# Standing, Reef Fish, Socioeconomic, and Ecosystem SSC
# Meeting Summary
# July 31 – August 1, 2024
# Tampa, FL

The meeting of the Gulf of Mexico (Gulf) Fishery Management Council's (Council) Standing, Scientific and Statistical Committees (SSC) was convened at 8:30 AM EDT on July 31, 2024. The agenda for this meeting was approved along with the minutes from the May 2024 SSC meeting. Verbatim minutes from past SSC meetings can be reviewed here.

## *Election of Chair and Vice Chair*

The SSC elected Dr. Mike Allen as Chair, and Dr. Jim Nance as Vice Chair.

## *SSC Member General Orientation*

Council staff briefed the SSC on their general responsibilities to the Council in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)[1], and with the Council's Standard Operating Practices and Procedures. Staff also provided general information about participation, travel, and stipends.

## *SSC Member SEDAR Process Orientation and Engagement*

Council staff provided a presentation on the Southeast Data, Assessment, and Review (SEDAR) program. The SEDAR program provides an opportunity to broaden participation in Southeast region stock assessments. All SEDAR methodology, data, and supporting analyses are available to the public through SEDAR's website. There are several opportunities for public engagement through public meetings, SEDAR workshops, SSC and Council meetings, and the Council's advisory panels.

The SEDAR program is composed of collaborators from federal and state agencies, university scientists and stakeholders. Currently, there are two types of assessments under SEDAR: benchmark and operational assessments. The benchmark assessment can include multiple workshops, an independent peer review, and yields management advice. An operational assessment utilizes new and updated data in a previously accepted assessment model to yield management advice but in a more streamlined approach. The SEDAR is continually being refined to best address stock assessment and management needs. Each assessment is ultimately reviewed by the SSC, which considers whether the assessment has met its terms of reference and is consistent with the best scientific information available (BSIA). However, the Southeast Fisheries Science Center is currently considering re-imagining the stock assessment process, so other program modifications are possible.

[1] https://www.fisheries.noaa.gov/s3//dam-migration/msa-amended-2007.pdf

It was noted that the membership of the SEDAR Steering Committee, which oversees the SEDAR program, does not change often given the nature of the positions, with the exception of the Council chairs. Additionally, the inclusion of social scientists in SEDAR stock assessment processes was discussed. The SSC noted that social scientists and economist are encouraged to volunteer to participate in SEDAR workshops and engage throughout the process, but historically, their involvement has been less than that of biologist/ecologists.

## *Management Strategy Evaluation*

Dr. Cassidy Peterson (Southeast Fisheries Science Center [SEFSC]) provided an overview of management strategy evaluations (MSE). MSEs were described as a simulation framework to stress test the ability of management procedures to achieve management objectives, and to ensure that harvest strategies are robust to uncertainties. She reviewed the differences between model types and approaches, applications, limitations, and the expectations users should have. Dr. Peterson described the role of the SSC in MSE, which is to review operating models (variations of stock, fishery, and ecosystem dynamics to be tested), and advising on management objectives and procedures. Dr. Peterson outlined current MSE efforts in the Gulf, which include capacity building and validation for Stock Synthesis MSE (SS MSE) to pair with SS stock assessment approaches currently in use. Using SS MSE, the SEFSC aims to evaluate regional issues including bycatch, red tide, and climate readiness. Following a request from the Council, the SEFSC has begun developmental stages of a Fishing Effort Survey Desk MSE (FES MSE) for Spanish Mackerel to evaluate the influence of uncertainty or bias in recreational landings on management strategies. The Spanish Mackerel FES MSE will also test whether conventional management procedures or percent-change management procedures will perform better when recreational landings are biased. The Council also requested that the MSE consider the performance of decreasing the Spanish Mackerel recreational bag limit, results of which were not presented today.

SSC members questioned the timelines and costs associated with conducting the different levels of MSE complexity. Dr. Peterson replied that the effort needed will vary depending on the existing framework for each scenario. She estimated that a new full stakeholder-informed MSE would take approximately 3 years, and costs may include hiring a dedicated contractor and funding for stakeholder interactions. The less intensive Desk MSE was estimated to require approximately 1 year of effort initially, with the expectation that the timeline could be shortened to 6 months for future iterations once the necessary framework has been established. An SSC member asked whether common bottlenecks to stock assessment progress such as data inputs also apply to MSE approaches. Dr. Peterson replied that unlike stock assessments, MSEs are simulations, and a range of data assumptions can often be made to help expedite the MSE approach.

