



**Individual independent review as part of
the 46th SARC: stock assessment of
Atlantic striped bass (*Morone saxatilis*).**

for

Centre for Independent Experts (NTVI)

December 2007

**Cefas Contract
C3187**

COMMERCIAL IN CONFIDENCE

Table of contents

Executive Summary	2
Summarized Recommendations.....	2
Introduction	4
Description of review activities	4
Agenda for the 46 th Northeast SARC	5
Summary of findings	7
Overall findings	7
ToR 1. Commercial and recreational catch characterization	8
ToR 2. Fishery-dependent and fishery-independent indices.....	9
ToR 3. Evaluate the statistical catch at age (SCA) model	10
ToR 4. Evaluate Baranov’s catch equation method (CEM) for tagging.....	10
ToR 5. Review the Instantaneous rates tag return model (IRCR)	10
ToR 6. Review the SCA with tagging data (SCATAG)	10
ToR 7. Evaluate the current biological reference points.....	10
Conclusions and Recommendations	11
Conclusions	11
Recommendations (by ToR)	12
ToR 1. Commercial and recreational catch characterization	12
ToR 2. Fishery-dependent and fishery-independent indices.....	13
ToR 3. Evaluate the statistical catch at age (SCA) model	13
ToR 4. Evaluate Baranov’s catch equation method (CEM) for tagging.....	13
ToR 5. Review the Instantaneous rates tag return model (IRCR)	13
ToR 6. Review the SCA with tagging data (SCATAG)	13
ToR 7. Evaluate the current biological reference points.....	14
Appendix 1. Bibliography	15
Appendix 2. Statement of work	16
Terms of Reference	21

Executive Summary

- This document is the individual CIE Reviewer Report for the 46th Northeast SARC (Stock Assessment Review Committee) meeting held on the stock assessment of Atlantic striped bass, provided at the request of the Center for Independent Experts (CIE) (see Appendix 1).
- This report solely represents the views of the independent reviewer (Dr Tingley).
- The reviewer fully agrees with all of the findings reported in the *Summary Report of the 46th Northeast Regional Stock Assessment Review Committee (SARC 46)*. Findings that are fully reported in the Summary Report are not repeated in this individual report. This report focuses on clarifications of elements in the Summary Report plus some additional views of the individual reviewer that may not have been fully discussed by the SARC.
- The principal finding is that the assessment team met all of the review terms of reference.
- The reviewer believes that the best approach to improving the assessment of the Atlantic striped bass is to shift to regional, stock-based assessments using a spatially segregated multi-stock model.
- A series of recommendations that will both improve the current approach to stock assessment and that will also support a move towards regional assessment are made below. Readers should refer to the main text for full descriptions.

Summarized Recommendations

ToR 1.

Recommendation 1. The magnitude and variability (spatial, temporal, gear and fleet type) of mortality caused by the catch and release processes should be re-evaluated.

Recommendation 2. Discard data should be collected directly from the commercial fishery to establish the current scale of this activity and reduce assessment uncertainty.

Recommendation 3. Available data on catches from the EEZ should be collated into time-series and analyzed to assess scale and trend.

Recommendation 4. A periodic monitoring program to collect catch and discard data from the offshore (i.e. EEZ) fisheries should be established.

Recommendation 5. Methods of collecting catch, effort and discard data are made fully compatible with any potential change in assessment methodology, especially in terms of the spatial location of the catch, effort and discards, while protecting the integrity and continuity of existing time-series.

Recommendation 6. To ensure that adequate biological material (scales and otoliths) exists to address concerns over correctly ageing older (10+) fish, a small, focused program to collect appropriate material from fisheries and research activities is recommended.

Recommendation 7. Double tagging studies should be undertaken to quantify some of the unknowns arising from the tagging programs, notably tag loss and loss of tag readability.

Recommendation 8. The application of data storage tags to address missing information relating to the migration of components of the striped bass population should be considered.

ToR 2.

Recommendation 9. It is recommended that consideration be made to developing additional regionally focused recreational fishery CPUE indices.

Recommendation 10. A review of old and current data collection programs to identify potentially useful time-series of data that might support global and/or region assessments is recommended. This review should also consider the continuation or re-establishment of relevant data collection programs in the light of on-going assessment needs and available resources.

ToR 3.

Recommendation 11. Continued development of the single stock SCA model is recommended as this is the best currently available. It is also recommended that concurrent development and testing of a spatially segregated multi-stock model is pursued as this, (i) should offer improved stock assessments and (ii) will enable more appropriate and defined advice to managers.

ToR 4.

No recommendations beyond those of the Summary Report.

ToR 5.

No recommendations beyond those of the Summary Report.

ToR 6.

No recommendations beyond those of the Summary Report.

ToR 7.

Recommendation 12. The impacts of sex ratio variation away from 1:1 on the definition of reference points and abundance estimates should be examined and, if required, additional data collected to establish the spatial and temporal pattern of sex ratios.

