A358 Taunton to Southfields Dualling

Bat Activity surveys Technical Report

PCF STAGE 2

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Notice

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Executive summary

The A358 Taunton to Southfields Dualling scheme (hereafter referred to as 'the scheme') would provide a dual carriageway along the length of the A358 between Taunton and Ilminster in Somerset, connecting the A303 at Ilminster to the M5 motorway to the north. The scheme would include grade separated junctions and, with the purpose of providing a high-quality free flow journey for those using the route, the removal of at-grade junctions and direct accesses.

All native species of bat are afforded full protection under the *Conservation of Habitats and Species Regulations 2017*, the *Countryside and Rights of Way (CRoW) Act 2000*, the *Natural Environment and Rural Communities (NERC) Act* and the *Wildlife and Countryside Act (WCA) 1981* (as amended). Four species of bat, comprising barbastelle, Bechstein's bat, greater horseshoe bat and lesser horseshoe bat are given extra protection, being listed as an Annex II species of the *EU Habitats Directive 1992*.

In order to assess which bat species are present in the survey area, and how habitats within them are used by these species, the following surveys were undertaken:

- Walked transects, to assess the activity levels and identify important commuting routes and foraging grounds of bats along defined routes within the survey area
- Static bat detector recorded, to assess activity levels and species present at designated points associated with each transect route
- Crossing point surveys, to assess how bats are using linear features such as hedgerows which cross the scheme

Surveys identified the presence of at least 11 species of bat: common pipistrelle; soprano pipistrelle; Nathusius pipistrelle; noctule; serotine; Leisler's bat; *Myotis* spp.; barbastelle; long-eared bat; greater horseshoe; and lesser horseshoe. It is likely that more than one *Myotis* species is present, with habitat suitable for a range of *Myotis* species, including Bechstein's. Additionally, there is the potential that the scheme could have more than one long-eared species, as the scheme is in the home range of grey long-eared bats. Therefore, it is likely that more than 11 species of bat are present within the surveyed area.

From the crossing point surveys, two features were determined to have high value and four determined to have moderate value to bats. Notable species recorded at crossing points included lesser horseshoe, greater horseshoe, barbastelle and Myotis, including possible Bechstein's bats.

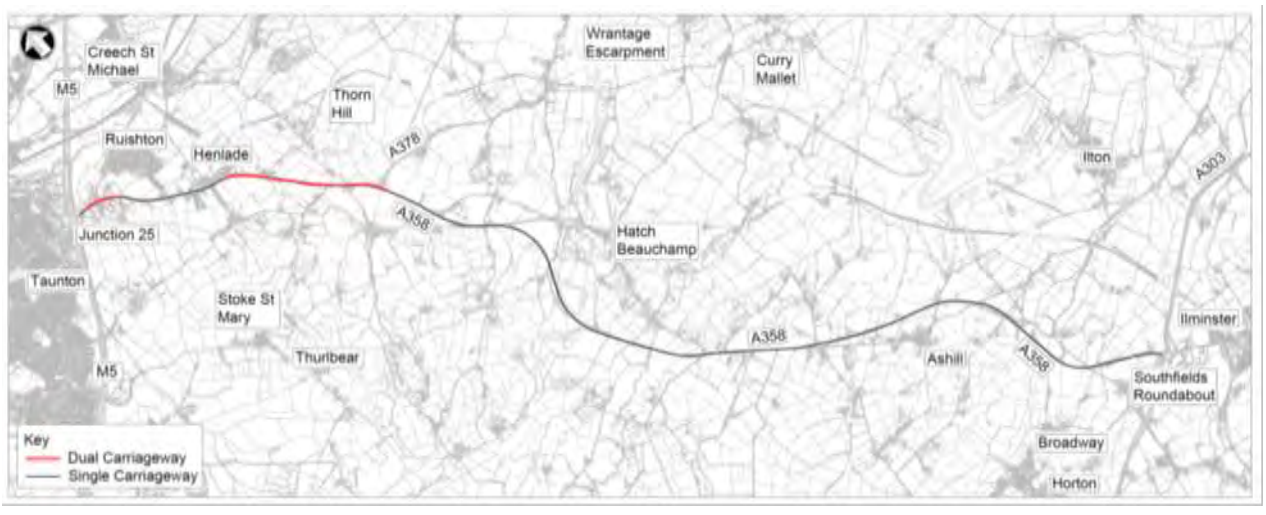
1. Background

1.1.1. The A303 / A358 corridor is a vital connection between the south-west, London and the south-east. Due to the population density, employment opportunities, urban concentrations and tourist attraction of the south-west the A303 / A30 / A358 corridor experiences a wide range of traffic flows which lead directly to severe and regular instances of congestion and delay.

1.1.2. The A303 / A30 is part of the strategic road network (SRN) and together with the A358 forms a key strategic link between the South West Peninsular (SWP) and the rest of the south, south-east and London. Although it is dualled over much of its length there are several unimproved single carriageway sections between the M3 motorway at Basingstoke and the M5 at Taunton and Exeter which cause congestion, especially during summer weekends.

1.1.3. The existing A358 between Taunton and Southfields Roundabout is predominantly single carriageway with a short (1.1 miles) dual carriageway section in the vicinity of Thornfalcon and a 3 lane (2+1) section (0.3 miles) immediately to the south of that. It has many side roads and private accesses directly onto it. The national speed limit applies between Southfields and Henlade where it reduces to 30mph; the speed limit increases to 40mph north of Henlade on the approach to M5 junction 25. A plan showing the existing route between Taunton and Southfields is provided in Figure 1:1.

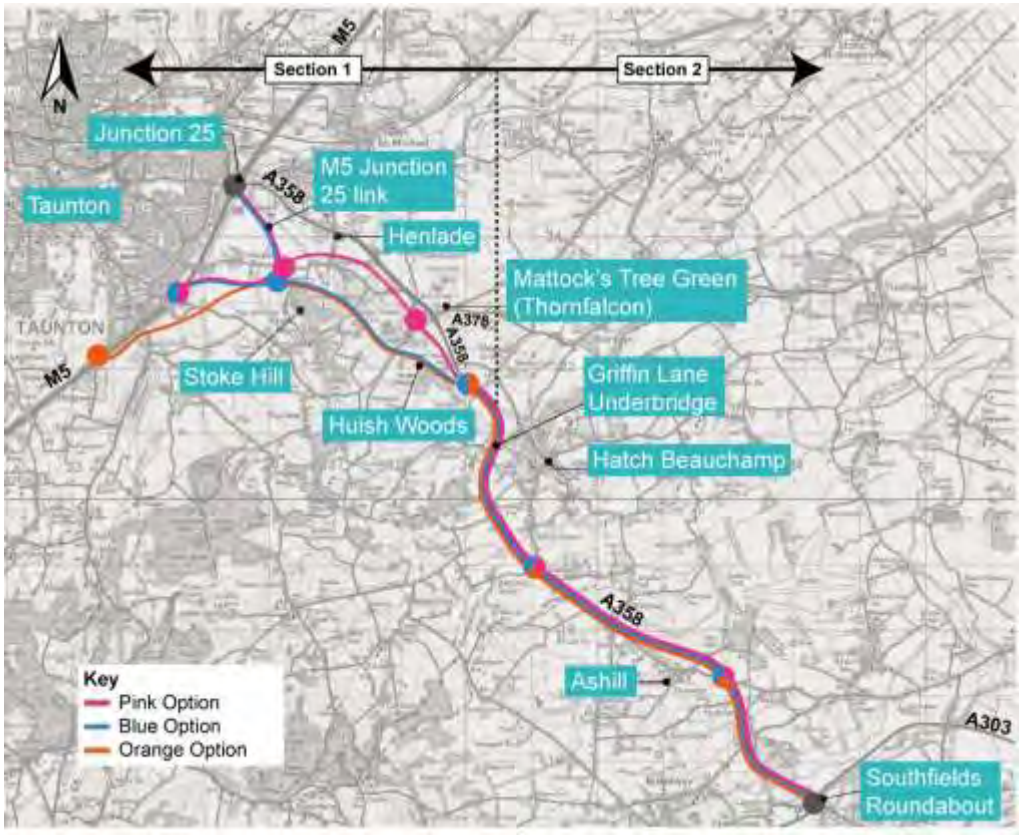
Figure 1:1 : A358 Taunton to Southfields existing road layout



1.1.4. Three potential route options were chosen, the Orange, Pink and Blue. At the public consultation in 2017 only the Orange option was presented. A further consultation was held in 2018 in which all three options were presented. The three route options presented at the 2018 consultation are described below:

- The **Pink option** commences at a new junction on the M5 approximately 1.2 miles (2 kilometres) south of junction 25. South-facing slip roads from the M5 would combine to become the new dual carriageway, which runs eastwards and north of Stoke Hill. Here a limited-movement junction is proposed with east-facing slip road connections to the new road which would allow traffic to travel between the new A358 and junction 25 via a new 0.9 mile (1.5 kilometre) dual carriageway link past the planned Nexus 25 site. The proposed route would then follow the existing A358 to Southfields Roundabout enabling the existing road to be upgraded from a single to a dual carriageway. The total length of the Pink option is 9 miles (14.6 kilometres), plus the 0.9 miles (1.5 kilometres) spur leading to M5 junction 25.
- The **Blue option** commences at the M5 approximately 1.2 miles (2 kilometres) south of junction 25 and runs eastwards on a more southerly alignment. At Stoke Hill a junction is proposed similar to that with the Pink option which would allow traffic to travel between the road and junction 25 via a new 1.2 miles (2 kilometres) dual carriageway link past the planned Nexus 25 site. The road would then continue in a south-easterly direction to West Hatch Lane, where an all-movement, grade separated junction is proposed to allow access to Hatch Beauchamp, Henlade and surrounding communities, and the A378. This option is identical to the Pink option from this point onwards to Southfields Roundabout. The total length of the Blue option is 8.7 miles (14.1 kilometres), plus the 1.2 miles (2 kilometres) spur leading to M5 junction 25.
- The **Orange option** commences at the M5 approximately 2.1 miles (3.5 kilometres) south of junction 25 at a proposed new two-bridge roundabout which would form a new all-movements junction between the new A358 and the motorway. The proposed road initially takes a north-easterly course towards Henlade before arcing around the north of Stoke Hill. In contrast to the Blue option, there is no link to junction 25 from this location, and therefore no junction at Stoke Hill. This option is identical to the Blue option from this point onwards. The total length of the Orange option is 9.5 miles (15.3 kilometres).

Figure 1:2 : Route options presented at the public consultations



Source: Mott MacDonald Sweco Joint Venture. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2016.

1.2. Scheme proposal

1.2.1. The scheme would provide a dual carriageway along the length of the A358 between Taunton and Ilminster in Somerset, connecting the A303 at Ilminster to the M5 motorway to the north. The scheme would include grade separated junctions with the purpose of providing a high-quality free flow journey for those using the route, with the removal of at-grade junctions and direct accesses.

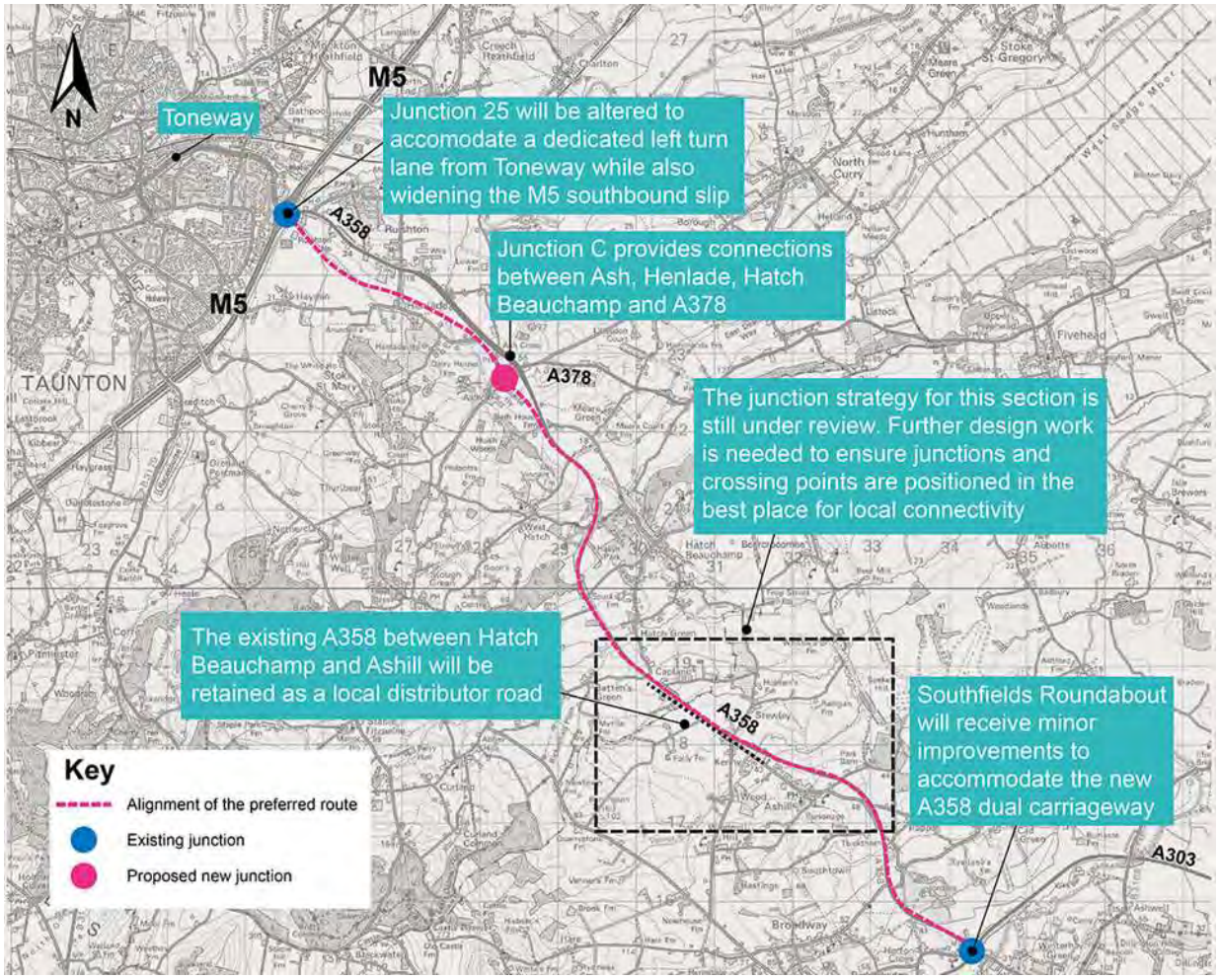
1.2.2. The Preferred Route Announcement (PRA) on the 13 June 2019 identified the Pink Modified option as the preferred route option (PRO), (refer to the Scheme Appraisal Report (SAR) for details of the development of the Pink option to the Pink Modified option).

1.2.3. The Pink Modified option would comprise online widening between West Hatch Lane and Southfields Roundabout. This option would involve the re-use of a large amount of the existing A358 corridor, and between West Hatch Lane and Henlade the route would pass close to the A378 junction at Mattocks Tree Green. This would enable direct connections between the proposed road and the A378. The Pink Modified option retains

the bypass at Henlade, connects with the A378, and connects directly to junction 25 on the M5. A plan showing the Pink Modified option route is shown in Figure 1:3 below.

1.2.4. The scheme would provide a dual carriageway along the length of the A358 between Taunton and Ilminster in Somerset, connecting the A303 at Ilminster to the M5 motorway to the north. The scheme would include grade separated junctions and, with the purpose of providing a high-quality free flow journey for those using the route, the removal of at-grade junctions and direct accesses.

Figure 1:3 : Pink Modified option



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1.3. Purpose of the report

1.3.1. This bat activity technical report has been prepared during Stage 2 of the Highways England's Project Control Framework (PCF). This technical report provides an overview of the results for the activity surveys, undertaken between 2017 and 2020 within 100m of the Pink Modified option. The report provides methods, constraints and results of

the bat activity surveys undertaken for the scheme. This report is to be read in conjunction with the Bat Roost Report HE551508-MMSJV-MMSJV-EBD-000-RP-LB-0058 and the Bat Trapping and Radio Tracking Report HE551508-MMSJV-EBD-000-RP-LB-0047.

1.4. Scope of report

1.4.1. The objectives of this report are:

- To inform the Environmental Impact Assessment (EIA)
- To present the survey methodology used to assess the activity levels within the Zone of Influence (ZoI) of the scheme and detail any constraints encountered during these surveys
- To present the results for the bat activity within the ZoI

1.4.2. This report does not attempt to assess the potential impacts of the scheme on foraging and commuting bats, nor does it provide recommendations for mitigation and enhancement measures, but provides the information to enable this impact report and mitigation design to be undertaken.

1.5. Legislation

1.5.1. All native bat species are afforded full protection under the *Conservation of Habitats and Species Regulations 2017 (as amended by the Conservation of Habitats and Species Regulations (amendment) (EU Exit) Regulations 2019)*, the *Countryside and Rights of Way (CRoW) Act 2000*, the *Natural Environment and Rural Communities (NERC) Act* and the *Wildlife and Countryside Act (WCA) 1981* (as amended).

1.5.2. Under Regulation 41 of the *Conservation of Habitats and Species Regulations* it is illegal to:

- Deliberately capture, injure or kill any UK bat species
- Deliberately disturb bats (in particular, disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young, to hibernate or migrate or to affect significantly the local distribution or abundance of the species to which they belong)
- Damage or destroy a breeding site or resting place of any UK bat

1.5.3. Under Schedule 5 of the *Wildlife and Countryside Act 1981* it is illegal to:

- Deliberately capture, injure or kill a bat
- Intentionally or recklessly disturb a bat in its roost
- Deliberately disturb a group of bats
- Damage or destroy a bat roosting place (even if not occupied at the time)
- Possess or advertise / exchange a bat (dead or alive) or any part of a bat

- Intentionally or recklessly obstruct access to a bat roost

1.5.4. The *Conservation of Habitats and Species Regulations 2017* (as amended) strengthens protection given under the WCA 1981, making it an offence to disturb bats, particularly where this may impair their ability to survive, breed, reproduce, hibernate, nurture or rear their young, or significantly affect the local distribution or abundance of a species.

1.5.5. The *CRoW Act 2000* further strengthens the *WCA 1981*, requiring the conservation of biodiversity in accordance with the *Convention on Biological Diversity (CBD) 1992*.

1.5.6. The *NERC Act 2006* places obligation on public authorities to take the conservation of species and habitats of principal importance, for conserving biodiversity, into consideration. Section 41 of the Act contains a list of habitats and species of principal importance in England.

1.5.7. The following bat species are listed as Annex II species within the *EU Habitats Directive 1992*, and therefore are given additional protection:

- Barbastelle Barbastella barbastellus
- Bechstein's bat Myotis bechsteinii
- Greater horseshoe Rhinolophus ferrumequinum
- Lesser horseshoe Rhinolophus hipposideros

1.5.8. This means that these species have been assessed as meeting the criteria for site selection of Special Areas of Conservation (SAC), to specifically observe them. Site selection is based on evidence of a large and robust population of one or more of these bat species.

1.6. Status of bats at national level

1.6.1. There are 18 species of bat within the UK, 17 of which are known to be breeding. Bat populations are known to have decreased significantly over the last century, with this largely attributed to threats associated with development. These threats include direct impacts on roosts from building and development work requiring tree removal and the demolition of buildings and other structures, in addition to severance of important commuting corridors by roads, other linear infrastructure and vegetation removal. Habitat loss has also resulted in the loss and degradation of important foraging grounds for bat populations. Increased disturbance from light and noise associated with development both through construction and operation and the installation of wind turbines, are also thought to have contributed to the decline in the numbers of bats.

1.6.2. The following species were previously listed as *UK Biodiversity Action Plan* (*UK BAP*) species and are now listed as species of 'principal importance' for the conservation of biodiversity in England, under Section 41 of the *NERC Act'*:

- Barbastelle Barbastella barbastellus
- Bechstein's bat Myotis bechsteinii
- Brown long-eared bat Plecotus auritus
- Greater horseshoe bat Rhinolophus ferrumequinum
- Lesser horseshoe bat Rhinolophus hipposideros
- Noctule Nyctalus noctula
- Soprano pipistrelle Pipistrellus pygmaeus

1.6.3. Following the production of Biodiversity 2020: the national strategy for England, actions were identified to help the recovery of Schedule 41 listed species. Specific species actions, their attributed action priority and the priority group Natural England has classified each species into, are detailed in Appendix A.

1.7. Status of bats at county level

1.7.1. Sixteen bat species have historically been recorded in Somerset, and of these 15 species are known to roost within the county.

1.7.2. Although the *UK BAP* has been superseded, BAPs are still widely used at county level to support *Biodiversity 2020*. Bats are listed on the *Somerset BAP* under the *Somerset Bats Group Action Plan*[1]. Table 1:1 lists species of bat found within Somerset county, the national conservation status and their status within the county, as detailed in the *Somerset Bats Species Action Plan* (SAP).

Table 1:1 *:* The status of bats in Somerset

Species	National conservation status	Somerset status
Barbastelle	Rare	Very rare
Bechstein's bat	Very rare	Rare
Brandt's bat *Myotis brandtii*	Common in west and north, rare elsewhere	Rare
Brown long-eared bat	Common	Common
Common pipistrelle *Pipistrellus pipistrellus*	Common	Common
Daubenton's bat	Common	Widespread

[1] Somerset Wildlife Trust (n.d.g). *Somerset Bat Species Action Plan* [online] available at: https://somersetbat.group/bats/ (last accessed January 2021).

Species	National conservation status	Somerset status
Myotis daubentonii		
Greater horseshoe	Very rare and endangered	Local
Grey long-eared bat *Plecotus austriacus*	Rare	Very rare
Leisler's bat *Nyctalus leisleri*	Scarce	Very Rare
Lesser horseshoe	Rare and endangered	Local
Nathusius' pipistrelle *Pipistrellus nathusii*	Rare	Very rare
Natterer's bat *Myotis nattereri*	Fairly common	Widespread
Noctule	Uncommon	Local
Serotine *Eptesicus serotinus*	Widespread	Local
Soprano pipistrelle	Common	Common
Whiskered bat *Myotis mystacinus*	Locally distributed	Widespread

1.7.3. The *Somerset Bat SAP* also identifies the following habitat types, each with their own action plans, of being of importance to bats in Somerset:

- Water and wetlands (including rivers and streams)
- Hedgerow and hedgerow trees
- Wood pasture, parkland and veteran trees
- Woodland
- Calcareous and neutral grassland

1.7.4. Populations of all bat species have been subject to decline in the past as a result of a number of impacts and threats, mainly as a result of development. Within the Somerset county the following impacts and threats have been identified as being of particular relevance to how development affects bat populations:

- loss of feeding habitat:
  - reduction of available woodland, pasture, hedgerow and ponds as a result of land take for development
  - hydrological changes resulting in loss of wetlands and ponds, with resultant loss of diverse invertebrate populations these support
- loss or alteration of roost site:
  - loss from alterations to and demolition of buildings and barns
  - felling of mature trees
  - tree surgery and management
- loss or fragmentation of flight lines:

    - severance of linear features such as hedgerows and treelines reducing connectivity between roosting sites and foraging grounds
- installation of street and other artificial lighting:
    - disturbance and potential abandonment of roosts
    - prevention of safe exit from roosts
    - alteration of feeding behaviour, with some species of bat attracted to artificial light and other avoiding artificially lit areas, potentially severing commuting routes
    - draw of prey towards artificial light and away from foraging grounds reducing prey abundance in feeding areas
- disturbance from increased noise:
    - disturbance to bat behaviour close to development site, particularly during the construction phase
    - abandonment of trees roosts, with these roosts particularly sensitive to noise disturbance
    - road mortality

1.8. Bat ecology

1.8.1. All bat species in the UK are nocturnal, emerging from their roosts at dusk, or shortly after. Bats have been found to roost in a number of places, including: trees, barns, buildings (within lofts, basements and cavity walls), caves and bridges. Their preferred roosting location depends on a number of factors; species, gender and time of year. Bats require different conditions when hibernating compared to summer roosts.

1.8.2. Bats utilise an array of habitats as foraging grounds, including riparian habitats, woodland and grassland, feeding on a variety of insect species. Foraging grounds and insect prey differ between each species of bat, with different species adapted for hunting in a variety of ways. Many bat species are also known to use multiple different habitat types to forage, highlighting the importance of landscape scale assessment to ensure the persistence of a mosaic of habitats across important foraging areas.

1.8.3. In order to navigate between their roosts and foraging grounds, bats use linear features as commuting corridors. These are most commonly seen to be hedgerow and treelines, in addition to small patches of woodland, rivers and streams. Where these features are comprised of diverse plant assemblages, suitable to support insect populations, they may be used during opportunistic foraging, with bats feeding on the way to their main foraging grounds.

2. Methodology

2.1. Desk study

2.1.1. A detailed biological records search was requested from Somerset Environmental Records Centre (SERC) in 2016, for all known records of bats within a 2km radius of the scheme.

2.1.2. A desktop study was undertaken in 2016 to identify statutory and non-statutory designated sites with 2km of the proposed scheme, extending to 30km for Special Areas of Conservation (SACs) designated for bats; these were identified using Department for Environment Food and Rural Affairs (Defra's) Multi Agency Geographic Information for the Countryside (MAGIC[2]) online mapping tool and the Joint Nature Conservation Committee (JNCC[3]) website. These results for bats can be found within Appendix B.

2.2. Field surveys

2.2.1. The methods described in this section were designed for data collection throughout the 2017, 2018, 2019 and 2020 bats surveys, to enable robust baseline data to be recorded for bats within the survey area of the scheme.

2.2.2. A meeting was held with Natural England (NE) in May 2017 to discuss proposed protected species surveys and in particular bat surveys for the A358 Taunton to Southfields dualling scheme. In advance of this meeting, Natural England were sent a memo outlining the proposed surveys. A copy of this memo and the Natural England meeting response are provided in Appendix C. Natural England agreed that the scope of proposed surveys was appropriate.

2.2.3. The scheme lies within the known distribution of listed Annex II bat species lesser horseshoe, greater horseshoe, barbastelle and Bechstein's bats (*EU Habitats Directive, 1992*), and these species have the potential to be using features and habitats within the study area. Where these species were recorded, the need for advance survey techniques was identified to provide sufficient information to assess the likely impact on these species. These advanced surveys include trapping surveys and radio tracking. Advanced bat surveys were carried out by Davidson Watts Ecology in 2018 and 2019. This report should be read in conjunction with the Bat Radiotracking Report[4] for a comprehensive understanding of bat activity within the Zone of Influence (ZoI) of the scheme.

[2] https://magic.defra.gov.uk/
[3] https://jncc.gov.uk/
[4] HE551508-MMSJV-EBD-000-RP-LB-0047 - *A358 Bat Radio Tracking Technical Report* - Davidson Watts Ecology 2018.

2.3. Activity surveys (walked transects)

2.3.1. Transects were designed to identify species composition and general distribution of bats along the length of the proposed scheme, focusing on linear features with potential importance for commuting bats, in addition to habitats potentially used as foraging grounds.

2.3.2. When assessing potential foraging and commuting habitats, the guidelines below (Table 2:1) within the Bat Conservation Trust (BCT) Guidelines [5] were followed.

Table 2:1 : Defining suitability of bat foraging and commuting habitat

Suitability of commuting and foraging habitat	Description
High	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, treelined watercourses and grazed parkland. Site is close to and connected to known roosts.
Moderate	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
Low	Habitat that could be used by small numbers of commuting bats such as a fragmented hedgerow or unvegetated stream, but isolated, for example not very well connected to the surrounding landscape by another habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Negligible	Negligible habitat features on site likely to be used by commuting or foraging bats.

Source: Bat Surveys – *Good Practice Guidelines* 3rd Edition (Collins, 2016)

2.3.3. The transect surveys aimed to indicate species and numbers of bats utilising habitats within and near the proposed scheme, and existing features within the landscape considered important for bat foraging, navigation, and orientation that may be adversely affected by the proposed scheme.

2.3.4. Eleven transects were undertaken across the scheme, each transect was up to 5km in length and assigned 10 stopping points of five minutes, associated with differentiating areas of habitat which had the potential to be important for foraging or commuting. These included established hedgerows, streams or woodland edges. Particular focus was given to high quality habitats which are likely to be directly impacted by the construction footprint, or those areas connected to such habitats. Twelve transects were originally agreed to be undertaken with Natural England (See Appendix C).

[5] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: ***Good Practice Guidelines*** (3rd edn). The Bat Conservation Trust, London.

However, due to changes in the preferred route and access restrictions as noted in section 2.8 survey constraints, this was reduced to 11 transects for the Pink Modified option.

2.3.5. In accordance with the bat memo agreed with Natural England (Appendix C) due to the length of the scheme, the suitability of the foraging and commuting habitat is variable, ranging from low to high. Low value habitats include intensively farmed areas containing large arable / pastoral fields divided by heavily manged hedgerows. High value habitats include areas of broadleaved woodland and smaller less intensively managed fields bordered by mature species-rich hedgerows with trees.

2.3.6. To ensure survey effort was proportional, the agreed survey effort of one survey per month (April to October) is based on the 'moderate' habitat suitability outlined in the BCT Guidelines. This effort is considered adequate for the report due to the mix of habitats present across the scheme and given that the surveys are supplemented by crossing point surveys, targeted on the higher quality habitats. Additionally, advanced survey techniques were used, including mist netting and radiotracking, to provide further assessment of high-quality habitats, due to the presence of Annex II species. Together, these survey techniques provide robust survey data to enable the report of the impacts of the schemes on bats.

2.3.7. Each transect route was surveyed a total of seven times over the active bat periods (April to October) of 2017 to 2020 with the exception of transects 12 and 13 which due to the Covid-19 pandemic and land access permissions, the April surveys have been missed. Transect 14 has not had any surveys due to land access not being granted. Commencement of surveys and months surveyed each year were dependent on the dates when land access was granted.

2.3.8. Dusk transects began at sunset and lasted for 3 hours afterwards to account for late-emerging bat species; notably horseshoe species. Transects were walked at a steady pace and the direction of passage was alternated each time the route was walked to ensure that different areas of each transect was sampled at different times before / after sunrise / sunset.

2.3.9. Each of the July transects were subject to a single follow-up dawn survey, which was undertaken within the same 24-hour period as the previous dusk.

