

Population Regulation In The Serengeti

Task: Mathematics
Population Regulation in the Serengeti

Activity
Student Handout

3. In Figure 1, which symbol (unshaded square or shaded circle) represents the number of wildebeest, and which represents the percentage ("prevalence") of wildebeest with redworm? How do you know?

The shaded circles represent prevalence - as the figure shows the prevalence of redworm in the herd. The unshaded squares represent the number of wildebeest.

4. The distribution of redworm impacted the wildebeest population. What type of factor is redworm?

a. density-independent, top-down
b. density-independent, bottom-up
c. density-dependent, top-down
d. density-dependent, bottom-up

density-dependent and bottom-up

Initial answer and explanation:

Revised answer and explanation:

5. Consider the growth curve of the wildebeest population shown in Figure 1. Which of the following best describes this type of growth?

a. exponential
b. linear
c. logistic
d. geometric

logistic

Initial answer and explanation:

Revised answer and explanation:

6. Predict what would happen to the wildebeest population in the long term given this type of growth.

the population will level off. It will not keep growing because there are limited resources. The wildebeest will reach a carrying capacity and the population will stabilize.

Revised answer and explanation: *and decreasing the population. It could also affect other density-dependent factors.*

Part 2: What Happened to Migratory Wildebeest? (2008-2010)

Watch video (L1) (5:55-7:05), which explains what happened to the wildebeest population over time. Figure 2, which is an extended version of Figure 1, shows the population up until 2010.

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Population Regulation in the Serengeti: A Complex Web of Life

The Serengeti. The name conjures images of vast, endless plains teeming with wildlife – majestic lions, graceful giraffes, thundering herds of wildebeest. But this iconic ecosystem isn't a chaotic free-for-all. Behind the breathtaking spectacle lies a finely tuned system of population regulation, a delicate balance maintained through intricate interactions between predators, prey, and the environment. This post delves into the fascinating complexities of population regulation in the Serengeti, exploring the various factors that keep this incredible ecosystem thriving. We'll examine the roles of predation, competition, disease, and environmental influences, providing a

comprehensive understanding of this crucial ecological process.

Predator-Prey Dynamics: The Foundation of Serengeti Regulation

The Serengeti's population dynamics are heavily influenced by the classic predator-prey relationship. The iconic wildebeest migration, for instance, is a dramatic demonstration of this. The sheer number of wildebeest provides ample food for lions, cheetahs, hyenas, and other predators. When wildebeest numbers are high, predator populations can also increase, leading to a natural check on prey abundance. This isn't a simple linear relationship, however. Fluctuations in prey populations can influence predator breeding success and survival rates. A decline in wildebeest, for example, can lead to increased competition among predators, resulting in higher mortality rates or reduced reproductive success.

The Role of Keystone Predators

Specific predators play disproportionately large roles in maintaining ecosystem balance, often referred to as keystone species. Lions, for instance, are apex predators whose presence significantly impacts the populations of many herbivores. Their hunting strategies, targeting primarily weaker or younger animals, contribute to a healthier overall prey population by preventing overgrazing and disease spread. The removal of lions could lead to a cascade effect, dramatically altering the entire ecosystem.

Competition: A Struggle for Resources

Competition for resources – water, grazing land, and nesting sites – is another crucial factor regulating populations in the Serengeti. Herbivores compete directly for food, with some species better adapted to certain environments or plant types. This competition can lead to resource partitioning, where different species specialize in different niches to minimize direct conflict. For example, zebras might focus on taller grasses, while wildebeest graze on shorter vegetation.

Intraspecific and Interspecific Competition

It's important to differentiate between intraspecific (competition within a species) and interspecific (competition between different species) competition. Both are critical. Intraspecific competition can lead to self-regulation of populations, as individuals struggle for limited resources. High population density can increase stress, reduce reproductive rates, and even increase vulnerability to disease,

ultimately leading to a decline in numbers. Interspecific competition, on the other hand, shapes the community structure, influencing the distribution and abundance of various species.

Disease and Parasitism: Silent Regulators

Disease and parasitism are often overlooked but play a significant role in regulating Serengeti populations. Outbreaks of disease can decimate populations rapidly, particularly among vulnerable young or old animals. The density of animals also plays a role; high population densities facilitate the rapid spread of contagious diseases. Parasites can weaken individuals, reducing their fitness and making them more susceptible to predation or starvation.

Environmental Influences: The Hand of Nature

Environmental factors, such as rainfall, temperature, and vegetation patterns, exert a powerful influence on Serengeti populations. Rainfall directly affects vegetation growth, impacting the availability of food for herbivores. Droughts can lead to significant population declines, while unusually wet seasons can support larger populations. The cyclical nature of these environmental variations contributes to the boom-and-bust cycles observed in many Serengeti populations.

The Impact of Climate Change

Climate change is increasingly impacting the Serengeti ecosystem. Shifting rainfall patterns, increased temperatures, and altered vegetation composition could disrupt the delicate balance of population regulation, potentially leading to unpredictable changes in species abundance and distribution.

