Standing, Reef Fish, Socioeconomic, and Ecosystem SSC
Meeting Summary
September 27 – 28, 2023

The meeting of the Gulf of Mexico (Gulf) Fishery Management Council's (Council) Standing, Reef Fish, Socioeconomic, and Ecosystem Scientific and Statistical Committees (SSC) was convened at 8:30 AM EDT on September 27, 2023. The agenda for this meeting was approved along with the minutes from the July 2023 SSC meeting. Verbatim minutes from past SSC meetings can be reviewed here.

Dr. Luiz Barbieri will represent the SSC at the Council's October 23 – 26, 2023, meeting in Panama City, Florida.

Review of Gag Grouper Abundance, Movement, Spawning Behavior, Discard Mortality, and Environmental Influences

Reproductive resilience in the protogynous gag grouper: Dr. Sue Lowerre-Barbieri

Dr. Lowerre-Barbieri, from the Florida Fish and Wildlife Research Institute (FWRI), discussed the reproductive resilience paradigm (RRP), with reproductive resilience defined as the capacity of a population to maintain the reproductive success needed to result in long-term population stability despite disturbances such as climate change and fishing mortality. Fish can display widely varied reproductive strategies, and often there is little discernible relationship between recruitment and adult abundance. Dr. Lowerre-Barbieri added that movement and reproductive strategies in marine fish are linked, and current conceptual models of life history do not capture this because they do not integrate movement. Specific to gag, which are protogynous hermaphrodites (beginning life as female and transitioning to male at larger sizes/older ages), mature individuals only coexist in spawning grounds. Because nursery areas do not overlap, females must undergo ontogenetic habitat shifts to the spawning grounds. Dr. Lowerre-Barbieri reviewed past research relevant to gag prior to 2015, before further characterizing her research.

Dr. Lowerre-Barbieri discussed two studies on gag reproductive potential, which included sampling inside and out of marine protected areas (MPAs) in the northeastern Gulf. The main points covered were: spatial ecology and sex ratios; factors affecting male recruitment; and, sex change, movement, catchability, and connectivity. Dr. Lowerre-Barbieri reviewed a conceptual model showing the gag life cycle, and identified the hypotheses tested relevant to that model. Testing of the first hypothesis, that gag exhibit sex-specific habitat use, finding that males are only really present in waters deeper than 50 meters, with all gag shallower than that only found to be female. Testing the next hypothesis, that gag only spawn north of 28-degrees north latitude, showed that gag do in fact spawn south of that line of latitude, as shown in gag collected from the Sticky Grounds due west of Tampa Bay and Anna Maria Island. When testing whether females exhibit spawning migrations, but males do not, Dr. Lowerre-Barbieri's team found that mean depth at capture differed significantly with gonadal development and age for females, but not males, and that skipped spawning was common in both studies (32%-41% of the time). Dr. Lowerre-Barbieri

said that gonad histology is needed to assign sex, and that pigmentation alone is not always reliable. She added that female recruitment to the spawning population will affect sex ratios, both when there is a strong year class and if there is skip spawning and variable participation in any spawning migrations in any given year.

Dr. Lowerre-Barbieri discussed testing sex ratios, which Heppell et al. (2006) had predicted would return to 15% male in MPAs, and which she found did not exhibit such high male sex ratios (just under 5% male in Madison-Swanson and Steamboat Lumps). Outside the MPAs, in The Edges (a seasonally closed area, closed annually from January - April), no males were captured in the spawning season, and 6.3% males were found in the Sticky Grounds. When testing whether the age at which 50% of individuals will be males (A50), the A50 was found to be older when including the MPAs versus excluding them. Dr. Lowerre-Barbieri's team also found that gag sex-specific size distributions do not overlap nearly as much as other groupers like red grouper; males are exclusively found in the upper portion of the length composition. Also, there does not seem to be the same sort of triggers for sex change for gag as would be expected from red grouper (i.e., if no males are present, the largest female red grouper may change sex to male). When discussing whether gag's mating strategy may be to form spawning aggregations, Dr. Lowerre-Barbieri said that no large-scale aggregations (e.g., four-fold increases in abundance) were consistently observed as they have been for other groupers that aggregate like Nassau grouper. However, she did show one video in which over 40 gag were observed aggregated in April 2023 in Steamboat Lumps. With regard to gag hermaphroditism and testing whether sex change occurs primarily over the spawning grounds, Dr. Lowerre-Barbieri stated that sex change in shallow water was as or more common than on the spawning grounds, but noted the small sample size for these data. She added that males are not needed to spurn sex change, and that sex ratio is not the main driver in gag hermaphroditism. Further, size and age of gag sex change appears dependent on the relative size of others in the social group, with shallow-water transitionals being younger and smaller than those in deeper waters.

Dr. Lowerre-Barbieri next discussed whether fishing effort increases in the fall when temperatures decline, which showed high fishing effort from November through January. The majority of recreational fishing trips sampled occurred in waters less than 50 meters, with 21 – 27% of gag caught in waters shallower than 20 meters during November – January versus the rest of the year, including the February – April spawning season. Dr. Lowerre-Barbieri's ongoing research is sampling estuarine, nearshore, and offshore habitats using remotely operated vehicles to assess seasonal density of gag during different seasons, and dart and acoustic tags to assess movement. Tags will help assess the fate of gag tagged and release in nearshore waters. Dr. Lowerre-Barbieri also noted that analysis of maturity and transitionals sampled in shallow water is on-going. Looking forward, Dr. Lowerre-Barbieri aims to develop best practices for protogynous species.

An SSC member recalled that only 22 transitionals were found in the completed work, and that it was difficult to determine seasonality of transition. Dr. Lowerre-Barbieri added that transition is possible in shallow waters, thus providing evidence against the idea that transition only occurs in spawning grounds. The SSC member also recalled that the Sticky Grounds showed a sex ratio of 6.3% male, which was higher than both MPAs (Madison-Swanson and Steamboat Lumps, but just less than 5% male), and the seasonally closed area (The Edges, 0% male).

