



# Bats Species Action Plan

## 1. Introduction

Bat species in the UK are nocturnal mammals, all of which prey exclusively on insects. These highly adaptable mammals occur throughout Worcestershire, and readily exploit both man-made and semi-natural habitats. All species of bat in the UK are protected by both UK and European legislation. This Species Action Plan is a combined plan for all the bat species that occur in Worcestershire (table 1).

The following species occurring in Worcestershire were listed as UK BAP priority species and subsequently in Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006: barbastelle; Bechstein's; noctule; soprano pipistrelle; brown long-eared; lesser horseshoe; greater horseshoe.

## 2. Current Status

### 2.1 Ecology and habitat requirements

Bats are highly evolved, long-lived (up to 30 years in the wild) sociable mammals, and are well adapted to the UK's climate and its range of habitats. All UK bat species have evolved as nocturnal feeders. This strategy enables them to avoid competing for food resources with other species such as birds and allows them to avoid many potential predators.

Contrary to popular myth, bats are not blind and have excellent low-level light eyesight. However, in order to hunt effectively at night, bats have evolved a sophisticated biosonar system called 'echo-location'. This system allows bats to build up a 'sound image' of their immediate environment using a series of high-pitched ultra-sonic calls inaudible to the human ear. The bat analyses the returning echoes and uses this information to navigate, avoid collisions and locate its prey. So highly developed is this system that bats can detect and prey upon even small flying insects in total darkness.

In order to cope with scarce food supply and cold temperatures, bats have evolved the ability to enter a state known as 'torpor'. In order to go into torpor, bats lower their metabolic rate and body temperature to that of their surroundings to reduce energy consumption. Periods of extended torpor are known as hibernation and bats can spend most of the winter months in this state, only waking to drink and feed on mild nights. This strategy can also be employed in the summer months in prolonged periods of poor weather.

Mating generally occurs in autumn, sometimes continuing into the winter months (weather dependant), but the female bat does not become pregnant until spring, post hibernation. After mating, the female stores the sperm until conditions become favourable, at which point an egg is released and is fertilised. In the UK female bats generally have one pup born between June and early August. The pup's growth is rapid and they will be weaned, able to fly and feed for themselves about 45-65 days after birth (Altringham, 2003). While adult males tend to spend the summer alone or in small groups, females tend to form larger maternity colonies. These can range in size from 10-200 individuals; although in some species can be many times that. Despite the differences in roost choice from

species to species their basic requirements are the same. The roost must provide the required micro-climate to enable the bats to minimise energy loss through body temperature regulation and to successfully rear their young. The roost must also be close to suitable foraging habitats and provide protection from potential predators.

**Table 1: Bat species occurring in Worcestershire**

Species	Status in Worcestershire
Barbastelle <i>Barbastella barbastellus</i>	Rare
Bechstein's bat <i>Myotis Bechsteinii</i>	Very rare.
Brandt's bat <i>Myotis brandti</i>	Very rare.
Brown long-eared bat <i>Plecotus auritus</i>	Widespread, common.
Daubenton's bat <i>Myotis daubentonii</i>	Widespread.
Leisler's bat <i>Nyctalus leisleri</i>	Uncommon.
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	Locally common
Greater horseshoe bat <i>Rhinolophus ferrumequinum</i>	Very rare
Natterer's bat <i>Myotis nattereri</i>	Uncommon
Noctule bat <i>Nyctalus noctula</i>	Widespread
Serotine <i>Eptesicus serotinus</i>	Rare
Common pipistrelle <i>Pipistrellus pipistrellus</i>	Widespread, common
Soprano pipistrelle <i>Pipistrellus pymaeus</i>	Widespread, common
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	Rare
Whiskered bat <i>Myotis mystacinus</i>	Uncommon, widespread.
Alcathoe bat <i>Myotis alcathoe</i>	Unknown

