South Atlantic Research and Monitoring Prioritization Plan for 2023-2027

DRAFT FOR COUNCIL REVIEW

This document provides summarized research needs identified by the South Atlantic Fishery Management Council. Highlighted text indicates highest priority topics.

I. Short Term Research Needs for Stock Assessments to be Completed in 2024-2026

- FWC Benchmark assessment for Black Grouper, planned to start in 2026:
  - Resolve the Gag-Black Grouper species identification and landings data issues that stopped SEDAR 48.
  - Obtain more genetic samples of Black Grouper from areas of southeastern US (Texas to North Carolina) to assess potential population structure.
  - Recommendations from SEDAR48 DW:
    - Additional fishery-independent survey effort to supplement the reef visual census index to assess population abundance trends.
    - More observer coverage for the snapper-grouper fishery.
    - Expand TIP sampling to better cover all statistical strata.
    - Need for more biological sampling to obtain age data.
- FWC Benchmark assessment for Hogfish, planned to start in 2024:
  - Conduct genetic sampling to better define the boundaries between the southeast Florida and Florida Keys stock and Georgia through North Carolina stock.
  - Monitor changes in growth that may occur due to reduced fishing pressure on southeast Florida and Florida Keys stock.
  - Recommendations from SEDAR37:
    - Conduct focused life history studies in the FLK/EFL and GA-NC stocks across a range of sizes/ages in order to test for differences in growth, maturity, and fecundity relative to the WFL stock where more information is available.
    - Develop/improve fisheries-independent surveys for the GA-NC stock to specifically track Hogfish abundance.
    - Improve biological sampling of Hogfish in all regions from fishery-dependent data sources.
    - Develop a life history study to ascertain the contribution of males to spawning reproductive potential.
- Red Porgy Operational Assessment, planned to start in 2025:
  - Investigate temporal trends in growth, sex at age, and female maturity.
  - Investigate whether males establish and maintain territories as part of their spawning behavior.
  - Investigate the potential impacts of increased abundance of Red Lionfish and Red Snapper on Red Porgy including predation on juvenile Red Porgy and

competition for prey between Red Porgy and Red Snapper.
    - Include abundance and catch times series to inform projection timeframes including autocorrelation and partial autocorrelations functions, and other recommendations and guidance from the catch level projections workgroup report.

- Blueline Tilefish Operational Assessment, planned to start in 2024:
    - Address life history information gaps noted in SEDAR 50.
    - Evaluate recent survey efforts (e.g., SADL survey) to determine if an independent abundance index can be developed.
    - More detailed spatial information of the catch location. This will assist with interpreting landings data and will assist in dividing ABC between jurisdictions.

- Tilefish Operational Assessment, planned to start in 2024:
    - Explore alternative distributional assumptions for natural mortality for MCBE uncertainty analysis.
    - Consider incorporation of new fishery-independent abundance data and/or life history data from CRP Cooperative Bottom longline survey data, deepwater survey data, SCDNR vertical longline survey, SA deepwater longline survey.
    - The SSC recommends investigating the relationship between recruitment and environmental variability to predict/project recruitment using currently available environmental data given the lag between the terminal year of the assessment and timing for use in management.
    - Collect information on pre-recruit (<age7) abundance, acknowledging this information may be difficult to collect given lack of knowledge on where younger fish are located and what gear could be used to collect them. Consider the use of sonar or ROVs to assess the density of occupied burrows (e.g., Wolcott's work on ghost crabs). Identify current, ongoing, or recent studies regarding stock structure along the east coast of the US. If none exist, collect genetic data on tilefish related to the Cape Hatteras stock boundary.
    - Increase age sampling to improve age composition data.
    - Investigate effects of weather/oceanographic patterns on catchability. Due to the derby style nature of the fishery, the fleet tends to operate in less-than-ideal conditions which may affect catchability and fishery-dependent CPUE.
    - Examine evidence for potential northward range shift.
    - Examine evidence for hermaphroditism in the South Atlantic (specifically the interpretation and applicability of analyses conducted in Gulf of Mexico by Lombardi-Carlson (2012)).
    - Examine evidence for age or size dependence of spawning frequency and spawning season duration.