2.3.10. All surveys were aimed to be conducted during suitable weather conditions (start temperature of 10°C or above, no rain or strong winds), as defined in BCT Guidelines. Some surveys were carried out in sub-optimal conditions, the lead ecologist made the final decision on whether a survey was to continue if conditions deteriorated for more than half an hour. Where activity surveys were not undertaken in line with BCT Guidelines and within optimal conditions, the outcome of the results and validity is stated within section 2.8 of the survey constraints section.

2.3.11. For the activity transect surveys two active full spectrum detector models were used, the Anabat Walkabout and Batlogger M. These were set to automated recording, where the detectors would record a sound file that passed its trigger criteria to record until these criteria are no longer met. These were then analysed using their respective software, Batlogger M was analysed with Bat Explorer and Anabat Walkabouts with Anabat Insight. Whist two different models of detectors were used, both have high end microphones and recorded in full spectrum, so therefore the sound files recorded for analysis from both detectors is considered comparable.

2.3.12. Analysis of the bat passes to create heat maps of bat activity were undertaken using ArcGIS and the Kernel density tool. Settings were set to 0.1 output with a search radius of 50m. The data was then classified into 11 categories indicating density of bat calls. The bottom class had no colour classified to it, to indicate that there weren't sufficient calls.

2.4. Static surveys

2.4.1. Three static detectors were installed for each transect, resulting in a total of 30 detector deployment sites. This is in accordance with BCT Guidelines. Detectors were deployed for one week per month between April and October (see section 2.8 for exceptions) over the bat active periods in 2017 to 2020, to collect data over 5 consecutive nights per month.

2.4.2. Static detectors were set up to begin recording 30 minutes before sunset and stop recording 30 minutes after sunrise. The location of each static detector was selected based on the alignment of the scheme and presence of potential habitat features which could be used by foraging and commuting bats. Static detectors were deployed within a range of suitable habitats considered to be directly or indirectly affected by the proposed scheme. This included hedgerows, woodland, and scrub habitats. Detectors were secured within a cable lock and locked with an individual key; the number of which was recorded within the proforma at deployment. The detector microphones were located so that ambient or extraneous noise recorded was minimised. Positions were also adjusted where solid objects would impede the passage of sound to the microphone.

2.4.3. To ensure consistency across hardware, the same type of automated full spectrum detectors were used across all sites (Wildlife Acoustic SM4). Prior to deployment, fully charged batteries and empty SD cards were fitted. The SD cards were individually numbered and recorded within the proforma.

2.4.4. Analysis of bat calls was undertaken using Wildlife Acoustics Kaleidoscope Pro software. Bat calls were initially analysed using Kaleidoscope Pro Automatic Identification. Calls were then subject to manual verification by an experienced ecologist. Classifiers for pipistrelle species are well established, and calls assigned to common pipistrelle and soprano pipistrelle were not subject to manual verification. Calls for Nathusius pipistrelle

were however subject to manual verification, as were calls for Myotis species, noctule, serotine, Leisler's, horseshoe species and barbastelle. Noise files and unidentified calls were also subject to analysis and were frequently found to contain bat calls.

2.5. Grouping of bat species calls

2.5.1. Calls from bats belonging to the species Myotis are all known to produce very similar sounding calls, which are difficult to distinguish between both in the field, and when using bat call analysis software. For the purposes of this report the following species have been grouped to be reported as *Myotis sp*.

- Alcathoe bat Myotis alcathoe
- Bechstein's bat
- Brandt's bat
- Daubenton's bat
- Natterer's bat
- Whiskered bat

2.5.2. This grouping is required to lower the probability of misidentification of species recorded during surveys. However, it is not expected to significantly impact the results of this report, with any *Myotis sp*. recordings of significance (such as a confirmed roost with the potential to be directly impacted by the proposed scheme) to undergo more in-depth analysis to determine which species this may belong to. The trapping and radio-tracking surveys would also identify whether any populations of Bechstein's bat (the rarest Myotis species) are present within the ZoI.

2.5.3. With calls which look and sound the same, that have peak frequencies only 10kHz apart, common pipistrelle and soprano pipistrelle calls often overlap as a result of call plasticity allowing bats to adapt their calls to the habitats they are in. Therefore, to avoid misidentification of species, the label *Pipistrellus sp*. has been used for any calls falling within the range of peak frequency where call overlap is known to occur between 49kHz and 51kHz.

2.5.4. This is also the case for common pipistrelle and Nathusius' pipistrelle, with the lower end of the common pipistrelle call range overlapping with the higher end of the Nathusius' pipistrelle range. As all three species of pipistrelle have been recorded within the survey area, Pipistrellus sp., has been used as a species identifier where calls have been recorded in the overlap ranges, but definitive calls from all three species has not been recorded during a specific survey or at that location. The purpose of which is to ensure that none of these three species are underreported within this report.

2.5.5. Due to the similarities in calls between brown long-eared and grey long-eared bats, it is not possible to differentiate between calls of these species. Therefore, calls are labelled as *Plecotus* species. However, mist netting for the scheme has confirmed the

presence of brown long-eared, and it is probable that the majority of long-eared bats recorded are brown long-eared. The scheme is however within the known range of the rarer grey long-eared and there is a potential that this species is present within the region, despite the lack of records returned in the desk study.

2.6. Analysis of static data

2.6.1. Comparison and analysis of data collected during static surveys was undertaken using Microsoft Excel spreadsheets and pivot tables. Additionally, the project analysed the data using the online EcoBat tool[6]. EcoBat is a web-based tool for supporting evidence-based decision-making by offering a standardised method of interpreting bat activity data. Previously there was no way of interpreting bat activity data in context, for example 100 bat passes could be interpreted as either high or low activity depending on context. The tool uses percentiles to provide a numerical indicator of the relative importance of a nights' worth of bat activity on the project site by comparing it with a national database. Relative activity levels are based on the following categories:

- low activity: 0-20th percentiles
- low to moderate activity: 21st-40th percentiles
- moderate activity: 41st-60th percentiles
- moderate to high activity: 61st-80th percentiles
- high activity: 81st-100th percentiles

2.6.2. For this scheme, the reference range dataset was stratified to include only records from within 100 kilometres[2] of the survey location.

2.7. Crossing point surveys

2.7.1. Crossing point surveys aimed to inform the impact report in relation to potential fragmentation of bat foraging and commuting habitat, and direct mortality. The resultant data can inform the nature and location of any required bat crossing structures as well as providing baseline data for future monitoring of effectiveness of any mitigation implemented as required.

2.7.2. The methodology was in accordance with Berthinussen and Altringham (2015)[7] with all crossing point having six visits per crossing with two surveyors per crossing point (either side of proposed road – increased to four on certain sites) to determine visually whether bats were crossing the proposed new road in these locations.

[6] http://www.ecobat.org.uk/

[7] Berthinussen A. & Altringham J. (2015) WC1060: *Development of a cost-effective method for monitoring the effectiveness of mitigation for bats crossing linear transport infrastructure*. Department for Environment, Food and Rural Affairs (Defra), UK report.

2.7.3. Crossing point locations were selected based on presence of significant linear features that would be severed by the scheme which provide high quality commuting and foraging habitat for bats, such as mature hedgerows, linear woodland belts and riparian corridors.

2.7.4. Dusk surveys began at sunset and lasted for 90 minutes to account for late emerging species. Dawn surveys began 90 minutes before sunrise, finishing at sunrise. Repeated surveys of each crossing point location were at least one week apart. During a survey the following was recorded:

- Bat Pass Number (for example first bat will be one)
- Time (hh:mm:ss)
- Height above road (or below if underbridge / culvert) to nearest meter
- Distance from feature to nearest meter (for example distance from edge of hedgerow)
- Side of feature which bat crossed (N,S,E,W)
- Direction that bat crossed (for example N-S)
- Species
- Comments – any notable observations
- Weather variables at start middle and end of survey

2.7.5. Surveys were undertaken between May and September which are acceptable months to undertake surveys.

2.7.6. Surveys were conducted in 2017, 2019 and 2020 due to access restrictions and programme changes.

2.8. Survey constraints

Transect surveys

2.8.1. Transect surveys were undertaken across the survey's seasons of 2017, 2019 and 2020 due to access issues and programme changes, although the majority were undertaken in 2017. Transects 5, 6 and 10 had additional July surveys in 2020 as dusk / dawn surveys were not undertaken in 2017.

Twelve transects were originally agreed to be undertaken with Natural England (See Appendix C) to cover three route options (blue, orange and pink). Though due to restricted access it was not possible to undertake an assessment of transect route 14. It is recommended that activity surveys are carried out along transect route 14 to determine it use to bats in the local area.

2.8.2. The surveys for transects 2, 5, 6 and 8 in April and May and transect 11 in May were conducted for two hours rather than three hours as suggested by Natural England.

The May survey for transect 10 ceased after two hours due to a landowner complaint. The shorter length of the surveys is not considered a significant limitation as it was a sufficient duration to record bat activity which included some of the later emerging species such as brown long-eared bat and Myotis spp. Furthermore, these surveys were conducted in line with the best practice. Additionally, whilst there are late emerging species within the landscape of the scheme, all species are known to emerge before two hours after sunset[8], therefore it is considered that the results, though partially limited, are still valid in the context of this assessment

2.8.3. The dusk survey for transect 8 in July was stopped two and a half hours into the survey due to heavy rain. Light rain was present throughout the survey but common pipistrelle, soprano pipistrelle and noctules recorded throughout the survey, therefore the rain and length of survey is not considered a limitation to the survey. Late emerging bat species would have also been captured within this time frame, however, not undertaking the survey for the full 3 hour period would have limited the recording of these species during this survey.

2.8.4. The May survey for transect 9 ceased after an hour and a half due to health and safety reasons and the whole route was not surveyed. The fact that this survey was not completed in full is not considered to be a significant constraint to the overall results, as full survey data was collected on other surveys of this transect.

2.8.5. The September survey for transect 9 was abandoned after an hour and a half due to consistent heavy rain. This survey was undertaken again in September 2020 in optimal conditions and therefore a full and valid survey was undertaken for transect 9 in September.

2.8.6. No bats were identified during the April survey for transect 10 and 11 as the temperatures were 5 degrees Celsius and below, with light rain for the duration of the survey for transect 10 (dry for transect 11). As further surveys were carried out throughout the bat survey season, it was deemed that the overall analysis of the routes would not be impacted from having undertaken this survey in sub-optimal conditions. Conditions in April are often sub-optimal and it is not considered necessary to repeat these transects.

2.8.7. For transects 12 and 13, the April survey was not undertaken due to access restrictions, this was scheduled for April 2020 but due to the Covid-19 pandemic this was not undertaken. The October survey for transect 13 in 2020 was not completed due to access restrictions. These surveys will need to be completed in 2021.

[8] A review of empirical data in respect of emergence and return times reported for the UK's 17 native bat species, H, Andrews and L. Pearson, June 2017, Version 4. Source: http://battreehabitatkey.co.uk/wp-content/uploads/2017/06/AEcol-REVIEW-OF-EMERGENCE-AND-RETURN-EMPIRICAL-DATA-2017-Ver.-4.pdf

2.8.8. No transect surveys have been undertaken for transect 14 due to no access being grated for the surveys. These surveys will need to be completed in 2021.

Transect analysis

2.8.9. The bat equipment only recorded the first 90 minutes of the April data for transect 4. However, this is not a significant limitation in this survey, as no bats were noted within the survey proformas by the surveyors outside of the Huish Woods for the last section of the transect route. There may be some incidental records missed from the automatic recordings from the bat detectors walking through Huish Woods, however, the other surveys fully covered this area to provide a robust baseline for this transect. Additionally, this woodland was also subject to trapping and radio-tracking surveys, so it is considered this is not a limitation to determine the overall value of this woodland for bats.

2.8.10. Sound files from the October surveys for transect 4 were corrupt and therefore could not be analysed. Point data has been added into the activity maps using the survey proforma to determine locations. Species could not be confirmed via sound analysis, though surveyors were experienced to determine some species. Therefore, some species may have been missed. However, as noted above the woodland was subject to advanced surveys, which helped establish a robust baseline for this area.

2.8.11. The bat equipment did not record the last hour of transect 5 in April. However, bat detectors were still operational and very little activity was noted in the proformas. This data has been added manually to the activity maps. Therefore, it is considered that there is no limitation to this survey and the results.

2.8.12. No data was recorded in for the June surveys for transect 5. Point data has been added into the activity maps using the proforma to determine locations. Species ID is considered to be accurate, as the surveyors were using a Anabat Walkabout which show the calls allowing for a higher level of species ID confidence. The surveyors are also experienced surveyors. Therefore, it is considered this is not a limitation.

2.8.13. No data was recorded during October transect 11. Point data has been added into the activity maps using the proforma to determine locations, to which there was a low level of activity for this survey. Species ID is considered to be accurate, as the surveyors were using a Anabat Walkabout which show the calls allowing for a higher level of species ID confidence. The surveyors are also experienced surveyors. Therefore, it is considered this is not a limitation.

2.8.14. No data was recorded during October transect 12. Point data has been added into the activity maps using the proforma to determine locations, to which there was a low level of activity for this survey. Species ID is considered to be accurate, as the surveyors were using a Anabat Walkabout which show the calls allowing for a higher level of species ID confidence. There were two bat recordings were the surveyors, could not ID the

species. However, as the rest of the surveys were undertaken for this transect, it is considered this is not a limitation for the results of the survey.

Static surveys

2.8.15. At the time of the surveys in 2017 statics 8a, b and c, 10a, b and c, 11a, b and c were not deployed in April due to access restrictions. One survey at the beginning of May and one at the end of May was undertaken instead. Static's 12, a, b and c and 13a, b and c were due to have April surveys in 2020 but due to the Covid-19 pandemic these surveys have not been undertaken. Static's 14 a, b and c have not been deployed due to lack of access. Due to the lack of access for statics 14 a, b and c, the total number of statics deployed was 30.

2.8.16. Some static deployments failed in 2020 due to corruption of the SD card, even though each SD card is formatted within the devices and activated to check it is working prior to deployment, in addition some statics did not record for the full 5 days. Failed deployments for 8a June, 8c June, 9b June, 11b / c June, 12c July, 13c July, 12b August and 13a August will need repeating in 2021.

2.8.17. No access was permitted for transect 14 and the associated statics 14 a, b and c. These static locations will require full surveys during the 2021 season.

2.8.18. Due to access constraints, it was not possible to survey all static locations for all months (April-October) for one year. Instead, surveys were spread between 2017 and 2020. The majority of static surveys were from the 2017 season, with gaps filled in during the 2018, 2019 and 2020 seasons. Data may therefore reflect differences in activity over different years, for example due to different weather patterns. However, the data is considered to provide a robust report of bat activity throughout the scheme and throughout the active bat season.

Crossing point surveys

2.8.19. Surveys for crossing point number 2 were undertaken across three survey seasons from 2017, 2019 and 2020 due to access restrictions and programme changes. Two surveys were undertaken in 2017, four surveys in 2019 and one in 2020. This is not considered a limitation as the surveys were undertaken during the required months as part of the assessment guidelines. However, it is recommended that repeat surveys be carried out and that surveys carried out in 2017 should be repeated, to make sure no data is older than three years.

2.8.20. It was agreed with NE (see Appendix C) that an estimated 25 crossing point surveys would be undertaken for this scheme. This was prior to the preferred route announcement, and at the time, a total of 34 crossing points were selected and surveys commenced at these crossing points in 2017. When the preferred route was selected, a number of these crossing points were no longer valid, and an additional four crossing

points were added for the new junction design next to Ashe Farm (west of Huish Woods), giving a total 14 crossing points for the Pink Modified Option.

2.8.21. Surveys for crossing points 16, 20 and 23 were undertaken across two survey seasons due to access restrictions, three surveys in 2019 and three in 2020.

2.8.22. Surveys for crossing points 17, 18, 19, 21, 22 and 33 were undertaken across two survey seasons due to access not being granted until the later part of 2019. Four surveys were undertaken in 2019 and two in 2020.

2.8.23. Surveys for crossing points 34a, 34b, 34c and 34d were added in 2020 to account for route changes in the location of a junction to the west of Huish Woods.

2.8.24. There were surveys cancelled due to change in weather conditions and sound data corruption which were repeated, as seen in Table 3:9, these were CP2: 08/08/17, CP16: 07/07/20 and 21/07/20 and CP20: 11/06/19.

3. Results

3.1. Desk study

3.1.1. There are four European Special Areas for Conservation (SACs) designated for bats which are located within 30km of the scheme. A Special Protection Area (SPA) and Ramsar designated site is located 5.8km downstream of the site, although not designated for bats. Two Sites of Scientific Interest (SSSIs) were identified within 2km of the scheme and seven designations were identified within 300m of the affected road network (ARN) for the scheme, none of which are designated for bat presence. Three Local Nature Reserves (LNR) have been identified at a regional level, two of which support bat species, and there are 44 regional Local Wildlife Sites (LWS).

European designated sites

Hestercombe House SAC

3.1.2. Hestercombe House SAC (UK0030168) is a 0.06ha site located approximately 4.5km north-west of the proposed scheme. The site supports Annex II species that are a primary reason for selection of this site.

3.1.3. The SAC is a Lesser horseshoe bat maternity site in the Vale of Taunton Deane. The bats roost in the roof void of part of a large building. Although only a small proportion of the UK population, this site has been included as representative of the species in south-west England.

3.1.4. This site is of European importance for lesser horseshoe bats.

Bracket's Coppice SAC

3.1.5. Bracket's Coppice SAC (UK0030095) is a 53.75ha site located approximately 18.4km south-east of the scheme. The site supports Annex II bat species that are a primary reason for selection of this site.

3.1.6. The site is designated for Bechstein's bat and is one of the first maternity colonies of its kind and was discovered using bat-boxes in this small woodland.

3.1.7. The site is of European importance for Bechstein's bat.

Exmoor and Quantock Oakwoods SAC

3.1.8. Exmoor and Quantock Oakwoods SAC (UK0030148) is an 1,894.05ha site located approximately 16.7km north-west from the scheme. The site supports Annex I habitats that are a primary reason for the selection of this site, Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site, Annex II species

that are a primary reason for selection of this site and Annex II species present as a qualifying feature, but not a primary reason for site selection.

3.1.9. Its primary reason for designation is its 'Old sessile oak woods with Ilex and Blechnum in the British Isles in conjunction with heath', and for its maternity colonies of barbastelle bat. The qualifying features include Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*), for its maternity colony of Bechstein's bats and otters *lutra lutra.*

3.1.10. The site is of European importance for barbastelle bat and old sessile oak woods.

Beer Quarry and Caves SAC

3.1.11. Beer Quarry and Caves (UK0012585) is a 31ha site located approximately 28.5km south of the scheme. The site supports Annex II bat species that are a primary reason for selection of this site as well as Annex II bat species present as a qualifying feature, but not a primary reason for site selection.

3.1.12. The Annex II species that are a primary reason for selection of this site include Bechstein's bat. This complex of abandoned mines in south-west England is regularly used as a hibernation site by small numbers of Bechstein's bat as well as an important assemblage of other bat species. Annex II qualifying features include the lesser horseshoe bat and greater horseshoe bat.

3.1.13. The site is of European importance for Bechstein's bat.

Nationally designated sites

3.1.14. Two SSSIs have been identified within 2km of the scheme. A further six SSSIs have been identified to be further than 2km from the scheme, but within 200m of the ARN. Information regarding the distance, orientation and potential use of the site by bats is given in Table 3:1 below.

Table 3:1 Location of nationally designated sites in relation to the scheme, and their potential to be used by bats

Site Name	Distance and orientation from scheme	Area description	Potential use of site by bats
Thurlbear Woods and Quarrylands SSSI	1.47km west	It is of special interest due to species-rich woodland, formerly managed in a traditional coppice-with-standards system and situated on soils derived from Rhaetic shales and limestones. The recorded history of the site, its Medieval	Woodland is likely to provide a high-quality foraging habitat and potential roost sites for bats.

Site Name	Distance and orientation from scheme	Area description	Potential use of site by bats
		embankments and the presence of several plants normally confined to primary woods, all suggest that Thurlbear is of considerable antiquity.	
Barrington Hill Meadows SSSI	1.7km south	It is of special interest as it comprises four meadows traditionally managed of unimproved neutral grassland and only 22ha of this species-rich community are known to remain in Somerset. Additional interest lies in the occurrence of an extremely rare grass species *Gaudinia fragilis.*	Species-rich grassland is likely to provide a high-quality foraging habitat for bats.
Fivehead SSSI	The closest point is adjacent to the south of the A378.	Fivehead Fields is rich in flora and supports a large population of the rare broad-fruited cornsalad. Shepherd's needle, corn parsley and corn buttercup can also be seen.	The riparian habitat is likely to provide high quality foraging and commuting habitat for bats.
Ruttersleigh SSSI	The closest point is approximately 4km south-west of the A358, 3km north-west of the A303.	Lowland bogs, broadleaved mixed and yew woodland are the main habitats, along with fen, marsh and swamp, and neutral grassland.	Woodland and species-rich grassland are likely to provide a high-quality foraging habitat for bats and potential roost sites.
Deadman SSSI	The closest point is approximately 374m east of the B3170.	Lowland bog is the main habitat.	Low potential for bat use.
Prior's Park and Adcombe Wood SSSI	The closest point is approximately 517m west of the B3170.	Broadleaved, mixed and yew woodland is the main habitat.	Woodland is likely to provide a high-quality foraging habitat and potential roost sites for bats.
Quants SSSI	The closest point is approximately 2km south of the M5, west of the proposed scheme.	Broadleaved, mixed and yew woodland is the main habitat.	Woodland is likely to provide a high-quality foraging habitat and potential roost sites for bats.
Maiden Down SSSI	Adjacent to the south of the M5 carriageway, west of the proposed scheme.	Dwarf shrub heath lowland is the main habitat.	The shrub heath us likely to provide good foraging habitat for bats.

Regionally designated sites

3.1.15. There are three Local Nature Reserves (LNRs) and 44 Local Wildlife Sites (LWS) within 1km of the proposed scheme. Their distance and orientation from the scheme are detailed in Table 3:2 below, alongside any features that may potentially support native bat species.

Table 3:2: Location of regionally designated sites in relation to the scheme, and their potential to support UK bat species

Site Name	Distance and orientation from scheme	Area characteristics	Potential use of the site by bats
South Taunton Streams LNR	688m west of the link road to junction 25 on the M5	The reserve supports a wide range of flora and fauna including water vole, otters, kingfisher, sand martin and bats.	Low potential for bat use. Riparian habitat provides high quality foraging and commuting habitat for bats.
Children's Wood / Riverside Park LNR	900m north of the proposed scheme	Important habitat for wildlife including otters and bats.	High potential for bat use.
Bickenhall Orchard LNR	550m south-west of the proposed scheme	Ancient woodland site, mainly conifer and mixed orchard plantation but species rich rides and areas of semi-natural broadleaved woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Huish Copse East LWS	348m south of the proposed scheme	Woodland habitat.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Road Verges West of Hatch Beauchamp LWS	Located within the boundary of the proposed scheme	Deciduous woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as potentially supporting roosting features.
Bickenhall Wood LWS	Adjacent to the proposed scheme	Bickenhall Wood LWS is a 28.2ha area of ancient woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.

Site Name	Distance and orientation from scheme	Area characteristics	Potential use of the site by bats
Saltfield Copse LWS	Immediately adjacent to the south-west of the existing A358	Ancient woodland site with areas of semi-natural broadleaf, woodland and conifer plantation.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
River Rag LWS	Adjacent to the proposed scheme	River corridor with species indicating habitat of high biological quality.	Riparian habitat provides high quality foraging and commuting habitat for bats. Low potential for bat use.
Jordans Park LWS	Adjacent to the proposed scheme	Parkland with an important assemblage of veteran trees in improved grassland.	Species-rich grassland will likely provide high-quality foraging habitat for bats. Veteran trees likely to provide high quality roosting habitat.
River Tone and Tributaries LWS	649m west of the proposed junction with the M5	Biologically rich river and tributaries with a variety of associate habitats and legally protected species.	Riparian habitat provides high quality foraging and commuting habitat for bats. Low potential for bat use.
Huish Woods LWS	220m south of the proposed scheme	Ancient broadleaved semi-natural woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Stoke Wood LWS	60m south of part of the link road, though the main route is located 170m south of the proposed scheme	Ancient broadleaved semi-neutral woodland, some recent broadleaved planting and areas of grassland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Knowl Wood LWS	760m south of the proposed scheme	Ancient semi-natural broadleaved woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Every's Copse LWS	210m north-east of the proposed scheme	Ancient semi-natural broadleaved woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.

Site Name	Distance and orientation from scheme	Area characteristics	Potential use of the site by bats
River Isle LWS	255m south of the proposed scheme	Species-rich aquatic habitat.	Riparian habitat provides high quality foraging and commuting habitat for bats. Low potential for bat use.
Ashill Wood LWS	250m north-east of the proposed scheme	Ancient semi-natural broadleaved woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Oldway Bridge Field and Spring LWS	529m south of the proposed scheme	Unimproved neutral grassland on edge of woodland, an important invertebrate site, also adjacent tufa spring.	Species-rich grassland and woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Blackbrook Pavilion LWS	116m north of the junction with the M5	Hedgerows with legally protected species.	Low potential for bat use. Hedgerows likely to provide high quality commuting and foraging habitat and potential roost sites.
Forest Orchard LWS	528m south of the proposed scheme	Unimproved grassland and orchard trees.	Species-rich grassland and orchard trees will likely provide high-quality foraging habitat for bats and potential roosting opportunities.
Line Wood LWS	691m north-east of the proposed scheme	Ancient semi-natural broadleaved woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Barton Grange and East Poundisford LWS	656m south-west of the proposed junction with the M5	Parkland with veteran trees.	Species-rich grassland will likely provide high-quality foraging habitat for bats.
Ten Acre Copse LWS	1,326m south of the proposed scheme	Ancient broadleaved semi-natural woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.

Site Name	Distance and orientation from scheme	Area characteristics	Potential use of the site by bats
Hatch Green Fields LWS	600m north of the proposed scheme	Unimproved calcareous and neutral grassland EMB 4/4/97.	Species-rich grassland will likely provide high-quality foraging habitat for bats.
Hatch Court Park LWS	800m north of the proposed scheme	Parkland with an important assemblage of Veteran Trees.	Species-rich grassland will likely provide high-quality foraging habitat for bats.
Bens Copse LWS	800m north of the proposed scheme	Ancient woodland site now mixed woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Scutty Benches Copse LWS	795m north-east of the proposed scheme	Ancient semi-natural broadleaved woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Southtown Farm LWS	820m south of the proposed scheme	Neutral, wet unimproved grassland with Somerset notable species.	Species-rich grassland will likely provide high-quality foraging habitat for bats.
Close Park LWS	870m south of the proposed scheme	Parkland with an important assemblage of Veteran Trees.	Species-rich grassland will likely provide high-quality foraging habitat for bats. Veteran trees likely to provide high quality roosting habitat.
Near Myrtle Farm LWS	930m south of the proposed scheme	Green lane with Somerset notable species together with species-rich rough grassland, scrub and secondary woodland.	Species-rich grassland will likely provide high-quality foraging habitat for bats.
Broughton Brook LWS	1,100m south of the proposed scheme	Fast flowing stream with wooded banks, rare invertebrate record.	Riparian habitat provides high quality foraging and commuting habitat for bats. Low potential for bat use.
Curry Mallet Drove LWS	950m south of the proposed scheme	Species rich green lane.	Species-rich grassland will likely provide high-quality foraging habitat for bats.

Site Name	Distance and orientation from scheme	Area characteristics	Potential use of the site by bats
Donyatt Railway Cutting LWS	970m north of the proposed scheme	Mosaic of habitats with good bird population.	Low potential for bat use. Rail cutting likely to provide foraging and commuting habitat for bats.
Boon's Copse LWS	1,040m south of the proposed scheme	Ancient semi-natural broadleaved woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Merryfield Airfield LWS	1,020m south of the proposed scheme	Unimproved neutral grassland, scrub, fen, ponds and secondary broadleaved woodland.	Species-rich grassland will likely provide high-quality foraging habitat for bats.
Thorn Clump LWS	480m north of the proposed scheme	Self-improved grassland and clump of trees with Somerset notable species.	Species-rich grassland will likely provide high-quality foraging habitat for bats.
Wright's Copse LWS	1,150m south of the proposed scheme	Ancient semi-natural broadleaved woodland, with an area of conifer plantation.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Abbey Hill Farm Meadow LWS	1,250m south of the proposed scheme	A large level field supporting herb rich grassland.	Species-rich grassland will likely provide high-quality foraging habitat for bats.
Herne Hill LWS	1,220m south of the proposed scheme	Ancient woodland site with semi-natural broadleaved, conifer and broadleaved plantation standards, supporting important fauna.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Meadows at West Hatch LWS	1,400m north of the proposed scheme	A group of four unimproved / semi-improved fields.	Low potential for bat use. Unimproved grasslands likely to provide high quality foraging habitat.
Newlands Plantation and Extensions LWS	1,500m north of the proposed scheme	Complex of unimproved neutral and marshy grassland, scrub and semi-natural broadleaved woodland.	Species-rich grassland will likely provide high-quality foraging habitat for bats.

Site Name	Distance and orientation from scheme	Area characteristics	Potential use of the site by bats
Quarrylands North LWS	1,500m north of the proposed scheme	Complex site with areas of unimproved and improved grassland, scrub, bracken and colonised building foundations.	Species-rich grassland will likely provide high-quality foraging habitat for bats.
Drakes Meadow and Weir LWS	1,780m south of the proposed scheme	Semi-natural broadleaved woodland and section of river.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Staple Farm Area LWS	1,800m south of the proposed scheme	Large arable farm with headlands and substantial areas of fallow set aside some of them marshy with Somerset notable breeding birds.	Low potential for bat use. Fallow field margins likely to provide good quality foraging habitat.
Forest Farm Drove LWS	1,830m south of the proposed scheme	Herb-rich drove.	Low potential for bat use. Likely to provide suitable foraging habitats.
Fieldgate Land Fields LWS	1,830m south of the proposed scheme	Arable fields with rare flora.	Field margins likely to provide good quality foraging habitat. Low potential for bat use.
The Goyle LWS	1,920m north of the proposed scheme	Ancient semi-natural broadleaved woodland in steep-sided stream valley.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.
Middleroom Wood and Lane LWS	2,000m north of the proposed scheme	Ancient woodland site, mainly mixed plantation but species rich rides and areas of semi-natural broadleaved woodland.	Woodland is likely to provide high-quality foraging habitat for bats, as well as supporting roosting features.

