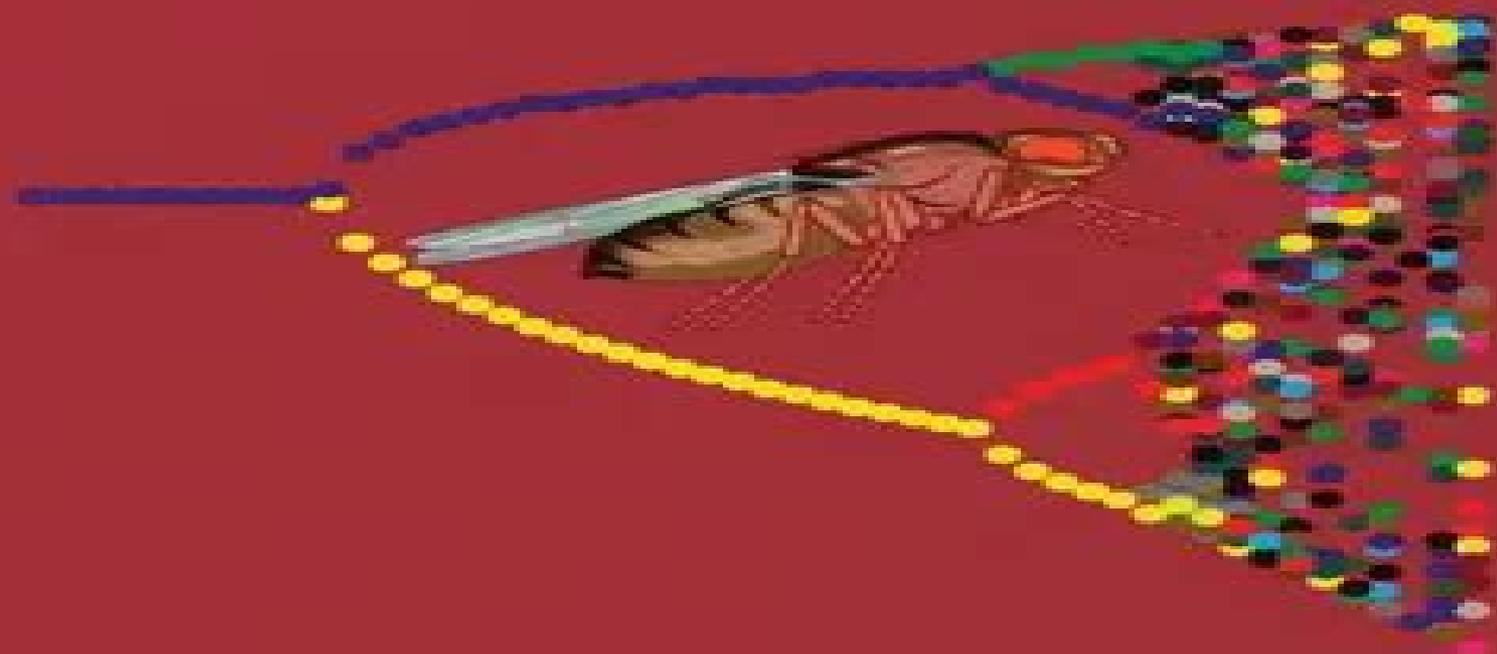# Stability in Model Populations

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Stability In Model Populations

Robert M May

Stability In Model Populations:

Stability in Model Populations Laurence D. Mueller,Amitabh Joshi,2020-03-31 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   Stability and Complexity in Model Ecosystems ,2001-03-18 What makes populations stabilize What makes them fluctuate Are populations in complex ecosystems more stable than populations in simple ecosystems In 1973 Robert May addressed these questions in this classic book May investigated the mathematical roots of population dynamics and argued counter to most current biological thinking that complex ecosystems in themselves do not lead to population stability Stability and Complexity in Model Ecosystems played a key role in introducing nonlinear mathematical models and the study of deterministic chaos into ecology a role chronicled in James Gleick s book Chaos In the quarter century since its first publication the book s message has grown in power Nonlinear models are now at the center of ecological thinking and current threats to biodiversity have made questions about the role of ecosystem complexity more crucial than ever In a new introduction the author addresses some of the changes that have swept biology and the biological world since the book s first publication   *Population Dynamics and Laboratory Ecology* Robert Desharnais,2005-08-04 Population Dynamics and Laboratory Ecology highlights the contributions laboratory studies are making to our understanding of the dynamics of ecological and evolutionary systems Chapters address the scientific rationale for laboratory ecology its historical role within the broader discipline and recent advances in research The book presents results from a wide range of laboratory systems including insects mites plankton protists and microbes A common theme throughout the book is the value of microcosm studies in advancing our knowledge of ecological and

evolutionary principles Each chapter is authored by scientists who are leading experts in their fields The book addresses fundamental questions that are of interest to biologists whether they work in the laboratory or field or whether they are primarily empiricists or theorists Details a scientific rationale for laboratory systems in ecological and evolutionary studies Offers a view on historical role of laboratory studies Includes examples of recent research advances in ecology and evolution using laboratory systems ranging from insects to microbes Integrates mathematics statistics and experimental studies

