

'Moth motorways' could help resist climate change impact

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Rosy Footman moth, found in woodland. Credit: Patrick Clement

Moths struggling to move north to adapt to climate change in the U.K.

could be assisted by pinpointing areas where habitat restoration can give them a smoother journey.

New research by the University of Liverpool, Rothamsted Research, Butterfly Conservation and the University of Reading combined real data gathered by volunteers with new computer simulations for the first time to predict the movement of different moth species in a changing climate.

These predictions revealed that farmland and suburban moths, which are crucial for both pollination and as food to support birds and bats, struggled to move across landscapes. It helped the scientists identify [landscape features](#), such as rugged hills, that seemed to slow their movements.

Dr. Jenny Hodgson, lead author from the University of Liverpool, said: "These new computer models will help us to target habitat restoration in the most effective places to help species adapt to climate change by shifting their ranges across the country."

Professor Tom Oliver, an ecologist at the University of Reading and a co-author of the study, said: "Previous research has shown how severe fragmentation of habitats in our U.K. landscapes is preventing the ability of species to shift their ranges in response to climate warming. We urgently need targeted habitat restoration to help species adapt to climate change.

"Utilizing predictions like these would enable us to effectively create moth motorways, helping endangered moth species reach new, more suitable regions more quickly in their bid to survive."

There is widespread concern that U.K. wildlife will fail to track climate change if habitat is too scarce or insufficiently connected. However, up

until now there has been a lack of capacity to predict the movement of species across landscapes under climate change.

The research, published today (Friday 20 May) in the journal *Global Change Biology*, revealed that moth species found in farmland and suburban habitats were only moving northwards in some British landscapes, putting them at greater risk.

The team found that landscapes with hills or varying temperatures acted as bottlenecks, slowing the movement of farmland and suburban moths. The reasons for this are unclear, although it may be that hills present a [physical barrier](#) to dispersal, or that upland areas contain fewer hedgerows, nectar sources and larval food plants.

Data on the movement of 54 southerly-distributed [moth](#) species from 1985 onwards was gathered from the Rothamsted Research Light trap network and the National Moth Recording Scheme to test results from computer modeled data.

Dr. Chris Shortall, an entomologist from Rothamsted Research and co-author on the study, said: "The restricted expansion of farmland moths is surprising and shows it is not safe to assume that such relatively tolerant species face no geographical barriers to range expansion. There may be ways to adapt farming practices to improve species ability to move through these landscapes."

Dr. Zoë Randle, the Senior Survey's Officer at Butterfly Conservation and a co-author on the study, said: "The findings from this work have great potential to maximize the impact of conservation action, [habitat](#) restoration and tree planting by targeting these environmental enhancements in the right places. We are in the grip of a biodiversity and climate crisis, time is of the essence and the findings of this research can really help make a difference in helping moths and other [species](#) in these

communities that are undergoing range expansion due to [climate change](#)."

More information: Jenny A. Hodgson et al, Where and why are species' range shifts hampered by unsuitable landscapes?, *Global Change Biology* (2022). [DOI: 10.1111/gcb.16220](https://doi.org/10.1111/gcb.16220)

Provided by University of Reading

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