

36<sup>th</sup> Northeast Regional Stock Assessment Workshop (SAW-36)  
Stock Assessment Review Committee (SARC) Meeting  
Northeast Fisheries Science Center  
Woods Hole, Massachusetts  
December 2 - 6, 2002

Report Prepared

for

University of Miami Independent System for Peer Review

by

John P. Wheeler  
Department of Fisheries and Oceans  
Northwest Atlantic Fisheries Centre  
St. John's, Newfoundland  
Canada

## Executive Summary

- The 36<sup>th</sup> Stock Assessment Review Committee (SARC 36) met at the Northeast Fisheries Science Center, Woods Hole, Massachusetts, from December 2 - 6, 2002.
- The Committee was asked to review the assessments of five stocks:
  - 1) Southern New England / Mid-Atlantic winter flounder
  - 2) Gulf of Maine winter flounder
  - 3) Southern New England / Mid-Atlantic yellowtail flounder
  - 4) Cape Cod / Gulf of Maine yellowtail flounder
  - 5) Northern shrimp
- The Committee was also asked to investigate stock structure of yellowtail flounder resources off the northeastern United States and identify appropriate stock units for assessment and management.
- The Committee was also asked to address several issues regarding Striped Bass.
- This report provides a summary of the results and recommendations from the meeting. Detailed information is available in the Consensus Summary and respective Advisory Reports, generated as output from the SARC meeting. Perceptions of the assessment process, which are my opinions, are also provided.
- The SARC reviewed information on spatial distribution patterns, geographic variation in growth and maturity, morphometric variation, and larval transport of yellowtail flounder off the northeastern United States. The committee concluded that yellowtail flounder should be managed as three stock units: Georges Bank, Southern New England / Mid-Atlantic, and Cape Cod / Gulf of Maine.
- For Southern New England / Mid-Atlantic, and Cape Cod / Gulf of Maine yellowtail flounder stocks, the assessments indicated that these stocks were overfished and that overfishing is occurring. In both cases, the SARC recommended that fishing should be reduced to near zero.
- For Southern New England / Mid-Atlantic winter flounder, the assessment also indicated that the stock is overfished and that overfishing is occurring. For this stock, the SARC recommended that the fishing mortality in 2003 be reduced to a level which would promote stock rebuilding by 2013.
- For Gulf of Maine winter flounder, the assessment indicated that the stock is not overfished and that overfishing is not occurring. The SARC recommended that fishing mortality be maintained below the maximum sustainable level to ensure that spawning stock biomass remains near the maximum sustainable level.

- For Northern Shrimp, the estimated biomass was above the proposed biomass threshold and fishing mortality was below all standard reference points. The SARC recommended that fishing mortality be kept low to minimize the risk of decline in stock size and to protect the 1999 and 2001 year classes.
- For Striped Bass, the SARC suggested that age 7 be used as the first fully recruited age for the estimation of fishing mortality. Problems with age determination need to be resolved before choosing the best plus grouping. Objective methods for the selection of tuning indices also need to be developed.
- Although the SARC process is highly structured and well organized, I felt that the agenda for SARC 36 may have been too ambitious. It is also very important that the terms of reference be clearly written.
- The SARC process would benefit from greater involvement of industry and fishers.
- Advisory Reports should place greater emphasis on how and why stock status has changed since the last assessment.
- For research recommendations within the control and mandate of specific scientific agencies, progress should be described in detail in SARC reports.
- For analytical assessments with severe retrospective patterns, decision rules are required to determine if the assessment should be rejected or accepted.

## Background

The Stock Assessment Review Committee (SARC) is a forum where stock assessment experts review fish stock assessments prepared by federally or state led working groups. The SARC is part of the Northeast Regional Stock Assessment Workshop (SAW), which is a formal scientific peer review process for evaluating and presenting stock assessment results to managers. The SARC prepares two reports: an Advisory Report or summary for managers, and a Consensus Summary of Assessments, which includes assessment working papers, SARC comments, sources of uncertainty, and research recommendations.

