Download Ebook Real World Biology Analysis Population Research Read Pdf Free

Mathematics in Population Biology **Population Biology of Plants Introduction to Population Biology** *Management and Analysis of Biological Populations Quantitative Conservation Biology* Population Biology **Integrated Population Models** *Population Ecology in Practice Matrix Population Models* **Complex Population Dynamics Applied Population Biology** *Sensitivity Analysis: Matrix Methods in Demography and Ecology* **Dynamical Systems in Population Biology Orangutans Population Biology of Vector-Borne Diseases** *Insect Ecology* **An Introduction to Quantitative Ecology** Population Regulation The Population Biology of Tuberculosis **Problem-Solving in Conservation Biology and Wildlife Management Ecology of Shallow Lakes Consumer-Resource Dynamics (MPB-36)** *Biology for AP ® Courses* Communities and Ecosystems *Resolving Ecosystem Complexity (MPB-47)* **Dogs, Zoonoses and Public Health Evolutionary Developmental Biology The Unified Neutral Theory of Biodiversity and Biogeography (MPB-32) Conservation Biology in Sub-Saharan Africa** *Mathematical Methods of Population Biology* **Concepts of Biology The Biology of Population Growth Problem-Solving in Conservation Biology and Wildlife Management An Introduction to Methods and Models in Ecology, Evolution, and Conservation Biology** Fertility, Biology, and Behavior **Structured-Population Models in Marine, Terrestrial, and Freshwater Systems** *Data-driven Modelling of Structured Populations* **Population Viability Analysis Great Adaptations** Mathematical Biology: Modeling and Analysis

Data-driven Modelling of Structured Populations Jan 25 2020 This book is a “How To” guide for modeling population dynamics using Integral Projection Models (IPM) starting from observational data. It is written by a leading research team in this area and includes code in the R language (in the text and online) to carry out all computations. The intended audience are ecologists, evolutionary biologists, and mathematical biologists interested in developing data-driven models for animal and plant populations. IPMs may seem hard as they involve integrals. The aim of this book is to demystify IPMs, so they become the model of choice for populations structured by size or other continuously varying traits. The book uses real examples of increasing complexity to show how the life-cycle of the study organism naturally leads to the appropriate statistical analysis, which leads directly to the IPM itself. A wide range of model types and analyses are presented, including model construction, computational methods, and the underlying theory, with the more technical material in Boxes and Appendices. Self-contained R code which replicates all of the figures and calculations within the text is available to readers on GitHub. Stephen P. Ellner is Horace White Professor of Ecology and Evolutionary Biology at Cornell University, USA; Dylan Z. Childs is Lecturer and NERC Postdoctoral Fellow in the Department of Animal and Plant Sciences at The University of Sheffield, UK; Mark Rees is Professor in the Department of Animal and Plant Sciences at The University of Sheffield, UK.

Complex Population Dynamics May 23 2022 Why do organisms become extremely abundant one year and then seem to disappear a few years later? Why do population outbreaks in particular species happen more or less regularly in certain locations, but only irregularly (or never at all) in other locations? Complex population dynamics have fascinated biologists for decades. By bringing together mathematical models, statistical analyses, and field experiments, this book offers a comprehensive new synthesis of the theory of population oscillations. Peter Turchin first reviews the conceptual tools that ecologists use to investigate population oscillations, introducing population modeling and the statistical analysis of time series data. He then provides an in-depth discussion of several case studies--including the larch budmoth, southern pine beetle, red grouse, voles and lemmings, snowshoe hare, and ungulates--to develop a new analysis of the mechanisms that drive population oscillations in nature. Through such work, the author argues, ecologists can develop general laws of population dynamics that will help turn ecology into a truly quantitative and predictive science. Complex Population Dynamics integrates theoretical and empirical studies into a major new synthesis of current knowledge about population dynamics. It is also a pioneering work that sets the course for ecology's future as a predictive science.

An Introduction to Quantitative Ecology Oct 16 2021 Primarily written for non-mathematically inclined biologist.