Conclusion

Population regulation in the Serengeti is a complex interplay of factors, including predation, competition, disease, and environmental influences. Understanding these dynamics is crucial for effective conservation efforts. Preserving the Serengeti's biodiversity requires a holistic approach that considers the intricate web of life that sustains this incredible ecosystem. The delicate balance of nature is constantly in flux, making continuous monitoring and adaptation essential to ensure the long-term health of this iconic landscape.

FAQs

Q1: How do researchers study population regulation in the Serengeti?

A1: Researchers employ a variety of methods, including long-term monitoring of animal populations, analyzing vegetation patterns, studying predator-prey interactions, and investigating the impacts of disease outbreaks. Sophisticated tracking technologies and statistical modeling are crucial tools in understanding these complex dynamics.

Q2: Are human activities impacting population regulation in the Serengeti?

A2: Absolutely. Human activities, including habitat loss, poaching, and livestock grazing, can disrupt the natural balance of the ecosystem. These disturbances can exacerbate existing pressures and create new challenges for wildlife populations.

Q3: What is the role of migration in Serengeti population regulation?

A3: Migration, particularly the wildebeest migration, plays a crucial role in distributing resources and reducing the impact of localized environmental changes or resource depletion. It acts as a natural buffer against extreme fluctuations in population numbers.

Q4: How can we better protect the Serengeti's delicate balance?

A4: Effective conservation requires a multi-faceted approach, including protecting critical habitats, controlling poaching, managing human-wildlife conflict, and mitigating the effects of climate change. International collaboration and community involvement are essential.

Q5: What are some future research directions for understanding Serengeti population regulation?

A5: Future research should focus on integrating climate change predictions into population models, exploring the impact of emerging diseases, and improving our understanding of the complex interactions between different species and their environment. Advances in technology, like remote sensing and genomic analysis, will be invaluable in this pursuit.

population regulation in the serengeti: *Population Regulation* Robert H. Tamarin, 1978

population regulation in the serengeti: *The Serengeti Rules* Sean B. Carroll, 2024-08-20 One of today's most accomplished biologists and gifted storytellers reveals the rules that regulate all life. How does life work? How does nature produce the right numbers of zebras and lions on the African savanna, or fish in the ocean? How do our bodies produce the right numbers of cells in our organs and bloodstream? In *The Serengeti Rules*, award-winning biologist and author Sean Carroll tells the stories of the pioneering scientists who sought the answers to such simple yet profoundly important questions, and shows how their discoveries matter for our health and the health of the planet we depend upon. One of the most important revelations about the natural world is that everything is regulated—there are rules that regulate the amount of every molecule in our bodies and rules that

govern the numbers of every animal and plant in the wild. And the most surprising revelation about the rules that regulate life at such different scales is that they are remarkably similar—there is a common underlying logic of life. Carroll recounts how our deep knowledge of the rules and logic of the human body has spurred the advent of revolutionary life-saving medicines, and makes the compelling case that it is now time to use the Serengeti Rules to heal our ailing planet. Bold and inspiring, *The Serengeti Rules* illuminates how life works at vastly different scales. Read it and you will never look at the world the same way again.

population regulation in the serengeti: *Using Science to Improve the BLM Wild Horse and Burro Program* National Research Council, Division on Earth and Life Studies, Board on Agriculture and Natural Resources, Committee to Review the Bureau of Land Management Wild Horse and Burro Management Program, 2013-10-04 *Using Science to Improve the BLM Wild Horse and Burro Program: A Way Forward* reviews the science that underpins the Bureau of Land Management's oversight of free-ranging horses and burros on federal public lands in the western United States, concluding that constructive changes could be implemented. The Wild Horse and Burro Program has not used scientifically rigorous methods to estimate the population sizes of horses and burros, to model the effects of management actions on the animals, or to assess the availability and use of forage on rangelands. Evidence suggests that horse populations are growing by 15 to 20 percent each year, a level that is unsustainable for maintaining healthy horse populations as well as healthy ecosystems. Promising fertility-control methods are available to help limit this population growth, however. In addition, science-based methods exist for improving population estimates, predicting the effects of management practices in order to maintain genetically diverse, healthy populations, and estimating the productivity of rangelands. Greater transparency in how science-based methods are used to inform management decisions may help increase public confidence in the Wild Horse and Burro Program.

population regulation in the serengeti: Serengeti Story Anthony Sinclair, 2012-11-22 For more than 40 years, Anthony Sinclair has researched the world's most famous conservation area, Serengeti. He understands its complex ecology - grasslands, birds, insects, and animals - as well as anyone on earth. Here he shares his deep knowledge, plus stories of dealing with civil war, bandits, poachers, and politicians.