Another SSC member discussed how to best inform the stock assessment modeling setup for gag, and how to best inform recommendations to the Council. They thought it could be useful to time block the recruitment parameters in Stock Synthesis (SS), and to fix the gender component within SS as well. If spawners are skipping spawning, that may affect the perceptions of reproductive output and success. Dr. Lowerre-Barbieri said that year class strength is usually examined, which is not always an indicator of long-term reproductive success, and said that was part of the rethinking of the RRP. The SSC member then recalled that transition to male does not seem to occur until after a gag is at least 10 years old; and thus, how rebuilding should be structured was of concern. Dr. Lowerre-Barbieri replied that there is a balance to be achieved between rebuilding quickly and the rate or level of fishing mortality allowed during rebuilding.

An SSC member asked which critical life history facet is not being captured by the stock assessment process. Dr. Lowerre-Barbieri replied that sex ratios must be examined to determine whether there is in fact a sperm limitation. How reproductive success is assessed when a fish is overfished versus rebuilt may be very different. For gag, there may be considerable female biomass before the male sex ratio appreciably improves. Dr. Lowerre-Barbieri added that if there really are so few males, answering whether it was most important to protect the current male population or recruitment to the male population was necessary. Either way, she stated that the current sex ratio of 2% was undeniably too low.

Dr. Tom Frazer (Gulf Council member) asked whether the current sex ratio was an artifact of decades of fishing pressure. He noted photos of past harvests of very large, visually characteristically male, gag, and wondered whether sustained fishing pressure has altered the spatial distribution of gag by sex. Dr. Lowerre-Barbieri replied that there is still much to learn about the sex-specific spatial distribution of male gag. She added that all immature gag are female, all gag in shallow water are females (immature and mature), and that no males have been found in waters shallower than 50 meters. She thought it unlikely that males would be, or would have been, present in nearshore waters prior to the historic increase in fishing pressure. Dr. Frazer asked about the demonstration of a threshold for sex change based on size or age alone. Dr. Lowerre-Barbieri replied that she thought there was much more to what drives sex change in gag than just size or age.

An SSC member thought the historical sex ratios discussed at the beginning of the presentation were less relevant due to differences in sampling strategies, and added that some prior historical work identified sex ratios not dissimilar from those observed today (5-6%). The SSC member also recalled past stock assessments that showed much improved historical recruitment, despite then low sex ratios comparable to today's ratios. Dr. Lowerre-Barbieri replied that future work would be examining oceanographic conditions and their potential linkage to sex ratio, movement, catchability, and connectivity. She postulated that a higher proportion of males may be possible if those males are just not being recovered by the fisheries or by fishery-independent sampling. The SSC member asked about the potential contamination of gag reproductive organs, perhaps from anthropogenic forces like the *Deepwater Horizon* oil spill, and whether any work had been done on that topic. Dr. Lowerre-Barbieri replied that while an oil spill effect may be temporally present, it has not been explicitly detected. She added that her team has observed gag with less healthy gonads, and females with "plugs", whereby the mature female abruptly halts spawning activity due to stress, perhaps including due to being caught by fishing, and may not be able to spawn again for

the rest of that spawning season. She did not think it likely that males would undergo the same response to such stress. Dr. Lowerre-Barbieri added that looking at sperm and egg quality would be interesting to examine for gag.

Effects of Recreational Catch and Release Angling on the Survival of Gag, and Gear and Strategies Designed to Reduce Barotrauma: Dr. Angela Collins

Dr. Angela Collins (Florida Sea Grant) presented on research examining survivorship of gag grouper captured using recreational fishing catch and release methods. The three-year study focused on offshore areas of Tampa Bay, Florida where 90 fish, ranging from 17-32 inches total length, were acoustically tagged. Study results indicated low observed release mortality (<10%) in water depths less than 40 meters, provided evidence of high site fidelity, and illustrated that both barotrauma mitigation release measures (venting or descending devices) resulted in favorable survivorship outcomes when properly applied.

An SSC member asked Dr. Collins about any stakeholder responses to the study results. She replied that most feedback she had received had been favorable. She continued that, while the study results may be expected, empirically documenting how on-the-water practices affect fishing mortality estimates is important and that stakeholders are crucial for helping to understand these linkages. The SSC inquired about the handling time of the study fish. Dr. Collins stated that the handling time was as quick as practicable and that fish were acoustically tagged externally to reduce deck time, which is more reflective of handling on a typical recreational trip than a surgical implementation tagging technique.

An SSC member remarked that nearly all the acute release mortality appeared to be observed within 48 hours. Dr. Collins agreed and continued that an increase in sample size and study duration would help better tease apart some of the possible contributing factors to acute release mortality (i.e., time of year, water temperature, habitat type, water depth, etc.). She also stated that there is an observed increase in release mortality in the summer relative to the cooler temperature months. She has observed that experienced recreational anglers who have been trained to release fish quickly (especially during the summer) and properly vent or descend fish can influence the probability of survivorship of released gag grouper. She suggested that outreach and education approaches may be an effective management tool to mitigate release mortality for gag grouper.

Age-specific Mortality of Gag from Red Tide on the West Florida Shelf: Dr. David Chagaris

Dr. Chagaris (UF) presented an update to his red tide modeling and ecosystem work on gag. Since 2021, a red tide event was recorded in that year coinciding with the Piney Point nutrient-laden water inflow. Following in 2022, a red tide bloom formed following Hurricane Ian off Lee County, and lingered through March 2023 and was largely constrained to nearshore waters. No further red tide has been detected since March 2023. Dr. Chagaris updated the West Florida Shelf (WFS) ecosystem model with these new mortality events, and demonstrated the predicted mortality of age-0 through age-6 gag from 2005 to 2022. Mortality is predicted to be highest on younger fish (i.e., age-0).

