

the Wilderness Lodge. I found Higgs' thoughts on the concepts of wilderness vs. wildness and "freak landscapes" enormously interesting. In the second chapter, the reader is introduced to three diverse restoration projects from around the world. These projects differ in their scale, intent (or goal), and method and serve well the ideas posed in the remaining chapters – Higgs regularly comes back to these examples to illustrate a point. Chapter 3 explains what ecological restoration is and provides some history to the restoration movement. It is unusual that the subject of the book isn't properly defined until the middle, but Higgs makes it work and the book flows like a good story.

The concept of historicity is central to the fourth chapter which asks the restoration ecologist how the reference condition (or the state to restore a place back in time to) is decided. It is this chapter where the course of the book changes and the reader starts on a more philosophical journey. Chapter 5 explores the issue of commodification and the increasing technological nature of restoration while Chapter 6 explores the alternative, a more traditional approach founded on community based initiatives. In the final summary chapter, the author effectively brings all his examples and arguments together and suggests that in order for ecological restoration to prosper into the future, we must communicate effectively with each other and not sit idle as landscapes all around us rapidly grow outside the historical range of natural variability.

Following the text of the book, rich footnotes give the reader both valuable reference and provocative

anecdotal information. More information is contained in the bibliography which is followed by an ample index.

Higgs's writing style is clear and fluid. The narrative, filled with personal accounts and stories, is not something to be read quickly. It takes time for the concepts and ideas to sink in and take shape to hold a deeper meaning. Those looking for specific instructions on how to accomplish a restoration project will be disappointed. However, this book would be required reading for anyone in the field of ecological restoration, and more than just an interesting read for the general reader. Further, the casual reader may get just as much out of the book by reading only the beginning and concluding chapters which concisely sum up the thoughts and arguments, instead of plowing through the entire text. This is a testament to the author's skill.

Higgs openly states that this book is for an audience who are looking for ways to solve problems – environmental in nature – in a better way. However, like any good philosophy book, *Nature by Design* asks more questions than it answers.

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Spreadsheet Exercises in Ecology and Evolution

By Therese M. Donovan and Charles W. Welden. Sinauer Associates Inc. Sunderland, British Columbia. 556 pages. \$38.95.

Spreadsheet Exercises in Conservation Biology and Landscape Ecology

By Therese M. Donovan and Charles W. Welden. Sinauer Associates Inc., Sunderland, British Columbia. 464 pages. \$41.50.

A core component of biological study is the suite of theoretical models that researchers have developed to describe and forecast biological phenomena. Browse through any introductory ecology textbook and you'll find models for nearly every quantifiable biological process. Models are used to answer questions in every area of natural history study: what is a sustainable harvest level for a fishery? what is the likelihood that a rare species will go extinct? what is the best foraging strategy for a particular animal? With their *Spreadsheet Exercises*, Donovan and Welden present a series of computer-based assignments to guide students through the development and application of models to a variety of such ecological and evolutionary scenarios.

The intended audience for these books undergraduate biology students for whom each chapter provides a practical exercise to complement course lectures. The first six chapters of each book provide a brief review of basic statistics while introducing the concept of computer modelling. As the target audience likely has or will receive instruction in biological statistics the treatment here is very light – just enough to refresh the fundamentals and introduce the novice to key concepts.

The remainder of each book is given over to the exercises. Each chapter begins with a brief theoretical review followed by step by step instructions explaining how to convert the theory into a computer simulation. Some of the chapters stand alone, but generally the later chapters within a section build upon earlier work. For example, in the ecology section the chapter on reproductive value assumes previous completion of exercises on life tables, geometric and age-structured

population models, and survivorship curves. The progression is well thought out: the experience I gained from working through the simpler models and theories of earlier chapters was good preparation for the complexities of stage-structured matrix population models encountered in Chapter 14. Having spent a fair bit of time struggling with these algebra-heavy models in the past, I was pleased to find that several key concepts became clear when I had completed the chapter.