3.1.16. These sites are of regional importance although none have been designated for bats.

Historic bat records

3.1.17. A significant number of bat records were returned from Somerset Environmental Records Centre (SERC) within 2km of the proposed scheme. A summary of the all the results is provided in Table 3:3 below.

Table 3:3: All Historic bat records within 2km of the proposed scheme.

Species	Number of records within 2km Shows number of records (with total abundance in brackets)	Notes on significant records (hibernation and maternity roosts[9])
Bats	34 (38)	Including 10 hibernation roosts. The closest being 78m west of the scheme.
Bechstein's bat	1 (1)	1.9km south-west of the scheme in Thurlbear Wood.
Brown long-eared bat	46 (146)	Including seven hibernation roosts. The closest being 698m south-west of the scheme. Including three maternity roosts. The closest being 270m east of the scheme.
Common pipistrelle	36 (379)	Including one hibernation roost, 1.04km south-east of the scheme. Including two maternity roosts. The closest being 200m south-west of the scheme.
Daubenton's bat	3 (3)	No maternity or hibernation roosts identified.
Lesser horseshoe bat	54 (1026)	Including four hibernation roosts. The closest being 696m east of the scheme. Including one maternity roost, 2km east of the scheme.
Long-eared bat species	1 (1)	No maternity or hibernation roosts identified.
Natterer's bat	2 (3)	No maternity or hibernation roosts identified.
Noctule bat	8 (8)	No maternity or hibernation roosts identified.
Pipistrelle bat species	12 (12)	No maternity or hibernation roosts identified.

[9] Assessment of roost status based on maximum counts recorded and months when bats were recorded.

Species	Number of records within 2km Shows number of records (with total abundance in brackets)	Notes on significant records (hibernation and maternity roosts[9])
Serotine	26 (26)	One hibernation roost 698m south-west of the scheme. No maternity roosts identified.
Soprano pipistrelle	10 (33)	Including one maternity roost with 24 bats, 1.6km south of the scheme. No hibernation roosts.
Unidentified bat	8 (8)	No maternity or hibernation roosts identified.
Western barbastelle	4 (4)	Records from four separate sites. Closest is 2.4km west in Thurlbear Wood.
Whiskered bat	4 (4)	No maternity or hibernation roosts identified.
Whiskered / Brandt's bat	1 (1)	No maternity or hibernation roosts identified.

3.1.18. The data search results show the importance of the area for lesser horseshoe bats, with lesser horseshoe records representing the highest number of records with 54 records (comprising a total count of individuals recorded of 1,026) records within 2km of the scheme, including one maternity roost (940 of the 1,026 records are associated with this maternity roost) and four hibernation roosts. At least 11 species of bat have been recorded within 10km of the scheme.

Existing bat mitigation licences

3.1.19. A search for current and historic bat mitigation licenses on Multi-agency geographic information for the countryside (Magic)[10] identified bat mitigation licences within 10km of the scheme footprint. These licences covered the following species:

- Lesser horseshoe – 22 licences
- Greater horseshoe – three licences
- Brown long-eared – 46 licences
- Common pipistrelle – 48 licences
- Soprano pipistrelle – 19 licences
- Whiskered – five licences
- Natterer's – nine licences
- Brandt's – one licence
- Serotine – 14 licences

[10] https://magic.defra.gov.uk/MagicMap.aspx

- Barbastelle – one licence

3.1.20. The above licences covered impacts to 12 breeding roosts. As the licences covered multiple species it is not possible to confirm which species the breeding roosts supported, with the exception of licences for single species which included one lesser horseshoe breeding roost and one brown long-eared breeding roost.

3.1.21. Two of the bat mitigation licenses are within 2km of the scheme footprint. Species affected are listed in Table 3:4 below.

Table 3:4: Bat mitigation licenses within 2 kilometres of the scheme foot print.

License number	Bat species	Start date	End date	Location	Distance from scheme
2015-13117-EPS-MIT-1	Brown long-eared, common pipistrelle, soprano pipistrelle	03/08/2015	02/08/2020	Stoke St Mary	890m
2014-2694-EPS-MIT	Brown long-eared, lesser horseshoe and whiskered	27/08/2014	01/10/2015	Between Ruishton and Thornfalcon	980m

3.2. Field surveys

3.2.1. Information obtained from the bat surveys undertaken between 2017 and 2020 survey seasons is presented below, within their respective survey sections.

Bat activity transect surveys

3.2.2. There were 11 intended transects located across the scheme, with three static bat detectors placed along each transect route. Transects relevant to the Pink Modified option only include numbers 2, 4, 5, 6, 8, 9, 10, 11, 12, 13 and 14. Appendix D shows the location of each transect route. Table 3:5 below, provides dates and weather conditions for the transect surveys. The transect numbering has been kept the same from when the initial bat assessment of the scheme was being carried out when multiple design options were being assessed prior to preferred final design, to prevent confusion in assessment.

3.2.3. For transect 14, access was never agreed in time and it was not possible to carry out any transect surveys. Therefore, it was not possible to assess the bat status within this aspect of the landscape surrounding the scheme.

Table 3:5: Dates and weather condition of transect surveys

Transect Number	Survey Date	Weather Conditions	Temperature (°C)	Sunset / Sunrise Time	Start / Finish Time
2	04-04-17	Clear and dry slight breeze	14	Sunset: 19:51	Start: 19:36 End: 21:34
	16-05-17	Mild and dry	15	Sunset: 20:57	Start: 20:50 End: 23:05
	13-06-17	Warm and clear evening	16	Sunset: 21:27	Start: 21:27 End: 00:27
	25-07-17	Mild and calm	18	Sunrise: 05:29 Sunset: 21:07	Start: 21:07 End: 00:07
	08-08-17	Overcast, cool and dry	16	Sunset: 20:47	Start: 20:47 End: 23:47
	05-09-17	Clear with a light breeze	16	Sunset: 19:49	Start: 19:49 End: 22:49
	03-10-17	Cool and bright with high clouds	12	Sunset: 18:46	Start: 18:46 End: 21:46
4	06-04-17	Dry calm cool	11	Sunset: 19:53	Start: 19:58 End: 22:12
	18-05-17	Mild and dry	11	Sunset: 20:59	Start: 20:58 End: 23:02
	15-06-17	Cool summer's evening	15	Sunset: 21:28	Start: 21:28 End: 00:28
	13-07-17	Mild dry overcast	24	Sunset: 21:24	Start: 21:24 End: 00:24
	14-07-17	Mild dry overcast	18	Sunrise: 05:12	Start: 03:30 End: 05:30
	10-08-17	Cool and dry	15	Sunset: 20:43	Start: 20:43 End: 23:43
	07-09-17	Drizzle at start and heavy rain before survey. Dry throughout, calm and cool	15	Sunset: 19:47	Start: 19:47 End: 22:47
	10-10-17	Mild and overcast	17	Sunset: 18:30	Start: 18:30 End: 21:30
5	03-04-17	Cloudy, no breeze, cool	11	Sunset: 19:48	Start: 19:47 End: 22:12
	15-05-17	Cloudy, humid, mild. Very slight drizzle	15	Sunset: 20:55	Start: 20:35 End: 22:45
	12-06-17	Cloudy, mild	14	Sunset: 21:26	Start: 21:24 End: 00:26
	17-07-17	Warm and dry	19	Sunset: 21:19	Start: 21:21 End: 00:22
	18-07-17	Warm and dry	16	Sunrise: 05:18	Start: 03:18 End: 05:33
	07-08-17	On and off rain. Humid, cool, clam	18	Sunset: 20:48	Start: 20:48 End: 00.00
	1-09-17	Cool and breezy	14	Sunset: 19:36	Start: 19:30 End: 22:36
	09-10-17	Warm and still	16	Sunset: 18:34	Start: 18:34 End: 21:34

Transect Number	Survey Date	Weather Conditions	Temperature (ºC)	Sunset / Sunrise Time	Start / Finish Time
	15-07-20	Overcast humid, dry, moderate number of flying insects	17	Sunset: 21:19	Start: 21:19 End: 23:19
	16-07-20	Dry, high number of flying insects, overcast, calm	14	Sunrise: 05:16	Start: 02:16 End: 05:16
	05-08-20	Occasionally gusty	18	Sunset: 20:50	Start: 20:50 End: 23:50
6	04-04-17	Cool and cloudy	11	Sunset: 19:49	Start: 19:49 End: 22:05
	16-05-17	Overcast, humid and mild	16	Sunset: 20:56	Start: 20:56 End: 23:01
	13-06-17	Clear and mild	15	Sunset: 21:27	Start: 21:15 End: 00.15
	18-07-17	Humid thunder / lightening, light drizzle	22	Sunset: 21:18	Start: 21:18 End: 00:18
	08-08-17	Raining earlier during the day. Dry, cool, calm	12	Sunset: 20:45	Start: 20:45 End: 23:45
	19-09-17	Dry, overcast, cloud	17	Sunset: 19:20	Start: 19:20 End: 10:45
	10-10-17	On and off torrential rain before survey began. Some short bursts of drizzle during first 10 minutes but was dry for remainder of survey	14	Sunset: 18:33	Start: 18:33 End: 21:26
	23-07-20	Cool and dry	13	Sunrise: 05:26	Start: 02:25 End: 05:25
	23-07-20	Cool overcast	18	Sunset: 21:10	Start: 21:10 End: 00:10
8	24-04-17	Light drizzle one hour into survey and continued to end	12	Sunset: 20:20	Start: 20:20 End: 22:27
	18-05-17	Cool and clear	12	Sunset: 20:59	Start: 20:51 End: 22:48
	15-06-17	Cool and clear	14	Sunset: 21:28	Start: 21:25 End: 00:28
	19-07-17	Overcast with light rain progressing to heavy rain as the survey continued	20	Sunset: 21:19	Start: 21:19 End: 23:57
	20-07-17	Overcast with light rain, clearing as survey continued	13	Sunrise: 05:19	Start: 03:19 End: 05:16
	10-08-17	Dry, calm. Cool. Temperature was 11 degrees C at the end.	16	Sunset: 20:43	Start: 20:43 End: 23:43
	13-09-17	At start, rain was very heavy but this became lighter within	11	Sunset: 19:31 Sunrise: 06:45	Start: 19:31 End: 22:31

Transect Number	Survey Date	Weather Conditions	Temperature (ºC)	Sunset / Sunrise Time	Start / Finish Time
		20 minutes and then stopped within 35 minutes.			
	13-10-17	Warm clear evening	14	Sunset: 18:25	Start: 18:25 End: 21:25
9	25-04-17	Cool and overcast	8	Sunset: 20:20	Start: 20:12 End: 23:17
	22-05-17	Slightly humid, clear	15	Sunset: 21:07	Start: 21:07 End: 22:30
	19-06-17	Very warm and muggy	24	Sunset: 21:30	Start: 21:30 End: 00:30
	24-07-17	Cool after a hot day	19	Sunset: 21:10	Start: 21:10 End: 00:06
	25-07-17	Mild dry overcast	13	Sunrise 5:12	Start: 03:33 End: 05:28
	30-08-17	Still and mild	15	Sunset: 20:03	Start: 20:03 End: 23:03
	19-09-17	Overcast, calm, humid	15	Sunset: 19:17	Start: 19:17 End: 22:17
	24-10-17	Windy and mild	18	Sunset: 18:01	Start: 18:01 End: 21:01
10	25-04-17	Very cold, light rain by end. Stayed at 5 degrees for whole survey	5	Sunset: 20:25	Start: 20:25 End: 22:25
	23-05-17	Fine mist / drizzle	15	Sunset: 21:08	Start: 21:07 End: 23:15
	20-06-17	Warm and dry	22	Sunset: 21:30	Start: 21:29 End: 00:25
	25-07-17	Clear, fine and still with cloud on the horizon	20	Sunset: 21:08 Sunrise: 05:19	Start: 21:08 End: 00:08
	26-07-17	Overcast but fairly still with drizzle starting at 04:30 getting increasingly heavy by 05:30	17	Sunrise: 05:26	Start: 03:26 End: 05:26
	30-08-17	Dry, cool, calm	11	Sunset: 20:02	Start: 20:02 End: 23:03
	20-09-17	Light drizzle, overcast	16	Sunset: 19:15	Start: 19:15 End: 22:15
	18-10-17	Foggy, cool, overcast	12	Sunset: 18:12	Start: 18:12 End: 21:12
	14-07-20	Dry	14	Sunrise: 05:14	Start: 02:14 End: 05:14
	15-07-20	Still and dry	14	Sunset: 21:21	Start: 21:21 End: 00:21
11	26-04-17	Clear and cold with temperature dropping further	4	Sunset: 20:26	Start: 20:48 End: 22:16
	24-05-17	Clear	18	Sunset: 21:08	Start: 21:18 End: 23:24
	21-06-17	Breezy and warm	21	Sunset: 21:30	Start: 21:30

Transect Number	Survey Date	Weather Conditions	Temperature (ºC)	Sunset / Sunrise Time	Start / Finish Time
					End: 00:30
	26-07-17	Dry and breezy	18	Sunset: 21:08	Start: 21:08 End: 00:08
	27-07-17	Calm	15	Sunrise: 05:30	Start: 03:30 End: 05:45
	22-08-17	Humid and mild	19	Sunset: 20:19	Start: 20:19 End: 23:20
	21-09-17	Cold, dry, no wind	11	Sunset: 19:13	Start: 19:13 End: 22:13
	18-10-17	Cloudy, little wind, fine mist / damp	12	Sunset: 18:13	Start: 18:13 End: 21:13
	08-07-20	Dry, breeze, warm overcast	15	Sunrise: 05:07	Start: 02:07 End: 05:07
	08-07-20	Muggy and still	16	Sunset: 21:26	Start: 21:26 End: 00:19
12	27-09-17	Clear with light breeze	14	Sunset: 18:58	Start: 18:58 End: 20:24
	11-10-17	On and off light rain at start of survey but clear sky later	14	Sunset: 18:28	Start: 18:28 End: 21:28
	18-06-19	Warm evening, light rain	15	Sunset: 21:30	Start: 21:29 End: 00:44
	16-07-19	Dry and calm	16	Sunset: 21:21	Start: 21:21 End 00:08
	21-08-19	Dry	13	Sunrise: 06:08	Start: 03:08 End 06:08
	21-08-19	Warm calm evening	17	Sunset: 20:20	Start: 20:20 End: 23:20
	28-05-20	Dry, warm, still	18	Sunset: 21:11	Start: 21:14 End: 00:14
	15-09-20	Warm, dry, clear	21	Sunset: 19:28	Start: 19:28 End: 22.08
13	31-08-17	Dry, calm and cool	12	Sunset: 20:00	Start: 20:00 End: 23:00
	25-09-17	Partially cloudy, warm	16	Sunset: 09:03	Start: 19:03 End: 22:03
	30-10-17	Cool and clear	10	Sunset: 16:51	Start: 16:51 End: 19:51
	20-06-19	Dry	14	Sunset: 19:39	Start: 19:39 End: 22:39
	26-05-20	Warm, clear, dry	21	Sunset: 21:04	Start: 21:04 End: 00:04
	09-06-20	Warm, dry	20	Sunset: 09:25	Start: 09:25 End: 00:25
	23-07-20	Dry, calm	12	Sunrise: 05:26	Start: 02:23 End: 05:26
	23-07-20	Overcast, dry, calm, humid warm	17	Sunset: 21:00	Start: 21:11 End: 00:11
	03-08-20	Dry	15	Sunset: 20:55	Start: 20:55 End: 23:42

Transect Number	Survey Date	Weather Conditions	Temperature (ºC)	Sunset / Sunrise Time	Start / Finish Time
	08-09-20	Very little cloud cover with a temperature of 17 degrees	17	Sunset: 19:42	Start: 19:42 End: 22:42

3.2.4. At least 10[11] species were recorded across all the transects between 2017-2020:

- Barbastelle
- Long-eared bat Plecotus sp.
- Common pipistrelle
- Greater horseshoe
- Leisler's bat
- Lesser horseshoe
- Myotis sp.
- Noctule
- Serotine
- Soprano pipistrelle

3.2.5. A breakdown of bat species recorded across all of the transects routes is provided within Table 3:6, below.

Table 3:6: Activity transect route species counts

	Transect Route Number										
Species	**2**	**4**	**5**	**6**	**8**	**9**	**10**	**11**	**12**	**13**	**Total**
Barbastelle	5	1	5	3	6	20	1	7	0	5	53
Common pipistrelle	540	260	489	846	360	390	254	526	149	231	4,045
Greater Horseshoe	0	0	0	0	0	0	0	0	1	0	1
Lesser Horseshoe	1	5	0	1	0	6	0	0	1	2	16
Leisler's bat	15	11	0	2	12	19	3	12	0	1	75
Myotis sp.	1	33	57	22	4	34	3	35	11	4	204
Noctule	134	72	28	55	31	55	5	35	101	17	533
Nyctaloid	1	0	13	0	13	7	5	1	2	0	42
Nyctalus sp.	8	0	5	8	23	10	6	14	0	24	98
Pipistrellus sp.	15	0	5	9	6	29	2	8	3	1	78
Plecotus sp.	4	4	4	24	5	7	2	6	12	0	68
Serotine	33	54	44	62	12	12	4	27	20	29	297
Soprano pipistrelle	58	184	48	88	65	235	3	4	356	8	1,049
Total transect call number	815	624	698	1,120	537	824	288	675	656	322	6,559

[11] It is likely that more than one *Myotis* species is present as well there is potential for grey long-eared bats to be present but not possible to determine from sound analyses and therefore 10 represents the minimum number of species present.

	Transect Route Number										
Species	**2**	**4**	**5**	**6**	**8**	**9**	**10**	**11**	**12**	**13**	**Total**
Percentage of total calls across all transects	12.43	9.51	10.64	17.08	8.19	12.56	4.39	10.29	10	4.91	N/A

3.2.6. Due to the quiet nature in which long-eared bats echolocate, as they are primarily hawkers when hunting for insects, it is likely that the number is not representative of the true status long-eared species present along the transect routes as noted within BCT Guidelines.

3.2.7. Survey proformas are provided in Appendix E.

3.2.8. Appendix F includes drawings showing point data for all bat calls, and separate drawings for barbastelle and horseshoe sp., calls recorded during all the transects. Appendix F also shows heat density maps of the calls for all bat calls, barbastelle and horseshoe sp.

Transect 2

3.2.9. Surveys were all successfully completed across transect 2.

3.2.10. The transect route passes through a dark area of country side that is a mixture of arable and pasture land, that has a number of field margins with hedgerows and tree lines which offer good foraging and commuting potential, additionally there is stream that passes through which are known to be associated with particular species (Daubenton's bat as well as soprano pipistrelles). Transect 2 had a minimum total of nine species recorded, including barbastelle and lesser horseshoe. There were five recordings of barbastelles spread out across the route, one up near to the M5 / A358 junction, the second in the middle of transect along a hedge row, with the last two near to Stoke Road. Four of the five calls were recorded in September, with the other one in May. There is no clear indication in terms of how they are using this part of the landscape, but the results would indicate that they are not regularly foraging or commuting through these areas. A single recording of a lesser horseshoe was recorded in July, which would also indicate that they are not utilising this area primarily for either foraging or commuting purposes.

3.2.11. Bat activity was frequent throughout the transect but was concentrated primarily to southern end of the transect adjacent to Stoke Road along field margins and the respective hedgerow / tree line as seen in the heat map. The stream that runs through the transect also had a high level of activity associated with it. Registrations were primarily of common pipistrelles (540 calls), with noctule comprising the second most recordings (134 calls), serotine and soprano bats also had high levels of recordings. Other species recorded included Leisler's, Myotis sp. and Plecotus sp. Overall, activity along the transect

was high compared with the other transects, with it having the third highest percentage of call with 12.43% of the total bat passes recorded.

Transect 4

3.2.12. Surveys were all successfully completed across transect 4.

3.2.13. The transect route passes through Huish Woods and then around pasture fields, close to the pre-existing A358. The woodland and dense tree field margins offer a lot of foraging potential as well as roosting potential. The woodland is mature deciduous woodland, which is suitable to support the annex II species Bechstein's and barbastelle as they are heavily associated with mature ancient woodlands.

3.2.14. The transect had a minimum total of nine species, which included barbastelle and lesser horseshoe. The barbastelle GPS location was not recorded by the detector during the transect. The lesser horseshoes were recorded on the edge of Huish Woods and along the track outside the small commercial area adjacent to the A358. It is not known if the bat crossed the road. It is likely that both species are foraging in and around the woodland and the fields, which lesser horseshoes are known to prefer and barbastelle are likely to be foraging within Huish Woods.

3.2.15. Bat activity was frequent throughout the transect but was concentrated primarily to Huish Woods and around the field between the commercial area and the woodland. This is not unexpected as the woodland is a mature semi-ancient woodland which offers great foraging potential for bats. Registrations were primarily of common pipistrelles (260 calls), with soprano pipistrelle comprising the second most recording (184 calls), noctule and serotine also had high levels of recordings. Other species recorded included Myotis sp. and Plecotus sp. It was not possible to determine if any of the Myotis sp. calls were that of Bechstein's. Overall, activity along the transect was low compared with the other transects, with it having the seventh highest percentage of call with 9.51% of the total bat passes recorded.

Transect 5

3.2.16. Surveys were all completed successfully across transect 5.

3.2.17. The transect route passes through and around arable field primarily, so it is likely that there will be more commuting than foraging.

3.2.18. The transect had a minimum total of seven species, which included barbastelle. The barbastelles were recorded foraging along the trees that line the stream along the western edge of the transect route.

3.2.19. Bat activity was fairly spread out along the route, though concentrated primarily along the single lane Park Barn Lane and along the two streams, this is due to the road

and streams offering both good commuting and foraging opportunities due to the mature trees present along the linear features. Registrations were primarily of common pipistrelles (489 calls), with Myotis sp. comprising the second most recording (57 calls), soprano and serotine then had the next highest level of calls though these are still low numbers. Other species recorded included noctule and Plecotus sp. Overall, activity along the transect was high compared with the other transects, with it having the fourth highest percentage of call with 10.64% of the total bat passes recorded.

Transect 6

3.2.20. Surveys were all completed successfully across transect 6.

3.2.21. The transect route passes along and through arable fields primarily and through the small village of Ashill.

3.2.22. The transect had a minimum total of nine species, which included barbastelle and lesser horseshoes. Both species were recorded along the southern aspect of the transect route primarily following the small country road, Hastings Cross. It is likely that these were using this feature to commute along and not forage within.

3.2.23. Bat activity was fairly spread out along the route, though concentrated primarily along the unnamed road that passes along and through Ashill and along Hasting Cross, with a large peak of activity along the transect nearest to the A358 where a pasture field is boarded by trees the separates the A358. Registrations were dominated by common pipistrelles (846 calls the most along all the routes), with soprano pipistrelle comprising the second most recording (88 calls), noctule and serotine then had the next highest level of calls though these are still low numbers. Other species recorded included Myotis sp., Plecotus sp. and Leisler's. This route had the highest level of activity compared with the other transects, with 17.08% of the total bat passes recorded.

Transect 8

3.2.24. Surveys were all completed successfully across transect 8.

3.2.25. The transect route passes around a mix of arable and pasture fields, passing adjacent to residential area of Henlade, near to the A358.

3.2.26. The transect had a minimum total of eight species, which included barbastelle. The species was recorded on six occasions, along the middle section of the route which passes alongside a small woodland and field margins. It is likely that these were using the linear features to commute along with possible incidental foraging.

3.2.27. Bat activity was concentrated along the route, primarily in the middle section alongside the stream and aligning treeline, as this will be offering good foraging as well as commuting aspects. There were no call restrictions along the southern aspect of the route,

even though there were mature trees offering good foraging potential. Registrations were dominated by common pipistrelles (360 calls), with soprano pipistrelle comprising the second most recording (65 calls), noctule, Leisler's and serotine then had the next highest level of calls though these are still low numbers. Other species recorded included Myotis sp. and Plecotus sp. This route had the low level of activity compared with the other transects in 8th with 8.198% of the total bat passes recorded.

Transect 9

3.2.28. Surveys were all completed successfully across transect 9.

3.2.29. The transect passes around the edge of a large woodland (Bickenhall Wood) and a small wood (Saltfield Copse), with the rest of the route along the edges of arable fields. The woodlands and especially Bickenhall Wood will offer large foraging potential as well as roosting potential. Bickenhall wood is also an ancient woodland, providing suitable habitat for barbastelles and Bechstein's.

3.2.30. The transect had a minimum total of nine species, which included barbastelle and lesser horseshoe. This route had the highest number of barbastelle recordings of 20, with the next being seven for transect route 11. These were recorded around the edge of Bickenhall Wood and Saltfield Copse, which they were recorded foraging and commuting. The lesser horseshoes recorded with GPS were recorded along Griffin Lane which passed under the existing A358 (four didn't have locations recorded). This is a clear commuting route under the A358 to which this species and likely others are commuting along. There is also foraging opportunity along here due the woodland surrounding and the stream that flows under it adjacent to the road.

3.2.31. Bat activity was concentrated primarily around the edge of Bickenhall Wood, as well as a hot spot along Griffin Lane on the under pass of the A358. Other areas of activity included along Bickenhall Lane and adjacent to Saltfield Copse. Registrations were comprised mainly of common pipistrelles (390 calls) and soprano pipistrelle (235 calls). Noctule and Myotis sp. had the next highest level of calls though these are low numbers. Other species recorded included Leisler's, serotine and *Plecotus* sp. This route had the second highest level of activity compared with the other transects with 12.56% of the total bat passes recorded.

Transect 10

3.2.32. Surveys were all completed successfully across transect 10, though the route had to be adjusted due to access restrictions partway through the surveys. However, it was still possible to capture the different habitats present.

3.2.33. The transect passes primarily around pasture fields, as well as small residential / commercial areas, a small immature woodland, and a stream with a mature tree line to the

south of the route. These habitats provide primarily foraging potential with some commuting opportunity as well along linear features.

3.2.34. The transect had a minimum total of eight species, which included a single recording of a barbastelle. This individual was recorded close to the A358 on Capland Lane at the edge of a small wooded area. There was no evidence to say the species was crossing the A358 at this point.

3.2.35. Bat activity was concentrated primarily of foraging around Capland Farm in the middle of the transect route and the small immature woodland. Other areas of activity included along Capland Lane and unnamed road coming off the A358 leading to Village Road. Registrations were dominated by common pipistrelle with 254 calls with the second highest being Nyctalus sp. with six calls. All other species had very low levels which included Leisler's, Myotis sp., noctule, serotine, *Plecotus* sp. and soprano pipistrelle. This route had the lowest level of activity compared with the other transects with only 4.39% of the total bat passes recorded.

Transect 11

3.2.36. Surveys were successfully completed across transect 11.

3.2.37. The transect route is through arable and pasture fields in a largely rural area. The majority of field margins have trees or hedgerows lining them which offers good foraging and commuting potential.

3.2.38. There were a minimum of eight species recorded along transect 11 and transect 11 represented 10.29% of all calls recorded across all transects. There were seven barbastelles recorded across the transect fairly spread out, which would indicate that they are likely commuting through the area, with potentially foraging along the stream and the mature trees that line it.

3.2.39. Across the whole transect the main species recorded was the common pipistrelle (526 calls) representing 78% of total call recordings across the transect. Other species recorded include Leisler's bat, *Myotis* sp., noctule, *Plecotus* sp. serotine and soprano pipistrelle.

3.2.40. Most of the species recordings on transect 11 were on the south section of the transect along a very thick section of hedgerow that lines Folly Drove. The main species recorded was common pipistrelle, followed by *Myotis* species. There were three recordings of pipistrelle and one of soprano pipistrelle along this section.

3.2.41. The second section of the transect that recorded a lot of activity was along a section of hedgerow lining fields south of an unnamed road coming off of the A358. The main species recorded was common pipistrelle, followed by *Myotis* species and with two

noctule, six serotine, one soprano pipistrelle, one *Nyctalus* species and one pipistrelle species.

3.2.42. The rest of transect 11 shows sparse bat activity compared to the two sections described above.

Transect 12

3.2.43. Surveys were completed from May to October. The April transect remains outstanding due to early access restrictions and subsequent Covid-19 restrictions.

3.2.44. The transect route passes through an area of countryside that is a mixture of arable and pastureland punctuated by hedgerows and trees lining the field margins, which offers good foraging and commuting potential.

3.2.45. Transect 12 recorded ten different species spread out across the route. The majority of the recordings were for common pipistrelle (149 calls) and soprano pipistrelle (356 calls), followed by a moderate number of recordings for noctule (101 calls). Recordings were also made for serotine, *Myotis* species, *Nyctaloid* species, pipistrelle species, long eared bat, greater horseshoe and lesser horseshoe. Transect 12 represents about 10% of all bat call activity across all of the transects.

3.2.46. The north section of transect 12 reported the most activity in terms of species. This section of the transect follows the dense hedgerow and tree lined areas that are south of the Blackdown Shepherds Huts. Common pipistrelle and soprano pipistrelle were the main species recorded in this northern section of the transect, but there were also two recordings of serotine, two of long-eared bat and one of *Nyctaloid* species.

3.2.47. There is a section of transect 12 that crosses the A358 and runs along dense hedgerows south of the A358. This section of transect also has a high number of species recordings, including one pipistrelle, one serotine, one long-eared bat and a large number of common pipistrelle, noctule and soprano pipistrelle.

3.2.48. The rest of the transect has a sparse number of recordings following the outline of field boundaries.

Transect 13

3.2.49. Transects were successfully completed from May to October. The April transect remains outstanding due to early access restrictions and subsequent Covid-19 restrictions.

3.2.50. The transect route passes around the edge of woodland, through Ashe Farm and passing around the edge of arable fields adjacent to the A358. Habitats covered by the transect have good opportunities for foraging and commuting.

3.2.51. The transect had a minimum total of eight species, which included barbastelle and lesser horseshoe calls. The five recordings of barbastelle and two lesser horseshoes were all recorded on the western part of the transect, alongside the woodland and tree lines that interconnect these areas. It is likely they are foraging in these areas as well as commuting through the landscape.

3.2.52. Bat activity was fairly spread out with peak in concentration at Ashe Farm. Other areas of activity included to the west along the filed margins. Registrations were dominated by common pipistrelle with 231 calls with the second highest being serotine with 29 calls. All other species were recorded in low numbers including Leisler's, *Myotis* sp., noctule and soprano pipistrelle. This route had the second lowest level of activity compared with the other transects with only 4.91% of the total bat passes recorded.