Dr. Chagaris discussed future efforts to evaluate alternative spatial extrapolation approaches for mapping red tide. This work is expected to improve mapping and inclusion of effects of red tide into the WFS ecosystem model. Dr. Chagaris has also secured funding to operationalize the WFS Ecospace model, with the overall goal of accounting for red tide when assessing Gulf reef fish species and setting their acceptable biological catch (ABC) limits. Operationalizing the WFS model will require changing satellites to NOAA's Visible Infrared Imager Radiometer Suite (VIIRS), incorporating oxygen and *Karenia brevis* dynamics into a physical biogeochemical model, updating and calibrating the WFS Ecospace model, and then operationalizing WFS for use in stock assessments and catch limit analysis. Dr. Chagaris intends to engage stakeholders to gather local knowledge to complement model predictions and serve as a reality check to model estimates and performance.

Discard Mortality of Gag on the West Florida Shelf: Ms. Beverly Sauls

Ms. Sauls (FWRI) presented trends in gag discard mortality. Florida funds two monitoring programs that capture recreational catch and effort data, including methods used for fish released, length composition, condition of the released fish, areas fished and habitat type. Complementing the regulations in the Gulf EEZ, the requirement to have a descending device rigged and ready was extended to Florida state waters in 2023. Fishery-dependent data suggest that anglers target reef fish on natural hardbottom and artificial reefs, with the highest effort occurring in state waters along the western peninsula. The majority of trips targeting gag took place on natural bottom with 90% of the total catch being regulatory discards. Gag grouper is vulnerable to fishing pressure throughout its entire life history. Juveniles are targeted by recreational catch and release practices on seagrass habitat; sub-adults are targeted in nearshore natural hardbottom by recreational anglers; and, adults are targeted offshore by the recreational and commercial sectors. Recreational gag landings and discards follow two peaks: one in the summer and another in the late fall. Data also suggest the majority of discards occur closer to shore.

The FWRI conducted a fishery-dependent discard mortality study during 2009-2012 to assess the condition of discards by the recreational fishery and estimate the survival rate of discarded gag. The study areas included the Florida Panhandle, the Big Bend area, Tampa Bay nearshore, and Tampa Bay offshore. The use of descending devices was rare and not observed during the study. The majority of tagged gag discards came from Tampa Bay nearshore and were released in good condition. The mean depths of capture ranged between 20 – 30 m. Fish caught offshore or around the Panhandle more frequently required venting. The study reports that gag released in good condition tended to be smaller and caught in shallower depths. Gag caught in deeper waters tended to be in fair to poor condition and were estimated to have a lesser rate of survival. Gag discard mortality in the hook and line fishery was estimated to be 15%. Discard mortality increased significantly with depth. For comparison, SEDAR 10 had estimated as high as a 40% discard mortality.

An SSC member asked if the study compared how many anglers had venting tools in lieu of, or in addition to, a descending device. Ms. Saul noted that the state survey captures those responses for both coasts of Florida, but that no analysis had been performed this time. Ms. Saul also

commented about the summer and all recreational landings peaks. Anglers tend to target what is in season and what meets the minimum size limit- in the summer, being mostly red snapper and gag. Reef fish share similar habitat requirements, so it is expected that more than one species can be caught from a specific site on a single trip.

General Discussion

Dr. Frazer asked, in reference to commercial longline data, what proportion of those trips carry a reef fish observer, and do those observers collect biological data such as sex. An SSC member noted that the NMFS Reef Fish Observer Program coverage is very low, at about 1% of commercial reef trips annually. Dr. Lowerre-Barbieri replied that FWC does work with willing captains to sample gonads from gutted fish, along with animal-specific data about length and weight for each gonad sample. Dr. Frazer noted that some recent longline effort has been thought to be comprised of a higher proportion of males. Dr. Lowerre-Barbieri added that FWC would work with any fishermen willing to preserve gonads from gutted fish. An SSC member also noted a new study underway to examine fin clips from a suite of reef fish species to determine sex.

Review: Possible Management Modifications for Gag and Black Grouper

Council staff reviewed possible management alternatives for a framework action for gag and black grouper. The Council is still considering which actions and alternatives to include, and has requested SSC input on the evaluation of the data included in the document to support these decisions. The Council has outlined the following goals for the management of these species in this document:

What to do about gag grouper?

- Reduce fishing mortality on male gag
- Constrain future harvests to the ACL
- Increase the probability of rebuilding the stock
- Avoid increasing discards
- Reduce vulnerability of gag during spawning to increase spawning success

What to do about black grouper?

- Alleviate misidentification issues

An SSC member asked whether the measures proposed in Amendment 56 were expected to rebuild the stock. Council staff replied that they were; however, the Council was seeking to consider additional measures to achieve these other stated goals, in addition to those from Amendment 56. Another SSC member stressed the science-focused nature of SSC recommendations, and the responsibility of the Council for making the actual changes to management measures.

In discussing the recreational bag and vessel limit, an SSC member thought that neither measure was likely to reduce fishing mortality, and thus would not appreciably affect the probability of rebuilding. Regarding misidentification, the SSC member noted that the issue is likely variable by

region, angler experience, and other factors. Another SSC member noted that available biomass is expected to increase dramatically, and asked about the likelihood of that increase being realized. The Southeast Fisheries Science Center (SEFSC) replied that the revised catch limits constitute a dramatic reduction in fishing mortality, which if realized, should directly contribute to the growth of the biomass over time. The SEFSC asked if a decrease in fishing effort was expected with a decrease in the recreational bag limit. Council staff replied that an appreciable decrease in fishing effort was not expected, due to the "recreational" aspect of this type of fishing, and especially if some retention was still allowed. The SEFSC noted that being able to collect landings was a valuable data source, and important to assessing the species. An SSC member recalled presented research which showed that discard mortality is low for gag caught in waters shallower than 30 meters. The SSC member postulated a slot limit, or some other commensurate measure, for females in waters shallower than 30 meters, could be evaluated. The SSC member also suggested measuring escapement of females from nearshore habitats to offshore spawning grounds. Another SSC member thought that anything that slows down fishing effort might increase the precision of quota monitoring; however, doing so would likely have a cost to the stock in terms of dead discards. The SSC member also discussed other species which would be concurrently open to harvest, and thought managers could look at having the gag recreational season co-occur with species often caught with gag to reduce overall discards.

