

Report on SEDAR 9 for the Centre for Independent Experts, University of Miami.

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Executive Summary

The ninth South East Data, Assessment, and Review (SEDAR 9) meeting aimed to review the assessments for the Gulf of Mexico greater amberjack, vermillion snapper, and gray triggerfish. The assessment reports for these three species were provided by email from the SEDAR Coordinator (John Carmichael) before the SEDAR 9 meeting. In addition, the other reports from the Data and Assessment meetings were downloaded from http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=09. The meeting was at the Hotel Monteleone, New Orleans, LA between Monday 27th to the Friday 31st March, 2006. Assessments for the three species were presented to the panel between Monday, March 27th and Wednesday 29th March. Open and informative discussion continued both through and following the presentations.

The SEDAR process (and terms of reference) are relatively prescriptive so the Panel were able to pursue the review by focussing on the adequacy and appropriateness of the available data and the assessment models used. Slight amendments to the models (especially with regard to the relative weighting ascribed to different data sources) and sensitivity runs were requested for all three species. The discussions and extra model runs enabled the Panel to recommend a base case model for each species and to suggest a number of strategies for improving the assessments.

Background

South East Data, Assessment, and Review (SEDAR) is a process for stock assessment development and review conducted by the South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils; NOAA Fisheries, SEFSC and SERO; and the Atlantic and Gulf States Marine Fisheries Commissions. SEDAR is organized around three workshops: data, assessment, and review. Input data are compiled during the data workshop, population models are developed during the assessment workshop, and an independent peer review of the data, assessment models, and results is provided by the review workshop. SEDAR documents include a data report produced by the data workshop; a stock assessment report produced by the assessment workshops; a peer review consensus report evaluating the assessment and a peer review advisory report, both drafted during the review panel workshop; and collected stock assessment documents considered during the workshops.

SEDAR is a public process. All workshops, including the review, are open to the public and noticed in the Federal Register. All documents are freely distributed to the public upon request and posted to the SEDAR website. Public comment during SEDAR workshops is taken on an ‘as needed’ basis; the workshop chair is allowed discretion to recognize the public and solicit comment as appropriate during panel deliberations.

The review workshop is an independent peer review of the stock assessment. The term review is applied broadly, as the review panel may request additional analyses, correction of errors, and sensitivity runs of the assessment model provided by the Assessment Workshop. The review panel is ultimately responsible for ensuring that the best possible assessment is provided through the SEDAR process. The review panel task is specified in Terms of Reference.

Review Activities

Prior to travelling to the meeting, the SEDAR 9 Data and Assessment meeting papers were downloaded from the WWW and given a preliminary reading. Travel to New Orleans began on Saturday 25th March, crossing the dateline over the Pacific meant that I also arrived in New Orleans on the 25th March. The SEDAR 9 meeting was well organized, providing sufficient time for questions and discussion of the review materials. Given there were three species to be reviewed, each review panellist was allocated a particular species to focus upon by the panel chair Dr. Elizabeth Clarke, but each panellist considered all three species. I was allocated the greater amberjack, Dr. Din Chen focussed upon gray triggerfish, and Dr. Kenneth Patterson considered vermillion snapper. Each review panellist produced a draft consensus report for their respective species, which was then considered by the other panellists. In addition, each panellist produced an Advisory report. The two reports relating to the greater amberjack constitute the bulk of this CIE report. The panel chair has provided an executive summary to the consensus report. Following the meeting I returned to Hobart in Australia, leaving New Orleans on 1st April and arriving in Hobart on 3rd April.

Summary of Findings

The consensus report for greater amberjack is presented as Appendix 1. The advisory report for greater amberjack is presented as Appendix 2. These two reports contain the details of the main findings of the review. In very brief summary the main findings were:

Data Used in assessments

Given that ageing data for greater amberjack is sparse and uncertain the available data for the greater amberjack assessment was generally appropriate. Some criticism was aimed at the recreational data available but the USA remains a great deal ahead of other nations in obtaining a regular time series of recreational catch and effort data. There are four main fishing sectors that target greater amberjack and the data from each appears adequate. Only in the final year of data (2004) does a problem appear. Two of the sectors (Charter and Private boat – recreational; and hand-line – commercial) both exhibit a downturn in catch rates, while headboats and long-line fisheries both exhibit upturns. Most of the catch derives from the methods exhibiting the decline. This inconsistency has the effect of making the projections very uncertain.

Assessment

Because of the absence of adequate ageing data the base case model recommended was the simple surplus production model (implemented as ASPIC). This model was capable of generating adequate management advice and found that the fishery was overfished and that overfishing was occurring. However, because of the inconsistencies between different fishing sectors in 2004 the projections were highly uncertain, which lead to the recommendation that an update assessment be undertaken before the next formal assessment in order to determine the actual trajectory being followed by the stock.

Recommendations

- 2.1.1 Whenever a major data stream (effort, catches or catch rates) is to be modified the details of any modifications should be stated explicitly and documented completely.
- 2.1.2 To avoid overloading the scientific staff, sufficient resources and time should always be provided to prepare the materials to normal scientific standards and allowance be made for any major un-avoidable disruption to this process (such as Hurricane Katrina).
- 2.1.3 A summary table for each assessment should be provided stating each data stream to be used with its constraints and any treatments or modifications made. Included in this table should be an indication of the reliability of each data stream. It could be included in either the Data Workshop or Assessment Workshop reports.
- 2.1.4 Within the greater amberjack assessment, because of the uncertainty caused by the final year of data, an update assessment should be conducted within a few years (outside the usual benchmark assessment process) to elucidate the most likely trajectory being followed by the stock and enable the provision of remedial management measures should these be necessary.
- 2.2.1 Each assessment document should, preferably, contain appendices detailing the structure and likelihood estimator for at least the base case model, or alternatively refer to a readily available document containing these details.
- 2.2.8 A yield-per-recruit analysis should be made for the greater amberjack as an addition to future assessments to act as a check against growth overfishing and to determine whether the legal minimum length is appropriate.
- 2.4.1 The various model outputs and management benchmarks (e.g. MSY, F_{MSY}, B_{MSY}, MSST, MFMT) for the accepted base case model should be defined in one place within the stock assessment report along with how they were defined mathematically.
- 2.4.2 A glossary of all the acronyms used in the assessments should be provided as an appendix in every assessment report.
- 2.8.1 If the data available are adequate for conducting an assessment then the 5th and 6th Terms of Reference in the Data Workshop should be removed from consideration by the Data Workshop and shifted instead to the Assessment Workshop.

Appendix 1: Consensus Summary Report

Gulf of Mexico Greater Amberjack (*Seriola dumerili*)

Prepared by the SEDAR 9 Review Panel for:

Gulf of Mexico Fishery Management Council

Edited by M. Elizabeth Clarke for
SEDAR 9, March 27- 31, 2006
New Orleans, Louisiana

Executive summary

The SEDAR 9 Review Workshop met in New Orleans, LA from March 27 to 31, 2006 to review the stock assessment of Greater Amberjack in the Gulf of Mexico. The first day consisted primarily of presentations by the Assessment Team covering the Data Workshop, the two Assessment Workshops, and their preferred base case assessment. During the second and third days, the workshop reviewed the assessment by addressing the terms of reference for the Review Workshop, including the consideration of additional model runs. On the final day, preliminary drafts of the Consensus Summary Report and the Advisory Report were discussed.

The SEDAR for Greater Amberjack has extended over more than 12 months and was interrupted by the impact of Hurricane Katrina. During this time the Assessment Team and other Data Workshop and Assessment Workshop participants worked towards producing a credible and reliable stock assessment. The previous stock assessment was conducted in 2000. The previous assessment used a calibrated VPA to obtain estimates of population abundance and mortality rates using data through 1998.

During the panel's deliberations the base case model selected as most appropriate was the simple surplus production model known as ASPIC. The assessment using the suggested base case model is documented in an Addendum to the Stock Assessment document. The final assessment using this method indicates that the stock is both overfished and experiencing overfishing.

The Review Panel was impressed by the quantity of work that had gone into the assessment, however, small but significant changes to the base case assessment were requested during the Review Workshop. The model initially presented to the panel was an age-structured production model. The panel recommended that because of the difficulty in obtaining representative aging and catch at age data that neither the VPA (the continuity case) nor the age-structured production model be used as the base case model. Instead, the panel recommended that a simple production model be used.

