Occupancy Estimation And Modeling Inferring Patterns and Dynamics Of Species Occurrence

Occupancy Estimation and Modeling
Darryl I. MacKenzie 2017-11-17 Occupancy Estimation and Modeling: Inferring Patterns and Dynamics of Species Occurrence, Second Edition, provides a synthesis of model-based approaches for analyzing presence-absence data, allowing for imperfect detection. Beginning from the relatively simple case of estimating the proportion of area or sampling units occupied at the time of surveying, the authors describe a wide variety of extensions that have been developed since the early 2000s. This provides an improved insight about species and community ecology, including, detection heterogeneity; correlated detections; spatial autocorrelation; multiple states or classes of occupancy; changes in occupancy over time; species co-occurrence; community-level modeling; and more. Occupancy Estimation and Modeling: Inferring Patterns and Dynamics of Species Occurrence, Second Edition has been greatly expanded and detail is provided regarding the estimation methods and examples of their application are given. Important study design recommendations are also covered to give a well rounded view of modeling. Provides authoritative insights into the latest in occupancy modeling Examines the latest methods in analyzing detection/not-detection data surveys Addresses critical issues of imperfect detectability and its effects on species occurrence estimation Discusses important study design considerations such as defining sample units, sample size determination and optimal effort allocation.

Occupancy Estimation and Modeling
Darryl I. MacKenzie 2006-11-17 Occupancy Estimation and Modeling is the first book to examine the latest methods in analyzing presence/absence data surveys. Using four classes of models (single-species, single-season; single-species, multiple-season; multiple-species, single-season; and multiple-species, multiple-season), the authors discuss the practical sampling situations, present a likelihood-based model enabling direct estimation of the occupancy-related parameters while allowing for imperfect detectability, and make recommendations for designing studies using these models. Provides authoritative insights into the latest in estimation modeling Discusses multiple models which lay the groundwork for future study designs Addresses critical issues of imperfect detectability and its effects on estimation Explores the role of probability in estimating in detail

Spatial Capture-Recapture
J. Andrew Royle 2013-08-27 Spatial Capture-Recapture provides a comprehensive how-to manual with detailed examples of spatial capture-recapture models based on current technology and knowledge. Spatial Capture-Recapture provides you with an extensive step-by-step analysis of many data sets using different software implementations. The authors’ approach is practical - it embraces Bayesian and classical inference strategies to give the reader different options to get the job done. In addition, Spatial Capture-Recapture provides data sets, sample code and computing scripts in an R package. Comprehensive how-to reference on the topic. A very detailed and readable book is a must have for any researcher in conservation biology or ecology currently employing capture-recapture data. Includes numerous examples throughout an extremely useful and readable text for graduate and undergraduate students.

Hierarchical Modeling and Inference in Ecology
J. Andrew Royle 2008-10-15 A guide to data collection, modeling and inference strategies for Bayesian hierarchical models. This book describes a general, flexible framework for hierarchical models, and inference in ecological systems based on Bayesian methods. The book has a strict focus on the use of probability models and parametric inference. Hierarchical models represent a paradigm shift in the application of statistics to ecological inference problems because they combine explicit models of ecological system structure or dynamics with models of how ecological systems are observed. The application of hierarchical models is developed and applied to populations, metapopulation, community, and ecosystem dynamics. The book provides the first synthesize of recent methodological advances in ecological modeling and unifies disparate methods and procedures. It introduces the new concepts, methods, and procedures of hierarchical models that are designed from the ground up to deal with the complex and diverse problems of ecological inference. The book explains all procedures in the context of hierarchical models that represent a unified approach accessible to non-statisticians and provides fully worked examples that serve as a template for readers' analyses.

