Gray's Ecology

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Bat Surveys Report

Site: Ham Brook

Client: Chichester District Council

Version 001

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The information provided in this document has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct.

Contents

1 Introduction

1.1 Background

Gray's Ecology were commissioned by Chichester District Council to undertake bat activity monitoring surveys using two automatic static bat recorders, simultaneously placed at Farm Lane (Grid reference: SU 77791 05433) and Brook Meadows (Grid reference: SU 78636 06825) on three separate occasions. (see map in Figure 1 below). The surveys were required to provide current data on bat activity at these locations, which could be used to facilitate appropriate consideration for the requirements of bats within the proposed Chichester Strategic Wildlife Corridors and the wider local area.

1.2 Site Description

The sites are both located on the edge of residential settlements within the Sussex coastal plain, adjacent to Ham Brook in West Sussex. Point 9 is approximately 6.3 km west of Chichester and 0.5 km north of the Chichester Harbour Site of Scientific Interest, Chichester and Langstone Harbours Ramsar & Special Protection Area, Solent Maritime Special Area of Conservation, Nutbourne Marshes Local Nature Reserve and adjacent Chichester Harbour Area of Outstanding Natural Beauty. The South Downs National Park lies 1.5 km to the north and east of Point 10.

The area is characterised by small settlements, light industry and large fields of intensively cultivated low-lying farmland. A continuous ribbon of scrub, hedgerow (with mature trees) and small pockets of connected woodland are present along the route of Ham Brook. The large open fields present to the west of the site are separated by ditches and fences, with little in the way of hedging or trees present.

Figure 1. Map showing the static bat recorder deployment locations marked as Point 9 (Farm Lane) and Point 10 (Brook Meadows).

Map data source (c) Google Earth Pro 2020.

2 Summary of Relevant Legislation

Details of legal protection and planning policy applying to all UK bats and other relevant protected species are outlined in Appendix 1 of this report.

The results of this survey will be used to advise on impact avoidance measures and/or an appropriate mitigation strategy, that ensures compliance with EU and UK wildlife legislation.

All British bat species and their roosts are listed under Annex IV(a) of the European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive). As such, they are defined in UK law as 'European Protected Species' under Schedule 2 of the Conservation of Habitats and Species Regulations, 2017 (as amended) (Habitats Regulations 2017).

All bat species in England are also listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), which confers protection under Section 9 of the act and through the Countryside and Rights of Way (CRoW) Act, 2000. This combined legislation means that it is a criminal offence to:

- Deliberately capture, injure or kill a bat.
- Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats[1].
- Damage or destroy a bat resting place or roost (even if bats are not occupying the roost at the time).
- Possess, advertise, sell or exchange a bat (dead or alive) or any part of a bat, or to transport a bat or any part of a bat for this purpose.
- Intentionally or recklessly obstruct access to a bat roost.

The UK is a signatory to "The Agreement on the Conservation of Populations of European Bats," or "EUROBATS," which came into force in 1994, under the auspices of the "Convention on the Conservation of Migratory Species of Wild Animals" – more widely known as "The Bonn Convention 1991." Under the Bonn Convention 1991, the UK is required to identify and provide protection from damage or disturbance to important feeding areas and roosts used by bats. Under the agreement, a bat roost is "*any structure or place which any bat uses for shelter or protection*". Bats tend to regularly reuse the same roosts, therefore legal opinion is that the protection of bat roosts are required regardless of whether bats are present or not – there is currently no guidance on when a roost ceases to be protected if it is not used by bats.

Activities likely to harm bats include the following:

- renovating, converting or demolishing a building
- cutting down or removing branches from a mature tree
- repairing or replacing a roof structure or roof covering
- repointing brickwork
- insulating or converting a loft
- installing lighting in a roost, or outside if it lights up the entrance to the roost
- removing 'commuting habitats' like hedgerows, watercourses or woodland
- changing or removing foraging areas used by bats
- using insecticides or treating timber within or near to an occupied bat roost or resting place.

[1] *Disturbance of bats include any disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate; or to significantly affect the local distribution or abundance of the species to which they belong.*

Local authorities in England are required to consider biodiversity and protected wildlife under their obligation to the Habitats Regulations 2017, and Section 40 of the Natural Environment and Rural Communities Act 2006 (NERC Act 2006).

3 Planning Policy

The following National and Local Planning Policies are relevant in respect to ecology in general:

- National Planning Policy Framework (2019), Section 2 (8c) and Section 15 (174 - 177).
- Chichester District Council Adopted Chichester Local Plan: Key Policies 2014-2029, Policies 40, 49 – 50 and 52.
- Chichester Harbour Management Plan 2019 – 2024 Third Review, Policy 8.
- South Downs National Park Authority. South Downs Local Plan (2019).
- People And Nature Network: Green Infrastructure in the South Downs and wider South East (PANN) – Par. 2.36.
- Sussex Natural Capital Investment Strategy – Par.6, Principle 'd.'

The National Planning Policy Framework (NPPF) 2019 sets out government policy on biodiversity in planning decisions. Under the NPPF, the presence of a protected species is a material consideration when a planning authority is considering a development proposal. The NPPF also confirms that weight may be given to policies in emerging plans following their publication.

In accordance with the NPPF, it is important that developments should contribute to and enhance the natural and local environment by:

- Minimising impacts on existing biodiversity and habitats,
- Providing net gains in biodiversity and habitats, wherever possible,
- Establishing coherent ecological networks that are more resilient to current and future pressures.

Further regard should be given to the principles laid out within the document *People And Nature Network: Green Infrastructure in the South Downs and wider South East* (PANN), recently published by the South Downs National Park Authority (SDNPA) and Natural England Commissioned Report NECR207: *Functional linkage: How areas that are functionally linked to European sites have been considered when they may be affected by plans and projects - a review of authoritative decisions* (2016).[2]

PANN Par. 2.36 states that…

"*This document has been developed to provide strategic, high level direction for the Sussex Local Nature Partnership (LNP) and marks the beginning of an important process to plan and coordinate the collective investment in the natural capital of Sussex*."

PANN is underpinned by The Natural Capital Investment Strategy (NCIS), which is a product of the Sussex Local Nature Partnership (SxLNP). The SxLNP is comprised of groups with larger geographical remits. Generally top tier Local Authorities (not districts or boroughs), and county-wide organisations, which also includes Sussex Wildlife Trust.

Par.6. Principle 'd' of the Sussex NCIS includes the following statement…

[2] PANN is supported by NECR207 and the South Downs Local Plan (2019), which advocates special consideration for developments falling within 12km of the Cocking Tunnel Special Area of Conservation (SAC), under Policy 10, via the Draft Sussex Bat Special Area of Conservation Planning and Landscape Scale Enhancement Protocol (Natural England, 2018).

It should be noted that the surveyed area lies within 12km of the Singleton and Cocking Tunnel Special Area of Conservation (SAC), which is designated for bats.

"*Many asset-benefit relationships are at risk, at a range of levels, both nationally and in Sussex. The LNP has a role to keep a watching brief on the status of these and periodically review whether action is needed to push for greater protection. Opportunities should also be taken to embed a general understanding of 'natural capital at risk' within decision-making processes in Sussex, so that impacts of decision on the assets involved are fully discussed and understood.*"

4 Methods

This report has been produced in accordance with the following current guidelines:

- Chartered Institute of Ecology and Environmental Management (2017). Guidelines for Ecological Report Writing, Second Edition. Technical Guidance Series. CIEEM.
- Collins, J. (2016). Bat Surveys for Professional Ecologists. Good Practice Guidelines (3rd edition). Bat Conservation Trust, London.

4.1 Experience of Ecologist

Nick Gray is licensed under Natural England's Bat Survey Class Licence WML-CL18 (Bat Survey Level 2) – registration number 2017-32546-CLS-CLS. Nick has considerable experience as an ecological consultant, which includes surveying and monitoring habitats for bats. He regularly acts as the named ecologist on Natural England Protected Species Mitigation Licences relating to bats. Nick is also a committee member of Sussex Bat Group and the coordinator and team leader for bat roost counts at several nationally important bat hibernation roost sites across West Sussex (including Singleton and Cocking Tunnels) on behalf of the Bat Conservation Trusts' National Bat Monitoring Programme (Winter Hibernation Counts).

4.2 Field Surveys

Two Elekon Batlogger A+ automated static acoustic bat recorders were deployed simultaneously at two locations adjacent to Ham Brook, under the direction of Chichester District Council. The parameter settings for both recorders were synchronised and set to monitor and record automatically each day from 15 minutes before sunset until 15 minutes after sunrise, for a minimum period of five days on three separate occasions (Table 1). The surveys were conducted in accordance with methodology set out in Collins, J.(ed.) (2016).

Table 1. Showing locations and deployment dates for acoustic bat recorders (Figure 1).

Recorder location	Recorder S/N	Grid reference	Start date	End date
Point 9 (Farm Lane)	1578	SU 77791 05433	01.08.20	08.08.20
Point 9 (Farm Lane)	1578	SU 77791 05433	22.08.20	29.08.20
Point 9 (Farm Lane)	1578	SU 77791 05433	09.09.20	15.09.20
Point 10 (Brook Meadows)	1540	SU 78636 06825	01.08.20	07.08.20
Point 10 (Brook Meadows)	1540	SU 78636 06825	22.08.20	28.08.20
Point 10 (Brook Meadows)	1540	SU 78636 06825	09.09.20	15.09.20

The surveys were undertaken during peak periods of bat activity and in appropriate weather conditions, in accordance with best practice guidelines (Collins, 2016).

Both Elekon Batlogger A+ recorders used firmware version 2.6.2 and used the Elekon "Crest Adv" algorithm to trigger the automatic recording of sound signals between 15 – 155 kHz. Recordings captured all calls from 0.5 s prior to the trigger event until 1.0 s after the trigger event, at which point the recorder saved the recording file to a folder and either began recording a new file or reverted to passive monitoring.

For the purpose of this study, a bat pass is defined as a single recording file, each of which may contain one or several bat call signatures.

Following the Survey, a full analysis of the sound recording data was performed using Bat Explorer analysis software, version 2.1.40 (2.1.7017.34360) to help isolate and identify bat species, the numbers of bat passes and the times of passes for each bat species recorded. Bat species were identified by comparing sonograms and audio against known a reference of echolocation call parameters and a library of audible echolocation calls. Recorded calls were assigned to species level wherever possible. Where species were not clearly definable, identification to genus level was made. The results were checked and verified by Nick Gray, who is registered by Natural England to survey for bats under Bat Scientific Survey Class Licence WML CL18 (Reg. 2017-32546-CLS-CLS).