In discussing the commercial spawning season closure, an SSC member thought there was high substitutability for grouper species, and that it was possible that a shortage of gag could be offset with another grouper species. They also agreed that effort displacement to avoid a closed species has been observed in the past and was plausible to occur in this situation also. Another SSC member asked about the proportion of landings of gag by month, which Council staff replied peak from November through April. An SSC member suggested having a different but equitable vessel limit for for-hire and headboat vessels, as opposed to an equal vessel limit across all recreational vessels. Another SSC member thought it best for the SSC to focus on the objective use of data to evaluate the effects of the proposed measures. An SSC member disagreed, noting the volumes of data presented and available, and the Council's request for assistance in determining which measures would achieve its stated goals for the stock. Some data will not be available until more time has passed, such as daily catch and effort rates with the new recreational fishing season start date of September 1, and discards. No data on slot limits exist for groupers in the Gulf.

The SSC discussed the concepts of sperm limitation and the current versus historical sex ratios. Dr. Lowerre-Barbieri said that whether a fish is a "big fat fecund female", or a male, it is still a considerable contributor to spawning success. She added that age truncation and relative value to the stock's reproductive output should be a focus if increasing production is a goal. She also thought that escapement of mature females (around ages 7-8) to spawning grounds from shallower water habitats would be beneficial to reproductive success, and perhaps also eventually to the proportion of the stock comprised of males.

An SSC member noted that it is not uncommon to rapidly change or add regulations for a species when it is found to be imperiled. The SSC member expressed caution with again adding more regulations to the stock before first observing the effects of the measures already submitted through Amendment 56. They proposed that the Council take a step-wise approach to evaluating the efficacy of the already proposed measures, and then determining what other measures, if any,

may be necessary. Another SSC member thought that no other measure was going to reduce fishing mortality as much as the approximately 80% reduction in the catch limits recently included in Amendment 56.

In revisiting the spawning season closure, Council staff clarified that closing any area for only part of the year was not expected to protect males. Rather, a total closure of an area, as was done with the Madison-Swanson and Steamboat Lumps MPAs, would be necessary to eliminate fishing mortality on males in those areas. Another SSC member added that fishing would be expected to continue for other species for which fishing was allowed; this was validated by the SEFSC via a species correlation analysis. The SSC member thought that due to the current low commercial quota for gag, it was likely that for at least some time, the commercial fleet is likely to treat gag as a bycatch fishery. An SSC member commented about the spatial aspect of closure options, and noted the general lack of enforcement at remote offshore MPAs. The SSC member said that establishing such an MPA, in the absence of effective enforcement, is essentially just telling fishermen where the big fish are. Another SSC member did not think that the proposed measures were likely to achieve the desired outcomes listed by the Council, with agreement from an SSC member in the context that decreasing discards seemed unlikely for the recreational fleets.

An SSC member proposed creating a ranking of the management options presented relative to the expected outcomes of those options for achieving the Council's stated goals. Another SSC member added that characterizing the adaptability of the fleets to changes in regulations would also need to be accounted for. The SSC member also appreciated the inclusion of social and economic considerations, and their applicability to whether and how the Council considers any of the proposed management options for gag. An SSC member agreed that exploring the potential effectiveness of these management options was worth pursuing, noting that only about 10% of the total catch is retained while the remaining catch is discarded. They added that the recreational discards are considerable, and are the main source of mortality in the stock. The SSC member thought the Council should advocate for remote sensing or other capability to fully characterize the scope of recreational effort, both spatially and temporally. Dr. Frazer agreed, and thought applying technology to assess effort was necessary. He added that both effort and discards are continuing to increase in the Gulf. Dr. CJ Sweetman (Gulf Council member) said that the Council did not expect any single action to solve all issues. Capt. Ed Walker (Gulf Council member) added that the SSC's recommendations carried weight with the Council, and that based on the SSC's discussions thus far, he did not think that any of the proposed options were likely to meet the Council's goals.

SSC members discussed the perceptibly low likelihood of constraining the recreational gag landings to the recreational ACL, despite the application of the types of measures proposed by the Council for gag (e.g., recreational bag and vessel limits). SSC members did note that the aggressive reduction in catch limits was likely appropriate, and differentiated the treatment of gag from some past stocks that were identified as overfished by their respective stock assessments. An SSC member recalled the possibility of other options for the Council to consider, like a slot limit for fish in shallower waters, and encouraged the SSC to consider the potential impacts of a measure like that. Another SSC member suggested using current modeling techniques to evaluate the efficacy of a slot limit, such as that used previously for red snapper. Council staff thought that the width of the slot limit would be directly related to its efficacy in allowing for escapement.

They stated that the wider the slot limit, the greater the amount of time a gag would spend being exposed to being selected by the fishery and thus the greater the probability of its harvest and denial of escapement to the offshore spawning grounds. The SSC member thought the width of the slot limit could be explored in the same modeling exercise. Another SSC member pointed out that any measures which cannot be effectively enforced are not likely to be effective in implementation.