Noninvasive Survey Methods for Carnivores
Robert A. Long 2012-09-26 The status of many carnivore populations is of growing concern to scientists and conservationists, making the need for data pertaining to carnivore distribution, abundance, and habitat use even more pressing. Recent developments in "noninvasive" research techniques—those that minimize disturbance to the animal being studied—have resulted in a greatly expanded toolbox for the wildlife practitioner. Presented in a straightforward and readable style, Noninvasive Survey Methods for Carnivores is a comprehensive guide for wildlife researchers who seek to conduct carnivore surveys using the most up-to-date scientific approaches. Twenty-five experts from throughout North America discuss strategies for implementing surveys across a broad range of habitats, providing input on survey design, sample collection, DNA and endocrine analyses, and data analysis. Photographs from the field, line drawings, and detailed case studies further illustrate on-the-ground application of the survey methods discussed. Coupled with cutting-edge laboratory and statistical techniques, which are also described in the book, noninvasive survey methods are efficient and effective tools for sampling carnivore populations. Noninvasive Survey Methods for Carnivores allows practitioners to carefully evaluate a diversity of detection methods and to develop protocols specific to their survey objectives, study area, and species of interest. It is an essential resource for anyone interested in the study of carnivores, scientists engaged in primary research to agencies or organizations requiring carnivore detection data to develop management or conservation plans.

Bayesian Population Analysis Using WinBUGS
Robert A. Long 2008-07-01 Bayesian statistics has exploded into biology and its sub-disciplines, such as ecology, over the past decade. The free software program WinBUGS, and its open-source sister, OpenBUGS, is currently the only flexible and general-purpose program available with which the average ecologist can conduct standard and non-standard Bayesian analyses. Comprehensive and richly commented examples illustrate a wide range of models that are most relevant to the research of a modern population ecologist All WinBUGS/OpenBUGS analyses are completely integrated in software R Includes complete documentation of all R and WinBUGS code required to conduct analyses and shows all the necessary steps from having the data in the text file out of Excel to interpreting and processing the output from WinBUGS in R

Ecological Models and Data in R
Benjamin Bolker 2007-09-11 Ecological Models and Data in R is the first truly practical introduction to modern statistical methods for ecology. In step-by-step detail, the book teaches ecological graduate students and researchers everything they need to know to use maximum likelihood, information-theoretic, and Bayesian techniques to analyze their own data using the programming language R. Drawing on extensive experience teaching these techniques to graduate students in ecology, Benjamin Bolker shows how to choose among and construct statistical models, interpret the results of analyses, and present the results of both model fitting and inference in easy to understand graphical displays. Includes practical, beginner-friendly introduction to modern statistical techniques for ecology using the programming language R Step-by-step instructions for fitting models to messy, real-world data Balanced view of different statistical approaches Wide coverage of techniques—from simple (distribution fitting) to complex (state-space modeling) Techniques for data manipulation and graphical display Companion Web site with data and R code for all examples

Applied Hierarchical Modeling in Ecology: Analysis of distribution, abundance and species richness in R and BUGS
Marc Kery 2012-11-01 Applied Hierarchical Modeling in Ecology: Analysis of Distribution, Abundance and Species Richness in R and BUGS presents a synthesis of the state-of-the-art in hierarchical models for plant and animal distribution, abundance, and community characteristics such as species richness using data collected in metapopulation designs. These types of data are extremely widespread in ecology and its applications in such areas as biodiversity monitoring and fisheries and wildlife management. This first volume describes static models/procedures in the context of hierarchical models that collectively represent a unified approach to ecological research, taking the reader from simple models into the most advanced hierarchical modeling in Ecology, and provides an indispensable manual for practicing ecological field biologists, and as a graduate-level test for students in ecology, conservation biology, fisheries/wildlife management, and related fields. Provides a synthesis of important classes of models about distribution, abundance, and species richness while accommodating imperfect detection. Presents models and methods for identifying unmarked individuals and species Written in a step-by-step approach accessible to non-statisticians and provides fully worked examples which serve as a template for readers' analyses companion website containing data sets, code, solutions to exercises, and further information

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Analysis of Distribution, Abundance and Species Richness in R and BUGS
Marc Kery 2012-11-01 Analysis of Distribution, Abundance and Species Richness in R and BUGS, Volume Two: Dynamic and Advanced Models provides a synthesis of the state-of-the-art in hierarchical models for plant and animal distribution, also focusing on the complex and more advanced models currently available. This book explains all procedures in the context of hierarchical models that represent a unified approach to ecological research, through data collection, and into analyses using a very powerful way of synthesizing data. Makes ecological modeling accessible to people who are struggling to use complex or advanced modeling programs Synthesizes current ecological models and explains how they are inter-connected Contains numerous examples throughout the book. It is an essential resource for ecologists working in R software and in BUGS software for more flexible Bayesian estimation procedures.
analyses