population regulation in the serengeti: *A Place like No Other* Anthony R. E. Sinclair, 2021-10-19 From famed zoologist Anthony Sinclair, an account of his decades-long quest to understand one of Earth's most spectacular ecosystems With its rich biodiversity, astounding wildlife, and breathtaking animal migrations, Serengeti is like no other ecosystem on the planet. *A Place like No Other* is Anthony Sinclair's firsthand account of how he and other scientists discovered the biological principles that regulate life in Serengeti and how they rule all of the natural world. When Sinclair first began studying this spectacular ecosystem in 1965, a host of questions confronted him. What environmental features make its annual migration possible? What determines the size of animal populations and the stunning diversity of species? What factors enable Serengeti to endure over time? In the five decades that followed, Sinclair and others sought answers. What they learned is that seven principles of regulation govern all natural processes in the Serengeti ecosystem. Sinclair shows how these principles can help us to understand and overcome the challenges facing Serengeti today, and how they can be used to repair damaged habitats throughout the world. Blending vivid storytelling with invaluable scientific insights from Sinclair's pioneering fieldwork in Africa, *A Place like No Other* reveals how Serengeti holds timely lessons for the restoration and conservation of our vital ecosystems.

population regulation in the serengeti: Population Fluctuations in Rodents Charles J. Krebs, 2013-04-19 How did rodent outbreaks in Germany help to end World War I? What caused the destructive outbreak of rodents in Oregon and California in the late 1950s, the large population outbreak of lemmings in Scandinavia in 2010, and the great abundance of field mice in Scotland in the spring of 2011? Population fluctuations, or outbreaks, of rodents constitute one of the classic problems of animal ecology, and in *Population Fluctuations in Rodents*, Charles J. Krebs sifts

through the last eighty years of research to draw out exactly what we know about rodent outbreaks and what should be the agenda for future research. Krebs has synthesized the research in this area, focusing mainly on the voles and lemmings of the Northern Hemisphere—his primary area of expertise—but also referring to the literature on rats and mice. He covers the patterns of changes in reproduction and mortality and the mechanisms that cause these changes—including predation, disease, food shortage, and social behavior—and discusses how landscapes can affect population changes, methodically presenting the hypotheses related to each topic before determining whether or not the data supports them. He ends on an expansive note, by turning his gaze outward and discussing how the research on rodent populations can apply to other terrestrial mammals. Geared toward advanced undergraduate students, graduate students, and practicing ecologists interested in rodent population studies, this book will also appeal to researchers seeking to manage rodent populations and to understand outbreaks in both natural and urban settings—or, conversely, to protect endangered species.

population regulation in the serengeti: Animals of the Masai Mara Adam Scott Kennedy, Vicki Beard, 2013-07-11 One of the greatest attractions of a trip to Kenya is the chance to see animals such as lions, cheetah, leopards, zebra, and giraffe up close and in their natural habitats. *Animals of the Masai Mara* is a lavish photographic guide that explores the charismatic wildlife most likely to be encountered by a safari visitor to the Masai Mara National Reserve in southwest Kenya. More than 140 stunning photographs showcase 65 mammals and 17 reptile species, including 6 snakes. Designed to be informative and locally accurate, rather than purely identification-based, this easy-to-use book pays particular attention to wildlife behavior and is written from the firsthand experiences of the authors and the knowledge of local safari guides. Numerous Top Tips throughout show readers how and where to locate specific species. The only field guide to focus solely on the wildlife of the Masai Mara National Reserve, *Animals of the Masai Mara* will be indispensable to visitors to this famous park and all nature enthusiasts with an interest in this area of the world. The only photographic guide specific to the animals of the Masai Mara National Reserve More than 140 remarkable photographs covering 65 mammals and 17 reptile species, including 6 snakes Accessible text explores animal behavior and other interesting facts A brief and informative introduction to the habitats of the Masai Mara

population regulation in the serengeti: Wildlife Ecology, Conservation, and Management John M. Fryxell, Anthony R. E. Sinclair, Graeme Caughley, 2014-08-11 To understand modern principles of sustainable management and the conservation of wildlife species requires intimate knowledge about demography, animal behavior, and ecosystem dynamics. With emphasis on practical application and quantitative skill development, this book weaves together these disparate elements in a single coherent textbook for senior undergraduate and graduate students. It reviews analytical techniques, explaining the mathematical and statistical principles behind them, and shows how these can be used to formulate realistic objectives within an ecological framework. This third edition is comprehensive and up-to-date, and includes: Brand new chapters that disseminate rapidly developing topics in the field: habitat use and selection; habitat fragmentation, movement, and corridors; population viability. analysis, the consequences of climate change; and evolutionary responses to disturbance A thorough updating of all chapters to present important areas of wildlife research and management with recent developments and examples. A new online study aid – a wide variety of downloadable computer programs in the freeware packages R and Mathcad, available through a companion website. Worked examples enable readers to practice calculations explained in the text and to develop a solid understanding of key statistical procedures and population models commonly used in wildlife ecology and management. The first half of the book provides a solid background in key ecological concepts. The second half uses these concepts to develop a deeper understanding of the principles underlying wildlife management and conservation. Global examples of real-life management situations provide a broad perspective on the international problems of conservation, and detailed case histories demonstrate concepts and quantitative analyses. This third edition is also valuable to professional wildlife managers, park rangers, biological resource

managers, and those working in ecotourism.

population regulation in the serengeti: Tropical Ecosystems and Ecological Concepts

Patrick L. Osborne, 2012-02-09 Introductory textbook using the entire range of tropical ecosystems - terrestrial, freshwater and marine - to illustrate and explain major ecological concepts.

