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Book Review: Populist Systems: A General Introduction

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ly involved with deer work; (4) current population managers are conspicuous by their scarcity among the authors; (5) more emphasis than that in Chapter 8 on application of population data, techniques, analysis, etc., to population management via harvest regulations would have increased its usefulness to managers within state agencies; (6) the use of deer as "biotic analyzers" to infer something about the balance between deer numbers and carrying capacity is not mentioned on pages 540–541 under "Balancing Deer Populations with Their Habitats"; and (7) "Indicators of Animal Condition" (pages 333–335) contains no mention of carcass weights, although mention does occur under other headings on pages 72 and 432–433, when such weights provide a useable indicator of condition and are often already on file with state agencies.

This book is relatively free of "errors." I found few mistakes that were not obvious enough to be clearly flagged as errors.

There are a few places where I disagree with an author's interpretation or coverage of a subject. I believe that crippling losses are an inevitable, albeit unpleasant, consequence of harvest which should be minimized, but I cannot agree that they "... are an intolerable waste" (p. 544). I would have emphasized, in Chapter 11, Part 2, that a by-product of forest management is the varied direct and indirect impacts of roads on deer and their habitat.

This excellent book will help those who work with mule and black-tailed deer because it provides a good synthesis of the "state-of-the-art" regarding deer management. It will serve the profession well as the authoritative reference on these deer. All biologists and habitat managers working with deer in the West should have this book at their disposal.—**Carl H. Nellis**, Idaho Department of Fish and Game, Jerome, ID 83338.

Population Systems: A General Introduction. By Alan A. Berryman. Plenum Press, New York, N.Y. and London, U.K. 1981. xv, 222pp. \$16.95 (cloth).

The profession of wildlife management has had an incomplete evolution into wildlife ecology if we are to believe that names of university departments accurately reflect current status. This transition implies less emphasis on doing and greater emphasis on understanding. I term the evolution incomplete because wildlife biologists have not fully embraced all the tools of ecology. One such tool is population ecology. Certainly we have studied wildlife population dynamics, but often with a narrow focus, viewing as unique a particular group of animals in a certain area at some specified time. Less often have we endeavored to draw together our knowledge into a comprehensive theory of more general applicability. Alan A. Berryman, a forest entomol-

ogist with a background in population dynamics, has successfully organized a theory of population ecology based on the mathematical theory of systems analysis.

Berryman's book will not solve all problems in wildlife biology, but it provides a perspective on population dynamics different from our norm, and one that may lead to fresh insights into our problems. It should be useful for undergraduate and graduate courses in population dynamics as well as for the practicing ecologist with a mathematical inclination.

The book contains 6 chapters, the first of which briefly describes systems in general. Featured are such topics as dynamic systems, system diagramming conventions, feedback, feedforward, and control. It concludes by indicating the role in biology of systems analysis, a theory developed primarily by engineers.

An elementary model of a single population is constructed in Chapter 2. The derivation of the logistic model of population growth is well motivated and illustrates the richness of behaviors that can be obtained from a simple model.

Population regulation is developed more fully in Chapter 3, which considers competitive and cooperative processes in density-dependent systems. Of particular management importance is the notion of multiple equilibrium points for a population, a situation that can arise, for example, if cooperative processes dominate at 1 level of density and competitive processes at another. Such circumstances may be common in nature and might explain why some populations do not recover from severe depletion even though the habitat is favorable, and why certain populations occasionally increase sharply. It may also provide a rationale for reintroduction efforts; a population still persisting but at a low level might move to a higher equilibrium if it is augmented by a large number of individuals. I would enjoy seeing this theory applied to some of the situations faced by wildlife managers, such as protection of rare species, reintroduction of depleted populations, and control of abundant pest species.

Chapter 4 treats systems with 2 interacting species; the mathematical complexity grows in proportion to the biological complications. Despite its difficulty, this chapter contains much important material and is worthy of serious study. Among the topics are cooperative and competitive interactions between species, and predator-prey interactions, including predator functional responses and strategies of prey and predators. Hypotheses of potential value to wildlife and fishery managers are interspersed throughout the book. One in this chapter is the extension to 2 species of the possibility of multiple equilibrium points in animal communities; the relationship between overharvested sardine stocks and the subsequent rise of anchovy fisheries is cited as a possible example. Berryman cautions that such

tales do not prove the theory, but my own opinion is that a theoretical framework is needed, for only theories can provide testable and refutable hypotheses which are necessary to advance our understanding.

