Gulf of Mexico Fishery Management Council
Standing, Reef Fish, Socioeconomic, and Ecosystem SSC

Review of SEDAR 72: Gulf of Mexico Gag Grouper (SRFS Run)
Meeting Summary
September 21 – 23, 2022

Review: Alternative Model Run for SEDAR 72 Base Model using Florida's State Reef Fish Survey

Dr. Katie Siegfried (Southeast Fisheries Science Center [SEFSC]) presented a resolved issue with the landings data from the headboat directed landings and discards. When these data were pulled for the assessment, Area 23, which covers northwest Florida and Alabama, was accidentally omitted. The inclusion of these data in both the original SEDAR 72 base model using Marine Recreational Information Program (MRIP) data, and Florida's State Reef Fish Survey (SRFS) data, resulted in minimal differences in the estimated landings by year. This error was also corrected for the SEDAR 68 operational assessment for scamp, which is not being discussed at this SSC meeting. Although these differences for gag grouper were small, both the MRIP- and SRFS-informed models were re-run to ascertain any effects to management benchmarks and rebuilding timelines. This resulted in no substantial change to the rebuilding timeline for the SRFS model; however, the MRIP model now projects that the stock rebuilds in 10 years (T_{Min}, F=0) at a fishing mortality rate at maximum sustainable yield (F_{MSY}) proxy using a 30% spawning potential ratio ($F_{30\%SPR}$), and a medium severity estimate for red tide mortality in 2021. Dr. Siegfried commented that automated data processing methods being developed by the SEFSC are being built to include error checking and safeguards.

Dr. Lisa Ailloud (SEFSC) presented the revised results of the SEDAR 72 Gulf of Mexico gag grouper operational assessment using the SRFS private angling landings in place of those from the MRIP's Fishing Effort Survey (FES), and the original SEDAR 72 base model. The Council requested the SRFS-informed model run in October 2021, with diagnostics, to see how the SRFS private angling landings data performed for gag grouper. A review of the SRFS was coordinated and completed by NMFS Office of Science and Technology (OST) in May 2022. The findings of the review were subsequently evaluated by NMFS OST and SEFSC staff, and no major concerns were identified in the review that would preclude the use of the calibrations for their intended purpose. Generally, the SRFS model estimates similar trends in landings as the MRIP model, albeit with lower estimates of removal and stock size. Approximately 95% of private angling landings of gag grouper are captured within the SRFS sampling frame, which encompasses the eastern Gulf of Mexico from the Florida/Alabama state line east and south through Monroe County. Like the MRIP-informed model, the SRFS model shows a decline in gag grouper landings in recent years.

Dr. Ailloud presented updated model results and diagnostics, including comparisons with the SEDAR 33U assessment as well as the previously approved SEDAR 72 base model (SEDAR 2021), and revised management benchmarks, stock status estimates and projections for Gulf gag grouper. Fits to age and length composition data were similar between model runs, with some

bounding issues with selectivity of directed fleets resolved by fixing those values to improve model stability. Fits to indices, trends in recruitment, exploitation rate (F), and spawning stock biomass (SSB) were also similar between models. The aforementioned headboat correction, which had a minimal effect on the overall results from the models, will be included in a revised report for the SRFS run. The SRFS run does estimate a lower virgin biomass, a lower rate of depletion, and less recruitment, all to pair to the lower estimated historical removals under SRFS compared to MRIP. The 2014 red tide episodic mortality event is more pronounced in the SRFS run than in the MRIP run; Dr. Ailloud noted that the time blocks in the model for defining fishing season duration for the recreational fleets led to differences in retention estimates between the models. However, these retention estimates are generally estimated with considerable uncertainty. Diagnostics demonstrated stable models using either SRFS or MRIP, and minimal retrospective patterns in the SSB, recruitment, and F as years of data are peeled away. Generally, the SRFS run scales down the stock's population size by about 50%, but does not change the stock's trajectory or the ratio of SSB to virgin SSB in the terminal year. Both models perform similarly.