Great Adaptations Nov 24 2019 "The irresistible enthusiasm of Great Adaptations couldn’t come at a better time."—David P. Barash, Wall Street Journal "Be very amazed."—Carl Safina, author of Beyond Words and Becoming Wild How one scientist unlocked the secrets behind some of nature’s most astounding animals From star-nosed moles that have super-sensing snouts to electric eels that paralyze their prey, animals possess unique and extraordinary abilities. In Great Adaptations, Kenneth Catania presents an entertaining and engaging look at some of nature’s most remarkable creatures. Telling the story of his biological detective work, Catania sheds light on the mysteries behind the behaviors of tentacled snakes, tiny shrews, zombie-making wasps, and more. He shows not only how studying these animals can provide deep insights into how life evolved, but also how scientific discovery can be filled with adventure and fun. Beginning with the star-nosed mole, Catania reveals what the creature’s nasal star is actually for, and what this tells us about how brains work. He explores how the deceptive hunting strategy of tentacled snakes leads prey straight to their mouths, how eels use electricity to control other animals, and why emerald jewel wasps make zombies out of cockroaches. He also solves the enigma of worm grunting—a traditional technique in which earthworms are enticed out of the ground—by teaming up with professional worm grunters. Catania demonstrates the merits of approaching science with an open mind, considers the role played by citizen scientists, and illustrates that most animals have incredible, hidden abilities that defy our imagination. Examining some strange and spectacular creatures, Great Adaptations offers a wondrous journey into nature’s grand designs.

Concepts of Biology Aug 02 2020 Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand.We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today's instructors and students, we maintain the overall organization and coverage found in most syllabi for this course. A strength of Concepts of Biology is that instructors can customize the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative art program that incorporates critical thinking and clicker questions to help students understand--and apply--key concepts.

The Population Biology of Tuberculosis Aug 14 2021 Despite decades of developments in immunization and drug therapy, tuberculosis remains among the leading causes of human mortality, and no country has successfully eradicated the disease. Reenvisioning tuberculosis from the perspective of population biology, this book examines why the disease is so persistent and what must be done to fight it. Treating tuberculosis and its human hosts as dynamic, interacting populations, Christopher Dye seeks new answers to key questions by drawing on demography, ecology, epidemiology, evolution, and population genetics. Dye uses simple mathematical models to investigate how cases and deaths could be reduced, and how interventions could lead to TB elimination. Dye's analysis reveals a striking gap between the actual and potential impact of current interventions, especially drug treatment, and he suggests placing more emphasis on early case detection and the treatment of active or incipient tuberculosis. He argues that the response to disappointingly slow rates of

disease decline is not to abandon long-established principles of chemotherapy, but to implement them with greater vigor. Summarizing epidemiological insights from population biology, Dye stresses the need to take a more inclusive view of the factors that affect disease, including characteristics of the pathogen, individuals and populations, health care systems, and physical and social environments. In broadening the horizons of TB research, The Population Biology of Tuberculosis demonstrates what must be done to prevent, control, and defeat this global threat in the twenty-first century.

Ecology of Shallow Lakes Jun 11 2021 Ecology of Shallow Lakes brings together current understanding of the mechanisms that drive the diametrically opposite states of water clarity, shown by the cover paintings, found in many shallow lakes and ponds. It gives an outline of the knowledge gained from field observations, experimental work, and restoration studies, linked by a solid theoretical framework. The book focuses on shallow lakes, but the lucid treatment of plankton dynamics, resuspension, light climate and the role of vegetation is relevant to a much wider range of aquatic systems. The models that are used remain simple and most analyses are graphical rather than algebraic. The text will therefore appeal to students, scientists and policy makers in the field of ecology, fisheries, pollution studies and water management, and also to theoreticans who will benefit from the many real-world examples of topics such as predation and competition theory, bifurcation analysis and catastrophe theory. Perhaps most importantly, the book is a remarkable example of how large field experiments and simple models can catalyze our insight into complex ecosystems. Marten Scheffer wrote this book while at the Institute of Inland Water Management and Waste Treatment, RIZA, Lelystad, The Netherlands. He is currently at the Department of Water Quality Management and Aquatic Ecology of the Wageningen Agricultural University. Reviews `Much rarer are textbooks that so succinctly sum up the state-of-the-art knowledge about a subject that they become instant `bibles'. This book is one of these. It is probably one of the best biological textbooks I have read. Scheffer masterfully pulls all this information together under one cover and presents a coherent account, which will serve as a benchmark for the subject. The reader will not gain any great insight into the breeding biology of pike from this book, nor learn much about dragonflies or newts. They will, however, come to understand the essential nature of shallow lakes or, as the author puts it, `how shallow lakes work'. Overall, this book will be of great interest to practical and theoretical ecologists, students and managers in all fields of biology. All freshwater ecologists should certainly read it.' Simon Harrison in Journal of Ecology, 86 `The book by Scheffer can be seen as a milestone in the recognition of shallow lakes as a research topic in its own right. Scheffer uses three approaches concurrently to unravel the functioning of shallow lakes: 1) statistical analysis of large datasets from a variety of lakes; 2) simple abstract models made up of a few non-linear ordinary differential equations, which he calls `mini-models'; and 3) logical reasoning based on a mixture of results from fieldwork, experiments and models. What is new is that Scheffer links mathematics very nicely with what one feels is a correct description of the functioning of a shallow lake. Employing logical reasoning, Scheffer combines all these sources of knowledge into a general, coherent picture of the functioning of a shallow lake.' Wolf Mooij in Aquatic Ecology, 32

