

KIRKBYMOORSIDE ALLOTMENT SITE – BAT SURVEY (2023)

SUMMARY

Static acoustic bat detectors were installed on the allotment site to measure bat activity. Detectors were placed on the north, east, south and west boundaries to see whether bat activity varied across the site. The survey was assisted by the North York Moors National Park Authority, who provided the bat detectors and the British Trust for Ornithology (BTO), whose 'Acoustic Pipeline' software was used to analyse the recordings.

SURVEY OVERVIEW

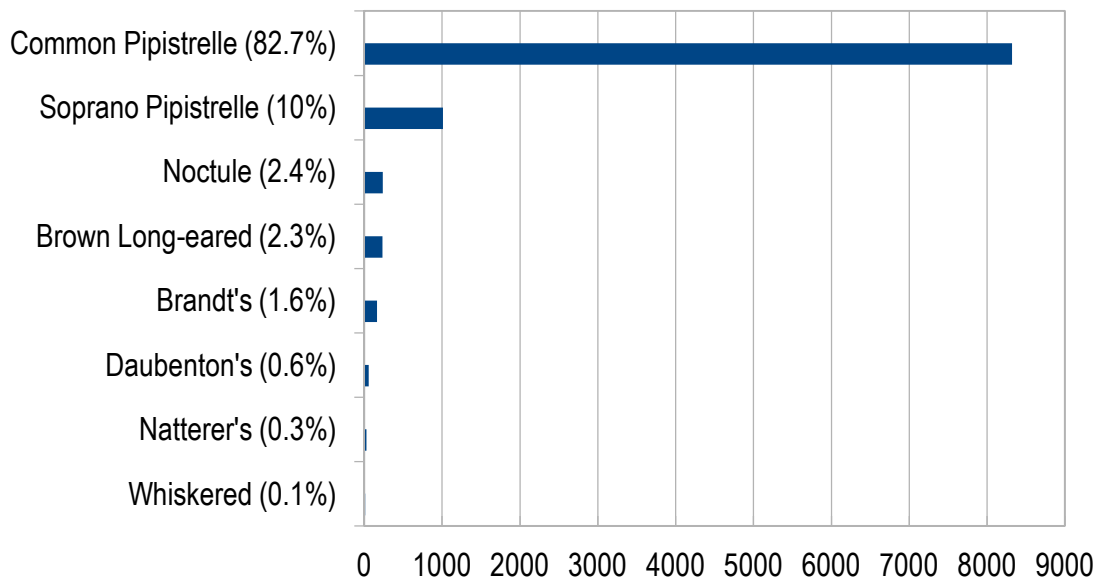
Over 18,000 acoustic recordings were collected over 4 consecutive *dusk to dawn* periods in August 2023. The BTO's Acoustic Pipeline service was used to assess the recordings for their *probability of accuracy* in bat species identification. Around 8,000 recordings were graded as 'low probability of accuracy, for example having a less than a 50% likelihood of a particular bat species being identified correctly. These low probability recordings were discounted from the analysis and results from the remaining 10,066 recordings indicated the presence of 8 species of bats on the Kirkbymoorside allotment site. Whilst the focus of this survey was bats, some small mammal and insect presence was also detected, including that of Eurasian pygmy shrew, brown rat, bush-cricket and several audible moths including the Bird Cherry Ermine and Green Silver-Lines moths.

Acoustic detection of some bat species can be technically challenging due to acoustic similarities between echolocation sounds or social calls made by the bats. Fortunately, only 2 species of bats identified in the survey [Whiskered bat and Brandt's bat] fell into the category of 'difficult to tell apart' and these species only accounted for a small percentage (1.7%) of the total detections recorded. The sounds produced by the other 6 species of bats recorded during the survey are more reliably acoustically identifiable. The 8 species of bats detected in the survey and present on the Kirkbymoorside allotment site are:

- Brandt's Bat (*Myotis brandtii*)
- Brown Long-eared Bat (*Plecotus auritus*)
- Common Noctule (*Nyctalus noctula*)
- Common Pipistrelle (*Pipistrellus pipistrellus*)
- Daubenton's Bat (*Myotis daubentonii*)
- Natterer's Bat (*Myotis nattereri*)
- Soprano Pipistrelle (*Pipistrellus pygmaeus*)
- Whiskered Bat (*Myotis mystacinus*)

The two most common bat species detected during the monitoring survey were the Common Pipistrelle and Soprano Pipistrelle. These two species accounted for 92.7% of the total number of detections (10,066) recorded. Figure 1, below shows the scale of the detections recorded across the allotment site as a whole:

Figure 1. The proportion of the 10,066 bat detections recorded by species, represented as a percentage.