Ranking Strategy for Management Options for Gag and Black Grouper

The SSC discussed a ranking strategy for whether the proposed management measures for gag and black grouper were likely to achieve the Council's stated goals for those stocks. An SSC member reminded the SSC about the difficulties of enforcing a slot limit in a single geographic area, and thought that a spatially constrained slot limit should apply universally. Another SSC member thought that a slot limit could also lead to increased discards which, while less consequential in shallower waters, could have negative effects in deeper waters. An SSC member replied that, in general, length limits could be analyzed to determine their effect on escapement of mature females to the spawning grounds. Another SSC member reminded the SSC that when discards are significant in number compared to landings, a slot limit may create a more negative effect on the stock than just a minimum size limit. An SSC member stated that it was unlikely that any of the proposed measures were likely to further reduce fishing mortality, compared to the measures already proposed in Amendment 56. They added that any commercial spawning season closure would be unlikely to be as effective if only applied to a single species, and would rather need to apply to all grouper and associated species to truly be effective. Another SSC member agreed that the 80% reduction in the catch limits in Amendment 56 was likely to have the greatest effect compared to other considered options.

An SSC member thought examination of potential actions against stated goals could be achieved through a management strategy evaluation; however, such an approach would be expected to take considerable time to develop. Dr. Frazer said that adding additional measures, such as a slot limit, would require additional time for analysis and consideration, thereby delaying the expediency with which these measures could be implemented. Another SSC member added that the social and economic factors could be evaluated by the Reef Fish Advisory Panel (RFAP); Council staff replied that the RFAP will have the opportunity to review the same material as the SSC on October 2, 2023. An SSC member stated that the SSC has thus far examined all of the potential measures put before it, which all have costs and benefits associated with them. However, without all of the necessary data to evaluate the strengths and weaknesses of each proposed measure, they thought the SSC was unable to explicitly inform the Council about the best course of action to take for gag and black grouper

An SSC member thought the effect of reducing the bag limit was likely more beneficial than the data suggest due to the prevalence of fishing effort originating from private access points, which go unmonitored for catch. They also proposed setting the upper end of the slot limit at the length at which 50% of sexually mature females transition to male, or approximately 38 inches total length. Discard mortality of larger fish, which would be found almost exclusively in deeper

waters, is expected to be considerable. Dr. Lowerre-Barbieri noted that despite tagging multiple gag in waters exceeding 50 meters, none of those tagged fish have been recovered.

Discussion: SEDAR 94 Florida Hogfish Terms of Reference

Council staff reviewed the terms of reference, noting changes to data inputs and exploration requests. The assessment will evaluate the West Florida and East Florida/Florida Keys stocks; the latter stock is under a rebuilding plan. The Georgia to North Carolina stock of hogfish is a very small component of the total southeastern population, and the data for that stock The SSC did not have any edits to the terms of reference, which will now go to the South Atlantic Fishery Management Council's SSC for approval. Drs. Josh Kilborn, David Griffiths, and Steven Scyphers volunteered for the Data Workshop; Drs. Luiz Barbieri and Steve Saul for the Assessment Workshop; and, Drs. Roy Crabtree, Mike Allen and Luiz Barbieri for the Review Workshop, with Dr. Barbieri volunteering to be the Review Workshop Chair.

Public Comment, September 27

Clay Schidler, Hang 'Em High Sport Fishing, Crystal River:

- Mr. Schidler explained his extensive fishing background, especially for charter trips targeting gag, his years of experience in the Crystal River area, and his charter business model. This was all provided as context for how important gag fishing is to him and his recommendation that he firmly believes lowering the bag limit to one fish per person is the best option to reduce catch and help rebuild the stock. This could also potentially extend the fishing season, ensure the ACL is not exceeded, and improve the male gag ratio.
- He believes a one-fish bag limit would be a beneficial management change but would not severely damage private recreational and charter fishing effort. It's not ideal, but he can still sell charter trips with a one gag limit. He did clarify, when asked about a vessel limit, that anything less than a 6-fish vessel limit would be unfair to charter captains and make it more difficult to sell trips.
- He noted the differences in discard mortality that occur by season and region. Catching and discarding gag in 8 ft. of water can have remarkably different outcomes than catching and discarding gag at depths of 300 ft. or more.
- When asked about the likelihood of individuals returning to private docks landing more than one gag per person, and the possibility of underestimating the fishery, Mr. Schidler stated that there are some who are reticent to give samplers any information because they don't trust it will be used in a proper manner. However, there are others who are more than willing to help collect and provide data.
- Besides targeting gag on his offshore trips, he also targets mangrove snapper, hogfish and yellowtail snapper. When gag season ends, he transitions to targeting mangrove snapper. He would prefer to have a longer season for gag so it alleviates pressure on other species.

Michael Drexler, Ocean Conservancy:

- He doesn't think the current rebuilding plan is sufficient because of all the complex issues within the gag fishery, but appreciates the continued work on gag and the SSC's review. He stressed the importance of the discard issue and that discard mortality is the largest fraction of total stock mortality and there are no checks on discards in the process; the only

time they are accounted for is during the stock assessment. He suggests building discard checks into the process.
- He also suggested this may be an opportune time to change the process to provide more "checks" such as better methods to document sex ratios, monitoring of discards, interim analyses, and ecosystem and/or socioeconomic profiles as monitors, rather than focusing on predictions given the difficulty in predicting shifts in effort.

Brian Lewis, commercial fishing vessel owner, fishes for Frenchy's Seafood:
- He doesn't think the bag limit idea is a "one size fits all" solution for the recreational sector. In light of the already substantial reduction to the catch limits, he advocates to take a measured approach and monitor outcomes since there may be solutions that work well for certain portions or sections of the fishery but not work well for others.
- He reiterated that fishermen are likely the "best science available" and to make use of them to collect data and rely on their expertise and willingness to assist.
- Regarding the gag sex ratio, he thinks more data are needed and offers his assistance to help however he can.

Review: Gulf of Mexico Gag Health Check

Dr. Lisa Ailloud and Dr. Katie Siegfried (SEFSC) presented the 2023 Gulf gag grouper interim analysis (IA), using data through 2022. SEDAR 72 estimated the stock to be overfished and undergoing overfishing as of 2019. This IA for Gulf gag grouper was provided as a "health check" of the stock, since the catch limits for gag grouper were modified via Reef Fish Amendment 56 in June of 2023, but have not yet been implemented.

