The State of Britain's Dormice 2016

people's trust for endangered species

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Hazel dormice aren't the charasmatic megafauna, or giants, that capture public attention in conservation. But at about the same size as wood mice, golden-coloured with large, black eyes and a furred tail, their good looks have an undeniable appeal.

Dormice are found predominantly in established, semi-natural, traditionally managed woodland and are a flagship-species for that habitat and wider conservation efforts. However, a long-term decline in their numbers in England and Wales continues across their range. National monitoring shows the population has fallen by a third since the end of 20th century.

Native dormice (*Muscardinus avellanarius*) are largely arboreal, occupying overgrown, species-rich hedgerows or mixed deciduous forest, moving between the shrub layer, understorey and canopy. Although associated with broad-leaved woodland, dormice are also found in conifer plantations and coastal scrub. They're typically active from April to October, hibernating the rest of the year on the ground. The species' popular name is the hazel or common dormouse, to distinguish it from the fat or edible dormouse (*Glis glis*), which was introduced into England in 1902, but today hazel dormice are far from common.

Historic and current status

Dormouse numbers in Britain declined during the 20th century. Writing as early as 1905, one author noted: 'in Middlesex the dormouse is now scarce: it was formerly common,' and an article in *Country Life*, in 1945, remarked that dormice were less commonly encountered than in 1930. It's thought that their range has shrunk by around a half in the last hundred years. In 1885, dormice were present in 49 English counties; today, they're known in 32 (excluding those counties where they have been reintroduced—Figure 2), almost entirely south of a line between Shropshire and Suffolk, with the exception of remnant and reintroduced populations. The species' currently known northern limit in Britain is a single population in the limestone woodlands around Morecombe Bay to the south of the Lake District National Park. There has been no recent evidence of the population at Staward Gorge,

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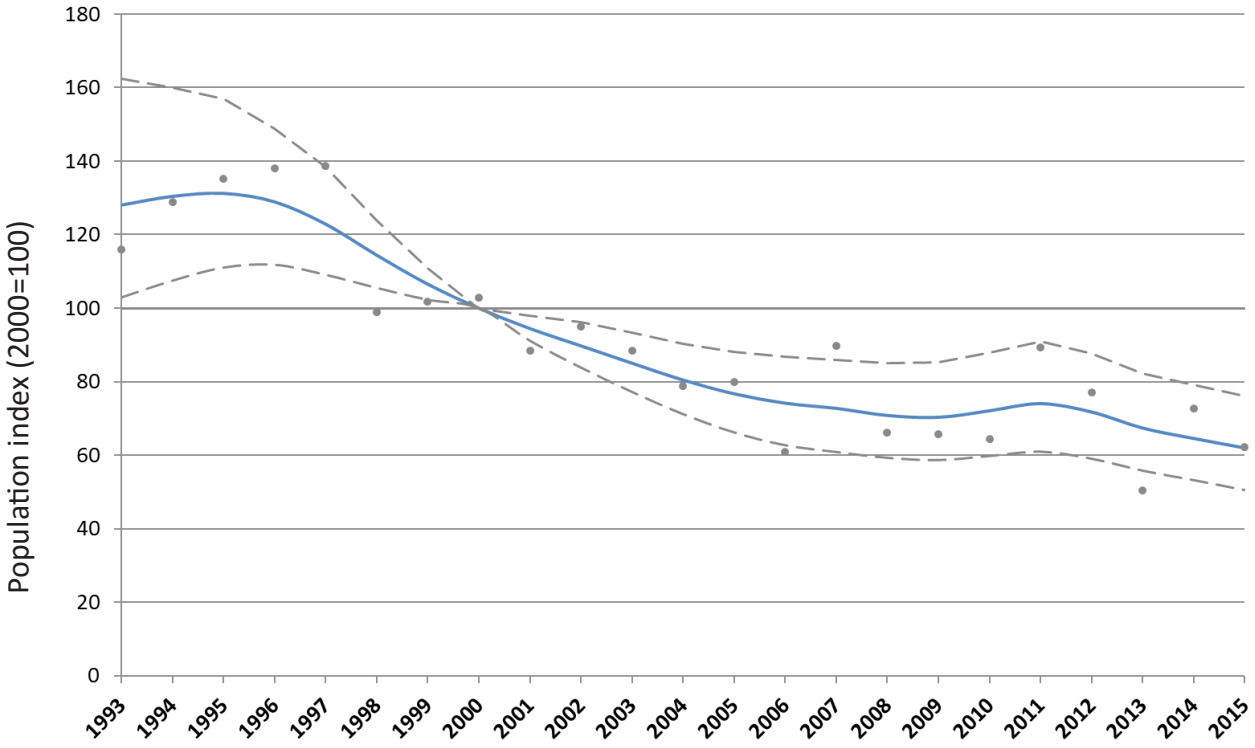

Figure 1 The population change recorded at NDMP sites between 1993 and 2015. Annual values (circles) are estimated relative to that in 2000, which is given a value (or 'index') of 100. The underlying trend, smoothing out fluctuations, is shown by the solid line. Statistical confidence limits are shown by broken lines. See box to the left.