AIM & OBJECTIVES OF THE SURVEY

The aim of the survey was to improve our understanding of the occurrence of bats on the Kirkbymoorside allotment site. The objectives were to help develop a community awareness of the presence and ecology of bats on the site, but also to register the findings with interested stakeholders. These includes the Bat Conservation Trust which is a registered charity that is solely devoted to research and the conservation of bats, and North Yorkshire Council. *[Councils have legal duties placed on them by the Environment Act 2021. Amongst other things this legal 'biodiversity duty' means that the council must: consider what they can do to conserve and enhance biodiversity in their area; agree policies and objectives to do this; and act on these policies to conserve and enhance biodiversity].* This survey contributes to the biodiversity baseline for the Kirkbymoorside allotment site and highlights its value as a wildlife habitat.

BAT MONITORING LOCATIONS

The Kirkbymoorside allotment site covers around 13,000m² and has approximately 460 metres of perimeter boundary hedges and vegetation. Bats are known to use linear boundary features, including hedges as corridors for foraging and to move to and from their roosts. The 4 acoustic monitoring locations on the north,

east, west and southern boundaries were chosen due to their different vegetation characteristics. The monitoring points and vegetation characteristics are highlighted in Figure 2, below:

Figure 2. Bat monitoring locations.



Acoustic microphones were placed in accordance with the bat survey protocol used in the North York Moors Ryevitalise Landscape Partnership bat monitoring project. In this protocol, microphones are mounted approximately 2 metres off the ground and at least 1.5 metres away from obstacles to avoid ground noise and interference from reflected sound. The use of 4 dusk to dawn monitoring period is based on recommendation produced by the BTO. The survey was conducted during warm-dry weather which is conducive to bat activity.

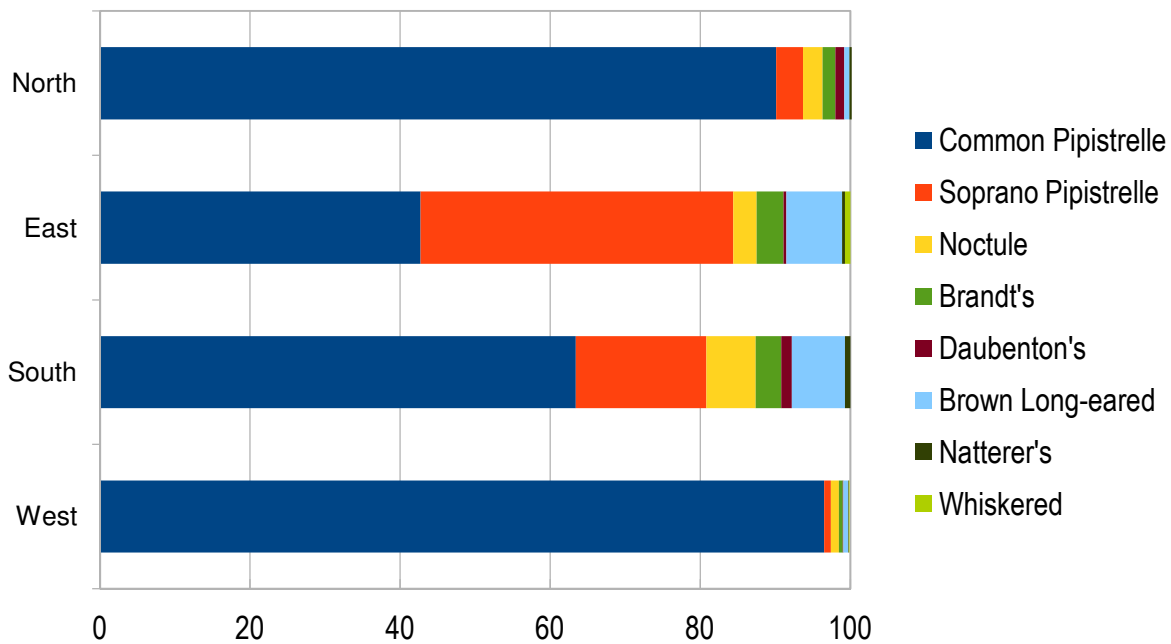
LOCATION SPECIFIC SURVEY FINDINGS.

