SEDAR

SouthEast Data, Assessment, and Review

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BENCHMARK ASSESSMENT: Gulf of Mexico Red Snapper

Terms of Reference

I. Data Workshop

1. Review stock structure and unit stock definitions, considering whether changes are required.
2. Review, discuss, and tabulate available life history information.
   - Evaluate age, growth, natural mortality, and reproductive characteristics
   - Provide appropriate models to describe growth, maturation, and fecundity by age, sex, or length as applicable
   - Evaluate the adequacy of available life-history information for conducting stock assessments and recommend life history information for use in population modeling, with particular emphasis on density-dependence
3. Recommend discard mortality rates.
   - Review available research and published literature
   - Consider research directed at red snapper as well as similar species from other areas
   - Provide estimates of discard mortality rate by fishery, gear type, depth, and other feasible or appropriate strata
   - Include thorough rationale for recommended discard mortality rates
   - Provide justification for any recommendations that deviate from the range of discard mortality provided in the last benchmark or other prior assessment
4. Provide measures of population abundance that are appropriate for stock assessment.
   - Consider and discuss all applicable fishery dependent and independent data sources
   - Document all programs evaluated; address program objectives, methods, coverage, sampling intensity, and other relevant characteristics
   - Provide maps of fishery and survey coverage
   - Develop fishery and survey CPUE indices by appropriate strata (e.g., age, size, area, and fishery) and include measures of precision and accuracy; rank indices with regard to their suitability for use in assessment modeling
   - Discuss the degree to which available indices adequately represent fishery and population conditions
   - Recommend which data sources are considered appropriate for use in assessment modeling

- Complete the SEDAR index evaluation worksheet for each index considered

5. Characterize commercial and recreational catch, including both landings and discards in both pounds and number.
    - Evaluate and discuss the adequacy of available data for accurately characterizing harvest and discard by fishery sector or gear
    - Provide length and age distributions if feasible, and maps of fishery effort and harvest
    - Provide maps of fishery effort and harvest
6. Evaluate the mortality rate of red snapper due to explosive rig removals, and whether such mortality is significant for inclusion in the assessment.
7. Describe any environmental covariates or episodic events that would be reasonably expected to affect population abundance.
8. Provide any information available about demographics and socioeconomics of fishermen, especially as they may relate to fishing effort.
9. Provide recommendations for future research, including guidance on sampling design, intensity, and appropriate strata and coverage.
10. Prepare the Data Workshop report providing complete documentation of workshop actions and decisions (Section II of the SEDAR assessment report).
    - Develop a list of tasks to be completed following the workshop
    - Review and describe any ecosystem consideration(s) that should be included in the stock assessment report

II. Assessment Process

1. Review and provide justification for any changes in data following the data workshop and any analyses suggested by the data workshop. Summarize data as used in each assessment model.
2. Develop population assessment models that are compatible with available data and document input data, model assumptions and configuration, and equations for each model considered. Consider past modeling approaches (SEDAR 7 (2004), SEDAR 7 Update (2009)).
3. Incorporate known applicable environmental covariates into the selected model, and provide justification for why any of those covariates cannot be included at the time of the assessment.
4. Provide estimates of stock population parameters, if feasible.
    - Include fishing mortality, abundance, biomass, selectivity, stock-recruitment relationship, and other parameters as appropriate given data availability and modeling approaches
    - Include appropriate and representative measures of precision for parameter estimates
5. Characterize uncertainty in the assessment and estimated values.
    - Consider uncertainty in input data, modeling approach, and model configuration
    - Provide appropriate measures of model performance, reliability, and 'goodness of fit'
    - Provide a continuity model consistent with the prior assessment configuration, if one exists, updated to include the most recent observations. Alternative approaches to a strict continuity run that distinguish between model, population, and input data influences on findings, may be considered
    - Provide measures of uncertainty for estimated parameters
6. Provide yield-per-recruit, spawner-per-recruit, and stock-recruitment evaluations.
7. Provide estimates of stock status for management criteria consistent with applicable FMPs, proposed FMPs and Amendments, other ongoing or proposed management programs, and National Standards for each model run presented for review.
    - Evaluate existing or proposed management criteria as specified in the management summary
    - Recommend proxy values when necessary
8. Provide declarations of stock status relative to management benchmarks, or alternative data poor approaches if necessary.
9. Project future stock conditions (biomass, abundance, and exploitation) and develop rebuilding schedules if warranted; include estimated generation time. Stock projections (in both biomass and number of fish) shall be developed in accordance with the following:

    A) If stock is overfished:
    $F=0$, $F_{Current}$, F_{MSY}, F_{OY}
    $F=F_{Rebuild}$ (max that permits rebuild in allowed time)
    B) If stock is undergoing overfishing:
    $F= F_{Current}$, F_{MSY}, F_{OY}
    C) If stock is neither overfished nor undergoing overfishing:
    $F= F_{Current}$, F_{MSY}, F_{OY}
    D) If data limitations preclude classic projections (i.e. A, B, C above), explore alternate models to provide management advice

10. Provide a probability density function for the base model, or a combination of models that represent alternate states of nature, presented for review.
    - Determine the yield associated with a probability of exceeding OFL at P* values of 30% to 50% in single percentage increments for use with the Tier 1 ABC control rule
    - Provide justification for the weightings used in producing combinations of models
11. Provide recommendations for future research and data collection.
    - Be as specific as practicable in describing sampling design and intensity
    - Emphasize items which will improve future assessment capabilities and reliability
    - Recommend an appropriate interval and type for the next assessment
11. Prepare a spreadsheet containing all model parameter estimates, all relevant population information resulting from model estimates, and projection and simulation exercises. Include all data included in assessment report tables and all data that support assessment workshop figures.
12. Complete the Assessment Workshop Report (Section III: SEDAR Stock Assessment Report).

