

provide state-of-the-art reviews on these key topics in physiology that should be helpful to graduate students and researchers who appreciate a succinct synthesis that provides key inroads into the literature on these topics.

The eighth chapter provides an overview of contemporary methods for measuring energy expenditure and movement patterns of birds, and a reminder of many of the new stable-isotope and molecular methods that avian physiologists and ecologists have at their disposal. The brave new world of ornithology is incredibly bright if we all embrace these new technologies and understand both their promise and limitations. The book ends with a concluding chapter on selected future directions that highlights several of the current “hot” topics in avian physiological ecology, although within this final six pages the authors have tried to inspire us rather than provide details about fruitful future directions.

In general, this book achieves the goal of this series in providing a succinct state-of-the-art review on the physiological ecology of birds. Graduate students and researchers interested in updating their knowledge of this field will be well served by this book. The lack of figures and other illustrations to depict key concepts, and the relatively brief reviews of key topics, make the book less appealing for use as a textbook for an upper-division course. However, it has much value when placed next to your favorite ornithology and physiology text(s) so that you can use it as a fine supplement as you prepare your lectures, when you need reminders of the breadth and depth of a key topic, or as you plan your next research project.—SCOTT R. MCWILLIAMS, *Program in Wildlife & Conservation Biology, Department of Natural Resources Science, University of Rhode Island, Kingston, Rhode Island 02881, USA. E-mail: srmcwilliams@uri.edu.*

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Living on the Edge: Wetlands and Birds in a Changing Sahel.—Leo Zwartts, Bob G. Bijlsma, Jan van der Kamp, and Eddy Wymenga. 2009. KVN Publishing, Zeist, The Netherlands, 564 pp. ISBN 9789050112802. Hardcover, \$130.—Most North American ornithologists know that the Sahel is that semitropical zone between the Sahara and tropical Africa, and that R. E. Moreau's classic early-70s book on bird migration in Africa identified this then little-known area as of importance to wintering Palearctic migrants. They may also recall it as the site of massive human suffering in the drought of a couple of decades ago. Beyond that, unless one is studying the birds that use the zone or has wanted to visit Timbuktu, most North Americans don't know much more and haven't much compulsion to learn. Palearctic ornithologists know and care more, but their source materials have been limited. For those not working on Palearctic migrants, why should precious time be spent on a book that is essentially regional in focus and outlook? The reasons are several: it is a wonderful book, well written, well illustrated, well presented, and that is a rare joy;

it is an even rarer example of excellence in primary scholarship at the book scale of publishing; it is a model of wise use (and in some cases deliberate nonuse) of existing data; it tells an important tale of the complexity of unraveling environmental change; and it is a case-history harbinger of what likely is to come to other parts of the globe, because it is in the Sahel that the effects of climate change are not modeled predictions but real and compelling facts on the ground.

This book aims to reveal the ecology of the Sahel and the Palearctic birds that use it, particularly waterbirds. Why waterbirds in the seasonally desiccated landscape of the sub-Sahara? Because it is also a landscape containing dry-country rivers, wetlands, and lakes, including the Niger River and Inner Niger Delta, the Senegal River and Senegal Delta, Habesja-Nguru floodplain, Lake Chad and its basin, and the Sudd, habitats used by a half billion European birds (more or less). The Sahel first came to my attention years ago when it was unexpectedly discovered that survivorship of southern European Purple Herons was correlated not with what was happening in Europe but with rainfall in the Sahel, inversely so. It turns out that about a quarter of European birds migrate seasonally to the Sahel during the northern subtropical drying season, and these species are, for the most part (75 of 127), in a state of population decline. Conditions in the Sahel are a prime candidate by way of explanation. The climate in the Sahel has been changing complexly for thousands of years, and over the last decades mostly getting drier, although somewhat wetter more recently. The authors show that of all the proposed explanations, this drying is most closely correlated with ocean warming—global climate change in action. They explore why most climate-change models do not detect the Great African Drought of 1972–1992 and find that the most acceptable of current models show a continuation of current conditions with further drying in subsequent decades, thus setting the stage for critical bird-conservation issues of the future. For today, the current problems are people-caused.

The first chapters are analyses of the abiotic and biological characteristics of the Sahel, including climate, vegetation, rivers, and land use. These are clearly written, full of original analyses, superior interpretation of the literature, excellent illustrations, and mind-bending use of original modeling and satellite data—a tour de force of geography. They show, for example, that, contrary to the previously accepted paradigm, which once underpinned the Desertification Convention, desertification is more the result of climate change than of human activity, which can, however, prolong drought recovery. Massive human population increases and urbanization, increases in farmed land and the elimination of land rotation, dams and water use, destruction of native forests for charcoal, planting of insect-free trees, hunting, and elimination of the once huge herds of grazing wildlife—much of this in the past 50 years—all contribute to a continuation of the pattern of habitat loss for birds, which began in drought.