SSC members inquired about the flexibility of MSE models to explore and incorporate enforcement trade-offs and stressed the need for improved social and economic data, and stakeholder input, to evaluate buy-in for management procedures. Also, because MSE is a new process, building trust through demonstration will be needed before adoption. Dr. Peterson commented that safeguards are built into the MSE process to override management procedures under exceptional circumstances where stocks fall outside of simulated conditions, and that continuous review and refining of management procedures is planned to ensure efficacy. An SSC member asked how climate would be incorporated into MSEs. Dr. Peterson stated that an

empirical approach would be most likely, where various plausible climate-induced changes in the fisheries dynamics (e.g., productivity scenarios) are tested to evaluate management procedure robustness to climate uncertainty.

Specific to the Spanish Mackerel FES MSE, SSC members encouraged the integration of uncertainty and variance into the indices used to develop harvest limits, and accounting for historic uncertainty in recreational landings using sensitivity runs. SSC members inquired whether MSE could be used to evaluate the scale of recreational landings bias relative to other sources of uncertainty such as ageing error. An SSC member questioned whether bias in recreational landings data inputs would result in biased allocation accounting, compounding the issue on both the data analysis and management decision sides. Per Dr. Peterson, the MSE process has the flexibility to address and explore all of these inquiries.

When thinking about building future Gulf MSEs, SSC members expressed interest in using MSE to investigate many questions, including multispecies management and multispecies discards. SSC members acknowledged that MSE is a tool that allows for the testing of endless scenarios to satisfy scientific curiosity and urged restraint to testing questions that are realistic and operationally viable. Dr. Katie Siegfried (SEFSC) commented that, in cases such as the Spanish Mackerel FES MSE, the MSE approach is meant to be applied temporarily to test sensitivities and aid in producing robust management advice in the interim while data issues are being resolved. In these cases, models should remain simple and focused on the question(s) at hand.

## *SEDAR Assessment Process Changes and Model Complexity*

Drs. Siegfried and Shannon Cass-Calay (SEFSC) reviewed proposed changes to the SEDAR process and the SEFSC's organizational plan for addressing and implementing these proposed changes. This proposal includes assessing up to 12 species every 8 years, with updated management advice generated between full stock assessments. These assessments would only be as logistically complex as the data and methods require, with the methods appropriately matched to the data. Ideally, this proposal would allow for the consistent and predictable provision of stock assessment advice, while maintaining some capacity for unforeseen needs. To assist in this, the Council has identified five key stocks (i.e., red snapper, red grouper, gag grouper, greater amberjack, and gray snapper) which will receive more frequent attention than the remaining species. Some species may be assessed using simpler approaches, which can be tested for robustness against past approaches via simulation (e.g., MSE). Dr. Siegfried stated that data bottlenecks are being improved through automated data processing and index standardization approaches, with artificial intelligence (AI) being used to improve the speed with which video data are analyzed.

Dr. Siegfried said the proposal did not account for post-assessment work, such as assisting with management action development and supporting other work which may come before the SSC. Further, expectations need to be described by the Council for the types and frequency of management updates expected between assessments. Council staff added that assessments were expected to take disparate amounts of time, and discussions between the Council and SEFSC would help better define the resource requirements of each assessment. An SSC member advised

clarifying the emergency capacity available to the system, to ensure the unexpected could be addressed when the need arises.

Dr. Siegfried then reviewed the data availability for many species managed by the Council. She highlighted the fishery-independent and -dependent data available, and for the latter, the fleet-specific data for these species. Many of the Council's reef fish species are captured by the G-FISHER composite video survey, which could be used to evaluate trends with these species. Dr. Siegfried described data availability timelines, noting when certain datasets become available for inclusion in other analyses (e.g., stock assessments). Specifically, the provision of age composition data remains the most delayed between when the data are collected and then when they are available for stock assessments. Dr. Siegfried also discussed possible levels of model complexity which might be considered for various managed species, relative to the data available for each. Next steps for the SEFSC will be to determine the best course of action for providing management advice with uncertain or biased data, and to determine the usefulness and period of time after full stock assessments that the SSC would recommend using management procedures and interim analyses to modify catch advice.

Council staff asked if the processing time for video surveys would be reduced as AI is integrated into video data processing. Dr. Siegfried replied that the most headway had been made with video identification of red snapper, and that advancement there would be incremental and species-specific. Council staff also asked whether the same AI technology could be applied to processing data collected by the plankton surveys, to which Dr. Siegfried said that she would inquire and see if this approach was being considered. SSC members also clarified the regional data timelines for the state fishing effort surveys.

An SSC member asked about how to best proceed with pairing assessment type and complexity with the data available for a species or complex. The necessity for a statistical catch-at-age model should be reconsidered to help reduce process error, amongst other concerns. Council staff noted that it seemed that the rate of development of new assessment methods outpaced improvements in and expansion of data collection, and now a correction to that is occurring. Ultimately, none of the managed species with statistical catch-at-age models should be excluded from an analysis of whether a few key data sources can provide comparatively useful management advice. SSC members decided to schedule a discussion of how to proceed with the proposed changes to the SEDAR process and approaches by species at the October 2024 SSC meeting.