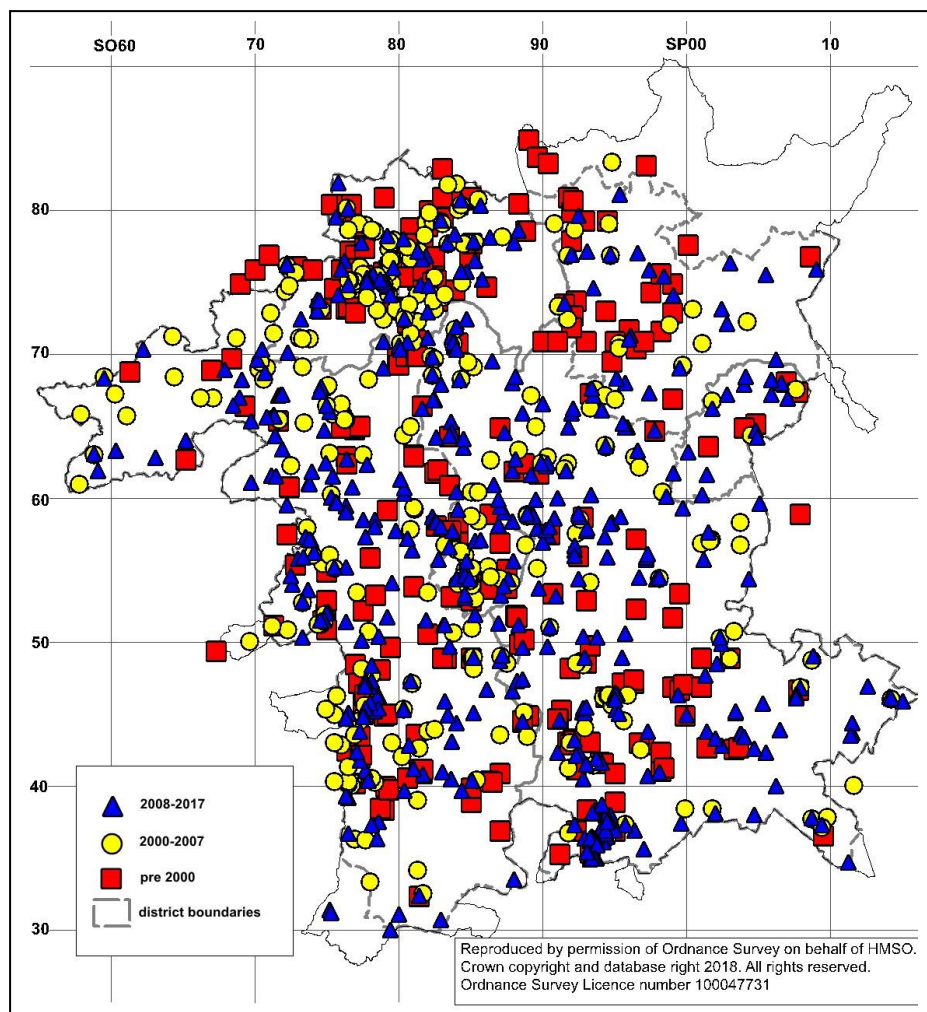
## 2.2 Population and distribution

We have insufficient data on most bat species in Worcestershire to calculate long-term population trends. 16 of the 18 bat species occurring in the UK (table 1) have been recorded in the county. However, only three species, common pipistrelle, soprano pipistrelle and brown long-eared bats are considered to be common. Figure 1 shows the current combined distribution of all of Worcestershire's bat species, and indicates that bats are widespread throughout the county. However, all bat species are generally under-recorded and therefore current records cannot be relied upon to represent their true range and distribution. Until a more co-ordinated and systematic countywide survey is undertaken, bat distribution in Worcestershire will not be fully understood.

Some bat species such as Brandt's, whiskered and Alcathoe have very similar physical characteristics and echo-location calls. These similarities make it very difficult to distinguish between the species, either in the hand or through sound analysis, which can lead to misidentification. Knowledge of species diversity and distribution has benefitted greatly from technological advances, reduced cost of bat detectors and recording devices and an increase in recording effort. More common use of cheaper time-expansion and automated/static bat detectors and wider use of DNA analysis have resulted in larger volumes of data of better

species resolution. Alcathoe was confirmed within the county in 2011 through the DNA analysis of droppings.

The National Bat Monitoring Programme Annual report (2016) and State of the UK's Bats report (2017) both indicate stable or positive trends for most bat species, albeit with data returned from certain survey types requiring more cautious interpretation (e.g. the effect of roost switching exhibited by some species including pipistrelle may potentially skew results). In this context, recordings indicating modest but important range extensions of species such as greater and lesser horseshoe bats have been notable within the county over the previous decade.