The panel felt that the final assessment using the base case model, recommended by the panel, is adequate to provide management advice. The data used in the assessment of greater amberjack were generally appropriate and were also applied in an appropriate manner. However, the last year of catch rate indices were inconsistent among different sectors within the recreational and commercial fisheries. Some particular methods exhibited an increase while others exhibited a decrease and the decreasing trends accounted for most of the catch on both the commercial and the recreational fisheries. This led the panel to recommend that the assessment be updated in the next few years to determine the trajectory of the stock more precisely. The panel also recommended that a yield-per-recruit analysis should be made for the greater amberjack as an addition to future assessments. This analysis would act as a check against growth overfishing.

The panel thanks the authors for their efforts and suggests that sufficient resources and time should always be provided to the scientific staff to prepare the materials to normal

scientific standards and allowance be made for any major un-avoidable disruption to this process (such as Hurricane Katrina).

The panel made several recommendations that would improve the documentation of data and methods used in the assessments. A summary table for each assessment should be provided stating each data stream to be used with its constraints and any treatments or modifications made. Included in this table should be an indication of the reliability of each data stream. It could be included in either the Data Workshop or Assessment Workshop reports. The various model outputs and management benchmarks (e.g. MSY, Fmsy, Bmsy, MSST, MFMT) for the accepted base case model should be defined in one place within the stock assessment report along with how they were defined mathematically. Each assessment document should contain appendices detailing the structure and likelihood estimator for at least the base case model, or alternatively refer to a readily available document containing these details. Whenever a major data stream (effort, catches or catch rates) is to be modified the details of any modifications should be stated explicitly and documented completely.

1. Introduction

1.1 Time and Place

The SEDAR 9 Review Workshop met in New Orleans, Louisiana, from 27 to 31 March 2006.

1.2 Terms of Reference for the Review Workshop

1. Evaluate the adequacy, appropriateness, and application of data used in the assessment.
2. Evaluate the adequacy, appropriateness, and application of methods used to assess the stocks.
3. Recommend appropriate estimates of stock abundance, biomass, and exploitation^{*}.
4. Evaluate the methods used to estimate population benchmarks and management parameters (*e.g., MSY, F_{msy}, B_{msy}, MSST, MFMT, or their proxies*); provide estimated values for management benchmarks, a range of ABC, and declarations of stock status^{*}.
5. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status; recommend appropriate estimates of future stock condition^{*} (*e.g., exploitation, abundance, biomass*).
6. Evaluate the adequacy, appropriateness, and application of methods used to characterize uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters^{*}. Ensure the implications of uncertainty in technical conclusions are clearly stated.
7. Ensure that stock assessment results are clearly and accurately presented in the Stock Assessment Report and that reported results are consistent with Review Panel recommendations. (In the event corrections are made in the assessment, alternative model configurations are recommended, or additional analyses are prepared as a result of review panel findings regarding the TORs above, ensure that corrected estimates are provided by addenda to the assessment report)
8. Evaluate the performance of the Data and Assessment Workshops with regard to their respective Terms of Reference; state whether or not the Terms of Reference for those previous workshops were met and are adequately addressed in the Stock Assessment Report.
9. Review research recommendations provided by the Data and Assessment workshops and make any additional recommendations warranted. Clearly indicate the research and monitoring needs that may appreciably improve the reliability of future assessments.
10. Prepare a Peer Review Consensus Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Prepare an Advisory Report summarizing key assessment results. (Reports to

be drafted by the Panel during the review workshop with a final report due two weeks after the workshop ends.)

1.3 List of Participants

Participants	Affiliation	
<i>Panel Chair:</i>		
M. Elizabeth Clarke		N
<i>Review Panel:</i>		
Haddon, Malcolm		C
Patterson, Kenneth		C
Chen, Din	CIE Reviewer	
<i>Presenters:</i>		
Craig Brown		N
Shannon Cass-Calay		N
Guillermo Diaz		N
Josh Sladek-Nowlis		N
Steve Turner		
Jerry Scott		
<i>Observers:</i>		
Chris Dorsett	The Ocean Conservancy/GMFMC AP	
Myron	Fischer	
Mike Nugent		
Andy Strelcheck		N
Wayne	Werner	
Joseph Powers		
<i>Staff support:</i>		
John Carmichael	SEDAR	
Dawn Aring	GMFMC Staff	
Patrick	Gilles	
Stu Kennedy		
Joseph Powers		
Jerry Scott		

1.4 Review Workshop Documents

The following documents were available to the Review Panel during SEDAR 9.

Document #	Title	Authors
Documents Prepared for the Data Workshop		
SEDAR9-DW1	History of vermillion snapper, greater amberjack, and gray triggerfish management in Federal waters of the US Gulf of Mexico, 1984-2005	Hood, P.
SEDAR9-DW2	Vermillion Snapper Otolith Aging: 2001-2004 Data Summary	Allman, R J., J. A. Tunnell, B. K. Barnett
SEDAR9-DW3	Reproduction of vermillion snapper from the Northern and Eastern Gulf of Mexico, 1991-2002.	Collins, L. A., R. J. Allman, and H. M Lyon
SEDAR9-DW4	Standardized catch rate indices for vermillion snapper landed by the US recreational fishery in the Gulf of Mexico, 1986-2004	Cass-Calay, S. L.
SEDAR9-DW5	Standardized catch rate indices for vermillion snapper landed by the US commercial handline fishery in the Gulf of Mexico, 1990-2004	McCarthy, Kevin J., and Shannon L. Cass-Calay
SEDAR9-DW6	Standardized catch rates of vermillion snapper from the US headboat fishery in the Gulf of Mexico, 1986-2004	Brown, Craig A.
SEDAR9-DW7	Estimated Gulf of Mexico greater amberjack recreational landings (MRFSS, Headboat, TXPW) for 1981-2004	Diaz, Guillermo
SEDAR9-DW8	Size frequency distribution of greater amberjack from dockside sampling of recreational landings in the Gulf of Mexico 1986-2003	Diaz, Guillermo
SEDAR9-DW9	Size frequency distribution of greater amberjack from dockside sampling of commerical landings in the Gulf of Mexico 1986-2003	Diaz, Guillermo
SEDAR9-DW10	Standardized catch rates of gulf of Mexico greater amberjack for the commercial longline and handline fishery 1990-2004	Diaz, Guillermo
SEDAR9-DW11	Length Frequency Analysis and Calculated Catch at Age Estimations for Commercially Landed Gray Triggerfish (<i>Balistes capriscus</i>)	Saul, Steven

	From the Gulf of Mexico	
SEDAR9-DW12	Estimated Gray Triggerfish (<i>Balistes capriscus</i>) Landings From the Gulf of Mexico Headboat Fishery	Saul, Steven
SEDAR9-DW13	Estimated Gray Triggerfish (<i>Balistes capriscus</i>) Commercial Landings and Price Information for the Gulf of Mexico Fishery	Saul, Steven
SEDAR9-DW14	Estimated Gray Triggerfish (<i>Balistes capriscus</i>) Recreational Landings for the State of Texas	Saul, Steven
SEDAR9-DW15	Estimated Gray Triggerfish (<i>Balistes capriscus</i>) Landings From the Marine Recreational Fishery Statistics Survey (MRFSS) In the Gulf of Mexico	Saul, Steven, and Patty Phares
SEDAR9-DW16	Length Frequency Analysis for the Gray Triggerfish (<i>Balistes capriscus</i>) Recreational Fishery In the Gulf of Mexico	Saul, Steven
SEDAR9-DW17	Estimates of Vermilion Snapper, Greater Amberjack, and Gray Triggerfish Discards by Vessels with Federal Permits in the Gulf of Mexico	McCarthy, Kevin J.
SEDAR9-DW18	Size Composition Data from the SEAMAP Trawl Surveys	Nichols, Scott
SEDAR9-DW19	Species Composition of the various amberjack species in the Gulf of Mexico	Chih, Ching-Ping
SEDAR9-DW20	Standardized Catch rates of Gulf of Mexico greater amberjack catch rates for the recreational fishery (MRFSS, Headboat) 1981-2004	Diaz, Guillermo
SEDAR9-DW21	SEAMAP Reef Fish Survey of Offshore Banks: Yearly indices of Abundance for Vermilion Snapper, Greater Amberjack, and Gray Triggerfish	Gledhill, et. al.
SEDAR9-DW22	Data Summary of Gray Triggerfish (<i>Balistes capriscus</i>), Vermilion Snapper (<i>Rhomboplites aurorubens</i>), and Greater Amberjack (<i>Seriola dumerili</i>) Collected During Small Pelagic Trawl Surveys, 1988 – 1996	Ingram, Jr., G. Walter
SEDAR9-DW23	Abundance Indices of Gray Triggerfish and Vermilion Snapper Collected in Summer and Fall SEAMAP Groundfish Surveys (1987 – 2004)	Ingram, Jr., G. Walter
SEDAR9-	Review of the Early Life History of Vermilion Snapper, <i>Rhomboplites</i>	Lyczkowski-Shultz,