population regulation in the serengeti: *Trophic Cascades* John Terborgh, James A Estes, 2013-06-25 Trophic cascades—the top-down regulation of ecosystems by predators—are an essential aspect of ecosystem function and well-being. Trophic cascades are often drastically disrupted by human interventions—for example, when wolves and cougars are removed, allowing deer and beaver to become destructive—yet have only recently begun to be considered in the development of conservation and management strategies. *Trophic Cascades* is the first comprehensive presentation of the science on this subject. It brings together some of the world's leading scientists and researchers to explain the importance of large animals in regulating ecosystems, and to relate that scientific knowledge to practical conservation. Chapters examine trophic cascades across the world's major biomes, including intertidal habitats, coastal oceans, lakes, nearshore ecosystems, open oceans, tropical forests, boreal and temperate ecosystems, low arctic scrubland, savannas, and islands. Additional chapters consider aboveground/belowground linkages, predation and ecosystem processes, consumer control by megafauna and fire, and alternative states in ecosystems. An introductory chapter offers a concise overview of trophic cascades, while concluding chapters consider theoretical perspectives and comparative issues. *Trophic Cascades* provides a scientific basis and justification for the idea that large predators and top-down forcing must be considered in conservation strategies, alongside factors such as habitat preservation and invasive species. It is a groundbreaking work for scientists and managers involved with biodiversity conservation and protection.

population regulation in the serengeti: *Serengeti* A. R. E. Sinclair, M. Norton-Griffiths, 1979

Dynamics of the serengeti ecosystem: process and pattern; The serengeti environment; Grassland-herbivore dynamics; The eruption of the ruminants; The migration and grazing succession; Feeding strategy and the pattern of resource-partitioning in ungulates; Energy costs of locomotion and the concept of foraging radius; The dynamics of ungulate social organization; Serengeti predators and their social systems; Population changes in lions and other predators; The adaptations of scavengers; A simulation of the wildebeest population, other ungulates, and their predators; The influence of grazing, browsing, and fire on the vegetation dynamics of the serengeti; Changes in populations of resident ungulates.

population regulation in the serengeti: *Ecological Networks* Mercedes Pascual, Jennifer A.

Dunne, 2006 Food webs are one of the most useful, and challenging, objects of study in ecology. These networks of predator-prey interactions, conjured in Darwin's image of a tangled bank, provide a paradigmatic example of complex adaptive systems. This book is based on a February 2004 Santa Fe Institute workshop. Its authors treat the ecology of predator-prey interactions, food web theory, structure and dynamics. The book explores the boundaries of what is known of the relationship between structure and dynamics in ecological networks and will define directions for future developments in this field.

population regulation in the serengeti: *Animal Dispersal* N.C. Stenseth, W.Z. Lidicker,

2012-12-06 4.1.1 Demographic significance Confined populations grow more rapidly than populations from which dispersal is permitted (Lidicker, 1975; Krebs, 1979; Tamarin et al., 1984), and demography in island populations where dispersal is restricted differs greatly from nearby mainland populations (Lidicker, 1973; Tamarin, 1977, 1978; Gliwicz, 1980), clearly demonstrating the demographic significance of dispersal. The prevalence of dispersal in rapidly expanding populations is held to be the best evidence for presaturation dispersal. Because dispersal reduces the growth rate of source populations, it is generally believed that emigration is not balanced by immigration, and that mortality of emigrants occurs as a result of movement into a 'sink' of unfavourable habitat. If such dispersal is age- or sex-biased, the demography of the population is markedly affected, as a consequence of differences in mortality in the dispersive sex or age class.

Habitat heterogeneity consequently underlies this interpretation of dispersal and its demographic consequences, although the spatial variability of environments is rarely assessed in dispersal studies.

population regulation in the serengeti: Endless Forms Most Beautiful Sean B. Carroll, 2005 As described in this fascinating book, Evo Devo is evolutionary development biology, the third revolution in the science, which shows how the endless forms of animals--butterflies and zebras, trilobites and dinosaurs, apes and humans--were made and evolved.

population regulation in the serengeti: Savanna Woody Plants and Large Herbivores Peter Frank Scogings, Mahesh Sankaran, 2019-09-30 Insights on current research and recent developments in understanding global savanna systems Increasingly recognized as synonymous with tropical grassy biomes, savannas are found in tropical and sub-tropical climates as well as warm, temperate regions of North America. Savanna Woody Plants and Large Herbivores examines the interactions between woody plants and browsing mammals in global savannas—focusing primarily on the C4 grassy ecosystems with woody components that constitute the majority of global savannas—and discusses contemporary savanna management models and applications. This much-needed addition to current research examines topics including the varying behavior of browsing mammals, the response to browsing by woody species, and the factors that inhibit forage intake. Contributions from an international team of active researchers and experts compare and contrast different savanna ecosystems, offering a global perspective on savanna functioning, the roles of soil and climate in resource availability and organism interaction, and the possible impacts of climate change across global savannas. Fills a gap in literature on savanna management issues, including biodiversity conservation and animal production Applies concepts developed in other biomes to future savanna research Complements contemporary books on savanna or large herbivore ecology Focuses on the woody component of savanna ecosystems and large herbivore interactions in savannas Compares tree-mammal systems of savannas and other eco-systems of temperate and boreal regions Provides numerous case studies of plant-mammal interactions from various savanna ecosystems Savanna Woody Plants and Large Herbivores is a valuable addition to those in fields such as ecology, wildlife and conservation biology, natural resource management, and environmental science.

