

Age-Structured Ecological-Economic Multi-Species Models for Baltic Sea Fisheries

Martin Quaas*

*University of Kiel

Abstract

Biologists have criticized traditional biomass models in fishery economics for being oversimplified. Biological stock assessment models are more sophisticated with regard to biological content, but rarely account for economic objectives. Recently, age-structured models of fish stocks have increasingly been used in fisheries economics, but applications have so far mainly been limited to single-species settings. Here, a multi-species age-structured optimization model will be presented for the Baltic that comprises the three economically most important stocks, cod, herring, and sprat, and the effects of predator-prey relationships between these stocks. The optimization model not only studies economically efficient management (using the Kaldor-Hicks criterion), but also studies distributional effects by studying Pareto-efficient allocations in the absence of compensation payments between fleets. It is shown that the distributional effects of economically efficient management can be large, and that, on the other hand, addressing distributional issues, or ecosystem considerations, can be very costly.