DW24	<i>auroubens</i> , With a Summary of Data from SEAMAP plankton surveys in the Gulf of Mexico: 1982 – 2002	J. and Hanisko, D.
SEDAR9-DW25	Review of the early life history of gray triggerfish, <i>Balistes capriscus</i> , with a summary of data from SEAMAP plankton surveys in the Gulf of Mexico: 1982, 1984 – 2002	Lyczkowski-Shultz, J., Hanisko, D. and Zapfe, G.
SEDAR9-DW26	Shrimp Fleet Bycatch Estimates for the SEDAR9 Species	Nichols, Scott
SEDAR9-DW27	SEAMAP Trawl Indexes for the SEDAR9 Species	Nichols, Scott
SEDAR9-DW-28	Standardized Abundance Indices for Gulf of Mexico Gray Triggerfish (<i>Balistes capriscus</i>) based on catch rates as measured by the Marine Recreational Fisheries Statistics Survey (MRFSS)	Nowlis, Josh Sladek
SEDAR9-DW-29	Standardized Abundance Indices for Gulf of Mexico Gray Triggerfish (<i>Balistes capriscus</i>) based on catch rates as measured by the NMFS Southeast Zone Headboat Survey	Nowlis, Josh Sladek
SEDAR9-DW-30	Standardized Abundance Indices for Gulf of Mexico Gray Triggerfish (<i>Balistes capriscus</i>) based on catch rates as measured from commercial logbook entries with handline gear	Nowlis, Josh Sladek
SEDAR9-DW-31	Estimated Gulf of Mexico vermillion snapper recreational landings (MRFSS, headboat, TPWD) for 1981-2004	Cass-Calay, Shannon, & Guillermo Diaz

Documents Prepared for the Assessment Workshop

SEDAR9-AW1	Incorporating age information into SEAMAP trawl indices for SEDAR9 species	Nicholls, S.
SEDAR9-AW2	Separating Vermilion Snapper Trawl Indexes into East and West Components	Nicholls, S
SEDAR9-AW3	Modeling Shrimp Fleet Bycatch for the SEDAR9 Assessments	Nicholls, S
SEDAR9-AW4	Status of the Vermilion Snapper (<i>Rhomboplites aurorubens</i>) Fisheries of the Gulf of Mexico	Cass-Calay, S.
SEDAR9-AW5	Gulf of Mexico Greater Amberjack Stock Assessment	Diaz, Guillermo A., and Elizabeth Brooks

SEDAR9-AW6	A Categorical Approach to Modeling Catch at Age for Various Sectors of the Gray Triggerfish (<i>Balistes Capriscus</i>) Fishery in the Gulf of Mexico	Saul, Steven and G. Walter Ingram, Jr.
SEDAR9-AW7	Updated Fishery-Dependent Indices of Abundance for Gulf of Mexico Gray Triggerfish (<i>Balistes Capriscus</i>)	Nowlis, Joshua Sladek
SEDAR9-AW8	An Aggregated Production Model for the Gulf of Mexico Gray Triggerfish (<i>Balistes Capriscus</i>) Stock	Nowlis, Joshua Sladek and Steven Saul
SEDAR9-AW9	Age-Based Analyses of the Gulf of Mexico Gray Triggerfish (<i>Balistes capriscus</i>) Stock	Nowlis, J. S.
SEDAR9-AW10	Gulf of Mexico greater amberjack virtual population analysis assessment	Brown, C. A., C. E. Porch, and G. P. Scott
SEDAR9-AW11	Rebuilding Projections for the Gulf of Mexico Gray Triggerfish (<i>Balistes capriscus</i>) Stock.	Nowlis, J. S.
Documents Provided for the Review Workshop		
SEDAR9-RW01	Performance of production models on simulated data. (Presentation for NMFS National SAW 8, 2006)	Brooks, E. N. et al
Reference Documents Provided at Workshops		
SEDAR9-RD01 Univ. South AL. PhD Thesis	Stock structure of gray triggerfish on multiple spatial scales in the Gulf of Mexico.	Ingram, W.G.
SEDAR9-RD02 2002. Proc. 53 rd GCFI	Indirect estimation of red snapper and gray triggerfish release mortality	Patterson, W. F. et al.
SEDAR9-RD03 1997 Proc. 49 th GCFI	Preliminary Analysis of Tag and Recapture Data of the Greater Amberjack, <i>Seriola dumerili</i> , in the Southeastern United States	McClellan, D. and Cummings, N.
SEDAR9-RD04 SEFSC Doc. No. SFD-	Trends in Gulf of Mexico Greater Amberjack Fishery through 1998: Commercial landings, Recreational Catches, Observed length Frequencies, Estimates of Landed and Discarded Catch at Age, and Selectivity at	Cummings, N. J., and D. B McClellan

99/00-99	Age.	
SEDAR9-RD05 Fish. Res. 70 (2004) 299-310	A multispecies approach to subsetting logbook data for purposes of estimating CPUE	Stephens, A. and A. MacCall.
S9-RD06 SFD 99/00-100	Stock assessments of Gulf of Mexico greater amberjack using data through 1998.	Turner, S. C., N.J. Cummings, and C. E. Porch
S9-RD07 SFD 99/00-92	Catch rates of greater amberjack caught in the handline fishery in the Gulf of Mexico in 1990-1998	Turner, S. C.
S9-RD08 SFD 99/00-107	Catch rates of greater amberjack caught in the headboat fishery in the Gulf of Mexico, 1986-1998.	Turner, S. C.
S9-RD09 SFD 01/02-150	Projections of Gulf of Mexico greater amberjack from 2003-2012	Tuner, S. C. and G. P. Scott
S9-RD10 SFD 99/00-98	Gulf of Mexico greater amberjack abundance from recreational charter and private boat anglers from 1981-1998.	Cummings, N. J.
S9-RD11 SFD00/01-124	A stock assessment for gray triggerfish in the Gulf of Mexico.	Valle, M., C. Legault, and M. Ortiz.
S9-RD12 SFD00/01-126	Another assessment of gray triggerfish in the Gulf of Mexico using a space-state implementation of the Pella-Tomlinson production Model	Porch, C. E.
S9-RD13 SFD01/02-129	Status of the vermillion snapper fishery in the Gulf of Mexico. Assessment 5.0	Porch, C. E. and S. Cass-Calay.
S9-RD14 Panama City 01-1	Report of vermillion snapper otolith aging; 1994-2000 data summary	Allman, R. J., G. R. Fitzhugh, and W. A. Fable
S9-RD15 FWRI IHR2005-3	Genetic stock structure of vermillion snapper in the Gulf of Mexico and southeastern United States	Tringali, M. D. and M. Higham
S9-RD16 SCDNR	Age, growth, and reproduction of greater amberjack in the Southwestern North Atlantic. December 2004 Analytical Report	Harris, P. J.
S9-RD17	Preliminary Assessment of Atlantic white marlin using a state-space implementation of	Porch, C. E.

	an age-structured production model	
S9-RD18	VPA-2BOX Program Documentation, Version 2.01. 2003. ICCAT Assessment Program Documentation.	Porch, C. E.
S9-RD19	VPA-2BOX Program Documentation, Version 3.01. 2003. ICCAT Assessment Program Documentation.	Porch, C. E.

Final Assessment Reports

SEDAR9-AR1	Gray Triggerfish	
SEDAR9-AR2	Greater Amberjack	
SEDAR9-AR3	Vermillion Snapper	

2. Response to Terms of Reference

2.1 Background

The panel examined and reviewed the reports and related documents from both the Data Workshop and the Assessment Workshops relating to the greater amberjack.

The assessments were reviewed in detail and minor modifications were recommended which had significant implications for the assessment outcomes. So an addendum will be produced to the assessment report for the greater amberjack.

2.2 Review of the Panel's deliberations

The deliberations on each species are presented in the form of responses to the terms of reference questions specifically, followed by relevant comments on the discussions.

2.2.1. Evaluate the adequacy, appropriateness, and application of data used in the assessment.

The data used in the assessment of greater amberjack were generally appropriate and were also applied in an appropriate manner. The data were also generally adequate to provide an informative assessment except in the latest year (2004) where the catch rate indices are inconsistent between the different sectors. Depending on what weight is given to the different sectors (equal weights or weighted relative to proportional catch) this inconsistency results in great uncertainty over the current stock status and the projections into the future. It is recommended that this uncertainty will only be clarified

by conducting an update assessment in the next few years to determine the trajectory of the stock more precisely.

The Data Workshop (DW) for greater amberjack considered the life history characteristics (stock structure, habitat requirements, ageing, growth, age-at-maturity, natural mortality, and release mortality of greater amberjack taken as bycatch). Then the DW detailed the commercial and recreational fishing statistics (the catch statistics), and finally the measures of abundance (catch rates) for the different commercial and recreational sectors was discussed and presented.

