NOAA Fisheries EBFM Implementation Plan – South Atlantic Region

1.0 Introduction

NOAA Fisheries has long recognized the importance of ecosystem-based fisheries management (EBFM), and released a national EBFM policy in 2016 (National Marine Fisheries Service (NMFS) Policy Directive 01-120; May 23, 2016). NOAA Fisheries defines EBFM as "a systematic approach to fisheries management in a geographically specified area that contributes to the resilience and sustainability of the ecosystem; recognizes the physical, biological, economic, and social interactions among the affected fishery-related components of the ecosystem, including humans; and seeks to optimize benefits among a diverse set of societal goals."

To implement EBFM, the Policy identifies and outlines six guiding principles:

1. **Implement ecosystem-level planning**
2. **Advance our understanding of ecosystem processes**
3. **Prioritize vulnerabilities and risks of ecosystems**
4. **Explore and address trade-offs within an ecosystem**
5. **Incorporate ecosystem considerations into management advice**
6. **Maintain resilient ecosystems**

This Road Map is intended to communicate how the Southeast Regional Office (SERO) and the Southeast Fisheries Science Center (SEFSC) are working, internally and with partners, to move EBFM forward in the southeastern US Atlantic (hereafter South Atlantic) region.

2.0 Regional Context

The southeast United States Atlantic (SEUSA) coastal region encompasses a large area (> 100,000 km2) between Cape Hatteras, North Carolina, and Key West, Florida. The width of the continental shelf (< 100 m deep) varies in the region, ranging from ~ 10 km in southern Florida to over 120 km off Georgia. The dominant oceanographic feature of the region is the Gulf Stream, a warm and powerful ocean current that originates in southern Florida and moves northward along the southeast coast of the United States. The Gulf Stream strongly influences the oceanographic and temperature dynamics in outer continental shelf waters, whereas the inner and middle shelves are dominated by river runoff, local winds, and Gulf Stream eddies (Atkinson et al. 1985; Lee et al. 1991). The Gulf Stream is also partly responsible for cold water intrusions (i.e., upwelling) that occur during summer months in some years as far inshore as the inner shelf, especially in southern and central Florida and North Carolina, where the Gulf Stream approaches closest to shore (Lee and Pietrafesa 1987). Upwelling typically occurs when the Gulf Stream is more intensive and shoreward located and southwest winds are consistently strong, causing deep, cold, nutrient-rich waters to upwell and replace surface waters that have been pushed northward

and eastward (Aretxabaleta et al. 2006; Hyun and He 2010). Gulf Stream-induced upwelling events occur approximately every ten days (Atkinson 1977, Lee & Atkinson 1983, Hyun & He 2010) and are the primary source for delivery of nutrients to SEUSA waters.

The interactions between the Gulf Stream and continental shelf waters influence the distribution and production of the benthic and pelagic fishes in the region (Lee et al. 1981; Atkinson et al. 1987). Substrates on the continental shelf and shelf-break consist primarily of sand and mud, but patches of hard, rocky temperate reefs also exist throughout the region (Miller and Richards 1980; Schobernd and Sedberry 2009). Various pelagic fish species occur over hard and soft bottom substrates (e.g., scombrids, carangids, clupeids, engraulids), while benthic fishes tend to occur over soft or hard bottom substrates, but generally not both. For instance, various sciaenids, sparids, paralichythids, triglids, malacanthids and others occur over soft substrates (Walsh et al. 2006), while lutjanids, serranids, balistids, haemulids and others mainly occur over hard substrates (Bacheler et al. 2013). The SEUSA region is also home to tropical coral reefs off southeastern Florida and the Florida Keys, with associated diverse fish communities, as well as deep-water coral pinnacles ranging from Florida to North Carolina (Lumsden et al. 2007). Diverse recreational and commercial fisheries occur in the region, the most common being hook-and-line fisheries for various reef fish species (Low et al. 1985; Rudershausen et al. 2008). The warming influence of the Gulf Stream allows tropical and subtropical species to inhabit areas at least as far north as North Carolina (Miller and Richards 1980), especially in deeper water (Whitfield et al. 2014).

The South Atlantic Fishery Management Council (SAFMC), in cooperation with NOAA Fisheries has been proactive in including Ecosystem Based Fisheries Management (EBFM) in their management strategy.