**Figure 1. Records of bats (all species shown) in Worcestershire. Data supplied and map prepared by Worcestershire Biological Records Centre.**

### 2.3 Legislation

All species of bat in the UK are protected by European and national legislation (table 2). This legislation protects the breeding site/resting place of bats from destruction or obstruction (even if they are not occupying it at the time) and the animals themselves (or any part thereof). It also protects them against deliberate disturbance, injury, capture, possessing, selling and killing. In order to avoid legal

offences, any activities that would result in any of the above actions would need to be carried out under licence from Natural England.

**Table 2: Legislation protecting bats in Europe and England.**

European	National
<ul style="list-style-type: none"> <li>• The Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1982)</li> <li>• Agreement on the Conservation of Bats in Europe (1992) (Under the Bonn Convention on the Conservation of Migratory Species of Wild Animals)</li> <li>• EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora. (1992)</li> </ul>	<ul style="list-style-type: none"> <li>• Wildlife and Countryside Act 1981 (as amended)</li> <li>• The Conservation (Natural Habitats, &amp;c.) Regulations (1994) (as amended).</li> <li>• The Countryside and Rights of Way Act 2000 (as amended).</li> <li>• Natural Environment and Rural Communities (NERC) Act 2006, (places a duty on public bodies to have regard for biodiversity and lists certain species as being of 'Principal Importance' in England)</li> <li>• Proceeds of Crime Act (2002).</li> </ul>

## 2.4 Summary of important sites in Worcestershire

Apart from a few significant roost sites, relatively little is known about where sites of county importance for bats are located within Worcestershire. However, these are likely to be characterised by large areas of semi natural habitat, well-connected mosaics of smaller areas of semi-natural habitats or a mixture of both. Such areas tend to contain diverse invertebrate-rich foraging habitats, a strong wildlife corridor network linking foraging habitats and roosting sites and a range of roosting habitat suitable for both summer, transitional (spring and autumn) and winter use.

By contrast, poor quality habitats for bats include areas of intensively managed agricultural land with few trees and hedgerows and limited semi-natural habitat.

### Wyre Forest

The Wyre Forest is one of the largest areas of woodland in Britain covering 2,636ha. Virtually half of this vast area is ancient semi-natural woodland (ASNW) and half Plantation on Ancient Woodland Site (PAWS). The Wyre Forest is nationally important and most of it is designated as a National Nature Reserve (NNR), Site of Special Scientific Interest (SSSI) or Local Wildlife Site (LWS). As well as woodland, the Wyre holds a mosaic of other semi-natural habitats including valuable areas of heathland, unimproved/semi-improved species-rich grasslands (acid and mesotrophic), traditional orchards and wetland.

### Worcester-Martley-Great Witley

The countryside north west of Worcester, centred on the parishes of Kenswick and Wichenford, Martley, Great Witley and Little Witley, is considered to be an area of high importance for bats. This area was highlighted during Worcestershire County Council's development of ecological profiles for the county Landscape Character Assessment.

The area holds a very significant ASNW resource and has a high number of very small ASNW, many of which are too small (<2ha) to appear on the Ancient Woodland Inventory. The area also has a high veteran tree resource associated with ancient woodland, wood pasture and a relatively intact ancient hedgerow system. The area also holds excellent foraging habitat including many traditional orchards, areas of unimproved/semi-improved species-rich grasslands and biologically rich road verges, all of which connect via the ancient hedgerow network.

### **Teme Valley**

The Teme Valley contains significant areas of ASNW. These tend to be associated with dingle woodlands and incised stream valleys, which contain species-rich wetland habitats. The Teme Valley also contains significant areas of traditional orchard and old grassland. Many of these habitats are connected via a strong network of wildlife corridors associated with ancient hedgerows and the road verge and public right of way networks. This rich mosaic of well-connected habitats makes the Teme Valley a particularly important area for bats.

