Standing, Reef Fish, Socioeconomic, Shrimp, and Ecosystem SSC Meeting Summary May 2 – 4, 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 May 2, 2023. The agenda for this meeting was approved along with the minutes from the March 2023 SSC meeting. Verbatim minutes from past SSC meetings can be reviewed here.

Mr. John Mareska will represent the SSC at the Council's June 5 – 8th, 2023, meeting in Mobile, Alabama.

Report from the MRIP Transition Team on Red Snapper and Other Species in Gulf State Supplemental Surveys

Dr. Richard Cody (Office of Science and Technology) provided background and an activity update for the various Marine Recreational Information Program (MRIP) Transition Teams' progress on recreational survey calibrations. The update also included an April 2023 Council motion that requested a collaborative effort to help identify the universe of private recreational anglers in federal waters. The Gulf Surveys Research Planning Team (GSRPT) discussed the Council motion and identified the Gulf States Marine Fisheries Commission's (GSMFC) Technical Coordinating Committee as an appropriate group to be briefed and requested that group provide insights on this initiative at its October 2023 meeting.

The SSC discussed the presentation relative to the ongoing red snapper stock assessment (SEDAR 74). Several members inquired as to the completion timing of various pilot studies investigating non-sampling errors in several surveys, the draft Gulf Transition Plan short-term objectives, and whether those results would be available for incorporation in the red snapper Operational Assessment (OA), scheduled for 2024. Dr. Cody and a member of the GSRPT indicated that it was unlikely all studies would be completed by that time. However, any results of these efforts available in the fall could be used to inform discussions during the red snapper OA process.

Several SSC members requested an update on if a determination had been made on the inclusion of Texas red snapper recreational landings in the OA. At the Research Track Data Workshop, the recreational data group discussed the merits of whether including Texas red snapper recreational landings as is, or using an adjustment to MRIP-FES (multiplier of 11) based on one-year of federal survey overlap, would be appropriate. Dr. Cody stated that independent statistical consultants had recommended the adjustment since they interpreted the Texas survey as an index as opposed to a probability-based approach for estimating landings. A member of the Assessment Development Team (ADT) indicated that no determination had been finalized yet but acknowledged that the issue needed addressing. The ADT member further inquired whether a representative from Texas was present at the most recent GSRPT meeting. Dr. Cody indicated that the Texas representative was unable to attend the meeting but that member would be briefed by the GSRPT chairs.

An SSC member asked about the proposed modification from two-month waves to producing cumulative estimates and requested a presentation on the topic. Dr. Cody indicated that could be accomplished and Council staff stated that such a presentation could tentatively be scheduled for the July SSC meeting. Dr. Cody added that an update presentation on this modification will be presented at an upcoming Northeast Fishery Management Council meeting.

An SSC member expressed concern about the inherent complexity of calculating survey calibrations. They thought the decision-making processes regarding resolving potential conflicting pilot study results or assessing which survey may be more appropriate for use was not explicit. Dr. Cody indicated that individual data collection programs were not considered as best scientific information available (BSIA) by NMFS; rather, the wholistic determination of including data into an analysis would be considered consistent with BSIA. He continued that he did not anticipate any major conflicts between pilot study results since they were narrowly focused to address survey-specific questions. He further stated that another goal of the pilot studies was to identify ways to make improvements without altering the survey design to the point of disrupting the survey.

An SSC member asked if the GSRPT had identified any research prioritizations that could be quickly accomplished, and Dr. Cody responded that some could. Some examples included how survey question organization and design may affect estimates. These investigations require minimal data to test and are fairly easy to run. Another SSC member asked if private recreational data from all surveys would, at some point, be made available publicly. Dr. Cody answered that the GSMFC is working towards creating a warehousing database to achieve that goal.

An SSC member recommended that the Gulf Transition Plan include considerations for integrating findings from the plan directly into stock assessments. At the moment, the Gulf Transition Plan only considers red snapper and gag grouper, but it is likely other species may be included. The SSC member added that as this Transition Plan continues, it would be helpful to have a set of reference points that could be used to inform decisions on what data sources could be used.

Evaluation of Interim Analysis Process

Mr. Ryan Rindone (Council Staff) and Dr. Katie Siegfried (Southeast Fisheries Science Center [SEFSC]) presented the interim analysis process (IA), and addressed previous questions posed by the SSC at its January 2023 meeting. Dr. Siegfried noted that the headboat catch-per-unit-effort index is used as part of the NOAA Data-Limited Toolkit for lane snapper and takes a similar amount of time as an IA; however, the SEFSC prefers to use a fishery-independent index of relative abundance for traditional IAs. She added that the SEFSC would be interested in the sorts of data the SSC would like to consider alongside the IAs for providing more context and perspective when evaluating an IA.

An SSC member liked the idea of adding information to the IAs, like catch-at-length and fishery-independent data on length to garner a more complete understanding of the recent changes to the demographics of a stock. Doing so may reveal information about recruitment and movement of cohorts as they age and are selected by different fleets. The SSC member asked whether Stock Synthesis (SS) is re-run for any of the IA health checks, and whether SS can be re-run with only

updated catches. Dr. Siegfried replied that a health check uses an index-based management procedure (MP), rather than a re-run of the last SS model for the species. She added that catches can be added and re-run, but discards are typically assumed constant. The SSC member noted the SSC having previously modified catch limits using the IA, and added that they wanted to be mindful of the additional data requested for evaluation such that the analytical work did not evolve into a full stock assessment. The SSC member asked for recommendations about best practices from the SEFSC moving forward, regarding how to use the IAs. Dr. Siegfried replied that it can take a considerable amount of time to complete a stock assessment, and the results of an IA may be equally informative in the short-term. Long-term, there are expected limitations regarding carrying forward assumptions from the last stock assessment.

An SSC member said there was a disconnect between the IAs and the last stock assessment, and thought that adding more data streams would be a marked improvement. The SSC member said that whatever data that were available when the work was started could be updated, and assumptions about the remaining data made based on the previous assessment, similar to what was done with the last yellowtail snapper IA. They thought continual improvement to tie the IAs back to the stock assessments was a worthy goal, and would improve the quality of the advice that could be offered to management. An SSC member replied that feedback to the SEFSC should be provided to outline the data that would be updated as part of this expanded approach, such as length compositions by fleet, and any indices of relative abundance for which the data are available. Dr. Siegfried recognized that relying on an index that hasn't been tested by a management strategy evaluation (MSE) does have its risks; however, acknowledging those limitations, there are still ways to provide useful advice based on the IA tool. She said that updating key parameters was possible, and planning of when these analyses would be expected and automation efforts to improve efficiency would be key. Dr. Siegfried added that the SEFSC is currently working on these initiatives, and would benefit from SSC feedback on the sorts of data to prioritize for updating. She also said that testing this MP with an MSE would answer many of the outstanding questions about the validity of the assumptions inherent to the use of a fishery-independent index to scale catch up or down.