Resource Selection by Animals B.B. Manly 2012-06-12 We have written this book as a guide to the design and analysis of field studies of resource selection, concentrating primarily on statistical aspects of the comparison of the use and availability of resources of different types. Our intended audience is field ecologists in general and wildlife biologists in particular who are attempting to measure the extent to which real animal populations are selective in their choice of food and habitat. As such, we have made no attempt to address those aspects of theoretical ecology that are concerned with how animals might choose their resources if they acted in an optimal manner. The book is based on the concept of a resource selection function, where this is a function of characteristics measured on resource units such that its value for a unit is proportional to the probability of that unit being used. We argue that this concept leads to a unified theory for the analysis and interpretation of data on resource selection and can replace many ad hoc statistical methods that have been used in the past.

Second Nature David J. Shepardson 2012-01-11 Growing recognition of the complexity of animals’ physical, social, and psychological lives in the wild has led both zookeepers and the zoo-going public to call for higher environmental standards for animals in captivity. Bringing together the work of animal behaviorists, zoo biologists, and psychologists, Second Nature explores a range of innovative strategies for environmental enrichment in laboratories and marine parks, as well as in zoos. From artificial feeding-prey devices for leopards to irregular feeding schedules for whales, the practices discussed have resulted in healthier, more relaxed animals that can breed more easily and can exert some control over their environments. Moving beyond the usual studies of primate to consider reptiles, fish, invertebrates, and even birds, the book offers unique insights into animal behavior in captivity and provides a framework for developing more sophisticated enrichment programs.

Model Selection and Multimodel Inference Kenneth P. Burnham 2007-05-28 A unique and comprehensive text on the philosophy of model-based data analysis and strategy for the analysis of empirical data. The book introduces information theoretic approaches and focuses critical attention on a priori model selection and the selection of a good approximating model that best represents the inference supported by the data. It contains several new approaches to estimating model selection uncertainty and incorporating selection uncertainty into estimates of precision. An array of examples is given to illustrate various technical issues. The text has been written for biologists and statisticians using models for making inferences from empirical data.

Animal Movement: A Biologist's Guide to Movement and Movement Models - 2nd edition Ben Hooten 2017-03-16 The study of animal movement has always been a key element in ecological science, because it is inherently linked to critical processes that scale from individuals to populations and communities to ecosystems. Rapid improvements in biotelemetry data collection and processing technology have given rise to a variety of statistical methods for characterizing animal movement. The book serves as a comprehensive reference for the types of statistical models used to study individual-based animal movement. Animal Movement is an essential reference for wildlife biologists, quantitative ecologists, and statisticians who seek a deeper understanding of modern animal movement models. A wide variety of modeling approaches are discussed in the book, ranging from traditional statistical models to modern Bayesian hierarchical models. The book also introduces new techniques in model selection and model evaluation, which are essential for a deep understanding of the movement of animals.

Camera Traps in Animal Ecology Allan F. O’Callan 2010-10-05 Remote photography and infrared sensors are widely used in the sampling of wildlife populations worldwide, especially for cryptic or elusive species. Guiding the practitioner through the entire process of using camera traps, this book is the first to compile state-of-the-art sampling techniques for the purpose of conducting high-quality science or effective management. Chapters on the evaluation of equipment, field sampling designs, and data analysis methods provide a coherent framework for making inferences about the abundance, species richness, and occupancy of sampled animals. The volume introduces new models that will revolutionize use of camera data to estimate population density, such as the newly developed spatial capture-recapture models. It also includes richly detailed case studies of camera trap work on some of the world’s most charismatic, elusive, and endangered wildlife species. Invaluable to wildlife conservationists, ecologists, biologists, and conservation agencies around the world, this book provides a thorough review of the subject as well as a forecast for the future of remote photography in natural resource conservation over the next few decades.

Spatial Analysis in Field Primatology Francine L. Dolsin 2021-02-18 A primatologist’s guide to using geographic information systems (GIS), from mapping and field accuracy, to tracking travel routes and the impact of logging.

