

Reports identify areas where wildlife can survive in a changing climate

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A High Brown Fritillary butterfly (*Argynnis adippe*) basks in the sun.
Credit Philip Corley

The University of Exeter has worked with Natural England on a project that helps to target conservation action. Two reports from the study highlight how future conservation management should identify climate change 'refugia'. These are localised areas like hills, valleys, moors and mountains, with specific environmental conditions that could allow wildlife to survive, despite climate change making the surrounding areas less suitable.

['Climate change refugia for the flora and fauna of England'](#) describes and maps the location of these sites in existence today. ['Palaeoecological evidence to inform identification of potential climatic change refugia and areas for ecological restoration'](#) considers how data on past

environmental change, from peat bogs and lake sediments, can help us understand where refugia have been present in the landscape since the last Ice Age.

Together, the reports identify areas which are vulnerable to climate change and those areas which are more climatically stable and so offer protection to wildlife, making them a priority for [conservation efforts](#).

Areas were pinpointed by modelling the survival and extinction of over 1,000 species that had reduced their range over the past four decades, against the [environmental conditions](#) found on localised areas like slopes and valleys, thought likely to moderate the effects of a changing climate.

The results indicated that local extinctions have been higher in parts of England that have experienced greater climatic change in recent decades.

The studies also showed that local landscapes which influence the microclimate have provided a buffer against broader scale climatic changes, and enhance the survival of many species in these areas. They prove that the concept of refugia, a well-established feature of the last Ice Age is also relevant to a warming climate.

Different types of species were sensitive to different aspects of the environment. Plant persistence reduced in regions with greater summer warming, but this was moderated by variability in landform: slope, aspect and elevation. Beetles were affected by changes in rainfall and variability in moisture levels, while persistence in other invertebrate groups such as butterflies and moths, showed stronger relationships with changes in summer temperature, modified by variations in the landscape.

The report also demonstrates the effectiveness of protected sites such as Sites of Special Scientific Interest (SSSI) as refugia.

Dr Mike Morecroft, Natural England Principal Specialist for Climate Change said: "We are building up a picture of where species are most likely to be able to persist under [climate change](#). This is a good example of how science can help us to target our conservation efforts to best effect."

Dr Andrew Suggitt, from the University of Exeter's Environment and Sustainability Institute at the University of Exeter's Penryn Campus in Cornwall, said: "Climate change is already having a noticeable impact on our wildlife, and for many of these plants and animals, the future impact of rising temperatures is likely to be negative. Our research identifies the locations- known as 'refugia'- which have buffered species from adverse changes in climate, and we hope this will be useful for wildlife conservation efforts."

The models of species persistence have been used to provide maps of potential refugia in England, which will now be used to inform Natural England's work.

The reports can be found on Natural England's publications [website](#).

Provided by University of Exeter

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