### **Malvern Hills**

The Malvern Hills is an area of old countryside that contains large areas of semi-natural habitats and has a strong well connected wildlife corridor network. There are significant areas of ASNW flanking the hills and the rich geodiversity of the area has created a mix of woodland types. On the hills themselves there is moderate woodland cover, in large part due to recent natural regeneration.

The Malvern Hills hold large areas of nationally significant unimproved grassland communities. The majority of this grassland is acidic with locally dominant areas of bracken. However, the diverse geology of the area has given rise to areas of calcareous and mesotrophic grassland types. As well as grassland and woodland, the Malvern Hills and the surrounding landscape also contain areas of heathland, wetland and traditional orchards. The area also contains many ancient species-rich hedgerows and veteran trees often associated with the road verge and public right of way networks. Many of these species-rich hedgerows were derived from woodlands, often representing original woodland boundaries. Amongst other bat species, this area is known to support important populations of lesser horseshoe and barbastelle bats. Bechstein's bats have also been recorded.

### **Forest of Feckenham**

The Forest of Feckenham area boasts good-to-high coverage of ancient woodland, unimproved meadows and pastures including calcareous grassland and MG5 meadows, good coverage of traditional orchards and remnant orchards, parkland, good open water networks and wetland. The area is important for a diversity of bat species including breeding colonies of Bechstein's bat.

## **3. Current factors affecting bat species in Worcestershire**

### **Loss of corridor habitat**

Bat species in the UK have adapted to foraging in a complex landscape, within a mosaic of habitats (woodland, grassland, open/running water, hedgerows and scrub) rich in invertebrates. Within the landscape bats use linear habitats such as hedgerows and watercourses to navigate through the countryside from their roost sites to suitably insect-rich foraging habitats. However, during the second half of

the 20<sup>th</sup> century this type of high quality corridor habitat became increasingly rare and fragmented within the county, and the UK as a whole. With the push to improve agricultural productivity hedgerow removal was a common practice.. Of the hedgerows that remain, many have become degraded, defunct and sterile through a process of over-cutting, spray drift and close ploughing.

Like hedgerows, watercourses have also been affected by agricultural intensification, suffering through a combination of diffuse agricultural pollution and bank modification. This has led to a reduction in vegetation structure and diversity and a general reduction in invertebrate abundance and diversity.

Lighting from poorly designed development has been shown to have an adverse impact on a range of flora and fauna including bats, with light intolerant species being significantly affected both directly, through inappropriate illumination of roosts and roost access, and indirectly, through severance of linear features and denuded foraging opportunities. Whilst research indicates lighting has less significant effects on 'hawking' species such as pipistrelles, the impacts on 'gleaning' species such as horseshoes and many *Myotis* species can be significant and lead to roost abandonment or modification or loss of home ranges.

As a consequence of bats' dependence on corridor habitat for navigation, its removal can have a significant negative effect. When these flight-lines are removed, either in a single event or over a long period of unsympathetic management, it has the effect of isolating bat colonies away from suitable food sources. This process of habitat fragmentation and isolation has led to serious declines in local bat populations, most significantly affecting the more specialist and light intolerant species.

### **Loss of insect-rich habitats**

Habitat modification/simplification has occurred across much of Worcestershire's semi-natural habitat and in turn has had a negative impact on bat populations/species distribution in the county. Many of Worcestershire's past ancient woodland sites have been clear felled and either replaced by intensive farmland or by non-native coniferous plantations. These plantations are typically a monoculture of non-native species and are therefore unable to offer the roosting habitat associated with old/veteran trees, or to support the rich invertebrate assemblages that its broadleaf predecessor did.

Grasslands have suffered a similar fate; many unimproved grasslands rich in flora and fauna have been ploughed-up either for arable use, or to be re-seeded with more productive and less diverse grass species. Of the remaining unploughed grasslands many have been agriculturally improved through a combination of overgrazing, agrichemical application or scrubbing up. This change in management intensity has drastically reduced the biological diversity of many grassland sites and in turn their suitability as quality bat foraging habitat. Notably, the abundance of night-flying insects – bats' principal prey – is now substantially lower than during the mid-twentieth century as a consequence of agricultural intensification.