An Introduction to Methods and Models in Ecology, Evolution, and Conservation Biology Apr 29 2020 An innovative introduction to ecology and evolution This unique textbook introduces undergraduate students to quantitative models and methods in ecology, behavioral ecology, evolutionary biology, and conservation. It explores the core concepts shared by these related fields using tools and practical skills such as experimental design, generating phylogenies, basic statistical inference, and persuasive grant writing. And contributors use examples from their own cutting-edge research, providing diverse views to engage students and broaden their understanding. This is the only textbook on the subject featuring a collaborative "active learning" approach that emphasizes hands-on learning. Every chapter has exercises that enable students to work directly with the material at their own pace and in small groups. Each problem includes data presented in a rich array of formats, which students use to answer questions that illustrate patterns, principles, and methods. Topics range from Hardy-Weinberg equilibrium and population effective size to optimal foraging and indices of biodiversity. The book also includes a comprehensive glossary. In addition to the editors, the contributors are James Beck, Cawas Behram Engineer, John Gaskin, Luke Harmon, Jon Hess, Jason Kolbe, Kenneth H. Kozak, Robert J. Robertson, Emily Silverman, Beth Sparks-Jackson, and Anton Weisstein. Provides experience with hypothesis testing, experimental design, and scientific reasoning Covers core quantitative models and methods in ecology, behavioral ecology, evolutionary biology, and conservation Turns "discussion sections" into "thinking labs" Professors: A supplementary Instructor's Manual is available for this book. It is restricted to teachers using the text in courses. For information on how to obtain a copy, refer to: http://press.princeton.edu/class_use/solutions.html

Biology for AP ® Courses Apr 09 2021 Biology for AP® courses covers the scope and sequence requirements of a typical two-semester Advanced Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board’s AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences.

Mathematics in Population Biology Mar 01 2023

Quantitative Conservation Biology Oct 28 2022 The goal of this book is to provide practical, intelligible, and intuitive explanations of population modelling to empirical ecologists and conservation biologists. Modelling methods that do not require large amounts of data (typically unavailable for endangered species) are emphasised. 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.

Management and Analysis of Biological Populations Nov 28 2022 Management and Analysis of Biological Populations demonstrates the usefulness of optimal control theory in the management of biological populations and the Liapunov function in simulating an ecosystem model under large perturbations of its initial state and continual disturbances on its dynamics. The first chapter of the book introduces the topic by presenting the different models in ecology and discussing the stability concepts, the ecological engineering, and various relevant functions in ecosystem modeling. The next chapter contains a brief survey of static optimization techniques and optimal control theory for systems, which are modeled by differential and difference equations. Another chapter covers methods that use Liapunov and Liapunov-like functions to establish that a given population model is stable relative to finite perturbations of its initial state and that it is non-vulnerable relative to large continual disturbances. The book also covers fisheries and logistic modeling, including a discussion of a few management problems. Moreover, this reference considers stability in an ecosystem model with complexities due to species richness, nonlinearities, time delays, and spatial heterogeneity. Finally, it explains how to manage pests and greenhouse crops. The book is an excellent reference source for students and professionals in ecology and environmental engineering. Research professionals and extended workers in agriculture and agronomy will also find this book invaluable.

Dogs, Zoonoses and Public Health Jan 07 2021 Zoonotic diseases constitute a public health problem throughout the world. Addressing a little studied area of veterinary and medical science, this book covers the viruses, bacteria and protozoan and helminth parasites that are transmitted between man and dogs, discussing population management, control disease agents and human-dog relationships. Fully updated throughout, this new edition also includes two new chapters on benefits of the human-dog relationship and non-infectious disease issues with dogs. It is a valuable resource for researchers and students of veterinary and human medicine, microbiology, parasitology and public health.

