Report from the Chair

of the

35th Northeast Regional Stock Assessment Workshop (SAW-35)
Stock Assessment Review Committee (SARC) Meeting

held at the

Aquarium Conference Room
NEFSC Woods Hole Laboratory
Woods Hole, Massachusetts

on

24 - 28 June, 2002

Norm Hall
Murdoch University, Western Australia, Australia
July 2002

Executive summary of findings and recommendations.

1. More detailed descriptions of the methods used to collect and analyze the raw data should be provided.
1. Estimates of the uncertainty that is associated with each point estimate should be presented.
2. The results of analyses using alternative sets of assumptions should be presented.
3. The extent to which the survey indices and size/age composition data represent different components of each stock needs to be assessed.
4. Observer surveys should be enhanced to obtain appropriate data on the discards of each stock.
5. Consideration should be given to applying adaptive control rules that utilize feedback from the fishery for stock assessments of fisheries for which the paucity of data precludes estimation of the current absolute levels of fishing mortality and biomass.
6. More stringent controls on recreational catches of summer flounder may be required if the specified limits on these catches are to be effective.
7. Simulation studies should be undertaken to assess further the use of the index-based methodology.

Background

The 35th Northeast Regional Stock Assessment Workshop (SAW-35) Stock Assessment Review Committee (SARC) met in the Aquarium Conference Room, NEFSC Woods Hole Laboratory, Woods Hole, Massachusetts, on 24 - 28 June, 2002. The purpose of the meeting was to review the stock assessments that had been undertaken for the summer flounder and scup, to review methodology developed by the SAW Methods Working Group for index-based stock projections, and to review the preliminary results from a recent genetic-based stock identification study on silver hake (whiting).

The 35th SARC panel comprised Steve Cadrin, Devorah Hart, Jim Weinberg, and Susan Wigley (NMFS/NEFSC); Christopher Moore (MAFMC); John Carmichael, Matt Cieri, and Joe Desfosse (ASMFC); Ciaran Kelly (Irish Marine Institute); Ana Parma (Centro Nacional Patagonico, Argentina/CIE); Isaac Wirgin (NYU) and was chaired by Norm Hall (Murdoch Univ., Australia/CIE).

A list of the background documents that were reviewed and discussed by the SARC is presented in Appendix 1. The summer flounder, scup, methods and silver hake documents were presented at the meeting by Mark Terceiro, Laura Lee, Paul Rago and Bill Phoel & Peter Straub, respectively. The Statement of Work for the Chair is attached as Appendix 2.

Details of the discussions, conclusions and recommendations by the SARC are recorded in the Draft Advisory Report and the Consensus Reports that are produced as outputs of the SARC Meeting. Rather than duplicating these reports, I shall focus on the process and on certain aspects of the assessments where improvements may be possible.

Description of review activities

Drawing upon their previous experience at organizing such meetings, the NEFSC ensured that the SARC meeting flowed smoothly, and that working documents that were generated during the meeting were available as needed. By networking the notebook computers used by the panel members, the NEFSC provided immediate access to the working documents that were being created and modified during the course of the meeting. This innovation proved very effective in ensuring that panel members were able to access updated versions of the draft reports being developed at the meeting.

The meeting was constrained to discuss the silver hake (whiting) on the afternoon of Wednesday, June 26, by the availability at this time of Bill Phoel, Peter Straub and Isaac Wirgin, and was required to reach consensus on this segment while these individuals were present. However, this did not constrain or limit the discussion as, prior to the SARC meeting, Bill Phoel and Peter Straub had recognized that certain aspects of the preliminary results (as discussed in the Draft Advisory and Consensus Reports) were deficient and that further study was required. This conclusion was strongly endorsed by Isaac Wirgin, Jim Weinberg and Steve Cadrin, who made suggestions for improving further research. Accordingly, the SARC rapidly reached consensus that no new data were available to support any change to the current understanding of the stock identity of the silver hake.