- Snowy Grouper Operational Assessment, planned to start in 2026:
    - The SSC noted 2 major uncertainties that should be addressed for the next assessment:
        - Uncertainties regarding maximum age assumptions and resulting estimation of natural mortality.
        - Estimation of a Beverton-Holt stock recruitment curve with fixed steepness. Consider not specifying the stock recruitment relationship and

model recruitment as an average value with random residuals. Rather than calculating MSY and BSY from the SR curve, consider alternative proxies.

- Explore the effect of different methods used to develop indices of abundance. Determine why they generate different trends and peaks/valleys and how best to treat these data.
- Explore MRIP data in greater detail to a) understand what causes outliers (e.g., 2012), b) determine potential for bias in discard estimates, and c) determine how best to treat these data in the assessment.

- King Mackerel Operational Assessment, planned to start 2025:
  - Provide a means to model projected discards in a manner that relaxes the assumption that discards would increase/decrease in proportion to changes in the landings.
  - Explore alternative age references, or age-specific time series for the SEAMAP and NEAMAP fishery independent survey.
  - Explore model sensitivity to the exclusion of sub-legal fish observations. Explore assumptions regarding the size/age of discards and bycatch.
  - Evaluate model sensitivity to the age-data and explore alternative parameterizations (such as inverse age-length key).
  - Explore cause of high max gradient for the model. Describe the cause and implement improvements feasible.
  - As feasible, explore the possibility to include a sensitivity run with FISHStory length data (1950s-1970s).

II. Assessment Research Priorities

- General assessment topics
  - **Identify potential sources of recent recruitment declines in several reef fish species in the South Atlantic, including Black Sea Bass, Gag, Red Grouper, Red Porgy, and Scamp/Yellowmouth Grouper.**
  - Evaluate assessment projection performance, considering their ability to estimate landings, recruitment, and biomass levels.
  - Evaluate sample size cutoffs for using age and length compositions. What should be the minimum standards, and how does this interplay with the number of age and length classes modeled in the assessment?
  - Initiate long-term continuous monitoring of age structures and age validation for species listed as Level 1 in Table 1.
  - Evaluate estimation of the Stock-Recruitment relationship (SRR) and steepness parameter used in SA assessments and update the prior distribution analysis used as proxy steepness values (Shertzer and Conn, 2012) based on developments in stock assessment science and SRR estimation since its publication.
  - Incorporate recommendations and guidance from the SSC catch level projections workgroup report in developing rebuilding plans and catch level projections.
  - Evaluate current methods for determining regime shifts, particularly with

respect to multispecies fisheries.

- Evaluate potential interspecies effects of rebuilding or managing one species of a multispecies fishery to harvest MSY. Can all of a group of co-occurring and co-caught species be harvested at MSY as currently estimated?
- Research needs for protogynous stocks, particularly groupers, Hogfish, Red Porgy, and Black Sea Bass:
  - Investigate possible effects of hermaphroditism on the steepness parameter.
  - Investigate temporal patterns in sexual transition and develop explanations for any patterns identified.
  - Investigate methods for incorporating the dynamics of sexual transition in assessment models.
- MRIP presentation to provide catch series for data limited species and rare events – data limited PSE >50% for 1/3 years between 1990 to current or PSE >50% for 5 years since 2010. Provide guidance on how to deal with extreme values that are not observed in other data series.
- Simulate impact of carry-over for stocks with stock assessments, where feasible (not overfished and/or not overfishing).
- Develop monitoring programs to estimate recruitment or investigate non-traditional datasets such as bridge net survey to determine feasibility of use.
- Gather quantitative information on the extent to which shark predation may be influencing fishing-based or natural mortality for Council managed species.