An SSC member noted that the last stock assessment, the SEDAR 33 Update (2016) showed a healthy stock when using female-only biomass and F_{MAX} as the proxy for F_{MSY} (the SSC determined this proxy to be inappropriate in November 2021). However, since the 2014 terminal year of that assessment, there have been three red tide episodic mortality events (2014, 2018, and 2021), and recruitment and landings have declined therein. The SSC member also postulated whether the *Deepwater Horizon* oil spill may have had an effect on recruitment of gag grouper on the west Florida shelf, and noted that the issue of sex ratio has been an ongoing concern.

Dr. Ailloud continued with the projections from the models, which were informed by a medium severity estimate of red tide mortality in 2021 compared to the 2005 red tide, and proxies for F_{MSY} of $F_{30\%SPR}$ and $F_{40\%SPR}$. F_{MAX} was not included here due to previously being deemed inappropriate by the SSC. Choosing a proxy for F_{MSY} affects estimates of a recruit's future reproductive output. With protogynous hermaphrodites, if only measuring female biomass, long-term F may result in relatively low biomass levels of males, which in turn affects long-term yield. Given the uncertainty surrounding the relative contribution of males to the reproductive output of the stock, using sexes-combined SSB (males and females) provides a buffer to avoid depleting the males. Following a similar logic and adding in the complexity of uncertainty surrounding steepness, Harford et al. 2018[1] provides guidance on the level of SPR that would be highest probability of achieving long-term MSY in hermaphroditic stocks. Steepness was fixed in both models.

For the projections, selectivity and retention are fixed at their 2019 values, with recruitment following the Beverton-holt stock-recruitment relationship. Actual landings are used for the interim years of 2019 – 2021, and the average of those three years for 2022. The sector allocation ratio from Reef Fish Amendment 30B is retained (61% recreational, 39% commercial), and the red tide influence in the interim years is included as a fixed F. Ultimately, the sector allocation scenario may necessitate differing sets of projections; if SRFS data are used to inform the sector allocation based on the years used in Reef Fish Amendment 30B (1986 – 2005), the sector allocation (based on the same formula as the present sector allocation) changes to 65% recreational, 35% commercial. Under either the SRFS or MRIP models, gag grouper is overfished and undergoing overfishing. Using an F_{MSY} proxy of $F_{30\%SPR}$, the stock rebuilds to a smaller SSB

[1] https://gulfcouncil.org/wp-content/uploads/05f.-Harford-et-al.-2019-Fish-and-Fisheries.pdf

than at $F_{40\%SPR}$, with ultimately smaller yields over time. The SSC noted that fixing steepness and setting a proxy for F_{MSY} in effect fixes stock productivity.

The SSC discussed the SRFS run compared to the MRIP run, considerate of how the fishery is expected to be monitored in the future. An SSC member noted that the State of Florida and the Council have expressed a desire to use the same data collection program to both monitor and assess the stock, which would indicate using SRFS. The SEFSC was commended on its work to perform these additional analyses. Another SSC member added that migrating from a generalized survey like MRIP to a region-specific survey like SRFS may be more appropriate for stocks that are effectively sampled by the latter (95% of private angling landings for gag grouper are captured by SRFS), with the added benefit of improved precision in the SRFS survey. An SSC member asked whether switching from recommending the MRIP model at its November 2021 meeting as consistent with the best scientific information available (BSIA) to the SRFS model was in effect stating that one survey was better than the other. Council staff recalled that the SSC has always made recommendations on BSIA on a case-by-case basis, and has never given a blanket recommendation to any fishery-independent or -dependent survey. SSC members noted that any recommendation of BSIA was not specific to a survey, but rather to the completed stock assessment product as being *consistent* with BSIA. An SSC member thought it appropriate for the SRFS survey to be considered whenever it encompasses the overwhelming majority of the private angling landings for a stock (>90%). The SSC also noted the differentiation in circumstances with species like gag compared to, say, red snapper, when considering the spatial distribution and magnitude of landings compared to the surveys examining those stocks. An SSC member expressed some reservation about making determinations of BSIA between the surveys.