SARC 36 met at the Northeast Fisheries Science Center, Woods Hole, Massachusetts, from December 2 - 6, 2002. The Committee was asked to review the assessments of five stocks, 1) Southern New England / Mid-Atlantic winter flounder, 2) Gulf of Maine winter flounder, 3) Southern New England / Mid-Atlantic yellowtail flounder, 4) Cape Cod / Gulf of Maine yellowtail flounder, and 5) Northern shrimp. In addition, the Committee was asked to investigate stock structure of yellowtail flounder resources off the northeastern United States and to identify appropriate stock units for assessment and management. The Committee was also asked to address several issues regarding striped bass, including the most appropriate Virtual Population Analysis (VPA) model configuration for assessing the stock. SARC 36 was asked to review more assessments than any prior SARC.

The SARC 36 panel consisted of twelve members, four from the host Northeast Fisheries Science Center, two from the Atlantic States Marine Fisheries Commission, one from the Northeast Regional Fishery Management Council, two from the National Marine Fisheries Service, one from the Department of Fisheries and Oceans, and two (including myself) from the Center for Independent Experts. In addition, there were two *ex officio* participants from the Northeast Fisheries Science Center.

## Description of Review Activities

The SAW chair, Terry Smith, distributed electronic copies of the terms of reference (Appendix 1) and all working papers (Appendix 2) approximately two weeks prior to the meeting. In addition, draft Advisory Reports were provided for some stocks prior to the meeting. Upon receipt of the working papers and prior to the meeting, I made hard copies, read each of the documents, summarized results, and developed questions to ask during the meeting.

For each of the five stock assessments, plus the yellowtail flounder stock identity and striped bass review, a detailed presentation was given by a lead researcher. This was followed by an extensive question and discussion period. On occasion, the lead researcher was asked to provide further analyses which were subsequently reviewed during the meeting. Before the meeting ended, Advisory Reports were completed. This involved reviewing the reports sentence by sentence until a consensus was reached by the panel. Similarly, SARC comments, sources of uncertainty and research recommendations were reviewed and agreed upon by the panel for inclusion in the Consensus Summary.

During the meeting, the Chair asked me to act as SARC leader for Southern New England / Mid-Atlantic winter flounder. As such, I prepared comments from the SARC discussions, consulted with the rapporteur in the development of the draft Advisory Report, ensured that research recommendations were properly recorded, and ensured that the Advisory Report and Consensus Summary reflected the discussion and conclusions of the SARC.

In this report, I have taken the liberty of including conclusions and recommendations with the Summary of Findings. I have also divided the Summary of Findings into two parts: 1) a stock by stock summary, and 2) my perceptions of the process. The first part addresses the terms of reference of the meeting and follows closely from the respective Advisory Reports and Consensus Summary. The second part is based mostly upon my observations during the meeting and as such, represents my personal views. Acknowledging that they are personal views, I hope that they will provide a fresh perspective to the SAW process and will aid in the evolution of the process.

I would be remiss if I did not acknowledge the help of several people during SARC 36. The chair, Andy Payne (CIE reviewer), must be congratulated; given the different philosophical views of the panel, he did an excellent job ensuring that all views were presented while maintaining a flow and keeping the meeting on schedule. Terry Smith (SAW Chair) was extremely helpful prior to and during the meeting in ensuring that panellists had all information necessary to review the stocks in question. Finally, a special thanks to Pie Smith (SAW Program Coordinator) for her incredible hospitality during the week.

## **Summary of Findings**

### **1) Stock Structure of Yellowtail Flounder**

Before reviewing the assessments of yellowtail flounder, the SARC was asked to review a summary of available information on stock structure of yellowtail flounder off the northeastern United States. Currently, yellowtail flounder in the area are managed as five units: Georges Bank, Cape Cod, Gulf of Maine, Southern New England, and Mid-Atlantic.

The review included information on spatial distribution patterns, geographic variation in growth and maturity, morphometric variation, and larval transport. Most evidence suggested that yellowtail flounder on Georges Bank were distinct from those in adjacent areas. The data also showed a considerable degree of movement and similarities in biological characteristics between Southern New England and Mid-Atlantic stocks. It was noted that, in the past, these areas had been considered a single stock, but were split for jurisdictional rather than biological reasons. There was also limited information to suggest that Cape Cod and Gulf of Maine yellowtail flounder should be assessed as a single stock.