### **Loss of summer roost sites**

High-quality roost sites are as important to bats as high-quality foraging habitat. Bats roost in a wide range of habitats and structures and these differ from

species to species, reproductive condition and the time of year. Potential roost sites can include beneath bark and inside tree hollows, barns, churches, bridges, old and new buildings of all types, and in many cases people's homes. Bats continue to suffer from poor public relations, particularly when roosting in the home, and as a result bats can suffer from persecution.

Whether it is intentional or through ignorance, many bat roosts have been destroyed or sealed up during demolition and/or renovation works. The re-use of agricultural buildings for residential purposes is another factor affecting bat roosts. The increase in barn conversions has almost certainly had a negative impact on some bat species. Whilst some of these developments do take protected species into account there are still many that do not. Case law in the UK establishes that developments carried out under Permitted Development rights must still comply with the law regarding protected species.

The planning policy in place to protect bats can be inconsistently applied. A lack of expertise within planning authorities can make it difficult to ensure that bats are considered properly throughout the development process and in some cases failures within the system have almost certainly caused harm or loss to roost sites. Even when roosts are retained or new roost sites are created as compensation within a development, bats sometimes fail to return. A lack of mitigation monitoring means that the reasons for this are often not confirmed.

The application of highly toxic timber treatment chemicals to control wood-boring pests has also had a detrimental effect on bat roosts. Studies have shown that these chemicals are easily absorbed through the bat's skin and can be lethal. Although some of these chemicals have now been withdrawn from sale because of the danger they present to humans, many others are still in use and pose a direct threat to some bat species if used carelessly. There are now more bat-friendly timber treatments on the market but these tend to be more expensive, and can still poison bats if directly sprayed onto the animal.

Although many bat species have adapted to using man-made structures, some species like barbastelle and Bechstein's generally have not. These species rely on natural roost structures (splits, tears, holes) in damaged or veteran trees. However, during the last century very mature and veteran trees have decreased in number throughout the landscape due to a range of causes and it is no coincidence that bat species that rely on this habitat have also declined in number.

### **Loss of hibernation sites**

High quality and secure hibernation roosts are relatively rare and tend to attract high numbers of hibernating bats. As a result, the loss of a single roost site can have a significant negative impact on bat populations in a given area. Bat species that have in the past relied on natural underground structures such as caves have become well adapted to using man-made structures such as mines, disused railway tunnels, canal tunnels, cellars and ice houses. However, it is important that these sites remain secure to prevent disturbance and are maintained in a sympathetic manner so as not to inadvertently seal in bats or disturb them during maintenance work.

Bats are extremely vulnerable when hibernating and disturbance through factors such as tourism pressure (caving), deliberate vandalism or through curiosity can have severe consequences for the hibernating bats. Hibernating bats may take 30 minutes or more to arouse from torpor and escape from danger (Altringham, 2003). If bats are disturbed during the winter months and do arouse from torpor, then this will use up vital energy reserves which may prevent the disturbed bats surviving the winter.

#### **Installation of breathable membrane in roofs used by bats**

Breathable Roofing Membranes (BRMs) are installed in many buildings to allow the roof to breathe so that traditional ventilation is not required. Research shows that all non-woven roofing membranes, produced using spun-bond filaments, pose a serious threat to bats as a result of entanglement leading to injury and death.

#### **Risk of collision with wind turbines**

Wind turbines can have multiple effects upon bats, heat generated by nacelles is thought to attract insects which may in turn attract bats, some wind turbines may generate ultrasonic sound which could attract bats and inappropriately located turbines may physically obstruct linear connective features which may be regularly used by some bat species. Recent research has shown that inappropriately located wind turbines can increase bat mortality both through direct strike and barotrauma. Current Natural England guidance (TIN051) directs land managers to locate wind turbines away from known roosts and sensitive landscape features which are likely to be of value to bats. However, there is a lack of national and local research which evaluates the effectiveness of the planning system and permitted development regimes in minimising bat mortalities from micro (and larger) wind turbines.

## **4. Current Action**

### **4.1 Local Protection**

- Some of the known roosts of the rare Bechstein's bat are located within Worcestershire Wildlife Trust reserves, notably Grafton and Trench woods.
- Unit 11 of the Malvern Hills SSSI is a disused railway tunnel notified for its hibernating population of lesser horseshoe bats.