Across the allotment site as a whole the Common Pipistrelle and Soprano Pipistrelle were the most commonly recorded species of bat. The survey sought to gather information on total bat 'activity' using the number of recordings captured, but also on the relative 'specific species activity' at the 4 monitoring locations.

Differences were seen in both the total bat activity and species-specific activity across the 4 monitoring locations. Figure 3 and 4 highlights these differences. Figure 3 shows the species-specific activity, which is a simple proxy measure of species abundance at each of the monitoring locations. The data is represented for each species, as a percentage of the total number of all species recordings captured at that specific

monitoring location. For example, at the eastern monitoring location Common Pipistrelle bats accounted for 42.7% of the total recordings at that location, and at the Western monitoring location they accounted for 95.5% of the total recordings at that location:

Figure 3. The proportion of bat species detections recorded for each monitoring location, represented as a percentage.

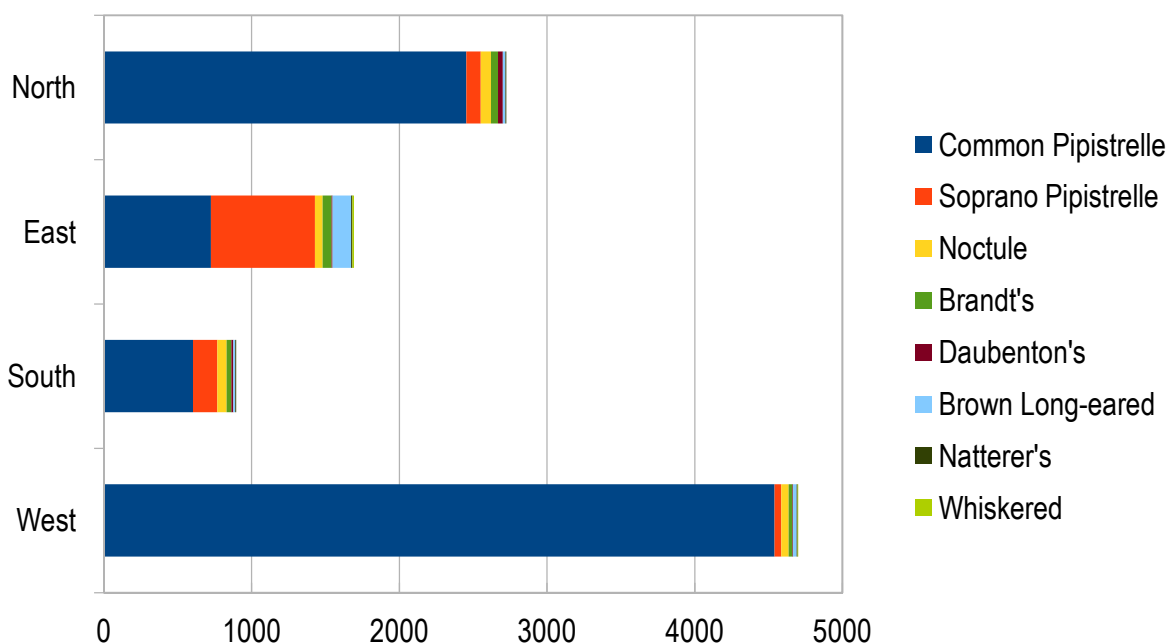


From Figure 3, it is evident that the proportion of Soprano Pipistrelle and Brown Long-eared bat acoustic detections at the east (*woodland edge*) and south (*high hawthorn hedge*) monitoring locations is relatively greater than found at the north and west monitoring locations. The reason for these findings could be due to the foraging and/or roosting preferences of these two particular species. For example, Soprano Pipistrelle bats are known to be more selective in their habitat use than the more generalist Common Pipistrelle bat and prefer woodland edges. Similarly, Brown Long-eared bats are known to have a preference for feeding using a 'gleaning' technique where prey insects are captured from the surface of vegetation rather than caught on the wing. The heavier leaf canopy potentially provides more gleaning opportunities. From these initial observations and habitat considerations it is important to note that acoustic monitoring can give rise to possible misidentification. For example, in extreme vegetation clutter, such as in a woodland canopy, Common Pipistrelle bats typically produces very short calls that are elevated in frequency, where they could be misidentified as Soprano Pipistrelle calls. In addition, where there are multiple individuals of the same species present, one or more bats may use 'frequency shifting' where they shift their echolocation frequencies to avoid

