CIE Reviewer Report

Kenneth Patterson

9th SEDAR Assessment Review: Gulf of Mexico Vermilion Snapper, Greater Amberjack and Gray Triggerfish

13th April 2006

Executive Summary

The 9th SEDAR assessment review was held as planned and in good order.

Each CIE expert focussed on a particular stock. This report principally addresses issues concerning Vermilion Snapper. Given the workload in the time available, such task distribution was unavoidable. Draft Consensus Summary and Advisory Reports have been prepared for the chair as foreseen.

The Vermilion Snapper assessment is acceptable, despite serious weaknesses in the collection of data on shrimp by-catches. Fishing mortality has an increasing trend, biomass has a decreasing trend, but biomass was held up by a strong recruitment around 2000. The increasing trend in fishing mortality may be associated with a tendency of the commercial handline boats to target vermilion snapper instead of red snapper.

The most important of several research recommendations is to obtain age-structured information on by-catches made by the shrimp fleet.

The SEDAR process seems effective at building a consensus on the state of the stock, but is a technically inefficient use of scarce scientific resources. The expectations of the managers of this process appear to exceed the resources available, and there should either be a strengthening of resources or a streamlining of the meeting process.

It would be helpful for the SEDAR process to consider the desirable attributes and contents of a stock assessment report.

1. Background and Description of Review Activities

I attended the meeting of the 9th SEDAR Assessment Review, held at the Hotel Monteleone, New Orleans as scheduled from mid-day on 27th March to 31st March 2006. The meeting was held in good order, was efficiently chaired, and resulted in consensus on all issues. Prior to this meeting I familiarised myself with the extensive background material detailed in Appendix 1.

At the meeting, presentations were made of the three reports of the stock assessment workshops, and discussions were held about these assessments with respect to the terms of reference of the assessment review.

It rapidly became evident that the workload for the reviewers would be difficult to manage without some division of labour. Each reviewer concentrated on a single assessment and due

to the time available, only limited comments could be made about the other assessments. I concentrated on the Vermilion Snapper assessment review.

I participated in discussions concerning the assessment review. It was initially difficult to determine objective criteria for evaluating a stock assessment. Such exercises are frequently based on incomplete and highly-variable data sets and use highly-parameterised models that can be relatively sensitive to structural constraints as well as to parameter constraints and weighting structures. It can often be the case that a stock assessment only becomes incontrovertible and highly reliable once a stock is fished to a highly depleted state. Placing too high a demand on a stock assessment in a review process risks rejecting assessments that are usefully informative for management purposes even if they are relatively imprecise or not as robust as could be desired. As a step forward in developing useful review criteria, the Review Panel adopted the following guidelines:

1. All relevant data should be used, unless there is an *a priori* reason to exclude a data series, or a sound *a posteriori* reason can be identified. Data should be real observations, not "filled-in" using assumptions or other criteria, to the extent possible. Fish stock assessment depends on having reasonably long time-series of catch, effort and fishery-independent abundance estimates.

2. Conclusions about stock status with respect to reference points should be robust to underlying assumptions about data and structural model, e.g. reliance on filling-in assumptions, dependence on most contested parts of the data sets.

3. Assessments should include the following:

- 3.1 Data screening, to check assumptions in 1 and 2,
- 3.2 Model screening, to see if broadly similar conclusions are drawn from different models, including sensitivity to constraints etc.,
- 3.3 Residual pattern screening: Does the model replicate the trends in the data?,
- 3.4 Credibility check: Are the estimated model parameters reasonable (e.g. selection pattern, r, B_0/B_{msy} , trends in F etc. in the context of biological knowledge about the stock and the fishery ?,
- 3.5 Variance estimates (or posteriors) for the estimated interest parameters, and *a priori* model testing, using simulated data, which should demonstrate that the model has useful precision in predicting interest parameters when presented with data.

4. Assessment documentation should include:

- 4.1. Data used to fit the assessment model,
- 4.2. Structural model equations, including process-error model if applicable,
- 4.3. Observation-error model,
- 4.4. Description of estimating algorithm,
- 4.5. List of final parameter estimates and their s.d.s.,
- 4.6. Computational validation, including simulation testing,
- 4.7. Source code (and ideally documentation) of the programs used should be made available.

Further discussions during the week were focused on this approach and are documented in the Consensus Report (Appendix 3). While one would not wish to stifle innovation or to promulgate a formulaic approach to stock assessments, some such guidelines as these might be useful in a more general framework in the SEDAR process.

During the meeting I prepared first drafts of the Consensus Report and the Assessment Report for Vermilion Snapper (Appendices 3 and 4). After final editing, these will be incorporated in the final reports.

2. Summary of Findings

Data sources: Data collection in the Gulf of Mexico is obviously challenging because of the wide diversity of small-scale activity affecting the stocks. However, serious and appropriate efforts are being made to collect reliable data for assessment purposes- for example, the MRFSS programme is to be congratulated. Data collection appears to be developing well although there will always remain uncertainty about the situation in earlier years (and hence about reference levels). The biggest weakness is in the estimation of by-catches in the shrimp fishery, which should be a priority area for data collection. Also, the incomplete age-structure information is hindering the use of assessment methods that can discriminate year-class strengths. Some further development of fishery-independent indices of abundance would also be helpful.

Assessment methods: It is clear that the assessment scientists involved are highly proficient at fisheries modelling. The methods they use are very appropriate for modelling single-species stock assessments in data-poor situations, and are the right methods for interpreting the available information in a likelihood-based framework. However, there seem to be too few assessment scientists for the large number of stocks being managed. Furthermore, some of the assessment workshops are burdened by additional terms of reference that are unrealistic. The outcome is that quality and thoroughness in assessments are less than optimal because of a lack of resources. Simulation modelling, sensitivity testing (both to data and to model structure and constraints) are not always completed nor documented thoroughly enough to demonstrate the reliability of the assessments.

Evaluation of assessment configuration: This issue took up the most of the time during the review meeting. The questions raised, the additional analyses requested and the outcomes are detailed in Addendum 1 to the Draft Summary Report. The model finally adopted as a base case will be documented in Addendum 2.

For all three species, a number of new issues were identified and met during the meeting, which resulted in improved assessments.

Methods for Population Benchmarks: $F_{30\%SPR}$ –based benchmarks were preferred because of the high uncertainty associated with stock-recruit parameter estimation. The values of these parameters and stock status statements are provided in the Advisory Reports.

Methods for Population Projections: Population projections were calculated using deterministic (and in some cases bootstrapped) population trajectories starting from the assessment model fits. This is generally acceptable when accompanied by explanations about model uncertainties, though stochastic projections are in principle much to be preferred.

