

Preface

Biological invasions can drive global environmental change. Biologists have explained the risks so that both the public and policy makers are now aware of the impacts of invasive species. Economists are also taking greater interest in determining how invasive species interact with economic systems, and in how invaders should be controlled to increase societal welfare. Disciplinary work by ecologists and economists expands our understanding of the drivers and impacts of invasions, but neither ecological nor economic systems operate in isolation. This book provides a greater integration and synthesis of ecological and economic concepts and tools—a bioeconomic approach to understanding and managing invasive species. Such an approach can help policy makers and the public determine optimal expenditures, for example, on preventing and controlling invasive species.

The Integrated Systems for Invasive Species (ISIS) team is a multi-institution collaboration among ecologists, economists, and mathematical biologists. The team came together as a project funded by the U.S. National Science Foundation and has met annually since 2000 (and conducted much research between meetings) to identify and address key questions about the bioeconomics of invasive species. The questions and our best responses are presented here. Our framework blends the work of the ISIS project with results from other researchers working on both disciplinary and interdisciplinary frontiers. Our group's composition ensures analytical and empirical rigor, as well as ecological and economic realism.

As society becomes more aware of global environmental change, people are demanding that policy makers address broader biological and economic realities. This book has two related goals. The first is to reinforce the role of bioeconomic research as the best approach to design policy and management systems for invasive species. The second is to show how bioeconomic research can be conducted to generate realistic invasive species policy recommendations. Throughout the ISIS project, we aim to place our bioeconomic research approach into a context that is useful to researchers and society.

The book's structure follows the linked economic and ecological processes that lead to invasion—starting with the vector of introduction, through establishment and spread, to the impacts of successful invaders. Our main thesis throughout is that a bioeconomic approach is required both to understand and to manage invasions. The first two chapters introduce the study of species invasions and give the rationale for this thesis. The next four chapters track the invasion process, including risk assessment tools to predict the identity of likely invaders and methods to identify the extent of suitable habitat for non-native species, also treating model approaches for predicting species establishment and dispersal. We consider throughout how the science can inform management and policy actions to reduce total impacts. Next we

explore general issues, addressing uncertainty in models and methods for economic valuation, then tie it all together in an integrated bioeconomic model for determining appropriate management decisions in response to particular species invasions. The final four chapters include case studies based on ISIS research and a discussion of the possibilities and challenges for future bioeconomic research.

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