- Spanish Mackerel
  - **Describe observer coverage of fisheries that catch Spanish Mackerel (gillnets, cast nets, handlines, pound nets, and shrimp trawls) for bycatch estimates.**
  - **Develop a fishery-independent survey for pelagic species to decrease reliance on a fishery-dependent index of abundance that has unexplained trends in residual values in recent years.**
  - Examine how schooling or migratory dynamics may influence the catchability of the species. In particular, research the assumption of the hyperstability of indices that sample the schooling portion of the stock.
  - Evaluate stock structure using updated data and modern techniques, such as genetics.
  - Re-investigate growth parameters and potential impact on stock assessment model.
  - Conduct research to help inform the selectivity function of the cast net fishery.
  - Evaluate fleet structure (e.g., grouping of shore and private recreational modes).
  - Conduct an evaluation of MSY proxies and timeseries for average recruitment for next assessment.
  - Evaluate different methods to estimate natural mortality.
  - Describe changes in phenology of the fishery off the Carolinas and potential causes.

- Gag
  - Sample juvenile and spawning Gag to identify important spawning populations.

- Identify factors contributing to decreased recruitment.
- Monitoring recruitment through non-traditional datasets such as channel net sampling.
- Incorporate length composition from the video survey, as feasible. As indicated in the report, "The utility of the SERFS video index for future assessment could be improved if length information of observed fish were available to inform the selectivity of the index."
- Better characterize the reproductive dynamics of gag (e.g., sex ratio, maturity schedule, batch fecundity, spawning seasonality, and spawning frequency, sperm limitation) Develop recruitment indices:
  - Recreational catches in inland waters (MRIP definition) as an indicator of recruitment.
  - Estuarine habitat traps (oyster shell traps), Witham collectors, and oyster culture trays.
  - Channel net sampling or
  - Chevron trap catches of ages 1-3

- Red Snapper
  - Document spawning migrations or aggregations and return of fish to non-spawning areas.
  - Evaluate the frequency and magnitude of recruitment coming from other regions such as the Gulf of Mexico or areas to the south.
  - Evaluate the effects of environmental variation on recruitment and survivorship.
  - Obtain empirical estimates of natural mortality for all ages in the US South Atlantic with a special focus on ages < 7.
  - Investigate possible historical changes in sexual maturity. The current estimate of age of sexual maturity is low and unusual for other Lutjanids.
  - Quantify egg size and quality as well as batch size by age, especially for young females.
  - Estimate discard mortality associated with different release techniques, gear, and size classes.
  - Monitor impact of climate change on distribution and peak spawning. Incorporate findings in assessment if found to be important.

- Black Sea Bass
  - Investigate the potential for a range shift in the black sea bass population, and the potential causes, such as climate change. Determine if stock boundaries should remain at their current boundary.
  - Estimate discard mortality associated with different release techniques, gear, and areas.
  - Identify factors contributing to decreased recruitment.
  - Re-investigate growth model assumed for stock assessment using traditional datasets and mark-recapture data; non-asymptotic growth curve could lead to issues estimating MSY.
  - Collect data on size/age of released fish in general recreational fishery to inform selectivity.

- Blueline Tilefish

    - Develop aging techniques for future Blueline Tilefish age structured stock assessments.
    - Evaluate catch estimate and rates in SEFHIER and MRIP Charter mode to determine appropriate data stream to include in upcoming stock assessment.

- Red Grouper
    - Evaluate the frequency and magnitude of recruitment coming from other regions such as the Gulf of Mexico or areas to the south.
    - Identify factors contributing to decreased recruitment.
    - Update reproductive biology parameters and evaluate potential latitudinal variation in spawning characteristics.
    - Incorporate index of abundance of South Florida Red Grouper

- Mutton Snapper
    - Conduct a multi-year study to collect age and gonad samples at spawning sites during the spawning season. This should entail identifying the diurnal usage patterns at spawning sites during the year.