Integrated Population Biology and Modeling, Part A ,2018-09-26 Integrated Population Biology and Modeling Part A offers very complex and precise realities of quantifying modern and traditional methods of understanding populations and population dynamics Chapters cover emerging topics of note including Longevity dynamics Modeling human environment interactions Survival Probabilities from 5 Year Cumulative Life Table Survival Ratios Tx 5 Tx Some Innovative Methodological Investigations Cell migration Models Evolutionary Dynamics of Cancer Cells an Integrated approach for modeling of coastal lagoons A case for Chilka Lake India Population and metapopulation dynamics Mortality analysis measures and models Stationary Population Models Are there biological and social limits to human longevity Probability models in biology Stochastic Models in Population Biology and more Covers emerging topics of note in the subject matter Presents chapters on Longevity dynamics Modeling human environment interactions Survival Probabilities from 5 Year Cumulative Life Table Survival Ratios Tx 5 Tx and more *Forest Insect Population Dynamics, Outbreaks, And Global Warming Effects* A. S. Isaev,Vladislav G. Soukhovolsky,O. V. Tarasova,E. N. Palnikova,A. V. Kovalev,2017-03-21 This new approach to insect modeling discusses population dynamics regularities control theory theory of transitions and describes methods of population dynamics and outbreaks modeling for forest phyllophagous insects and their effects on global climate change Research in insect population dynamics is important for more reasons than just protecting forest communities Insect populations are among the main ecological units included in the analysis of stability of ecological systems Moreover it is convenient to test new methods of analyzing population and community stability on the insect related data as by now ecologists and entomologists have accumulated large amounts of such data In this book the authors analyze population dynamics of quite a narrow group of insects forest defoliators It is hoped that the methods proposed herein for the analysis of population dynamics of these species may be useful and effective for analyzing population dynamics of other animal species and their effects and role in global warming What can insects tell us about our environment and our ever changing climate It is through studies like this one that these important answers can be obtained along with data on the insects and their behaviors themselves The authors present new theories on modeling and data accumulation using cutting edge processes never before published for such a wide audience This volume presents the state of the art in the science and it is an essential piece of any entomologist s and forest engineer s library **On the Stability of a Population Growth Model with Sexual Reproduction on the Two Dimensional Integer Lattice** Hwa-Nien Chen,1990 **Allee Effects in Ecology and**

Conservation Franck Courchamp,Ludek Berec,Joanna Gascoigne,2008-02-14 Allee effects are broadly defined as a decline in individual fitness at low population size or density They can result in critical population thresholds below which populations crash to extinction As such they are very relevant to many conservation programmes where scientists and managers are often working with populations that have been reduced to low densities or small numbers There are a variety of mechanisms that can create Allee effects including mating systems predation environmental modification and social interactions The abrupt and unpredicted collapses of many exploited populations is just one illustration of the need to bring Allee effects to the forefront of conservation and management strategies Allee Effects in Ecology and Conservation provides a concise yet authoritative overview of the topic collating and integrating a widely dispersed literature from various fields marine and terrestrial plant and animal theoretical and empirical academic and applied This accessible text with its clear and simple explanations of both empirical observations and theoretical predications is particularly suitable for professional and academic ecologists requiring an overview of the state of the art in Allee effect research as well as for graduate students in population ecology and conservation biology It will also be of relevance to a wide readership of professionals in conservation and management requiring a concise summary of the topic   **Stability and Complexity in Model Ecosystems** Robert McCredie May,1973   Machine Learning Using R Karthik Ramasubramanian,Abhishek Singh,2016-12-22 Examine the latest technological advancements in building a scalable machine learning model with Big Data using R This book shows you how to work with a machine learning algorithm and use it to build a ML model from raw data All practical demonstrations will be explored in R a powerful programming language and software environment for statistical computing and graphics The various packages and methods available in R will be used to explain the topics For every machine learning algorithm covered in this book a 3 D approach of theory case study and practice will be given And where appropriate the mathematics will be explained through visualization in R All the images are available in color and hi res as part of the code download This new paradigm of teaching machine learning will bring about a radical change in perception for many of those who think this subject is difficult to learn Though theory sometimes looks difficult especially when there is heavy mathematics involved the seamless flow from the theoretical aspects to example driven learning provided in this book makes it easy for someone to connect the dots What You ll Learn Use the model building process flow Apply theoretical aspects of machine learning Review industry based cae studies Understand ML algorithms using R Build machine learning models using Apache Hadoop and Spark Who This Book is For Data scientists data science professionals and researchers in academia who want to understand the nuances of machine learning approaches algorithms along with ways to see them in practice using R The book will also benefit the readers who want to understand the technology behind implementing a scalable machine learning model using Apache Hadoop Hive Pig and Spark   **Risk Evaluation and Biological Reference Points for Fisheries Management** National Research Council Canada,Canada. Department of Fisheries and Oceans,1993 Papers presented 1

