TA 6.4: Turbine 3 Consultation Material

Technical Appendix 6.4: Turbine 3 Consultation Material

1.1 Introduction

1.1.1 This Technical Appendix provides two wirelines submitted to Historic Environment Scotland (HES) during the pre-application consultation which took place between October and December 2021. HES required the iterative design process to consider whether a reduction in height of proposed Turbine 3 would materially reduce the impact upon the setting of Auchindoun Castle. As such, the Applicant produced indicative wirelines from eastern entrance of Auchindoun Castle to illustrate the difference in impact of proposed Turbine 3 at both 200 m and 180 m tip height. These are shown in Figures 6.4.1 and 6.4.2.

1.1.2 No material difference was apparent in the wirelines and these were provided to HES as part of the consultation process by email on 21 December 2021. HES noted that the EIAR should outline this iterative design process and so this consultation material has been included here.

1.1.3 It should be noted that the wirelines within this Technical Appendix were produced prior to the finalisation of the Proposed Development design freeze, but that there has been no change in the location or height of Turbine 3, as can be seen in Figures 3.29a-f.
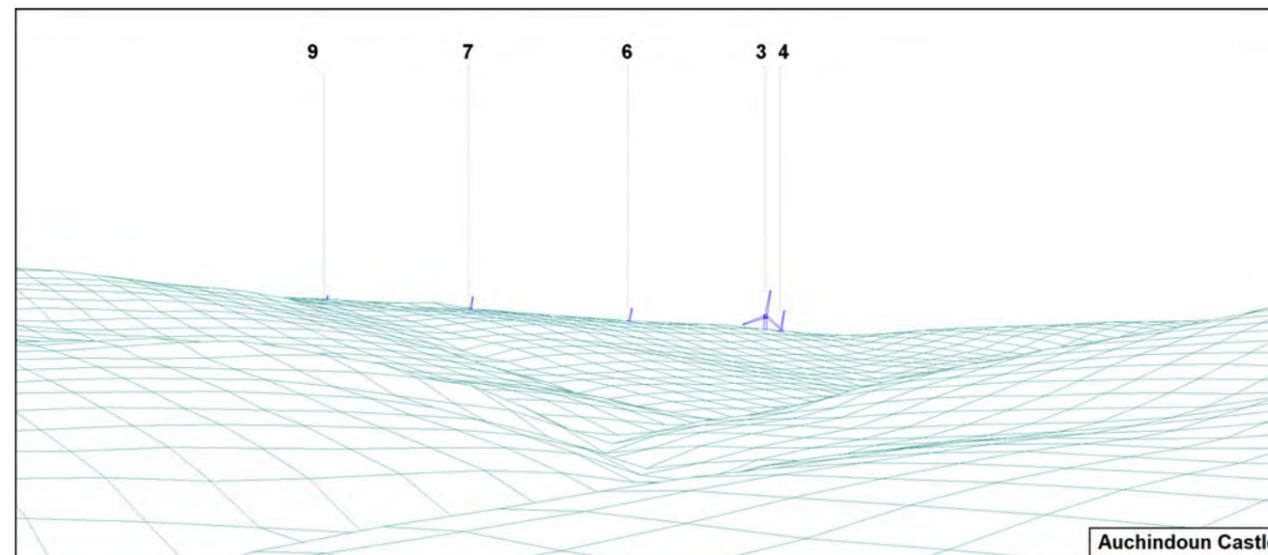

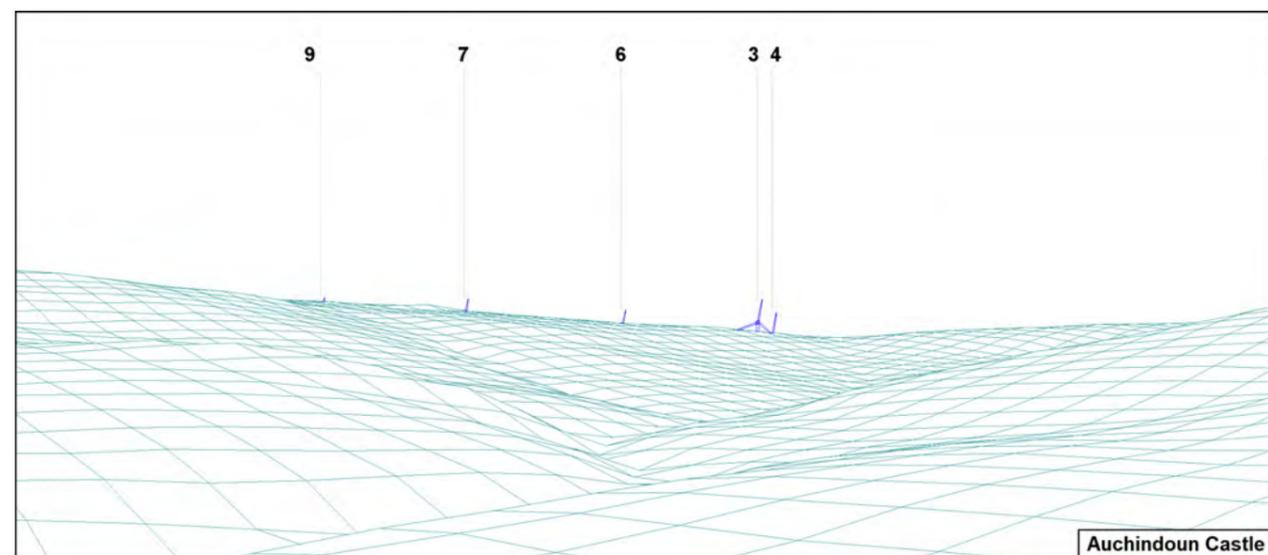**Figure 6.4.1: Wireline of Turbine 3 at 200 m Tip Height**

Figure 6.4.2: Wireline of Turbine 3 at 180 m Tip Height

Technical Appendix 7: Ecology

TA 7.1: Habitats and Vegetation

TA 7.2: Protected Terrestrial Mammals

TA 7.3: Bats

TA 7.4: Fisheries

TA 7.5: Outline Habitat Management Plan

TA 7.1: Habitats and Vegetation

Technical Appendix 7.1: Habitats and Vegetation

1.1 Introduction

1.1.1 This Technical Appendix has been prepared to accompany Chapter 7: Ecology of the EIAR.

1.1.2 It presents detailed methodologies and results of desk study and field surveys completed to establish baseline habitat conditions to inform the design and assessment of the Proposed Development.

1.1.3 It should be read with reference to the following Figures, presented in Volume 3a:
- Figure 7.1: Statutory Sites Designated for Ecological Interest;
- Figure 7.2: Phase 1 Habitat Plan; and
- Figure 7.3: National Vegetation Classification Plan.

1.1.4 Other than where they form part of a plant community name, only common species names are used throughout this Technical Appendix. Scientific names for all species referenced are supplied in Annex 1.

1.2 Site Overview

1.2.1 The following terms are used within this Technical Appendix:
- Site: all land within the red-line application boundary, as shown in Figures 7.1 to 7.3; and
- Study Area: all land within the Site boundary, plus 250 m buffer (where access allowed) of an earlier smaller Site boundary, as shown in Figures 7.2 to 7.3 and within which baseline habitat and vegetation surveys were undertaken.

1.2.2 The Site is located approximately 8 km south east of Dufftown, 11.9 km south west of Huntly, on the border of Morayshire and Aberdeenshire. The Site includes both the area surveyed in 2020 and the additional area surveyed April 2021, to the south west and north west.

1.2.3 The north west and north east arms of the Site predominantly comprise semi-mature coniferous plantation, mainly composed of Sitka spruce. Open heathland, bog, and acid and marshy grasslands are present in the more upland areas centrally on-site, much of which are used for grazing. Grazing land on the lower south eastern and south western margins tends to be more improved in nature.

1.2.4 There are a number of named hills within the Site, including Craig Watch and Kelman Hill. A small number of watercourses cross the Site, flowing into the Burn Treble and the River Deveron, which form the south western and south eastern margins of the Site respectively.

1.3 Methodology

1.3.1 This section provides detailed methodologies of desk studies and field studies undertaken to establish baseline habitat and vegetation information to inform the design and assessment of the Proposed Development.

1.3.2 The objectives of the baseline studies were to:

- establish the spatial distribution of habitats and vegetation communities which may be impacted by the Proposed Development;
- identify the presence and distribution of any habitat types listed on Annex 1 of the Habitats Directive[1], the Scottish Biodiversity List (SBL) or the North East Scotland Local Biodiversity Action Plan (LBAP) and/ or which represent potential Groundwater Dependent Terrestrial Ecosystems for (GWDTEs) for subsequent hydrological assessment; and
- record the presence of any protected or non-native plant species listed on Schedules 8 and 9 of the Wildlife and Countryside Act 1981 (as amended) respectively.

1.4 Desk Study

1.4.1 A desk study was undertaken to identify the proximity of the Site to any statutory or non-statutory designated site for nature conservation with habitat or botanical qualifying interest and to obtain any existing records of protected and/ or non-native flora within the Site and the surrounding wider area.

1.4.2 Key desk study sources, search areas and information obtained, are summarised in Table 7.1.1.

Table 7.1.1: Desk Study Sources		
Source	**Information Obtained**	**Search Area**
SiteLink[2]	Designated sites for habitats and/ or botanical interest.	Within 10 km of the Site.
North East Scotland Biological Records Centre (NESBReC)	Existing records of protected and notable habitats and plant species.	Within 2 km of the Site.

1.5 Field Surveys

1.5.1 The following field surveys have been completed:
- Phase 1 habitat survey; and

National Vegetation Classification (NVC) survey.

1.5.2 Survey methodologies and subsequent interpretation of results have made reference to the following key pieces of guidance:
- An Illustrated Guide to British Upland Vegetation (Averis *et al.*, 2014)[3];
- Handbook for Phase 1 Habitat Survey - a technique for environmental audit (Joint Nature Conservation Committee, 2010)[4];
- Commissioned Report 766 - Manual of terrestrial EUNIS habitats in Scotland (SNH, 2017)[5];
- National Vegetation Community Users' Handbook (Rodwell, 2006)[6];
- British Plant Communities. Volume 1. Woodlands and Scrub (Rodwell (ed.), 1991)[7];
- British Plant Communities. Volume 2. Mires and Heaths (Rodwell (ed.), 1992)[8];
- British Plant Communities. Volume 3. Grasslands and montane communities (Rodwell (ed.), 1992)[9];

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[1] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

[2] https://sitelink.nature.scot/home [Accessed 30/11/2020]

[3] Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D. & Yeo, M. (2004). *An Illustrated Guide to British Upland Vegetation*. JNCC, Peterborough.

[4] JNCC (2010). *Handbook for Phase 1 Habitat Survey - a technique for environmental audit*. Revised Reprint 2010. JNCC, Peterborough.

[5] SNH (2017) Commissioned Report 766 - Manual of terrestrial EUNIS habitats in Scotland - correspondence tables.

[6] Rodwell, J. S. (2006). *National Vegetation Community Users' Handbook*. JNCC, Peterborough.

[7] Rodwell, J. S. (ed.) (1991). *British Plant Communities. Volume 1. Woodlands and Scrub*. Cambridge University Press, Cambridge.

[8] Rodwell, J. S. (ed.) (1992). *British Plant Communities. Volume 2. Mires and Heaths*. Cambridge University Press, Cambridge.

[9] Rodwell, J. S. (ed.) (1992). *British Plant Communities. Volume 3. Grasslands and montane communities*. Cambridge University Press, Cambridge.

- British Plant Communities. Volume 4. Aquatic communities, swamps and tall-herb fens (Rodwell (ed.), 1998)[10];
- British Plant Communities. Volume 5. Maritime communities and vegetation of open habitats (Rodwell (ed.), 2000)[11];
- WFD95: A Functional Wetland Typology for Scotland – Field Survey Manual (SNIFFER, 2009)[12];
- Field flora of the British Isles (Stace, 1997)[13]; and
- Land Use Planning System Scottish Environment Protection Agency (SEPA) Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2014)[14].

Habitat Study Area

1.5.3   The Study Area within which baseline habitats and vegetation field surveys have been undertaken has comprised all terrestrial habitats within the proposed Site boundary. Also included in the Study Area is the 250 m buffer zone for the original 2020 red line boundary. (Refer to Figure 7.2, for the extent of the Study Area).

Phase 1 Habitat Survey

1.5.4   An initial Phase 1 habitat survey was undertaken on the 3 to 4 June 2020, followed by a further survey undertaken on 20 to 22 April 2021.

1.5.5   The survey was undertaken in accordance with the UK industry standard Joint Nature Conservation Committee (JNCC) Phase 1 Habitat Methodology (JNCC, 2010).

1.5.6   During the survey all habitats within the Study Area were mapped according to industry standards and described using a series of 'target notes' (TNs).

NVC Survey

1.5.7   An initial NVC survey was undertaken on 10 August 2020 following the guiding principles detailed within the National Vegetation Classification: Users' Handbook (Rodwell, 2006), followed by a further survey undertaken on 20 to 22 April 2021.

1.5.8   The NVC survey comprised all noteworthy habitats within the Study Area, concentrating on those areas where plant communities were deemed likely to form Annex 1 habitats and/ or represent GWDTEs.

1.5.9   During survey, square quadrats of relevant size as specified in the guidance were distributed throughout homogenous stands identified in order to provide a representative sample of the vegetation community present.

1.5.10 In each quadrat sample area, data was collected on the presence and abundance of vascular plant species using the Domin scale. These data were then analysed and classified to an NVC vegetation community, where possible, using the keys in Rodwell (various) British Plant Communities Volumes 1 to 5.

Field Survey Personnel

1.5.11 All field surveys were conducted by Mr M Wood BSc; a competent botanist with considerable experience of undertaking Phase 1 Habitat and NVC surveys for proposed wind farm developments, across numerous comparable upland sites in Scotland.

1.5.12 The NVC analysis was undertaken by Ms S. Turner BSc (Hons) MSc MCIEEM, a competent botanist with experience of undertaking and analysing NVC surveys for numerous similar upland sites across Scotland.

1.6   Results

Desk Study

1.6.1   This section provides details of existing habitat information and existing records of protected and notable plant species identified within and in proximity to the Site from desk study sources listed in Table 1.1.1.

Designated Sites for Nature Conservation

1.1.5   The Site does not form a part of any internationally or nationally designated site for nature conservation.

1.1.6   Table 7.1.2 provides a summary of statutory and locally designated sites with qualifying habitat and/ or botanical interest located within 10 km of the Site and should be read with reference to Figure 7.1. The distances specified within Table 7.1.2 are taken from the Site boundary to the designation boundary at its nearest point.

Table 7.1.2: Statutory and Non-Statutory Designated Sites		
Designated Site	**Distance/ Orientation**	**Qualifying Interests**
European Sites		
Hill of Towanreef Special Area of Conservation (SAC)	5.7 km south east	Multiple interests, including: • Dry heaths • Blanket bog • Alpine and subalpine heaths
Nationally Designated Sites		
Craigs of Succoth Special Site of Scientific Interest (SSSI)	2.4 km east	Upland habitats: • Calaminarian grassland and serpentine heath • Subalpine flushes
Hill of Towanreef SSSI	5.7 km south east	Multiple interests, including: • Upland plant assemblage • Calaminarian grassland and serpentine heath
Den of Pitlurg SSSI	8.8 km north east	• Upland birch woodland • Valley fen
Locally Designated Sites		
Craigs of Succoth Aberdeenshire Local Nature Conservation Site	2.4 km east	One of the few sites locally where serpentine rocks outcrop at the surface and give rise to rare serpentine grassland, flushes and heathland. A number of locally uncommon plant species present such as spring sandwort.

Non-statutory Designated Sites

1.6.2   In consultation with NESBReC the Site does not form part of any non-statutory designated site for nature conservation. The nearest such designation is the Craigs of Succoth Aberdeenshire Local Nature Conservation Site, which is located 2.4 km east of the Site.

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[10] Rodwell, J. S. (ed.) (1998). British Plant Communities. Volume 4. Aquatic communities, swamps and tall-herb fens. Cambridge University Press, Cambridge.

[11] Rodwell, J. S. (ed.) (2000). British Plant Communities. Volume 5. Maritime communities and vegetation of open habitats. Cambridge University Press, Cambridge.

[12] Scotland and Northern Ireland Forum for Environmental Research (SNIFFER, 2009) WFD95: *A Functional Wetland Typology for Scotland – Field Survey Manual*. Version 1

[13] Stace, C. (1997). *Field Flora of the British Isles*. Cambridge University Press, Cambridge.

[14] SEPA (2014) Land Use Planning System SEPA Guidance Note 31: *Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems*.

Existing Records of Protected and Non-native Species

1.6.3   NESBReC returned no records of protected flora listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) or non-native flora listed on Schedule 9 of the Act from within 2 km of the Site.

Field Surveys

1.6.4   This section presents the results of baseline field surveys, including an overview of habitat types present within the Study Area and their distribution. It should be read with reference to Figures 7.2 and 7.3.

1.6.5   Phase 1 habitat survey Target Notes are detailed in Annex 2, and detailed species lists, NVC tables are presented in Annex 3, with photographic plates presented in Annex 4. All scientific plant names are provided in Annex 1.

Phase 1 Habitat Survey

1.6.6   A summary of Phase 1 results, including Phase 1 Habitat Code in brackets, is given below. Full results are provided in Table 7.6 of Chapter 7, and on Figure 7.2.

1.6.7   Semi-mature Sitka spruce dominates the coniferous plantation (A1.2.2) within the Study Area, with occasional lodgepole pine and larch. There are small areas of clear-fell in the north east. On the south western margin, plantation conifers occur together with acid dry dwarf shrub heath (see summary for D1 below). Small pockets of broadleaved plantation woodland are also present in the north west of the Study Area. Broadleaved semi-natural woodland bounds the River Deveron on the south east boundary.

1.6.8   Occasional small areas of dense scrub (A2.1) are found across the Site, mostly consisting of gorse and bramble.

1.6.9   Semi-improved acid grassland (B1.2) occurs within pasture areas in the south and north east of the Study Area, and comprises of common bent and Yorkshire fog, and also heath rush and wavy hair-grass. Although limited in extent there are also small pockets of unimproved acid grassland (B1.1) with a high density of heath rush and mat grass, and this grassland also supports hare's-tail cottongrass and some ericoids.

1.6.10   Improved grassland (B4) found particularly in the south of the Study Area is used for sheep grazing and has a low herb diversity and abundant perennial ryegrass. Occasional small traces of more acid grassland are found within this habitat with occurrence of species such as Yorkshire fog, sheep's fescue, common bent and crested dog's tail.

1.6.11   Marshy grassland (B5) forms damp fields, rides and along watercourses and is dominated by soft rush and purple moor grass, with some tufted hair-grass.

1.6.12   Dry heath (D1) is present close to the margins of the coniferous plantation in the Study Area, and is dominated by dense common heather, with frequent bell heather and occasional juniper and gorse. Wet heath (D2) has a limited extent and is principally associated with rides and openings within the forested areas within the Study Area. Cross-leaved heath is abundant, with some bog-mosses and cup lichens.

1.6.13   Bog habitat within the Study Area is blanket bog (E1.6.1) and Dry Modified Bog (E1.8). The blanket bog is located on the flat to gently sloping ground to the north of the Study Area, and consists of dense tussocks of hare's-tail cottongrass with a mix of ericoids including common heather, bilberry and crowberry spread throughout. Dry modified bog (E1.8) is mostly present on the southern slopes of Garbet Hill, which has been subject to drainage, grazing and heather mowing/ burning, on peat of variable depths. Typical species include common heather and hare's tail cottongrass. There is some acute-leaved bog-moss, however the predominant bryophytes are red-stemmed feather moss and glittering wood-moss.

1.6.14   There are a small number of streams (G2.1) which flow through the Study Area and most of these are headwaters of the River Deveron which flows to the east of the Study Area. There is a pond (G1) which is located on the edge of the forestry in the north east of the Study Area, surrounded by reedbed swamp (F1).

1.6.15   No protected or non-native plant species listed on Schedule 8 and 9 of the Wildlife and Countryside 1981 (as amended) respectively were recorded within the study area.

Field Surveys - NVC Communities

Dry Heath

H10A CALLUNA VULGARIS – ERICA CINEREA HEATH, TYPICAL SUB-COMMUNITY, H10D CALLUNA VULGARIS – ERICA CINEREA HEATH, THYMUS PRAECOX – CAREX PULICARIS SUB-COMMUNITY, H12A CALLUNA VULGARIS – VACCINIUM MYRTILLUS HEATH, CALLUNA VULGARIS SUB-COMMUNITY AND H18 VACCINIUM MYRTILLUS – DESCHAMPSIA FLEXUOSA HEATH.

1.6.16   The H10 communities are very limited in the Study Area, restricted to just three small areas, where it occurs on dry, very steep, or steep rocky hillsides on very shallow peat. The H10a sub-community is very species poor, composed of almost entirely common heather and bell heather. The H10d sub-community is a little more diverse, covering a very small area on rocks, surrounded by acid grassland (U4e). This differs in that it contains some wild thyme, woolly fringe moss and cup lichen. There is also some juniper growing among this community.

1.6.17   The H12a community dominates large portions of the central part of the Study Area. It forms a mosaic with the H18 heath community over most of the south east slope of Garbet Hill, where large areas of the heath have either been cut or burned. Elsewhere it is found on the tops of Meikle Balloch Hill, and the tops of Kelman Hill. The community is very species poor, being dominated by a dense covering of deep, mature common heather, with a lesser amount of bilberry, and occasional green-ribbed sedge and cowberry. Hypnoid mosses form a carpet beneath the heather layer. It is located on dry, generally shallow peat, around 15-20 cm deep; where the peat becomes deeper it transitions into an M19 community. It is grazed, but not heavily, and muir burning has taken place on some areas of Garbet Hill.

1.6.18   The H18 community is species poor and forms a mosaic with the H12a heath, and represents areas where the parent H12a community has been either cut or burned, probably to facilitate the H18 community, which can be described as a recovering heath. In its current state it is chiefly composed of wavy hair grass and diminutive bilberry. This community is found in great abundance across the south east facing slope of Garbet Hill in the south of the Study Area and in varying states as it transitions back towards a H12 community (depending when it was cut/ burned).

Alpine and Sub-alpine Heath (when above the natural tree line)

H13 CALLUNA VULGARIS – CLADONIA ARBUSCULA HEATH

1.1.7   The H13 community is present in a small area near the summit of Craig Watch. It occurs in an area that appears to have been subject to past erosion and has resulted in a peat depth of 0-5 cm or bare stones, compared to the adjacent blanket bog communities which have a peat depth of approximately 1 m. The community is very species poor, and is dominated by either very short common heather or large patches of shrubby cup lichen and reindeer lichen. There is also a lot of bare peat. Also present are crowberry, heath plait-moss and the occasional patch of deergrass and heath rush. No other plant species were noted.

Wet Heath

M15B TRICHOPHORUM GERMANICUM – ERICA TETRALIX WET HEATH, TYPICAL SUB-COMMUNITY

1.6.19   The M15b community forms a small-scale mosaic within an area of H12a community, adjacent to a narrow extent of M19a bog emerging from the forestry, with a peat depth of 25 cm. It is distinguished by a high proportion of deergrass compared to the surrounding M19a and H12a communities with some acute-leaved bog-moss and papillose bog-moss present.

Active Raised Bog

M2 SPHAGNUM CUSPIDATUM BOG POOL COMMUNITY

1.6.20 The M2 bog pool community is restricted to existing within the M17a mire community (see below) near to the summit of Craig Watch in the north west of the Study Area. The community is confined to small pools and water filled hollows generally no bigger than 1 m x 1 m on the bog surface. Feathery bog-moss dominates this community but can be joined by other bog-mosses tolerant of the wet conditions, including soft bog-moss and papillose bog-moss. Other plants like common cottongrass and round-leaved sundew are also present in small quantities.

