local population dynamics is potentially of more relevance to management than wider scale stock assessment.

The genetic link between the southern Atlantic Red Drum stock and that in the Gulf of Mexico appears sufficiently weak not to outweigh assessment and management considerations.

### **Biological Data**

Growth and natural mortality: the Data Workshop and Assessment Workshop considered the fitting of growth curves and estimates of natural mortality. At the Data workshop, a von Bertalanffy growth

function was fitted and natural mortality at age was fit using the scaled Lorenzen method. Because the fit to the von Bertalanffy function was poor at young ages, the Assessment Workshop also used a non-parametric growth function which generally fit better, again using the scaled Lorenzen method to estimate natural mortality at age. This seems reasonable and the biological explanation provided (re high growth rates and early maturity in estuarine systems) seems reasonable. Overall, whilst accepting the estimated age vector as a baseline assumption for the assessments (with sensitivity testing of the assessment), it is a concern that the very low natural mortality associated with old fish, together with lack of catch, implies in the model a large “cryptic” biomass for which there is little or no direct evidence from fishery dependent or independent sources.

In the absence of data to suggest otherwise the assumptions on natural mortality are reasonable for assessment purposes. In the absence of data to which to fit it is hard to see progress being made on the issue but it is notable that in at least one case for which there is also a (much smaller) problem of fewer than expected older fish observed, hoki in New Zealand, where natural mortality at age has been fit, younger and older fish are estimated to have higher mortalities (e.g. Francis, 2007; 2008). The resulting “bathtub” mortality schedule makes biological sense with younger fish experiencing high mortality due to predation and older fish due to senescence.

Maturity: Limited information on sex specific and spatial variation in maturity is available. A summary of studies is provided in the Assessment Workshop report that suggests males are 50% mature as young as 1-2 years old whilst females are 50% mature at or around 3 years old. The limited information available does suggest a north-south difference, or possibly local scale variation, and it is a concern that for the Southern stock the maturity schedule from the Northern stock is used. Given the indicator used to frame management advice (sSPR) and the limited number of ages over which it is calculated for which actual data exist in the assessment, it is important to get as accurate a picture as possible of this important biological parameter. There is a need for more work in this respect.

### **Landings and Removals**

Generally, the Data and Assessment Workshop decisions on the use of landings and removals appear sound. However, two issues were of note.

The proportion of live-release fish has been increasing in the Northern and Southern fisheries but is particularly noticeable in the Southern region. The live-release proportion contributed by the Georgia and Florida recreational fisheries in 1989 (the new start year for the assessment, below) was of the order of ten per cent. It is now near 30 per cent (both these percentages assume eight per cent mortality). The survival of live-release fish, however, is poorly known. The age structure of the releases is also not well known. Generally there is increasing uncertainty in total removals and the structure of the removals, neither of which are fully captured by the model. (These changes were not readily apparent from the original reports but were clear from graphics presented during the meeting.)

In the original assessment (pre Review Workshop) Northern stock commercial discard data from three years (2004 to 2006) was used to “fill in” discards for the years 1999 to 2007. The average discard rate observed in the period 2004 to 2006 was used for this purpose. No discards were assigned for the period prior to 1999. This is problematic because it neglects to account for variability in discarding but especially because it creates a discontinuity in the removals series in 1999 at which point the discards account suddenly for about 20 per cent of total removals.

The Review Workshop discussed these issues at length and requested the assessment use discards for the whole period of the assessment. The use of the three year average rate was accepted although recommendations to improve discard sampling were made.

### **Proportions/catch at age**

There are a number of important issues relating to the proportions at age data used in the assessments.

First, given the nature of the assessment (age-based statistical model) and use of an indicator (sSPR) dependent on estimates at age of fishing mortality, the quality of the assessment and derived advice is critically dependent on the quality of the age-based “data”. It is essential therefore to ensure the best possible age information is used and that the model is not confronted by data that contain spurious or misleading information. It became clear in the Review Workshop presentations by the Assessment Team that sampling prior to 1989 was inadequate to allow a credible characterisation of proportions at age for either the Northern or Southern Red Drum fisheries. For the initial assessment, the proportions at age “data” had been created by using data across fisheries, regions and even years. During the review meeting it was agreed that only data from 1989 should be used.

Second, as noted above, there is a growing proportion of removals due to live-release fisheries (currently of the order of 30% in the Northern region and as much as 50% in the Southern). The age composition for the live-release catch is derived from size-frequencies from only North Carolina tagging programmes. This creates a particular problem for the Southern assessment for which a large and growing proportion of the fishery is poorly characterised. (The Review Panel made a recommendation in this respect, below).

Third, there is very low catch of fish greater than age 4 in either the Southern or Northern regions. Sampling these catches for size and age is poor (and fishery independent data are lacking). Given the maximum ages of fish in the two regions, the nature of the assessment and indicators used, this is of huge concern and is the cause of major uncertainty in the assessment (below).

### **Surveys**

It was difficult prior to the review to get a clear picture of where and when the many surveys take place, how they relate to the biological and fishery spatio-temporal characteristics, and whether or not they provide sufficient spatial coverage to provide stock level information. During the review presentations



this became clearer (I note a recommendation relating to this is made in the Review Panel Consensus Report). It emerged also during the workshop that proportions at age from the surveys were worked up using a common age-length key rather than being derived from survey-specific age sampling (again, the Review Panel made a recommendation in this respect).

For the Southern region the seven state surveys are scattered locally and conducted using five different approaches. Overall, however, at least for the estuarine areas, the surveys appear substantially to cover the range of the stock as assessed. That coverage, however, is not of all ages in all areas – age 1 fish are surveyed over all three states but only Florida has surveys aimed at ages 1, 2, and 3. Many surveys are of short duration and there are no clear signals from looking at all together. For the southern region there is a survey (SC longline) aimed at indexing older (6+) fish. Overall, it is hard to expect *a priori* that the surveys as a whole are likely to provide a clear index or suite of indices that would influence the stock assessment.

As seen during the review, the Northern region surveys provide a better spatial coverage of the stock as assessed, at least for ages 1, 2, and 3 inshore. The independent gillnet surveys of ages 1 and 2 are recent and relatively uninformative but the longer age 1 juvenile series appears more informative. Unfortunately, there is no index of older fish.

It emerged during the review meeting that the annual survey indices had all been presented to the assessment model as geometric means. All surveys are of random stratified design and the appropriate index would be the arithmetic mean. This seemed to have been a simple error on the part of the Data and Assessment Teams with the assessment model further log-transforming the supplied indices. During the Review Workshop the Assessment Team recalculated the arithmetic indices for use in final assessment runs (as will be reported in the Addendum and reported in the Review Panel Consensus report).

### **Tagging Information**

Tagging data exist for the Northern region Red Drum only, not for the Southern. The review did not include specific discussion on the tagging program design and analysis (no specific presentation was made). It is of concern that the tagging data result from an un-designed program, have a low return rate and that biological sampling is poor. On the plus side, the program has run for many years and is extensive. This is especially so as the fishing mortality estimates derived from the program drive the Northern rd Drum assessment.

The Northern stock assessment does not converge unless fishing mortality rates at age derived from the tagging study are used. Indeed, there is considerable similarity between those input fishing mortality rates and the assessment estimates. In other words, the assessment is dominated by the tagging analysis. However, using the tagging data in this way is not optimal (and may even be inconsistent given e.g. different natural mortality assumptions in the tagging analysis and stock assessment). It would be preferable to include the tagging data directly in the assessment and let the model estimate fishing

mortality at age, by year, using all data and all other assumptions in a consistent framework. This would allow a better characterisation of uncertainty associated with the fishing mortality (and other) estimates.

2. Evaluate the adequacy, appropriateness, and application of methods used to assess the stock. *(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 model used was the same for both Southern and Northern Red Drum assessments. In both cases a statistical catch-at-age (SCAA) model was used, implemented using AD-Model Builder (ADMB). Full ADMB code and all data files were included in the Assessment Workshop Report and were available for the Review Workshop.

The model estimates numbers-at-age in the starting year (1982 in the presented assessment but 1989 in the revised assessment) and numbers at age 1 in all years. The model projects forward from these starting numbers, accounting for natural mortality-at-age (an input) and fishing mortality-at-age (the product of internally estimated separable age (selectivity) and year effects for each fishery). Selectivity was estimated by age (i.e. not using a parametric form). Catchability by fleet is also estimated.

For both regions, the model was fit to commercial landings and proportions-at-age, and survey indices. For the Northern region, in addition, tagging-derived estimates of annual fishing mortality-at-age were presented to the model. Error structures assumed for all model components were log-normal except for the proportions-at age data for which a multinomial likelihood was assumed.

Given the data available, including highly uncertain catch-at-age due to increasing live-release capture, incomplete commercial discard sampling, and restricted biological sampling (see ToR 1 comments on all of these) the use of a SCAA model is not just appropriate, it is necessary. The use of ADMB to implement the SCAA allows relatively straightforward investigation of model assumptions, data set influence, error structure, weighting options, etc. It was clear during the workshop that the approach taken allowed good prior review of the model implementation and flexible model running during the meeting.

Points to note include that prior to the workshop CIE reviewer Gibson noticed a coding error relating to the way in which natural mortality was accounted for prior to surveys and CIE reviewer Hall noticed that an input vector for one survey was incorrectly ordered. These errors were corrected prior to the review meeting.

Changes to the model implementation made during the Review Workshop include starting from 1989 (as explained under ToR1) and for the Northern stock including a commercial discard component for the whole time series (again, as outlined in ToR 1).

During the review meeting, using standard diagnostics and additional diagnostics (e.g. graphical presentations on fits to proportions at age and post-convergence MCMC) the model was well explored to choose weights, to investigate sensitivity to a range of factors and to try to improve fits generally.

Following exploration, one modification made was to the selectivity estimation procedure. The Assessment team had reasonably tried to estimate selectivity at each age rather than using a parametric form (which would be more usual). However, the original presented model used assumed selectivity multipliers relative to age 3 for ages 4 and 5. For the final assessment and sensitivity runs the age 4 and 5 multipliers were estimated.

The weights chosen for the final Southern and Northern region model fits were those outlined in the Assessment Workshop Report (1.0 for all data except age composition which was down-weighted using a weight of 0.01). However, final model configurations were only agreed late in the meeting and it would have been ideal to explore weighting schemes more fully for both stock assessments. Although this would be a good thing to do in principal, I am not convinced it would make a difference to the general and caveated conclusions reached in Terms of reference 3 and 4. I agree, however, with the recommendation at Term of Reference 8 on the need for exploration of iterative re-weighting to better define weighting contributions.