The SARC concurred with the conclusion of the Southern Demersal Working Group to define three yellowtail flounder stock units: Georges Bank, Southern New England / Mid-Atlantic, and Cape Cod / Gulf of Maine.

The SARC expressed concern that many conclusions were based upon differences in biological characteristics which may simply reflect different environmental regimes in various areas. Also, significant emphasis was placed upon the results of historical tagging studies. However, tag returns from these studies were not adjusted for fishing effort, which may affect the interpretation of results. There were also concerns that the Cape Cod / Gulf of Maine stock may not be self-sustaining, as there was limited evidence of egg and larval production in the area.

It was recommended that further investigation be carried out to evaluate the degree of mixing of yellowtail flounder between Georges Bank and Cape Cod. It was also suggested that the analysis of stock boundaries could be refined by: 1) evaluating the spatial scale at which data are presented for distribution of life history stages, 2) incorporating information on larval size composition to better delineate possible spawning areas, and 3) performing statistical tests for differences in biological characteristics.

## 2) Southern New England / Mid-Atlantic Yellowtail Flounder

This was the first combined assessment for yellowtail flounder in the Southern New England and Mid-Atlantic areas since the 1960's. A virtual population analysis (VPA) was completed which indicated that the combined stock is overfished and that overfishing is occurring. The SARC recommended that fishing mortality should be reduced to near zero. The state of the stock and management advice is similar to that of SARC 27 in 1998 for the Southern New England stock component. Both components of the combined stock were previously determined to be overfished.

In a retrospective analysis, the VPA indicated a consistent pattern of underestimating fishing mortality and overestimating spawning stock biomass since the mid 1990's. Consequently, current estimates of biomass and fishing mortality are likely to be optimistic, and future analyses may indicate lower biomass estimates and higher fishing mortality estimates for 2001 than indicated in the current assessment. The SARC considered the retrospective pattern to be a key source of uncertainty in the assessment. Although it noted that overfishing status was not affected by the retrospective bias, it recommended that this information be included in the management advice.

It was suggested that retrospective patterns may indicate inadequate sampling and mis-allocation of catch at age. Although sampling was poor in 1999, it improved in 2000 and 2001. Obtaining adequate samples from a low volume fishery is always difficult. For numerous years in the time series, samples were not available from the Mid-Atlantic fishery; in these cases, Southern New England samples were used to characterize Mid-Atlantic catches. The SARC recommended evaluating the impact of such pooling, by examining years where adequate samples exist for both areas. It also suggested that a forward projection model be considered to account for errors in catch at age caused by poor sampling.

The SARC noted that the discard ratio used to estimate yellowtail flounder discards in the scallop fishery may not be the most suitable. It recommended that the use of effort-based and discard / kept ratios be examined for such fisheries.

Mean weights at age in the commercial catch have decreased in recent years. The SARC recommended that weights at age from research survey data be examined to confirm trends observed in the commercial catch.

The spatial coverage of the NEFSC autumn research survey, used as an index of recruitment and stock abundance in the VPA, was not consistent over the entire time series, in particular in the 1960's. This would not impact the results of the VPA which begins in 1973. However, it may impact hind-cast recruitment estimates which are used in projections, and hence may ultimately affect the biological reference point estimates. The SARC recommended that data from the entire stock area be incorporated for the fall survey calibration index.

### 3) Cape Cod - Gulf of Maine Yellowtail Flounder

This was the first combined assessment for Cape Cod and Gulf of Maine yellowtail flounder. Results indicated that the combined stock is overfished and that overfishing is occurring. The SARC recommended that fishing mortality should be reduced to near zero to halt overfishing and promote rebuilding to the maximum sustainable spawning stock biomass. The state of the stock and management advice is similar to that of SARC 28 in 1999 for the Cape Cod stock component. This component, which accounts for 90% of the combined landings, was previously determined to be overfished.

