

Gulf of Mexico and South Atlantic King Mackerel

SEDAR 16

South Atlantic and Gulf of Mexico King Mackerel

Assessment Workshop Report

Prepared by the SEDAR 16 Assessment

Workshop Panel

July 2008



1.	WORKSHOP PROCEEDINGS.....	4
1.1	INTRODUCTION.....	4
1.1.1	Workshop Time and Place.....	4
1.1.2	Terms of Reference.....	4
1.1.3	List of participants.....	5
1.1.4	List of Assessment Workshop Working Papers.....	6
1.2	PANEL RECOMMENDATIONS AND COMMENT.....	8
1.2.1	Discussion and Recommendations Regarding Data Modifications and Updates.....	9
1.2.1.1	Commercial.....	9
1.2.1.2	Recreational.....	12
1.2.1.3	Life History.....	13
1.2.1.4	Indices.....	15
1.2.2	Discussion and Critique of Each Model Considered.....	19
1.2.2.1	Continuity Case.....	19
1.2.2.2	VPA vs. SS3.....	19
1.2.2.3	VPA Base.....	20
1.2.2.4	Stock Synthesis 3.....	22
1.2.3	Preferred Model, Configuration, and Summary of Model Issues Discussed.....	22
1.2.4	Recommended Parameter Estimates.....	23
1.2.5	Evaluation of Uncertainty and Model Precision.....	23
1.2.6	Discussion of YPR, SPR, Stock-Recruitment.....	23
1.2.7	Recommended SFA Parameters and Management Criteria.....	23
1.2.8	Status of Stock Declarations.....	23
1.2.9	Recommended ABC.....	24
1.2.10	Discussion of Stock Projections.....	24
1.2.11	Management Evaluation.....	24
1.2.12	Research Recommendations.....	24
1.2.13	References.....	26
1.2.14	Assessment Workshop Panel Figures and Tables.....	27
2.	DATA REVIEW AND UPDATE.....	28
3.	STOCK ASSESSMENT MODELS AND RESULTS.....	28

3.1. MODEL 1 – “CONTINUITY CASE”	28
3.1.1. Methods.....	28
3.1.1.1. Overview	28
3.1.1.2. Data Sources.....	28
3.1.1.3. Model Configuration and Equations.....	42
3.1.1.4. Parameters Estimated	45
3.1.1.5. Uncertainty and Measures of Precision.....	45
3.1.1.6. Methods Used to Compute Benchmark / Reference Points	45
3.1.1.7. Projection methods	46
3.1.2. Model 1 Results	46
3.1.2.1. Measures of Overall Model Fit.....	46
3.1.2.2. Parameter estimates & associated measures of uncertainty	49
3.1.2.3. Stock Abundance and Recruitment	49
3.1.2.4. Stock Biomass (total and spawning stock).....	50
3.1.2.5. Fishery Selectivity	51
3.1.2.6. Fishing Mortality	57
3.1.2.7. Stock-Recruitment Parameters	58
3.1.2.8. Evaluation of Uncertainty.....	59
3.1.2.9. Benchmarks / Reference Points / ABC values	59
3.2. MODEL 2 – BASE VPA	59
3.2.1. Methods.....	59
3.2.1.1. Overview	59
3.2.1.2. Data Sources.....	60
3.2.1.3. Model Configuration and Equations.....	71
3.2.1.4. Parameters Estimated	72
3.2.1.5. Uncertainty and Measures of Precision.....	73
3.2.1.6. Methods Used to Compute Benchmark / Reference Points	73
3.2.1.7. Projection methods	75
3.2.2. Results.....	77
3.2.2.1. Measures of Overall Model Fit.....	77
3.2.2.2. Parameter estimates & associated measures of uncertainty	80

