

Science for Environment Policy

How does climate change affect birds? New tool provides accurate measurements to support biodiversity targets

A new long-term monitoring study is the first to demonstrate that climate changes are having divergent effects on populations of bird species across Europe and the United States. The study identifies broad-scale impacts on the abundance of common bird species over a 30-year period, to show that, overall, populations of bird species across both continents are being affected by changes in climate. The research adds to a growing body of evidence that climate change is affecting biodiversity either positively or adversely, depending on species' climate preferences.

Global climate changes are a major threat to biodiversity. Despite increasing evidence of impacts at a local scale, large-scale studies assessing multiple species are rare. In this study, researchers showed that common bird populations are responding to [climate changes](#) in a similar, noticeable way in both Europe and the US. The study, part-funded by the EU¹, is the first to demonstrate that climate change is having a large-scale influence on the population numbers of common birds in widely separated parts of the world. Europe has generally seen a reduction in bird abundance since 1980; understanding how climate is likely to further affect bird populations on the continent is important in the context of conservation efforts to reverse this decline.

The researchers developed a Climate Change Indicator (CCI) to quantify the impacts of recent climate change on population numbers of common bird species. The indicator was developed by integrating information on species abundance for a wide range of common bird species in both Europe and the US. Data from 1980 to 2010 for 145 common European bird species — making up almost 90% of the total individual terrestrial breeding birds in Europe — was taken from the [Pan-European Common Bird Monitoring Scheme](#) (PECBMS). Monitoring data was excluded for species that were particularly rare, poorly monitored or whose populations fluctuate considerably. For the US, indices of abundance were used for 380 species monitored by the [North American Breeding Bird Survey](#). Comparing Europe and the US allowed the researchers to assess how climate change has affected large numbers of species over two regions that are likely to be locally affected by climate change in different ways. Climate changes can have positive or negative effects on bird populations, depending on how factors such as habitats or prey are affected by changes in climate.

Annual climate data and information on species geographic ranges (independent of the monitoring data on species abundance) were then combined to produce species distribution models to determine whether the climate will become more or less suitable for each species. When developing the species distribution models, the researchers considered species-specific attributes to determine whether a species is likely to be impacted by climate changes; these included migratory behaviour, breeding habitats and body mass. The species distribution models were then combined for each country (Europe) and state (US) with bird species allocated at a country/state level to one of two groups: those expected to have been either advantaged (CST+) or disadvantaged (CST-) by climate change during the study period. The combined model for both groups enabled the researchers to compare how bird populations were varying over the study period to provide an indicator of climate change effect on species both favoured and disadvantaged by the impacts.

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1. The European Commission provided funds over the last decade to support the collection and analysis of species data on birds from national breeding bird surveys from across Europe.

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2. Aichi biodiversity targets:
<https://www.cbd.int/sp/targets/>

For Europe, the group of bird species likely to be adversely affected by climate change has seen a decline in population since 1980, whereas the group likely to be positively affected by climate change has generally seen no change in abundance. For example, populations of bee-eater (*Merops apiaster*) and Cetti's warbler (*Cettia cetti*), species with a southerly distribution in Europe, have increased in recent years, whilst more northerly distributed species such as willow tit (*Poecile montanus*) and brambling (*Fringilla montifringilla*) have been declining in the same period. In the US, where bird populations have been more stable since 1980, the group of birds better suited to the changes in climate saw an increase in population numbers compared to the group less well suited to it, for which populations have remained static. However, in both regions, the difference in abundance of populations between the two groups is increasing — indicating that the effects of climate change are already altering the abundance of bird populations globally. The fact that this has been observed across two continents, with only six bird species in the analysis which are common to both, suggests that climate changes are having an impact at a global level.

The study demonstrates the benefit of long-term monitoring of populations, such as the EU-supported PECBMS, to understand the effects of environmental changes. The CCI indicator developed in this study allows conservationists and decision makers to track the response of bird populations to ongoing climate change, which could help achieve the Aichi biodiversity targets² outlined by the UN [Convention on Biological Diversity](#) and could be used as a guide to the scale of the impacts of global climate change on species, and as a monitoring tool to determine whether policies and interventions are making a difference. The large quantity of data and wide geographical scope of this indicator make it more accurate and data-led than other approaches to date. The researchers say it could also be used for bird populations in other locations and for tracking changes in other well-monitored species groups, such as bees, butterflies and dragonflies, which are also susceptible to the impacts of climate changes.