Prior to our meeting, the yellowtail flounder working group had formulated a VPA using age 1 to 6+ catch at age (as per previous assessments) which exhibited a severe retrospective pattern for spawning biomass and fishing mortality. It also produced a high estimate of current fishing mortality, which was inconsistent with increasing research survey indices of abundance, used as input to the model. This generated considerable discussion within the SARC. It was suggested that a high estimate of fishing mortality indicates that the VPA is tuning on the oldest age group only. It was concluded that using a fishing mortality estimate for ages 4 and 5 in the VPA may not be a good estimator of fishing mortality on the population since a large portion of the catch is age 3. The SARC recommended a VPA which truncated the catch at age to age 5+. In the first VPA, age 3 fish were partially recruited; in the revised run, age 3 fish were considered fully recruited. The revised run reduced the magnitude of the retrospective patterns for fishing mortality and spawning biomass, but was highly sensitive to the calibration range. Fully recruited fishing mortality decreased while spawning biomass increased. The SARC accepted the revised VPA, acknowledging that it provided a different perspective on the historical development of the stock and the fishery.

The SARC noted several sources of uncertainty in the assessment. Relative year class strengths were not tracked well over time by the research surveys, indicating that survey availability has been variable throughout the time series. In particular, there was an apparent increase in survey availability in the fall of 1999 and spring of 2000 which would have a large influence upon the VPA calibration. Although the SARC recommended that Cape Cod and Gulf of Maine yellowtail flounder be considered a single stock for assessment purposes, it expressed concern that the area may not be self-sustaining. The degree of mixing with adjacent stocks is not well known. Given that the Georges Bank yellowtail stock is much larger

than the Cape Cod / Gulf of Maine stock, any transfer from there could confound population estimates.

The SARC recommended that tagging studies be planned to examine movements of yellowtail flounder between stock areas. This would also allow for the independent estimation of fishing mortality. It also recommended increased biological sampling from the Gulf of Maine portion of the stock area, inclusion of the State of Maine inshore survey data in the assessment, and the potential for alternative indices of abundance, such as industry based surveys, study fleets, and a dedicated flatfish survey.

#### 4) Southern New England / Mid-Atlantic Winter Flounder

This stock was last assessed by SARC 28 in 1998. At that time, the stock was at a medium level of biomass and was fully exploited. The current assessment indicated that the stock is overfished and overfishing is occurring. This change in perception was due mainly to the retrospective pattern of underestimating fishing mortality and overestimating spawning stock biomass in the current VPA. The SARC recommended that fishing mortality be reduced in 2003 to a level (0.24) which would promote rebuilding to a maximum sustainable biomass by 2013.

There was considerable discussion regarding the retrospective pattern in the VPA for this stock and whether the VPA should be accepted. Numerous sources of uncertainty were suggested which could cause such retrospective patterns, including increased catchability in the research surveys, mis-classification of landings by stock area, underestimation in the discarded proportion of the catch, and under-reporting of commercial or recreational landings. The SARC concluded that, while the VPA provided uncertain estimates of current fishing mortality and spawning stock biomass, it still provided the best available determination of stock status. It recommended that these uncertainties and their potential magnitudes be included in the management advice.

The SARC noted that retrospective patterns are evident in several New England groundfish stock assessments. It recommended that these be further investigated to determine if a common cause exists. It also suggested that alternative assessment methods, such as statistical catch at age models, be explored for dealing with retrospective patterns.

The SARC discussed the process for selecting indices to tune the VPA. In the current assessment, three new tuning series and two new recruitment indices were used. Quite often, it appeared that indices were used for political rather than biological reasons. A VPA with the same indices as in SARC 28 was reviewed; results were similar to the accepted VPA.

#### 5) Gulf of Maine Winter Flounder

This stock was last assessed by SARC 21 in 1996. At that time, an index based assessment concluded that the stock was at a low level of biomass and was over exploited. This is the first analytical assessment for this stock. It indicated that the stock is not overfished and overfishing is not occurring. The SARC recommended that fishing mortality be maintained

below the maximum sustainable level (0.43) to ensure that the spawning stock biomass remains near the maximum sustainable level.

This stock is relatively unique among Gulf of Maine groundfish stocks, as the VPA indicates that stock biomass is currently at a high level and is subjected to low fishing mortality. Based upon the recent spatial distribution of commercial landings and research survey catches, it appears that most of the recent stock rebuilding has occurred off Massachusetts, with very little evidence of rebuilding off Maine.

As with the previous stocks reviewed by SARC 36, the VPA for this stock also exhibited a retrospective pattern of underestimating fishing mortality and overestimating spawning stock biomass. The probable cause of this pattern is under-reporting or under-estimation of catch. The SARC concluded that, while the VPA provided uncertain estimates of current fishing mortality and spawning stock biomass, it provided a better determination of stock status than reliance on survey indices alone.