Council staff described the last red grouper IA, and how the NMFS Bottom Longline (BLL) index appeared flat, while catches from directed fleets that typically select for smaller fish than the BLL were increasing in the last few years (the latter was not included as part of the red grouper IA). This illustrated a disconnect between the landings and the index. Council staff thought it would be of interest to consider how to mimic or replicate the estimation of certain factors from the stock assessment to better inform some of the outstanding assumptions. An SSC member agreed that pulling dynamics from the assessment into the IA was an interesting approach to consider. Another SSC member remarked on the concept of using the correct tool for the advice required, in that it is not always necessary to have to completely update a stock assessment, and the proposed modifications to the IA process would be expected to yield a more valuable analytical tool.

An SSC member thought a presentation from the SEFSC on the intricacies of the IA would be helpful, including the expected effects of proposed changes to data inputs on IA outputs. Another SSC member thought a tiered approach to the analytical product requested might be useful. They described examining the index for trend, and if that trend differs from that observed in the stock assessment in a manner that was not expected, then additional data would be evaluated and linking

those estimated to the inertia from the last stock assessment could be performed to garner a better understanding of what is occurring with the stock.

An SSC member asked about the status of automation efforts, particularly for the main indices of relative abundance. Dr. Siegfried replied that the NMFS BLL is available in the same year in which the survey is conducted as a result of the automation efforts. However, video data still require considerable processing time. Dr. Siegfried added that artificial intelligence may be able to be used to evaluate video data in the future to identify certain species like red snapper, but this advancement is still currently theoretical. The SSC member replied that recreational age composition data are continually evaluated by some states, and constitute a voluminous amount of processed data that could be made available. Dr. Siegfried asked to be put in touch with those with these data. The SSC member added that the usefulness of these data may depend on the species.

The IAs are requested by the Council in coordination with the SEFSC or Florida Fish and Wildlife Research Institute (FWRI), outside of the SEDAR process. An SSC member thought health checks could be done for higher priority species to monitor stock health; however, doing so may artificially prolong the life of a stock assessment at the cost of completing a new stock assessment. The SSC member also asked about using the Council's *Fishermen Feedback* tool to evaluate general stock health for multiple species. Council staff replied that although the tool had not been deployed in that way, it certainly could. However, the Council tries to be cognizant of how often the *Fishermen Feedback* tool is deployed so as to not weary stakeholders. Another SSC member asked if throughput could be resolved by adding additional staff. Dr. Siegfried noted that the SEFSC has worked to identify bottlenecks, which has been an impetus for the automation efforts. She added that the SEFSC tries to continually describe to the Council and other cooperating partners all of the work in which the SEFSC is engaged at any point in time, and that this constant communication is key to how nimble and adaptive the SEFSC can be to Council requests.

An SSC member agreed that the IAs should be pursued in a tiered process based on the evaluation of the index, along with the integration of additional available data whenever possible. Another SSC member thought that ecosystem status reports for multiple but similar species may be equally informative as an IA health check. An SSC member asked if the SEFSC could, in September 2023, provide a table detailing the time requirements for consideration of additional data and levels of analysis for the IA, and "interim-plus", options. Dr. Siegfried said that such a table could be produced for the SSC's September 2023 meeting, as could a breakdown of assumptions about the precision and reliability of catch advice when updating the overfishing limit (OFL) versus the acceptable biological catch (ABC). She added that prioritizing the sorts of data the SSC wants to see would be most informative for the SEFSC.

Council staff discussed process following receiving updated catch advice. For a stock that is healthy, changes in catch limits would be expected to be minimal, and proportionally, only small increases in the ABC would be expected to be possible without also having to modify the OFL. This would be expected because the buffer between the OFL and ABC for a healthy stock would be expected to be smaller. Conversely, for rebuilding stocks, changes in spawning stock biomass (SSB) and other factors might more regularly result in modified catch advice, and the larger buffers between the OFLs and ABCs for those stocks might allow for updating an ABC for a rebuilding stock without modifying the OFL. Dr. Tom Frazer (Council representative) thought the

IAs have a role, and to avoid conflating IAs with stock assessments because of the differences in time, resources, and data between the two analytical products. If the data suggest there may be a reason to evaluate the condition of a stock, then an IA (or "IA-plus") could be completed; however, he expected there may be less consistent throughput of stock assessments in the long-term. Dr. Frazer prioritized stability and simplicity in management. An SSC member commented that things like constant catch recommendations could provide both stability and simplicity. Dr. Frazer replied that it would be useful for the SSC to identify the sorts of triggers which may require evaluation of current management measures to address observed changes in a stock, be it through fishery-independent or fishery-dependent data streams. He emphasized avoiding reacting too quickly to what are essentially minor observed changes or typical interannual variation in an index. Another SSC member asked whether the Council or SSC would be the one to initiate the exploration of a harvest control rule (HCR). Council staff replied that the initiation for an HCR would come from the Council, with Council staff soliciting the Southeast Regional Office (SERO) and SEFSC for data to consider when evaluating the proposed HCR(s). Further, the Council will need to be goal-oriented and clear in its expectations for the purpose and performance of the HCR.

Review of Queen Snapper, Silk Snapper, and Blackfin Snapper Landings and Catch Limit Consideration

Council staff provided an overview of the mid-water snapper (MWS) landings and catch limits and reminded the SSC of the outcomes of their previous discussions on this complex. The SSC recommended removing wenchman from the MWS complex, leaving blackfin snapper, queen snapper, and silk snapper in the complex, which are all considered rare-event species. Potential options for setting a new OFL and ABC for the MWS complex, excluding wenchman, includes using Tier 3a or 3b of the ABC Control Rule. Additionally, landings will need to be updated from the legacy Marine Recreational Fisheries Statistics Survey to current MRIP-FES units.