Transition Mires and Quaking Bog

M4 CAREX ROSTRATA – SPHAGNUM FALLAX MIRE

1.6.21 The M4 mire community occupies a very small area in the northern end of the Study Area at grid reference NJ 39729 36695. It occurs in a flat basin on the edge of an area of extensive M23b marshy grassland, a community which it gradually transitions into. Upslope, it transitions to H12 dry heath. Bottle sedge is dominant here, with a few examples of common cottongrass. Bog-mosses including flat-topped bog-moss and blunt-leaved bog-moss are growing on very wet ground.

Blanket Bogs

M17A TRICHOPHORUM GERMANICUM – ERIOPHORUM VAGINATUM MIRE, DROSERA ROTUNDIFOLIA – SPHAGNUM SPP. SUB-COMMUNITY, M19A CALLUNA VULGARIS – ERIOPHORUM VAGINATUM MIRE, ERICA TETRALIX SUB-COMMUNITY, M19B CALLUNA VULGARIS – ERIOPHORUM VAGINATUM MIRE, CLADONIA SUB-COMMUNITY AND M20 ERIOPHORUM VAGINATUM MIRE

1.6.22 The M17a community occurs in the west of the Study Area in a low shoulder between Garbet Hill and Craig Watch where the drainage is very poor, and the peat is in excess of 2 m in depth. This community transitions from surrounding drier M19 bog but differs in being much wetter. As a result, common heather diminishes and is replaced by larger amounts of deergrass, and bog-mosses are diverse and abundant. The ground is very wet and there are numerous M2 bog pools. Round-leaved sundew and bog asphodel also are abundant in this area.

1.6.23 The M19 community covers large areas of the high ground in the northern margins of the Study Area. It is always on peat in excess of 50 cm. It is a dry bog however, and is characterised by having similar abundances of both common heather and hare's-tail cottongrass and contains occasional cross-leaved heath and wavy hair grass. The M19a sub-community dominates, present on the high ground between Meikle Balloch, Garbet Hill and Craig Watch where other typical bog plants present include cowberry and crowberry. Bog-mosses were limited to acute-leaved bog-moss. The M19b sub-community occurring in small patches on Garbet Hill where cloudberry is present. Grazing of these communities is not heavy and appears to be limited to wild deer. There were some signs of natural erosion on the north western edge were the community transitioned to H12 on shallower peat, with a 1.5 m high hag wall.

1.6.24 The M20 community found in the south east of the Study Area is present in a large field which appears to have been heavily grazed for a prolonged period, resulting in a mosaic of degraded communities. This small patch of bog is different from the M17 and M19 bogs found elsewhere within the Study Area in that it is solely dominated by large hare's-tail cottongrass tussocks and has been grazed free of all but the most diminutive bits of heather. Bottle sedge is scattered throughout, and wavy hair grass, bilberry and hypnoid mosses are common. There is also some acute-leaved bog-moss and papillose bog-moss in the wetter patches between tussocks. The community transitions/ mosaics with adjacent M23 and U6 grasslands and the peat depth is around 80 cm.

Marshy Grasslands

M23 JUNCUS EFFUSUS/ ACUTIFLORUS - GALIUM PALUSTRE RUSH PASTURE, M23A JUNCUS EFFUSUS/ ACUTIFLORUS - GALIUM PALUSTRE RUSH PASTURE, JUNCUS ACUTIFLORUS SUB-COMMUNITY AND M23B JUNCUS EFFUSUS/ ACUTIFLORUS - GALIUM PALUSTRE RUSH PASTURE, JUNCUS EFFUSUS SUB-COMMUNITY

1.6.25 The M23a community is mostly present around the edges of the Study Area and is localised to marshy ground around the head of burns, along streams and wet flushes, usually on ground where the water table is near or above the surface. It is distinctive in being obviously dominated by sharp-flowered rush. It can sometimes mix with soft rush dominated areas, but largely remains separate.

1.6.26 The M23b community has a species assemblage similar to M23a, but differs in that soft rush is the dominant species. It is also more likely to have stands of tufted hair-grass and often transitions with or into MG9. It is typical of drier conditions compared to M23a where the water table is beneath the surface, but may still be damp. It can cover quite large areas, often in damper areas of fields that are otherwise U4 and is mainly distributed on the edge of the Study Area, but does also occupy areas along a few burn lines and forest rides within the Study Area.

1.6.27 Some areas have an even mix of soft rush and sharp flowered rush, these cannot be assigned to one or other of the two sub-communities and have been mapped as M23 (see Figure 7.3).

Neutral Grasslands

MG9 HOLCUS LANATUS – DESCHAMPSIA CESPITOSA GRASSLAND

1.6.28 The MG9 grassland community is widespread and dominant across several parts of the Study Area on damp or seasonally damp/ flushed ground. It often mosaics or transitions gradually with other nearby communities, such as M23 or U4 communities. It is characteristic in being chiefly tufted hair grass, which at the time of survey had grown very tall. Species diversity is generally quite low within this community but it did support some herbs not found in other communities within the Study Area, such as marsh ragwort and meadow vetchling. Sheep's sorrel and soft rush were typically noted within this community.

Swamps

S4 PHRAGMITES AUSTRALIS SWAMP

1.6.29 The S4 swamp community has formed around a small pond on the edge of coniferous plantation, which has just been felled. The species composition is almost entirely common reed, which is both emergent from the open water of the pond and the surrounding wet to damp ground.

Tall Herb-Weeds

OV25 URTICA DIOICA – CIRSIUM ARVENSE COMMUNITY

1.6.30 The OV25 tall herb-weed community is located in a small area in the north of the Study Area, where it occurs in the fallow garden of an abandoned ruin where it forms a mosaic with a MG9 community. The community contains several large patches of common nettle and an abundance of creeping thistle.

Acid Grasslands

U4 FESTUCA OVINA - AGROSTIS CAPILLARIS - GALIUM SAXATILE GRASSLAND, U4B FESTUCA OVINA - AGROSTIS CAPILLARIS - GALIUM SAXATILE GRASSLAND, HOLCUS LANATUS -TRIFOLIUM REPENS SUB-COMMUNITY, U4E FESTUCA OVINA - AGROSTIS CAPILLARIS - GALIUM SAXATILE GRASSLAND, VACCINIUM MYRTILLUS – DESCHAMPSIA FLEXUOSA SUB-COMMUNITY, U5 NARDUS STRICTA – GALIUM SAXATILE GRASSLAND, U5A NARDUS STRICTA - GALIUM SAXATILE GRASSLAND; SPECIES-POOR SUB-COMMUNITY AND U6C JUNCUS SQUARROSUS - FESTUCA OVINA GRASSLAND, VACCINIUM MYRTILLUS SUB-COMMUNITY.

1.6.31 U4 grassland communities are generally restricted to the far north and south of the Study Area. They form on dry, shallow, well-drained and non-peaty soil.

1.6.32   The U4b sub-community is the most widespread within the Study Area, and is largely restricted to fenced off fields used for sheep and cattle grazing. This sub-community has been heavily grazed and semi-improved as a result. As such it is characterised by having some perennial ryegrass and crested dog's tail, present throughout and often a high abundance of white clover. Despite this, it often still retains some heath bedstraw and/ or tormentil along with sheep's fescue, common bent and sweet vernal-grass.

1.6.33   The U4e sub-community is more restricted in area and is found in less intensively grazed areas, such as small patches on hill tops and steep slopes amongst the moorland, particularly around the heath on the top of Kelman Hill. This differs in the absence of grasses such as perennial ryegrass and has some more diverse elements, such as bilberry, wavy-hair grass and a higher abundance of heath bedstraw and tormentil.

1.6.34   The U5 grassland community forms small disjunct patches along the gully and banks of the burn in the south of the Study Area, and is too small to map individually. It forms a mosaic with the adjacent U4 and MG9 communities, but is generally restricted to steeper slopes where the soil is well drained and shallow. It is not much different in character from the nearby U4 or MG9 communities other than mat grass being dominant over any other grasses. Herbs such as heath bedstraw and tormentil were present. The species-poor U5a subcommunity was identified in small areas to the west of the Study Area.

1.6.35   The U6c grassland community occurs in areas of shallow peat that is exposed to grazing by livestock, generally of flat hill tops and around the edge of bogs. It is mostly found in the east and south of the Study Area. The community is characterised by large concentrations of soft rush and species including wavy hair-grass, common haircap moss, heath woodrush. Mat grass is also widespread and numerous. The community often transitions into U4 grassland, H12 heath or bog communities.

Tall Herbs

U16 LUZULA SYLVATICA – VACCINIUM MYRTILLUS TALL HERB COMMUNITY

1.6.36   The U16 herb community occupies a limited area at the bottom of a small gully, along the banks of a stream in the south east of the Study Area. It is almost entirely comprised of heath woodrush but merges/ mosaics with tufted hairgrass MG9 community which occupies the same gully. It quickly transitions into H10 dry heath as the slope of the gully increases.

Woodlands

W4 BETULA PUBESCENS-MOLINIA CAERULEA WOODLAND AND W7 ALNUS GLUTINOSA-FRAXINUS EXCELSIOR-LYSIMACHIA NEMORUM WOODLAND

1.6.37   A small area of W4 woodland is present within the large coniferous plantation in the north west of the Study Area. It also contains rowan and a ground layer of purple moor-grass and bracken on poorly drained ground.

1.6.38   A small area of W7 woodland grows along the banks of the river Deveron on the eastern edge of the Study Area. There is another area of alder dominated woodland in the western part of the Study Area, presumably planted in the past. This alder woodland is located on moist ground, and lacks any ash trees; however it does have a typical ground layer of tufted hair-grass, common heather and purple moor-grass.

Other Communities

1.6.39   It was not possible to assign a community assessed as a *Carex nigra- c. echinata – C. panicea* flush to a NVC code. The community occupies an area at the northern end of the open ground in the southern half of the Study Area and has been mapped as 'Carex flush'. The community is present in a damp hollow or flush that originates in an M17 bog and flows downhill being flanked by peaty M19 bog on one side and H12 heath on the other before eventually joining up with an M23b *Juncus effusus* community that follows the main burn downhill.

1.6.40   This flush community has affinities with a M23 mire but almost entirely lacks Juncus spp., except for a few scattered examples of soft rush. It is dominated by common sedge, forming large swards, with smaller quantities of carnation sedge and star sedge. Other plants present that are similar to M23 communities, include marsh thistle, marsh violet, sheep's sorrel, sheep's fescue, Yorkshire fog, sweet vernal-grass, heath woodrush, common cottongrass and ragged robin. The peat in this location was 80 cm deep.

NVC Summary

1.6.41   Vegetation communities present within the Study Area and included in the NVC survey results are summarised in Table 7.1.3, along with (where appropriate) corresponding Habitats Directive (92/43/EEC) Annex 1 Habitat type, SBL priority habitat type, LBAP priority habitat type and potential GWDTE status in accordance with SEPA Guidance Note 31 (2014) and SNH NVC/EUNIS/Annex 1 correspondence tables (2017).

Table 7.1.3: Summary of Vegetation Communities				
NVC Community	Principal Corresponding Habitats Directive Annex I Type/s	Corresponding SBL Priority Habitat Type	North East of Scotland Biodiversity Action Plan	Potential Dependence of Community/ Habitat on Groundwater.*
H10a *Calluna vulgaris – Erica cinerea* heath, typical sub-community	4030 European dry heaths	Upland Heathland	Upland Heathland	3
H10d *Calluna vulgaris – Erica cinerea* heath, Thymus praecox – Carex pulicaris sub-community	4030 European dry heaths	Upland Heathland	Upland Heathland	3
H12a *Calluna vulgaris – Vaccinium myrtillus* heath, *Calluna vulgaris* sub-community	4030 European dry heaths. (Where on deep peat >0.5 m, this habitat represents degraded blanket bog, restoration to H7130 Blanket bog may be possible)	Upland Heathland (Blanket Bog where on deep peat >0.5 m)	Upland Heathland	3
H13 *Calluna vulgaris – Cladonia arbuscula* heath (suggested community)	4030 European dry heaths. (This community is linked to 4060 Alpine and Boreal heaths, but only where it occurs above the natural tree line.)	Upland Heathland	Upland Heathland	3
H18 V*accinium myrtillus – Deschampsia flexuosa* heath (suggested community)	4030 European dry heaths. (Where on deep peat >0.5 m, this habitat represents degraded blanket bog, restoration to H7130 Blanket bog may be possible)	Upland Heathland	Upland Heathland	3
M2 *Sphagnum cuspidatum* bog pool community (suggested community)	H7130 Blanket bog	Blanket Bog	-	3
M4 *Carex rostrata – Sphagnum fallax* mire (suggested community)	7140 Transition mires and quaking bogs	Blanket Bog	-	3
M15b *Trichophorum germanicum – Erica tetralix* wet heath, typical sub-community	4010 Northern Atlantic wet heaths with *Erica tetralix*	Upland Heathland	Upland heathland	2
M17a *Trichophorum germanicum – Eriophorum vaginatum* mire, *Drosera rotundifolia – Sphagnum* spp sub-community	H7130 Blanket bog	Blanket Bog	-	3

Table 7.1.3: Summary of Vegetation Communities

NVC Community	Principal Corresponding Habitats Directive Annex I Type/s	Corresponding SBL Priority Habitat Type	North East of Scotland Biodiversity Action Plan	Potential Dependence of Community/ Habitat on Groundwater.*
M19a *Calluna vulgaris – Eriophorum vaginatum* mire, *Erica tetralix* sub-community	H7130 Blanket bog	Blanket Bog	-	3
M19b *Calluna vulgaris – Eriophorum vaginatum* mire, *Cladonia* sub-community (suggested community)	H7130 Blanket bog	Blanket Bog	-	3
M20 *Eriophorum vaginatum* mire (suggested community)	H7130 Blanket bog	Blanket Bog	-	3
M23a *Juncus effusus/ acutiflorus - Galium palustre* rush pasture, *Juncus acutiflorus* sub-community	-	Upland flushes, fens and swamps	-	1
M23b *Juncus effusus/* acutiflorus - *Galium palustre* rush pasture, *Juncus effusus* sub-community	-	-	-	1
MG6 *Lolium perenne – Cynosurus cristatus* grassland (suggested community)	-	-	Grasslands	3
MG9 *Holcus lanatus – Deschampsia cespitosa* grassland (suggested community)	-	-	Grasslands	2
OV25 *Urtica dioica – Cirsium arvense* community	-	-	-	3
S4 *Phragmites australis* swamp	Only Annex 1 if within water body of relevant Annex 1 type	Freshwater and wetland	Freshwater Habitats	3
U4 *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland	-	-	Grasslands	3
U4b *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland, *Holcus lanatus - Trifolium repens* sub-community	-	-	Grasslands	3
U4e *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland, *Vaccinium myrtillus – Deschampsia flexuosa* sub-community (suggested community)	-	-	Grasslands	3
U5 *Nardus stricta – Galium saxatile* grassland (suggested community)	-	Nardus stricta-Galium saxatile grassland	Grasslands	3
U5a Nardus stricta - Galium saxatile grassland; species-poor sub-community	-	Nardus stricta-Galium saxatile grassland	Grasslands	3
U6c *Juncus squarrosus - Festuca ovina* grassland, *Vaccinium myrtillus* sub-community	-	Juncus squarrosus-Festuca ovina grassland	Grasslands	2
U16 *Luzula sylvatica – Vaccinium myrtillus* tall herb community (suggested community)	-	-	-	3

Table 7.1.3: Summary of Vegetation Communities

NVC Community	Principal Corresponding Habitats Directive Annex I Type/s	Corresponding SBL Priority Habitat Type	North East of Scotland Biodiversity Action Plan	Potential Dependence of Community/ Habitat on Groundwater.*
W4 *Betula pubescens-Molinia caerulea* woodland (suggested community)	-	Upland birchwoods	Woodlands	1
W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland	H91E0 Alder woodland on flood plains.	Wet Woodland	Woodlands	1
Carex nigra – C. echinata – C. panicea flush	-	Upland flushes, fens and swamps	-	1

* As listed in Appendix 4 of SEPA (2014) LUPS Guidance Note 31. The categorisation of GWDTEs is preliminary and is based on vegetation communities present, and therefore confirmed GWDTE categorisation is based on subsequent formal hydrological assessment. 1= high, 2=moderate, 3=low

ANNEX 1: SCIENTIFIC PLANT NAMES

Table A1.1: Provides scientific names for plant species referred to by common names in this appendix and in Chapter 7.

Table A1.1: Scientific Names of Plant Species	
Common Name	**Scientific Name**
Acute-leaved bog-moss	*Sphagnum capillifolium*
Alder	*Alnus glutinosa*
Aspen	*Populus tremula*
Ash	*Fraxinus excelsior*
Bell heather	*Erica cinerea*
Bilberry	*Vaccininum myrtillus*
Birch	*Betula* spp.
Blunt-leaved bog-moss	*Sphagnum palustre*
Bog asphodel	*Narthecium ossifragum*
Bog-mosses	*Sphagnum* spp.
Bottle sedge	*Carex Rostrata*
Bracken	*Pteridium aquilinum*
Bramble	*Rubus fruticosus agg.*
Carnation sedge	*Carex panicea*
Common bent	*Agrostis capillaris*
Common cottongrass	*Eriophorum angustifolium*
Common haircap moss	*Polytrichum commune*
Common heather	*Calluna vulgaris*
Common nettle	*Urtica dioica*
Common reed	*Phragmites australis*
Common sedge	*Carex nigra*
Cowberry	*Vaccininum vitis-idaea*
Creeping thistle	*Cirsium arvense*
Cross-leaved heath	*Erica tetralix*
Crowberry	*Empetrum nigrum*
Cup lichens	*Cladonia* spp.
Deergrass	*Trichophorum germanicum*
Feathery bog-moss	*Sphagnum cuspidatum*
Flat-topped bog-moss	*Sphagnum fallax*
Glittering wood-moss	*Hylocomium splendens*
Hare's-tail cottongrass	*Eriophorum vaginatum*
Heath bedstraw	*Galium saxatile*
Heath plait-moss	*Hypnum jutlandicum*
Heath rush	*Juncus squarrosus*
Juniper	*Juniperus communis*
Larch	*Larix spp.*
Lodgepole pine	*Pinus contorta*
Marsh ragwort	*Senecio aquaticus*
Marsh thistle	*Cirsium palustre*
Marsh violet	*Viola palustre*

Table A1.1: Scientific Names of Plant Species	
Common Name	**Scientific Name**
Mat grass	*Nardus stricta*
Meadow vetchling	*Lathyrus pratensis*
Meadowsweet	*Filipendula ulmaria*
Papillose bog-moss	*Sphagnum papillosum*
Purple moor-grass	*Molinia caerulea*
Ragged robin	*Silene flos-cuculi*
Reindeer lichen	*Cladonia portentosa*
Round-leaved sundew	*Drosera rotundifolia*
Rowan	*Sorbus aucuparia*
Sharp-flowered rush	*Juncus acutiflorus*
Shrubby cup lichen	*Cladonia arbuscula*
Sheep's fescue	*Festuca ovina*
Sheep's sorrel	*Rumex acetosella*
Sitka spruce	*Picea sitchensis*
Soft bog-moss	*Sphagnum tenellum*
Soft rush	*Juncus effusus*
Star sedge	*Carex echinata*
Sundews	*Drosera* spp.
Sweet vernal-grass	*Anthoxanthem odoratum*
Tormentil	*Potentilla erecta*
Tufted hair-grass	*Deschampsia cespitosa*
White clover	*Trifolium repens*
Wild thyme	*Thymus polytrichus*
Woolly fringe moss	*Racomitrium lanuginosum*
Yorkshire fog	*Holcus lanatus*

ANNEX 2: PHASE 1 HABITAT SURVEY TARGET NOTES

Target Notes presented in Table A2.1 should be read with reference to Figure 7.2 presented in Volume 3a of the EIAR and photographic plates presented in Annex 4**.**

Table A2.1: Phase 1 Habitat Survey Target Notes.			
Target Note	**Grid Reference**	**Description**	**Photographic Plate**
TN1	NJ 39895 35103	Burn, 0.5 m wide, with shallow water only 10-20 cm depth. Turbid with abundant algae. Banks dominated with great wood rush *Luzula sylvatica*. V-shaped valley with patches of juniper and gorse along with scattered broad-leaved trees, including rowan *Sorbus aucuparia*, birch *Betula* sp. and hawthorn *Crataegus monogyna*. Some newly tube planted sycamore *Acer pseudoplatanus* is also present.	1
TN2	NJ 39774 35261	Forest ride with some young beech *Fagus sylvatica*, alder *Alnus glutinosa*, sycamore 5-7 m tall, and a stand of aspen *Populus tremula* around 12 m tall, with many self-germinating saplings.	2
TN3	NJ 40092 36151	Stone ruin with a pile of rusting metal, potential reptile habitat. Ruin has mature trees surrounding it, and the trees are 15-20 m tall. These trees are a mix of larch, pine *Pinus* sp. and sycamore. Fields adjacent to the ruin are a mosaic of marshy grassland and improved grassland.	3
TN4	NJ 39084 35766	Old grouse shooting butt. Several exist in a row, north to south and continue into the forestry. Reptile potential.	4
TN5	NJ 36922 33099	Dry ditch and old dry-stone wall. Ditch approximately 2 m wide and 1.5 m deep.	No photo
TN6	NJ 37984 33527	Burn, 0.5 m wide and water depth approximately 20 cm. Banks lined with grasses and rushes. Water vole *Arvicola amphibius* run and droppings. Water quality good – clear and flowing freely. Stone base with many caddisfly *Trichoptera* larvae.	5
TN7	NJ 38274 33721	Area of rocky outcrops on hill top, harbouring a few relict mature juniper trees and some scattered gorse.	6
TN8	NJ 38230 34023	Scattered broad-leaved trees between 4-10 m tall. A mix of birch, rowan and aspen.	7
TN9	NJ 40463 36446	Pond within a large common reed *Phragmites australis* bed. Open water is limited in extent, but where present supports pondweed *Potamogeton* sp.	8
TN10	No grid ref.	Bog/ acid grassland habitat, dominated by hare's tail cottongrass, heath rush and mat grass. Bilberry, crowberry, *Sphagnum capillifolium* and chickweed wintergreen *Trientalis europaea* is also present.	9
TN11	NJ35581 34075	Part of the dry heath on Meikle Balloch Hill being colonised by Sitka spruce and some whin bush scrub.	10
TN12	NJ38620 31509	Mature ash, alder and some beech trees growing along the banks of a small tributary to the River Deveron. Trees up to 20 m tall. Some bat roosting potential in tall old ash trees that do contain some holes.	11
TN13	NJ38650 31513	Burn; small tributary to the River Deveron. 0.5 m wide, 10 cm deep, clear water with an uninterrupted steady flow with gravel and pebble base. Wooded banks with a mix of woodland herbs.	12
TN14	NJ38740 31529	The River Deveron; 4 m wide and 0.5 m deep with a pebble and boulder base. Strong, steady flow of clear water. Banks of willows, great wood rush *Luzula sylvatica* and bracken.	13
TN15	NJ39499 33309	Small tributary stream to the Deveron on the north periphery of the site. It is 0.5 m wide and 15 cm deep, with pebble and boulder base. Strong, fast flow, water clear. Banks of soft rush and semi-improved grassland.	14
TN16	NJ36824 32426	Large area of gorse scrub along the site boundary with the A941 road.	15
TN17	NJ35952 34144	Burn near Ballochford, 0.25 m wide, 10 cm deep, pebble and gravel bed. Steady flow of clear water, banks of soft rush on a layer of shallow peat.	16
TN18	NJ36038 34085	Remains of a small barn near Ballochford Farm. Small part of the roof remains, could still function as a bat roost, though no evidence noted during survey.	17
TN19	NJ35631 34692	Eastern edge of large forestry block on the north side of Meikle Balloch Hill, showing the extensive dry heath here and the Sitka spruce generation that is taking place on the forest edge.	18
TN20	NJ35063 34447	Small area of presumably planted alder trees that exist on the edge of the forestry block next to the A941, Trees around 8 m tall.	19
TN21	NJ34743 35024	Small area of presumably planted birch and rowan on the edge of the forestry block next to the A941, trees are around 8–10 m tall with an understory of grasses and bracken.	20
TN22	NJ38016 31238	Burn Treble; 2-3 m wide at this point, 0.25 m deep with a pebble and boulder bed. Strong, steady flow of clear water, banks a mix of soft rush, tufted hair grass, nettle and rosebay willowherb.	21

Table A2.1: Phase 1 Habitat Survey Target Notes.