3.2.2.3.	Stock Abundance and Recruitment	82
3.2.2.4.	Spawning Stock Biomass	84
3.2.2.5.	Fishery Selectivity	86
3.2.2.6.	Fishing Mortality	87
3.2.2.7.	Stock-Recruitment Parameters	93
3.2.2.8.	Evaluation of Uncertainty.....	94
3.2.2.9.	Benchmarks / Reference Points / ABC values	96
3.2.2.10.	Projections Base Case (TOR 8C).....	100
3.2.2.11.	Projections for the Status Quo case (TOR 8B)	107
3.2.2.12.	Other Projections (TORs 8A and 8D).....	113
4.	SUBMITTED COMMENTS	118

1. WORKSHOP PROCEEDINGS

1.1 INTRODUCTION

1.1.1 Workshop Time and Place

The SEDAR 16 Assessment Workshop was held May 5 - 9, 2008 in Miami, Florida. Two additional web-based conference calls were held to complete the presentation and discussions for the models. The calls were held on 30 May, 2008 and 17 June 2008.

1.1.2 Terms of Reference

1. Review any changes in data following the data workshop and any analyses suggested by the data workshop. Summarize data as used in each assessment model. Provide justification for any deviations from Data Workshop recommendations.
2. Develop population assessment models that are compatible with available data and recommend which model and configuration is deemed most reliable or useful for providing advice. Document all input data, assumptions, and equations.
3. Provide estimates of stock population parameters (fishing mortality, abundance, biomass, selectivity, stock-recruitment relationship, etc); include appropriate and representative measures of precision for parameter estimates.
4. Characterize uncertainty in the assessment and estimated values, considering components such as input data, modeling approach, and model configuration. Provide appropriate measures of model performance, reliability, and 'goodness of fit'.
5. Provide yield-per-recruit, spawner-per-recruit, and stock-recruitment evaluations.
6. Provide estimates for SFA criteria consistent with applicable FMPs, management programs, and National Standards. This may include: evaluating existing SFA benchmarks, estimating alternative SFA benchmarks; and recommending proxy values. SFA parameters shall be provided for the Gulf and Atlantic Migratory Units as currently defined using the most current mixing data.
7. Provide declarations of stock status relative to SFA benchmarks.
8. Estimate Allowable Biological Catch (ABC) based on the following criteria:
 - A) Based on migratory groups and mixing zone dynamics defined using best available scientific information, provide separate ABC values for each of two management areas delineated at the Miami-Dade/Monroe County line: all fish caught north of the line allocated to the Atlantic management area and all fish caught south of the line allocated to the Gulf management area.
 - B) Based on migratory groups and mixing zone dynamics as currently defined, provide separate ABC values for the Gulf and Atlantic Migratory Units based on allocating all fish in the mixing zone to the Gulf Migratory Unit (essentially the 'continuity' approach).
 - C) Based on migratory groups and mixing zone dynamics as currently defined, provide separate ABC values for the Gulf and Atlantic migratory units based on allocating 50%

- of the fish in the mixing zone to the Gulf Migratory Unit and 50% of the fish to the Atlantic Migratory Unit.
- D) Based on migratory groups and mixing zone dynamics defined using best available scientific information, provide separate ABC values for each of two management areas delineated at the Gulf and South Atlantic Council boundaries
9. Project future stock conditions (biomass, abundance, and exploitation) and develop rebuilding schedules if warranted; include estimated generation time. Stock projections shall be developed in accordance with the following:
- A) If stock is overfished:
 $F=0$, $F=current$, $F=Fmsy$, $F=target$ (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, if appropriate, probable impacts of current management actions with emphasis on determining progress toward stated management goals.
11. Provide recommendations for future research and data collection (field and assessment); be as specific as practicable in describing sampling design and sampling intensity. Provide discussion of progress on research and monitoring recommended by SEDAR 5.
12. Complete the Assessment Workshop Report (Section III of the SEDAR Stock Assessment Report) and prepare a first draft of the Summary Report.