The SSC noted the need to determine whish proxy to use for F_{MSY}. As noted, the SSC no longer supports the use of F_{MAX} for gag grouper. An SSC member noted differences in when the stock was estimated to be overfished, based on the way in which SSB is calculated (female-only versus sexes-combined SSB), and based on the F_{MSY} proxy (F_{MAX} versus $F_{30\%SPR}$). These model specifications have changed from assessment to assessment as the data have evolved with time. An SSC member thought that an F_{MSY} proxy of $F_{30\%SPR}$ was likely a lower bound for gag grouper, and $F_{50\%SPR}$ or $F_{60\%SPR}$ was a higher bound, with $F_{40\%SPR}$ being closer to the middle. Another SSC member agreed, adding that given the low sex ratio, rate of reproduction, and red tide susceptibility, there appeared to be ample evidence in support of a higher F_{MSY} proxy than $F_{30\%SPR}$, and certainly higher than F_{MAX}.

> **Motion: The SSC recommends $F_{40\%SPR}$ as the appropriate F_{MSY} proxy and the basis for stock status determination criteria for Gulf of Mexico gag grouper.**
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> *Motion carried with one opposed and 5 absent.*

The SSC discussed selecting the exact model that was consistent with BSIA, considerate of discussions about the data inputs and the trends observed in the stock. An SSC member asked whether the SSC was differentiating between the MRIP and SRFS surveys, and determining one to be more consistent with BSIA than the other. Another SSC member noted the certification of the SRFS program and its calibration to historical data, and its increased precision over MRIP due to it being explicitly designed for waters adjacent to Florida. Further, they noted that the decision isn't

about which survey is "better"; however, the surveys are linked in that intercept data collected by SRFS are ultimately used to inform MRIP's catch estimation in the Access Point Angler Intercept Survey. Where the surveys differ is in the estimation of fishing effort. Another SSC member added that monitoring and assessing the stock using the same survey(s) was likely to the benefit of understanding the performance of the stock over time. An SSC member stated that deciding which survey to use for the private angling landings made implicit assumptions about accuracy. Another SSC member replied that studies were planned or ongoing to better determine relative estimates of accuracy for various surveys; at present, the MRIP Transition Team, which has been working on the calibration ratios for the several state surveys for various species, has stated that it is not yet possible to determine which survey(s) is more accurate. An SSC member thought that determining that the SRFS run was consistent with BSIA was not out of order, especially given the comparatively similar performance of the two models.

> **Motion: The SSC determines that the SEDAR 72 Gulf of Mexico Gag Operational Assessment State Reef Fish Survey Run, based on the combined-sexes SSB, the corrected SRHS data, an MSY proxy of F40%SPR, and the "medium" red tide scenario is consistent with the best scientific information available and should be used as the basis for stock status determination and management advice. Based on this assessment model, the stock is determined to be overfished and undergoing overfishing.**
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> *Motion carried 15-4 with 5 absent.*

Dr. Ailloud reviewed the rebuilding timelines for the projections assuming no fishing pressure (F = 0), to determine the minimum time to rebuild the stock (T_{Min}). Both the MRIP and SRFS models, assuming an $F_{30\%SPR}$ reference point, rebuild in 10 years with F = 0. This similarity is not surprising given the similar performance of both models, with the primary difference being a scaling of the magnitude of recreational harvest. Assuming an $F_{40\%SPR}$ reference point, the MRIP model rebuilds in 13 years at F = 0, and 12 years for the SRFS run. Dr. Ailloud also provided the rebuilding timeline for T_{Min} * 2, which was preferred by the Council in its recommendations to NMFS for the proposed gag grouper interim rule. Under T_{Min} * 2, the MRIP model projects the rebuilding of the stock by 2049, compared to 2047 under SRFS, under an FMSY proxy of $F_{40\%SPR}$. An SSC member was concerned with the assumption of F = 0, since that assumes no additional red tide mortality or any changes in the magnitude of discards, which they thought seemed unreasonable. Dr. Ailloud agreed, replying that it isn't possible to predict exactly when, for how long, or how severe the next red tide event, or successive events, will be. Generally, the SEFSC acknowledged the presence of episodic mortality and discard mortality, and the incompatibility of that knowledge with the assumption of no fishing mortality. The SEFSC encouraged the use of interim analyses to examine the performance of the stock in the interim years between stock assessments. The SSC member then stated that they thought the argument that rebuilding the stock in 10 years was possible under F = 0 was not defensible. The SSC thought the mortality from discards would remain unchanged, and then determining the acceptable F from directed effort could be determined from there. The SSC acknowledged the sound analysis for calculating the rebuilding timelines based on the options available under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), deferring to the Council to determine which rebuilding timeline it thought most appropriate given physical, biological, social,