Despite attempts to investigate and improve fits, a number of persistent problems remain (see ToR 2)

Overall, given time and data available, I am comfortable that the assessments are the best available. I am also comfortable that within the management context for the stocks the assessments can be accepted and used to inform management. I would be less comfortable about accepting the assessments if the management regime were formally requiring calculation of specific indicators and using pre-determined benchmarks. Generally, I consider the assessments to be well conducted and sufficient to allow constrained advice to be given, but not sufficient to be used for more formal management advice necessary, for example, to underpin TAC advice.

3. [Recommend appropriate estimates of stock abundance, biomass, and exploitation.](#)  
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For the Northern stock it is problematic that the model fit and estimates are driven primarily by the tagging derived fishing mortality estimates. If the tagging derived estimates are not used the model does not converge. As noted in ToR 1, the proper way to incorporate the tagging data would be to integrate the tagging model directly in to the SCAA in order that uncertainty be carried forward through the full assessment. The current assessment does not properly characterize uncertainty in fishing mortality estimates (nor therefore in sSPR estimates). However, anchoring of the assessment is also good in that the estimates are largely insensitive to a wide range of explored assumptions and variations in data inputs. Problems with the assessment include that the estimated starting size of the plus group is too large compared with the numbers of younger fish, and there are persistent age-specific trends and poor fits to proportions at age data

Nevertheless, the model appears to characterize age one to three dynamics reasonably well. Older age groups are not well estimated.

Recruitment (numbers at age one) has varied about eightfold and without trend since 1989 (see Figure 1). Abundance of age 2 and 3 (Figure 2) Red Drum increased until 1990 – 2000 since when it has fluctuated without obvious trend. The increase in numbers at age 2 and 3 appears to correspond to the decrease in exploitation rate estimated in the early 1990s (Figure 3).

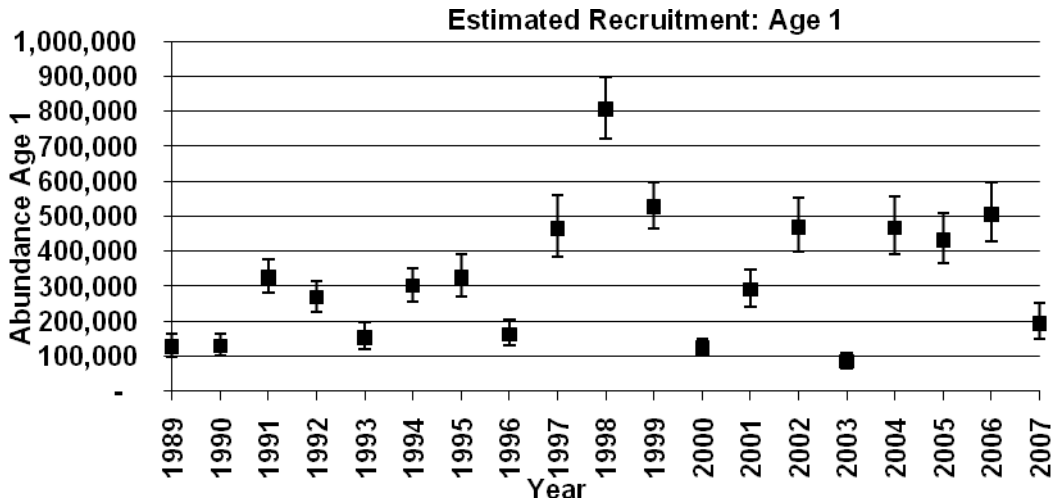


Figure 1. Age 1 numbers (recruitment) for Northern Red Drum as estimated in the revised assessment

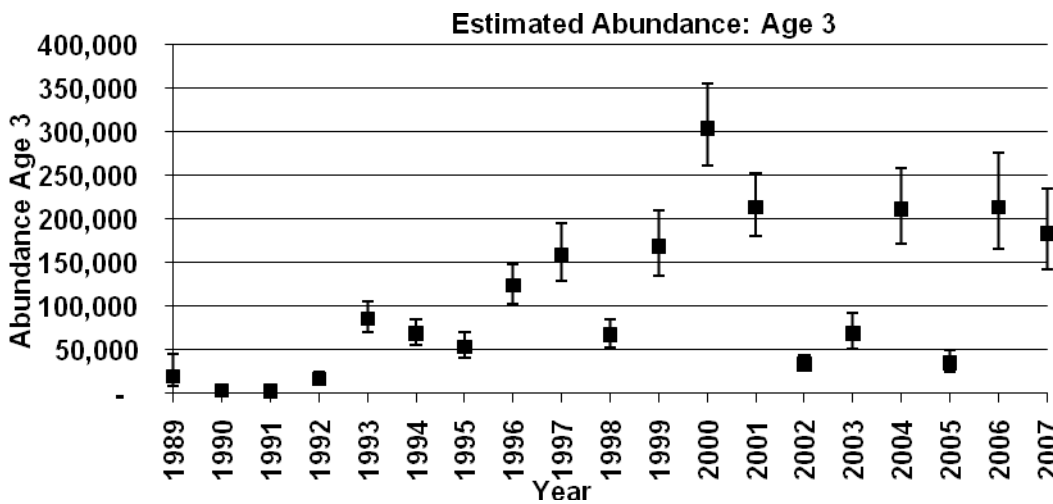


Figure 2. Age 3 numbers for Northern Red Drum as estimated in the revised assessment

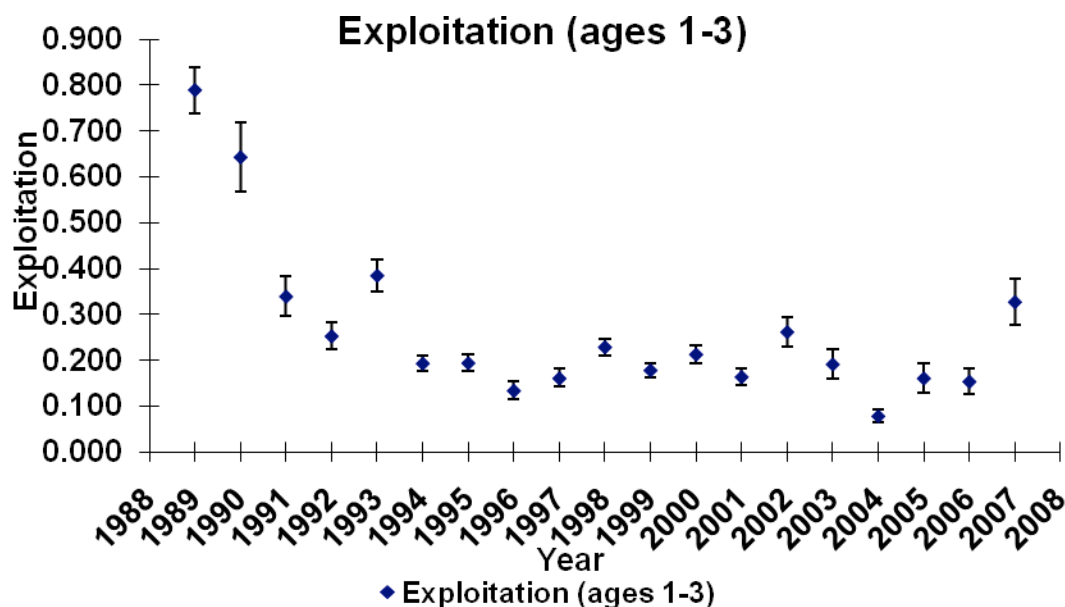


Figure 3. Estimated annual exploitation for Northern stock of Red Drum

### Southern Stock

Problems with the assessment include persistent age-specific trends and poor fits to proportions at age data, and high sensitivity to assumptions on selectivity. These were investigated during the review meeting and its high sensitivity to initial condition was found.

For the Southern stock, standard errors on some model estimates are very large (reasonably given the data) and there is a problem in that the estimated starting-year (1989) numbers of older fish are poorly estimated.

Nevertheless, the model appears to characterize trends in age one to three dynamics reasonably well. Older age groups are not well estimated. There is very high uncertainty in fishing mortality estimates (and therefore in sSPR estimates).

It is important to stress that the Review Panel considered that the assessment could only provide guidance on trends in exploitation and abundance (and sSPR). If the Review Panel had not reached this agreement I would have argued not to accept the assessment. Overall, poor convergence, high estimates of uncertainty within model runs, and problematic retrospective analyses indicate the need for more exploration of the data and model.

Recruitment (numbers at age one) has varied without trend since 1989 (see Figure 4). Numbers of age 2 and 3 (Figure 5) Red Drum increased until 1990 – 2000 since when they have fluctuated without obvious trend. The increase in numbers at age 2 and 3 appears to correspond to the decrease in exploitation rate estimated in the early 1990s (Figure 6). Though masked by the wide error bars (Figure 6) exploitation rate is estimated to have increased somewhat since the early 1990s.



Figure 4. Age 1 numbers (recruitment) for Southern Red Drum as estimated in the revised assessment

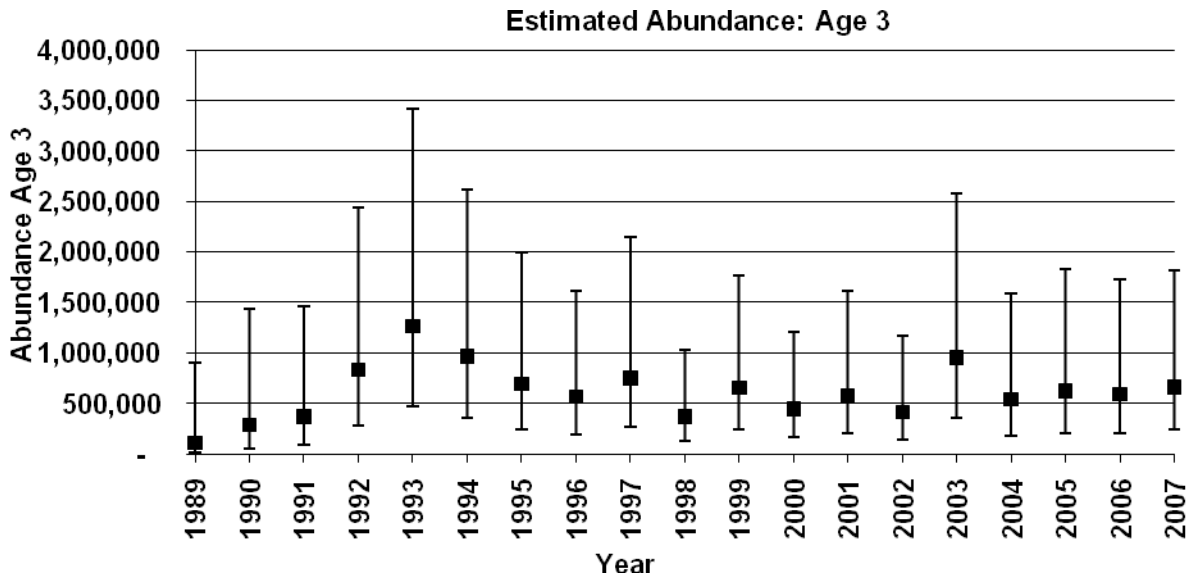


Figure 5. Age 3 numbers for Southern Red Drum as estimated in the revised assessment