population regulation in the serengeti: *Towards a sustainable, participatory and inclusive wild meat sector* Coad, L., Fa, J.E., Abernethy, K., Van Vliet, N., Santamaria, C., Wilkie, D., El Bizri, H.R., Ingram, D.J., Cawthorn, D-M., Nasi, R., 2019-01-30 The meat of wild species, referred to in this report as 'wild meat', is an essential source of protein and a generator of income for millions of forest-living communities in tropical and subtropical regions. However, unsustainable harvest rates currently

population regulation in the serengeti: *Serengeti II* A. R. E. Sinclair, Peter Arcese, 1995-08 *Serengeti II: Dynamics, Management, and Conservation of an Ecosystem* brings together twenty years of research by leading scientists to provide the most thorough understanding to date of the spectacular Serengeti-Mara ecosystem in East Africa, home to one of the largest and most diverse populations of animals in the world. Building on the groundwork laid by the classic *Serengeti: Dynamics of an Ecosystem*, published in 1979 by the University of Chicago Press, this new book integrates studies of the ecosystem at every level—from the plants at the bottom of the visible food chain, to the many species of herbivores and predators, to the system as a whole. Drawing on new data from many long-term studies and from more recent research initiatives, and applying new theory and computer technology, the contributors examine the large-scale processes that have produced the Serengeti's extraordinary biological diversity, as well as the interactions among species and between plants and animals and their environment. They also introduce computer modeling as a tool for exploring these interactions, employing this new technology to test and anticipate the effects of social, political, and economic changes on the entire ecosystem and on particular species, and so to shape future conservation and management strategies.

population regulation in the serengeti: *White-tailed Deer in Eastern Ecosystems* William F.

Porter, 1991

population regulation in the serengeti: *Conservation Biology in Sub-Saharan Africa* Richard Primack, Johnny W. Wilson, 2019-09-10 *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.

population regulation in the serengeti: *Wildlife Ecology, Conservation and Management* Anthony R. E. Sinclair, John M. Fryxell, Graeme Caughley, 2009-03-12 The second edition of *Wildlife Ecology, Conservation, and Management* provides a thorough introduction to general ecological principles and examines how they can be applied to wildlife management and conservation. Expanded and updated, this second edition includes new chapters on understanding ecosystems and the use of computer models in wildlife management Gives a comprehensive, up-to-date overview of ecology including the latest theories on population dynamics and conservation Reviews practical applications and techniques and how these can be used to formulate realistic objectives within an ecological framework Examples of real-life management situations from around the world provide a broad perspective on the international problems of conservation Worked examples on CD enable students to practice calculations explained in the text Artwork from the book is available to instructors online at www.blackwellpublishing.com/sinclair. An Instructor manual CD-ROM for this title is available. Please contact our Higher Education team at HigherEducation@wiley.com for more information. Note: CD-ROM/DVD and other supplementary materials are not included as part of eBook file.

population regulation in the serengeti: Foundations of Ecology II Thomas E. Miller, Joseph Travis, 2022-09-06 A sweeping overview of key advances in the field of ecology over the latter half of the twentieth century. For three decades, *Foundations of Ecology*, edited by Leslie A. Real and James H. Brown, has served as an essential primer for graduate students and practicing ecologists, giving them access to the classic papers that laid the foundations of modern ecology alongside commentaries by noted ecologists. Ecology has continued to evolve, and ecologists Thomas E. Miller and Joseph Travis offer here a freshly edited guide for a new generation of researchers. The period of 1970 to 1995 was a time of tremendous change in all areas of this discipline--from an increased rigor for experimental design and analysis and the reevaluation of paradigms to new models for understanding, to theoretical advances. *Foundations of Ecology II* includes facsimiles of forty-six papers from this period alongside expert commentaries that discuss a total of fifty-three key studies, addressing topics of diversity, predation, complexity, competition, coexistence, extinction, productivity, resources, distribution, and abundance. The result is more than a catalog of historic firsts; this book offers diverse perspectives on the foundational papers that led to today's ecological work.

population regulation in the serengeti: *Communities and Ecosystems* David A. Wardle, 2002-05-12 Soil.