All of this is useful and a sensible selection of information for the development of appropriate stock assessments. As with all fisheries data, different data streams tend to be of varying detail and quality, for example the age-at-maturity information is clearly approximate for greater amberjack (0% at age 2 year, 50% at age 3, and 100% beyond). Nevertheless, the attention paid to collecting detailed recreational fishing data on catches and catch rates is both welcome and necessary in a fishery which has such large recreational catches. This is a significant advance over the state of affairs as found in Europe and is more detailed than in New Zealand and Australia. Greater precision of the recreational catch rates and catches would undoubtedly be beneficial to the assessments, but these assessments are only possible at all, for fisheries in which recreational fishing is so significant, because such recreational data is available.

The application of the data analyses is usually clear with details of the standardizations of the catch rate data being given in separate SEDAR documents. At times the clarity of documentation of some of the treatments that the different data streams undergo varies. The most important instance of obscurity in the case of greater amberjack is the manner in which the catch history is developed for each sector. There is an issue with subdividing catches reported in summary categories (e.g. amberjacks – there are four species that are commonly included in this category) into their component species. Also there is the addition of an assumed 20% discard mortality rate in some sectors which is not described in sufficient detail. The full details of the treatments should be documented. It is recommended that whenever a major data stream (effort, catches or catch rates) is to be modified then those modifications be stated explicitly and documented completely; this is so obvious that underlying this recommendation is another more fundamental recommendation, which is that sufficient resources and time be provided to the scientific staff to prepare the materials and allowance be made for any major un-avoidable disruption to the process. This is not a criticism of the scientific staff involved in the assessments, who appear to have done an excellent job with the data available. It is understood that in this instance the advent of Hurricane Katrina was a large impediment to the smooth running of the SEDAR9 process. Thus, analyses were completed but it was apparent that insufficient time remained to completely document all aspects.

Sometimes the documentation fails to be explicit in listing exactly which data were finally to be used in the assessments and it is recommended that clarity would be improved by providing a summary table stating each data stream to be used with its constraints and any treatments or modifications made. This could be either in the Data Workshop report or the Assessment Workshop report.

It is relatively straightforward to assess the appropriateness and application of the data but more difficult to determine the adequacy of the different data streams. As a

minimum if it proves possible to generate an assessment then in a sense the data could be deemed adequate. But without stated standards of precision and other performance measures then making firmer statements with respect to adequacy is difficult. In the case of greater amberjack the recreational MRFSS data in the final year appears to have enormous influence over the outcomes of the assessment. Up to and including 2003 the assessment appears to perform well but the addition of the 2004 recreational data (which makes up over half the total catch) can lead to the final outcomes of the assessment taking diverging paths in the projections. This difference depends upon what weighing scheme is placed on the different data streams (either equal weight to each data source or weighted according to their relative contribution to the total catch – which emphasizes the recreational and down-weights things like commercial long line). The weighting scheme selected (that of using the relative catches by sector over the last eight years) makes the assumption that the greater the catch the greater the chance that those catches are representative of the wider stock of greater amberjack. This is debatable considering the different sectors may target different ages or areas but is the best assumption currently available. We can conclude that the data up until 2003 are adequate for the production of a stable assessment but that the 2004 data leads to such uncertainty that the data series could be considered as no longer adequate to provide precise estimations of stock status and future potential yields. This was determined by experimentally removing the 2004 data from the analysis. The review panel concluded that because of the great uncertainty arising from the final year of data, more years of data are required to clarify the most recent trends in the stock. It is recommended that an update assessment be conducted (outside the usual benchmark assessment process) to elucidate the most likely forecasts and track the trajectory being followed by the stock.

2.2.2. Evaluate the adequacy, appropriateness, and application of methods used to assess the stocks.

The methods used to select and standardize the catch and effort data are innovative and appropriate. Other methods used to prepare the data for the assessments also appear appropriate and adequate. The stock assessment models utilized were also appropriate given the data available.

It was found that because of the difficulty in obtaining representative ageing data and lack of any representative catch-at-age data, the VPA (the continuity case) and the age-structured production model were inadequate to provide appropriate analyses of stock status. Even if future ageing data improves in quality and quantity it is recommended that the VPA option be abandoned as there is less chance that it could improve its performance in the face of poor early data. In the face of these problems the simple production model was the most appropriate of the available methods. Its implementation is via a user-friendly interface that appears to operate well. This method is capable of providing estimates of some of the management benchmarks of interest and in that sense at least is clearly adequate.

The Stephens and MacCall (2004) method of using catch composition of individual trips to identify appropriate sub-sets of trip data to be used when estimating the standardized CPUE time series was not reviewed in detail and its performance is

unknown (though the method has been published in the formal literature). Nevertheless, on theoretical grounds alone the method is considered appropriate. To avoid possible biases potentially introduced by this method, if different species exhibit different stock trends, it is considered that the application of this modelling approach separately each year is appropriate. In effect, the use of catch composition as part of the analysis of catch rates takes some account of multi-species considerations in these single species assessments.

Comparing more than one assessment model is an excellent strategy for exploring the most appropriate method to use within the constraints imposed by the available data. Such comparisons are also useful for exploring uncertainty due to model uncertainty. The three methods compared were a standard VPA, an age structured production model, and a simpler production model. The latter two models are estimated using penalized maximum likelihood methods. References to priors and methods typically associated with Bayesian methods should not be taken to imply that Bayesian methods were used. It is assumed that the priors were used as penalty functions during the model fitting process. The use of continuity cases (in this case the VPA) is applauded as it should indicate the influence of new data in the previous context. However, the development and use of other methods is desirable, especially in this case, because of the limitations in the ageing data. It is recommended that, if future ageing data can be improved, the age-structured modelling be restricted to the age-structured production modelling (ASPM) and the VPA be dropped as an option. The early ageing data will not be improved so the VPA method will remain compromised into the future whereas the ASPM may be able to improve its performance.

Given the constraints with greater amberjack data (primarily related to ageing difficulties and a lack of detailed catch-at-age data or low sample sizes) the assessment methods used are considered to be appropriate. The methods chosen reflected the character of the data available and the way in which it was collected. However, it was clear that insufficient time and resources had been made available to consider fully the model constraints and possible parameterisations. In this context, the further model and data explorations that occurred at the review workshop were able to lead to significant improvements. The practice of testing the sensitivity of model parameters of interest (e.g. F_{2004}/F_{msy}) to the use of alternative data series, and to the fixing of structural parameters and constraints is essential in the application of stock assessment models and this process should be developed and continued. In this workshop considerable changes to the assessment outcomes were affected by a more detailed consideration of different weighting being given to the different data streams. Such investigations should be a part of every assessment. For this to happen sufficient time must be allocated or permitted to the assessment staff to conduct these detailed analyses.

The application of the methods is not always simple to assess as details of the implementations are not always provided (it is recommended that each assessment should, preferably, contain appendices detailing at least the base case model or else refer to a readily available document).

In the absence of good quality ageing data it is difficult to obtain an unambiguous selectivity curve. Without either catch-at-age data or selectivity curves then the use of an age-structured method, such as VPA or the age-structure production model, can ask questions about the stock's status that cannot be answered by the information available in the data. Because of this neither the VPA nor the age-structured production model were deemed appropriate or adequate for greater amberjack. Instead it was the appropriate choice to select the simple production model to act as the base case assessment. Whether this model was adequate to characterize the stock status is difficult to assess in the absence of a formal simulation study. However, with what appears to be inconsistent data between sectors in the final year (2004), while the surplus production model was able (and therefore adequate) to provide an estimate of the current status of the stock the uncertainty in the final year means that the projections are not unambiguously informative.