Biological reference points were estimated for the first time in this assessment, using empirical, nonparametric, and parametric stock-recruit modelling approaches. The SARC concluded that the Beverton-Holt parametric model reference points be adopted as the basis for the ASMFC and NEFMC FMP overfishing definitions.

Several sources of uncertainty were identified in the assessment, including the lack of a long time series of research survey coverage in inshore New Hampshire and Maine waters, the small number of NEFSC survey tows in inshore Massachusetts strata, low sampling intensity (length frequencies) of commercial and recreational landings, and differences in the age at maturity between different research surveys.

The SARC recommended that some of these sources of uncertainty be investigated, by increasing the number of tows in inshore strata in the NEFSC survey, increasing the temporal and market category coverage of length sampling in the commercial landings, and initiating periodic maturity staging workshops, involving State and federal trawl survey staff.

## 6) Northern Shrimp

This stock was last assessed by SARC 25 in 1997 at which time biomass was considered to be below average and fishing mortality was considered to be high. In this assessment, biomass was estimated to be above the proposed biomass threshold and fishing mortality was estimated to be below all standard reference points. The SARC recommended that fishing mortality be kept low to minimize the risk of decline in stock size and to protect the 1999 and 2001 year classes.

There were no quantitative status determination criteria adopted in this assessment. Total landings and indices of abundance from a summer shrimp research survey were analysed with a Collie-Sissenwine (CSA) model to estimate abundance and mortality rates. Given the unique life history characteristics of the species, the SARC questioned the use of a single reference point estimate when interpretation of fishery independent indices may provide more reliable management advice. It recommended that managers establish appropriate

reference targets, thresholds, and limits, and consider control rules that account for the unique life history characteristics of the species.

The SARC also expressed concern that the estimate of natural mortality (0.25) used in the CSA model may be low for a short-lived species such as shrimp. It recommended that alternative methods of estimating natural mortality be investigated, including maximum expected lifespan, size-dependent mortality, and life history based approaches.

Biomass estimates from the current assessment did not match historical estimates as changes had been made to the empirical data. The SARC recommended that all changes since SARC 25 be documented.

Sources of uncertainty included poorly defined natural mortality, incomplete catch data, inconsistent availability of shrimp to the NEFSC fall survey, and poorly estimated growth. To address some of these uncertainties, the SARC recommended that assumptions of natural mortality, as used in the analyses, be further explored, survey selectivity of the NEFSC fall survey and State/Federal summer survey be investigated, and development of growth consistent with shrimp life history be better estimated.

## 7) Atlantic Striped Bass

SARC 36 was not asked to review the assessment of Atlantic Striped Bass, but was asked to address six specific issues (see Terms of Reference, Appendix 1).

Commercial and recreational catch, including landings and discards, were characterized both by number and weight. Catch (in numbers) decreased by 14% from 2000 to 2001. Recreational fisheries accounted for 71% of the 2001 total catch and age 4 to 7 fish dominated in the total catch.

On providing guidance on the most appropriate VPA configuration, the SARC suggested that age 7 be used as the first fully recruited age for the estimation of fishing mortality. Problems with determining the age of older fish need to be resolved before selecting the best plus grouping. However, in the interim, the use of a 12+ age group should be acceptable. Objective methods for the selection of tuning indices also need to be developed. It was also noted that the determination of overfishing status was sensitive to the plus group. Use of a 13+ group generated a fishing mortality in 2001 which exceeded the threshold.

On the estimation of fishing mortality rates from tagging data, it was noted that recapture data are used to estimate survival and recovery rates. These methods are used to independently estimate fishing mortality rates for four mixed coastal stocks using alternative models. However, some models provide little information in estimating fishing mortality. The SARC suggested that models that provide little information could be excluded.

On the validity of averaging stock specific estimates from several tagging programs to estimate total stock exploitation, the SARC noted that differences between tagging programs makes averaging difficult. It suggested that model structure could be improved to account for differences in tagging seasons.