- Yellowtail Snapper
    - Examine the effects of anthropogenic noise on catchability.

- Obtain life history traits for priority unassessed species: Almaco Jack, Atlantic Spadefish, Gray Snapper, Hogfish (GA-NC stock), Lane Snapper, and White Grunt (both stocks); provide von Bertalanffy growth parameters, maturity, and reproductive rates.

- Collect genetic samples to develop baseline information or for future use in:
    - Stock structure
    - Aging
    - Close Kin Mark Recapture

- Dolphin and Wahoo
    - Obtain updated life history traits; provide von Bertalanffy growth parameters, maturity, and reproductive rates.
    - Better define migratory patterns.
    - Define potential stocks and stock boundaries.
    - Define drivers of stock productivity and recruitment.
    - Better define warm season distributions relative to water temperature with emphasis on the south Florida.

III. Research Needs for Managed Areas (Spawning SMZs and Deepwater MPAs).

- Document occurrence of spawning within Spawning SMZs by high priority species in the Snapper Grouper complex (needed before 2025).

- Characterize usage of Deepwater MPAs by managed species.

- Develop annual monitoring to collect data inside and outside managed areas to enable

comparison among managed sites and reference sites. Identify fish population demographics (e.g., size and age structure, sex ratio, species use of habitat by life stage, spawning activities, etc.) within and adjacent to the managed areas.

- Complete multibeam surveys of the MPAs.
- Evaluate compliance with regulations for managed areas.
- Use hydrodynamic modeling to assess connectivity between MPAs and other habitats.

IV. Management Research Needs

- Climate Change Related Priorities
  - Develop models to predict suitable areas for shallow-water and deep-water coral as climate changes (e.g., deep water coral distribution model).
  - Integrate recommendations from the 2023 Climate Change Scenario Planning summit and final report.
- Develop models to predict changes in managed fish populations due to climate change, including changes to species' distribution, movements, and reproductive patterns. Species of particular interest include Dolphin, King and Spanish Mackerel, shrimp, and Wahoo. Expand existing fishery independent monitoring programs and implement additional monitoring programs required to ensure survey coverage of the resources managed by the Council. Programs are required to cover the complete range and life history stages of managed stocks and include their forage and prey.
- Improve estimates of King and Spanish Mackerel recreational catch through a permit or additional data collection techniques.
- Social and Economic Priorities:
  - Evaluate the cumulative economic and social implications of existing regulations on the multi-species Snapper Grouper fishery in the South Atlantic.
    - Describe the impact of the limited entry system on underserved communities.
  - Provide regularly updated estimates of recreational economic values for Council managed species.
    - Expand the list of species covered by these estimates.
    - Provide information on how changes in allocation or species availability influence recreational net benefit estimates.
    - Develop or expand economic value estimates that focus on angler opportunity rather than realized harvest (abundance, catch rates, opportunity to harvest a given bag limit, etc.).
    - Develop methods that allow economic value information to be updated on a regular basis.
  - Develop estimates or models for the response of angler behavior to regulation changes for Council managed species.
  - Develop a socio-economic profile and an economic impact model for the South Atlantic headboat component of the for-hire sector.
  - Conduct an economic analysis on the capacity of the commercial Snapper

Grouper fishery.
    - Develop net revenue estimates generated from the sale of Council managed species for seafood dealers.
    - Develop a study to quantify current and baseline access to fishing infrastructure throughout the south Atlantic region to evaluate community dependance and cultural importance of fishing activities.
    - Develop a socio-economic profile of commercial and recreational participants involved in Council managed fisheries (commercial captain and crew, for-hire captain and crew, private, charter, or headboat anglers, etc.).
    - Explore management alternatives that would facilitate overlapping harvest seasons to allow commercial boats to minimize economic costs, particularly through fuel savings and reduction of the industry's carbon footprint.
- Characterize usage of and evaluate compliance with the best practices recommendations for reducing discard mortality in the snapper grouper fishery. Develop or modify fishery dependent reporting programs to collect the information necessary to address this need.
- Development of updated annual trap and video indices and SEAMAP for all managed species effectively sampled by the fishery-independent surveys.