4.3 Survey Limitations

In accordance with best practice guidelines (Collins, 2016), three survey visits were undertaken. Surveys were conducted during periods when bats are known to be active and in appropriate weather conditions. The results presented herein are considered an accurate representation of the audible bat activity occurring at the recorder locations during the monitoring periods.

Bats can use roosting, foraging and commuting habitat intermittently throughout the year and may therefore be present in larger or smaller numbers depending on their breeding cycle, available prey, weather conditions, and in response to any disturbance. These data are a record of the activity of bats at the time of the survey visits only and therefore, provide a 'snapshot' of bat activity at the site during that time. Bats may also be present at other times and in greater or lower numbers.

Bat surveys undertaken using a bat sound recorder are inherently biased towards bats with louder calls (such as the *Nyctalus* species), which will be recorded at a greater distance than species which use quiet calls, such as long-eared *Plecotus auratus* and some species within the *Myotis* genus (often not detectable more than 3-5 m from the bat recorder). Therefore, it is likely this genus will be under-recorded during such surveys.

The comparative effectiveness of bat sound recorders can be influenced by variations in model, parameter settings, microphone type and efficiency, as well as differing environmental conditions, such as weather, wind noise, electronic interference, reflected or obstructed sound and other sources of unwanted sound.

Species identification by sonogram is limited (to a certain extent) by similarities in call structure. In addition, all bats can modulate their calls according to the habitats they are navigating, their behaviour and the information they require at the time. This imposes limitations on reliable analysis, particularly between species within the genera *Plecotus, Myotis and Nyclalus*. There is also no reliable way to differentiate between *Pipistrellus Nathusii* and *P. Kuhlii* when relying upon echolocation call patterns alone, i.e. without social calls.

As defined above, bat passes provide an indication of bat species present and the levels of activity within the site area, but do not represent the actual number of bats present.

The above survey limitations are unavoidable. However, it is considered that they have not affected the robustness of the survey results for the purposes of this study.

There were no limitations to the survey in terms of the following:

- Access.
- Available resources e.g. specialist survey equipment and experienced personnel.
- Seasonal constraints.
- Available suitable weather conditions.
- Sufficient background data.
- Time spent surveying.

4.4 Evaluation Methods

To provide statistical relevance, the analysed data was evaluated using the 'Ecobat' software system, via the Ecobat website http://www.ecobat.org.uk/. Ecobat was originally designed with support from the NERC and the University of Exeter and now run by the Mammal Society. The outputs obtained from Ecobat are designed to provide the following:

- Quantify bat activity relative to local and national datasets.
- Assess nightly variability in bat activity and to help identify sites with roosts nearby.
- Produce easy-to-use, report-ready summaries.

To counteract the inherent subjectivity of bat assessments Ecobat uses a large dataset (in excess of 50,000 records) so that bat activity recorded at a focal site can be contextualised against reference levels recorded in the same region and at a similar time of year etc. The 'reference range' is the stratified dataset by which percentile outputs can then be generated.

Ecobat output data uses percentiles to provide a numerical indicator of the relative importance of a nights' worth of bat activity. For example, activity data in the 70th percentile would indicate that the recorded data was in the top 30% of activity for the reference range.

To maintain consistency, the Ecobat output data was commissioned using a geographical reference radius of 100 km and comparative data within a 30-day yearly time window, to ensure compatibility with previous studies of bats within the locality.

Percentiles have been used within this study to define areas of 'low', 'moderate' or 'high' activity as follows:

- 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.

An indication of bat species rarity values are shown in (Table 2).

Table 2. Species rarity value for 22 species of bat that occur in the UK (some are resident in Sussex, while others visit occasionally or at certain times of the year).

Common name	Latin name	Status in Sussex	Status in UK
Alcathoe whiskered bat	*Myotis alcathoe*	Rarest	Rarest
Barbastelle	*Barbastella barbastellus*	Rarest	Rarest
Bechstein's	*Myotis bechsteinii*	Rarest	Rarest
Brandt's	*Myotis brandtii*	Rarer	Rarer
Brown long-eared	*Plecotus auritus*	Common	Common
Common pipistrelle	*Pipistrellus pipistrellus*	Common	Common
Daubenton's	*Myotis daubentonii*	Rarer	Rarer
Geoffroy's bat	*Myotis emarginatus*	Rarest	Rarest
Greater horseshoe	*Rhinolophus ferrumequinum*	Rarest	Rarest
Greater mouse-eared	*Myotis myotis*	Rarest	Rarest
Grey long-eared	*Plecotus austriacus*	Rarest	Rarest
Kuhl's pipistrelle	*Pipistrellus kuhlii*	Rarest	Rarest
Leisler's	*Nyctalus leisleri*	Rarest	Rarest
Lesser horseshoe	*Rhinolophus hipposideros*	Rarest	Rarest
Nathusius' pipistrelle	*Pipistrellus nathusii*	Rarer	Rarer
Natterer's	*Myotis nattereri*	Rarer	Rarer
Noctule	*Nyctalus noctula*	Rarer	Rarer
parti-coloured bat	*Vespertilio murinus*	Rarest	Rarest
Savi's pipistrelle	*Hypsugo savii*	Rarest	Rarest
Serotine	*Eptesicus serotinus*	Rarer	Rarer
Soprano pipistrelle	*Pipistrellus pygmaeus*	Common	Common
Whiskered	*Myotis mystacinus*	Rarer	Rarer

Data sources: Sussex Bat Group 2020. Available online at: https://www.sussexbatgroup.org.uk/batsinsussex and *Valuing Bats in Ecological Impact Assessment* (Wray, S et al. 2010).

5 Results

5.1 Field Surveys

Bat sounds were recorded for a minimum of six nights at all deployments, with the first two deployments in August 2020 at Point 9 (Farm Lane) continuing to record for seven nights before the battery expired.

Figure 2 below shows the percentage species composition of passes recorded at each detector.

It should be noted that all of the bat species identified attained 'high' activity status at some point during the survey. This was particularly evident for *P. pipistrellus* and *P. pygmaeus* (Table 3), where P9 (Farm Lane) detected the highest nightly pass rate (Figure 3, Appendix 2) for *P. pipistrellus*, with 1,632 passes recorded during the first deployment between 01 August 2020 and 08 August 2020. Activity for this species was shown to be consistently 'high' during this period, occurring from approximately 60 minutes after sunset until the following sunrise (Table 4 and Figure 4, Appendix 2). During the two subsequent deployments at this location the total number of passes were not as high. However, the activity level was still classified as statistically 'High' for 19 of the 20 nights that recording took place (Table 4).

P10 (Brook Meadows) saw the highest number of *P. pygmaeus* (Figure 3, Appendix 2), with a maximum pass rate of 3,148 during the deployment between 09 September 2020 and 15 September 2020. Once again, activity was found to be consistently high for this species throughout the survey (Figure 4, Appendix 2) and with a high incidence of social calls recorded, which is consistent with the presence of a nearby roost (Figure 5, Appendix 2). During the second deployment at P10, samples of bat guano were collected from below a bat roost, which was located behind hanging tiles on the western elevation of the house at 8 Brook Meadows. The sample was sent to the University of Warwick for identification using mtDNA sequence analysis. The results confirmed the presence of a roost for *P. pigmaeus* to be located within 25 m of the detector (Figure 6, Appendix 2). *P. pipistrellus* were also recorded as 'high' for this location on 17 of the 19 nights surveyed (Table 4), which is also indicative of a nearby active roost for this species (Figure 5, Appendix 2).

During the final deployment at P10 (Brook Meadow), between 09 September 2020 and 15 September 2020, four passes were detected, which produced echo location call signatures consistent with those produced by *P. Nathusii or P. Kuhlii,* Unfortunately, it is not possible to reliably distinguish between these two species using echo location calls alone, without the presence of social calls.

During the first deployment at P10 (Brook Meadow), between 01 August 2020 and 08 August 2020, three passes were detected with echo location calls likely to have been produced by *M. Alcathoe.* However, there was not enough clear evidence recorded to provide a definitive identification beyond the genus for these.

Barbastella barbastellus were recorded at both P9 (Farm Lane) and P10 (Brook Meadow) during the deployments in August (Table 3). This was found to be of 'moderate' to 'high' statistical significance (Table 4).

Nyctalus noctule, *Plecotus sp*., and *Myotis sp*., were all recorded at P10 (Brook Meadow) within the window that indicates the presence of a nearby roost for these species (Figure 5, Appendix 2).

Table 3, Table 4 and Figures 3 to 6 in Appendix 2 summarise bat activity recorded at each location.

Table 3. Showing the total number of bat passes recorded for each species per detector in each month.

	Number of bats passes recorded per species					
	P9 (Farm Lane) active recording period			P10 (Brook Meadows) active recording period		
Bat species	01.08.20 until 08.08.20	22.08.20 until 29.08.20	09.09.20 until 15.09.20	01.08.20 until 07.08.20	22.08.20 until 28.08.20	09.09.20 until 15.09.20
Barbastella barbastellus	1	12	0	3	0	0
Eptesicus serotinus	0	11	1	72	3	9
Myotis sp.	4	26	6	21**	20	73
Nyctalus noctula	42	93	105	47	5	92
Pipistrellus sp.	1	1	10	2	2	5*
Pipistrellus pipistrellus	1632	325	910	1395	1171	518
Pipistrellus pygmaeus	467	1080	408	2198	667	3148
Plecotus sp.	1	24	2	28	1	21
Total number of bat passes	**2148**	**1573**	**1442**	**3766**	**1869**	**3866**

*Note – four of these bat passes were either *P. Nathusii or P. Kuhlii*.