The SSC reviewed MWS aggregated landings data to identify a reference period for Tier 3. High landings of wenchman in 2020 and 2021 led to the MWS complex ACL being exceeded in those two years; there was also an anomalous spike in landings in 2009 attributable to silk snapper that seemed dubious to the SSC. Based on the options available, an SSC member remarked that the ABC Control Rule needs to be redone because of the risk analysis associated with each option. Another SSC member noted that the ABC Control Rule will be revisited at the July SSC meeting. The SSC agreed that the 2009 landings are not plausible; however, landings across the 2011 – 2021 time period seemed consistent. The SSC questioned whether landings spikes and apparent abnormalities should be revisited or averaged. Council staff responded that there are constraints on the data due to confidentiality issues and that the proportional standard error (PSE) for the 2009 landings was near 100%. An SSC member noted that current MRIP procedures have methods to evaluate highly influential data points, and asked if such procedures could be used to evaluate the 2009 silk snapper estimate. Data issues also arose due to the MWS complex being considered rare event species in MRIP, usually incidentally caught, and with overall little information available on the species, so stock assessments cannot be conducted. An SSC member provided rationale for a motion stating that use of Tier 3a is sensible to set the OFL and ABC for the MWS complex, excluding wenchman, since landings data are limited and management intervention will only be needed if there's a drastic change in the fishery.

Motion: The SSC recommends using Tier 3a for setting the OFL (mean + 2*SD) and option A for the ABC (mean + 1.5*SD) for the mid-water snapper complex, excluding wenchman, with both to be converted to MRIP-FES units. The reference period used for landings is recommended to be 2012-2021.

Catch Level	Pounds whole weight
OFL	107,904
ABC	96,689

Motion carried with no opposition.

Review of Black Grouper and Yellowfin Grouper Landings and Catch Limit Consideration

Council staff reviewed the landings for black grouper and yellowfin grouper. Both species are part of the shallow-water grouper complex and, due to being data-limited, do not have a stock assessment. Given that the SSC has already recommended an OFL and ABC for scamp and yellowmouth grouper (the other two species within the shallow-water grouper complex), the SSC debated whether to provide catch limit recommendations.

An SSC member asked if the Council had requested to remove scamp and yellowmouth grouper from the shallow-water grouper complex, given that these species have a stock assessment. Staff responded that the SSC could provide recommendation based on the scientific data available and the management options would include: deciding whether to separate the shallow-water grouper complex (which would have management implications), or take no action (which means not using the SEDAR 68 stock assessment to make catch limit recommendations). Dr. Frazer also mentioned that, given the large amount of data on scamp, the Council would like to see what the options are based on available data and whether to modify the shallow-water grouper complex.

The SSC also discussed the life history of black grouper, which reach maturity at a later age and size (50% maturity at approximately 34.5 inches total length) than the rest of the species in the complex. An SSC member was concerned about the stock status given the decrease in landings, and because the minimum size limit (24 inches total length [TL]) is smaller than size-at-maturity. Another SSC member asked if the decrease in landings could be related to effort and the size of the fleet. Staff responded that a reef fish permit moratorium went into effect in about 1990 (later corrected to 1992), which could affect effort. Thus, the numbers of vessels targeting black grouper would have to either remained static or decreased.

The SSC also requested feedback from a fisherman in the audience who said that the declining trend in black grouper landings showed during the meeting is not reflective of what the fishing community is seeing in south Florida waters. The fisherman also noted not seeing a decrease in the size of black grouper being landed, and that these black grouper are being landed on vertical line, rod and reel, and with spearguns from Tampa Bay to south Florida. The fisherman also noted that black grouper were being landed in soft bottom, and not necessarily on coral habitat.

Although quantitatively it appears that scamp could be used as an indicator species, some SSC members thought the difference in the biology between the species could be troublesome. The SSC also referred to the SEDAR 48 Data Workshop on black grouper, which determined that the data were insufficient to perform a stock assessment. An SSC member asked about the best approach to provide management advice given declining trend in the black grouper landings data. They noted that other fisheries with similar trends have been closed due to concerns about the status of the stock. Another SSC member provided background information explaining the concerns with the lack of confidence in black grouper historic data. FWRI wrote a letter to the SEDAR Steering Committee requesting the black grouper stock assessment process to stop due to historic black grouper landings data being questionable.

An SSC member expressed concern as to how one fisherman saying that there is no issue with black grouper had such an effect on changing the SSCs stance. Staff responded that this would be a perfect opportunity for deploying *Fishermen Feedback*. Staff also provided examples of additional public comments expressing favorable observations about the status of the black grouper stock. Another SSC member noted that FWRI's data do not show juvenescence, which is usually an indication of a stock crashing.

> **Motion: The SSC discussed the shallow water grouper complex with potential for providing OFL and ABC catch advice. Previously the SSC has provided catch advice for scamp and yellowmouth grouper, leaving black grouper and yellowfin grouper within this complex for consideration. Given a lack of fishery independent data available as well as very high uncertainty in the landings data for black grouper and yellowfin grouper, the SSC recommends additional fishery independent data sources be examined for the next stock assessment. The SSC recommends using Tier 3a for setting the OFL (mean + 2* SD) and option A for the ABC (mean + 1.5 *SD) for the black grouper and yellowfin grouper, with both to be converted to MRIP-FES units. The reference period used for landings is recommended to be 2010-2021.**

Catch Level	Pounds gutted weight
OFL	359,255
ABC	307,752

> *Motion carried 12 – 4 with 1 abstention and 4 absent.*

A Gulf of Mexico Ecosystem Model to Support Fisheries Management

Drs. Skyler Sagarese and Holden Harris (SEFSC) presented research efforts to support ecosystem-based fishery management (EBFM) with a U.S. Gulf-wide Ecosystem Model (GWEM). Dr. Sagarese described the Ecopath and Ecosim components of the model and its recent applications for assessing ecological reference points. Dr. Sagarese described the three components of their approach, which uses Ecopath (ecosystem snapshots), Ecosim (temporally dynamic), and Ecospace (spatially dynamic). She noted that their Gulf-wide model builds upon previous models to: focus on federally- and internationally-managed species on matching spatial scales; include statistically-derived, more comprehensive definitions of species interactions; and, model bycatch removals

from the menhaden reduction fishery and large-scale fisheries. Over 1,900 diet observations were combined to characterize diet compositions by subsetting observations that were weighted by area, with bootstrapping and Dirichlet distributions fit to prey groups. Next, species composition and the proportion of retained bycatch for the menhaden purse seine fishery were used to infer bycatch. Dead discards (i.e., retained landings) were allocated based on percent by weight in the bycatch.