Dr. Tom Frazer (Council representative) asked the SSC about balancing consistency in management advice against repeatedly updating that catch advice and introducing management changes. An SSC member replied that ideally, management would be stable for a predictable period of years, thereby creating less stress on stakeholders and allowing for better estimation of the effects of management changes on a stock.

## *Essential Fish Habitat (EFH) Contract Review: Progress on EFH Data Collection*

Council staff provided a brief presentation to introduce the SSC to the EFH work, including the request for proposals which was ultimately awarded to Dr. Bridgette Froeschke (University of Tampa). Dr. Froeschke then provided a progress report on contract work to identify, catalog, and

assess available contemporary habitat datasets and associated metadata for those sources. The purpose of the work is to help inform the Council's descriptions of EFH in a new generic amendment. The SSC was tasked with reviewing the spatial data collected to date and identify any possible missing data sources that could then be included in the final report.

An SSC member asked if it was possible to develop changes in habitat distribution over time based on the data collected during the project. Dr. Froeschke replied that some shapefiles indicated specific years when particular spatial features were collected, but many others only described a range of time for the data collection and could not be parsed further. An SSC member recommended contacting the Louisiana Coastal Protection and Restoration Authority and the Bureau of Ocean Energy Management to inquire about marsh and soft bottom habitats, respectively.

SSC members offered to provide Dr. Froeschke with key data sets to support the EFH contract work. The SSC discussed the possibility of including artificial habitats as an EFH habitat type as the Council has deliberated on this topic in the past. Dr. Froeschke stated that she had collected several artificial habitat data layers and included those datasets in the contract work in case the Council was interested in pursuing a modification in EFH types in the future. The SSC should pass along any new contacts or other data sources not already identified during the contract to Dr. Froeschke by August 30, 2024.

## *Review: Influence of Timing and Duration of Recreational Seasonal Harvest Restrictions on Gag Effort, Harvest, and Discards in the Gulf of Mexico*

Dr. Challen Hyman (University of South Florida) presented recent research on the effects of modifications to the recreational fishing season duration for Gulf gag grouper on fishing effort, harvest, and discards. Dr. Hyman described the relationships between these factors and how accounting for them can assist fisheries managers in better aligning fishing seasons with management goals. Gag was recently declared overfished and experiencing overfishing[2] (SEDAR 72 2022), and catch limits were reduced dramatically in response[3] (GMFMC 2023). Dr. Hyman and colleagues aimed to develop a multi-model framework to predict recreational effort, gag catch-per-unit-effort (CPUE), and proportion of gag harvested using a 2023 recreational dataset (Marine Recreational Information Program [MRIP]), and to use that framework to simulate multiple fishing season start dates and season durations and examine corresponding harvest and dead discard projections. This research tested these factors against the options presented to the Council in Amendment 56 to the Fishery Management Plan for Reef Fish Resources in the Gulf of Mexico.

Dr. Hyman reviewed the model framework, which considers regional estimates of gag abundance, fishing effort, CPUE, fishing days, social and economic factors, and environmental factors. He showed the model's ability to estimate catch and effort by region, and the ability of the model to produce those estimates against observed data, to which the model generally produced good fits. The SSC discussed patterns in the observed harvest data, noting that harvest from early in the historical fishing season may have been on a different component of the stock (offshore) than later

[2] https://sedarweb.org/documents/sedar-72-gulf-of-mexico-gag-grouper-operational-assessment-report-amendment-state-reef-fish-survey-srfs-run/

[3] https://gulfcouncil.org/wp-content/uploads/RF56-Gag-Rebuilding-Plan-FINALv2_09112003.pdf

in the fishing season (nearshore) due to species also open to harvest and water temperatures. Dr. Hyman proceeded by describing the conditions under which his simulations were conducted, noting which were held constant and which were allowed to be manipulated within the simulations. When discussing discard mortality, Dr. Hyman said he used sea surface temperature (SST) to estimate discard mortality based on published research. Council staff added that they thought there would be an interactive effect of depth related to SST's effect on discard mortality.

Dr. Hyman stated the simulation framework was based on a conditional design matrix with fixed simulation conditions. He included an effort simulation as a predictor in the CPUE model to help simulate CPUE and included that simulation in the conditional design matrix for the proportional harvest model. When examining the simulation in total, Dr. Hyman found that regardless of season start date, the cumulative dead discards remain relatively unchanged. He added that moving from a one month to a two-month season did increase removals, but the magnitude of those removals varied by season opening date. He also noted that the uncertainty about the removals estimates was strongly correlated to the fishing season duration, with greater uncertainty for shorter fishing seasons. Dr. Hyman summarized that the proportion of gag harvested is relatively insensitive to the choice of fishing season start date, and seasonal changes in discard mortality appear to offset changes in catch rate, and do not produce noticeable shifts in cumulative dead discards. Thus, based on the simulation, managers should continue to manage fishing seasons with the aim of controlling harvest, paying attention to the effects of season duration.