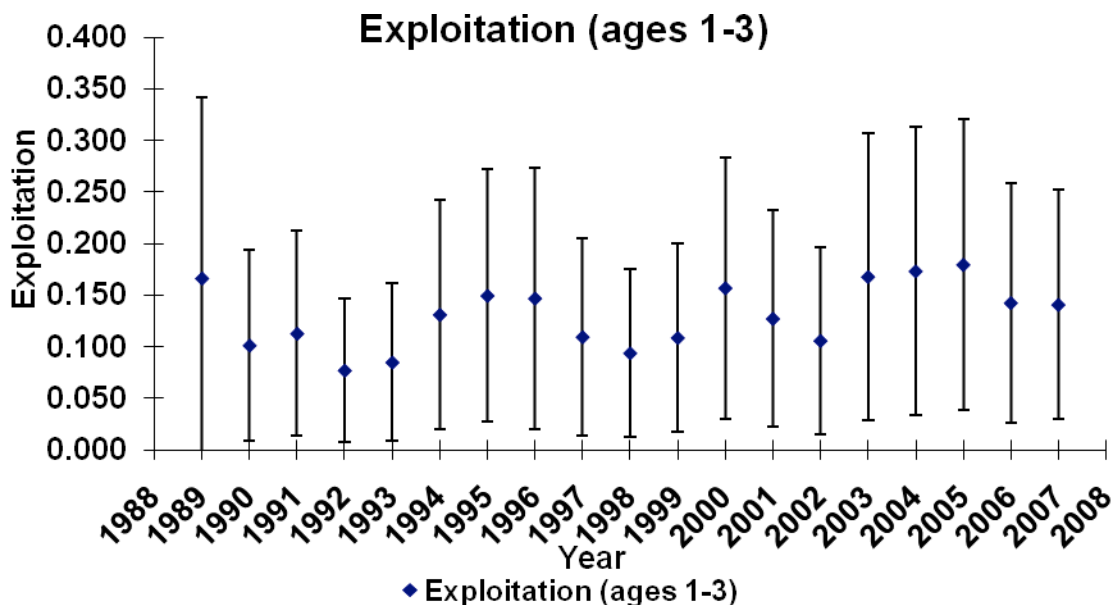


Figure 6. Estimated annual exploitation for Southern stock of Red Drum

- Evaluate the methods used to estimate population benchmarks and management parameters (e.g., static spawning potential ratio); provide estimated values for management benchmarks, and declarations of stock status. Evaluate the population metric used by managers to determine the stock status and, if appropriate, recommend alternative measures.  
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As described at ToR 2 and 3, for both assessments there is a “cryptic biomass” problem with estimated numbers at age 7+ very large but with no direct evidence (data). For both stocks, age 4-6 abundances are also poorly estimated. Overall, for ages 4+ the assessments are therefore not informative. This is problematic when defining appropriate indicators and benchmarks, especially with maximum observed ages of over 60 years in the Northern stock and approaching 40 years in the Southern stock.

Despite this difficulty, and although there is also a sensitivity in the Southern stock assessment to estimated selectivity, it is reasonable to use static SPR (sSPR) as a simple indicator of fishing pressure. However, it is reasonable to consider whether or not the standard benchmarks for sSPR (a 30% threshold and 40% target) are appropriate given the life history characteristics of Red Drum, especially the maximum age. Longer living teleost fish are generally lower productivity species and on that basis higher benchmarks would be warranted. For Red Drum, however, the fast growth, early maturity and high fecundity all suggest that the standard benchmarks are reasonable. Although it is reasonable to use sSPR and standard benchmarks, especially for the Southern stock the errors and variability in annual fishing mortality-at-age estimates are such that it provides more comfort to use a running average of sSPR to compare against the benchmarks and guide management. A running average of three years is a

reasonable compromise to track fast changes but smooth variability in the estimates whilst providing advice relevant to the timeframe of the assessment.

In the previous assessment sSPR (annual) and an escapement indicator were used. These were again presented in the Assessment Workshop Report. However, sSPR is no more than a convenient translation of fishing mortality-at-age to a scale which is standardized and for benchmarks have been investigated and accepted. Escapement is just another translation of the same estimated fishing mortalities but without any clarity as to how to choose benchmarks. Presenting escapement therefore seems both redundant but also less useful than sSPR.

The sSPR indicators presented (below) are measures of “overfishing”. It is common also to present measures of whether or not a stock is “overfished”. In the case of Atlantic Red Drum this is currently not possible because of the large uncertainty as to the numbers of age 4 –7<sup>+</sup> fish.

*NOTE: I have tidied up some of the following text but have retained text written for the Review Panel Consensus Report when making declarations as to stock status. I am content at the Review Panel conclusions and my capturing of them and do not wish inadvertently to introduce a different interpretation.*

### **Northern stock benchmarks and status**

As described above, the fishing mortality-at-age estimates for the northern stock are anchored by the tagging data and are therefore tightly estimated (see Figure 3) and not highly sensitive to model assumptions. As sSPR is a translation of fishing mortality at age, sSPR is also tightly estimated.

The distribution of sSPR<sub>2007</sub> (estimated annual sSPR averaged over 2005-2007) is centered at about 45% with the lower 95% confidence interval at or above 40% sSPR (Figure 7). The average sSPR has been above the threshold (30%) since 1994 and with the exception of one year (2002) has been at or above the target (40%) since 1996 (Figure 8). Fishing pressure appears to be stable. The indicator of fishing pressure, average sSPR, is therefore above the threshold overfishing benchmark with high probability and thus the stock is likely not subject to overfishing. The average sSPR is also likely above the target benchmark.

**North**

**South**

*Figure 7. Posterior distributions of average (2005-2007) sSPR from MCMC analyses of the base case assessment models. For comparison, vertical lines show the asymptotic estimates of the mean +/- 2 s.e.*



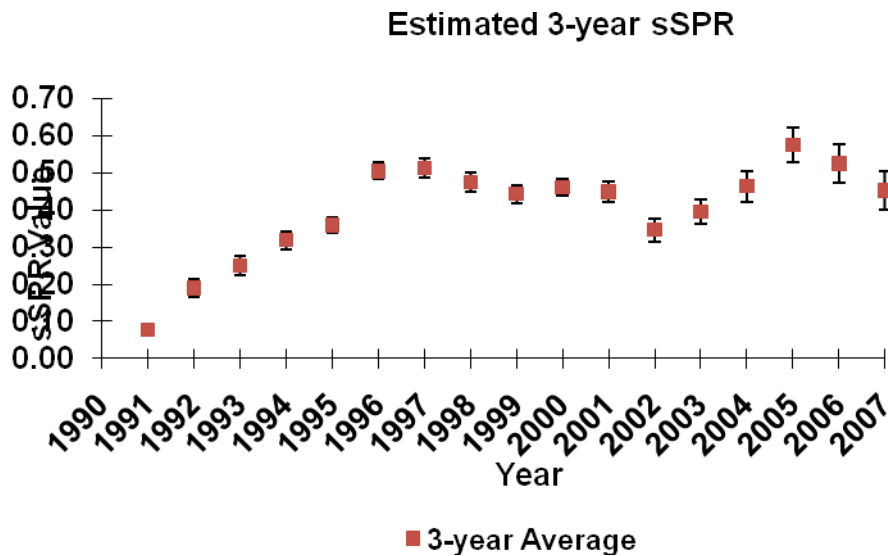


Figure 8. Average sSPR (3-year running mean) as estimated for Northern stock of Atlantic red Drum

### Southern stock benchmarks and status

The estimates of annual and average sSPR from the southern stock assessment are highly sensitive to the model inputs and assumptions (see ToR 2,3 and 5). Because of sensitivity to estimated selectivity any model run for the southern stock can reflect relative trends in sSPR but not absolute trends. Interpretation of the three-year mean sSPR needs to be treated with care.

The distribution of  $sSPR_{2007}$  (estimated annual sSPR averaged over 2005-2007) is very wide, ranging from about 20% to 80% (Figure 7). However, the majority of the probability is above 30% sSPR. Retrospective analyses of the average sSPR (see Term of Reference 5) suggest that whilst more work is needed to make definitive statements about sSPR, it is likely that the average sSPR in 2007 is above 30%. Thus, the indicator of fishing pressure, average sSPR, is uncertain but likely above the accepted threshold benchmark. The stock is therefore likely not subject to overfishing at this time. Due to the uncertainties, it is not possible to state status in relation to the fishing pressure target benchmark.

Relative trends in fishing mortality (slowly trending upwards since 1991) and average sSPR (slowly trending downwards since 1991) are apparent (Figure 9). Fishing pressure, therefore, appears to be slowly increasing.

### Estimated 3-year sSPR

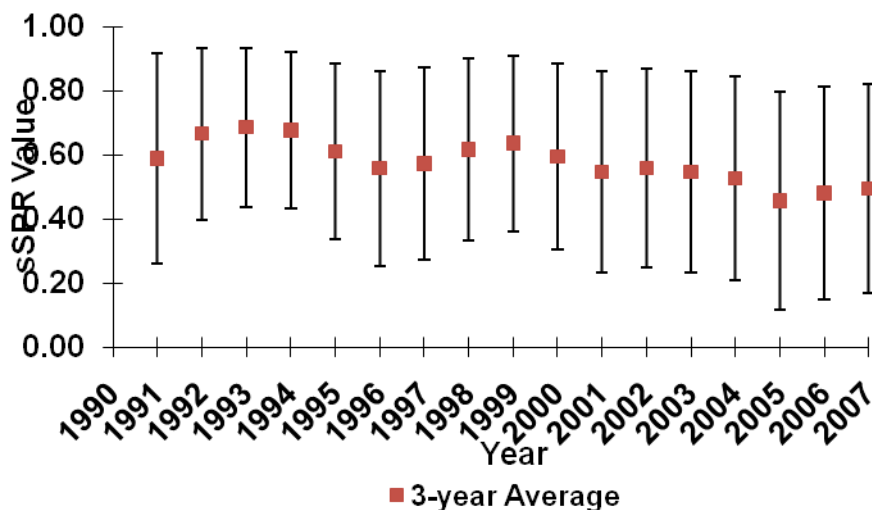


Figure 8. Average sSPR (3-year running mean) as estimated for Southern stock of Atlantic red Drum

- Evaluate the adequacy, appropriateness, and application of methods used to characterize uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters. Ensure that the implications of uncertainty in technical conclusions are clearly stated. *(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 statistical catch at age models used for both stock assessments are complex, involving multiple, potentially conflicting, data sets and estimation of the order of 130 parameters for the Northern stock and 160 for the Southern stock. As ever, fitting such models necessitates a careful consideration of diagnostics to investigate model adequacy, tensions between data sets, etc. Standard diagnostics include likelihood components, residual plots, likelihood profiles, etc, which are considered under alternative weighting schemes, with and without individual datasets, and with variations in assumptions. Together, the general model fitting approach is to find the best balance of inputs, minimizing the negative log-likelihood overall but with consideration of the individual components, and characterizing uncertainty both by looking at standard errors generated within the model fit and at estimates (and errors) across model fits. In other words, there is a need to characterize uncertainty due to observation error, process error and structural error.