Target Note	Grid Reference	Description	Photographic Plate
TN23	NJ38016 31238	Area around small flood plain in the river valley, around the Burn Treble. The area appears to be used for grazing but is quite weedy with willowherbs and nettles being prevalent. During the time of survey people were clearing the whin scrub and burning much of the vegetation here.	22
TN24	NJ38078 31276	Small river valley embankment with a mix of improved grassland and willowherb scrub and some mature trees up to 20 m tall including larch and ash but mostly birch and a few rowan. Also a large rabbit warren here.	23
TN25	NJ38019 31732	A typical dry stone dyke found around the Site, this one on the east side of Kelman Hill.	24
TN26	NJ37956 31372	Area of road side whin scrub adjacent to the A941.	25
TN27	NJ37936 31826	Small area of planted Sitka spruce, Scots pine and tube planted rowan, all between 4–5 m tall growing on semi improved acid grassland.	-
TN28	NJ38184 32045	Some of the few patches of juniper scrub that grow on the hill side at this location. The Juniper is quite short in stature and is persisting in an area of heavy sheep grazing. Also a lone rowan here and some large patches of great woodrush, otherwise semi improved acid grassland.	-
TN29	NJ38239 32047	Stone ruin with some beech trees around it. No bat potential within the structure but the gnarled beeches may provide roost spots.	26
TN30	NJ38295 32195	Area of mature gorse scrub	27
TN31	NJ39021 33006	Area of mature gorse scrub	-
TN32	NJ38210 31231	Burn; 0.5 m wide and 15 cm deep with clear water and a steady flow. Pebble and gravel bed and meadowsweet, rosebay willowherb, and raspberry dominating the banks.	28
TN33	NJ37066 32257	Hawthorn hedge, similar to the other few present on-site. Solely comprised of hawthorn, fairly recently planted but establishing, currently around 2 m tall. Species poor.	29
TN34	NJ36356 33173	Area of hillside, seemingly planted with commercial forestry and clearfelled, the area is recovering into a common heather and bilberry dominated dry heath, but is also being colonised by either self-seeded conifers or loosely planted ones. These trees are currently around 1.5 m tall. There is also a remnant patch of 20 m tall larch at the top of this deer fenced area.	30
TN35	NJ36672 32960	Private residence and garden area called Rinturk. Also a stand of 20 m tall Sitka here and another area of mixed planted trees along the length of burn and track that accesses the property.	31
TN36	NJ37765 32861	Ruined stone cottage and series of old walls. Roof still partially intact and could be a roost spot for barn owls, jackdaws certainly nesting within. Roof space and chimney stack are good potential bat roosts, though the interior was not properly inspected due to the unstable condition of the building, so could not say for sure if it was being used as a roost.	32
TN37	NJ37831 32908	Burn; 1 m wide and 15 cm deep with a pebble and gravel base, clear water with a steady flow and soft rush dominated banks.	33
TN38	NJ36596 32594	Burn; 0.25 m wide and 15 cm deep with a gravel and sand base, steady flow of clean water, banks dominated by soft rush.	34
TN39	NJ36415 32754	River; 1.5 m wide at this point, though variable along length, up to 0.5 m deep with a strong flow of clear water over a bed of gravel and pebbles. Soft rush and tufted hair grass dominate the bank vegetation. Good watercourse for fish and probably otters.	35

ANNEX 3: NVC SURVEY RESULTS

Table A3.1 outlines the DOMIN scales. Table A3.2 scores and communities for NVC survey results in the original survey area to the east of the Study Area, and Table A3.3 shows scores and communities for the extended western part of the Study Area.

Table A3.1: Dominance (DOMIN) Scale	
Code	Approximate Percentage Cover in Quadrat
10	>90%
9	75 – 90%
8	51 – 75%
7	34 – 50%
6	26 – 33%
5	11 – 25%
4	5 – 10%
3	<5%, many individuals
2	<5%, a few individuals
1	<5%, one or two individuals

Table A3.2: NVC Tables						
Phase 1 Habitat Type	Dry Heath					
Community	H10a – Calluna vulgaris – Erica cinerea heath, Calluna vulgaris sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ 39910 35131	NJ 38093 33579	NJ 39887 35207	NJ 38055 33600	NJ 38074 33650	
Approximate peat depth (cm)	20	20	30	20	20	
Species	Cover					CONSTANCY
Calluna vulgaris	8	7	7	8	7	5
Erica cinerea	5	7	6	5	7	5
Campanula rotundifolia	3	-	-	-	-	1
Juniperus communis	3	-	-	-	-	1
Rhytidiadelphus squarrosus	6	-	-	5	-	2
Pleurozium schreberi	6	-	7	7	-	3
Hypnum jutlandicum	6	4	5	6	5	5
Luzula sylvatica	-	2	1	-	-	2
Hylocomium splendens	-	8	6	6	7	4
Rhytidiadelphus triquetrus	-	4	6	-	-	2
Carex binervis	-	2	-	-	1	2
Molinia caerulea	-	3	-	2	-	2
Blechnum spicant	-	-	3	1	-	2
Vaccinium myrtillus	-	-	3	-	-	1
Potentilla erecta	-	-	2	-	1	2
Galium saxatile	-	-	2	-	-	1

Phase 1 Habitat Type	Dry Heath					
Community	H12a – Calluna vulgaris – Vaccinium myrtillus heath, Calluna vulgaris sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ40010 36797	NJ37031 33163	NJ37031 33456	NJ37342 33996	NJ37898 33911	
Approximate peat depth (cm)	15	10	15	50	10	
Species	Cover					CONSTANCY
Calluna vulgaris	9	9	10	8	9	5
Molinia caerulea	3	3	-	-	-	2
Trichophorum germanicum	3	-	-	-	-	1
Carex binervis	2	3	-	-	-	2
Juncus squarrosus	4	-	-	-	-	1
Cladonia portentosa	1	-	-	-	-	1
Hypnum jutlandicum	6	6	7	4	5	5
Pleurozium schreberi	7	4	4	5	6	5
Hylocomium splendens	5	7	4	8	8	5
Empetrum nigrum	1	3	-	3	3	4
Rhytidiadelphus squarrosus	-	5	-	3	-	2
Nardus stricta	-	4	-	-	-	1
Vaccinium myrtillus	-	3	3	4	4	4
Sphagnum capillifolium	-	5	-	-	-	1

Phase 1 Habitat Type	Wet Heath	
Community	M15b Trichophorum germanicum – Erica tetralix wet heath, typical sub-community	
Quadrat	Q1	
OS Grid Coordinates	NJ40295 35650	
Approximate peat depth (cm)	25	
Species	Cover	CONSTANCY
Calluna vulgaris	7	n/a
Erica tetralix	5	n/a
Anthoxanthem odoratum	3	n/a
Carex binervis	3	n/a
Potentilla erecta	3	n/a
Trichophorum germanicum	3	n/a
Carex nigra	4	n/a
Eriophorum angustifolium	3	n/a
Sphagnum capillifolium	7	n/a
Empetrum nigrum	3	n/a
Juncus squarrosus	3	n/a
Sphagnum papillosum	4	n/a

Phase 1 Habitat Type	Wet Heath	
Community	M15b Trichophorum germanicum – Erica tetralix wet heath, typical sub-community	
Quadrat	Q1	
OS Grid Coordinates	NJ40295 35650	
Approximate peat depth (cm)	25	
Species	Cover	CONSTANCY
Festuca ovina	2	n/a

Phase 1 Habitat Type	Blanket Bog					
Community	M17a Trichophorum germanicum – Eriophorum vaginatum mire, Drosera rotundifolia - sphagnum spp. sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ37961 34921	NJ37826 34887	NJ37826 34803	NJ37757 34762	NJ37643 34671	
Approximate peat depth (cm)	200+	200+	200+	200+	200+	
Species	Cover					CONSTANCY
Calluna vulgaris	4	3	4	4	3	5
Erica tetralix	4	3	3	3	3	5
Trichophorum germanicum	6	4	4	6	4	5
Eriophorum vaginatum	6	7	5	5	6	5
Cladonia portentosa	5	3	-	4	4	4
Sphagnum capillifolium	6	7	5	8	6	5
Sphagnum tenellum	3	-	6	3	-	3
Sphagnum subnitens	3	-	-	-	-	1
Drosera rotundifolium	2	3	3	2	3	5
Narthecium ossifragum	3	5	7	3	5	5
Sphagnum papillosum	-	5	-	-	5	2
Sphagnum cuspidatum	-	-	3	4	-	2
Racomitrium lanuginosum	-	-	-	3	-	1
Eriophorum vaginatum	-	-	2	-	2	2
Empetrum nigrum	-	-	-	-	2	1

Phase 1 Habitat Type	Blanket Bog					
Community	M19a Calluna vulgaris – Eriophorum vaginatum mire, Erica tetralix sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ40269 36753	NJ39464 35845	NJ38668 35586	NJ37557 34504	NJ37122 34253	
Approximate peat depth (cm)	70	60	100	90	200+	
Species	Cover					CONSTANCY
Calluna vulgaris	7	7	7	7	8	5
Eriophorum vaginatum	7	6	6	7	6	5
Empetrum nigrum	4	3	3	3	3	5
Deschampsia flexuosa	3	-	-	-	-	1
Hylocomium splendens	9	7	-	8	4	4
Sphagnum capillifolium	4	-	2	4	-	3
Dactylorhiza maculata	1	-	-	-	-	1
Trientalis europaea	1	-	-	-	-	1
Vaccinium myrtillus	2	-	-	3	-	2
Cladonia portentosa	-	5	8	4	7	4
Pleurozium schreberi	-	-	3	3	6	3
Erica tetralix	-	-	3	-	-	1
Rubus chamaemorus	-	-	-	3	-	1
Hypnum jutlandicum	-	-	-	3	3	2
Vaccinium vitis-idaea	-	-	-	3	-	1

Phase 1 Habitat Type	Marshy Grassland					
Community	M23a – Juncus effusus /acutiflorus – Galium palustre rush pasture, Juncus acutiflorus sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ39906 36612	NJ39965 36620	NJ40088 36649	NJ40177 36670	NJ40305 36664	
Species	Cover					CONSTANCY
Juncus acutiflorus	10	10	8	9	9	5
Rumex acetosella	3	3	3	2	2	5
Carex rostrata	1	-	-	-	-	1
Trientalis europaea	3	-	-	-	-	1
Viola palustre	2	3	3	3	3	5
Holcus mollis	2	2	2	3	2	5
Festuca rubra	3		-	3	-	2
Galium palustre	-	3	3	3	3	4
Epilobium palustre	-	3	3	3	3	4
Equisetum palustre	-	3	3	2	3	4
Juncus effusus	-	2	-	-	-	1

Phase 1 Habitat Type	Marshy Grassland					
Community	M23a – Juncus effusus /acutiflorus – Galium palustre rush pasture, Juncus acutiflorus sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ39906 36612	NJ39965 36620	NJ40088 36649	NJ40177 36670	NJ40305 36664	
Species	Cover					**CONSTANCY**
Pedicularis palustris	-	-	2	-	-	**1**
Trifolium repens	-	-	3	-	-	**1**
Ranunculus repens	-	-	2	3	2	**3**
Plantago lanceolata	-	-	1	-	-	**1**
Carex panicea	-	-	3	-	-	**1**
Carex nigra	-	-	3	-	-	**1**
Silene flos-cuculi	-	-	1	-	-	**1**
Holcus lanatus	-	-	2	2	2	**3**
Rhytidiadelphus squarrosus	-	-	5	-	-	**1**
Luzula multiflora	-	-	2	-	-	**1**
Cardamine flexuosa	-	-	3	-	3	**2**
Sphagnum fallax	-	-	-	3	4	**2**
Potentilla palustre	-	-	-	-	3	**1**

Phase 1 Habitat Type	Marshy Grassland					
Community	M23b – Juncus effusus /acutiflorus – Galium palustre rush pasture, Juncus effusus sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ 39817 36658	NJ 40320 36311	NJ36667 33155	NJ 36801 33202	NJ 36879 33191	
Species	Cover					**CONSTANCY**
Juncus effusus	8	8	9	9	8	**5**
Holcus lanatus	3	3	3	5	3	**5**
Epilobium palustre	3	-	-	-	-	**1**
Rumex acetosella	4	3	3	-	3	**4**
Potentilla erecta	3	3	-	-	-	**2**
Viola palustre	3	3	-	-	-	**2**
Ranunculus repens	2	-	3	3	3	**4**
Festuca rubra	3	3	-	-	-	**2**
Cirsium palustre	1	2	2	1	3	**5**
Anthoxanthem odoratum	1	3	-	2	3	**4**
Equisetum palustre	2	-	-	-	-	**1**
Holcus mollis	4	-	2	-	-	**2**
Achillea ptarmica	3	-	-	-	2	**2**
Galium palustre	3	-	-	-	3	**2**

Phase 1 Habitat Type	Marshy Grassland					
Community	M23b – Juncus effusus /acutiflorus – Galium palustre rush pasture, Juncus effusus sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ 39817 36658	NJ 40320 36311	NJ36667 33155	NJ 36801 33202	NJ 36879 33191	
Species	Cover					CONSTANCY
Sphagnum squarrosus	2	-	-	-	-	1
Pleurozium schreberi	5	3	-	-	4	3
Galium saxatile	-	3	-	-	-	1
Rhytidiadelphus squarrosus	-	5	5	4	6	4
Deschampsia cespitosa	-	3	-	-	3	2
Carex nigra	-	4	-	-	-	1
Luzula multiflora	-	2	-	-	2	2
Agrostis canina	-	-	3	3	3	3
Cerastium fontanum	-	-	-	1	-	1
Ranunculus acris	-	-	-	-	3	1

Phase 1 Habitat Type	Neutral Grassland					
Community	MG9 Holcus lanatus - Deschampsia cespitosa grassland (no sub-community assigned)					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ40468 36582	NJ40526 36541	NJ40376 35933	NJ37814 33284	NJ37973 33269	
Species	Cover					CONSTANCY
Deschampsia cespitosa	9	8	8	9	10	5
Lathyrus pratensis	3	-	-	-	-	1
Holcus lanatus	3	2	-	3	-	3
Dactylis glomerata	3	-	-	-	-	1
Juncus effusus	3	7	5	3	-	4
Cirsium palustre	3	4	1	1	-	4
Anthoxanthem odoratum	4	-	-	-	-	1
Agrostis capillaris	4	-	-	1	-	2
Rumex acetosella	3	3	4	3	-	4
Senecio congestus	-	3	-	-	-	1
Equisetum palustre	-	3	-	-	-	1
Epilobium palustre	-	3	-	-	-	1
Galium palustre	-	3	-	-	-	1
Festuca rubra	-	-	3	-	-	1
Urtica dioica	-	-		3	-	1
Stellaria graminea	-	-	-	-	3	1
Galium saxatile	-	-	-	-	4	1

Phase 1 Habitat Type	Neutral Grassland					
Community	MG9 *Holcus lanatus - Deschampsia cespitosa* grassland (no sub-community assigned)					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ40468 36582	NJ40526 36541	NJ40376 35933	NJ37814 33284	NJ37973 33269	
Species	**Cover**					**CONSTANCY**
Nardus stricta	-	-	-	-	3	**1**

Phase 1 Habitat Type	Acid Grassland					
Community	U4b Festuca ovina - Agrostis capillaris - Galium saxatile grassland, Holcus lanatus - Trifolium repens subcommunity					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ38158 33499	NJ40215 35276	NJ37518 33132	NJ37656 33331	NJ38067 33122	
Species	**Cover**					**CONSTANCY**
Cynosurus cristatus	-	-	3	5	4	**3**
Lolium perenne	-	-	3	3	-	**2**
Agrostis capillaris	3	5	4	3	6	**5**
Holcus lanatus	5	3	5	4	4	**5**
Ranunculus repens	2	-	-	3	3	**3**
Trifolium repens	3	3	5	5	6	**5**
Bellis perennis	-	-	-	2	-	**1**
Cerastium fontanum	-	-	-	1	-	**1**
Scorzoneroides autumnalis	-	-	-	-	3	**1**
Deschampsia flexuosa	-	3	-	-	-	**1**
Potentilla erecta	3	3	-	-	-	**2**
Festuca ovina	4	4	-	3	3	**4**
Carex nigra	-	3	-	-	-	**1**
Luzula multiflora	1	3	-	-	-	**2**
Vaccininum myrtillus	3	3	-	-	-	**2**
Galium saxatile	3	3	4	3	2	**5**
Pleurozium schreberi	4	7	-	-	-	**2**
Plantago lanceolata	2	1	-	-	-	**2**
Rumex acetosella	3	2	-	-	-	**2**
Veronica officinalis	-	3	-	-	-	**1**
Anthoxanthem odoratum	3	5	6	6	4	**5**
Rhytidiadelphus squarrosus	6	-	7	7	8	**4**
Cirsium palustre	-	-	3	3	1	**3**
Achillea millefolium	-	-	4	3	2	**3**
Achillea ptarmica	-	-	-	-	1	**1**
Galium verum	3	-	-	-	-	**1**
Carex echinata	3	-	-	-	-	**1**

Phase 1 Habitat Type	Acid Grassland					
Community	U4b Festuca ovina - Agrostis capillaris - Galium saxatile grassland, Holcus lanatus - Trifolium repens subcommunity					
Quadrat	Q1	Q2	Q3	Q4	Q5	
OS Grid Coordinates	NJ38158 33499	NJ40215 35276	NJ37518 33132	NJ37656 33331	NJ38067 33122	
Species	Cover					CONSTANCY
Nardus stricta	4	-	-	-	-	1
Deschampsia cespitosa	3	-	-	-	-	1
Ornithopus perpusillus	3	-	-	-	-	1

Phase 1 Habitat Type	Acid Grassland					
Community	U6c Juncus squarrosus - Festuca ovina grassland, Vaccinium myrtillus sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
Grid reference	NJ38514 33960	NJ40093 35117	NJ37120 32959	NJ37113 32829	NJ37243 32912	
Species	Cover					CONSTANCY
Juncus squarrosus	8	8	8	8	8	5
Deschampsia flexuosa	4	4	4	4	4	5
Agrostis canina	3	3	-	3	3	4
Potentilla erecta	4	3	3	4	3	5
Polytrichum commune	5	6	3	-	-	3
Eriophorum angustifolium	1	1	-	-	-	2
Calluna vulgaris	-	-	3	-	-	1
Luzula multiflora	1	3	3	3	3	5
Pleurozium schreberi	5	3	7	4	7	5
Nardus stricta	4	4	5	5	5	5
Vaccininum myrtillus	4	3	4	-	4	4
Anthoxanthem odoratum	-	3	3	3	3	4
Galium saxatile	3	-	3	4	3	4
Carex nigra	-	-	-	2	-	1
Rhytidiadelphus squarrosus	5	-	-	5	-	2
Hylocomium splendens	6	-	-	-	-	1

Table A3-3: NVC Tables — Western Area.

Phase 1 Habitat Type	Dry Heath										
Community	H12a — Calluna vulgaris — Vaccininum myrtillus heath, Calluna vulgaris sub-community										
Quadrat	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
Grid reference	NJ 36405 33987	NJ 36465 34572	NJ 30698 34831	NJ 35896 34694	NJ 35638 34328	NJ 37968 32075	NJ 38207 32402	NJ 38313 32561	NJ 38869 32883	NJ 38042 32577	
Approximate peat depth (cm)	20	10	20	15	20	15	15	15	10	15	
Species	Cover										**CONSTANCY**
Calluna vulgaris	6	9	10	9	8	8	9	9	9	9	**5**
Vaccininum myrtillus	4	-	4	4	4	3	-	2	3	2	**4**
Hylocomium splendens	9	-	4	4	7	8	8	8	8	9	**5**
Empetrum nigrum	3	3	-	-	3	3	-	3	3	-	**3**
Vaccininum vitis-idaea	4	-	-	4	4	-	-	-	1	-	**2**
Carex binervis	1	-	-	1	-	-	-	1	-	-	**2**
Festuca ovina	2	-	-	-	3	-	-	-	-	-	**1**
Hypnum jutlandicum	4	8	8	5	4	3	3	4	4	3	**5**
Cladonia portentosa	-	4	4	-	-	-	-	-	-	-	**1**
Juncus squarrosus	-	4	-	-	-	3	3	-	-	-	**2**
Pleurozium schreberi	-	-	4	8	4	3	3	4	4	3	**4**
Polytrichum commune	-	-	-	-	4	-	-	-	-	-	**1**
Trichophorum germanicum	-	-	-	-	-	3	-	-	-	-	**1**
Erica tetralix	-	-	-	-	-	-	-	-	-	2	**1**

Phase 1 Habitat Type	Blanket Bog					
Community	M19a Calluna vulgaris — Eriophorum vaginatum mire, Erica tetralix sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
Grid reference	NJ 36517 33978	NJ 36654 34303	NJ 36525 34652	NJ 36393 34825	NJ 36267 34914	
Approximate peat depth (cm)	**80**	**80**	**100+**	**100+**	**60**	
Species	Cover					**CONSTANCY**
Calluna vulgaris	7	6	7	8	7	**5**
Eriophorum vaginatum	5	5	6	5	7	**5**
Vaccinum vitis-idaea	4	-	-	-	-	**1**
Cladonia portentosa	3	4	5	7	3	**5**
Pleurozium schreberi	5	4	4	4	6	**5**
Hylocomium splendens	7	-	5	-	7	**3**
Empetrum nigrum	3	-	4	4	3	**4**
Hypnum jutlandicum	3	3	5	4	4	**5**
Trichophorum germanicum	-	7	3	-	-	**2**

Phase 1 Habitat Type	Blanket Bog					
Community	M19a Calluna vulgaris – Eriophorum vaginatum mire, Erica tetralix sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
Grid reference	NJ 36517 33978	NJ 36654 34303	NJ 36525 34652	NJ 36393 34825	NJ 36267 34914	
Approximate peat depth (cm)	**80**	**80**	**100+**	**100+**	**60**	
Species	Cover					CONSTANCY
Cladonia arbuscula	-	3	-	-	-	**1**
Erica tetralix	-	3	3	3	3	**4**
Diplophyllum albicans	-	4	-	-	-	**1**
Sphagnum capillifolium	-	-	5	3	-	**2**
Rubus chamaemorus	-	-	-	-	2	**1**