On discard estimation methodology and the validity of using tag returns to adjust the reporting rate, the SARC suggested that, in the absence of direct estimates of reporting rates, the use of tag returns appeared to be useful for application on a gear and state specific basis. Additional studies on discard mortalities, by gear, should be conducted.

Estimates of fishing mortality from an illustrative VPA were compared with estimates from coastal tagging programs. Fishing mortalities from the VPA were not statistically different from tagging programs. With the information provided, the SARC was not able to advise on which combination of tagging programs provided the most appropriate derivation of fishing mortality for comparison with the VPA. The SARC was also unable to advise on the appropriate age range and weighting scheme to derive a fishing mortality from the VPA for comparison with that from tagging.

### **Perceptions of the SARC Process**

The SARC process is highly structured and well organized. However, SARC 36 may have been over subscribed due to a large agenda that included the review of five stock assessments, the stock structure of yellowtail flounder, and detailed questions on striped bass. In my opinion, the agenda was too long and some items did not receive a thorough review. This was especially apparent when the analytical assessment of one stock, Cape Cod - Gulf of Maine yellowtail flounder, had to be revised during the meeting and reviewed a second time. Without the forceful guidance of the Chair, the agenda would never have been completed in the prescribed time. This also highlights the importance of having a good Chair who can balance the flow of the meeting, allowing for the give and take of individual opinions, while maintaining the schedule.

Given the busy schedule of the SARC, it is important that the terms of reference be clearly written. In the case of striped bass, uncertainty over the meaning of the terms of reference led to delays during the meeting. The draft Advisory Report had to be rewritten and reviewed by the committee.

The SARC process could benefit from greater involvement of industry and fishers. Some researchers indicated that the SARC advice is not normally well received by the fishing industry or fishers. This questions the credibility of the process. If the fishing industry and fishers played a greater role in the earlier stages of the review process, they would better understand the conclusions and advice provided by the SARC. For northern shrimp, it was indicated that an industry advisory panel provided input to the technical panel prior to the assessment. This type of approach should be encouraged for other assessments. It was also indicated that there would be an industry-based survey for Southern New England - Mid-Atlantic yellowtail flounder in 2003. This would provide an excellent opportunity for collaboration between the fishing industry and scientists.

In their current format, the Advisory Reports for each assessment provide detailed information on current stock status. However, they provide very little information on how stock status or the perception of stock status has changed since the last assessment. This could be improved with the inclusion of comparative fishing mortality, spawning stock biomass, and

recruitment plots, with explanatory text regarding any changes. This would allow managers, fishers, and industry to better understand how and why stock status has changed. It would also allow scientists to better explain the uncertainties in the assessment and how these uncertainties can affect the perception of stock status.

In this SARC, an attempt was made to separate research recommendations into two categories, new recommendations from the current SARC and old recommendations from previous SARCs. For old recommendations, progress was indicated as 'nil', 'in progress', or 'completed'. However, for recommendations within the control and mandate of specific scientific agencies, progress should be described more fully. This would allow future SARCs to better evaluate areas of concern.

On an editorial note, previous SARC Advisory Reports and Consensus Summaries should be made available prior to the meeting. This would provide reviewers with a better understanding of the issues for a particular stock and allow them to determine the progress on research recommendations.

My final comment is a generic one applicable to any analytical assessment but certainly pertinent to the current SARC. There do not appear to be any decision rules to determine if and when a VPA should be rejected based upon retrospective patterns. In several cases, there were severe retrospective patterns where fishing mortality was underestimated and spawning stock biomass was overestimated. In all such cases, there was also a pattern to the residuals. However, in all cases, it was concluded that although the VPAs provided uncertain estimates of fishing mortality and spawning stock biomass, they provided a better determination of stock status than reliance upon survey indices alone. I realize that this problem is widespread and not restricted to the SARC; however, in order to maintain credibility in the assessment process, this issue needs to be reconciled possibly by setting decision rules to define if the assessment should be rejected or accepted.