Transect 14

3.2.53. No surveys have been undertaken to date due to access not being granted.

Static bat detector surveys

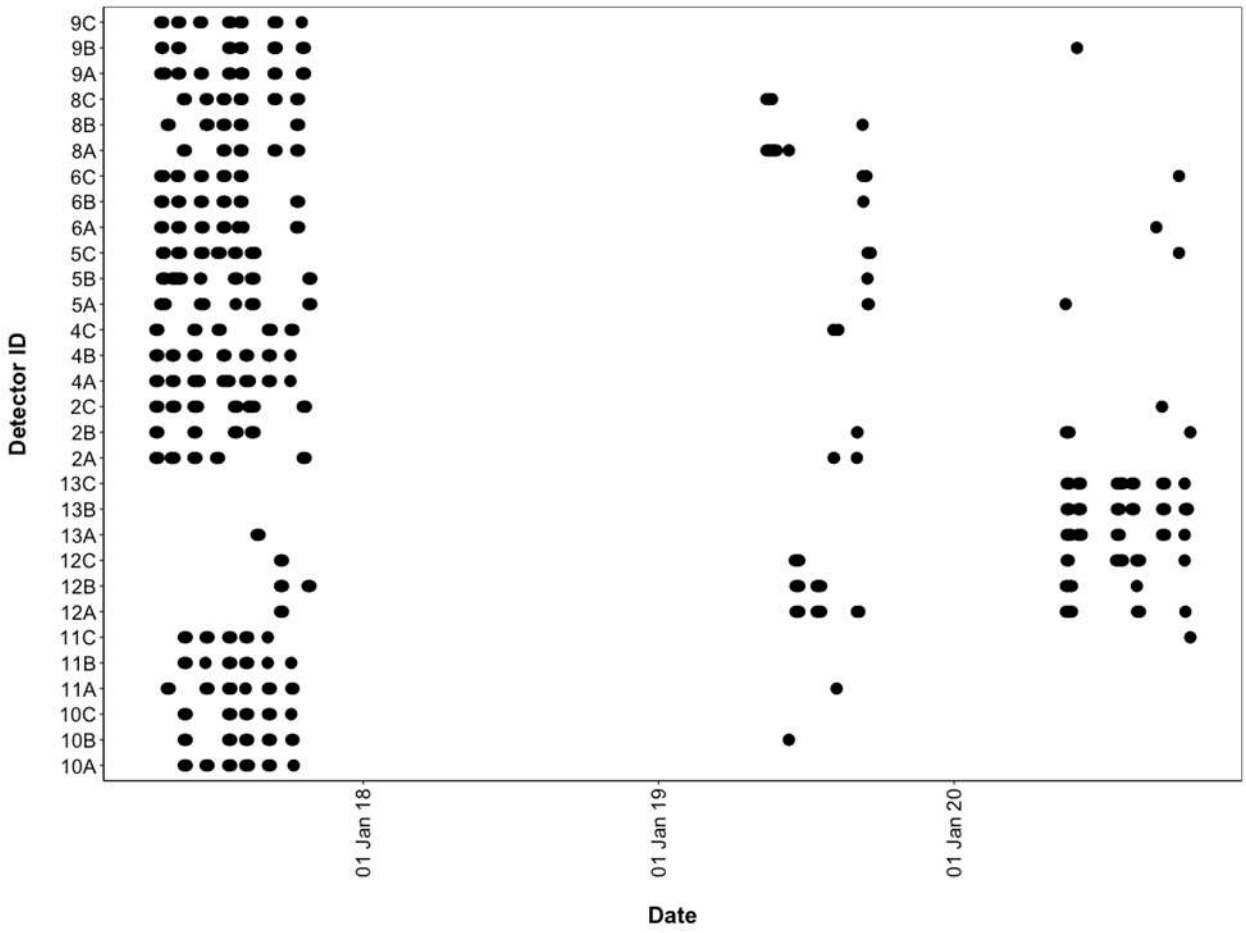
3.2.54. Three static detectors were placed along each transect for five nights per month between April and October. The location of each static is provided in Appendix D. Surveys were undertaken between 2017 and 2020. Constraints associated with the surveys, including where surveys have not been undertaken, are outlined in 2.8.12.

3.2.55. Static data has been analysed using The Mammal Society EcoBat Tool. A copy of this detailed static analysis is provided in Appendix G. A high-level summary of some of the key static data is outlined below, however, the appendix should be referred to for the full analysis. Within the EcoBat tool, a pass was defined as a single registration of up to 15 seconds.

3.2.56. A total of 30 static detector locations were surveyed throughout the survey period. These were associated with ten transects. No surveys were undertaken for statics 14 a, b and c due to access constraints. Bats were detected on 269 nights between April 2017 and October 2020. A total of 111,458 bat passes were recorded during the surveys.

3.2.57. Figure 3:1 shows the distribution of when bats were recorded during the surveys. This illustrates that the majority of the surveys were undertaken during the 2017 survey season, with additional surveys undertaken in 2019 and 2020 to fill gaps in surveys where access had not been possible during the 2017 season.

Figure 3:1 : Distribution of bats recorded during surveys



3.2.58. A total of 11 species of bat were recorded across all statics. As all *Myotis* species have been grouped together for the static analysis due to the similarities and crossover of calls, it is likely that more than 11 species are present in the survey area. Radiotracking surveys for the A358 have confirmed that there are at least three myotis species present including Bechstein's, Natterer's, and Whiskered / Brandt's. Therefore, the area is known to support at least 13 species of bat. The majority of calls were associated with *Pipistrelle* species with calls from *Pipistrelle* species (excluding Nathusius) representing 79% of all calls recorded. Table 3:7 below summarises the percentage of each bat species passes recorded.

Table 3:7: Percentage of bat calls recorded per species

Row Labels	Sum of number of bat passes across all transects	Percentage of passes
Pipistrellus pipistrellus	76,234	68.40
Pipistrellus pygmaeus	9,963	8.94
Myotis	7,838	7.03
Nyctalus noctula	6,127	5.50
Eptesicus serotinus	4,795	4.30
Pipistrellus	2,306	2.07

Row Labels	Sum of number of bat passes across all transects	Percentage of passes
Nyctaloid	1,356	1.22
Nyctalus leisleri	1,210	1.09
Barbastella barbastellus	893	0.80
Pipistrellus nathusii	486	0.44
Nyctalus	107	0.10
Rhinolophus hipposideros	82	0.07
Plecotus	51	0.05
Rhinolophus ferrumequinum	10	0.01

3.2.59. Table 3:8 below provides a summary of the percentage of species recorded across all transects throughout the surveys.

Table 3:8: Species list and percentage of bat calls recorded per static site

Static number and species	Sum of number of bats	Percentage
2A	**5,536**	
Barbastella barbastellus	7	0.13
Eptesicus serotinus	34	0.61
Myotis	53	0.96
Nyctaloid	67	1.21
Nyctalus leisleri	25	0.45
Nyctalus noctula	364	6.58
Pipistrellus	81	1.46
Pipistrellus nathusii	167	3.02
Pipistrellus pipistrellus	4,562	82.41
Pipistrellus pygmaeus	176	3.18
2B	**4,504**	
Barbastella barbastellus	44	0.98
Eptesicus serotinus	764	16.96
Myotis	115	2.55
Nyctaloid	28	0.62
Nyctalus leisleri	340	7.55
Nyctalus noctula	327	7.26
Pipistrellus	15	0.33
Pipistrellus nathusii	4	0.09
Pipistrellus pipistrellus	2,730	60.61
Pipistrellus pygmaeus	137	3.04
2C	**5,725**	
Barbastella barbastellus	8	0.14
Eptesicus serotinus	168	2.93
Myotis	113	1.97
Nyctaloid	68	1.19

Static number and species	Sum of number of bats	Percentage
Nyctalus leisleri	21	0.37
Nyctalus noctula	284	4.96
Pipistrellus	44	0.77
Pipistrellus nathusii	22	0.38
Pipistrellus pipistrellus	4,439	77.54
Pipistrellus pygmaeus	558	9.75
4A	**2,017**	
Barbastella barbastellus	19	0.94
Eptesicus serotinus	224	11.11
Myotis	28	1.39
Nyctaloid	78	3.87
Nyctalus leisleri	9	0.45
Nyctalus noctula	159	7.88
Pipistrellus	20	0.99
Pipistrellus nathusii	86	4.26
Pipistrellus pipistrellus	713	35.35
Pipistrellus pygmaeus	681	33.76
4B	**1,055**	
Barbastella barbastellus	13	1.23
Eptesicus serotinus	207	19.62
Myotis	315	29.86
Nyctaloid	89	8.44
Nyctalus leisleri	8	0.76
Nyctalus noctula	135	12.80
Pipistrellus pipistrellus	242	22.94
Pipistrellus pygmaeus	46	4.36
4C	**1,386**	
Barbastella barbastellus	7	0.51
Eptesicus serotinus	125	9.02
Myotis	166	11.98
Nyctaloid	31	2.24
Nyctalus leisleri	5	0.36
Nyctalus noctula	109	7.86
Pipistrellus	8	0.58
Pipistrellus pipistrellus	759	54.76
Pipistrellus pygmaeus	175	12.63
Rhinolophus hipposideros	1	0.07
5A	**957**	
Barbastella barbastellus	45	4.70
Eptesicus serotinus	99	10.34
Myotis	111	11.60
Nyctaloid	36	3.76
Nyctalus leisleri	7	0.73
Nyctalus noctula	120	12.54

Static number and species	Sum of number of bats	Percentage
Pipistrellus	2	0.21
Pipistrellus nathusii	4	0.42
Pipistrellus pipistrellus	495	51.72
Pipistrellus pygmaeus	38	3.97
5B	**5,808**	
Barbastella barbastellus	25	0.43
Eptesicus serotinus	182	3.13
Myotis	179	3.08
Nyctaloid	72	1.24
Nyctalus leisleri	8	0.14
Nyctalus noctula	194	3.34
Pipistrellus	675	11.62
Pipistrellus nathusii	1	0.02
Pipistrellus pipistrellus	3,913	67.37
Pipistrellus pygmaeus	559	9.62
5C	**3,646**	
Barbastella barbastellus	7	0.19
Eptesicus serotinus	151	4.14
Myotis	267	7.32
Nyctaloid	72	1.97
Nyctalus leisleri	8	0.22
Nyctalus noctula	119	3.26
Pipistrellus	45	1.23
Pipistrellus nathusii	10	0.27
Pipistrellus pipistrellus	2,795	76.66
Pipistrellus pygmaeus	172	4.72
6A	**1,255**	
Barbastella barbastellus	11	0.88
Eptesicus serotinus	31	2.47
Myotis	128	10.20
Nyctaloid	43	3.43
Nyctalus leisleri	4	0.32
Nyctalus noctula	53	4.22
Pipistrellus	1	0.08
Pipistrellus nathusii	1	0.08
Pipistrellus pipistrellus	943	75.14
Pipistrellus pygmaeus	40	3.19
6B	**2,938**	
Barbastella barbastellus	26	0.88
Eptesicus serotinus	424	14.43
Myotis	188	6.40
Nyctaloid	86	2.93
Nyctalus leisleri	14	0.48
Nyctalus noctula	116	3.95

Static number and species	Sum of number of bats	Percentage
Pipistrellus	27	0.92
Pipistrellus nathusii	6	0.20
Pipistrellus pipistrellus	1,582	53.85
Pipistrellus pygmaeus	469	15.96
6C	**8,268**	
Barbastella barbastellus	7	0.08
Eptesicus serotinus	373	4.51
Myotis	1,435	17.36
Nyctaloid	108	1.31
Nyctalus leisleri	318	3.85
Nyctalus noctula	105	1.27
Pipistrellus	122	1.48
Pipistrellus nathusii	1	0.01
Pipistrellus pipistrellus	5,623	68.01
Pipistrellus pygmaeus	176	2.13
8A	**6,081**	
Barbastella barbastellus	3	0.05
Eptesicus serotinus	165	2.71
Myotis	107	1.76
Nyctaloid	76	1.25
Nyctalus leisleri	12	0.20
Nyctalus noctula	252	4.14
Pipistrellus	29	0.48
Pipistrellus nathusii	7	0.12
Pipistrellus pipistrellus	4,922	80.94
Pipistrellus pygmaeus	506	8.32
Rhinolophus hipposideros	2	0.03
8B	**7,311**	
Barbastella barbastellus	426	5.83
Eptesicus serotinus	176	2.41
Myotis	293	4.01
Nyctaloid	98	1.34
Nyctalus leisleri	22	0.30
Nyctalus noctula	267	3.65
Pipistrellus	31	0.42
Pipistrellus nathusii	2	0.03
Pipistrellus pipistrellus	4,357	59.60
Pipistrellus pygmaeus	1,639	22.42
8C	**5,431**	
Barbastella barbastellus	10	0.18
Eptesicus serotinus	143	2.63
Myotis	100	1.84
Nyctaloid	34	0.63
Nyctalus leisleri	22	0.41

Static number and species	Sum of number of bats	Percentage
Nyctalus noctula	231	4.25
Pipistrellus	7	0.13
Pipistrellus nathusii	25	0.46
Pipistrellus pipistrellus	4,435	81.66
Pipistrellus pygmaeus	424	7.81
9A	**2,383**	
Barbastella barbastellus	6	0.25
Eptesicus serotinus	109	4.57
Myotis	174	7.30
Nyctaloid	24	1.01
Nyctalus leisleri	1	0.04
Nyctalus noctula	187	7.85
Pipistrellus pipistrellus	85	3.57
Pipistrellus pygmaeus	1,797	75.41
9B	**2,028**	
Barbastella barbastellus	1	0.05
Eptesicus serotinus	46	2.27
Myotis	343	16.91
Nyctaloid	3	0.15
Nyctalus leisleri	8	0.39
Nyctalus noctula	91	4.49
Pipistrellus pipistrellus	951	46.89
Pipistrellus pygmaeus	583	28.75
Plecotus	1	0.05
Rhinolophus hipposideros	1	0.05
9C	**4,661**	
Barbastella barbastellus	2	0.04
Eptesicus serotinus	54	1.16
Myotis	119	2.55
Nyctaloid	26	0.56
Nyctalus noctula	76	1.63
Pipistrellus	19	0.41
Pipistrellus pipistrellus	4,196	90.02
Pipistrellus pygmaeus	169	3.63
10A	**4,594**	
Barbastella barbastellus	65	1.41
Eptesicus serotinus	164	3.57
Myotis	1,210	26.34
Nyctaloid	42	0.91
Nyctalus leisleri	15	0.33
Nyctalus noctula	297	6.46
Pipistrellus	6	0.13
Pipistrellus nathusii	20	0.44
Pipistrellus pipistrellus	2,440	53.11

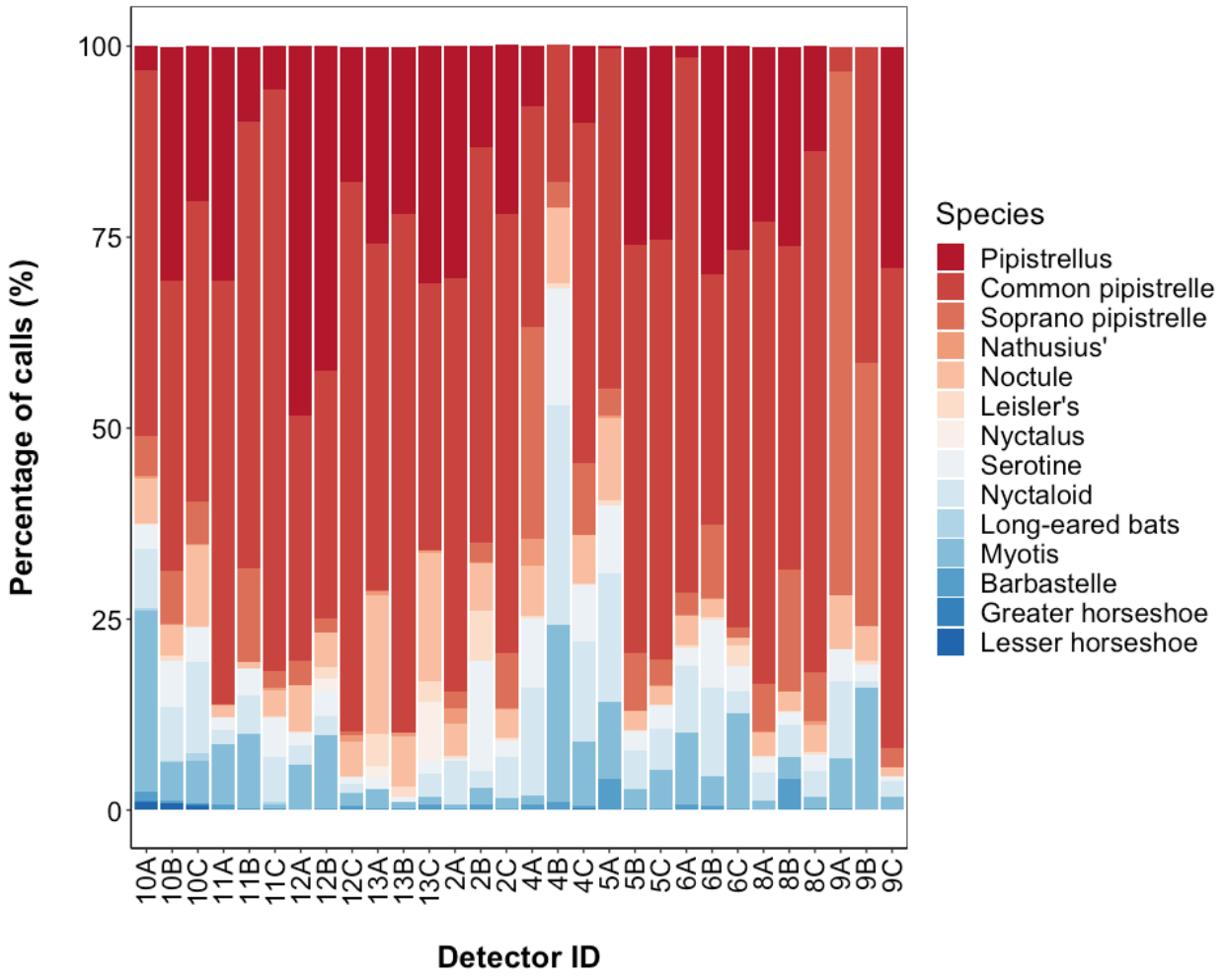
Static number and species	Sum of number of bats	Percentage
Pipistrellus pygmaeus	260	5.66
Plecotus	19	0.41
Rhinolophus ferrumequinum	7	0.15
Rhinolophus hipposideros	49	1.07
10B	**1,419**	
Barbastella barbastellus	9	0.63
Eptesicus serotinus	133	9.37
Myotis	108	7.61
Nyctaloid	24	1.69
Nyctalus leisleri	12	0.85
Nyctalus noctula	86	6.06
Pipistrellus	41	2.89
Pipistrellus nathusii	2	0.14
Pipistrellus pipistrellus	824	58.07
Pipistrellus pygmaeus	155	10.92
Plecotus	5	0.35
Rhinolophus ferrumequinum	1	0.07
Rhinolophus hipposideros	19	1.34
10C	**1,251**	
Barbastella barbastellus	3	0.24
Eptesicus serotinus	79	6.31
Myotis	98	7.83
Nyctaloid	47	3.76
Nyctalus leisleri	1	0.08
Nyctalus noctula	188	15.03
Pipistrellus	13	1.04
Pipistrellus nathusii	2	0.16
Pipistrellus pipistrellus	692	55.32
Pipistrellus pygmaeus	98	7.83
Plecotus	18	1.44
Rhinolophus ferrumequinum	2	0.16
Rhinolophus hipposideros	10	0.80
11A	**5,686**	
Barbastella barbastellus	56	0.98
Eptesicus serotinus	132	2.32
Myotis	654	11.50
Nyctaloid	29	0.51
Nyctalus leisleri	1	0.02
Nyctalus noctula	125	2.20
Pipistrellus	82	1.44
Pipistrellus nathusii	14	0.25
Pipistrellus pipistrellus	4,589	80.71
Pipistrellus pygmaeus	4	0.07
11B	**5,890**	

Static number and species	Sum of number of bats	Percentage
Barbastella barbastellus	12	0.20
Eptesicus serotinus	192	3.26
Myotis	510	8.66
Nyctaloid	49	0.83
Nyctalus leisleri	3	0.05
Nyctalus noctula	64	1.09
Pipistrellus	3	0.05
Pipistrellus nathusii	1	0.02
Pipistrellus pipistrellus	4,245	72.07
Pipistrellus pygmaeus	811	13.77
11C	**3,238**	
Barbastella barbastellus	8	0.25
Eptesicus serotinus	187	5.78
Myotis	22	0.68
Nyctaloid	30	0.93
Nyctalus leisleri	5	0.15
Nyctalus noctula	126	3.89
Pipistrellus	4	0.12
Pipistrellus nathusii	15	0.46
Pipistrellus pipistrellus	2757	85.15
Pipistrellus pygmaeus	77	2.38
Plecotus	7	0.22
12A	**3,601**	
Barbastella barbastellus	2	0.06
Eptesicus serotinus	107	2.97
Myotis	349	9.69
Nyctaloid	46	1.28
Nyctalus leisleri	6	0.17
Nyctalus noctula	355	9.86
Pipistrellus	696	19.33
Pipistrellus pipistrellus	1,908	52.99
Pipistrellus pygmaeus	132	3.67
12B	**2,589**	
Barbastella barbastellus	3	0.12
Eptesicus serotinus	155	5.99
Myotis	447	17.27
Nyctaloid	19	0.73
Nyctalus	38	1.47
Nyctalus leisleri	70	2.70
Nyctalus noctula	205	7.92
Pipistrellus	93	3.59
Pipistrellus nathusii	1	0.04
Pipistrellus pipistrellus	1,498	57.86
Pipistrellus pygmaeus	60	2.32

Static number and species	Sum of number of bats	Percentage
12C	**3,833**	
Barbastella barbastellus	22	0.57
Eptesicus serotinus	36	0.94
Myotis	79	2.06
Nyctaloid	25	0.65
Nyctalus leisleri	14	0.37
Nyctalus noctula	200	5.22
Pipistrellus	150	3.91
Pipistrellus nathusii	40	1.04
Pipistrellus pipistrellus	3,248	84.74
Pipistrellus pygmaeus	18	0.47
Plecotus	1	0.03
13A	**1,504**	
Barbastella barbastellus	4	0.27
Eptesicus serotinus	28	1.86
Myotis	52	3.46
Nyctalus	12	0.80
Nyctalus leisleri	87	5.78
Nyctalus noctula	369	24.53
Pipistrellus	20	1.33
Pipistrellus nathusii	11	0.73
Pipistrellus pipistrellus	918	61.04
Pipistrellus pygmaeus	3	0.20
13B	**5,053**	
Barbastella barbastellus	22	0.44
Eptesicus serotinus	54	1.07
Myotis	46	0.91
Nyctalus leisleri	88	1.74
Nyctalus noctula	427	8.45
Pipistrellus	49	0.97
Pipistrellus nathusii	31	0.61
Pipistrellus pipistrellus	4,336	85.81
13C	**1,810**	
Barbastella barbastellus	20	1.10
Eptesicus serotinus	53	2.93
Myotis	29	1.60
Nyctaloid	6	0.33
Nyctalus	57	3.15
Nyctalus leisleri	76	4.20
Nyctalus noctula	496	27.40
Pipistrellus	23	1.27
Pipistrellus nathusii	13	0.72
Pipistrellus pipistrellus	1,037	57.29
Grand Total	111,458	

3.2.60. Figure 3:2 below provides an illustration of the percentage of bat calls at each static detector location. A similar pattern of percentage activity was recorded across the majority of the static sites, with the majority of passes from common and soprano pipistrelle bats. One exception to this is static location 4b, where 25% of calls were common / soprano pipistrelle, with *Myotis* species being the most frequently recorded with 30% of passes.

Figure 3:2 : Percentage species composition of passes at each detector (EcoBat)



Percentile Analysis

3.2.61. Figure 3:2 illustrates the results of the percentile analysis to give a comparison of bat activity recorded on site, to identify relative bat activity levels compared to existing records in the same region. This enables the survey data to be contextualised against reference levels recorded in the same region. The reference dataset used for comparison was stratified to include records within 100km^2 of the survey location. The 100km^2 dataset was selected by EcoBat based on the existing dataset available, to provide a comparison of the site survey data with existing data held on the EcoBat database for the local geographic area, to identify the relative activity levels recorded during the surveys. The

reference dataset is based on existing records held by EcoBat including the NBN Gateway[12].

3.2.62. Relative activity levels are based on the following categories:

- low activity: 0-20th percentiles
- low to moderate activity: 21st-40th percentiles
- moderate activity: 41st-60th percentiles
- moderate to high activity: 61st-80th percentiles
- high activity: 81st-100th percentiles

3.2.63. Figure 3:3 illustrates differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).

3.2.64. The results illustrate that high levels of bat activity were most frequently observed for common pipistrelle, with nights of high levels of activity recorded across all static locations. The interquartile range was within the high activity range for all static sites except 2b, 4a, 4b, 5a and 9a. For these sites common pipistrelle activity was moderate to high, except 9a where activity levels for common pipistrelle were low to moderate. Soprano pipistrelle activity was generally lower, with activity levels typically moderate or moderate to high. High levels of soprano pipistrelle activity were recorded at 11b, 12a and 8b.

3.2.65. High levels of *Myotis* activity were recorded at 10a, 11a, 11b, 4b, 6b, 6c, 8b and 9b. The highest median levels of activity were at 10a where high activity levels were recorded, with the lowest median activity level associated with static 11c where low activity levels were recorded. Across the other statics, *Myotis* activity levels ranged between low-moderate and moderate-high.

3.2.66. Serotine activity levels peaked at high at statics 2b, 2c, 4a, 5b, 5c, 6a, 6b, 6c, 9a and 11b. The interquartile range was generally low to moderate or moderate across the site, with 4b recording the highest upper limit of the interquartile range, peaking at moderate to high levels of activity.

3.2.67. The interquartile range of noctule activity was generally in the low-moderate, to moderate range, with highest levels recorded at 2a, 2b, 2c, 4c, 5b, 8b, 10a, 10c, 12a, 12b, 13a, 13b, and 13c where the interquartile range covered the moderate to high activity level. Peaks in high noctule activity were recorded at half of the static sites.

3.2.68. Leisler's activity was generally low, with peaks of high activity at statics 6c and 2a, and moderate to high activity at 12b, 13a, 13b and 13c.

[12] https://nbnatlas.org/

3.2.69. Barbastelle were recorded across all statics. The highest levels of activity were associated with 8b, where there were peaks of high activity and the interquartile range covered the moderate to high activity band. 8b recorded the highest number of barbastelle passes in total, with 426 passes. The majority of this activity was from the September deployment with 412 passes, with other months recording only single figures. Peaks of moderate to high activity were recorded at 10a (45 passes in August) and 5a (33 passes in September), with low activity in other months. Median activity for barbastelle was either low or low to moderate, with the highest median activity at static 11a and 2b.

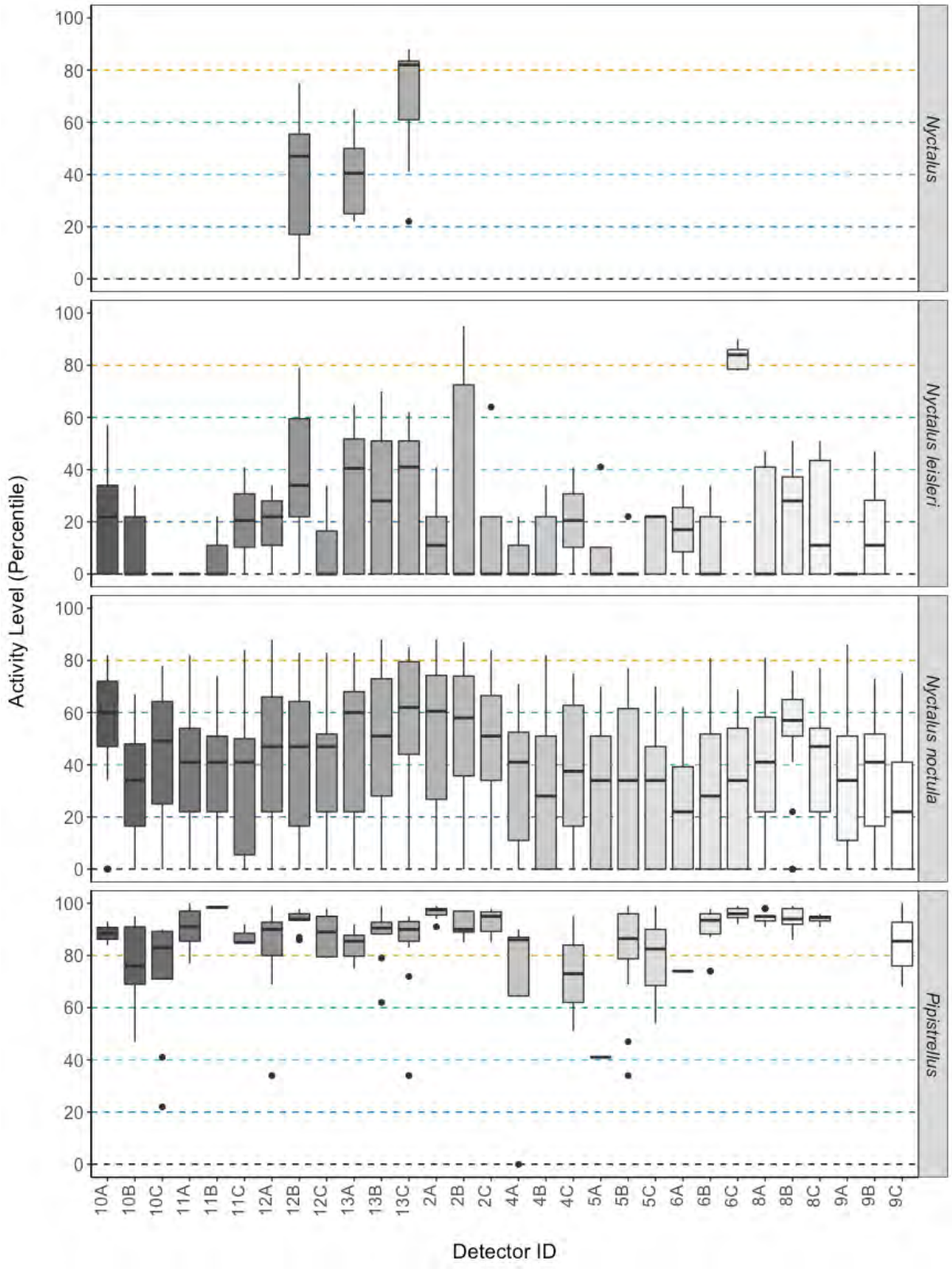
3.2.70. Lesser horseshoes were recorded at 4c, 8a, 9b, 10a 10b and 10c. Activity was typically low with a maximum number of 49 passes associated with 10a.