Complications due to spatial interactions are discussed in Chapter 5. Berryman presents the spruce budworm as an example involving spatial as well as temporal dynamics; an important implication here is that an epidemic can be prevented by treating a relatively small area (the epicenter), an alternative to costly and environmentally hazardous large-scale treatments. Spatial aspects are also shown to afford stability to an otherwise unstable system.

Chapter 6 offers a brief introduction to ecological communities, a link between population dynamics and community ecology. Most attention is given to the stability of communities and to the long-standing question of whether or not complex communities are more stable than simple ones. Berryman introduces the technique of loop analysis to evaluate the stability of a feedback system. This topic makes for some rather rough going, but references to other literature will guide those with whetted appetites.

Each chapter concludes with some exercises which allow the reader to take pencil and paper to the theory and mathematics developed in the chapter. The exercises, in conjunction with answers given at the end of the book, facilitate understanding for the independent reader. I suspect, however, that the latter chapters will be difficult for most students without an instructor, and that lively classroom interplay would make the learning more enjoyable and permanent.

A short epilogue to the book applies some of the theory developed earlier to the problem of human population growth, which is treated as a cooperative process. The negative feedback controls of the system—disease, starvation, predators, etc.—have now been overwhelmed and the system is in a positive feedback loop which results in unstable growth. Berryman ascribes many of today's ecological problems to economic attitudes, particularly those evolved from ideas of David Ricardo, a proponent of economic growth and a contemporary and intellectual competitor of Thomas Malthus. Ricardo's economic theories were followed instead of Malthus', a choice now lamented.—**Douglas H. Johnson**, U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center, Jamestown, ND 58401.

Portraits of Mexican Birds. By George Miksch Sutton. University of Oklahoma Press, Norman. 1975. 106pp. Fifty full-page color paintings. \$35.00 (hard cover). Reissued 1980 (soft cover \$14.95.)

This is a "hangfire" review as I did not see the publication when it first became available, but after

examining it in 1981, even a delayed review seemed in order.

The book, marketed in both hard and soft covers, is a small folio (280 × 330 mm). The white paper is of good quality, doing justice to the color reproductions, photographs, and text.

Enrique Beltran, Director of the Institute of Mexico's Natural Resources at the University of Mexico provides, in the Foreword, a generous acknowledgment of the author's contributions to ornithology south of the border.

The Preface describes the field circumstances under which the paintings were made, presents a list of acknowledgments, particularly to his field associates, and sentimentally tells of the treasured paintbox given him by Louis Agassiz Fuentes.

The birds selected were painted in watercolor, each species on a single (recto) page accompanied on the opposite facing page by explanatory comments concerning some aspect of the field situation during which the individual painting was made, or by a pertinent piece of ornithological information.

Clearly the over-riding characteristic of this work is maturity. The text in particular is unforced and unhurried. It contains precise yet elegant prose, is unpretentious and at times folksy, but always a joy to read. Another remarkable aspect of the explanatory notes is the recording of the scientific, artistic, and the mundane detail of a field exercise. The author's field notes were so accurate that the exact time and place where each painting was made could be recalled. Even the call-notes of the birds, problems with paint or easel, and the artist's nemesis (the tick) are recounted along with other attendant minutia, thus putting the reader at the author's elbow as he plies his scientific and artistic skills.

As a field scientist, Sutton also has an excellent grasp of botany. He frequently states that he painted the plant on which a bird was placed "from life." The branch or portion of the plant was often the exact one on which the bird was observed or from which it was collected.

Sutton is interested in the behavior as well as the form and function of birds he depicts. For example, he was puzzled when Abeille's orioles atypically pecked at their toes, and on investigation found they were removing pitch acquired during the time they spent in fir trees.

The paintings were made between 1938 and 1975. They vary in style, detail, and precision. The "bust" portrait of the bare-throated tiger heron (p. 5) is loose and much less succinct in detail than that of the Muscovy duck (p. 9). Although Sutton is known for his astute use of shadow color (after the style of his mentor Louis Agassiz Fuentes), the painting of the thicket tinamou (p. 3) surprisingly has little if any shadow to accentuate the subject. If any aspect of his painting can be criticized (which I doubt), it would have to be in the choice of setting or in the body of the bird. The color and detail on the heads of his birds are, in my opinion, letter perfect.