## Appendix 1. SARC 36 Terms of Reference

### A. Yellowtail Flounder (for Mid-Atlantic, Southern New England and Cape Cod areas)

1. Investigate stock structure of yellowtail flounder resources off the northeastern United States and identify appropriate stock units for assessment and management.
2. Characterize the commercial and recreational catch including landings and discards.
3. Estimate fishing mortality, spawning stock biomass, and total stock biomass for the current year and characterize the uncertainty of those estimates.
4. Evaluate and either update or re-estimate biological reference points as appropriate.
5. Where appropriate, estimate a TAC and/or TAL based on stock status and target mortality rate for the year following the terminal assessment year.
6. If stock projections are possible,
  - a. provide short term projections (2-3 years) of stock status under various TAC/F strategies and
  - b. evaluate current and projected stock status against existing rebuilding or recovery schedules, as appropriate.

### B1. Winter Flounder (Southern New England / Mid-Atlantic (SNE/MA) stock)

1. Update the status of SNE/MA winter flounder stock through 2001 providing estimates of fully recruited fishing mortality rate, biomass weighted fishing mortality rate, stock size, mean biomass, spawning stock biomass, and recruitment as appropriate. Characterize uncertainty in SSB and fishing mortality rates.
2. Provide short-term (2002) and medium term projections (2009) of catch and biomass (mean biomass, SSB) under status quo F, and ASMFC's  $F_{40\%}$ , target and NEFMC's  $F_{MSY}$ .
3. Develop research recommendations for improving assessment of winter flounder.
4. Comment on and revise, where necessary, the ASMFC and the NEFMC overfishing definitions for this stock. (Note: currently ASMFC and the NEFMC have different overfishing definitions. The Board had recommended that the WFTC develop a single overfishing definition for this stock.)

### B2. Winter Flounder (Gulf of Maine (GOM) stock)

1. Characterize status of GOM winter flounder using the analytical tools that are most appropriate for available data. These may include sequential population analysis,

surplus production, survey indices and relative exploitation indices, or length based models.

2. Where possible provide best estimates of exploitation rates (fishing mortality, relative exploitation), mean biomass, spawning stock biomass and characterize uncertainty associated with these estimates.
3. Develop yield per recruit and biological reference points.
4. Where possible, provide short-term and medium term projections of catch and stock size under status quo  $F$  and various proposed target fishing mortality rates ( $F_{20\%}$ ,  $F_{25\%}$ ,  $F_{30\%}$ ,  $F_{40\%}$ ,  $F_{0.1}$ ,  $F_{max}$ ,  $F_{msy}$ ) as appropriate.
5. Develop and recommend an overfishing definition for Gulf of Maine winter flounder that meets the standards of the Sustainable Fishery Act.
6. Develop research recommendations for improving assessment of winter flounder.

#### C. Northern Shrimp

1. Characterize the commercial and recreational catch including landings and discards.
2. Estimate fishing mortality, spawning stock biomass, and total stock biomass for the current year and characterize the uncertainty of those estimates.
3. Evaluate methodologies for the development of biological reference points for Northern Shrimp.

#### D. Atlantic Striped Bass

1. Characterize the commercial and recreational catch including landings and discards.
2. Review the VPA based stock assessment and provide guidance on determining the best, most appropriate model configuration. Provide specific guidance on plus grouping, as well as an evaluation of the fishery independent surveys and the ages on which to base the last true age  $F$ .
3. Estimate fishing mortality rates for specific components of the coastal stock complex using tagging data.
4. Discuss the validity of averaging stock specific estimates from several separate tagging programs as a means to estimate total stock exploitation.
5. Review the discard estimation methodology and the validity of using tag returns as an adjustment to the reporting rate.

6. Provide a comparison of tag and VPA derived F estimates. If possible, provide guidance on the most comparable aspects of the VPA output and the tag derived F. Also provide guidance on which of the tagging programs (or average of programs) would be most comparable to the VPA derived F.