Dr. Sagarese detailed recent model development, including funding from the NOAA RESTORE program. The goal of this portion of the project was to integrate information on ecosystem stressors and predator-prey interactions into the assessment and management of Gulf fisheries. The current model has 78 functional groups, 12 commercial fleets, and 4 recreational fleets. The model uses 160 input time series, including biomass, catch, fishing mortality (F), and fishing effort from SEDAR, SEAMAP, ICCAT, and NOAA landings. The model fits to stock assessment model outputs when possible. Dr. Sagarese described differences in fits among models, noting that goodness of fit was not necessarily correlated with the comparative degree of data richness for a species. However, she noted that some data may benefit from further evaluation. Dr. Sagarese described modeling of fishing mortality at maximum sustainable yield (F_{MSY}), which differentiated between fully compensatory estimates by species, stationary estimates, and those derived from the stock assessments. F_{MSY} was estimated from the Gulf-wide Ecopath with Ecosim model compared to single-species stock assessment estimates or proxies for key Gulf menhaden predators. Each ecological reference point was described by a trade-off plot, with ratios of each scenario's biomass relative to the target biomass (B_{Target}) for menhaden predators as a function of the variation in fishing mortalities for Gulf menhaden and its predators. The key takeaways were that the tool could be used to address a number of ecological questions, and how B_{Target} could be achieved for a given predatory group, by modifying menhaden and/or the group's fishing pressure. Based on this relationship, ecological reference points (ERPs) were established. Outstanding model needs include: incorporating spatial components such as species overlap and bycatch (EcoSpace is not currently implemented in the model as published); incorporating the effects of additional environmental drivers (e.g., temperature and hypoxia); follow the approach used for Atlantic menhaden (SEDAR 69[1]); develop alternative model configurations or models; examine the Models of Intermediate Complexity for Ecosystem Assessment focused on key predator groups; and, holding a technical review akin to a stock assessment review.

An SSC member asked how this model could be applied to a migratory species like king mackerel, including waters not managed by the United States. Dr. Sagarese replied that understanding more about king mackerel may be possible through improved spatial considerations in the model. Another SSC member asked why king mackerel and Spanish mackerel were separated into juvenile and adult groups. Dr. Sagarese replied that, where possible, the modelers attempted to separate each species into functional age groups. She added that it was difficult to determine which predators were preying regularly on menhaden, and that it was particularly difficult to determine which age classes of menhaden were being preyed upon by which species.

Dr. Harris reviewed their recent RESTORE-funded project and publication that identified trade-offs and ERPs for managing Gulf menhaden. This model demonstrates how B_{Target} of menhaden and its predators could be achieved by modifying fishing pressure for either. Dr. Harris described current efforts to develop a spatially-explicit Ecospace model. In Ecospace, immigration and

[1] https://sedarweb.org/assessments/sedar-69/

emigration rates are based on abiotic factors (habitat and environmental drivers [e.g., temp. & salinity]) and biotic factors (feeding and avoiding predators). Fishing effort is informed by an Ecopath base, or predicts fleet dynamics with a gravity (top-down) model. Dr. Harris then described examples of Ecospace use in the Gulf for various purposes, such as for characterizing spill-in and spill-out effects for marine protected areas, effects of hypoxia and freshwater diversions on nekton species off Louisiana, effects of red tide on gag grouper on the west Florida shelf (WFS), and effects of freshwater provisioning on estuary ecosystems and fisheries.

Dr. Harris described data syntheses for habitat maps, spatial-temporal environmental drivers, functional responses, and initial results/validation. He noted that continual tuning and data evaluation occur, and that the model is functioning well. Next steps involve efforts to calibrate and fit the model to the data via iterative parameter adjustments. This work has been completed for the Ecosim times series, and is still outstanding for the empirical time series and spatial surveys. Acknowledging that data do not exist to fill all gaps, he noted efforts to incorporate scientific and fisher qualitative knowledge to: review and validate results and modeled trends; and, update parameters for preference functions like depth, temperature, salinity, habitat use, and spatial validation. Dr. Harris added that stakeholder input was necessary early and often to ensure that the model's estimates were correlated with observations in situ. He then discussed how to operationalize the model, including its incorporation in the Council's fishery ecosystem plan (FEP) to address fishery ecosystem issues (FEI; e.g., fishery closures, bycatch reduction, climate change, environmental stressors, and changes in habitat (natural and artificial). Ultimately, Dr. Harris noted the goals of developing an operational model that supports decision-making; a co-produced model that is valuable for management; and, a robust model that withstands rigorous review.

An SSC member thought the model could have far-reaching applications for understanding predator-prey dynamics, especially in coastal systems. Another SSC member reiterated the necessity for continual input throughout the model's development. An SSC member asked whether other species like birds, turtles, cetaceans (whales and dolphins), and eventually humans will be considered in the model. Dr. Harris replied that the primary focus has been related to fisheries; however, scaling to include whale and seabird interactions could be explored depending on the data available to do so.

Public Comment, May 2

No public comments received on May 2, 2023.

Management Strategy Evaluation (MSE) Workshop

Dr. Steve Saul (Ecosystem SSC) introduced the MSE products that would be covered throughout the day and requested that the SSC consider various discussion points regarding the MSE items presented to the SSC He noted main directions of exploring how MSEs can be structured, and to consider how the SSC is key to the development, implementation, and validation process for MSE.

Primer, Techniques and Considerations

Dr. Bill Harford (Nature Analytics) introduced MSE, which is used to simulate the interactions between data collection, data analysis, and fishery regulations. Data analysis can include stock assessments and MPs, like IAs. MSE highlights how well these interacting parts can be expected to result in the achievement of fishery management objectives. Two types of guidance generally result from MSE: tactical guidance, which develops a management strategy for a particular fishery; and, strategic guidance, which evaluates general principles and strategies. Evaluation of the fishery system works in a loop, with monitoring of the fish stock conducted via quota monitoring and stock assessments, followed by the application of HCRs, which then affects the fishery and thus the fish stock. MSE evaluates the entire fishery system in a manner that allows for design and testing of a management strategy prior to implementation, based on BSIA. Stakeholder engagement created buy-in from resource users, and trade-offs in the system are based on informed decision-making, acknowledging that not all strategies will perform similarly. Dr. Harford added that such a harvest strategy is a pre-agreed process for decision-making, so stakeholders know what to expect. User understanding of trade-offs between conservation and provision of social and economic benefits are central to successful fishery management. Dr. Harford noted that conducting MSE is an iterative process, whereby through exploration, management strategies will often need to be refined or discarded for better alternatives. He viewed this as an opportunity for scientists to collaborate with stakeholders and decision-makers.

Dr. Harford detailed six steps to the creation of MSE: 1) identifying key management objectives; 2) identifying key uncertainties; 3) developing an operating model; 4) selection of parameters; 5) identification of candidate management strategies; and 6) simulation and interpretation of performance. Within the fishery system, the performance of the management strategy is continually evaluated in the operating model (OM), which determines how fishing will occur on a stock or complex.