An SSC member said understanding behavioral response to management change was key to making appropriate management decisions. He also asked about the representativeness of the catch data included in the simulation with respect to the totality of stakeholders expected to be affected by changes in fishing season. SSC members discussed this, noting that the MRIP data are not totally representative of the private angling fleet, and that there are some differences between the fishery dynamics of the private angling and for-hire fleets. Presently, there are also notable issues with non-response bias in the MRIP survey, which Dr. Hyman highlighted in an accompanying manuscript. Dr. Hyman next plans to partner with the Florida Fish and Wildlife Conservation Commission to use observer program data from charter for-hire trips to better understand gag discards and discard mortality, inclusive of depths, lengths, and weights of gag caught by time of year.

An SSC member asked about the magnitude of the uncertainty of cumulative discards between season start dates, considerate of the lower total removals for a season opening like in September. Dr. Hyman replied that the simulation is based on the information available, and that the season duration is dependent on the catch limit. Cumulative discards seem otherwise unaffected, perhaps because fishing for reef fish is expected to continue regardless of whether one species is open for harvest or not.

### *Public Comment, July 31*

None received.

## *Discussion: Acceptable Biological Catch Control Rule Modifications*

Drs. Cass-Calay and Siegfried (SEFSC) reviewed an alternative approach to the current Acceptable Biological Catch (ABC) Control Rule, used by the SSC for determining the scientific uncertainty between the overfishing limit (OFL) and the ABC. The current ABC Control Rule has been in place since 2011; however, SSC members have regularly expressed a desire to revisit the control rule. This stems from the propensity for the buffer determined by the P* approach generally resulting in a difference between the OFL and ABC that is not representative of the uncertainty identified in the stock assessment.

Dr. Siegfried began by describing the purpose of the ABC Control Rule, and the SSC's role in recommending an ABC to the Council. These rules vary by Council and are in many ways tailored to the species and fisheries in each region. Tier 1 describes a scenario where the assessment estimates maximum sustainable yield (MSY) reference points and produces a probability distribution function (PDF) of the OFL. The choice of P* is based on the level of uncertainty considered in the assessment using a risk determination table. The assessment can use proxy values for the fishing mortality level at MSY ($F_{MSY}$), uncertainty is characterized, diagnostics are satisfactory, and environmental covariates are considered. Here, the SEFSC proposes that fishing mortality (F) should be reduced as stock size declines, and a critical biomass level ($B_{CRIT}$) be assigned to reduce F to zero below some level. The use of $B_{CRIT}$, defined as the minimum level of depletion at which fishing would be allowed, would reduce the likelihood of total stock collapse. The SEFSC also proposes addressing P* and sigma (σ) separately; the former is a prerogative of the Council, and the latter addresses scientific uncertainty. Further, the SEFSC proposes a tiered system where σ increases as data quality/quantity declines, resulting in larger buffers between the OFL and ABC for lower tiers.

Dr. Siegfried said that the determination of ABC should be based, when possible, on the probability that a catch equal to the stock's ABC would result in overfishing (P*). Under the Magnuson-Stevens Act, the probability of overfishing cannot exceed 50%. The current process of estimating the variance of the PDF often results in small buffers, and estimating this variance external to the assessment process often relies on external data. Here, an approach like that described by Ralston et al. (2011)[4] which considers multiple species from a region may be informative. Generally, under this method, the buffer between the ABC and OFL increases as the data available to inform a species' stock status decreases. Following a Council request via the SSC, the SEFSC developed a Gulf-specific approach for a σ value for this region. Dr. Siegfried described estimating σ based on different time series, which were generally consistent for using the Ralston et al. approach and using that approach as modified by Privitera-Johnson and Punt (2020)[5].

Dr. Siegfried said that SS report files do not contain some necessary information for applying the Privitera-Johnson and Punt modification, and that the SEFSC would have to revisit each assessment, which is not feasible at this time. In response, the SEFSC proposes to use an MSE* to determine the effectiveness of different levels of uncertainty. Regarding the amount of included

[4] https://gulfcouncil.org/wp-content/uploads/12c-Ralston-et-al.-2011.pdf
[5] https://www.sciencedirect.com/science/article/abs/pii/S0165783620300205

uncertainty, P* < Restrepo et al. (1998)[6] < Ralston < Privitera-Johnson and Punt. Thus, rather than using time to calculate Privitera-Johnson and Punt, the SEFSC would like to use their MSE development capacity to test harvest control rules for this proposed ABC Control Rule.