From the beginning the authors adopt an exploratory approach, guiding the reader through the use of spreadsheets to illustrate mathematical concepts. Using spreadsheets allows for easy experimentation, instantly revealing the consequences of altering formulas or model parameters, and encourages independent exploration of the models. Models are by definition abstractions, and I found the exercises very effective in translating the sometimes esoteric mathematical concepts into concrete numbers and informative graphs. Each chapter required between one and two hours to work through, a reasonable evening's diversion for the aspiring ecologist.

Some exercises are more successful than others. Generally, I thought the ecology section was very well done. The population and demography models lend themselves to this sort of presentation, and the authors do a good job of organising them in an engaging way. The evolution chapters were less consistent. Some of the basic concepts, such as Hardy-Weinberg Equilibrium, were clearly laid out. However, I don't think the model used to illustrate gene-flow and population structure was as effective as it could have been. The section on landscape ecology is generally weak. The ideas they try to present here are too complex to allow for easy partitioning into manageable chapters. There were also a handful of typos or minor errors which made some examples unintentionally difficult.

To properly take advantage of the exercises readers will need access to a computer with a recent spreadsheet program installed. The authors have chosen to use Microsoft Excel 98 for their examples. As this is one of the most widely used programs this is a rea-

sonable choice. Many of the exercises use features not available in earlier versions of this program, and people using spreadsheets from different companies may have to spend some time figuring out how to convert the Excel-based instructions to suit their program.

While the *Spreadsheet Exercises* are published in two volumes, this is not intended as a set. More than half of the chapters are shared by both books. Both books have the six introductory chapters. The *Ecology and Evolution* edition is then divided into an ecology section: population, demographic, niche, and succession models; and an evolution section: genetic, selection, and mating system models. The *Conservation Biology and Landscape Ecology* edition contains many of the same chapters under the heading conservation biology, and seven chapters on aspects of landscape ecology: edge effects, reserve design, and landscape statistics. It's unfortunate that the chapters on population viability analysis and harvest models appear only in the *Conservation Biology and Landscape Ecology* edition. These would have been a strong addition to the *Ecology and Evolution* edition. The landscape ecology section requires further development and perhaps an entire book of its own. As is, it left me feeling it was an unfinished last minute add-in.

All things considered, I think the *Ecology and Evolution* edition will be a valuable addition to any undergraduate course in either discipline – indeed, it has already been adopted in biology courses at several universities. The question remains, will it be of interest to naturalists generally? If your interest in natural history is strictly field-oriented, as a botanist, birder etc., probably not. But if you have an interest in biological theory, enjoy math puzzles and learning new tricks on your computer, I think you'll find this an engaging way to introduce yourself to ecological concepts. *Spreadsheet Exercises* isn't the sort of book that will find a place of honour on your reference shelf, but it might help you to better understand the books that have.

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Quantitative Conservation Biology: Theory and Practice of Population Viability Analysis

W. F. Morris and D. F. Doak. 2002. Sinauer Associates Inc., Sunderland MA USA. ISBN 0-87893-546-0 paperback US \$41.95.

This is a great book which should affect how we research and manage wildlife and its controlling factors. The topic of a Population Viability Analysis (PVA) is not really new, but there are only a few books that describe the topic well for the general public and managers. "PVA is the use of quantitative methods to predict the likely future status of a population or collection of populations of conservation concern".

"The promise that PVA holds as a tool for guiding conservation decision-making has been recognized

by governmental science advisory boards, by professional organizations such as the Ecological Society of America and by nongovernmental conservation organizations such as The Nature Conservancy." This statement also holds for the Habitat Conservation Plans and for the Recovery Plans of the U.S. Endangered Species Act. However, "Instead of seeing PVA as a valuable tool to aid their decision making, most field-oriented conservation biologists retain the misinterpretation that PVA models can only be constructed and understood by an elite priesthood of mathematical population ecologists".

Fortunately, this book is supposed to make PVAs easier to understand. It is based on the advanced