Biology Of Populations

This volume unifies population studies emphasising the interplay between modelling and experimentation. 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.

A knowledge of animal population dynamics is essential for the proper management of natural resources and the environment. This book, now available in paperback, develops basic concepts and a rigorous methodology for the analysis of animal population dynamics to identify the underlying mechanisms.

Viable Populations for Conservation
Primer Of Population Biology
Introduction to Population Biology
Analytical Population Dynamics
Mathematical Models in Population Biology and Epidemiology

In the 50 years that have passed since Alfred Latka's death in 1949 his position as the father of mathematical demography has been secure. With his first demographic papers in 1907 and 1911 (the latter co authored with F. R. Sharpe) he laid the foundations for stable population theory, and over the next decades both largely completed it and found convenient mathematical approximations that gave it practical applica tions. Since his time, the field has moved in several directions he did not foresee, but in the main it is still his. Despite Latka's stature, however, the reader still needs to hunt through the old journals to locate his principal works. As yet no exten sive collections of his papers are in print, and for his part he never as sembled his contributions into a single volume in English. He did so in French, in the two part Theorie Analytique des Associations Biologiques (1934, 1939). Drawing on his Elements of Physical Biology (1925) and most of his mathematical papers, Latka offered French readers insights into his biological thought and a concise and mathematically accessible summary of what he called recent contributions in demographic analy sis. We would be accurate in also calling it Latka's contributions in demographic analysis.

This book explores the factors affecting the survival of small populations. As the human impact on Earth expands, populations of many wild species are being squeezed into smaller and smaller habitats. As a consequence, they face an increasing threat of extinction. National and international conservation groups rush to add these populations, species and sub-species to their existing endangered and threatened lists. In nations with strong conservation laws, listing often triggers elaborate plans to rescue declining populations and restore their habitats. The authors review these theoretical ideas, the existing data, and explore the question: how well do small and isolated populations actually perform? Their case study group is the song sparrows of Mandarte Island, British Columbia. This population is small enough and isolated enough so that all individuals can be uniquely marked and their survival and reproduction monitored over many generations. This is one of the strongest long-term ecological studies of a contained vertebrate population, now in its 31st year.

The goal of this book is to search for a balance between simple and analyzable models and unsolvable models which are capable of addressing important questions on population biology. Part I focusses on single species simple models including those which have been used to predict the growth of human and animal population in the past. Single population models are, in some sense, the building blocks of more realistic models -- the subject of Part II. Their role is fundamental to the study of ecological and demographic processes including the role of population structure and spatial heterogeneity -- the subject of Part III. This book, which will include both examples and exercises, is of use to practitioners, graduate students, and scientists working in the field.

The Song Sparrows of Mandarte Island

The Biology of Populations
Applied Population Biology
The Evolution of Population Biology
Biology in the Community

Updated to include two new chapters, a modified Part II structure, more recent empirical examples, and online spreadsheet simulations.

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.

This volume contains the papers presented at a symposium on popula tion biology sponsored by the Deutsche Forschungsgemeinschaft. It was . held at the guest house of the University of Ttibingen at Oberjoch on May 15-19, 1983. Prior to this conference a small group of European biologists had met in Berlin (June 1981) and Pavia (September 1982) to discuss re search problems on the borderline between population genetics and evolutionary ecology. From the contributions and discussions at these meetings it became evident that the unification of approaches to evolutionary problems in population genetics and evolutionary ecology has not yet been suc cessful and requires further efforts. It was the consensus that a larger symposium with international participation would be helpful to con front and discuss the different approaches to population biology in order to assess "where we are now" and "where we should be going. " As a result an organizational committee was formed (F. Christiansen, S. Jayakar, V. Loeschcke, W. Scharloo, and K. W6hrmann) to iden tify topics that seemed, at least to them, to be fruitful in tackling problems in population biology. Consequently, a number of colleagues were asked to participate in the meeting. We have divided this book into chapters corresponding to the eight topics chosen. The volume begins with the relation between genotype and phenotype and is followed by a chapter on quantitative genetics and selection in natural populations.

Population Biology of Vector-Borne Diseases
General Biology: Organisms, populations, and ecosystems
Structured Population Models in Biology and Epidemiology
How Planets Move and Populations Grow
Stability in Model Populations (MPB-31)

Throughout the twentieth century, biologists investigated the mechanisms that stabilize biological populations, populations which--if unchecked by such agencies as competition and predation--should grow geometrically. How is order in nature maintained in the face of the seemingly disorderly struggle for existence? In this book, Laurence Mueller and Amitabh Joshi examine current theories of population stability and show how recent laboratory research on model populations--particularly blowflies, Tribolium, and Drosophila--contributes to our understanding of population dynamics and the evolution of stability. The authors review the general theory of population stability and critically analyze techniques for inferring whether a given population is in balance or not. They then show how rigorous empirical research can reveal both the proximal causes of stability (how populations are regulated and maintained at an equilibrium, including the relative roles of biotic and abiotic factors) and its ultimate, mostly evolutionary causes. In the process, they describe experimental studies on model systems that address the effects of age-structure, inbreeding, resource levels, and population structure on the stability and persistence of populations. The discussion incorporates the authors' own findings on the evolution of population stability in Drosophila. They go on to relate laboratory work to studies of animals in the wild and to develop a general framework for relating the life history and ecology of a species to its population dynamics. This accessible, finely written illustration of how carefully designed experiments can improve theory will have tremendous value for all ecologists and evolutionary biologists.

