

Population Ecology Lab Exercise Using Mice and Fox in a Meadow Ecosystem

Materials:

- One habitat container
- 100 red beads - these are 'control' and represent times that the mice will escape/gets away; "strikes".
- 100 yellow beads - these represent the prey species; mice
- Data sheet
- Graph paper
- Colored pencils
- Fox - students will be the predators in this lab exercise

Procedure:

1. Place 100 control (red beads) in the habitat
 2. Add 10 mice (yellow or white beads) to the habitat
- Generation 1 - Your designated 'fox' will draw 15 beads from the habitat, without looking.

If the fox gets 5 yellow/white/mouse beads, it survives and reproduces. You would start generation 2 with 2 fox- the survivor and its offspring.

If a fox gets 10 mice it survives and has 2 babies (fox total is now 3).

If the fox captures less than 5 mice it dies (and doesn't reproduce either).

Count the number of mice left in the habitat container - each of these survivors *reproduces*. For example, if your fox captures 3 of the ten mice (this fox starves) but the 7 mice left in the container reproduce. You would then start generation 2 with 14 mice.

Always start each generation with a minimum of 10 mice and 1 fox; even if all of your organisms die, assume that new ones will discover your meadow and immigrate.

Never have more than 200 mice or 20 fox. (We have set an arbitrary carrying capacity for this meadow.)

Generation 2 - Place beads in your habitat that represent the next generation of mice and fox; consider that some have reproduced and some have starved.

If you have more than one fox, then each fox captures its 15 beads individually. The first fox takes 15 beads, counts the mice and PUTS THE RED BACK. Then the 2nd fox takes 15 beads, counts the mice and RETURNS THE RED. Eventually the more fox you have the more that will start starving, and the "early fox gets the mouse".

Total the mice caught by all your fox, subtract from 100 and double the survivors. This is your prey number for the next generation.

Continue for 20 generations.



"its getting harder and harder to find food with all this competition!"

Population Ecology Lab Exercises

Iowa State University



Population Ecology Lab Exercises:

40 Inquiry Exercises for the College Biology Lab A. Daniel Johnson, 2009 Drawing from the author's own work as a lab developer coordinator and instructor this one of a kind text for college biology teachers uses the inquiry method in presenting 40 different lab exercises that make complicated biology subjects accessible to major and nonmajors alike The volume offers a review of various aspects of inquiry including teaching techniques and covers 16 biology topics including DNA isolation and analysis properties of enzymes and metabolism and oxygen consumption Student and teacher pages are provided for each of the 16 topics Laboratory Exercises for Freshwater Ecology John E. Havel, 2016-03-17 Limnology stream ecology and wetland ecology all share an interdisciplinary perspective of inland aquatic habitats Scientists working in these fields explore the roles of geographic position physical and chemical properties and the other biota on the different kinds of plants and animals living in freshwaters How do these creatures interact with each other and with their physical environment In what ways have humans impacted aquatic habitats By what methods do freshwater ecologists study these environments With this new laboratory manual Havel provides a variety of accessible hands on exercises to illuminate key concepts in freshwater ecology These exercises include a mixture of field trips indoor laboratory exercises and experiments with some portions involving qualitative observations and others more quantitative With the help of this manual students will develop an appreciation for careful techniques used in the laboratory and in the field as well as an understanding of how to collect accurate field notes keep a well organized lab notebook and write clear scientific reports **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 Laboratory Exercises in Microbiology Robert A. Pollack, Lorraine Findlay, Walter Mondschein, R. Ronald Modesto, 2018-07-11 The Laboratory Exercises in Microbiology 5e by Pollack et al presents exercises and experiments covered in a 1 or 2 semester undergraduate microbiology laboratory course for allied health students The labs are introduced in a clear and concise manner while maintaining a student friendly tone The manual contains a variety of interactive

activities and experiments that teach students the basic concepts of microbiology The 5th edition contains new and updated labs that cover a wide array of topics including identification of microbes microbial biochemistry medical microbiology food microbiology and environmental microbiology **Population Ecology in Practice** Dennis L. Murray, Brett K.

Sandercock, 2019-12-20 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

Exploring Human Biology in the Laboratory Matthew M. Douglas, Jonathan M. Douglas, 2016-01-01 Exploring Human Biology in the Laboratory is a comprehensive manual appropriate for human biology lab courses This edition features a streamlined set of clearly written activities These exercises emphasize the anatomy physiology ecology and evolution of humans within their environment *Courses and Programs* Iowa State University, 1999 **Laboratory and Field Ecology**

Victor Ernest Shelford, 1929 Some problems of ecology and climatology Behavior and acclimation Food and food effects animals in relation to temperature Ventilation under experimental conditions Light conditions and effects Location and planning of buildings and equipment for the simulation of climatic conditions Chemical conditions in water **Oak Seed**