population regulation in the serengeti: The Lion Craig Packer, 2023-03-28 Lions lead intricate lives. They hunt together, raise cubs together, and defend territories together. But though

life at the top of the food chain may mean that lions have little to fear from other species - they can easily dominate every other carnivore in their midst - they still must constantly safeguard against the threat posed by other lions. Each day is dominated by the demands of raising a family while protecting themselves against enemies endowed with the same strengths and skills. Biologist Craig Packer has spent his career studying the African lion, one of the most fascinating animals on earth. In this book, he synthesizes his decades of research in the Serengeti into an up-to-date portrait of the African lion, and reveals how he and his colleagues have come to understand this creature's behavior, ecology, and conservation. Packer opens the book by providing readers with background on lions' territory, daily behavior, lifespan, and physiology. From there he delves more deeply into lion society, illustrating the complexity of lion life from cub rearing and foraging to competition with other lions. In the final chapters, Packer zooms out to summarize what is known about lion ecological abundance and distribution as well as their conservation status. Not surprisingly, lions are increasingly threatened; however, Packer ends his book on a hopeful note, pointing to programs that are successfully protecting lion populations--

population regulation in the serengeti: Remarkable Creatures Sean B. Carroll, 2014-10-16 National Book Award Finalist: A biologist's "thoroughly enjoyable" account of the expeditions that unearthed the history of life on our planet (Publishers Weekly). Not so long ago, most of our world was an unexplored wilderness. Our sense of its age was vague and vastly off the mark, and much of the knowledge of our own species' history was a set of fantastic myths and fairy tales. But scientists were about to embark on an amazing new era of understanding. From the New York Times--bestselling author of *The Big Picture*, this book leads us on a rousing voyage that recounts the most important discoveries in two centuries of natural history: from Darwin's trip around the world to Charles Walcott's discovery of pre-Cambrian life in the Grand Canyon; from Louis and Mary Leakey's investigation of our deepest past in East Africa to the trailblazers in modern laboratories who have located a time clock in our DNA. Filled with the same sense of adventure that spurred on these extraordinary men and women, *Remarkable Creatures* is a "stirring introduction to the wonder of evolutionary biology" (Kirkus Reviews). "Charming and enlightening." —San Francisco Chronicle "As fast-paced as a detective story." —Nature

population regulation in the serengeti: Natural Enemies Michael J. Crawley, 2009-07-30 This book is about disease and death. It is an ecologist's view of Darwin's vivid evocation of Nature, red in tooth and claw. An international team of authors examines broad patterns in the population biology of natural enemies, and addresses general questions about the role of natural enemies in the population dynamics and evolution of their prey. For instance, how do large natural enemies like wolves differ from small natural enemies like bacterial diseases in their effects on prey abundance? Is it better to chase after prey, or sit and wait for it to come to you? How should prey behave in order to minimize the risk of being eaten? The answers are all in this fascinating senior undergraduate/postgraduate text.

population regulation in the serengeti: Dynamics of Tropical Communities D. M. Newbery, H. H. T. Prins, N. D. Brown, 1998-08 This 1998 volume challenges the validity of the dynamic equilibrium concept for tropical forests.

population regulation in the serengeti: The Serengeti Lion George B. Schaller, 2009-10-15 Based on three years of study in the Serengeti National Park, George B. Schaller's *The Serengeti Lion* describes the vast impact of the lion and other predators on the vast herds of wildebeest, zebra, and gazelle for which the area is famous. The most comprehensive book available on the lion, this classic work includes the author's findings on all aspects of lion behavior, including its social system, population dynamics, hunting behavior, and predation patterns. "If you have only enough time to read one book about field biology, this is the one I recommend."—Edward O. Wilson, *Science* "This book conveys not only the fascination of its particular study of lion behavior but the drama and wonder and beauty of the intimate interdependence of all living things."—*Saturday Review* "This is an important book, not just for its valuable information on lions, but for its broad, open, and intelligent approach to problems that cut across the fields of behavior, populations, ecology, wildlife

management, evolution, anthropology, and comparative biology.”—Richard G. Van Gelder, Bioscience

population regulation in the serengeti: Ecology Charles J. Krebs, 2001 This best-selling majors ecology book continues to present ecology as a series of problems for readers to critically analyze. No other text presents analytical, quantitative, and statistical ecological information in an equally accessible style. Reflecting the way ecologists actually practice, the book emphasizes the role of experiments in testing ecological ideas and discusses many contemporary and controversial problems related to distribution and abundance. Throughout the book, Krebs thoroughly explains the application of mathematical concepts in ecology while reinforcing these concepts with research references, examples, and interesting end-of-chapter review questions. Thoroughly updated with new examples and references, the book now features a new full-color design and is accompanied by an art CD-ROM for instructors. The field package also includes The Ecology Action Guide, a guide that encourages readers to be environmentally responsible citizens, and a subscription to The Ecology Place (www.ecologyplace.com), a web site and CD-ROM that enables users to become virtual field ecologists by performing experiments such as estimating the number of mice on an imaginary island or restoring prairie land in Iowa. For college instructors and students.

population regulation in the serengeti: Rodent Societies Jerry O. Wolff, Paul W. Sherman, 2008-09-15 Rodent Societies synthesizes and integrates the current state of knowledge about the social behavior of rodents, providing ecological and evolutionary contexts for understanding their societies and highlighting emerging conservation and management strategies to preserve them. It begins with a summary of the evolution, phylogeny, and biogeography of social and nonsocial rodents, providing a historical basis for comparative analyses. Subsequent sections focus on group-living rodents and characterize their reproductive behaviors, life histories and population ecology, genetics, neuroendocrine mechanisms, behavioral development, cognitive processes, communication mechanisms, cooperative and uncooperative behaviors, antipredator strategies, comparative socioecology, diseases, and conservation. Using the highly diverse and well-studied Rodentia as model systems to integrate a variety of research approaches and evolutionary theory into a unifying framework, Rodent Societies will appeal to a wide range of disciplines, both as a compendium of current research and as a stimulus for future collaborative and interdisciplinary investigations.

