Report to CIE of the 1st Southeast Atlantic Stock Assessment Review Committee (SARC)
Raleigh, N. Carolina 14-16 May 2002

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History of events

The first SARC in the Southeast was convened on the afternoon of May 14th and continued until May 16, 2002. It followed a Data Workshop and a Stock Assessment Workshop. A summary document from the latter and a CD-ROM of supporting information were circulated prior to the SARC.

Once underway, Drs. Berkson and Prager led the SARC through the SAW assessment. During their presentation, clarifications and requests for more information were made. Time was also used to discuss developing the SARC process for the Southeast. The first draft of the Advisory Document was produced following the format of the Northeast series. Time constraints meant that the Consensus Document was developed only to point form before the meeting broke up. New figures and tables were required for both the Advisory and Consensus documents, most of which were supplied during the meeting.

After the meeting, the Chair formatted and finished the first draft of the Advisory and sent it out to the SARC panel for final feedback. While waiting their responses, the Consensus Document, which was in a much rougher form, was developed to a draft status and circulated by e-mail. The final, approved versions of these two documents were sent to Dr. Nancy Thompson on June 5.

Executive summary, findings and recommendations

This summary will be partitioned into two sections; the first will deal with the technical aspects of the review, and the second on those related to the process.

Technical summary

The assessment well represented the status of the red porgy stock, which has fallen and is currently overfished, but overfishing is not occurring. The current index of spawning stock biomass is low; the 2001 spawning stock size is estimated at about 43% of SSBmsy and 55% of MSST. The 2001 fishing mortality rate is estimated at about 45% of Fmsy. Recruitment, as measured by the age-structured model, has trended down from 1972 with an upturn in 2001. The size structure of the stock has been reduced after a period of high fishing mortality.

There is considerable uncertainty in future rates of recovery due to uncertainty about the biology of the species, model uncertainty, and quality of the data available. Projections simulating current fishing mortality (Amendment 12 regulations) show less than 50% probability of achieving SSBmsy in 2016 which is the last year of the Council's 18 year rebuilding program. Several other scenarios and models were investigated and showed considerable divergence in the recovery rates. Because of this divergence and the difficulty in extrapolation outside the regions for which data are available, until further investigation, the projections should be used only as broad indicators of trend.

Procedural summary.

The unusual degree of haste made pre-meeting preparation difficult, both in terms of lead-time and confusion. The FEDEX package containing the document and CD-ROM did not arrive in Halifax until after I left. Fortunately, Dr. Merriner called and arranged with Dr. Prager to direct me to a website so that a copy of the SAW assessment manuscript could be reviewed before the meeting. Another aspect of the lack of sufficient pre-meeting preparation time was that I did not receive the final Terms of Reference until arriving in Raleigh. The situation was compounded by the limited circulation of two other sets of ToRs, which although similar, were not identical to the final version.

The two and a half days allotted for the meeting were insufficient. The assessment received a thorough review, but there was not enough time for document preparation. There were two reasons for this. The first was the SAW assessment manuscript itself. It was well prepared and edited. However, it was insufficiently informative for systematic critical and technical review. There were few tables, even basics such as catch history and abundance data were not in the document. Although much of the missing information was in an accompanying compact disk, a certain minimum level in the printed material is needed for immediate reference. Also the degree of documentation describing the details of the models, alternative analyses (especially those that were later rejected), and diagnostics was insufficient. It is more efficient for a review to have more detail than will be needed in the final documentation and then edit out the superfluous than to have not enough and have to guess what is missing and request more information during the meeting. To paraphrase, this meant the reviewers did not know what they did not know. The second reason for the failure to complete the agenda during the meeting was the lack of familiarity with the SARC proceedings among the assessment production team. This meant that standards and default formats for figure and text exchange were not at hand. The other aspect of the lack of SARC experience was the document (advisory and consensus) preparation phase was less efficient than desirable. As an example there was no analog to the 'SARC Leader' in the New England reviews to help in document preparation nor were first drafts. Exchange of personnel with the Northeast for SARCs would expedite the transition to an experienced team, especially those about to do assessments in the Southeast. Also, Dr. Terry Smith from Woods Hole would be a good source of experience and information on the SARC process and document production.

Considerable time was spent describing the SAW/SARC process in New England and discussing what attributes would be directly applicable and what amendments would make the process better suited for the Southeast. Both the SARC panel and the other attendees actively participated in this discussion and the Consensus Document contains a summary. Opening this discussion to all was appreciated and it should help to assure that the system and the review process more transparent.

Although adequate and effective, the SARC was smaller than ideal. A second person from either CIE or NMFS (Northeast) would have been useful. This will be more of an issue when more than one stock is reviewed. The Chair had to act as both chair and a technical reviewer. These roles were sometimes in conflict. As chair, he would try to move the discussion along towards consensus; as a reviewer he would try to slow it down to examine details or propose alternative analysis. A Chair should not dominate, but rather solicit the panel's viewpoints. When acting as a technical expert, he must make his point but guard against giving his own point of view too much weight.

Future SARCs will need realistic support, enough people on the SARC and enough time to produce good drafts. A default standard format for exchange of text and figures would be expeditious. Finally, a glossary (eg, MSST, Fmsy…) for both output documents should be developed.

The hotel environment is less productive than a government lab, especially the lab of the team producing the assessment(s), such aspects as copying, technical support, libraries etc.

Appendix A. Background material.

Harris, P. J., and J. C. McGovern. 1997. Changes in the life history of red porgy, *Pagrus pagrus*, from the southeastern United States, 1972 – 1994. *Fishery Bulletin* 95: 732-747.

Poots, J. C., and C. S. Manooch III. 2002. Estimated ages of red porgy (*Pagrus pagrus*) from fishery-dependent and fishery-independent data and a comparison of growth parameters. *Fishery Bulletin* 100: 81-89.

Red Porgy 2002 CD ROM (containing basic data, assessment workshop results, data workshop reports, and the SAW report).

SAFMC Meeting Folder. October 2001(a). MARMAP Objectives (1996 – 2000).

SAFMC Meeting Folder. October 2001(b). Potential MARMAP Objectives (2001 – 2006).

Vaughan, D. S., and M. H. Prager. 2002. Severe decline in abundance of the red porgy (*Pagrus pagrus*) population off the southeastern United States. *Fishery Bulletin* 100: 351-375.

Appendix B. Statement of Work.

STATEMENT OF WORK

Consulting Agreement Between The University of Miami and Dr. Robert Mohn

General

NMFS is conducting a new stock assessment for red porgy (*Pagrus pagrus*). In this effort, a Stock Assessment Workgroup (SAW) convened on April 8-12, 2002 and produced a preliminary assessment of the red porgy stock -- including estimates of stock status benchmarks (MSY, Fmsy, Bmsy, MSST, and a rebuilding projection analysis) as called for by the Sustainable Fisheries Act (SFA). This assessment is to undergo independent peer review by a Stock Assessment Review Committee (SARC) during a formal 3-day meeting May 14-16, 2002. Actions needed by South Atlantic Fishery Management Council (SAFMC) to manage red porgy in compliance with SFA (i.e. to meet the rebuilding schedule) will also be determined. The SARC will be comprised of stock assessment experts (7 - 9 in number from organizations including the following: NMFS, university faculty, plus SAFMC staff and advisory panel chair). The red porgy assessment will serve as a "pilot stock assessment" in the Southeast Fishery Science Center's (SEFSC) effort to develop a new stock assessment process with an expanded peer review component for the SE Region. The SAFMC will schedule a special meeting in July to take action(s) as appropriate for the red porgy stock.

SEFSC requests the assistance of a scientist from the Center for Independent Experts (CIE) to chair the SARC scheduled to convene May 14-16, 2002 in Raleigh, NC. The CIE designee should have expertise in fisheries stock assessment. Given that this is a pilot effort, the CIE designee will also be asked to identify strengths and weaknesses in the red porgy assessment review process and provide recommendations for improvements.

Stock Assessment Review Committee Tasks

The SARC will evaluate the red porgy assessment, its input data, assessment methods, and model results as put forward by the SAW. Specifically, the SARC will:

1. Evaluate the adequacy and appropriateness of fishery-dependent and fishery-independent data used in the assessment (i.e. was the best available data used in the assessment?);
2. Evaluate the adequacy, appropriateness, and application of models used to assess red porgy and to estimate population benchmarks (MSY, Fmsy, Bmsy and MSST, i.e. SFA items);

3. Evaluate the adequacy, appropriateness, and application of models used for rebuilding analyses;
4. Develop recommendations for future research for improving data collection and the assessment;
5. Prepare a Consensus Stock Assessment Report from the Draft Stock Assessment Workshop Report provided by the SAW and presented to the SARC by the SAW Chair. An example of the format and content of the report is available on NMFS, Northeast Fisheries Science Center's web site (http://www.nefsc.nmfs.gov/nefsc/publications); see year 2001 item entitled "Report of the Northeastern Regional Stock Assessment Workshop (33rd SAW) Consensus Summary of Assessments". This red porgy report will be completed by May 31, 2002;
6. Prepare a SARC Advisory Report including a summary of stock-status, management recommendations and forecast for the upcoming year. An example of the format and content is shown within "Report of the 33rd SAW" document (see item 5 above). This red porgy report will be completed by May 31, 2002.

Attending NMFS scientific staff will provide editorial assistance to the review panel during the meeting and assist the panel in preparation of the reports (items 5 and 6 above). The reports shall be provided to Dr. Nancy Thompson, SEFSC Director, 75 Virginia Beach Drive, Miami, FL 33149.

SARC Chairperson Tasks

The primary responsibility of the Chairperson of the SARC is to ensure that the Committee tasks outlined above are completed and the two reports cited above, are delivered as per to the formats referenced in items "5 & 6" above, to the CIE in a timely manner. Additional duties are listed below:

1. Prior to the meeting, the SARC Chairperson will be provided with the Draft Stock Assessment Workshop Report and associated documents on red porgy (including previous assessment paper, recent studies of age, and an overview of the Marine Area Monitoring and Prediction project conducted by the South Carolina-Department of Natural Resources). The SARC Chair shall read and review these documents to gain an in-depth understanding of stock assessment itself and the resources and information considered for the assessment;
2. The SARC Chairperson shall control and guide the meeting, including the coordination of presentations and discussions, and document flow as per the Agenda, developed by the SARC Chairperson in consultation with the SAFMC and NMFS contact persons identified in this Statement of Work;
3. The SARC Chairperson shall facilitate the preparation and writing of the Draft SARC Advisory Report and final Consensus Stock Assessment Report. SARC members, SEFSC staff and the SAW Chairperson will assist the SARC Chairperson in revising the above two reports. The SARC Chairperson shall be

responsible for the editorial content of the final Consensus Stock Assessment Report and the SARC Advisory Report;

4. The SARC Chairperson will also identify strengths and weaknesses in the red porgy SAW/SARC process and provide recommendations for improvements, in a letter to the SEFSC Center Director;
5. No later than May 31, 2002, submit a chair report[1] detailing the major events, results, and conclusions of the meeting. The report should be addressed to the "UM Independent System for Peer Reviews, " and sent to David Die via email to ddie@rsmas.miami.edu.

Signed_____ Date_____

NMFS contact :
John Merriner 252-728-8708, FAX 252-728-8784, e-mail John.Merriner@noaa.gov

SAFMC contact:
Gregg Waugh 843-571-4366, FAX 843-769-4520, e-mail Gregg.Waugh@noaa.gov

[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.

Appendix C. Red Porgy Advisory Document

RED PORGY ADVISORY REPORT

Status of Stock: The stock is overfished but overfishing is not occurring. The current index of spawning stock biomass is low; the 2001 spawning stock size is estimated at about 43% of SSBmsy and 55% of MSST. The 2001 fishing mortality rate is estimated at about 45% of Fmsy. Recruitment, as measured by the model, has trended down from 1972 with an upturn in 2001. The size structure of the stock has been reduced after a period of high fishing mortality.

Management Advice: Fishing mortality should not be increased. Although overfishing is not currently taking place, in the future fishing mortality may need to be reduced to meet the 2016 rebuilding requirement. However, there is very little information associated with the effects of the current management regime (Amendment 12 initiated in 1999) with which to project rebuilding.

