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RECENT LITERATURE

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BOOK REVIEWS

Ducks, Geese, and Swans of North America

Guy Baldassarre. 2014. Wildlife Management Institute, Johns Hopkins University Press, Baltimore, MD. xxvii + 1027 pages. ISBN: 9781421407517. $69.95 (Hardcover).

This is the third comprehensive revision of Francis H. Kortright's classic (1942) work describing the biology and ecology of North American waterfowl. Guy Baldassarre has produced a masterpiece two-volume boxed set that is an essential natural history resource for waterfowl biologists, and a beautiful library addition for birders, hunters, and other waterfowl enthusiasts. Guy's love for waterfowl and his meticulous attention to detail is strikingly apparent in this book; personally, I have never seen a more astoundingly vast compendium of waterfowl natural history. This abundance of information has been compressed into a manageable, well-organized format, with information on each species presented using the same schema. The text itself is necessarily dense with information, and so this book will probably see more use as a practical reference tool than as casual light reading, though there are a few amusing anecdotes and cultural references (e.g., the section on Mute Swans) that provide balance.

This book is primarily an encyclopedic description of North American waterfowl species, and contains information similar to what one would find in the Birds of North America (BNA) online database. However, it provides far more detailed information on basic life history characteristics. For example, BNA may list the average clutch size for Gadwalls (*Anas strepera*), but this book will show full ranges of clutch size from several studies from different locations and time periods. This presentation is perfect if one is interested in variation among studies, sites, and years, but it can be difficult to track down simple answers to simple questions (e.g., "when do Canvasbacks arrive on the breeding grounds?") Ducks, Geese, and Swans provides extraordinarily rich descriptions of migration behavior, mating systems, courtship displays, nutritional requirements, demographics, and species-specific timing of annual events, many of which would be nearly impossible to track down from primary sources. A few natural history details are absent, presumably hard editing choices had to be made to keep the text manageable. I would have appreciated images of nests, eggs, and contour feathers (common characteristics that biologists use to identify duck nests) for each species, and graphs of breeding populations over time. This information is available elsewhere though and, given space limitations, perhaps their exclusion makes sense. The only notable peculiarity I came across in this book is the renaming of Green-winged Teal from *Anas crecca* (American Ornithologists' Union) to *Anas carolinensis*, reflecting the substantial morphological and genetic divergence between American and European teal populations—let the debate continue.

This book differs from previous editions in several important ways; here, I refer specifically to differences from Bellrose (1976). First, the broad but shallow introduction on waterfowl ecology and management found in previous editions has been eliminated. These topics received extensive treatment in Baldassarre and Bolen (2006), so focusing on the species accounts in Ducks, Geese, and Swans seems reasonable. Also gone are the extraordinarily detailed (and very complex) range and migration maps that were a hallmark of previous editions. These have been replaced by more familiar maps of breeding and wintering ranges, though unlike most field guides, locations through which ducks migrate are not shown on the maps.

The maps are supplemented with information in the text on migration routes and seasonal concentrations of waterfowl (broken down by flyway). Older versions also included population graphs depicting the percent of the population present in key areas during a given time of the year, which I wish had been retained, and extensive appendices of waterfowl management areas, which I am not upset to see excised. In general, this new overhaul of Ducks, Geese, and Swans is far more detailed and comprehensive, which is not surprising given the number of new waterfowl studies conducted in the last 30 yr.

The beautiful plates drawn by Bob Hines have returned in this version, and are supplemented by full-color photographs selected by the author. The photos are an outstanding addition, and elevate this book well beyond a useful reference text. Often the photographs are used to show courtship display postures, or highlight differences between species that closely resemble one another. That said, this book does not regularly show (in plates or photos) differences between juveniles and adults, nor different stages of molt; these are described in the text only. In general, the full-color plates and photos are a gorgeous addition to older predominately black-and-white versions. They make the weighty text of the book feel well-balanced, but do not detract from the strict focus on natural history, as perhaps a field guide or picturesque coffee table book might.