The IA used data from the Panama City video survey (ages 0-3) and the SEAMAP Reef Fish video survey (ages 3+) through 2021. The video data require substantial processing time, which is the reason for the lag in the available data against the present day. The Age-0 index was updated through 2022, and is also shown to evaluate recruitment signals. The Panama City video survey shows an increase from 2018 to 2019, followed by a decrease to 2020 and 2021. Length composition data are sparse in some years. The SEAMAP Reef Fish video survey also shows an increase from 2018 to 2019, followed by a decrease from 2019 to 2020, and then an increase from 2020 to 2021. All of these years are still estimated to be below the long-term mean (1993 – 2021) relative abundance for gag observed by this survey. Only sparse length composition data are available. The Age-0 index, taken over seagrass and used only to look at recruitment signals, shows an increase from 2018 to 2020, followed by a decrease from 2020 through 2022.

Dr. Ailloud stated that with only two years of data since the terminal year of the assessment, conducting an IA in the typical fashion was not possible, because three years of data are needed. She added that the peaks and valleys in the surveys should be monitored for their effects in successive survey years. An SSC member thought it would be useful to look at the FWRI video survey also, which samples the entire width of the west Florida shelf. Dr. Ailloud said it was not analyzed, because it was not included in the last assessment. The SSC member recommended considering that index also moving forward, regardless of it not being included in SEDAR 72. The SSC member thought that examining all available and applicable data would be prudent for the SSC. Dr. Siegfried asked that the SSC indicate what it expects to see out of an IA, in terms of the data examined and the years of those data that may be available at a given point in time. She

added that a judgement call was made with regard to the FWRI video data, since video processing times have lengthened due to staffing considerations. Drs. Siegfried and Ailloud agreed that the combined video index, coined G-FISHER (a combination of the Panama City, SEAMAP, and FWRI video surveys), was likely to be considered in the next gag assessment.

Another SSC member asked about possible differences between the signals in the Panama City and SEAMAP Reef Fish video surveys, and how the SSC should expect to see these fish move from one survey to the other as they grow in light of their site fidelity at younger ages. The SSC member sought assurance that these surveys were able to capture coverage of the geographic center of biomass for the stock. Dr. Ailloud noted the survey coverages of the two video surveys included, and that the Age-0 index covers the geographic range of gag along the west Florida shelf. Two SSC members pointed out the relationship apparent between the Age-0 index and the SEAMAP index, in which a 3-4 year lag could be observed between the peaks in the Age-0 index and the same peaks in the SEAMAP index. The SSC thought looking at the video data in conjunction with the Age-0 index would continue to be informative. Dr. Frazer thought, and Dr. Sweetman agreed, the Council would like to see annual updates on gag during its rebuilding plan, and thought the Council could work with the SEFSC and FWRI to time the review of the IA to achieve the smallest gap between the terminal year of data and present day. He also agreed with other SSC members about examining whatever pertinent data could be made available. An SSC member noted that it might be acceptable to just do video counts of gag and forego length composition analysis for expediency, if the SSC thought the count information alone would suffice for this purpose. Another SSC member added that a contractor has been secured to use artificial intelligence to automatically analyze the video data; however, this project is in its infancy, and the SSC will be kept apprised.

Dr. Frazer asked whether the indices observed corroborate the hypothesis of sperm limitation. Dr. Lowerre-Barbieri replied that there simply are not enough males in the population to fertilize the eggs of all the mature females, as is evidenced by the probability of skipped spawning (32 – 41%). She added that the thinking should orient around reproductive success and reproductive value at age, and that these much larger fish are really the more important components of the reproductive issue with the stock. She thought less emphasis was needed for year classes specifically, and more emphasis on protecting the large and valuable contributors to the stock's spawning potential. An SSC member postulated that juvenescence may be an issue for the stock, in that mature females are not making it to the spawning population, perhaps due to fishing pressure. If 50% of sexually mature females don't transition to male until at least age-10, and the mean age of gag in the stock is approximately age-4 or 5, then a shortage of males, and by extension sperm, could be expected. The SSC did not expect the stock to recover to a sex ratio of 32% males, as estimated for the virgin biomass. An SSC member cautioned against evaluating sex ratio without expansive geographic and temporal sampling, both during and outside of the spawning season, due to the geographic sexual segregation of gag discussed in the previous presentations.

The SSC agreed that the 2023 gag IA was properly conducted using the appropriate methods for the stock, and thought that the stock status (overfished and undergoing overfishing) from SEDAR 72 remains unchanged as of 2021. In the future, the SSC would like to also see the FWRI video index presented along with the aforementioned indices.

Review: Vermillion Snapper Interim Analysis

Dr. Francesca Forrestal (SEFSC) provided results of an interim analysis (IA) for vermillion snapper which was informed by the G-FISHER combined video index. In order to calculate 3- and 5-year moving averages to compare to the reference period starting in 2018, projections from SEDAR 45 were converted to MRIP-FES to be directly comparable with the SEDAR 67 interim period. Data from the G-FISHER index was available through 2021 and variability in the index was relatively high beginning in 2016. This resulted in a 3-year average of that was higher but a 5-year average that was lower than the reference period. The IA did not result in abundance estimates markedly different from projection results generated from SEDAR 67.

The SSC and SEFSC agreed that the variability in the video survey was likely attributable to the behavior of vermillion snapper as a highly motile schooling species. Several SSC members expressed some hesitancy in recommending catch advice informed by an IA with a highly variable index. SEFSC staff replied that, while the index was variable, the methodology used in the IA was consistent with previous projection analyses for vermillion snapper. Several SSC members stated that the results of the IA incorporated more contemporary fishery-independent information and advised that the SSC consider new catch recommendations for vermillion snapper based on the results.