1.1.3 List of participants

Workshop Panel

Harry Blanchet.....	GMFMC SSC/LA DWF
Craig Brown.....	NMFS Miami
Christine Burgess.....	SAFMC SSC/NC DMF
Shannon Cass-Calay	NMFS Miami
Frank Hester	DSF (SAFMC)
Kevin J. McCarthy.....	NMFS Miami
Robert Muller.....	GMFMC SAP/FL FWC
Michael Murphy.....	GMFMC SAP/FL FWC
Russ Nelson	NRC, Inc. (GMFMC)
Refik Orhun	NMFS Miami
Mauricio Ortiz.....	NMFS Miami
Clay Porch.....	NMFS Miami
Victor Restrepo.....	NMFS Miami
Steve Turner.....	NMFS Miami

Donald WatersGMFMC AP
 Bob Zales, II.....GMFMC AP

Council Representation

David Cupka SAFMC
 William Teehan..... GMFMC/FL FWC

Observers

Steve Branstetter NMFS SERO
 Susan Gehart NMFS SERO
 Doug GregoryGMFMC SSC
 Tom Ihde Univ. of MD
 Russell Hudson DSF
 Albert JonesGMFMC SSC
 Dennis O'Hern.....FRA
 Mike Wilberg CBL

Staff

Tyree Davis..... NMFS Miami
 Julie Neer SEDAR
 Tina TrezzaGMFMC
 Andi Stephens SAFMC
 Gregg Waugh..... SAFMC

1.1.4 List of Assessment Workshop Working Papers

Document #	Title	Authors
Documents Prepared for the Assessment Workshop		
SEDAR16-AW-01	Commercial King Mackerel Sampling Fractions for North Carolina by District,	Gloeckner, David
SEDAR16-AW-02	Effects of King Mackerel Fishing Regulations on the Construction of Fisheries Dependent Indices of Abundance	McCarthy, K, S. Cass-Calay, M. Ortiz, and J. Walter
SEDAR16-AW-03	Commercial King Mackerel Trip	Gloeckner, David

	Sampling in NC, Differences in Fishing by State District	
SEDAR16-AW-04	Technical Description of the Stock Synthesis II Assessment Program	Methot, Richard D.
SEDAR16-AW-05	User Manual for the Integrated Analysis Program Stock Synthesis 2 (SS2)	Methot, Richard D.
SEDAR16-AW-06	Virtual Population Analyses of Gulf of Mexico and Atlantic King Mackerel Migratory Groups: Continuity Case and Sensitivity Runs (Version 1)	Cass-Calay, S. and M. Ortiz
SEDAR16-AW-07	Updated Estimates of Gulf king mackerel bycatch from the U.S. Gulf of Mexico Shrimp trawl fishery	Ortiz, M. and K. Andrews
SEDAR16-AW-08	Preliminary Report King Mackerel stock assessment results 2008	Ortiz, M. R. Methot, S.L. Cass-Calay, and B. Linton
SEDAR16-AW-09	Notes on the weighting of the indices for the king mackerel VPA analyses	Restrepo, V.R., S. Cass-Calay, and M. Ortiz
SEDAR16-AW-10	Virtual Population Analyses of Gulf of Mexico and Atlantic King Mackerel Migratory Groups: Continuity Case and Sensitivity Runs (Version 2)	Cass-Calay, S., M. Ortiz and V.R. Restrepo
SEDAR16-AW-11	Virtual Population Analyses of Gulf of Mexico and Atlantic King Mackerel Migratory Groups: Continuity Case and Sensitivity Runs (Version 3)	Cass-Calay, S., M. Ortiz and V.R. Restrepo
SEDAR16-AW-12	Virtual Population Analyses of Gulf of Mexico and Atlantic King Mackerel Migratory Groups: Continuity Case and Sensitivity Runs (Version 4)	Cass-Calay, S., M. Ortiz and V.R. Restrepo
Reference Documents		
SEDAR16-RD08	THE FLORIDA KEYS WAY BACK WHEN... (<i>FISHING FOR KING</i>	Little, Jr, E.J.

	<i>MACKEREL IN THE "GOOD OLD DAYS" OF KEY WEST'S HISTORIC SEAPORT DISTRICT</i>	
SEDAR16-RD09	King mackerel hooking mortality assessment	Edwards, Randy E.