Dr. Harford said that in step 1, goals for the fishery are defined using timelines for achievement and with stated levels of acceptable risk or of performance, such that managers can understand the consequences of alternative management strategies. He added that trade-offs in goals are common, since a single management strategy seldom performs the same across multiple priorities. Dr. Harford stressed focusing on a few performance metrics that can be understood and interpreted from available data. In step 2, key uncertainties thought to have potentially important influences on performance of a management strategy are evaluated. MSE can be show whether reduction in uncertainties is useful, like comparing high and low precision monitoring programs, and how to cope with uncertainty. Common sources of this uncertainty are in life history, trends in abundance and harvest, and poorly understood environmental effects. An MSE would be considered robust to a key uncertainty when it performs nominally across all plausible OM configurations.

In step 3, Dr. Harford described the development of the OM, which consists of fish population dynamics, fishery characteristics, and precision with which management tactics are implemented. The OM is limited by the data available, but can be informed by similar data from other species or regions, with model tuning being key to developing a functional OM. In step 4, parameters are selected for the OM, for the purpose of representing uncertainty in these key pieces of information that are thought to be important to understanding the system. These parameters are then

continually evaluated to monitor past trends and forecast future conditions. In step 5, candidate MSEs are created consisting of a monitoring program, assessment, and HCRs. These HCRs guide adjustments to a management measure, such as a catch limit or measure of fishing effort. An HCR determines the degree of management responsiveness to measures of prevailing conditions, like SSB or index trends. MSE replicates management responsiveness to changing conditions, with an analysis like stock assessment projections used to forecast constant F or catch limits. The reliability of guidance from stock assessments can be hard to surmise, as is whether an approach to harvest will result in long-term achievement of management goals. MSE is objectively focused on how management advice is provided and whether a given management strategy is likely to achieve stated management goals. In step 6, the MSE is simulated and its performance evaluated and tuned against input about preferences regarding trade-offs to stated management goals.

An SSC member asked who makes the decision about which MPs to implement. The presenters replied that selecting the goals for the MSE would be under the purview of the Council, while the selection of relevant parameters and determination of how to evaluate the performance of the MSE relative to the data available would likely fall to the SSC. Another SSC member commented that, ultimately, resulting management decisions result in a measurable amount of resource access for stakeholders. They asked how MSE would ultimately affect the framework through which fishery management in the Gulf is conducted, which the presenters described later.

Flavors of MSE

Dr. John Walter (SEFSC) described some specific challenges for fishery managers in the southeast and introduced the concept of possible MSE approaches. Determination of Optimum Yield (OY), the dynamic nature of the marine environment, developing more EBFM MPs, and other difficulties inherent in implementing conventional management measures are issues difficult to directly address in a conventional stock assessment. MSEs are novel such that decision tradeoffs can be quantified. OMs can be developed to explore uncertainties in biological, economic, and social variables and provide more a holistic context for fisheries managers to consider.

Dr. Walter discussed four methods in which an MSE could be developed. The most in-depth method would be a full stakeholder and a resource-heavy MSE resulting in management advice. A desk MSE would not require stakeholder input and would involve simulation analyses to answer general research questions. An intermediate MSE would allow for the possibility of an MSE approach that would exist on a spectrum of resource intensity between an extensive full stakeholder MSE and a desk MSE. Also, there would be the possibility to decide not to pursue an MSE if a less complex risk analysis was available.

An SSC member asked on what timeframe an intermediate MSE could be completed. Dr. Walter replied that it would depend on the amount of stakeholder involvement required but that an immediate MSE could take a few months to about three years. Another SSC member asked if a MP was adopted through an MSE, how often would that decision need to be revisited? Dr. Walter stated that setting something such as catch limits would not need to be reviewed again unless some exceptional change warranted a reevaluation of that decision, which would result in substantially less workload compared to traditional stock assessments. He continued that simulation testing could be conducted to assess whether an exceptional scenario was being observed.

SAFMC Approach

Dr. Adrian Hordyk (Blue Matter Science) presented the MSE being developed for the South Atlantic Fishery Management Council (SAFMC) for its Snapper Grouper Fishery Management Plan (FMP). Beginning with the OM, he described the sorts of data that are known (e.g., growth, natural mortality, reproduction, distribution, stock status, fleet selectivity and retention, and historical exploitation), within the context of a multi-species fishery. In this setting, changes in exploitation on one species is likely to affect other species in the FMP (over 50 species in the Snapper Grouper FMP). Key considerations for the SAFMC MSE are for red snapper and gag, which are common primary target species in the region, and both are also presently in rebuilding plans. Dr. Hordyk described how the recent stock assessments for these species are considered in the development of the OM. He stressed that the stock assessment describes the current state of the stock, as of the terminal year of data, but doesn't predict how any management changes thereafter will subsequently affect the stock.

To build the OM, data sources feed into a rapid conditioning model (RCM). The RCM is designed to help condition OMs for data-limited to data-rich situations. Starting with a fitted model, historical depletion and F are informed via an objective method. The RCM is sufficiently flexible to be parameterized as a full stock assessment model with various data weighting schemes and some time-varying dynamics explored. Dr. Hordyk described the spatial component of the SAFMC model, to which a depth component is also being included. Within this spatial component, percent area and percent effort are factored, along with internal species distribution. He then described uncertainty in the OM, parsed as system (uncertainties in our knowledge of the system) and projection uncertainty (unavoidable uncertainty about future conditions). The system uncertainty is then determined and evaluated against plausible hypotheses of system dynamics for the OM. Projection uncertainty is evaluated through simulation of recruitment scenarios, effects of changes in habitat, and fluctuations in fishing effort.

Dr. Hordyk described the performance metrics for the SAFMC OM, couched as either biological, or social and economic. Biological goals for the Snapper Grouper MSE are sustainability, determining a probability of low biomass, and determining a probability of overfishing; social and economic goals are catch, catch level stability, length composition of catch, and opportunity to fish. These goals are all measurable management outcomes that can be quantitatively evaluated with available data, and were determined in part using the SAFMC's five-year visioning process held between 2016 – 2020. As Dr. Harford also described, continual evaluation of OM performance is key: data collection occurs continuously and is routinely analyzed against regulations, which can be modified as necessary. Compliance with regulations is also monitored, and the combination of all feed back into the data used to measure OM performance relative to stated management goals. Static (fixed) and dynamic (change in response to data) controls can be used by managers to influence, and adapt to, changes in performance data. Dr. Hordyk noted that in calculating MSE performance, the OM is based on what the user knows; performance metrics are based on what the user wants; and, the management strategies are based on what the user can do in the system to achieve stated goals. The results of this performance calculation tells the user what to do next as more is learned and decisions regarding trade-offs in the system are addressed. Understanding and responding to these results appropriately is key to the successful implementation of the MSE, which should be reproducible, transparent, and defensible.