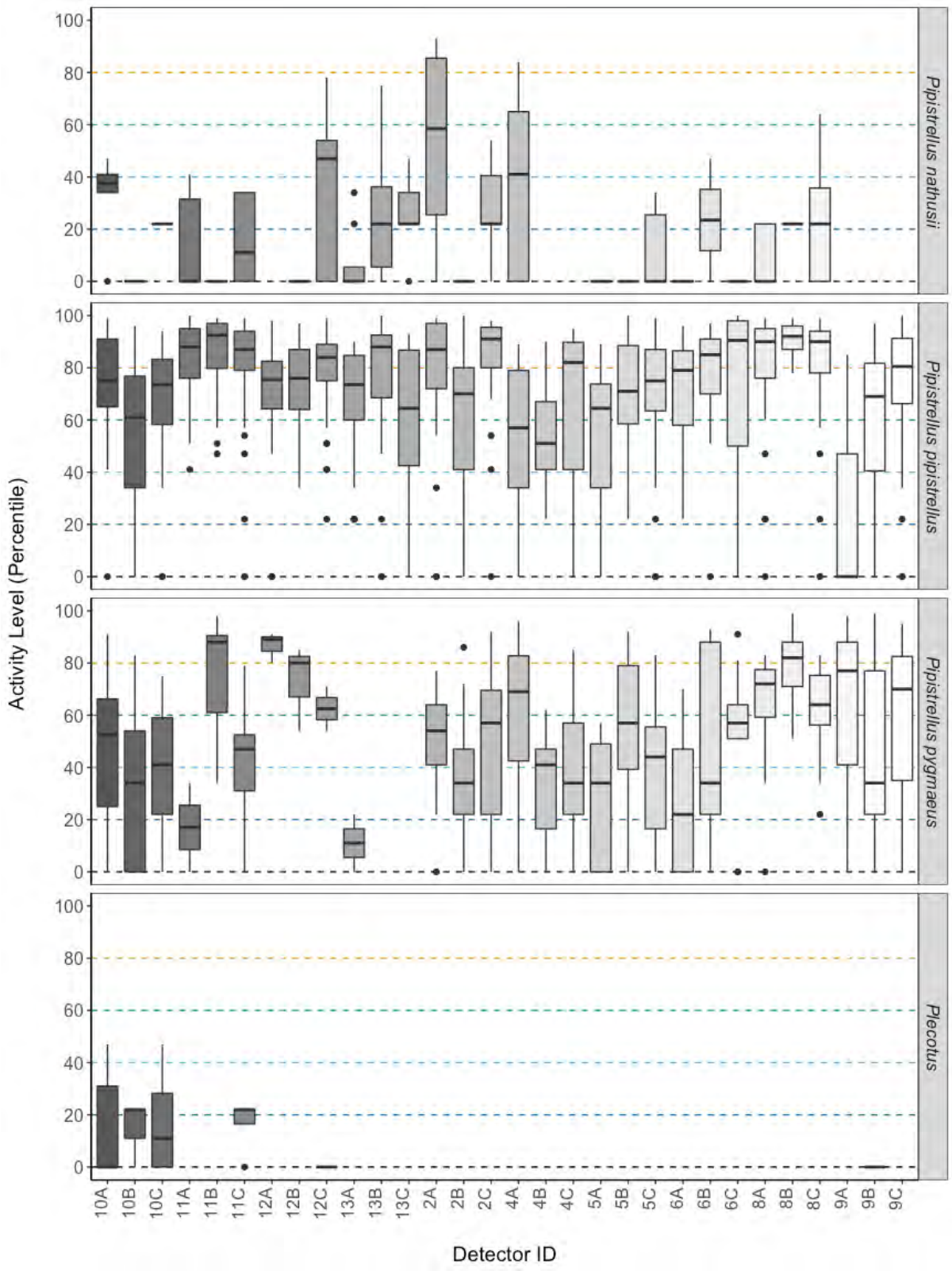
3.2.71. Greater horseshoes were recorded at 10a, 10b and 10c. Activity was low with a maximum number of seven passes at 10a.

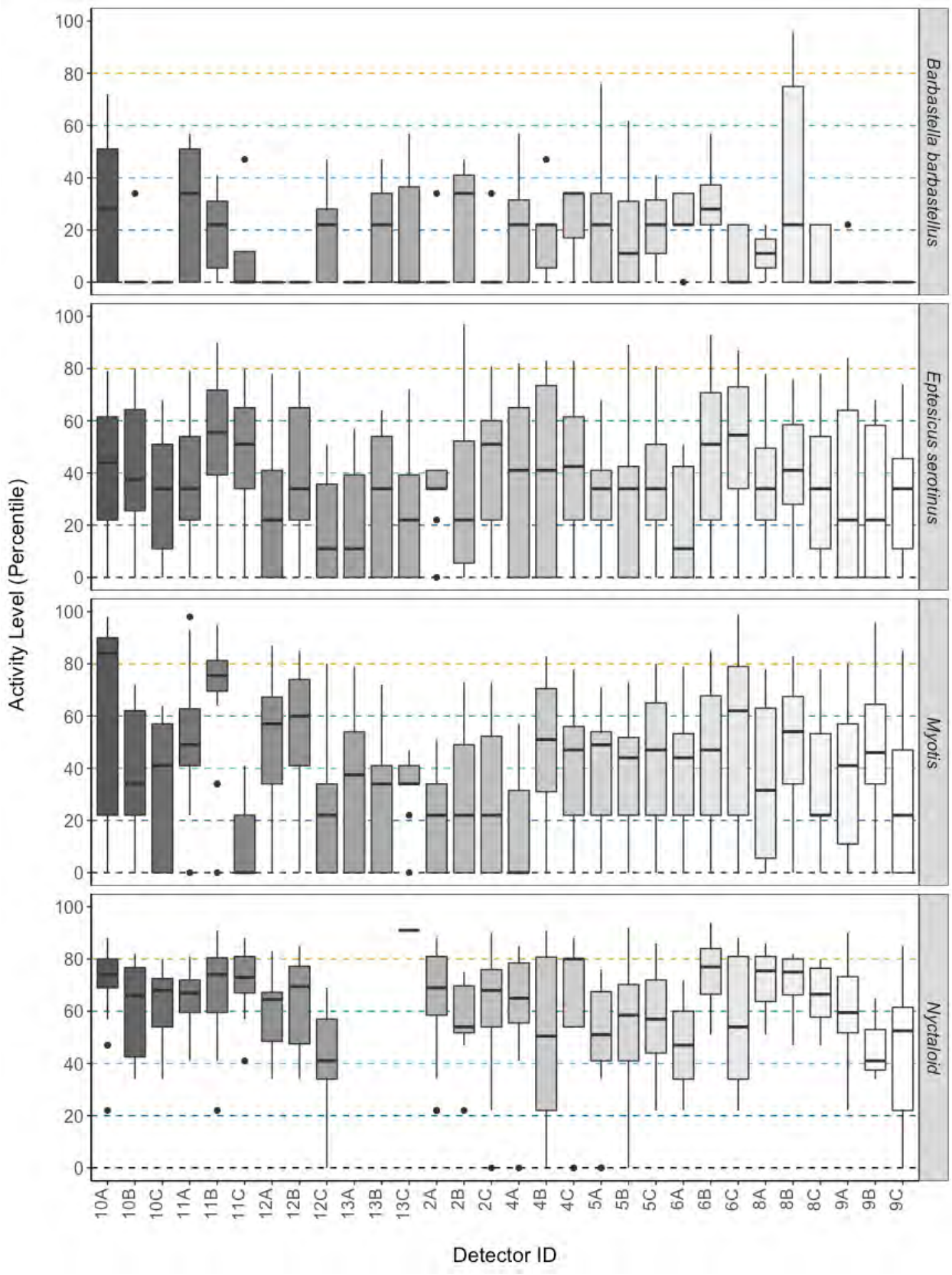
3.2.72. Nathusius pipistrelle were recorded at 24 of the 30 static sites. Activity was typically in the low to low-moderate range. A peak of high activity was associated with 2a with 167 calls and the interquartile range is just within the high activity band for this static. The interquartile range for 4a is just within the moderate to high band, and the interquartile range for 12c is within the moderate activity band.

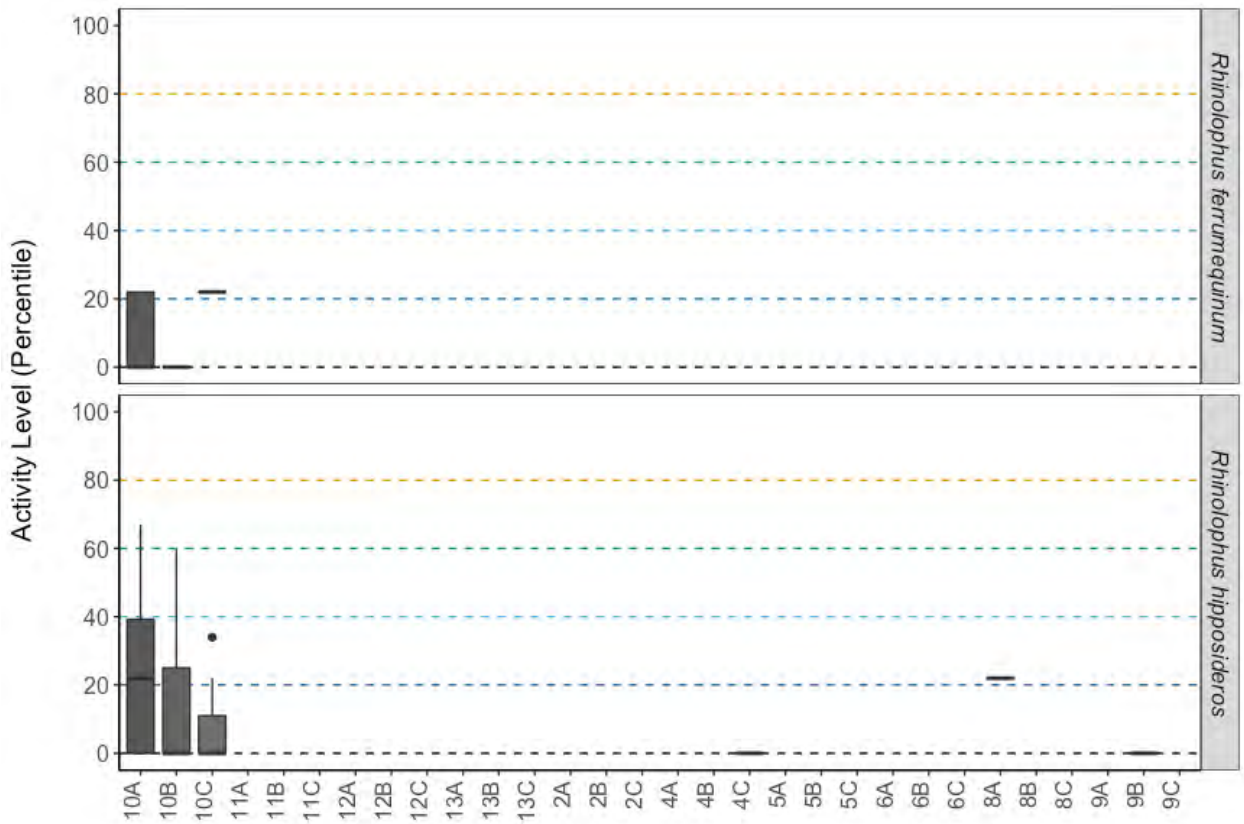
3.2.73. *Plecotus* activity was low throughout the site. However, this is likely to reflect the very quiet calls of these species, rather than a true reflection of the distribution and abundance of these species. Whilst it is not possible to differentiate between calls of brown long-eared and grey long-eared, it is probable that most calls are associated with brown long-eared bats, as this species is more widespread. Additionally, all long-eared species recorded during the mist netting and radiotracking studies were brown long-eared.

Figure 3:3 : Percentile bat activity level (EcoBat)



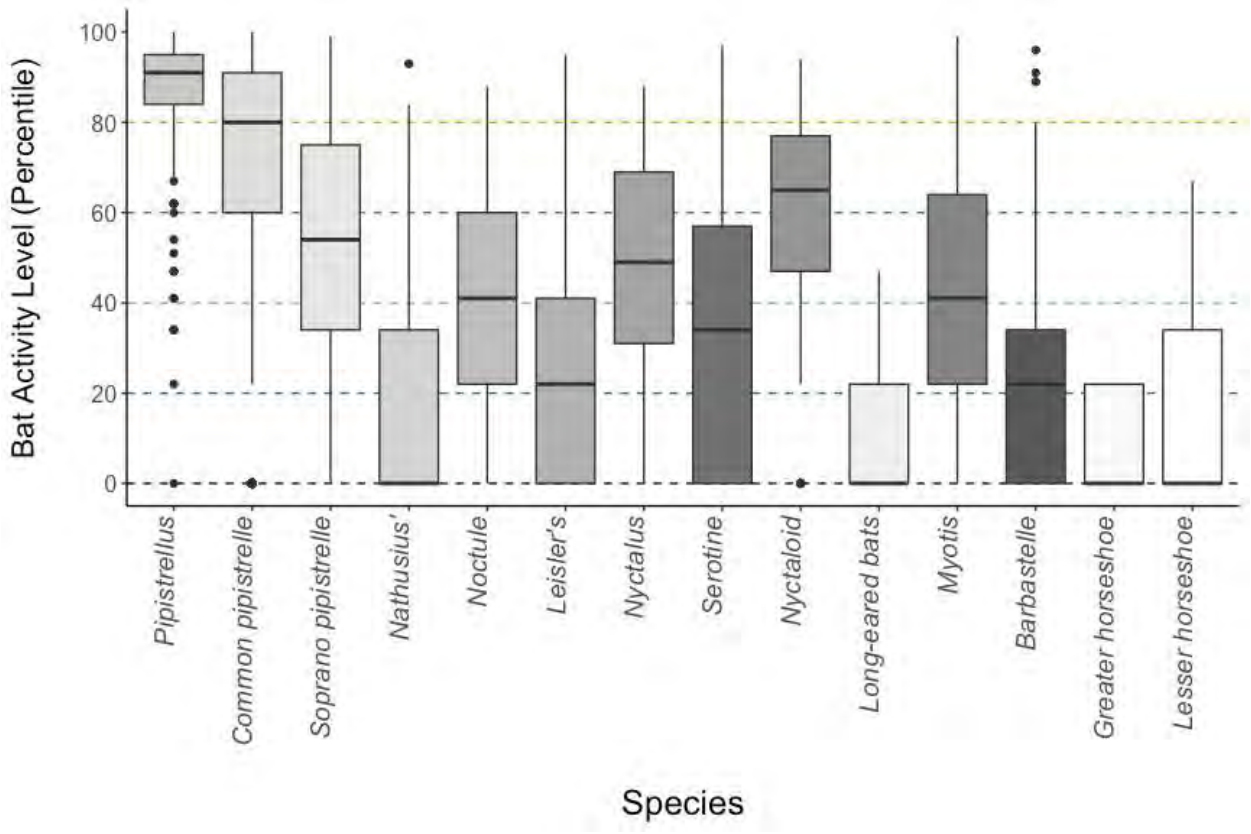

Activity Level (Percentile)
Pipistrellus nathusii
Pipistrellus pipistrellus
Pipistrellus pygmaeus
Plecotus
0
20
40
60
80
100
10A
10B
10C
11A
11B
11C
12A
12B
12C
13A
13B
13C
2A
2B
2C
4A
4B
4C
5A
5B
5C
6A
6B
6C
8A
8B
8C
9A
9B
9C
Detector ID


Activity Level (Percentile)
Barbastella barbastellus
Eptesicus serotinus
Myotis
Nyctaloid
0
20
40
60
80
100
10A
10B
10C
11A
11B
11C
12A
12B
12C
13A
13B
13C
2A
2B
2C
4A
4B
4C
5A
5B
5C
6A
6B
6C
8A
8B
8C
9A
9B
9C
Detector ID



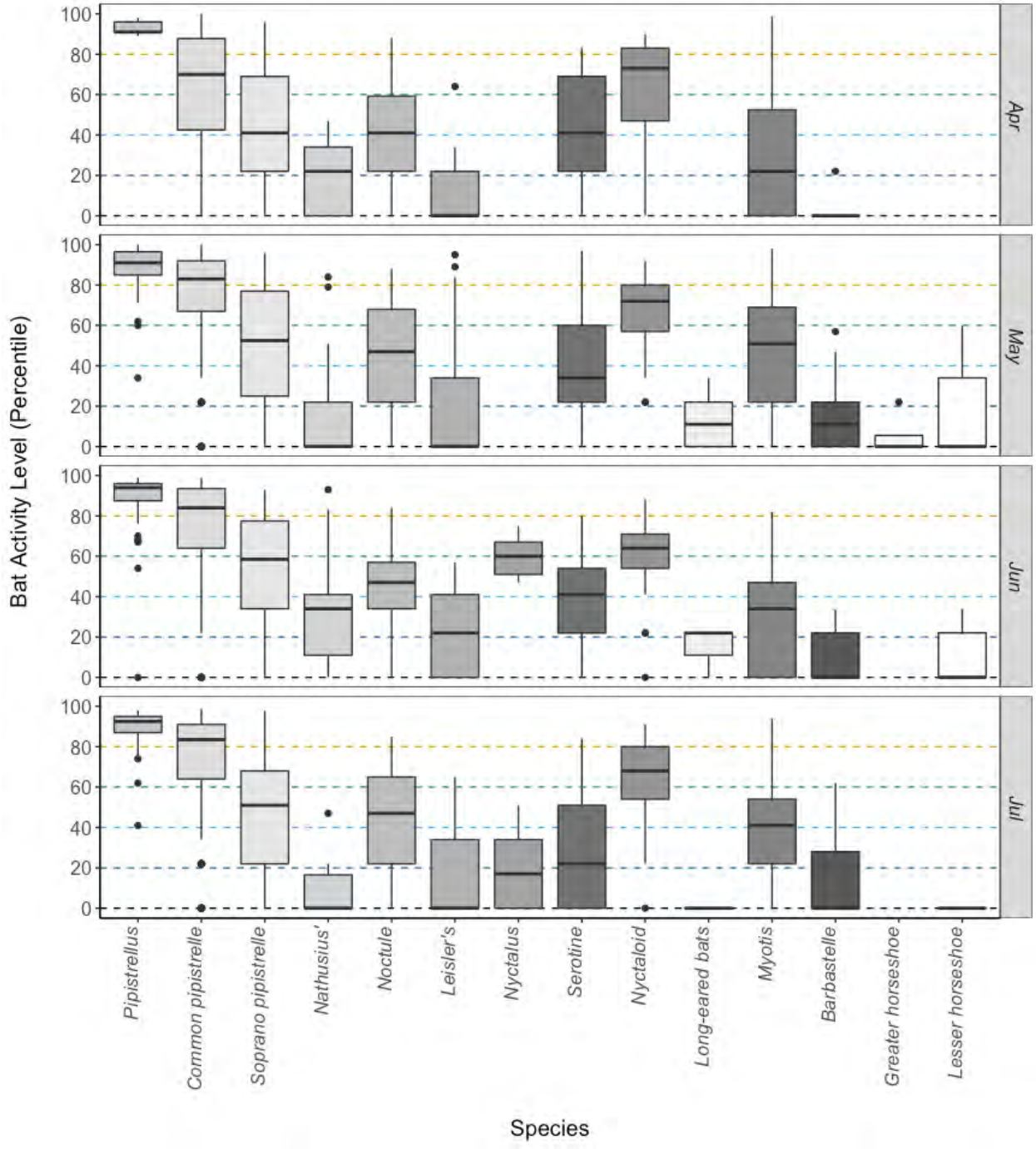
3.2.74. Figure 3:4 below illustrates the results of the percentile activity levels recorded across each night of the bat survey for the entire site. This illustrates that common pipistrelle and *pipistrellus* species activity was high with the interquartile range and median activity within the high band. Soprano pipistrelle activity was lower, with peaks of high activity, but an interquartile range covering the moderate to high band and a moderate median level of activity. Moderate to high median and interquartile range activity was recorded for *Nyctaloid* bats (where calls could not be differentiated between noctule, Leisler's and serotine). Peaks of high activity were recorded for common pipistrelle, soprano pipistrelle, Nathusius pipistrelle, noctule, Leisler's, serotine, *Nyctaloid*, *Myotis* species and barbastelle. The interquartile range and median activity level for barbastelle was in the low to moderate band. The median activity level for greater and lesser horseshoe was in the low band, with the interquartile range just within the low to moderate band for greater horseshoe and within the low to moderate band for lesser horseshoe. For lesser horseshoe there was a peak of moderate to high activity.

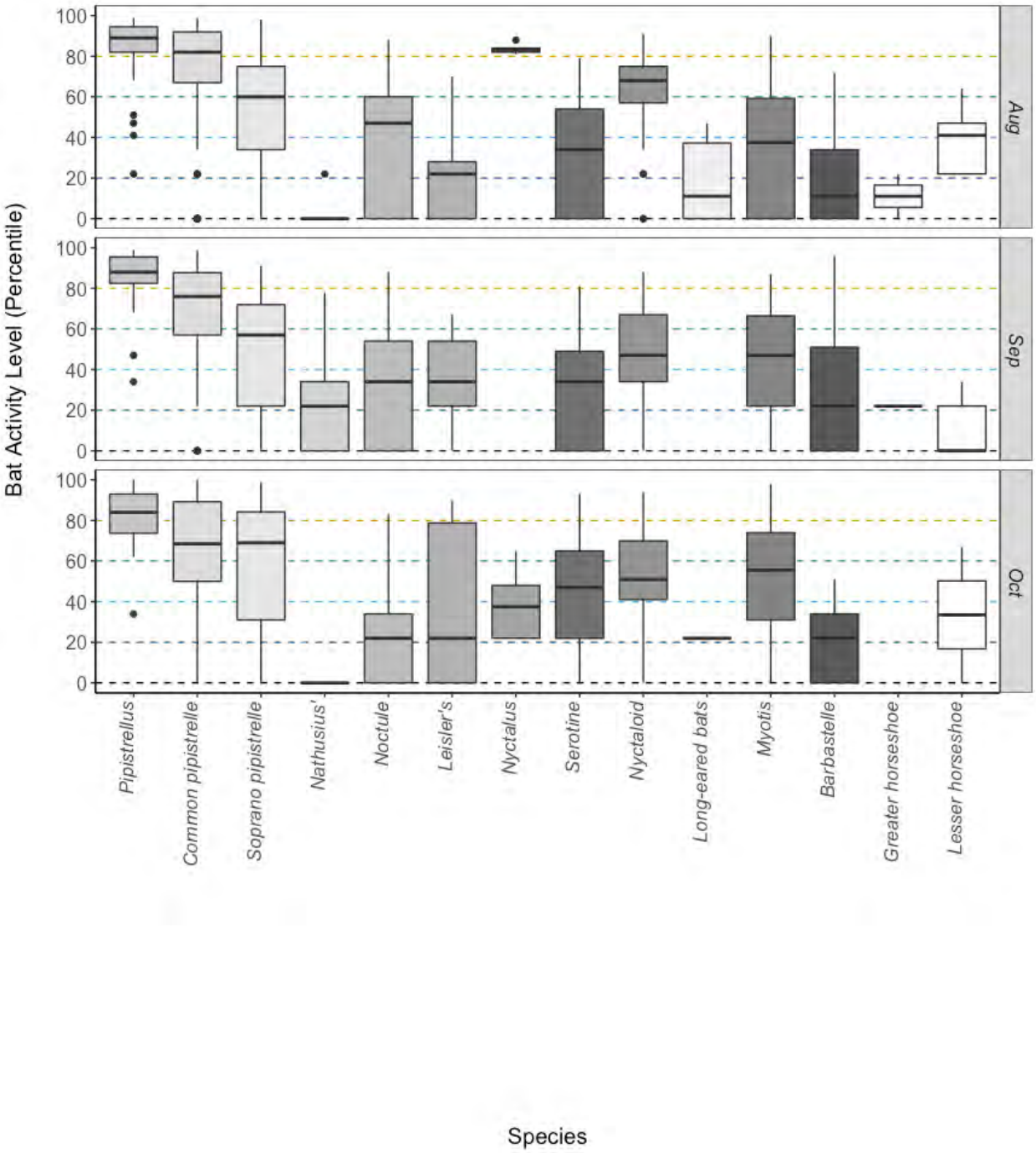
Figure 3:4 : Percentile bat activity per species across entire site (EcoBat)



3.2.75. A comparison of bat activity across each night of the bat survey for the entire site split between months is illustrated in Figure 3:5 below. This illustrates that percentile bat activity was fairly consistent throughout the season for most species. Peaks in Leisler's activity were recorded in September and October and lesser horseshoe activity was greatest in August and October.

Figure 3:5 : Percentile bat activity per species across entire site (EcoBat)




Bat Activity Level (Percentile)
100
80
60
40
20
0
Aug
Sep
Oct
Pipistrellus
Common pipistrelle
Soprano pipistrelle
Nathusius'
Noctule
Leisler's
Nyctalus
Serotine
Nyctaloid
Long-eared bats
Myotis
Barbastelle
Greater horseshoe
Lesser horseshoe
Species

Analysis of static data to identify likely proximity of roosts

3.2.76. Using the EcoBat tool, an analysis was made of the timings of bat passes compared with typical emergence times (based on Russ 2012[13]) for each bat species. Within the EcoBat tool, a pass was defined as a single registration of up to 15 seconds. Figure 3:6 below shows for each static location all bat passes between 15 minutes before sunset and 90 minutes after sunset, with emergence times for each species shown as a grey bar. Where there is an overlap in bat passes and emergence times (or where bat passes are recorded earlier than typical emergence times) this may indicate the close proximity of a roost.

3.2.77. High levels of common pipistrelle activity were recorded around emergence time or before for statics 2a, 2b, 2c, 4a, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 6c, 8a, 8b, 8c, 9c, 10a, 10b, 10c, 11a, 11b, 11c, 12a, 12b, 12c, 13a and 13c, indicating the likely presence of roosts within proximity of these static locations.

3.2.78. High levels of soprano pipistrelle activity were recorded around emergence time of before for statics 2a, 2b, 2c, 4a, 4b, 4c, 5b, 6c, 8a, 8b, 9a, 9b, 9c, 10a, 10b, 10c, 11b, 12a, and 12b, indicating the likely presence of roosts within proximity of these static locations.

3.2.79. High levels of Nathusius pipistrelle activity was recorded around emergence time or before for static 4a, indicating the likely presence of roosts within proximity of these static locations.

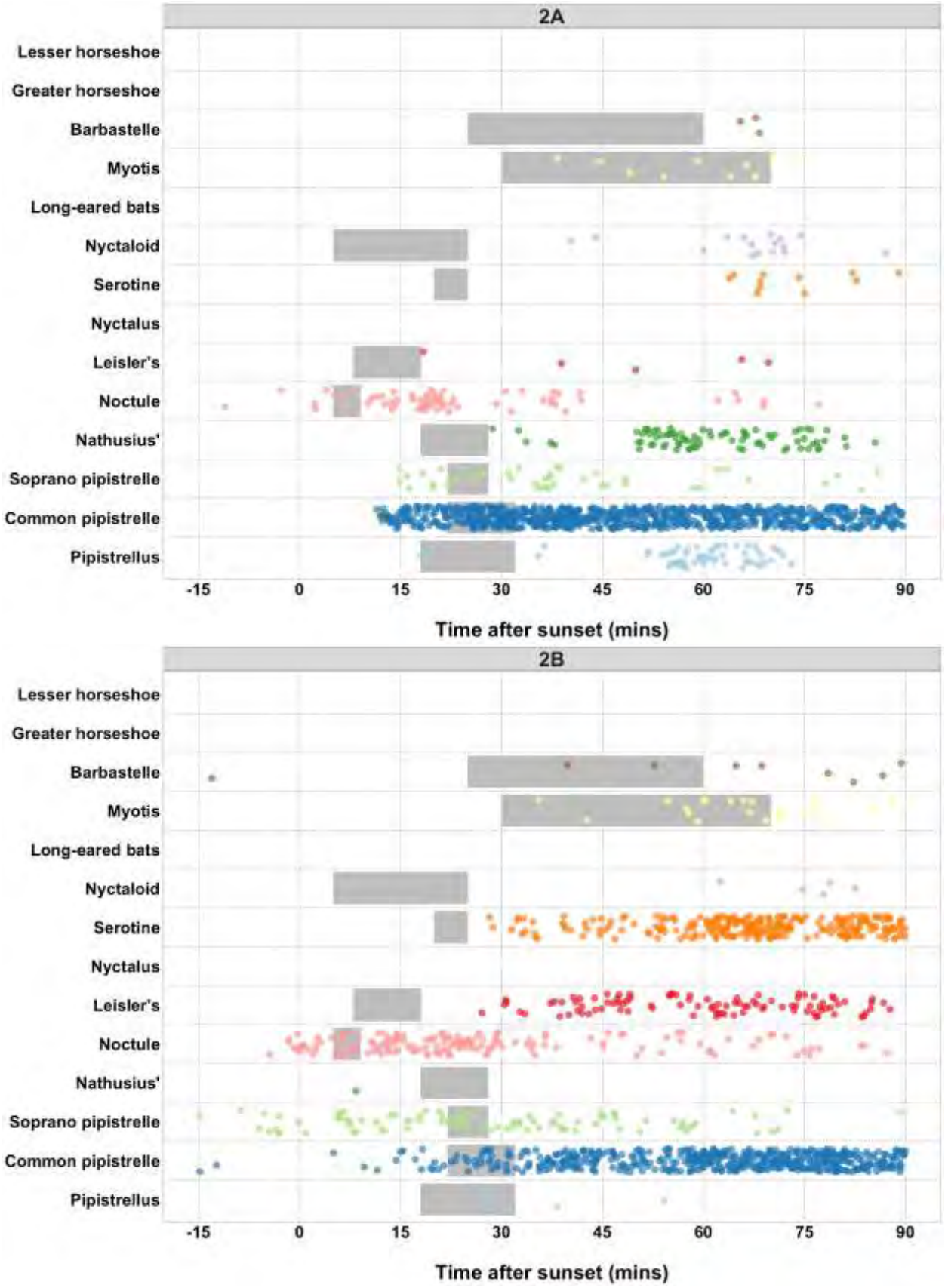
3.2.80. High levels of myotis activity were recorded around emergence time of before for statics 4c, 5b, 5c, 6a, 6c, 8b, 10a, 11a, 11b, 12a and 12b, indicating the likely presence of roosts within proximity of these static locations.