Population Ecology in Practice Jul 25 2022 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 quantitative methods to ecological data. The book covers new tools for designing robust field studies; estimation of abundance and demographic rates; matrix population models and analyses of population dynamics; and current

approaches 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 software platform. Fills a niche for a book that emphasizes applied aspects of population analysis Covers many of the current methods being used to analyse population dynamics and structure Illustrates the application of specific analytical methods through worked examples based on real datasets Offers readers the opportunity to work through examples or adapt the routines to their own datasets using computer code in the R statistical platform Population Ecology in Practice is an excellent book for upper-level undergraduate and graduate students taking courses in population ecology or ecological statistics, as well as established researchers needing a desktop reference for contemporary methods used to develop robust population assessments.

Sensitivity Analysis: Matrix Methods in Demography and Ecology Mar 21 2022 This open access book shows how to use sensitivity analysis in demography. It presents new methods for individuals, cohorts, and populations, with applications to humans, other animals, and plants. The analyses are based on matrix formulations of age-classified, stage-classified, and multistate population models. Methods are presented for linear and nonlinear, deterministic and stochastic, and time-invariant and time-varying cases. Readers will discover results on the sensitivity of statistics of longevity, life disparity, occupancy times, the net reproductive rate, and statistics of Markov chain models in demography. They will also see applications of sensitivity analysis to population growth rates, stable population structures, reproductive value, equilibria under immigration and nonlinearity, and population cycles. Individual stochasticity is a theme throughout, with a focus that goes beyond expected values to include variances in demographic outcomes. The calculations are easily and accurately implemented in matrix-oriented programming languages such as Matlab or R. Sensitivity analysis will help readers create models to predict the effect of future changes, to evaluate policy effects, and to identify possible evolutionary responses to the environment. Complete with many examples of the application, the book will be of interest to researchers and graduate students in human demography and population biology. The material will also appeal to those in mathematical biology and applied mathematics.

Fertility, Biology, and Behavior Mar 28 2020 Fertility, Biology, and Behavior: An Analysis of the Proximate Determinants presents the proximate determinants of natural fertility. This book discusses the biological and behavioral dimensions of human fertility that are linked to intermediate fertility variables. Organized into nine chapters, this book begins with an overview of the mechanisms through which socioeconomic variables influence fertility. This text then examines the absolute and relative age-specific marital fertility rates of selected populations. Other chapters consider the trends in total fertility rates of selected countries, including Colombia, Kenya, Korea, Indonesia, Mexico, Pakistan, France, and United States. This book discusses as well the effects of deliberate marital fertility control through contraception and induced abortion. The final chapter deals with the management of sex composition and implications for birth spacing. This book is a valuable resource for reproductive physiologists, social scientists, demographers, statisticians, biologists, and graduate students with an interest in the biological and behavioral control of human fertility.

The Unified Neutral Theory of Biodiversity and Biogeography (MPB-32) Nov 04 2020 Despite its importance and the threat of its global crash, biodiversity is poorly understood both empirically and theoretically. This work presents a neutral, general theory to explain the origin, maintenance and loss of biodiversity in a biogeographical context.

Applied Population Biology Apr 21 2022 An increasing variety of biological problems involving resource management, conservation and environmental quality have been dealt with using the principles of population biology (defined to include population dynamics, genetics and certain aspects of community ecology). There appears to be a mixed record of successes and failures and almost no critical synthesis or reviews that have attempted to discuss the reasons and ways in which population biology, with its remarkable theoretical as well as experimental advances, could find more useful application in agriculture, forestry, fishery, medicine and resource and environmental management. This book provides examples of state-of-the-art applications by a distinguished group of researchers in several fields. The diversity of topics richly illustrates the scientific and economic breadth of their discussions as well as epistemological and comparative analyses by the authors and editors. Several principles and common themes are emphasized and both strengths and potential sources of uncertainty in applications are discussed. This volume will hopefully stimulate new interdisciplinary avenues of problem-solving research.