Introduction

Against a background of a heavily depleted stock in the 1970's and early 1980's, management action coupled with a series of higher than average recruitment events have driven a substantial and successful stock recovery in Atlantic striped bass. The size of the fishery has grown with the stock recovery and the fishing mortality (F) has been showing a rising trend over recent years with good but stable recruitment.

A variety of different stock assessments have been developed and applied to this fishery. It is of note that the stock assessments applied have been 'global' ones covering the majority of the range of the striped bass but that the management units are smaller, based on the State structure.

Description of review activities

This review was undertaken by Dr Geoff Tingley in Woods Hole, Massachusetts over the period 26-29th November 2007. Relevant documentation (see bibliography) was made available just prior to the SARC meeting via a website link to a NOAA NEFSC server at Woods Hole. The documentation was reviewed prior to the SARC meeting.

The background information and assessment of striped bass was presented on behalf of the Atlantic States Marine Fisheries Commissions striped bass technical committee's stock assessment sub-committee (the "assessment team") by Mr. Doug Grout, Dr. Gary Nelson, and Ms. Beth Versak.

Comments are provided against the specific terms of reference (ToR) provided (Appendix 1) and are those of the independent reviewer only.

Agenda for the 46th Northeast SARC

46th Northeast Regional Stock Assessment Workshop (SAW 46) Stock Assessment Review Committee (SARC) Meeting

Stephen H. Clark Conference Room – Northeast Fisheries Science Center
Woods Hole, Massachusetts

November 26 - 29, 2007

Sessions are open to the public, except where indicated.

AGENDA (11-24-07)

TOPIC	PRESENTERS	RAPPORTEURS
Monday, 26 November (1:00 – 5:00 PM).....		
Welcome	James Weinberg , SAW Chairman	
Introduction	Mike Murphy , SARC Chairman	
Agenda		
Conduct of Meeting		
Striped bass (A)	Gary Nelson & Beth Versak	Gary Shepherd & Nichola Meserve
SARC Discussion	Mike Murphy	
Tuesday, 27 November (9 AM – Noon).....		
Striped bass (A) – finish presentations.	Beth Versak, Gary Nelson, Doug Grout	Gary Shepherd & Nichola Meserve
SARC Discussion	Mike Murphy	
Tuesday, 27 November (1:15 PM – 5 PM).....		
Q&A #1 between Reviewers and All Presenters, clarification of any issues. (Open Meeting)		Gary Shepherd & Nichola Meserve
SARC Discussion	Mike Murphy	
Wednesday, 28 November (9 AM – Noon)		
SARC Panel deliberations/report writing (Closed Meeting).		
Wednesday, 28 November (1:15 PM – 3:45 PM).....		
Q&A #2 between Reviewers and All Presenters, clarification of any issues. (Open Meeting)		Gary Shepherd & Nichola Meserve

SARC Discussion

Mike Murphy

Wednesday, 28 November (3:45 PM –)
SARC Report writing (Closed Meeting).

Thursday, 29 November
SARC Report writing (Closed Meeting).

Summary of findings

This reviewer finds that the assessment team should be commended for their thorough and professional approach to developing and applying the range of models to provide the best advice to managers. The openness of the discussions and breadth of information presented during the review greatly aided the review process. A summary of findings and recommendations from this reviewer are presented below.

The findings of this reviewer are reported within relevant sections, addressing the seven main areas of the Terms of Reference (Appendix 1). Numbered recommendations (**in bold**) refer to the correspondingly numbered items within the conclusions and recommendations section of this report.

Where no recommendations are made against a specific ToR, this is because the reviewer believes that the Summary SARC Report has made the appropriate recommendations in full.

Overall findings

The reviewer fully agrees with all of the findings reported in the *Summary Report of the 46th Northeast Regional Stock Assessment Review Committee (SARC 46)*. Findings that are fully reported in the Summary Report are not repeated in this individual report. This report focuses on clarifications of elements in the Summary Report plus some additional views of the individual reviewer that may not have been fully discussed by the SARC.

The principal finding is that the assessment team met all of the terms of reference of the review.

The assessments currently applied to striped bass stocks characterize the stock as at or below the current reference points (ToR 7). The recent trend in the stock and fishery is one of rising fishing mortality (F) coupled with a fairly stable recruitment. Should this trend continue, then the first of the reference points ($F \leq 0.30$) will be passed in the foreseeable future. It is the opinion of this reviewer that the primary focus of the assessment team should be to prepare for this eventuality by focusing on improving the quality of the scientific knowledge and advice. As there are three principal striped bass stocks to be managed, and as they each contribute different proportions of the overall stock, it is likely that as F rises management action will be required on one or two stocks in advance of the need for 'global' management action. The current approach to assessment will not permit this need to be addressed. It is, therefore, critical for the principal assessment approach to provide advice at the spatial scale of management i.e. the stock assessment needs to provide regional rather than global interpretations of the status of the stocks. This may be done in two ways, (i) to improve the definition of those aspects of the fishery (e.g. F, M, etc.) and (ii) to focus on assessments that match the stock structure. Item (i) requires the collection of some additional data and item (ii) may require some redirection of resources away from multiple model development into improving the performance of the most appropriate models and their application at the stock structure level.