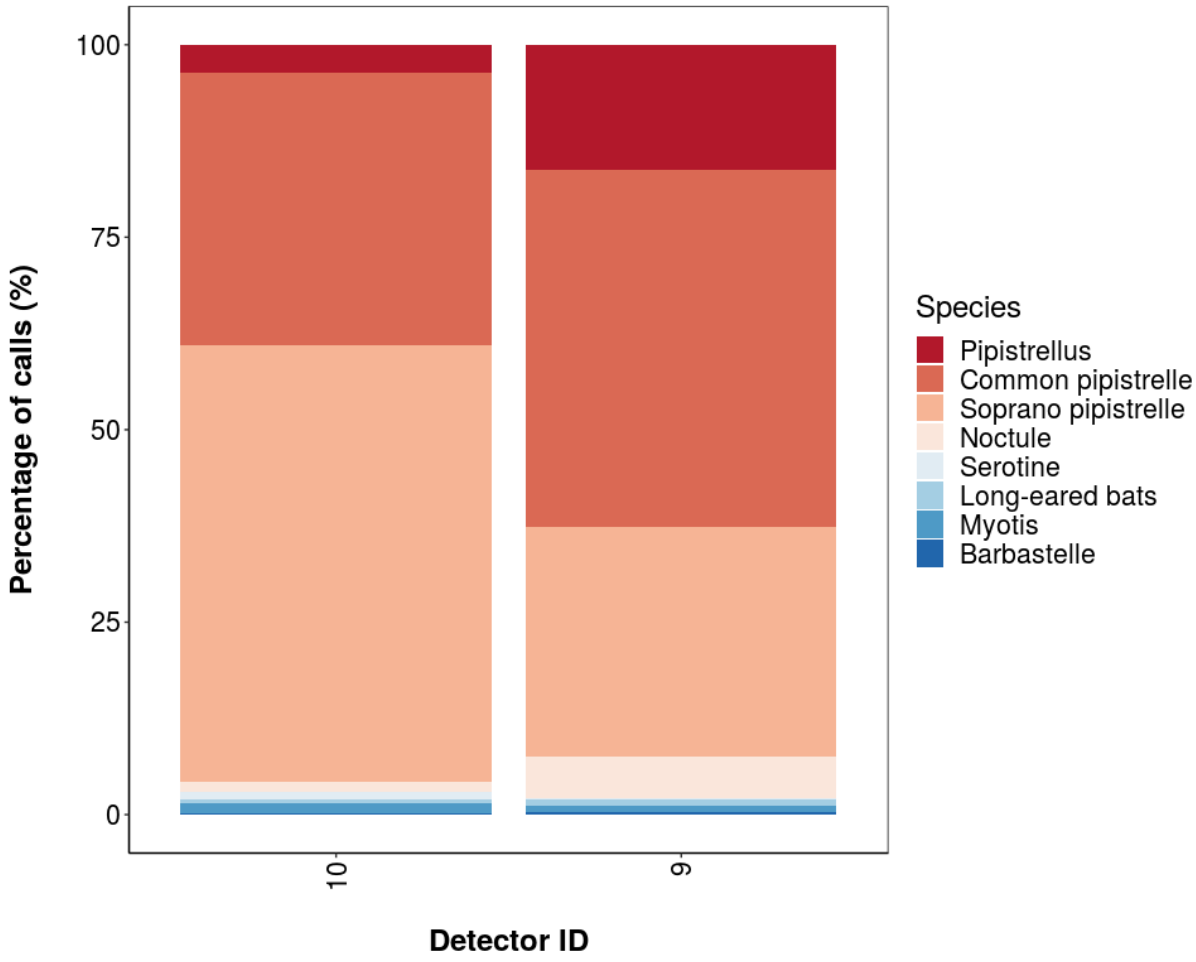
**Note – three of these bat passes were considered likely to be *M. Alcathoe*.

Table 4. Summary table showing the number of nights recorded bat activity fell into each activity band for each species.

Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
10	*Barbastella barbastellus*	0	1	0	0	1
10	*Eptesicus serotinus*	3	7	0	0	2
10	*Myotis*	4	9	0	0	3
10	*Nyctalus noctula*	6	6	0	0	3
10	*Pipistrellus*	6	0	0	0	1
10	*Pipistrellus pipistrellus*	17	2	0	0	0
10	*Pipistrellus pygmaeus*	18	1	0	0	0
10	*Plecotus*	1	8	0	0	2
9	*Barbastella barbastellus*	1	1	0	0	2
9	*Eptesicus serotinus*	1	1	0	0	2
9	*Myotis*	0	8	0	0	3
9	*Nyctalus noctula*	11	8	0	0	0
9	*Pipistrellus*	6	0	0	0	0
9	*Pipistrellus pipistrellus*	19	0	0	0	1
9	*Pipistrellus pygmaeus*	20	0	0	0	0
9	*Plecotus*	2	2	0	0	5

Summary data courtesy of Ecobat.

Figure 2. Percentage species composition of passes at each detector (Summarised using Ecobat).



6 Discussion

All bats in the UK feed exclusively upon invertebrates and are nocturnal in habit, relying upon trees hedgerows, grasslands and wetlands for foraging, shelter and for navigation. It is therefore imperative that these areas remain undisturbed and are enhanced for bats and other wildlife wherever possible.

In the UK, bat populations have declined considerably over the last century due to loss and fragmentation of habitat, diminished food supply and destruction of roosting sites. Today, bats remain under threat from a wide range of factors, including:

- Rapid and increasing loss of their invertebrate food sources, largely as a result of modern intensive farming practices.
- Loss of habitat for foraging, commuting and shelter.
- Loss of roosting sites within buildings and trees.
- Disturbance from high levels of artificial light (this also has a harmful impact on invertebrates and other nocturnal wildlife).
- Predation by domestic cats.
- Collision with vehicles and wind turbines.
- Contact with harmful chemicals (such as some timber treatments) and even sticky flypaper.

Linear landscape features, such as, waterways, ditches, hedgerows and tree lines, as well as woodlands, heathland and unimproved grassland are fundamentally important for bats; providing

essential connectivity between roosts and foraging sites, as well as providing foraging and roosting habitats for bats in their own right.

The widespread removal of hedgerows to allow improvements to farming efficiency, better stock-proofing and weed control (Sutherland and Hill 1995). Although hedgerow loss slowed in the 1990s and agri-environment schemes seek to encourage their reinstatement and better management, the loss and fragmentation of these important commuting and foraging habitats continues. Increasing urbanisation and new infrastructure development now cause the biggest loss of hedgerows, affecting bats by reducing access to suitable foraging habitats or isolating populations (e.g. Russ & Montgomery 2002).

The findings from this study indicate that established biodiversity corridors like Ham Brook can be important features, supporting significant numbers of foraging and commuting bats (BCT 2020).

The study showed that the eight species of bat recorded, occurred at both recorder locations. *Barbastella barbastellus, Plecotus, Nyctalus noctula* and *Myotis* species are all reliant on woodland. *Nyctalus noctula, Eptesicus Seortinus* and *Barbastella barbastellus* are known to travel a considerable number of miles on a nightly basis along linear features, such as Ham Brook to access their primary foraging habitat. *Barbastelle barbastellus* are considered to be 'very rare' within the UK and across Europe and are listed under Annex II of the EC Habitats Directive. This requires that sites, which contain important populations of these species are designated as Special Areas of Conservation. The nearest of these sites is located at the Singleton and Cocking Railway Tunnels, 11.2 km to the north-east of Point 10 (Brook Meadows). Consideration for this is a requirement under Policy 49 of the Adopted Chichester Local Plan: Key Policies 2014-2029, PANN and NECR207 (see Section 3, above).

The general lack of mature woodland and open water along and near the route of the Ham Brook means that the watercress beds at Hambrook Spring, to the north of Point 10 (Brook Meadows), the woodlands associated with Churcher's Copse to the west of the same site and the fishing ponds and woodland at Brook Farm, 525 m to the north of P9 (Farm Road) will be fundamental to the integrity of Ham Brook as a functioning corridor for bats travelling between Chichester and Langstone Harbour and the South Downs National Park.

Many of the UK's resident species of bat are reluctant to cross open ground or even small breaks in linear features and will also often go some distance to remain within the darkest areas, in an attempt to avoid artificial light. This study has indicated that the Ham Brook is significantly important to bats and appears to function as an important wildlife corridor for these animals. It serves to connect bats to the protected sites of Chichester and Langstone Harbour on the coastal plain, with the wooded downland of the South Downs National Park to the north. The Ham Brook corridor represents a narrow and very vulnerable wildlife artery, which if compromised, even a small way is likely to have a devastating effect upon bats and the wider ecology within the locality. This would be especially damaging for the protected environments of Chichester and Langstone Harbour.

7 Recommendations

Practical actions must be adopted to maintain and improve habitat connectivity for bats and other wildlife along the Ham Brook. These should be considered at an early stage in the local community planning process to enable them to form part of any future programme of local action. Local and neighbourhood development plans should demonstrate a commitment to protecting and enhancing natural capital assets in line with national and local planning policy and avoid damaging habitat connectivity at all costs. Chichester District Council should seek to promote the maintenance and improvement of existing habitats features for bats and other wildlife, as well as the creation of new additional habitat features within the built environment – these could include additional tree planting, formation of tree-lined streets, riparian corridors, new lakes and ponds, hedges and dedicated areas of scattered trees and woodland. It is imperative that such landscape features provide unbroken connectivity with the wider rural landscape and with urban green spaces, such as parks and gardens. Further advice is available using

the following link: https://cdn.bats.org.uk/pdf/Our%20Work/Landscape_and_urban_design_for_bats_and_biodiversityweb.pdf?mtime=20181101151349

Built structures should also be enhanced with the inclusion of integral bat roosting opportunities, such as bat bricks. Examples of these can be viewed using the following link: https://www.nhbs.com/bat-brick & https://www.nhbs.com/search?q=bat%20box%20built%20in&hPP=60&idx=titles&p=0&fR%5Bdoc_s%5D%5B0%5D=false&fR%5Bhide%5D%5B0%5D=false&fR%5Blive%5D%5B0%5D=true.

Many bat species and other nocturnal wildlife are vulnerable to disturbance from artificial lighting. Any reduction in existing levels of artificial lighting will be beneficial to bats. Where new lighting is proposed, it should be directed away from trees, shrubs and wetlands and used for restricted time periods only. All new developments should include a suitable lighting plan for this purpose (see Appendix 3 for further information on lighting).

Wildlife education for the local community and supported community habitat management and action group initiatives should be encouraged. These can go a long way to achieving desirable planning policy outcomes, both for wildlife and for community wellbeing. Example of successful local community groups can be viewed at https://www.aruncountryside.org/ and http://mwhg.org.uk/.

Future assessments of biodiversity indicator species, such as bats should be undertaken at regular intervals to obtain the necessary baseline data required to successfully monitor their status and inform appropriate adaptive management plans for the biodiversity corridors within the district into the future. A programme of hedge restoration and tree planting along these routes, to bridge the gaps in defunct hedgerows and to provide additional connectivity to other hedgerows and woodland within the locality should be considered.

