Gulf of Mexico Fishery Management Council
Scientific and Statistical Committee
Review of SEDAR 51: Gulf Gray Snapper
May 31-June 1, 2018

Description of Data

Dr. Jeff Isely (SEFSC) presented an overview of the gray snapper SEDAR 51 benchmark stock assessment. This is the first stock assessment that has been completed for gray snapper in the Gulf of Mexico. The assessment included recreational (1981-2015) and commercial fishery (1962-2015) data as inputs. Estimates of recreational (1945-1980) and commercial (1945-1961) historical landings were calculated based on historical effort from the US Fish and Wildlife Survey of Hunters and Fishers. In total, the assessment included 6 indices based of harvest, 8 indices of abundance, 6 length composition indices, and 5 discard indices (Figure 1).

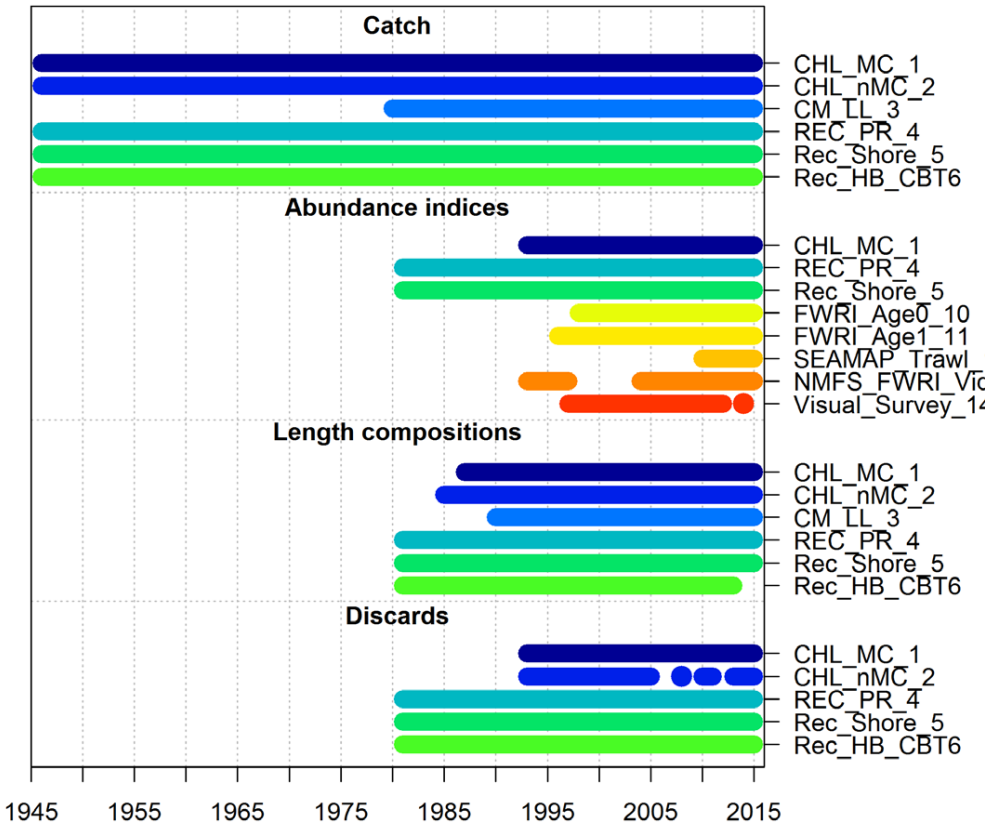

Figure 1. Summary of inputs into SEDAR 51 benchmark stock assessment for Gulf gray snapper.

Model Configuration

The start year of the SEDAR 51 benchmark assessment was 1945 and the terminal year of the assessment was 2015. The SEDAR 51 benchmark assessment used a length-based, age-structured, forward projecting population model and was used to assess the status of the gray snapper stock

and provide guidance for future harvest levels. The model was implemented using "Stock Synthesis 3" (Methot 2013)[1].

Model Outputs

The final configuration of the stock assessment model outputs fit closely to the observed length composition and indices of abundance. However, the model output did not align well with the estimated discard abundance and the model fit could not be improved without degrading the fit to the length composition and abundance information.

After review and discussion the SSC made a motion declaring this benchmark stock assessment to be the best scientific information available for Gulf gray snapper and a second motion indicating that the results of this assessment are suitable for providing management advice.

> **Motion: The Committee recommends that the SEDAR 51 Gray Snapper benchmark assessment be considered the best scientific information available.**
> *Motion carried unanimously*.

> **Motion: The Committee considers the SEDAR 51 Gray Snapper benchmark assessment suitable for management advice**.
> *Motion carried unanimously*.