and economic considerations. An SSC member asked about further consideration of discards out of season. The SEFSC noted the ability to consider discards in this way for red snapper, and that doing so for other stocks would constitute a substantial model change, but should be done.

> **Motion: The SSC determines that the yields corresponding to the rebuilding schedules based on T_{Min}, T_{Min} plus one generation time (8 years for gag grouper), and T_{Min} * 2, are appropriately calculated and suitable for informing catch advice.**
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> *Motion carried with no opposition and 5 absent.*

The SSC noted that the overfishing limit (OFL) projections (i.e., fishing at MFMT) and those for $F_{Rebuild}$, which are equivalent to the acceptable biological catch (ABC), were contained in the tables in the presentation provided in millions of pounds gutted weight. The SEFSC compiled these data into a single table for the different rebuilding timelines. The SSC noted that yields should be described annually, and not averaged into constant catch scenarios, given the overfished condition of the stock. Dr. Tom Frazer (Council Representative) added that it was likely that the Council would request annual interim analyses until the next stock assessment of gag grouper. These interim analyses may be used as "health checks" unless they result in revised catch advice from the SSC. An SSC member recalled similarities between the current estimated condition of gag grouper compared to historic red snapper and red drum assessments, when those stocks were thought to be most depleted. The SSC member thought it important to illustrate how much of a recovery would be needed to rebuild gag grouper from its current condition.

Table 1. OFL and ABC yields for gag grouper based on the model selected by the SSC (SRFS run, using $F_{40\%SPR}$, and medium red tide severity) for the three rebuilding timelines permitted under the Magnuson-Stevens Act.

SRFS RUN		mp gw	million pounds gutted weight		
F40%SPR		mt gw	metric ton gutted weight		
			FRebuild	0.091	
F= F40%SPR	0.098		**Year Rebuilt**	2047	
OFL	mt gw	**mp gw**	**TMin (12 yrs) * 2**	mt gw	**mp gw**
2023	189.915	**0.41869**	2023	175.909	**0.387812**
2024	284.417	**0.627031**	2024	264.72	**0.583607**
2025	382.781	**0.843887**	2025	357.698	**0.788588**
2026	467.534	**1.030735**	2026	438.582	**0.966907**
2027	566.314	**1.248507**	2027	533.216	**1.175539**
			FRebuild	0.081	
			Year rebuilt	2043	
			TMin (12 yrs) + 1 Generation (8 yrs)	mt gw	**mp gw**
			2023	157.508	**0.347245**
			2024	238.533	**0.525875**
			2025	324.008	**0.714315**
			2026	399.289	**0.880281**
			2027	487.816	**1.075449**
			FRebuild	0.074	
			Year rebuilt	2042	
			F=75% * F40%SPR	mt gw	**mp gw**
			2023	142.614	**0.31441**
			2024	217.079	**0.478577**
			2025	296.117	**0.652825**
			2026	366.418	**0.807812**
			2027	449.428	**0.990818**