The new index-based methodology provoked interesting discussion among the SARC. A flaw in the mathematical derivation, which linked the replacement ratio to the series of recruitment levels and the mortality to which these preceding year classes had been exposed, was detected. However, this error in derivation did not invalidate the method as the replacement ratio, calculated as the ratio of the survey index to a moving average of previous survey indices, still provides a measure of the change in stock biomass. Thus, much of the assessment of the method by the Methods group was still relevant. Unfortunately, some confusion developed initially within the SARC as to the impact of the flaw on the utility of the results derived using the index-based method. Nevertheless, the SARC reached consensus that the method was likely to be useful in future stock assessments, but concluded that further simulation studies were required before the full potential of the technique could be assessed. The mathematical basis of the method also needed to be revised, recognizing that the original derivation was inappropriate.

Overall, the meeting ran smoothly and all panel members participated well in the discussions and in the drafting of the advisory and consensus reports. The quality of the background documentation and presentations contributed to the effectiveness of the SARC's deliberations. As the meeting ran to schedule, detailed consideration of the draft recommendations and advice from the SARC was possible, ensuring that the final documents received the SARC's endorsement before the meeting concluded.

Summary of findings

1. Detailed descriptions of the designs of the various data capture methods, the validation that is undertaken to confirm the accuracy of these raw data, and the analytical methods that are used to produce the estimates used in the assessments are not presented in the background documents. Thus, for example, it is not clear how the Marine Recreational Fishery Statistics Survey is conducted, nor is it clear whether the use of the annuli in otoliths or scales for determining the ages of the fish of each species has been properly validated. A summary document that provides details of the collection of the basic raw data, and the derivation of the values of the variables that form the basis of the estimates used in the stock assessment should form part of the background documentation. In this respect, I found it surprising that the annuli in scales were being used to age the summer flounder, as the use of the annuli in otoliths is now preferred for many species. However, insufficient information was presented to allow determination of the adequacy of the ageing methodology that had been applied.
2. Estimates of values of variables such as survey indices, proportions of the catches that are discarded, etc., that are derived from sampling or research surveys, should be presented with the estimates of the error associated with the point estimates. By providing these standard errors, it is possible to assess more appropriately the weight that should be given to the point estimates and to identify where samples are less than adequate.
3. The paradigm existing for the summer flounder assessment is that stock abundance may best be represented by incorporating as many of the survey indices as possible when analyzing the data. However, the issue is more complex than this, as the question is whether the survey indices are representative of the abundance of the stock, or of some components of the stock, and thus whether and how these indices should be used in the VPA. Simply incorporating all possible indices has the potential of introducing bias into the assessment. Incorporating the spatial structure of the stock into the VPA is unrealistic. However, appropriate analyses should be undertaken of the survey data to determine the impact on the statistics used in the VPA of the spatial distribution of the surveys and of fishing with respect to the underlying spatial distribution of the stock. Through such analysis, the adequacy and extent to which each of the survey indices (and associated size and age compositions) are representative of the abundance of different components of the stock might be determined, allowing appropriate use within the VPA.
4. Estimation of the quantities of discarded fish, and the associated removals from the stock through the resultant deaths of some/many of these fish, continues to be a source of uncertainty. The primary cause of this uncertainty lies in the fact that observer surveys are required to provide accurate estimates of the proportions of the fish of each species, that are caught by commercial fishers, which are landed or released. Yet, such observer surveys often provide only a small statistical sample of the total quantities of fish that are discarded. The sampling intensity becomes more of a problem as the data are disaggregated in accordance with the spatial and temporal distribution of fishing and the age composition of the released fish. The resulting estimates of the discarded catch, even before allowing for the proportion that die, are very much dependent on the assumptions used in the analysis. It would be useful to ensure that the alternative estimates are considered in the subsequent assessment for summer flounder rather than selecting to use

only the analysis based on the total days fished. However, it would also be appropriate to derive estimates of the precision of the resulting point estimates. While there is a need for additional observer surveys, at least for some sectors, an assessment of the impact of the uncertainty in the discard estimates is also warranted.

