



Evidence of both phenological and range shifts in birds in response to increasing temperature in Ireland

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It is well established that the timing of arrival of long-distance migrant birds in spring is advancing throughout Europe and that this response is, at least in part, due to an increase in temperature in line with current global warming. In Ireland, we have seen a number of sub-Saharan species, such as, barn swallow (*Hirundo rustica*), northern wheatear (*Oenanthe oenanthe*) and sand martin (*Riparia riparia*) advance their arrival time over a 31-year period. In addition, a medium-distance winter migrant, the whooper swan (*Cygnus cygnus*), has significantly advanced its spring departure time from its wintering ground in Ireland. Furthermore, a number of species, such as the little egret (*Egretta garzetta*), more typically associated with a warmer climate than Ireland, was considered to be a 'rare visitor' up to 1990 and has now begun to breed and to establish a population on the island. All of these phenological and range shifts have been correlated with various temperature variables. The consequences of early arrival at wintering and breeding grounds could result in increased fitness but only if an appropriate food resource is in adequate supply at the new earlier time. If temperatures continue to rise as predicted, the status of some bird species in Ireland may change from 'rare' to 'common' or from 'visitor' to 'resident' with a possible concurrent increase in population size. Equally, the opposite trend may occur, for birds that prefer cold temperatures, whereby we may see a decrease in population size followed by the loss of certain species.