National Dormouse Monitoring Programme (NDMP) analysis

The population index (Fig. 1) is estimated from peak counts of adult dormice in either May or June at sites with a minimum of 20 nest boxes, surveyed in five or more years, and excludes reintroduction sites. Annual values (circles) and a smoothed trend (solid line) are estimated using a Generalised Additive Model, taking 2000 as the base year (=100); 95% confidence limits are shown by broken lines.

The NDMP has grown markedly (Fig. 3). The number of sites contributing data each year varies from 27 in 1993 to 206 in 2011, with over 80 sites each year since 2000. The analysis adjusts for the different number of boxes at sites. The highest count from site visits in either May or June is taken as an indication of the size of the pre-breeding (adult) population. Adults, juveniles and offspring that have not yet been weaned are identified separately, but older juveniles, later in the year, can be mistaken for the previous year's adults. Using May and June counts avoids potential confusion.

Counts of dormice since the mid-1990s show a steady decline (Fig. 1). Since 1993, the smoothed index of counts has halved and fallen by over a third (38%) since 2000. The current rate of decline, since 2000, is equivalent to a fall of 55% over 25 years.

further north, suggesting their range may still be contracting. Even in counties where they are widespread, hazel dormice have a very patchy distribution across poorly connected sites.

Hazel dormice are absent from Ireland and Scotland, and widespread in continental Europe, from the Mediterranean to southern Sweden, and eastward to Russia. They're a priority species of conservation concern, protected under national and European legislation, but classified as 'Least Concern' on the IUCN Red List.

Population monitoring

Dormice are small, nocturnal and arboreal, which makes

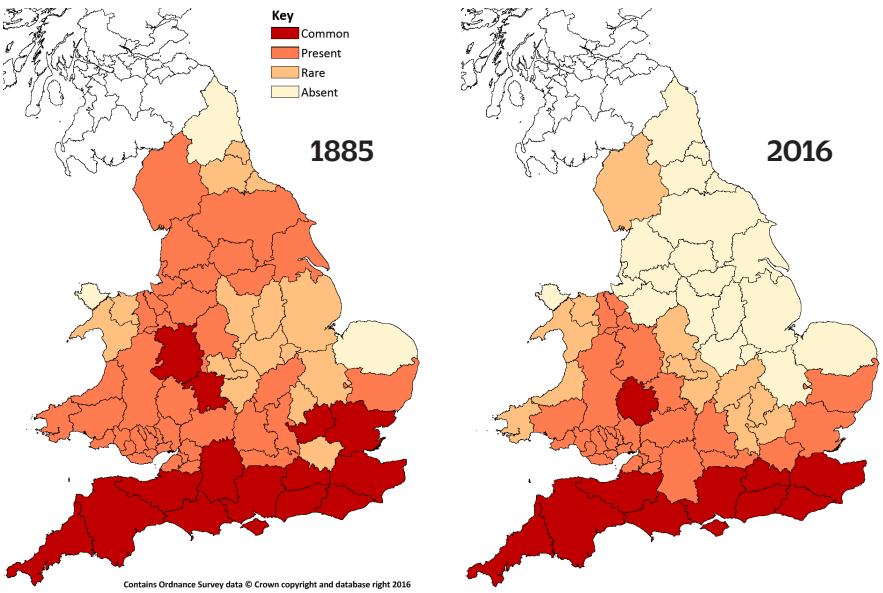

Figure 2 The geographical range of dormice in Britain has shrunk since the 19th century. Distribution in 1885 (described by G. T. Rope), left; current distribution, right.

encountering them often a matter of luck. They do, however, readily use existing bird boxes and the design of a nest box specifically for dormice by Doug Woods in the 1980s has enabled systematic monitoring of the population at sites across the country since the early 1990s. This work forms the basis of the National Dormouse Monitoring Programme (NDMP), described on the previous page.

Recording dormice

Great Nut Hunt

To date, three Great Nut Hunts have taken place (1993, 2001 and 2009-11), the last, marking the 21st anniversary of the NDMP. These built on work by Elaine Hurrell and others from 1975-79 that formed the Mammal Society's dormouse survey.