## Appendix 2. List of References Provided

- A-1. Cadrin, S. Literature Review of Research on Yellowtail Flounder Stock Structure.
  - A-2. Cadrin, S. Spatiotemporal Patterns in Abundance of Yellowtail Flounder off the Northeastern United States.
  - A-3. Cadrin, S. Geographic variation in Growth and Maturity of Yellowtail Flounder off the Northeast United States.
  - A-4. Cadrin, S. and V. Silva. Morphometric Variation of Yellowtail Flounder.
  - A-5. Cadrin, S. Exploratory Analysis of Yellowtail Flounder Larval Transport off the Northeastern United States.
  - A-6. SAW Southern Demersal Working Group<sup>1</sup>. Stock Assessment of Yellowtail Flounder in the Southern New England - Mid-Atlantic Area.
  - A-7. SAW Southern Demersal Working Group<sup>1</sup>. Stock Assessment of Yellowtail Flounder in the SAW Cape Cod – Gulf of Maine Area.
  - B-1. ASMFC Winter Flounder Technical Committee<sup>2</sup>. Assessment of the Southern New England - Mid-Atlantic winter flounder stock complex for 2002.
  - B-2. ASMFC Winter Flounder Technical Committee<sup>2</sup>. Assessment of the Gulf of Maine winter flounder stock for 2002.
  - C1. ASMFC. Stock Assessment Report for Gulf of Maine Northern Shrimp – 2002.
  - C-2. ASMFC. Draft Discussion Paper for Northern Shrimp Section to Amendment 1 to the Interstate Fishery Management Plan for Northern Shrimp – 12/18/01.
  - C-3. ASMFC. An Hierarchical Approach to Determining Reference Points for Pandalid Shrimp.
  - D-1. ASMFC Striped Bass Technical Committee. Atlantic Striped Bass Draft Advisory Report.
  - D-2. ASMFC Striped Bass Technical Committee. 2002 Stock Assessment Report for Atlantic Striped Bass.
1. SAW Southern Demersal Working Group: F. Almeida, J. Brodziak, H. Chickarmane, L. Col, A. Hangsterfer, J. King, A. Kuzirian, C. Legault, R. Mayo, T. Nies, L. O'Brien, W. Overholtz, P. Rago, T. Sheehan, V. Silva, S. Sunderland, M. Terceiro (Chair), M. Thompson, and S. Wigley

2. ASMFC Winter Flounder Technical Committee: J. Burnett, S. Cadrin, S. Correia, L. Lee, C. Legault, A. Mooney, L. Munger, P. Nitschke, S. Sherman, D. Simpson, K. Sosebee, M. Terceiro, and S. Wigley

## Appendix 3. Statement of Work

### General

The Stock Assessment Review Committee meeting (SARC) is a formal, one-week long meeting of stock assessment experts who serve as a peer review panel for several tabled stock assessments. It is part of the overall Northeast Stock Assessment Workshop (SAW) process which also includes peer assessment development (SAW Working Groups), public presentations, and document publication within a cycle that lasts six months. The panel is made up of some 12-15 assessment scientists: 4 scientists from the NEFSC; a scientist from the Northeast Regional office, scientists from the staff of the New England and Mid-Atlantic Fishery Management Councils, and Atlantic States Marine Fisheries Commission and additional panelists from state fisheries agencies, academia (US and Canada), and other federal research institutions (US and Canada).

Designee will serve as a panelist on the 36th Stock Assessment Review Committee panel. The panel will convene at the Northeast Fisheries Science Center in Woods Hole the week of 2 December 2002 (2 - 6 December) to review assessments for yellowtail flounder (*Limanda ferruginea*) (including stock identification issues for nominal Mid-Atlantic, southern New England and Cape Cod stocks), winter flounder (*Pseudopleuronectes americanus*) (southern New England/Mid-Atlantic and Gulf of Maine stocks), northern shrimp (*Pandalus borealis*) and striped bass (*Morone saxatilis*).

### Specific

The reviewer's duties will occupy a maximum of 11 workdays; a day or two prior to the meeting for document review; the week long meeting; and a day or two following the meeting to ensure that the final documents are consistent with the SARC'S recommendations and advice, and a few days to prepare the review report. No consensus opinion between two CIE reviewers will be accepted.

1. Prior to the meeting: become familiar with the working papers produced by the SAW Working Groups (total number not final; there will be at least one per stock);
2. During the meeting: participate, as a peer, in panel discussions on assessment validity, results, recommendations, and conclusions. Participate in the formulation of the draft SARC Advisory Report;
3. Review the final Draft Advisory Report and Consensus Summary Report.
4. No later than December 20, 2002, submit a written report consisting of the findings, analysis, and conclusions, addressed to the "University of Miami Independent System for Peer Review," and sent to Dr. David Die, via email to [ddie@rsmas.miami.edu](mailto:ddie@rsmas.miami.edu).