

## **TOWARD MERGING ECONOMICS AND ECOLOGY\***

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### **Abstract**

This paper offers a different approach to bioeconomic models of harvesting that permits large numbers of interacting species. Three themes fundamental to economics - rational behavior, efficiency and centrality of equilibrium - are used to build a general equilibrium model of an ecosystem. Based on individual behavior directing aggregate outcomes, the approach allows for multiple species in complex food webs. The ecosystem model is combined with a general equilibrium model of an economy, with the result a tight integration of economic and ecological models that captures feedbacks within and between the economic and ecological systems. The combined general equilibrium model is applied to a fishery. The results demonstrate human welfare depending on natural cycles in species populations, with critical economic variables tracking critical ecological variables. The analysis highlights the fundamental importance of renewable resource managers' knowledge over the ecosystem. When managers possess incomplete information the economy is shown to undergo welfare losses, experience inefficient factor employment, and be faced with capacity mismanagement in the fishery, with potentially disastrous outcomes to the ecosystem. Only when managers more fully understand the processes within the ecosystem can human and ecosystem welfare be improved.

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