An SSC member asked about the data collected to inform projections and forecasting. Dr. Hordyk replied that the conditioning process uses a historical index of relative abundance, and quantifies the observational error from the index against the results of the OM. The index expected in the future is then tuned against the expected observational error to better predict future conditions. He added that effects of collecting more or different data for the OM can affect the performance of the OM, and the MSE, in the future.

Dr. Nikolai Klibansky (SEFSC) asked about the tactics being evaluated for trading off favorably with other management goals, such as the need to reduce regulatory discards. Dr. Hordyk replied that explorations in reducing discards are ongoing, but doing so is a recognized goal for the SAFMC in the opportunity to fish, stability in catch limits, and stability in length composition. He added that consideration of size limits and effort controls would be expected to affect discards and overall effort, as would flexible spatio-temporal management measures.

An SSC member asked for clarity regarding the use of age-structured stock assessment models in the MSE, versus building a completely different OM. They thought there might be disconnects between the data in the stock assessment models and the OMs. Dr. Hordyk replied that model structure depends on the questions being asked and the types of management objectives the MSE is expected to address. He detailed variations in interpretations regarding length compositions within and out of open fishing seasons, with modeling used to determine how these variations would be affected by different static and dynamic controls. Dr. Hordyk added that if management questions are already captured by the stock assessment model, then incorporating those data directly from the stock assessment is very straightforward. The SSC member asked about the time steps expected to be used (e.g., annual, monthly). Dr. Hordyk replied that an annual model constitutes a whole new population every year with short-lived species, which may be better addressed with shorter (e.g., monthly) time steps. An annual model may also miss seasonal dynamics in a fishery, including the effects of seasonal closures, migrations, and changes in catchability.

An SSC member asked whether the SAFMC MSE project was expected to require a full stakeholder engagement process, and if so, the expected timeframe for completion of this process for the SAFMC. Dr. Hordyk replied that initial education is key for all users, from the Council through the stakeholders. A similar project in California took four years. He noted that the SAFMC funding for the development of this MSE is for two years, and they are tasked with working directly with the SAFMC's Snapper Grouper Advisory Panel. Dr. Hordyk thought whether this approach was appropriate for other regions would depend on the stated management goals for a region. Another SSC member thought engaging law enforcement to understand the compliance side of the resultant management measures would be of value.

<u>An SEFSC Approach and Interim Analyses</u>

Dr. Klibansky provided an overview on the utility of IAs, and presented results of OMs that were created for four species (red porgy, black sea bass, snowy grouper, and vermillion snapper) as a case study. IAs are informed by a single index, which is considered reflective of stock biomass, and can produce catch advice between scheduled stock assessments. Recently, MSEs have been explored as a method for generating IAs using OMs to provide greater context for decision-making related to IA results. OMs were developed using biological inputs, a simplified fleet structure, and

information on total removals. These outputs were then assessed for fit to historical landings generated by the stock assessment model. Additional inputs to simulate a series of MP scenarios were also included to compare and contrast how differing management decisions performed relative to conventional reference points and metrics. Management measures considered for setting catch advice were simulated using a fixed Total Allowable Catch (TAC) approach, modeled projections, an adjusted three-year moving index average, and a modified TAC based on index estimates buffered by the index standard deviation. Duration between stock assessments was simulated for 1, 5, and 10-year increments as a potential explanatory variable for model performance. Reference index uncertainty was also varied across models. Each model was run for 50 replicates for each slightly modified input.

Results varied depending on the performance metric being considered. For SSB, F, and total catch targets, there was not much variation between MPs which did not perform markedly better than a fixed TAC approach. Average annual variability in yield resulted in some observable variation between the tested management measures and was more variable between years. These modeling explorations generally focused on average long-term performance but other metrics could be considered in future research. Regarding timeliness, Dr. Klibansky noted that running OMs could be conducted quickly, but the management process likely moves at a pace that is not conducive to modifying catch advice annually, even if that was a desired management goal.

An SSC member commented that variability in yield might be of interest when assessing the effects of episodic events such as red tide. Dr. Klibansky stated that a series of models to investigate episodic natural mortality were also created, although were not statistically different. He continued that all the model metrics were averaged across simulations and there might be utility in examining OM performance during periods of extreme environmental events. Another SSC member commented that a possible management performance metric could be instances where stock status results in substantial reductions in yield to recover the stock. These drastic "shocks to the system" create hardships for stakeholders, and the SSC member asked if it was possible to test various OMs relative to this end. Dr. Klibansky replied it would take some further investigation but that it may be possible.

Model results were presented for long-term performance (41-50 years) and an SSC member asked if it would be possible to generate performance metrics on a shorter (~ few year) time scale. Dr. Klibansky answered that it was possible and results from these case studies indicated that short-term model performance was species-specific. MSE approaches allow for investigating the complexity and frequency of IAs on management effectiveness. This could generate a point where some other scientific approach may be more parsimonious than a stock assessment.

<u>An International Approach with ICCAT for Bluefin Tuna</u>

Dr. Walter reviewed the Atlantic bluefin tuna MSE used for the International Commission for the Conservation of Atlantic Tunas (ICCAT). The strategy for this MSE is based on biology, considering the presence of at least two (or more) stocks with time-varying and/or environmentally driven productivity (e.g., high/low stock recruitment relationships), and uncertainty in age at maturity. Tunas are highly migratory, and those stocks in the MSE are assessed spatially (east and west with virtual population analyses. F-based management is used instead of biomass-based

benchmarks . The bulk of harvest comes from the eastern Atlantic purse seine fishery, and in some years, a large proportion of fish harvested in the western Atlantic may have originated from the eastern Atlantic. Dr. Walter described the management objectives for Atlantic bluefin tuna: safety in the form of a low probability of stock failure; maintaining a healthy stock status; stability in the total allowable catch for stakeholders; and, satisfactory yield to allow continued access to the resource by stakeholders. The first two points constitute "biological must-pays" (conservation requirements for the stock), while the latter two points are stakeholder needs. Once the safety and healthy stock status are achieved, stability would be expected, and yield could be proportionally maximized. Both empirical and model-based MPs were explored, using quantities from stock assessment models when possible and proxies otherwise. Empirical MPs perform simply in that as the representative index of relative abundance goes up or down, so does the catch limit. Model-based MPs perform more similarly to stock assessments and associated projections.