Evaluation of Data and Assessment Workshops: For the Vermilion Snapper workshops, a detailed and point-by-point examination of the outcome of the terms of reference was made. This is fully documented in the Consensus Summary.

Research Recommendation: Recommendations are documented in Section 2.9 of the Assessment Summary.

Recommendations made by Data and Assessment Workshops: For the Vermilion Snapper, the workshops did not progress much in making research recommendations. This is one of several symptoms that these workshops were faced with unrealistic terms of reference.

3. Conclusions and Recommendations.

Research recommendations are provided in Section 2.9 of the Consensus Summary Report in respect of Vermilion Snapper. Recommendations concerning the SEDAR process are outlined in Section 4.

4. Suggestions for improvement of the SEDAR process

The SEDAR process is impressive in its thoroughness, its transparency, and in the consensus perception of stock development that it builds. This consensus-building is however achieved at considerable cost in terms of scientific manpower. The three-stage process of data evaluation, stock assessment and review is laudable in principle, but each stage involves a large number of participants, many of which are to some extent repeating work that has been done elsewhere. A symptom of this is that the technical elements of the assessments are spread out through a large number of working documents and workshop reports which refer to each other, creating a "thicket" of documentation that is difficult for an outsider to this process to penetrate. The task of repeating text from one report to another detracts significantly from the time available to address new substance.

The consensus-building is achieved at cost of considerable inefficiency in the use of scientific resources, to an extent that may not be sustainable.

I would suggest that SEDAR consider some of the following options, in order of priority:

a) Recruiting more assessment scientists to the process;

b) Reducing and simplifying the terms of reference to workshops - in particular, it is unrealistic to expect experts in fish stock modelling to address terms of reference concerning control and enforcement issues;

c) Reducing and simplifying the number of reports to be produced – for example, there is considerable redundancy and repetition in the six reports generated by the review process;

d) Merging some meetings in the process, e.g. either merge the "data" and "assessment" workshops into one, or else merge "data" workshops for several species (because many data issues are not species specific), or incorporate external experts into the assessment workshops and cease holding separate "review" meetings;

e) Introducing a "lighter" procedure for assessing species of minor importance, with perhaps all three steps addressed in a single meeting.

With respect to the SEDAR Review process in particular, I would make the following points:

a) The workload for the reviewers to address the terms of reference thoroughly is very challenging to meet within the allocated 12 working days – this could be alleviated with some

pre-meeting task allocation and possibly a stronger focus by each reviewer to a particular stock;

b) If an agreement could be reached on the desirable elements of an assessment (e.g. as in Section 2) this could assist a better coordination of the assessment and review activities.

APPENDIX 1. BIBLIOGRAPHY

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 vermilion 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 vermilion 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 vermilion 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 (*Balistes capriscus*) From the Gulf of Mexico	Saul, Steven
SEDAR9-DW12	Estimated Gray Triggerfish (*Balistes capriscus*) Landings From the Gulf of Mexico Headboat Fishery	Saul, Steven
SEDAR9-DW13	Estimated Gray Triggerfish (*Balistes capriscus*) Commercial Landings and Price Information for the Gulf of Mexico Fishery	Saul, Steven

SEDAR9-DW14	Estimated Gray Triggerfish (*Balistes capriscus*) Recreational Landings for the State of Texas	Saul, Steven
SEDAR9-DW15	Estimated Gray Triggerfish (*Balistes capriscus*) 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 (*Balistes capriscus*) 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 (*Balistes capriscus),*Vermilion Snapper (*Rhomboplites aurorubens),* and Greater Amberjack (*Seriola dumerili)* 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-DW24	Review of the Early Life History of Vermilion Snapper, *Rhomboplites auroubens,* With a Summary of Data from SEAMAP plankton surveys in the Gulf of Mexico: 1982 – 2002	Lyczkowski-Shultz, J. and Hanisko, D.
SEDAR9-DW25	Review of the early life history of gray triggerfish, *Balistes capriscus,* 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-	Standardized Abundance Indices for Gulf of	Nowlis, Josh Sladek

28	Mexico Gray Triggerfish (*Balistes capriscus)* based on catch rates as measured by the Marine Recreational Fisheries Statistics Survey (MRFSS)	
SEDAR9-DW-29	Standardized Abundance Indices for Gulf of Mexico Gray Triggerfish (*Balistes capriscus)* 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 (*Balistes capriscus)* 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 (*Rhomboplites Aurorubens)* 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 (*Balistes Capriscus)* 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 (*Balistes Capriscus)*	Nowlis, Joshua Sladek
SEDAR9-AW8	An Aggregated Production Model for the Gulf of Mexico Gray Triggerfish (Balistes Capriscus) Stock	Nowlis, Joshua Sladek and Steven Saul
SEDAR9-AW9	Age-Based Analyses of the Gulf of Mexico Gray Triggerfish (Balistes capriscus) 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 (Balistes capriscus) Stock.	Nowlis, J. S.
Documents Provided for the Review Workshop		
SEDAR9-	Performance of production models on	Brooks, E. N. et al

RW01	simulated data. (Presentation for NMFS National SAW 8, 2006)	
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. 53rd GCFI	Indirect estimation of red snapper and gray triggerfish release mortality	Patterson, W. F. et al.
SEDAR9-RD03 1997 Proc. 49th GCFI	Preliminary Analysis of Tag and Recapture Data of the Greater Amberjack, *Seriola dumerili,* in the Southeastern United States	McClellan, D. and Cummings, N.
SEDAR9 RD04 SEFSC Doc. No. SFD-99/00-99	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 Age.	Cummings, N. J., and D. B McClellan
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 vermilion 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 vermilion 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 vermilion 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 an age-structured production model	Porch, C. E.
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	

APPENDIX 2. STATEMENT OF WORK

Statement of Work

SEDAR 9 Assessment Review
Gulf of Mexico vermilion 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 vermilion 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, vermilion 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 Report[1]. 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 the CIE no later than April 14, 2006, via e-mail to Dr. David Sampson at David.Sampson@oregonstate.edu, and to Mr. Manoj Shivlani at 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 14 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.

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

CIE Reports:

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.

Once finalized and accepted by NOAA Fisheries, the 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)

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.

