

Will roe deer persist? Climate change spells disaster for species unable to keep up

April 1 2014

As the climate continues to change, it's unclear to what extent different species will be able to keep pace with altered temperatures and shifted seasons. Living organisms are the survivors of previous environmental changes and might therefore be expected to adapt, but are there limits?

According to research to be published in the Open Access journal *PLOS Biology* on April 1, some [species](#) may be much less able to cope with the effects of [climate change](#) than previously thought. The study, by Floriane Plard, Jean-Michel Gaillard, Christophe Bonenfant and colleagues, looked at a unique long-term dataset on a population of [roe deer](#) in France's Champagne region. They found that this species has failed to adapt to the increasingly earlier arrival of spring, and young are still being born at the same time as they were 27 years ago. The authors show that this has reduced the survival rate of the fawns and could spell disaster for this species and others, as climate change advances.

As the climate changes, it has been widely presumed that many species will adapt with it; either through short-term 'plastic' shifts (for example giving birth earlier in response to environmental cues) or long-term evolutionary adaptations. This has been shown to be the case with some species, for example amongst birds, but data is lacking for other groups. Long-term datasets like the one used in this study can provide invaluable insights.

For roe deer to be successful, the timing of the appearance of spring vegetation must coincide with the time when females are preparing to

give birth, to provide nutrition for the milk they will supply to their fawns. Plard and colleagues found that although spring had shifted earlier by two weeks between 1985 and 2011, the timing of birth of fawns had not changed significantly in the same period. This leaves a mismatch, and the failure of the deer to adjust the timing of their reproductive cycle was associated with reduced survival of the fawns and a general downward trend in the growth of the deer population as a whole.

Some birds, such as great tits, have been found to keep up with climate change because their reproduction is cued by temperature, as is their food source. In the case of roe deer, however, it seems that the principal reproductive pacemaker is day-length, a parameter that isn't affected by the warmer spring. Thus a direct consequence of climate change is that an increasing mismatch with a crucial food supply is threatening the survival of a commercially important long-lived mammal in a European country.

We are only just beginning to understand how human activities are affecting the climate, and how in turn those changes will impact biodiversity. The emerging picture is a complex one, but this study provides a sombre warning that not all species should be expected to adapt to changing climates, including species such as roe deer that are (or once were) common and play an important functional role in the ecosystem.

More information: Plard F, Gaillard J-M, Coulson T, Hewison AJM, Delorme D, et al. (2014) Mismatch Between Birth Date and Vegetation Phenology Slows the Demography of Roe Deer. PLoS Biol 12(4): e1001828. [DOI: 10.1371/journal.pbio.1001828](https://doi.org/10.1371/journal.pbio.1001828)

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