Phase 1 Habitat Type	Marshy Grassland					
Community	M23b – *Juncus effusus /acutiflorus – Galium palustre* rush pasture, *Juncus effusus* sub-community					
Quadrat	Q1	Q2	Q3	Q4	Q5	
Grid reference	NJ 36061 33969	NJ 38510 32616	NJ 38968 33356	NJ 37840 32901	NJ 36551 32581	
Approximate peat depth (cm)	15	30	20	30	60	
Species	Cover					CONSTANCY
Juncus effusus	9	8	8	10	8	**5**
Hylocomium splendens	5	3	4	5	5	**5**
Rumex acetosella	3	3	3	3	3	**5**
Diplophyllum albicans	3	-	-	7	7	**3**
Peltigera canina	3	-	-	-	-	**1**
Pleurozium schreberi	3	-	4	-	3	**3**
Cirsium palustre	2	-	1	-	2	**3**
Agrostis stolonifera	-	9	4	3	3	**4**
Rhytidiadelphus squarrosus	-	-	6	-	3	**2**
Ranunculus repens	-	-	3	-	1	**2**
Viola palustris	-	-	2	3	-	**2**
Galium palustre	-	-	-	3	3	**2**
Sphagnum fallax	-	-	-	4	-	**1**
Cardamine flexuosa	-	-	-	3	-	**1**

Phase 1 Habitat Type	Neutral Grassland					
Community	MG9 *Holcus lanatus - Deschampsia cespitosa* grassland (no sub-community assigned)					
Quadrat	Q1	Q2	Q3	Q4	Q5	
Grid reference	NJ 36417 32755	NJ 36390 32797	NJ 36359 32802	NJ 36309 32889	NJ 36314 32936	
Species	Cover					**CONSTANCY**
Deschampsia cespitosa	9	9	9	9	9	**5**
Cirsium palustre	3	3	3	2	3	**5**
Rumex acetosella	4	4	3	3	3	**5**
Agrostis stolonifera	3	3	3	3	3	**5**
Pleurozium schreberi	4	4	3	4	3	**5**
Urtica dioica	1	2	1	1	-	**4**
Jacobaea vulgaris	1	3	-	-	1	**3**
Rhytidiadelphus triquetrus	6	5	5	4	3	**5**
Ranunculus repens	-	3	3	2	-	**3**
Cardamne flexuosa	-	2	2	3	-	**3**
Juncus effusus	-	-	3	4	4	**3**
Rumex acetosella	4	4	3	3	3	**5**

Phase 1 Habitat Type	Acid Grassland					
Community	U4e *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland, *Vaccinium myrtillus – Deschampsia flexuosa* sub-community.					
Quadrat	Q1	Q2	Q3	Q4	Q5	
Grid reference	NJ 37848 31841	NJ 37929 31932	NJ 38260 32176	NJ 38029 32472	NJ 37824 32008	
Species	Cover					**CONSTANCY**
Rhytidiadelphus triquetrus	6	-	-	-	-	**1**
Rhytidiadelphus squarrosus	5	6	3	6	3	**5**
Festuca ovina	5	5	7	7	5	**5**
Agrostis capillaris	5	6	3	-	3	**4**
Luzula multiflora	4	3	3	3	3	**5**
Galium saxatile	3	3	3	4	4	**5**
Potentilla erecta	3	2	2	3	3	**5**
Vaccininum myrtillus	4	-	2	-	3	**3**
Hylocomium splendens	7	7	8	6	8	**5**
Nardus stricta	3	4	-	4	-	**3**
Deschampsia flexuosa	3	3	-	-	-	**2**
Cerastium fontanum	2	-	-	2	1	**3**
Molinia caerulea	-	3	-	-	-	**1**

Phase 1 Habitat Type	Acid Grassland					
Community	U4e *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland, *Vaccinium myrtillus – Deschampsia flexuosa* sub-community.					
Quadrat	Q1	Q2	Q3	Q4	Q5	
Grid reference	NJ 37848 31841	NJ 37929 31932	NJ 38260 32176	NJ 38029 32472	NJ 37824 32008	
Species	**Cover**					**CONSTANCY**
Juncus squarrosus	-	-	4	3	-	**2**
Vaccininum vitis-idaea	-	-	2	-	1	**2**
Polytrichum commune	-	-	3	-	-	**1**
Carex flacca	-	-	3	-	-	**1**
Anthoxanthem odoratum	-	-	-	3	1	**2**
Holcus lanatus	-	-	-	3	3	**2**
Eriophorum angustifolium	-	-	-	4	-	**1**
Rumex acetosella	-	-	-	-	3	**1**
Calluna vulgaris	-	-	-	-	3	**1**

Phase 1 Habitat Type	Acid Grassland					
Community	U5a *Nardus stricta - Galium saxatile* grassland; species-poor subcommunity					
Quadrat	Q1	Q2	Q3	Q4	Q5	
Grid reference	NJ 36172 33981	NJ 36422 33120	NJ 36370 33088	NJ 36160 33944	NJ 36185 33916	
Species	**Cover**					**CONSTANCY**
Nardus stricta	7	7	8	8	7	**5**
Vaccininum myrtillus	3	-	3	3	3	**4**
Hylocomium splendens	6	7	6	6	7	**5**
Potentilla erecta	3	3	3	3	3	**5**
Rumex acetosella	3	2	-	3	3	**4**
Festuca ovina	4	5	4	4	4	**5**
Galium saxatile	3	-	3	3	3	**4**
Rhytidiadelphus squarrosus	3	4	3	3	3	**5**
Luzula multiflora	3	3	3	4	3	**5**
Carex flacca	3	2	2	2	3	**5**
Pleurozium schreberi	-	4	3	3	3	**4**
Juncus squarrosus	-	4	-	1	-	**2**

ANNEX 4 – PHOTOGRAPHS

Photo	Description
Phase 1 Target Notes	
	Photo 1 TN1.
	Photo 2 TN2.

Photo	Description
	Photo 3 TN3.
	Photo 4 TN4.

Photo	Description	Photo	Description
	Photo 5 TN6.		**Photo 7** TN8.
			Photo 8 TN9.
	Photo 6 TN7.		**Photo 9** TN10.

Photo	Description	Photo	Description
	Photo 10 **TN11**		**Photo 13** **TN14**
	Photo 11 **TN12**		**Photo 14** **TN15**
	Photo 12 **TN13**		**Photo 15** **TN16**

Photo	Description	Photo	Description
	Photo 16 **TN17**		**Photo 19** **TN20**
	Photo 17 **TN18**		**Photo 20** **TN21**
	Photo 18 **TN19**		**Photo 21** **TN22**

Photo	Description	Photo	Description
	Photo 22 **TN23**		**Photo 25** **TN26**
	Photo 23 **TN24**		**Photo 26** **TN29**
	Photo 24 **TN25**		**Photo 27** **TN30**

Photo	Description	Photo	Description
	Photo 28 **TN32**		**Photo 31** **TN35**
	Photo 29 **TN33**		**Photo 32** **TN36**
	Photo 30 **TN34**		**Photo 33** **TN37**

Photo	Description
	Photo 34 **TN38**
	Photo 35 **TN39**
NVC Communities	
	Photo 36 H10a.

Photo	Description
	Photo 37 H10d.
	Photo 38 H12a.
	Photo 39 H13.

Photo	Description	Photo	Description
	Photo 40 H18 - right side of photo.		**Photo 43** M15b.
	Photo 41 M2.		**Photo 44** M17a.
	Photo 42 M4.		**Photo 45** M19a.

Photo	Description	Photo	Description
	Photo 46 M20.		**Photo 49** MG9.
	Photo 47 M23a.		**Photo 50** S4.
	Photo 48 M23b.		**Photo 51** OV25 /MG9 mosaic.

Photo	Description
	Photo 52 U4b.
	Photo 53 U6c.
	Photo 54 U16.

Photo	Description
	Photo 55 *Carex* mire.

TA 7.2: Protected Terrestrial Mammals

Technical Appendix 7.2: Protected Terrestrial Mammals

1.1 Introduction

1.1.1   This Technical Appendix has been prepared to accompany Chapter 7: Ecology of the EIAR.

1.1.2   It presents detailed methodologies and results of desk studies and field surveys completed to establish baseline conditions with regards to protected and notable terrestrial mammals (excluding bats), in order to inform the design and assessment of the Proposed Development.

1.1.3   It should be read with reference to the following specific figures, presented in Volume 3a of the EIAR:

- Figure 7.1: Ecological Statutory Designated Sites; and
- Figure 7.4: Terrestrial Mammal Survey Results.

1.1.4   The detailed methodologies and results of desk studies and field surveys completed to establish baseline conditions with regards to bat species, is considered separately in Technical Appendix 7.3: Bats.

Site Overview

1.1.5   The Site is shown in Figures 7.1 to 7.7. The Site is located approximately 8 km south east of Dufftown, Morayshire. There is one designated site, River Spey Special Area of Conservation (SAC), with terrestrial mammal interest within 10 km of the Site.

1.1.6   The habitats within the Site comprise a mosaic of commercial conifer plantation, coniferous semi-natural woodland, blanket bog, marshy grassland, dry modified bog and acid dry dwarf scrub.

1.1.7   The north western section of the Site consists of south east facing slope comprising blanket bog leading to Craig Watch and Garbet Hill, the latter falling outside of the Site.

1.1.8   Full habitat descriptions are provided in Technical Appendix 7.1: Habitats and Vegetation.

1.2 Methodology

Desk Study and Consultation

1.2.1   A desk study and consultation with specialist recording groups was undertaken to identify the proximity of the Site to any statutory or non-statutory designated sites for nature conservation with terrestrial mammal qualifying interests and to identify any existing records of protected and/ or notable terrestrial mammals within or in close proximity to the Site. This was in order to identify the likely sensitivity of any such species to the Proposed Development and to inform the requirements for targeted field surveys.

1.2.2   Key desk study sources, search areas and information obtained are summarised in Table 7.2.1.

Table 7.2.1: Desk Study Sources

Key Source	Information Sought	Search Area
Sitelink	Statutory designated sites for nature conservation with qualifying terrestrial mammal interests.	Within 10 km of the Site.

Table 7.2.1: Desk Study Sources

Key Source	Information Sought	Search Area
North East Scotland Biological Records Centre (NESBReC)	Existing records of protected and notable terrestrial mammals, and non-statutory designated sites with terrestrial mammal interest.	2 km from the Site, extended to 10 km for bat roosts.
Garbet Wind Farm Environmental Impact Assessment Report – Chapter 10 - (Planning Application ref: 21/00020/EIA, February 2021)	Existing records of protected and notable terrestrial mammals from baseline surveys.	Study Area is shown on Figure A10.1 of the Garbet Wind Farm ES. Garbet Wind Farm is located approximately 1.5 km to the north west of the Site.
Saving Wildcats	Wildcat Felis (*silvestris silvestris*) records.	Records within the Site and within 2 km of the Site.
Saving Scotland's Red Squirrels website	Red squirrel (*Sciurus vulgaris*) records.	Within, and adjacent to the Site.

Field Surveys

1.2.3   Field survey effort and methodologies were agreed with NatureScot prior to commencement (see Chapter 7: Ecology, Table 7.1).

1.2.4   Detailed information regarding the presence or likely presence of protected and notable terrestrial mammal species within proximity to the Proposed Development has been derived through field survey for the following species:

- badger (*Meles meles*);
- red squirrel;
- pine marten (*Martes martes*);
- wildcat;
- otter (*Lutra lutra*); and,
- water vole (*Arvicola amphibius*).

Field Survey Methodology

1.2.5   The field survey has comprised a walkover survey of the Survey Area which included the Site and up to a 250 m buffer (see Figure 7.4 and further details of species-specific buffers below) to assess habitat suitability. This was followed by a systematic search of habitat features, to record the location and distribution of field signs identifying the presence and/ or potential presence of protected terrestrial mammal species within the Survey Area as summarised in Table 7.2.2 below. The survey methodology followed industry standard guidance: Chanin (2003)[1], Cresswell *et al.* (2012)[2], Dean *et al.* (2016)[3], Harris *et al.* (1989)[4] and SNH (2018)[5].

Table 7.2.2: Terrestrial Mammal Field Survey Methodology Summary

Species	Survey Methodology Summary
Badger	Walkover search of suitable habitat for signs of badgers, such as footprints, hair, snuffle holes, latrines and sett entrances.

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[1] Chanin, P. (2003). *Monitoring the Otter Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No 10.

[2] Cresswell, W. J., Birks, J. D. S., Dean, M., Pacheco, M., Trewhella, W. J., Wells, D. and Wray, S. (2012). *UK BAP Mammals Interim Guidance for Survey Methodologies, Impact Assessment and Mitigations*. The Mammal Society, Southampton

[3] Dean, M., Strachan, R., Gow, D. and Andrew, R. (2016). *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. Eds Fiona Mathews and Paul Chanin. The Mammal Society, London

[4] Harris S., Cresswell P. and Jefferies D. (1989). *Surveying Badgers*. Mammal Society. English Nature, Peterborough

[5] SNH (2018). *Best Practice Badger Survey Guidance Note*. SNH, Inverness

Table 7.2.2: Terrestrial Mammal Field Survey Methodology Summary

Species	Survey Methodology Summary
Red squirrel	Walkover search of suitable habitats for feeding remains and potential dreys.
Wildcat	Walkover search of suitable habitats for scats and potential den sites.
Pine marten	Walkover search of suitable habitats for scats and potential den sites.
Otter	Walkover search of suitable habitat for spraints, paw prints, paths, slides, food remains, holts and places used for breeding and/ or shelter.
Water vole	Walkover search of suitable habitats for potential burrows, runs, footprints, feeding stations and feeding remains, droppings and latrines.

1.2.6   The survey was undertaken over three staggered visits in June and October 2020:

- 05 June 2020;

- 23 June 2020; and,

- 05 October 2020.

1.2.7   In addition, an updated extended Phase 1 habitat survey was carried out on additional areas of the Site on 20 to 22 April 2021 following an extension of the red-line boundary, which included recording signs of terrestrial mammals.

1.2.8   All surveys were undertaken in conditions conducive to the survey of terrestrial mammals, including normal flow conditions of on-site watercourses and not undertaken after periods of heavy rain.

Survey Area

1.2.9   The Survey Areas, as shown in Figure 7.4, has comprised all areas within the Site, extended to include areas of suitable habitats accessible by public rights of way (PRoW), out to the following distances in accordance with NatureScot species-specific guidance (NatureScot, 2020a-j):

- On-site forested areas within the Site for red squirrel;

- 50 m of the Site for water vole;

- 100 m of the Site for badger;

- 200 m of the Site for otter; and

- 250 m of the Site for pine marten and wildcat.

Personnel

1.2.10   Field surveys have been undertaken by Mr M Wood BSc (Hons), who is a highly experienced field ecologist with considerable experience in the survey and identification of field signs of protected mammal species in Scotland.

1.2.11   Incidental observations of water vole were recorded during fish surveys in August by Heritage Environmental Ltd. ecologists, Mr S Green MCIEEM and Mr D Dowse MCIEEM.

Limitations

1.2.12   Habitats off-site were surveyed from PRoWs. Access to off-site habitats for recording evidence of terrestrial mammals was relatively extensive in all areas within and surrounding the Site considered suitable for terrestrial mammals and the results obtained are considered robust (for further details see Chapter 7: Ecology).

1.3   Results

Desk Study

1.3.1   This section provides details of existing terrestrial mammal information, and existing records of protected and notable mammal species identified within and in proximity to the Site, from desk study sources listed in Table 7.2.1.

Statutory Designated Sites

1.3.2   A review of Sitelink identifies that the Site does not form part of any statutory designated site for nature conservation with qualifying terrestrial mammal interests.

1.3.3   There is one statutory designated site cited for terrestrial mammal qualifying interests within 10 km of the Site: River Spey SAC as detailed below in Table 7.2.3.

Table 7.2.3: Statutory Designated Sites (with qualifying terrestrial mammal interest) within 10 km of the Site

Designated Site	Distance from Site	Qualifying Interest
River Spey SAC	Approximately 0.05 km north west of the Site	European otter

Non-Statutory Designated Sites

1.3.4   In consultation with NESBReC, the Site does not form part of any non-statutory designated site with terrestrial mammals as a designated feature and no such sites are located within 2 km of the Site.

Existing Records of Protected Terrestrial Mammal Species - NESBReC

1.3.5   A summary of existing records of protected terrestrial mammal species within 2 km of the Site, provided by the NESBReC, is presented in Table 7.2.4. The data summarised in Table 7.2.4 is considered historic (>10 years old).

Table 7.2.4: Existing Records of Protected Terrestrial Mammal Species – NESBReC

Species	Conservation Status*	No. of Records (Incl. Date)	Summary
Red squirrel	SBL, WACA-Sch5	Red squirrel	SBL, WACA-Sch5

*Key to Table 7.2.4

WACA-Sch5 – listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended); animals which are protected from their access to any structure or place which they use for shelter; and,

SBL – listed on the Scottish Biodiversity List and considered by the Scottish Ministers to be of principal importance for biodiversity conservation.

Existing Records of Wildcat – Saving Wildcats

1.3.6   The Scottish Wildcat Priority Area's outer boundary falls at the eastern end of the Site.

1.3.7   A review of wildcat sighting records, previously available on the Scottish Wildcat Action (SWA) website was undertaken in November 2020. Subsequently, SWA has changed to Saving Wildcats.

1.3.8   Full details of consultation are provided in Chapter 7 of the EIAR.

1.3.9   In review and further consultation no existing records of wildcat were identified within 2 km of the Site, although several records have been recorded to the east of the Site, 2.3 km from the Site boundary.

1.3.10   The Site is also located at the outer limit of the Strathbogie Scottish Wildcat Priority Area (Littlewood, 2014).

Existing Records of Red Squirrel - Saving Scotland's Red Squirrels

1.3.11 A review of red squirrel records, available on the Saving Scotland's Red Squirrels website, was undertaken in August 2021.

1.3.12 In review and consultation, six existing records of red squirrel are identified within 2 km of the Site, including in June 2021 to the west of the Site within the woodlands surrounding Carn Chrom.

Existing Records of Protected Terrestrial Mammal Species - Garbet Wind Farm ES

1.3.13 A summary of the surveys undertaken to support the Garbet Wind Farm (Planning Application Ref: 21/00020/EIA) are presented in Table 7.2.5. Locations of badger setts and otter holts, which are considered sensitive, were contained within a confidential appendix to the planning application.

Table 7.2.5: Survey Summary which Supported the Garbet Wind Farm

Survey Type	Dates	Results
Badger	May/ June 2018; July/ August 2018; and, November 2018 (access track).	• Four active setts were found during surveys; and • Latrines and prints, hair and spoil heaps were also recorded.
Red squirrel	May/ June 2018; July /August 2018; and, November 2018 (access track).	• No evidence of red squirrels was found during surveys.
Pine marten	May/ June 2018; July/ August 2018; and, November 2018 (access track).	• No evidence of pine martens was found during the surveys.
Otter and water vole	May/ June 2018.	• Two potential otter holts were recorded, as well as two potential resting places/ couches. In addition, several spraints and an individual otter were recorded during surveys; and • No evidence of water vole was recorded.
Wildcat	July/ August 2018.	• No evidence of wildcat was found during the surveys.

Field Survey Results

1.3.14 This section presents the results of baseline field surveys, including an overview of protected terrestrial mammals present within the Survey Areas and their distribution.

Badger

1.3.15 No signs indicative of the presence of badgers were recorded during field surveys.

1.3.16 Plantation woodland habitats, drier grassland and field boundaries of the Site, do provide some suitable sett-building and foraging opportunities for badger. Wetter heathland and blanket bog habitats within and around the peripheries of the Site however present poor opportunities for the species. No existing local records are identified, and the species distribution in the Moray area is understood to be relatively limited, as such future territory establishment within the Site is considered unlikely.

Red Squirrel

1.3.17 No signs indicative of the presence of red squirrel were recorded during field surveys.

1.3.18 The species known distribution in Moray area is understood to remain relatively widespread, however fragmentation of suitable habitat reduces the species' expansion away from key areas. Only one old record of red squirrel within the Site was returned with limited records within 2 km of the Site. The woodland habitats within the Site do provide suitable foraging and drey buildings opportunities for red squirrel however, the predominance by coniferous managed Sitka spruce *Picea sitchensis* crops is less

favourable for the species than mixed native woodlands, which provide a more plentiful and reliable food supply.

1.3.19 The surrounding of the Site by extensive areas of open moorland and the relatively fragmented nature of woodland habitats within the local landscape provides few opportunities for species dispersal into the Site.

Pine Marten

1.3.20 Pine marten scats within the plantation woodland within the Site, were recorded. Observations are summarised in Table 7.2.6.

Table 7.2.6: Terrestrial Mammal Survey Results – Pine Marten

Grid Reference	Description
NJ 39744 35762	Several scats recorded along forest track.
Between: NJ 39659 35260 & NJ 40033 36151	Several scats recorded along a single section of forest track.
NJ 38731 31527[*]	Pine marten scat recorded

*observation recorded on extended Phase 1 Survey.

1.3.21 The woodland habitats of the Site provides some opportunities for the establishment of den sites, with pockets of moorland and grassland habitats also providing a mix of habitats, with the species known to utilise open habitats to some degree for foraging and commuting.

1.3.22 The predominantly wet nature of moorland habitats present within the Site, notably blanket bog is however, generally suboptimal for pine marten.

Wildcat

1.3.23 A single wildcat or hybrid was observed on 5 October 2020 and summarised below in Table 7.2.7.

Table 7.2.7: Terrestrial Mammal Survey Results – Wildcat

Grid Reference	Description
NJ 39856 34820	Wildcat or hybrid seen running through long grass along deer fence.

1.3.24 Plantation woodland habitats that dominate the Site are generally considered to provide suboptimal habitats for wildcat. More favourable habitats provided by mosaics of deciduous woodland, scrub and grasslands are absent from the local surrounding area.

1.3.25 The Site falls at the outer limit of the Strathbogie Scottish Wildcat Priority Area.

Otter

1.3.26 No evidence of otter activity was recorded within the Site.

1.3.27 Watercourses within and intersecting the Site do provide potential suitable commuting opportunities for otter, but are considered to provide relatively poor foraging opportunities due to their low importance for fish species (see Technical Appendix 7.4: Fish Habitat Survey).

Water Vole

1.3.28 Evidence of water vole activity recorded within the study area included characteristic droppings, latrines, and clipped vegetation, as shown in Figure 7.4 and summarised in Table 7.2.8. Small mammal runs were also recorded along the banks of a number of unmarked ditches and watercourse sections and which are characteristic of water vole, but also brown rat *Rattus norvegicus*, and for which additional signs of presence were also noted within the Survey Area.

1.3.29 Additionally, four water vole latrines were recorded whilst carrying out fish surveys within the Site.

Table 7.2.8: Terrestrial Mammal Survey Results – Water Vole

Grid Reference	Description
NJ 39720 35214	Several water vole and brown rat latrines found along stream bank.
NK 38157 33859	Water vole signs including a burrow, runs, clippings and latrine.
NJ 37748 33163	Water vole latrine[1]
NJ 37499 33278	Water vole latrine[1]
NJ 37981 33424	Water vole latrine[1]
NJ 37973 33514	Water vole latrine[1]

[1] This water vole evidence was recorded during the fish habitat survey in August 2020.

Additional Protected Species

MOUNTAIN HARE

1.3.30 A single mountain hare *Lepus timidus* was recorded in June 2020 with several additional signs of Lepus droppings recorded on similar suitable upland habitat. Whilst brown hare *Lepus europaeus* droppings were not ruled out, these were considered likely to be mountain hare droppings. Observations are summarised in Table 7.2.9 below.

Table 7.2.9: Terrestrial Mammal Survey Results – Mountain Hare

Grid Reference	Description
NJ 37075 34127	Mountain hare observed close to the summit of Garbet Hill.

TA 7.3: Bats

Technical Appendix 7.3: Bats

1.1   Introduction

1.1.1   This Technical Appendix has been prepared to accompany Chapter 7 of the EIAR.

1.1.2   It presents detailed methodologies and results of desk studies and field surveys completed to establish baseline conditions with regards to bat species, in order to inform the design and assessment of the Proposed Development.