The second part of the book devotes chapters to the great wetlands and to rice farming. The Inner Niger and Senegal deltas are treated in most detail because they are the better known. Dams, irrigation, land-use changes, climate change, and population pressures have changed the way these Sahel wetlands function. The seasonal flood pulse and seasonal dry-down have been altered to the extent that 15–20% of the floodplains of the Inner Niger Delta have been lost and the Senegal Delta was converted

from a wetland of seasonally fluctuating salinity to freshwater. The Goliath Heron, five species of storks, and the Hammerkop, all abundant in the 1930s, no longer are found or breed in the Inner Niger Delta, because of both habitat change and human consumption. On the other hand, over 100,000 pairs of colonial waterbirds (in large part Cattle Egrets) are estimated to still nest in the Inner Niger Delta, and wintering waterbirds still number in the millions. In the Senegal Delta and Hadeija-Nguru floodplains, dams have totally changed the hydrology and led to invasions by exotic plants. Active management using artificial flooding to simulate a more natural hydrology has maintained the conservation values of Djoudj and Diawling national parks, which, although mere patches of remnant habitat, support hundreds of thousands of waterbirds. The world-famous story of the “drying of Lake Chad” is well covered and shown to be much overblown in the public mind, the danger coming not so much from the long-term trend of drying as from governmental determination not to learn the clear lessons from elsewhere but to continue to plot and scheme to stabilize lake levels. The Sudd, the largest wetland of the world, is also one of the least known; little more is known now than in Moreau’s time. Unfortunately, according to the authors’ analyses, the most complete survey of waterbird numbers for the area seems to be wrong. In fact, throughout the book, the authors work very hard to get the best possible population estimates by evaluating a hodgepodge of census and survey data of varying methodology, quality, and extent that they have procured from various sources for the individual species, the major wetlands, and the Sahel as a whole. They call bad data bad data, estimates estimates, and complain clearly about the pitfalls in existing monitoring data, much of which is very poor and lacking in any sense of error estimation. They present their numerical guesses as best they can; I have little doubt anyone has done it better. They similarly do what they can with migration and winter mortality data.

In the third part of the book, 31 chapters are devoted to the birds. The first, 40 pages long, details how the Sahel serves as the wintering area for the northern continent; the second explains the role of locusts; and the last three discuss the Sahel in relation to Europe. In between, chapters of a few pages each cover individual species of European migrants, mostly waterbirds, including status, trend, migration, and distribution, nearly all with maps of banding recoveries. The book ends with an analysis of the connectivity of the Sahel with European bird trends, an exceptional attempt to discern trends and causality from messy data. Almost 1,450 references, an excellent index, and technical chapter endnotes support the materials covered.

This is a book that has interesting things to say on most pages and real treasures on some. Although the book is multi-authored, its voice is amazingly consistent throughout. The figures and color photographs are superior; the latter not only illustrating the point being discussed but also revealing the harsh beauty, mystery, and human face of the region. The authors set out on this project in the early 2000s, when they realized how little information was available. They decided to get control not only of the literature but also of unanalyzed databases and to do original analyses, modeling, and field research as required to more fully understand and tell the story. This original research makes the book special. The overall impression one takes from each of the chapters is that the authors speak authoritatively. They have no hesitancy in taking on

long-held views and prior misanalyses or in drawing conclusions from the literature and their own analyses that ring both true and fair. It is a book to be recommended to ornithologists and bird conservationists alike, worldwide, and a necessity for any university library.—JAMES A. KUSHLAN, P.O. Box 2008, Key Biscayne, Florida 33149, USA. E-mail: jkushlan@earthlink.net.

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The Wilderness Warrior: Theodore Roosevelt and the Crusade for America.—Douglas Brinkley. 2009. HarperCollins, New York. xv + 940pp., ISBN 9780060565282. Hardbound, \$34.99; Paperback, \$19.99.—This book’s subtitle could as easily have been “Theodore Roosevelt as Ornithologist and Bird Conservationist.” The dust jacket introduces the book as an examination of the naturalist president, and so it is. Most Americans know from their history books and communal cultural literacy about the Theodore Roosevelt of the Rough Riders in the Spanish-American War, of trust busting, big-stick foreign policy, the Panama Canal, and big game hunting. The more historically minded might know of his Nobel Peace Prize, his devotion to the strenuous life, and his Bull Moose progressive movement. Some even may know that his death was hastened by his South American explorations. Conservationists know him for setting aside public lands that eventually became the first and still greatest national system of wildlife refuges, parks, and forests in the world. What may not be so well known is why he did this, and exploring this question is the core goal of Brinkley’s book. Theodore Roosevelt never meant to be president; he meant to be a great American naturalist. In fact, in his early life he devoted himself to studying birds, and later he was indeed one of the leading mammalogists of his era. Few ornithologists or present-day birders know, I dare say, that he was at his very core one of them.

To set the stage, it is valuable to appreciate his political milieu, and that he was an accidental president. He never could have been nominated on his own because of his progressive social policies, liberal economic policies, belief in government, and obsession with conservation. While his ascension to the presidency via assassination was accidental, so was his being vice president in the first place, owing to the New York powers being anxious to get him out of the state, where as governor he annoyed them by setting aside parks; reorganizing management of public lands, fish, and wildlife; and overseeing the destruction of the New York-based millenary trade, which was killing millions of birds for their feathers, as well as wanting to tend to the social ills of the city. But not owing his ascension to power to anyone, he did what he wanted, letting the chips fall where they might. And what he chose to do was tend to the preservation of wilderness and, very deliberately, the total protection of nongame birds. The American conservation movement was well underway when Roosevelt became president, but he legitimized it. By the end of his first term, America was electing governors and members of congress who followed