In addition to identifying potential improvements in the mathematical/statistical assessment of the stock, significant improvements may be achieved by addressing a number of data shortfalls that can be relatively quickly and easily addressed. Appropriate suggestions and recommendations are made to address these.

ToR 1. Commercial and recreational catch characterization

Some removals from the fishery are poorly understood and need to be characterized to ensure that F is defined without significant error or bias. The more accurate the estimation of F, the more confident in the assessment outputs and the stronger the advice to managers can be.

Factors that may affect the estimation of F include errors in estimating the mortality of fish caught and released by the (a) recreational fishery; (b) the targeting commercial fishery; and (c) offshore by-catch.

(a) Recreational fishery: The application of the published catch and release mortality factor (0.09) rather than the currently used value (0.08), a 12.5% variation in assumed mortality due to release from the largest single part of the fishery, has been covered in the Summary Report. These figures are, however, now quite old and are probably unrepresentative of the fishery as it now operates. Better estimates of mortality caused by recreational catch and release are needed. **See recommendation 1.**

(b) Targeting commercial fishery: Discards from the commercial fleets are not directly measured but estimated using ratios of tagging data from the commercial and recreational fisheries. Although, as noted in the Summary Report, this method may be adequate; this reviewer does not believe that the adequacy has been demonstrated. Principally, it is not clear that this method is adequate given differences in tag recovery rates and in survivorship of released fish between the two fisheries, which are very different in nature, and there are also differences in the minimum landing sizes between the commercial and recreational fisheries that will drive a proportion of the discard pattern. Therefore, in addition to the SARC suggestion that the associated error for this estimate be included in the data characterization and carried forward in the assessment, this reviewer would also like to see some comparative data derived from observations on the fishery itself to define the scale of the commercial discards. **See recommendation 2.**

(c) Offshore by-catch: the Summary Report describes the need for periodic monitoring of various forms of unreported removals (catch and discard) from vessels operating offshore within the EEZ. There are underlying reasons to support this, including the lack of any recent fishery representative data; potential changes in the distribution of the stock (especially large female fish) due to the overall growth of the population: i.e. with increased competition in a population substantially larger than it was a decade ago, behaviorally driven changes in distribution of elements of the stock may have occurred leading to increased availability to fisheries operating in the EEZ. It is likely that some information exists that could begin to define the scale of this as an issue and this should be reviewed. **See recommendations 3 & 4.**

Key benefits of identifying additional elements of F that are currently under-accounted for in the assessment is that this will (i) tend to increase the overall estimate of stock size, which will tend to slow the increase in F towards the reference points, and (ii) improve confidence in the overall estimation of removals (and thus F).

As noted elsewhere, the regional nature of the stocks and fisheries should support improved assessments based on a regional approach. To enable this, it is obviously important that the catch and effort data from both the commercial and recreational fisheries, as well as any

discard information, can be assigned to whatever regional spatial scale that may be adopted. **See recommendation 5.**

The Summary Report recommends convening a workshop to address aging concerns between otoliths and scales, especially in older fish. (Summary Report Recommendation 2). In discussing this, some concern was expressed about the difficulty of obtaining sufficient otoliths from the older (age 10+) and thus larger fish. Whilst there may be a degree of resistance to killing large numbers of older (larger) fish to collect otoliths on a regular basis, the use of local knowledge to target a small number of individual commercial, recreational or charter fishermen to collect what would in effect be a small number of otolith and scale samples (with length) from larger fish should be achievable. **See recommendation 6.**

There is a vast wealth of tagging data available to support not only the assessment but also the biological understanding of the striped bass stocks. During the discussions of the range of tagging programs and what was known and not known about various errors associated with the use of tags, the relative lack of knowledge about the impact of tag loss on the assessment was identified as an area that could be addressed. **See recommendation 7.**

Based on a review of the background documentation and discussion with the assessment team there appear to be some specific areas where there is little information about some of the migratory behavior of the striped bass. This included, for example, the extent of and any change in the offshore migration of large females in either frequency, number, or extent. This may be due to the lack of a targeting offshore fishery from which to obtain tag returns. The scale of such movements may, or may not, be significant currently or in the future as the stock dynamics change in response to an increasing population size or as the inshore or offshore fishery change. The new generations of data storage tags with their ability to define various parameters including depth, light and temperature offer an approach at filling this gap in knowledge. A key drawback of deploying what are relatively expensive data storage tags in some fisheries (i.e. low tag return rates) is not present in this fishery as the recovery rate from even normally tagged fish is substantial. **See recommendation 8.**

ToR 2. Fishery-dependent and fishery-independent indices

The Summary Report has a detailed section dealing with fishery dependent and independent indices available to support a variety of assessments.