In 2009, the SAFMC recognized habitat protection as a factor in the move to EBFM in the region and evolved the South Atlantic Habitat Plan into the South Atlantic Fishery Ecosystem Plan (FEP). The original FEP served as a source document describing the South Atlantic ecosystem and the impact of fisheries on the environment. This approach required a greater understanding of the South Atlantic ecosystem and the complex relationships among humans, marine life, and the environment including essential fish habitat. SAFMC adopted broad goals for EBFM including: maintaining or improving ecosystem structure and function; maintaining or improving economic, social, and cultural benefits from resources; and maintaining or improving biological, economic, and cultural diversity.

Since the original FEP, the SAFMC has developed and implemented EBFM plan amendments with the objective of protecting deepwater coral ecosystems in the South Atlantic. In 2010, Comprehensive Ecosystem-Based Amendment (CE-BA 1) was implemented, which protects specific areas of sensitive habitat, deemed Coral Habitat Areas of Particular Concern (Coral HAPCs). These Coral HAPCs house deepwater coral species living in waters ranging from 400 meters (1200 ft.) to 700 meters (2300 ft.). The South Atlantic region is home to what may be the largest contiguous distribution of deepwater corals in the world, including the common *Lophelia* coral, largely responsible for reef mound construction in these cold-water areas. The parameters defined within the amendment aim to shield these areas from impacts associated with bottom-tending fishing practices.

In 2012, Comprehensive Ecosystem-Based Amendment 2 was implemented, which included modifications in the management of octocorals; changes to the sea turtle release gear requirements for the snapper-grouper fishery based upon freeboard height of vessels; and amends FMPs to designate or modify essential fish habitat (EFH) and EFH-HAPCs, including the FMP for Pelagic *Sargassum* Habitat; the Coral FMP to designate EFH for deepwater Coral HAPCs designated under CE-BA 1; and the Snapper-Grouper FMP to designate EFH-HAPCs for golden and blueline tilefish and the deepwater marine protected areas.

In 2015, the SAFMC began development of FEP II, and its online portal, in cooperation with NOAA Fisheries, as a mechanism, to incorporate ecosystem principles, goals, and policies into the fishery management process. FEPs are developed to provide the SAFMC with a clear description and understanding of the fundamental physical, biological, and human/institutional context of ecosystems within which fisheries are managed. The FEP also identifies information needed and how that information should be used in the context of fishery management plans (FMPs). SAFMC policies developed through the process support data collection, model, and supporting tool development and implementation of FEP II.

The FEP II was developed by writing and review teams established by the SAFMC's Habitat Protection and Ecosystem Based Management Advisory Panel, and experts from state, Federal, NGOs, academia and other regional organizations and associations. FEP II is a continually developing online information system presenting documents and online systems with updated information on species, habitat, fisheries and research. FEP II addresses South Atlantic food webs and the implications of climate variability on fisheries. The FEP II considers in future management of fisheries and habitat in the South Atlantic, including long-term information needs, as well as available models, tools, and capabilities needed to advance to EBFM in the region.

3.0 South Atlantic Region Milestones and Priority Activities

NMFS is currently pursuing, or plans to pursue, the following priority activities focused in or on the South Atlantic region:

1. (ongoing) Develop a South Atlantic Ecosystem Status Report.
2. (ongoing) Continue multi-species / aggregate production modeling
3. (ongoing) (add SERO-led activities here, as appropriate – Develop Community Vulnerability Analysis for the South Atlantic
4. (planned) Complete a multi-species Climate Vulnerability Analysis
5. (ongoing) Coordinate with the SAFMC on ecosystem-related activities, including (1) implementation of the SAFMC Fishery Ecosystem Plan II, and (2) SAFMC-led ecosystem modeling activities

In addition to these priority activities, NMFS, working with partners including the SAFMC, federal and state agencies, and academia, will continue, implement or plan to implement pursuit of the milestones listed in Table 1.