1.1.3   It should be read with reference to the following specific figures, presented in Volume 3a of the EIAR:

- Figure 7.1 – Designated Sites for Nature Conservation;
- Figure 7.5 – Bat Roost Survey Plan; and
- Figure 7.6 – Bat Activity Survey Plan.

1.1.4   Only common names are used throughout this appendix. Scientific names are provided in Annex 1.

Site Overview

1.1.5   The Site, as shown in Figure 7.1, is located approximately 8 km south east of Dufftown, Morayshire.

1.1.6   The habitats within the Site comprise a mosaic of commercial conifer plantation, coniferous semi-natural woodland, blanket bog, marshy grassland, dry modified bog and acid dry dwarf scrub.

1.1.7   The north western section of the Site consists of south east facing slope comprising blanket bog leading to Craig Watch and Garbet Hill, the latter falling outside of the Site.

1.1.8   Full habitat descriptions are provided in Technical Appendix 7.1 Habitats and Vegetation.

1.2   Methodology

1.2.1   The approach to baseline information gathering with regards to bats has been undertaken with reference to current NatureScot guidance 'Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation' (SNH, 2019)[1].

1.2.2   Additional pieces of guidance and peer reviewed literature have also been referred to and are referenced where relevant.

Desk Study

1.2.3   A desk study was undertaken to inform the approach to field survey work and provide context for subsequent assessment.

1.2.4   The desk study has included a review of:

- Aerial imagery and Ordnance Survey (OS) maps to identify any features of potential value to foraging, commuting or roosting bats;
- A review of SiteLink[2] to identify the proximity of the Site to any national or internationally designated sites for nature conservation, with bat qualifying interests;

- A review of existing bat records within 10 km of the Site, including species and roost records, obtained from the following key sources;
    - Records request to the North East Scotland Biological Records Centre (NESBReC); and
    - Bat records from EIA documentation of Garbet Wind Farm.
- A review of the Site's location in relation to species known ranges in Scotland, with reference to the most recent UK Habitats Directive[3] Article 17 Report, based on Mathews *et al.* (2018)[4].
- The location of other wind farm developments, including the number of turbines and their size within 10 km of the Site through a review of Moray Council 'Wind Turbine Proposal Interactive Map'[5] and Aberdeenshire Council 'Wind Turbine Interactive Map'[6].

Field Surveys

1.2.5   The purpose of the baseline field surveys for bats has been to establish the bat species assemblage using the Site, the spatial and temporal distribution of bat activity within the Site, the location and extent of commuting and foraging habitat used by bats, and the locations of any maternity roosts and/ or any significant hibernation or swarming sites that could potentially be affected by the Proposed Development.

1.2.6   The following surveys have been completed:

- habitat assessment;
- roost surveys; and
- ground-level Static Bat Activity Surveys.

Habitat Assessment

1.2.7   An initial habitat assessment of the Site was undertaken on 3 June 2020 to appraise the potential value of habitats within the Site for commuting and foraging bats, using the criteria detailed within Bat Conservation Trust (BCT) guidance (Collins, 2016[7]; see Table 7.3.1).

1.2.8   The assessment was informed through a review of aerial imagery and comprised a daylight walkover of potentially suitable habitat features within the Site. The assessment was undertaken by M. Wood *BSc (Hons)*, a suitably competent ecologist with considerable experience of undertaking bat activity surveys for proposed wind farm developments, at comparable sites across Scotland.

Table 7.3.1: Bat Habitat Suitability Criteria (Collins, 2016).		
Suitability	**Roosting Habitats**	**Commuting and Foraging Habitats**
Negligible	Negligible habitat features on-site not likely to be used by roosting bats.	Negligible habitat features on-site not likely to be used by commuting or foraging bats.
Low	A structure or tree with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/ or suitable surrounding habitat to be used on a regular basis or by larger	Habitat that could be used by small numbers of commuting bats such as gappy hedgerow or un-vegetated streams, but isolated, i.e., not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be

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1 SNH (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.

2 https://sitelink.nature.scot/home [Accessed September 2021].

3 Council Directive 92/43/EEC.

4 https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/#regularly-occurring-species-vertebrate-species-mammals-terrestrial [Accessed September 2021].

5 http://www.moray.gov.uk/moray_standard/page_119083.html [Accessed January 2022].

6 https://gis.aberdeenshire.gov.uk/maps/map.aspx?x=337908&y=813529&resolution=200&epsg=27700&mapname=aberdeenshire&baseLayer=OS%20Greyscale&datalayers=Wind%20Turbine%20Applications%20,selectFeaturesControl_container [Accessed January 2022]

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

Table 7.3.1: Bat Habitat Suitability Criteria (Collins, 2016).

Suitability	Roosting Habitats	Commuting and Foraging Habitats
	numbers of bats (i.e., unlikely to be suitable for maternity or hibernation).	used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree of sufficient size and age to contain potential roost features but with none seen from the ground or features seen with only very limited roosting potential	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.
High	A structure or tree with one or more potential roost sites that could be used by bats due to its size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	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. Site close to and connected to known roosts.

Roost Surveys

1.2.9   Structures and trees with the potential to support maternity roosts and significant hibernation and/ or swarming sites within 200 m of the Site, plus the candidate turbine rotor radius distance (77.5 m) i.e., within a total of 277.5 m of the Site, were identified through a review of aerial imagery and the preliminary habitat assessment.

1.2.10   This identified 16 structures and two groups of trees within and surrounding the Site as shown within Figure 7.5 , though none of these are within 277.5 m of the turbines.

1.2.11   A daylight, ground-level preliminary roost assessment in accordance with BCT guidance (Collins, 2016), was therefore undertaken in January 2021 by M Wood, an experienced bat surveyor, with extensive experience in undertaking bat surveys.

Ground-level Static Surveys

1.2.12   Bat activity surveys, comprising ground-level static surveys were undertaken in the spring (May to June), summer (July to mid-August) and autumn (mid-August to September) 2020 bat activity periods in accordance with NatureScot guidance (SNH, 2019).

1.2.13   The survey methodology employed the use of automated monitoring stations (MSs), each consisting of a 'Song Meter SM4 Acoustic Recorder', fitted with a single omnidirectional microphone and attached to a 1 m high wooden stake.

1.2.14   Bat activity generated was based on a full spectrum analysis of the captured sound files.

1.2.15   Automated monitoring stations were programmed to commence recording approximately 30 minutes before sunset and finish recording approximately 30 minutes after sunrise, with all stations set up to record simultaneously for 10 consecutive nights with the same settings, to allow comparison of activity recorded across the Site for the same monitoring period.

1.2.16   In accordance with NatureScot guidance (SNH, 2019), the Proposed Development comprising an 11-turbine scheme requires the use of 11 automated monitoring stations. A total of 11 monitoring stations were deployed.

1.2.17   Placement considered minimum mitigation requirements for bats, including habitat feature setback distances, as outlined within current NatureScot guidance (SNH, 2019), whilst ensuring a representative sampling of activity within different habitat types of potential interest to bats within the Site was obtained.

1.2.18   Automated monitoring stations were deployed at the onset of an appropriate weather window for bat activity i.e., forecast temperatures of >8°C (at dusk), maximum ground level wind speeds of 5 m/s and no, or only very light, rainfall.

1.2.19   Recording periods for each monitoring station are summarised within Table 7.3.2. Detailed survey effort is presented in Annex 2.

Table 7.3.2: Monitoring Station (MS) Recording Period Summary.

Monitoring Station Ref. (Figure 7.6)	Grid Ref.	No. of Successful Recording Nights			Phase 1 Habitat Classification	Linear Feature within 50 m
		Spring	Summer	Autumn		
MS 1	NJ3722333319	12	8	12	Semi-improved acid grassland	None
MS 2	NJ3828933442	5	8	11	Unimproved acid grassland	None
MS 3	NJ3767533938	10	2	11	Semi-improved acid grassland on the edge of blanket bog	None
MS 4	NJ3778734574	0	0	14	Blanket bog on the edge of coniferous plantation woodland	Woodland edge
MS 5	NJ3859034552	18	16	14	Blanket bog on the edge of coniferous plantation woodland	Woodland edge
MS 6	NJ3916534803	1	9	9	Coniferous plantation woodland.	Woodland edge
MS 7	NJ3851235127	12	3	2	Coniferous plantation woodland.	None
MS 8	NJ3912035406	13	7	13	Coniferous plantation woodland.	None
MS 9	NJ3977935350	13	10	13	Marshy grassland on the edge of coniferous plantation woodland.	Woodland edge
MS 10	NJ3947735969	13	9	13	Blanket bog on the edge of coniferous plantation woodland	Woodland edge
MS 11	NJ4007436354	13	9	9	Semi-improved acid grassland on the edge of coniferous plantation woodland	Woodland edge

Weather Data

1.2.20   Weather data was collected from the Time and Date website[8] and from SEPA[9] for the static deployment periods. Temperature and wind speed at dusk were collected from the closest weather mast; located approximately 4 km north at Milltown of Auchindoun. Rain data was provided by SEPA from the closest mast; located approximately 12 km north east at Keith. Weather conditions are summarised in Annex 3.

1.2.21   Weather data was also analysed to check for any periods of poor weather which could have affected bat activity.

Data Analysis and Assumptions of Bat Activity

1.2.22   Analysis and interpretation of bat activity has followed principles presented within BCT (Collins, 2016) and NatureScot (SNH, 2019) guidance.

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[8] https://www.timeanddate.com/ [Accessed September 2021].

[9] https://www2.sepa.org.uk/rainfall/ [Accessed September 2021]

1.2.23 Digital sonograms were analysed through Kaleidoscope Pro Version 5.3.3. A selection of sonograms were also manually checked prior to uploading to *Ecobat*, through Kaleidoscope Viewer and Analook (Titley Scientific).

1.2.24 As bat detectors record the passage of echolocating bats during surveys, this enables an estimation of relative bat activity levels at a particular location or feature within a study area, for subsequent use in assessment.

1.2.25 For the purpose of sonogram analysis, bat activity was taken as the number of 'bat registered calls' i.e., a sequence of echolocation calls consisting of two or more call notes (pulse of frequency), not separated by more than one second (White and Gehrt, 2001[10] and Gannon *et al.*, 2003[11]), with a minimum call note length of two milliseconds (Weller *et al.*, 2009[12]).

1.2.26 It should be noted that as an individual bat can pass a particular location or feature on several occasions while foraging it is not possible to estimate the number of individual bats recorded.

Ecobat Tool

1.2.27 In accordance with NatureScot guidance (SNH, 2019) guidance, the *Ecobat* tool (Box 1) was used to provide an objective interpretation of the relative importance of bat activity levels recorded within the Site.

Box 1: Ecobat Tool
Ecobat[13] is a secure online tool initially designed by the University of Exeter and now hosted and developed by the Mammal Society (Lintott *et al.*, 2018[14]).
The *Ecobat* tool compares baseline bat activity data collected for a site, with bat survey information collected from similar areas (i.e., the 'reference range') at the same time of year. It then provides a percentile rank for each species and a numerical representation of activity levels recorded at a site, relative to the surrounding landscape for each night of surveying.
Percentiles can then be assigned to activity categories (low, moderate, high) to provide a quantifiable and objective measure of bat activity (Table 7.3.3), rather than relying on professional judgment alone
It should be noted that the online tool remains limited by the amount of data in the database on a locational basis; and therefore, the results should be regarded as indicative rather than conclusive evidence of the importance of a site for bats.

1.2.28 Relative levels of activity are determined by *Ecobat* by comparison to a reference data set, the 'reference range'. When uploading data into the *Ecobat* tool, the reference range was stratified to only include the following records from the reference data set:

- Only records from within 30 days of the survey date; and
- Only records from within 100 km^2 of the survey location.

1.2.29 Records of each species included within the reference range for comparison included:

- Common pipistrelle – 1,208 records;
- Soprano pipistrelle – 558 records;
- Brown long-eared – 31 records;
- *Myotis* species – 230 records; and
- Noctule – 169 records.

1.2.30 For each night where bat activity was recorded, the *Ecobat* tool reports the percentile and associated confidence limits of the night of data against the reference range. Table 7.3.3 presents the percentile and associated bat activity category, replicated from NatureScot guidance (SNH, 2019).

Table 7.3.3: Percentile Scope and Categorised Level of Bat Activity

Percentile	Bat Activity Category
81 to 100	High
61 to 80	Moderate to High
41 to 60	Moderate
21 to 40	Low to Moderate
0 to 20	Low

Risk Assessment

1.2.31 In accordance with NatureScot guidance (SNH, 2019), a risk assessment has been carried out to identify the potential risk to bat populations. Wind farm developments can impact upon bat species as a result of:

- collision mortality and other injuries (although it is important to consider these in the context of other forms of anthropogenic mortality);
- loss or damage to commuting and foraging habitat, (wind farms may form barriers to commuting or seasonal movements, and can result in severance of foraging habitat);
- loss of, or damage to, roosts; and,
- displacement of individuals or populations (due to wind farm construction or because bats avoid the wind farm area).

1.2.32 To ensure that bat species are protected by minimising the risk of collision, NatureScot guidance (SNH, 2019) advises that an assessment of impact for a proposed wind farm development, requires a detailed appraisal of:

- the level of activity of all bat species recorded at the site assessed both spatially and temporally;
- the risk of turbine-related mortality for all bat species recorded at the Site during bat activity surveys; and
- the effect on the species' population status if predicted impacts are not mitigated.

Assessing Potential Risk

1.2.33 NatureScot guidance (SNH, 2019) presents a two-stage process for assessing the potential risk to bats as a result of onshore wind turbine developments:

- Stage 1 - gives an indication of the potential risk level of a site, based on a consideration of habitat and development-related features; and
- Stage 2 – uses the output of Stage 1 (i.e., the potential risk level of a site) to provide an overall risk assessment based on the activity level of high collision risk species.

1.2.34 The assessment is intended to assist in the identification of those developments which are of greatest concern in terms of potential collision risks at the population level and inform the potential requirements for mitigation.

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11 Gannon, W., Sherwin, R. and Haymond, S. (2003). On the importance of articulating assumptions when conducting acoustic studies of habitat use by bats. Wildlife Society Bulletin, 31, pp. 45-61.

12 Weller, T.J., Cryan, P.M., O'Shea, T.J. (2009) Broadening the focus of bat conservation and research in the USA for the 21st century. Endang Species Res 8:129–145.

13 http://www.ecobat.org.uk/about-ecobat [Accessed August 2021]

14 Lintott, P.R., Davison, S., van Breda, J., Kubasiewicz, L., Dowse, D., Daisley, J., Haddy, E. and Mathews, F., 2018. Ecobat: An online resource to facilitate transparent, evidence-based interpretation of bat activity data. Ecology and evolution, 8(2), pp.935-941.

1.3   Limitations

Field Surveys

1.3.1   Due to COVID-19 restrictions on movement applicable at the time of survey commencement, detectors were deployed at the earliest and safest possible opportunity during the spring activity period, on 20 May 2020.

1.3.2   NatureScot guidance (SNH, 2019) requires a minimum of *10 consecutive* monitoring nights for each of the spring, summer and autumn 2020 activity periods.

1.3.3   Due to an unforeseen detector malfunction, bat activity data captured at MS 4 during the spring and summer 2020 surveys could not be retrieved. Failures occurred at several other locations meaning that fewer than the recommended 10 nights of data are available for some detectors during some of the surveys. A total of five detectors failed to record for 30 nights minimum when the survey periods are combined (MS 2; 24 nights, MS 3; 24 nights, MS 4; 14 nights, MS 6; 19 nights, MS 7; 17 nights). However, failures are common events and are not considered to affect the overall validity of the data set, particularly in upland locations comprising relatively homogenous habitat of low overall value to bats such as conifer plantation. When the 11 detector locations are combined, the total nights of recording for the Site equates to 312 out of the recommended 330, which is considered in excess of what is needed to characterise bat interest and activity levels at a site of this type.

1.3.4   Weather constraints including temperatures below 8°C, heavy rain and/ or winds exceeding 5 m/s were recorded at dusk on 10 nights during the spring 2020 survey, four nights during the summer 2020 survey and four nights during the autumn 2020 survey. These weather conditions are likely to be representative for sites at this latitude, and therefore are not considered to represent a constraint to the validity of the assessment. However, with the exception of one night (24 July 2020), bat activity was still recorded on the majority of these nights and so have been included within the analysis. Although it is recognised that poor weather can affect bat activity, excluding these data from the analysis skews the dataset and would remove some high collision risk species (noctule) from the dataset. Subsequently inclusion of these nights represents a precautionary approach.

1.3.5   Due to an unforeseen weather station malfunction it was not possible to retrieve the weather data for the three survey periods. Instead, the weather data for this static deployment period was obtained from SEPA and the Time and Date website. Weather masts in this area are very limited with the closest SEPA mast being Keith approximately 12 km north east and the closest Time and Date mast being at Milltown of Auchindoun approximately 4 km north. As a result, the weather data may not be totally accurate for the Site; however, considering that bats were recorded on all but two recording nights, including during nights deemed as having unsuitable weather, this is not considered to represent a significant limitation to the data.

Sonogram Analysis

1.3.6   Analysing bat sonograms using Kaleidoscope can clearly identify certain species. However, some genus groups (such as *Myotis* spp) can be difficult to determine the specific species due to their similar styles of calls. In addition, it can be difficult to determine species or even genus in some circumstances, due to partial calls being heard or due to distortion from, for example passing cars, rain or wind. In cases where it is not possible to identify a bat call to genus, it is labelled as an unknown bat. If the genus can be identified but not the species, the call is labelled by the genus group only.

1.3.7   The detectability of some bat species, such as *Plecotus* is lower than that of, for example, *Nyctalus* and *Pipistrellus*. The echolocation calls of *Plecotus* are comparatively more difficult to detect with bat detectors, and their particular hunting strategies take them into less open habitats, where survey transect routes may not venture. Careful interpretation has been applied when comparing survey results across species.

Ecobat Tool

1.3.8   The *Ecobat* tool remains is in its infancy, and naturally there are fewer data in the reference range, reducing the confidence in the assigned category. The tool does, however, provide a guide for discussion along with Site-specific circumstances (e.g., habitats present, desk study information) and its use is advised in accordance with NatureScot guidance (SNH, 2019).

1.3.9   The data within the reference range used to compare activity levels between Site data and other records within 100 km² is likely to have been obtained from surveys undertaken at proposed or operational wind farm sites. Thus, most of the records are likely to be from low value habitats (upland, exposed commercial forestry) compared to habitats of greater value (such as those detailed in Table 3a of NatureScot guidance (SNH, 2019) and listed under 'High').

1.3.10   When data are entered into *Ecobat* for analysis, there is no allowance for entering recording nights where no bat passes were recorded, and so the analysis is carried out only on presence data. For example, the detector may have recorded 200 bat passes over a seven-day period; all of these passes were recorded on two nights but the *Ecobat* medians and means only consider those two nights in their analysis, not the full seven days. This can act to skew the results and elevate the risk levels of percentile ranks calculated.

1.3.11   *Ecobat* output is therefore regarded as an indicative assessment and to be considered alongside desk study information and professional judgement, rather than conclusive evidence of the importance of a site for bats.

1.4   Results

Desk Study

Statutory Designated Sites for Nature Conservation

1.4.1   In review of Sitelink, the Site is not located within 10 km of any national or internationally designated site for nature conservation with bat qualifying interests.

1.4.2   In consultation with NESBReC, no non-statutory designated sites for nature conservation with bat qualifying interests are located within 2 km of the Site.

Existing Bat Records

NESBReC

1.4.3   NESBReC returned a total of 96 bat records for the period 1980 to 2018 from within 10 km of the Site, 81 of which are from the period 2011 to 2021. Records were attributable to: common pipistrelle, soprano pipistrelle, pipistrelle species *Pipistrellus spp*, Daubenton's bat, Natterer's bat, brown long-eared and an unidentified bat species with further details provided in Annex 4.

1.4.4   The records included four roosts for common pipistrelle, three for soprano pipistrelle and one for brown long-eared bat. Limited information regarding the nature of these roosts was provided by NESBReC but none were specifically identified to comprise maternity or hibernation roosts.

OTHER WIND FARM EIA DOCUMENTATION

1.4.5   A summary of existing bat records identified in a review of EIA documentation for the nearby Garbet Wind Farm is provided in Table 7.3.4.

Table 7.3.4: Existing Records of Bat Species — Adjacent Wind Farm EIA Documentation	
Wind Farm	**Summary**
Garbet 21/00020/EIA	Garbet Wind Farm is located approximately 1.5 km to the north west of the Site.

Table 7.3.4: Existing Records of Bat Species – Adjacent Wind Farm EIA Documentation

Wind Farm	Summary
	Baseline bat surveys were undertaken in 2017 and 2018. In total four bat species were recorded for the Site: soprano pipistrelle, common pipistrelle, Daubenton's bat and brown long-eared bat. Potential roost features were also identified within trees and derelict buildings within the Site.

UK Bat Species Range

1.4.6   In review of the UK Habitats Directive Article 17 Report 'Habitats Directive Report 2019: Species Conservation Status Assessments 2019', the Site is located within the known UK distribution range for the following bat species:

- Common pipistrelle;
- Soprano pipistrelle;
- Brown long-eared bat; and
- Daubenton's bat.

1.4.7   Whilst beyond the general distribution range of Natterer's bat, NESBReC returned records of this species within 10 km of the Site in the data search.

Other Wind Farm Developments

1.4.8   In review of Moray Council and Aberdeenshire Council Wind Turbine Interactive Map's, the Site is located within 10 km of five proposed/ operational wind farms with a tip height greater than 100 m and three proposed/ operational wind farms with a tip height less than 100 m.

1.4.9   Wind farms within 10 km of the Proposed Development are summarised in Table 7.3.5.

Table 7.3.5: Windfarm Developments within 10 km

Application Reference	Council	No. Turbines	Tip Height	Distance from Closest Turbine
21/00020/EIA	Moray	7	>100 m	Approx. 0.7 km north
11/01422/APP	Moray	1	<100 m	Approx. 2.7 km north
APP/2009/1380	Aberdeenshire	18	>100 m	Approx. 2.9 km south east
08/01200/536	Moray	59	>100 m	Approx. 5.4 km south west
06/02961/FUL	Moray	1	<100 m	Approx. 5.9 km north west
APP/2012/2619	Aberdeenshire	1	<100 m	Approx. 6.5 km north
APP/2013/3282	Aberdeenshire	4	>100 m	Approx. 9.9 km north east
13/02057/536	Moray	16	>100 m	Approx. 10 km north

Field Surveys

Habitat Assessment

1.4.10   The habitats within the Site are considered to be of low habitat risk for bats, in accordance with criteria presented in BCT guidelines (Collins, 2016).

1.4.11   The predominantly closed canopy commercially managed coniferous woodlands of the Site provide relatively poor foraging opportunities for bat species, in comparison to broadleaved and non-commercially managed woodlands.

1.4.12   There is a low incidence of prominent linear features, such as tree lines, scrub and major wooded riparian networks, providing connectivity between the Site and potentially higher value habitats for bats within wider landscape.

1.4.13   A small number of features with the potential to support roosting bats, comprising stone ruins and mature trees are identified within the Site. Bat roost surveys detailed herein have, however, not identified the presence of roosting bats within these features and there are no existing roost records at the Site identified through the desk study.

Bat Roost Surveys

1.4.14   The findings of the preliminary roost assessment for the structures and trees identified in Figure 7.5 and conclusions of roost suitability in accordance with Collins guidance (2016) are presented in Table 7.3.6 which should be read with reference to Photographic Plates (1-17), presented in Annex 2.