Forecast: There is considerable uncertainty in future rates of recovery due to: uncertainty about the biology of the species, model uncertainty, and quality of the data available.

Projections simulating current fishing mortality (Amendment 12 regulations) show less than 50% probability of achieving SSBmsy in 2016 which is the last year of the Council's 18 year rebuilding program. See Figure 4. The projections show a 50% probability of exceeding the MSST in 2011. Projections simulating no directed fishing or by-catch (F = 0) would achieve SSBmsy in 2009 but the mortality from discards would increase.

Landings (metric tons) and Stock Status Table

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Max*	Min*	Mean*
Commercial	234	213	198	196	195	193	144	48	12	30	729	12	294
Headboat	50	46	40	42	37	34	31	22	6	23	340	6	117
Recreational	54	30	21	48	53	8	6	31	12	25	109	3	41
Total	338	290	258	286	285	236	181	101	30	77	929	30	452
SSB	960	908	880	879	820	807	833	933	1132	1326	9580	807	3652
Abundance	4661	4428	4491	4537	4276	4624	4450	4065	3907	4307	18215	3907	9069
Recruits (1000)	1301	1212	1403	1342	1085	1646	1119	787	796	1226	3349	787	2015
F	0.72	0.62	0.56	0.63	0.68	0.56	0.37	0.21	0.04	0.09	0.83	0.04	0.35
F/FMSY	3.81	3.27	2.96	3.30	3.57	2.96	1.95	1.09	0.24	0.45	4.37	0.24	1.86

*Maximum, minimum and mean based on period 1972-2001

Stock Identification and Distribution: Red porgy have an extensive range in warm waters of the Atlantic Ocean and adjacent seas. The management unit analyzed includes fish from U.S. Atlantic waters of North Carolina (NC) south of Cape Hatteras, South Carolina (SC), Georgia (GA), and the east coast of Florida (FL), including the Atlantic side of the Florida Keys (Monroe County). Within that stock definition, red porgy have been most abundant in NC and SC waters. Tagging studies show neither long-range migrations nor extensive local movements of adult red porgy, and there is no circumstantial or anecdotal information to suggest such movements.

Catches: (Figure 1) Three major fisheries catch this stock of red porgy: commercial, recreational, and headboat. The most common commercial gear has been hook and line, with occasional commercial landings also from trawls and traps. Trawling for red porgy has been banned since January 12, 1989. Total landings increased during the 1970s and early 1980s as the commercial fishery expanded, rising from about 335 mt in 1972 to over 900 mt in 1982. Except for a brief spike in 1988-1990, landings declined steadily from the 1982 peak to the low of under 30 mt in 2000.
The headboat fishery was predominant, 1972-1977, accounting for 64% on average of landings in weight. From 1978, onward the commercial fishery predominated, representing 53-82% of annual landings. Recreational fisheries seldom landed more than 10% of the total until 1999-2001, when they represented 34% of total weight landed. Commercial landings increased during the 1970s, from 47 mt in 1972 to 729 mt in 1982.

Data and Assessment: A Data Workshop was held March 11-14, 2002, and a series of Stock Assessment Workshops took place between April 8 - May 6, 2002. Two models were used to assess stock status: Age structured model and Production model. The age structured model used catch, length composition (Figure 2), age composition, and abundance indices (Figure 3). The production model used catch and abundance indices.

In all analyses, the value of natural mortality used was 0.225.

Biological Reference Points: Three sets of Biological Reference Points are presented: 1) the current definitions using the last assessment's results, 2) the current definitions using results from the 2002 assessment and 3) a proposed set.

Council's Current Definitions (Proxies) from Amendment 12:

A. Maximum fishing mortality threshold (MFMT). A fishing mortality rate (F) corresponding to a 35% Static SPR (previously estimated as F=0.43; estimated in the 2002 assessment as 0.49) based on a 14" TL minimum size limit.

B. Minimum stock size threshold (MSST). The minimum stock size threshold is defined as the maximum of either 0.5 or 1-M (M = natural mortality = previously defined as 0.28; currently defined as 0.225) times SSBmsy proxy. The Council is specifying the minimum stock size associated with 35% Static SPR which was previously estimated as 3,328 metric tons (MSST=(1-0.28)*4,622=3,328 mt) or 7.34 million pounds. The SSBmsy proxy associated with 35% Static SPR estimated in the 2002 assessment was 859 mt.

C. Rebuilding timeframe. Red porgy cannot be rebuilt in less than 10 years (see NMFS SEFSC results as shown in Figure 4) and a generation time is estimated as 8 years. Therefore, the rebuilding timeframe for red porgy is 18 years with 1999 being Year 1 given the emergency closure was implemented on September 8, 1999.

The SARC recommends using the following biological reference points:
The Council's definition of MSST = (1-M) * SSBmsy; MSST was estimated in this assessment to be 2,364 mt.

Fmsy used as per Amendment 12 to determine overfishing; Fmsy was estimated in this assessment to be 0.19.

Amendment 12 defines the rebuilding time period as 18 years with 1999 as Year 1. The rebuilt state was defined as the stock's reaching SSBmsy = 3,049.5 mt. The minimum stock size threshold (MSST) is used to measure whether the stock is overfished.

Fishing Mortality: F from model had an increasing trend from 1972 through 1990 and generally declined until 2000. F exceeds Fmsy from the late 1970s through the late 1990s (Figure 5)**.** Relative fishing mortality rates from the age structure and production models showed similar patterns.

Recruitment: Estimated recruitment generally declined throughout the time series. See Figure 6.

Stock Biomass: The Total SSB (males and females) declined through 1990 with a slight increase in 1999 and 2000. The relative SSB/SSBmsy from the Age-structured and Production models were in agreement (Figure 7). The SSB estimates from the Age-structured model were divided into male and female components (Figure 8). The male SSB declined more than female SSB.

Special Comments:
Red porgy switch sex from females to males. The analytical tools and biological reference points do not take this into consideration. Implications of this are unknown and could have important affects on reference points and estimates of recovery.

Concern was expressed that important information on the status of larger red porgy derived from deeper waters was not available as a separate index for inclusion in the assessment. It is recommended that further consideration be given to developing such indices from commercial and fishery independent data.

Effective monitoring of stock recovery, especially under further fishing mortality reductions, will require information on discards.

Source of Information: Report of Red Porgy Stock Assessment Workshop, April 8 - May 6, 2002. In addition, a Data Workshop was held March 11-14, 2002. All data, reports, and results are included on a CD available from the NMFS Beaufort Lab.

Figure 1. History of catches with management events superimposed.

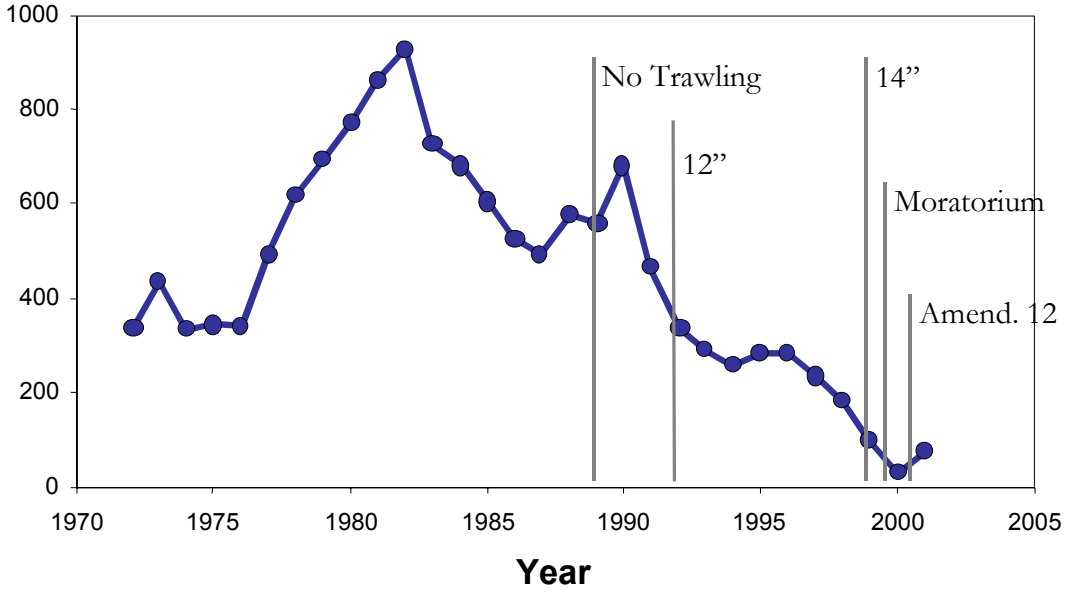


Figure 2. Commercial (hand line) and Headboat length frequency data from selected years (1976, 1986, 1996 and 2001).

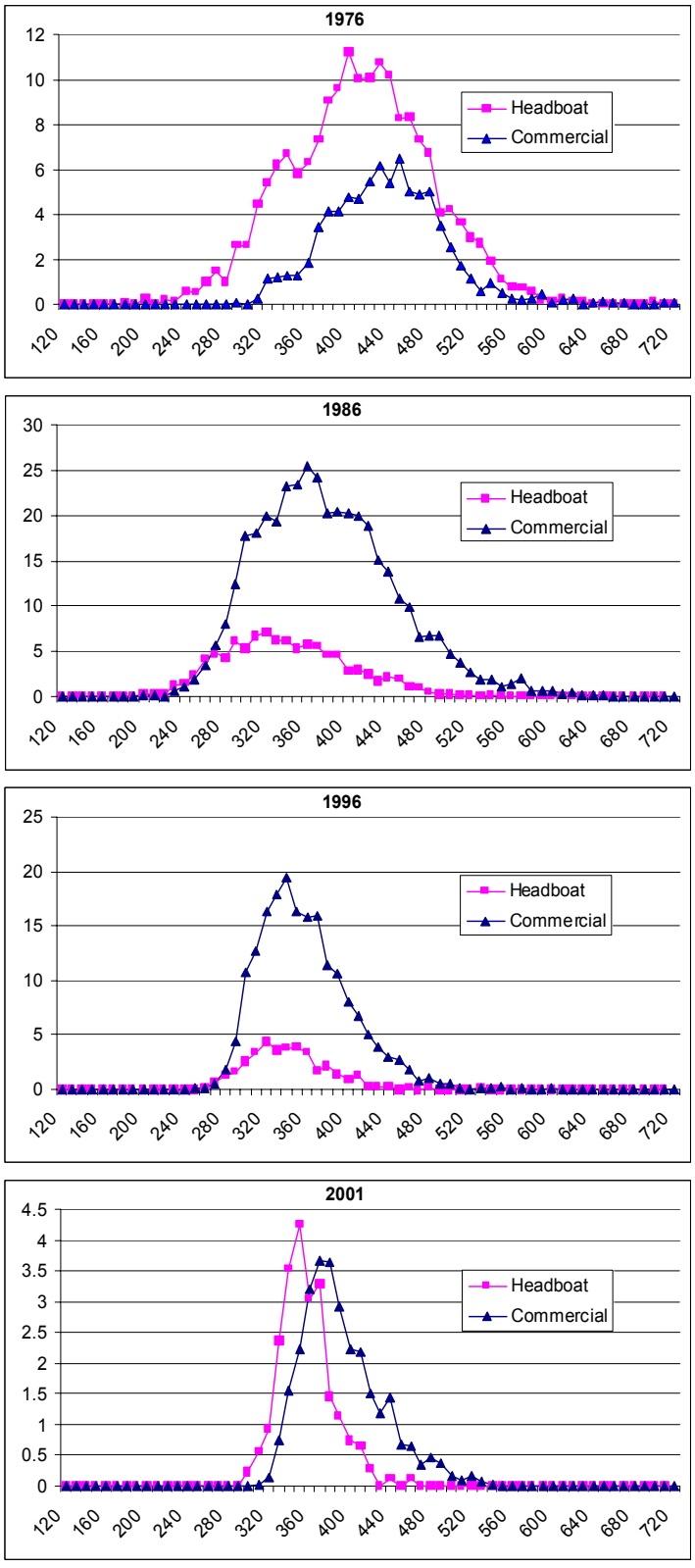


Figure 3. Abundance indices.