V. Habitat Research and Monitoring Needs

- Map and Characterization of EFH
    - Map and characterization of mesophotic coral and euphotic coral distribution in the South Atlantic region.
    - Characterization of use and change of SAV habitat used by managed species.
- Monitor Health of Habitats
    - Document essential fish habitat loss over time (e.g., wetland and SAV).
    - Monitor health of coral reef systems.
    - Evaluate changes in estuarine and near coastal water quality and estimate impact of poor water quality on habitat and recruitment for federally managed species and their prey.
    - Project potential losses of estuarine primary productivity related to sea level rise and loss of saltmarsh habitat.
- Analyze Anthropogenic Impacts
    - Estimate impacts of fishing gear on EFH including coral, coral reefs and live hard bottom habitat.
    - Compilation of the impacts of sand and sediment dredging on estuarine dependent species.
    - Investigate potential impacts of materials from space launches being dropped into the South Atlantic region.
    - Conduct more regional research on economic costs/loss to purchase oceanfront properties as opposed to spending funds to renourish beaches.
- Collect data and research necessary to move EFH classifications from Level 1 Presence Absence to higher tiers.

    - Expand characterization of juvenile reef fish use of habitat.
    - Use of surveys to collect early life stage habitat.
    - Understand connection of habitat type, location, and recruitment of spiny lobster.
- Develop a Habitat Assessment for the South Atlantic Region
- Seek novel opportunities to cooperatively expand long term monitoring (e.g., new sensors on offshore wind platforms- acoustic, cameras monitoring fishing effort, local cell phone coverage, etc.).
- Implementing actions to support SASMP sustaining saltmarsh in the Southeast.
- Develop models that better incorporate habitat changes and environmental variability into stock assessments (e.g., habitat suitability).
- Re-evaluate the abundance and distribution of Atlantic Sargassum relative to trends in the Gulf of Mexico.
- Determine if warmer winters are disrupting natural recruitment mechanisms of larvae and postlarvae (i.e. brown shrimp) to the estuaries
- Determine rates of recruitment of fouling fauna and recruitment of motile fauna to proposed concrete blankets to cover windfarm power lines.
- More closely identify optimal salinities for early life phases of penaeid shrimp and examine relative abundance, survival rates and growth rates of young shrimp in habitats near the saltwater/freshwater interface in the upper estuary
- Assess the relative shrimp productivity of freshwater marsh vegetated habitat relative to saltmarsh vegetated habitat.

VI. Specific Monitoring Priorities

- Increase funding for fisheries independent monitoring in the South Atlantic. Specific needs include:
    - Restoring MARMAP funding to a minimum of $850,000 annually.
    - Maintaining funding for SEAMAP at levels sufficient to support long-term fishery independent survey operations.
    - Maintaining funding for SEFIS to support video survey work.
    - Increasing funding for SEFIS to support the use of stereo cameras, or other such technology, to measure fish length during the video survey.
    - Providing funding for the MPA/SMZ monitoring needs noted above.
- Implement a monitoring and research program to address issues relevant to ecosystem management. Topics include trophic interactions, food preferences, predator-prey relationships, and ecosystem connectivity.
- Develop and implement new methods for decreasing uncertainty of recreational catch estimates for federally managed offshore species, including but not limited to

enhancements to the MRIP survey, add-on surveys, and new methods for collecting recreational catch data.

  - The Council specifically requests that NMFS complete the work of the MRIP rare event species estimation working group by March 31, 2024, and provide a final report on the groups' recommendations for review by the SAFMC SSC in April 2024.