Table 7.3.6: Preliminary Roost Assessment - Findings

Structure Ref. (Figure 7.5)	Grid Ref.	Assessment	Roost Suitability (Collins, 2016)
S 1: Road bridge	NJ 34076 35704	Many crevices suitable for roosting bats	Low
S 2: Ruin	NJ 37791 31376	Reduced to rubble and unsuitable for roosting bats.	Negligible
S 3: Road bridge	NJ 40156 34164	Suitable for bats.	Low
S 4: Ruin	NJ33164 36693	Reduced to rubble and unsuitable for roosting bats.	Negligible
S 5: Derelict house	NJ 37413 31687	Derelict house, currently uninhabitable. Also large stone wall and stone road bridge here.	Low
S 6: Road bridge	NJ 38621 31501	Old stone road bridge and the remains of a weir. Unlikely to be used by bats.	Negligible
S 7: Shed	NJ 41013 35560	No sign of any habitable or derelict structures. Only a small wooden shed here.	Negligible
S 8: Ruin	NJ 40711 36530	Reduced to rubble and unsuitable for roosting bats.	Negligible
S 9: Derelict house	NJ 40431 37330	Derelict stone house but potentially habitable with work.	Low
S 10: Derelict house	NJ 40789 36925	Derelict stone house and adjacent barn, potentially habitable with work.	Low
S 11: Derelict house	NJ 40620 37170	Additional derelict stone house, potentially habitable with work.	Low
S 12: Derelict house	NJ 38817 37526	Additional derelict large stone house and accompanying barn, potentially habitable with work.	Low
S 13: Derelict barns	NJ 39301 32712	Additional derelict barns.	Low
S 14: Barn near Ballochford Farm	NJ36038 34085	Remains of a small barn near Ballochford Farm. Small part of the roof remains, could still function as a bat roost, though no evidence noted during survey.	Low
S 15: Stone ruin	NJ38239 32047	Stone ruin with some beech trees around it. No bat potential within the structure but the gnarled beeches may provide roost spots.	Negligible
S 16: Mature beech trees	NJ38239 32047	Stone ruin with some beech trees around it. No bat potential within the structure but the gnarled beeches may provide roost spots.	Negligible/ low
S 17: Ruined stone cottage and series of old walls	NJ37765 32861	Ruined stone cottage and series of old walls. Roof still partially intact and roof space and chimney stack are good potential bat roosts, though the interior was not properly inspected due to the unstable condition of the building, so could not say for sure if it was being used as a roost.	Low
S 18: Mature ash trees	NJ38620 31509	Some bat roosting potential in tall old ash trees that do contain some holes.	Negligible/ low

Bat Activity Surveys

Summary of Results and Activity Levels

1.4.15 Bats were detected on 58 dates out of a possible 60 sampled dates over the full survey period between May and September 2020.

1.4.16 Species identified are presented in Table 7.3.7 along with potential collision risk and population vulnerability as described in Table 2 of NatureScot guidance (SNH, 2019).

Table 7.3.7: Bat Species Recorded, Collision Risk and Population Vulnerability

Species	Collision Risk	Population Vulnerability
Brown long-eared	Low	Low
Common Pipistrelle	High	Medium
Myotis species	Low	Low/ Medium
Noctule	High	High
Soprano pipistrelle	High	Medium

1.4.17 A total of 13,345 bat passes were recorded over a total of 312 survey nights (all detectors combined) as summarised in Table 7.3.8.

Table 7.3.81: Total Number of Bat Passes

Species	Passes (No.)	Percentage of Total (%)[15]
Brown long-eared bat	33	0.2
Common pipistrelle	8,553	64.1
Myotis species	353	2.6
Noctule	1553	11.6
Soprano pipistrelle	2,853	21.4
Total	13,345	99.9

Ecobat Output

1.4.18 The full *Ecobat* Tool output report is included as Annex 6.

1.4.19 Table 7.3.9 presents the total numbers of nights bat activity fell under each band of high to low activity and Table 7.3.10 presents the percentiles, confidence intervals (CI) and key metrics of the *Ecobat* output for each species.

Table 7.3.9: Number of Nights Recorded Bat Activity Fell into Each Activity Band or each Species within the Site.

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
Brown long-eared bat	0	0	0	7	17
Common pipistrelle	46	28	13	11	13
Myotis species	0	9	32	20	22
Noctule	14	22	19	29	34
Soprano pipistrelle	25	27	7	22	15

Table 7.3.10: Percentiles for Each Species within the Site

Species/ Species Group	Total Passes	Passes per Night Recorded[19]	Passes per Night Included in *Ecobat*[20]	Median Percentile[16]	95% CIs[17]	Max Percentile[18]	Nights Recorded
Brown long-eared bat	33	0.11	0.57	1	13.5 - 32	38	24
Common pipistrelle	8,553	27.50	147.47	74	70.5 - 92	99	111
Myotis species	353	1.14	6.09	38	30 - 67	75	83
Noctule	1,553	4.99	26.78	38	63 - 81	92	118
Soprano pipistrelle	2,853	9.17	49.19	64	78 - 94	97	96

Spatial Distribution

1.4.20 The *Ecobat* output median and mean nightly pass rate (passes per hour, per night) of each species, at each detector for all months is presented in Table 7.3.11. The use of the median value is recognised to provide the more accurate representation of activity, as bat activity levels between nights can be highly variable, and thus the median provides a more reliable value than the mean or maximum (Lintott *et al.*, 2018). In addition, the dataset is unlikely to be normally distributed, therefore the median is the most appropriate metric to report.

1.4.21 Data for 'Includes Absences' and 'Excludes Absences' are included in Table 7.3.11. Includes absences takes into account nights when no bats were recorded and therefore lowers the overall medians and means (note this does not include any nights when no bats of any species were recorded as these are filtered out by *Ecobat* in the initial data upload to the *Ecobat* tool, see Limitations). Including absences are key to demonstrating the level of bat interest at a Site as 'no bats' on a recording night where there were no technical issues or weather constraints is a valid result.

Table 7.3.11: Median and Mean Bat Pass Rate per Species, Per Detector

Species	Detector ID	Total Bat Passes	Median Pass Rate (passes per hour/ night) Incl. Absences	Median Pass Rate (passes per hour/ night) Excl. Absences	Mean Pass Rate (passes per hour/ night) Incl. Absences	Mean Pass Rate (passes per hour/ night) Excl. Absences
Brown long-eared	MS 1	1	0	0.1	0	0.1
	MS 2	No brown long-eared bats were recorded at MS 2.				
	MS 3	No brown long-eared bats were recorded at MS 3.				
	MS 4	5	0	0.1	0	0.1
	MS 5	No brown long-eared bats were recorded at MS 5.				
	MS 6	3	0	0.1	0	0.1
	MS 7	No brown long-eared bats were recorded at MS 7.				
	MS 8	3	0	0.1	0	0.1
	MS 9	8	0	0.2	0	0.2
	MS 10	5	0	0.1	0	0.1
	MS 11	8	0	0.1	0	0.2

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[15] The 'Total' percentage may not be exactly 100% due to rounding of the percentages per species.

[16] A numerical representation of average activity levels relative to the surrounding landscape (within 100 km) for each night of surveying.

[17] An indication of the confidence in the median percentile.

[18] A numerical representation of maximum activity levels on any one night relative to the surrounding landscape (within 200 km) for each night of surveying

[19] Total recorded nights for the survey period is 312.

[20] A total of 201 nights were included in Ecobat's analysis. Nights when no bats are recorded are excluded.

Table 7.3.11: Median and Mean Bat Pass Rate per Species, Per Detector

Species	Detector ID	Total Bat Passes	Median Pass Rate (passes per hour/ night)		Mean Pass Rate (passes per hour/ night)	
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences
Common pipistrelle	MS 1	36	0.1	0.2	0.3	0.4
	MS 2	No common pipistrelle were recorded at MS 2.				
	MS 3	No common pipistrelle were recorded at MS 3.				
	MS 4	1514	2.7	2.7	12.3	12.3
	MS 5	97	0	0.9	0.6	1.2
	MS 6	1279	2.6	2.8	7.2	7.6
	MS 7	368	0	15.7	1.5	12.4
	MS 8	1576	1.8	4.6	8.5	9.8
	MS 9	128	0	0.6	0.6	1.6
	MS 10	1133	0	2	3.4	7.1
	MS 11	2422	1.5	10	8.9	14.9
Myotis species	MS 1	15	0	0.3	0.1	0.3
	MS 2	No Myotis were recorded at MS 2.				
	MS 3	No Myotis were recorded at MS 3.				
	MS 4	68	0.5	0.7	0.6	0.7
	MS 5	24	0.1	0.2	0.1	0.2
	MS 6	43	0.1	0.3	0.2	0.4
	MS 7	4	0	0.4	0	0.4
	MS 8	52	0.2	0.4	0.2	0.4
	MS 9	25	0	0.4	0.1	0.4
	MS 10	42	0	0.3	0.1	0.5
	MS 11	80	0.1	0.5	0.3	0.5
Noctule	MS 1	No noctule were recorded at MS 1.				
	MS 2	8	0.3	0.3	0.4	0.4
	MS 3	4	0.3	0.3	0.3	0.3
	MS 4	7	0	0.1	0.1	0.1
	MS 5	65	0.1	0.2	0.6	1.1
	MS 6	83	0	0.2	0.7	1.3
	MS 7	913	3	3.2	5.5	6
	MS 8	10	0	0.1	0.1	0.2
	MS 9	186	0.8	0.9	1.1	1.4
	MS 10	67	0.1	0.3	0.3	0.6
	MS 11	210	0.2	0.3	1	1.3
Soprano pipistrelle	MS 1	22	0.1	0.2	0.2	0.3
	MS 2	No soprano pipistrelle were recorded at MS 2.				
	MS 3	No soprano pipistrelle were recorded at MS 3.				
	MS 4	201	0.4	0.5	1.7	2

Table 7.3.11: Median and Mean Bat Pass Rate per Species, Per Detector

Species	Detector ID	Total Bat Passes	Median Pass Rate (passes per hour/ night)		Mean Pass Rate (passes per hour/ night)	
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences
	MS 5	43	0.1	0.3	0.3	0.5
	MS 6	406	0.8	1.2	2.3	2.5
	MS 7	333	0	10.6	1.3	11.2
	MS 8	318	0.2	0.7	1.7	2.7
	MS 9	113	0	0.8	0.5	1.6
	MS 10	149	0	0.3	0.5	1.2
	MS 11	1268	1.4	7.5	4.5	8.5

1.4.22   Table 7.3.12 presents the relative bat activity levels (percentiles) per detector, per species. Table 7.3.13 presents the percentage distribution of no. bats per detector.

Table 7.3.12: Percentiles for Each Species per Detector Location for the Whole Survey Period

Species/ Species Group	Detector ID	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level (based on median percentile)
Brown long-eared	MS 1	1	0	1	1	Low
	MS 2	No brown long-eared bats were recorded at MS 2.				
	MS 3	No brown long-eared bats were recorded at MS 3.				
	MS 4	1	1 - 1	1	5	Low
	MS 5	No brown long-eared bats were recorded at MS 5.				
	MS 6	1	1 - 1	1	3	Low
	MS 7	No brown long-eared bats were recorded at MS 7.				
	MS 8	14	13.5 - 13.5	26	2	Low
	MS 9	26	13.5 - 32	38	4	Low to Moderate
	MS 10	1	1 - 1	26	4	Low
	MS 11	1	1 - 19.5	38	5	Low
Common pipistrelle	MS 1	26	1 - 39.5	78	9	Low to Moderate
	MS 2	No common pipistrelle were recorded at MS 2.				
	MS 3	No common pipistrelle were recorded at MS 3.				
	MS 4	61	38 - 91	99	12	Moderate to High
	MS 5	64	43.5 - 74.5	82	8	Moderate to High
	MS 6	78	68 - 85	99	17	Moderate to High
	MS 7	92	68 - 94	94	3	High
	MS 8	81	55 - 85	98	19	High
	MS 9	51	26 - 78	83	9	Moderate
	MS 10	72	38.5 - 82	97	16	Moderate to High
	MS 11	89	70.5 - 92	99	18	High
Myotis species	MS 1	38	1 - 42	46	6	Low to Moderate
	MS 2	No Myotis were recorded at MS 2.				
	MS 3	No Myotis were recorded at MS 3.				

Table 7.3.12: Percentiles for Each Species per Detector Location for the Whole Survey Period

Species/ Species Group	Detector ID	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level (based on median percentile)
	MS 4	59	30 - 67	75	9	Moderate
	MS 5	26	1 - 42	56	10	Low to Moderate
	MS 6	38	13.5 - 51	71	11	Low to Moderate
	MS 7	46	0	46	1	Moderate
	MS 8	46	19.5 - 52.5	67	13	Moderate
	MS 9	46	19.5 - 52.5	59	7	Moderate
	MS 10	38	13.5 - 57.5	68	9	Low to Moderate
	MS 11	51	30 - 55	67	17	Moderate
Noctule	MS 1	No noctule were recorded at MS 1.				
	MS 2	26	1 - 51	51	3	Low to Moderate
	MS 3	20	19.5 - 19.5	38	2	Low
	MS 4	1	1 - 1	38	5	Low
	MS 5	26	1 - 48	83	9	Low to Moderate
	MS 6	26	1 - 44.5	86	9	Low to Moderate
	MS 7	75	63 - 81	92	23	Moderate to High
	MS 8	1	1 - 1	38	8	Low
	MS 9	56	38.5 - 64	80	20	Moderate
	MS 10	26	13.5 - 43.5	74	17	Low to Moderate
	MS 11	26	26 - 47	91	22	Low to Moderate
Soprano pipistrelle	MS 1	26	13.5 - 46	63	7	Low to Moderate
	MS 2	No soprano pipistrelle were recorded at MS 2.				
	MS 3	No soprano pipistrelle were recorded at MS 3.				
	MS 4	51	23.5 - 78.5	86	10	Moderate
	MS 5	38	1 - 61	68	9	Low to Moderate
	MS 6	67	45 - 73	94	16	Moderate to High
	MS 7	90	78 - 94	94	3	High
	MS 8	59	37.5 - 73.5	87	14	Moderate
	MS 9	55	13.5 - 74.5	85	8	Moderate
	MS 10	38	19.5 - 62	86	13	Low to Moderate
	MS 11	85	78 - 88	97	16	High

Table 7.3.13: Bat Activity Survey Results per Monitoring Station (MS)[21]

Detector ID	No. Nights Sampled	No. of Nights Bats were Recorded	Percentage of Nights Bats were Recorded	Total No. Bats Recorded	Percentage Distribution of No. Bats
MS 1	32	13	40.6%	74	0.55%
MS 2	24	3	12.5%	8	0.06%

Table 7.3.13: Bat Activity Survey Results per Monitoring Station (MS)[21]

Detector ID	No. Nights Sampled	No. of Nights Bats were Recorded	Percentage of Nights Bats were Recorded	Total No. Bats Recorded	Percentage Distribution of No. Bats
MS 3	23	2	8.7%	4	0.03%
MS 4	14	12	85.7%	1795	13.45%
MS 5	47	17	36.2%	229	1.72%
MS 6	19	18	94.7%	1814	13.59%
MS 7	27	25	92.6%	1618	12.12%
MS 8	33	22	66.7%	1959	14.68%
MS 9	36	26	72.2%	460	3.45%
MS 10	35	33	94.3%	1396	10.46%
MS 11	31	30	96.8%	3988	29.88%

Temporal Activity

1.4.23　A summary of results per season is provided in Table 7.3.14.

1.4.24　Activity levels were calculated by *Ecobat* per species (or species group) per month to allow for temporal variations in bat activity. Median and maximum percentiles and corresponding activity levels are presented.

Table 7.3.14: Percentiles for Each Species Each Month Within the Site[22]

Species/ Species Group	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level
Brown long-eared	May	No brown long-eared bats were recorded in May.				
	June	No brown long-eared bats were recorded in June.				
	July	No brown long-eared bats were recorded in July.				
	August	1	13.5 - 32	38	13	Low
	September	1	13.5 - 13.5	38	11	Low
Common pipistrelle	May	No common pipistrelle were recorded in May.				
	June	No common pipistrelle were recorded in June.				
	July	76	70.5 - 92	97	17	Moderate to High
	August	78	70.5 - 92	99	49	Moderate to High
	September	72	70.5 - 92	99	45	Moderate to High
Myotis species	May	No Myotis bats were recorded in May.				
	June	No Myotis bats were recorded in June.				
	July	1	30 - 55	46	9	Low
	August	46	30 - 67	68	36	Moderate
	September	42	30 - 67	75	38	Moderate
Noctule	May	51	63 - 81	92	44	Moderate
	June	56	63 - 81	86	36	Moderate
	July	1	63 - 81	68	6	Low
	August	1	63 - 81	59	17	Low
	September	1	26 - 47	71	15	Low

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[21] The number of nights sampled is the number of nights each detector was operational for, taking account of detector failures.

[22] Activity Level is based on the median percentile

Table 7.3.14: Percentiles for Each Species Each Month Within the Site[22]

Species/ Species Group	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level
Soprano pipistrelle	May	No soprano pipistrelle were recorded in May.				
	June	No soprano pipistrelle were recorded in June.				
	July	56	78 - 88	88	10	Moderate
	August	70	78 - 94	94	44	Moderate to High
	September	49	78 - 88	97	42	Moderate

Potential Bat Roosts Within or Close to the Site

1.4.25   *Ecobat* analysis showed that activity was recorded within the species-specific emergence time for five monitoring locations. This is detailed in Table 7.3.15.

Table 7.3.15: Bat Activity Recorded Within the Species-Specific Emergence Time

Detector ID	Species/ Species Group	Nights Recorded[23]	Peak Count	Month of Peak Count
MS 4	Common pipistrelle	1	3	September
MS 4	*Myotis* species	2	1	August/ September
MS 5	Noctule	2	40	June
MS 5	*Myotis* species	2	1	September
MS 6	Common pipistrelle	6	1	July/ August/ September
MS 7	Common pipistrelle	1	5	August
MS 7	Noctule	4	30	May
MS 8	Common pipistrelle	9	5	July
MS 8	Soprano pipistrelle	5	3	July
MS 8	*Myotis* species	1	1	July
MS 9	Common pipistrelle	5	2	August
MS 9	Noctule	7	6	June
MS 10	Common pipistrelle	6	3	July
MS 10	Soprano pipistrelle	1	1	September
MS 10	Noctule	2	1	May/ June
MS 11	Common pipistrelle	10	9	August
MS 11	Soprano pipistrelle	1	1	August
MS 11	Noctule	2	1	May/ June

1.4.26   No activity was recorded within any species-specific emergence time at MS 1 to MS 3.

1.4.27   Based on the *Ecobat* analysis above, it is possible that roosts for common pipistrelle, soprano pipistrelle, *Myotis* species and noctule bat species may be present within close proximity to the Site.

Weather Conditions

1.4.28   Weather conditions are presented in Annex 3.

1.4.29   In the main, the 2020 survey periods were dry and warm, with temperatures falling below 8°C on seven nights during spring 2020 survey, three nights during summer 2020 survey and two nights during autumn 2020 survey.

1.4.30   Moderate to heavy rain fall was recorded on two nights during the spring 2020 survey, one night during the summer 2020 survey and two nights during the autumn 2020 survey.

1.4.31   Wind data was greater than 5 m/s on five nights during the spring 2020 survey and two nights during both the summer and autumn 2020 surveys.

1.4.32   Bats were recorded throughout all of these nights, with the exception of 27 July 2020 which recorded high winds throughout the night and therefore, has been excluded from analysis. Nights deemed unsuitable, yet still recorded bats have been included in the analysis.

1.5   Discussion and Conclusions

Desk Study

1.5.1   No statutory or non-statutory designated sites were identified within 10 km of the Site with bats as a qualifying interest.

1.5.2   The desk study identified the potential presence of common pipistrelle, soprano pipistrelle, pipistrelle species, Daubenton's bat, Natterer's bat and brown long-eared bat within proximity to the Site.

Field Surveys

Habitat Assessment

1.5.3   The habitats within the Site are considered to be of low habitat risk for bats, in accordance with criteria presented in the BCT guidelines (Collins, 2016).

Roosts

1.5.4   No structures or trees with the potential to support maternity or hibernation roosts were identified within a radius of at least 277.5 m (200 m plus the rotor length) of proposed turbine locations.

1.5.5   A small number of stone structures and trees were subject to a preliminary roost assessment however these were considered to support negligible or low suitability for roosting bats and therefore unlikely to support maternity or hibernation roosts.

1.5.6   The *Ecobat* tool identified the possible presence of roosts of common pipistrelle, soprano pipistrelle, *Myotis* species and noctule bat within proximity of the Site based on recording of activity at the Site within their species-specific emergence times.

Ground-level Static Surveys

1.5.7   Surveys identified the following species:

- Brown long-eared bat;
- Common pipistrelle;
- *Myotis* species;
- Noctule; and
- Soprano pipistrelle.

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[23] Nights recorded with bat activity within the species-specific emergence time

1.5.8 Common pipistrelle was the most frequently recorded species representing 64.1% of all recordings. Activity overall was considered to be moderate, with the species being recorded on 111 nights out of 312 and representing 27.4 passes per night for the survey period. When compared with activity at other sites (*Ecobat* reference range and percentiles) common pipistrelle activity was concluded to be moderate to high at the 74th percentile.

1.5.9 Soprano pipistrelle represented 21.4% of all recordings. Activity overall was considered to be low, with the species being recorded on 96 nights out of 312 and representing 9.1 passes per night for the survey period. When compared with activity at other sites (*Ecobat* reference range and percentiles) soprano pipistrelle activity was concluded to be moderate to high at the 64th percentile.

1.5.10 Noctule represented 11.6% of all recordings. Activity overall was considered to be low, with the species being recorded on 118 nights out of 312 and representing 5.0 passes per night for the survey period. When compared with activity at other sites (*Ecobat* reference range and percentiles), noctule activity was concluded to be low to moderate at the 38th percentile.

1.5.11 *Myotis* species bats represented 2.6% of all recordings. Activity overall was considered to be low, with the species being recorded on 83 nights out of 312 and representing 1.1 passes per night for the survey period. When compared with activity at other sites (*Ecobat* reference range and percentiles) Myotis bat activity was concluded to be low to moderate at the 38th percentile.

1.5.12 Brown long-eared bat activity was considered to be low with less than 1 bat pass recorded per night. When compared with activity at other sites (*Ecobat* reference range and percentiles) activity of brown long-eared bat was considered to be low.

Spatial Distribution of Bat Activity

1.5.13 Brown long-eared bat activity was recorded at seven of the detectors, with no activity at MS2, MS3, MS5 and MS7. The highest activity was at MS9 with low to moderate activity whilst the remaining detectors were low. The median pass rate (passes per hour, per night) for brown long-eared bat was less than one at all of the detectors.

1.5.14 Common pipistrelle activity was recorded at nine of the detectors, with no activity at MS2 and MS3. Highest activity was at MS7, MS8 and MS11 with high activity MS3, followed by MS4, MS5, MS6 and MS10 with moderate to high activity, then MS9 with moderate activity and MS1 with low to moderate activity. The median pass rate for common pipistrelle peaked at 15.7 for MS7, followed by 10 for MS11. The median pass rate for the remaining detectors was less than 5.

1.5.15 *Myotis* species activity was recorded at nine of the detectors, with no activity at MS2 and MS3. The highest activity was at MS4, MS7, MS8, MS9 and MS11 with moderate activity whilst the remaining detectors were low to moderate. The median pass rate for *Myotis* species was less than 1 at all of the detectors.