1.2 PANEL RECOMMENDATIONS AND COMMENT

Preface: Assessment Timeline

The assessment workshop for Gulf of Mexico and South Atlantic king mackerel was held in Miami, FL May 5-9, 2008. The Panel was initially provided with two main models for discussion: a statistical catch-at-age model (an updated version of Stock Synthesis) and a virtual population analysis model (VPA-2Box). The VPA, consisting of 2 migratory units (Gulf and Atlantic), was initially considered for the continuity case, while SS3, consisting of three zones (Gulf No-mix, Atlantic No-mix, and Mixing), was the original the base model under consideration. As the SS3 model was unfamiliar to most Panelists, the majority of the discussions during the workshop focused on this model, as reflected in the discussions documented below. Approximately half way through the workshop the Panel agreed that an updated VPA model should be constructed as well to use as a check of sorts for the SS3 model. To that end, the updated VPA model was initially designed to mirror as closely as possible the SS3 data inputs. At the end of the workshop, neither model had overcome the issues raised during the workshop that the Panel felt it could not recommend a preferred model and agreed that work on both the SS3 and updated VPA models should be continued and presented on a web-based conference call to be held on 30 May 2008.

On the first conference call, the results of both models were presented and discussed with the majority of the discussion again focusing on the SS3, as the Panel hoped to select it as the preferred model. Unfortunately, the inability to have a stock-recruit relationship for each migratory group, the linkage in benchmarks between the two migratory groups, questions on movement parameters, and the inability to estimate uncertainty in the parameters convinced the Panel that the SS3 model was not appropriate at that time, and they selected the VPA as the base model. The remaining portion of the first call was devoted to the VPA. The Panel agreed to hold a second conference call on 17 June 2008 to review the VPA results.

The second web-based call represented the first time the Panel as a whole had time to discuss the full suite of results from the base VPA, including projections and some sensitivities. Over the next few weeks the Panel continued to work together to refine the assessment workshop documentation and produce this report.

1.2.1 Discussion and Recommendations Regarding Data Modifications and Updates

1.2.1.1 Commercial

LANDINGS

The AW panel noted that deep-mesh, runaround gill nets were not fished in the earlier time period, and extrapolations back in time using their landings could overestimate the portion of the catch attributed to gill nets. Therefore, it was suggested that the historical commercial landings be reconstructed without extrapolating the runaround gill net catch. It was further proposed that the reconstructed catch without this type of gill net be used as a sensitivity run. However, it was pointed out that regional gear-specific landings had to be estimated only for the years from 1962 to 1971 when these specialized deep gill nets were not in use. As a result, the issue was dismissed.

Note was made of the high reported landings from Mexico, which could affect stock status of king mackerel from the Gulf of Mexico (GOM) if the GOM and Mexican king mackerel are actually one unit stock. It was further noted that additional fishery information (size composition, catch rates, general knowledge of the fisheries) from that area were lacking or limited in duration, and that there were concerns about the quality of the available Mexican landings data (accuracy of landings reports, species identification, etc.).

During the assessment workshop modifications were made to the treatment of the historical landings data, particularly with respect to the assignment of some of the west Florida landings to the mixing area. While the commercial landings had been accounted for spatially and temporally to include a GOM zone, a mixing zone, and an SA zone, it was not evident that the DW had split the landings into Gulf and Atlantic areas that corresponded to the jurisdictions of the respective Federal Councils (split by the Florida Keys). The AW panel asked that the analysts ensure that this was done.

FINFISH BYCATCH

The AW accepted the DW's recommendation that the number of dead discards in the commercial finfish fisheries is considered sufficiently low (about 10-15 thousand fish per year) to be negligible enough to not include in the assessment.

SHRIMP BYCATCH

The AW agreed with the DW's recommendation to exclude shrimp bycatch from the mixing zone in the model since there were few observed occurrences of king mackerel bycatch by shrimp trawlers in this area, and extrapolation of these using estimated shrimp trawl effort would be highly uncertain.

