

## Preface

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It has been our experience that placing the reams of observations, examples, and research within the broad context of invasion ecology gets more difficult as the field grows each year. Not only does relevance change with new insights, but the field itself requires an intense understanding of multiple disciplines. Invasion ecology by its nature is integrative, requiring its practitioners to understand (at the least) economics, evolution, population genetics, biogeography, and ecology. Indeed, those studying biological invasions must not only understand these contributing fields, they must combine them in order to find ways to control the flow and impact of non-native species. This is a tall order. We discovered early in writing this book that we could not cover all aspects and examples of invasions within a single text. Not only are different disciplines integrated into the study of invasions, but different ecologists have distinct motivations behind their research. We ultimately decided to produce an overview of the invasion process from the point of view of an applied ecologist. Thus, we hope to highlight the salient research findings associated with each invasion stage (i.e., transport and introduction, establishment, spread, impact), while explicitly considering how these findings support societies' efforts to prevent the influx of non-native species and control those that cause ecological harm. We would also humbly like to apologize to the many excellent invasion ecologists (including some of our friends) whose work we did not include.

This textbook is designed to be used in senior-level courses for undergraduates and in graduate courses. We purposefully take a very broad view of biological invasions with the hope that students and instructors will find the book useful as a primer to the growing field of invasion ecology. We have tried to make the chapters accessible and interesting to read while conveying the history and complexity of current debates, and we offer readings that we think complement each chapter. We have assumed students have at least completed a basic ecology course and can read calculus equations without fainting (or we suggest they assume a seated position while reading Chapters 7 and 8). The boxes placed throughout each chapter are integral to the material there, and we strongly

recommend that students and instructors do not skip over them. Given our goal of producing a comprehensive textbook, readers will not find appreciable amounts of new material here; instead we hope they will find some insightful organization and interesting juxtapositions.

To further this effort, at the end of each chapter we provide a set of suggested articles for use as companion readings. These "foundational papers" are the books and articles that laid the groundwork for various aspects of the chapter's topics. These are the works we suggest as "must reads" to anyone interested in pursuing invasion ecology as part of their graduate education. Others may disagree about which articles we included in these lists, but at the very least they provide a starting point for the student just entering the field. We also include a list of further reading, which are articles that delve more deeply into the issues we present or are key syntheses of relevant literature on a particular topic. We suggest that those using this book in a graduate or undergraduate class incorporate these articles into their reading assignments. These suggested papers should make student discussions of the topics we present in each chapter a bit more lively.

We made a few key decisions concerning the breadth of material we cover that may leave some readers frustrated. Invasion ecology interfaces with a variety of fairly distinct subdisciplines such as biocontrol, agro-ecology, weed science, epidemiology, ecological economics, and environmental law. We do not cover these particular topics in any real depth here but attempt to point to other resources for interested readers. Our decision not to cover the area of biocontrol extensively is likely to receive the most criticism. We do consider some examples of biocontrol in detail; however, it quickly became apparent that the traditions and experience of biocontrol practitioners were somewhat specific and differed from those of many more broadly defined ecologists. We simply could not do justice to this history within the page limits of this book. There is so much to explore in the crossover between invasions, biocontrol, and conservation biology that it deserves its own consideration.

We have organized the book primarily around the stages of the invasion process (transport and introduction, establishment, spread, impact), but we made the decision to pull three additional topics out of our sequence and present them as cross-stage syntheses. These topics are evolution (Chapter 11), management (Chapters 12 and 13), and the effects of climate change on invasion dynamics (Chapter 14). We could have incorporated these topics into each of the invasion stages we use as the structure for the book and discussed the stage-specific aspects of each topic. Ultimately, though, we felt there was more to be gained from presenting these topics as synthetic whole chapters so that we could follow key threads and explain cross-stage changes without disrupting other organizational structures. For example, management options change drastically as one moves from the transport and release stage to the post-establishment stages, and stating these changes seems less useful than explaining them.

We have endeavored not to break too much new ground in this book but instead to strike a balance between breadth and depth in coverage of invasion ecology. If we have broken new ground at all, it was because it was necessary to present a coherent picture of the overwhelming variety of research results in one area. We have also tried to incorporate a variety of examples that cross

taxonomic groups and geopolitical boundaries. However, most readers will quickly recognize the following biases: (i) we predominantly study birds, aquatic organisms, and plants; (ii) we live in North America; and (iii) at some point in our lives we have each lived and worked in California. Such biases are perhaps unavoidable, and we welcome input from our colleagues around the world just in case a third edition of this book is warranted.

We decided to produce a second edition of this book in 2009, and it has been a slow march toward this final product, yet this new edition is truly a major revision. We have added two new chapters (Chapters 13 and 14), substantially modified, reworked and rewritten the remaining 12 chapters, and included almost 300 new references in this second edition. Our progress was impeded in part by our own fecundity, with the production of four new humans over the last couple of years. This near doubling of our "population" meant that we could no longer indulge in long working sessions that included both beers and Oreos, and instead had to be satisfied with Skype meetings. Despite this limitation, it was an enjoyable undertaking and made us realize how much we value the friendships this book has allowed us to forge. Delving back into the literature was almost more daunting than having children. The annual production of published papers on invasion ecology has itself doubled from 600 to nearly 1200 since we wrote the first edition. This growth in the field reinforces the need for a textbook such as this but also makes the production of such a book a Herculean task. We are certain that there are very good recent papers we have overlooked, and we each regret some of the excellent papers that we found and loved but could not include here due to space or complexity constraints.

If we achieve any success with this text, it will have much to do with the help we have received from our families, partners, colleagues, and friends. In particular we would like to thank those colleagues who provided "friendly" peer review for each of the original chapters. These folks are Kama Almasi, Tim Blackburn, Cini Brown, Phillip Cassey, Jeff Corbin, Curt Daehler, Susan Harrison, David Holway, Ruth Hufbauer, Theo Light, Kelly Lyons, Peter Moyle, Katriona Shea, Dov Sax, Dan Simberloff, and Betsy Von Holle. Our gratitude also goes out to those authors who shared original figures and photos with us including Towns Peterson, Dave Rizzo, and Marcel Holyoak. This edition was helped tremendously by feedback we obtained from professors who used this book in the classroom. We thank Sudeep Chandra, Tony Ricciardi, Jim Darling, Laura Meyerson, J. Michael Reed, J. Thaxton, and John Waring for their unvarnished feedback. We owe our respective academic departments our thanks as they not only put up with our distraction but also provided the space and resources we needed to work. We owe a special thanks to our original editor at Blackwell, Sarah Shannon, who initially contacted Julie to propose the book, to our current editors there, as well as to Ward Cooper and Kelvin Matthews, and the Wiley-Blackwell production staff. Finally, we dedicate this book to Tabby, Henry, Tanner, Crystal, Sarah, and Matteo and thank them for their unconditional love demonstrated by their patience with our distracted brains.

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