Draft Agenda

- SEDAR 9: Gulf vermilion snapper, greater amberjack, gray triggerfish

Monday, March 27, 2006

1:00 p.m.	**Convene**	
1:00 – 1:30	**Introductions and Opening Remarks** **Coordinator** *- Agenda Review, TOR, Task Assignments*	
1:30 – 3:30	**Vermilion Snapper Presentation**	**TBD**
3:30 – 3:45	**Break**	
3:45 – 6:00	**Vermilion Snapper Discussion** *- Data, Methods, Results Evaluation* *- identify additional analyses, sensitivities, corrections*	**Chair**
	Evening Work Session *- Vermilion assessment runs* *- First draft vermilion advisory and consensus*	**Informal**

Tuesday, March 28, 2006

8:00 a.m. – 11:30 a.m.	**Vermilion Snapper Assessment Discussion** *- Continue Discussions* *- Review additional analyses, sensitivities* *- Consensus recommendations and comments*	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:00 p.m.	**Greater Amberjack Presentation**	**TBD**
3:00 p.m. – 3:15 p.m.	**Break**	
3:15 p.m. – 6:00 p.m.	**Greater Amberjack Discussion** *- Data, Methods, Results Evaluation* *- identify additional analyses, sensitivities, corrections*	**Chair**
	Evening Work Session *- Amberjack assessment runs* *- First draft amberjack advisory and consensus* *- Second draft vermilion advisory and consensus*	**Informal**

Wednesday, March 29, 2006

8:00 a.m. – 11:30 a.m.	**Greater Amberjack Discussion** *- Continue Discussions* *- Review additional analyses, sensitivities* *- Consensus recommendations and comments*	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:00 p.m.	**Gray Triggerfish Assessment Presentation**	**TBD**
3:00 p.m. – 3:15 p.m.	**Break**	
3:15 p.m. – 6:00 p.m.	**Gray Triggerfish Discussion** *- Data, Methods, Results Evaluation* *- identify additional analyses, sensitivities, corrections*	**Chair**
	Evening Work Session *- Triggerfish analyses* *- First draft triggerfish consensus, advisory* *- Second draft amberjack consensus, advisory*	**Informal**

Thursday, March 30, 2006

8:00 a.m. – 11:30 a.m.	**Gray Triggerfish Discussion** *- Continue Discussions* *- Review additional analyses, sensitivities* *- Consensus recommendations and comments*	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 6:00 p.m.	**Discuss & Review Workshop Reports** *- Vermilion 2nd D. Consensus Summary & Advisory Report* *- Amberjack 2nd D. Consensus Summary & Advisory Report*	**Chair**
	Evening Work Session *- Final edits to Vermilion and Amberjack* *- Second draft Triggerfish*	**Informal**

Friday, March 31, 2006

8:00 a.m. – 12:00 a.m.	**Final Review of Panel Documents**	**Chair**
12:00 p.m.	**ADJOURN**	

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

Summary of the unit stock and its geographic distribution.

Assessment Methods

Summary of the assessment method.

Assessment Data

Summary of input data sources.

Catch Trends

Summary of catches by fishery

Fishing Mortality Trends

Summary of fishing mortality estimates

Stock Abundance and Biomass Trends

Summary of abundance, biomass, and recruitment

Status Determination Criteria

Summary of SFA and management criteria.

Stock Status

Declaration of stock status.

Projections

Summary of stock projections.

Special Comments

Additional comments of importance

Sources of Information

Source of results contained in advisory report (i.e., workshop report or addendum)

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/Fmsy, B/Bmsy). 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 Reports

1. The reviewer reports shall be prefaced with an executive summary of findings and/or recommendations.

2. The main body of the reviewer reports 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 reports shall include as separate appendices the bibliography of materials provided for review and a copy of the Statement of Work.

Consensus Summary Report

Gulf of Mexico Vermilion Snapper (*Rhomboplites aurorubens*)

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

To be written by editor after the meeting

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, Fmsy, Bmsy, 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

Panel Chair:

M. Elizabeth Clarke	NOAA Fisheries/NWFSC

Review Panel:

Haddon, Malcolm	CIE Reviewer
Patterson, Kenneth	CIE Reviewer
Chen, Din	CIE Reviewer

Presenters:

Craig Brown	NMFS/SEFSC Miami
Shannon Cass-Calay	NMFS/SEFSC Miami
Guillermo Diaz	NMFS/SEFSC Miami
Josh Sladek-Nowlis	NMFS/SEFSC Miami
Steve Turner	NMFS/SEFSC Miami
Jerry Scott `	SEFSC

Observers:

Chris Dorsett	The Ocean Conservancy/GMFMC AP
Myron Fischer	GMFMC
Mike Nugent	GMFMC AP
Andy Strelcheck	NMFS/SERO
Wayne Werner	GMFMC AP
Joseph Powers	NMFS/SEFSC Miami

Staff support:

John Carmichael	SEDAR
Dawn Aring	GMFMC Staff
Patrick Gilles	NMFS/SEFSC Miami
Stu Kennedy	GMFMC Staff
Joseph Powers	NMFS/SEFSC Miami
Jerry Scott `	SEFSC

– **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,	Hood, P.

	1984-2005	
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 vermilion 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 vermilion 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 vermilion 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 (*Balistes capriscus*) From the Gulf of Mexico	Saul, Steven
SEDAR9-DW12	Estimated Gray Triggerfish (*Balistes capriscus*) Landings From the Gulf of Mexico Headboat Fishery	Saul, Steven
SEDAR9-DW13	Estimated Gray Triggerfish (*Balistes capriscus*) Commercial Landings and Price Information for the Gulf of Mexico Fishery	Saul, Steven
SEDAR9-DW14	Estimated Gray Triggerfish (*Balistes capriscus*) Recreational Landings for the State of Texas	Saul, Steven
SEDAR9-DW15	Estimated Gray Triggerfish (*Balistes capriscus*) 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 (*Balistes capriscus*) Recreational	Saul, Steven

	Fishery In the Gulf of Mexico	
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 (*Balistes capriscus),*Vermilion Snapper (*Rhomboplites aurorubens),* and Greater Amberjack (*Seriola dumerili)* 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-DW24	Review of the Early Life History of Vermilion Snapper, *Rhomboplites auroubens,* With a Summary of Data from SEAMAP plankton surveys in the Gulf of Mexico: 1982 – 2002	Lyczkowski-Shultz, J. and Hanisko, D.
SEDAR9-DW25	Review of the early life history of gray triggerfish, *Balistes capriscus,* 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 (*Balistes capriscus)* 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 (*Balistes capriscus)* based on catch rates as measured by the NMFS Southeast Zone Headboat Survey	Nowlis, Josh Sladek
SEDAR9-DW-	Standardized Abundance Indices for Gulf of	Nowlis, Josh Sladek

