

Applying Principles from Economics to Improve the Transfer of Ecological Production Estimates in Fisheries Ecosystem Services Research

Melissa N. Errend, Marine Resource Management Program, Oregon State University, Corvallis, OR, USA

Theodore H. DeWitt, US Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Western Ecology Division, Newport, OR, USA

Jessica B. Moon, ORISE Postdoctoral Fellow at US Environmental Protection Agency, Newport, OR, USA

Abstract:

Ecosystem services (ES) represent a way to represent and quantify multiple uses, values as well as connectivity between ecosystem processes and human well-being. Ecosystem-based fisheries management approaches may seek to quantify expected trade-offs in ecosystem services due to actions such as restoration and gear restrictions, or due to changes such as climate change and ocean acidification. However, lack of adequate data, time or budget constraints needed to model these scenarios in part creates a demand to directly apply (i.e., transfer) existing models and estimates of ecological production across different geographic, temporal, or spatial scales. Inconsistency and a lack of transparency in how knowledge gaps are filled by transfers can create sources of uncertainty and error that can propagate through and between ecosystem service values and assessments. While production estimate transfer represents a useful tool for research, policy and management to gain ES information when primary research is not available, transparency concerning these values is needed for assessing assumptions, trade-offs, and the need for primary research. While methodologies exist to facilitate and analyze the transfer of economic ES values (e.g., benefit transfer), there is no analogous formalized process to transfer ecological data underlying ES production. Drawing from the benefit transfer literature, we present a framework to similarly improve the transparency and accuracy of transferred ecological and biophysical ES production estimates in coastal ecosystem services assessments, specifically for habitat-fishery linkages.

Impact Statement

Applying principles from economics to improve the transfer of ecological production estimates in fisheries ecosystem services research

EPA and Oregon State University scientists are developing a methodology to assess the reliability of using estimates of fisheries-related ecosystem service stocks and production applied to locations or contexts different from where those were originally measured. Communities that wish to sustain or increase the availability of fisheries for the benefit of their populace need ways to estimate fisheries stocks and production, and their sensitivity to human actions or stressors. Measurement of fisheries stocks and production are costly and time consuming, and many studies rely on applying existing measurements (i.e., transferring ecological information) to their sites of interest. However, those information transfers may not be appropriate (and thus inaccurate) because of contextual differences

between the development site and the application site. The research team is using concepts from economic benefit transfer to develop a “transferability assessment” (TA) methodology that will help with the assessment of the accuracy and error (i.e., variability) of transferring estimates for ecosystem services, such as fisheries stocks and production. This methodology will be useful for identifying which environmental models and data are most appropriate to be used at sites where data are limited.