Reference points for fisheries management the western Canadian experience 2 Reference points for fisheries management the eastern Canadian experience 3 Reference points for fisheries management the ICES experience 4 Spawning stock biomass per recruit in fisheries management foundation and current use 5 The development of a management procedure for the South African anchovy resource 6 How much spawning per recruit is enough 7 The behaviour of Flow Fmed and Fhigh in response to variation in parameters used for their estimation 8 The Barents Sea capelin stock collapse a lesson to learn 9 Variance estimates for fisheries assessment their importance and how best to evaluate them 10 Evaluating the accuracy of projected catch estimates from sequential population analysis and trawl survey abundance estimates 11 Bootstrap estimates of ADAPT parameters their projection in risk analysis and their retrospective patterns 12 Analytical estimates of reliability for the projected yield from commercial fisheries 13 Risk evaluation of the 10% harvest rate procedure for capelin in NAFO Division 3L 14 Using jackknife and Monte Carlo simulation techniques to evaluate forecast models for Atlantic salmon 15 Monte Carlo evaluation of risks for biological reference points used in New Zealand fishery assessments 16 A comparison of event free risk analysis to Ricker spawner recruit simulation an example with Atlantic menhaden 17 Choosing a management strategy for stock rebuilding when control is uncertain 18 Risks and uncertainties in the management of a single cohort squid fishery the Falkland Islands Illex fishery as an example 19 Risks of over and under fishing new resources 20 Estimation of density dependent natural mortality in British Columbia herring stocks through SSPA and its impact on sustainable harvesting strategies 21 The comparative performance of production model and ad hoc tuned VPA based feedback control management procedures for the stock of Cape hake off the west coast of Africa 22 A proposal for a threshold stock size and maximum fishing mortality rate 23 Biological reference points for Canadian Atlantic gadoid stocks 24 Stochastic locally optimal harvesting 25 ITQ based fisheries management 26 Bioeconomic methods for determining TACs 27 Management strategies fixed or variable catch quotas 28 Bioeconomic impacts of TAC adjustment strategies a model applied to northern cod 29 Experimental management programs for two rockfish stocks off British Columbia 30 A brief overview of the experimental approach to reducing uncertainty in fisheries management 31 Fisheries management organizations a study of uncertainty **Stability and Complexity in Model Ecosystems** Robert M May,2019-12-31 What makes populations stabilize What makes them fluctuate Are populations in complex ecosystems more stable than populations in simple ecosystems In 1973 Robert May addressed these questions in this classic book May investigated the mathematical roots of population dynamics and argued counter to most current biological thinking that complex ecosystems in themselves do not lead to population stability Stability and Complexity in Model Ecosystems played a key role in introducing nonlinear mathematical models and the study of deterministic chaos into ecology a role chronicled in James Gleick s book Chaos In the quarter century since its first publication the book s message has grown in power Nonlinear models are now at the center of ecological thinking and current threats to biodiversity have made questions about the role of ecosystem complexity more

crucial than ever In a new introduction the author addresses some of the changes that have swept biology and the biological world since the book s first publication   **Population-Level Ecological Risk Assessment** Lawrence W. Barnthouse,Jr. Munns,Mary T. Sorensen,2007-09-25 Most ecological risk assessments consider the risk to individual organisms or organism level attributes From a management perspective however risks to population level attributes and processes are often more relevant Despite many published calls for population risk assessment and the abundance of available scientific research and technical tool   The Methods and Materials of Demography Henry S. Shryock,Jacob S. Siegel,1975   *Some Methods of Estimation for Statistically Underdeveloped Areas* Paul George Demeny,1971   **Stability in Discrete Population Models** Paul Cull,J. Chaffee,Oregon State University. Department of Computer Science,1999   *Profiles in Scientific Research: Mathematical sciences, physics, chemical sciences, engineering & technology, and earth sciences* ,1986   **Optimal Control Theory Applied to a Class of Biological Population Growth Models** John Anthony Fleming,1973

       Applications of Stability Methods to a Dynamic Population Model Peter Anthony Cummings,1992   **Stability and Complexity in Model Ecosystems** ,2001   **Systems Analysis and Simulation in Ecology** Bernard C. Patten,1976

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