How to learn population biology. Population genetics. Ecology. Biogeography: species equilibrium theory.

Provides a quantitative and Darwinian perspective on population biology, with problem sets, simulations and worked examples to aid the student.

Progress and Problems of Studies on Natural Populations
Conservation of Wildlife Populations
Teacher's Study Guide on the Biology of Human Populations
Population Biology of Tropical Insects
Genetics, Ecology, and Evolution /.

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.

Sample Text

This book, written in 1977, brought together for the first time, the current knowledge of plants that might be relevant to understanding their population biology. ¿This monumental volume did more than summarize the state of plant biology; ¿it linked the conceptual and theoretical developments in population ecology, mostly derived from the study of animals, with field observations and experimental evidence of population regulation and life history evolution in plants. ¿ ¿The field of population biology was already well established in the 1960s although with a clear zoocentric emphasis, however, it is because of Harper¿s work that the field experienced a veritable explosion, reached maturity and became a mainstream scientific endeavour worldwide. This field is so vast now that it would be pointless, if not impossible, for someone to summarise it. It is precisely because of this that PBP is as relevant now as it was in 1977. John Harper¿s style of highlighting unanswered questions and the limitations of both theory and empirical evidence served and still serves as foundation for research agendas worldwide. Much remains to be done in this field and this alone makes PBP an essential element in the library of every student/researcher of population biology, whether interested in plants or animals.¿ From the ¿Preface to the 2010 Printing¿ written by José Sarukhán, Rodolfo Dirzo and Miguel Franco.

Population Biology of Plant Pathogens

A Model System for Population Biology

Ecological Orbits

Population Biology of Grasses

Professor L. Scott Mills has been named a 2009 Guggenheim Fellowby the board of trustees of the John Simon Guggenheim MemorialFoundation. Conservation of Wildlife Populations provides anaccessible introduction to the most relevant concepts andprinciples for solving real-world management problems in wildlifeand conservation biology. Bringing together insights fromtraditionally disparate disciplines, the book shows how populationbiology addresses important questions involving the harvest,monitoring, and conservation of wildlife populations. Covers the most up-to-date approaches for assessing factorsthat affect both population growth and interactions with otherspecies, including predation, genetic changes, harvest, introducedspecies, viability analysis and habitat loss andfragmentation. Is an essential guide for undergraduates and postgraduatestudents of wildlife biology, conservation biology, ecology, andenvironmental studies and an invaluable resource for practisingmanagers on how population biology can be applied to wildlifeconservation and management. Artwork from the book is available to instructors online at ahref="http://www.blackwellpublishing.com/mills"www.blackwellpublishing.com/mills/a.An Instructor manual CD-ROM for this title is available. Pleasecontact our Higher Education team at ahref="mailto:HigherEducation@wiley.com"HigherEducation@wiley.com/afor more information.

Despite various studies carried out by scientific centres for population biology research in the USSR, many findings remain unknown to Western scientists. This collection of reviews on population biology in the USSR, attempts to remedy the situation. The areas covered include surveys of animal population biology studies - population genetics, population ecology and ecophysiology, population ethology, population cytogenetics, and population radioecology. Also explored are the population biology of amphibians and invertebrates, the population biology of the lower taxa - plants, protists, and microorganisms, and some general problems of population biology.

Introduction to Population BiologyCambridge University Press

Population Biology and Evolution

Conservation and Biology of Small Populations

The Biology of Population Growth

Modelling Biological Populations in Space and Time

Population Principles in Research Into Natural Focality of Zoonoses

Proposes a fresh approach to population biology and ecology. This book proposes and develops an inertial view of population growth, taking note of acceleration, or rate of change of the growth rate between consecutive generations. It is useful for population biologists, ecological modellers, and theoretical biologists and philosophers of science.

In this book I have tried to bring together the major developments in the study of insect

populations in tropical environments. In some ways, this task has been a difficult one because conceptually it is virtually impossible to limit a discussion of insect ecology to the tropics, since the same concepts, theories, and hypoth eses concerning the mechanisms by which habitats support insect populations often apply both to temperate and to tropical regions. Thus one might argue effectively that a book such as Peter Price's Insect Ecology represents a more comprehensive treatment of insect ecology, including the tropical aspects. Yet because there has been a tremendous amount of new study on insects in the tropics in recent years, and because there has also been a strong historical interest in tropical insects, judging from early museum expeditions and medically and agriculturally oriented studies of insects in the New and Old World tropics, I believe there is a place for a book dealing almost exclusively with tropical insects. But logically so, such a book by necessity incorporates data and informa tion from Temperate Zone studies, if for no other reason than because insights into the properties of tropical environments often emerge from compariso'ns of species, communities, or faunas between temperate and tropical regions. An understanding of insect populations in the tropics cannot be divorced from a consideration of Temperate Zone populations.