Integrated Population Models Aug 26 2022 Integrated Population Models: Theory and Ecological Applications with R and JAGS is the first book on integrated population models, which constitute a powerful framework for combining multiple data sets from the population and the individual levels to estimate demographic parameters, and population size and trends. These models identify drivers of population dynamics and forecast the composition and trajectory of a population. Written by two population ecologists with expertise on integrated population modeling, this book provides a comprehensive synthesis of the relevant theory of integrated population models with an extensive overview of practical applications, using Bayesian methods by means of case studies. The book contains fully-documented, complete code for fitting all models in the free software, R and JAGS. It also includes all required code for pre- and post-model-fitting analysis. Integrated Population Models is an invaluable reference for researchers and practitioners involved in population analysis, and for graduate-level students in ecology, conservation biology, wildlife management, and related fields. The text is ideal for self-study and advanced graduate-level courses. Offers practical and accessible ecological applications of IPMs (integrated population models) Provides full documentation of analyzed code in the Bayesian framework Written and structured for an easy approach to the subject, especially for non-statisticians

Problem-Solving in Conservation Biology and Wildlife Management Jul 13 2021 This set of exercises has been created expressly for students and teachers of conservation biology and wildlife management who want to have an impact beyond the classroom. The book presents a set of 32 exercises that are primarily new and greatly revised versions from the book's successful first edition. These exercises span a wide range of conservation issues: genetic analysis, population biology and management, taxonomy, ecosystem management, land use planning, the public policy process and more. All exercises discuss how to take what has been learned and apply it to practical, real-world issues. Accompanied by a detailed instructor’s manual and a student website with software and support materials, the book is ideal for use in the field, lab, or classroom. Also available: Fundamentals of Conservation Biology, 3rd edition (2007) by Malcolm L Hunter Jr and James Gibbs, ISBN 9781405135450 Saving the Earth as a Career: Advice on Becoming a Conservation Professional (2007) by Malcolm L Hunter Jr, David B Lindenmayer and Aram JK Calhoun, ISBN 9781405167611

Population Regulation Sep 14 2021

Consumer-Resource Dynamics (MPB-36) May 11 2021 Despite often violent fluctuations in nature, species extinction is rare. California red scale, a potentially devastating pest of citrus, has been suppressed for fifty years in California to extremely low yet stable densities by its controlling parasitoid. Some larch budmoth populations undergo extreme cycles; others never cycle. In Consumer-Resource Dynamics, William Murdoch, Cherie Briggs, and Roger Nisbet use these and numerous other biological examples to lay the groundwork for a unifying theory applicable to predator-prey, parasitoid-host, and other consumer-resource interactions. Throughout, the focus is on how the properties of real organisms affect population dynamics. The core of the book synthesizes and extends the authors' own models involving insect parasitoids and their hosts, and explores in depth how consumer species compete for a dynamic resource. The emerging general consumer-resource theory accounts for how consumers respond to differences among individuals in the resource population. From here the authors move to other models of consumer-resource dynamics and population dynamics in general. Consideration of empirical examples, key concepts, and a necessary review of simple models is followed by examination of spatial processes affecting dynamics, and of implications for biological control of pest organisms. The book establishes the coherence and broad applicability of consumer-resource theory and connects it to single-species dynamics. It closes by stressing the theory's value as a hierarchy of models that allows both generality and testability in the field.

Problem-Solving in Conservation Biology and Wildlife Management May 30 2020 This book, intended as a supplement to a conservation biology or wildlife management textbook, provides a series of exercises for the field, lab or classroom. Topics range from population viability analysis to conservation planning, rare species occurrence, and gap analysis. The authors plan to develop a web site in conjunction with the book so that

