SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

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Draft
POLICY CONSIDERATIONS FOR SOUTH ATLANTIC CLIMATE VARIABILITY AND FISHERIES AND ESSENTIAL FISH HABITATS
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Introduction

This document provides guidance from the South Atlantic Fishery Management Council (SAFMC) regarding South Atlantic Climate Variability and Fisheries and the protection of Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (EFH-HAPCs) supporting the Council move to Ecosystem Based Fishery Management. The guidance is consistent with the overall habitat protection policies of the SAFMC as formulated and adopted in the Habitat Plan (SAFMC 1998a), the Comprehensive EFH Amendment (SAFMC 1998b), the Fishery Ecosystem Plan of the South Atlantic Region (SAFMC 2009a), Comprehensive Ecosystem-Based Amendment 1 (SAFMC 2009b), Comprehensive Ecosystem-Based Amendment 2 (SAFMC 2011), and the various Fishery Management Plans (FMPs) of the Council.

For the purposes of policy, the findings assess potential threats and impacts to managed species EFH and EFH-HAPCs and the South Atlantic ecosystem associated with climate variability or change and processes that could improve those resources or place them at risk. The policies and recommendations established in this document are designed to address such impacts in accordance with the habitat policies of the SAFMC as mandated by law. The SAMFC may revise this guidance in response to 1) changes in conditions in the South Atlantic region, 2) applicable laws and regulatory guidelines, and 3) knowledge about the impacts.

Policy Considerations

The marine environment is constantly in flux and today, many parts of the ocean are changing quickly due to such factors as varying temperatures and salinities, productivity, rising sea levels, ocean acidification and growing coastal populations. While the extent and types of changes occurring vary from region to region, these changes are a major driver of ecosystem dynamics and the impacts are already being observed by scientists, managers, and fishermen in the South Atlantic.

Fish populations can react to changing ocean conditions. For example, as the ocean warms, many fish species are expanding their range or shifting their distributions toward the poles or into deep areas to find cooler waters[1]. Changes in spawning location and timing could have cascading effects, such as changes in population size, stock structure and population connectivity[2]. Research indicates that winter severity is also emerging as an important factor shaping fish assemblages and distribution patterns in this region[3]. In the South Atlantic, black sea bass are being caught further south off Florida which is thought to be related to cooler near surface water resulting from more frequent upwelling events in recent years. Such events need to be investigated comprehensively. Scientists are also observing changes in the distribution of cobia which are shifting northwards during their spring migration[4]. As conditions change and fluctuate, other South Atlantic fish populations could follow suit. Changing ranges are particularly important as fish movements into other jurisdictions can affect existing management plans and perhaps require modification of the existing management strategies.

Along with north-south (latitudinal) changes in distribution, vertical (depth) changes in the distribution of fish are affecting the catchability of the resources in terms of availability and vulnerability. These changes are particularly important for fishermen and the stock assessment process, for which changes in catch rates are assumed to be linearly related to changes in abundance. The effects of environment on stock dynamics need to be parsed into those which affect catchability – which tend to obscure true abundance signals – and those factors which actually lead to change stock abundance. Differentiating between these effects involves the development of quantitative catchability coefficients derived from environmental data, and is becoming increasingly important with climate change.

Changing ocean conditions have the potential to alter existing fisheries and create opportunities for new fisheries in different regions. Sometimes this can happen before managers have an opportunity to assess impacts of the new fishery on the ecosystem and legislate appropriate management measures. For example, there is a developing fishery for cannonball jellyfish off the South Atlantic coast but there is little information on the possible ecosystem impacts of these fisheries[5]. As climate variability leads to range expansions and distribution shifts, new opportunities may develop and exploiting these could have a cascading effect on other fish species and habitats, highlighting the need for a precautionary approach.

Changing ocean chemistry, in particular the impact of ocean acidification has the potential to change food webs in the region. Ocean acidification appears likely to have significant consequences because many species which depend on calcium metabolism

[1] M. C. Jones, W. W. L. Cheung. 2014. Multi-model ensemble projections of climate change effects on global marine biodiversity. *ICES Journal of Marine Science*,DOI: 10.1093/icesjms/fsu172

[2] Hare J., Alexander M., Fogarty M., Williams E., Scott J. 2010. Forecasting the dynamics of a coastal fishery species using a coupled climate-population model. Ecological Applications. 20(2):452-464.