Dr. Walter briefly described the initial nine proposed MPs, with only one ultimately being implemented. The implemented MP sets the catch limit for three years based on ten indices relative to a reference year (2017), with built-in stability provisions to limit initial catch limit changes, and simulation testing to ensure the MP is robust to external factors. The result is a MP that achieves multiple, competing management objectives from cooperating countries. The MSE is intended to require fewer stock assessments and annual modifications, and ICCAT can intervene in extreme circumstances. As has been mentioned by other presenters, continual evaluation of MSE performance is key, and the bluefin tuna MSE will undergo "reconditioning" in 2027.

An SSC member asked about the ten considered indices, and whether there were political pressures associated the indices considered. Dr. Walter acknowledged that there is desire for each region to provide data; however, the performance of each index was the deciding factor in whether it would be included in the final suite. Another SSC member asked how the approach to directly and openly compare the proposed MPs came to be, and whether it could be replicated in the southeastern U.S. Dr. Walter replied that competition between the proposed MPs was deliberate to generate the most appropriate and functional candidate based on objective performance. He thought that development and testing of candidates in the southeastern U.S. should be done in conjunction with the Council's development of its FEP and the FEIs included therein.

The Magnuson-Stevens Act, MSE, and the Possible Role of the SSC

Dr. Walter provided suggestions on how to integrate MSE into the existing management process which involves stakeholders, data modelers, the SSC, and Council. He categorized three major components of the MSE as the development of the OMs, quantifying management objectives, and implementing MPs. Stakeholders would be expected to advise throughout the MSE process. The modeling team would be responsible for constructing the OMs, with the SSC adopting the model under advisement of the Council. The management objectives would then be quantified by the modeling team under advisement from the SSC, and adopted by the Council. Lastly, MPs would be tested and refined by the modeling team with the SSC identifying biological "must-pays" (e.g., avoid overfishing, rebuilding plans, etc.) that the Council could then adopt and implement as a MP based on performance. As an example, rather than "solving" for OY, this process would allow for the selection of an OY from a tradeoff state-space, informed by simulated modeling that represents a compromise between competing management objectives.

Discussion: Management Strategy Evaluation in the Gulf of Mexico

Dr. Saul recapped the progression of MSE presentations. He began by posing the question of the SSC's role in the development, implementation, and review of an MSE. He also discussed the need for continual review and the frequency with which measurables such as stock status are determined. Dr. Saul also noted the need to consider climate and ecosystem factors, which could be used to develop novel MPs.

An SSC member commented on the SSC's responsibility of advising the Council on MSE, especially regarding data considered, methods, robustness, and plausibility of results. They asked if there is any guidance for certain factors to which particular attention should be paid. Dr. Harford replied that it is key to develop a sound process that can be easily followed and replicated. Dr. Walter recalled the competitive testing of candidate MPs for Atlantic bluefin tuna, and how this process resulted in options with varying degrees of plausibility. He added that this process is replicable and was shown to produce the best candidate MP.

An SSC member thought MSE would be particularly useful for species for which routine stock assessments are not feasible, and that such a process was likely to help the Council avoid situations where stock assessments result in drastic changes to catch limits. He noted specifically greater amberjack, which has seen continually reduced catch limits across several stock assessments over the last decade, along with numerous changes in management. He added that these changes likely also introduced management bias, and may make it difficult to discern what is truly happening with the stock. Lastly, the SSC member thought that MSE was rife with opportunities for consideration of social and economic data for evaluating management objectives and performance. Dr. Walter commented that social and economic considerations could be included within the current MSE process. With respect to greater amberjack, Dr. Walter thought there were likely several hypotheses for what is actually happening with the stock, and that exploring these was something that OMs could be tuned to address.

An SSC member noted the importance of general social and economic consideration in MSE, and thought that evaluation of fisher behavior in the expected response to static and dynamic measures would be important. Council staff recalled an SSC member's comment about considering enforcement data on compliance as a way to inform, at least partially, regarding fisher behavior to changes in regulations. Another SSC member asked about engaging stakeholders in determining management objectives. Dr. Walter replied that using a key group of stakeholders throughout the development process is useful to get continuous and reliable feedback, including through approaches such as participatory modeling and workshops. He cautioned foregoing useful management advice in the pursuit of the absolute "best" possible, and commented on trade-offs between "best" and the time and resources necessary to achieve "best". The SSC member revisited trade-offs and their relationship to social and economic considerations, and asked if there is an analytical way to limit to the number of prioritized trade-offs. Dr. Walter said that his experience inferred that 7 objectives or priorities was about the maximum that could be simultaneously evaluated, understanding that the minimum requirement for each was some method of quantitative evaluation. He added that in terms of optimization of the MP for the objectives, it was not feasible to gauge the degree to which the MP met each objective. Rather, the developers

were able to require that the candidate MPs met a minimum degree of performance for a single, highest priority objective, and used that as a screening tool for the suite of MPs considered.

An SSC member asked how the IA factored into the MP and MSE process. Dr. Walter replied that a stock assessment is not always necessary to answer the question(s) at hand, and that other tools may be equally or more appropriate to address research and management questions. The current analytical capacity simply does not exist to perform a stock assessment for each species with sufficient regularity to satisfy management expectations for contemporary data availability. Dr. Frazer asked whether the last series of failed attempts at age-structured stock assessments for Atlantic bluefin tuna spelled the end of such attempts on the stock by ICCAT. Dr. Walter replied that close-kin genetic studies showed promise, and may lead to the ability to characterize total biomass in the western Atlantic. However, exploration of novel methods takes time, and if those resources (human and monetary) are consistently dedicated to producing stock assessments, then not much is left to allow for innovation.

An SSC member asked how the current stock assessment process might be improved to allow for more flexibility and transparency to complete the appropriate levels of analysis. Dr. Frazer replied that he thought the SEDAR process was quite transparent; however, resources are always limited, and there are often pressing management concerns that may take away from the assessment of new species or to innovate methods for all species. He also thought that seeking appropriate levels of analysis was key, but noted that many assessment endeavors are quite reactionary to current management concerns. Changing baselines with calibrating to new recreational data units was noted as a point of concern across multiple species, and as a possible area where MSE may be useful in providing clarity in direction. The Council is also developing its FEP, with specific FEIs to consider, and addressing these issues may also benefit from an MSE approach.

An SSC member asked how an MSE might replace a stock assessment in the absence of a reliable index. Dr. Walter replied that if the stock assessment is not using the index, then perhaps it is using the available age and/or length compositions. Catch advice could be scaled against mean age or length, assuming recruitment is constant. Dr. Saul added that a model ensemble approach can be used to simultaneously evaluate F and SSB to generate actionable advice that is considerate of uncertainty, which can be carried forward through projections of catch advice. Another SSC member noted that use of a fishery-independent index of abundance was a common theme in the MSE presentations, and commented on efforts by the states to expand the video surveying capabilities of the northern Gulf states commensurate with the methods used by SEAMAP. They noted that this effort would not be useful for analytical purposes for some time; however, when available and with sufficient data, could provide a large-scale index for consideration with MSE.