1.5.16 Noctule bat activity was recorded at ten of the detectors, with no activity at MS1. Highest activity was at MS7 with moderate to high activity, followed by MS9 with moderate activity. The remaining detectors had low and low to moderate activity levels. The median pass rate for noctule bats peaked at 3.2 for MS7, with the remaining detectors all being below 1.

1.5.17 Soprano pipistrelle activity was recorded at nine of the detectors, with no activity at MS2 and MS3. Highest activity was at MS7 and MS11 with high activity, followed by MS6 with moderate to high activity and MS4, MS8 and MS9 with moderate activity. The remaining detectors recorded low to moderate activity. The median pass rate for soprano pipistrelle peaked at 10.6 for MS7 and 7.5 for MS11 with MS6 peaking at 1.6 and the remaining detectors all being below 1.

1.5.18 Overall, bat activity was highest at the woodland locations, in particular MS11 where 29.88% of the total bat passes were recorded. These are likely to offer increased foraging value compared to other open monitoring locations (MS1, MS2 and MS3) where activity comprised less than 1% of the total bat passes.

Temporal Distribution of Bat Activity

1.5.19 Brown long-eared bat activity was not recorded between May and July 2020 and overall activity for August and September 2020 was low.

1.5.20 Common pipistrelle activity was not recorded in May and June 2020 and overall activity for July to September 2020 was moderate to high.

1.5.21 *Myotis* species activity was not recorded in May and June 2020 and overall activity for July 2020 was low whilst for August and September 2020 it was moderate.

1.5.22 Noctule was recorded every month, with overall activity for May and June 2020 being moderate and July to September 2020 being low.

1.5.23 Soprano pipistrelle was not recorded in May and June 2020. Overall activity in July and September 2020 was moderate and August 2020 was moderate to high.

1.5.24 Overall, activity was generally higher in the summer and autumn months with low activity consistently recorded in spring (with the exception of noctule).

Bat Activity Relative to Other Sites

1.5.25 On nights where brown long-eared bat was recorded, the level of activity most frequently represented low activity when compared against records from a similar date in a similar geographical location in *Ecobat*.

1.5.26 On nights where common pipistrelle was recorded, the level of activity most frequently represented moderate to high activity when compared against records from a similar date in a similar geographical location in *Ecobat*.

1.5.27 On nights where *Myotis* species was recorded, the level of activity most frequently represented moderate activity when compared against records from a similar date in a similar geographical location in *Ecobat*.

1.5.28 On nights where noctule was recorded, the level of activity most frequently represented low to moderate activity when compared against records from a similar date in a similar geographical location in *Ecobat*.

1.5.29 On nights where soprano pipistrelle was recorded, the level of activity most frequently represented moderate activity when compared against records from a similar date in a similar geographical location in *Ecobat*.

1.6 Assessment of the Potential Risks to Bats

Stage 1 – Initial Site Risk Assessment

1.6.1 In accordance with NatureScot guidance (SNH, 2019) an assessment of the potential risk level of the Proposed Development, has been undertaken based on a consideration of habitat and development-related features detailed in Table 7.3.16.

1.6.2 The values and classification criteria provided within Table 7.3.16, corresponding to Table 3a of NatureScot guidance (SNH, 2019) are intended to be taken as a guide, with habitat and development-related features at proposed wind farm sites rarely matching rigid descriptions. Professional judgement has therefore been applied to interpret and assign risk categories and conclude on the overall risk level for the Site.

1.6.3 The Site has been assessed as having an overall 'Site Risk' of 2, represent a Low/ Lowest Site Risk:
- The Site 'Habitat Risk' is classified as Low.
- The Site 'Project Size' is classified as being Medium, comprising a development of 11 turbines of up to 200 m tip height, with two other wind developments within 5 km comprising turbines >100 m in height.

Table 7.3.16: Stage 1 - Initial Site Risk Assessment

Site Risk Level (1-5)	Project Size			
		Small	Medium	Large
Habitat Risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5
Green (1-2) = low/ lowest site risk. Amber (3) = medium site risk. Red (4-5) = high/ highest site risk.				

Habitat Risk	Description
Low	Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats. Isolated site not connected to the wider landscape by prominent linear features.
Moderate	Buildings, trees or other structures with moderate-high potential as roost sites on or near the Site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as tree lines and streams.
High	Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the Site, and/ or confirmed roosts present close to or on the Site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. At/ near edge of range and/ or on an important flyway. Close to key roost and/ or swarming site.

Project Size	Description
Small	Small scale development (≤10 turbines). No other wind energy developments within 10 km. Comprising turbines <50 m in height.
Medium	Larger developments (between 10 and 40 turbines). May have some other wind developments within 5 km. Comprising turbines 50-100 m in height.
Large	Largest developments (>40 turbines) with other wind energy developments within 5 km. Comprising turbines >100 m in height.

Stage 2 – Overall Risk Assessment

1.6.4   Stage 2 of the two-stage process detailed within NatureScot guidance (SNH, 2019) has been completed to provide an overall assessment or risk, by considering the conclusions of Stage 1 (above) in relation to relative levels of bat activity obtained through using the *Ecobat* tool (Box 1) and considering the vulnerability of species recorded, at the population level.

1.6.5   In accordance with NatureScot guidance (SNH, 2019), Stage 2 should be carried out separately for all high collision risk species recorded, which includes the following species recorded during bat activity surveys for the Proposed Development:

- noctule;
- common pipistrelle; and
- soprano pipistrelle.

1.6.6   In order to derive an 'Overall Risk Assessment' the determined Bat Activity Category derived from the *Ecobat* Tool Output Report is compared against the Site Risk Level (Stage 1) using the matrix presented in Table 7.3.17 (based on Table 3b in SNH (2019)) to determine the level of overall risk.

Table 7.3.17: Overall Risk Category

Site Risk Level	Ecobat Activity Category					
	Nil	Low	Low-Moderate	Moderate	Moderate-High	High
Green = Low, Amber = Medium, Red = High.						
Lowest	0	1	2	3	4	5
Low	0	2	4	6	8	10
Medium	0	3	6	9	12	15
High	0	4	8	12	15	18
Highest	0	5	10	15	20	25

1.6.7   The calculated 'Overall Risk Assessment' per species, both temporally and spatially is presented in Table 7.3.18. The values as presented in the matrix in Table 7.3.17 are presented but the Overall Risk Category provided is concluded on the basis of the determined *Ecobat* conclusion and professional judgement on the basis of all available information and in recognition of the limitations of *Ecobat*.

1.6.8   As outlined, the *Ecobat* tool is in its infancy and given current limitations in available bat survey data on the database, definitive bat activity for regions are not generated and bat activity representations are instead indicative for each region. Based on this our results show that overall, there is a low/ medium likelihood of the Proposed Development resulting in significant impact on bats. Data collected indicates low activity levels based on bat passes per hour and the *Ecobat* tool indicated bat activity may be slightly increased to low/ medium.

1.6.9   In summary, the Overall Risk Assessment for common and soprano pipistrelle is considered to fall under "Moderate Site Risk", *Myotis* under "Low to Moderate" and noctule and brown long-eared are considered to fall under "Low Site Risk".

1.6.10   In recognition of the limitations associated with the *Ecobat* tool, the output of Stage 2 should be treated with caution.

Table 7.3.18: Overall Risk Assessment (Table 3b from SNH (2019) guidance)

Key: Green = Low, Amber = Medium, Red = High.

Species/ Species Group	I.D	Median Percentile[24]	Percentile Category	Overall Risk Assessment (Stage 2)	Species/ Species Group	Month	Median Percentile	Percentile Category	Overall Risk Assessment (Stage 2)
Common pipistrelle	MS 1	26	Low to Moderate	Low (4)	Common pipistrelle	July	76	Moderate to High	Medium (8)
	MS 4	61	Moderate to High	Medium (8)		August	78	Moderate to High	Medium (8)
	MS 5	64	Moderate to High	Medium (8)		September	72	Moderate to High	Medium (8)
	MS 6	78	Moderate to High	Medium (8)	Soprano pipistrelle	July	56	Moderate	Medium (6)
	MS 7	92	High	Medium (10)		August	70	Moderate to High	Medium (8)
	MS 8	81	High	Medium (10)		September	49	Moderate	Medium (6)
	MS 9	51	Moderate	Medium (6)	Noctule	May	51	Moderate	Medium (6)
	MS 10	72	Moderate to High	Medium (8)		June	56	Moderate	Medium (6)
	MS 11	89	High	Medium (10)		July	1	Low	Low (2)
Noctule	MS 2	26	Low to Moderate	Low (4)		August	1	Low	Low (2)
	MS 3	20	Low	Low (2)		September	1	Low	Low (2)
	MS 4	1	Low	Low (2)	Myotis species	July	1	Low	Low (2)
	MS 5	26	Low to Moderate	Low (4)		August	46	Moderate	Medium (6)
	MS 6	26	Low to Moderate	Low (4)		September	42	Moderate	Medium (6)
	MS 7	75	Moderate to High	Medium (8)	Brown long-eared	August	1	Low	Low (2)
	MS 8	1	Low	Low (2)		September	1	Low	Low (2)
	MS 9	56	Moderate	Medium (6)					
	MS 10	26	Low to Moderate	Low (4)					
	MS 11	26	Low to Moderate	Low (4)					
Soprano pipistrelle	MS 1	26	Low to Moderate	Low (4)					
	MS 4	51	Moderate	Medium (6)					
	MS 5	38	Low to Moderate	Low (4)					
	MS 6	67	Moderate to High	Medium (8)					
	MS 7	90	High	Medium (10)					
	MS 8	59	Moderate	Medium (6)					
	MS 9	55	Moderate	Medium (6)					
	MS 10	38	Low to Moderate	Low (4)					
	MS 11	85	High	Medium (10)					
Myotis species	MS 1	38	Low to Moderate	Low (4)					
	MS 4	59	Moderate	Medium (6)					
	MS 5	26	Low to Moderate	Low (4)					
	MS 6	38	Low to Moderate	Low (4)					
	MS 7	46	Moderate	Medium (6)					
	MS 8	46	Moderate	Medium (6)					
	MS 9	46	Moderate	Medium (6)					
	MS 10	38	Low to Moderate	Low (4)					
	MS 11	51	Moderate	Medium (6)					
Brown long-eared	MS 1	1	Low	Low (2)					
	MS 4	1	Low	Low (2)					
	MS 6	1	Low	Low (2)					
	MS 8	14	Low	Low (2)					
	MS 9	26	Low to Moderate	Low (4)					
	MS 10	1	Low	Low (2)					
	MS 11	1	Low	Low (2)					

Annex 1: Scientific Names

Table A1.1 below provides full scientific names of species referenced within the report.

Table A1.1: Scientific Names	
Common Name	**Scientific Name**
Common pipistrelle	*Pipistrellus pipistrellus*
Soprano pipistrelle	*Pipistrellus pgymaeus*
Brown long-eared bat	*Plecotus auritus*
Noctule	*Nyctalus noctula*
Barbastelle	*Barbastella barbastellus*
Daubenton's bat	*Myotis daubentonii*
Natterer's bat	*Myotis nattereri*
Myotis species	*Myotis spp.*

Annex 2: Bat Activity Survey Effort

Table A2.1 below provides further details of bat activity surveys.

Table A2.1: Bat Activity Survey Effort				
Monitoring Station Ref.	**Monitoring Station Grid Ref.**	**Date Start**	**Date End**	**No. Nights**
MS 1	NJ3722333319	20/05/2020	11/06/2020	22
MS 2	NJ3828933442	20/05/2020	11/06/2020	22
MS 3	NJ3767533938	20/05/2020	11/06/2020	22
MS 4	NJ3778734574	20/05/2020	11/06/2020	22
MS 5	NJ3859034552	20/05/2020	11/06/2020	22
MS 6	NJ3916534803	20/05/2020	11/06/2020	22
MS 7	NJ3851235127	20/05/2020	11/06/2020	22
MS 8	NJ3912035406	20/05/2020	11/06/2020	22
MS 9	NJ3977935350	20/05/2020	11/06/2020	22
MS 10	NJ3947735969	20/05/2020	11/06/2020	22
MS 11	NJ4007436354	20/05/2020	11/06/2020	22
MS 1	NJ3722333319	13/07/2020	06/08/2020	24
MS 2	NJ3828933442	13/07/2020	06/08/2020	24
MS 3	NJ3767533938	13/07/2020	06/08/2020	24
MS 4	NJ3778734574	13/07/2020	06/08/2020	24
MS 5	NJ3859034552	13/07/2020	06/08/2020	24
MS 6	NJ3916534803	13/07/2020	06/08/2020	24
MS 7	NJ3851235127	13/07/2020	06/08/2020	24
MS 8	NJ3912035406	13/07/2020	06/08/2020	24
MS 9	NJ3977935350	13/07/2020	06/08/2020	24
MS 10	NJ3947735969	13/07/2020	06/08/2020	24
MS 11	NJ4007436354	13/07/2020	06/08/2020	24
MS 1	NJ3722333319	27/08/2020	10/09/2020	14
MS 2	NJ3828933442	27/08/2020	10/09/2020	14
MS 3	NJ3767533938	27/08/2020	10/09/2020	14
MS 4	NJ3778734574	27/08/2020	10/09/2020	14
MS 5	NJ3859034552	27/08/2020	10/09/2020	14
MS 6	NJ3916534803	27/08/2020	10/09/2020	14
MS 7	NJ3851235127	27/08/2020	10/09/2020	14
MS 8	NJ3912035406	27/08/2020	10/09/2020	14
MS 9	NJ3977935350	27/08/2020	10/09/2020	14
MS 10	NJ3947735969	27/08/2020	10/09/2020	14
MS 11	NJ4007436354	27/08/2020	10/09/2020	14

Annex 3: Weather Conditions

Table A3.1 below provides weather conditions for Bat Activity Survey periods. Red text indicates sub-optimal weather conditions.

Table A3.1: Weather Conditions.			
Date	**Temp at Dusk (°C)**	**Rainfall**	**Maximum Wind Speed (m/s)**
20/05/2020	15	0	2.78
21/05/2020	7	0	3.33
22/05/2020	8	0	3.61
23/05/2020	10	0	10.83
24/05/2020	3	0	3.06
25/05/2020	12	0	1.39
26/05/2020	8	0.1	2.50
27/05/2020	10	0	2.50
28/05/2020	12	0	2.50
29/05/2020	18	0	2.50
30/05/2020	11	0	6.11
31/05/2020	13	0	3.61
01/06/2020	13	0.2	2.22
02/06/2020	9	2.7	5.83
03/06/2020	5	0.1	3.61
04/06/2020	5	0.3	5.00
05/06/2020	-3	1.8	10.28
06/06/2020	9	3.7	7.78
07/06/2020	6	0.1	4.72
08/06/2020	4	0	2.22
09/06/2020	9	0.5	0.56
10/06/2020	0	0.2	5.56
11/06/2020	9	0	3.33
13/07/2020	10	0.1	3.06
14/07/2020	10	0.1	4.72
15/07/2020	11	0.1	2.78
16/07/2020	8	0	3.33
17/07/2020	15	0	2.22
18/07/2020	11	0.2	2.50
19/07/2020	9	0	4.17
20/07/2020	9	0.2	4.72
21/07/2020	9	0.4	1.11
22/07/2020	9	0.1	1.67
23/07/2020	11	1.1	1.94
24/07/2020	12	0.3	1.94
26/07/2020	12	0	4.44
27/07/2020	13	0.5	2.22
28/07/2020	0	0.3	11.39
29/07/2020	9	0	2.78
30/07/2020	12	0.1	2.50
31/07/2020	16	0.7	3.61
01/08/2020	12	0.4	3.06
02/08/2020	9	0	3.89
03/08/2020	9	0	2.50
04/08/2020	3	5	4.44
05/08/2020	14	0.2	0.83

Table A3.1: Weather Conditions.

Date	Temp at Dusk (ºC)	Rainfall	Maximum Wind Speed (m/s)
06/08/2020	15	0	3.89
27/08/2020	9	1	1.94
28/08/2020	9	3.6	4.72
29/08/2020	6	0.8	2.78
30/08/2020	9	0.4	1.39
31/08/2020	11	0	3.33
01/09/2020	11	0	3.33
02/09/2020	9	1.2	4.17
03/09/2020	9	0	4.17
04/09/2020	9	0	6.11
05/09/2020	7	1.2	4.72
06/09/2020	6	1.6	2.50
07/09/2020	12	0.2	5.00
08/09/2020	11	14.2	1.11
09/09/2020	8	2.4	6.39
10/09/2020	9	0	3.61

Annex 4: Existing Bat Species Records — NESBReC

Table A4.1 below provides further details of bat records provided by NESBReC from within 10 km of the Site.

Table A4.1: Existing Bat Species Records — NESBReC.					
Species	**Date**	**Location**	**Sample Spatial Reference**	**Abundances**	**Comment**
Bats	30/10/2013	Auldyne	NJ408396	Abundance - 2 Count	At garden shed
Bats	27/11/2013	Near Glass school	NJ428402	Abundance - 3 Count	Foraging
Bats	06/03/2013	Clashindarroch	NJ479372	Abundance - + Count	
Daubenton's Bat	21/06/2015	Bridgehaugh	NJ341357	Abundance - + Count	Passive bat detector
Daubenton's Bat	20/06/2015	Bridgehaugh	NJ341357	Abundance - + Count	Passive bat detector
Daubenton's Bat	21/05/2018	Cabrach	NJ386269	Abundance - 1 Count	Recorded on an Echometer touch. Sonograms verified
Daubenton's Bat	06/06/2014	Parkhaugh, Glass	NJ425286	Abundance - 1+ Count	Using static recorder and sound analysis
Natterer's Bat	21/05/2018	Cabrach	NJ386269	Abundance - 1 Count	Recorded on an Echometer touch. Sonograms verified
Common Pipistrelle	23/06/2015	Tom Liath	NJ284337	Abundance - + Count	Passive bat detector
Common Pipistrelle	22/06/2015	Tom Liath	NJ284337	Abundance - + Count	Passive bat detector
Common Pipistrelle	21/06/2015	Tom Liath	NJ284337	Abundance - + Count	Passive bat detector
Pipistrelle	07/08/2016	Dufftown	NJ324389		4 roosting
Common Pipistrelle	27/08/2015	Mortlach Distillery Warehouse 1 and 2	NJ327397	Abundance - + Count	EMT bat detector + Sonogram analysis
Common Pipistrelle	21/06/2015	Bridgehaugh	NJ341357	Abundance - + Count	Passive bat detector
Common Pipistrelle	20/06/2015	Bridgehaugh	NJ341357	Abundance - + Count	Passive bat detector
Common Pipistrelle	21/05/2018	Cabrach	NJ386269	Abundance - 5 Count	Recorded on an Echometer touch. Sonograms verified
Common Pipistrelle	18/09/2014	Hillockhead, Glass	NJ403420	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	18/09/2014	Hillockhead, Glass	NJ403420	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	17/09/2014	Hillockhead, Glass	NJ403420	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	17/09/2014	Hillockhead, Glass	NJ403420	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	22/09/2014	Hillockhead, Glass	NJ403420	Abundance - 1+ Count	Using static recorder and sound analysis
Common Pipistrelle	14/09/2014	Hillockhead, Glass	NJ403420	Abundance - 1+ Count	Using static recorder and sound analysis
Common Pipistrelle	10/09/2014	Beldorney, Huntly	NJ422369	Abundance - + Count	Roosting; males
Common Pipistrelle	11/06/2014	Parkhaugh, Glass	NJ425286	Abundance - 1+ Count	Using static recorder and sound analysis
Common Pipistrelle	10/06/2014	Parkhaugh, Glass	NJ425286	Abundance - 1+ Count	Using static recorder and sound analysis
Common Pipistrelle	06/06/2014	Parkhaugh, Glass	NJ425286	Abundance - 1+ Count	Using static recorder and sound analysis
Common Pipistrelle	21/09/2014	Parkhaugh, Glass	NJ425386	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	21/09/2014	Parkhaugh, Glass	NJ425386	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	21/09/2014	Parkhaugh, Glass	NJ425386	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	20/09/2014	Parkhaugh, Glass	NJ425386	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	20/09/2014	Parkhaugh, Glass	NJ425386	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	19/09/2014	Parkhaugh, Glass	NJ425386	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	19/09/2014	Parkhaugh, Glass	NJ425386	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	04/09/2015	Glass, Huntly	NJ427401	Abundance - 2 Count	Roosting; 2 males
Common Pipistrelle	09/08/2015	Glass, Huntly	NJ427401	Abundance - 2 Count	Roosting; 2 males
Common Pipistrelle	01/06/2011	Market Hill, Glass	NJ428401	Abundance - + Count	Feeding

Table A4.1: Existing Bat Species Records – NESBReC.

Species	Date	Location	Sample Spatial Reference	Abundances	Comment
Common Pipistrelle	16/06/2014	Inside stable, Sunnybrae	NJ428402	Abundance - 1+ Count	Using static recorder and sound analysis
Common Pipistrelle	22/09/2014	Sunnybrae, Glass	NJ428402	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual. Inside stable
Common Pipistrelle	22/09/2014	Inside stable, Sunnybrae	NJ428402	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	15/09/2014	Inside stable, Sunnybrae	NJ428402	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	14/09/2014	Sunnybrae, Glass	NJ428402	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual. Outside stable
Common Pipistrelle	03/06/2014	Outside stable, Sunnybrae	NJ428402	Abundance - 1+ Count	Using static recorder and sound analysis
Common Pipistrelle	12/05/2014	Sunnybrae, Glass	NJ428402	Abundance - 1+ Count	Using static recorder and sound analysis
Common Pipistrelle	11/05/2014	Sunnybrae, Glass	NJ428402	Abundance - 1+ Count	Using static recorder and sound analysis
Common Pipistrelle	14/09/2014	Outside stable, Sunnybrae	NJ428402	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	18/06/2014	Sunnybrae, Glass	NJ428402	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	18/06/2014	Sunnybrae, Glass	NJ428402	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	17/06/2014	Sunnybrae, Glass	NJ428402	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	17/06/2014	Sunnybrae, Glass	NJ428402	Abundance - 1 Count	Using static recorder and sound analysis. Minimum of 1 individual
Common Pipistrelle	24/06/2015	Sunnybrae, Glass	NJ428403	Abundance - + Count	Passive bat detector
Common Pipistrelle	01/08/2015	Sunnybrae, Glass	NJ428403	Abundance - + Count	Foraging
Common Pipistrelle	17/05/2013	Glebe Cottage, Glass	NJ433399	Abundance - + Count	Foraging
Soprano Pipistrelle	22/06/2015	Tom Liath	NJ284337	Abundance - + Count	Passive bat detector
Soprano Pipistrelle	21/06/2015	Tom Liath	NJ284337	Abundance - + Count	Passive bat detector
Soprano Pipistrelle	07/08/2016	Dufftown	NJ324389		Foraging
Soprano Pipistrelle	27/08/2015	Mortlach Distillery Warehouse 1 and 2	NJ327397	Abundance - + Count	EMT bat detector + Sonogram analysis
Soprano Pipistrelle	21/06/2015	Bridgehaugh	NJ341357	Abundance - + Count	Passive bat detector
Soprano Pipistrelle	20/06/2015	Bridgehaugh	NJ341357	Abundance - + Count	Passive bat detector
Soprano Pipistrelle	06/10/2014	Bridge near Torniechelt	NJ3789728845	Abundance - + Count	Passive bat detector
Soprano Pipistrelle	05/10/2014	Bridge near Torniechelt	NJ3789728845	Abundance - + Count	Passive bat detector
Soprano Pipistrelle	21/05/2018	Cabrach	NJ386269	Abundance - 1 Count	Recorded on an Echometer touch. Sonograms verified
Soprano Pipistrelle	22/09/2014	Hillockhead, Glass	NJ403420	Abundance - 1+ Count	Using static recorder and sound analysis
Soprano Pipistrelle	15/09/2014	Hillockhead, Glass	NJ403420	Abundance - 1+ Count	Using static recorder and sound analysis
Soprano Pipistrelle	10/09/2014	Beldorney, Huntly	NJ422369	Abundance - + Count	Roosting; males
Soprano Pipistrelle	11/06/2014	Parkhaugh, Glass	NJ425286	Abundance - 1+ Count	Using static recorder and sound analysis
Soprano Pipistrelle	13/06/2014	Parkhaugh, Glass	NJ425286	Abundance - 1+ Count	Using static recorder and sound analysis
Soprano Pipistrelle	12/06/2014	Parkhaugh, Glass	NJ425286	Abundance - 1+ Count	Using static recorder and sound analysis
Soprano Pipistrelle	04/09/2015	Glass, Huntly	NJ427401	Abundance - + Count	Roosting; 1 male
Soprano Pipistrelle	09/08/2015	Glass, Huntly	NJ427401	Abundance - + Count	Foraging
Soprano Pipistrelle	01/06/2011	Market Hill, Glass	NJ428401	Abundance - + Count	Feeding
Soprano Pipistrelle	02/10/2014	Sunnybrae, Glass	NJ428402	Abundance - 1+ Count	Using static recorder and sound analysis
Soprano Pipistrelle	01/10/2014	Sunnybrae, Glass	NJ428402	Abundance - 1+ Count	Using static recorder and sound analysis
Soprano Pipistrelle	15/05/2014	Inside stable, Sunnybrae	NJ428402	Abundance - 1+ Count	Using static recorder and sound analysis
Soprano Pipistrelle	14/05/2014	Inside stable, Sunnybrae	NJ428402	Abundance - 1+ Count	Using static recorder and sound analysis
Soprano Pipistrelle	10/06/2014	Outside stable, Sunnybrae	NJ428402	Abundance - 1+ Count	Using static recorder and sound analysis

Table A4.1: Existing Bat Species Records – NESBReC.