III. Review Workshop

1. Evaluate the data used in the assessment, addressing the following:
    - Are data decisions made by the Data and Assessment Workshops sound and robust?
    - Are data uncertainties acknowledged, reported and within normal or expected levels?
    - Are data applied properly within the assessment model?
    - Are input data series reliable and sufficient to support the assessment approach and findings?
2. Evaluate the methods used to assess the stock, accounting for only the available data:
    - Are the methods scientifically sound, robust, and appropriate for the available data?
    - Are assessment models properly configured and used consistent with standard practices?
3. Evaluate the assessment findings with respect to the following:
    - Are abundance, exploitation, and biomass estimates reliable, consistent with input data and population biological characteristics, and useful to support inferences on stock status?
    - Is the stock overfished? What information helps you reach this conclusion?
    - Is the stock undergoing overfishing? What information helps you reach this conclusion?
    - Is there an informative stock recruitment relationship? Is the stock recruitment curve reliable and useful for evaluation of productivity and future stock conditions?
    - Are quantitative estimates of status determination criteria for this stock reliable? If not, are there other indicators that may be used to inform managers about stock trends and conditions?
4. Evaluate the stock projections, addressing the following:
    - Are the methods consistent with accepted practices and available data?
    - Are the methods appropriate for the assessment model and outputs?
    - Are results informative and robust, and useful to support inferences of probable future conditions?
    - Are key uncertainties acknowledged, discussed, and reflected in the projection results?
5. Consider how uncertainties in the assessment, and their potential consequences, are addressed.
    - Comment on the degree to which methods used to evaluate uncertainty reflect and capture the significant sources of uncertainty in the population, data sources, and assessment methods
    - Ensure that the implications of uncertainty in technical conclusions are clearly stated.
6. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted.
    - Clearly denote research and monitoring that could improve the reliability of, and information provided by, future assessments with particular emphasis on the Deepwater Horizon Oil Spill
    - Provide recommendations on possible ways to improve the SEDAR process
7. Provide guidance on key improvements in data or modeling approaches which should be considered when scheduling the next assessment.

8. Prepare a Peer Review Summary Report summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Develop a list of tasks to be completed following the workshop. Complete and submit the Peer Review Summary Report in accordance with the project guidelines.

The review panel may not request a new assessment. The review panel may request a limited number of additional sensitivity analyses and evaluations of alternative assumptions, and may correct errors identified in the assessment. Additional details regarding the latitude given to the review panel to deviate from assessments provided by the assessment workshop panel are provided in the SEDAR Guidelines and the SEDAR Review Panel Overview and Instructions.

** The panel shall ensure that corrected estimates are provided by addenda to the assessment report in the event corrections are made, alternate model configurations are recommended, or additional analyses are prepared as a result of review panel findings regarding the TORs above.**

Table 1. Required MSRA Evaluations:

Criteria	Definition* (2009)	Current Value* (2009)
Mortality Rate Criteria		
F_{MSY}	$F_{SPR26\%}$	0.53
MFMT	$F_{SPR26\%}$	0.53
F_{OY}	75% of F_{MSY}	0.39
$F_{CURRENT}$	Mean F for 2006-2008	1.00
$F_{CURRENT}$/MFMT		1.90
Base M		0.10
Biomass Criteria		
SSB_{MSY}	Equilibrium SSB_{MSY} @ $F_{SPR26\%}$	10.16 mp
MSST	(1-M)*SSB_{MSY}: M=0.10	9.14 mp
$SSB_{CURRENT\ (2008)}$	SSB_{2008}	1.78 mp
$SSB_{CURRENT}$/MSST		0.19
Equilibrium MSY	Equilibrium Yield @ F_{MSY}	14.96 mp
Equilibrium OY	Equilibrium Yield @ F_{OY}	13.35 mp
OFL	Annual Yield @ MFMT	
	2013	10.79 mp
	2014	11.29 mp
	2015	
	2016	
	2017	
	2018	
Annual OY**	Annual Yield @ F_{OY}	
	2013	8.70 mp
	2014	9.26 mp
	2015	
	2016	
	2017	
	2018	

*Definitions and values are subject to change as per guidance from this assessment.

**Based upon current definitions of OY, where OY = 75% of F_{MSY}.

Table 2. Projection Scenario Details

2.1 Initial Assumptions:

OPTION	Value
2012 base TAC	TBD
2012 Recruits	TBD by Panel
2012 Selectivity	TBD by Panel
Projection Period	6 yrs (2013-2018)
1st year of change F, Yield	2013

2.2 Scenarios to Evaluate (preliminary, to be modified as appropriate) in both biomass and numbers of fish:

1. Landings fixed at 2013 OY level
2. F_{OY}= 65%, 75%, 85% $_{FMSY}$ (project when OY will be achieved)
3. F_{MSY}
4. $F_{REBUILD}$ (if necessary)
5. F=0 (if necessary)

2.3 Output values

1. Landings in both biomass and numbers of fish
2. Discards (including dead discards)
3. Exploitation
4. F/F_{MSY}
5. B/B_{MSY}