5. Implementation of limits on the recreational catches of summer flounder appears to be difficult, as the catches from this sector considerably exceed the limits that have been specified. If the limits are to be effective, more stringent controls are required for this sector.
6. The evidence that the stock of summer flounder is rebuilding is strong, as both survey indices and age composition data support this finding. However, rebuilding the age composition takes time, and thus achievement of a biomass in excess of the biomass threshold is still to be attained. While fishing mortality has been reduced considerably, it still exceeds the fishing mortality threshold. This may be attributed to (a) recreational catches that exceed the specified limit; (b) the retrospective bias in the estimates of biomass and fishing mortality and lack of adjustment for this bias when estimating an appropriate TAC (total allowable catch); and (c) specification of a target fishing mortality that is equal to the threshold fishing mortality. These factors delay the achievement of fishing mortalities and stock sizes that would demonstrate rebuilding beyond the threshold. It would be appropriate to include an adaptive strategy, which responds to feedback from the fishery as to the adequacy of the fishery's response, in the control rules that are adopted for each fishery.
7. The control rule that has been adopted for the summer flounder is not as strong as that used in the example presented in the introduction to the draft advisory report. That is, although the biomass of the stock is less than the threshold biomass, the threshold fishing mortality has not been set to the minimum possible level, nor even to a level less than F_{msy}, but rather to F_{msy}. In the example in the Draft Advisory Report, such a threshold fishing mortality might be assigned when the biomass of the stock exceeds B_{msy}, but not when it lies below B_{msy} or below $B_{threshold}$. Similarly, in the example, target fishing mortalities are set at levels less than $F_{threshold}$. Control rules appear to be poorly defined for the summer flounder and should possibly be reconsidered when the reference points are reviewed.
8. Little has changed from previous assessments for the scup fishery, beyond the addition of further years of landings data and further collection of inadequate survey data, which were insufficient to provide precise and accurate estimates of commercial discards. Although various algorithms were applied to the observer data, the analysis of discards was constrained by the paucity of input data. The resulting estimates of discards were considered too imprecise to be used in either biomass dynamics or VPA models. There appear to be three possible approaches to resolve this problem. The approach that has been proposed by previous SARCs is to extend the observer survey to collect adequate data and develop an appropriate time series. A second approach might be to incorporate explicitly the uncertainty of the discard estimates within the modeling framework, thereby ensuring that appropriate consideration is given to the adequacy and representation of the existing observer discard data. A third approach is to develop an adaptive strategy to manage the scup fishery, based on the survey indices of abundance.
9. Considerable concern was expressed within the SARC that the assessment of the current status of the biomass of the scup stock was based on the three-year average of a single,

but possibly imprecise, survey index of SSB. Although the value of this index had clearly increased, the increase in abundance had occurred in all year classes rather than only the recruiting year class. This suggested that the increase may have arisen partly from a change in distribution, and thus a change in catchability, rather than representing only a real increase in abundance of the scup stock. Confirmation of the stock status may need to be obtained from next year's data, before managers may confidently accept the conclusions arising from the current assessment.

