Ecology and Control of Introduced Plants

The global spread of plant species by humans is both a fascinating large-scale experiment and, in many cases, a major perturbation to native plant communities. Many of the most destructive weeds today have been intentionally introduced to new environments where they have had unexpected and detrimental impacts. This book considers the problem of invasive introduced plants from historical, ecological, and sociological perspectives. We consider such questions as 'What makes a community invasible?' 'What makes a plant an invader?' and 'Can we restore plant communities after invasion?' Written with advanced students and land managers in mind, this book contains practical explanations, case studies and an introduction to basic techniques for evaluating the impacts of invasive plants. An underlying theme is that experimental and quantitative evaluation of potential problems is necessary, and solutions must consider the evolutionary and ecological constraints acting on species interactions in newly invaded communities.

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ECOLOGY, BIODIVERSITY, AND CONSERVATION

The world's biological diversity faces unprecedented threats. The urgent challenge facing the concerned biologist is to understand ecological processes well enough to maintain their functioning in the face of the pressures resulting from human population growth. Those concerned with the conservation of biodiversity and with restoration also need to be acquainted with the political, social, historical, economic and legal frameworks within which ecological and conservation practice must be developed. This series will present balanced, comprehensive, up-to-date and critical reviews of selected topics within the sciences of ecology and conservation biology, both botanical and zoological, and both 'pure' and 'applied'. It is aimed at advanced final-year undergraduates, graduate students, researchers, and university teachers, as well as ecologists and conservationists in industry, government and the voluntary sectors. The series encompasses a wide range of approaches and scales (spatial, temporal, and taxonomic), including quantitative, theoretical, population, community, ecosystem, landscape, historical, experimental, behavioural, and evolutionary studies. The emphasis is on science related to the real world of plants and animals, rather than on purely theoretical abstractions and mathematical models. Books in this series will, wherever possible, consider issues from a broad perspective. Some books will challenge existing paradigms and present new ecological concepts, empirical or theoretical models, and testable hypotheses. Other books will explore new approaches and present syntheses on topics of ecological importance.

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We dedicate this book to our families
Jamie, Isla and Iain
Peter, Madeleine, and Carolyn

Contents

Preface

The concept for this book goes back at least 15 years. In the meantime invasive plant species have become the 'flavor of the month' and the literature bursts with interesting new papers. Writing this book has been an exciting undertaking. We have written for a wide audience, and therefore take the chance that it falls between the interests of a variety of readers. Some may find sections to be too anecdotal. Others may find parts to be too technical. As we wrote we could not resist including some of the fascinating stories of the involvement of individuals in spreading plants. It is a scary thought that others may be introducing weeds of the future as we write. We hope that land managers who are charged with controlling invasive weeds and restoring habitats will find this book useful. We admire your efforts in tackling such complex problems. We value the great scientific and management contributions made by our colleagues in biological control, and are sorry we could not include all of the ideas and successes. For students, the experts of the future, we hope that invasion ecology and biological control stimulate your interest. There are many hypotheses to be tested and problems to be solved at this interface between basic and applied ecology. To all, we would be happy to get your feedback.

Many people helped in this project and two in particular deserve enormous thanks. First, Jamie Smith used up several red pens worth of ink editing the manuscript. His insights and suggestions have been invaluable. Second we thank Dawn's mother who provided weeks of babysitting. We also thank Madeleine, Carolyn and Peter Ewins, for letting Dawn come west to work on the book. Jenny Cory, Anne Miller, and Diane Srivastava read sections of the manuscript and made many useful suggestions. Isla Myers-Smith read and commented on the total manuscript and also prepared several of the figures which was extremely helpful. Charley Krebs has been a valued mentor. He facilitated this project by writing useful books on ecology and ecological techniques and by providing the laptop on which the book was written. We also thank our graduate students who

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