This reviewer has the following specific observations. For a fishery so dominated by the recreational sector there are only two indices derived from the recreational fishery: the 'global' Total Catch Rate Index (MRFSS) and the Connecticut Recreational CPUE index (CTCPUE). This reviewer finds it surprising that there are not more, and especially not more regional recreational CPUE data available to support the stock assessment process. There would be benefit in having more recreational fishery indices available, especially to support regionally based assessments. **See recommendation 9.**

During the discussions, the assessment team presented a figure displaying a time-series of samples taken from Chesapeake Bay showing striped bass egg prevalence in planktonic net samples. This was a potentially useful index that apparently had not been included in the assessment, and might be particularly useful in a regional assessment. It would not be unreasonable to expect there to be other potentially useful data sets that exist that could be

helpful in assessing these stocks. Reviewing old and existing data collection programs, and their continuation/re-establishment, seems advisable. **See recommendation 10.**

ToR 3. Evaluate the statistical catch at age (SCA) model

After careful consideration, the SCA model appears to be the best model at the current time. The model is not perfect and there are number of issues that could be considered to improve the performance, including addressing the mis-specification of the model with respect to the older age classes. All of these aspects are adequately covered in the Summary Report.

The summary report offers two ways forward for the SCA model, with appropriate recommendations, the continued development of a single stock (global) hypothesis model and the development of a spatially segregated multi-stock model (referred to elsewhere as a regionally based assessment approach). Both options should yield benefits in improved assessment but the spatially segregated multi-stock model provides the added advantage of better fitting with the management structure for striped bass.

When applying a new assessment methodology, it is obviously important to retain continuity of existing approaches to ensure that mistakes are avoided. Therefore, the best approach in the opinion of this reviewer, is to push forward with improving the single stock SCA model to provide continuity of assessment using the current best approach but concurrently develop a spatially segregated multi-stock SCA model that will dove-tail with the existing, effective approach to management. **See recommendation 11**

ToR 4. Evaluate Baranov's catch equation method (CEM) for tagging

The Summary Report fully reflects the views of this reviewer.

ToR 5. Review the Instantaneous rates tag return model (IRCR)

The Summary Report fully reflects the views of this reviewer.

ToR 6. Review the SCA with tagging data (SCATAG)

The Summary Report fully reflects the views of this reviewer.

ToR 7. Evaluate the current biological reference points.

The meaning of this term of reference was clarified just prior to the presentation of the ToR at the meeting by the assessment team. In addition to determining the stock status, its purpose was to review the methods used to determine the current biological reference points and to get the review committee's opinion on whether they were developed appropriately and whether those approaches should be continued. Based on this clarification, this term of reference was successfully completed. Fishing mortality has increased in recent years and, based on the latest data (2006), is currently at or very near the target level.

The review meeting discussed the potential importance of the sex ratio used in the assessments that generated the reference points and in current assessments. In all cases, this has been assumed to be 1:1. It is known that the fishery does not fish on striped bass sub-populations that are 1:1 but that in different areas and at different times the sex ratio varies substantially from 1:1. For example the Chesapeake fishery, taking smaller individuals, has a preponderance of males in the catch and fish caught farther from shore tend to have a large female bias. The different minimum size limits in different areas and fisheries will also impact on the sex ratio of the population available to fishery. All of this overlies the differential growth, and thus recruitment rates, of male and female fish. There is sufficient uncertainty as to the importance of these various factors to raise concerns about possible impacts on the estimation of the reference points and aspects of the stock estimation procedures. **See recommendation 12.**

All other relevant points pertaining to this ToR are covered in the Summary Report. This reviewer specifically supports and endorses the Summary Report recommendations 15 and 16.

Conclusions and Recommendations

Conclusions

The stock assessment team should be commended on its professionalism and expertise in addressing the complexities of a fishery where the majority of catches come from a recreational sector as well as having a commercial aspect and considerable tagging and other data to incorporate. This reviewer was especially grateful for the clarity in the way the information was presented to the SARC.

The majority of recommendations are contained within the 46th SARC Summary Report and are not necessarily repeated in this individual report. Specific recommendations from this reviewer resulting from this review are presented here, and the reader should refer to the text of the 46th Summary Report and of the other independent individual reviews for the full context.

The modeling approach covers a wide range of methodologies and needs to be more focused on a smaller range of methods that will generate the most reliable assessment and enable the best and most appropriate management advice to be developed.

The single stock SCA model is currently the best available and should continue to be applied, with appropriate modifications. This reviewer strongly support the consensus view of the SARC that a spatially segregated multi-stock SCA model be developed and tested as this will give improved assessment outcomes and also link-in to the management of the fisheries in the most effective manner.

A number of recommendations are made concerning changes to the collection of data and collection of additional data. It is recognized that some of these recommendations may have resource implications in terms of human resources and funding. It is beyond the scope of this review to assess and prioritize these recommendations as some will apply to Federal agencies and others to State agencies and prioritization also depends, in part, upon the future approach to stock assessment chosen for this species. The cost implications of any changes in, or additions to, data collection programs should be viewed as a whole, as a number of the

recommendations for additional data could effectively be delivered by the same program in a highly cost-effective way.