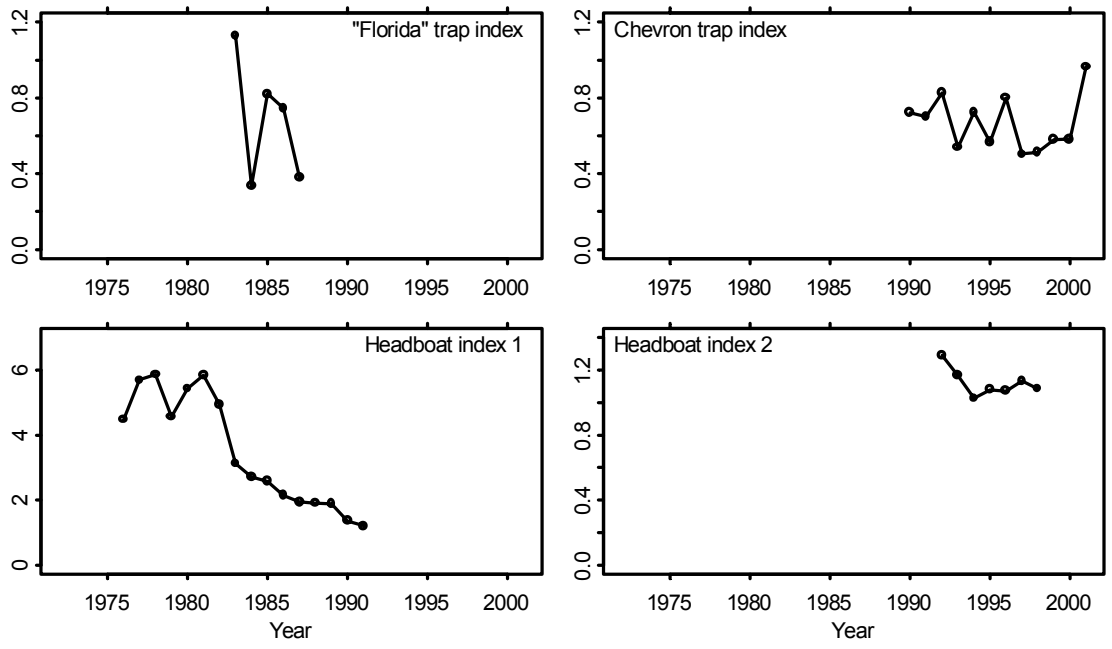


Figure 4. Rebuilding projections under two scenarios no fishing or by-catch (F = 0) and simulating Amendment 12. The horizontal line is BMSY and the dashed line in the upper plot is the MSST and the verticle line as 2016 is the Amendment 12 date for rebuilding.

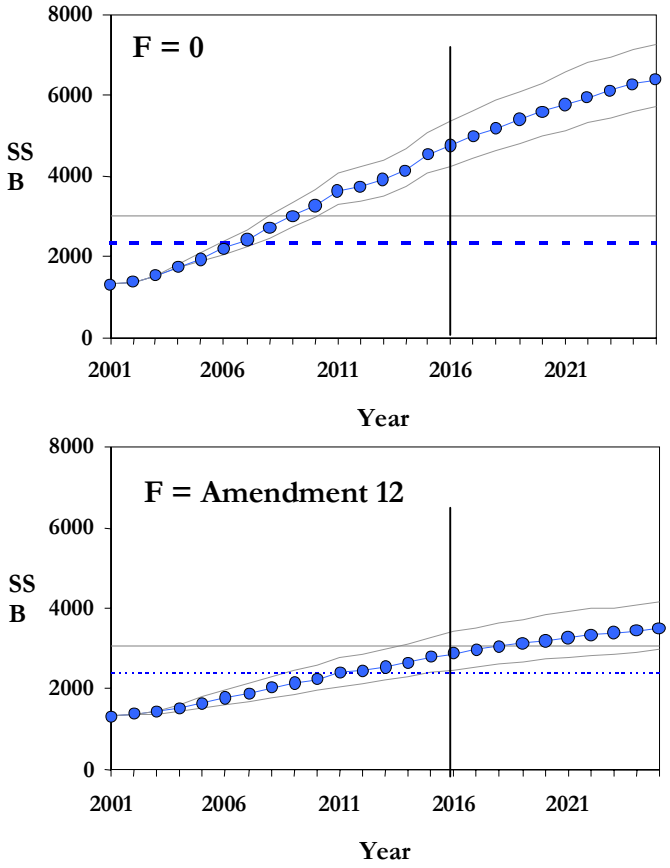


Figure 5. Relative Fishing Mortality Rates (F/FMSY). Solid line is the Age-structured model, line with dots is Production model.

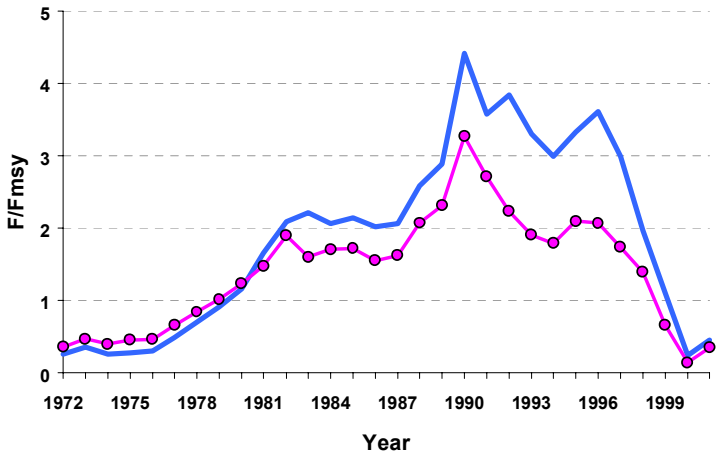


Figure 6. Stock SSB and Recruitment from Age-structured model .

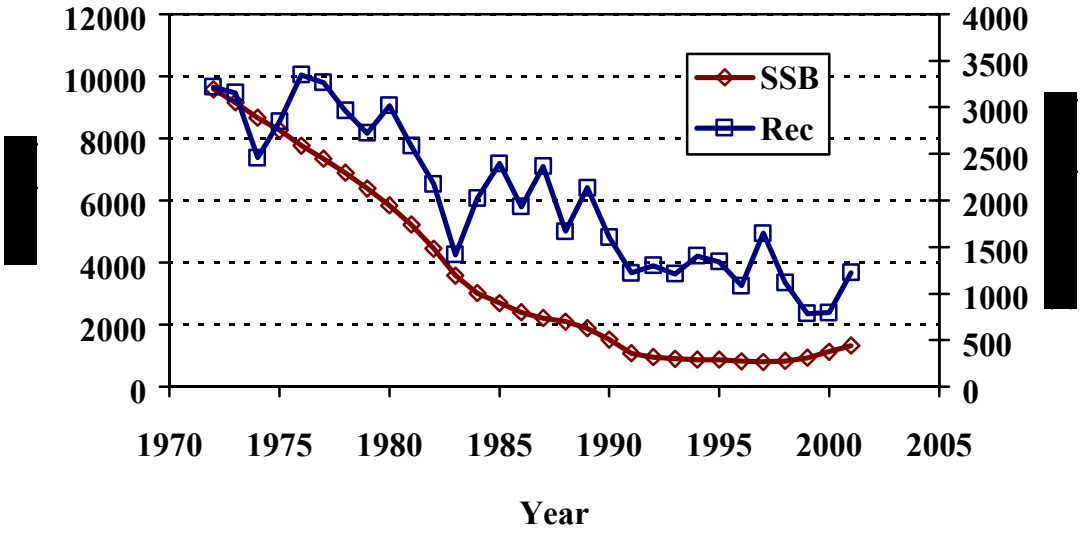


Figure 7. Relative biomass estimates. Solid line is the Age-structured model (SSB/SSBMSY), line with dots is Production model (B/BMSY).

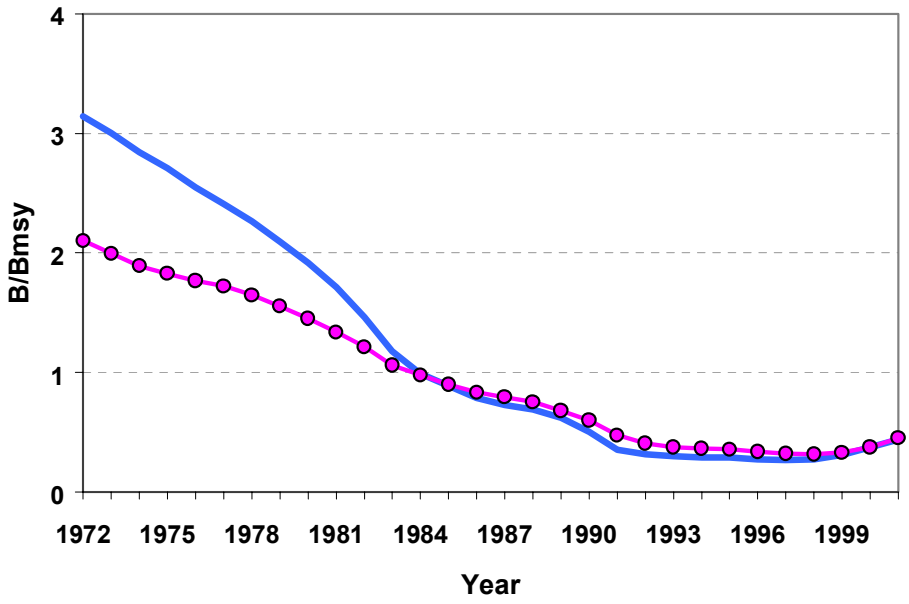
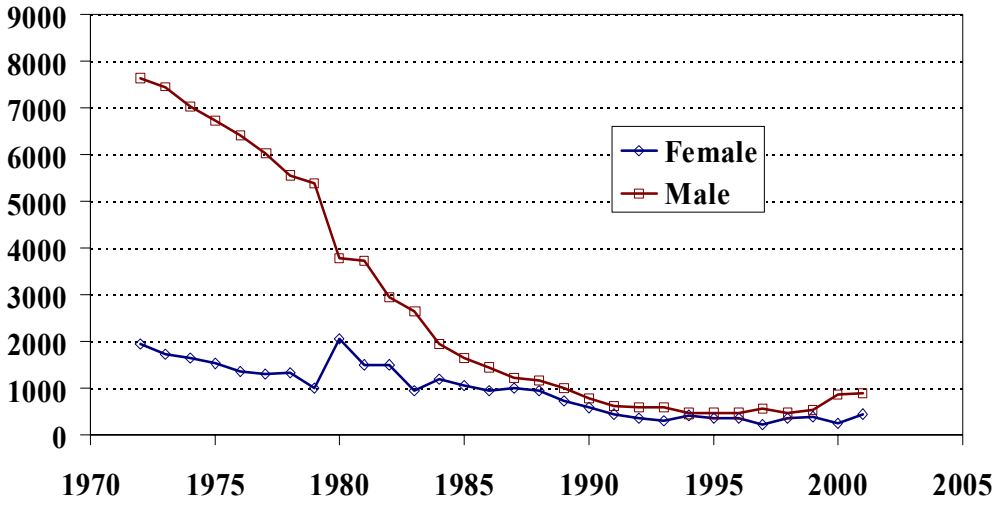


Figure 8. Male and Female SSB



<u>Appendix D.</u> Report of the 1st Southeast Atlantic Regional Fisheries Stock Assessment Workshop Stock Assessment Review Committee (SARC) Consensus Summary of Assessment. This document is not meant to stand alone; the SAW assessment is to be appended.

Doc Number XX-02

Report of the 1st Southeast Atlantic Regional Fisheries Stock Assessment Workshop Stock Assessment Review Committee (SARC) Consensus Summary of Assessment

Meeting Overview.

The SARC met the Brownstone Inn in Raleigh N.C. May 14-16, 2002 to review the red porgy assessment produced by the 1st Southeast Atlantic Regional Stock Assessment Workshop (SA-SAW). As this was the first SARC for the Region, it was based on the approach developed by Northeast Regional Stock Assessment meetings and documents. The meeting was chaired by Dr. Bob Mohn (CIE) and comprised of Council members and members from Universities and the fishing industry. The only assessment on the agenda was red porgy. However, considerable time was spent discussing the structure and functions of future SA-SAWs and SARCs.