Where they are not already in place, it is recommended that tree preservation orders are used to protect mature trees within these habitats. The presence of standing deadwood trees is an asset to bats and other wildlife and every effort should be made to retain these where possible. Where there is a safety concern, it is often possible to reduce, but not remove a tree completely and to leave the stem as a standing monolith, where it can potentially remain safely for many years.

Consideration must also be given to protecting adjacent habitat, which can be achieved through restrictions on land-use changes. New development should be resisted within 50 m of a bat corridor. Where development does proceed, conditions should be used to restrict artificial lighting and maintain the integrity of existing biodiversity corridors and to ensure that they are not severed or compromised in other ways. Further recommendations on the use of artificial lighting are presented in Appendix 3 below.

All roof structures and wall claddings can potentially become available to bats. Developers should be directed to government advice at https://www.gov.uk/guidance/bat-roosts-use-of-chemical-pest-control-products-and-timber-treatments-in-or-near-them to ensure that no chemically treated timber or products likely to harm bats are used in buildings. The use of non-bitumen coated roofing membranes, such as 'Tyvec,' along with other modern types of bitumen felt containing polypropylene filaments must also be avoided. Roof spaces should be lined with 1F traditional hessian-backed bitumen felt, which complies with BS EN 13707:2013 and BS 5250:2011 (as amended)

When considering potential impacts for bats, attention should begiven to bat core sustenance zones. Further guidance on this subject is available from the Bat Conservation Trust at https://cdn.bats.org.uk/images/Bat-Species-Core-Sustenance-Zones-and-Habitats-for-Biodiversity-Net-Gain.pdf?mtime=20200808090239&focal=none.

This study provides evidence to support the establishment of 'Biodiversity' or 'Green' Corridors as designated through the policies in the Chichester Local Plan: Key Policies 2014-2029, PANN and

NECR207 and recommends that Chichester District Council uses its influence to resist development that would negatively impact upon these corridors.

8 Conclusion

This study was commissioned alongside a wider ecological study to determine how the biodiversity corridors within the Chichester District operate for foraging and commuting bats and to assist in providing evidence to highlight the importance of protecting and maintaining effective wildlife and landscape links within the District. These include links to and from the coastal plain into and from the South Downs National Park, along with biodiversity corridors and landscape features being proposed by other authorities within the locality.

The static bat recorder surveys carried out for this study have shown the locations surveyed to be part of an important commuting and foraging route for bats, which is likely to be a significant corridors for bats traveling between the South Downs National Park and the coastal plain.

The survey has confirmed the importance of retaining this linear corridor and associated landscape features for bats and ensuring unbroken links to other important landscape features within and beyond the district, enabling bat species to continue to move freely along the corridor into and from the wider countryside.

It is important that future planning continues to be informed by robust baseline and ongoing monitoring data for local wildlife, which will remain essential to support good planning and development decisions for wildlife within the local area. It is recommended that further evidence of bat activity within the district is obtained throughout the 'active' season (from May until September). This should include a combination of static bat recorder monitoring at key locations and crossing points, such as the A27 and the east-west railway line, supported by bat transect surveys along linear features likely to be used by commuting bats.

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10 Appendix 1 –Wildlife Legislation and Planning Policy

10.1 Bats

The following text provides guidance in the form of a summary of the current legal protection afforded to bats.

All bat species in the UK are included in Schedule II of the Conservation of Habitats and Species Regulations 2017 (available online at: http://www.legislation.gov.uk/uksi/2017/1012/contents/made), which transpose Annex IV of the European Council Directive 92/43/EEC 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (EC Habitats Directive) (available online at: http://jncc.defra.gov.uk/page-1374). As such all bat species found naturally in the UK are defined as 'European Protected Species'.

Five species of bat, Bechstein's *Myotis bechsteinii*, western Barbastelle *Barbastella barbastellus*, greater mouse-eared *Myotis myotis*, greater horseshoe *Rhinolophus ferrumequinum* and lesser horseshoe R. *hipposideros* are also listed on Annex II of the EC Habitats Directive. This requires the designation of a series of sites, which contain important populations of these species as Special Areas of Conservation (SACs).

All species of British bat are also fully protected under the Wildlife and Countryside Act 1981 (as amended), through inclusion in Schedule 5 (available online at: http://www.legislation.gov.uk/ukpga/1981/69).

As a signatory to The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (available online at: https://jncc.gov.uk/our-work/the-convention-on-the-conservation-of-migratory-species-of-wild-animals/), the UK is also required to protect their habitats, requiring the identification and protection from damage or disturbance of important feeding areas.

In this interpretation, a bat roost is "*any structure or place which any bat uses for shelter or protection*". Because bats tend to reuse the same roosts, legal opinion is that the protection of bat roosts are considered to apply regardless of whether bats are present or not. There is currently no guidance on when a roost ceases to be protected if it is not used by bats.

Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006) (available online at: http://www.legislation.gov.uk/ukpga/2006/16/contents) lists the habitats and species of principle importance. Seven species of bat (western barbastelle *Barbastella barbastellus,* Bechstein's *Myotis bechsteinii,* noctule *Nyctalus noctule,* soprano pipistrelle *Pipistrellus pygmaeus,* brown long-eared *Plecotus auratus,* greater horseshoe *Rhinolophus ferrumequinum* and lesser horseshoe *Rhinolophus hipposideros*) are listed under Section 41. Section 40 of the NERC Act (2006) places a statutory duty on all public bodies, including planning authorities to take, or promote, steps to further the conservation of habitats and species of principal importance for the conservation of biodiversity in England (commonly referred to as the 'Biodiversity Duty'). This duty extends to all public bodies, requiring them to have regard to Section 74 of the Countryside and Rights of Way (CROW) Act 2000 (available online at: http://www.legislation.gov.uk/ukpga/2000/37/contents).

……..

The legislation outlined above makes it an offence to:

- Kill, injure or take any individual bat of any species.
- Possess any part of an individual bat, either alive or dead.
- Intentionally or recklessly damage, destroy or obstruct access to any place or structure used by bats for shelter, rest, protection, or breeding.
- Intentionally or recklessly disturb these species whilst using any place of shelter or protection.
- Deliberately disturb bats in such a way as to be likely to impair their ability to survive, breed or reproduce, rear or nurture their young, hibernate or migrate, or to significantly affect the local distribution or abundance of the species to which they belong.
- Keep (possess), transport, sell or exchange, or offer for sale or exchange, any live or dead bat, or any part of, or anything derived from a bat.

It is also an offence to set and use articles capable of catching, injuring, or killing bats (for example a trap or poison), or knowingly cause or permit such an action. Further protection is provided under Schedule 6 of The Wildlife and Countryside Act 1981 (as amended), relating specifically to trapping and direct pursuit of bats.

If planned works would constitute an offence, they may only be carried out under licence from Natural England. Works or mitigation activities involving interference with bats or bat shelters must be carried out by a licensed bat worker, who is registered with a Natural England bat survey class licence for this Purpose.

A European Protected Species 'Mitigation' Licence in relation to bats is also required from Natural England for any work that would result in an otherwise unlawful activity (e.g. damage to a bat roost). A license can only be issued for this purpose if Natural England are satisfied that all of the following three tests are met:

1. The proposal is for 'preserving public health or public safety, or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment:
2. There is no satisfactory alternative; and
3. The action authorised by the license will not be detrimental to the maintenance of bat populations at a favourable conservation status in their natural range.

A bat roost is defined by the Bat Conservation Trust's Bat Surveys—Good Practice Guidelines 3rd Edition as "the resting place of a bat". In general, the word roost is interpreted as "any structure or place, which any wild bat uses for shelter or protection."

Bats tend to re-use the same roosts. Therefore, legal opinion is guided by recent case law precedents, that a roost is protected, regardless of whether the bats are present at the time. This includes summer roosts used for breeding; or winter roosts used for hibernating.

10.2 Birds

Under Schedule 1 of the Wildlife and Countryside Act (1981) as amended, all wild birds (with the exception of those listed on Schedule 2), their eggs and nests are protected by law and it is an offence to:

- Take, damage or destroy the nest of any wild bird while it is in use or being built.
- Take or destroy the egg of any wild bird.
- Disturb any bird listed on Schedule 1, while it is nest building, or at a nest with eggs or young, or disturb the dependant young of any such bird.

In 1996, the UK's leading non-governmental bird conservation organisations listed the conservation status of all bird species in the UK against a series of criteria relating to their population size, trends and relative importance to global conservation, in order to identify Birds of Conservation Concern (BoCC) (Eaton et al (2015). Available online at: https://britishbirds.co.uk/wpcontent/uploads/2014/07/BoCC4.pdf). The lists, known as the 'Red', 'Amber' and 'Green' lists (in order of decreasing concern) are used to inform key conservation policy and decisions. The lists are reviewed every 5 years and are a useful reference for determining the current importance of a particular site for birds. The most recent review was undertaken in 2015 (Eaton et al, 2015), which provides an up to date assessment of the conservation status of birds in the UK.

The Council Directive 79/409/EEC on the Conservation of Wild Birds ("the Birds Directive") European Council Directive 79/409/EEC on the Conservation of Wild Birds ("the Birds Directive") (available online at: http://jncc.defra.gov.uk/page-1373) sets a framework for the protection of wild birds. Under the directive, several provisions are made including the designation and protection of 'Special Protection Areas' (SPAs) – areas which support important bird populations – to assist with the legal protection of rare or vulnerable species.

10.3 Natural Environment and Rural Communities (NERC) Act (2006)

The NERC Act (2006) created the statutory nature conservation body Natural England, and places a statutory duty on all public bodies, including planning authorities, under Section 40, to take, or promote the taking by others, of steps to further the conservation of *habitats and Species of Principal Importance for the conservation of biodiversity* in England (commonly referred to as the 'Biodiversity Duty'). This duty extends to all public bodies the biodiversity duty of Section 74 of the Countryside and Rights of Way (CROW) Act 2000, which placed a duty only on Government and Ministers. Section 41 of the NERC Act (2006) lists the habitats and species of principle importance. This includes a wide range of species from mosses, vascular plants, invertebrates through to mammals and birds. It originates from the priority species listed under the UK Biodiversity Action Plan (UK BAP) with some omissions and additions.

10.4 National and Local Planning Policy

The National Planning Policy Framework (2019) (NPPF), Section 2 (8c) and Section 15 (174b and 175a) (available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf) set out government policy on biodiversity in planning decisions. Under the NPPF, the presence of a protected species is a material consideration when a planning authority is considering a development proposal (Circular 06/2005, 2005) (available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7692/147570.pdf).