Recommendations (by ToR)

ToR 1. Commercial and recreational catch characterization

Recommendation 1. A re-assessment of the mortality caused by the catch and release of striped bass is recommended. This re-assessment should include addressing temporal and spatial variation so as to understand the effects of temperature, area and stock origin, so that regional and global averages of this factor can be estimated and be weighted by the level of fishery activity (catch) by season and area. Gear type differences should also be considered, as there may be different mortality effects derived from different hook types and fishing methods.

Recommendation 2. It is recommended that bass discard data are collected directly from the commercial fishery in order to provide a ‘ground-truthed’ estimate of discard mortality from this sector. This may also enable the tag ratio methodology currently used to be validated, and/or improve the estimation of error. The collection of these data could, for example, be through an observer program or by using a voluntary log-book reporting scheme. The data collected should be representative of the fishery in both temporal and spatial dimensions, in fleet type, gear type, etc.

Recommendation 3. It is recommended that available data on catches from the EEZ (observer data; research cruise data, logbook data, reported landings and discards, enforcement records, etc.) be collated into time-series and analyzed to assess the scale and any trend in EEZ by-catch of striped bass in other fisheries.

Recommendation 4. The establishment of a periodic monitoring program for catch and discard data from the offshore (i.e. EEZ) fisheries is recommended. This should focus on the need to update the current state of knowledge of fishing related mortality that would otherwise be unrecorded and remain unknown as a result of unreported or illegal catches as well as unreported but legitimate discards. An appropriate period for sampling might be every three to five years.

Recommendation 5. It is recommended that the methods of collecting catch, effort and discard data are made fully compatible with any change in the assessment methodology, especially in terms of the spatial location of the catch, effort and discard. The key is to be able to assign catches, effort and discards to whatever assessment unit is most appropriate and to cope if these units change over time. As with all time-series data, when changing data collection, reporting or recording protocols, retaining the integrity of and continuity with the existing data series are of paramount importance.

Recommendation 6. To ensure that sufficient numbers and representative spatial coverage of scales and otoliths from larger (older) fish are available to the workshop proposed by the Summary Report Recommendation 2, this reviewer recommends the specific collection of data to supplement that already available. These data should comprise fish length, otoliths and scales (and where possible sex) derived from a specific focused sampling program from within the commercial and recreational fisheries to provide full spatial coverage of the range of the species within the fishery.

Recommendation 7. Tag losses in long-lived species, such as striped bass, can undermine some of the basic assumptions of the tagging methodologies. In order to improve and

update the knowledge of the potential impacts of tag loss (loss, loss of readability) on the assessment, it is recommended to conduct some double tagging experiments within the fishery to obtain improved and current estimates of tag losses from tagged striped bass. These studies should adequately cover the temporal and spatial characteristics of the range of the fisheries.

Recommendation 8. The use of appropriately configured data storage tags to provide missing information about aspects of the migration of components of the striped bass population should be considered.

ToR 2. Fishery-dependent and fishery-independent indices

Recommendation 9. It is recommended that consideration be made to developing additional, regionally focused, recreational fishery CPUE indices.

Recommendation 10. It is recommended that old and current data collection programs at national, state and sub-state levels are reviewed to identify potentially useful time-series of data that might support global and or region assessments. It is also recommended that, where useful time-series are found, continuation or re-establishment of the data collection program(s) is reviewed in the light of on-going assessment needs and available resources.

ToR 3. Evaluate the statistical catch at age (SCA) model

Recommendation 11. It is recommended that the single stock assessment SCA model continue to be developed, as this is currently the best available model. Concurrently, it is recommended that a spatially segregated multi-stock SCA model be developed and tested as it is believed that this will offer the best opportunity to assess the stock in future and will enable the provision of more appropriate management advice than will the single stock model.

ToR 4. Evaluate Baranov's catch equation method (CEM) for tagging

No recommendations beyond those of the Summary report.

ToR 5. Review the Instantaneous rates tag return model (IRCR)

No recommendations beyond those of the Summary report.

ToR 6. Review the SCA with tagging data (SCATAG)

No recommendations beyond those of the Summary report.

ToR 7. Evaluate the current biological reference points.

Recommendation 12. It is recommended that the impact of the assumed 1:1 sex ratio on reference point determination and stock assessment performance be reviewed and, if required, a data collection program to better characterize the sex ratio of the different components of the various stocks be made. This should specifically cover spatial and temporal factors in the fish population as a whole, the various sub-stocks and also cover the spatial, temporal and fleet characteristics of the fishery.