Stock Status

The annual estimates of spawning stock biomass (SSB) and exploitation rate relative to the management reference points indicate that gray snapper is currently experiencing overfishing, and it may be overfished depending upon the level of the minimum stock size threshold (MSST) (Table 1). The maximum fishing mortality threshold (MFMT) is defined as $F_{30\%SPR}$ and based on a current fishing mortality rate calculated as the geometric mean of the fishing mortality rates for 2013-2015, the stock is experiencing overfishing (i.e., $F_{current}/F_{30\%SPR}=1.2$), and overfishing has occurred most years since 1976 (Figure 2). The SSC discussed two alternative metrics to evaluate stock overfished status. Reef Fish Amendment 44 (Gulf Council, 2017) standardized the MSST at 50% of B_{MSY} for 7 reef fish species (gag, red grouper, red snapper, vermillion snapper, gray triggerfish, greater amberjack, and hogfish), but gray snapper was not considered in this document. Based on this definition, gray snapper would not be considered overfished as the biomass is currently above this level for MSST (Figure 3 [gray line]). However, as gray snapper was not included in the amendment that established MSST for several reef fish species, the SSC considered the default definition where MSST = (1-M) * $B_{SPR30\%}$ to be the appropriate metric. For gray snapper, M = 0.15 and the current biomass estimate is below MSST (Figure 3 [orange line]).

[1] Methot Jr., R. D. 2013. User Manual for Stock Synthesis Model Version 3.24s NOAA Fisheries, Seattle, WA. http://nft.nefsc.noaa.gov/Stock_Synthesis_3.htm

Table 1. Management advice from the SEDAR 51 benchmark stock assessment model for gray snapper.

Criteria	**Definitions**	**SEDAR 51 Values**	**Status**
M		0.15	
Steepness		1.0	
Virgin Recruitment	1,000s	10,683	
SSB Unfished	metric tons	22,200	
Mortality Rate Criteria			
F_{MSY} or proxy	$F_{SPR30\%}$	0.115	
MFMT	$F_{SPR30\%}$	0.115	
$F_{CURRENT}$	geometric mean ($F_{2013\text{-}2015}$)	0.138	
$F_{CURRENT}$/MFMT		**1.2**	**Overfishing**
Biomass Criteria			
SSB_{MSY} or proxy (metric tons)	$SSB_{SPR30\%}$	6,621	
MSST (metric tons) @ (1-M)	(1-M)*$SSB_{SPR30\%}$	5,627	
MSST (metric tons) @ 50%	0.50*$SSB_{SPR30\%}$	3,310	
$SSB_{CURRENT}$ (metric tons)	SSB_{2015}	4,660	
$SSB_{CURRENT}/SSB_{SPR30\%}$	SSB_{2015}	0.704	
$SSB_{CURRENT}$/MSST @ (1-M)	**MSST = (1-M)* $SSB_{SPR30\%}$**	**0.827**	**Overfished**
$SSB_{CURRENT}$/MSST @ 50%	MSST = 0.50* $SSB_{SPR30\%}$	1.408	Not Overfished