30	Mexico Gray Triggerfish (*Balistes capriscus)* based on catch rates as measured from commercial logbook entries with handline gear	
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 (*Rhomboplites Aurorubens)* 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 (*Balistes Capriscus)* 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 (*Balistes Capriscus)*	Nowlis, Joshua Sladek
SEDAR9-AW8	An Aggregated Production Model for the Gulf of Mexico Gray Triggerfish (Balistes Capriscus) Stock	Nowlis, Joshua Sladek and Steven Saul
SEDAR9-AW9	Age-Based Analyses of the Gulf of Mexico Gray Triggerfish (Balistes capriscus) 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 (Balistes capriscus) 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. 53rd GCFI	Indirect estimation of red snapper and gray triggerfish release mortality	Patterson, W. F. et al.
SEDAR9-RD03 1997 Proc. 49th GCFI	Preliminary Analysis of Tag and Recapture Data of the Greater Amberjack, *Seriola dumerili,* in the Southeastern United States	McClellan, D. and Cummings, N.
SEDAR9 RD04 SEFSC Doc. No. SFD-99/00-99	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 Age.	Cummings, N. J., and D. B McClellan
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 vermilion 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 vermilion 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 vermilion 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 an age-structured production model	Porch, C. E.
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 conducted a review of the documents "Assessment of Vermilion Snapper, *Rhomboplites aurorubens*, in the Gulf of Mexico", "SEDAR 9: Stock Assessment Report 3, Gulf of Mexico Vermilion Snapper. Section 2. Data Workshop", and the series of working documents cited in those reports.

Based on this review, the panel identified a number of key concerns about the assessment and raised these during the meeting. Some of the concerns were addressed by further explanation, but others were addressed by additional calculations to identify sensitivities. After this exploration, some revisions to the assessment were agreed as being appropriate. The concerns raised, the sensitivity tests made and the conclusions drawn therefrom are identified in Addendum 1 to this report, which also lists the panel's internally-adopted guidelines for assessing assessments. The revised assessment arising from this review is documented in Addendum 2 to this report.

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 the data used in the assessment.

The data contained serious weaknesses.

- Most important of these was the lack of adequate sampling of the shrimp by-catch, which is a major source of anthropogenic mortality on this stock: removals by this fishery are about 40% of the incoming recruitments. Subsidiary issues were :
    1. the high variability in the MRFSS estimates of recreational catch, which is due to low proportion of positive replies in the telephone survey component of this sampling system;

2. the absence of reliable fishery-independent information requires the careful interpretation of fishery-dependent indices of abundance;
3. the absence of complete catch-at-age information substantially limits the precision of the analysis and the accuracy of the forecasts.

Overall, the data are considered adequate only subject to the following:

1. forecasts of stock status and yields will depend on the shrimp fishery discards continuing at current levels - yield improvements of up to 40% in the directed fisheries may be possible if this source of mortality were removed;
2. forecasts are predicated on the assumption that selection pattern remains unchanged;
3. management agencies are aware that high uncertainty is attached to this assessment.

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

The assessment methods are considered to be appropriate for analysing the available data.

The Stephens and MacCall (2004) approach to identifying appropriate sub-sets of trip data for estimating CPUE was not reviewed in detail and its performance is not known. However, the method is considered appropriate on theoretical grounds alone. In particular, the restriction of this modeling approach to separate model fits for each year is considered appropriate.

The assessment methodologies used were State-Space Age-Structured Production Models (SSASPM), and biomass-dynamic production models. These methods are appropriate in situations, as here, where age-structured information is limited or absent. In particular, the SSASPM model structure has the advantage of utilising most of the relevant available information inside a formal likelihood-based structure. It is preferable on theoretical grounds if informative age-structured data are available. However, the performance of the ASPM method in estimating management-related parameters has not been fully tested by simulation in comparable circumstances. Although the outcome of a simulation exercise was made available, the conclusions were not unambiguous.

Absolute levels of **adequacy** of the methods cannot be assessed at present. In order to assess adequacy for management purposes, performance criteria for the system of data collection, assessment and management should be established *a priori*. In addition, simulation testing of the assessment methods would have to be performed under conditions approximating those believed to pertain to vermilion snapper. Such simulations were not available to the review panel.

In the absence of a defined acceptable level of precision, it is the expert opinion of the review panel that the "preferred case model", when applied to the vermilion snapper, results in an **adequately reliable** estimate of the state of the stock with respect to benchmarks in the context of the framework of current fisheries management in the Gulf of Mexico. This assessment is robust to reasonable alternative model structures and alternative interpretations of the data.

The methods are **not adequate** for forecasting the effects of management measures that involve changing selection patterns, such as changes to minimum landing sizes. They are however adequate for exploring the information content and management implications of small and incomplete data sets such as that available for vermilion snapper. It is noted that data collection in the Gulf of Mexico fisheries is a difficult and challenging task (see Recommendations, section 2.9.)

The **application** of the methods was considered to be appropriate. Continuity runs were established in order to identify the change in perception of stock status in response to new information. Methods were chosen in order to reflect the availability of data 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 parameterisations. In this context, further model and data explorations at the review workshop were a helpful step in the process.

The practice of testing the sensitivity of model interest parameters (e.g. current F/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 should be developed and continued.

Model documentation should be improved (Recommendations, section 2.9.).

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

The review panel recommends the adoption of population parameter estimates as listed in Addendum 2.

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

The methods are appropriate for management over medium-term timescales, but the benchmarks should be updated periodically.

The methods used are transformations of maximum-likelihood parameter estimates from the final stock assessment. For the SSASPM base model, the reference points are calculated numerically with reference to maximum of the product of the equilibrium fecundity-per-recruit and recruitment-per-fecundity functions. This provides a calculation of the following population parameters:

- the fishing mortality corresponding to maximum sustainable yield (F_{msy}) or proxy thereof;
- the biomass at which maximum sustainable yield can be taken (B_{msy});
- the maximum sustainable yield.

The methods used are considered to be appropriate. However, improved methods based on stochastic modelling of the fishery, the stock, and the sampling from the stock could be

developed that would give greater insight into the dynamics of the assessment and management process if more resources were available.

Density-dependence in growth and fecundity was not modelled. As growth and fecundity are likely to change over time and when stock abundance changes, the panel recommends that the benchmarks should be updated when new life history parameters become available.

The F_{msy} parameter estimate depends on quantifying both the stock-recruit relationship and quantifying the life-history parameters. In contrast, a $F_{30\%SPR}$ proxy for F_{msy} can be calculated using life-history parameters alone. Typically, much greater uncertainty is attached to the estimation of stock-recruit parameters than to life history parameters. In order to help provide more stable management (at the possible cost of some bias) it is recommended to use a yield-per recruit criterion as the proxy for F_{msy} until stock-recruit parameters can be estimated reliably. The $F_{30\%SPR}$ is appropriate for this purpose.