free-ware programmes and other information can be downloaded for use in some of the exercises. Perfect as a field manual as well as a course textbook. An instructors manual will also be available. Web site provides downloadable exercises.
Mathematical Methods of Population Biology Sep 02 2020 An introduction to mathematical methods used in the study of population phenomena including models of total population and population age structure, models of random population events presented in terms of Markov chains, and methods used to uncover qualitative behavior of more complicated difference equations.
Orangutans Jan 19 2022 This book describes one of our closest relatives, the orangutan, and the only extant great ape in Asia. It is increasingly clear that orangutan populations show extensive variation in behavioural ecology, morphology, life history, and genes. Indeed, on the strength of the latest genetic and morphological evidence, it has been proposed that orangutans actually constitute two species which diverged more than a million years ago - one on the island of Sumatra the other on Borneo, with the latter comprising three subspecies. This book has two main aims. The first is to carefully compare data from every orangutan research site, examining the differences and similarities between orangutan species, subspecies and populations. The second is to develop a theoretical framework in which these differences and similarities can be explained. To achieve these goals the editors have assembled the world's leading orangutan experts to rigorously synthesize and compare the data, quantify the similarities or differences, and seek to explain them. Orangutans is the first synthesis of orangutan biology to adopt this novel, comparative approach. It analyses and compares the latest data, developing a theoretical framework to explain morphological, life history, and behavioural variation. Intriguingly, not all behavioural differences can be attributed to ecological variation between and within the two islands; relative rates of social learning also appear to have been influential. The book also emphasizes the crucial impact of human settlement on orangutans and looks ahead to the future prospects for the survival of critically endangered natural populations.
Insect Ecology Nov 16 2021 Dr. Timothy Schowalter has succeeded in creating a unique, updated treatment of insect ecology. This revised and expanded text looks at how insects adapt to environmental conditions while maintaining the ability to substantially alter their environment. It covers a range of topics- from individual insects that respond to local changes in the environment and affect resource distribution, to entire insect communities that have the capacity to modify ecosystem conditions. Insect Ecology, Second Edition, synthesizes the latest research in the field and has been produced in full color throughout. It is ideal for students in both entomology and ecology-focused programs. NEW TO THIS EDITION: * New topics such as elemental defense by plants, chaotic models, molecular methods to measure disperson, food web relationships, and more * Expanded sections on plant defenses, insect learning, evolutionary tradeoffs, conservation biology and more * Includes more than 350 new references * More than 40 new full-color figures
Population Biology of Plants Jan 31 2023 Population Biology of Plants defines a science of population biology for plants and other fixed organisms. The author describes the processes that determine the number of plants (and the number of plant parts), examines the separate stages in a general model of population behavior, the ways in which individual plants interfere with each others growth and risk of death and aspects of the behavior of animals that influence or determine the size of plant populations.
The Biology of Population Growth Jul 01 2020
Dynamical Systems in Population Biology Feb 17 2022 Population dynamics is an important subject in mathematical biology. A cen tral problem is to study the long-term behavior of modeling systems. Most of these systems are governed by various evolutionary equations such as difference, ordinary, functional, and partial differential equations (see, e. g. , [165, 142, 218, 119, 55]). As we know, interactive populations often live in a fluctuating environment. For example, physical environmental conditions such as temperature and humidity and the availability of food, water, and other resources usually vary in time with seasonal or daily variations. Therefore, more realistic models should be nonautonomous systems. In particular, if the data in a model are periodic functions of time with commensurate period, a periodic system arises; if these periodic functions have different (minimal) periods, we get an almost periodic system. The existing reference books, from the dynamical systems point of view, mainly focus on autonomous biological systems. The book of Hess [106J is an excellent reference for periodic parabolic boundary value problems with applications to population dynamics. Since the publication of this book there have been extensive investigations on periodic, asymptotically periodic, almost periodic, and even general nonautonomous biological systems, which in turn have motivated further development of the theory of dynamical systems. In order to explain the dynamical systems approach to periodic population problems, let us consider, as an illustration, two species periodic competitive systems dUI dt = !I(t,Ul,U2), (0.