### **4.2 Site management and programmes of action**

- Bats are included within the management plans for some sites in conservation ownership e.g. Worcestershire Wildlife Trust reserves.

### **4.3 Survey, research and monitoring**

- Worcestershire Bat Group undertakes surveys, research, training and awareness raising programmes for members of the bat group and the public.
- The Bat Conservation Trust coordinates volunteer participation in numerous surveys as part of the National Bat Monitoring Programme, including field surveys, watercourse surveys, summer roost counts and hibernation counts. BCT also co-ordinate the network of Volunteer Bat Roost Visitors who provide advice and support to bat roost owners.



- Natural England carries out annual monitoring (including hibernation counts) of bats within the disused Colwall Railway Tunnel.
- In 2010-2011 Worcestershire Bat Group surveyed 23 woodlands as part of a national Bechstein's Bat Survey Project co-ordinated by the Bat Conservation Trust. The project aimed to establish baseline distribution data and information on habitat preferences. Prior to the start of the survey, there were no records of breeding female Bechstein's bats in Worcestershire. Twenty-three woodlands within the county were surveyed and a total of 160 bats caught comprising a minimum of 10 species. A total of 12 Bechstein's bats were caught in six woodlands: Grafton, Park, Oakley, Romer, Trench and Little Goosehill. Breeding females were caught in Grafton, Oakley, Trench and Romer.
- In 2012 Worcestershire Wildlife Trust commissioned a radio-tracking study to identify bat foraging areas and roost sites in and around Grafton Wood nature reserve. The information from the study enables WWT to adapt reserve management, such as creation and maintenance of woodland glades and open rides, which can negatively impact on the Bechstein's bat population, and undertake habitat enhancements for this species. The radio-tracking project was funded by a grant from People's Trust for Endangered Species and was carried out by a team of voluntary bat surveyors led by two professional ecologists.
- Data collected from bats in Grafton Wood in 2016 were included in a collaborative study by the Vincent Wildlife Trust and the University of Exeter that aimed to investigate size, structure and change in the British population of Bechstein's bats using a combination of molecular and landscape ecology approaches. A paper published by Wright *et al* (2018) concluded that high levels of diversity occurred across Britain and Europe, although diversity was lower in Britain.
- The 2017-2019 **Finding Rare Species in the Malvern's** project, a partnership between Worcestershire Biological Records Centre and the Malvern Hills AONB Partnership, is engaging with volunteers and landowners within the northern part of the AONB to collect data on some of the areas rarest wildlife, with lesser horseshoe bat being a target species.
- In 2004 the Vincent Wildlife Trust (VWT) installed 120 boxes of four different designs in the largely privately owned Tinkers Hill Wood in the Malvern Hills. The project aimed to improve understanding of barbastelle bats and was triggered by the first recording of this species in the wood in 2003. The VWT has continued to maintain and monitor the boxes and recently initiated a ringing study of barbastelles. At least nine bat species in addition to barbastelle have been recorded using the boxes.
- Worcestershire County Council is trialling street lighting of a 'high red' lighting recipe as manufactured by Phillips. Recent research undertaken in the Netherlands indicates this lighting recipe has a neutral effect on foraging and commuting activity of the light sensitive long-eared and horseshoe bat species.

## 5. Associated Plans

Woodland, Wet Woodland, Grassland, Lowland Heathland, Ancient and Veteran Trees, Hedgerows, Traditional Orchards, Rivers and Streams, Ponds and Lakes, Canals, Urban.

## 6. Conservation Aims

The status of all bat species found within Worcestershire has been maintained or improved.

## 7. Conservation Objectives

- Carry out regular research, surveys and submission of records to WBRC to continuously improve our knowledge and understanding of the distribution of bat species in Worcestershire
- Continue monitoring at key sites including Knapp and Papermill, Grafton Wood and Worcester Cathedral
- Complete icehouse audit and survey project
- Up to date bat species data informs all site management and land management decision-making by environmental professionals, landowners and local authorities
- Worcestershire Bat Group continues to train, coordinate and lead a network of volunteers within the county to collect and submit quality bat data to WBRC
- Worcestershire Bat Group to carry out public engagement and awareness raising activities
- Worcestershire Bat Group to create or refurbish at least one 'bat house' within the public realm

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