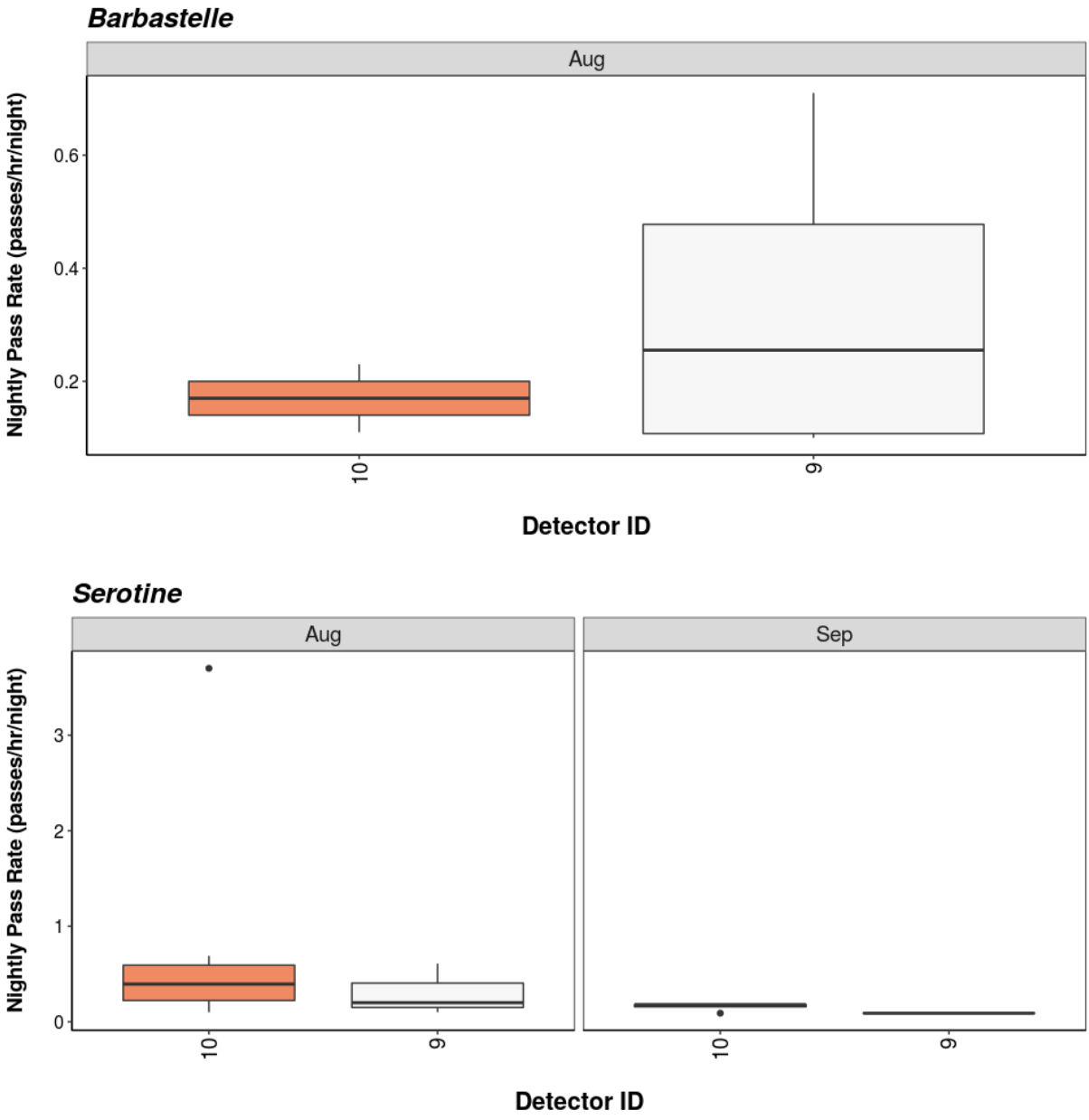
The NPPF also states that the wider benefits of an ecosystem should be recognised. In accordance with this it is important that developments should contribute to and enhance the natural and local environment by:

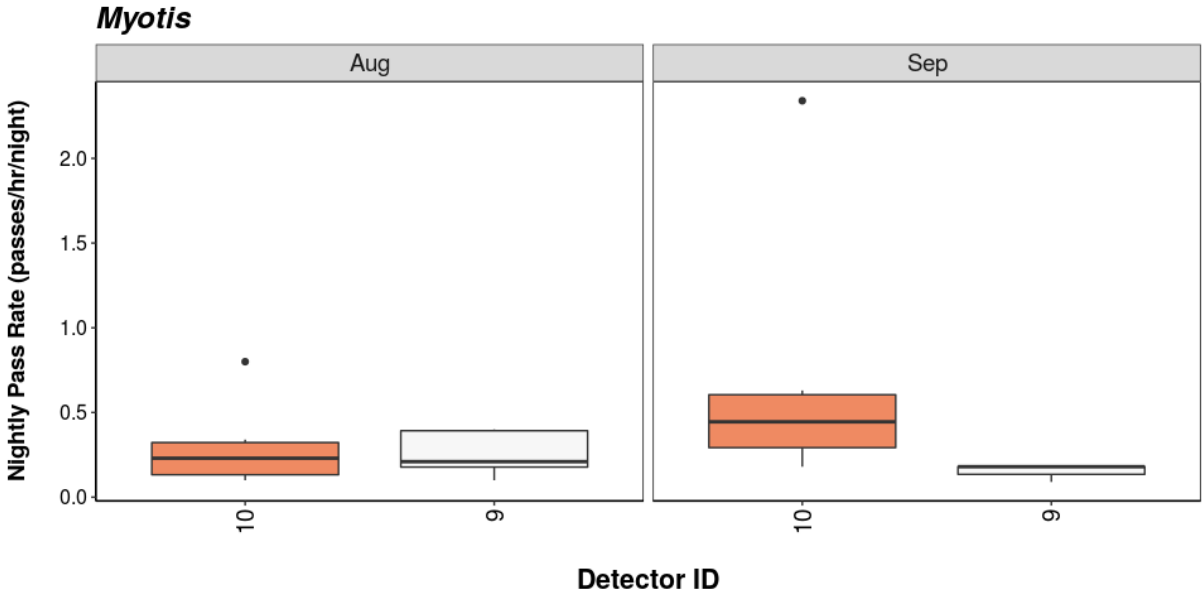
- Minimising impacts on existing biodiversity and habitats,
- Providing net gains in biodiversity and habitats, wherever possible,
- establishing coherent ecological networks that are more resilient to current and future pressures.

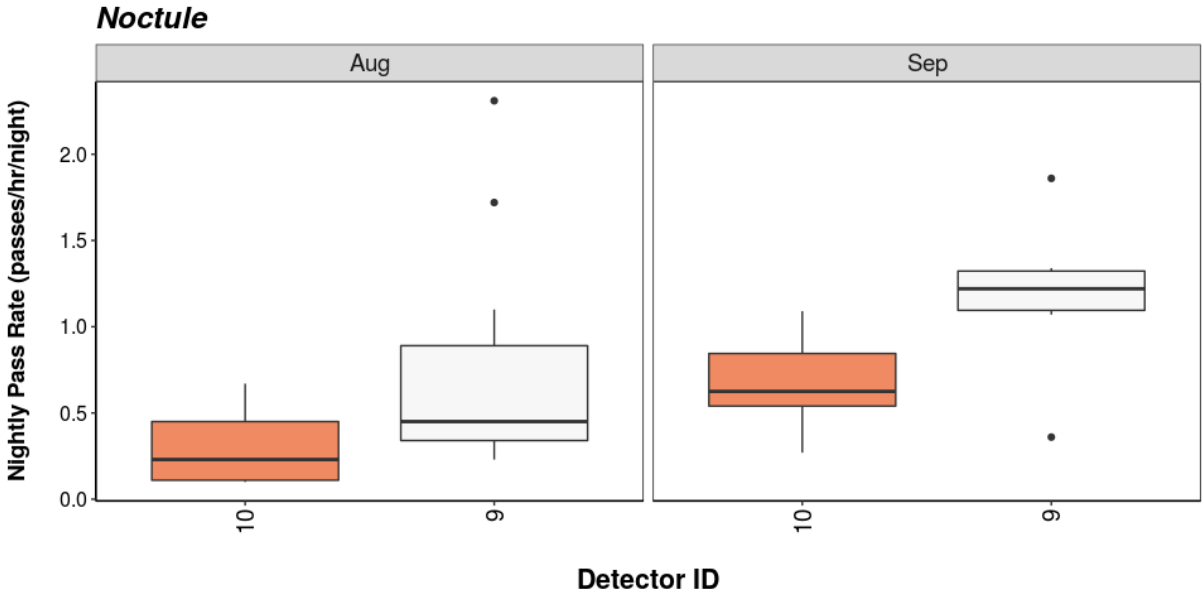
The NPPF is implemented through local planning under the South Downs Local Plan (2019), Policy SD2, SD8 – SD11.