The Assessment Workshop Report presented a range of diagnostics and sensitivity tests to explore the assessment models and choose final model configurations and weighting. Much of the Review Workshop was taken up by further investigation which was aided by more detailed and graphical diagnostics for residual patterns (in proportions at age through time) and the use of MCMC to both produce estimates of posterior distributions of parameters and derived parameters (e.g. sSPR) and to explore model convergence. Methods used to explore uncertainty were appropriate, adequate and

reasonably applied. I am satisfied that the exploration was thorough and that the new base cases chosen are appropriate.

From explorations during the Review Workshop (and recognized by the assessment Workshop) it is clear that the way selectivity is estimated is a major source of uncertainty. The Assessment workshop used the model to estimate selectivity at ages 1, 2 and 3 and applied constant multipliers (of 0.10 and 0.05) to the age 3 selectivity for ages 4 and 5 (the age 5 selectivity then applied also to age 6+). Exploration of alternative values for the constants and of estimating all age 1 to 5 selectivities separately (again setting age 6+ selectivity to that age 5) showed that the models for both Northern and Southern Red Drum are highly sensitive to the way selectivity is treated. The best fitting model for both regions were those that estimated selectivity at each age with no constants assumed. These were chosen as new base case assessments.

Sensitivity to other assumptions (natural mortality and live-release mortality) was appropriately conducted with the new model structure (selectivity estimation of ages 1-5 separately, with the Review Workshop agreed year range, from 1989, and the new discard series). Regardless of model configuration, weighting, etc, the pattern of proportion at age residuals suggests these data are poorly fit.

An important sensitivity for the Northern region stock assessment is to exclude the tagging “data” – that is, the fishing mortality-at-age estimates from the tagging analyses. As previously noted by the Assessment Workshop, exclusion of these data resulted in a model that did not converge. Lack of convergence remains a problem even with the other model changes made during the Review workshop. The Northern Red Drum assessment is clearly dominated by the fishing mortality inputs. As noted above there was not time in the review meeting to look in detail at the tagging analyses – that analysis dominates the assessment and the characterization of uncertainty relating to fishing mortality, and hence sSPR. It is highly likely that the characterization of uncertainty for Northern red Drum sSPR is too tight. The proper way to characterize the uncertainty would be to integrate the tagging data directly in the SCAA (see ToR 9).

Retrospective analyses were conducted for both stocks. For the Northern Red Drum assessment it is worrying that even with the dominant tagging-derived fishing mortalities used as input data, one run (for 2005) did not converge. In any case, the analysis is effectively meaningless because the fishing mortality inputs are not changed as the assessment is stepped back in time. For meaningful retrospective analysis the tagging data would ideally be integrated in to the SCAA or, at a minimum, a separate retrospective analysis of the tagging analysis could be conducted.

Retrospective analyses for the Southern stock produced widely varying absolute levels of abundance and fishing mortality although the trends were unaffected. As for the Northern assessments, retrospective analyses did not all converge. Explorations inspired by the retrospective analyses during the review meeting (dropping surveys, changing starting conditions for minimization, changing the initial condition configuration) did not help to remove the strong retrospective patterns which, together with fragile convergence, indicate a lack of model robustness. The problems with the Southern stock assessment retrospective patterns could be used to dismiss the assessment. However, I am content to maintain the Review Panel consensus that the assessment can be used to comment on sSPR trends and likely relationship to the sSPR threshold.

Overall, I am comfortable that uncertainty is reasonably reflected in comments at Terms of reference 3 and 4 and, in particular, that comments on stock status in Term of Reference 4 are appropriate.

6. Ensure that stock assessment results are clearly and accurately presented in the Stock Assessment Report and that reported results are consistent with Review Panel recommendations.  
*(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.)*

This Term of Reference is being dealt with by the preparation of an Addendum to the Assessment Report as requested by the Review Panel. At the time of writing the Addendum is due to be available in time for completion of the Review Panel Consensus Report by 2<sup>nd</sup> October (two weeks after the due date of this CIE report). The chair of the Review Panel has worked with the SEDAR coordinator since to the Review Workshop to compile the stock assessment report and to ensure that the Term of Reference is met.

[Late comment: the Addendum was circulated on the afternoon of 15<sup>th</sup> September, New Zealand time. This is good timing for completion of the Review Panel Consensus Report. The Review Panel has also engaged in e-mail discussion on the addendum and its relationship to the Review Panel Consensus Report.]

7. Evaluate the SEDAR Process. Identify any Terms of Reference which were inadequately addressed by the Data or Assessment Workshops; identify any additional information or assistance which will improve Review Workshops; suggest improvements or identify aspects requiring clarification.

The Review Panel reviewed the Data and Assessment Workshop reports with respect to how well the groups had addressed their Terms of Reference. In general, the Review Panel considered that Terms of reference had been met. In some cases, comments and suggestions were made to provide guidance/assistance. Listed below are brief comments on the specific Terms of Reference. These are simplifications or brief expansions of comments in the Review Panel Consensus Report.

#### **Terms of Reference of Data Workshop**

*Characterize stock structure and develop a unit stock definition. Provide a map of species and stock distribution(s)*

A better (graphical) description of habitat and Red Drum distribution would be helpful. The stock split for Red Drum is largely driven by the habitat distribution and presumed unsuitability for Red Drum between the Carolinas. Amongst other things, maps of stock range presented during the review could usefully be presented.

*Tabulate available life history information (e.g., age, growth, natural mortality, reproductive characteristics, discard mortality rates); provide appropriate models to describe natural mortality, growth, maturation, and fecundity by age, sex, or length as applicable; and provide appropriate relations between length and weight and between various length measures; evaluate the adequacy of available life-history information for input into stock assessments and recommend life history information for use in population modeling*

Better description of data used could have been made (although data inputs were tabulated). More extensive description and analysis of the maturity data would have been useful, especially with respect to spatial variation. Limited data clearly exist as evidenced from the brief description in the Data Workshop Report.

*Evaluate all available tag/recapture data for use in estimating mortality rates, both natural and fishing, within appropriate strata (e.g., age, size classes, areas); estimate tag/recapture-based selectivity vectors for fishery units, by length or age.*

For the Northern Red Drum assessment the fishing mortality estimates derived from the time series of tagging data are overwhelmingly influential. It was frustrating that the Data Workshop (nor the Assessment Workshop) Report did not cover detailed analyses of these data. One issue that arose in the stock assessment was the inability meaningfully to do retrospective analyses for the Northern stock because the tagging data were not integrated in to the assessment. Integrating tagging data directly in to the assessment is most appropriate but if tagging data-derived fishing mortality estimates are to be used in the assessment then at a minimum, to allow retrospective assessments to be conducted, the tagging analyses themselves should be subject to retrospective analysis to provide appropriate fishing mortality inputs.

*Consider relevant fishery dependent and independent data sources to develop measures of population abundance; document all programs used to develop indices; address program objectives, methods, coverage, sampling intensity, and other relevant characteristics; provide maps of survey coverage; develop relative abundance indices by appropriate strata (e.g., age, size, area, and fishery); provide measures of precision; evaluate the degree to which available indices represent fishery and population conditions; evaluate stock enhancement effects on indices*

The ToR was covered. However, better graphical presentation of the spatial coverage of all surveys relative to the stock and fishery would be useful. Similarly, a (Gant) chart of survey timing, major biological processes (spawning) and fishery activity would be useful. I note that this is very much a view from an outsider looking for presentation of information to provide a quick overview – to those involved in the fisheries an understanding is built up over time that obviates such a need.

*Characterize catch for each fishery unit (e.g., commercial hook and line, recreational, commercial gill net), including both landings and discard removals, in pounds and number; discuss the adequacy of available data for accurately characterizing harvest and discard by species and fishery unit; for estimated catch provide measures of precision; provide all available data on the length and age distributions of the catch, both harvest and discard; provide figures of the amount of fishery effort and harvest; also, provide a timeline of all fishery regulations relevant to the above fishery units, such as size limits, caps, and gear restrictions.*

Similar to comments above on surveys, whilst the ToR was addressed, it would have been useful to have simple overviews to allow a quick understanding. Examples raised during the review meeting (and responded to usefully) include a) graphs showing the percentage of the catch for each stock, through time, based on observation and assumption, and b) a (Gant) chart of regulations through time to be used in interpreting changes in estimates of selectivity.

*Provide recommendations for future research in areas such as sampling, fishery monitoring, and stock assessment; evaluate sampling intensity by sector (fleet), area, and season.*

No comment. This was attended to as required.

*Develop a spreadsheet of potential assessment model input data that incorporates the decisions and recommendations of the Data Workshop. Review and approve the contents of the input spreadsheet within 6 weeks prior to the Assessment Workshop*

No comment. This was attended to as required.

### **Terms of Reference of Assessment Workshop**

*Review any changes in data following the data workshop, any completed analyses suggested by the data workshop; summarize data as used in each assessment model; provide justification for any deviations from Data Workshop recommendations.*

No comment. This was attended to as required.

*Develop population assessment models that are compatible with available data and recommend which model and configuration is deemed most reliable or useful for providing advice relative to current management metric (static SPR levels); document all input data, assumptions, and equations; document model code in an AW working paper; if chosen assessment model differs from that used previously (Vaughan and Carmichael 2000) include a continuity case run of that model to determine, as best as possible, the effect of changing assessment models.*

No comment. This was attended to as required.

*Provide estimates of stock population parameters (fishing mortality, abundance, biomass, selectivity, stock-recruitment relationship, discard removals, etc.) by age and other relevant categorizations (i.e., fleet or sector); include representative measures of precision for parameter estimates.*

No comment. This was attended to as required.