population regulation in the serengeti: Perspectives on Plant Competition James Grace, 2012-12-02 Perspectives on Plant Competition is mainly about addressing the many different perspectives in plant competition and finding a common ground among them. Its aim is that through this common ground, new theories can be created. Encompassing 20 chapters, this book is divided into three parts. Part I, Perspectives on the Determinants of Competitive Success, consists of eight chapters. This section deals mainly on the question of determination of competitive success. Different writers put forward various definitions of competition and competitive success to shed light on the question at hand. In the second part of this book, an opposing set of views regarding the consequences of competitive interactions for the plant community structure is provided. This section emphasizes the idea that competition is not the sole force in natural communities. Each chapter in this part focuses on a certain aspect of competition as seen in different communities – across and within habitats – and systems. Part III, which comprises of four chapters, focuses on the competition within the context of interaction of plants with organisms on the other trophic levels. The chapters set forth the idea that competition depends on the impacts of herbivores, parasites, and symbionts. The concluding part of the book greatly emphasizes the need to integrate the mechanisms of competition into the framework of the entire food web.

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population regulation in the serengeti: Brave Genius Sean B. Carroll, 2014-09-23 The never-before-told account of the intersection of some of the most insightful minds of the 20th century, and a fascinating look at how war, resistance, and friendship can catalyze genius. In the spring of 1940, the aspiring but unknown writer Albert Camus and budding scientist Jacques Monod were quietly pursuing ordinary, separate lives in Paris. After the German invasion and occupation of France, each joined the Resistance to help liberate the country from the Nazis and ascended to prominent, dangerous roles. After the war and through twists of circumstance, they became friends, and through their passionate determination and rare talent they emerged as leading voices of modern literature and biology, each receiving the Nobel Prize in their respective fields. Drawing upon a wealth of previously unpublished and unknown material gathered over several years of research, Brave Genius tells the story of how each man endured the most terrible episode of the twentieth century and then blossomed into extraordinarily creative and engaged individuals. It is a story of the transformation of ordinary lives into exceptional lives by extraordinary events--of courage in the face of overwhelming adversity, the flowering of creative genius, deep friendship, and of profound concern for and insight into the human condition.

population regulation in the serengeti: Linkages in the Landscape Andrew F. Bennett, 2003 The loss and fragmentation of natural habitats is one of the major issues in wildlife management and conservation. Habitat corridors are sometimes proposed as an important element within a conservation strategy. Examples are given of corridors both as pathways and as habitats in their own right. Includes detailed reviews of principles relevant to the design and management of corridors, their place in regional approaches to conservation planning, and recommendations for research and management.

population regulation in the serengeti: Wildlife Population Growth Rates R. M. Sibly, J. Hone, T. H. Clutton-Brock, 2003-08-07 What determines where a species lives? And what determines its abundance? This book takes a fresh approach to some of the classic questions in ecology. Despite great progress in the twentieth century much more remains to be done before we can provide full answers to these questions. The methods described and deployed in this book point the way forward. The core message of the book is that the key insights come from understanding what determines population growth rate, and that application of this approach will make ecology a more predictive science. Topics covered include population regulation, density-dependence, the ecological niche, resource and interference competition, habitat fragmentation and the ecological effects of environmental stress, together with applications to conservation biology, wildlife management, human demography and ecotoxicology. After a substantial introduction by the editors the book brings together contributions from leading scientists from Australia, New Zealand, North America, Europe and the U.K.

population regulation in the serengeti: Bat Ecology Thomas H. Kunz, M. Brock Fenton, 2005 In recent years researchers have discovered that bats play key roles in many ecosystems as insect predators, seed dispersers, and pollinators. Bats also display astonishing ecological and evolutionary diversity and serve as important models for studies of a wide variety of topics, including

food webs, biogeography, and emerging diseases. In *Bat Ecology*, world-renowned bat scholars present an up-to-date, comprehensive, and authoritative review of this ongoing research. The first part of the book covers the life history and behavioral ecology of bats, from migration to sperm competition and natural selection. The next section focuses on functional ecology, including ecomorphology, feeding, and physiology. In the third section, contributors explore macroecological issues such as the evolution of ecological diversity, range size, and infectious diseases (including rabies) in bats. A final chapter discusses conservation challenges facing these fascinating flying mammals. *Bat Ecology* is the most comprehensive state-of-the-field collection for scientists and researchers. Contributors: John D. Altringham, Robert M. R. Barclay, Tenley M. Conway, Elizabeth R. Dumont, Peggy Eby, Abigail C. Entwistle, Theodore H. Fleming, Patricia W. Freeman, Lawrence D. Harder, Gareth Jones, Linda F. Lumsden, Gary F. McCracken, Sharon L. Messenger, Bruce D. Patterson, Paul A. Racey, Jens Rydell, Charles E. Rupprecht, Nancy B. Simmons, Jean S. Smith, John R. Speakman, Richard D. Stevens, Elizabeth F. Stockwell, Sharon M. Swartz, Donald W. Thomas, Otto von Helversen, Gerald S. Wilkinson, Michael R. Willig, York Winter