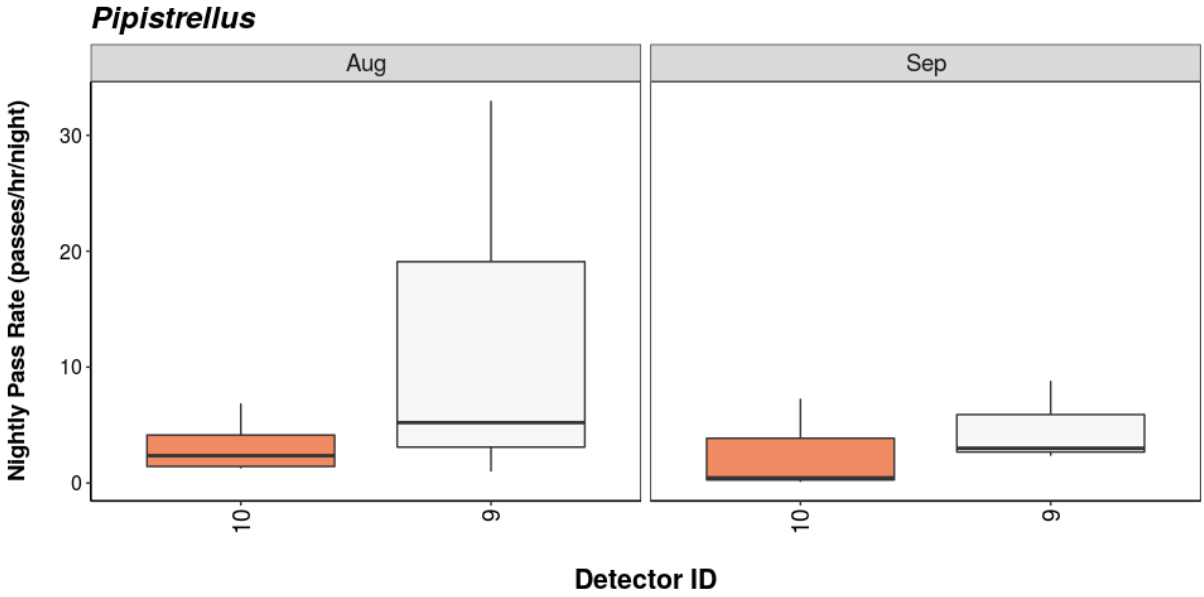
11 Appendix 2 – Survey Results

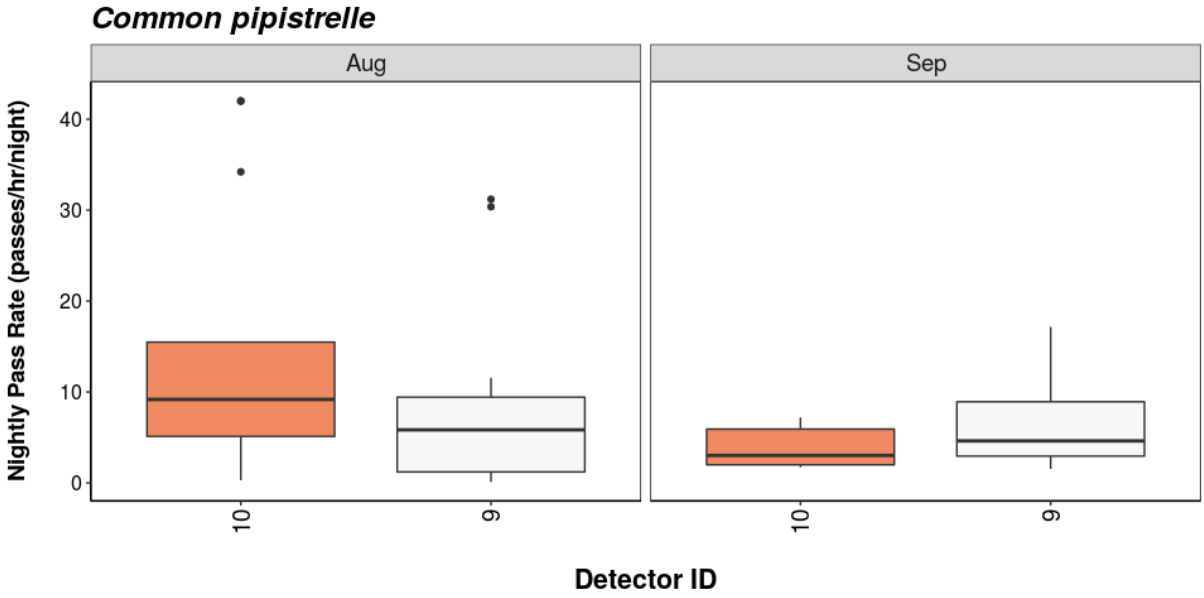
Figure 3. Boxplots showing the differences in activity between static detector locations, split by species and location for the number of bat passes per hour by detector, for each month compared with data in a similar geographic region (within 100km2) at a similar time of year (within 30 days) to give a relative comparison of bat activity. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line (Summarised using Ecobat).

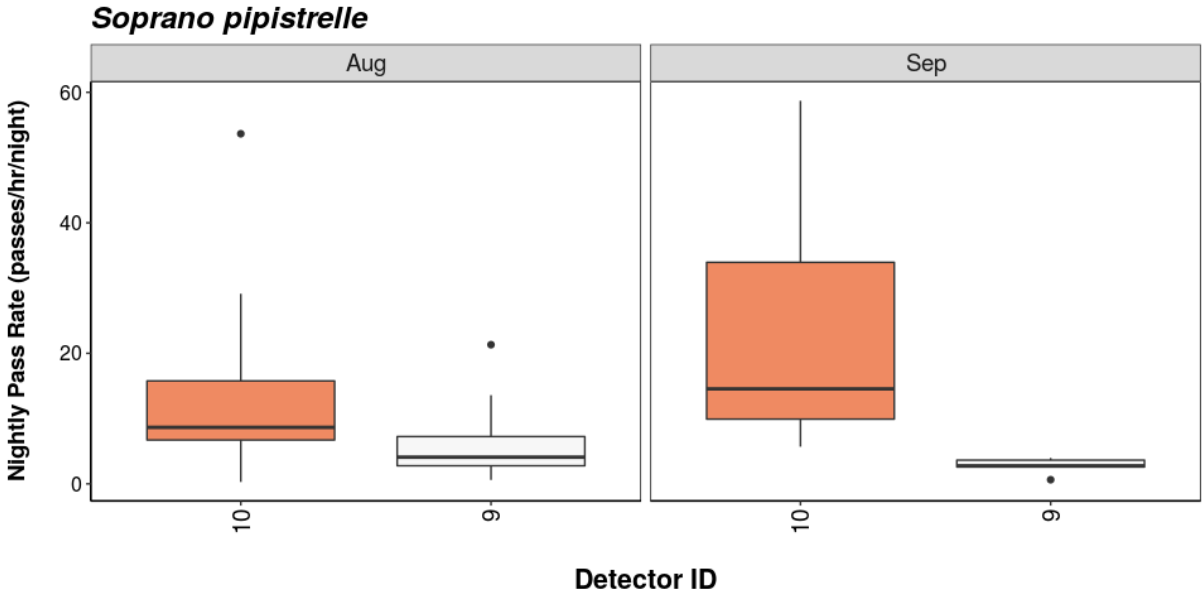



Myotis
Aug
Sep
Nightly Pass Rate (passes/hr/night)
0.0
0.5
1.0
1.5
2.0
10
9
10
9
Detector ID


Noctule
Aug
Sep
Nightly Pass Rate (passes/hr/night)
0.0
0.5
1.0
1.5
2.0
10
9
10
9
Detector ID


Pipistrellus
Aug
Sep
Nightly Pass Rate (passes/hr/night)
0
10
20
30
10
9
10
9
Detector ID


Common pipistrelle
Aug
Sep
Nightly Pass Rate (passes/hr/night)
0
10
20
30
40
10
9
10
9
Detector ID


Soprano pipistrelle
Aug
Sep
Nightly Pass Rate (passes/hr/night)
60
40
20
0
10
9
10
9
Detector ID