Spatial Ecology and Conservation Modeling Robert Fletcher 2019-02-15 This book provides a foundation for modern applied ecology. Much of current ecology research and conservation applications require knowledge across landscapes and regions, focusing on spatial patterns and processes. This book is aimed at teaching fundamental concepts and focuses on learning-by-doing through the use of examples with the software R. It is intended to provide an entry-level, easily accessible foundation for students and practitioners interested in spatial ecology and conservation.

The Ecological Detective Ray Hilborn 2013-02-12 The modern ecologist usually works in both the field and laboratory, uses statistics and computers, and often works with ecological concepts that are model-based, if not model-driven. How do we make the field and laboratory coherent? How do we link models and data? How do we use statistics to help experimentation? How do we integrate modeling and statistics? How do we confront multiple hypotheses with data and assign degrees of belief to different hypotheses? How do we deal with time series (in which data are linked from one measurement to the next) or put multiple sources of data into one inferential framework? These are the kinds of questions asked and answered by The Ecological Detective. Ray Hilborn and Marc Mangel investigate ecological data much as a detective would investigate a crime scene by trying different hypotheses until a coherent picture emerges. The book is not a set of statistical procedures but rather an approach. The Ecological Detective makes liberal use of computer programming for the generation of hypotheses, exploration of data, and the comparison of different models. The authors’ attitude is one of exploration, both statistical and graphical. The background required is minimal, so that students with an undergraduate course in statistics and ecology can profitably add this work to their tool kit for solving ecological problems.

Turtles of the United States and Canada Carl H. Ernst 2009-06-15 Ernst and Lovich’s thoroughly revised edition of this classic reference provides the most updated information ever assembled on the natural histories of North American turtles. From diminutive mud turtles to giant alligator snapping, two of North America’s most prominent experts describe the turtles that live in the fresh, brackish, and marine waters north of Mexico. Incorporating the explosion of new scientific information published on turtles over the past fifteen years—including the identification of four new species—Ernst and Lovich supply comprehensive coverage of all fifty-eight species, with discussions of conservation status and recovery efforts. Each species account contains information on identification, genetics, fossil record, distribution, geographic variation, habitat, behavior, reproduction, biology, growth and longevity, food habits, populations, predators, and conservation status. The book includes range maps for freshwater and terrestrial species, a glossary of scientific names, an extensive bibliography for further research, and an index to scientific and common names. Logicaly organized and richly illustrated—with more than two hundred color photographs and fifty-two maps—Turtles of the United States and Canada remains the standard for libraries, museums, nature centers, field biologists, and professional and amateur herpetologists alike.

Stream Ecology - 2nd edition David Allan 2007-08-17 A bulky text for advanced undergraduates as well as graduates with an interest in stream and river ecology, this second, updated edition is designed to serve as a textbook as well as a working reference for specialists in stream ecology and related fields. The book presents vital new findings on human impacts, and new work in pollution control, flow management, restoration and conservation planning that point to practical solutions. All told, the book is expanded in length by some twenty-five percent, and includes hundreds of figures, most of them new.

