

A Conceptual Framework for Evaluating the Domains of Applicability of Ecological Models and its Implementation in the Ecological Production Function Library

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The use of computational ecological models to inform environmental management and policy has proliferated in the past 25 years. These models have become essential tools as linkages and feedbacks between human actions and ecological responses can be complex, and as funds for sampling have become increasingly limited. A key attraction of ecological models is the ability to apply them in new 'contexts' (i.e., locations, ecosystems, spatial and temporal extents) without having to collect extensive new datasets. There are, however, recognized risks when an ecological model developed in one context is applied in another. In order to better assess this risk we have developed a general conceptual framework that aids in evaluating the potential contextual range of a given model's application, and we have implemented this framework within a database that allows end users to browse, compare and select among ecological models. The framework draws on the "transferability" literature and the importance of a model's "life cycle", as described in the 2007 National Research Council Report, *Models in Environmental Regulatory Decision Making*. The framework, in the form of a decision tree, assesses a model's conceptual validity (i.e., model type, complexity and structure) during development as well as its evolution and its use in the literature by evaluating its performance (i.e., validation, model comparison and uncertainty) and its similarity in four domains of context: scale, geography, ecology (e.g., geophysical, biotic, etc.), and parameter range or hyperspace. We will showcase the implementation of this framework in the Ecological Production Function Library (EPF-L), a database currently being developed by the U.S. Environmental Protection Agency. Its goal is to provide end users with an array of ecological models and a guided assessment of their applicability to the user's context.