



Gulf of Mexico Fishery Management Council

Managing Fishery Resources in the U.S. Federal Waters of the Gulf of Mexico

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SEDAR 98 Gulf of Mexico Red Snapper Assessment

Terms of Reference

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Start year: 1950, where possible

Terminal year: 2023, where possible

Data Workshop Terms of Reference

1. Utilize the three-area model (west, central, east) developed through the SEDAR 74 red snapper Stock ID process, for the Gulf red snapper unit stock.
2. Review available life history information as it pertains to length and age data collection and processing by areas.
 - Summarize, describe, and tabulate length and age data by year and fleet/survey and area through the terminal year of the assessment where possible.
 - Explore the validity and representativeness of length and age data and ageing methodology across ageing facilities and cooperators. Describe any sub-sampling methods employed through time and weighting of length and age compositions. Ensure samples of either length or age from one survey are not input twice.
 - Use documentation from SEDAR 74 working papers as appropriate.
 - Explore differences in growth parameters if length and/or age sampling methods differ from the previous assessment. Utilize appropriate models and diagnostics to describe population and region-specific (if warranted) growth, as applicable.
 - Develop age-length keys and Conditional Age at Length as appropriate.
 - Evaluate and discuss the sources of uncertainty and error, and data limitations (such as temporal and spatial coverage) for each data source. Provide estimates or ranges of uncertainty for length and age data as a whole and by area and source.
3. Provide fishery-independent measures of population abundance developed for the SEDAR 74 Research Track through the terminal year where possible.
 - For recommended indices (and those used in SEDAR 74), extend the index to the new terminal year and document any known or suspected temporal patterns in catchability not accounted for by standardization.
 - Evaluate the G-FISHER composite video index for use in the assessment.
 - Consider any changes to the fishery-independent indices comprising the G-FISHER index as provided for SEDAR 74 and evaluate the representativeness through time of the composition data. Evaluate the compositions available. Recommend modifications needed to inform differences in catchability and selectivity of the surveys.
 - Provide appropriate measures of uncertainty for all fishery-independent abundance indices and effort time series considered in SEDAR 74.
4. Provide commercial catch statistics as was provided for SEDAR 74, including both

landings and discards in both pounds and number extended through the new terminal year. Provide a corresponding working paper for the data and analyses with the following:

- Evaluate and discuss the adequacy of available data for accurately characterizing landings and discards by fishery sector or gear in pounds whole weight.
 - Provide length and age distributions for both landings and discards, if feasible.
 - Provide estimates of uncertainty around each set of landings and discard estimates.
 - Utilize the new estimates of shrimp fishery effort and bycatch, as appropriate, based on the peer review of such data from SEDAR 87. Document any change in start year from previous data provisions (previous start year 1950).
 - Evaluate the existing composition data and recommend whether the data are sufficient to represent the bycatch by the fleet.
 - Document all new methodologies:
 - Address program objectives, methods, coverage, sampling intensity, and other relevant characteristics.
 - Provide maps of shrimp fishery effort and any changes to observer coverage.
5. Provide recreational catch statistics by area for each fleet (private boat mode, for-hire charter vessels and headboats) including both landings and discards (for open and closed seasons) in both pounds and number. If state survey landings data are used (e.g., private boat mode), provide a fully calibrated (to a common data unit) time series as necessary.
- Evaluate and discuss the adequacy of available data for characterizing landings and discards (open and closed season) by fleet, mode, or gear.
 - Specifically discuss the potential for bias and uncertainty in the data sources.
 - Provide length and age distributions for both landings and discards (open and closed season) where feasible.
 - Provide estimates of uncertainty around each set of landings and discard (open and closed season) estimates.
6. Consider data available from external surveys (e.g., the Great Red Snapper Count and the LGL Ecological Associates survey off Louisiana coast), such as but not limited to: estimates of absolute abundances; length composition data; and tagging data to inform catchability, region, and fishing mortality in coordination with the PIs of each survey to determine their utility in the assessment.
- Consider and evaluate the data and analysis available to estimate the catchability and selectivity for each survey. Where possible, conduct additional analyses to determine priors for the catchability of each sampling gear by area.
 - Consider the usefulness of the length composition data for assessment, including spatiotemporal coverage, sample size/units and which gear the composition data represent.
7. Develop an updated Connectivity Modeling Simulation recruitment index for recruitment forecasting.
- Explore potential hypotheses to link any relevant ecosystem and climatic information identified to population and fishery parameters.
8. Provide recommendations for future research in areas such as sampling, fishery monitoring, and stock assessment. Include guidance on sampling intensity and

appropriate strata and coverage.

9. Prepare a Data Workshop report providing complete documentation of workshop actions and decisions in accordance with project schedule deadlines.