population regulation in the serengeti: Current Mammalogy H.H. Genoways, 2013-06-29
When I first proposed a series entitled *Current Mammalogy* to the publishers, they were reluctant to undertake such a project because they viewed the field of mammalogy as overly fragmented. At first I found this idea to be difficult to accept; however, upon reflection, I came near to agreeing with it. Although many of us work on mammals, we generally feel more allegiance to our specialties, such as systematics, genetics, cytogenetics, ecology, behavior, pest control, paleontology, wildlife management, primatology, and marine mammalogy, than we do to the general field of mammalogy. However, rather than becoming discouraged from pursuing this project, I became more certain than ever that a series such as *Current Mammalogy* was needed. We hope to make this series a place where specialists can present their ideas not only to other members of their specialty, but to those outside the area as well. Hopefully, this exchange of ideas will be a mutually beneficial exercise. The Editorial Board of *Current Mammalogy* has decided to keep the range of subjects in each volume as broad as possible rather than concentrating on one or two topics, in the hope that this will keep the series as useful as possible to the broadest range of readers.

population regulation in the serengeti: Ecology Michael Begon, Colin R. Townsend, 2020-11-17
A definitive guide to the depth and breadth of the ecological sciences, revised and updated. The revised and updated fifth edition of *Ecology: From Individuals to Ecosystems* - now in full colour - offers students and practitioners a review of the ecological sciences. The previous editions of this book earned the authors the prestigious 'Exceptional Life-time Achievement Award' of the British Ecological Society - the aim for the fifth edition is not only to maintain standards but indeed to enhance its coverage of Ecology. In the first edition, 34 years ago, it seemed acceptable for ecologists to hold a comfortable, objective, not to say aloof position, from which the ecological communities around us were simply material for which we sought a scientific understanding. Now, we must accept the immediacy of the many environmental problems that threaten us and the responsibility of ecologists to play their full part in addressing these problems. This fifth edition addresses this challenge, with several chapters devoted entirely to applied topics, and examples of how ecological principles have been applied to problems facing us highlighted throughout the remaining nineteen chapters. Nonetheless, the authors remain wedded to the belief that environmental action can only ever be as sound as the ecological principles on which it is based. Hence, while trying harder than ever to help improve preparedness for addressing the environmental problems of the years ahead, the book remains, in its essence, an exposition of the science of ecology. This new edition incorporates the results from more than a thousand recent studies into a fully up-to-date text. Written for students of ecology, researchers and practitioners, the fifth edition of *Ecology: From Individuals to Ecosystems* is an essential reference to all aspects of ecology and addresses environmental problems of the future.

population regulation in the serengeti: The Physics of Evolution Michael W. Roth, 2023-06-06
This book provides an introduction to the significant role of physics in evolution, based

on the ideas of matter and energy resource flow, organism self-copying, and ecological change. The text employs these ideas to create quantitative models for important evolutionary processes. Many fields of science and engineering have come up against the problem of complex design—when details become so numerous that computer power alone cannot make progress. Nature solved the complex-design problem using evolution, yet how it did so has been a mystery. Both laboratory experiments and computer-simulation attempts eventually stopped evolving. Something more than Darwin's ideas of heredity, variation, and selection was needed. The solution is that there is a fourth element to evolution: ecological change. When a new variation is selected, this can change the ecology, and the new ecology can create new opportunities for even more new variations to be selected. Through this endless cycle, complexity can grow automatically. This book uses the physics of resource flow to describe this process in detail, developing quantitative models for many evolutionary processes, including selection, multicellularity, coevolution, sexual reproduction, and the Serengeti Rules. The text demonstrates that these models are in conceptual agreement with numerous examples of biological phenomena, and reveals, through physics, how complex design can arise naturally. This will serve as a key text on the part physics plays in evolution, and will be of great interest to students at the university level and above studying biophysics, physics, systems biology, and related fields.

population regulation in the serengeti: Mammal Community Dynamics Cynthia J. Zabel, Robert G. Anthony, 2003-09-18 Table of contents

population regulation in the serengeti: Science Discovery Files: 10 Forgotten Stories Of Incredible Scientists Diane Lincoln, 2022-02-18 Science Discovery Files: 10 Forgotten Stories of Incredible Scientists tells real stories of scientific discoveries that you cannot find in textbooks or popular science books. The scientists featured are a diverse group, from female Chinese chemist Tu Youyou to William Beaumont and his handicapped assistant Alexis St. Martin, who helped pioneer studies into the human digestive system. Going beyond history, readers can also learn about the science principles behind each discovery! The backmatter includes additional information and further reading for curious readers. Scientists featured: This book is a 2023 Nautilus Book Awards winner.

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