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## Frontiers of Biogeography

### Title

Birds on the brink?

### Permalink

<https://escholarship.org/uc/item/4g68320v>

### Journal

Frontiers of Biogeography, 7(2)

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### Publication Date

2015

### DOI

10.21425/F5FBG27470

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Peer reviewed

## Birds on the brink?

Birds and Climate Change: Impacts and Conservation Responses. James W. Pearce-Higgins and Rhys E. Green, 2014, Cambridge University Press. 467 pp. £75 (hardback) / £40 (paperback) ISBN: 9780521114288 / 9780521132190; <http://www.cambridge.org>

This is a very readable book. With many academic texts, best value is obtained by a selective approach, dipping in and out, but this book can be easily and profitably read from cover to cover. The overall structure is logical. After a short summary of how the climate is changing, the first part of the book deals with potential impacts of climate change on bird distributions, abundance and productivity and the second part on how conservation efforts (including negative aspects as well as positive ones) might respond to the challenges. Each chapter usually ends with discussion of overall conclusions in addition to an actual summary. This could tend towards repetition, but it is well done and serves to cement the main points and maintain the narrative. Similarly, statistical descriptions and results of particular analyses are included within separate boxes so you don't lose the plot or get lost in the detail—all of which contributes to excellent readability and comprehension.

In temperate Europe at least, most people's perception of climate change in relation to birds is probably linked with phenology, the tendency for birds to start breeding earlier and for spring in general to be earlier. This book however makes it clear that climate fundamentally shapes all aspects of bird ecology. At all scales from global to local, temperature and rainfall patterns have direct effects on bird survival and breeding success, and indirectly influence habitat type, structure and composition. While much has been made of early breeding by some species, others have not changed their timing (or have even shifted later). Phenological responses also differ for residents, and short and long distance migrants, depending on the cues used to time migration and breeding behavior (e.g. local temperature, vegetation changes, changes in food abundance). Thus bird communities will change with the potential to alter resource use and com-

petitive interactions. The complexities of climate change effects on birds are illustrated by the groups currently identified as most at risk, that is, seabirds, upland birds, long distance migrants, some forest birds and specialists. Changes in ocean temperatures, fronts and circulation patterns are altering the abundance and distribution of food resources for seabirds, rising temperatures are changing habitat suitability for upland birds, some forest species may be at risk from phenological mismatch and the fine tuning of specialists may be challenged by rapid changes in habitats and bird communities. Long distance migrants stand to face a triple whammy with temperature, rainfall and habitat changes in both their breeding and wintering ranges and at all points in between.

The book makes it clear that despite great interest and concern over climate change and its effects on birds, clear hard evidence of deleterious (or beneficial) effects is as yet relatively scarce. This is probably not surprising as real change has yet to occur; the next 100 years or so could amount to 'interesting times'. The book deals in some detail with the currently best-researched aspect, i.e. phenology, and its corollary of mismatching, and gives a well-balanced account of a sometimes contradictory literature. It then takes the very sensible approach of examining how climate and weather currently affect bird demographic rates (and population sizes) and hence what the impacts of future changes might be. This highlights the potential importance of changes in rainfall, and in particular of drought, especially in the tropics. As with most aspects of bird ecology, there is a notable lack of research in the tropics, with most studies being in north temperate and boreal regions.

The book then continues down the chain from direct climate and weather effects to indirect influences on habitats and land use change.

This again examines current effects on bird communities, especially in relation to agricultural versus semi-natural habitats, and habitat fragmentation. These topics are well-discussed and place the current concern about the effects of climate change in the broader context of the challenges that birds already face from habitat loss and fragmentation. The comments about corridors (to allow birds to move more easily in the context of range changes) are interesting in that the unwritten conclusion seems to be that corridors work when they are large enough to constitute ‘habitat’ rather than acting simply as ‘roads’; in effect, what works is habitat provision.

In the context of range changes, the chapter on using climate models to predict where suitable conditions for a given species may occur in the future is excellent. Some readers might be tempted to skip a chapter on modelling, but don’t. This is the best verbal account of climate envelope models—the data, the assumptions, the good, the bad and the ugly bits—that I have read. It is highly readable, very interesting and rather scary. It deals with potential future changes in range extents, including altitudinal and coastal ranges, and details possible changes in abundance in addition to shifts in distribution. Although the uncertainties in both the climate and bird data are large, and any model predicting years into the future is beset with difficulties, this amounts to a carefully documented, and frankly gloomy, journey through range contractions and extinctions. You are left with the overwhelming conclusion that we should not be messing with the climate, but that it is probably already too late to escape unscathed (although we should certainly try). There is also a useful discussion of how to manage habitats and landscapes to enable range shifts, but this carries the inevitable problem that management to enhance habitat at the leading edge of a northward shift for species *x* might exacerbate problems at the contracting southerly edge for species *y* (and habitat corridors for species *x* might constitute barriers for species *y*). And perhaps most especially, management to mitigate climate change effects will have to contend with all the current problems of providing and maintaining good

quality habitat in landscapes already under pressure from multiple demands.

The accounts of the pros and cons of non-fossil fuel energy alternatives are interesting and useful and once again prove that there is no such thing as a free lunch. They also make it clear that politics and profit have as much or more to do with some alternatives than concern about the climate. There is no discussion of nuclear power as an alternative (perhaps because it not considered to be a sustainable option), but it is included in Figure 8.1 which is a rather depressing illustration of the 87% of global energy sourced from fossil fuels in 2011.

The weakest chapter is the first one giving a brief overview of climate change. Given the scale (both temporal and spatial) of the topic, this was always going to be a bit of a thankless task. In particular, space precludes discussion of the very different effects (for example on ice melting/accretion and temperatures) in the Arctic and Antarctic. As a book dealing with the impacts of climate change on birds, it might be argued that this chapter is not essential, i.e. that climate change could be taken as read, but this would, no doubt, also attract criticism – a no-win scenario for the authors. Several of the figures in this chapter would have really benefited from the use of colour or other enhancements. Despite these difficulties, this summary does set the scene and provides references for readers wanting more detail. There are some other errors and irritations, (e.g., conflating the use of ‘mean’ and ‘median’, and the need for excessive back-tracking to identify some abbreviations) in this chapter and elsewhere in the book, but they do not detract unduly from the overall high quality. The scope of the content is impressive, with consideration of non-European literature where possible.

This is not a ‘shock, horror’ account, on the contrary, it is a very measured, possibly even conservative, evidence-based account – but possibly all the more worrying for it. There is currently no overwhelming evidence for hugely detrimental effects of climate change on birds, but this could be partly due to the problem of distin-

guishing climate effects from all the other pressures on bird populations. The authors also point out the value of long-term monitoring, an activity not particularly favoured by current funding models. However, what this book documents is an increasing accumulation of evidence from all over the globe pointing to future potential for possibly large and drastic changes. A recent publication (Roberts et al. 2015) suggests that global surface temperature increases have been stalled since about 1998 due to excess heat warming the oceans instead. When this pause ends, possibly within a few years, temperatures could rise rapidly. If you are interested in knowing what this might mean for birds, and what approaches might be available to reduce potential impacts,

then I can thoroughly recommend that you read this book.

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### Reference

Roberts, C.D., Palmer, M.D., McNeall, D. & Collins, M. (2015) Quantifying the likelihood of a continued hiatus in global warming. *Nature Climate Change*, 5, 337 - 342. DOI: 10.1038/NCLIMATE2531.

Submitted: 14 May 2015

Accepted: 19 May 2015

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