[3] H.J. Walsh, D.E. Richardson, K.E. Marancik, and J.A. Hare. 2015. Long-term changes in the distributions of larval and adult fish in the Northeast U.S. shelf ecosystem. PLOS One. DOI:10.1371/journal.pone.0137382.

[4] J.W. Morley, R. D. Batt, and M. L. Pinsky (in review). Marine assemblages respond rapidly to winter climate variability.

[5] Pinsky, M. L., B. Worm, M. J. Fogarty, J. L. Sarmiento, and S. A. Levin. 2013. Marine taxa track local climate velocities. Science 341: 1239-1242 doi: 10.1126/science.1239352

[6] http://coastalgadnr.org/sites/uploads/crd/pdf/FMPs/CannonballFMP.pdf

serve as prey or provide habitat, including mollusks, diatoms, soft and hard corals, crustacean larvae; indeed direct impacts in other regions have already included shellfish mortality.

Around the nation, scientists and managers are formulating management strategies for changing ocean conditions[6]. In 2009, the North Pacific Fishery Management Council banned all commercial fishing in the changing Arctic until more scientific information is available and the Council is able to evaluate potential impacts. In 2014, the Mid-Atlantic Fishery Management Council, in coordination with the South Atlantic Fishery Management Council, New England Fishery Management Council, and Atlantic States Marine Fisheries Council, held a workshop to examine the potential impacts of climate change and the associated management implications. They underscored the importance of fostering ecological resilience to develop "climate-ready" fisheries, fishing communities, stock assessment, and management strategies[7]. The 2015 National Science and Statistical Committee meeting also focused on incorporating climate variability into stock assessments and fisheries management as one of its meeting themes[8]. Currently, NOAA is developing Regional Action Plans (RAPs) to guide and increase the use of climate-related information necessary to manage marine resources[9]. The extent and degree of changes expected in the South Atlantic are not fully known and the consequences of these changes cannot always be predicted. Such changes have implications for both stock assessments and fisheries management decisions.

Threats to EFH and EFH-HAPCs from Climate Variability

The SAFMC finds that climate variability impacts EFH and EFH-HAPCs for managed species. Table 1 following climate variability policy and research recommendations, presents a summary of fisheries and habitat designations potentially affected by climate variability in the South Atlantic Region.

SAFMC Policies Addressing South Atlantic Climate Variability and Fisheries

The SAFMC establishes the following policies to address South Atlantic climate variability and fisheries, to clarify and augment the general policies already adopted in the Habitat Plan and Comprehensive Habitat Amendment and Fishery Ecosystem Plan (SAFMC 1998a; SAFMC 1998b; SAFMC 2009a).

General Policies:

1. As species expand/shift their distributions due to changing ocean conditions and/or market demands, it is the Council's policy that the SAFMC will proactively work with:

[7] M. L. Pinsky and N. J. Mantua, 2014. Emerging Adaptation Approaches for Climate-Ready Fisheries. Oceanography 27(4): 147-159.

[8] MAFMC 2014. A Workshop Report: East Coast Climate Change and Governance Workshop Report. March 19-21, 2014. Washington, DC.

[9] http://www.wpcouncil.org/wp-content/uploads/2015/01/DRAFT-2015-National-SSC-Workshop-Timed-Agenda.pdf

[10] https://www.st.nmfs.noaa.gov/ecosystems/climate/rap/index

a. State agencies, other Councils, NOAA Fisheries to manage species that span multiple jurisdictions.
b. South Atlantic LCC, NOAA RISAs, Southeast Climate Science Center, and other multi-organizational partnerships.
c. The fishing industries, fishing communities, and other interested civil stakeholders.

2. A priority list of climate indicators should be developed or selected that likely track ecological, social, and economic trends and status. The Council requests annual summaries of these indicators, species likely to be influenced, and fisheries trends that appear to be due to changing ocean environmental conditions in the South Atlantic ecosystem.

3. Climate change requires the consideration of tradeoffs. Changing ocean conditions necessitate responses ranging from increasing buffers due to a higher level of uncertainty to adjusting quotas upward or downward to account for predicted and realized increases in productivity.