Dr. Siegfried described the differences between the OFL and ABC scenarios in Table 1 for gag grouper, compared to the wide buffers observed in other rebuilding plan demonstrations (e.g., greater amberjack, gray triggerfish). For gag grouper, the stock-recruit curve was used for both management benchmarks and recruitment, and the time to rebuild for gag grouper is much longer (at least 12 years, and as many as 24 years) than for greater amberjack (6 years) or gray triggerfish (7 years). Generally, the shorter the rebuilding timeline, the lower the F must be to rebuild the stock in time, and thus, the larger the buffer will be between the OFL (at equilibrium F) and ABC. An SSC member noted that the assumptions about the spawner-recruit relationship is heavily informing future catch limits in the projections, which is in effect relying on gag grouper that have not yet been born to carry the rebuilding of the stock. Further, they thought that the approach

being taken with respect to discards may be underestimating the true number of discarded fish, and as such the subsequent discard mortality. The SEFSC thought regular interim analyses, perhaps using the combined video survey index of relative abundance, may be informative in keeping the SSC and Council apprised of the rebuilding progress of gag grouper in the interim years between stock assessments. Evaluating the recruitment of juvenile females into the fishery will need to be monitored with time to shed light on the annual success of recruitment of the stock. Although not contained in the SSC's previous motion about the catch limits associated with the different rebuilding timelines, the SSC stated that it thought the catch limits associated with the rebuilding timeline using 75% of $F_{40\%SPR}$, which is one of the options when T_{Min} is greater than 10 years under the Magnuson-Stevens Act, was a valid option for consideration by the Council. Further, the SSC decided to only recommend catch limits for the five year period of 2023 – 2027.

> **Motion: The SSC determines that the yields corresponding to the rebuilding schedules based on T_{Min} (12 years @ F = 0), T_{Min} plus one generation time (8 years for gag grouper; 20 years total), T_{Min} * 2 (24 years total), and 75% of $F_{SPR40\%}$ (19 years total) are appropriately calculated, and the 5-year OFL and ABC yield streams associated with those rebuilding timelines are suitable for informing catch advice.**
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> *Motion carried with no opposition and 5 absent.*

Review of Updated Projections for Gulf of Mexico Gag Grouper using SRFS

Dr. Siegfried reviewed updated catch projections for gag grouper based on the alternative SRFS run. These updated projections considered a revised sector allocation of 65% recreational, 35% commercial, based on the application of the SRFS landings and discards to the historical reference period (1986 – 2005) used to set the current sector allocation for gag grouper (presently equal to 61% recreational, 39% commercial). As part of its work to develop a rebuilding plan for gag grouper (Reef Fish Amendment 56), the Council considered other reference periods (1986 – 2009 [pre-IFQ] and 1986 – 2019 [data-rich period]), and found those referenced periods to result in similar average landings ratios between the commercial and recreational fleets. Dr. Siegfried reviewed updated projections based on four scenarios: the minimum time to rebuild (T_{Min}) with fishing mortality set equal to zero (F = 0; 11 years); 75% of F at 40% spawning potential ratio (SPR: the current proxy for maximum sustainable yield; 18 years); T_{Min} plus one generation period (8 years for gag grouper; 19 years total), and T_{Min} * 2 (22 years).

For these projections, the first year of management is 2024, using the total ACL of 661,000 lbs gw for 2023 as specified in the interim rule being reviewed for implementation by NMFS. Dr. Siegfried described how the landings for the interim year were divided by fleet within sectors, based on fleet-specific proportional landings within sector for 2017 – 2019. Selectivity and retention use 2019 values, recruitment is informed by the stock-recruit relationship, and a medium red tide severity for 2021 is estimated. Managing at an F_{MSY} proxy of $F_{40\%SPR}$ will necessitate a substantial reduction in catch limits, but is expected to result in a larger, more robust stock with time and allow for greater annual yields (compared to managing at $F_{30\%SPR}$) once the stock is rebuilt. Table 3 describes the updated OFL projections for gag grouper. Tables 4, 5, and 6 show the ABC yields at the various rebuilding timelines of 75% of $F_{40\%SPR}$ (18 years); T_{Min} plus one generation period (8 years for gag grouper; 19 years total), and T_{Min} * 2 (22 years), respectively.

Table 3. OFL projections for Gulf gag grouper for 2024 – 2028, using an F_{MSY} proxy of $F_{40\%SPR}$, and a sector allocation of 65% recreational and 35% commercial.