Appendix 1: Bibliography

A1	Assessment Summary Report		Summary; primarily used for management.
A2	Assessment Report		Text of Scientific report -- 2007 assessment.
A2	Assessment Report		Tables of Scientific report.
A2	Assessment Report		Figures of Scientific report.
A2	Assessment Report	Appendix 1	Documentation of Mixed Stock status and GIS
A2	Assessment Report	Appendix 2	Commercial Landings data sources.
A2	Assessment Report	Appendix 3	Estimation of Virginia and NC harvests.
A2	Assessment Report	Appendix 4	Recreational Fishery Monitoring.
A2	Assessment Report	Appendix 5	Analysis and discussion of 1998-2002 coast-wide weight at age.
A2	Assessment Report	Appendix 6	VPA indices workshop.
A2	Assessment Report	Appendix 7	AD Model Builder code for Stat. Catch at Age Model.
A2	Assessment Report	Appendix 8	Plots of SCA Model O-put
A2	Assessment Report	Appendix 9	ADAPT VPA
A2	Assessment Report	Appendix 10	Age-Structured Assessment Program (ASAP).
A2	Assessment Report	Appendix 11	Catch Curve Analysis.
A2	Assessment Report	Appendix 12	Estimation of F on Ages 8+, from landings and survey indices, 1982-2006.
A2	Assessment Report	Appendix 13	Input Tagging Matrices for MARK/Catch Method etc.
A2	Assessment Report	Appendix 14	Tables about Tagging Data.
A2	Assessment Report	Appendix 15	AD Model Builder code for Instant rates catch/release model (IRCR).
A2	Assessment Report	Appendix 16	Plots of results from SCATAG model.
	Background		Large pdf file with background papers from earlier work; previous assessment.

Some addition, particularly graphic, material was presented during the meeting, either at the request of the SARC or because the assessment team considered that it would be helpful to address a specific issue. Relevant figures are presented in Summary Report.

Appendix 2. Statement of work

CIE REQUEST

Subcontract between NTVI and Cefas (Dr. Geoff Tingley)

Statement of Work

November 14, 2007

General

The Northeast Regional Stock Assessment Review Committee (SARC) meeting is a formal, multiple-day meeting of stock assessment experts who serve as a panel to peer-review tabled stock assessments and models. The SARC is the cornerstone of the Northeast Stock Assessment Workshop (SAW) process, which includes assessment development (SAW Working Groups or ASMFC technical committees), assessment peer review, public presentations, and document publication.

The SARC46 review panel will be composed of three appointed reviewers from the Center of Independent Experts (CIE), and an independent chair from the Florida Fish and Wildlife Conservation Commission. The panel will convene at the Woods Hole Laboratory of the Northeast Fisheries Science Center (NEFSC) in Woods Hole, Massachusetts, from November 26 - 30, 2007 to review one assessment (Striped bass, *Morone saxatilis*). In the days following the review of the assessments, the panel will write the SARC Summary Report and each CIE reviewer will write an individual independent review report.

Specific Activities and Responsibilities

The CIE's deliverables shall be provided according to the schedule of milestones listed on Page 5. The CIE reviewers, along with input from the SARC Chairman, will write the SARC Summary Report. In addition, each CIE reviewer will write an individual independent review report. These reports will provide peer-review information for a presentation to be made by NOAA Fisheries at meetings of the New England and Mid-Atlantic Fishery Management Councils in 2008. The SARC Summary Report shall be an accurate and fair representation of the SARC panel viewpoint on how well each SAW Term of Reference was completed (please refer to Annex 1 for the SAW Terms of Reference).

The three SARC CIE reviewers' duties shall occupy a maximum of 14 days per person (i.e., several days prior to the meeting for document review; the SARC meeting in Woods Hole; and several days following the open meeting to contribute to the SARC Summary Report and to produce the Independent CIE Reports).

Not covered by the CIE, the SARC chair's duties shall occupy a maximum of 15 days (i.e., several days prior to the meeting for document review; the SARC meeting in Woods Hole; several days following the open meeting for SARC Summary Report preparation.)

Charge to SARC panel

The panel is to determine and write down whether each Term of Reference of the SAW (see Annex 1) was or was not completed successfully during the SARC meeting. To make this determination, panelists should consider whether the work provides a scientifically credible basis for developing fishery management advice. Criteria to consider include: whether the data were adequate and used properly, the analyses and models were carried out correctly, and the conclusions are correct/reasonable. Where possible, the chair shall identify or facilitate agreement among the reviewers for each Term of Reference of the SAW.

If the panel rejects any of the current Biological Reference Point (BRP) proxies for B_{MSY} and F_{MSY} , the panel should explain why those particular proxies are not suitable and the panel should recommend suitable alternatives. If such alternatives cannot be identified, then the panel should indicate that the existing BRPs are the best available at this time.

Roles and responsibilities

(1) Prior to the meeting

(SARC chair and CIE reviewers)

Review the reports produced by the Working Groups and read background reports.

(2) During the Open meeting

(SARC chair)

Act as chairperson, where duties include control of the meeting, coordination of presentations and discussion, making sure all Terms of Reference of the SAW are reviewed, control of document flow, and facilitation of discussion. For each assessment, review both the Assessment Report and the Assessment Summary Report.

During the question and answer periods, provide appropriate feedback to the assessment scientists on the sufficiency of their analyses. It is permissible to discuss the stock assessment and to request additional information if it is needed to clarify or correct an existing analysis and if the information can be produced rather quickly.