Assessment Terms of Reference

1. Review any changes in data or analyses following the Data Workshop. Summarize data as used in the assessment. Provide justification for any deviations from Data Workshop recommendations.
2. Detail the model building procedure, including modifications from the previously approved stock assessment for red snapper (SEDAR 52), and characterize the effects of new data and methods on model performance.
3. Starting with the SEDAR 74 model, modify as appropriate for the available data: Start year, evaluate selectivity and retention functions for all directed, discard, and bycatch fleets as appropriate.
 - Evaluate the effects of any bias correction to fishery independent- or dependent data on reproduction and age and length compositions.
 - Investigate fitting recommended length composition data as well as developing age-length keys and converting length frequency to age composition external to the modeling process.
 - Investigate the use of (nominal and weighted as recommended by the DW) age compositions for directed fleets either independently or along with the length compositions for the same fleets.
 - Explore whether available data supports the estimation of growth parameters within the model.
 - Document assumptions made when mirroring between West, Central, and Eastern Gulf parameters. Determine validity of those assumptions using diagnostics.
4. If external surveys were recommended during the Data Workshop, work with the survey PIs to incorporate the surveys in the models as suggested and where possible. Demonstrate any effects to other data fits and evaluate the fit(s) to the survey(s) directly.
 - If fits to any external surveys are determined to be unacceptable by the Assessment Panel, discuss and explore other ways in which the data from those external surveys might inform, if even indirectly, other aspects of the assessment.
5. Provide estimates of stock population parameters, including:
 - Fishing mortality, abundance, biomass, selectivity, stock-recruitment relationship, and other parameters as necessary to describe the population.
 - Run appropriate sensitivities of key parameters (e.g., steepness and natural mortality) to demonstrate their effect on stock population parameters.
 - A) Explore sensitivities of other biologically relevant estimates of steepness based on species with similar life histories.
6. Characterize uncertainty in the assessment and estimated values.

- Consider uncertainty in input data, the modeling approach, and the model configuration.
 - Provide appropriate measures of model performance, reliability, and ‘goodness of fit.’
 - Provide measures of uncertainty for estimated parameters.
7. Provide estimates of population benchmarks or management criteria consistent with available data, applicable FMPs, proposed FMPs and Amendments, and other ongoing or proposed management programs.
 - Evaluate existing or proposed management criteria as specified in the management summary.
 - Recommend additional proxy values when necessary.
 8. Project future stock conditions (biomass, abundance, and exploitation; including probability density functions) and develop rebuilding schedules if warranted; include estimated generation time. Develop stock projections for the following circumstances, in accordance with the guidance on management needs provided in the management history:
 - A) If stock is overfished: $F=0$, $F_{Current}$, F_{MSY} , $F_{Rebuild}$ (max exploitation that rebuild in greatest allowed time), fixed landings equal to the ABC.
 - B) If stock is undergoing overfishing: $F_{Current}$, F_{MSY} , fixed landings equal to the ABC.
 - C) If stock is neither overfished nor undergoing overfishing: $F_{Current}$, F_{MSY} , and F_{OY} (75% F_{MSY}).
 9. Provide recommendations for future research and data collection. Emphasize items that will improve future assessment capabilities and reliability. Consider data, monitoring, and assessment needs.
 10. Complete assessment webinars and write an assessment report in accordance with project schedule deadlines.

Review Workshop Terms of Reference

1. Evaluate the data used in the assessment, including discussion of the strengths and weaknesses of data sources and decisions. Consider the following:
 - The context of the data availability in the region. Are the procedures appropriate for our data limitations?
 - Are data decisions made by the DW and AW justified?
 - Are data uncertainties acknowledged, reported, and within normal or expected levels?
 - Is the appropriate model applied properly to the available data?
 - Are input data series sufficient to support the assessment approach?
2. Evaluate and discuss the strengths and weaknesses of the methods used to assess the stock, considering the available data. Consider the following:
 - Are methods scientifically sound and robust?
 - Are priority modeling issues clearly stated and addressed?
 - Are the methods appropriate for the available data?

- Are assessment models configured properly and used in a manner consistent with standard practices?
3. Consider how uncertainties are addressed in the assessment, and their potential consequences.
 - 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.
 - Comment on the relationship of this variability with ecosystem or climate factors and mechanisms for encompassing this into management reference points.
 4. Provide, or comment on, recommendations to improve the assessment.
 - Consider the research recommendations provided by the Data and Assessment workshops in the context of overall improvement to the assessment and make any additional research recommendations warranted.
 - If applicable, provide recommendations for improvement or for addressing any inadequacies identified in the data or assessment modeling. Describe these recommendations in sufficient detail for application, and should be practical for short-term implementation (e.g., achievable within ~6 months). List longer-term recommendations as research recommendations above.
 5. Evaluate the stock projections, including discussing strengths and weaknesses, and consider the following:
 - Are the methods consistent with accepted practices and available data?
 - Are the methods appropriate for the assessment model and outputs?
 - Are the results informative and robust, and are they useful to support inferences of probable future conditions?
 - Are key uncertainties acknowledged, discussed, and reflected in the projection results?
 6. Prepare a Review Workshop Summary Report describing the Panel's evaluation of the stock assessment and addressing each Term of Reference.