acoustic interference, which again can potentially result in a degree of misidentification. [For this survey a verification stage involving comparison of actual recordings against against reference recordings was not available and therefore the theoretical risk of misidentification errors between Common Pipistrelle and Soprano Pipistrelle bats has been ignored].

Bat activity is a useful proxy measure for relative abundance with high levels of activity typically occurring where the species is most abundant. The total number of recordings [activity] can only reliably be used to compare the 'same' species, for example to compare the activity of Common Pipistrelles at each of the 4 monitoring locations. Using this principle, the data in Figure 4 shows the number of recordings [activity] at the 4 monitoring locations. These results indicate how Common Pipistrelle activity at the western boundary was greater than the activity for the same species at the other 3 locations combined, (4,541 detections at the western location compared to 3,779 detections at the north, east and southern monitoring locations combined). However, bat activity cannot be compared between different species across multiple monitoring locations, particularly where the microphone locations are relatively close together. This is because the distance at which different species of bats are detected is very different. For example, the detection distance of Noctule bats flying in an open or semi-open environment can be up to 100 metres, compared with a detection distance of Brown Long-eared bat in closed woodland which might be about 5 metres.

Figure 4. The total number of detections, by species at that four monitoring locations.



The greater proportional abundance of Brown Long-eared bats and to some extent Whiskered and Brandt's bats on the eastern boundary is potentially characteristic of these species' preference for mixed or broadleaved woodland foraging habitats. All the bats detected, with the exception of the Natterer's bat* are considered medium-fast flyers and will ordinarily catch and eat insects on the wing. It is possible that the relatively well-lit western boundary attracts moths and other insects and that this in turn attracts bats to feed. Although relatively less well illuminated than the road, it is also possible that domestic lights at Kirkdale Court may also account for the relatively high numbers of Common Pipistrelle detections recorded at the northern monitoring location. **[Natterer's bats take much of their prey from foliage and species that prefer not to catch and eat on the wing are believed to be potentially adversely impacted by illuminated habitats].* Several of the bat species identified, including the Daubenton's, Soprano Pipistrelle, Whiskered and Brandt's bats are known to feed heavily on mosquitoes and midges and these insects require still water for breeding. Although there is no sizeable area of open water, the abundance of water butts and other water containers [*insect larvae breeding grounds*] on the allotment probably enhances the habitat value for these bat species.

BASIC BAT ECOLOGY & THE ALLOTMENT SITE

There are over 1,400 species of bats worldwide. The survey indicates that Kirkbymoorside allotments is home to 8 of the 17 species of bats that breed in the British Isles. There are various classification systems for bats, but the 8 bat species detected fall within the Vespertilionidae (vesper bat) family of insect eating microbats. Bats are the only mammals capable of true flight and on average have a lifespan 2 to 3 times that of similar sized mammals at over 20 years. Bats actively forage between April and October and mate in the Autumn. Females store sperm until the following spring where pregnant females congregate together in maternity roosts in late spring. These roost sites are not necessarily the same roosts used for hibernation or foraging. Temperature influences the gestation period, but single *pup* bats are born at 6-9 weeks; suckle for 4-5 weeks; and are usually able to fly in early to mid-summer. Around 75% of vesper bat species use tree roost sites, but old and new buildings are also used. Bats prefer warm roost sites for the foraging season and ideally ones that are at least 4 metres off the ground which allows them to be able to free-fall into flight.

In general, allotment sites provide high quality habitat for insects and this in turn will attract bats. One special feature of the Kirkbymoorside allotment site is its location. It has a 'warm' south facing aspect; it is close to varied roost locations, including both old and new buildings, woodland trees and the cliff face off Manor Vale Lane which offers 'cave-like' roost opportunities; and it sits in close proximity to other insect foraging areas, notably surrounding domestic gardens and pastureland.