Management benchmarks are therefore calculated with reference to these population parameters as follows:

MFMT, the Maximum Fishing Mortality Threshold, is set = $F_{30\%SPR}$.
MSST, the Minimum Stock Size Threshold, is set = (1-M).B_{msy}.
F_{OY}, the optimum yield is defined as 0.75.$F_{30\%SPR}$.

The parameters relevant to management are estimated as follows:

Parameter	***Value***
Population parameters and management benchmarks	
$F_{30\%SPR}$	1.19
$F_{30\%SPR}$	0.79
$F_{40\%SPR}$	0.55
F_{msy}	0.81
B_{msy}	5.41×10^{13} eggs
MFMT	0.80
MSST	5.35×10^{13} eggs
F_{OY}	0.59
Stocks parameters in 2004	
F_{2004}	0.49
F_{2004}/MFMT	0.62
B_{2004}	1.05×10^{13} eggs
B_{2004}/MSST	1.95
F_{2004}/OY	1.33

Declarations of Stock Status:

- the stock is not overfished.

- the stock is not undergoing overfishing.
- the stock is overexploited with respect to the optimum fishing mortality.
- a substantial but unmeasured mortality is exerted as a by-catch in the shrimp fishery, which is substantially reducing the yield in the directed fisheries.

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 programme to calculate projections with uncertainty estimates is "VPA2box".The methods implemented and the performance of this method were not assessed at the meeting. Revised estimates of future population status are to be provided in Addendum 2.

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.

The primary tool for evaluating uncertainty is the calculation of sensitivity analyses, by investigating the robustness of interest parameter estimates to alternative choices about data usage, to specification of structural parameters. Numerous trial runs are calculated in order to identify key sensitivities and develop appropriate relevant treatments. This is considered highly **appropriate**. However, improved documentation of these trials at an earlier stage in the process would be helpful.

Model-conditioned estimates of the standard errors in the most important parameter estimates were calculated. The method is based on using automatically-calculated derivatives of the interest parameter with respect to the inverse hessian matrix of the likelihood at the solution (the method is specific to the software used, "AD model builder"). Improvement in the documentation of the method would be welcomed (see recommendation 2.9.5). These uncertainty estimates are considered to be more useful as diagnostics of model fitting rather than as reflecting the "real" uncertainty in the assessment.

2.2.7. Ensure that stock assessment results are clearly and accurately presented in the stock assessment report and that the reported results are consistent with Review Panel recommendations.

An addendum to this report is to be produced after the meeting, which documents the results of the assessment exercise.

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.

2.2.8.1 Evaluation of Data Workshop terms of reference

The terms of reference of the Vermilion Snapper Data Workshop are evaluated by the review panel in Table 8.1. The workshop completed a thorough preparation of the available data and

made helpful recommendations concerning the analysis. However, ToRs 5, 6 and 7 referring to assessing the impacts of management actions, the choice of assessment methods and research recommendations were not addressed. The Review Panel considers that these terms of reference were outside the reasonable scope of requests to a data preparation meeting, and recommends that such requests should be addressed in a different meeting.

The review panel commends the data workshop for the detailed and thorough analyses undertaken in preparation of the assessment meeting. However, it is recommended that data workshop reports should contain in printed tables all the data used to fit the assessment models. However, the provision of the data on the SEDAR website is commended.

Specific recommendations relevant to data collection are collected in Section 9.

2.8.2. Evaluation of Assessment Workshop

The workshop completed its principal terms of reference and achieved an assessment of the vermilion snapper assessment despite considerable challenges of limited information. The workshop did not complete all of its terms of reference, which were unrealistically ambitious given the available resources, and extended substantially beyond the stock assessment remit. The level of documentation was good and thorough. However, provision of the final parameter estimates and their standard errors would have been a helpful additional model diagnostic.

This assessment work sets a high standard for the assessment of fisheries with data of this type.

Additional technical issues were addressed during the review meeting (Addendum 1) and corresponding recommendations are made in section 2.9.

Table 2.8.1. Synopsis of the results of the Data Workshop

Term of Reference	***Outcome***	***Reviewers' Conclusion***
1. Characterise stock structure and develop a unit stock definition.	Some differentiation in stock structure and genetic composition is reported. A further report was sent to the Assessment Workshop. This did not show any significant stock differentiation.	ToR met by correspondence after the meeting.
2.1. Tabulate available life history information	Various life history parameters are tabulated and plotted.	ToR was unclear. It would have been helpful to identify exactly which data were required.
2.2 Provide models of growth, maturation and fecundity by age and sex or length as appropriate	Length-weight, growth and fecundity-weight relationships provided. Sex ratios and maturity-at-age are estimated. A long spawning period is identified, but spawning area was widespread.	ToR met. However, the assessment workshop did not support the proposed length-weight relationship.
2.3 Recommend life history parameters for assessments.	Suggested M =0.25 but test the range 0.15 to 0.30; Recommended further work. Steepness lognormal with mode 0.6 and P(steepness >0.9) <=10%.	ToR met (taking account of 2.2)
2.4 Evaluate adequacy of life history information for assessments	Life history parameters were evaluated with due regard for data quality.	Not directly addressed, but implicit in 2.3

Term of Reference	*Outcome*	*Reviewers' Conclusion*
3.1. Provide indices of population abundance with estimates of precision	Indices provided together with uncertainty estimates.	ToR met.
3.2. Conduct analyses evaluating the degree to which available indices adequately represent fishery and population conditions.	Partially achieved, but on an "expert opinion" basis rather than by analysis.	ToR not fully met, but this task is better addressed to a meeting focusing on analysis. The comments provided were very helpful. More clarity in formulating ToRs would be helpful.
3.2. Document programs, methods, coverage, sampling intensities.	Sampling intensities were documented. Other documentation was generally tackled by reference to earlier work	A more complete documentation would be helpful in making the information accessible to a wider audience.
4.1 Characterise commercial and recreational catches, including landings in weight and numbers.	Available data on commercial and recreational landings, discards and by-catches are presented.	ToR met.
4.2.Evaluate adequacy of data for estimating removals by sector.	Some features of the data sets are discussed, but clear evaluations of adequacy are not made. Substantial data problems were identified, particularly in the MRFSS catch data.	ToR was partially met. A full review of the data collection programmes is outside the plausible scope of a single-species workshop.
4.3. Provide length and age distributions if feasible	Age-distributions are plotted graphically	ToR partially met.
5. Evaluate the adequacy of	Not addressed	ToR not met.