(SARC CIE reviewers)

For each stock assessment, participate as a peer reviewer in panel discussions on assessment validity, results, recommendations, and conclusions. From a reviewer's point of view, determine whether each Term of Reference of the SAW was completed successfully. Terms of Reference that are completed successfully are likely to serve as a basis for providing scientific advice to management. If a reviewer considers any existing Biological Reference Point proxy to be inappropriate, the reviewer should try to recommend an alternative, should one exist.

During the question and answer periods, provide appropriate feedback to the assessment scientists on the sufficiency of their analyses. It is permissible to request additional information if it is needed to clarify or correct an existing analysis and if the information can be produced rather quickly.

(3) After the Open meeting

(SARC CIE reviewers)

Each reviewer shall prepare an Independent CIE Report (see Annex 2). This report should explain whether each Term of Reference of the SAW was or was not completed successfully during the SARC meeting, using the criteria specified above in the “Charge to SARC panel” statement.

If any existing Biological Reference Point (BRP) proxies are considered inappropriate, the Independent CIE Report should include recommendations and justification for suitable alternatives. If such alternatives cannot be identified, then the report should indicate that the existing BRPs are the best available at this time.

During the meeting, additional questions that were not in the Terms of Reference but that are directly related to the assessments may be raised. Comments on these questions should be included in a separate section at the end of the Independent CIE Report produced by each reviewer.

If a reviewer feels that his/her comments are adequately expressed in the SARC Summary Report, it will not be necessary to repeat the same comments in the Independent CIE Report. In that case, the Independent CIE Report can be used to provide greater detail on specific Terms of Reference or on additional questions raised during the meeting.

(SARC chair)

The SARC chair shall prepare a document summarizing the background of the work to be conducted as part of the SARC process and summarizing whether the process was adequate to complete the Terms of Reference of the SAW. If appropriate, the chair will include suggestions on how to improve the process. This document will constitute the introduction to the SARC Summary Report.

(SARC chair and CIE reviewers)

The SARC Chair and CIE reviewers will prepare the SARC Summary Report. Each CIE reviewer and the chair will discuss whether they hold similar views on each Term of Reference and whether their opinions can be summarized into a single conclusion for all or only for some of the Terms of Reference of the SAW. For terms where a similar or a consensual view can be reached, the SARC Summary Report will contain a summary of such opinions. In cases where multiple and/or differing views exist on a given Term of Reference, the SARC Summary Report will note that there is no agreement and will specify - in a summary manner – what the different opinions are and the reason(s) for the difference in opinions.

The chair’s objective during this Summary Report development process will be to identify or facilitate the finding of an agreement rather than forcing the panel to reach an agreement if it cannot reach one. The chair will take the lead in editing and completing this report. The chair may express the chair’s opinion on each Term of Reference of the SAW, either as part of the group opinion, or as a separate minority opinion.

The SARC Summary Report (please see Annex 3 for information on contents) should address whether each Term of Reference of the SAW was completed successfully. For each Term of Reference, this report should state why that Term of Reference was or was not completed successfully. The Report should also include recommendations that might improve future assessments.

If any existing Biological Reference Point (BRP) proxies are considered inappropriate, the SARC Summary Report should include recommendations and justification for suitable alternatives. If such alternatives cannot be identified, then the report should indicate that the existing BRP proxies are the best available at this time.

The contents of the draft SARC Summary Report will be approved by the CIE reviewers by the end of the SARC Summary Report development process. The SARC chair will complete all final editorial and formatting changes prior to approval of the contents of the draft SARC Summary Report by the CIE reviewers. The SARC chair will then submit the approved SARC Summary Report to the NEFSC contact (i.e., SAW Chairman).

Schedule

The milestones and schedule are summarized in the table below. No later than December 17, 2007, the CIE reviewers shall submit their Independent CIE Reports to the CIE Program manager Dr. Manoj Shivlani via e-mail to mshivlani@rsmas.miami.edu

Milestone	Date
Open workshop at Northeast Fisheries Science Center (NEFSC) (begin writing reports, as soon as open Workshop ends)	November 26-28, 2007
SARC Chair and CIE reviewers work at the NEFSC drafting reports	November 28-30
Draft of SARC Summary Report, reviewed by all CIE reviewers, due to the SARC Chair **	December 17
CIE reviewers submit Independent CIE Reports to CIE for approval	December 17
SARC Chair sends Final SARC Summary Report, approved by CIE reviewers, to NEFSC contact (i.e., SAW Chairman)	December 24
CIE provides reviewed Independent CIE Reports to NMFS COTR for approval	December 31
COTR notifies CIE of approval of reviewed Independent CIE Reports	January 7, 2008 *
COTR provides final Independent CIE Reports to NEFSC contact	January 7, 2008

* Assuming no revisions are required of the reports.

** The SARC Summary Report will not be submitted, reviewed, or approved by the CIE.

The SAW Chairman will assist the SARC chair prior to, during, and after the meeting in ensuring that documents are distributed in a timely fashion.

NEFSC staff and the SAW Chairman will make the final SARC Summary Report available to the public. Staff and the SAW Chairman will also be responsible for production and publication of the collective Working Group papers, which will serve as a SAW Assessment Report.