F = $F_{40\%SPR}$	0.097	
OFL	mt gw	**mp gw**
2024	268.153	**0.591175**
2025	365.347	**0.805451**
2026	449.523	**0.991027**
2027	544.507	**1.200431**
2028	659.547	**1.454051**

Table 4. ABC projections for Gulf gag grouper for 2024 – 2028, using an F_{MSY} proxy of $F_{40\%SPR}$, and a sector allocation of 65% recreational and 35% commercial, for the 75% of $F_{40\%SPR}$ (18 years) rebuilding timeline.

$F_{Rebuild}$	0.073	
Year rebuilt	2042	
F = 75% * $F_{40\%SPR}$ (18 years)	mt gw	**mp gw**
2024	201.297	**0.443783**
2025	279.095	**0.615298**
2026	348.787	**0.768943**
2027	427.865	**0.94328**
2028	524.249	**1.15577**

Table 5. ABC projections for Gulf gag grouper for 2024 – 2028, using an F_{MSY} proxy of $F_{40\%SPR}$, and a sector allocation of 65% recreational and 35% commercial, for the T_{Min} plus one generation period (8 years for gag grouper; 19 years total).

$F_{Rebuild}$	0.08	
Year rebuilt	2043	
T_{Min} (11 yrs) + 1 Generation (8 yrs)	mt gw	**mp gw**
2024	221.646	**0.488645**
2025	305.689	**0.673928**
2026	380.219	**0.838238**
2027	464.626	**1.024324**
2028	567.294	**1.250668**

Table 6. ABC projections for Gulf gag grouper for 2024 – 2028, using an F_{MSY} proxy of $F_{40\%SPR}$, and a sector allocation of 65% recreational and 35% commercial, for the T_{Min} * 2 (22 years) rebuilding timeline.

$F_{Rebuild}$	0.088	
Year rebuilt	2046	
T_{Min} (11 yrs) * 2	mt gw	**mp gw**
2024	243.595	**0.537034**
2025	334.039	**0.736429**
2026	413.364	**0.911311**

2027	503.034	**1.108999**
2028	611.876	**1.348954**

The SSC acknowledged that the request for updated projections, using an alternative sector allocation of 65% recreational and 35% commercial based on the SRFS landings and discards from 1986 - 2005, came directly from the Council based on Council discussions at its August 2022 meeting. The SSC stated that allocation decisions are expressly the purview of the Council, and it was up to the Council to determine which sector allocation scenario it ultimately prefers.

> **Motion: The SSC determines that the yields corresponding to the rebuilding schedules, calculated using the Council requested allocation scenario of 35% commercial and 65% recreational, based on T_{Min} (11 years @ F = 0), 75% of $F_{40\%SPR}$ (18 years), T_{Min} plus one generation time (8 years for gag grouper; 19 years total), and T_{Min} * 2 (22 years total) are appropriately calculated, and the 5-year OFL and ABC yield streams associated with those rebuilding timelines for 2024 – 2028 are suitable for informing catch advice.**
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> *Motion carried with one opposed.*

The SSC noted that the projections using the status quo sector allocation scenario of 61% recreational and 39% commercial should be updated to include the use of the interim rule's 661,000 lb gw ACL for 2023, and those values used in Amendment 56 for Council consideration.

Meeting Participants

Standing SSC
Jim Nance, *Chair*
Luiz Barbieri, *Vice Chair*
Harry Blanchet
Roy Crabtree
Benny Gallaway
Doug Gregory
David Griffith
Paul Mickle
Trevor Moncrief
Will Patterson
Steven Scyphers
Jim Tolan

Special Reef Fish SSC
Jason Adriance
Mike Allen
John Mareska

Special Ecosystem SSC
Mandy Karnauskas
Josh Kilborn

Special Socioeconomic SSC
Luke Fairbanks
Cindy Grace-McCaskey
Jack Isaacs

Council Representative
Tom Frazer

A list of all meeting participants can be viewed here.