Gulf of Mexico Fishery Management Council
Scientific and Statistical Committee
Review of SEDAR 52: Gulf Red Snapper
May 31-June 1, 2018

Dr. Matt Smith and Dr. Dan Goethel (SEFSC) presented the SEDAR 52 stock assessment results for Gulf of Mexico red snapper. The assessment process was delayed at key points due to data deadlines which were not met. SEDAR 52 was a standard assessment, which utilized the agreed upon model parametrizations and data inputs from the SEDAR 31 benchmark assessment (and the 2014 Update of the SEDAR 31 benchmark). Data inputs were updated through 2016. New data and minor model changes were explored per the TORs developed through the SEDAR process.

Life history parameters were largely unchanged from the 2014 SEDAR 31 update assessment. Additional samples were added to the age and length composition data, which were used in fleet-specific age-length keys in the assessment. Based on recent studies, the discard mortality rate for the recreational fleets was increased from 10% to 11.8%.

The method for estimating discard fractions for the recreational headboat and commercial longline and handline fisheries was improved to produce more realistic estimates based on SEDAR best practices and recommendations by the data providers (and approved by the SEDAR 52 panel). The MRIP discard estimates matched up well with the previous assessment. It was noted that there were differences between Louisiana-specific private recreational discard estimates, and those estimated by LA Creel. The SEFSC staff clarified that the SEDAR 52 method did not parse data apart by state, but rather extrapolated discard data Gulf-wide.

Catch-per-unit-effort (CPUE) indices for the commercial handline fleets were truncated in 2006 (per the SEDAR 31 benchmark assessment methods) to exclude IFQ years. A missed management regulation was discovered in the CPUE standardization code for the MRFSS index in the eastern Gulf and was fixed resulting a slight change in trend (from declining to steady) for the last few years; the same data for the western Gulf were unchanged. No change was observed after updating the headboat CPUE data either.

The continuity model used data from 1872 – 2016, assuming that red snapper were unfished prior to 1872. Recruitment was apportioned into eastern and western components resulting in essentially independent recruitment streams for the two regions. The scale of shrimp bycatch was determined by fitting the median value of the observed values, while year-to-year variation in bycatch levels was determined by fitting the shrimp effort index in the model. A seven step model building approach with was utilized to bridge from the 2014 Update model to the final continuity/update model for SEDAR 52, which examined scaling the standard error of indices to a common mean of 0.2, changing the methods for calculating headboat and commercial discards, and updating the recreational CPUE indices. The western Gulf was largely unaffected by these changes. The eastern Gulf saw an increase in biomass compared to the 2014 Update assessment primarily due to scaling the index standard error to a common mean (due to equal weighting now be given to all indices and avoiding undue influence from a single index).

The base model structure was generally the same as the final SEDAR 52 continuity/update model, except that selectivity parameters were estimated as double-normal as opposed to using a random walk approach and an iterative reweighting scheme was utilized to adjust the effective sample size of the age composition to avoid overfitting these data sources at the expense of fit to the abundance indices. . Indices which select for the youngest (SEAMAP Larval Trawl; Groundfish Trawl) and largest (NMFS Bottom Longline) individuals still used the random walk approach. Biomass estimates show the western Gulf continues to rebuild, while the eastern Gulf has leveled off over the last few years. Both sides of the Gulf are seeing increases in the number of older fish present indicating rebuilding age structure. Recruitment continues to have no observed correlation to spawning stock biomass; as such, steepness was fixed at 0.99 as in previous assessments, suggesting no stock-recruitment relationship. Most indices were fit well to observed data by the model, with the exception of those indices with shorter time series or fewer samples. Due to the use of the median of the shrimp CPUE data, the model was forced to fit the observed data from the shrimp effort index.

Several model diagnostic approaches were used. A jitter analysis of the starting parameters by 10% illustrated tension in the model (i.e., because different jitter runs illustrated varying log-likelihood values) between fits to discards/indices and age composition, but for several tested parameters the estimated values did not change across these runs. Model bootstrapping (700 runs) showed normal distributions, with the widest intervals around the virgin biomass and virgin recruitment estimates. No retrospective patterns were observed, and index elimination (jackknifing) did not destabilize the model. Tests on recruitment variance showed steepness trending lower towards 1.0, which the analysts thought lent some credibility to the decision to fix steepness at 0.99. Generally, sensitivity runs resulted in little change in model estimates of total or spawning stock biomass.