Term of Reference	*Outcome*	*Reviewers' Conclusion*
available data for estimating the impacts of current management actions.		
6. Recommend assessment methods and models that are appropriate given the quality and scope of the data sets reviewed and management requirements	Not addressed.	ToR not met. This is outside the reasonable scope of competence of a data evaluation meeting.
7. Provide recommendations for future research in areas such as sampling, fishery monitoring and stock assessment. Include specific guidance on sampling intensity and coverage where possible.	Not addressed.	ToR not met.
8. Prepare complete documentation of workshop actions and decisions (Section II of the SEDAR assessment report)	Report is prepared.	ToR met.

Table 2.8.2. Synopsis of the results of the Assessment Workshop.

Term of reference	***Outcome***	***Reviewers' Conclusion***
1. Select several appropriate modelling approaches, based on available data sources, parameters and values required to manage the stock, and rcommendations of the Data Workshop.	The workshop used both biomass-dynamic and SSASPM models.	These are the most appropriate methods. However, some additional insight might be gained by using simple approaches such as catch curves and yield-per recruit calculations in data screening. However, some further robustness testing and model adjustments as documented in Addendum 1 were found useful.
2. Provide justification for the chosen data sources and for any deviations from Data Workshop recommendations.	The only major deviation from the Data Workshop recommendations was the use of a different length-weigh relationship.	ToR met.
3. Estimate stock parameters (fishing mortality, abundance, biomass, selectivity, stock-recruitment relationship, etc); include appropriate and representative measures of precision for parameter estimates and measures of model 'goodness of fit'.	Parameter estimates provided.	ToR met.
4. Characterize uncertainty in the assessment, considering components such as input data, modeling approach, and model	Uncertainty characterised principally through investigation of sensitivity of model estimates to model choice, model structure and parameterisation, but also	ToR met. This approach is considered highly appropriate.

Term of reference	*Outcome*	*Reviewers' Conclusion*
configuration.	by delta-estimates of standard errors of interest parameters at the solution.	
5. Provide yield-per-recruit and stock-recruitment analyses.	Not calculated separately – these are incoporated in the SSASPM model fits.	ToR met, but it would be informative to provide a separate yield-per recruit analysis based on the selection pattern and life-history characteristics.
6. Provide complete SFA criteria. This may include evaluating existing SFA benchmarks or estimating alternative SFA benchmarks (SFA benchmarks include MSY, Fmsy, Bmsy, MSST, and MFMT). Develop stock control rules.	Population parameters and benchmarks are calculated. No stock control rules were developed.	ToR partially met, because no stock control rules were developed. A more specific term of reference may have been required. Scientific groups usually require clearer definitions of control rules to be evaluated.
7. Provide declarations of stock status relative to SFA benchmarks: MSY, Fmsy, Bmsy, MSST, MFMT.	Statements are provided (but subject to revision in Addendum 1).	ToR was met.
8. Estimate Allowable Biological Catch (ABC) and provide an appropriate confidence interval.	Not achieved	ToR not met.
9. Project future stock conditions and develop rebuilding schedules if warranted; include estimated generation time. Projections shall be developed in accordance with the following: A) If stock is overfished: F=0, F=current, F=Fmsy,	Projections are calculated based on current yield and fishing mortality scenarios.	ToR met.

Term of reference	*Outcome*	*Reviewers' Conclusion*
Ftarget (OY), F=Frebuild (max that rebuild in allowed time) B) If stock is overfishing F=Fcurrent, F=Fmsy, F= Ftarget (OY) C) If stock is neither overfished nor overfishing F=Fcurrent, F=Fmsy, F=Ftarget (OY)		
10. Evaluate the results of past management actions and probable impacts of current management actions with emphasis on determining progress toward stated management goals.	New assessment suggests rebuilding trajectory is at a higher level than was anticipated.	ToR is met.
11. Provide recommendations for future research and data collection (field and assessment); be as specific as practicable in describing sampling design and sampling intensity. Prioritize recommendations based on their likelihood for improving stock assessment.	Not achieved.	ToR not met.
12. Fully document all activities.	Achieved	ToR is met, though improved documentation would be helpful.

2.9 Recommendations

2.9.1. Establish an obligatory, randomised observer scheme to estimate levels of shrimp by-catches.
2.9.2. Establish a comprehensive age-reading programme for vermilion snapper in the major sectors, especially the shrimp by-catches.
2.9.3. Consider further reinforcing the MRFSS programme so that more precise and accurate estimations of recreational catches can be obtained.
2.9.4. Methods should preferably be simulation-tested prior to their use in an advisory context.
2.9.5. Methods should be documented more fully, including the structural model equations, the observation-error models, process-error models (if appropriate), values of constants, constraints and priors, and description of the fitting algorithm including the uncertainty-estimation method. This documentation, together with the input data, should be included in the stock assessment reports.
2.9.6. More detailed model diagnostics should be provided, such as complete lists of estimated parameters together with their estimated standard errors.
2.9.7. Significant increases in the resources available to the data collection, processing and modelling teams would be required in order to allow the foregoing recommendations to be implemented.
2.9.8. The benchmarks should be updated when new life history parameters become available.
2.9.9. In future assessments the SSASPM should be modified to take account of bias-correction in the length-weight prediction.

Addendum 1. Detailed review of the Vermilion Snapper Assessment.

A1.1 Panel's approach to evaluating stock assessments : Basic Principles

The review panel considered the characteristics that would ideally be desirable in a stock assessment process used for advisory purposes. In order to guide its deliberations relevant to the terms of reference, the panel considered the following attributes to be desirable. Specific issues of concern addressed for each stock are addressed in this framework. Overall conclusions are summarised in section 2.2.

1. All relevant data should be used, unless there is an *a priori* reason to exclude a data series, or a sound *a posteriori* reason can be identified. Data should be real observations, not "filled-in" using assumptions or other criteria, to the extent possible. Fish stock assessment depends on having reasonably long time-series of catch, effort and fishery-independent abundance estimates.

2. Conclusions about stock status with respect to reference points should be robust to underlying assumptions about data and structural model, e.g. reliance on filling-in assumptions, dependence on most contested parts of the data sets.

3. Assessments should include the following :

> 3.1 Data screening, to check assumptions in 1 and 2.
> 3.2 Model screening, to see if broadly similar conclusions are drawn from different models, including sensitivity to constraints etc.
> 3.3 Residual pattern screening: Does the model replicate the trends in the data?
> 3.4 Credibility check : are the estimated model parameters reasonable (e.g. selection pattern, r, B_0/B_{msy} , trends in F etc. in the context of biological knowledge about the stock and the fishery ?
> 3.5 Variance estimates (or posteriors) for the estimated interest parameters, and *a priori* model testing, using simulated data, which should demonstrate that the model has useful precision in predicting interest parameters when presented with data.