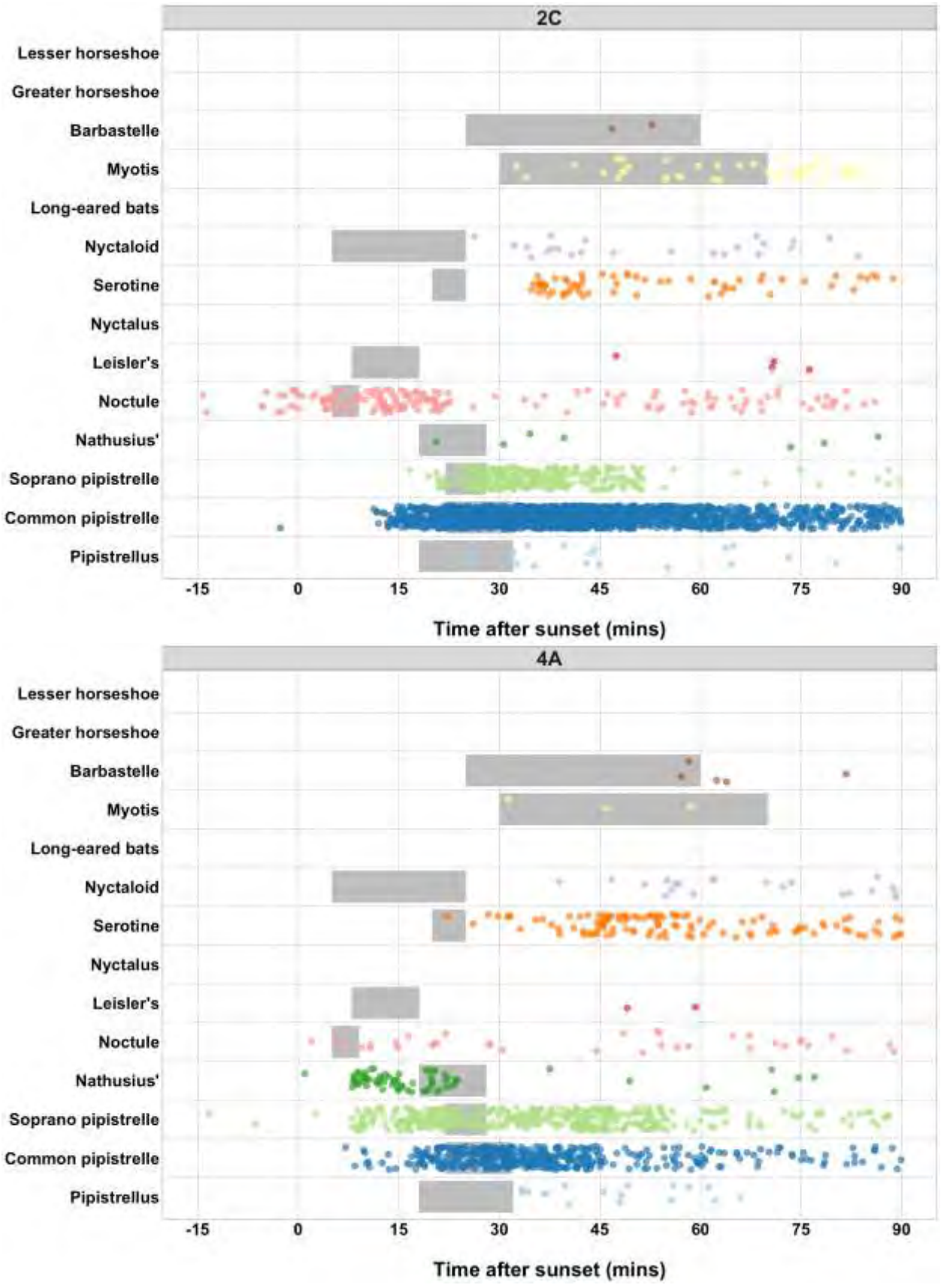
3.2.81. Moderate levels of barbastelle activity were recorded around emergence time for statics 8b and 10a, indicating the potential presence of roosts within proximity of these static locations.

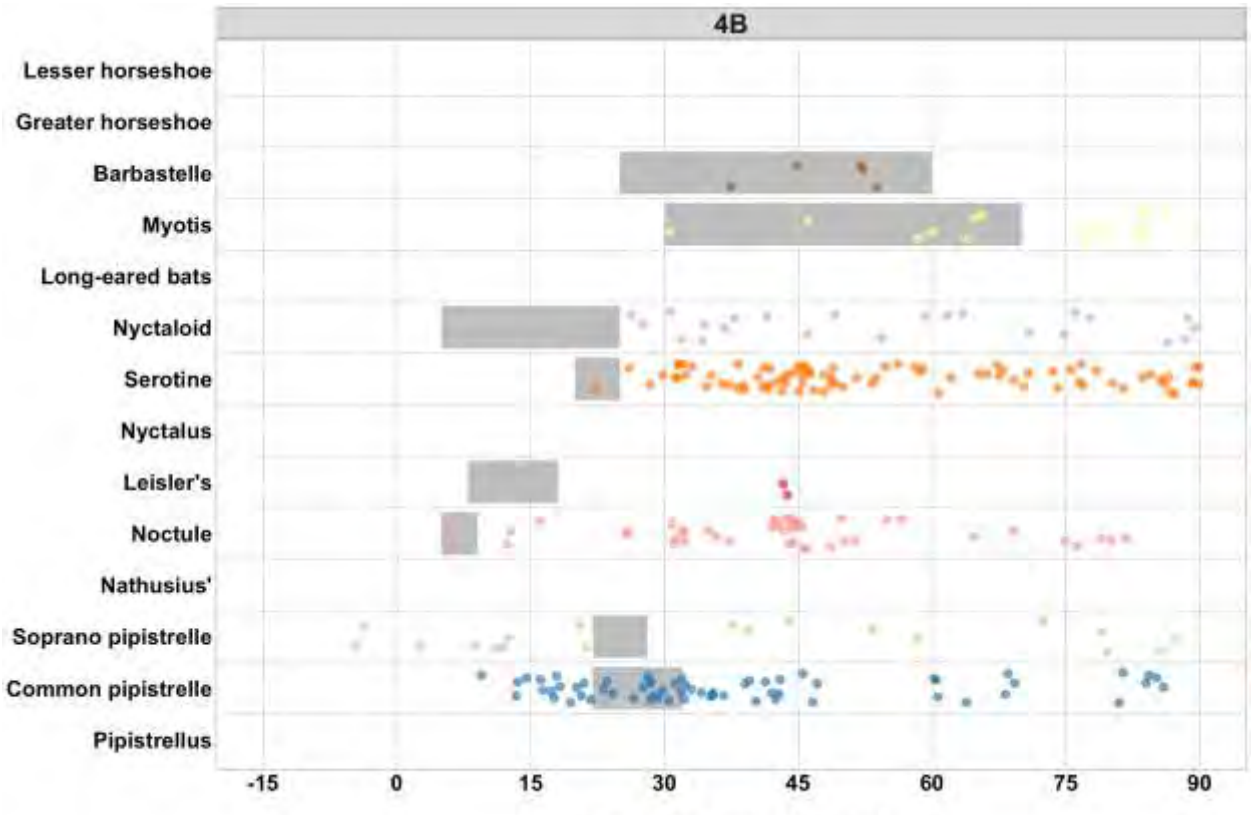
3.2.82. Moderate levels of serotine activity were recorded around emergence time for static 12b, and moderate levels of Leisler's activity was recorded around emergence time for static 13b, indicating the potential presence of roosts within proximity of these static locations.

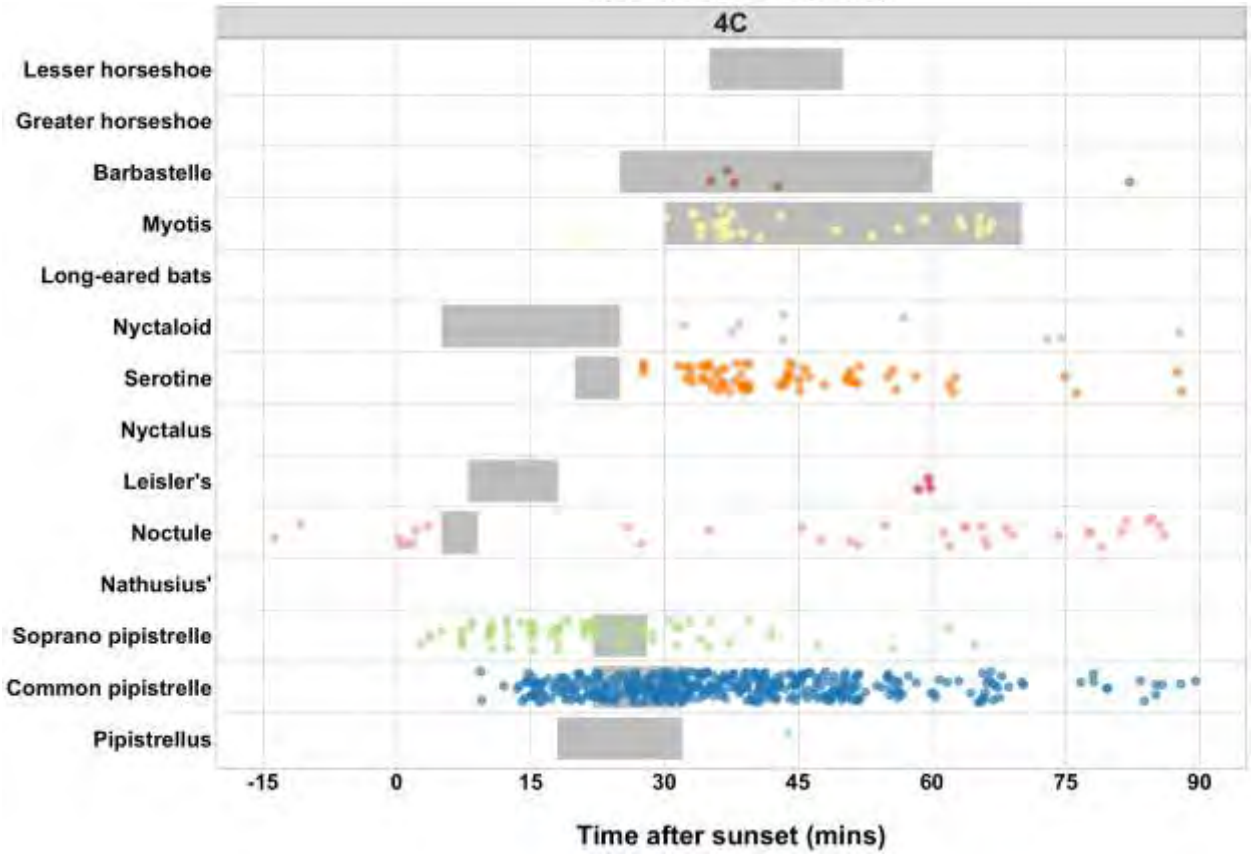
[13] Russ, J.M. (2012) British Bat Calls: A Guide to Species Identification. Pelagic Publishing, Exeter.

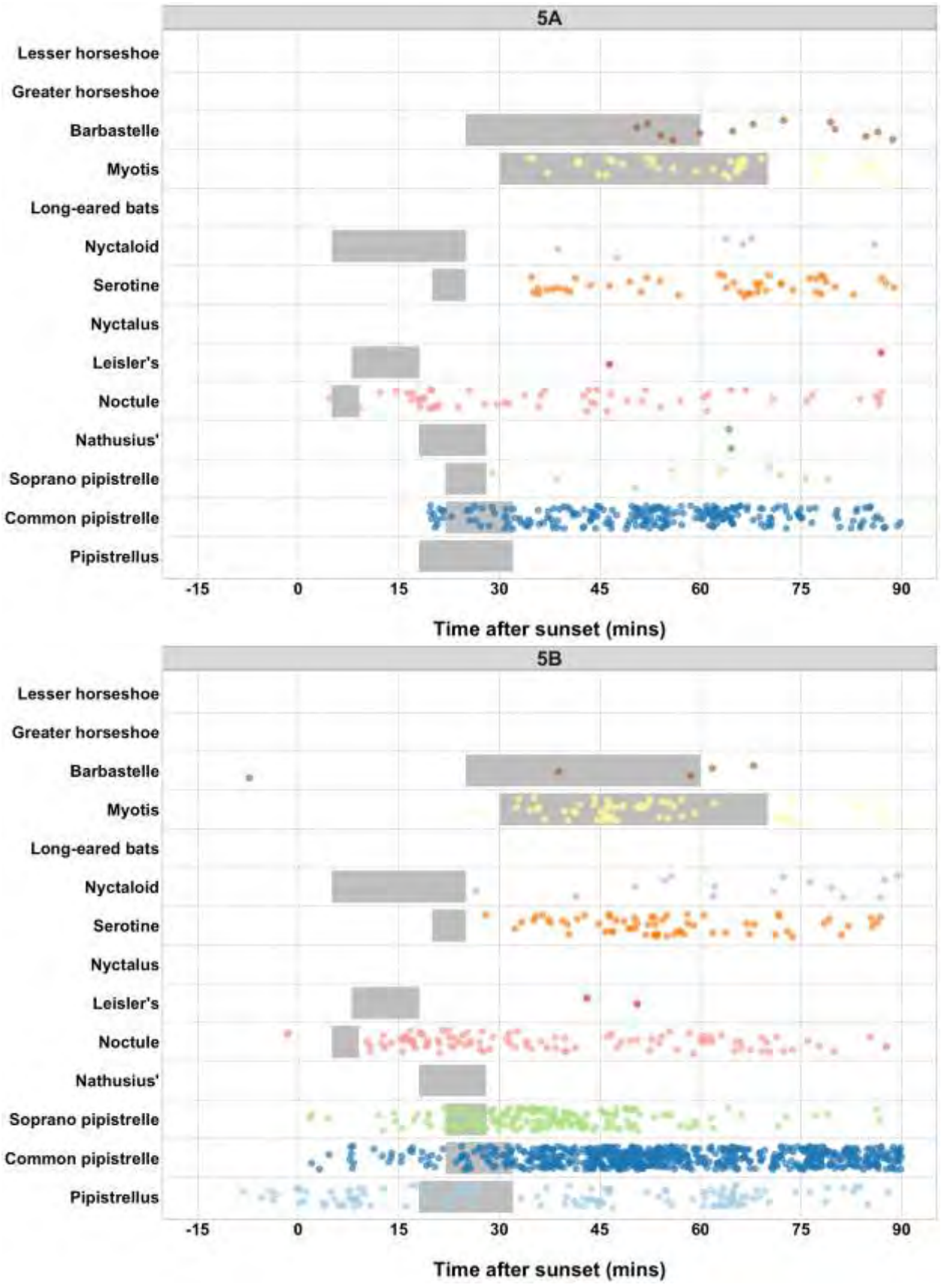
Figure 3:6 : Bat passes potentially indicating close proximity to a roost (EcoBat)

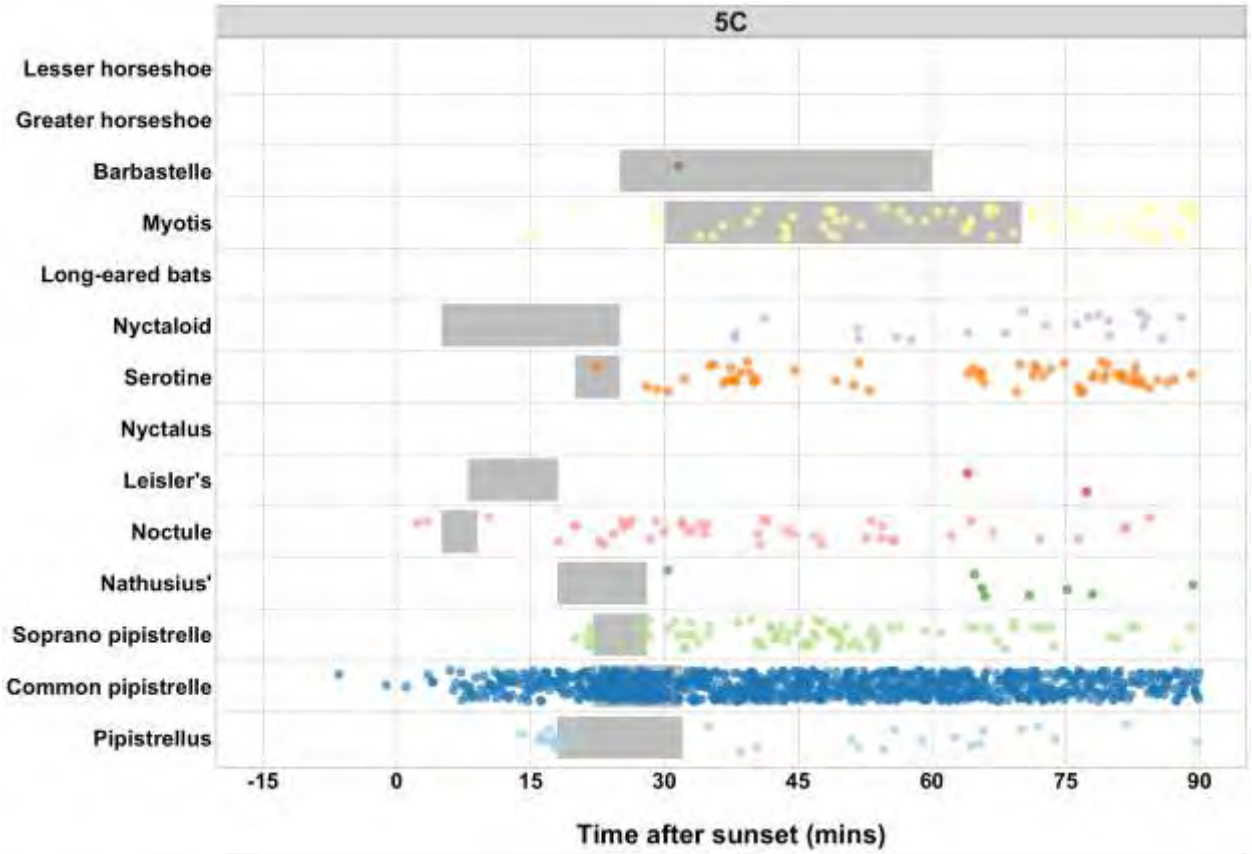


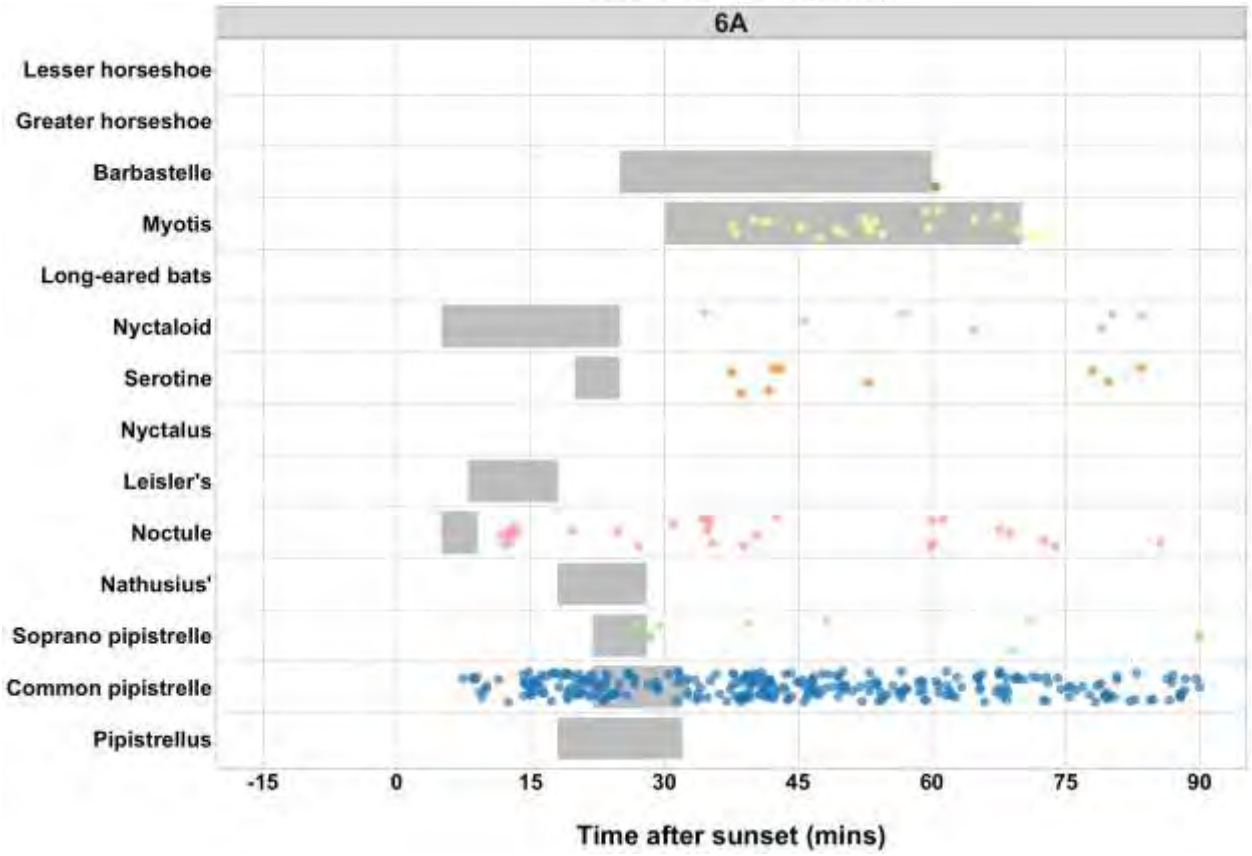

2C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)
4A
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)

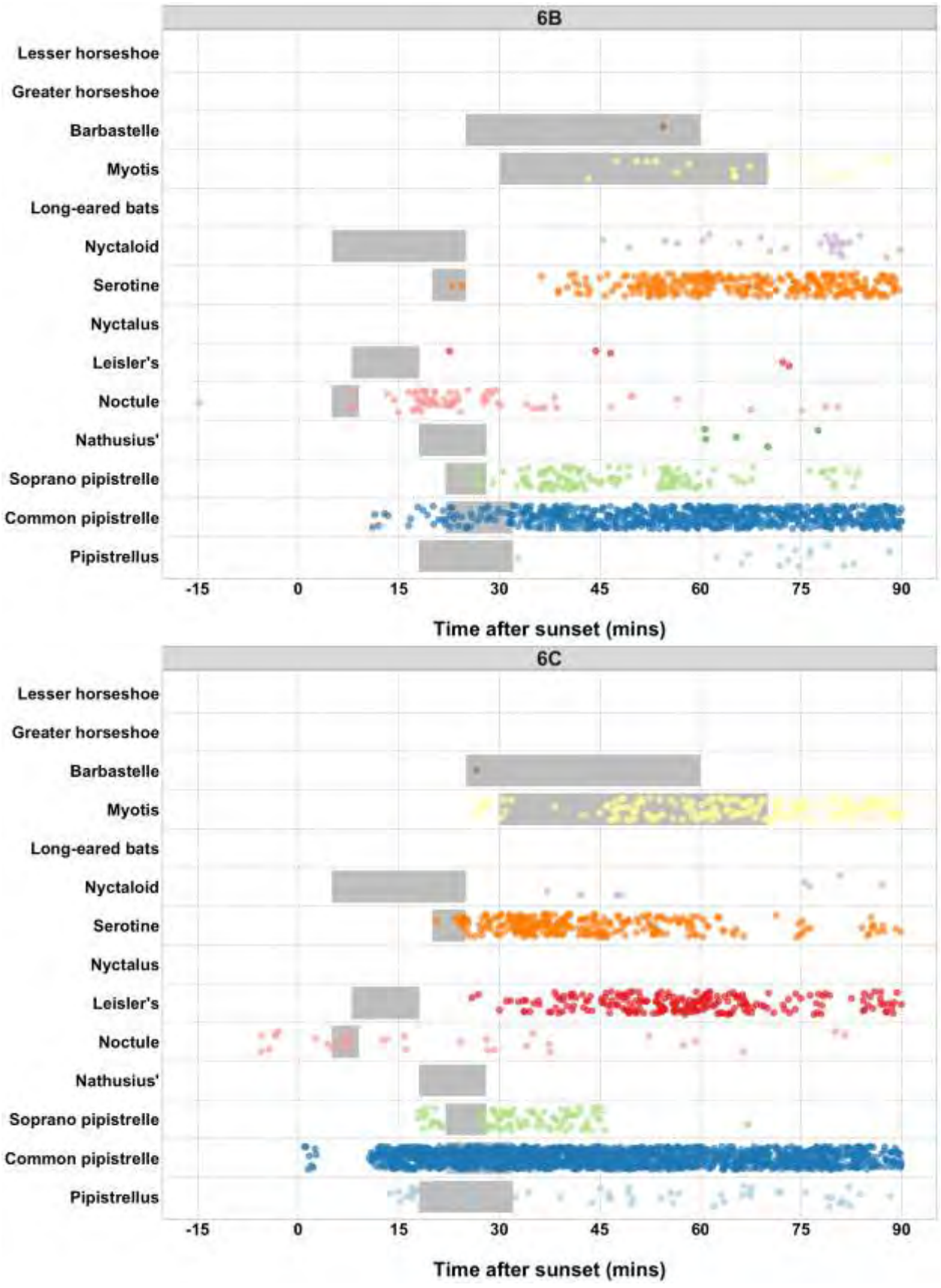

4B
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)

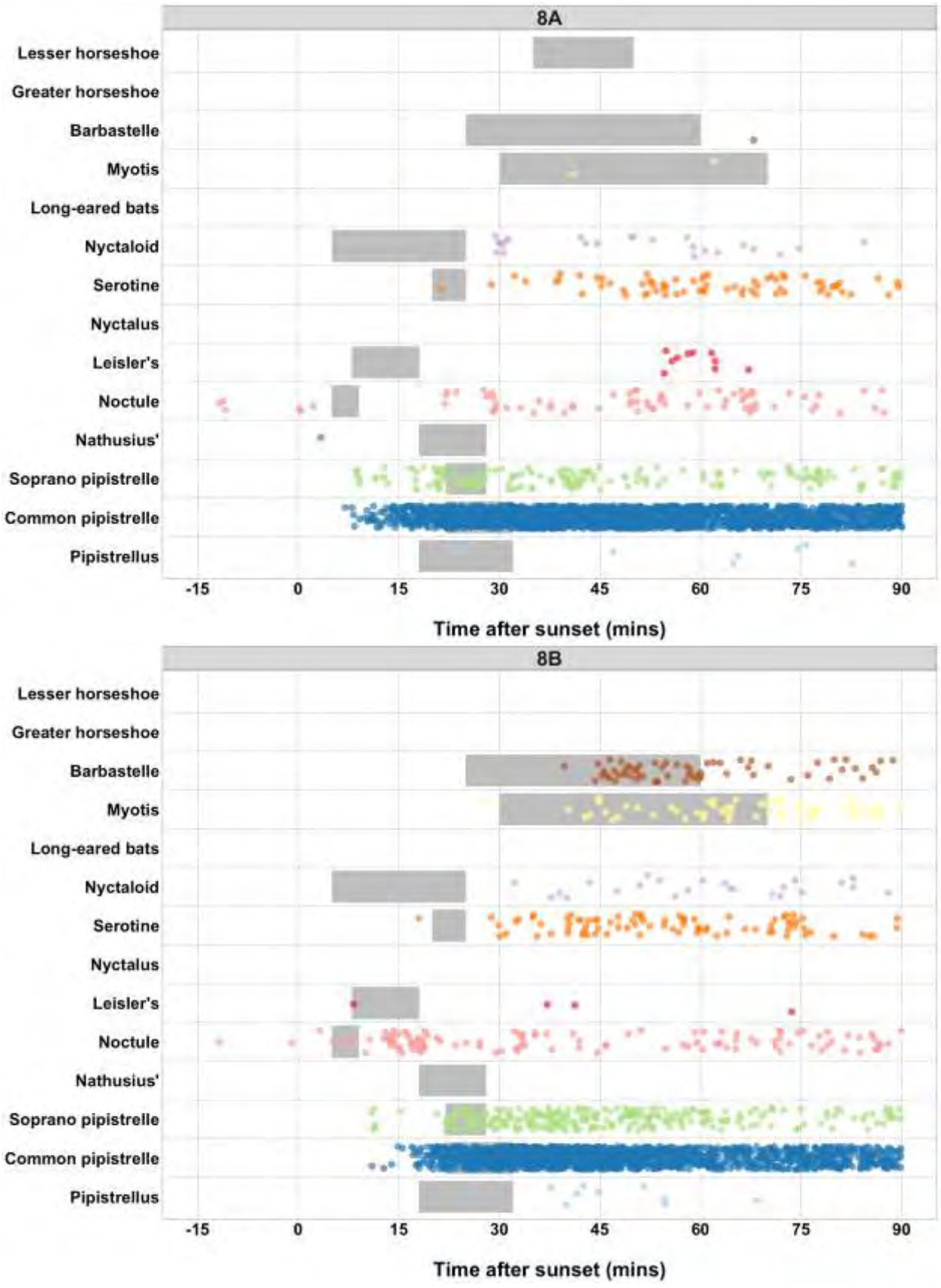

4C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)