Structured-Population Models in Marine, Terrestrial, and Freshwater Systems Feb 26 2020 In the summer of 1993, twenty-six graduate and postdoctoral stu dents and fourteen lecturers converged on Cornell University for a summer school devoted to structured-population models. This school was one of a series to address concepts cutting across the traditional boundaries separating terrestrial, marine, and freshwa ter ecology. Earlier schools resulted in the books Patch Dynamics (S. A. Levin, T. M. Powell & J. H. Steele, eds., Springer-Verlag, Berlin, 1993) and Ecological Time Series (T. M. Powell & J. H. Steele, eds., Chapman and Hall, New York, 1995); a book on food webs is in preparation. Models of population structure (differences among individuals due to age, size, developmental stage, spatial location, or genotype) have an important place in studies of all three kinds of ecosystem. In choosing the participants and lecturers for the school, we se lected for diversity-biologists who knew some mathematics and mathematicians who knew some biology, field biologists sobered by encounters with messy data and theoreticians intoxicated by the elegance of the underlying mathematics, people concerned with long-term evolutionary problems and people concerned with the acute crises of conservation biology. For four weeks, these perspec tives swirled in discussions that started in the lecture hall and carried on into the sweltering Ithaca night. Diversity mayor may not increase stability, but it surely makes things interesting.
Mathematical Biology: Modeling and Analysis Oct 23 2019 The fast growing field of mathematical biology addresses biological questions using mathematical models from areas such as dynamical systems, probability, statistics, and discrete mathematics. This book considers models that are described by systems of partial differential equations, and it focuses on modeling, rather than on numerical methods and simulations. The models studied are concerned with population dynamics, cancer, risk of plaque growth associated with high cholesterol, and wound healing. A rich variety of open problems demonstrates the exciting challenges and opportunities for research at the interface of mathematics and biology. This book primarily addresses students and researchers in mathematics who do not necessarily have any background in biology and who may have had little exposure to PDEs.
Population Biology of Vector-Borne Diseases Dec 18 2021 Population Biology of Vector-Borne Diseases is the first comprehensive survey of this rapidly developing field. The chapter topics provide an up-to-date presentation of classical concepts, reviews of emerging trends, synthesis of existing knowledge, and a prospective agenda for future research. The contributions offer authoritative and international perspectives from leading thinkers in the field. The dynamics of vector-borne diseases are far more intrinsically ecological compared with their directly transmitted equivalents. The environmental dependence of ectotherm vectors means that vector-borne pathogens are acutely sensitive to changing environmental conditions. Although perennially important vector-borne diseases such as malaria and dengue have deeply informed our understanding of vector-borne diseases, recent emerging viruses such as West Nile virus, Chikungunya virus, and Zika virus have generated new scientific questions and practical problems. The study of vector-borne disease has been a particularly rich source of ecological questions, while ecological theory has provided the conceptual tools for thinking about their evolution, transmission, and spatial extent. Population Biology of Vector-Borne Diseases is an advanced textbook suitable for graduate level students taking courses in vector biology, population ecology, evolutionary ecology, disease ecology, medical entomology, viral ecology/evolution, and parasitology, as well as providing a key reference for researchers across these fields.
Population Viability Analysis Dec 26 2019 Many of the world's leading conservation and population biologists evaluate what has become a key tool in estimating extinction risk and evaluating potential recovery