*Characterize scientific uncertainty in the assessment and estimated values, considering components such as input data sources, data assumptions, modeling approach, and model configuration; provide appropriate measures of model performance, reliability, and goodness of fit.*

No comment. This was attended to as required.

*Provide yield-per-recruit, spawner-per-recruit, and stock-recruitment evaluations, including figures and tables of complete parameters.*

This was attended to as required. Per recruit calculations were done and graphics provided (to be updated in the Assessment Workshop Addendum). Due to the cryptic biomass problem, spawning stock is effectively undefined. It would not have been meaningful to estimate stock-recruit relationships/parameters.

*Provide estimates of spawning potential ratio consistent with the goal of Amendment 2 to the Interstate FMP for Red Drum (i.e., to achieve and maintain optimum yield for the Atlantic coast red drum fishery as the amount of harvest that can be taken while maintaining the Static Spawning Potential Ratio at or above 40%).*

No comment. This was attended to as required.

*Evaluate the impacts of past and current management actions on the stock, with emphasis on determining progress toward stated management goals and identifying possible unintended fishery or population effects.*

No comment. This was attended to as required.

*Consider the data workshop research recommendations; provide additional recommendations for future research and data collection (field and assessment); be as specific as possible in describing sampling design and sampling intensity.*

No comment. This was attended to as required.

*Prepare an accessible, documented, labeled, and formatted spreadsheet containing all model parameter estimates and all relevant population information resulting from model estimates and any projection and simulation exercises. Include all data included in assessment report tables, all data that support assessment workshop figures, and those tables required for the summary report.*

No comment. This was attended to as required.

*Complete the Assessment Workshop Report (Section III of the SEDAR Stock Assessment Report), prepare a first draft of the Summary Report, and develop a list of tasks to be completed following the workshop.*

No comment. This was attended to as required.

[8. Review the research recommendations provided by the Data and Assessment workshops and make any additional recommendations warranted. Clearly indicate the research and monitoring needs that may appreciably improve the reliability of future assessments. Recommend an appropriate interval for the next assessment.](#)

The Review Panel reviewed and commented on all research recommendations of the Data and Assessment Workshops, as well as making its own recommendations as required in the ToR. In general, the Data Workshop recommendations appear to be a rather extensive “shopping list” for continued or expanded work and poorly directed at prioritizing work for assessment and management benefits. Many of the Data workshop recommendations were in fact statements rather than active recommendations. If this is common practice amongst working groups, it would be useful to give clear guidance on the making of recommendations which should be focused on making a clear difference to assessment and management and worded so as to be clear as to their intent.

#### Recommendations of Data Workshop

##### *Life History Work Group*

*The ASMFC-approved multi-state sampling program of adult Atlantic red drum from Florida to Virginia represents a unique opportunity to obtain critical comprehensive data. Specifically relevant to the genetic population structure evaluation is the concurrent aging of the fish which will allow for the determination if any detected genetic structure is the result of differential age composition of the reproductive stock, particularly in light of the proposed temporal genetic heterogeneity (Chapman et al. 2002) and suspected age structure differences from the GoM. The combined age-specific life history and genetic knowledge will allow for greater interpretive capabilities of the genetic data as well as provide the needed life history information necessary for an accurate estimate of effective population sizes for Atlantic red drum*

There is limited value in this work for stock assessment and management purposes. There is no doubt the work would be interesting and could lead to more complex hypotheses about stock relationships and dynamics. The extent to which these might be of use in assessment and management is, however, questionable.

*Updated maturity schedules and fecundity information for adult Atlantic red drum from Florida to Virginia is lacking; just as there are suspected age structure differences between the Atlantic and GoM stocks, maturity schedules and fecundity estimates are also suspected to be different in the Atlantic stock.*

Agreed.

*Further study is needed to determine discard mortality estimates for the Atlantic coast, both for recreational and commercial gears. Additionally, discard estimates should examine the impact of slot-size limit management and explore regulatory discard impacts due to high-grading.*

Agreed but note that the recommendation appears to suggest one-off studies. The requirement is for continuous sampling at least for a period of time to establish variability in discarding. If variability is not great, future sampling could be periodic.

*Dedicated northern and southern region larval and juvenile recruitment indices, as well as a Virginia adult recruitment index are recommended to provide more informative trends for future assessment processes*

Larval surveys are likely to be difficult to interpret, requiring considerable ancillary data and assumptions on larval/juvenile survival, fecundity and perhaps spatial dynamics to convert results to spawning biomass indices. Not supported.

*Continued cooperation between state ageing labs, such as the October 2008 red drum ageing workshop, to provide consistent age verification between labs; additionally, otolith microchemistry should be approached to look at state differences between regions for stock differentiation*

Agreed but note this should be standard practice. It is a concern if this is not the case. Otolith microchemistry work would be interesting not to look at “state differences for ... stock differentiation” but rather to investigate possible means of examining estuarine-offshore linkages.

*Identification of juvenile and adult habitat requirements and loss rates would provide more informative information for future management planning*

This would potentially be of value for fishery management more than for stock assessment per se.

#### *Commercial Work Group*

*Continued and expanded observer coverage for the NC and VA gill net fisheries (5-10% coverage)*

This recommendation is generic. It needs to be more focused on the specific purpose of expanded observer coverage and to justify the target coverage. See also the comments above on discard sampling.

*Expand observer coverage to include other gears of concern (i.e. haul seine, pound net, trawls).*



Agreed in general but more specificity is needed with clarity as to how focus on particular areas/fisheries would be beneficial in assessment/management terms.

*Expand biostatistical sampling (ages and lengths) to better cover all statistical strata (gears/states - principally NC and VA) – more ages proportional to lengths, preferably otoliths*

As above, this needs to be more specific and to justify more focused recommendations in terms of benefits to the assessments and management outcomes.

#### *Recreational Work Group*

*Have experts in survey design and implementation review historical data*

This is unclear. No comment.

*We support inclusion of volunteer logbook data for length*

Is this a recommendation?

#### *Indices Work Group*

*Adult sampling with the goal of small population estimates or density estimates through tag-recapture methods to evaluate trends in abundance over time. Secondly, this would help with delineate the stock distribution and mixing rates.*

This is unclear. No comment.

*Suggests a workshop on adaptive sampling techniques as applied to wildlife populations as well as other techniques that can be applied to aggregated species.*

*And*

*Encourage that States continue on with current surveys, and with current methodologies. If sampling methodologies change, the workgroup suggests some consistency exist between the original and new methodologies.*

For both of these recommendations the Review Panel noted its own recommendation relating to broader survey program needs.

*Age structure established for surveys internally rather through external age-length keys*

Agreed. This is a surprising recommendation in that it implies “internal” data are not currently used. This is not best practice and certainly needs to be improved.

#### *Recommendations of the Assessment Workshop*

*Determine batch fecundity estimates of red drum*

It is not clear why this recommendation is made and hard to see what benefit would be gained in stock assessments.

*Conduct experiments using logbooks etc. to develop estimates of the B2 catch in both the North and South regions*

This is already covered by the data Workshop.

*Further identify the selectivity of age classes of the B2 catch in both regions*

And

*Determine if existing and historic recreational tagging programs can be used to evaluate better B2 selectivities*

Agreed. This is also covered in the review Panel recommendations (below).

#### *Recommendations of Review Workshop*

The Review Panel made the following consensus recommendations during the Review Workshop. The final RW Consensus Report may modify these recommendations but they are used here as a basis for comment. Additional comment is made where appropriate.

*The Review Panel recommends the study of the broader survey program needs to better identify gaps in current activities and potential expansion / refocusing of current surveys. At present, it is difficult to discern where improvements to the overall survey program could be made. This study could be undertaken through simulation work to evaluate how proposed new survey activities would better inform stock assessment and management*

This relates to comments in Term of Reference 1 on the need for better information on the spatial and temporal coverage of surveys in relation to biological and fishery characteristics. In addition, simulation work to identify how survey changes/additions could add most value to the assessment and management are envisaged.

*The Review Panel notes the gap in synoptic indices of adult abundance and age composition which are critical to improvements in the red drum stock assessments. It recommends that a survey to provide indices of abundance at age for ages 4 and older be established but in the context of the previous recommendation [That is, within the context of an evaluation of all survey contributions to the assessment]. During the RW, mention was made of apparent gaps in the size frequencies i.e. red drum present in these distributions at smaller sizes and again at larger sizes but with fewer observations in between. The Review Panel recommends development of testable hypotheses on the biological basis of this apparent missing size frequency information. Survey activity could then be designed to challenge these hypotheses.*

*The Review Panel recommends that a comprehensive analysis of existing tagging data for use in the assessment models be undertaken and based upon this, there be consideration of additional tagging activities, based upon a statistical design for both the northern and southern stocks to provide age-based estimates of population abundance and fishing mortality. This activity could also provide estimates of movement which can confound estimation of stock parameters. It would be worthwhile to consider State – Space methods as has been recently employed to estimate fishing mortality and migration rates of some New England groundfish stocks (Miller and Andersen, 2008).*

*Further on the tagging data, the Review Panel strongly recommends integration of the tagging analysis into the assessment models, thereby ensuring that constants and errors derived in the model are appropriately treated*

*throughout the analysis. This would ensure that the tagging data is appropriately weighted in the assessment model and is not afforded undue weighting compared to the other information*

This is a key recommendation. Currently, the use of externally derived estimates of fishing mortality drive the Northern stock assessment, errors are not properly estimated and the fitting does not properly weight data sources. The use of externally estimated fishing mortalities also negates the validity of any retrospective analyses.