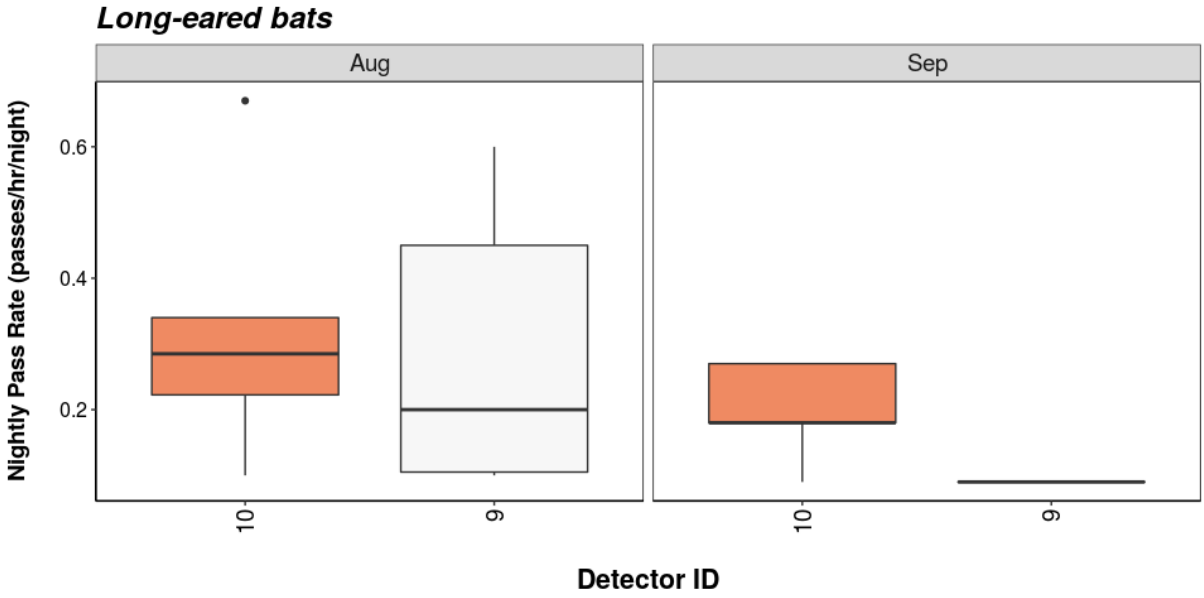
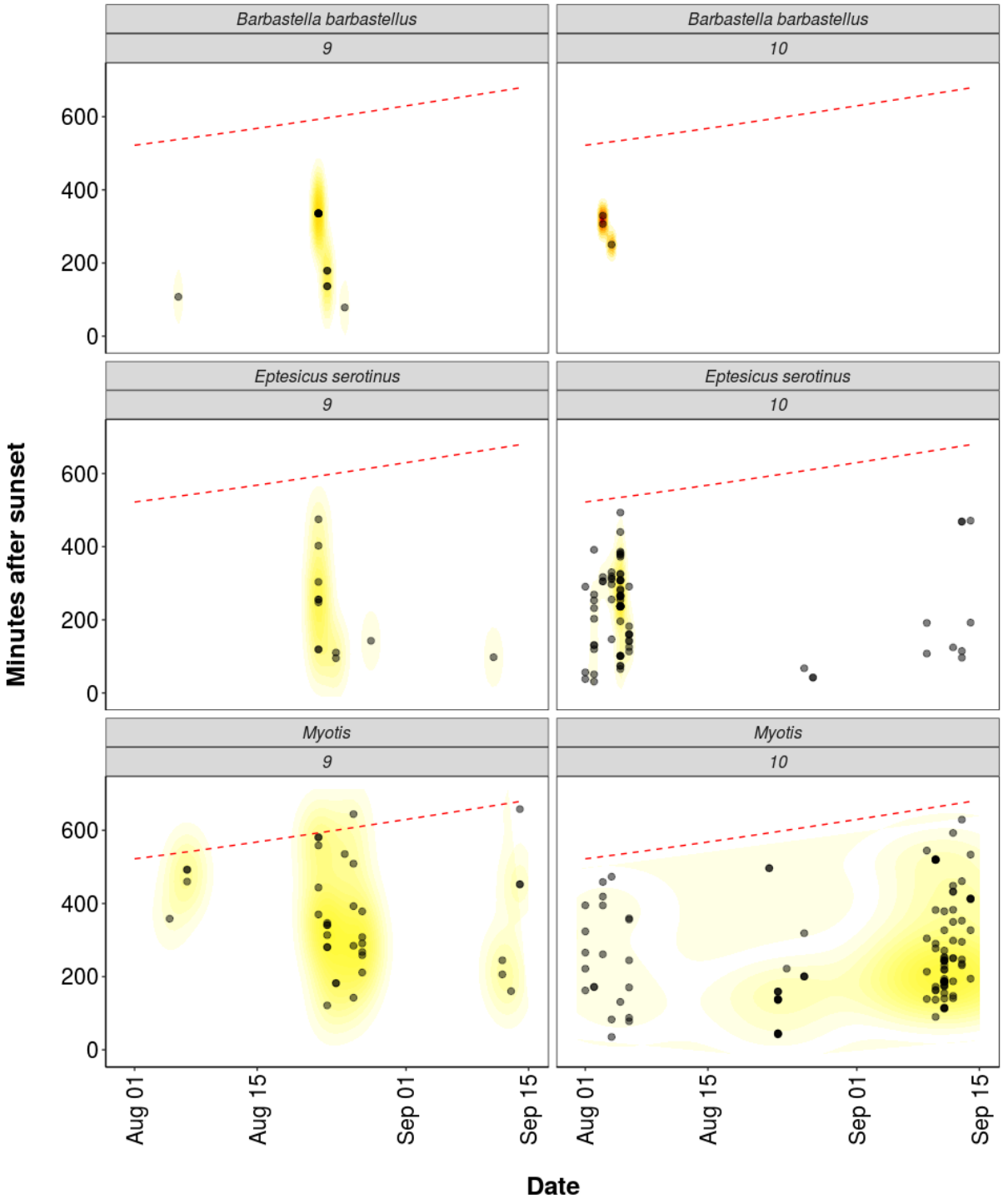
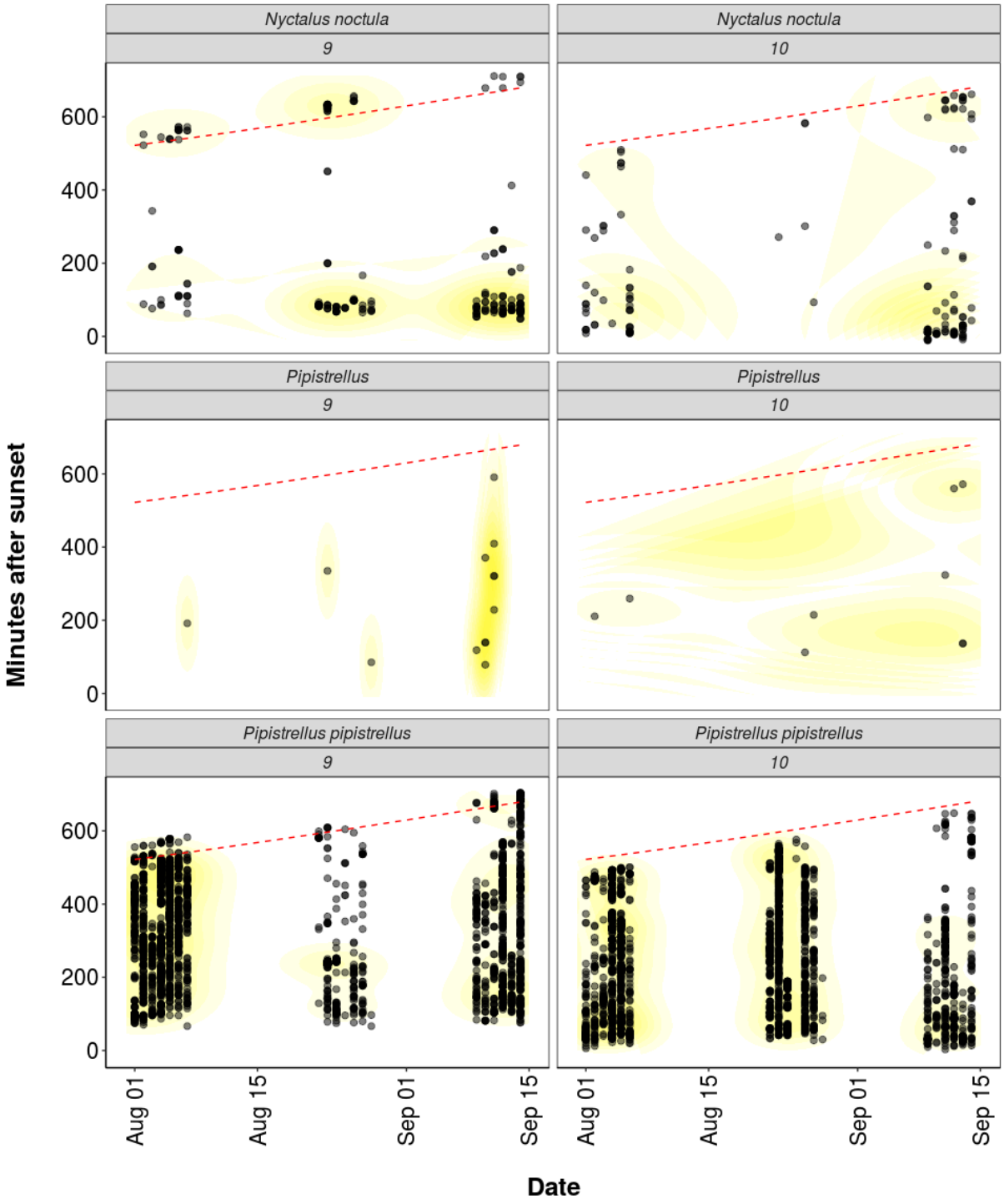

Long-eared bats
Aug
Sep
Nightly Pass Rate (passes/hr/night)
0.6
0.4
0.2
10
9
10
9
Detector ID

Figure 4. Timing of bat calls plotted as minutes before/after sunset, whereby 0 on the y axis represents sunset. Sunrise throughout the survey period is depicted as the red dashed line. Colours indicate kernel densities, with darkest colours showing peaks of activity. These colours are comparative only within each plot, and do not account for overall activity (Summarised using Ecobat).




Nyctalus noctula
9
Nyctalus noctula
10
Pipistrellus
9
Pipistrellus
10
Pipistrellus pipistrellus
9
Pipistrellus pipistrellus
10
Minutes after sunset
0
200
400
600
Aug 01
Aug 15
Sep 01
Sep 15
Date

