SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

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Draft

POLICY CONSIDERATIONS FOR SOUTH ATLANTIC FOOD WEBS AND CONNECTIVITY AND ESSENTIAL FISH HABITATS

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Introduction

This document provides guidance from the South Atlantic Fishery Management Council (SAFMC) regarding South Atlantic Food Webs and Connectivity 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 changes in food webs and connectivity 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

A key tenet of ecosystem-based fisheries management (EBFM) is the explicit consideration of indirect effects of fisheries, such as through food web processes, when developing harvest strategies and management plans. This is crucial because of the high likelihood that fishing may lead to unintended and unforeseen consequences on the ecosystem. For example, over exploitation of predators can cause an increase in abundance of their prey and a decline of organisms two trophic levels below them, a phenomenon known as a trophic cascade (Carpenter et al. 1985). Fishing on lower trophic level species, planktivorous “forage” fishes for example, may ultimately lead to predator population declines due to food limitation (e.g. Okey et al. 2014; Walters and Martell 2004). Food web linkages connect different components of the larger ecosystem, such as pelagic forage fishes and their piscivorous predators to demersal carnivores. This

connectivity between food webs over space, time, and depth creates multiple energy pathways that enhance ecosystem stability and resilience. Food web models are increasingly being utilized by fisheries managers as ecological prediction tools because they provide the capability to simulate the entire ecosystem from primary producers to top predators and fisheries. Food web models can serve to inform single species assessment and management and are capable of generating reference points (Walters et al. 2005) and ecosystem-level indicators (Coll et al. 2006; Fulton et al. 2005).

Threats to EFH and EFH-HAPCs from Changes in South Atlantic Food Web and Connectivity

The SAFMC finds that changes in South Atlantic food webs and connectivity potentially impacts EFH and EFH-HAPCs for managed species. Table 1 following food webs and connectivity policy and research recommendations, presents a summary of changes in South Atlantic food webs and connectivity as it relates to habitat essential to Council managed species.

SAFMC Policies Addressing South Atlantic Food Webs and Connectivity

The SAFMC establishes the following policies to address South Atlantic food webs and connectivity, 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. **Managing Forage Fisheries** - Managers should consider forage fish stock abundance and dynamics as well as the impacts to predators when setting catch limits of forage species to promote ecosystem sustainability. To do so, managers must invest in essential scientific research and monitoring to improve our understanding of the role of forage fish in the ecosystem in order to develop environmentally sound harvest strategies.

2. **Invasive Species** – Invasive species, most notably lionfish, may be having negative effects on ecologically and economically important reef fish species through predation and competition and those effects should be accounted for in management actions.

3. **Food Web Connectivity** – Separate food webs exist in the South Atlantic, for example inshore-offshore, north-south, and benthic-pelagic, but they are connected by species that migrate between them such that loss of connectivity could have impacts on other components of the ecosystem that would otherwise appear unrelated and must be accounted for.

4. **Energy Pathways** – Managers should aim to understand how fisheries production is driven either by bottom-up or top-down forcing and attempt to maintain diverse energy pathways to promote overall food web stability.

5. **Food Web Models** – Food web models can provide useful information to inform stock assessments, screen policy options for unintended consequences, examine ecological and economic trade-offs, and evaluate performance of management actions under alternative ecosystem states.

6. **Contaminants** – Bioaccumulation of contaminants in food webs can have sub-lethal effects on marine fish, mammals, and birds and is also a concern for human seafood consumption.

7. **Food Web Indicators** – Food web indicators have been employed to summarize the state of knowledge of an ecosystem or food web and could serve as a ecological benchmarks to inform future actions.

Research Needs Addressing South Atlantic Food Webs and Connectivity

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 distribution, habitat, reproduction, recruitment, growth, survival, predator-prey interactions and vulnerability.

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

3. Scientific research and monitoring to improve our understanding of the role of forage fish in the ecosystem, in particular abundance dynamics and habitat use.

Many of the habitats potentially affected by changes in South Atlantic food webs or connectivity have been identified as EFH-HAPCs by the SAFMC. Each habitat, food web and connectivity posing a potential threat and FMP / Managed Species affected is provided as follows:

Table 1. Summary of food webs and connectivity as it relates to habitat essential to Council managed species

EFH-HAPC	**Impacts of Changes in South Atlantic Food Webs and Connectivity**	**FMP and Managed Species Affected**
Nearshore hardbottom	Example-	Snapper Grouper
Coastal inlets		Shrimp, Snapper Grouper
Spawning sites		Shrimp, Snapper Grouper
Manganese outcroppings on the Blake Plateau		Snapper Grouper
Pelagic and benthic *Sargassum*		Snapper Grouper, Dolphin Wahoo
from shore to the ends of the sandy shoals of Cape Lookout, Cape Fear, and Cape Hatteras, North Carolina; Hurl Rocks, South Carolina; and *Phragmatopoma* (worm reefs) reefs off the central coast of Florida and near shore hardbottom south of Cape Canaveral		Coastal Migratory Pelagics
Atlantic coast estuaries with high numbers of Spanish mackerel and cobia from ELMR, to include Bogue Sound, New River, North Carolina; Broad River, South Carolina		Coastal Migratory Pelagics
Florida Bay, Biscayne Bay, Card Sound, and coral hardbottom habitat from Jupiter Inlet through the Dry Tortugas, Florida		Spiny Lobster
Hurl Rocks (South Carolina); The *Phragmatopoma* (worm reefs) off central east coast of Florida; nearshore (0-4 meters; 0-12 feet) hardbottom off the east coast of Florida from Cape Canaveral to Broward County; offshore (5-30 meters; 15-90		Coral, Coral Reef, and Live Hard/bottom

feet) hardbottom off the east coast of Florida from Palm Beach County to Fowey Rocks; Biscayne Bay, Florida; Biscayne National Park, Florida; and the Florida Keys National Marine Sanctuary		
Council-designated Artificial Reef Special Management Zones (SMZs)		Snapper Grouper, Coastal Migratory Pelagics, Coral, Coral Reef, and Live Hard/bottom Habitat
troughs and terraces intermingled with sand, mud, or shell hash at depths of 150 to 300 meters		Snapper-grouper [golden tilefish]
rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, and rocky reefs		Snapper-grouper [blueline tilefish]
HAPCs designated for HMS species (e.g., sharks) in the South Atlantic region – exploration and development		Highly Migratory Species (NMFS FMP)
Deepwater Coral HAPCs are designated as Snapper Grouper EFH-HAPCs: Cape Lookout Coral HAPC, Cape Fear Coral HAPC, Blake Ridge Diapir Coral HAPC, Stetson-Miami Terrace Coral HAPC, and Pourtalés Terrace Coral HAPC		Coral, Coral Reef, and Live Hard/bottom Habitat
Estuarine emergent and mangrove wetlands		Shrimp, Snapper Grouper
Seagrass		Shrimp, Snapper Grouper
State-designated nursery habitats (e.g., Florida Aquatic Preserves)		Shrimp, Snapper Grouper

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