This book is an essential reference for every waterfowl biologist, at all career stages. It would be especially useful for students and young professionals as their research shifts among waterfowl species throughout their careers, and they are forced to quickly learn new systems (as I have). Older waterfowl biologists will appreciate the treasure trove of classic natural history studies Guy includes in this book; there is something nostalgic in reading about courtship studies conducted by Konrad Lorenz in the 1950s. I suspect that if it were not for this book, many of these older citations would be lost to time. Hunters, birders, and other waterfowl enthusiasts will enjoy the detailed range maps and information on migration chronology and behavior, as well as the vivid descriptions of courtship behavior, territorial behavior, diet, and habitat preferences. In short, there is something in here for everyone—there would have to be, given the mind-boggling amount of information contained in this tome. Ducks, Geese, and Swans of North America is undoubtedly an instant classic, and is a brilliant capstone to the career and life of one of waterfowl's greatest champions.

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Climate Change and Birds: Impacts and Conservation Responses

James W. Pearce-Higgins and Rhys E. Green. 2014. Cambridge University Press, Cambridge, UK. 467 pp, 154 b/w illustrations, 21 tables. ISBN: 9780521114288. $120.00 (Hardback). Also available as an e-book.

"Birds and Climate Change: Impacts and Conservation Responses" offers readers a thorough review of knowledge on the impacts of climate change on bird populations, distributions, and conservation, drawing on a wide range of historical and up-to-date sources. The authors use several meta-analytical summaries and fascinating examples to illustrate how weather and climate impact the behavior, annual cycles, and demography of birds, focusing on mechanistic links to broad-scale patterns and usefully highlighting potential approaches to mitigation and conservation. As a consequence, the book is an excellent source for all professional ornithologists and graduate students embarking on work in avian demography, distribution, communities, and conservation, particularly because future research needs are also well and logically developed. Below, we

summarize key points, highlights, and criticisms of chapters.

Chapter one lays out a solid background on what we know about climate change, its human influences, as well as the underlying science of observed change in global climate. The chapter concludes by introducing the interesting case of the Red Grouse (*Lagopus lagopus scotica*) to make clear that climate can influence individuals and populations in complex ways, including indirectly via habitat. This species then re-appears usefully throughout the text to reinforce lessons across levels of organization and application.

Chapter two focuses on climate impacts on avian arrival dates to the breeding grounds (a mean advance of 5 d from 1980–2010) and the initiation of breeding (advancing at a rate of 2 d per decade), leading to a discussion of the many questions arising on the costs and benefits of such changes for individual and population fitness. The authors emphasize that, particularly for migrants, understanding where in the annual cycle climate has its biggest impacts can be difficult, specifically in the case of factors affecting timing of breeding. Using excellent examples, the authors outline a series of mechanisms potentially influencing migration timing including photoperiod, other endogenous signals, temperature in non-breeding areas, and factors affecting arrival timing at breeding sites (temperature, food, wind speed and direction, rainfall, storm events, and sea crossings). The authors point out potential benefits to earlier laying dates associated with climate warming (larger clutches and longer breeding seasons), but, lacking substantial work, were unable to develop themes related to the timing of molt, fall migration, or its consequences for survival or lifetime reproductive success (e.g., as potential costs of earlier breeding). By focusing on migrants (and some tropical species), however, readers may be left wanting more on resident and facultative migrant species.

Chapter three focuses on "mismatches," wherein the timing of arrival or breeding, as a consequence of responses to climate change, may no longer coincide with resource peaks. Here, a review of case studies leads to equivocal support for the existence of climate mismatches, illustrated with an excellent comparison (and figure) from Great Tit (*Parus major*) populations wherein one of two populations experienced a mismatch. A particularly remarkable insight of the authors is that despite evidence that mismatches can occur, there are as yet no conclusive demonstrations that mismatches linked to climate change are a root cause of population declines because competing hypotheses are not ruled out. Interestingly, the authors conclude that phenological mismatches are perhaps more likely symptoms of population decline, rather than a cause of decline. To move forward, the authors suggest that future studies focus also on the potential for environmental degradation in non-breeding areas.

Chapter four introduces the idea that weather and climate variables influence populations via their effect on demographic rates, and then makes clear that detecting those influences may require long-term study, particularly when environmental extremes are involved, but occur infrequently. The authors then summarize hundreds of studies on the influence of change in temperature and precipitation on performance in the breeding and non-breeding seasons via simple meta-analyses. Their results reveal interesting patterns suggesting that change is more influential on demography at high latitudes and in long-distant migrants, but that its effects can also vary with diet. In particular, the authors identify temperate and boreal zone birds that migrate to sub-tropical or tropical non-breeding areas, residents of those areas, and seabirds as groups to focus on in particular detail. The remaining sections do an excellent job of summarizing a highly complex literature to draw a number of intuitive conclusions, such as that warmer winter temperatures in the temperate zone tends to enhance survival, but also that weather and climate have complex effects on food abundance and thus influence populations in a variety of system-specific ways. For example, warmer temperatures often enhance offspring survival in species by ameliorating starvation, but reduce performance in species that rely on soil moisture to maintain insect biomass. Predictions become particularly complex in systems wherein environmental change influences species at multiple trophic levels (demonstrated with excellent examples from Arctic ecosystems). Boxes are used regularly throughout this and others chapters to illustrate summary analyses or points and, in most cases, are very useful