Dispersal Michael A. Steele, 2021-01-05 The definitive examination of oak forest evolutionary ecology Seed dispersal is a critical stage in the life cycle of most flowering plants The process can have far reaching effects on a species biology especially numerous aspects of its ecology and evolution This is particularly the case for the oaks in which the dispersal of the acorn is tied to numerous tree characteristics as well as the behavior and ecology of the animals that feed on and move these seeds to their final destination Forest structure composition and genetics often follow directly from the dispersal process while also influencing it in turn In Oak Seed Dispersal Michael A Steele draws on three decades of field research across the globe e g the United States Mexico Central America Europe and China to describe the interactions between oaks

and their seed consumers Rodents birds and insects he writes collectively influence the survival movement and germination of acorns as well as the establishment of seedlings often indicating a coevolutionary bond between oaks and their seed consumers This bond can only be understood by unraveling the complex interactions that occur in the context of factors such as partial seed consumption due to acorn chemistry scatterhoarding predation of the seed consumers by other organisms and the limiting effects of masting on insect rodent and jay damage Offering new insights on how animal mediated dispersal drives ecological and evolutionary processes in forest ecosystems Oak Seed Dispersal also includes an overview of threatened oak forests across the globe and explains how a lack of acorn dispersal contributes to many important conservation challenges Highly illustrated the book includes photographs of key dispersal organisms and tactics as well as a foreword by Stephen B Vander Wall a leading authority on food hoarding and animal mediated seed dispersal and beautiful artwork by Tad C Theimer also an accomplished ecologist

University of Michigan Official Publication University of Michigan,1973 Each number is the catalogue of a specific school or college of the University *Catalogs of Courses* University of California, Berkeley,1995 Includes general and summer catalogs issued between 1878 1879 and 1995 1997

Summaries of Projects Completed in Fiscal Year ... , **Summaries of Projects Completed** National Science Foundation (U.S.), Summaries of Projects Completed in Fiscal Year ... National Science Foundation (U.S.),1979 *The University of Virginia Record* University of Virginia,1929

Human Biology Laboratory Manual Charles J. Welsh,2006 A perfect accompaniment to any Human Biology course Charles Welsh s Human Biology Laboratory Manual boasts 18 lab exercises aimed at educating students on how the human body works Labs within the manual may be taught in any order offering instructors the flexibility to cater the text to their own needs and course lengths *Undergraduate and Graduate Courses and Programs* Iowa State University,2009

Encyclopedia of Virology ,2021-02-24 Encyclopedia of Virology Fourth Edition Five Volume Set builds on the solid foundation laid by the previous editions expanding its reach with new and timely topics In five volumes the work provides comprehensive coverage of the whole virosphere making this a unique resource Content explores viruses present in the environment and the pathogenic viruses of humans animals plants and microorganisms Key areas and concepts concerning virus classification structure epidemiology pathogenesis diagnosis treatment and prevention are discussed guiding the reader through chapters that are presented at an accessible level and include further readings for those needing more specific information More than ever now with the Covid19 pandemic we are seeing the huge impact viruses have on our life and society This encyclopedia is a must have resource for scientists and practitioners and a great source of information for the wider public Offers students and researchers a one stop shop for information on virology not easily available elsewhere Fills a critical gap of information in a field that has seen significant progress in recent years Authored and edited by recognized experts in the field with a range of different expertise thus ensuring a high quality standard

Ecotoxicology Essentials Donald W. Sparling,2016-04-18 Ecotoxicology Essentials

Environmental Contaminants and Their Biological Effects on Animals and Plants provides a fundamental understanding of this area for students and professionals in ecotoxicology ecology conservation chemistry public health wildlife management fisheries and many other disciplines Although new chemicals and potential problems are developed every year a basic education is essential to address these new challenges and this work gives such training Written with the regulatory framework in mind the material guides readers on modelling how to conduct assessments and human and wildlife risk focusing on effects on animals rather than transport of chemicals Simple discussions of chemistry are complemented by coverage on the behavior of the animal dynamics of the ecosystem real life situations like drought and predators in the system i e the natural system versus the lab setting The book s first section contains chapters on the principles of contaminant toxicology including a brief history of the science of ecotoxicology basic principles of the science testing methods and ways of determining if animals have been exposed to either acute or chronic concentrations of contaminants The second section deals with the primary classes of contaminants including their chemical characteristics sources uses and effects on organisms The third section focuses on more complex issues such as the regulation of pollution population and community effects risk assessment and modelling Uses examples from both aquatic and terrestrial environments and species Includes a Terms to Know section and a list of study questions in each chapter fostering a greater understanding of the issues Focuses on the effects of contaminants on wildlife while providing enough chemistry to allow a detailed understanding of the various contaminant groups Emphasizes natural examples and real species rather than laboratory studies on only a handful of organisms Features case histories detailing actual events that include aspects of how the contamination occurred and its effects on wildlife Provides material from a wide variety of international sources

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

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