Table 1: Action Items and Milestones to Implement Ecosystem-Based Fisheries Management in the South Atlantic

Principle 1: Ecosystem Level Planning			
Road Map Action Item (Road Map #)	**Status**	**Associated Milestone(s)**	**SERO Organizational or Science Priorities**
Establish EBFM Point of Contact at each Regional Office, Fisheries Science Center (1a1)	Continuing	• Identify SEFSC and SERO points of contact (s) (s) to coordinate EBFM initiatives.[1]	Org SFD 5 - Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program
Develop National and Regional EBFM engagement strategies (1a2)	Continuing	• Continue to work with the SAFMC on EBFM issues and strategies. The SAFMC has adopted broad goals for EBFM including: maintaining or improving ecosystem structure and function; maintaining or improving economic, social, and cultural benefits from resources; and maintaining or improving biological, economic, and cultural diversity.	Org SFD 5 - Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program

[1]SERO has identified an EBFM Coordinator, to liaise with Headquarters in the development of the EBFM Implementation Plan Roadmaps, as well as staff from each region to assist in the development and implementation of regional plans.

NOAA Fisheries supports any Ecosystem Plan Development Teams, Ecosystem Committees (or equivalent groups) that Councils establish (1a5)	Continuing	• Coordinate with the SAFMC on the implementation of FEP II. • Continued NOAA Fisheries SEFSC and SERO participation on, and/or coordination with, the SAFMC Habitat Protection and Ecosystem Based Management Advisory Panel.	Org SFD 5 - Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program
Establish Fishery Ecosystem Plan Coordinator/Analyst for each NOAA Fisheries Regional Office and in appropriate Headquarters Office (1b1)	Mid	• Identify SEFSC and SERO point of contact(s) to enhance coordination between SERO, SEFSC and the SAFMC related to the South Atlantic FEP II implementation	Org SFD 5 - Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program
Review and develop inventory of existing Fishery Ecosystem Plans and Ecosystem Considerations in fishery management plans, documenting best practices (1b2)	Short	• Identify and consolidate available climate change and ecosystem-based management guidance and incorporate this information into SERO products and analyses. • Explore the idea of adding ecosystem considerations section to the stock assessment process. • Explore the development of ecosystem considerations chapter to be added to fishery management plan amendments.	Org SFD 5 - Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program

Assist Councils, Commissions, regional fisheries management organizations, and other bodies as requested, in their development of new, or revision of existing Fishery Ecosystem Plans (1b3)	Continuing	• Continued coordination with the SAFMC on the implementation of FEP II [2]	Org SFD 5 - Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program

[2] FEP II has been developed for the South Atlantic region, led by the South Atlantic Fishery Management Council with input from SERO, SEFSC, other agencies , academic personnel, NGOs and other regional organizations and partners. Under this milestone, support for the FEP II would continue.

Principle 2: Advance our understanding of ecosystem processes			
Road Map Action Item (Road Map #)	**Status**	**Associated Milestone(s)**	**SERO Organizational or Science Priorities**
Develop and maintain core data and information streams (2a4)	Continuing	• Continue large-scale fishery-independent surveys (SEAMAP-SA Coastal Trawl Survey, Southeast Reef Fish Survey, NMFS-SEFSC longline survey) and fishery-dependent surveys (commercial and recreational sector sampling)[3]	Org SFD 53 Coordinate fishery-dependent data collection among all sources, including states, and transition to electronic reporting. SERO Science Priority - Continue to invest in maintaining and improving the fishery-dependent data for the reef fish and snapper-grouper fisheries that are crucial inputs for stock assessments. SERO Science Priority - Characterize the species composition, age, sex, size, fecundity, genetics, and disposition of all snapper-grouper, reef fish, dolphin wahoo, and coastal migratory pelagic species that are captured in commercial and recreational fisheries and are expected to be assessed in the next 3-5 years
Establish routine, regular and dynamic reporting of ecosystem status reports for each large marine ecosystem (2b2)	Continuing	• Develop an Ecosystem Status Report for the South Atlantic, providing updates to and seeking input from relevant partners, including SAFMC staff and the SAFMC Habitat Protection and Ecosystem Based Management Advisory Panel. •	SERO Habitat Science Priority - Expand modeling efforts related to ecosystem scale processes. This is being done through the Ecosystem Status Report and some related IEA-funded work.

[3] The Southeast Reef Fish Survey (SERFS) is a trap-video survey that is a cooperative effort between the MARMAP / SEAMAP-SA group (SCDNR) and the SEFIS group (NMFS-Beaufort).

