

Abstract

The Northeast U.S. (NEUS) Continental Shelf Ecosystem is a dynamic environment. In order to evaluate the response of this ecosystem to numerous human-induced perturbations and to explore possible future scenarios, the Northeast Fisheries Science Center (NEFSC) instituted the Energy Modeling and Analysis eXercise (EMAX). The primary goal of EMAX was to establish an ecological network model (i.e., a nuanced energy budget) of the entire NEUS Ecosystem food web. The highly interdisciplinary EMAX work focused on four contemporary (1996-2000) subregions of the ecosystem; designated 36 network nodes (biomass state variables) across a broad range of the biological hierarchy; and incorporated a wide range of key rate processes. The emphasis of EMAX was to explore the particular role of small pelagic fishes in the ecosystem, and various model configurations were constructed and pseudo-dynamic scenarios evaluated to explore how potential changes to this group can affect the rest of the food web. Preliminary results show that small pelagic fishes are clearly keystone species in the ecosystem. There are some differences across the four EMAX regions reflective of the local biology, but major patterns of network properties are similar over space. EMAX will continue to play a critical role in the further development of an ecosystem approach to fisheries (EAF) by acting as a catalogue of information and data; identifying major fluxes among biotic components of the ecosystem; serving as a basis for further analytical models; developing a way to evaluate biomass tradeoffs; and acting as a backdrop for a suite of other relevant management and research questions.