SAFMC Fishery Ecosystem Plan II

South Atlantic Climate Variability and Fisheries Section

Executive Summary - November 2016

Climate change and variability are already impacting the marine ecosystem in the southeast U.S., and understanding the impacts of these changes is essential to ensuring abundant fisheries and thriving-resilient coastal communities. Each year the oceans and coasts provide over $675 billion dollars' worth of economic impact in the southeast U.S. alone (Kildow et al, 2009). Fisheries and associated industries are major components of the economy, heritage, and ecological systems that support and sustain the unique culture of the region. However, over the coming decades, climate change appears likely to profoundly affect the dynamics of the marine environment due to factors such as changing temperature, salinity, oxygen and pH, changes in wind patterns, changes in current dynamics (particularly the Gulf Stream), and sea level rise. Over shorter time scales, environmental variability can exacerbate, ameliorate, or mask the effects of long-term climate change.

For the purposes of fisheries management, both climate variability (a result of natural variation in the ocean-climate system) and anthropogenic climate changes should be considered. Both impact the physical and biological conditions that affect the growth, distribution, and mortality of economically and ecologically important species. Marine, estuarine, and estuarine dependent organisms are sensitive to changes in their environment. However, in the South Atlantic region the effects of environmental variability and climate change are not well known. A greater understanding of current and predicted conditions in the South Atlantic region and their likely impacts on the ecosystem is needed for improved resource management. Changing conditions are expected to impact migration patterns, recruitment, catchability, as well as habitat and ecosystem structure. The potential significance of these changes, requires incorporating climate considerations into a comprehensive, big-picture approach to management of marine resources.

A key step to building more resilient, "climate ready" fisheries is to identify where best to incorporate climate-related information into the management process. Managers will need to assess vulnerabilities, risks and evaluate management strategies under various climate and ocean scenarios, and effectively evaluate and respond to changing conditions. This should be done through ecosystem-based fisheries management. This approach to management reflects the interconnected nature of the ecosystem's components. Moving forward, climate considerations coupled with a greater understanding of environmental and physiological drivers of ecosystem dynamics, will be increasingly important to fisheries management decisions.

This chapter provides a comprehensive and up-to-date review of five related topics: 1) historical and current oceanographic conditions and characterization of the South Atlantic marine environment; 2) predicted future oceanographic conditions; 3) climate impacts on fish, fish habitat and fisheries; 4) knowledge gaps and research priorities related to management needs, and 5) links to South Atlantic Fishery Management Council (SAFMC) management decisions and ecosystem-based fisheries management.

As the evidence of the effects of climate change on the ecosystem and fisheries are becoming more apparent there is an urgent need to better understand the impact of climate change and variability on a South Atlantic regional scale, and improve our ability to provide accurate regional climate predictions. Based on which a rigorous scientific understanding of the overall response of the South Atlantic marine community is needed to in order to: 1) quantify the vulnerability of fishery resources; 2) evaluate and anticipate human community responses; and 3) estimate the socio-economic impacts of future conditions in our region. These will require human and financial resources to: i) improve the regional marine observing networks to fill major data gaps, particularly in biological (e.g., plankton, demersal fish, forage fish, catches) and three dimensional metocean measurements; ii) develop and validate coupled marine environment-ecosystem based climate downscaled models to determine relationships between the fishery resources and the changing environment, and iii) identify climate indicators, species vulnerabilities, and ecological indicators suitable for the South Atlantic. Overall, adaptive ecosystem-based fisheries management processes in the South Atlantic that can proactively respond to climate require increased and persistent dialogue between scientists, managers and the fishing industries.