Principle 3: Prioritize vulnerabilities and risks of ecosystems			
Road Map Action Item (Road Map #)	**Status**	**Associated Milestone(s)**	**SERO Organizational or Science Priorities**
Ensure that factors which impact managed species are being considered (3b1)	Continuing	• Complete South Atlantic Climate Vulnerability Analyses to identify species where factors may affect the population. • Use multiple approaches, including Ecosystem Status Reports and ecosystem modeling, to identify ecosystem factors affecting managed species	Org SFD 5 - Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program.
Conduct Fishing Community vulnerability assessments (3b3)	Short	• Conduct community vulnerability assessments for the South Atlantic. This item is partially dependent upon the development of species specific vulnerability indices identified in 3b1. [4]	Economics and Human Dimensions Science Priority - Develop community level species vulnerability and catch diversity measures based upon the species diversity indices being developed.

[4] Accomplishment of community vulnerability assessments will depend upon the development of the biological species vulnerability indices that are used to create the community species vulnerability measures. Once those measures are available, a protocol similar to what has been developed in other regions will be implemented to create measures that target a community vulnerability to climate change related to species vulnerability.

Principle 4: Explore and address trade-offs within an ecosystem			
Road Map Action Item (Road Map #)	**Status**	**Associated Milestone(s)**	**SERO Organizational or Science Priorities**
Assess and bolster ecosystem and living marine resource modeling needs in the Southeast Fishery Science Center (4a1)	Short-Mid	• Increase capacity and support for ongoing ecosystem modeling efforts in the region.[5]	Org SFD 30 - Model ecosystems at spp.-complex level or even single species level.
Explore novel Harvest Control Rules (HCRs) and develop associated guidelines, as appropriate and consistent with National Standards, especially to test & explore robust Ecosystem Level strategies (4b2)	Long	• Continue ongoing multispecies production modeling • Continue to evaluate population-level stock boundaries (potentially differing from jurisdictional boundaries) for use in assessments	Org SFD 30 - Model ecosystems at spp.-complex level or even single species level.

[5] The SEFSC continues to enhance and refine data-limited assessment models, which is a science priority for SERO, but even those models will require data enhancements that may not be forthcoming in the near- or mid-term.

Principle 5: Incorporate ecosystem considerations into management advice			
Road Map Action Item (Road Map #)	**Status**	**Associated Milestone(s)**	**SERO Organizational or Science Priorities**
Delineate, evaluate, and explore best practices for estimating and using system-wide or aggregate group harvest limits, eco production measures, and other ecosystem level reference points, to inform management decisions (5a1)	Mid	• Continue development of multispecies production modeling • Continue support for SAFMC-led ecosystem modeling.	Org SFD 30 - Model ecosystems at spp.-complex level or even single species level.
Support consistent and effective implementation of the NS1 guidelines, which includes guidance on incorporating ecosystem information into stock management (5b2)	Mid	• Consider including an "Ecosystem Considerations" section for review and incorporation in stock assessments.[6]	Org SFD 5 - Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program
Identify best practices for	Short-Mid	• Consider including ecosystem	Org SFD 5 -

[6] Including an "Ecosystem Considerations" section would identify ecosystem-related information relevant to stock assessment and management, for consideration when making management decisions. Similar ecosystem sections are included in stock assessment reports in other regions.

Principle 5: Incorporate ecosystem considerations into management advice			
Road Map Action Item (Road Map #)	**Status**	**Associated Milestone(s)**	**SERO Organizational or Science Priorities**
incorporating ecosystem considerations into management decisions (5b3)		considerations chapter in fishery management plans.	Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program
Explore protocols for considering ecosystem-level information in essential fish habitat reviews, identifying ecosystem-level habitat areas of particular concern, and setting habitat conservation objectives and/or indicators (5c1)	Short	• Evaluate ecosystem information and needs to incorporate ecosystem-level information supporting spatial management and habitat conservation objectives/indicators in future EFH updates and 5-year EFH reviews.	Habitat Science Priority - Conduct research to enable EFH designations to include complex, guild, or life-stage specific designations. Org SFD 5 - Serve on and provide support services to the NMFS National and Regional Integrated Ecosystem Assessment Program.
Finalize and implement National Bycatch Reduction Strategy (5c2)	Short	• Continue to evaluate the Standardized Bycatch Reporting Methodologies (SBRM) in each FMP.[7]	Org SFD 16 - Evaluate current standardized bycatch reporting methodologies based on the SBRM final rule. Focus new standardized bycatch reporting program