Regression Modeling Strategies Frank E. Harrell 2013-03-09 Many texts are excellent sources of knowledge about individual statistical tools, but the art of data analysis is about choosing and using multiple techniques. Instead of presenting isolated techniques, this text emphasizes problem solving strategies that address the many issues arising when developing multivariable models using real data and not standard textbook examples. It includes imputation methods for dealing with missing data effectively, methods for dealing with nonlinear relationships and for making the estimation of transformations a formal part of the modeling process, methods for dealing with "too many variables to analyze and not enough observations," and powerful model validation techniques based on the bootstrap. This text realistically deals with model uncertainty and its effects on inference to achieve "safe data mining".
Bayesian Methods for Hackers - Cameron Davidson-Pilon 2015-09-30 Master Bayesian inference through Practical Examples and Computation-Without Advanced Mathematical Analysis Bayesian methods of inference are deep and extremely powerful. However, most are hard to master because they rely on conditional probability, an inherently counterintuitive concept for most people. This book introduces Bayesian inference, focusing on concepts and success through practical examples and computation. It makes it accessible to anyone without a strong mathematical background. Now, though, Cameron Davidson-Pilon introduces Bayesian inference from a computational perspective, bridging theory to practice—freeing you to get results using Bayesian power. Bayesian Methods for Hackers illuminates Bayesian inference through probabilistic programming with the powerful PyMC language and the closely related Python tools NumPy, SciPy, and Matplotlib. Using this approach, you can reach effective solutions in small increments, without extensive mathematical intervention. Davidson-Pilon begins by introducing the concepts underlying Bayesian inference, comparing it with other techniques and guiding you through building and training your first Bayesian model. Next, he introduces PyMC through a series of detailed examples and intuitive explanations that have been refined after extensive user feedback. You’ll learn how to use the Markov Chain Monte Carlo algorithm, choose appropriate sample sizes and priors, work with loss functions, and apply Bayesian inference in domains ranging from finance to marketing. Once you’ve mastered these techniques, you’ll constantly turn to this guide for working PyMC code you need to jumpstart future projects. Coverage includes • Learning the Bayesian “state of mind” and its practical implications • Understanding how computers perform Bayesian inference • Using the PyMC Python library to program Bayesian analyses • Building and debugging models with PyMC • Testing your model’s “goodness of fit” • Opening the “black box” of the Markov Chain Monte Carlo algorithm to see why and how it works • Leveraging the power of the “Law of Large Numbers” • Mastering key concepts, such as clustering, convergence, autocorrelation, and thinning • Using loss functions to measure an estimate’s weaknesses based on your goals and desired outcomes • Selecting appropriate priors and understanding how their influence changes with dataset size • Overcoming the “exploration versus exploitation” dilemma: deciding when “pretty good” is good enough • Using Bayesian inference to improve A/B testing • Solving data science problems when only small amounts of data are available Cameron Davidson-Pilon has worked in many areas of applied mathematics, from the evolutionary dynamics of genes and diseases to stochastic modeling of financial prices. His contributions to the open source community include lifelines, an implementation of survival analysis in Python. Educated at the University of Waterloo and at the Independent University of Moscow, he currently works with the online commerce leader Shopify.

Advanced Techniques for IoT Applications - Jyotsna Kumar Mandal 2021-08-02 This book includes original, unpublished contributions presented at the Sixth International Conference on Emerging Applications of Information Technology (EAIT 2020), held at the University of Kalyani, Kalyani, West Bengal, India, on November 2020. The book covers the topics such as image processing, computer vision, pattern recognition, machine learning, data mining, big data and analytics, information security and privacy, wireless and sensor networks, and IoT. It will also include IoT application-related topics for pattern recognition, artificial intelligence, expert systems, natural language understanding, image processing, computer vision, applications in biomedical engineering, artificial neural networks, fuzzy logic, evolutionary optimization, data mining, Web intelligence, intelligent agent technology, virtual reality, and visualization.

Introduction to WinBUGS for Ecologists - Marc Kery 2010-07-19 Introduction to WinBUGS for Ecologists introduces applied Bayesian modeling to ecologists using the highly acclaimed, free WinBUGS software. It offers an understanding of statistical models as abstract representations of the various processes that give rise to a data set. Such an understanding is basic to the development of inference models tailored to specific sampling and ecological scenarios. The book begins by presenting the advantages of a Bayesian approach to statistics and introducing the WinBUGS software. It reviews the basic ideas of Bayesian inference and methods of sampling from distributions, both normal, the uniform, the binomial, and the Poisson. It describes the two different kinds of analysis of variance (ANOVA) one can employ — two- or multilineal. It looks at the general linear model, or ANCOVA, in R and WinBUGS. It introduces generalized linear model (GLM), i.e., the extension of the normal linear model to allow error distributions other than the normal. The GLM is then extended to contain additional sources of random variation to become a generalized linear mixed model (GLMM) for a Poisson example and for a binomial example. The final two chapters showcase two fairly novel and nonstandard versions of a GLMM. The first is the site occupancy model for species distributions; the second is the binomial (or N-) mixture model for site occupancy distributions. Both models are applied to the analysis of the same models in WinBUGS Provides every detail of R and WinBUGS code required to conduct all analyses Companion Web Appendix that contains all code contained in the book and additional information (including more code and solutions to exercises)

Quantitative Conservation Biology - William F. Morris 2002-01-01 The goal of this book is to provide practical, intelligible, and intuitive explanations of population modelling to ecological and conservation biologists. Modelling methods that do not require large amounts of data (typically unavailable for endangered species) are emphasized. As such, the book is appropriate for undergraduate and graduate students interested in quantitative conservation biology, managers charged with preserving endangered species, and, in short, for any conservation biologist or ecologist seeking to better understand the analysis and modelling of population data.