*The Review Panel recommends exploration of iterative re-weighting to better define weighting for the contribution of each data set. The contribution of the survey indices to the negative log-likelihood calculated by the assessment model should be modified to allow for both the variance associated with sampling, i.e., related to the CVs calculated for the surveys, and an additional variance component due to “fluctuations in ... the fraction of the population present in the sites being surveyed” (Punt et al., 2002). An example is presented by Oliveira et al. (2007), who cite Butterworth et al. (1993). Essentially, the inclusion of this additional variance provides an iterative re-weighting of the survey indices and avoids the need for including an arbitrary, subjective, external weighting, such as that currently employed in the assessment model. A similar approach may need to be adopted for other components of the objective function if the observations are derived from samples that are not fully representative. The effective sample size that is currently employed when calculating the negative log-likelihood of the proportion-at-age data, i.e., the square root of the number of fish in the age-length key for the year or 2 if no age-length key was available for the year, should be compared with the value that is currently calculated in the ADMB implementation of the model using the method described by McAllister and Ianelli (1997, Appendix 2, Equation 2.5). Such a comparison might indicate whether the effective sample size currently used is appropriate. The Review Panel recommends exploration of assessment model formulations that fit modeled size frequencies, based upon age-based population dynamics to the size frequency observations. This would facilitate use of size frequency data when data for age / length keys are too sparse to reliably derive age composition*

*Possible inconsistencies among the various data sets that contribute to the objective function of the assessment model should be explored by plotting the likelihood profiles for each component across the ranges of feasible values for the parameters that represent the major axes of uncertainty. By examining the resulting plots, it is possible to identify the values of the parameters that minimize the negative log-likelihood of the different components, and thereby identify those parameters that most influence the values of the parameter estimates. Identification of inconsistencies among the data sets provides a focus for re-assessing the extent to which the inconsistent data sets are representative of the variables that they are intended to measure.*

*Convergence of the assessment models for the base, sensitivity and retrospective runs should be confirmed by “jittering” the initial parameter values and re-fitting the model a number of times, e.g. 100, then comparing the resulting parameter estimates and values of the objective function (e.g., Methot (2007)). Exploration of the consequences of “jittering” may also reveal whether the model converges to a region of parameter space in which the Hessian is positive definite, noting that, in several of the retrospective runs, the Hessian was found to be non-positive definite.*

*The Review Panel recommends exploration of use of estimates of fishing mortality directly from the tagging data (i.e. North) as the basis for stock assessment and guidance for fisheries management. Current stock assessments are undertaken every five years or so and involve the collection and synthesis of a wide arrange of data. The tagging program, as long as it is designed appropriately, can directly provide estimates of fishing mortality at a higher frequency than the current statistical catch at age (SCAA) formulations. It also has the benefit of having wide fishery visibility and support. Through a simulation exercise, such as Management Strategy Evaluation (MSE), the efficacy of using the tagging derived fishing mortality estimates between applications of the SCAA assessment could be explored. The use of the tagging information as the primary assessment tool to inform management decision rules could also be investigated.*

The Northern red Drum stock is apparently subject to slowly increasing fishing pressure. Although it is currently estimated not to be experiencing overfishing, a simple, direct, monitoring-decision tool as suggested here could provide a basis for more responsive management without the need for full stock assessment. This appears distinctly possible given the similarity between the assessment-derived estimates of fishing mortality and the direct estimates of fishing mortality from the tagging data analysis (notwithstanding the high tagging study-derived fishing mortality estimates for early years). The potential exists to use the direct estimates of fishing mortality to calculate sSPR.

*Recommend an appropriate interval for the next assessment*

Given current stock status as stated in term of Reference 4, and the need for improvements in data before meaningful new assessments can be performed, an interval of five years until the next assessment would seem appropriate. As noted above, for the Northern stock, if shorter-term advice is required, direct use of tagging data to inform changes in fishing pressure could be useful. Management Strategy Evaluation (MSE) could be used to investigate this possibility.

9. [Prepare a Peer Review Consensus 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 Consensus Report within 3 weeks of workshop conclusion.](#)

The Review Panel Consensus Summary is being prepared following the Review Meeting, based on extensive notes and agreements made during the review. The Review Panel Consensus Summary is being authored by all Review Panel Members with oversight from the Chair and is due to be submitted by 2<sup>nd</sup> October 2009. This is slightly delayed from the intended time but is necessary to accommodate preparation of an Addendum being prepared by Mike Murphy, the principal stock assessment analyst for Red Drum. The work to be reported in the addendum was specified during the review.

The Consensus Summary was outlined before the review meeting ended and should represent a clear consensus view on all issues. Together with the SEDAR appointed chair and ASMFC appointed member, CIE appointed reviewers have contributed major sections to the Summary Report. My primary role was construction of the section relating to Term of Reference 4.

## REFERENCES

- Francis, R.I.C.C. 2007 Assessment of hoki (*Macruronus novaezelandiae*) in 2006. Fisheries Assessment report 2007/15, New Zealand Ministry of Fisheries
- Francis, R.I.C.C. 2008 Assessment of hoki (*Macruronus novaezelandiae*) in 2007. Fisheries Assessment report 2008/4, New Zealand Ministry of Fisheries

## APPENDIX 1

### Bibliography of Material Provided for the Review

Extensive documentation was made available before and during the review using an ftp site. Access to all materials was straightforward both in advance and during the review. The Review Panel held two teleconferences in before the review meeting which led to requests for work and additional material being provided in advance of the review taking place.

A full list of materials made available in advance would run to several pages. The ftp site included all documents and reports from the separate Data Workshop and Assessment Workshop, including working papers and referenced publications.

The following initial presentations were made early during the Review Meeting and electronic versions distributed.

1. Red Drum Recreational and Commercial Input Data
2. Red Drum Southern Assessment
3. Red Drum Northern Assessment
4. Red Drum Survey Indices
5. Red Drum Life History

Further presentations and papers were made available in response to requests throughout the Review Meeting. The various spreadsheets, doc files and pdf files are too numerous to list. All are still available on the ftp site set up for the review.



## APPENDIX 2

### Attachment A: Statement of Work for Dr. Kevin Stokes

#### External Independent Peer Review by the Center for Independent Experts

##### SEDAR 18 - Atlantic Red Drum

**Scope of Work and CIE Process:** The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract to provide external expertise through the Center for Independent Experts (CIE) to conduct impartial and independent peer reviews of NMFS scientific projects. This Statement of Work (SoW) described herein was established by the NMFS Contracting Officer's Technical Representative (COTR) and CIE based on the peer review requirements submitted by NMFS Project Contact. CIE reviewers are selected by the CIE Coordination Team and Steering Committee to conduct the peer review of NMFS science with project specific Terms of Reference (ToRs). Each CIE reviewer shall produce a CIE independent peer review report with specific format and content requirements (**Annex 1**). This SoW describes the work tasks and deliverables of the CIE reviewers for conducting an independent peer review of the following NMFS project.

**Project Description:** SEDAR 18 will be a compilation of data, a benchmark assessment of stock, and an assessment review for Atlantic red drum conducted under the SEDAR (Southeast Data, Assessment and Review) process. SEDAR peer reviews typically involve a panel composed of one NOAA/NMFS chair, one reviewer selected by each resource management agency (1 for SEDAR 18), and three CIE reviewers. The lead assessment agency will be the Atlantic States Marine Fisheries Commission (ASMFC). The Southeast Regional Office, NMFS will be involved. Assessment of the Atlantic stock of red drum is an approved item of the SEDAR Steering Committee assessment schedule. Red drum is an important recreational fishery resource and contributes to commercial fisheries on the Atlantic coast. The most recent assessments of red drum are: Atlantic in 2000 and Florida both coasts in 2005. Considerable additional life history and fishery data have been collected since these assessments. Significant changes in stock status have been documented due to management efforts and population abundance. The purpose of the review is to ensure the assessment is based on sound scientific methods and provides information that is robust and adequate for determining stock status. The review is conducted by a panel of experts during a week-long workshop that is open to the public. Assessment team representatives will present their findings to the review panel which will then address a series of Terms of Reference. Reviewers will critique the assessment and document their findings in a written report that they prepare during the workshop and complete within two weeks of its conclusion. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

**Requirements for CIE Reviewers:** Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs 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. CIE reviewers shall have the expertise, background, and experience to complete an independent peer review in accordance with the SoW and ToRs herein. CIE reviewer shall have expertise and working experience in stock assessment, statistics, fisheries science, and marine biology.

**Location of Peer Review:** Each CIE reviewer shall conduct an independent peer review during the SEDAR 18 panel review meeting scheduled in Atlanta, Georgia during August 24-28, 2009.

**Statement of Tasks:** Each CIE reviewers 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 (name, affiliation, and contact details) 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 information concerning other 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., name, contact information, birth date, passport number, travel dates, and country of origin) to the NMFS Project Clearance 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/sponsor.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 the CIE reviewers all 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 on where to send documents. The CIE reviewers shall read all documents in preparation for the peer review.

Review workshop panelists receive the Assessment Report, including sections prepared by the data and assessment workshops; supplemental analytical materials including all working papers and reference documents from prior workshops; and general information regarding the Review Workshop, including the agenda, report outlines, terms of reference, and participant list. This list of pre-review documents



may be updated up to two weeks before the peer review. Any delays in submission of pre-review documents for the CIE peer review will result in delays with the CIE peer review process, including a SoW modification to the schedule of milestones and deliverables. Furthermore, the 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.

Panel Review Meeting: Each CIE reviewers shall conduct the independent peer review in accordance with the SoW and ToRs. **Modifications to the SoW and ToRs can 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 in the contract SoW. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Instructions to reviewers and the chair are provided in Annex 5. Reviewers are expected to review documents prior to the workshop, participate in panel discussions critiquing and evaluating the assessment, and contribute to preparation of the Review Panel Report documenting the panel's findings for each Term of Reference. The review workshop will be run by a chair who may also serve in a limited review capacity and will prepare an executive summary for the workshop panel report.

The Review Panel Chair is responsible for compiling, editing, and submitting the Review Panel Report to the SEDAR Coordinator by a deadline specified in the assessment schedule. At the start of the workshop the Chair will assign each panelist specific duties, such as drafting specific Review Panel Report sections. The Chair may select one panelist to serve as assessment leader for each stock assessment under review. The assessment leader is responsible for preparing initial drafts of the Review Panel Report for the assigned assessment. Such duties may be further subdivided if workshop manpower allows. The ASMFC will provide a rapporteur to take notes on the discussions so that panelists can more fully participate in discussions and assist the analytical team in documenting panel recommendations.

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.

Other Tasks – Contribution to Review Panel Report: Each CIE reviewer will assist the Chair of the review panel with contributions to the Review Panel Report. CIE reviewers are not required to reach a consensus, and should instead provide a brief summary of their views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs, and ensure final review comments and document edits are provided to the Chair.

**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 LOCATION and DATES as called for in the SoW, and conduct an independent peer review in accordance with the ToRs (Annex 2);
- 3) No later than 11 September 2009, each CIE reviewer shall submit an independent peer review report addressed to the “Center for Independent Experts,” and sent to Mr. Manoj Shivilani, CIE Lead Coordinator, via email to [shivlanim@bellsouth.net](mailto:shivlanim@bellsouth.net), and to Dr. David Sampson, CIE Regional Coordinator, via email to [david.sampson@oregonstate.edu](mailto: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;
- 4) CIE reviewers shall address changes as required by the CIE review in accordance with the schedule of milestones and deliverables.