The SARC met at the Holiday Inn-Brownstone Hotel in Raleigh, N.C. May 14-16, 2002 to review the red porgy assessment produced by the 1st Southeast Atlantic Regional Stock Assessment Workshop (SA-SAW). As this was the first SARC for the Region, it was based on the approach developed by Northeast Regional Stock Assessment meetings and documents. The meeting was chaired by Dr. Bob Mohn (CIE) and included Council staff, NMFS Northeast and Southeast staff, and members from Universities and the fishing industry. The only assessment on the agenda was red porgy. However, considerable time was spent discussing the structure and functions of future SA-SAWs and SARCs.

SARC Composition.

SARC CHAIR:	Dr. Bob Mohn, Center of Independent Experts
NMFS SEFSC:	Dr. Steve Turner
NMFS NEFSC:	Ms. Kathryn Sosebee
SAFMC:	Gregg Waugh
SNAPPER GROUPER AP:	Mark Marhefka
NGO/SSC REPRESENTATIVE:	Dr. Andy Cooper
SSC REPRESENTATIVE:	Debra Murie

List of Participants.

Presenters:

Data Workshop/SAW Chair - Dr. Jim Berkson, VPI
(Technical Support to Chair - Michelle Davis, VPI Student)
SAW Coordinator - Dr. Michael Prager, NMFS Beaufort Lab

SAW/SARC Support Staff:

Dr. John Merriner, NMFS SEFSC Beaufort Lab
Dr. Erik Williams, NMFS SEFSC Beaufort Lab
Dr. Scott Nichols, NMFS SEFSC
Dr. Doug Vaughan, NMFS SEFSC Beaufort Lab
John Carmichael, NC DMF and SSC

Meeting Support Staff & Observers:

Kerry O'Malley, SAFMC Staff
Megan Peabody, SAFMC Staff
Wayne Lee, Chair SAFMC Snapper Grouper Committee
Louis Daniel, SAFMC Snapper Grouper Committee & NC DMF
Dr. Nancy Thompson, NMFS Southeast Center Director
Dr. Pete Eldridge, NMFS SERO
Michelle Duval, Environmental Defense

SARC Process.

Prior to the SARC review, NMFS, South Atlantic Council and State personnel convened a Data Workshop (DW) to assemble, review and edit/correct data for subsequent assessment. The Stock Assessment Workshop (SAW) was then held to decide on methodology and prepare documents for SARC review. The SARC members have a dual role; panelists are both reviewers of assessments and drafters of management advice. More specifically, although the SARC's primary role is peer review of the tabled assessments, the committee also prepares a report with advice for fishery managers and a consensus documents of their review and the approved assessment.

Agenda and Reports.

TUESDAY - May 14, 2002 - 1:00 PM

1. Welcome and Background - John Merriner
2. Introductions: John Merriner
   - Panel Members and Presenters
   - SAW Personnel Contributors
   - Public Audience
3. Terms of Reference - John Merriner
   - Expected Reports & Products
4. Chair Discussion with Panel members - Bob Mohn
   - Procedures, evening sessions?

Breaks? General schedule

5. Presentation of Stock Assessment - Jim Berkson and Mike Prager
6. Initial Discussions of Stock Assessment - Chair and Panel
   Requests for Additional Analyses, if feasible at meeting or later
   Continue -----

5:30 PM - Adjourn for Evening

WEDNESDAY - May 15, 2002 8:30 AM - 5:30 PM

7. Continue Discussions of Stock Assessment
   Develop Initial Consensus Positions
8. Develop Initial Inputs for SARC Advisory Report

THURSDAY - May 16, 2002 8:30 AM - 3:00 PM

9. Discuss and Finalize Consensus Red Porgy Stock Assessment Report
10. Discuss and Finalize SARC Advisory Report on Red Porgy
11. ????

Adjourn at 3:30 PM

SARC documentation includes two reports, one containing the assessment(s) and the SARC comments and research recommendations (this report, the SARC Consensus Document), and another that summarizes the status of stocks and management advice (SARC Advisory Report). (Northeast now lists where the drafts will be publicly available and a reference for the Document Series under which they are published)

Executive Summary.

The status of red porgy was reviewed and terminal year (2001) and both age- structured and age-aggregated abundance and spawning stock estimates were provided. Fishing mortality was also assessed and long-term projections were conducted to evaluate relative trajectories of stock biomass and catch under various fishing mortality scenarios. The SARC consensus was that the assessment was good at representing the condition of the resource and that the resource is increasing under current management.

The 2002 assessment used commercial and recreational catch and catch rate data. Size composition from commercial and recreational boats was also used. MARMAP trap data was also incorporated in the analysis. This assessment updates the most recent red porgy assessment, Vaughn and Prager (2002).

The SARC concluded that the assessment well represented the status of the red porgy stock, which has fallen and is currently overfished but overfishing is not occurring. The

current index of spawning stock biomass is low; the 2001 spawning stock size is estimated at about 43% of SSBmsy and 55% of MSST. The 2001 fishing mortality rate is estimated at about 45% of Fmsy. Recruitment, as measured by the model, has trended down from 1972 with an upturn in 2001. The size structure of the stock has been reduced after a period of high fishing mortality.

There is considerable uncertainty in future rates of recovery due to: uncertainty about the biology of the species, model uncertainty, and quality of the data available. Projections simulating current fishing mortality (Amendment 12 regulations) show less than 50% probability of achieving SSBmsy in 2016 which is the last year of the Council's 18 year rebuilding program. See Figure 4. The projections show a 50% probability of exceeding the MSST in 2011. Projections simulating no directed fishing or by-catch (F = 0) would achieve SSBmsy in 2009 but the mortality from discards would increase.

Terms of Reference.

The SARC was given the following Terms of Reference. A brief response to each follows in Italics.

The SARC will evaluate the red porgy assessment, its input data, assessment methods, and model results as put forward by the SAW. Specifically, the SARC will:

7. Evaluate the adequacy and appropriateness of fishery-dependent and fishery-independent data used in the assessment (i.e. was the best available data used in the assessment?);

   The SARC concluded that the data used in the assessment were adequate and appropriate and that the assessment was based on the best available data. See recommendation below on extending data sources by sampling deeper water.

8. Evaluate the adequacy, appropriateness, and application of models used to assess red porgy and to estimate population benchmarks (MSY, Fmsy, Bmsy and MSST, i.e. SFA items);

   The SARC concluded that the models used were adequate and appropriate. Further investigations were recommended into model structure for future assessments. The SAW report did not include the MSST values although these could be calculated from material included. The SARC has included these values and suggest this be done in future SAWs.

9. Evaluate the adequacy, appropriateness, and application of models used for rebuilding analyses;

Although the SARC felt that the age-structured model was not adequate for predicting the probability of achieving rebuilding by 2016, the model provided sufficient information for the SARC to recommend that fishing mortality should not be increased over 2001 levels.

10. Develop recommendations for future research for improving data collection and the assessment;

See Recommendations Section below.

11. Prepare a Consensus Stock Assessment Report from the Draft Stock Assessment Workshop Report provided by the SAW and presented to the SARC by the SAW Chair. An example of the format and content of the report is available on NMFS, Northeast Fisheries Science Center's web site (http://www.nefsc.nmfs.gov/nefsc/publications); see year 2001 item entitled "Report of the Northeastern Regional Stock Assessment Workshop (33rd SAW) Consensus Summary of Assessments". This red porgy report will be completed by May 31, 2002;

Done. The format of the report differs from the NEFSC format because the format of the SAW report had not been defined in advance and time was limited.

12. Prepare a SARC Advisory Report including a summary of stock-status, management recommendations and forecast for the upcoming year. An example of the format and content is shown within "Report of the 33rd SAW" document (see item 5 above). This red porgy report will be completed by May 31, 2002.

Done. The format of the report differs from the NEFSC format because the format of the SAW report had not been defined in advance and time was limited.

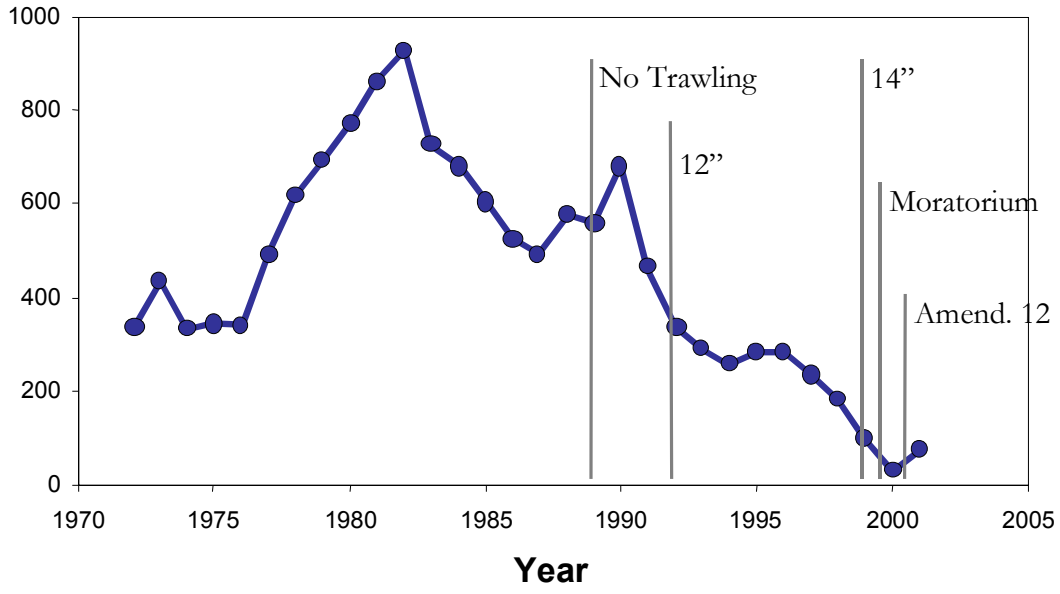
Attending NMFS scientific staff will provide editorial assistance to the review panel during the meeting and assist the panel in preparation of the reports (items 5 and 6 above). The reports shall be provided to Dr. Nancy Thompson, SEFSC Director, 75 Virginia Beach Drive, Miami, FL 33149.

Materials supplemental to SAW report.

This Section of the Consensus Document contains additional analyses, explanations and details to those supplied in the SAW document. They are in the form of numbered figures and items. In many instances, the SARC needed more detail to evaluate the red porgy assessment than was presented in the SAW document. Because of time constraints and the lack of familiarity with the requirements for document production specified in Terms

of reference 5 and 6, a provisional format has been used for this report. The format of this section will be annotated tables and figures. This is not meant to set a precedent for future documents. Indeed, this Consensus Document is of a makeshift nature and is offered as the minimum standard of documentation of the SARC. **It is recommended that** future SARC reports be integrated up into a single document based on the SAW report(s) and following a format to be determined. The Woods Hole SARC may provide a useful template.

Figure 1. The SARC requested that the major management interventions be superimposed on the catch history. This figure was later used in the Advisory document.



Item 1. Table of catch by year by fishery (metric tons).

