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BOOK REVIEW

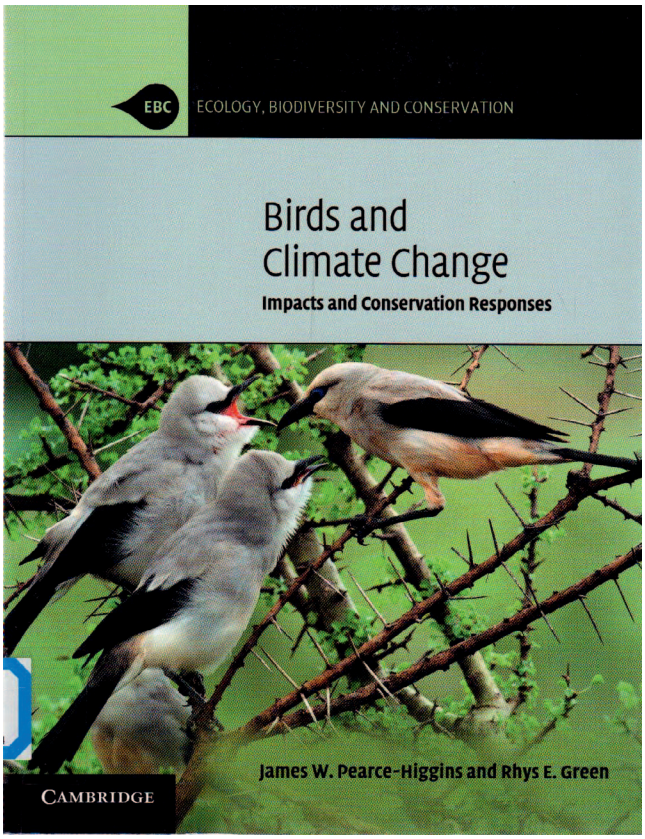
Birds and Climate Change: Impacts and Conservation Responses

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Birds and Climate Change: Impacts and Conservation Responses by James W. Pearce-Higgins and Rhys E. Green. 2014. Cambridge University Press, Cambridge, UK. xi + 467 pp., 19 tables, 82 figures. $130.00 (hardcover). ISBN 978-0-521-11428-8. $74.99 (paperback). ISBN 978-0-521-13219-0.



A quick search on Web of Science using the keywords *birds* and *climate change* reveals that more than 22,000 scientific papers have been written on the subject. Given the rising importance of climate change in ornithology, the question is how one can possibly provide a comprehensive review of a subject that spans decades, multiple continents, and hundreds of species. To answer this question, simply pick up a copy of *Birds and Climate Change* by James W. Pearce-Higgins and Rhys E. Green. This book, the culmination of six years of hard work, is a masterful review of the scientific evidence that birds remain our most important biological indicators of how species are responding to modern climate change. There are several notable books on birds and climate change, but Pearce-Higgins and Green, both leading scientists in climate change research, provide a unique addition to this body of work. *Birds and Climate Change* is not an edited volume with contributions from various scientists, but rather it is written in a cohesive and consistent voice that enhances readability.

The book consists of two equally substantive parts. Part I, "Impacts," is a balanced overview of the biological impacts of climate change on birds, including changes in the timing of migration, breeding phenology, phenological mismatches, geographic ranges, demographic and population impacts, and community dynamics. Importantly, the authors avoid the pitfalls of focusing on a single geographic region or taxonomic guild and instead provide an exhaustive review of these effects on birds that inhabit a diversity of environments, ranging from tropical rainforests to frozen tundra. Pearce-Higgins and Green present these findings by using two effective vehicles of storytelling: species-specific case studies—for example, Red Grouse (*Lagopus lagopus scotia*) or European Pied Flycatcher (*Ficedula hypoleuca*)—and meta-analyses compiled from numerous published studies. By so doing, they provide an effective narrative that uses both realistic, in-depth examples (to explain biological and demographic nuances) and broader summaries of existing studies (to more rigorously quantify how climate change affects multiple species and regions). The meta-analyses are carefully constructed contributions to our knowledge of climate-induced changes in phenology and range shifts that alone would make for essential manuscripts on the subject.

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Part II, "Conservation Responses," is an exploration, review, and battle plan for managers and agencies to incorporate the impacts of climate-change adaptation and planning into bird conservation. The authors begin this section with a review of climate envelope modeling and the potential benefits and pitfalls of this most widely used tool for predicting how future climate change will drive future bird ranges. The following sections comprise an interesting exploration of common conservation strategies (e.g., creating corridors and stepping-stones, habitat protection, enhancing connectivity, captive breeding) as tools for climate-change adaptation. These chapters are a useful summary that does not present climate-change adaptation as necessarily requiring new tools in bird conservation, but rather application of existing approaches for reducing vulnerability and accounting for the uncertainty of future climate change. Beyond adaptation, the authors are not shy in tackling the more controversial aspects of climate change by reviewing aspects of mitigation (e.g., solar energy, biofuels) within the context of bird conservation and management.

In summary, *Birds and Climate Change* is a comprehensive and thoughtful review of the impacts of modern climate change on bird populations and is essential reading for undergraduate and graduate students, scientists, managers, and policymakers interested in ornithology and bird conservation. The literature review is exhaustive, and Pearce-Higgins and Green provide an in-depth review of the subject using a careful balance of stories from the field and broader syntheses of hundreds of scientific studies. Even beyond the implications of climate change, this book offers excellent discussion on general topics in ornithology such as phenology, trophic interactions, and range changes. As a researcher and teacher concerned about the widening effects of modern climate change on birds and their habitats, I have given this book, complete with dog-eared pages and scribbled notes in the margins, a special place on my bookshelf.

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