4. Assessment documentation should include :

4.1. Data used to fit the assessment model.
4.2. Structural model equations, including process-error model if applicable
4.3. Observation-error model
4.4. Description of estimating algorithm
4.5. List of final parameter estimates and their s.d.s
4.6. Computational validation, including simulation testing
4.7. Source code (and ideally documentation) of the programs used should be made available.

A1.2 Vermilion Snapper: Summary of issues of concern identified by the review panel, sensitivity tests calculated by assessment staff, and conclusions drawn therefrom.

Criterion	*Concern*	*Sensitivities*	*Sensitivity test*	*Conclusion*
1. Data screening	Catch reporting changed from voluntary to obligatory in LA and FL during the time-series; impact of trip limit in recreational fishery	- to possible change in reporting efficiency	Not needed.	Change from voluntary to obligatory reporting is believed to have had little effect on reporting efficiency. MRFSS includes discards data (proportion is small).
1. Data screening	Change in minimum landing size was expected to alter reduce CPUE by ca. 11%.	- to step-change in q for commercial indices, several changes over time. 10" limit introduced in 1997.	Computationally intractable	In future assessments, consider a numerical simplification that allows a sensitivity test to be made.
1. Data screening	MRFSS data reported as very uncertain but 'the best that we have'	- to biases and gaps in the MRFSS catch data	Low priority	Concerns on MRFSS centre on CV of about 20% due to low response rate in telephone survey.
1. Data screening	MRFSS data reported as very uncertain but 'the best that we have'	- biases in the MRFSS data used as CPUE index	- Are the same trends in the assessment persistent if the MRFSS data (used as cpue) are	CPUE index from MRFSS believed reliable because is based on dockside sampling by independent

Criterion	*Concern*	*Sensitivities*	*Sensitivity test*	*Conclusion*
			excluded?	observers.
1. Data screening	CPUE estimates are calculated by selecting a subset of data, based on fish assemblages, where VS are expected to occur.	- depletion of several fish species at the same time could mask a trend in absolute fish stock abundance.	Not needed	Subset selection done on an annual basis, hence bias in time-series is not a problem
1. Data screening	Index divergence, use of all relevant data (Larvae survey was not received in time)	- do the abundance indices, when fitted separately, lead to similar conclusions about stock status ?	- Recalculate fitting each index series separately, including the SEAMAP video survey.	F04/Fmsy values: CHL-E: 0.43 CHL-W:0.14 HB-E: 0.75 HB-W: 0.4 MRFSS:0.8 Perception of stock status wrt MSY benchmarks is robust to choice of commercial cpue index or fishery-independent index
1. Data screening	Uncertainty about origin of length-weight data	Bias-correction for lognormal distribution should be applied	- Recalculate SSASPM with bias-correction in length-weight	Recommendation for future work
3.2 Model Screening (P-T continuity run)	MSY constrained to <= largest catch (equivalent to assuming all catches were sustainable).	Is the constraint limiting ?	- If constraint is limiting, what is the effect of its removal ?	The evaluation had been made but was not reported to the review panel.
3.2 Model Screening (P-T	Is constraint to Schaefer form limiting ?		Estimate exponent in PT model	Estimate of exponent =2.1, model is robust

Criterion	*Concern*	*Sensitivities*	*Sensitivity test*	*Conclusion*
continuity run)				to this.
3.2 Model Screening (P-T continuity run)	Continuity run	- to new data gathered since 2001	- Recalculate model with 5 years of new data.	r =0.67 (0.64 previously) K=2.2e7 (2.1e7) msy=3.6e6 3.4e6) trends are similar F_{04}/F_{msy}=2.7 B_{04}/F_{msy}=0.4
3.2 SSASPM runs, set 1		- to allowing recruitment deviations, estimating or fixing steepness, and 3 levels of shrimp by-catch	- 6 Model fits	F04/Fmsy in range 0.52 to 1.62; B_{04}/B_{msy} in range 0.68 to 1.8
3.2 SSASPM runs, set 1		- as above, but allowing greater deviation from shrimp fleet effort data.	- 6 Model fits	F04/Fmsy in range 0.82 to 2.05; B_{04}/B_{msy} in range 0.64 to 1.55
3.2 SSASPM Model screening	Is the model sensitive to assumptions about starting conditions ?	Sensitivity to assumptions made in the 'pre-historic' period	re-run with assumed starting conditions in a much earlier year	Catch data in directed fisheries are low prior to 1960s – but the shrimp by-catch may have been high since 1950s.
3.2 SSASPM Model screening	Is model sensitive to weighting ?	- to increasing the relative weighting on the survey indices	- re-fit with assumed sample size for age-distributions = 25 instead of 200, survey CV = 0.3 instead of 0.8, catch CV = 0.1 instead of 0.4	- Residual trends are substantially improved. F_{04}/F_{msy} changed from 0.67 to 0.59 and B_{04}/B_{msy} changed from 1.8 to 1.93

Criterion	*Concern*	*Sensitivities*	*Sensitivity test*	*Conclusion*
3.2 SSASPM Model screening	Is mode sensitive to estimating the autocorrelation in process error ?	- to estimating this parameter rather than fixing it equal to 0.2.	- re-fit estimating this parameter	- Estimate is bound limited at rho =1, only very small impact on interest parameters.
3.3 Residual pattern screening	Appropriateness of SSASPM fit	- does model describe trends in data ?	- test of appropriateness of model fit.	Model does not capture large decrease in HB-east and MRFSS-east around 1995, nor rapid increase in CMHL-west since 2000.
3.3 Residual pattern screening	Appropriateness of P-T model fit	-does model describe trends in data ?	- test of appropriateness of model fit (LOW PRORITY)	Model does not capture the increease in CM HL index after 2000.
3.4 Credibility check	Compare with trends in red snapper fishery : F increasing to 1 in 1983, then high but variable	- are trends inverse or complementary in this linked fishery ?	Compare F trends in red snapper and vermilion snapper. Compare F trend with deployed effort.	It was noted that F increases between two and three times since early 1980s. This could be due to increased targeting on this species. Industry confirms a greater tendency to switch to VS in the CMHL fleet.
3.4 Credibility check	Selection pattern looks reasonable ?	50% selection at ages 2-4, fully selected at ages 4- 5, about 300mm; flat-topped thereafter.	Is this reasonable given knowledge about hook selection and MLS?	It should be a high research priority to estimate selection and catches at age,

