Hungry birds as climate change drives food 'mismatch'

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Female Pied flycatcher. Credit: Tom Wallis

Warmer springs create a "mismatch" where hungry chicks hatch too late to feast on abundant caterpillars, new research shows.

With continued spring warming expected due to climate change, scientists say hatching of forest birds will be "increasingly mismatched" with peaks in caterpillar numbers.

The researchers, from the RSPB and the universities of Exeter and Edinburgh, used data collected across the UK—largely by citizen scientists—to study spring emergence of oak tree leaves and caterpillars, and timing of nesting by three bird species: blue tits, great tits and pied flycatchers.

They also tested a theory that some bird species in southern Britain may suffer most due to a greater mismatch effect—but they found no evidence of this.

"Forests have a short peak in caterpillar abundance, and some forest birds time their breeding so this coincides with the time when their chicks are hungriest," said Dr. Malcolm Burgess, of the University of Exeter and the RSPB.

"With spring coming earlier due to climate change, leaves and caterpillars emerge earlier and birds need to breed earlier to avoid being mismatched.

"We found that the earlier the spring, the less able birds are to do this.

Female Pied flycatcher. Credit: Tom Wallis

"The biggest mismatch was among pied flycatchers—as migratory birds, they are not in the UK in winter and therefore are much less able to respond to earlier spring weather."

The study presents the first assessment of whether the mismatch effect is greater in southern Britain than the north.

It has been suggested that northern bird populations may be "buffered" from the effects of climate change in this way.

Dr. Ally Phillimore, from the University of Edinburgh, said: "We found

no evidence of north-south variation in caterpillar-bird mismatch for any of the bird species. Therefore, population declines of insectivorous birds in southern Britain do not appear to be caused by greater mismatch in the south than the north."

Dr. Karl Evans, from the University of Sheffield's Department of Animal and Plant Sciences, said "Our work suggests that as springs warm in the future less food is likely to be available for the chicks of insectivorous woodland birds unless evolution changes their timing of breeding."

Female Pied flycatcher. Credit: Tom Wallis

First leafing dates of oak trees were collected by citizen scientists coordinated by the Woodland Trust via Nature's Calendar, caterpillar abundance was monitored by collecting frass (droppings) beneath oak trees, and the timing of egg laying by blue tits, great tits and pied flycatchers were recorded by the British Trust for Ornithology's long-running Nest Record Scheme.

The research team also included the universities of Durham, Glasgow, Oxford, Stirling and Cardiff.

The paper, published in the journal *Nature Ecology and Evolution*, is entitled: "Tritrophic phenological match-mismatch in space and time."

More information: Tritrophic phenological match–mismatch in space and time, *Nature Ecology and Evolution* (2018). nature.com/articles/doi:10.1038/s41559-018-0543-1

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