National Dormouse Monitoring Programme and National Dormouse Database

In 1988, Paul Bright, a graduate student under the supervision of Dr Pat Morris at Royal Holloway, University of London, set up nest boxes at five 'key sites' with the aim of monitoring dormouse numbers and breeding success. Bright and Morris subsequently recruited volunteers to monitor additional locations, including the then most northerly known population, in Northumberland, and by 1992 a network of 24 sites in ten counties was in place. The 'National Key Site Monitoring Scheme' developed into the NDMP which is now the longest-running annual, terrestrial, small mammal monitoring project in the world. Around 600 sites have contributed data and, since 2011, over 300 have submitted records annually. Almost one site in ten has been monitored for at least half the lifetime of the NDMP.

Why are dormice becoming scarcer?

Loss and fragmentation of habitat – the loss of woodland cover since the early 20th century and the removal of hedgerows as farming intensified after 1945, have reduced the extent of available habitat. Remaining patches of habitat are increasingly isolated, restricting movement between populations and increasing the risk that individual populations become extinct.

Changes in woodland and hedgerow management – traditional coppicing and selective felling are now much rarer than they were. As a result, woodland is less structurally diverse, with fewer open spaces and less new growth of understorey that provides food and nesting sites for dormice. Flail cutting hedgerows, too, leaves less suitable and available habitat.

Traditional coppicing of trees such as hazel, sweet chestnut and hornbeam as part of woodland management maintains new growth and the woody understorey that dormice need. As these practices have declined, so has the quality of habitat for dormice.

A changing climate and unpredictable weather – poor weather adversely affects foraging and breeding success, as well as winter survival rates. Hazel dormice hibernate over winter. During the rest of the year, when they are active, they undergo periods of 'torpor' if the weather is bad (dormouse fur is not very waterproof and they will avoid rain). This sensitivity to weather conditions suggests climate change – with warmer, wetter seasons and more extreme weather events – is likely to affect dormouse populations. How it does so, however, will depend on the type of habitat.

In oak woodland dormice tend to breed in spring and early summer, when food is available, and they benefit from warm, dry summers. In hazel woodlands, however, food is more plentiful in autumn and dormice tend to breed later than they do in oak forest. In this case, dormice benefit from cold, dry autumns, which provide ideal foraging conditions and may prolong the time that food is available.

At individual sites in the NDMP, some of these issues will be significant and others will not: they identify the broad threats to dormice nationally. Management practices at NDMP sites are often sympathetic to dormice populations but there is little or no management at some. The threats facing dormice and the efforts needed to preserve populations depend on the location and characteristics of particular sites.

Monitoring at sites is undertaken by trained and licenced volunteers, inspecting nest boxes at a site at least twice each year (in May or June and September or October), but often more or less monthly during the period.

In 1999, the management of the NDMP was taken over by PTES and the survey was put online in 2009, allowing monitors to submit and view data for individual sites. Ian White and Susan Sharafi oversee recording and the database, which currently stands at 100,000 records. The website also holds incidental records of dormice in the National Dormouse

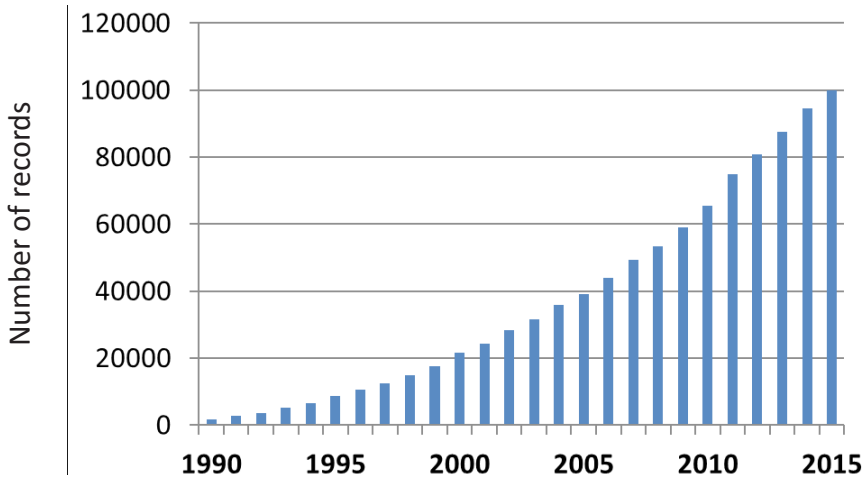

Figure 3 Growth of the NDMP: the total number of dormouse records between 1990 and 2015.

Database (NDD), originally the Dormouse Inventory, set up by Dr Tony Mitchell-Jones at Natural England. NDD records, together with those from the NDMP, are made available through the National Biodiversity Network (NBN) Gateway.

