Decision-support for ecosystem-based fishery management in the context of marine spatial planning: regional economic impact models, model outputs, and tradeoff measures

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Abstract

The implementation of ecosystem-based fisheries management (EBFM) requires the development of new analytic tools to integrate environmental, ecological, and socio-economic data from various sources; to capture explicit interactions among ecosystem components; and to simulate and evaluate the effects of alternative management options. We are developing a computable general equilibrium (CGE) framework that models coastal and marine resource sectors linked to the output of a marine food web model. The framework can be used to examine the interactions among different components of a coastal economy and alternative realizations of the structure of a marine food web (Jin et al. forthcoming). We illustrate our framework with two examples from New England fisheries: (1) a basic model with five industry sectors, including agriculture, manufacturing, commercial fishing, seafood processing, and other (an aggregate of all other industries); and (2) an expanded nine-sector model, including four non-fishing sectors and five fishing sectors characterized by gear type: lobster (pot), trawl, scallop (dredge), gillnet, and other. The integrated framework can be used to develop "what-if" type policy simulations for many important issues faced by coastal and ocean managers (e.g., marine spatial planning and climate change impact assessments). Through comparative analyses, we show how economic and distributional tradeoffs among alternative policy options can be assessed by examining changes in metrics of interest to marine resource managers, including a measure of economic surplus.