- Evaluation of commercial discard logbook program and provide comparison between observer estimates and logbook estimates.
- Evaluation of SEFHIER Program. Report on the SEFHIER Program to include compliance rates and comparison between MRIP and SEFHIER estimates by March 2025 and available for SSC review in April 2025.
- Improve estimates of commercial discards and make timelier for use in SAFE reports.

VII. Specific Annual Reporting Requests

- Provide by June 1 annually, SAFE reports that provide stock status including OFL and MSY, an evaluation of the management program including whether ACLs were met, or AMs triggered and addressing reasons for such, results of independent fisheries monitoring, complete landings and discard losses in weight and numbers of fish, fishery dependent monitoring statistics, and measures of effort and economic value for all managed stocks.
- Provide, by October 1 annually, a report on the SERFS program for the previous year's work that includes:
  - Survey sampling effort (number of sets; include a map of sampled sites), biological sampling intensity, (number of length and age structures by species)
  - Data will include the previous year's trap data, and video data from two years back.
  - Abundance indices and trends for Level 1 and 2 stocks listed in Table 1.
- Provide annual progress reports, by the SEFSC at the June Council meeting, detailing efforts to implement the research recommendations noted in Council Research and Monitoring Plans.

Table 1. SAFMC Assessment Priorities. Years are anticipated years of delivery.

Stock	Level**	Assessment Status. **Bold** indicates approved by SEDAR Steering Committee.
Black Grouper	1 (2)	2017 Benchmark attempt, 2026 Benchmark; data issues with Gag
Black Sea Bass	1	**2023 Operational**
Blueline Tilefish	1	**2024 Operational**
Dolphin	1/3	2026 SEFSC MSE; Needs international cooperation & approach
FLK/EFL Hogfish	1	**2025 FWC Benchmark**
Gag	1	2025 Operational
GA-NC Hogfish	1 (2)	2014 Benchmark (failed review), Data issues limit future assessment
Golden Tilefish	1	**2024 Operational**
Gray Snapper	1	not scheduled at this time
Gray Triggerfish	1 (2)	**2022/23 Research Track**; **2024 Operational**; ageing issues
Greater Amberjack	1	2020 Standard, 2026/2027 Research Track
King Mackerel	1	2020 Update, 2025 Operational
Mutton Snapper	1	**2023/2024 FWC Benchmark**
Red Grouper	1	**2023 Operational**
Red Porgy	1	2020 Standard, 2025 Operational
Red Snapper	1/3	2021 Operational, 2024/2025 Research Track
Scamp	1	**2020/21 Research Track, 2022 Operational**
Snowy Grouper	1	2020 Update, 2026 Operational
Spanish Mackerel	1	**2022 Operational**
Spiny Lobster	1/3	not scheduled at this time
Vermilion Snapper	1	**2023 Interim Analysis**
White Grunt	1	not scheduled at this time
Yellowtail Snapper	1	2020 Benchmark
Almaco Jack	2	not scheduled at this time, ID issues with Greater Amberjack
Atlantic Spadefish	2	not scheduled at this time
Banded Rudderfish	2	not scheduled at this time
Bar Jack	2	not scheduled at this time
Knobbed Porgy	2	not scheduled at this time
Lane Snapper	2	not scheduled at this time
Red Hind	2	not scheduled at this time
Silk Snapper	2	not scheduled at this time
Tomtate	2	not scheduled at this time
Wahoo	2	not scheduled at this time
Penaeid Shrimp	2	not scheduled at this time
Golden Crab	3	not scheduled at this time
Goliath Grouper	3	2016 attempt, multiple data issues
Nassau Grouper	3	not scheduled at this time
Speckled Hind	3	not scheduled at this time
Warsaw Grouper	3	not scheduled at this time
Wreckfish	3	2014 industry funded assessment

Level 1: High data collection priority, age-based assessment goal
Level 2: High data collection priority, data limited or non-age-based assessment goal
Level 3: Management actions or biological traits impede typical assessment approaches