YEAR	Comm.				Recr.	Recr.	TOTAL
	H&L	Trap	Trawl	HeadBoat	Charter	Private	
1972	32.83	13.37	0.31	240.39	18.75	29.94	289.08
1973	38.23	3.81	5.87	339.84	18.75	29.94	388.53
1974	37.57	11.57	0.00	234.67	18.75	29.94	283.37
1975	71.81	17.88	0.52	205.27	18.75	29.94	253.97
1976	79.39	16.63	17.81	177.49	18.75	29.94	226.19
1977	122.10	8.82	67.35	245.89	18.75	29.94	294.58
1978	325.98	0.13	3.37	240.17	18.75	29.94	288.87
1979	444.28	1.86	37.70	157.31	18.75	29.94	206.00
1980	417.17	4.51	137.96	162.42	18.75	29.94	211.12
1981	564.44	9.43	138.81	147.31	0.00	2.54	149.85
1982	620.25	4.94	103.32	195.93	2.15	2.91	200.98
1983	525.68	9.96	52.12	118.59	18.18	0.66	137.43
1984	466.96	10.12	33.19	98.45	69.41	4.83	172.70
1985	379.13	3.05	9.53	118.11	0.03	97.56	215.71
1986	397.28	13.76	6.83	100.74	1.28	7.61	109.64
1987	342.54	10.10	4.39	100.01	9.57	24.46	134.04
1988	381.48	12.30	11.30	97.76	32.21	41.17	171.14
1989	405.65	13.64		74.87	45.72	17.66	138.24
1990	474.79	41.66		56.82	8.95	100.02	165.79
1991	329.13	48.45		63.88	6.61	17.03	87.51
1992	228.86	5.43		49.83	33.45	20.32	103.60
1993	200.39	12.84		45.83	19.24	11.25	76.32
1994	190.19	7.74		39.72	10.61	10.02	60.35
1995	189.28	6.71		42.20	44.15	4.07	90.42
1996	189.71	5.16		37.29	16.35	36.40	90.04
1997	189.14	3.96		34.16	4.99	3.32	42.47
1998	140.78	3.45		31.42	3.62	2.14	37.17
1999	45.40	2.29		22.13	24.48	6.28	52.89
2000	11.07	0.82		6.46	7.19	4.40	18.05
2001	29.68	0.34		22.73	16.60	7.90	47.23

Figures 2-4. Additional information on the maturation and sex reversal for Red Porgy. Figures 2 and 3 are maturity at size and age from various sources. Further questions were posed about how maturity was defined and are sex specific data available. Figure 4 is sex ratio at size and age.

Figure 2. MARMAP data of maturity at size and age.

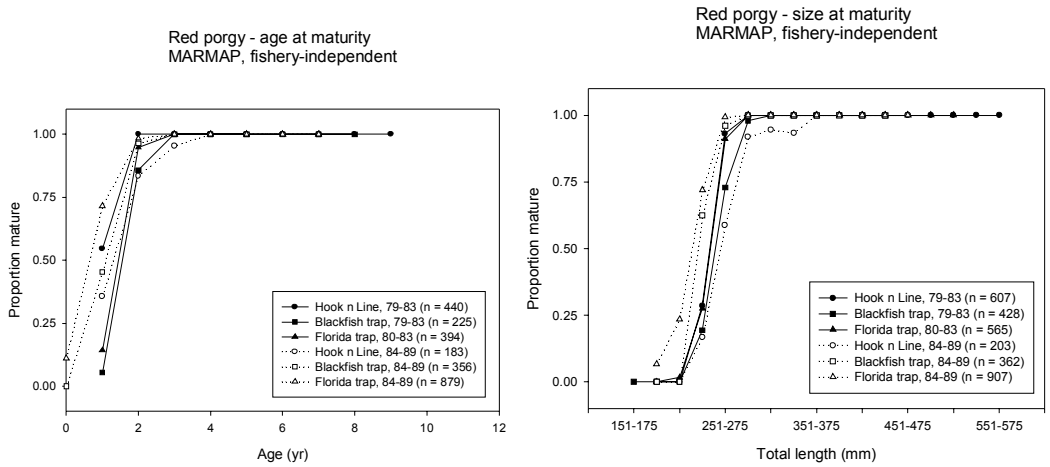


Figure 3. MARMAP data of age and size of maturity from Chevron traps.

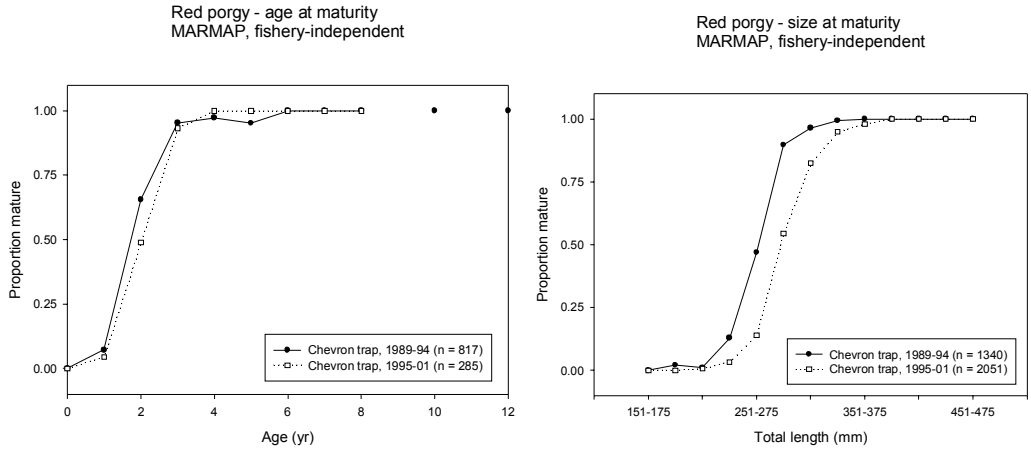


Figure 4. Sex ratio by age and size.

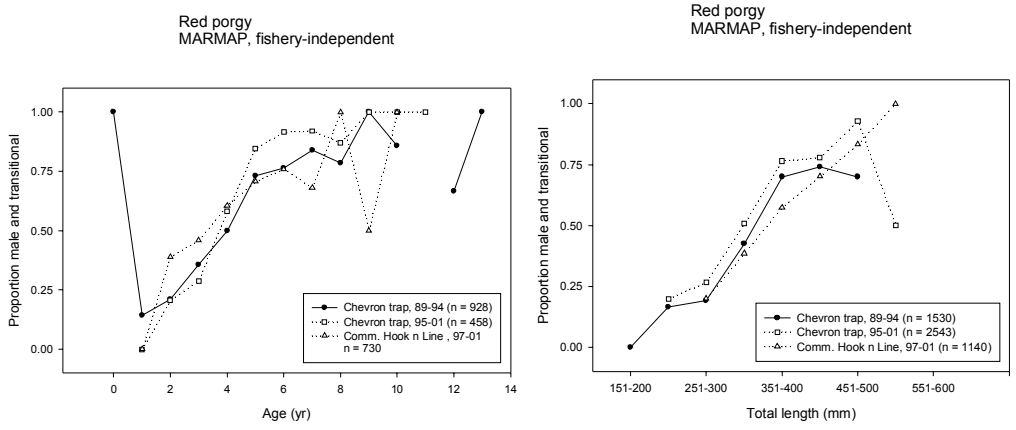


Figure 5. Disagreement between North Carolina and South Carolina aging was noted in the SAW document. The SARC requested a summary of the 289 fish aged by both laboratories, which is shown in the following figure. It was observed in the sensitivity runs that this poor agreement did not have much of an effect on the assessment results. The need to resolve the aging protocols is a Research Recommendation (below).

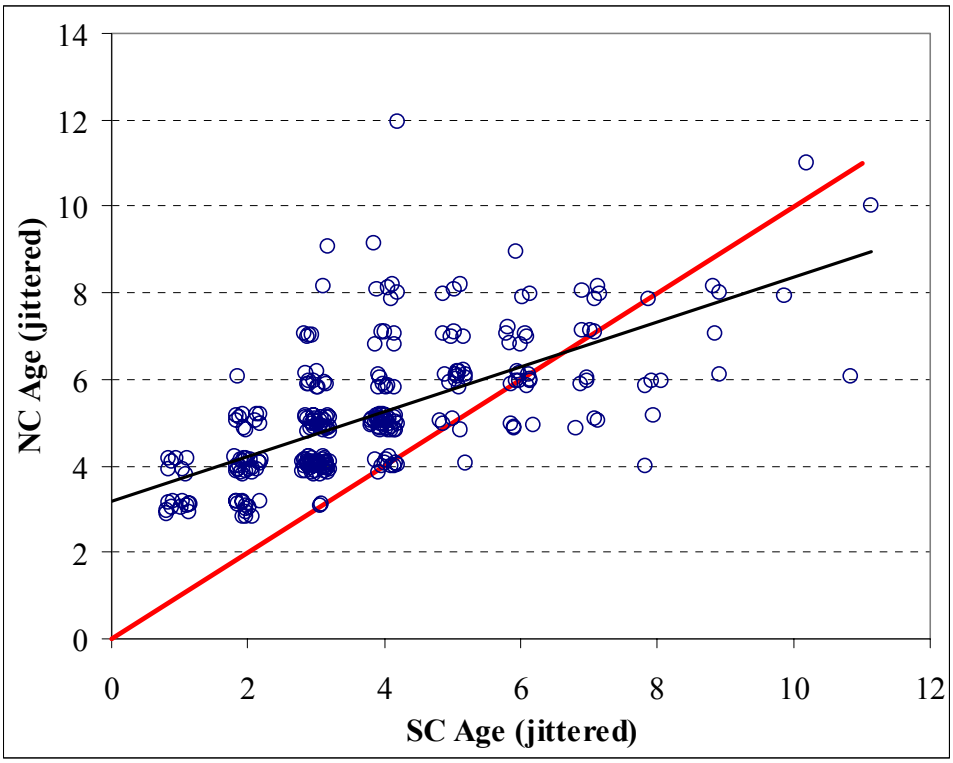
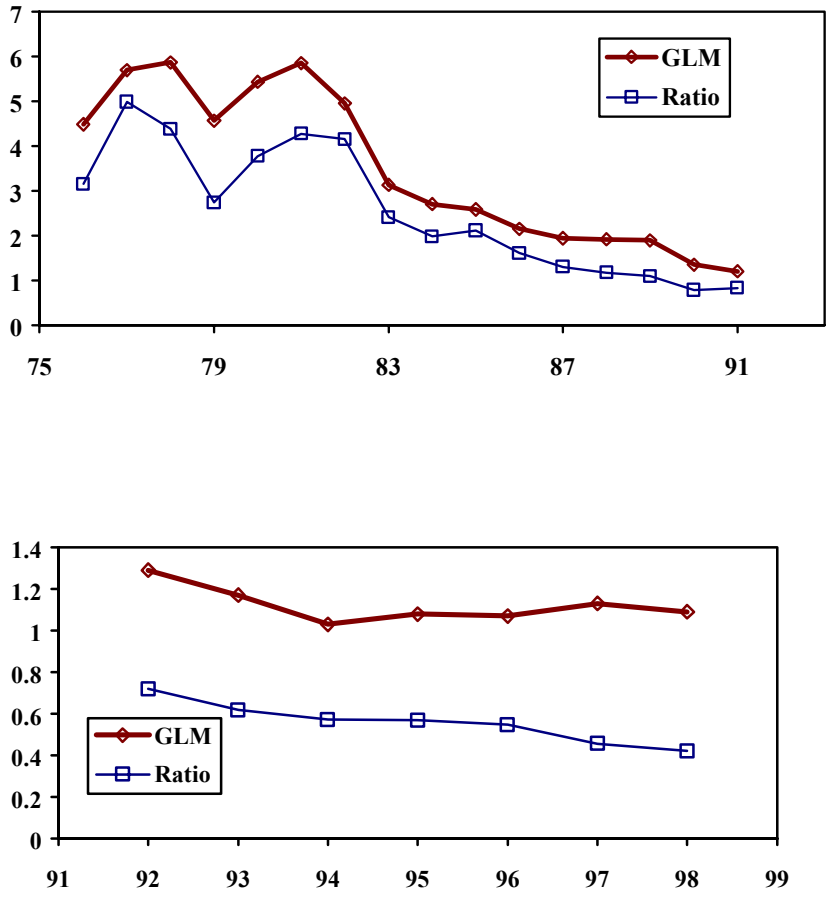


Figure 6. The Headboat CPUE data were analyzed using a GLM model for two periods (1976-1991, 1992-1998). The SAW document did not show the effect of the GLM, which the SARC requested . In the earlier time period the model results show a very similar pattern. The difference in scale does not affect the model results. In 1992-1998 the GLM results have less of a decline over the data period. It was recommended that future analyses examine catch rates including unsuccessful effort.