The SSC was informed that approximately 36% of the vermillion snapper ACL had been harvested to date and the SSC inquired as to why harvest had been well under the ACL since 2018. An SSC member postulated that the species reaches maturity quickly, has been unencumbered by regulations, and an effort shift to vermillion snapper from other species had not been realized. SEFSC echoed those thoughts and emphasized the high productivity of the stock as a reason for its observed robustness to harvest. The SSC discussed the merits of considering the presented catch advice associated with the 3- and 5-year moving averages. The SSC reached a consensus that a 5-year average would be advantageous as it includes more years of data, represents years where no abnormal episodic mortality event was observed, and had been used in the previous vermillion snapper catch recommendation.

The SSC discussed whether to provide catch advice based on the results of the IA. Some members contended that using the most recent analysis to update catch advice was prudent. Others stated that the IA did not illustrate a significant change from what had been recommended previously and implemented in May 2023. To date, no comprehensive assessment for vermillion snapper is included on the SEDAR schedule. The current catch advice for vermillion snapper has been recommended to 2025 and any update to the advice would not be implemented until then. Council staff indicated that an IA can be requested from the SEFSC at any point and that the objective of the IA approach is to complete the analysis quickly for SSC consideration.

The SSC agreed that the IA presented by SEFSC staff was properly conducted and scientific defensible. However, given the resulting catch limits using the 5-year average was likely not statistically significant from the codified catch limits and the index did not indicate any stock abundance trend deviation from SEDAR 67. After proffering a motion to consider modifying the

catch advice, the motion ultimately failed, and the SSC decided not to recommend updated catch advice for vermillion snapper. The SSC requested the failed motion be included in this summary:

> **Motion: The SSC accepts the 2023 vermilion snapper interim analysis as consistent with the best scientific information available. The SSC recommends the OFL at the estimated 5-year average in FES units at 5.805 million pounds whole weight and the ABC at the estimated 5-year average in FES units at 5.049 million pounds in whole weight.**
>
> *Motion failed 4 – 16, with 4 absent.*

Review: Southeast Region Best Scientific Information Available Framework

Dr. Jack McGovern (Southeast Regional Office [SERO]) detailed the development and features of the proposed framework for evaluating the best scientific information available in the southeastern US. This framework has been under development by the SERO, SEFSC, and Gulf and South Atlantic Council staff as a more refined best practices document suited for the Southeast that was required after the National BSIA Document[1] was released. An SSC member asked whether only a full stock assessment could be deemed consistent with BSIA, and not some other analytical product. NOAA General Counsel (GC) replied that an analytical product, stock assessment or otherwise, would be able to be deemed consistent with BSIA in reference to a specific purpose for a conservation and management recommendation to the Council and NMFS. Another SSC member asked about a scenario when an analytical product is deemed consistent with BSIA, but not suitable for management. NOAA GC replied that a more nuanced approach should first be considered, as the analytical product could likely be used to inform something about how management is operating for a species. They added that if a presented analytical product is not considered consistent with BSIA, then another product should be available for consideration. If another is not, then by virtue of a lack of options, the only analytical product is in fact BSIA. Ultimately, the determination of BSIA is a policy determination that is the responsibility of the Secretary of Commerce.

An SSC member asked about an instance if the SSC did not think an analytical product to be consistent with BSIA, but the SEFSC disagreed. Dr. McGovern said that the SEFSC would, with feedback, ask the SSC to reconsider its opinion about that analytical product in the context of the purpose of that product for conservation and management measures. NOAA GC noted that the record should clearly show a rational path to the decision to use, or not use, an analytical product for management. The SSC member recalled that National Standard 2[2] states, "SSC scientific advice and recommendations to its Council are based on scientific information that the SSC determines to meet the guidelines for best scientific information available as described in paragraph (a) of this section." NOAA GC replied that the NS2 guidelines help determine the process of peer review for determining consistency with BSIA.

[1] https://media.fisheries.noaa.gov/dam-migration/01-101-10.pdf
[2] https://gulfcouncil.org/wp-content/uploads/11b-MSA-NS2-50-CFR-600.315-up-to-date-as-of-9-11-2023.pdf

The SEFSC asked about the determination of stock status and maximum sustainable yield (MSY) proxies, and under whose authority those decisions were made. NOAA GC replied that stock status was required to be reported to the US Congress by NMFS. Without a proxy for MSY stated in the FMP, NMFS would be required to provide a value for MSY. In the Gulf, a value or proxy for MSY is provided in each FMP. Typically, the Council received input from its SSC with regard to the appropriateness of current and/or recommendation(s) for revised or new proxies or values for MSY. Council staff reviewed the specific language from the Magnuson Stevens Fishery Conservation and Management Act[3] which specifies the responsibility of the Council, or the Secretary, to assess and specify MSY in each FMP. The SSC noted that many of the "if, then" sorts of statements in the proposed BSIA framework were to ensure a process to address contemporarily uncommon disagreements between the SSC/Council and NMFS.

Dr. McGovern would like to incorporate any additional comments from the Gulf SSC by October 6th, prior to his meeting with the South Atlantic Council's SSC.

Incorporating Social Science Theory and Methods into Ecosystem Assessments

Dr. David Griffith gave a presentation on incorporating social science theory and methods into ecosystem assessments. Dr. Griffith stated that the increased relevance of integrated approaches to fisheries management has heightened the importance of incorporating theory and methods from social sciences and the humanities, e.g., anthropology, economics, and sociology. He noted that the SSC has received presentations on approaches placing fish and habitats into wider biological and socioeconomic contexts. These presentations addressed ecosystem analyses, agent-based modeling, and management strategy evaluation.