The stock is not considered to be overfished (SSB/MSST = 1.41) or undergoing overfishing (F/MFMT = 0.823), but will not be rebuilt until 2032. The analysts noted that the change in the MSST value from $(1-M) * SSB_{SPR26\%}$ to $0.5*SSB_{SPR26\%}$ from the 2014 Update to SEDAR 52 was the primary reason for the change in stock status from overfished to not overfished between the two assessments. Under the new MSST definition the stock would not have been overfished in 2014, while under the old MSST definition the stock would still be overfished in 2016. The stock is currently (as of 2016) estimated by SEDAR 52 to be at 18% SPR Gulf-wide, an increase from 14% SPR in 2014 under SEDAR 31. The Committee noted that without spikes in recruitment (assuming constant recruitment into the future), the eastern Gulf was projected to decline under current conditions (i.e., lower proportions of recruitment and higher removals, particularly due to the recreational closed season fleet, compared to the western region). The western Gulf appears to be carrying the bulk of the rebuilding effort for the stock. Analysts added that projections beyond three years into the future are highly uncertain, and should be updated at appropriate intervals.

Projections assumed constant recruitment from the recent time period, along with selectivity, retention, and discard mortality. Provisional combined 2017 landings of 15.36 million pounds were also used, and 2018 landings were assumed to be equal to the ACL (13.045 million pounds) based on the 2014 Update projections and catch level recommendations made by the SSC in 2015. For projections of OFL and ABC, fishing mortality ($F_{rebuild}$) and associated yield was constrained to reach a spawning potential ratio of 26% by 2032. Previous projections (2014) were more

pessimistic than the current estimates due to apparent underestimation of recent strong recruitment events. . SSC members agreed that a more thorough look at the productivity of the red snapper stock was warranted.

Per the SEDAR 52 base model, overfishing did not occur in 2017, because the recommended OFL for that year would have been 20.71 million pounds (based on SEDAR 52 reference point projections, i.e., 2017 F/MFMT = 0.93). Regionally, the SPR level in the eastern Gulf is predicted to decrease under current fishing mortality trends, while the western Gulf is predicted to increase.

SSC members asked what could be done to increase data timeliness. Analysts replied that all data outlined in the SEDAR 52 TORs were considered by the SEDAR 52 panel, but that many partners (academic, state, federal) are relied upon for providing data for red snapper. The SEFSC is also investing in automating many aspects of its data retrieval and index construction process to make those efforts timelier. SSC members remarked that data providers also need to be realistic about what it takes for data to be used in an assessment. Data sets which are too narrow from a spatial, temporal, or sample size perspective, and cannot be combined with other data, may not ultimately be used in an assessment. SSC members discussed the utility of providing a set of assignments for SSC members participating in SEDAR Standard Assessments, as the SSC serves as the review body for these assessments, rather than CIE. There is currently no formal method for documenting the SSC review process.

> **Motion: The Committee recommends that the SEDAR 52 red snapper standard assessment be considered the best scientific information available.**
> *Motion carried unanimously.*

> **Motion: The Committee considers the SEDAR 52 red snapper standard assessment suitable for management advice.**
> *Motion carried unanimously.*

The Committee used a P* of 0.50 applied to the probability distribution function (PDF) for calculating the OFL. Based on the tier 1 ABC Control Rule spreadsheet, the Committee determined that a P* of 0.40 should be applied to the PDF for calculating the ABC. Values are in millions of pounds.

The Committee endorsed two possible choices for setting OFL and ABC. The first choice sets OFL and ABC annually for each year 2019-2021. This results in a declining yield stream, which is the result of the projections being constrained to achieve an SPR of 26% by 2032. The second choice sets a constant catch OFL and ABC for the period 2019-2021, consisting of the average of the annual values. Some Committee members expressed concern that the constant catch ABC exceeded the annual OFL in 2021, but after discussion, Committee members agreed that the two methods of calculating OFL and ABC were equivalent within the three-year period.

> **Motion: The Committee recommends that for the years 2019 – 2021 the yield at $F_{26\% SPR}$ using a P* of 0.5 applied to the OFL PDF for Gulf red snapper be the OFL per the table below. The ABC using a P* of 0.4 is recommended.**

Year	OFL (mp ww)	ABC (mp ww)

2019	16.6	16.0
2020	15.4	15.0
2021	14.6	14.3

Under a constant catch scenario OFL would be 15.5 mp and ABC would be 15.1 mp for years 2019-2021. The Committee recognizes these two options as equivalent.
Motion carried unanimously

Dr. Julie Neer (SEDAR) noted that a research track assessment for red snapper is scheduled to begin in 2020. This will be followed by an operational assessment that will provide management advice by the end of 2021. Staff indicated at the SEDAR Steering Committee Meeting that, given the length of the research/operational assessment process, the Council may request an interim assessment in 2021 to provide more timely projections beyond the end of 2021.