NEFSC Contact person and SAW Chairman:

Dr. James R. Weinberg, NEFSC, Woods Hole, MA. 508-495-2352,
James.Weinberg@noaa.gov

Submission and Acceptance of CIE Reports

No later than December 31, 2007, the CIE shall provide via e-mail the final independent CIE reports and the CIE chair's summary report to the COTR William Michaels (William.Michaels@noaa.gov) at NOAA Fisheries. The COTR and alternate COTR Dr. Stephen K. Brown (Stephen.K.Brown@noaa.gov) will review the CIE reports to determine that the Term of Reference was met, notify the CIE program manager via e-mail regarding acceptance of the reports by January 7, 2008, and then distribute the reports to the NEFSC contact person.

ANNEX 1:

Terms of Reference

for the 46th Northeast Regional Stock Assessment Workshop on

ATLANTIC STRIPED BASS, *Morone saxatilis*
2007 Stock Assessment & Peer Review

Terms of Reference

1. Characterize the commercial and recreational catch including landings and discards.
2. Characterize the fisheries independent and dependent indices of abundance.
3. Evaluate the Statistical Catch at Age (SCA) model and its estimates of F, spawning stock biomass, and total abundance of Atlantic striped bass, along with the uncertainty of those estimates.
4. Evaluate the Baranov's catch equation method and associated model components applied to the Atlantic striped bass tagging data. Evaluate estimates of F and abundance from coastwide and Chesapeake Bay specific programs along with the uncertainty of those estimates.
5. Review the Instantaneous Rates Tag Return Model Incorporating Catch-Release Data (IRCR) and estimates of F on Atlantic striped bass. Provide suggestions for further development of this model for future use in striped bass stock assessments.
6. Review the Forward-Projecting Statistical Catch-At-Age Model Incorporating the Age-Independent Instantaneous Rates Tag Return Model (SCATAG) and estimates of F, spawning stock biomass, and total abundance of striped bass. Provide suggestions for further development of this model for future use in striped bass stock assessments.
7. Evaluate the current biological reference points for Atlantic striped bass from Amendment 6 and determine stock status based on those reference points.

ANNEX 2: Contents of SARC CIE Independent Reports

1.
For each assessment reviewed, the report should address whether each Term of Reference of the SAW was completed successfully. For each Term of Reference, state why that Term of Reference was or was not completed successfully. To make this determination, CIE reviewers should consider whether the work provides a scientifically credible basis for developing fishery management advice. Scientific criteria to consider include: whether the data were adequate and used properly, the analyses and models were carried out correctly, and the conclusions are correct/reasonable.

The report may include recommendations on how to improve future assessments.

If a reviewer feels that his/her comments are adequately expressed in the SARC Summary Report, it will not be necessary to repeat the same comments in the Independent CIE Report. In that case, the Independent CIE Report can be used to provide greater detail on specific Terms of Reference or additional questions raised during the meeting.
2.
If any existing Biological Reference Point (BRPs) proxies are considered inappropriate, include recommendations and justification for alternative proxies. If such alternatives cannot be identified, then indicate that the existing BRPs are the best available at this time.
3.
Any independent analyses conducted by the CIE reviewers as part of their responsibilities under this agreement should be incorporated into their Independent CIE Reports. It would also be helpful if the details of those analyses (e.g, computer programs, spreadsheets etc.) were made available to the respective assessment scientists.
4.
Additional questions that were not in the Terms of Reference but that are directly related to the assessments. This section should only be included if additional questions were raised during the SARC meeting.

ANNEX 3: Contents of SARC Summary Report

1.

The main body of the report shall consist of an introduction prepared by the SARC chair that will include the background, a review of activities and comments on the appropriateness of the process in reaching the goals of the SARC. Following the introduction, for each assessment reviewed, the report should address whether each Term of Reference of the SAW was completed successfully. For each Term of Reference, the SARC Summary Report should state why that Term of Reference was or was not completed successfully.

To make this determination, the SARC chair and CIE reviewers should consider whether the work provides a scientifically credible basis for developing fishery management advice. Scientific criteria to consider include: whether the data were adequate and used properly, the analyses and models were carried out correctly, and the conclusions are correct/reasonable. If the CIE reviewers and SARC chair do not reach an agreement on a Term of Reference, the report should explain why. It is permissible to express majority as well as minority opinions.

The report may include recommendations on how to improve future assessments.

2.

If any existing Biological Reference Point (BRP) proxies are considered inappropriate, include recommendations and justification for alternative proxies. If such alternatives cannot be identified, then indicate that the existing BRPs are the best available at this time.

3.

The report shall also include the bibliography of all materials provided during SAW 46, and any papers cited in the SARC Summary Report, along with a copy of the CIE Statement of Work.

The report shall also include as a separate appendix the Terms of Reference used for SAW 46, including any changes to the Terms of Reference or specific topics/issues directly related to the assessments and requiring Panel advice.



Cefas