As well as counts, the NDMP represents a wealth of biometric and other data. Fittingly, the first analysis of this dataset was by Paul Bright's own graduate student, Fiona Sanderson, who looked at the effects of weather and habitat on dormouse abundance, using data from 1991 to 2002. Her analysis showed that cold, dry winters, and warm springs boost numbers of dormice in subsequent years, while hot summers are associated with a greater survival of offspring. The effect, however, is dependent on the type of habitat: warm springs and hot summers benefit populations only where tree species provide food early in the breeding season, such as oak, which supports large numbers of insects.

Breeding success is susceptible to cold, wet weather at peak breeding times. Our climate is changing, with wetter springs and hotter summers forecast. The effect on dormice populations remains to be seen.

The NDMP has also been used in other studies, including work by the Disease Dynamics Unit of Cambridge University's Department of Veterinary Medicine (looking at disease and seasonal breeding) and two studies by the Centre for Ecology and Hydrology at Lancaster Environment Centre (looking at changing phenology).

The state of Britain's dormice remains precarious: the population decline apparent at monitored sites continues and a changing climate makes their future uncertain. The pressing need for conservation action, and the form that action might take, have become clear through the work described here, by professionals, volunteers and students alike, and the NDMP is testament to a remarkable collaboration.

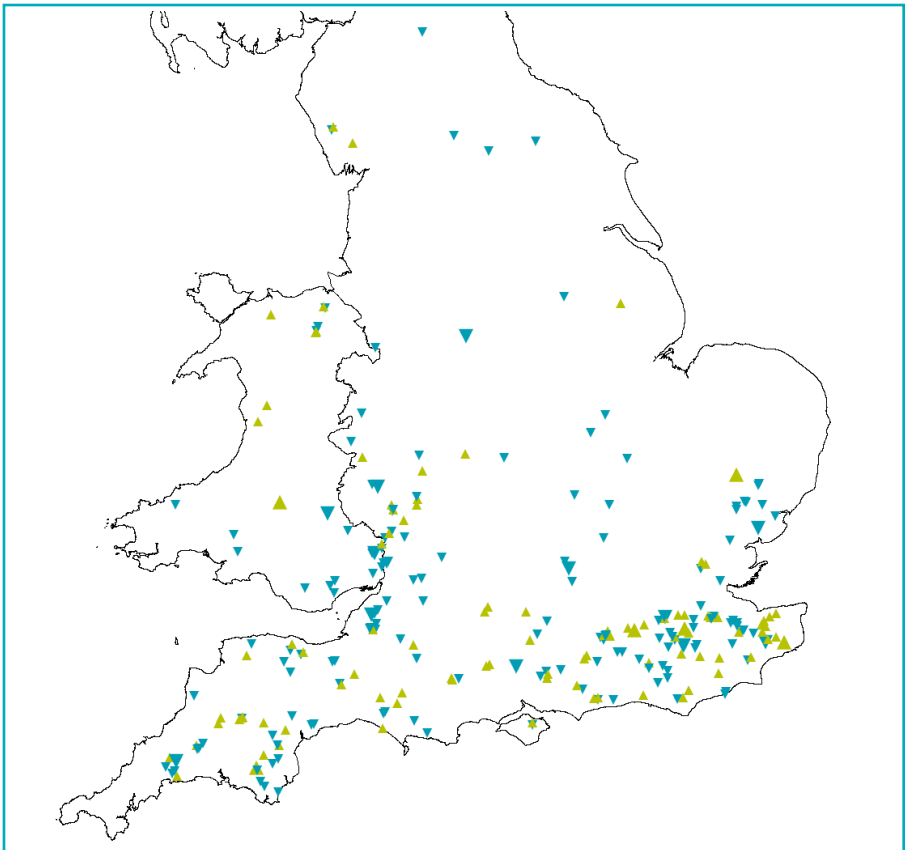

Figure 4 The change in population index measured in the NDMP differs between sites. Sites with five or more years' data are shown above in blue or green to indicate a decrease or increase respectively. The size of the change is shown by a small or large triangle.

Reintroductions

In 1993, the Common Dormouse Captive Breeders Group was set up to provide animals for release. The first reintroduction of captive-bred dormice into the wild took place in Cambridgeshire, the same year, as part of the Species Recovery Plan. The release and follow-up study, supported by the Nature Conservancy Council, were organised by Pat Morris and Paul Bright, alongside the captive breeders group, including Doug Woods, and were achieved with the help of numerous volunteers.

To date, 26 reintroductions have taken place in 12 counties. At five of these release sites, the introduced population has died out. At the others, populations have achieved varying criteria of success, such as breeding or dispersing beyond the site to new areas.

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