SSC members discussed its recent use of a Restrepo et al. -like approach, and how the buffers are treated there. Dr. Siegfried stated that the ability to test the entire proposed control rule was an important benefit to this approach. A rule's sensitivity to different decisions (e.g., $B_{CRIT}$, $F_{MSY}$ proxies, $\sigma_{min}$, etc.) could be evaluated and characterized, which would aid greatly in its development. Another SSC member asked if the MSE would need to be re-run for each species. Dr. Siegfried said that it could be species-specific, or it could be run for groupings of species. NOAA General Counsel asked whether there is any expectation that a species could be depleted to $B_{CRIT}$ under this proposal. Dr. Siegfried replied that the idea is to increase the buffer between the OFL and ABC as stock size decreases, and eventually closing fishing if a stock reaches $B_{CRIT}$.

An SSC member asked about the difference between setting F relative to a biomass at MSY ($B_{MSY}$) target versus the minimum stock size threshold (MSST). Dr. Cass-Calay replied that using $B_{MSY}$ as a target is actually more aggressive than rebuilding plans currently in place in the Gulf. She added that the current MSST definition for many reef fish stocks, currently set at 50% of $B_{MSY}$, is quite aggressive, and the odds of rebuilding may be affected when combined with the narrow buffers produced by the current P* method (which the SSC hasn't been using). She added that there are ways to reconsider the slope of the buffer determination when fishing towards $B_{MSY}$ once the biomass level reaches MSST. Another SSC member was concerned about triggering rebuilding plans more frequently if using the $B_{MSY}$ target over MSST and noted guidance from NOAA not to manage in such a way as to trigger rebuilding plans frequently. Council staff replied that if a stock was determined to be above MSST but below $B_{MSY}$, a rebuilding plan would still not be necessary. Further, techniques like phasing in catch reductions can be applied to attenuate the catch reductions necessary to eventually reach $B_{MSY}$ over time.

An SSC member noted that under the Restrepo et al. (1998) approach, which considers fishing near 95 – 98% of the OFL when $B>B_{MSY}$, the possibility of overfishing the stock may be much greater. Another SSC member commented about the importance of an approach tailored to the Gulf, and asked about decoupling the consideration of statutory requirements from the benchmarks upon which the proposed control rule operates. An SSC member replied that currently, the choices are such that a target of either MSST or $B_{MSY}$ is ultimately used for calculating the buffer between the OFL and ABC. Dr. Cass-Calay added that the MSST need not be reconsidered at this time; however, the control rule could be structured to adjust the magnitude of the buffer based on a number of factors. She also noted that the SSC's recent practice of setting the ABC at yield at 75% of $F_{MSY}$ (e.g., Restrepo et al. 1998) may also be sufficient and defensible.

The SSC discussed slopes that factor in natural fluctuations in biomass and environmental covariates, and whether this could be developed in the absence of management bias. Council staff noted that other measures, such as modifying the $F_{MSY}$ proxy used, may better generally account for these fluctuations, and that gag and scamp and yellowmouth grouper are recent examples. An SSC member thought a non-linear approach, perhaps when the biomass is between MSST and $B_{MSY}$, should be evaluated. Another SSC member asked about the Council's goals and thought it

[6] https://gulfcouncil.org/wp-content/uploads/12d-Restrepo-et-al.-1998.pdf

necessary to quantify those with respect to the requirements of the Magnuson-Stevens Act. Council staff replied that one of the Council's main goals is to avoid closing any fishery. This goal is rooted in both maintaining social and economic benefits of resource access, and for maintaining scientific data collection programs which rely on fishery-dependent sources for samples.

Dr. Siegfried proposed evaluating how the proffered control rule for Tier 1 would function in three scenarios: above $B_{MSY}$ (i.e., vermilion snapper); below $B_{MSY}$ but above MSST (i.e., king mackerel); and, below MSST (i.e., greater amberjack). She asked the SSC for guidance about future analyses, and to recommend timelines for proposed work. SSC members agreed that the proposed work was worth pursuing, but also to recommend the continued use of the Restrepo et al. approach until the SEFSC's proposed work is completed and evaluated. Post-evaluation, the SSC can make further recommendations to the Council. Another SSC member thought the SSC should be cognizant of the effects of these analyses on the SEFSC's workload, such that it does not affect the stock assessment calendar. The SSC member also discussed collating a list or table of all previously used criteria and proposed examining the performance of stocks against modifications to catch limits to identify trends and the efficacy of those changes.