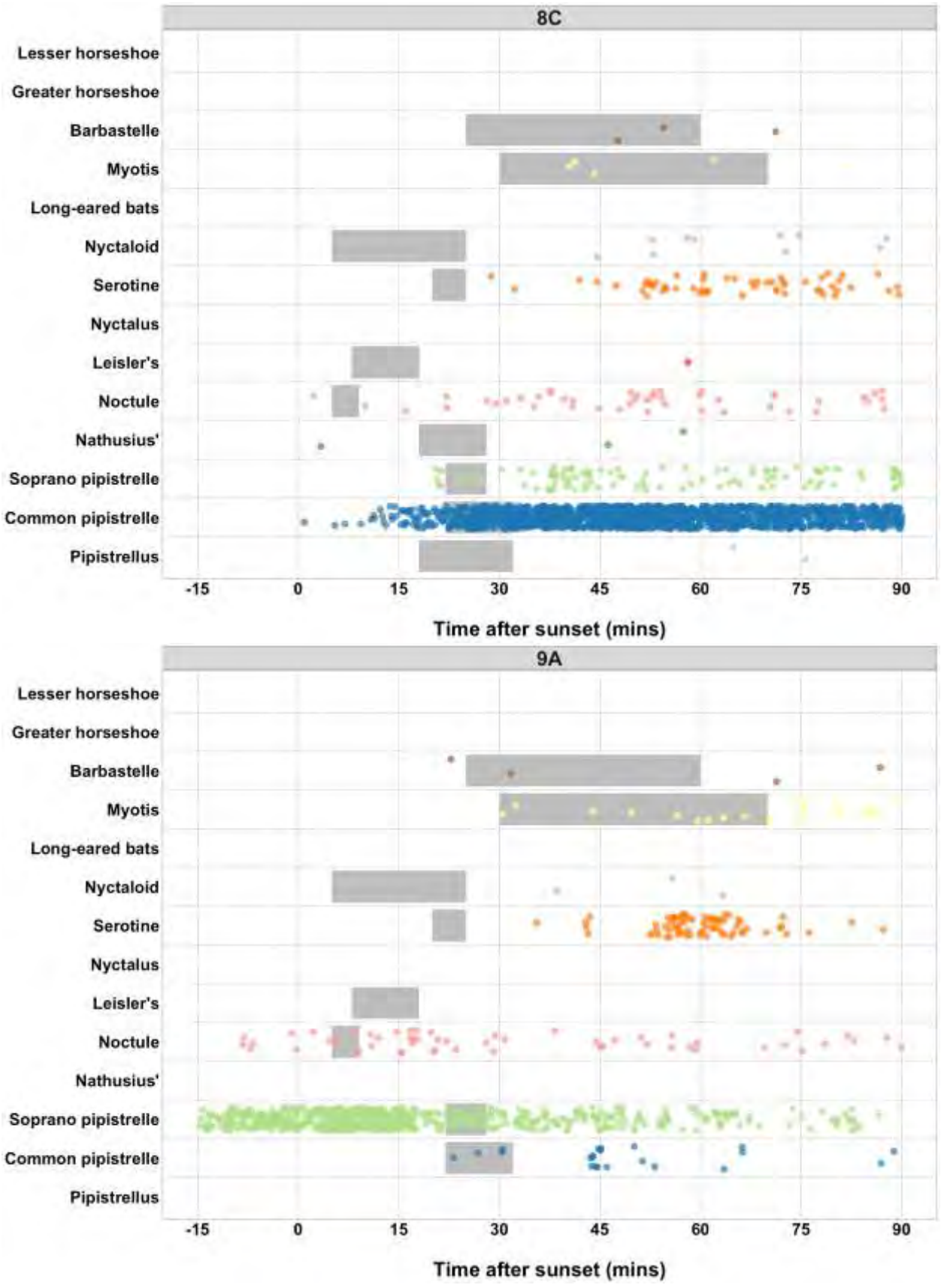

5A
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)
5B
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)


5C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)


6A
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)


6B
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)
6C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)


8A
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)
8B
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)


8C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
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75
90
Time after sunset (mins)
9A
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
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30
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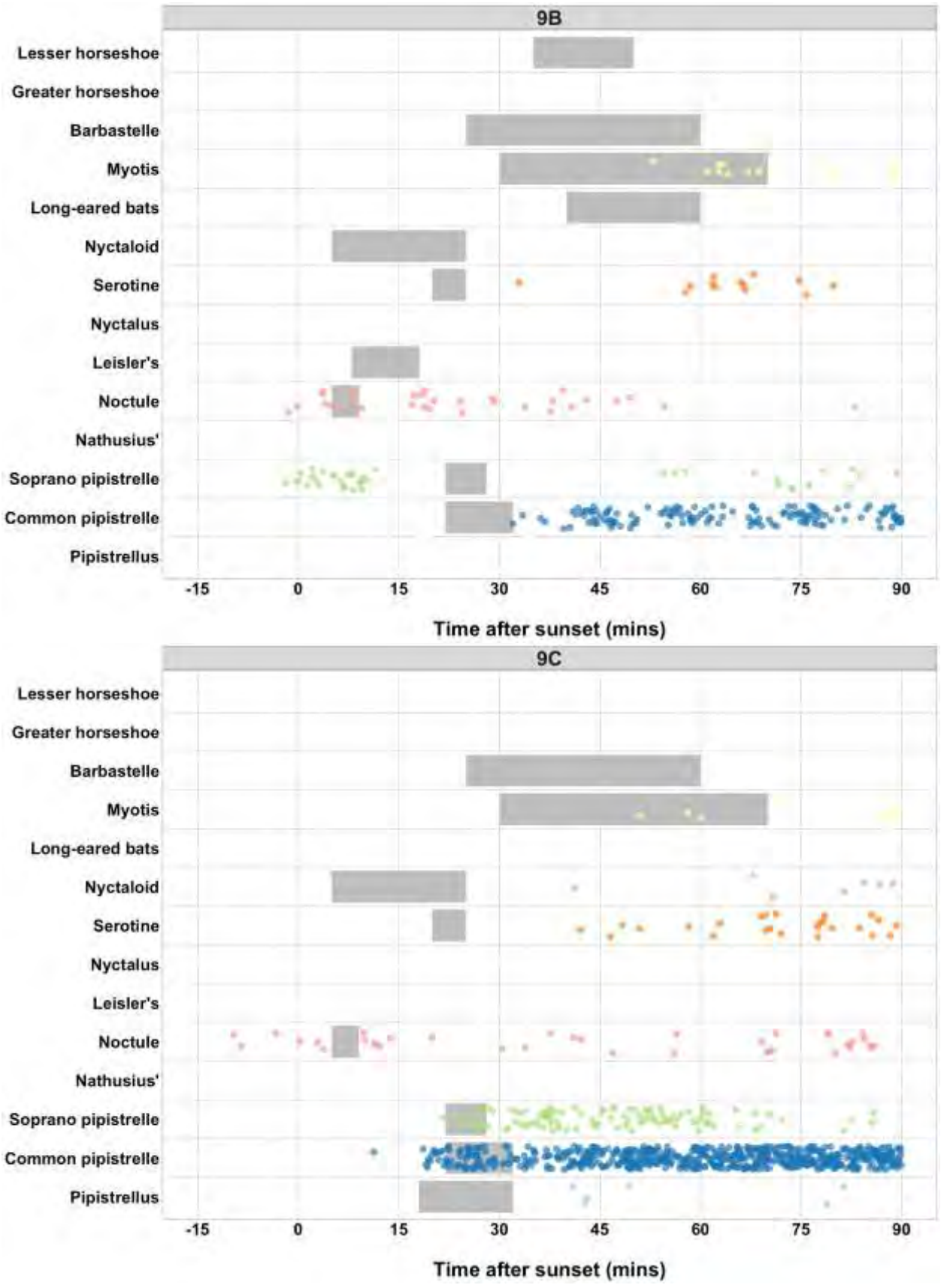
60
75
90
Time after sunset (mins)


9B
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
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30
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75
90
Time after sunset (mins)
9C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
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0
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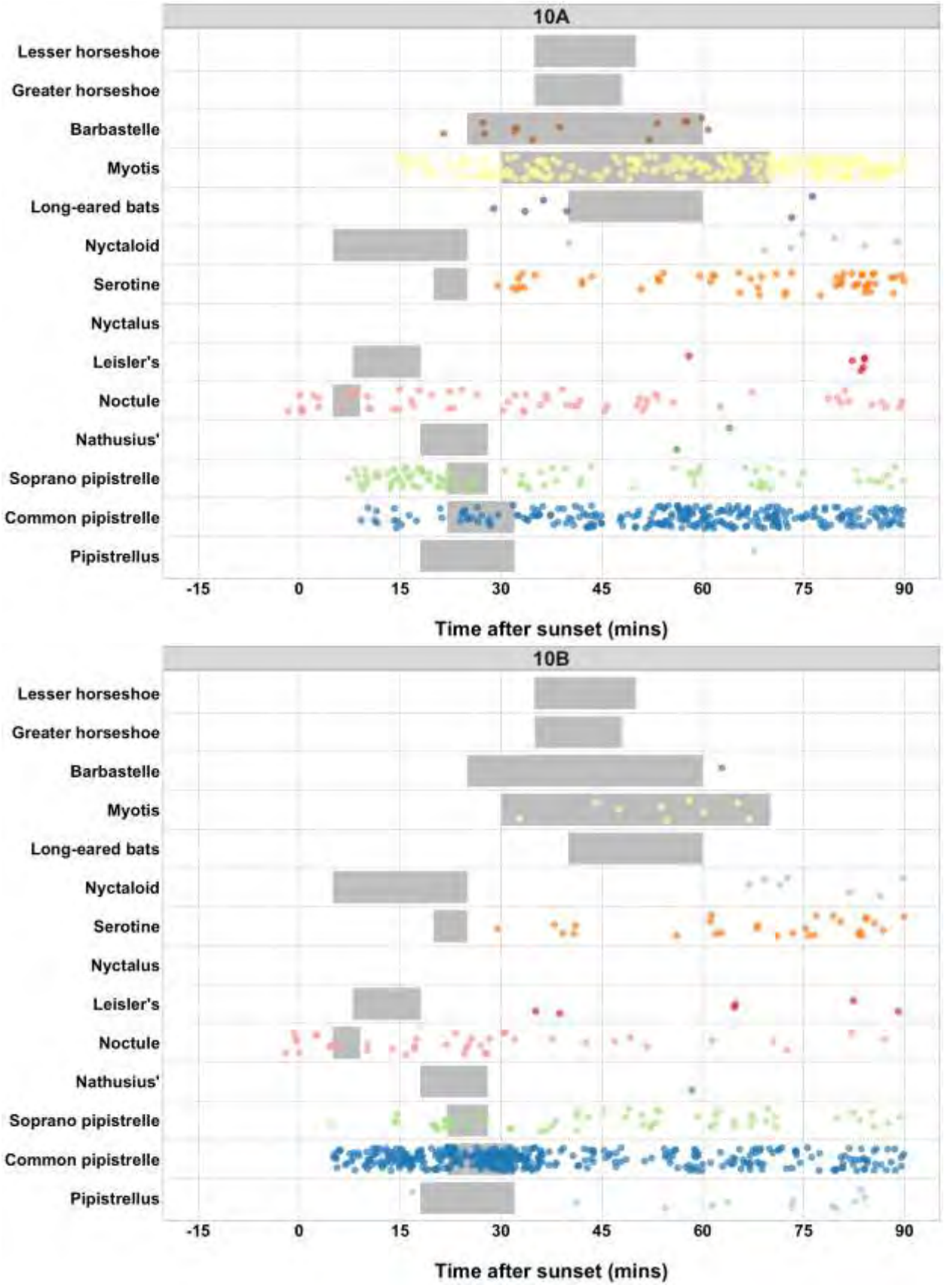
60
75
90
Time after sunset (mins)


10A
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)
10B
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
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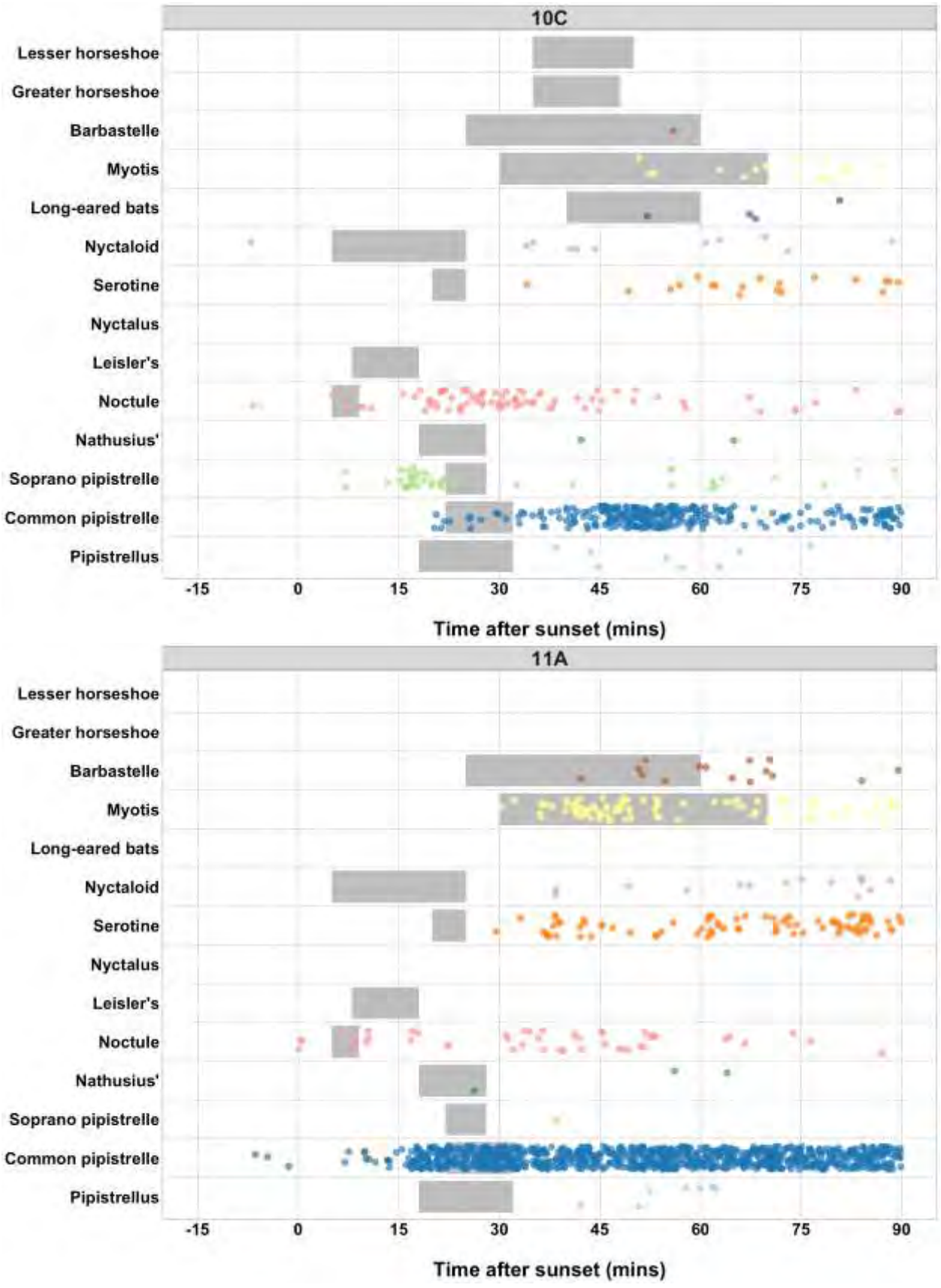
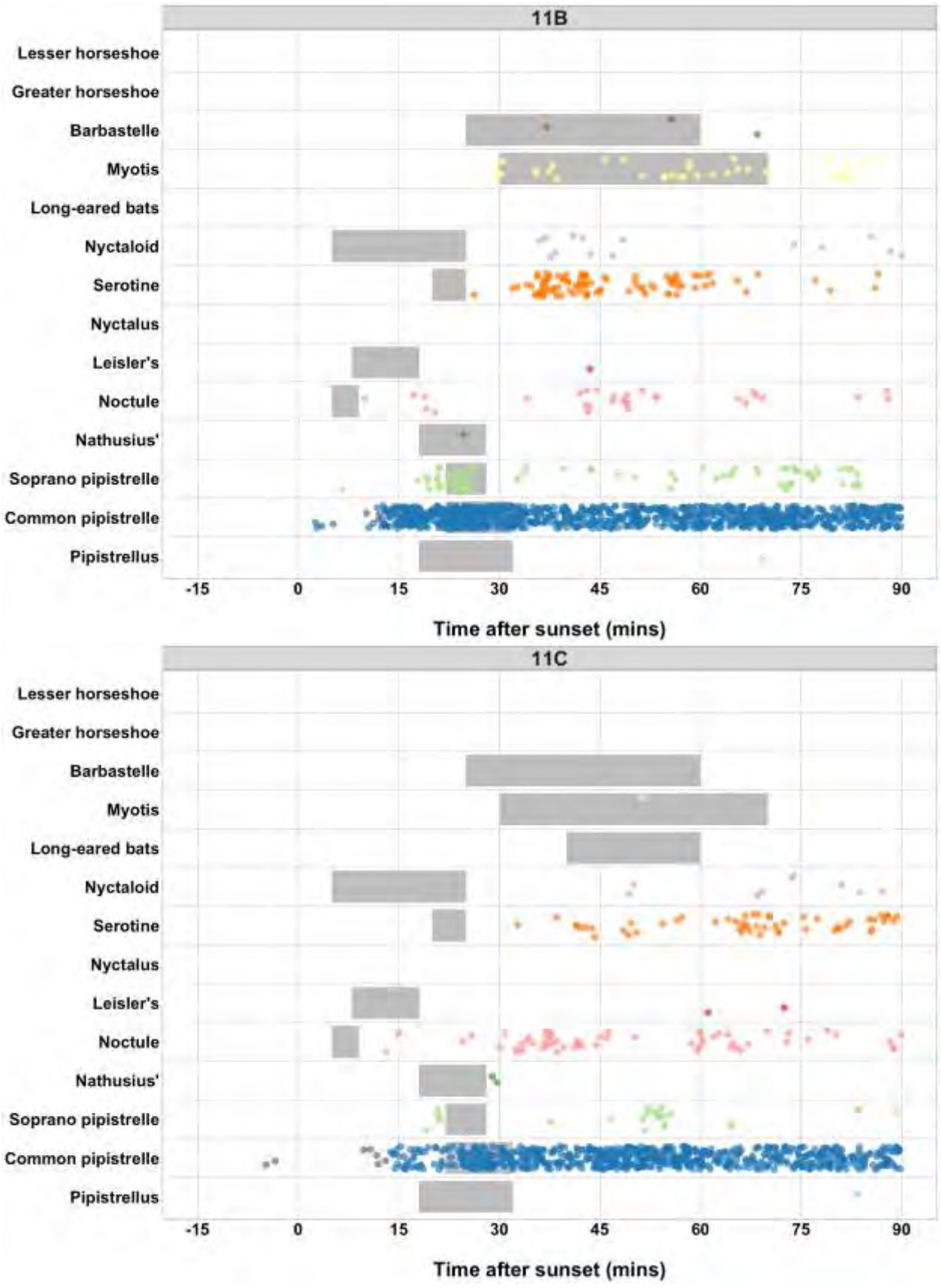
75
90
Time after sunset (mins)


10C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)
11A
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)


11B
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
30
45
60
75
90
Time after sunset (mins)
11C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
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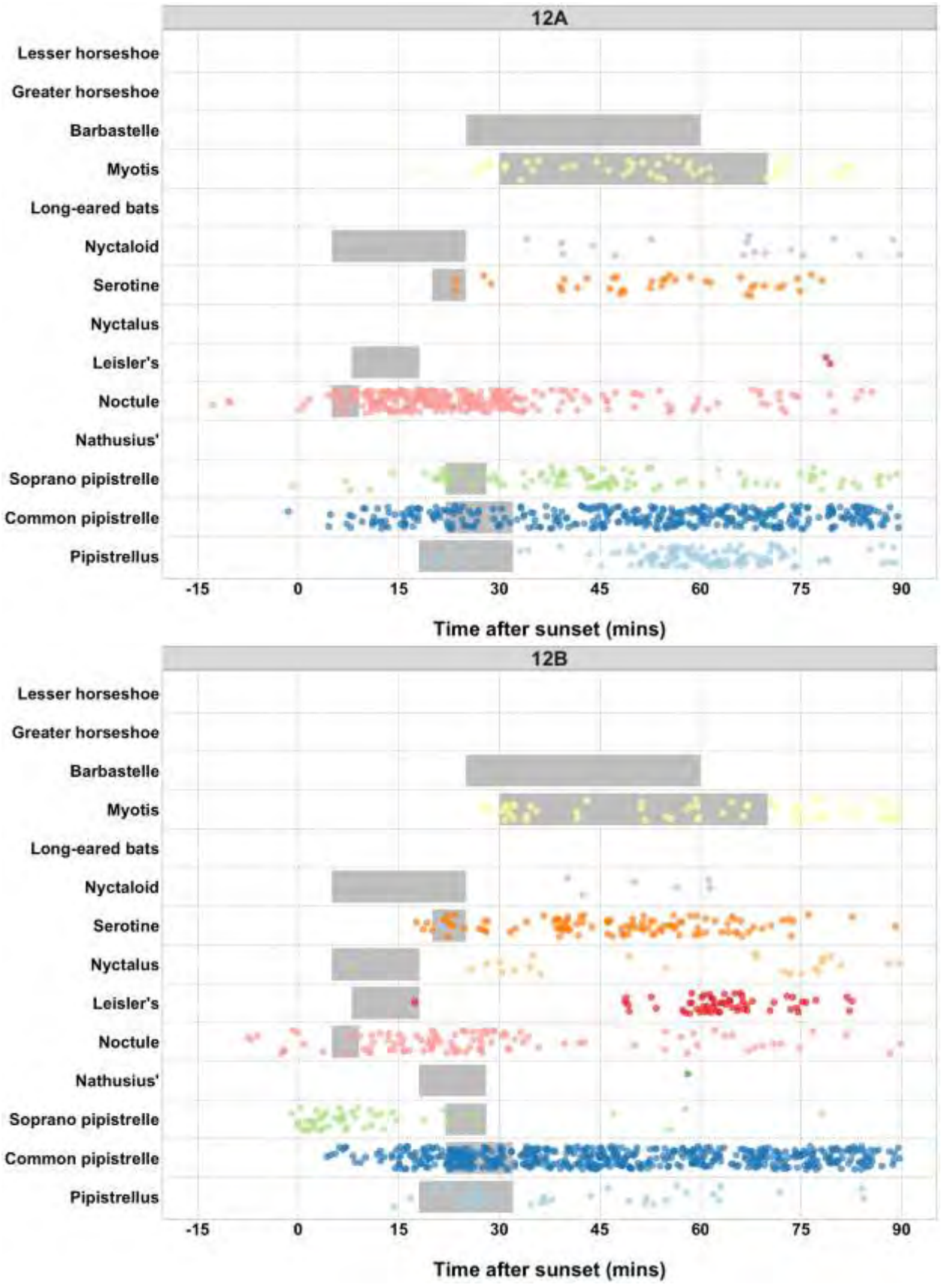
90
Time after sunset (mins)


12A
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
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Time after sunset (mins)
12B
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
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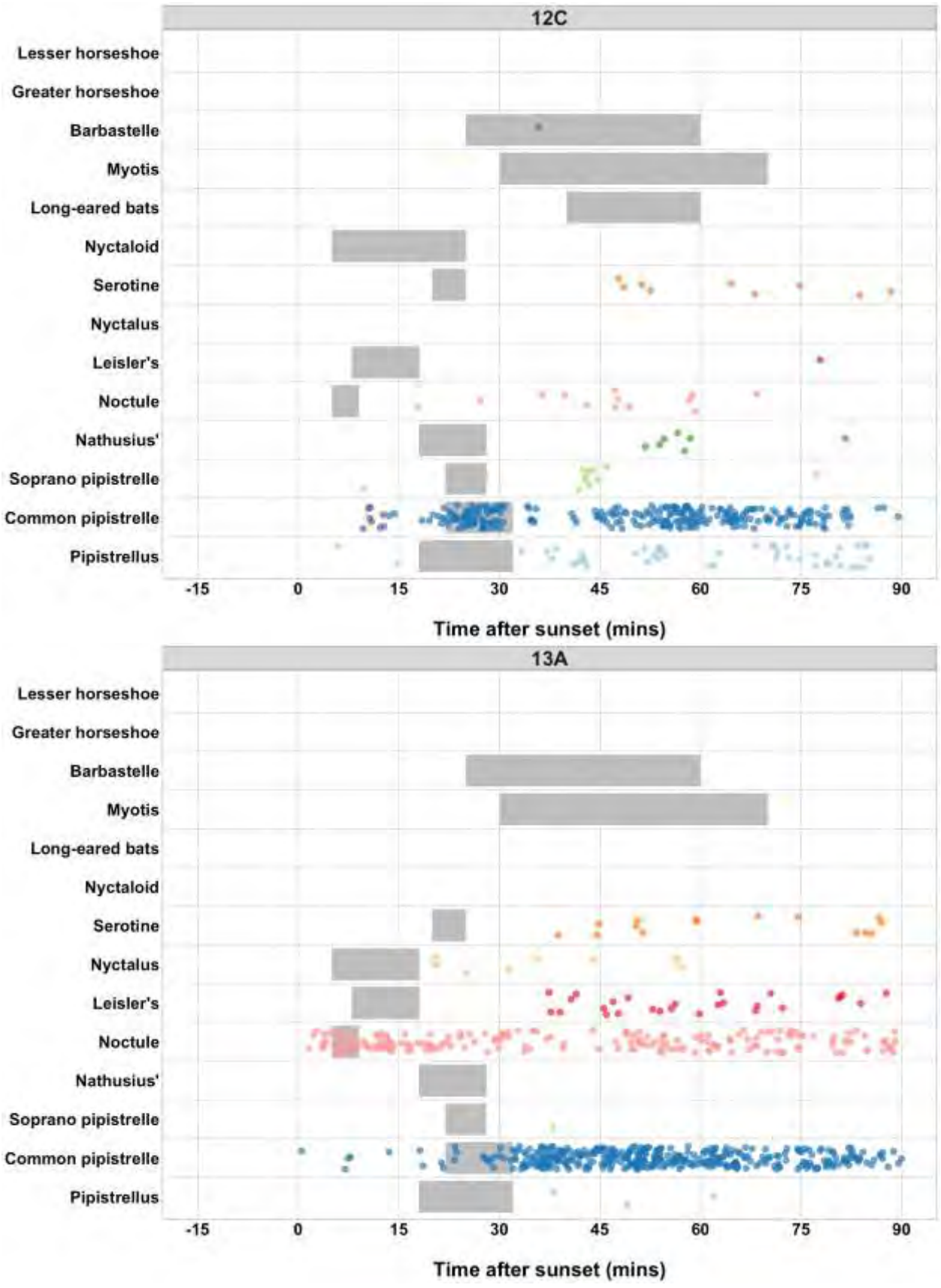
Time after sunset (mins)


12C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
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Time after sunset (mins)
13A
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
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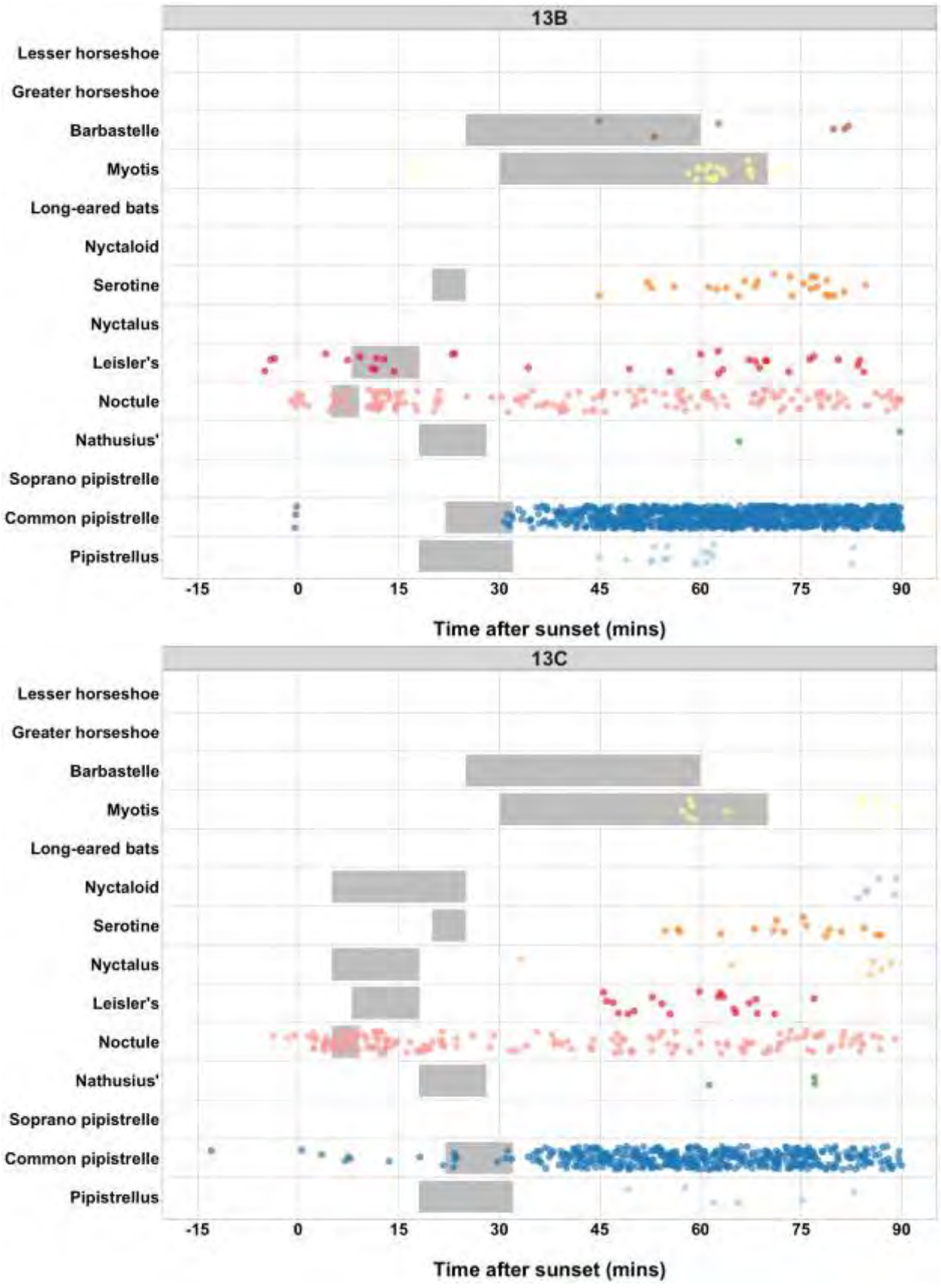
Time after sunset (mins)


