

Book review

SHOREBIRD ECOLOGY, CONSERVATION AND MANAGEMENT

By Mark A. Colwell

2010. Published by University of California Press, Berkeley. 328pp., black and white photographs. Hardback, \$105, ISBN 9780520266407.

Mark Colwell's passion for shorebirds, and his incredible knowledge of their biology, come into their own in this book and illustrate why he has been a major force in advancing this field for decades. Add to these a well thought-out and skilful presentation and you get a text that is a pleasure to read and a real asset to a biologist's bookshelf; both as a reference and as a source of inspiration. The appeal and the value of the book go beyond shorebirds or even ornithology. Instead, by combining science with conservation management, it will prove attractive to many ecologists and environmental practitioners looking for ways to develop their studies or improve wetland management. They will not be disappointed.

The book's three-part structure, clear layout and comprehensive table of contents make it easy to navigate. Each new section flows naturally from the preceding one, beginning with the basic evolution, morphology and breeding biology of shorebirds, moving to ecology and population dynamics before discussing the management of populations for conservation. Although the individual chapters in each part build on each other they can also be read out of sequence quite easily.

The decision to provide individual reference lists for each chapter has further increased its practicality and accessibility. Most chapters begin with a subtle but intriguing snapshot from the field that gives the reader an intuitive understanding of how the topic contributes to a comprehensive picture of shorebird ecology. At the end of each chapter, we find a brief and useful section summarising conservation and management implications of material discussed – another feature that facilitates the easy and quick use of the book for questions of practical ecology. The literature cited throughout reaches back far in time, which adds a real value to the book, but the book also references some of the most up to date research. At times, however, references to some additional modern research would have been welcome. An effort has also been made to include examples from around the world, but naturally the emphasis lies on examples from the well-studied shorebird populations in the North American and European migratory routes (flyways). This should be taken as an incentive to advance research on shorebirds in the little known Asian flyways where currently some of the most important decisions for shorebird conservation worldwide are made.

Unsurprisingly, a book of this quality will leave the reader wanting more. The textboxes with specific examples are a great addition to the book and one would like to see a few more of them. Similarly, the book sometimes feels a little thin on illustrations – sadly all in black and white only – and graphs are used sparingly. Although not essential, these additions could have further increased the appeal and the reading pleasure of the book.

Maybe this could be considered in a second edition. Generally, however, the book provides a comprehensive and detailed overview of shorebird ecology and management issues. Where the text leaves open questions this usually indicates gaps in current knowledge, rather than an oversight or intentional omission by the author.

A bias on western hemisphere taxa is a reality in many fields of study, not just in shorebird ecology. As a result of a substantial overlap of shorebird species between the western hemisphere and other flyways, however, many of the scientific findings presented in this book are easily transferrable. Still, more research on shorebird ecology in lesser known flyways is clearly essential.

Another limitation of shorebird research highlighted by this book is its focus on diurnal, migratory species, mostly relying on coastal habitats. However, shorebirds include a diverse range of species, whose ecology differs dramatically from that of Arctic long-distance migrants. In fact some of the most threatened shorebirds are tropical residents or nomads (e.g. the Moluccan Woodcock (*Scolopax rochussenii*) or the Australian Painted Snipe (*Rostratula australis*)) whereas other threatened species (e.g. stone curlews (Family Burhinidae) or cursors (Subfamily Cursore)) are night active. From a conservation point of view a chapter on shorebird extinctions and the events and missed management opportunities that led up to them could be extremely instructive. Finally, although the book highlights open questions along the way and thus has the potential to inspire new important research, a brief final chapter summarising the most pressing questions and an outlook for the field of shorebird ecology and conservation would have further increased its value for the ecological researcher.

In summary, with its focus on practical work aspects of shorebird management and research, this book fills a gap in a market already rich in excellent shorebird texts. What is more, it does this in an attractive and accessible way and I have no doubt that the book will be enjoyed by ornithologists, ecologists and environmental practitioners alike, regardless of whether they are already shorebird experts or whether they are just embarking on this fascinating field of study.

Golo Maurer

Birds Australia, Shorebirds 2020 Project Manager
Melbourne, Victoria

ECOLOGICAL AND ENVIRONMENTAL PHYSIOLOGY OF BIRDS

By J. Eduardo P. W. Bicudo, William A. Buttemer, Mark A. Chappell, James T. Pearson and Claus Bech
2010. Published by Oxford University Press, Oxford. 328 pp., 60 illustrations and figures. Paperback \$62.00, ISBN: 9780199228454.

