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Understanding geographical range changes of North American breeding birds

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We used North America's breeding avifauna as a model to understand geographical range changes that have occurred over the last 40 years. Our analysis aimed to describe the range changes observed since 1966. Preliminary results showed a trend for species to shift north with some shifts occurring at dramatic speed, consistent with expectations of the effects of climate change. We also found that many species have shifted south, suggesting that factors other than climate change should not be overlooked as potential drivers.

Few studies have accounted for spatial biases in sampling, and therefore we developed an improved method for identifying and describing geographical range shifts and showed that failure to account for sampling bias led to erroneous or biased findings for many species. Our research provides a demonstration of the improvements required in the analysis methods used in large-scale ecological investigations of global change, and draws attention to the care needed when using data from monitoring programmes with uneven sampling effort in space and time.

We examined species biological traits that have been implicated in mediating responses to global change, such as habitat specificity and dispersal ability. Most traits examined did not have a strong correlation with the rate of geographical range shift but species with northerly distributions tended to have shifted furthest.

Much research has focused on predicting future geographical ranges (e.g. climate envelope models), yet relatively little effort has been directed at describing recent range shifts. Our research advances our understanding of the dynamics of species distributions and helps to underpin the assumptions of predictive models. The findings can also help guide conservation managers in areas or for species where no predictive models are available.

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