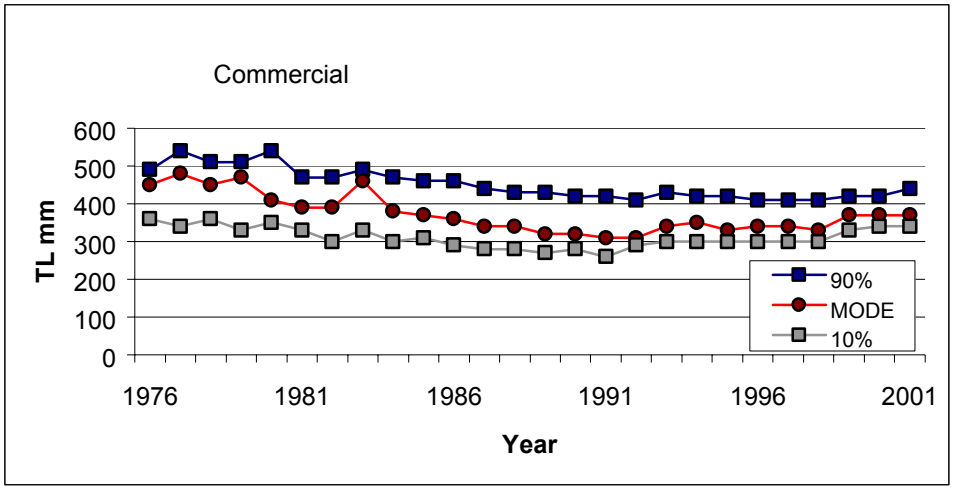
Item 2. A point form explanation of how the discard losses were estimated in the commercial fishery was requested. It was explained that an Analysis of Covariance model was fitted where the log of the red porgy landings was predicted from the log of gag and vermilion snapper landings. The data were disaggregated by state and month. Using this model, the red porgy landings were then predicted for 1999 to 2001 and the difference between the predicted and the observed was used as an estimate of the releases due to the management measures imposed in 1999. It was further assumed that 35% of these releases died.

Item 3. Summary of F used in projections. Four rebuilding scenarios were used in projections of the stock abundance. The moratorium estimate is half of the Amendment

12 estimate; it assumes that under Amendment 12 half of the removals are bycatch. The Amendment 9 estimate is also based on the Amendment 12 estimate which is multiplied by the ratio of estimated saving under each Amendment. See the SAW document ofr more details. They are in order of increasing F:

1) No catch or bycatch of red porgy. (F = 0)
2) Moratorium (bycatch only). (F = 0.054)
3) Amendment 12. (F = 0.107)
4) Amendment 9. (F = 0.173)

Figure 7. Time series of the mode, 10th and 90th percentiles of the length distributions for commercial hook and line and Headboat data. Commercial length frequencies show effects from management with mode moving towards size limit. In the commercial data, the mode moved closer to the 10th percentile in the early 1990s perhaps reflecting the effects of the imposition of management restrictions on harvest. In the headboat distributions, the 10th percentile responds to the management measures but the mode does not act as it did in the commercial data. An explanation was not offered for the difference in responses.



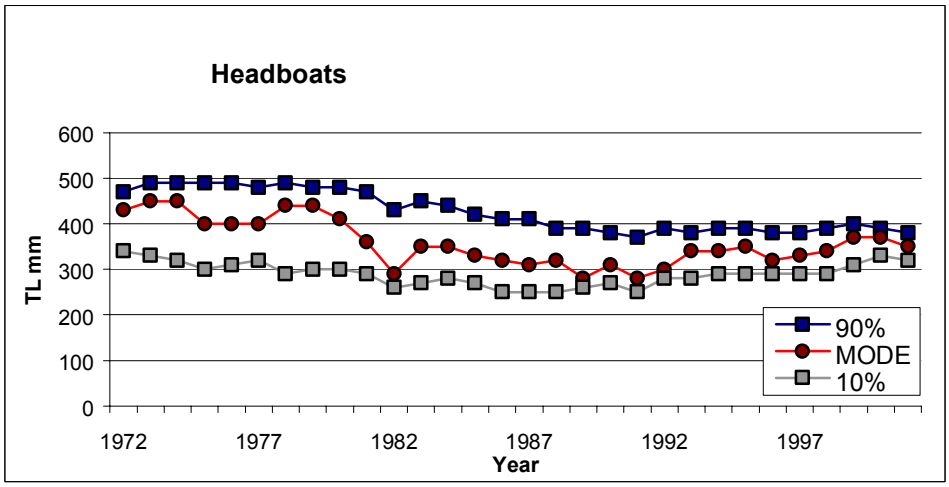
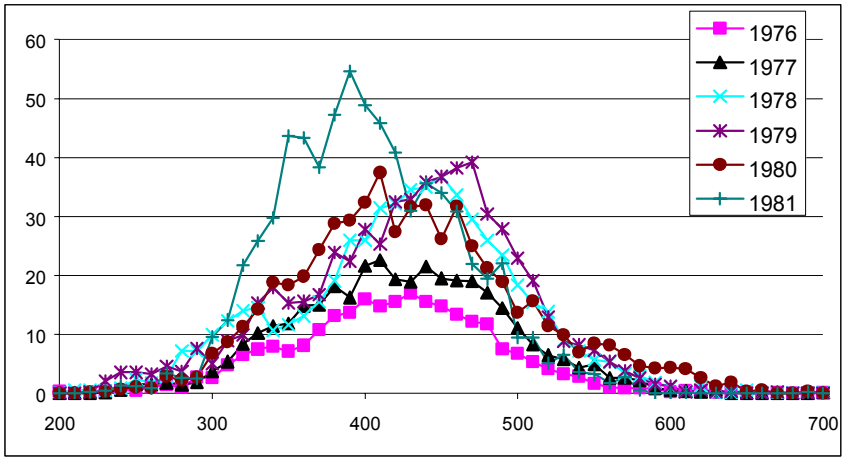
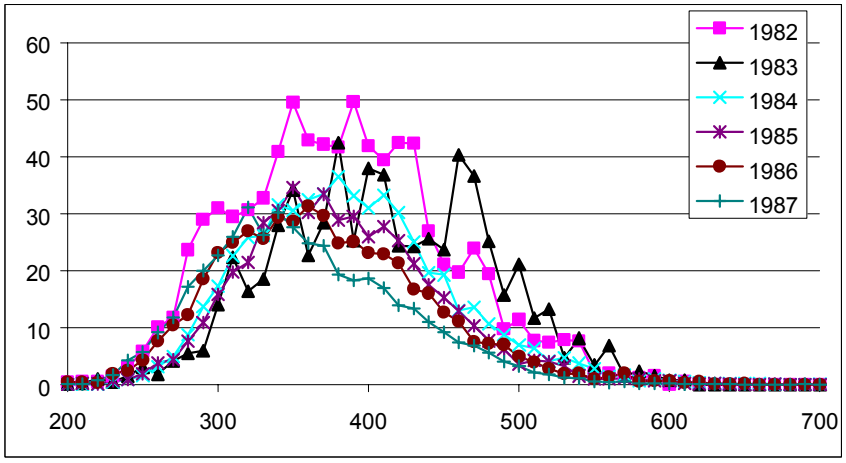
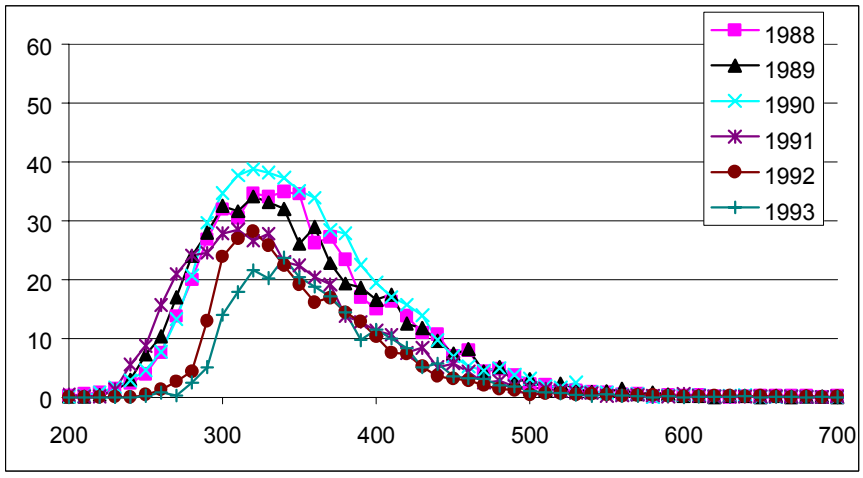


Figure 8. Length frequencies from Commercial (H&L) and Headboat fisheries. The most recent time period shows the effects of more restrictive management measures, especially 1999-2001.







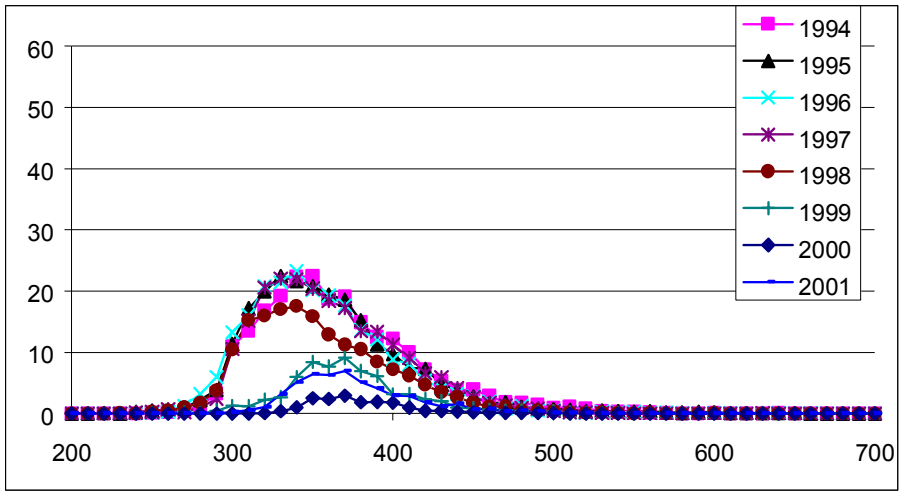
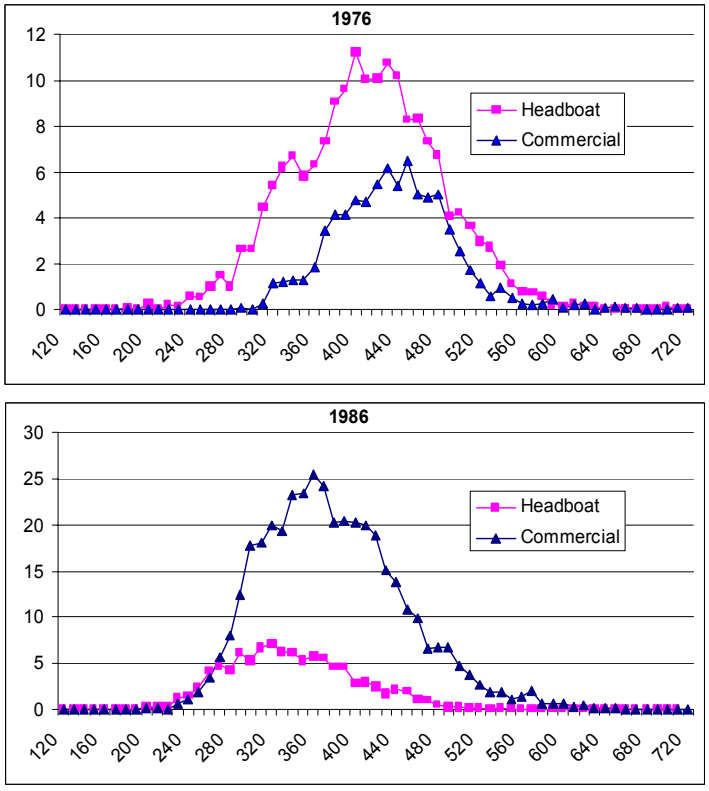
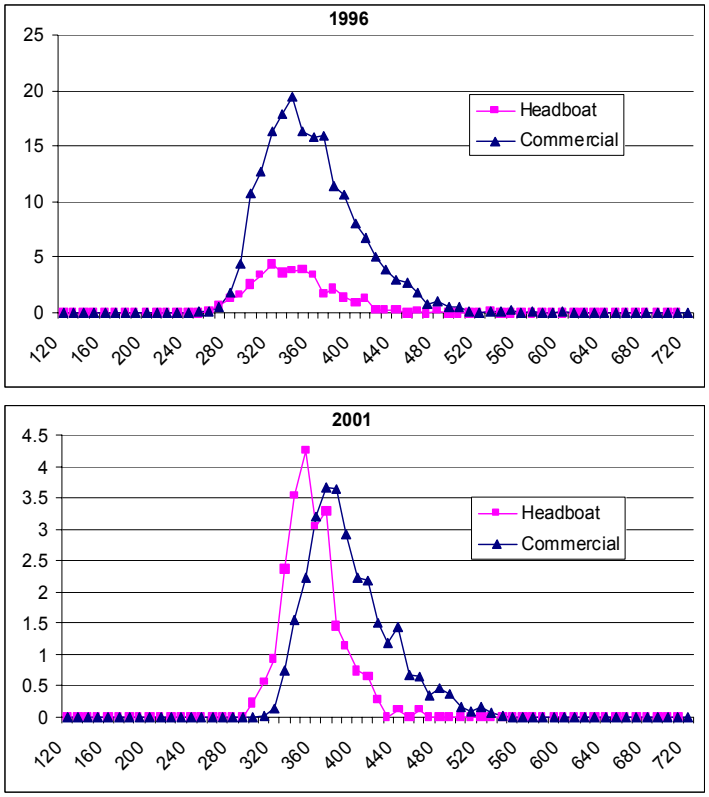


Figure 9. Commercial (hook and line) and Headboat length frequency data from selected years (1976, 1986, 1996 and 2001).