Camera Trapping for Wildlife Research - Francesco Rovero 2016-06-18 Camera trapping is a powerful and now widely used tool in scientific research on wildlife ecology and management. It provides a unique opportunity for collecting knowledge, investigating the presence of animals, or recording and studying behaviour. Its visual nature makes it easy to successfully convey findings to a wide audience. Camera trapping is a low-cost and low-impact method of data collection, especially suitable when large or remote areas need to be monitored. Researchers from all over the world are now using camera traps to study different species and species communities. While this is a fast-growing field, there is currently a lack of introductory textbooks aimed at ecologists that provide complete guidance on the methods and practical analysis of the same models in WinBUGS Provides every detail of R and WinBUGS code required to conduct all analyses Companion Web Appendix that contains all code contained in the book and additional information (including more code and solutions to exercises)

IUCN Red List Categories and Criteria - International Union for Conservation of Nature and Natural Resources 2001 The threatened species categories used in Red Data Books and Red Lists have been in place for almost 30 years. The IUCN Red List Categories and Criteria provide an easy and widely understood system for classifying species at high risk of global extinction, so as to focus attention on conservation measures designed to protect them. This latest version of the classification system was adopted by the IUCN Council in February 2001 and reflects comments from the IUCN and SSC memberships and the final meeting of the Criteria Review Working Group.

Deep Learning: Algorithms and Applications - Witold Pedrycz 2019-10-23 This book presents a wealth of deep-learning algorithms and demonstrates their design process. It also highlights the need for a prudent alignment with the essential characteristics of the nature of learning encountered in the practical problems tackled. Intended for readers interested in acquiring practical knowledge of analysis, design, and deployment of deep learning solutions to real-world problems, it covers a wide range of the paradigm’s algorithms and their applications in diverse areas including image, semantic, tomography, smart grids, surveillance, and security, and health care, among others. Featuring systematic and comprehensive discussions on the development processes, their evaluation, and relevance, the book offers insights into fundamental design strategies for algorithms of deep learning.

Amphibians and reptiles - Trevor Beebee 2013-07-01 A comprehensive guide to the native and non-native species of amphibian and reptile found in the British Isles. It covers the biology, ecology, conservation and identification of the British herpetofauna, and provides keys to adults and young.

Estimating the Occupancy of Spotted Owl Habitat Areas by Sampling and Adjusting for Bias - David L. Arzuca 1990

Population Ecology in Practice - Brett K. Sandercock 2020-02-10 A synthesis of contemporary analytical and modeling approaches in population ecology The book provides an overview of the key analytical approaches that are currently used in demographic, genetic, and spatial analyses in population ecology. The chapters present current problems, introduce advances in analytical methods and models, and demonstrate the applications of these methods to ecological data. The book covers the tools new designs for designing robust field studies; estimation of abundance and demograpic rates; matrix models and population growth; cluster and patch models for genetic and spatial analysis. Each chapter is illustrated by empirical examples based on real datasets, with a companion website that offers online exercises and examples of computer code in the R statistical platform. Fills a niche for a book that emphasizes applied aspects of population analysis Covers many of the current methods being used to apply population dynamics and ecological software to solve the problem, explaining and illustrating the application of specific analytical methods through worked examples based on real datasets Offers an R code repository through which readers can download code and data to their own computers for analysis Fills a niche for a book that emphasizes applied aspects of population analysis for contemporary methods used to develop robust population assessments.