[7] Considerations for bycatch reduction in the South Atlantic region have been included in the NOAA Fisheries National Bycatch Reduction Strategy published in December 2016. Implementation plans are in development. In addition, new guidance on criteria to be used when evaluating standardized bycatch reporting methodology (SBRM) in FMPs was provided in a final rule published on January 19, 2017. SERO staff will continue to work with the SAFMC to review the SBRMs in their FMPs. Reviewing SBRMs and

Principle 5: Incorporate ecosystem considerations into management advice			
Road Map Action Item (Road Map #)	**Status**	**Associated Milestone(s)**	**SERO Organizational or Science Priorities**
			efforts and improvements on fisheries with bycatch across a range of species to maximize the potential of future bycatch reduction efforts

making improvements to bycatch reduction and reporting methodology is one of SERO Sustainable Fisheries Division's organizational priorities.

Principle 6: Maintain resilient ecosystems			
Road Map Action Item (Road Map #)	**Status**	**Associated Milestone(s)**	**SERO Organizational or Science Priorities**
Evaluate, conduct and track ecosystem goods and services valuation methods and best practices (6a2)	Mid	• Begin to develop methods and best practices to evaluate, conduct and track ecosystem goods and services in the South Atlantic. [8]	SERO Science Priority - Examine the social and economic effects on fishermen, their families, and their communities of coastal development and coastal land management in the U.S. Caribbean, including, but not limited to, impacts on participation and production in the commercial, recreational, and subsistence fishing sectors
Develop best practices for tradeoff evaluation with respect to overall ecosystem and community resilience and well-being (6a3)	Mid	• Begin to develop best practices for evaluating tradeoffs between overall ecosystem health, community resilience and well-being. • Develop commercial and recreational engagement and resilience measures at county level to support ecosystem status report.	SERO Science Priority - Develop community level species vulnerability and catch diversity measures based upon the species diversity indices being developed. Org SFD 50 - Continued development and improvement of social indicators and community vulnerability tools for application to the social/community effects of proposed management changes
Explore community	Mid	• Build upon work using measures of	Org SFD 50 - Continued development and

[8] Ecosystem services measures are currently being evaluated through the Gulf of Mexico Integrated Ecosystem Assessment and conceptual modeling, but have not been applied to the South Atlantic region at this time. However, there is an interest in doing so. Additionally, there is an Ecosystem Services Valuation National Working Group led by Dan Lew that is evaluating and extending theoretical best practices tailored to the needs of NMFS. A sub-group of this working group is focused on application of current ecosystem services valuation methodologies to analysis of fisheries actions and identification of barriers to their usage (white paper expected in 1-2 years).

Principle 6: Maintain resilient ecosystems			
Road Map Action Item (Road Map #)	**Status**	**Associated Milestone(s)**	**SERO Organizational or Science Priorities**
health and well-being socio-economic metrics (6b1)		community well-being for the South Atlantic indicators and analyze connections to the ecosystem.[9]	improvement of social indicators and community vulnerability tools for application to the social/community effects of proposed management changes
Adopt community vulnerability analyses to a broader range of cumulative factors (6b2)	Mid	• Begin to expand the community vulnerability measures to a broader range of cumulative factors. [10]	SERO Science Priority - Develop community level species vulnerability and catch diversity measures based upon the species diversity indices being developed. Org SFD 50 - Continued development and improvement of social indicators and community vulnerability tools for application to the social/community effects of proposed management changes
Track community health, well-being and vulnerability socio-economic metrics (6b3)	Mid-continual	• Begin to analyze the measures of community well-being for the South Atlantic over time. [11]	SERO Science Priority - Develop community level species vulnerability and catch diversity measures based upon the species diversity indices being developed. Org SFD 50 - Continued development and improvement of social indicators and community vulnerability tools for application to the social/community effects of proposed management changes

[9] Community health and well-being socio-economic metrics have been developed for the South Atlantic region. Conceptualizing new analysis that incorporates them into ecosystem models or broader conceptual models is underway but not complete at this time.
[10] Work on expanding the community vulnerability measures to a broader range of cumulative factors is planned for later 2018.
[11] Community well-being measures (CSVIs) have been developed with two comparable time frames based on the US Census American Community Survey data for the South Atlantic and analysis comparing the two timeframes will be completed in latter 2018.

4.0 References

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