10. The flaw in the derivation of the replacement ratio from the recruitment and mortality time series, which was detected, did not invalidate the use of the ratio but did impact on the interpretation of some aspects of the study. Essentially, whether or not it is changing or is stable, the biomass may be expressed as the sum over all year classes of the surviving biomasses of the individual year classes. The biomass may be represented as a linear sum of functions of the number of fish that recruited to each year class, the survivorship of the year class and the average weight. Thus, by dividing the biomass by this sum (which is, by definition, also the biomass), the result must be 1. That is, this ratio provides no information as to whether the stock is increasing, decreasing, or remaining stable. However, by moving from this derivation, the replacement ratio may be defined as the ratio of the current biomass to an estimate of the biomass in the previous year. The latter may be calculated as a moving average or weighted average of the previous biomass estimates. The replacement ratio then takes on values less than, equal to, or greater than 1 depending on whether the biomass is decreasing, remaining stable, or increasing, respectively. The history of the fishery determines whether it has experienced periods of stability at different levels of fishing mortality. Accordingly, the pattern of the points that arise when the replacement ratio is plotted against the relative fishing mortality reflects the history of the fishery. Thus, whether it is appropriate to fit a regression line to these data points depends upon the trends in biomass and fishing mortality that have been experienced in the fishery. Further study of the replacement ratio is required, using simulation, before it is applied within a formal assessment. However, the graphic display that has been developed appears a useful tool to communicate the changes in biomass, and is likely to assist in interpreting the changes apparent in data from the fishery.
11. As the researchers who had undertaken the genetic study advised, the preliminary results of the analysis of the stock structure of silver hake were based on inappropriate data and the application of inappropriate analytical methods. Further work that the researchers have proposed to undertake should provide data that are more reliable. However, until such data become available, the current understanding of the stock structure remains unchanged.

Conclusions and recommendations

1. Documentation of the methods describing the capture of the raw data, their validation, and of the analytical methods (and weights of the various strata) that are used to produce the data that form the basis of the stock assessments should be made available to the SARC.

2. Estimates of the standard errors of the survey indices, estimates of discards, etc., that are derived from statistical analysis of collected data should be presented in tables and figures to accompany the point estimates that are used in the stock assessments.
3. Rather than choosing a single assumption from a set of alternatives, as in the decision to base the calculation of commercial discards of summer flounder on the estimates of fishing effort, there is merit in considering the impact of the alternative assumptions on the assessment of the stock's status and on the estimates of future TACs to achieve the management objectives.
4. The spatial and temporal distributions of the summer flounder and scup stocks and the relationship between these distributions and the distributions of fishing and of surveys are important factors that should be considered when assessing the status of each of these fisheries. There is a need to assess the extent to which the survey data, *i.e.*, the abundance indices and the size/age composition, are representative of the whole stock or of components of that stock. The consistency that exists between the different survey indices may provide an indication of the precision of these variables as indices of the abundance of (components of) the stock.
5. More stringent controls on recreational catches of summer flounder may be required if the specified limits on these catches are to be effective.
6. Assessment of the status of the scup is likely to remain highly uncertain until adequate discard data are collected and a sufficiently long time series becomes available. The recommendations for future research that are listed by the SARC are currently a wish list, rather than an attempt to assign priorities to the research that is required. It would be useful if the background documentation presented to the SARC for each stock provided a brief summary of the research studies or actions taken with respect to each of the previous SARC's recommendations, or advised of factors that had constrained research action.
7. For some stocks, such as the scup, the quality and quantity of data preclude the estimation of biological reference points of the type produced when data allow the application of models such as ASPIC or VPA. For such fisheries, there is potential value in considering adaptive control rules that utilize feedback from the fishery as to the response of the stock and fishing mortality to the management controls that have been applied. New index-based methods, such as that being developed for the replacement ratio, may prove valuable for such fisheries. A broader, yet still precautionary, approach may have relevance to the management of some fisheries for which MSY-based reference points may not be determined.

Appendix 1. Bibliography of materials provided

SAW-35 SARC WORKING PAPERS
24 - 28 June, 2002
NOAA/NMFS/NEFSC/Woods Hole Laboratory

W-35 SARC Working Papers, including the Working Group reports and other analyses, are listed below. The papers are coded by topic:
A - Summer flounder; **B - Scup; C - Methods; D - Silver Hake**