Council staff recommended assigning $B_{CRIT}$ by species grouping based on similar life histories, as opposed to individually by species, which may be less feasible based on available data. An SSC member asked whether $B_{CRIT}$ could be calculated from each species-specific stock assessment. Dr. Siegfried replied that it would still be set as a percentage of total biomass but is still sensitive to the time needed for management to modify fishing mortality and thought it could be simulation tested. An SSC member highlighted the need to have well-described tradeoffs between decisions to be made in the control rule, relative to Council goals. Council staff recommended that the SSC representative ask the Council at its August 2024 meeting about any overall goals for its fisheries, like stability in catch limits, on top of stated goals like avoiding fishery closures.

An SSC member asked about the workload and timing for the SEFSC with regard to the proposed work. Dr. Peterson replied that the SEFSC is still adding capacity to its MSE team and will need to complete current work before beginning work on the ABC control rule. The SEFSC anticipates that this work could take about two years. The SSC member replied that discussions about revisiting the Gulf ABC Control Rule has been ongoing for about 10 years already and asked about regional progress with MSEs elsewhere. Dr. Peterson replied that other regions are adopting the use of MSEs for various needs. Council staff noted that the ABC Control Rule MSE work should include considerable stakeholder engagement, and principally with the Council and its SSC.

> **Motion: The SSC recommends that the SEFSC proceed with the MSE analyses proposed to assess the management impacts of different ABC control rules for Tier 1 stocks.**
>
> *Motion carried without opposition*.

## *RESTORE Project Update: Projections Model Review*

Dr. Nathan Vaughan (Vaughan Analytics) reviewed targeted research of his team's RESTORE project, which is a 5-year award that aims to create new modeling technologies to better project the

effects of known variables on future catch limits. The funding supports the development of actionable research products that inform specific management decisions in the Gulf and is intended to facilitate the co-production of science between researchers, resource managers, and stakeholders. The overall goal is to develop and integrate improvements to existing stock assessment methods to inform OFL and ABC decision making for Gulf fisheries. This project will focus on three core areas for stock assessment improvement: realism and accuracy of projections; management advice throughput and robustness; and model interpretability and uncertainty quantification.

Dr. Vaughan discussed realism and accuracy of projections, focusing on how projections are needed to estimate reference points and short-term OFLs. Projections simulations need to account for many factors, like future fishery dynamics, future stock productivity, ecosystem and environmental effects, effects of episodic mortality on benchmarks, selectivity dependent MSY estimates, discards, and more. Dr. Vaughan clarified that the project is currently working in SS and expects to explore the utility of these methods for simpler models. However, in cases where simpler models did not ultimately perform well, it will be important to determine whether that result was due to a data issue, management bias, or another factor.

Dr. Vaughan provided specifics of simulations conducted for red grouper and gag with respect to incorporating red tide mortality. Of note, a single mortality rate is applied across ages for red grouper, whereas an age-specific rate is applied for gag. Dr. Vaughan's red tide simulation assumes fishing occurs at the OFL, which is assumed to have accounted for all uncertainty except red tide. For the purposes of inclusion in models, red tide is incorporated as a discard fleet that depletes the spawning stock biomass (SSB) relative to the unfished SSB. However, changing red tide to a directed removals fleet, or by modifying annual deviations in natural mortality (M), would cause red tide to reduce fished and unfished SSB for calculating benchmarks. This would continue to estimate MSY even under extremely high red tide mortality, which could result in extremely depleted SSB and potential stock collapse. Options moving forward are to include average red tide mortality as done in simulation analysis for all projections, or to quantify an equivalent increase in the SPR proxy target assuming zero red tide (e.g., a ~$F_{SPR40\%}$ proxy may achieve ~$F_{SPR30\%}$ on average, when average red tide mortality is 0.03).

Dr. Vaughan then reviewed selectivity based MSY, which is considerate of different age and length selectivities between directed fishing fleets. Consideration of this does require re-estimation of projections if ever sector allocations changes, and achieved landings often diverge from these assumptions. To determine fleet specific MSY estimates, MSY/OFL is calculated assuming only a single fleet operating by running a projection for each fleet with all other fleets set at F=0. The single fleet F for all fleets is then adjusted to achieve a target MSY proxy like $F_{SPR30\%}$. Status quo landings are then compared at a recent fleet-specific relative F (i.e., no allocations scenario) or to current managed allocations. The total fishery OFL can then be calculated such that the total proportion of fleet specific MSYs sum to 1. Dr. Vaughan discussed an example using bigeye tuna, whereby OFLs could be generated by fleet, with adjustments in allocations made relative to a fleet's impact on the overall MSY. Fleet-specific OFL/ABC values could be made without needing to first consider allocation decisions, which would be the Council's prerogative. Essentially, projections would be run for each fleet, which could be summed for an overall OFL for the stock. An SSC member asked if social and economic data could play a role in the

determination of the proportion of the OFL dedicated to a specific fleet. Dr. Vaughan replied that if those data were available, then a decision could be made externally to adjust the proportion of the OFL going to that fleet.

