

A Primer of Ecological Statistics, Second Edition

By Nicholas J. Gotelli and Aaron M. Ellison. 2013. Sinauer Associates, Inc., 23 Plumtree Road, P.O. Box 407, Sunderland, Massachusetts 01375-0407 USA. 614 pages, 120 illustrations. 54.95 USD. Paper.

Given that statistics are used to support arguments and learning in ecology at multiple levels of technical depth, an overview text on ecological statistics that can clearly explain the application of various tests is worth its weight in gold. Whether an in-field technician, ardent naturalist or academic, the changing use of statistics in ecology can be daunting for those among us who rely on a few tests based on experience, or who are long-removed from our university statistics courses.

The first edition of 'A Primer of Ecological Statistics' sought to meet the particular needs of ecologists and environmental scientists first through introducing probability theory and then the specific experimental designs used within ecological studies. Released almost ten years later, the second edition adds sections on the process of estimation, useful for community ecology and demography studies.

A deceptively dense book, the heavy Primer is printed on thin, glossy paper with two shades of blue used

as colour accent. Asides are presented as footnotes rather than boxes in-text, which may make reading more streamlined. The text is clearly aimed at senior science classes and above, as there are very few graphics used to illustrate founding statistical principles and almost no photographs. However, it is generalist in coverage, so for more in-depth treatment and application of particular tests or types of test (e.g., multivariate statistics) further reading might be required.

Fourteen chapters are logically laid out over four sections: fundamentals of probability and statistical thinking; designing experiments; data analysis; and the new section on estimation. There is an appendix reviewing matrix algebra, a glossary and an extended works cited section. Many texts will cover statistical basics, and the real strength of this text is in its treatment of experimental design from a statistical perspective. As the authors note in their forward, statistical use in ecology is shifting as computing power improves and can

be used for calculations more sensitive to the chaotic reality of nature. The shift includes a move from basic testing of hypotheses to estimating possible parameters.

In ecology, we know that we can likely never measure everything and are working with only small samples of diversity and using these samples to reflect their greater, more variable populations. All illustrative examples in the book use a hypothetical ecological situation, which while to be expected in an ecological statistics text, makes the content more useful in its application as any student using a biostats text in a non-medical context can attest. The Primer illustrates the difference in ecological experiment type depending on window of time used for the study, which is especially relevant for graduate students and impact assessment ecologists as both face budget and temporal restrictions.

The way the book is written and presented is more discursive than instructional. Mathematical equations are used to further explain how certain tests work, when truly the majority of ecologists rely on computer programs to perform the calculations and only concern themselves with whether the test is appropriate or not to their study needs. The inclusion of so many equations can be off-putting to a reader who only wants to know if the test is applicable, and its pros and cons. Other statistical books do quite well in this arena by not only clearly explaining when a test should be used or not, but also providing decision trees to assist re-

searchers in selecting a correct test.

More graphic illustration would be beneficial to explain how certain tests work in theory to help reinforce knowledge. For visual learners, far more illustration is required. Margin notes would help quickly find relevant points or takeaway information, providing a further layer of visual complexity and ease of navigation. As previously stated, this is not an entry-level or very advanced text; however, it could stand to incorporate more tools to create a book that can be readily used to learn statistical tests quickly and when they should or should not be used.

The Primer is, in fact, a decent introduction to considerations unique to ecological study and within its text are many useful ideas to retain while developing research studies. Where it is less effective is in instructing on how to use tests and when, especially the multivariate. Other books are far more user friendly in this respect and are equally aimed at the ecological sciences. Nevertheless, the theoretical discussion about how tests can be used in an ecological context and emerging areas such as estimation is excellent. I learned new tips and considerations in statistical design, and I think this book would be an excellent addition to the technical library for that reason alone. Otherwise, try and borrow the book from a library to determine if it fulfils an empty niche within your own technical collection.

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