

UK butterfly populations threatened by extreme drought and landscape fragmentation

November 1 2012



This is a Ringlet butterfly. Credit: Ross Newham

A new study has found that the sensitivity and recovery of UK butterfly populations to extreme drought is affected by the overall area and degree of fragmentation of key habitat types in the landscape.

The analysis, published this week in the scientific journal *Ecography*, used data on the Ringlet butterfly collected from 79 UK Butterfly Monitoring Scheme sites between 1990 and 1999, a period which spanned a severe drought event in 1995.

The study was led by Dr Tom Oliver from the NERC Centre for Ecology & Hydrology (CEH) in collaboration with colleagues from CEH and the charity Butterfly Conservation.

Lead author Dr Tom Oliver from the NERC Centre for Ecology & Hydrology said, "Most ecological climate change studies focus on [species](#)' responses to gradual temperature rise, but it may be that extreme weather will actually have the greatest impact on our wildlife. We have provided the first evidence that species responses to extreme events may be affected by the habitat structure in the wider countryside; for example in the total area and [fragmentation](#) (i.e. isolation) of woodland patches."

The UK has suffered from a number of severe droughts over the last few decades (e.g. 1976, 1995). Under global warming, the frequency of such summer droughts is expected to increase. The intense summer drought in 1995 led to marked declines in insect species associated with cooler and wetter microclimates and scientists are interested in how to make species populations more resilient, i.e. more resistant to and more able to recover from these extreme climate events.



This is a Ringlet butterfly. Credit: Ross Newham

The Ringlet *Aphantopus hyperantus* is a grass-feeding butterfly commonly found close to woodland edges and known to be susceptible to drought effects. The researchers found that, following the 1995 drought, Ringlet populations not only crashed most severely in drier regions but, additionally, the habitat structure in the wider countryside around sites influenced population responses. Larger and more connected patches of woodland habitat reduced population sensitivity to the drought event and also facilitated faster recovery.

Co-author Dr Tom Brereton from Butterfly Conservation said, "Our results suggest that [landscape](#)-scale conservation projects are vital in helping species to recover from extreme events expected under climate change. However, conversely, if we do nothing, the high levels of habitat fragmentation will mean species are more susceptible."

Although many Ringlet populations did show some recovery following 1995-1996 population crashes, the long-term situation of the species in some parts of the UK is worrying. The researchers found that 18% of Ringlet butterfly populations continued to decline in the subsequent three years. The majority of populations showed positive recovery, although only 33% of populations showed complete recovery to pre-drought population levels within three years.

Co-author Dr David Roy from the NERC Centre for Ecology & Hydrology added, "The delayed recovery of [butterfly populations](#) is worrying given that severe summer droughts are expected to become common in some areas of the UK, for example, South East England. If populations don't recover by the time the next [drought](#) hits, they may face gradual erosion until local extinction."

Provided by Centre for Ecology & Hydrology

Citation: UK butterfly populations threatened by extreme drought and landscape fragmentation (2012, November 1) retrieved 25 April 2024 from <https://phys.org/news/2012-11-uk-butterfly-populations-threatened-extreme.html>

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