Item 4 – Tabular description of the age-structured model (RPM2002)

	No. of parameters
Growth Model (von Bertalanffy)	3
Standard Deviations of Length at Age	15
Recruitments	44
Stock-Recruit Function	2
Fishing Mortality (Commercial Hook-n-line)	31
Selectivity (Commercial Hook-n-line)	22
Fishing Mortality (Commercial Trawl)	18
Selectivity (Commercial Trawl)	2
Fishing Mortality (Commercial Trap)	31
Selectivity (Commercial Trap)	4
Fishing Mortality (Recreational Headboat)	31
Fishing Mortality (Recreational Charter)	31
Fishing Mortality (Recreational Private)	31
Selectivity (Recreational)	26
Index Catchabilities	4
MARMAP Selectivity (Florida Trap)	4
MARMAP Selectivity (Chevron Trap)	4
SUM	**303**

Item 5. Likelihood contributions from the base age-structured model. Larger likelihoods mean more importance in the fitting of the model. The composition data are fit in

multinomial models and can be compared to one another. The rest of the data can also be compared to one another. This table shows the length composition data is the most important in the model.

	Likelihood
MARMAR "Florida" Trap Index	463
MARMAR Chevron Trap Index	172
Headboat Index (1976-1991)	112
Headboat Index (1992-1998)	-18
Commercial Hook-n-line Length Composition	265088
Commercial Hook-n-line Age Composition (SC)	2042
Commercial Hook-n-line Age Composition (NC)	540
Commercial Hook-n-line Landings	-65
Commercial Trap Length Composition	3301
Commercial Trap Landings	-120
Commercial Trawl Length Composition	6649
Commercial Trawl Landings	-56
Recreational Headboat Length Composition	170121
Recreational Headboat Age Composition (NC)	6196
Recreational Headboat Landings	-132
Recreational Charter Landings	-93
Recreational Private Landings	-83
MARMAR "Florida" Length Composition	8537
MARMAR "Florida" Age Composition (SC)	3673
MARMAR Chevron Length Composition	30382
MARMAR Chevron Age Composition (SC)	5754

Figure 10. Beverton-Holt stock-recruit relationships from the base run and a sensitivity run in which the points before 1972 were not used in fitting the model. Because the points before 1972 were supported by less data concern was expressed over their use in the determination of stock-recruitment, which is important in long term projections. Further it was noted that the residuals are unbalanced for the post 1972 data which also may affect projections.

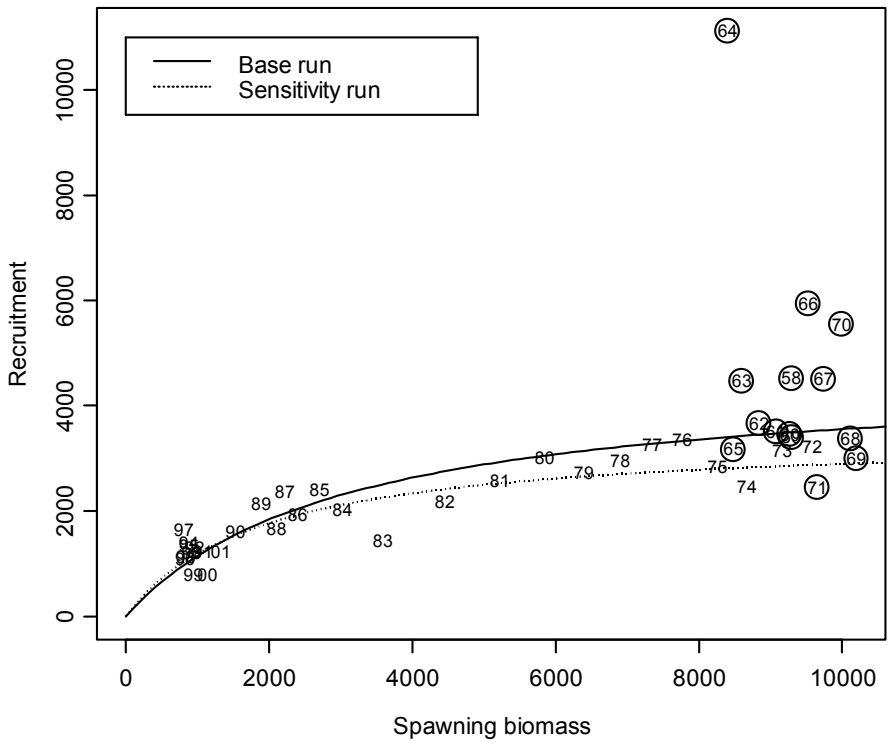
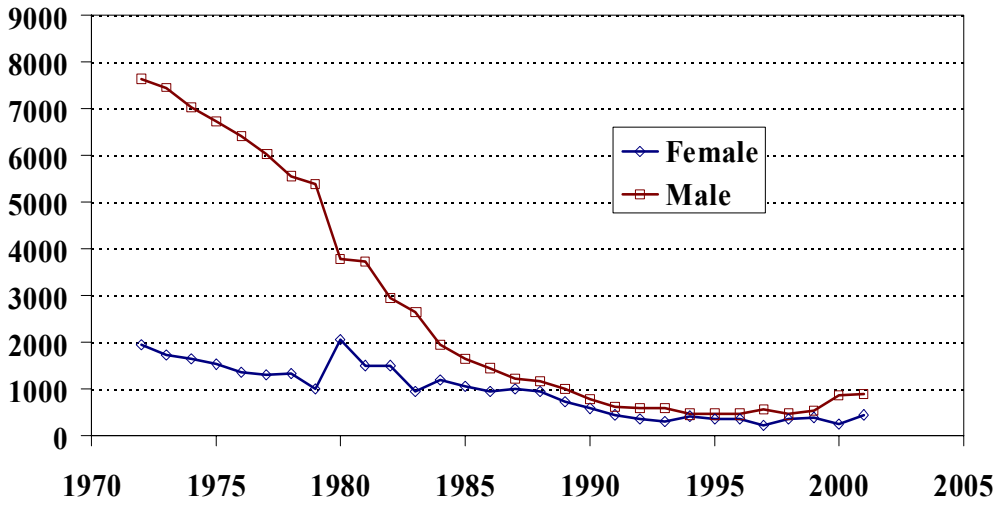
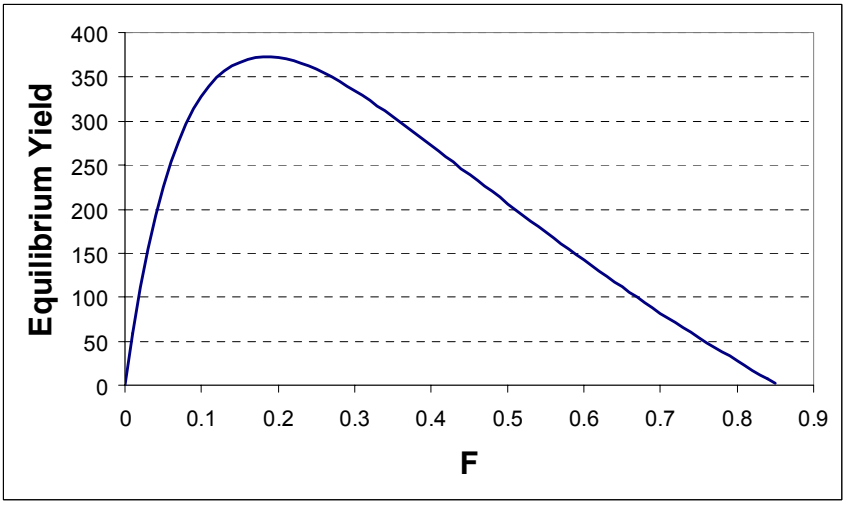


Figure 11. Male and female SSB estimates from the age-structured model.
Male SSB has been reduced more than female SSB with unknown affects on reproductive



success.

Figure 12. Equilibrium yield curves from the age-structured model. The modeled system shows more resistance to fishing pressure than a Schaefer model.



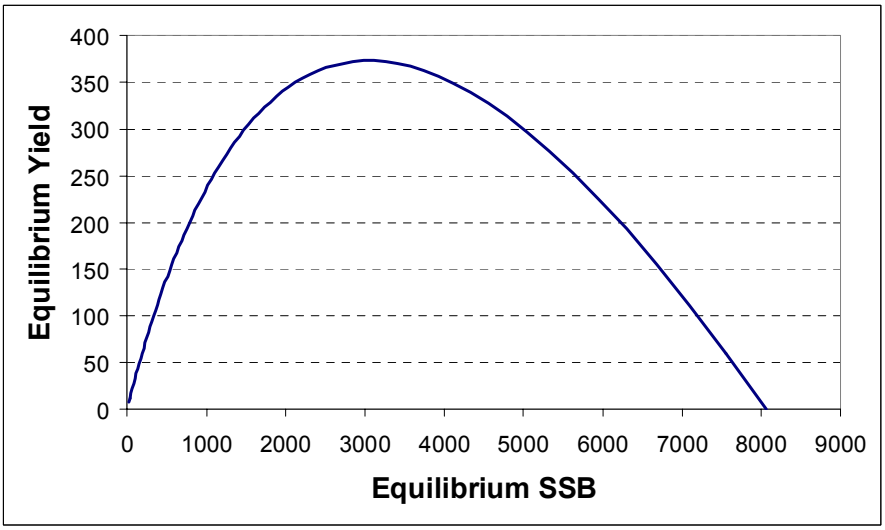
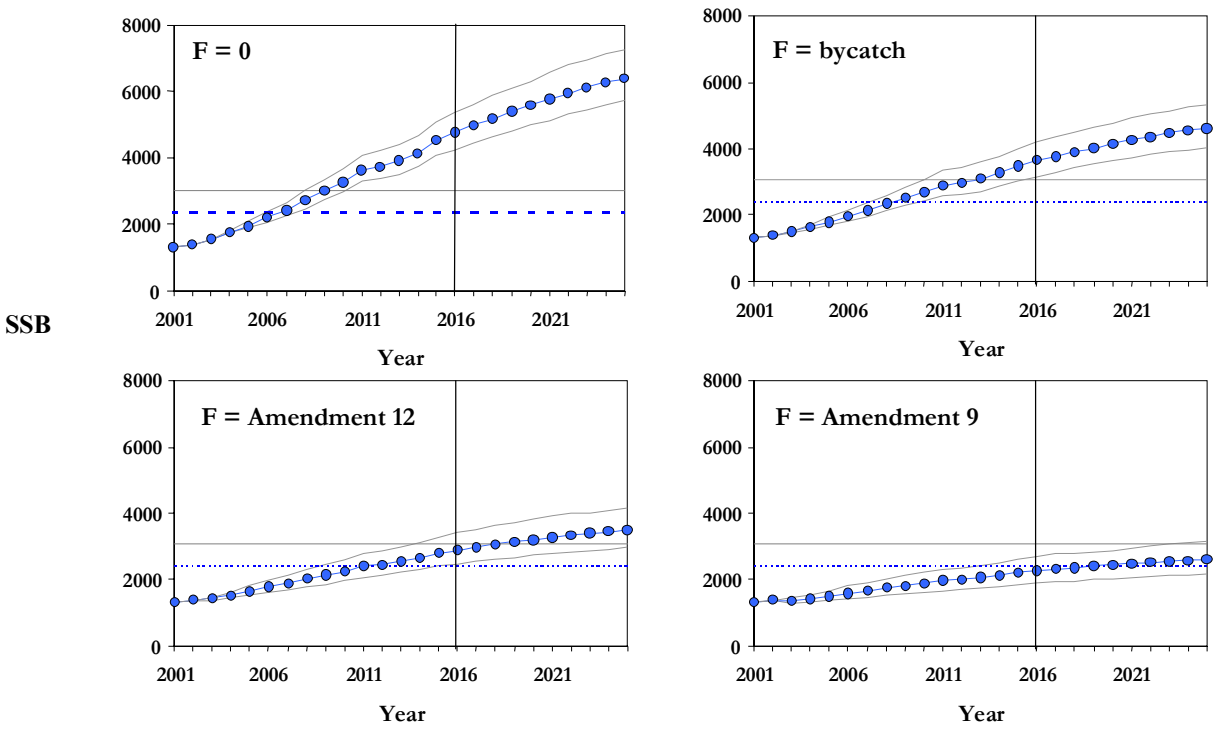


Figure 13 Long term projections (Figures 17 in SAW report) with line for MSST and a line for the rebuilding deadline, 2016.