2.2.3. Recommend appropriate estimates of stock abundance, biomass, and exploitation.

The base case model selected as being the best available was the simple production model known as ASPIC. Production models are based around a production curve that describes how the stock's productivity changes with stock size. While ASPIC has the flexibility to have an asymmetric production curve a symmetric curve was deemed most appropriate in this case. The data sources were the four fishery dependent indices of relative abundance (the different sectors commercial fisheries: Long Line, Hand Line and recreational fisheries: Headboat and Charter Boat/Private Boat). The relative contributions made by the different sectors varied greatly (in 2004 the charter boat sector took 59.5% of the catches, Headboat took only 3%, commercial handline took 35% and longline took 2.5%). In addition, the trends exhibited in the indices of relative abundance differed, especially in the last year, between sectors (with charter boat showing a marked decline, Headboat and longlines showing an increase and handline a slight decrease). In order to account for these differences in the base case model the relative contribution of each index of relative abundance to the overall likelihood was weighted relative to their relative contribution to the total catches over the final eight years. The base case was conducted using the following conditions:

Definition of Base Case Surplus Production model for Greater Amberjack	
Model Used	Non-equilibrium surplus production model conditioned on yield (ASPIIC software was used).
Production Curve	Logistic model, leading to a symmetric production curve, implying that the maximum productivity is found at $B_{MSY} = K/2$.
Four fisheries	Commercial Long Line, Hand Line, Recreational Head Boat and Charter Boat and Private Boat.
Indices of Abundance	Fishery dependent indices of abundance were available for each of the four separate sectors (fisheries) listed above. The relative weighting applied to these different indices was made with respect to their individual percent contribution to the overall catch over the last 8 years: 1997 to 2004 – CB+PB 52.85, HB 4.42, HL 40.06 and LL 2.67.
Years of data and modelling.	1986 - 2004
Assumptions	20% discard mortality for each sector (see DW report).
Model Parameters	Population size relative to unfished biomass (B_1/K), Maximum Sustainable Yield – MSY, unfished biomass K and catchability q by fleet. In addition, F_{MSY} and B_{MSY} and the ratios of F_{2004} and B_{2004} with respect to these were also estimated.
Uncertainty Characterization	Bootstrapping was used to characterize uncertainty in the estimated parameters and model outputs.

Appropriate estimates of stock abundance, biomass and stock status, along with some sensitivity tests. The ‘relative catch weighting’ column relates to the optimum base case model and the ‘equal weighting’ sensitivity test relates to weighting the different indices of relative abundance equally (which would down-weight the MRFSS data and up-weight the HeadBoat and Long Line data).

Estimated Parameter	Relative Catch Weighting	Equal Weighting
B_1/K	0.820	0.840
MSY (million lbs)	5.039	4.815
K (million lbs)	17.75	19.87
BMSY	8.873	9.937
FMSY	0.568	0.485
B_{2004}/B_{MSY}	0.479	0.706
F_{2004}/F_{MSY}	1.520	1.017

2.2.4. Evaluate the methods used to estimate population benchmarks and management parameters (e.g., MSY, F_{msy}, B_{msy}, MSST, MFMT, or their proxies); provide estimated values for management benchmarks, a range of ABC, and declarations of stock status.

Using the base case model, which was the simple production model implemented as ASPIC, the methods used to estimate the population benchmarks and management parameters appear to be either standard (*e.g.* $B_{MSY} = K/2$ – for a production model with a symmetric production curve) or constitute a completely appropriate approximation (*e.g.* $MSST = (1-M)*B_{MSY}$ or $0.75*B_{MSY}$). It is recommended that the various model outputs and management benchmarks (*e.g.* MSY , F_{msy} , B_{msy} , $MSST$, $MFMT$) for the accepted base case model be defined in one place along with how they were defined mathematically. This is especially important when the definitions of these values differ between models and possibly species. At the same time, it is recommended that a glossary of all the acronyms used in the assessments should be provided as the range of readers likely to be interested in this work will be large and acronyms are not always an aid to clarity. It should be noted that because there are no age-related data involved in this kind of assessment management benchmarks involving spawners-per-recruit are not available from simple surplus production models.

The summary of the stock status is provided in a table under section 2.3.

The assessment indicates that the stock is both overfished and experiencing overfishing.

2.2.5. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status; recommend appropriate estimates of future stock condition (*e.g.*, exploitation, abundance, biomass).

The method used to conduct projections from the simple production model was built into the software implementation of ASPIC. There is more than one way to project the outcomes of a surplus production model (Haddon, 2001). While it can be assumed on authority that this software is adequate and performs appropriately it would be better practice to have the algorithms behind the software documented along with copies of the software documentations available to those considering the assessments. As described above, the last year of data contains inconsistencies between sectors so that, depending on the weighting schema used, the projections are highly uncertain with regard to how long recovery of the stock to the management targets would take (assumed to be B_{msy} with this assessment). In order to increase the chances of being able to make adequate projections to be made in the future it is recommended that an update assessment be made before the next formal assessment of greater amberjack is due to be made.

2.2.6. Evaluate the adequacy, appropriateness, and application of methods used to characterize uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters. Ensure the implications of uncertainty in technical conclusions are clearly stated.

For the greater amberjack the preferred base case model was the simple production model. Bootstrapping was used to characterize the uncertainty of the estimated parameters and model outputs (management benchmarks). This method is both appropriate and is usually adequate with production models (Haddon, 2001). The classic application method of bootstrapping with surplus production models is to bootstrap the residuals between the observed data and the optimal model fit. These bootstrapped residuals are then added to the original fitted values and the model refitted to provide the bootstrap estimates of the parameters of interest. This process is repeated many times which provides the characterization of uncertainty. The implementation of this process was verbally reported as being correct and appropriate within ASPIC. Better documentation would be preferable. In this instance the bootstrapping led to a broad spread of potential outcomes reflecting the uncertainty and variation in the data and the production modelling analysis.

The implication of the uncertainty in the parameter estimates and model outcomes will be expressed in the addendum to the assessment report. The draft material presented at the SEDAR Review Workshop expressed this appropriately.

2.2.7. Ensure that stock assessment results are clearly and accurately presented in the Stock Assessment Report and that reported results are consistent with Review Panel recommendations. (In the event corrections are made in the assessment, alternative model configurations are recommended, or additional analyses are prepared as a result of review panel findings regarding the TORs above, ensure that corrected estimates are provided by addenda to the assessment report).

Corrections were made to the assessment (the base case selected involved small changes to the emphasis placed on the different indices of relative abundance that led to significant changes to the conclusions). The revised assessment was still be developed at the time of the SEDAR workshop but the outcomes of the revised assessment were presented at SEDAR 9 (this was not a correction but rather a revision). The formal revised assessment will be included as an addendum to the greater amberjack assessment document.

2.2.8. Evaluate the performance of the Data and Assessment Workshops with regard to their respective Terms of Reference; state whether or not the Terms of Reference for those previous workshops were met and are adequately addressed in the Stock Assessment Report.

The Data Workshop on Greater Amberjack was reported in *S9DWREP GAJ.pdf*. Overall the important terms of reference were well met with details being provided for life

history (including stock structure, ageing, growth, and natural mortality, which received detailed reviews), Commercial fishing statistics, recreational fishing statistics, and the various indices of relative abundance. In some places the recommendations were not as explicit as they could have been. For example, on page 48 in section “5.3.1 Indices to be considered for use in the assessment” the document states “As a general recommendation, the indices recommended for use from each fishery are those gulf-wide indices which employed the Stephens and MacCall (2004) approach to subsetting the data.” While this is useful in identifying the approach to be used it would have been simpler and more constructive to have explicitly listed the data series to be used in each of the different assessment methods to be applied [i.e. 1) commercial handline (1-9 hooks per line), 2) commercial longline, 3) recreational headboat and 4) recreational charter boat and private boat combined, and not the others]

At least two of the Terms of Reference for the Data Workshop did not appear to be addressed well and these were “5. Evaluate the adequacy of available data for estimating the impacts of current management actions.” Also “6. Recommend assessment methods and models that are appropriate given the quality and scope of the data sets reviewed and management requirements.” The relationship between the different data sources and recent and current management was not elucidated in many instances. Neither were suggestions documented as to what models would be most appropriate given the available data. However, answering both of these questions seems more appropriate in the assessment and overall review meetings rather than the Data meeting so this absence is not critical. It is recognized that the stock assessment staff involved in the modelling were mostly involved in the Data Workshop as well, so this failure to meet the TOR, in this case, may be more a matter of failure to document decisions. It is recommended that these TORs should be removed from consideration by the Data Workshop to one of the other workshops.

The Report from the Stock Assessment Workshop (AW) was S9SAR2 SectIIISAW GAJ.pdf. The time table for the assessments was greatly influenced by the advent of Hurricane Katrina. Nevertheless, while there were some deviations from the recommendations of the Data Workshop most of the details of the terms of reference for the Assessment Workshop were met satisfactorily.

The deviations from the Data Workshop (DW) recommendations constituted a constructive change that was fully justified. When standardizing the indices of relative abundance the selection of records to be included in the analyses used a strategy that attempted to account for where species were expected to be caught by considering the species mix of reported catches. This provides an estimate of the number of zero fishing events, which is a decided advantage but can also have the effect of excluding those trips which only had a single target species. The change away from the recommendation of the DW was to lower the thresholds required in a record to permit its inclusion in the analysis. This had the potential to make the results more robust and so was a positive move.