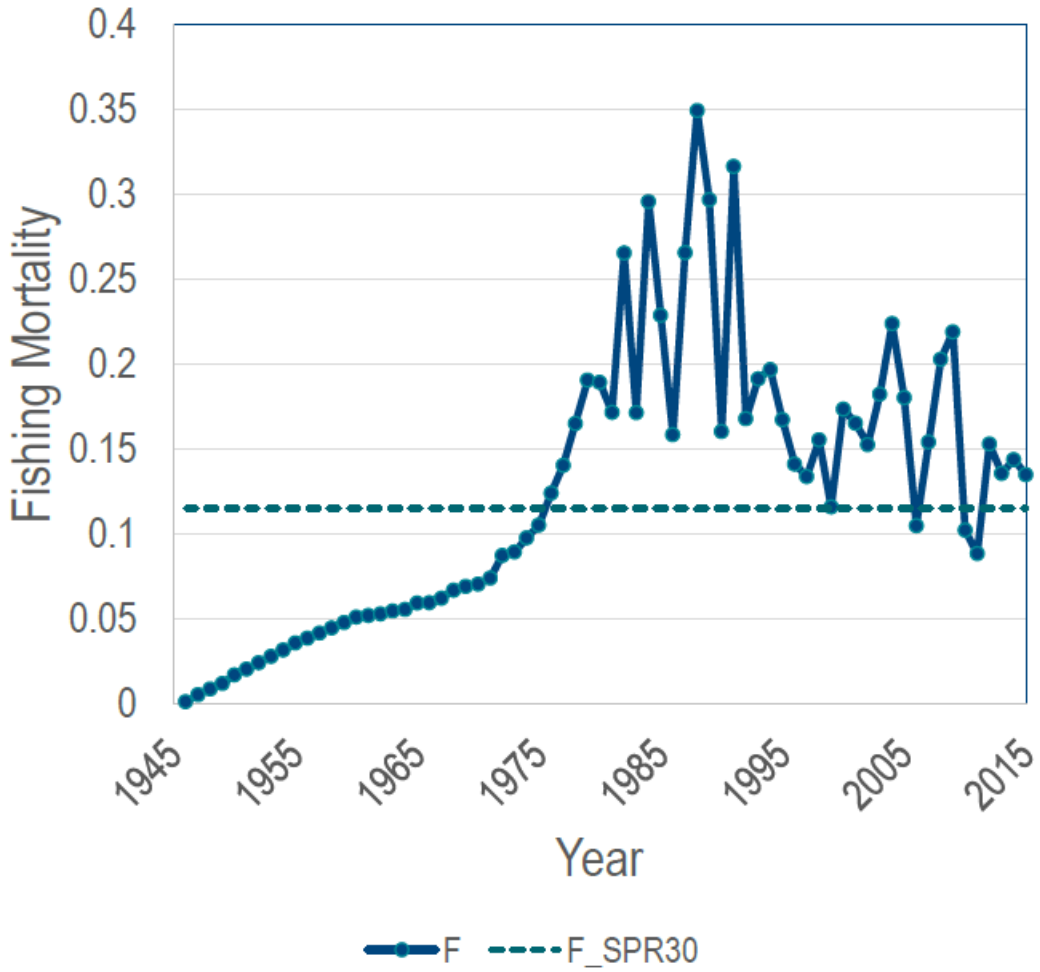

Figure 2. Estimates of fishing mortality from 1945 through 2015. Fishing mortality has been above MFMT (i.e., experiencing overfishing) for most years since 1976 and the stock is currently experiencing overfishing.

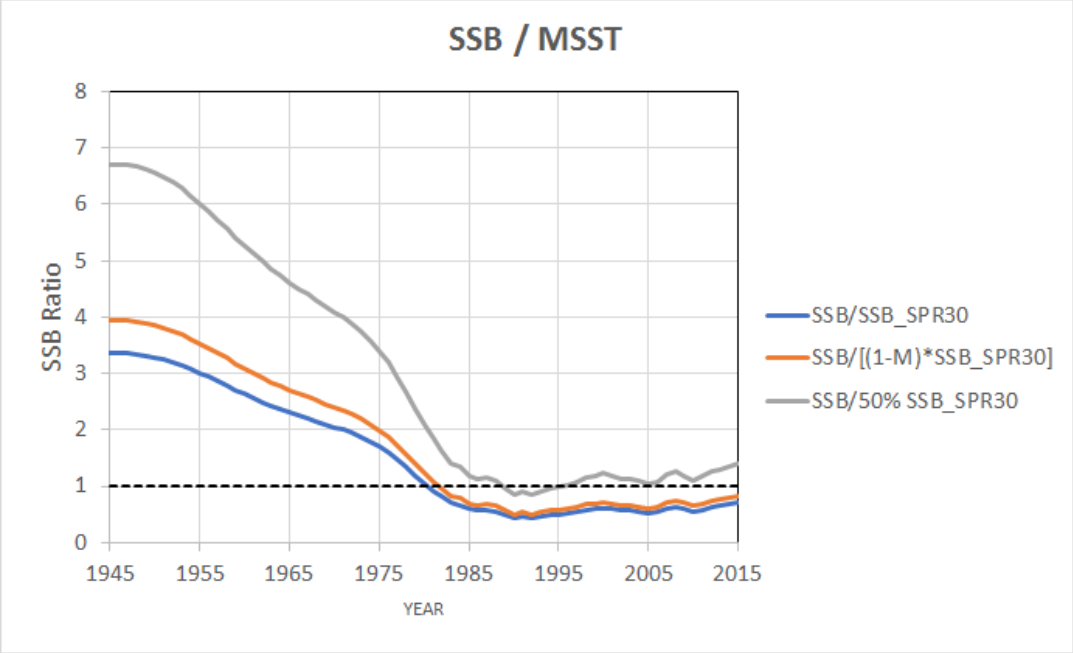

Figure 3. Ratio of SSB to MSST for three definitions of MSST. The SSC selected (1-M)*$SSB_{SPR30\%}$ as MSST (orange line) and based on this definition gray snapper is currently overfished.

Based on this discussion, the SSC passed the following motion:

> **Motion: The Committee estimates that the Gulf gray snapper stock is currently experiencing overfishing and, based on a stock status criterion of MSST = (1-M)*B_{MSY} proxy, where M=0.15, the stock is estimated to be overfished.**
> *Motion carried unanimously.*

OFL and ABC Projections

Stochastic projections were carried out to yield for the years 2019 – 2021. The OFL was calculated using $F_{30\% SPR}$ using a P* of 0.5 and the ABC was calculated using $F_{30\% SPR}$ using a P* of 0.4. Based on these calculations the SSC recommended OFL and ABC yield streams for 2019-2021 fishing years.

> **Motion: The Committee recommends that for the years 2019 – 2021 the yield at that F 30% SPR using a P* of 0.5 applied to the OFL PDF for Gulf gray 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	2.31	2.27
2020	2.33	2.29
2021	2.36	2.32

> *Motion carried unanimously.*