Dr. Griffith discussed the integration of social sciences into scientific modeling and noted that the full range of social scientific data, methods, and theory are not typically considered in stock assessments and other fisheries management issues. Dr. Griffith noted that scientific models about the natural world, including ecosystems, are based on systems theory, i.e., the idea that systems transmit energy across different trophic levels and respond to energy levels and shocks with feedback loops that serve to regulate the system. He further noted that systems are rarely as closed as they are represented in most systems theory models. Dr. Griffith proceeded to discuss and provide illustrative examples related to social scientific data and methods including assessing the lay of the land (overview methods), conventional methods such as interviews, focus groups, and surveys; less conventional methods such as social network elicitation and cultural consensus analysis; converting qualitative data into quantitative data by creating indices such as dependence and vulnerability indices; and, modeling. Dr. Griffith noted that the most helpful social scientific theories are those that place human behaviors in wider social and cultural contexts, just as ecologists place fish and trophic exchanges into their wider ecosystems.

The SSC asked about the contributions expected from the collection of the types of data and information presented. SSC members further inquired about the main issues and areas in which these types of information and data would be most useful in impacting the deliberations of the

[3] https://media.fisheries.noaa.gov/dam-migration/msa-amended-2007.pdf

SSC. Dr. Griffith replied that timely and systematic data collection programs and syntheses of data collected would be very informative to the SSC process. Dr. Griffith added that, for example, interviews with fishermen and their inputs relative to fishing effort and areas fished, and constraints relative to their ability to fish could be utilized to inform stock assessments. SSC members noted that social science data and analyses could be more prominently included in the Council process but social information is not routinely collected in some regions. The SSC noted that more funding and support for this kind of work is needed. SSC members emphasized the need to consider the inputs from economics and other social sciences. The SSC asked whether the types of data and information presented could be used to make predictions when considering fisheries policy changes. Dr. Griffith replied that historical analyses can inform future behavior. The SSC noted that long term funding opportunities are limited because research funding is usually reactive to present needs.

SSC members also asked about methods used to weight the various components included in determining the dependence index presented. Dr. Griffith indicated that for the Puerto Rico dependence index presented, weights were based on a subjective understanding of what was important in Puerto Rico. Weights were determined by consensus between the principal investigators following several months of field research. Dr. Griffith added that this index was developed to inform the location and size of marine protected areas in Puerto Rico. The SSC noted the challenges associated with relating some social indexes to measurable impacts. For example, assigning weights to different social indexes in allocation decision making. An SSC member indicated that there are quantitative approaches to developing indexes based on surveys. The SSC noted that similar challenges exist when attempting the inclusion of environmental considerations in stock assessments.

Review: Lane Snapper Updated Catch Analysis

Dr. Forrestal presented the 2023 Gulf lane snapper catch analysis, using data through 2022. Gulf lane snapper is currently evaluated periodically using an index-based method from the NOAA Data Limited Toolkit (iTarget). The data included use only landings and dead discards, and not live discards. The iTarget approach here used the catch-per-unit-effort (CPUE) index for the headboat fleet, and compares the reference period (1999 – 2008) against a more recent period (2018 – 2022). In the most recent time period, the CPUE index appears to have declined somewhat, but remains above that shown in the reference period. The OFL is currently set at the 50^{th} percentile (OFL = 1.053 mp ww), and the ABC at the 30^{th} percentile (ABC = 1.028 mp ww). The 2023 lane snapper IA indicates a possible increase the OFL to 1.116 mp ww, and the ABC to 1.088 mp ww, under the same parameters, despite a generally consistent index.

An SSC member asked whether there would be another model-based assessment in the near future for lane snapper. Council staff replied that no assessment was scheduled, nor could one be without removing another species from the schedule. The SSC discussed the possibility of conducting another type of assessment, and thought that it was unlikely that the data supported a model-based approach. Another SSC member asked about evaluating discards and length compositions, in conjunction with the analysis presented. Dr. Forrestal replied that those data were not presently available. Ms. Sauls added that FWRI collects lengths of retained catch and discards, and could examine those data. The SEFSC noted that the headboat CPUE index was considered most

representative at the time of SEDAR 49 (2017)[4], and thought it possible to reconsider which index might be most representative of the stock. The SSC thought modifying the catch advice for lane snapper in this manner was appropriate, as it was in keeping with past practices for this stock.

Motion: The SSC recommends to update catch advice for lane snapper using the 2023 SEDAR 49 interim analysis. The OFL is 1.116 mp ww (in MRIP-FES data units). The ABC is 1.088 mp ww (in MRIP-FES data units).

Motion carried with one opposed.

Public Comment, September 28

Michael Drexler, Ocean Conservancy:

- He reiterated that the projections, whether ACL or rebuilding, are entirely conditional on the fleets operating and discarding the way they have been in recent history and it is unlikely that operations will remain the same, in light of recent actions. He urges the SSC and Council to examine discard behavior and total mortality on an annual basis so that the rebuilding plan remains on track.
- He appreciated the discussion on incorporating socioeconomic indicators into fisheries management and pointed out a presentation provided by Dr. Andrea Chan (NOAA OST) and its recommendation of including social indicators into environmental and ecosystem profiles to inform management decisions. He also pointed out the use of a large-scale annual health survey (Behavioral Risk Factor Surveillance System), specifically the Industry and Occupation module, to garner information on demographics in various fishing industries.

Other Business

No other business was brought before the SSC.

The meeting was adjourned at 4:30 pm eastern time on September 28, 2023.

[4] https://sedarweb.org/documents/sedar-49-final-stock-assessment-report-gulf-of-mexico-data-limited-species/

Meeting Participants

Standing SSC
Luiz Barbieri, *Vice Chair*
Harry Blanchet
David Chagaris
Roy Crabtree
Doug Gregory
David Griffith
Paul Mickle
Trevor Moncrief
Will Patterson
Dan Petrolia
Sean Powers
Steven Scyphers
Jim Tolan

Special Reef Fish SSC
Jason Adriance
Mike Allen
John Mareska

Special Ecosystem SSC
Mandy Karnauskas
Josh Kilborn
Steven Saul

Special Socioeconomic SSC
Luke Fairbanks
Cindy Grace-McCaskey
Jack Isaacs

Council Representatives
Tom Frazer
CJ Sweetman

A list of all meeting participants can be viewed here.