A further issue within the assessment document was with reference to the species composition of commercial catches. There are four species of *Seriola* that are

sometimes reported in combination as “amberjack” or even as “unclassified amberjack”. The DW recommended that the yields reported as unclassified amberjack and unclassified jacks be identified by species and the proportions allocated to greater amberjack where appropriate for use in the stock assessments. This alternative catch series only involved changes from 1990 to 2004, and the ambiguous reporting was mostly a problem during the 1990s. Nevertheless, the ambiguous records in the early 1990s constituted an important proportion of the commercial catch. The inclusion of these data is a sensible precaution against omitting yield. The issue is in the documentation of these changes. It would have been better to have been explicit and provided the full details of the algorithms actually used to make the species sub-division and then to make the re-allocation to greater amberjack. Undoubtedly, the disturbed assessment timetable in 2005 has contributed to this omission in the documentation. Spreadsheets showing the calculations were made available during SEDAR9, but for future stock assessments it is recommended that the process of adjusting the catch time series be fully documented.

In the Assessment Workshop the Terms of Reference included: 5. Provide yield-per-recruit and stock-recruitment analyses. While information on the stock recruitment characteristics were provided in the DW and discussed in the AW the only reference to Yield per Recruit in the AW was as part of Table 3.3.2.2.1 on page 40 showing results from a particular SSASPM. Presumably the value of a YPR analysis would be to determine whether growth overfishing is occurring as a check on the legal minimum length (even though this is not listed as one of the fishery performance measured listed to be considered). When the assessments for a species are highly uncertain or omit important aspects of the fishery then a YPR is an excellent minimum fall-back position and should be developed more fully. In the case of greater amberjack it is a recommended a full YPR analysis would appear to be a valuable addition to future assessments.

Terms of reference 10 stated: Evaluate the results of past management actions and probable impacts of current management actions with emphasis on determining progress toward stated management goals. This is an ambitious request and could only be treated relatively lightly at the AW. Once again, further clarity in the terms of reference would be helpful or this term of reference is not appropriate for the AW.

2.2.9. Review research recommendations provided by the Data and Assessment workshops and make any additional recommendations warranted. Clearly indicate the research and monitoring needs that may appreciably improve the reliability of future assessments.

- 1) Research recommendations were reported as being discussed in the DW but were not documented.
- 2) The research recommendations from the AW were sensible and would assist in clarifying problems with the current assessment and provide the possibility of extending the assessment to more advanced methods (age-structured production model).

- 3) An additional research recommendation that may be helpful would be to collect information on the species composition and total catch of shore based landings of Greater Amberjack and other species.

2.2.10. Prepare a Peer Review Consensus Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Prepare an Advisory Report summarizing key assessment results. (Reports to be drafted by the Panel during the review workshop with a final report due two weeks after the workshop ends.)

See separate Advisory Report

2.3. Comments on the SEDAR Process

The SEDAR process appears to be remarkably thorough and detailed, with many opportunities for clarification and communication of the stock assessment processes. The whole idea of such detailed reviews is to be applauded as demonstrating a willingness to be open and to provide the best defensible assessments possible with available data.

The process itself is relatively intensive and after observing the difficulties involved in review three species at the same time it is recommended that future SEDAR events only consider two species at the most. With three fisheries there are greater opportunities for confusion between species and the time available for detailed discussion could be compromised. If there were to be multiple species considered in future SEDAR workshops it would be beneficial to allocate species among reviewers prior to arrival at the workshop so they could begin the detailed and focussed examination of the very many reports from the Data and Assessment Workshops before arriving at the review venue.

The final review workshop report appears to be asking for the review panellists to produce an independent assessment summary and while the review panel may have possibly provided significant input to the assessment development the work is still mostly all that of the assessment scientists. As such it feels contrary to general practice to not have their names associated with the final consensus report.

Some of the review reporting, such as the advisory report, appears to be primarily an editorial effort which could be produced by anyone rather than the review panellist. The chances for errors of omission would be significantly lower if the advisory report were produced by the assessment scientists concerned and merely edited and agreed to by the review panellists.

Recommendations

- 2.1.5 Whenever a major data stream (effort, catches or catch rates) is to be modified the details of any modifications should be stated explicitly and documented completely.
- 2.1.6 To avoid overloading the scientific staff, sufficient resources and time should always be provided to prepare the materials to normal scientific standards and allowance be made for any major un-avoidable disruption to this process (such as Hurricane Katrina).
- 2.1.7 A summary table for each assessment should be provided stating each data stream to be used with its constraints and any treatments or modifications made. Included in this table should be an indication of the reliability of each data stream. It could be included in either the Data Workshop or Assessment Workshop reports.
- 2.1.8 *Within the greater amberjack assessment, because of the uncertainty caused by the final year of data, an update assessment should be conducted within a few years (outside the usual benchmark assessment process) to elucidate the most likely trajectory being followed by the stock and enable the provision of remedial management measures should these be necessary.*
- 2.2.1 Each assessment document should, preferably, contain appendices detailing the structure and likelihood estimator for at least the base case model, or alternatively refer to a readily available document containing these details.
- 2.2.8 A yield-per-recruit analysis should be made for the greater amberjack as an addition to future assessments to act as a check against growth overfishing and whether the legal minimum length is appropriate.
- 2.4.1 The various model outputs and management benchmarks (e.g. MSY, F_{MSY}, B_{MSY}, MSST, MFMT) for the accepted base case model should be defined in one place within the stock assessment report along with how they were defined mathematically.
- 2.4.2 A glossary of all the acronyms used in the assessments should be provided as an appendix in every assessment report.
- 2.8.1 If the data available are adequate for conducting an assessment then the 5th and 6th Terms of Reference in the Data Workshop should be removed from consideration by the Data Workshop and shifted instead to the Assessment Workshop.

List of Acronyms

- ABC Acceptable Biological Catch – variable interpretations
- ASPIC aggregated surplus production model with integrated covariates
- EA environmental assessment
- FMP Fishery Management Plan
- Foy F optimal yield = 0.75 F_{msy}
- ICCAT International Commission for the Conservation of Atlantic Tuna
- IRFA initial regulatory flexibility analysis
- MFMT Maximum Fishing Mortality Threshold – overfishing criterion
- MRFSS marine recreational fisheries statistical survey
- MSST = (1-M)MSY Minimum Stock Size Threshold – overfished criterion
- NMFS National Marine Fish Service
- OY Optimal Yield 0.75 MSY for greater amberjack but see Magnusson Act
- RIR Regulatory Impact Review
- Sector any recognizable group, recreational, commercial or bycatch that impacts on the fish stock of interest.
- SFA Sustainable Fisheries Act
- SPR Spawning Potential Ratio
- SSASPM State Space Age-Structures Production Model
- SSB(R) Spawning Stock Biomass (per recruit)
- TIP Trip Intercept Programme
- TAC Total Allowable Catch
- TPW(D) Texas Parks and Wildlife (Department)
- VPA Virtual Population Analysis
- YOY Young of Year

References

- Haddon, M. (2001) *Modelling and Quantitative Method in Fisheries*. CRC/Chapman & Hall, Boca Raton, 406 p.
- Stephens, A. and A. MacCall. 2004. A multispecies approach to subsetting logbook data for purposes of estimating CPUE. *Fisheries Research* 70 (2004), 299–310.

Appendix 2.

Advisory Assessment Report

SEDAR 9

Greater Amberjack

4.1. Stock Distribution and Identification

Genetic studies indicate that the stock within the Gulf of Mexico constitutes a single biological stock. The geographic boundary of the management units occurs from the Dry Tortugas through the Florida Keys. Treating this region as a single biological stock is appropriate.

4.2. Assessment methods

The preferred assessment method chosen is a simple production model of the Schaefer type (uses a symmetric production curve) which assumes all individuals are equivalent and selectivity is ignored. Alternative and previous assessments (a VPA and an age-structured surplus production model) show similar assessment outcomes but a lack of good quality ageing data adds an unknown amount of uncertainty to these methods and they are not adequate at present.

4.3 Assessment data

The data sources and assumptions used were:

MRFSS estimates of catch and standardized catch rates.

Head boat estimates of catches and standardized catch rates.

Commercial hand line catches and standardized catch rates.

Commercial long line catches and standardized catch rates.

Date was available and modelled from 1986 to 2004.

Release mortality was assumed to be 20%.

Bycatch in the prawn fishery is assumed to be negligible.

4.4 Catch trends

Total catches are modelled from 1986.

Early catches were relatively variable which may be simply a reflection of early variation in the MRFSS catch estimates.

The general trend in catches across all sectors was a decline to 1998 followed by an increase to 2003 with a small drop in 2004.