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

22 July 2009	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
10 August 2009	NMFS Project Contact sends the CIE Reviewers the pre-review documents
24-28 August 2009	Each reviewer participates and conducts an independent peer review during the panel review meeting in Atlanta, Georgia
11 September 2009	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
25 September 2009	CIE submits CIE independent peer review reports to the COTR
01 October 2009	The COTR distributes the final CIE reports to the NMFS Project Contact, the Lead Assessment Agency Contact, and regional Center Director

**Modifications to the Statement of Work:** Requests to modify this SoW must be made through the Contracting Officer’s Technical Representative (COTR) who submits the modification for approval to the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the CIE within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and Terms of Reference (ToR) of the SoW as long as the role and ability of the CIE reviewers

to complete the SoW deliverable in accordance with the ToRs and deliverable schedule are not adversely impacted. The SoW and ToRs cannot 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. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (the CIE independent peer review reports) to the COTR (William Michaels, via [William.Michaels@noaa.gov](mailto: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) each CIE report shall have the format and content in accordance with Annex 1, (2) each 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 notification of 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 approved CIE reports to the NMFS Project Contact, the Lead Assessment Agency Contact, and regional Center Director.

**Key Personnel:**

William Michaels, Contracting Officer's Technical Representative (COTR)  
 NMFS Office of Science and Technology  
 1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910  
[William.Michaels@noaa.gov](mailto:William.Michaels@noaa.gov) Phone: 301-713-2363 ext 136

Manoj Shivlani, CIE Lead Coordinator  
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 10600 SW 131<sup>st</sup> Court, Miami, FL 33186  
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Dale Theiling, SEDAR Coordinator (NMFS Project Contact)  
 South Atlantic Fishery Management Council, 4055 Faber Drive, Suite 201,  
 North Charleston, SC 29405  
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Bonnie Ponwith, SEFSC Science Director  
 NMFS, SEFSC, 75 Virginia Beach Drive, Miami, FL 33149  
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Patrick Campfield, Science Director (Lead Assessment Agency Contact)  
Atlantic States Marine Fisheries Commission  
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Washington DC 20005  
[pcampfield@asmfc.org](mailto:pcampfield@asmfc.org) Phone: (202) 289-6400

## **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.
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, 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 detailed summary of findings, 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 Review Panel 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 proceedings and findings of the meeting, regardless of whether or not they read the Review Panel Report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the Review Panel Report.
3. The reviewer report shall include as separate appendices as follows:
  - 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 18 - Atlantic Red Drum

Approved by the South Atlantic State-Federal Fisheries Management Board  
October 23, 2008

#### Review Workshop

1. Evaluate the adequacy, appropriateness, and application of data used in the assessment<sup>\*</sup>.
2. Evaluate the adequacy, appropriateness, and application of methods used to assess the stock<sup>\*</sup>.
3. Recommend appropriate estimates of stock abundance, biomass, and exploitation<sup>\*</sup>.
4. Evaluate the methods used to estimate population benchmarks and management parameters (e.g., static spawning potential ratio); provide estimated values for management benchmarks, and declarations of stock status<sup>\*</sup>. Evaluate the population metric used by managers to determine the stock status and, if appropriate, recommend alternative measures.
5. Evaluate the adequacy, appropriateness, and application of methods used to characterize uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters<sup>\*</sup>. Ensure that the implications of uncertainty in technical conclusions are clearly stated.
6. Ensure that stock assessment results are clearly and accurately presented in the Stock Assessment Report and Summary Report and that reported results are consistent with Review Panel recommendations<sup>\*\*</sup>.
7. Evaluate the SEDAR Process. Identify any Terms of Reference which were inadequately addressed by the Data or Assessment Workshops; identify any additional information or assistance which will improve Review Workshops; suggest improvements or identify aspects requiring clarification.
8. Review the research recommendations provided by the Data and Assessment workshops and make any additional recommendations warranted. Clearly indicate the research and monitoring needs that may appreciably improve the reliability of future assessments. Recommend an appropriate interval for the next assessment.
9. Prepare a Peer Review Consensus 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 Consensus Report within 3 weeks of workshop conclusion.

\* 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: Tentative Agenda

#### SEDAR 18 REVIEW WORKSHOP

#### Atlantic Red Drum

Doubletree Buckhead Atlanta  
3342 Peachtree Road, NE, Atlanta, Georgia

TBN by NMFS, Chair  
Mr. Dale Theiling, SEDAR Coordinator

#### ***Monday, August 24, 2009***

<b>1:00pm – 5:30pm</b>	<b>Afternoon Session</b>	
	Convene	
	Introductions and Opening Remarks	SEDAR Coordinator and Chair
	Agenda Review, TOR Review	Chair
	Task Assignments	Chair
	Assessment Presentation	Lead analyst
	Assessment Discussion	Review Panel and Lead analyst

#### ***Tuesday, August 25, 2009***

<b>8:00am - 11:30am</b>	<b>Morning Session</b>	
	Assessment Discussion	Review Panel
<b>12:00nn Lunch</b>		
<b>2:00pm – 5:30pm</b>	<b>Afternoon Session</b>	
	Topical Discussions	Review Panel

#### ***Wednesday, August 26, 2009***

<b>8:00am - 11:30am</b>	<b>Morning Session</b>	
	Topical Discussions	Review Panel
<b>12:00nn Lunch</b>		
<b>2:00pm – 5:30pm</b>	<b>Afternoon Session</b>	
	Topical Discussions	Review Panel

#### ***Thursday, August 27, 2009***

<b>8:00am - 11:30am</b>	<b>Morning Session</b>	
	Topical Discussions	Review Panel
<b>12:00nn</b>	<b>Lunch</b>	
<b>2:00pm – 5:30pm</b>	<b>Afternoon Session</b>	
	Review Workshop Report	Review Panel

**Friday, August 28, 2009**

**8:00am - 11:30am Morning Session**

	Final Review of Panel Documents	Chair
<b>12:00nn</b>	Adjournment	Chair

**Discussion Topics**

- Evaluation of data and their preparation and presentation
- Choice and utilization of assessment models and methods
- Continuity run from previous assessment(s)
- Alternative assessment approaches
- Identification of additional analyses, sensitivities, and corrections
- Review of additional analyses and sensitivities
- Initial workshop recommendations and comments
- Data and Assessment Workshop Research Recommendations
- Identify Review Panel research recommendations
- Improvement of the SEDAR process
- Assure all Terms of Reference are addressed
- Develop draft Review Panel Report sections
- Review draft Review Panel Report sections
- Finalize workshop recommendations
- Finalize Review Panel Report
- Post Review Workshop tasks and products due Chair and CIE

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*The timing of particular events is tentative, and the Chair may modify this schedule during the workshop as needed to complete stated tasks. However, to accommodate travel planning the workshop will start as scheduled and will conclude no later than the stated time.*

*SEDAR is a public process, and the public is welcome to attend SEDAR workshops. Although no formal public comment period is scheduled, the workshop Chair will allow opportunity during the meeting for the public in attendance to comment on discussion items.*

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## **Annex 4: Review Panel Report**

### Executive Summary

#### I. Terms of Reference

*List each Term of Reference, and include a summary of the Panel discussion regarding the particular item. Include a clear statement indicating whether or not the criteria in the Term of Reference are satisfied.*

#### II. Analyses and Evaluations

*Summary results and findings of review panel analytical requests.*

Note: The Review Panel Report becomes Chapter 2 of the Review Workshop Report.

## Annex 5: SEDAR Review Workshop Panelist and Chair Instructions

### Tasks, Responsibilities, and Supplemental Instructions for SEDAR Review Workshop Participants

#### SEDAR Review Workshop Overview

SEDAR Review Workshops provide independent peer review of stock assessments prepared through SEDAR data and assessment workshops. The goal of the review is to ensure that the assessment and results presented are scientifically sound and that managers are provided adequate advice regarding stock status, management benchmarks, and the general nature of appropriate future management actions. The Review Panel has limited authority to request additional analyses, corrections of existing analyses and sensitivity runs.

An analytical and presentation team, composed of a subset of the Assessment Workshop panel and representing the primary analysts for each assessment, will be present at the workshop to present assessment findings, provide an overview of assessment data, provide additional results or model information, and prepare any additional analyses requested by the Review Panel. Although many individuals contribute to a SEDAR assessment, the Review Panel is ultimately responsible for ensuring that the best possible assessment is provided through the SEDAR process.

The review panel shall not provide specific management advice. Such advice will be provided by existing Council Committees, such as the Science and Statistical Committee and Advisory Panels, following completion of the assessment.

SEDAR review workshop panels are typically composed of a Chair, 3 reviewers appointed by the CIE (Center for Independent Experts), and 1 reviewer appointed by each Council having jurisdiction over the stocks under review. All reviewers are independent, meaning that they should not have contributed to the assessment under review and should not have a role in any management actions that may stem from the assessment. Each Council may appoint several official observers, typically including representatives of the Council, its SSC, and appropriate Advisory Panels.

All SEDAR workshops, including the Review Workshop, are open, transparent, public processes administered according to the rules and regulations governing Federal Fishery Management Council operations. All SEDAR workshops are recorded and transcripts of workshop discussions may be prepared upon request through the SEDAR Steering Committee. The names and affiliations of reviewers will be disclosed in the review workshop documents. The Review Workshop Report will be publicly distributed along with the other SEDAR Workshop working papers and workshop reports. The public may submit written comments in accordance with Council guidelines once the report is disseminated to the relevant Council.

Review workshop panelists receive the Assessment Report, including sections prepared by the data and assessment workshops; supplemental analytical materials including all working papers and reference documents from prior workshops; and general information regarding the Review Workshop, including the agenda, report outlines, terms of reference, and participant list. Review panelists are expected to read and review the provided materials to become familiar with the assessment.

The charge to each SEDAR Review Workshop is specified in Terms of Reference. During the review the Review Workshop panel will prepare a Review Panel Report for each stock assessed addressing each of the Terms of Reference. The summary should represent the views of the group as a

whole, but shall also include any dissenting views of individual panelists if appropriate. Outlines and example documents will be provided by SEDAR staff.

#### Review Workshop Panel General Instructions

The Review Panel Chair is responsible for compiling, editing, and submitting the Review Panel Report to the SEDAR Coordinator by a deadline specified in the assessment schedule. At the start of the workshop the Chair will assign each panelist specific duties, such as drafting specific report sections. The Chair may select one panelist to serve as assessment leader for each stock assessment under review. The assessment leader is responsible for preparing initial drafts of text addressing Terms of Reference for the assigned assessment. Such duties may be further subdivided if workshop manpower allows. The SEFSC will provide a rapporteur to take notes on the discussions so that panelists can more fully participate in discussions and assist the analytical team in documenting panel recommendations.