Have you ever wondered how hummingbirds can drink 4 to 6 times their body mass in water each day, how Emperor Penguins

(*Aptenodytes forsteri*) can hold their breath for up to 22 min, how a tiny Blue Tit (*Cyanistes caeruleus*) obtains the resources to lay 10 or more eggs in one clutch, or how Bar-headed Geese (*Anser indicus*) are able to fly over the Himalayas even as humans below require supplementary oxygen to survive? The physiological adaptations of birds to extreme environments and ecological niches have long fascinated laymen and scientists alike. This book is the second in a series of volumes published by Oxford University Press examining the adaptations and physiological mechanisms used by key groups of taxa to survive in diverse and often challenging ecological environments and situations. This present volume is devoted to birds, and deals with a broad range of physiological and ecological topics related to how birds 'work'. The authors use both general concepts and specific examples to delve into the range of physiological mechanisms that have enabled birds to successfully colonise and thrive in nearly every terrestrial habitat.

The focus on the ways birds respond to or cope with their environments is one thing that sets this book apart from more general books on avian physiology, such as Sturkie's classic textbook (Whittow 2000). This also means that many topics often covered in general physiology texts are not covered, or are only touched upon, such as the mechanics of the vocal, visual and auditory systems, or the details of muscle activity. *Ecological and Environmental Physiology of Birds* instead focuses heavily on energy metabolism; discussing the metabolic costs and energy requirements for a wide range of traits and behaviours. Each chapter provides fairly up-to-date reviews of each topic, with specific examples pulled from the literature. In addition, there are boxes throughout the text, which expound on the work of key investigators in the area or give more careful attention to difficult concepts or methods.

This book begins with a 'blueprint of a bird'; an introductory section that tackles the general body plan and common morphologic characteristics of birds that make them distinct from other taxa. The authors go on to review current theories about the evolution of birds, feathers and flight. A summary of topics related to flight (and the repeated loss of flight in diverse lineages) concludes the introduction and sets the background for a more in-depth treatment of physiological topics.

Chapter 2 consists of a clearly written, but quite technical review of the basic principles of physiology. Given are general explanations, with necessary equations and physical laws, for gas diffusion and exchange. The general concepts as well as the equations and physical laws necessary to calculate and understand them are set out for gas diffusion and exchange (in the egg and in the lungs), temperature regulation and thermal exchanges, water and ion fluxes and also the effect of body size on these physiological processes. This chapter alone makes the book a worthwhile investment for any student (or senior researcher) of physiology. I have myself wished for such a handy reference in the past when trying to refresh my memory about some variable or principle of physics that I don't use often enough in my own work to remember off-hand.

The third chapter deals with the complex trade-offs between reproductive effort and longevity. This chapter reviews the costs

of egg laying, incubating, chick rearing, male mating costs, and then discusses longevity, the ageing process, and how differences in species' life history strategies influence survivorship. This chapter not only provides an insightful, up-to-date review of these different areas, but also attempts – fairly successfully – to highlight the complex relationships between the many interconnected internal and external factors that influence reproductive behaviour, fecundity and survivorship in birds.

The following four chapters delve more deeply into the adaptations birds have evolved that permit them to obtain and process food or succeed in extreme or specialised environments. Here, the authors describe the particulars of life in marine environments, in the desert, at high altitudes, in very cold climates and other challenging habitats. The special neural and sensory adaptations of birds are covered, as is the adaptive plasticity that allows birds to respond to changing environments. In this chapter the authors review the use and detection of chemical signals, and summarise what is known about magnetoreception in birds. As a physiologist whose research focus has been primarily on vocal production, I admit being disappointed that so little space is given to sensory physiology. For a taxon in which vocal communication is such a conspicuous and widespread trait, it seems that more attention should have been paid to the costs, mechanisms and diversity of vocal production and perception. The same goes for the other senses. I wished for a more comprehensive review of the neural and sensory adaptations that allow birds to interface with their varied environments. In addition, there is a growing literature on the physiology of sleep in birds that would have been a welcome inclusion.

The final two chapters provide an overview of the methods and techniques used in modern physiological research, and suggestions for future study. The penultimate chapter, which describes methods and techniques, is another particularly useful resource that makes this book a worthwhile inclusion on one's reference shelf. For each sub-section (such as 'Methods for measuring energy expenditure and movement'), the authors describe the different experimental methods that may be employed and then discuss the benefits, drawbacks and common pitfalls of each technique, as well as other issues that must be considered when designing experiments or interpreting results.

In the end, I found this book to be clearly and insightfully written. It should be of interest to avian and comparative physiologists, conservation biologists, behavioural ecologists, graduate students and a fascinating read for anyone interested in how birds make their way through life.

Sue Anne Zollinger
Max Planck Institute for Ornithology
Seewiesen, Germany

References

- Whittow, G. C. (Ed.) (2000). 'Sturkie's Avian Physiology.' 5th edn. (Academic Press: New York.)