4.5 Fishing mortality trends

Fishing mortality, as expressed as $F_{\text{current}}/F_{\text{MSY}}$, was variable and above 1.0 until about 1998 after which there is a reduction closer to a ratio of 1.0 but remaining above this threshold. Full details will only become available in the addendum to the assessment report deriving from the new analysis.

4.6 Stock abundance and biomass trends

Stock biomass followed a pattern similar to total catches except it was less variable. There was a decline from 1986 down to 1998 until the ratio $B_{\text{current}}/B_{\text{MSY}}$ was below of 1.0. This decline was followed by a slow increase to the present. Full details will only become available in the addendum to the assessment report deriving from the new analysis.

4.7 Status determination criteria

The stock appears to be in both an overfished condition and was being overfished in 2004. This was determined by a consideration of the ratios of the current biomass estimate B_{2004} with B_{MSY} and the current fishing mortality F_{2004} with F_{MSY} ; biomass is less than half the limit reference point of B_{MSY} , and fishing mortality was 50% greater than its limit reference point of F_{MSY} . However, these results are very dependent upon the weighting applied to the different time series of catch rates, the base case is to weight each series of catch rate indices in line with the total proportion catch by each sector over the past eight years. When each catch rate is weighted equally (the poorest assumption) the stock remains overfished but less so than the base case, and is only just in the overfishing state.

Much of the uncertainty in the stock status derives from the indices of relative abundance being inconsistent between sectors in 2004. This makes the projections both uncertain and uninformative so that it is recommended that an update assessment be conducted in the next few years to determine the stock trajectory with more precision.

4.8 Stock Status

The parameters relevant to management are estimated as follows:

Parameter	Value
Population parameters and management benchmarks	
MSY (million pounds)	5.039
B _{MSY}	8.873
F _{MSY}	0.568
Stocks parameters in 2004	
F ₂₀₀₄	0.863
F ₂₀₀₄ / F _{MSY}	1.520
B ₂₀₀₄	4.250
B ₂₀₀₄ / B _{MSY}	0.479

Declarations of Stock Status:

- the stock was overfished in 2004 ($B_{2004}/B_{MSY} < 1.0$);
- the stock was undergoing overfishing in 2004 ($F_{2004}/F_{MSY} > 1.0$);
- the stock was overexploited with respect to the optimum fishing mortality;
- uncertainty has been added to the assessment by the 2004 data. Catch rate data from the four different sectors exhibits significant differences in 2004 and the assessment outcome and projections are very dependent upon how the catch rate series are weighted;

4.7 Projections

Only draft projection have been presented (SEDAR9 Review Workshop). Full quantitative projections will be available as an Addendum to the greater amberjack assessment document. The draft projections are uncertain depending upon the last year of catch rate data and how the catch rate series are weighted when fitting the model. This uncertainty is so great that the future stock status cannot be forecast adequately. *Because of this uncertainty it is recommended that an update assessment be conducted in the next few years to determine the most likely stock status trajectory and respond appropriately at that time.*

4.8 Allowable biological catch

Adequate projections are not available and will remain in that state until an update assessment is conducted. In the meantime, it would be precautionary to not recommend that the catch should remain as it is and should not be increased.

4.9 Special Comments

The change of assessment model from the VPA base case used previously to the simpler simple stock production curve was the most appropriate move given the uncertainty in ageing greater amberjack combined with the small samples used to characterize the catch-at-age. However, the stock status remains unchanged with the introduction of the simpler model. It was concluded that the stock was both overfished in 2004 and was experiencing overfishing in 2004. It is stressed, however that:

- (1) the catch rate data in 2004 was inconsistent between sectors; the minor components of the fishery (recreational headboats and commercial longline) exhibited an increase while the major components of the fishery (recreational charter boat and private boats with commercial hand line vessels) exhibited different degrees of decrease. This is why different weightings produced different outcomes.
- (2) there may be other reasons why the different sectors exhibited different trends in 2004, these include a) different selectivities between sectors, b) different fishing locations of each sector with some being more representative than others, and even c) a very strong recruitment into the fishery combined with the selectivity by the charter boats for smaller fish.
- (3) the assessments were well developed but the assessment staff had clearly not had sufficient time to fully explore all options. It is recognized that scientific advice is required for many species but additional scientific and technical resources need to be made available or else current stock assessment staff will be hard pressed to maintain the high quality of their work.

4.10 Sources of information

The report from the Data Workshop for greater amberjack along with the associated workshop documents.

The report from the Assessment workshop for greater amberjack along with associated documents.

The SEDAR9 Review workshop discussions and presentations.

Appendix 3: Statement of Work

Gulf of Mexico vermillion snapper, greater amberjack, and gray triggerfish

March 27-31, 2006

Hotel Monteleone

New Orleans, Louisiana

SEDAR Overview:

South East Data, Assessment, and Review (SEDAR) is a process for stock assessment development and review conducted by the South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils; NOAA Fisheries, SEFSC and SERO; and the Atlantic and Gulf States Marine Fisheries Commissions. SEDAR is organized around three workshops: data, assessment, and review. Input data are compiled during the data workshop, population models are developed during the assessment workshop, and an independent peer review of the data, assessment models, and results is provided by the review workshop. SEDAR documents include a data report produced by the data workshop; a stock assessment report produced by the assessment workshops; a peer review consensus report evaluating the assessment and a peer review advisory report, both drafted during the review panel workshop; and collected stock assessment documents considered during the workshops.

SEDAR is a public process. All workshops, including the review, are open to the public and noticed in the Federal Register. All documents are freely distributed to the public upon request and posted to the SEDAR website. Public comment during SEDAR workshops is taken on an ‘as needed’ basis; the workshop chair is allowed discretion to recognize the public and solicit comment as appropriate during panel deliberations.

The review workshop is an independent peer review of the stock assessment. The term review is applied broadly, as the review panel may request additional analyses, correction of errors, and sensitivity runs of the assessment model provided by the Assessment Workshop. The review panel is ultimately responsible for ensuring that the best possible assessment is provided through the SEDAR process. The review panel task is specified in Terms of Reference.

The SEDAR 9 Review panel will be composed of three CIE-appointed reviewers and a chair appointed by the SEFSC director.

CIE Request:

NMFS-SEFSC requests the assistance of three assessment scientists from the CIE to serve as technical reviewers for the SEDAR 9 Review Panel that will consider assessments for Gulf of Mexico vermillion snapper, greater amberjack, and gray triggerfish.

The species assessed through SEDAR 9 are within the jurisdiction of the Gulf of Mexico Fishery Management Council and respective southeastern states.

The review workshop will take place at the Hotel Monteleone in New Orleans, Louisiana, from March 27, 2006 (beginning at 1:00 pm) through March 31, 2006 (ending at 12:00 noon). Meeting materials will be forwarded electronically to review panel participants and made available on the internet (<http://www.sefsc.noaa.gov/sedar/>); printed copies of any documents are available by request. The names of reviewers will be included in workshop documents. Please contact John Carmichael (SEDAR Coordinator; 843-571-4366 or John.Carmichael@safmc.net) for additional details.

Hotel arrangements:

Hotel Monteleone
214 Royal Street
New Orleans LA 70130-2201
Phone: (800) 217-2033, (504) 523-3341
Fax: (504) 528-1019

Group Rate \$133.00 + 13% tax (\$17.29) + \$2.00 occupancy tax = \$152.29; guaranteed through February 24, 2006.

SEDAR Review Workshop Panel Tasks:

The SEDAR 9 Review Workshop Panel will evaluate assessments of Gulf of Mexico greater amberjack, vermillion snapper, and gray triggerfish populations, including input data, assessment methods, and model results as put forward in stock assessment reports. The evaluation will be guided by Terms of Reference that are specified in advance. For each species assessed the Review Workshop panel will document its findings in a Peer Review Consensus Summary and summarize assessment results in a Peer Review Advisory Report.

SEDAR 9 Review Workshop Terms of Reference (apply to each assessment):

1. Evaluate assessment data sources: determine if they are adequate and appropriate for stock assessment.
2. Evaluate the assessment methods: determine if they are reliable, properly applied, and adequate and appropriate for the species, fisheries, and available data.
3. Evaluate the assessment configuration, assumptions, and input data:
 determine if data are properly used, models are appropriately configured, and assumptions are reasonably satisfied.
4. Evaluate the methods used to estimate population benchmarks and management parameters (e.g., *MSY*, *Fmsy*, *Bmsy*, *MSST*, *MFMT*); recommend values for management benchmarks (or appropriate proxies) and provide clear statements of stock status.
5. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status.