strategies - population viability analysis, or PVA.
Conservation Biology in Sub-Saharan Africa Oct 04 2020 Conservation Biology in Sub-Saharan Africa comprehensively explores the challenges and potential solutions to key conservation issues in Sub-Saharan Africa. Easy to read, this lucid and accessible textbook includes fifteen chapters that cover a full range of conservation topics, including threats to biodiversity, environmental laws, and protected areas management, as well as related topics such as sustainability, poverty, and human-wildlife conflict. This rich resource also includes a background discussion of what conservation biology is, a wide range of theoretical approaches to the subject, and concrete examples of conservation practice in specific African contexts. Strategies are outlined to protect biodiversity whilst promoting economic development in the region. Boxes covering specific themes written by scientists who live and work throughout the region are included in each chapter, together with recommended readings and suggested discussion topics. Each chapter also includes an extensive bibliography. Conservation Biology in Sub-Saharan Africa provides the most up-to-date study in the field. It is an essential resource, available on-line without charge, for undergraduate and graduate students, as well as a handy guide for professionals working to stop the rapid loss of biodiversity in Sub-Saharan Africa and elsewhere.
Evolutionary Developmental Biology Dec 06 2020 Although evolutionary developmental biology is a new field, its origins lie in the last century; the search for connections between embryonic development (ontogeny) and evolutionary change (phylogeny) has been a long one. Evolutionary developmental biology is however more than just a fusion of the fields of developmental and evolutionary biology. It forges a unification of genomic, developmental, organismal, population and natural selection approaches to evolutionary change. It is concerned with how developmental processes evolve; how evolution produces novel structures, functions and behaviours; and how development, evolution and ecology are integrated to bring about and stabilize evolutionary change. The previous edition of this title, published in 1992, defined the terms and laid out the field for evolutionary developmental biology. This field is now one of the most active and fast growing within biology and this is reflected in this second edition, which is more than twice the length of the original and brought completely up to date. There are new chapters on major transitions in animal evolution, expanded coverage of comparative embryonic development and the inclusion of recent advances in genetics and molecular biology. The book is divided into eight parts which: place evolutionary developmental biology in the historical context of the search for relationships between development and evolution; detail the historical background leading to evolutionary embryology; explore embryos in development and embryos in evolution; discuss the relationship between embryos, evolution, environment and ecology; discuss the dilemma for homology of the fact that development evolves; deal with the importance of understanding how embryos measure time and place both through development and evolutionarily through heterochrony and heterotrophy; and set out the principles and processes that underlie evolutionary developmental biology. With over one hundred illustrations and photographs, extensive cross-referencing between chapters and boxes for ancillary material, this latest edition will be of immense interest to graduate and advanced undergraduate students in cell, developmental and molecular biology, and in zoology, evolution, ecology and entomology; in fact anyone with an interest in this new and increasingly important and interdisciplinary field which unifies biology.
Matrix Population Models Jun 23 2022 Emphasizes the construction of models, either from actual data or as an expression of hypotheses about the life cycle, mathematical analysis of the models, and the biological interpretation of the results. Annotation copyrighted by Book News, Inc., Portland, OR
Population Biology Sep 26 2022 Population biology has been investigated quantitatively for many decades, resulting in a rich body of scientific literature. Ecologists often avoid this literature, put off by its apparently formidable mathematics. This textbook provides an introduction to the biology and ecology of populations by emphasizing the roles of simple mathematical models in explaining the growth and behavior of populations. The author only assumes acquaintance with elementary calculus, and provides tutorial explanations where needed to develop mathematical concepts. Examples, problems, extensive marginal notes and numerous graphs enhance the book's value to students in classes ranging from population biology and population ecology to mathematical biology and mathematical ecology. The book will also be useful as a supplement to introductory courses in ecology.
Resolving Ecosystem Complexity (MPB-47) Feb 05 2021 An ecosystem's complexity develops from the vast numbers of species interacting in ecological communities. The nature of these interactions, in turn, depends on environmental context. How do these components together influence an ecosystem's behavior as a whole? Can ecologists resolve an ecosystem's complexity in order to predict its response to disturbances? Resolving Ecosystem Complexity develops a framework for anticipating the ways environmental context determines the functioning of ecosystems. Oswald Schmitz addresses the critical questions of contemporary ecology: How should an ecosystem be conceptualized to blend its biotic and biophysical components? How should evolutionary ecological principles be used to derive an operational understanding of complex, adaptive ecosystems? How should the relationship between the functional biotic diversity of ecosystems and their properties be understood? Schmitz begins with the universal concept that ecosystems are comprised of species that consume resources and which are then resources for other consumers. From this, he deduces a fundamental rule or evolutionary ecological mechanism for explaining context dependency: individuals within a species trade off foraging gains against the risk of being consumed by predators. Through empirical examples, Schmitz illustrates how species use evolutionary ecological strategies to negotiate a predator-eat-predator world, and he suggests that the implications of species trade-offs are critical to making ecology a predictive science. Bridging the traditional divides between individuals, populations, and communities in ecology, Resolving Ecosystem Complexity builds a systematic foundation for thinking about natural systems.
Communities and Ecosystems Mar 09 2021 Most of the earth's terrestrial species live in the soil. These organisms, which include many thousands of species of fungi and nematodes, shape aboveground plant and animal life as well as our climate and atmosphere. Indeed, all terrestrial ecosystems consist of interdependent aboveground and belowground compartments. Despite this, aboveground and belowground ecology have been conducted largely in isolation. This book represents the first major synthesis to focus explicitly on the connections between aboveground and belowground subsystems--and their importance for community structure and ecosystem functioning. David Wardle integrates a vast body of literature from numerous fields--including population ecology, ecosystem ecology, ecophysiology, ecological theory, soil science, and global-change biology--to explain the key conceptual issues relating to how aboveground and belowground communities affect one another and the processes that each component carries out. He then applies these concepts to a host of critical questions, including the regulation and function of biodiversity as well as the consequences of human-induced global change in the form of biological invasions, extinctions, atmospheric carbon-dioxide enrichment, nitrogen deposition, land-use change, and global warming. Through ambitious theoretical synthesis and a tremendous range of examples, Wardle shows that the key biotic drivers of community and ecosystem properties involve linkages between aboveground and belowground food webs, biotic interaction, the spatial and temporal dynamics of component organisms, and, ultimately, the ecophysiological traits of those organisms that emerge as ecological drivers. His conclusions will propel theoretical and empirical work throughout ecology.
Introduction to Population Biology Dec 30 2022 Updated to include two new chapters, a modified Part II structure, more recent empirical examples, and online spreadsheet simulations.