Options for Estimating Illegal Entries at the U.S.-Mexico Border - National Research Council 2013-03-01 The U.S. Department of Homeland Security (DHS) is responsible for securing and managing the nation’s borders. Over the past decade, DHS has dramatically stepped up its enforcement efforts at the U.S.-Mexico border, increasing the number of U.S. Border patrol (USBP) agents, expanding the deployment of technological assets, and implementing a variety of “consequence programs” intended to deter illegal immigration. During this same period, there has also been a sharp decline in the number of unauthorized migrants apprehended at the border. Trends in total apprehensions do not, however, by themselves speak to the effectiveness of DHS’s investments in immigration enforcement. In particular, to evaluate whether heightened enforcement efforts have reduced the flow of undocumented migrants, it is critical to estimate the number of border crossing attempts during the same period for which apprehensions data are available. With these issues in mind, DHS chartered the National Research Council (NRC) with providing guidance on the use of surveys and other methodologies to estimate the number of unauthorized crossings at the U.S.-Mexico border, preferably by geographic region and on a quarterly basis. Options for Estimating Illegal Entries at the U.S.-Mexico Border focuses on Mexican migrants since Mexican nationals account for the vast majority (around 90 percent) of attempted unauthorized border crossings across the U.S.-Mexico border.

Species Diversity in Ecological Communities - Robert E. Ricklefs 1993 A pioneering work, Species Diversity in Ecological Communities looks at biodiversity in its broadest geographical and historical contexts. For many decades, ecologists have studied only small areas over short time spans in the belief that diversity is regulated by local ecological interactions. However, to understand how species diversity comes to have the diversity they do, and to properly address urgent conservation problems, scientists must consider global patterns of species richness and the historical events that shape both local and regional communities. The authors use new theoretical developments, analyses, and case studies to explore the large-scale mechanisms that generate and maintain diversity. Case studies of various regions and organisms consider how local and regional processes interact to determine patterns of species richness. The contributors emphasize the fact that ecological

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processes acting quickly on a local scale do not erase the effects of regional and historical events that occur more slowly and less frequently. This book compels scientists to rethink the foundations of community ecology and sets the stage for further research using comparative, experimental, geographical, and historical data.

Monitoring Tigers and Their Prey

- K. Ullas Karanth 2002

Contributed articles presented at a workshop.

The Species-Area Relationship

- Thomas J. Matthews 2021-02-28

The species-area relationship (SAR) describes a range of related phenomena that are fundamental to the study of biogeography, macroecology and community ecology. While the subject of ongoing debate for a century, surprisingly, no previous book has focused specifically on the SAR. This volume addresses this shortfall by providing a synthesis of the development of SAR typologies and theory, as well as empirical research and application to biodiversity conservation problems. It also includes a compilation of recent advances in SAR research, comprising novel SAR-related theories and findings from the leading authors in the field. The chapters feature specific knowledge relating to terrestrial, marine and freshwater realms, ensuring a comprehensive volume relevant to a wide range of fields, with a mix of review and novel material and with clear recommendations for further research and application.

Hidden Markov Models for Time Series

- Walter Zucchini 2017-12-19

Hidden Markov Models for Time Series: An Introduction Using R, Second Edition illustrates the great flexibility of hidden Markov models (HMMs) as general-purpose models for time series data. The book provides a broad understanding of the models and their uses. After presenting the basic model formulation, the book covers estimation, forecasting, decoding, prediction, model selection, and Bayesian inference for HMMs. Through examples and applications, the authors describe how to extend and generalize the basic model so that it can be applied in a rich variety of situations. The book demonstrates how HMMs can be applied to a wide range of types of time series: continuous-valued, circular, multivariate, binary, bounded and unbounded counts, and categorical observations. It also discusses how to employ the freely available computing environment R to carry out the computations. Features Presents an accessible overview of HMMs Explores a variety of applications in ecology, finance, epidemiology, climatology, and sociology Includes numerous theoretical and programming exercises Provides most of the analysed data sets online New to the second edition A total of five chapters on extensions, including HMMs for longitudinal data, hidden semi-Markov models and models with continuous-valued state process New case studies on animal movement, rainfall occurrence and capture-recapture data

Lagomorph Biology

- Paulo C. Alves 2007-12-29

This is the first book to cover all aspects of Lagomorph biology. Lagomorphs are a mammalian order which includes rabbits, hares and pikas. They are distributed throughout the world and are of both scientific and public interest as they are classified between endangered and pest species. In addition, some have a high economic value as important game species. In the last few decades, a huge amount of information has been made available to the scientific community that has resulted in remarkable advances on all aspects of Lagomorph biology.

Biostatistics with R

- Jan Lepš 2020-07-31

A straightforward introduction to a wide range of statistical methods for field biologists, using thoroughly explained R code.
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