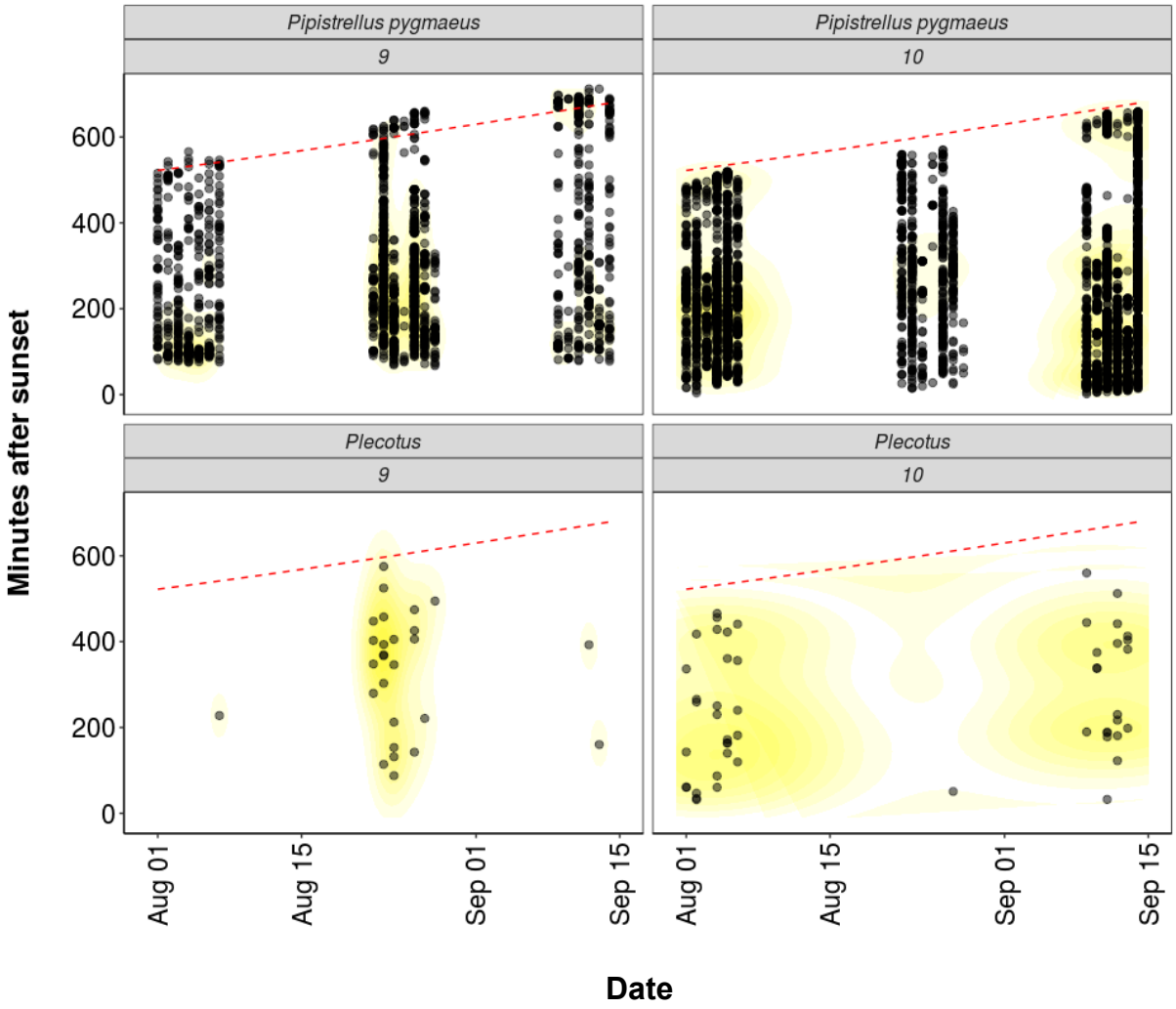
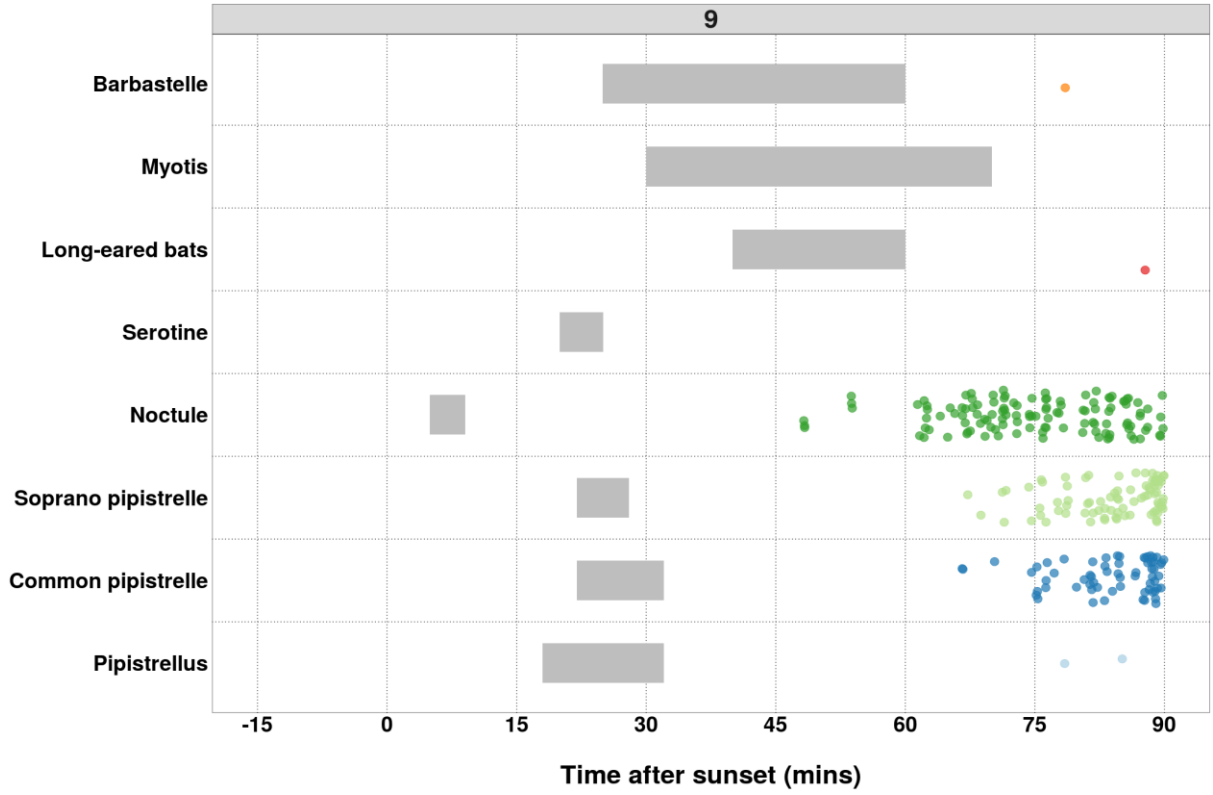

Pipistrellus pygmaeus
9
Pipistrellus pygmaeus
10
Plecotus
9
Plecotus
10
Minutes after sunset
0
200
400
600
Aug 01
Aug 15
Sep 01
Sep 15
Date

Figure 5. Showing bat passes recorded from 15 minutes before to 90 minutes after sunset. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occurring earlier than this time range, may potentially indicate the presence of a nearby roost (Russ 2012) (Summarised using Ecobat).



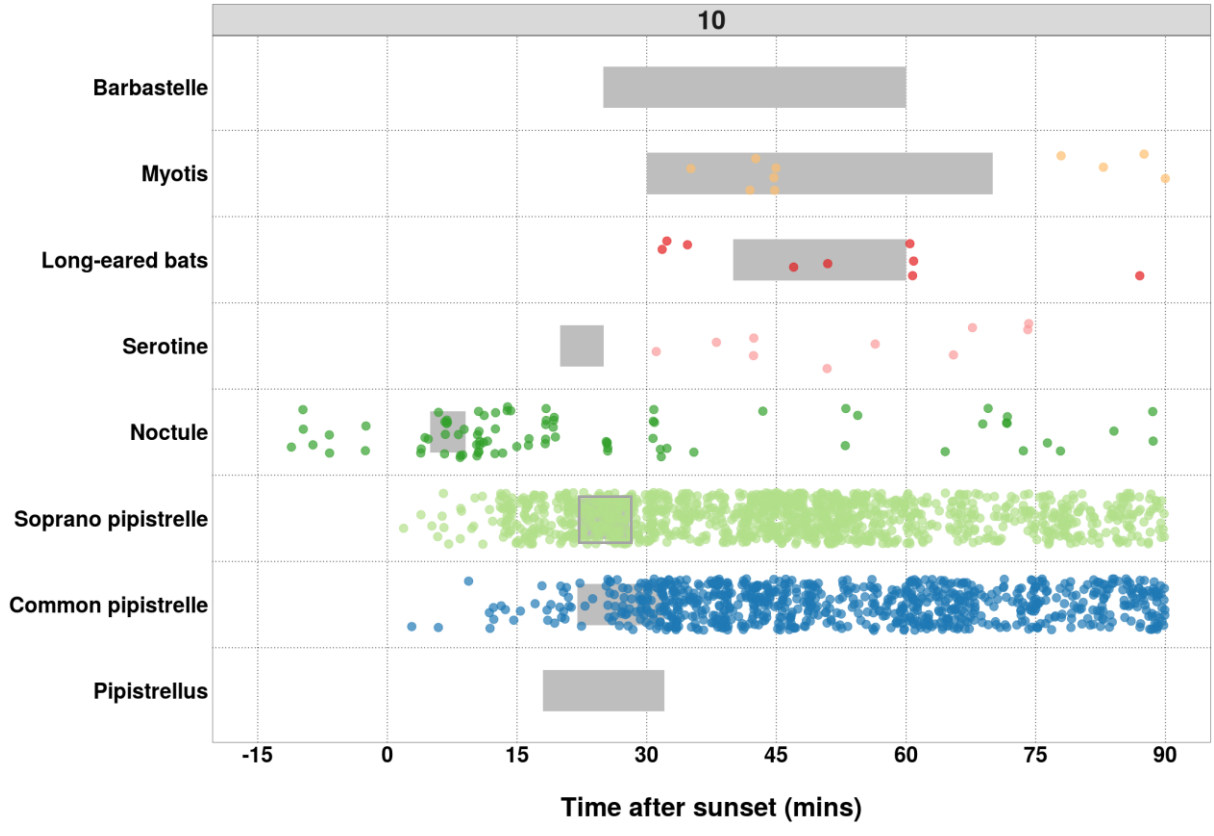


Figure 6. Bat guano sample Identification results using mtDNA sequence analysis.

WARWICK
THE UNIVERSITY OF WARWICK

EcoWarwicker
Ecological Forensics

14 September 20

Re: Identification Results for Nick Gray, Gray's Ecology

Job number 15777, received 01 September 2020
Sample labelled: 8 Brook Meadows, PO18 8FA. 22/8/20.
PCR amplification successful. DNA sequence:
ATGACAAACATTCGAAAGTCCCATCCCCTAATCAAAATTATTAACAGCTCATTCATTG
ACCTACCAGCTCCATCAAACATCTCAGCATGATGGAATTTTGGATCCCTTTAGGCTC
GTCTAG

Phylogenetic analysis identification: *Pipistrellus pygmaeus*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Best regards,

Professor Robin Allaby

The results and conclusions in this report are based on an investigation of mtDNA sequence analysis. The results obtained have been reported with accuracy. The interpretation represents the most probable conclusion for the DNA sequence obtained rather than the sample provided given current levels of species data. It should be borne in mind that different circumstances might produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial recommendations.

Professor Robin Allaby

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12 Appendix 3 – Reducing Impacts of Artificial Light

Bright external lighting can have a detrimental impact upon wildlife, particularly foraging and commuting bat flight paths, but more importantly can also cause bats to remain in their roosts for longer. Artificial lighting can also cause significant impacts on other nocturnal species, most notably moths and other nocturnal insects. It can result in disruption of the circadian rhythms of birds, reducing their fitness. Guidelines issued by the Bat Conservation Trust (2018) https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/ and HM Government (2019). Ministry of Housing, Communities & Local Government (Online). *Light pollution* Available online at: https://www.gov.uk/guidance/light-pollution should be considered while designing the lighting scheme. This includes the following measures:

Do not:

- Provide excessive lighting. Use only the minimum amount of light needed for the task.
- Directly illuminate bat roosts or important areas for nesting birds.

Avoid:

- Installing lighting in ecologically sensitive areas such as: near ponds, lakes, rivers, areas of high conservation value; sites supporting particularly light-sensitive species of conservation significance (e.g. glow worms, rare moths, slow-flying bats) and habitat used by protected species.
- Using reflective surfaces under lights.

Do:

- Consider employing a competent lighting designer who will apply the principals of providing the right light, in the right place, at the right time and controlled by the right system.
- Minimise the spread of light so that it is at or near to horizontal and ensure that only the task area is lit.
- Flat cut-off lanterns or other accessories should be used to reduce activation time and to shield or direct light only to where it is required.
- Consider the height of any lighting columns. It should be noted that a lower mounting height is not always better. A lower mounting height can create more light-spill or require more columns. Column height should be carefully considered to balance task and mitigation measures.
- Consider 'no lighting' solutions where possible. For example, light only high-risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times, assisted by good signage and fluorescent or LED markers.
- Use temporary close-boarded fencing until vegetation matures, to shield sensitive areas from lighting.
- Limit the times that lights are on to provide some dark periods. The task being lit often varies, for example roads are less used after 23.00hrs and car parks are empty. A lighting designer can vary the lighting levels as the use of the area changes reducing lighting levels or perhaps even switching installations off after certain times. This use of adaptive lighting can tailor the installation to suit human health and safety as well as wildlife needs.