6. Evaluate the Data and Assessment Workshops with regard to their respective Terms of Reference; state whether or not the Terms of Reference for those previous workshops are adequately addressed in the Data and Assessment Workshop Reports.
7. Consider research recommendations provided by the Data and Assessment workshops and make any additional recommendations warranted.
8. Prepare a Peer Review Consensus Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. (Report to be drafted by the Panel during the review workshop with a final version submitted to the SEDAR Coordinator no later than Monday, April 14, 2006)
9. Prepare a Peer Review Advisory Report summarizing key assessment results. (Report to be drafted by the Panel during the review workshop with final versions submitted to the SEDAR Coordinator no later than Monday, April 14, 2006)

SEDAR Review Workshop Panel Supplementary Instructions

The review panel Chair is responsible for conducting the meeting during the workshop in an orderly fashion. The Chair is responsible for compiling and editing the Peer Review Consensus Summary and Peer Review Advisory Report for each species assessed and submitting them to the SEDAR Coordinator by a deadline specified by the SEDAR Steering Committee.

Review panel reviewers are responsible for reviewing documents prior to the workshop, participating in workshop discussions addressing the terms of reference, preparing an assessment summary and consensus report during the workshop, and finalizing the assessment summary and consensus report within two weeks of the conclusion of the workshop.

The Chair and SEDAR Coordinator will appoint one panelist to serve as assessment leader for each assessment reviewed. The leader will be responsible for providing an initial draft of consensus and advisory report text for consideration by the panel. However, as stated above, all panelists are expected to participate in preparation of report text.

Each reviewer appointed by the CIE is responsible for preparing an additional CIE Reviewer Report as described in Annex 1.

The Review Panel's primary responsibility is to ensure that assessment results are based on sound science, appropriate methods, and appropriate data. During the course of review, the panel is allowed limited flexibility to deviate from the assessment provided by the Assessment Workshop. This flexibility may include modifying the assessment configuration and assumptions, requesting a reasonable number of sensitivity runs, requesting additional details and results of the existing assessments, or requesting correction of any errors identified. However, the allowance for flexibility is limited, and the review panel is not authorized to conduct an alternative assessment or to request an alternative assessment from the technical staff present. The Review Panel is responsible for applying its collective judgment in determining whether proposed changes and corrections to the presented assessment are sufficient to constitute an

alternative assessment. The Review Panel Chair will coordinate with the technical staff present to determine which requests can be accomplished and prioritize desired analyses.

Any changes in assessment results stemming from modifications or corrections solicited by the review panel will be documented in an addendum to the assessment report. If updated estimates are not available for review by the conclusion of the workshop, the review panel shall agree to a process for reviewing the final results.

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

If the Review Panel finds an assessment deficient to the extent that technical staff present cannot correct the deficiencies during the course of the workshop, or the Panel deems that desired modifications would result in a new assessment, then the Review Panel shall 1) provide in writing the required remedial measures, 2) suggest an appropriate approach for correcting the assessment, and 3) subsequently review the corrected assessment.

Statement of Tasks for CIE Reviewers:

Roles and responsibilities:

1. Approximately 3 weeks prior to the meeting the CIE reviewers shall be provided with the stock assessment reports, associated supporting documents, and review workshop instructions including the Terms of Reference. Reviewers shall read these documents to gain an in-depth understanding of the stock assessment, the resources and information considered in the assessment, and their responsibilities as reviewers.
2. During the Review Panel meeting, the CIE reviewers shall participate in panel discussions on assessment methods, data, validity, results, recommendations, and conclusions as guided by the Terms of Reference. The reviewers also shall participate in the development of the Peer Review Consensus Summary and the Peer Review Advisory Report. Reviewers may be asked to serve as assessment leaders during the review to facilitate preparation of first drafts of review reports.
3. Following the Review Panel meeting, the CIE reviewers shall review and provide comments to the Panel Chair on the Peer Review Panel Reports.
4. Following the Review Panel meeting, each CIE reviewer shall prepare a CIE Reviewer Report¹. The summary of findings shall address the workshop Terms of Reference 1-7 under the above heading “SEDAR Review Workshop Panel Tasks.” Reviewers are also encouraged to provide any criticisms and suggestions for improvement of the SEDAR process. This report shall be submitted to CIE no later than April 14, 2006, addressed to the “University of

¹ All reports will undergo an internal CIE review before they are considered final.

Miami Independent System for Peer Review," and sent to Dr.. David Sampson, via email to David.Sampson@oregonstate.edu, and to Mr. Manoj Shivlani, via email to mshivlani@rsmas.miami.edu. See Annex I for complete details on the report outline.

It is estimated that the CIE Review Panelist duties will occupy a maximum of 12 workdays each; several days prior to the meeting for document review; five days at the SEDAR meeting, and several days following the meeting to ensure that final review comments on documents are provided to the Chair and to complete a CIE review report.

Workshop Final Reports:

The SEDAR Coordinator will send copies of the final Review Panel Consensus Report and Advisory Report to Mr. Manoj Shivlani at the CIE.

CIE Reports:

Once finalized and accepted by the CIE, CIE reviewer reports shall be distributed to:

SEFSC Director: Nancy Thompson, NMFS Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149 (email, Nancy.Thompson@NOAA.gov)

SEDAR Coordinator: John Carmichael, SAFMC, One Southpark Circle, Suite 306, Charleston, SC 29407 ([email, John.Carmichael@safmc.net](mailto:John.Carmichael@safmc.net))

Gulf of Mexico Fishery Management Council: Wayne Swingle, GMFMC, 2203 N. Lois Avenue, Suite 1100, Tampa, FL 33607 (email (Wayne.Swingle@gulfcouncil.org)

For Additional Information or Emergency:

SEDAR contact: John Carmichael, One Southpark Circle, Suite 306, Charleston, SC 29407. Phone: 843-571-4366; cell phone (843) 224-4559. Email: John.Carmichael@safmc.net.

Submission and Acceptance of CIE Reports

The CIE shall provide via e-mail the three final CIE reviewer reports in pdf format to Dr.. Joseph Powers (joseph.powers@noaa.gov) for review by NOAA Fisheries and approval by the COTR, Dr.. Stephen K. Brown, by April 28, 2006. The COTR shall notify the CIE via e-mail regarding acceptance of these reports by May 3, 2006. Following the COTR's approval, the CIE will provide pdf versions of the CIE reports with a digitally signed cover letter to the COTR via e-mail (Stephen.K.Brown@noaa.gov) by May 5, 2006.

SEDAR Review Workshop Document Contents

Consensus Summary Outline

I. Terms of Reference

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

II. Additional Comments

Provide a summary of any additional discussions not captured in the Terms of Reference statements.

III. Recommendations for Future Workshops

Panelists are encouraged to provide general suggestions to improve the SEDAR process. Special consideration should be given to the review panel composition, as the Steering Committee intends to evaluate the alternative review panel composition used for SEDAR 9.

Advisory Report Outline

Stock Distribution and Identification	<i>Summary of the unit stock and its geographic distribution.</i>
Assessment Methods	<i>Summary of the assessment method.</i>
Assessment Data	<i>Summary of input data sources.</i>
Catch Trends	<i>Summary of catches by fishery</i>
Fishing Mortality Trends <i>estimates</i>	<i>Summary of fishing mortality estimates</i>
Stock Abundance and Biomass Trends <i>and recruitment</i>	<i>Summary of abundance, biomass, and recruitment</i>
Status Determination Criteria <i>criteria.</i>	<i>Summary of SFA and management criteria.</i>
Stock Status	<i>Declaration of stock status.</i>
Projections	<i>Summary of stock projections.</i>
Special Comments	<i>Additional comments of importance</i>
Sources of Information	<i>Source of results contained in advisory report (i.e., workshop report or addendum)</i>

Tables:**Catch and Status**

The Catch and Status table summarizes recent stock and fishery conditions. Items listed in the table typically include: catch and discards by fishery sector, fishing mortality estimates, stock abundance and biomass, spawning stock biomass, recruitment, and stock status relative to benchmark values (e.g., F/F_{msy} , B/B_{msy}). Values will be provided by the analytical team.

Stock Status Criteria

Summary of recommended or mandated benchmarks and estimated values.

FIGURES:

1. *Landings*
2. *Exploitation*
3. *Stock Biomass*
4. *Stock-Recruitment*
5. *Control Rule*
6. *Projections*

ANNEX I: Contents of CIE Reviewer Report

1. The reviewer report shall be prefaced with an executive summary of findings and/or recommendations.
2. The main body of the reviewer report shall consist of a background, description of review activities, summary of findings, and conclusions/recommendations. The summary of findings shall address the workshop Terms of Reference 1-7 under the above heading “SEDAR Review Workshop Panel Tasks”. Reviewers are also encouraged to provide any criticisms and suggestions for improvement of the SEDAR process.
3. The reviewer report shall include as separate appendices the bibliography of materials provided for review and a copy of the Statement of Work.