The Review Panel's primary responsibility is to ensure that assessment results are based on sound science, appropriate methods, and appropriate data. During the course of review, the panel is allowed limited flexibility to deviate from the assessment provided by the Assessment Workshop. This flexibility may include modifying the assessment configuration and assumptions, requesting a reasonable number of sensitivity runs, requesting additional details and results of the existing assessments, or requesting correction of any errors identified. However, the allowance for flexibility is limited, and the review panel is not authorized to conduct an alternative assessment or to request an alternative assessment from the technical staff present. The SEDAR Steering Committee recognizes that determining when modifications constitute an 'alternative' assessment is a subjective decision, and has therefore determined that the Review Panel is responsible for applying its collective judgment in determining whether proposed changes and corrections to the presented assessment are sufficient to constitute an alternative assessment. The Review Panel Chair will coordinate with the SEDAR Coordinator and technical staff present to determine which requests can be accomplished and prioritize desired analyses.

Any changes in assessment results stemming from modifications or corrections solicited by the review panel will be documented in an addendum to the assessment report. If updated estimates are not available for review by the conclusion of the workshop, the review panel shall agree to a process for reviewing the final results. Any additional or supplemental analyses requested by the Review Panel and completed by the Analytical team shall, at the discretion of the chair and panel, be either documented through a supplemental report or included in the Review Panel Report.

If the Review Panel finds an assessment deficient to the extent that technical staff present cannot correct the deficiencies during the course of the workshop, or the Panel deems that desired modifications would result in an alternative assessment, then the Review Panel shall provide in writing the required remedial measures suggest an appropriate approach for correcting the assessment and subsequently reviewing the corrected assessment.

#### Review Workshop Panel Participant Information

Serving as a review workshop panelists is a considerable time commitment that requires more than simply the daily sessions of the review workshop. Panelists will need to set aside time in the weeks prior to the workshop to review data and assessment documents. During the workshop, time beyond

that of the scheduled daily sessions may be required to complete workshop tasks and reports. Time is required following the workshop to review and finalize panel reports.

Review panelists are expected to author workshop reports and may conduct supplementary analyses or data summaries. Panelists should come prepared with a laptop computer for these tasks.

The SEDAR Steering Committee and SEDAR Coordinator establish deadlines for document submission. SEDAR staff distributes working documents and support materials (agenda, participant instructions) to workshop participants, typically two weeks prior to the workshop.

#### SEDAR Workshop Panelist Code of Conduct

- SEDAR workshop panels decisions shall be based on science. Discussions and deliberations shall not consider possible future management actions, agency financial concerns, or social and economic consequences.
- SEDAR Review Workshop Panels are encouraged to reach a group consensus that all participants can accept, which may include agreeing to acknowledge and present multiple possibilities. If this is not feasible, then each reviewer may state their individual opinion with regard to the Terms of Reference and are responsible for providing appropriate text that captures their opinion for the Review Panel Report.
- Personal attacks will not be tolerated. Advancement in science is based on disagreement and healthy, spirited discourse is encouraged. However, professionalism must be upheld and those who descend into personal attacks will be asked to leave.
- SEDAR workshop panelists are expected to support their discussions with appropriate text and analytical contributions. Each panelist is individually responsible for ensuring that their points and recommendations are addressed in workshop reports; they should not rely on others to address their concerns.
- Panelists are expected to provide constructive suggestions and alternative solutions; criticisms should be followed with recommendations and solutions.

#### Review Workshop Networking and IT

A wireless network is available at each SEDAR workshop to provide internet and file server access. All reports and documents pertaining to the review will be available on the server. IT staff will be available during the review workshop to aid each participant in securing network access.

#### Review Workshop Chair, Reviewer, and Support Staff Responsibilities

##### Review Workshop Chair:

1. Approximately 3 weeks prior to the Assessment Review Panel workshop the Chair shall be provided with same document package provided to the Technical Reviewers and appointed observers, including stock assessment reports and associated documents. The Chair shall read and review all documents to gain an in-depth understanding of the stock assessment under consideration and the data and information considered in the assessment.
2. Approximately 1 week prior to the workshop the Chair may be asked to participate in a conference call with the SEDAR Coordinator and representatives of the stock assessment teams to review the final agenda, plan for presentations, and meeting format.
3. During the Assessment Review Workshop the Chair shall control and guide the meeting, including the coordination of presentations, discussions, and task assignments.

4. During the Assessment Review Workshop the Chair may participate in technical discussions and serve as a technical reviewer.
5. During the Assessment Review Workshop the Chair shall work with the SEDAR Coordinator and the analytical and presentation team to manage the workload of panel requests and recommendations. At the conclusion of each session the Chair shall provide prioritized task lists to the analytical team and SEDAR Coordinator.
6. The Chair shall facilitate preparation and writing of the Review Panel Report. Review panel members, agency staff, and others present at the meeting will assist the Chair as needed. The Chair shall be responsible for the editorial content of Panel reports, and the Chair shall be responsible for ensuring that reports are produced and distributed to appropriate contacts on schedule (see “Final Reports” below).
7. The SEDAR coordinator shall assist the Assessment Review Panel Chair prior to, during, and after the meeting to ensure that documents are distributed in a timely fashion.
8. Expected Time Obligation: It is estimated that the Chair’s duties shall occupy up to 14 days: several days prior to the Review Panel meeting for document review, five days for the workshop, and several days following the meeting to ensure that the final documents are completed.

Review Workshop Technical Reviewer:

1. Approximately three weeks prior to the meeting, the reviewers shall be provided with the stock assessment reports, associated supporting documents, and review workshop instructions including the Terms of Reference. Reviewers shall read these documents to gain an in-depth understanding of the stock assessment, the resources and information considered in the assessment, and their responsibilities as reviewers.
2. During the Review Panel meeting, reviewers shall participate in panel discussions on assessment methods, data, validity, results, recommendations, and conclusions as guided by the Terms of Reference. The reviewers shall develop a Review Panel Report for each assessment reviewed. Reviewers may be asked to serve as an assessment leader during the review to facilitate preparing first drafts of review reports.
3. Following the Review Panel meeting, reviewers shall work with the chair to complete and review the Review Panel Reports. Reports shall be completed, reviewed by all panelists, and comments submitted to the Chair within two weeks of the conclusion of the workshop.
4. Additional obligation of CIE-appointed reviewers: Following the Review Panel meeting, each reviewer appointed by the CIE shall prepare an individual CIE Reviewer Report and submit it in accordance with specifications provided in the Statement of Work.

Review Workshop Support Staff:

*SEDAR Coordinator:* Arrange workshop and handle meeting logistics; distribute workshop materials and notices; support chair and reviewers during review workshop; coordinate with chair and analytical team to prioritize panel task requests; address procedural issues that arise; distribute final workshop products in accordance with SEDAR protocols.

*Analytical and Presentation Team:* Present data overview and assessment results, address panel questions and comments as required; complete panel requests for additional analyses or model corrections in accordance with SEDAR guidelines; document any analyses conducted during the workshop.

*Rapporteur:* Take notes on panel discussion of assigned species for use by technical reviewers in preparing initial report drafts, assist SEDAR Coordinator, Chair, and Analytical team in addressing panel requests and completing workshop documents as necessary.

*IT Support:* Set-up and manage the SEDAR network to provide internet and file server capabilities during the workshop, work with hotel or vendor contacts to provide internet and email access, ensure all participants are able to access the network, and address any IT-related issues that arise during the workshop

*SEDAR Administrative Assistant:* Provide general support to workshop participants, coordinate with hotel banquet and events staff to facilitate proper room arrangements and daily catering orders, record workshop sessions, manage submitted documents and written statements for administrative record.

SEDAR Review Workshop Panel Report Outline

Executive Summary

I. Terms of Reference

*List each Term of Reference, and include a summary of the Panel discussion regarding the particular item. Include a clear statement indicating whether or not the criteria in the Term of Reference are satisfied.*

II. Analyses and Evaluations

*Summary results and findings of review panel analytical requests.*

## APPENDIX 3

### Panel membership and final agenda

#### SEDAR 18 Review Meeting Participants

<b>Appointee</b>	<b>Function</b>	<b>Affiliation</b>
<b>Independent Review Panel</b>		
Dr. Robert O’Boyle	Chair and Reviewer	Consultant
Dr. Matthew Cieri	Independent Reviewer	ASMFC- ME DNR
Dr. Dr. Kevin Stokes	Independent Reviewer	CIE
Dr. Norm Hall	Independent Reviewer	CIE
Dr. Jamie Gibson	Independent Reviewer	CIE
<b>Rapporteur</b>		
Dr. Mike Denson	Rapporteur	ASMFC RD SAS
<b>Presenters and Analytical Team</b>		
Dr. Mike Murphy	Lead Analyst	ASMFC RD SAS
Lee Paramore	Stock Leader	ASMFC-TC
Dr. Joe Grist	Presenter and Asst-Rapporteur	ASMFC RD SAS
<b>Appointed Observers</b>		
Robert Boyles	Commissioner	ASMFC
Spud Woodward	Commissioner	ASMFC
Nichola Meserve	Red Drum FMP Coordinator	ASMFC
Bill Windley	ASMFC AP Chair Recreational	Maryland
<b>Coordination</b>		
Dale Theiling	Coordinator	SEDAR
Rachael Lindsay	Administrative Support	SEDAR
Patrick Gilles	IT Support	SEFSC-Miami

## SEDAR 18 FINAL AGENDA

- **Monday, 24 August 2009**
  - 13:00 – 17:30 Afternoon Session
    - Introduction, opening remarks, review of terms of reference & agenda
    - Northern & Southern assessment presentations & discussion
    - Data Inputs
  - 17:30 – 19:00 Supper
  - 19:00 – 21:00 Evening Session
    - Data Inputs (cont'd)
  
- **Tuesday, 25 August 2009**
  - 08:00 – 12:00 Morning Session
    - Assessment models
  - 12:00 – 14:00 Lunch
  - 14:00 – 17:30 Afternoon Session
    - Assessment models (cont'd)
    - Biological Reference Points
  - 17:30 – 19:00 Supper
  - 19:00 – 21:00 Evening Session
    - Biological Reference Points (cont'd)
    - Model rerun specifications (if required)
  
- **Wednesday, 26 August 2009**
  - 08:00 – 12:00 Morning Session
    - Drafting & Reruns
  - 12:00 – 14:00 Lunch
  - 14:00 – 17:30 Afternoon Session
    - Consideration of drafts & reruns
  
- **Thursday, 27 August 2009**
  - 08:00 – 12:00 Morning Session
    - Stock Status (Northern & Southern Stocks)
  - 12:00 – 14:00 Lunch
  - 14:00 – 17:30 Afternoon Session
    - Findings for each terms of reference
  
- **Friday, 28 August 2009**
  - 08:00 – 12:00 Morning Session
    - Discussion on SEDAR Process
    - Research Recommendations
    - Report assignments