Dr. Walter commented on the importance of testing non-stationarity in MSEs, acknowledging that changes in the factors informing the MP are inevitable, and that the OM needs to be robust to these changes. Further, development of a structured and replicable process will lead to efficiency gains and contribute to buy-in to MSE. An SSC member noted the resource-intensive nature of the stock assessment process, and stressed the necessity for applying the correct analytical tool for the job as opposed to always striving the most complex and analytically thorough and rigorous. Another SSC member posed the idea of using MSE to reduce regulatory discards, evaluating climate change, and achieving a multi-species OY, and how these endeavors would likely require the

resource-intensive stakeholder-informed MSE. They added that such an approach would not necessarily be required for single-species issues, which may be able to be adequately addressed via a desk MSE or some other less resource-intensive process.

An SSC member asked about the role of the SSC in the development of MSEs for the Council. SSC members discussed recommendations for levels of analysis for evaluating particular objectives, and for evaluating performance of any resulting MPs. However, the SSC acknowledged resource limitations, with Dr. Walter noting that the Council would be expected to give up a stock assessment slot (or series of slots) to accommodate the SEFSC's development of an MSE (desk or stakeholder-informed). Dr. Frazer replied that available resources are not expected to dramatically increase, and so expectations of efficiency gains and timetables for deliverables would be predictably expected from a Council request to develop an MSE. Another SSC member thought that more often than not, many objectives could be addressed by desk MSEs, and agreed that working through a few attempts would certainly allow for learning and tuning of approaches specific to the data available and management objectives in the Gulf.

An SSC member asked whether MSEs were being recommended as a negotiating tool for competing resource users. Dr. Frazer replied that whenever an objective tool can be used to inform a management decision, it is likely to be of generally positive benefit to the users. So long as the tool is credible and defensible, its creation and review would fall under the purview of the SSC; it would be up to the Council to use it to inform their decisions. Dr. Walter agreed, adding that MSE creates measurable performance metrics based on the Council's provided management objectives. Thus, MSE relies heavily on the goals of the Council, and it is up to the Council to use MSE to implement the most preferential modeled outcome, and acknowledgement of tradeoffs. An SSC member added that the SEFSC ecosystem planning efforts have been proficient as of late to be inclusive of the human element when considering the data available to evaluate such issues.

> **Motion: The SSC recommends the Council pursue management strategy evaluation (MSE) as a decision support tool with applications to stock assessments, fishery ecosystem issues, and Council decision-making.**
>
> *Motion carried without opposition.*
>
> **Motion: The SSC recommends the Council pursue opportunities to incorporate social and economic performance indicators, as well as human behavioral responses, in management strategy evaluations.**
>
> *Motion carried without opposition.*

Dr. Walter thought that greater amberjack may be a candidate for an MSE, since it is likely to benefit from a viable fishery-independent index in the GFISHER video survey. He recommended consideration of such an approach for the species by the SSC and Council. Council staff replied that more information may be needed before the Council could move forward with such a recommendation, especially since the SEDAR Steering Committee was not comfortable having the MSE process run through the SEDAR process. Council staff thought it most appropriate for the Council to provide direct feedback before embarking on an MSE for greater amberjack.

Public Comment, May 3

No public comments received on May 3, 2023.

Review SHELF Fish Egg Monitoring Program

Dr. Chris Stallings (University of South Florida [USF]) presented information about the Spawning Habitat & Early-Life Linages to Fisheries (SHELF) project and how it could support policy decisions. The project utilizes DNA barcoding on fish eggs that are collected by the Southeast Area Monitoring and Assessment Program (SEAMAP). Forty-nine stations have been sampled across the WFS from 2019-2023 through SEAMAP, with 163 fish taxa having been identified. The first part of SHELF was able to identify spatial distribution of eggs along the WFS, and egg retention and export dynamics. Although DNA bar coding of individual eggs is more time consuming and has a higher cost than metabarcoding, the methodology is more precise and could answer more questions about the biology of the fish.

SSC members expressed optimism on this type of sampling methodology and the types of information that it could provide as part of the stock assessment process. An SSC member asked if there was any difference between using NOAA's Continuous Underway Fish Egg Sampler (CUFES) versus collecting eggs via Bongo or Neuston nets. Dr. Stallings commented that it is something to be explored. Another SSC member asked if the study has looked into sampling periodicity by species and compared it to the amount of eggs in a sample. Dr. Stallings answered that it has not been done yet, but that they recognize that lunar phases and other environmental factors are cues that trigger spawning events.

Dr. Stallings was also asked about the presence of forage and other unmanaged species. The SSC envisioned future implications on how SHELF could feed into EBFM. Dr. Mya Breitbart (Co-PI, USF) also encouraged the SSC to reach out with specific questions as the group is developing additional techniques, such as species-specific primers for DNA sequencing. Dr. Walter also encouraged the use of eDNA to capture signals from viviparous and other fish species whose eggs do not have a pelagic stage. Another SSC member thought SHELF could inform IAs.

Scope of Work for Upcoming Gray Triggerfish Stock Assessment

Mr. Rindone reviewed the proposed scope of work for the operational assessment for Gulf of Mexico gray triggerfish, which will begin in late 2025. The change in assessment type from research track to operational assessment is to accommodate other SEFSC assessment scheduling needs while also providing timely management advice to the Council for gray triggerfish. The proposed assessment will explore essential model and data modifications, including consideration of recreational landings and discards, ageing, recruitment, and discard mortality. This assessment will also yield management advice at its conclusion; whereas, a research track would still need to be followed by a subsequent operational assessment. Topical working groups recommended will be held via webinar and concurrently during a to-be-scheduled in-person workshop. The SSC added points to the scope of work to specifically address assumptions about recruitment and new

research for ageing and discard mortality. Staff will submit the revised scope of work to SEDAR, and will expect a draft of the terms of reference in early 2024.

Public Comment, May 4

Harry Blanchet (Baton Rouge, LA):

- Mr. Blanchet was surprised to hear that Dr. Benny Gallaway had resigned from the SSC. Dr. Gallaway has provided critical expertise and informative research over his years of service to the Council, and Mr. Blanchet greatly appreciates his service. The SSC concurred that Dr. Gallaway has been an invaluable member of the SSC.

Other Business

No other business was brought before the SSC.

The meeting was adjourned at 12:00 pm eastern time on May 4, 2023.

Meeting Participants

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

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

Council Representative
Tom Frazer

A list of all meeting participants can be viewed here.