Title: A Preliminary Ecosystem Assessment Model for Atlantic Sea Herring (Clupea harengus): A General Equilibrium Framework

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Abstract: Interest in ecosystem-based management or the ecosystem-based approach to fisheries management has rapidly increased on a global basis. Most options for ecosystem-based management have emphasized some type of biological and natural conservation or non-use, and minimal attention has been given to assessing the social and economic ramifications of ecosystem-based management. We offer a framework for assessing the economic ramifications of an ecosystem-based approach to fisheries management, using an input/output (I/O) optimization (IOLP) model, and apply the model to the Atlantic sea herring (Clupea harengus) fishery in New England. The I/O model is based on IMPLAN, an off the shelf software package for input/output modeling by county, state, region, or the United States. A linear programming problem is specified for the three digit NAICS sectors in which total output or production is maximized subject to the inputs used and purchased by each NAICS sector. In addition to the standard NAICS sectors, we specify a sector for the herring fishery and a sector for all other fisheries of the region (i.e., an aggregate or composite of all other fisheries). We then include consumption and constraints related to predators. As such, the model may be considered a limited general equilibrium model in which the limitations are imposed by various constraints and assumptions (e.g., constant prices, fixed proportions in input usage, and zero substitution possibilities).