Figures 14 and 15.These figures were requested by the SARC to compare with the base projection runs in order to explore aspects of uncertainty that were not captured in the base model. Figure 14 is using the age-structured model with the alternative stock-recruit relationship shown in Figure 10. Figure 15 is a projection using the production model. In both cases they show more rapid rebuilding than the base model. Although it was concluded that these models were less probable than the base run, by comparing among models, broader insights are given into the uncertainty.

Figure 14.

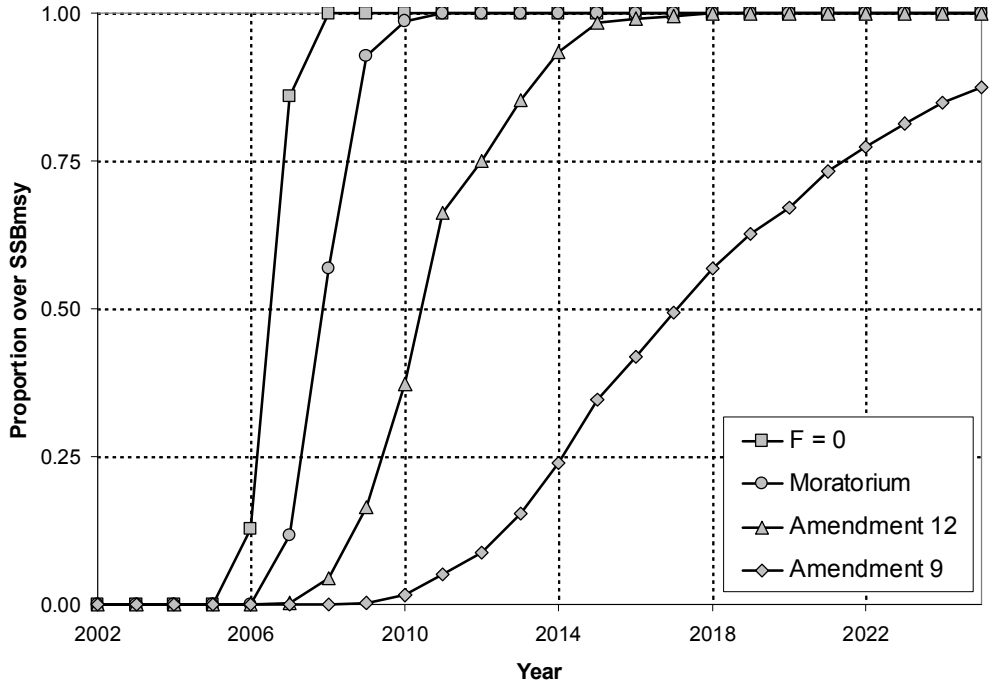
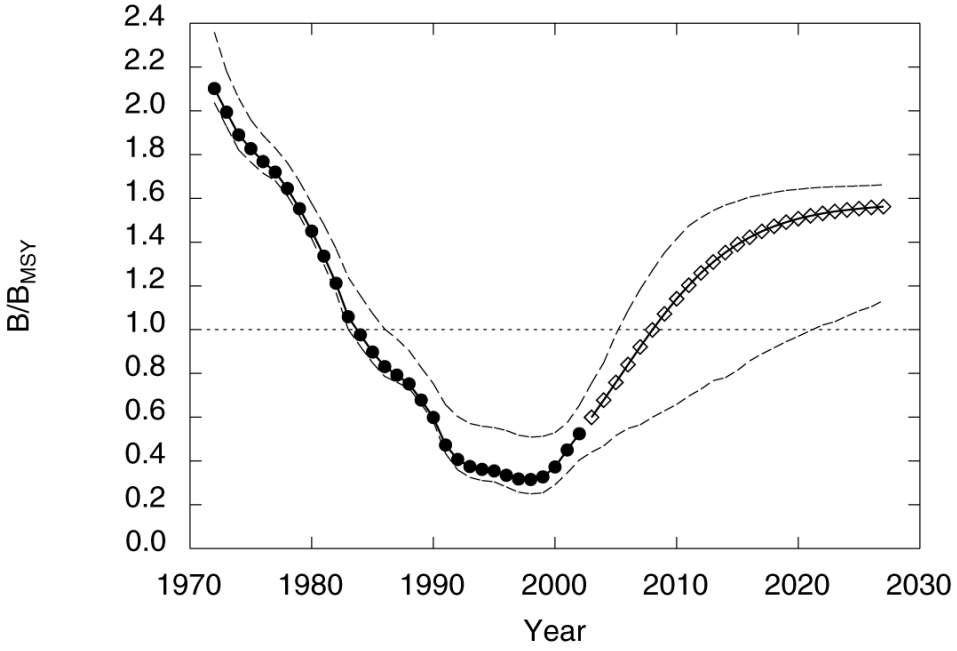


Figure 15.



Item 6. Biological Reference Points: The SARC accepts SAW recommendations. Comparison of actual values to proxy values indicates problems with proxies.

Research recommendations.

The SARC reviewed the research recommendations supplied by the SAW. In each, the relevant SAW research recommendation number is given (SAW-RR#) . The SAW recommendations are appended below for convenience.

1. (SAW-RR #1) Aging - The SARC agrees.
2. (SAW-RR #2) The SARC agrees. In addition, models and evaluations should incorporate this feature. Stock assessment scientists should discuss and develop methods to deal with these species.
   The implications of alternative assumptions about spawning stock definitions (total biomass, female biomass or…..) should be investigated.
3. (SAW-RR #3) The SARC agrees this should be collected from all sectors. At-sea observers are required. This may also be an opportunity to develop a CPUE index.
4. (SAW-RR #4) The SARC agrees.
5. (SAW-RR #5) The SARC did not evaluate this recommendation.
6. A hook and line index of abundance should be developed for deeper water.
7. The aging assumptions and the plus-group assumptions in the age-structured model should be evaluated.
8. Alternative assumptions about M should be evaluated.
9. Sampling of catch by sex from commercial vessels should be initiated.
10. Analyses to develop indices of abundance should consider the effects of unsuccessful effort

SAW Research Recommendations (Copied from SAW Document)

The SAW discussed aspects of the biology, sampling, and assessment of this population that make accurate and precise assessment more difficult. Execution of the following recommendations for research and data management could improve future assessments of red porgy.

1.The discrepancy between SC and NC aging is a major one that must be resolved, preferably before the next assessment. The SAW recommends that as soon as possible, the NC and SC investigators meet and share age readings techniques, to resolve the systematic discrepancies in age determinations, if possible. The SAW further recommends that research be undertaken that will accomplish verification of aging in red porgy.

2.The protogyny of red porgy is a life--history feature that complicates assessment and management. The SAW recommends that sampling for sex ratio at length be instituted in each fishery and that population sampling for sex ratio at length be continued by the MARMAP program. The SAW further recommends that research be instituted into assessment and population-projection methods that can make better use of sex-ratio data that exist now and that may exist in the future.

3. Under many forms of management, considerable discarding of red porgy could be expected to occur. The SAW recommends that sampling programs be initiated to quantify discard rates, especially in the commercial fishery, where the discard mortality rate is believed higher, and to estimate discard mortality rates. The SAW recommends that research be instituted on management strategies that could Reduce discard mortality and also research to illustrate the effects of discard mortality. The SAW also recommends that socioeconomic research be considered on educational measures to assist fishery participants in minimizing discard mortality and understanding the value of doing so.

4. Fishery-independent data collected by the MARMAP program have served an important role in understanding the dynamics of this population, and the National Research Council has recommended that fishery-independent data play a more important role in stock assessment generally. However, the MARMAP sampling programs have been criticized by some as not having ideal extent, both in area coverage and in sampling intensity, for red porgy. The SAW recommends that the MARMAP program expand its coverage as needed.

5. During the DW and SAW, it was noted that some incomplete, or misleading data have been entered in the NMFS general canvass data base. In particular, some data are available only under aggregated categories (e.\,g., porgies), even when accepted corrections to provide estimates of red porgy landings exist. The SAW recommends that state agencies contact and work with NMFS personnel maintaining the general canvass data base to make sure that data in that central data base are at the most disaggregated level possible and as accurate as possible. The goal is that future red porgy assessment should be able to use data from the general canvass data base with confidence and without further corrections.

Recommendations regarding process. The SARC, both panelists and those in attendance, reviewed the experiences leading up to the SARC and made conclusion and recommendations about the process.

1. The three step process (DW, SAW & SARC) proved to be very useful. It is recommended that more time be allocated between each of these steps. It would be helpful to have this incorporated into the Terms of Reference.

2. If more than one stock is to be assessed per year, substantial additional resources must be provided. Additional funding will be necessary for NMFS and state participants.

3. Participation of industry was a very important part at each step of the process. This practice should be continued.

4. Priorities as to the stocks to be assessed need to be set.

5. Having both NMFS and state scientists participating in the decision process for input data and assumptions for the model was very useful.

6. Input from SARC participants other than on the panel was very useful. This will facilitate exchanges between the SAW and SARC participants.

7. As well as peer review, the SARC was a useful forum for the exchange of technology and ideas.

8. In future, the SARC will draft the Consensus Report at the meeting with a subsequent review.

9. Improved technical support is required; printers, copiers, hard copy of drafts, LAN and other support.

Chairman's comments.

The participants, both on the SARC panel and the other in attendance, were cooperative and constructive throughout the SARC. As this was the first time, special considerations apply. The first is that the SARC had the added requirement of trying to establish precedents for this process in the Southeast. The Northeast experience served as a template. The second was the unfamiliarity of the participants with the SARC system and its requirements, especially document production.

Future SARCs should be larger; there was no buffer. If a single member left the room, the review was potentially affected. Also, the Chair was required to fill two roles; steering the meeting and as a technical reviewer. Sometimes these roles conflict one another; the Chair wishes to push to consensus, the reviewer wishes to slow things down and take a closer look.

In terms of review, more emphasis should be placed on systematic and structured comparison (figures and tables) with earlier assessments. It is important to be able to answer the question as to what degree changes in perception are due to new models or new data. Also, a more thorough the investigation of alternative models would give a better insight into confidence in results.

On a personal note, it was a pleasure to help the first Southeast SARC get off the ground. One of the comments from the audience was that it was beneficial to have the 'system'

opened up and a forum for many points of view. It will be a challenge for future Chairs to move the SARCs from developmental to a production basis and keep the meetings open and stimulating. One way to help achieve these objectives is to allot time for scientific exchange and for discussion among participants, both on and off the SARC panel, on the relevance of the proceedings. But of course, time is always at a premium.