



# Ecological Statistics: Contemporary theory and application

*From Oxford University Press*

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**Ecological Statistics: Contemporary theory and application** From Oxford University Press

The application and interpretation of statistics are central to ecological study and practice. Ecologists are now asking more sophisticated questions than in the past. These new questions, together with the continued growth of computing power and the availability of new software, have created a new generation of statistical techniques. These have resulted in major recent developments in both our understanding and practice of ecological statistics.

This novel book synthesizes a number of these changes, addressing key approaches and issues that tend to be overlooked in other books such as missing/censored data, correlation structure of data, heterogeneous data, and complex causal relationships. These issues characterize a large proportion of ecological data, but most ecologists' training in traditional statistics simply does not provide them with adequate preparation to handle the associated challenges. Uniquely, *Ecological Statistics* highlights the underlying links among many statistical approaches that attempt to tackle these issues. In particular, it gives readers an introduction to approaches to inference, likelihoods, generalized linear (mixed) models, spatially or phylogenetically-structured data, and data synthesis, with a strong emphasis on conceptual understanding and subsequent application to data analysis.

Written by a team of practicing ecologists, mathematical explanations have been kept to the minimum necessary. This user-friendly textbook will be suitable for graduate students, researchers, and practitioners in the fields of ecology, evolution, environmental studies, and computational biology who are interested in updating their statistical tool kits. A companion web site provides example data sets and commented code in the R language.

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### **Bibliography**

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## **Editorial Review**

### Review

"*Ecological Statistics* opens with a commendable introduction that makes some great points and provides an insightful big-picture perspective." --*BioScience*

"*Ecological Statistics: Contemporary Theory and Applications* is an amazing piece of work that deftly performs the unenviable task of presenting the "need to know" methods of a complex field. ... This book would be a valuable addition to any course asking students to expand their statistical comfort zone, but also easily lends itself to self-study for those wishing to join the conversation of ecological statistics." --*Plant Science Bulletin*

"This is a rich selection of the new canon of ecological statistics. Most examples are illustrated with the relevant R code, all of which is available online. As a result, this is not just an introduction to the theory underlying new approaches - it is a hands-on introduction to their use! Importantly, the chapters - though cross-referenced - are self-contained. As such, many practising ecologists will be able to dip in to a chapter that covers a particular problem that they are facing. That is a real strength of this book and suggests that most ecological research groups will benefit from access to at least one copy." --*British Ecological Society Bulletin*

### About the Author

Gordon Fox received his Ph.D. from the University of Arizona and was a postdoctoral fellow at the University of California, Davis. He is currently Professor in the Department of Integrative Biology at the University of South Florida. His research involves theoretical issues in ecology and population biology, and empirical studies of plant populations. He teaches at both the graduate and undergraduate levels, and supervises M.S. and Ph.D. students. He is co-author (with J. Gurevitch and S. M. Scheiner) of the textbook *The Ecology of Plants*, and co-editor (with C. K. Kelly and M. G. Bowler) of *Temporal Niche Dynamics and Ecological Process*. Fox is an associate editor of *Ecology*, and a Fellow of the American Association for the Advancement of Science (AAAS).

Simoneta Negrete-Yankelevich received her doctorate from the University of Edinburgh, and was a postdoctoral fellow within the Conservation and Sustainable Management of Belowground Biodiversity project (GEF-UNEP-TSBF). She is currently a researcher in the Functional Ecology Network of the Instituto de Ecología A.C. in Mexico and a member of the Mexican National System of Researchers. She works on issues related to the temporal and spatial dimensions of disturbance in tropical agroecosystems. She coordinates and participates in research projects related to the long term effects of human disturbance on soil biota, fertility and functioning in the tropics. She teaches statistics courses for graduate students on linear models, spatial statistics, and multivariate statistics, and supervises M.S. and Ph.D. theses related to spatial

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Vinicio J. Sosa received his Ph.D. from the University of Miami, and has an Applied Statistics Specialization from the Instituto de Investigaciones en Matematicas Aplicadas y en Sistemas (IIMAS) at the Universidad Nacional Autonoma de Mexico (UNAM). He is a researcher in the Instituto de Ecologia A.C. in Mexico and a member of the Mexican National System of Researchers (SNI II). Sosa has extensive experience in applied ecological problems, especially on environmental impacts of infrastructure development. His current research focuses on the effect of landscape fragmentation on flying vertebrate communities, and on mutualistic relationships between columnar cacti and bats. He teaches graduate-level statistics courses for the Instituto de Ecologia, A. C., and acts as consulting statistician within the Instituto. He is associate editor of *Acta Zoologica Mexicana*.

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