Stock		***Title***	***Author (s)***
Summer flounder	**A-1.**	Assessment of Summer Flounder for 2002	*
	A-2	2001Summer Flounder Assessment Draft Advisory Document	*
	A-3.	MAMFC SSC 2001 Summer Flounder Overfishing Definition Review	**
Scup	**B-1.**	Scup Working Paper for 2002 Assessment Update	***
	B-2.	Exploratory ASPIC Model Analysis for Assessment of Scup Population	
	B-3.	Estimates of Fishing Mortality (F) and Stock Biomass of Scup from 1981 to 2001 Based on CPUE from the Recreational Private Boat Fishery	
	B-4.	Scup Draft Advisory Report	
Methods	**C-1.**	Application of Index Methods: Catch and Fishery Independent Abundance Surveys	P. Rago
Silver Hake	**D-1.**	The Correlation of Silver Hake (*Merluccius bilinearis*) abundance with Bottom Water Temperatures in the Middle Atlantic Bight and Stock Identification using Microsatellite DNA	W. Phoel

* = Southern Demersal Working Group (J. Bancroft, P. Caruso, C. Legault, A. Mooney, C. Moore, P. Nitschke, R. Pearson, E. Powell, and M. Terceiro (Chair))
** = SSC (D. Conover, W. Gabriel, J. Hightower, J. Hoenig, M. Holliday, E. Houde, C. Jones, T. Miller, M. Prager, and C. Moore (Chair))
*** = Scup Stock Assessment Committee, ASMFC

Appendix 2. Statement of work

STATEMENT OF TASK

Consulting Agreement between the University of Miami and Dr. Norm Hall

June 7, 2002

General

The Stock Assessment Review Committee meeting (SARC) is a formal, one-week long meeting of a group 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 chairman of the 35th Stock Assessment Review Committee panel. The panel will convene at the Northeast Fisheries Science Center in Woods Hole the week of 24 June 2002 (24-28 June) to review assessments for summer flounder (*Paralichthys dentatus*) and scup (*Stenotomus chrysops*). The panel will also review a newly developed methodology used to provide biomass projections for stocks whose assessments are index-based. The SARC will also be asked to review and comment on some recent stock identification work for silver hake (whiting, *Merluccius bilinearis*).

Specific

(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: Act as chairperson where duties include control of the meeting, coordination of presentations and discussion, control of document flow;

(3) After the meeting: Facilitate the preparation and writing of a Draft Advisory Report and Consensus Summary Report by NMFS personnel. Panelists, NEFSC staff and the SAW Chairman will ensure that documents are made available to the SARC chair, revised according to the SARC Chair's directions, compiled, copied and distributed;

(4) Review the final Draft Advisory Report and Consensus Summary Report.

(5) No later than July 15, 2002, submit a written chair report[1] addressed to the "University of Miami Independent System for Peer Review," and sent to Dr. David Die, via email to ddie@rsmas.miami.edu.

The SAW Chairman and SAW Coordinator will assist the Chair prior to, during and after the meeting in ensuring that documents are distributed in a timely fashion. The SARC Chair will be solely responsible for the editorial content of the reports.

The Chair's duties will occupy a total of two weeks (14 days) - several days prior to the meeting for document review; the week long meeting; several days following the meeting to ensure that the final documents are consistent with the SARC's recommendations and advice, and several days to complete the chair report.

Contact persons: Dr. Terrence P. Smith, NEFSC, Woods Hole, SAW Chairman, 508-495-2230
Mary Jane Smith, NEFSC, Woods Hole, SAW Coordinator, 508-495-2370

Signed_____ Date_____

Norm Hall

[1] The written report will undergo an internal CIE review before it is considered final. After completion, the CIE will create a PDF version of the written report that will be submitted to NMFS and the consultant.

ANNEX I: REPORT GENERATION AND PROCEDURAL ITEMS

1. The report should be prefaced with an executive summary of findings and/or recommendations.

2. The main body of the report should consist of a background, description of review activities, summary of findings, conclusions/recommendations, and references.

3. The report should also include as separate appendices the bibliography of all materials provided and a copy of the statement of work.

Please refer to the following website for additional information on report generation: http://www.rsmas.miami.edu/groups/cimas/Report_Standard_Format.html