(though a few are superficial such as box 4.6, illustrating the effect of catastrophic breeding failure on extinction). Overall, the extensive reviews provided in this chapter offer truly outstanding value to any ecologist wanting to understand the potential impacts of climate on demography, and a careful development of species groups and bioregions most likely to include populations particularly sensitive to change.

Chapter five offers a comprehensive review of evidence indicating that climate change has led to shifts in species distributions and community membership. The authors argue that species in temperate latitudes are shifting poleward, more rapidly at the leading than trailing edge of their distributions. The authors then evaluate several hypotheses related to global patterns of species richness, and case studies of bird community change in Europe.

Chapter six discusses the complex ways in which climate can influence distribution and community, and the complications this raises for making predictions. Lacking detailed studies on climate driven change in demographic rates, there is considerable reliance on climate envelope models to predict future distribution or abundance. The authors provide a detailed and practical account of how to construct a climate envelope model, including important details on selecting and analyzing appropriate bird and climate data, as well as hazards/benefits of including non-climate variables in models (e.g., soil type and land cover). This provides a "beginner's practical guide," but also emphasizes important differences between presence/absence, presence-only, and abundance data that are not clearly delineated in some research results to date. Discussions also include how to make projections in a variety of scenarios (e.g., altitudinal change, sea-level rise, and population change) and how to test the performance of climate envelope models to avoid misleading results.

Chapter seven provides a useful review of the "6 main tools in a conservationist's toolkit" and how they can be applied to conserve species threatened by climate change. The authors focus on facilitating range expansion at the upper latitudinal and altitudinal limits of species' ranges and preventing or slowing population declines at the lower latitudinal and altitudinal limits. Because the magnitude and response of species to climate change is unknown, the authors stress that conservation decisions made in response to climate change should build on current practices rather than diverting conservation investment from addressing other anthropogenic threats to biodiversity. This chapter will be particularly useful to students or practitioners seeking an introduction to avian conservation, given some prior knowledge of meta-populations. Helpful tables and figures offer alternative frameworks for identifying high-risk species, though a discussion of surrogate or indicator species would have helped those interested in landscape-level conservation. However, further discussion of how the techniques identified can be enacted in "real world" situations could have helped the reader wondering how these techniques might be applied without dramatically constraining economic growth, which will always be an issue for decision-makers.

Chapter eight offers a comprehensive summary of the potential threats of climate change mitigation techniques to birds, such as wind turbines, tidal steam, and hydro-electric dams, including examples of how future research may help identify the most viable alternatives. Solar power is identified as, potentially, the most viable option for sustainable energy production with minimal impact to birds and, though its cost is highlighted, those costs are declining rapidly at present. In contrast, bioenergy was judged the least technologically advanced and least efficient form of energy production, despite its low average cost and widespread use globally. The final chapter ties together concepts and key findings to summarize in detail the main impacts of climate change on birds, including the role humans will play in future climate change and mitigation, and thus provides a necessary summary to the myriad factors addressed throughout this book.

Overall, we found this book to be the most thorough and detailed review to date on the impacts of climate change on free-living species and, though focused exclusively on birds, should be appealing to a wide range of readers, from amateurs to academics. It is an essential entry point for anyone beginning research on climate change and species demography and a very

useful resource for students and professionals that is likely to be similar in importance to Newton's (1998) "Population Limitation in Birds." Our only criticisms are the slightly Eurocentric perspective, but we would also point out that this can be taken as a challenge to researchers elsewhere to begin to create similarly thorough reviews, and should in any case be of great value to researchers elsewhere. Although publishing restrictions probably prevented color figures, the first chapter could have benefitted from color coding and larger figures overall. Nevertheless, we commend the authors on their hard work in producing an excellent book that is fascinating, extensive, and highly useful.

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