4. Given the uncertainty of climate impacts, the precautionary principle should be invoked as possible for future management decisions on issues that can be influenced by climate change.

5. New fisheries can develop before managers are able to adequately monitor or control them. One avenue to avoid uncontrolled removal where species have no limits is to include them in an aggregate bag limit.

6. Careful scientific and management evaluation should be undertaken as new fisheries develop, including consideration of how to avoid harmful impacts on essential fish habitat.

Research Needs Addressing Climate Variability and Change

1. Scientific research and collection of data to further understand the impacts of climate variability on the South Atlantic ecosystem and fish productivity must be prioritized. This includes species vulnerabilities in terms of distribution, habitat, reproduction, recruitment, growth, survival, and predator-prey interactions.

2. As appropriate, climate data and the effects of climate variability should be integrated into stock assessments. Climate impacts could also be a focus of the new proposed stock assessment research cycle.

3. More three dimensional ocean observations of ocean conditions are needed to characterize the coastal- estuarine – ocean habitats.

4. Management Strategy Evaluations are desired to allow the Council to analyze potential regional climate scenarios and determine whether current harvest strategies are robust to future changes.

5. Greater understanding of the socio-economic impacts and fisheries responses to climate variability is needed.

6. Greater understanding of the social impacts and fisheries responses to climate variability is needed.

7. Characterization of offshore ocean habitats used by estuarine dependent diadromous species which may be useful in developing ecosystem models.

Many of the habitats and associated fisheries affected by climate variability in the South Atlantic Region have been identified as EFH-HAPCs by the SAFMC as follows:

Table 1. Fisheries and Habitat Designations Potentially Affected by Climate Variability in the South Atlantic Region (Source: SAFMC EFH Users Guide 2016).

Essential Fish Habitat	**Fisheries/Species**	**EFH- Habitat Areas of Particular Concern**
Wetlands		
Estuarine and marine emergent wetlands	Shrimp, Snapper Grouper	Shrimp: State designated nursery habitats Mangrove wetlands
Tidal palustrine forested wetlands	Shrimp	
Submerged Aquatic Vegetation		
Estuarine and marine submerged aquatic vegetation	Shrimp, Snapper Grouper, Spiny lobster	Snapper Grouper, Shrimp
Shell bottom		
Oyster reefs and shell banks	Snapper Grouper	Snapper Grouper
Coral and Hardbottom		
Coral reefs, live/hardbottom, medium to high rock outcroppings from shore to at least 600 ft where the annual water temperature range is sufficient.	Snapper Grouper, Spiny lobster, Coral, Coral Reefs and Live Hard/bottom Habitat	The Point, Ten Fathom Ledge, Big Rock, MPAs; The *Phragmatopoma* (worm reefs) off central east coast of Florida and nearshore hardbottom; coral and hardbottom habitat from Jupiter through the Dry Tortugas, FL; Deepwater CHAPCs
rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, and rocky reefs		Snapper-grouper [blueline tilefish]
Artificial reefs	Snapper Grouper	Special Management Zones
Soft bottom		
Subtidal, intertidal non-vegetated flats	Shrimp	
Offshore marine habitats used for spawning and growth to maturity	Shrimp	
Sandy shoals of capes and offshore bars	Coastal Migratory Pelagics	Sandy shoals; Capes Lookout, Fear, Hatteras, NC; Hurl Rocks, SC;
troughs and terraces intermingled with sand, mud, or shell hash at depths of 150 to 300 meters		Snapper-grouper [golden tilefish]
Water column		
Ocean-side waters, from the surf to the shelf break zone, including Sargassum	Coastal Migratory Pelagics	
All coastal inlets	Coastal Migratory Pelagics	Shrimp, Snapper-grouper
All state-designated nursery habitats of particular importance (e.g., PNA, SNA)	Coastal Migratory Pelagics	Shrimp, Snapper-grouper
High salinity bays, estuaries	Cobia in Coastal Migratory Pelagics	Spanish mackerel: Bogue Sound, New River, NC; Broad River, SC
Pelagic Sargassum	Dolphin	
Gulf Stream	Shrimp, Snapper-grouper, Coastal Migratory Pelagics, Spiny lobster, Dolphin-wahoo	
Spawning area in the water column above the adult habitat and the additional pelagic environment	Snapper-grouper	

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