Criterion	*Concern*	*Sensitivities*	*Sensitivity test*	*Conclusion*
			Is selectivity of shrimp by-catch reasonable?	especially in the shrimp fishery.
3.4 Credibility check	Model parameters consistent with known life-history (PT model)	r= 0.7 for small, fast-growing tropical species; M assumed = 0.25. Seems in the right range – or perhaps a bit high ?		PT model inappropriate
3.4 Credibility check	Age-distribution consistent with perception of stock status	Many fish above age 10 not consistent with overfished status.		PT model inappropriate
3.4 Credibility check	M of 0.25 seems very high given the reported age-structure of catches.	Consider M=0.15	Run SSASPM with M=0.15	Not discussed in detail.
3.5 Performance of the estimators	Are the parameters estimated with reasonable precision ?	Precision of the estimators from the PT model	Estimate variances of interest parameters	r estimated with CV of 4% and K estimated with CV of 0.01% - Something is constraining this model fit.
3.5 Performance of the estimators	Are the parameters estimated with reasonable precision ?	Precision of the estimators from the PT model	Estimate variances of interest parameters	F estimated with CV 25%; SSB estimated with CV 10%, seems reasonable.

Documentation Issues

Criterion	*Requirement*	*Provided*	*Adequacy*
4.1 Data	P-T : all input data printed in report	p. 30 of SAR 3	Yes
4.1 Data	SSASPM - all input data printed in report	pp. 44-46 of SAR 3	Not clear how the age-distributions are calculated, otherwise ok.
4.2 Structural model	PT: Write down all the equations	Table 3.1.1.3.1 and p. 10 of SAR 3	Yes, except definitions of ρ and a are implicit. ρ values not given.
4.2 Structural model	SSASPM: Write down the structural equations	p. 16 of SAR 3	Yes, except definition of τ, α and A
4.3 Observation model	PT: Write down the observation model	Eqn. 4, p.10 of SAR 3	Yes, except definitions of $\boldsymbol{\Theta}$ and **X** are implicit.
4.3 Observation model	SSASPM: Write down the observation model	Table 3.2.1.5.1 of SAR 3	Yes
4.4 Estimating algorithm	PT: Describe the estimating method and constraints (if any)	Reference to AD Model Builder, Otter Research	Preferable to describe the mathematical method than to refer to a software package.
4.4 Estimating algorithm	SSASPM :Describe the estimating method and constraints (if any)	Not fully	No
4.5 Parameter estimates and s.e.	PT	Table 3.1.2.2.1.	Yes
4.5 Parameter estimates and s.e.	SSASPM	Selected estimates in Table 3.2.2.2.1	Partial. s.e.s provided for forecasts.

Criterion	***Requirement***	***Provided***	***Adequacy***
4.6 Computational validation	PT, SSASPM : Demonstration that the code implements the equations correctly	No	No
4.6. Simulation testing	PT, SSASPM : Demonstration of the statistical properties of the estimators under plausible conditions.	A paper was provided but this did not unambiguously support the use of SSASPM over PT models in the current situation.	More simulation studies would be helpful here.
4.6 Transparency	Source code availability	Will be posted on website.	Yes

APPENDIX 4. DRAFT ASSESSMENT SUMMARY FOR VERMILION SNAPPER.

4.1. Stock Distribution and Identification

This assessment covers the vermilion snapper distributed in the US waters of the Gulf of Mexico. There is no information available suggesting that this definition is an inappropriate one as a unit stock for management purposes.

4.2. Assessment methods

The assessment method used is an age-structured production model assuming constant selection and a stock-recruit relationship of Beverton-Holt form. The assessment used previously (a biomass-dynamic model of Schaefer type) shows similar tendencies.

4.3 Assessment data

The data sources used were :

Estimates of by-catches in the shrimp fishery
MRFSS estimates of catches and discards
Estimates of commercial catches
Estimates of catches in the charterboat and headboat recreational sectors
SEAMAP video survey indices of abundance
MRFSS estimates of catch rates
Commercial handline catch rates
Age, growth and fecundity estimates.

4.4 Catch trends

Catches before 1986 are not known with usable precision.

A large part – about 40% - of the removals from this stock are made as by-catches in the shrimp fishery. Very little information is available about the trends in these by-catches, and the absolute level is not known accurately.

In the non-shrimp fishery sectors, catches increased steadily from 1986 to 1994, decreased again until 2000, then increased from 2000 until 2004.

4.5 Fishing mortality trends

Fishing mortality shows an irregular but generally increasing trend from the mid 1980s to 2004, though fishing mortality may have been lower around 2000. This trend may be associated to an increased targeting of this species as the commercial handline fleet may be changing away from targeting red snapper.

4.6 Stock abundance and biomass trends

Stock biomass followed an irregular but declining trend in the time series. The estimated abundance in 2004 is the lowest in the time series. There are two periods of higher recruitment, around 2000 and around 1990.

4.7 Status determination criteria

The overall perception of trends in the stock are that fishing mortality is increasing, biomass is declining, and the stock has been sustained in recent years by a high recruitment in 2000. Furthermore, a substantial mortality is exerted, mostly on juvenile fish, by the shrimp fleet as a by-catch. These trends are robust to the various plausible assessment models and data series that were explored, and are considered to be reliably estimated.

However, the exact location of stock status in 2004 relative to the benchmarks is more uncertain.

4.8 Stock Status

Declarations of Stock Status:

- the stock was not overfished in 2004;
- the stock was not undergoing overfishing in 2004;
- the stock was overexploited with respect to the optimum fishing mortality;
- a substantial but unmeasured mortality is exerted as a by-catch in the shrimp fishery, which is greatly reducing the yield in the directed fisheries;
- fishing mortality is tending increasing and biomass is decreasing. A further decrease in the size of the stock is likely if present conditions continue.

4.7 Projections

Quantitative projections are not yet available (See Addendum 2 to the Consensus Summary).

4.8 Allowable biological catch

Quantitative projections are not yet available (See Addendum 2 to the Consensus Summary).

4.9 Special Comments

The change of assessment model from the base case used previously maintains the same broad perception of a declining stock with increasing fishing mortality. However, on including life-history information, the estimated productivity of the stock at small stock size has been revised upwards. It is stressed that :

(a) while allowing the trend to smaller stock size and higher fishing mortalities to continue is not forecast to cause overfishing in the short term, it will do so in the medium term and will lead to conditions which are outside those seen historically – and predictions of stock dynamics in such conditions have not been validated by observation;

(b) increasing fishing mortality rates will lead to a smaller average size of fish in the catches.

Additional scientific and technical resources need to be made available in order that the requests for scientific advice can be fully met.

4.10 Sources of information

refs to consensus report, assessment, data workshops etc.