In this new century mankind faces ever more challenging environmental and publichealthproblems,suchaspollution,invasionbyexoticspecies,theem- gence of new diseases or the emergence of diseases into new regions (West Nile virus,SARS,Anthrax,etc.),andtheresurgenceofexistingdiseases(in?uenza, malaria, TB, HIV/AIDS, etc.). Mathematical models have been successfully used to study many biological, epidemiological and medical problems, and nonlinear and complex dynamics have been observed in all of those contexts. Mathematical studies have helped us not only to better understand these problems but also to ?nd solutions in some cases, such as the prediction and control of SARS outbreaks, understanding HIV infection, and the investi- tion of antibiotic-resistant infections in hospitals. Structuredpopulationmodelsdistinguishindividualsfromoneanother- cording to characteristics such as age, size, location, status, and movement, to determine the birth, growth and death rates, interaction with each other and with environment, infectivity, etc. The goal of structured population models is to understand how these characteristics a?ect the dynamics of these models and thus the outcomes and consequences of the biological and epidemiolo- cal processes. There is a very large and growing body of literature on these topics. This book deals with the recent and important advances in the study of structured population models in biology and epidemiology. There are six chapters in this book, written by leading researchers in these areas.

Behavioral Ecology and Population Biology in Populations of of Fidder [sic] Crabs, Uca Pugnax (Smith), on the New Jersey Coast

On the Wings of Checkerspots

Sampling Biological Populations

Population Biology

Demography, Genetics and Management

How do plant and animal populations change genetically to evolve and adapt to their local environments? How do populations grow and interact with one another through competition and predation? How does behaviour influence ecology and evolution? This second edition of Dick Neal's unique textbook on population biology addresses these questions and offers a comprehensive analysis of evolutionary theory in the areas of ecology, population genetics, and behaviour. Taking a quantitative and Darwinian perspective, Neal uses mathematical models to develop the basic theory of population processes. Key features in this edition include new chapters on inbreeding and species interactions and community structure, a modified structure in Part II, more recent empirical examples to illustrate the application of theoretical models to the world around us, and end-of-chapter problems to help students with self-assessment. A series of spreadsheet simulations have also been conveniently located online, for students to further improve their understanding of such models. This book addresses research in the rapidly developing integration of conservation biology with population biology.

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.

Population Biology of Plants

The Human Biology of Pastoral Populations

Dynamical Systems in Population Biology

Mathematics in Population Biology

Concepts and Models

This 2004 collection of essays deals with the foundation and historical development of population biology and its relationship to population genetics and population ecology on the one hand and to the rapidly growing fields of molecular quantitative genetics, genomics and bioinformatics on the other. Such an interdisciplinary treatment of population biology has never been attempted before. The volume is set in a historical context, but it has an up-to-date

coverage of material in various related fields. The areas covered are the foundation of population biology, life history evolution and demography, density and frequency dependent selection, recent advances in quantitative genetics and bioinformatics, evolutionary case history of model organisms focusing on polymorphisms and selection, mating system evolution and evolution in the hybrid zones, and applied population biology including conservation, infectious diseases and human diversity. This is the third of three volumes published in honour of Richard Lewontin.

When we wrote this book it was, admittedly, flrst of all for the sake of our own enjoyment and enlightenment. We will, however, add our sincerely meant (but rather traditional) hope that it will prove interesting to graduate students, to colleagues and to anyone else, who will bother to read it. The book was written as a joint effort by a theoretically inclined population geneticist and an experimental ecologist who share opinions on what is interesting in the fleld of theoretical ecology. While we believe that qualifled natural history is of indisputable intrinsic value, we think that ecology is a natural science which should have a theoretical framework. On the other hand, theoretical ecology must draw its inspiration from nature and yield results which give insight into the flndings of the naturalist and inspire him to make new observations and experiments. Without this relationship between fleld biology and theory, mathe matical ecology may become a discipline totally divorced from biology and solve-albeit interesting-mathematical problems without signiflcance for ecology. Therefore, in addition to theoretical population biology (including some original models) the book also discusses observational data from nature to show how the theoretical models give new insight and how observations give rise to new theoretical thought. While no book on ecology could do without the mention of the hare-lynx example (and ours is, therefore, no exception) we have tried to bring new examples mainly derived from one of the authors' fleld of experience: microbial ecology and marine biology.

Introduction to population biology; The genetic structure of populations; Evolution at the population level; Population size: growth and dynamics; Regulatory systems in populations; Dispersion, dispersal, and populations; Population structure: age and sex; Life history patterns and selection in populations; Mating systens and behavior in populations; Seasonality and populations; Interactions of unrelated populations in communities.

Analytical Theory of Biological Populations

Theories of Populations in Biological Communities

Populations

Hanski, a leading thinker in metapopulation ecology, studies checkerspot butterfly populations in Finland. Ehrlich, one of the leading ecologists and conservation biologist, investigates checkerspot butterfly populations in California. This book reports on and synthsizes the major long-term research of both workers' careers on the population biology of checkerspot butterflies.

Dynamics.