13B
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
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Time after sunset (mins)
13C
Lesser horseshoe
Greater horseshoe
Barbastelle
Myotis
Long-eared bats
Nyctaloid
Serotine
Nyctalus
Leisler's
Noctule
Nathusius'
Soprano pipistrelle
Common pipistrelle
Pipistrellus
-15
0
15
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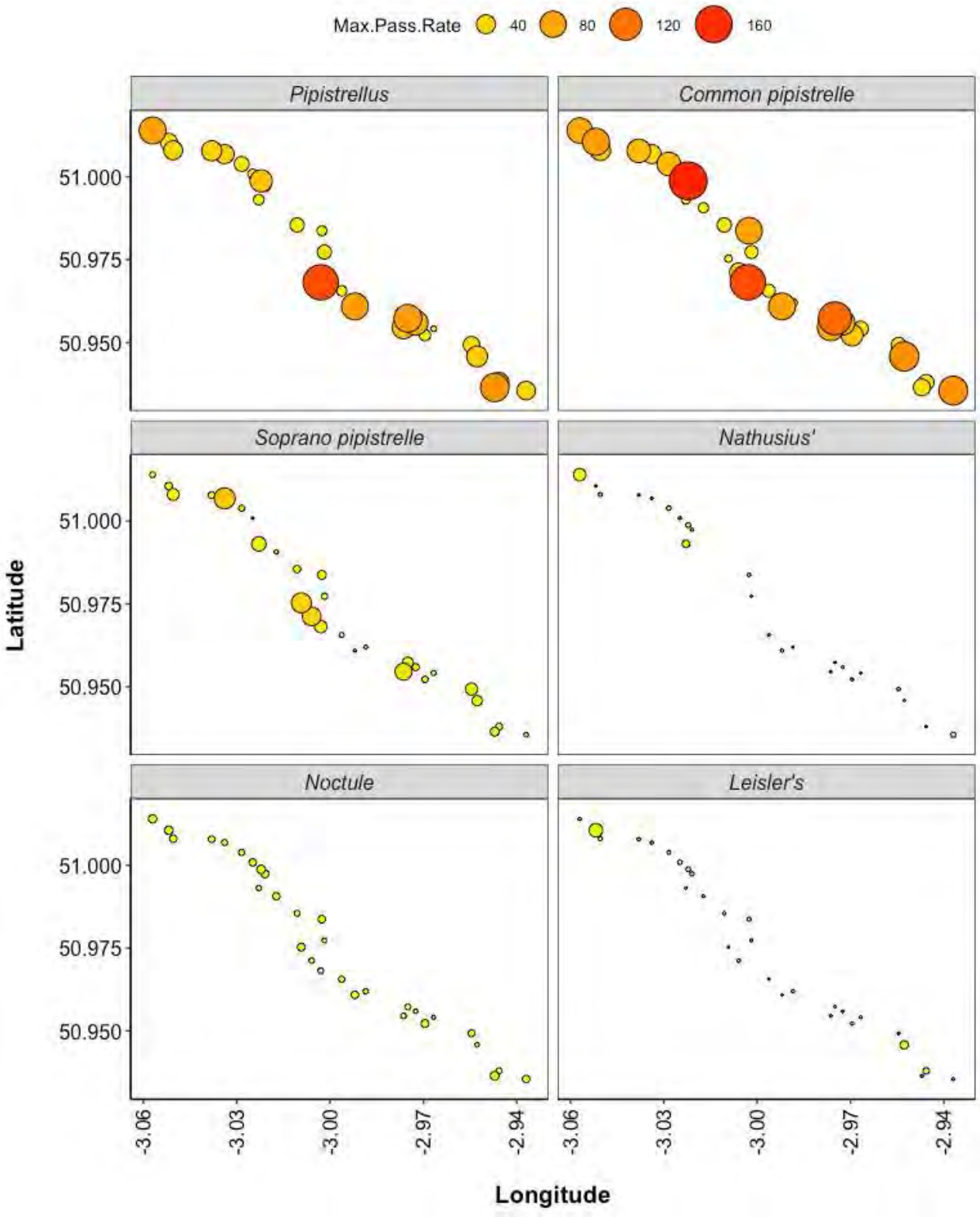
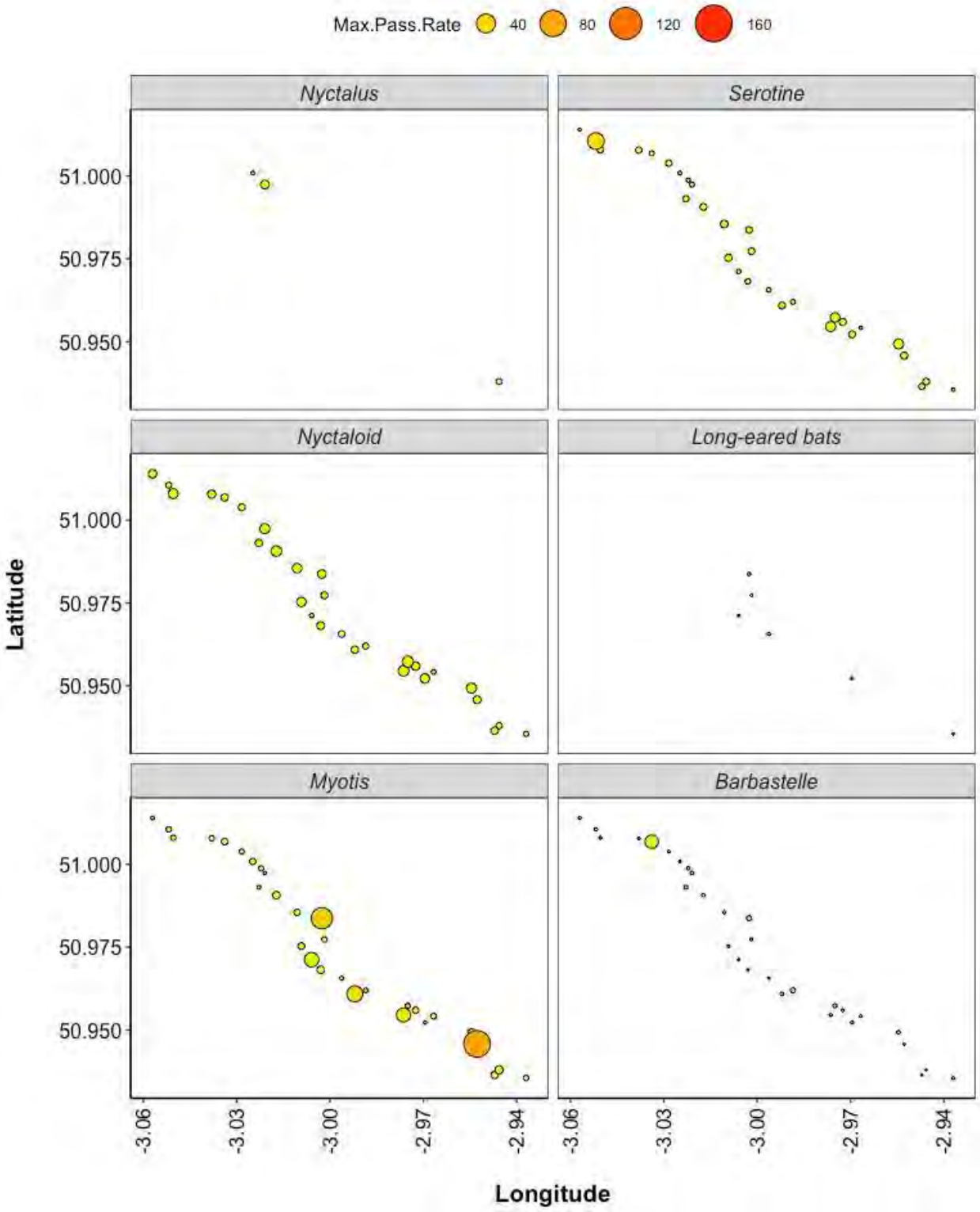
45
60
75
90
Time after sunset (mins)

3.2.83. Figure 3:7 below illustrates the maximum nightly pass rate (bat passes / hour / night) recorded in a single night throughout the survey period at each static location.

Figure 3:7 : Maximum Nightly Pass Rate (bat passes / hr / night) recorded in a single night throughout the survey period - represented by the size and colour of the point at each detector location (EcoBat)




Max.Pass.Rate
40
80
120
160
Nyctalus
Serotine
Nyctaloid
Long-eared bats
Myotis
Barbastelle
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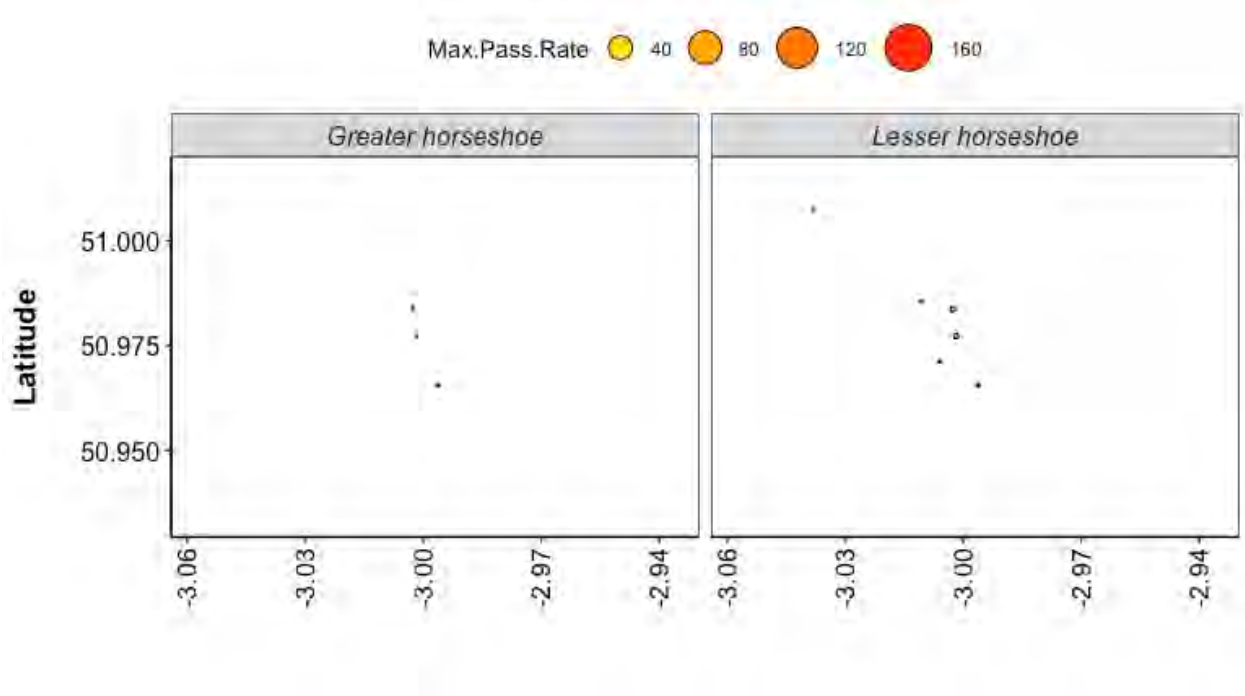
50.975
50.950
-3.06
-3.03
-3.00
-2.97
-2.94
Longitude



Bat crossing point surveys

3.2.84. Crossing point surveys were undertaken between 2017 and 2020. A summary of the key survey results at each crossing point relevant to the Pink Modified Option. Refer to Appendix H for crossing point locations. The results are provided in Table 3:9. Additional crossing point surveys were undertaken in 2017 prior to the selection of the preferred route. The results of these surveys are not reported as they are not relevant to the Pink Modified option. However, the original crossing point numbers have been retained for consistency. Please refer to Appendix I for crossing point survey proformas.

Crossing Point 2

3.2.85. Crossing point 2 is located to the north of Kenny and south of Stewley where a proposed link road is located and intersects a field boundary hedgerow. The crossing point is located approximately 30m north of the existing A358. Over the course of surveys at this location four species were recorded using the hedgerow running along a field boundary. These comprised, common pipistrelle, Myotis sp., serotine and soprano pipistrelle. Low levels of activity were recorded across the surveys for common pipistrelle with a peak count of 10 on 5 June 2019. A serotine was also recorded using the hedgerow with one pass on 4 September 2017. A Myotis sp. was recorded crossing the hedgerow twice in June 2019. No bats were observed crossing during the June 2020 survey. Due to the low number of bats recorded and none recorded crossing this crossing point is considered of low value.

Crossing Point 16

3.2.86. Crossing point 16 is located either side of the existing A358 at an underpass where the Fivehead River crosses under the A358. Over the course of the surveys three bat species were recorded crossing; common pipistrelle, long-eared bat and noctule. Common pipistrelle were the highest recoded bats with six in September. Two long-eared bats were recorded crossing in June and one noctule crossed in August.

3.2.87. A greater horseshoe bat was seen in September flying north to south through a gap in the hedge by the river. Due to a greater horseshoe being recorded crossing, and low number of crossings from common species this crossing point is considered of moderate value.

Crossing Point 17

3.2.88. Crossing point 17 is located to the south of the scheme along a riparian corridor where a proposed new link road crosses the River Ding. The crossing point is located approximately 25m from the existing A358. Low levels of activity were recorded across all surveys. Species recorded crossing include long-eared, common pipistrelle, soprano pipistrelle and myotis sp. The highest level of activity was recorded in June 2019 with five common pipistrelle recorded crossing, along with one long-eared and one myotis sp. crossing. July had four common pipistrelle crossing and one long-eared crossing. The other surveys only recorded low levels of pipistrelle species crossing. Due to the low number of crossings from common species this crossing point is considered of low value.

Crossing Point 18

3.2.89. Crossing point 18 is located to the south of the scheme along a riparian corridor where a proposed new link road crosses the River Ding. The crossing point is located approximately 20m from the existing A358. Low levels of bat crossings were recorded here and limited to two serotine bats in July 2019, one common pipistrelle, one soprano and one serotine crossing in June 2020, and one serotine crossing in July 2020. Due to the low number of crossings from common species this crossing point is considered of low value.

Crossing Point 19

3.2.90. Crossing point 19 is located either side of the of the existing A358 where Cad Brook flows under the A358. Low levels of crossings were recorded across surveys. Species recorded crossing the road included common and soprano pipistrelle, pipistrelle sp. serotine, noctule. The highest level of activity was recorded on the 16 July 2020, which had common pipistrelle crossing four times, together with one soprano pipistrelle and one noctule. The other survey of note was the 14 August, when a serotine crossed at a height of 6m, twice. Other surveys had low levels of common and soprano pipistrelle crossing.

Due to the low number of crossings from common species this crossing point is considered of low value.

Crossing Point 20

3.2.91. The crossing point is situated 147m south of the A358, located along a hedgerow with trees, with arable fields on either side. Only common pipistrelle with counts of eight on 2 June, 13 on 3 July and 20 on 7 August and soprano pipistrelle of one on 2 June were recorded crossing. On three occasions no bats were recorded crossing. As a maximum of 20 common pipistrelle bats were recorded crossing, this crossing point is considered to be of moderate value, despite the low species diversity recorded during surveys.

Crossing Point 21

3.2.92. The crossing point is situated 147m south of the A358, located along a hedgerow with trees, with arable fields on either side. Generally low activity was recorded across all six surveys, with the highest species count coming from common pipistrelle 12 on 12 July, three on 7 August and four on 2 June. There was a single recording of a lesser horseshoe crossing the hedgerow on the 7 August as well as two *Myotis* sp. and two serotine crossing. On three occasions no bats were recorded crossing. Due to the low number of crossings recorded, this crossing point is considered of low value.

Crossing Point 22

3.2.93. The crossing point is situated along Griffin Lane, which the current A358 passes directly over on a bridge above. Low level activity was recorded across all surveys, with more foraging recorded in the adjacent woodlands then crossing under and over the road. The highest level of crossings from species comes from two common pipistrelles on 9 May, ten on 4 June, one on 3 July, one on 28 July, five on 7 September. A lesser horseshoe was also recorded but was not seen, so cannot confirm if crossed. Barbastelle was recorded crossing underneath the bridge along Griffin Lane on 28 July. A barbastelle was also recorded crossing under the bridge on the 28 July and additional calls were recorded in the woodland to the immediate south, which with their quiet calling could be covering further crossings of barbastelle close to the abutments. On the 7 September there were three recorded barbastelles crossing under the bridge. Other species recorded crossing across the surveys in low numbers were Myotis sp., long-eared bat, and Leisler's. Although no high numbers of bats crossing were recorded, due to the presence of barbastelles confirmed crossing underneath the bridge and a lesser horseshoe was recorded in the area (additionally, during a transect activity survey a lesser horseshoe was observed flying underneath the bridge), it is determined this crossing point is of high value. It should also be noted that Bechstein's bats were recorded crossing in the vicinity of Griffin Lane during the radiotracking surveys, and there is potential that the Myotis bats recorded during the crossing point surveys were Bechstein's.

Crossing Point 23a and 23b

3.2.94. The crossing points are for the same feature. Due to the size, two separate teams were required to assess the crossing point (hence 23a and 23b).

3.2.95. The crossing point is located along a stream that passes under the A358 through a culvert, south-east of Meare Elm Farm. There was activity across all six surveys, with the highest level of species activity coming from common pipistrelle two on 6 June, one on 29 June, two on 4 July, three on 20 July, one on 4 August and six on 28 August. A number of other species have been recorded with a maximum crossing for serotine of four during two surveys, a maximum count of two Myotis sp. and two long-eared bats. Barbastelles were recorded crossing one on 6 June, one on 28 August and one on 3 June, and were recorded in the area but not crossing on the 4 July. Two Lesser horseshoes were recorded possibly crossing under the culvert on the 4 July and then again on the 4 August. Due to the consistent use by barbastelles and use by lesser horseshoes, this crossing point is of a high value.

Crossing Point 33

3.2.96. The crossing point is along Stoke Road in Henlade, south of the A358. Activity was fairly low across all surveys, with a maximum count of six bats on the 11 June including three soprano pipistrelle, two common pipistrelle and one serotine recorded crossing. Most of the calls were from the *Nyctaloids* with the highest night of activity on the 11 July with three noctules and two Leisler's flying 20-30m above, and the other crossings were also at height, above the possible impact area. Common and soprano pipistrelles were only recorded on the 11 June and 13 June. A greater horseshoe was recorded on the 4 September but not observed crossing. Due to the low number of crossings from common species this crossing point is considered of low value.

Crossing Point 34a

3.2.97. This crossing point is located along a hedgerow that follows an unidentified road, 75m south of the A358. Generally low activity was recorded across the surveys, with no bats recorded crossing on the 11 July and 21 July. The night with the highest level of activity was 8 June, which had eight common pipistrelles crossing. A maximum of three common pipistrelles were recorded during other surveys. Two of each serotine and noctule were recorded crossing along the hedge within 10m. Due to the low number of crossings from common species this crossing point is considered of low value.

Crossing Point 34b

3.2.98. The crossing point is located along a hedgerow between two arable fields, 62m from the A358 near to Ashe Farm. There was low activity across all surveys, with no crossings on the 22 June, 6 July, 21 July, 11 August, with only crossings on the 8 June

and 9 September. The 8 June had two common pipistrelle and one serotine cross, and 9 September a noctule, a Nyctaloid and a barbastelle (single crossing). A barbastelle was also recorded crossing on 22 June. It is considered that even though there was a recording of a single barbastelle, it was only one occasion with very little activity from all other species, therefore this crossing point is considered of moderate value.

Crossing Point 34c

3.2.99. This crossing point is 115m further along the same hedgerow as that of crossing point 34b away from the A358, with the south crossing point station adjacent to a tall line of coniferous trees. There was low activity across all surveys, with no crossings on the 5 June, 9 September and 22 September. The highest level of crossings was on the 24 June with three common pipistrelles. A single soprano pipistrelle and serotine were also recorded crossing on separate nights. A barbastelle was recorded on the 22 September though was not seen crossing. Due to the low level of activity it is considered that this crossing point is of low value.

Crossing Point 34d

3.2.100. This crossing point is situated along a farmland access track with maintained hedgerows either side, with the surrounding fields being arable. Activity fluctuated crossing the crossing point, with peaks in activity on the 24 June with 11 common pipistrelle crossing and 27 August with 11 common pipistrelle and one soprano pipistrelle. All surveys had bats crossing, with three serotine and three high crossing noctules and one Myotis sp. across the surveys. No annex 2 species recorded. Due to the fairly low levels of activity with only two nights of crossing above 10 of only common species this crossing point is considered low value

Table 3:9: Crossing point surveys results

Crossing Point Number	Survey 1	Bats Seen crossing	Survey 2	Bats Seen crossing	Survey 3	Bats Seen crossing	Survey 4	Bats Seen crossing	Survey 5	Bats Seen crossing	Survey 6	Bats Seen crossing	Repeat survey 1	Bats Seen crossing	Repeat survey 2	Bats Seen crossing
2	04.07.2017 Dusk	One pipistrelle species crossed.	08.08.2017 (dawn) called off due to weather - repeat survey required	Four	04.09.2017 Dusk	One Serotine crossed.	08.05.2019 (dusk)	Seven Common pipistrelle and soprano pipistrelle crossed	05.06.2019 Dawn	Ten Common pipistrelle & soprano pipistrelle and one Myotis crossed	25.07.2019 Dusk	Five crossing Common pipistrelle and soprano pipistrelle	23.06.2020 Dawn	None crossed		
16	14.08.2019 Dawn	Two Common pipistrelle	17.09.2019 Dusk	Four Common pipistrelle	01.06.2019 Dusk	Two Plecotus crossed. High species activity including barbastelle.	07.07.20 dusk. Invalid survey, as only one side of crossing point was surveyed. Survey needs repeating.	Though invalid a barbastelle recorded was identified during the sound analysis (was not seen crossing).	21.07.2020 AM-Survey called off	N/A	4.08.20 pm	None crossed. Good diversity heard surrounding including barbastelle	24.08.2020 Dusk	No bats seen crossing, Common pipistrelle foraging along field boundary hedgerow to south-west.	10.09.2020 Dusk	No crossing recorded. Common and Soprano pipistrelle recorded foraging.
17	20.06.2019 Dusk	One Plecotus, five Pipistrelles & one Myotis crossed. Barbastelle recorded foraging	02.07.2019 Dusk	Four Common pipistrelle and Plecotus crossed	01.08.19 Dawn	Two Pipistrelle crossed.	05.09.19 Dusk	Four Common pipistrelle crossed	26th May Dusk	Soprano pipistrelle & Common pipistrelle crossed. Barbastelle recorded foraging	24.06.20 Dawn	One Common pipistrelle crossed				
18	25.06.19 Dusk	None	02.07.2019 Dusk	Two Serotine crossed	01.08.2019 Dawn	None	05.09.19 dusk	None	16.06.20 Dusk	Common pipistrelle, soprano pipistrelle and serotine crossing	30.07.20 Dawn	One Serotine crossed				
19	26.06.2019 dusk	One Common pipistrelle crossed	23.07.2019 Dawn	None	14.08.2019 Dusk	Two Serotine & one Common pipistrelle crossed.	18.09.2019 Dusk	Three Common pipistrelle and one Soprano pipistrelle crossed	16.07.2020 Dusk	Four Common pipistrelle, one Serotine and one Noctule crossed	13.10.2020 Dusk	Pipistrelle Sp. crossing				
20	11.06.2019 Dusk- No sound data recorded- repeat survey required	N/A	03.07.2019 Dusk	Minimum count of 13 Common pipistrelle crossed	07.08.2019 Dusk	Twenty Common pipistrelles crossed.	05.09.2019 Dawn	None	02.06.2020 Dusk	Eight Common pipistrelle and one Soprano pipistrelle crossed	21.07.2020 Dawn	None	13.08.2020 Dusk	No bats crossed. Common pipistrelle flew adjacent to the hedgerow back and forth but did not cross.		
21	11.06.2019 (dusk)	None	12.07.2019 Dawn	Twelve Common pipistrelle crossed	07.08.2019 Dusk	Three Common pipistrelle, two Serotine, two Myotis and one Lesser horseshoe crossed.	05.09.2019 Dawn	None	02.06.2020 Dusk	Four common pipistrelle crossed	21.07.2020 Dawn	None				
22	09.05.2019 Dusk	Six Soprano pipistrelle & two common pipistrelle crossed under bridge	04.06.2019 Dusk	Ten Common pipistrelle and one long-eared bat crossed under bridge	03.07.2019 Dawn	Six Myotis sp. and one Common pipistrelle crossed under bridge.	13.08.2019 Dawn	Myotis sp. and Leisler's bat crossed under bridge	28.07.2020 Dusk	One Soprano pipistrelle, one Common pipistrelle and one barbastelle crossed under bridge.	07.09.2020 Dusk	Five Common pipistrelle and three barbastelle crossed.				

Crossing Point Number	Survey 1	Bats Seen crossing	Survey 2	Bats Seen crossing	Survey 3	Bats Seen crossing	Survey 4	Bats Seen crossing	Survey 5	Bats Seen crossing	Survey 6	Bats Seen crossing	Repeat survey 1	Bats Seen crossing	Repeat survey 2	Bats Seen crossing
23a	06.06.2019 Dusk	Four Serotine, two Plecotus, two Common pipistrelle and one barbastelle crossed	04.07.2019 Dusk	Two Soprano pipistrelle, two Common pipistrelle, two Myotis sp., four Serotine crossed road. Two possible lesser horseshoe crossed under road through culvert. Barbastelle recorded foraging.	28.08.2019 Dusk	Six Common pipistrelle, four Soprano pipistrelle, one Myotis sp, one Barbastelle crossed.	03.06.2020 Dusk	One Myotis sp, one Serotine, one Soprano pipistrelle and one Barbastelle crossed.	29.06.2020 Dusk	Minimum count of one Soprano pipistrelle, one Common pipistrelle, one Myotis sp and one Serotine crossed. Possibly up to 20 pipistrelle crossings but likely flew along roadside of hedges.	20.07.2020 Dusk	Three Common pipistrelle, three Serotine, two Soprano pipistrelle and one Myotis sp. Crossed.	04.08.2020 dawn	One Serotine, one Lesser horseshoe & one Common pipistrelle crossed.		
23b																
33	13.06.2019 (dusk) Analysis Complete	Two Common pipistrelle commuting / crossed hedgerow	11.07.2019 (dusk)	Three Noctules and two Leisler's flying high 20-30m high and broadly following hedgerow.	06.08.2019 Dusk	One Serotine crossed / commuted along hedgerow.	04.09.2019 Dawn	None Very low bat activity. Greater horseshoe pass.	19.05.2020	Four high-flying noctules broadly following feature / hedgerow.	11.06.2020 Dusk	Three Soprano pipistrelle, two Common pipistrelle and one Serotine crossing feature / hedgerow.				
34a	08.06.2020 Dusk	Eight Common pipistrelle crossed feature north / south	22.06.2019 June Dusk	Two Common pipistrelle and two Serotine crossed feature north / south	06.07.2019 Dusk	Two Noctules followed hedge, minimum crossing 10m above. Very low activity.	21.07.2019 Dusk	None	11.08.2020 Dusk	Low activity, common pipistrelle followed hedge but did not cross.	15.09.2019 dawn	Three bats, common pips crossed.				
34b	Dusk 08.06.2020	Two Common pipistrelle and one Serotine crossed hedgerow	22.06.2020 Dusk	No bats crossed. Low activity recorded but did include barbastelle	06.07.2020 Dusk	No bats crossed. Activity limited to three bat calls.	21.07.2020 Dusk	No bats crossed. Activity limited to two bat calls.	11.08.2020 Dawn	No bats crossed, noctules heard but they were not seen.	09.09.2020 Dusk	One Noctule, one *Nyctaloid*, one barbastelle crossed. Only the noctule was seen.				
34c	24.06.2020Dusk	Three Common Pipistrelles crossed	22.07.2020 Dusk	One Common pipistrelle crossed	05.08.2020 Dawn	None	25.08.2020 Dusk	One Soprano pipistrelle crossed.	09.09.2020 Dawn	No bat calls.	22.09.2020 Dusk	Serotine crossed. Common, Soprano pip, noctule, Leisler's, myotis and barbastelle recorded.				
34d	09.06.2020 Dusk	Two serotine, three common pip crossed, noctules crossed at height 40m+	24.06.2020 Dusk	Eleven Common pipistrelle crossed	22.07.2020 Dusk	One Pipistrelle sp, one Serotine and two high noctules crossed. seen crossing the feature.	05.08.2020 Dawn	Minimum count of four Common pipistrelles and one Myotis crossed.	27.08.2020 Dusk	Eleven common pipistrelle and one soprano pipistrelle recorded.	10.09.2020 Dawn	One Soprano pipistrelle recorded, no bats seen.				

4. Conclusion

4.1.1. Bat activity surveys have confirmed the presence of at least 11 species of bat within and around the footprint of the scheme. The majority of bats recorded both during transects and static surveys were common pipistrelle, with high activity levels recorded across the majority of the site for this species. A number of key foraging and commuting routes have been identified during the transect surveys including but not limited to Bickenhall Wood, Ashill village, several streams and their associated trees, also hedgerows around field boundaries.

4.1.2. Transect, static and crossing point surveys confirmed the presence of Annex II bat species including lesser horseshoe, greater horseshoe and barbastelle, as well as potential for Bechstein's due to the recording of Myotis species and availability of suitable habitat for this species. Barbastelles were the most frequently recorded annex II species across the scheme, with the highest level of barbastelle transect activity recorded around Bickenhall Wood. The species had recorded low levels of activity at all static detectors on each of the transect routes, with the highest at 8b with 426 passes. Activity for the other 2 Annex II species was low with lesser horseshoes recorded on 4C, 8A, 9B, 10A / B / C, where greater horseshoe was only recorded on statics 10A / B / C.

4.1.3. Of the crossing point surveys undertaken, crossing points 22 and 23 were considered of high value due to the use of the features by barbastelle and lesser horseshoes. Crossing points 16, 20, 34a and 34b were considered moderate for either low number use by Annex II species or because of a higher number use by common species. All other crossing points were considered to be of low value.

4.1.4. This report should be read in conjunction with the A358 Bat Roost Report, and A358 Radiotracking Report to provide a full report of bat activity within the zone of influence of the A358 Taunton to Southfields Dualling scheme.