Dr. Vaughan next discussed discards, which are currently estimated proportional to fishing effort at OFL. This assumption only holds if fishery participants are able and choose to 100% avoid landing a specific species during closed seasons, which is not thought to happen. Assessments that directly model closed season discards, such as red snapper, suggest selectivity overlap with other targeted species and/or catch and release effort is likely. Current approaches therefore present a litigation risk for overfished/overfishing stocks, particularly those under rebuilding plans that depend on significant landings reductions. A possible solution is to set a fleet-specific F in projections in proportion to the recent average F and adjust asymptotic retention to achieve OFL. The proportion used would reflect the relative amount of effort reduction expected ranging from 1 (being no reduction in effort) to 0 (being 100% avoidance of the species). Decisions would be needed to inform how to set the F proportion, i.e., the fishery's targeting ability. Annual asymptotic retention rates would then be estimated to achieve annual total dead discards. Proceeding with this method would require more explicit accounting of discard mortality in catch limits due to changing discard fractions. This explicit accounting raises more questions regarding how changes in discarding behavior or discard mortality rate should be integrated into future catch allocations. If discards are considerable, the continued discarding of fish could significantly extend rebuilding timelines.

In discussing management advice throughput and robustness, Dr. Vaughan highlighted that improvements in data provisioning and automation are expected. In addition, the use of interim analyses can increase the frequency of management advice, ideally to comparative levels of robustness and at consistent intervals. Identifying representative indices is key to an interim analysis being comparative in robustness to a full stock assessment. Dr. Vaughan then described how handling retrospective patterns in results and specifically changes in relative effort between fleets in hindcast model runs was key, and the caveat that the previous stock assessment represents reality.

An SSC member recommended Dr. Vaughan periodically come back to the SSC for continued progress reporting and feedback, due to the scope of the project. Council staff recommended bi-annual presentations to the SSC from Dr. Vaughan, perhaps in February and July each year. Another SSC member recommended further consideration of social and economic factors, given their relevance to certain projects, and offered additional guidance on how to achieve this integration.

## *Review: Regional and Sector-Specific Gulf of Mexico Age, Growth, and Age-length Key Estimation Derived from Otolith-based Ageing*

Dr. Will Patterson (University of Florida, SSC member) provided a presentation on the recent findings on addressing ageing error in Gulf gray triggerfish. This work was funded by the Council given the need to resolve this issue ahead of the next stock assessment, currently scheduled for 2025. A final report will be presented to the Council for consideration in August 2024.

Dr. Patterson provided a summary of life history traits, history of fishery exploitation, and management history of Gulf gray triggerfish. Recently, the attempted SEDAR assessment in 2019 (SEDAR 62), was terminated due to inconsistencies in data and potential for ageing error, resulting in the rationale for the current work completed by Dr. Patterson on estimating ageing error, and potential mitigation strategies. Dr. Patterson emphasized the challenges in using otoliths to age gray triggerfish. These otoliths are abnormal in shape and fragile in nature; thus, many researchers prefer using the dorsal spine as a primary ageing structure rather than an otolith. However, recent literature has highlighted that a previous spine ageing methodology may result in an underestimation of age. Dr. Jennifer Potts (SEFSC) developed a new dorsal spine ageing methodology that produces comparable results to otolith ageing in other bony fishes (Potts et al., 2023)[7].

Dr. Patterson and his team established the following objectives within the contract to assess ageing biases and potential error in previous Gulf gray triggerfish ageing:

1. sample gray triggerfish from landings in the southeastern, northeastern, and western Gulf,
2. estimate fish age via opaque zone counts in sagittal otoliths and translucent zone counts in dorsal spines,
3. validate age estimates for a subset of samples via application of the bomb $^{14}C$ chronometer to eye lens core (age-0 portion) $\Delta^{14}C$ values,
4. test for differences in sex-specific size-at-age and growth estimates among regions and between commercial and recreationally harvested fish, and
5. compute age-length keys (ALKs) by sex, and potentially by region and fishery sector, pending results under objective 4.

At present, Dr. Patterson has compiled three chapters addressing the objectives. Chapter 1 utilized bomb $^{14}C$ to validate gray triggerfish dorsal spine and ageing protocols. Results found that otolith ageing and new spine ageing agree closely with one another and are unbiased; however, precision issues persist with both methods. New dorsal spine protocol ageing was slightly more precise among readers (iAPE = 9.4%) than otolith ageing (iAPE = 10.1%) and read times were 2-3x faster for dorsal spine sections than whole otoliths. High percentages of sexual dimorphism by size and age were present among all aged fish in the study. The authors suggest that for the 2025 gray triggerfish assessment, re-ageing archived spine sections for fish > age-5 is an appropriate solution to produce unbiased age composition estimates.

Chapter 2 utilized the whole otolith, old spine protocol, and new spine protocol comparison using the von Bertalanffy growth model (VBGM) parameters to test for differences between sexes and ageing protocols. Results showed a lack of significant differences in VBGMs between otolith and new spine ageing data, which is consistent with the result that both methods produce accurate age estimates. Authors suggested that moving forward, the new spine ageing protocol proposed by Potts et al. (2023) is an effective approach for informing gray triggerfish growth models, and for producing age composition data for statistical catch-at-age stock assessment models.

Chapter 3 addressed the effect of ageing bias and precision on a statistical catch-at-age stock assessment model for gray triggerfish. This chapter utilized the SEDAR 43 (2015) data input files

[7] https://www.sciencedirect.com/science/article/abs/pii/S0165783623002023

to characterize the effect of the ageing bias. Authors found that ageing bias imparted from the old spine ageing protocol age compositions had a substantial effect on stock assessment results. Dr. Patterson emphasized that it is unclear to what extent the bias may have overestimated productivity, but ageing error likely contributed to the lack of recovery observed in gray triggerfish during the 2000s and 2010s, and likely resulted in not meeting rebuilding goals.

Additionally, Dr. Patterson re-emphasized that re-ageing archived spine samples for fish > age-5 with the Potts et al. (2023) protocol should alleviate ageing error issues revealed during this study. It was noted that for many states, databases are complete or re-ageing is underway for > age-5 gray triggerfish in preparation for the upcoming SEDAR assessment. It was also noted that the Gulf States Marine Fisheries Commission received a presentation on the Potts et al. (2023) method for ageing gray triggerfish and that all states are expected to apply the new ageing methodology in the future.

Dr. Patterson concluded his presentation by highlighting the importance of ageing for gray triggerfish to best manage the stock and noted that the issues surrounding sexual dimorphic growth are likely to persist in the next assessment. He added that ongoing epigenetic research may be able to inform age and sex in the future. The use of eye lens-based bomb $^{14}C$ age validation was used herein to test for ageing bias, but in new ageing methodology may allow for a simpler solution. The SSC commended the authors for their work and highlighted the importance of resolving this issue, echoing the need to re-age gray triggerfish dorsal spines using the Potts et al. (2023) method.

## *Discussion: 2025-2028 Research and Monitoring Priorities*

Council staff reviewed the Council's research and monitoring priorities for the next four-year grant cycle, 2025 – 2028. These priorities are intended to serve as a guide for individuals seeking to understand where the Council hopes to resolve gaps in knowledge or to expand existing datasets. After the SSC and Council review and approve these updated research and monitoring priorities, they are posted on the Council website and sent via letter to NMFS and other relevant federal and state grant agencies for consideration as priority items for funding opportunities. These priorities, if addressed, are expected to measurably improve the Council's abilities to manage federal fisheries per the Magnuson-Stevens Act.

An SSC member voiced concern over the SSC's ability to adequately review and approve the extensive list of priorities on short notice, with some members questioning the utility of having so many items labeled as "Priority A." There was a suggestion to streamline the document by limiting the number of items and categorizing them more selectively into As, Bs, and Cs. This would give the document more focus and make it more useful to funding agencies. The idea of further breaking down priority items and assigning more specific priority codes to each was also discussed, with some members suggesting this could enhance the clarity and effectiveness of the document. However, the Council liaison cautioned against overcomplicating the process and emphasized the importance of strategic thinking in identifying which indices and sampling programs would offer the greatest return on investment.

The SSC also acknowledged the need to evaluate how often these priorities are utilized in securing funding and whether the time invested in developing the list is justified by its impact. This led to a

proposal to explore the practical importance of the document in the context of funding opportunities at a future meeting. The SSC decided to table the final approval of the research and monitoring priorities until a later date, allowing more time to consider the issues raised. The goal is to have a refined and focused list ready for presentation by the November 2024 Council meeting.

## *Public Comment, August 1*

None received.

## *Other Business*

No other business came before the SSC.

**The meeting adjourned at 5:30 pm eastern time on August 1, 2024.**

## *Meeting Participants*

**Standing SSC**
Jason Adriance
Luiz Barbieri
Harry Blanchet
David Griffith
Tiffany Hopper
Jack Isaacs
John Mareska
Paul Mickle
Trevor Moncrief
James Nance (*Vice Chair*)
William Patterson
Dan Petrolia
Andrew Ropicki
Steve Saul
Steven Scyphers
Ralph Townsend

**Council Representative**
Tom Frazer

A list of all meeting participants can be viewed here.