Species	Date	Location	Sample Spatial Reference	Abundances	Comment
Soprano Pipistrelle	24/06/2015	Sunnybrae, Glass	NJ428403	Abundance - + Count	Passive bat detector
Soprano Pipistrelle	01/08/2015	Sunnybrae, Glass	NJ428403	Abundance - + Count	Roosting
Soprano Pipistrelle	17/05/2013	Glebe Cottage, Glass	NJ433399	Abundance - + Count	Foraging
Brown Long-eared Bat	04/09/2015	Glass, Huntly	NJ427401	Abundance - + Count	Foraging
Brown Long-eared Bat	01/06/2011	Market Hill, Glass	NJ428401	Abundance - + Count	Feeding
Brown Long-eared Bat	01/08/2015	Sunnybrae, Glass	NJ428403	Abundance - + Count	Roosting

Annex 5: Photographic Plates

Table A5.1 below provides photographs from the Site.

Table A5.1: Photographic plates				
Plate 1 – S 1: Road Bridge at NJ 34076 35704	Plate 2 – S 2:Ruin at NJ 37791 31376	Plate 3 – S 3: Road Bridge at NJ 40156 34664	Plate 4 – S 4: Ruin at NJ33164 36693	Plate 5 – S 5: Derelict House at NJ 37413 31687
Plate 6 – S 6: Road Bridge at NJ 38621 31501	Plate 7 – S 7: Ruin at NJ 41013 35560	Plate 8 – S 8: Ruin at NJ 40711 36530	Plate 9 – S 9: Derelict House at NJ 40431 37330	Plate 10 – S 10: Derelict House at NJ 40789 36925
Plate 11 – S 11: Derelict House at NJ 40620 37170	Plate 12 – S 12: Derelict House at NJ 38817 37526	Plate 13 – S 13: Derelict Barns at NJ 39301 32712	Plate 14 – S 14: Barn near Ballochford Farm at NJ36038 34085	Plate 15 – S 15 and S 16: Stone Ruin with Nearby Beech Trees at NJ38239 32047
Plate 16 – S 17: Ruined Stone Cottage at NJ37765 32861	Plate 17 – S 18: Mature Ash Trees at NJ38620 31509			

Annex 6: Ecobat Tool Output Report

This report was produced free of charge by the Mammal Society to support evidence-based conservation of bats.

The following analyses are based on data supplied by the user to the Mammal Society's Ecobat website. The outputs are designed to assist decision-making, but do not replace expert interpretation by the user. The creation of the Ecobat tool was supported by the Natural Environment Research Council (NERC).

Bat Activity Analysis

Site Name: Craig Watch

Author: Andrew Hulme

27/08/2021

Summary

Bats were detected on **58** nights between **2020-05-21** and **2020-09-09**, using **11** static bat detectors. Throughout this period **5** species were recorded. **Table 1.** Detectors were placed at the following locations:

Detector ID	Latitude	Longitude
LOC 8	57.40545	-3.017440
LOC 11	57.41327	-2.998946
LOC 6	57.39948	-3.013847
LOC 1	57.38588	-3.047190
LOC 10	57.41112	-3.009291
LOC 9	57.40386	-3.003649
LOC 4	57.39704	-3.025044
LOC 5	57.38727	-3.028997
LOC 7	57.40140	-3.024384
LOC 2	57.38954	-3.038094
LOC 3	57.39738	-3.036768

Survey Nights

**Table 2.** The number of nights that bats were detected on each recorder. This is not the same as the number of nights that detectors were active if there were nights when no bats were detected.

Detector ID	No. of nights
LOC 1	13
LOC 10	33
LOC 11	30
LOC 2	3
LOC 3	2
LOC 4	12
LOC 5	17
LOC 6	18
LOC 7	25
LOC 8	22
LOC 9	26

Survey Nights

Figure 1. Horizontal bars show nights when acoustic detectors recorded bats.
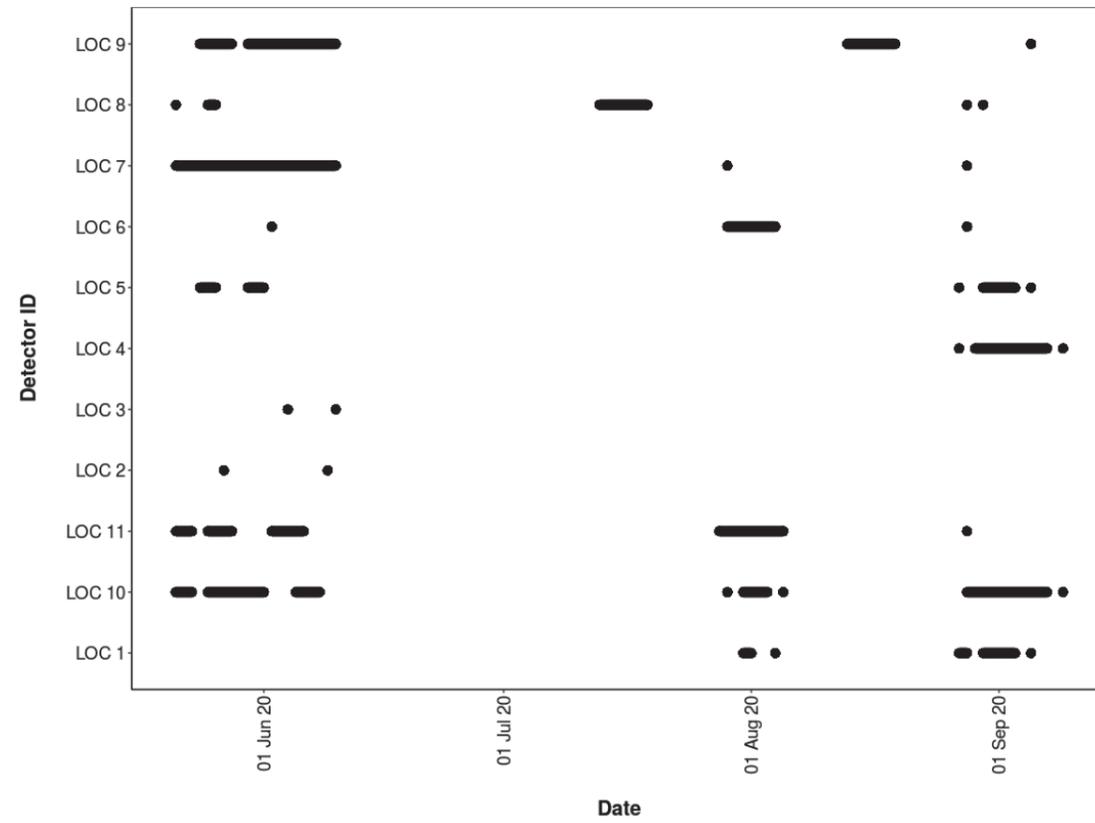
PART 1: Percentiles Analysis

This first part of the analysis looks at the relative activity levels of the bats you recorded. We take your value for the total bat passes each night for each species, and compare this to the values in our reference database. We tell you what percentile your data falls at, and therefore what the relative activity level is. For example, if the reference database has values of 5, 10, 15, 20 and you submit a value of 18, this will be the 80th percentile, and be classed as high activity.

The reference range dataset was stratified to include:

- Only records from within 30 days of the survey date.

- Only records from within 200 km radius of the survey location.

PER DETECTOR

Table 3. Summary table showing the number of nights recorded bat activity fell into each activity band for each species.

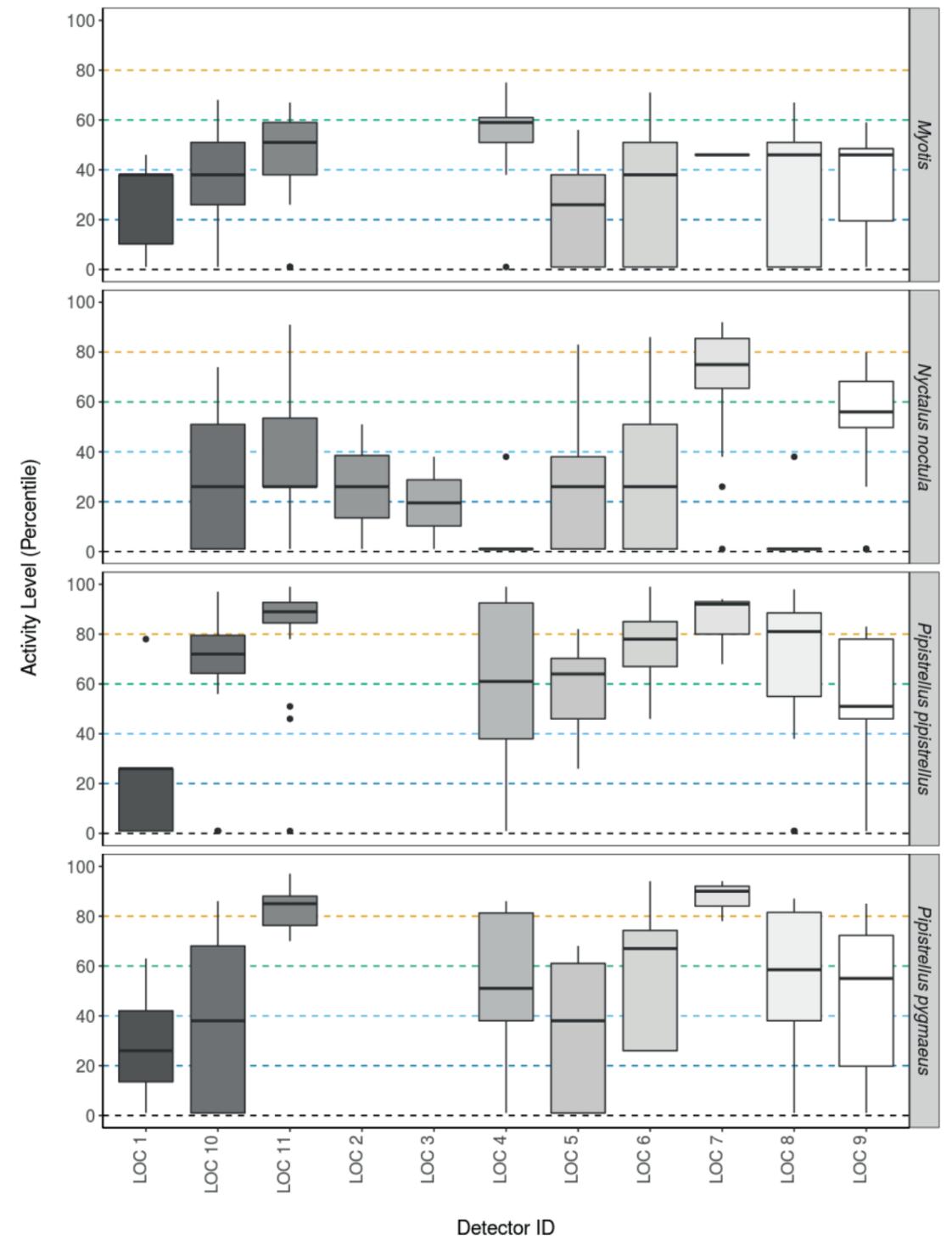| Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/High Activity	Nights of Moderate Activity	Nights of Low/Moderate Activity	Nights of Low Activity
LOC 1	Myotis	0	0	1	3	2
LOC 1	Pipistrellus pipistrellus	0	1	0	4	4
LOC 1	Pipistrellus pygmaeus	0	1	1	3	2
LOC 1	Plecotus auritus	0	0	0	0	1
LOC 10	Myotis	0	2	2	3	2
LOC 10	Nyctalus noctula	0	3	3	5	6
LOC 10	Pipistrellus pipistrellus	4	8	1	0	3
LOC 10	Pipistrellus pygmaeus	2	3	0	4	4
LOC 10	Plecotus auritus	0	0	0	1	3
LOC 11	Myotis	0	2	8	4	3
LOC 11	Nyctalus noctula	1	2	4	12	3
LOC 11	Pipistrellus pipistrellus	14	1	2	0	1
LOC 11	Pipistrellus pygmaeus	10	6	0	0	0
LOC 11	Plecotus auritus	0	0	0	2	3
LOC 2	Nyctalus noctula	0	0	1	1	1
LOC 3	Nyctalus noctula	0	0	0	1	1
LOC 4	Myotis	0	3	4	1	1
LOC 4	Nyctalus noctula	0	0	0	1	4
LOC 4	Pipistrellus pipistrellus	6	0	0	4	2
LOC 4	Pipistrellus pygmaeus	3	1	2	2	2
LOC 4	Plecotus auritus	0	0	0	0	5
LOC 5	Myotis	0	0	2	4	4
LOC 5	Nyctalus noctula	1	1	0	3	4
LOC 5	Pipistrellus pipistrellus	1	4	2	1	0
LOC 5	Pipistrellus pygmaeus	0	3	0	3	3
LOC 6	Myotis	0	1	4	2	4
LOC 6	Nyctalus noctula	1	0	2	2	4
LOC 6	Pipistrellus pipistrellus	8	7		0	0
LOC 6	Pipistrellus pygmaeus	3	6	1	6	0
LOC 6	Plecotus auritus	0	0	0	0	3
LOC 7	Myotis	0	0	1	0	0
LOC 7	Nyctalus noctula	11	8	1	2	1
LOC 7	Pipistrellus pipistrellus	2	1	0	0	0
LOC 7	Pipistrellus pygmaeus	2	1	0	0	0
LOC 8	Myotis	0	1	6	2	4
LOC 8	Nyctalus noctula	0	0	0	1	7
LOC 8	Pipistrellus pipistrellus	10	3	3	1	2
LOC 8	Pipistrellus pygmaeus	4	3	2	3	2
LOC 8	Plecotus auritus	0	0	0	1	1
LOC 9	Myotis	0	0	4	1	2
LOC 9	Nyctalus noctula	0	8	8	1	3
LOC 9	Pipistrellus pipistrellus	1	3	3	1	1
LOC 9	Pipistrellus pygmaeus	1	3	1	1	2
LOC 9	Plecotus auritus	0	0	0	3	1

Table 4. Summary table showing key metrics for each species recorded. The reference range is the number of nights for each species that your data were compared to. We recommend a Reference Range of 200+ to be confident in the relative activity level.

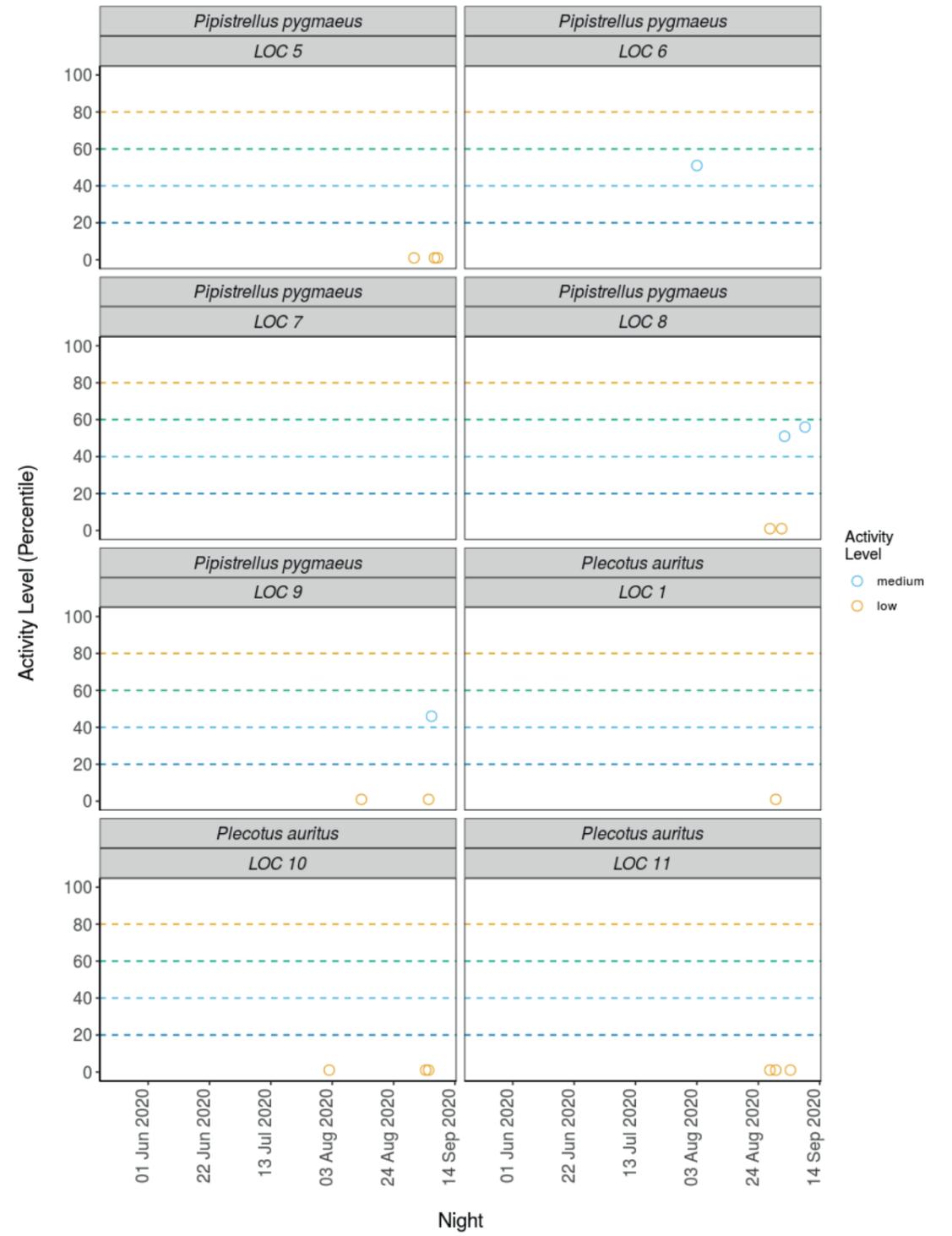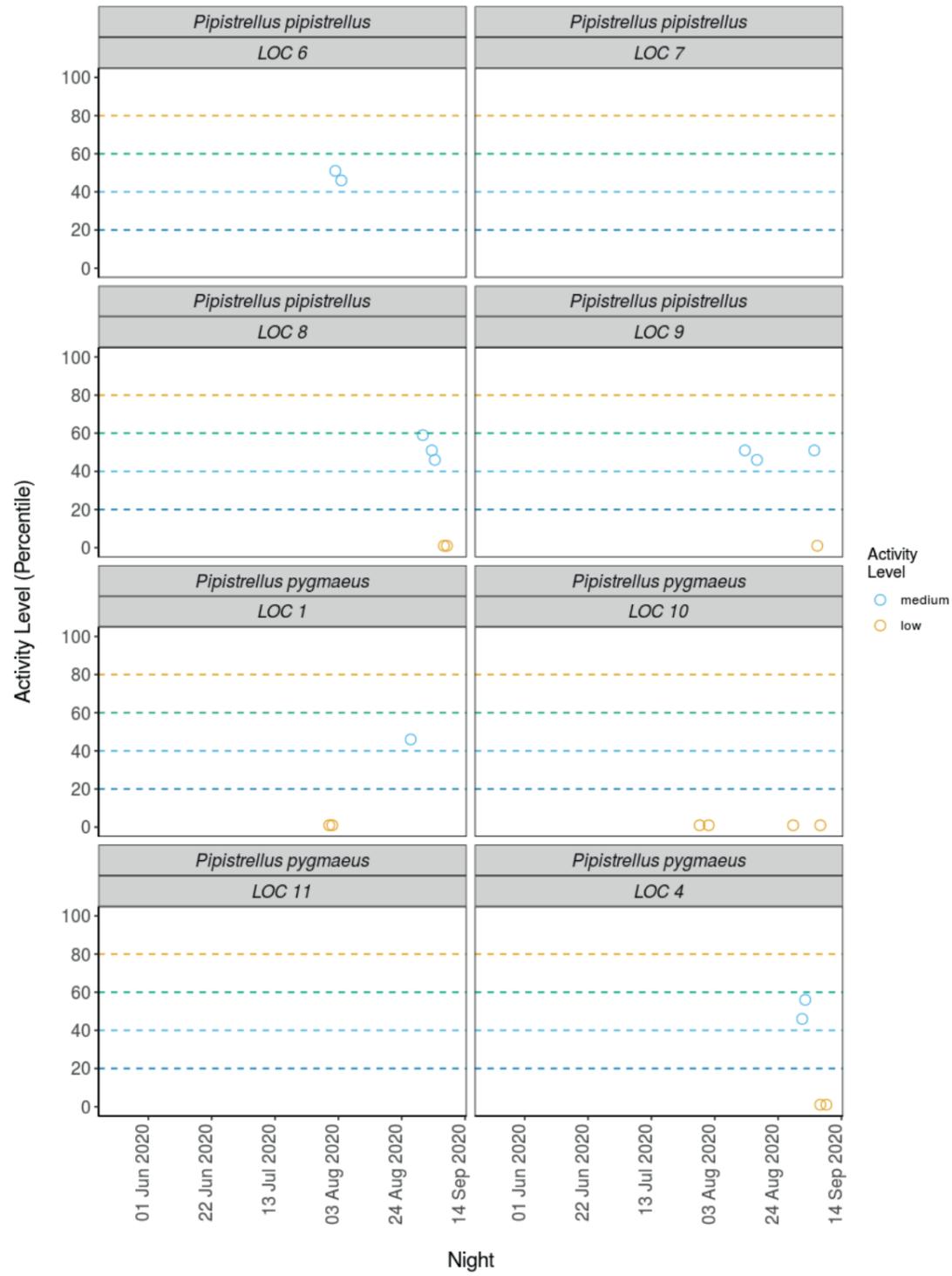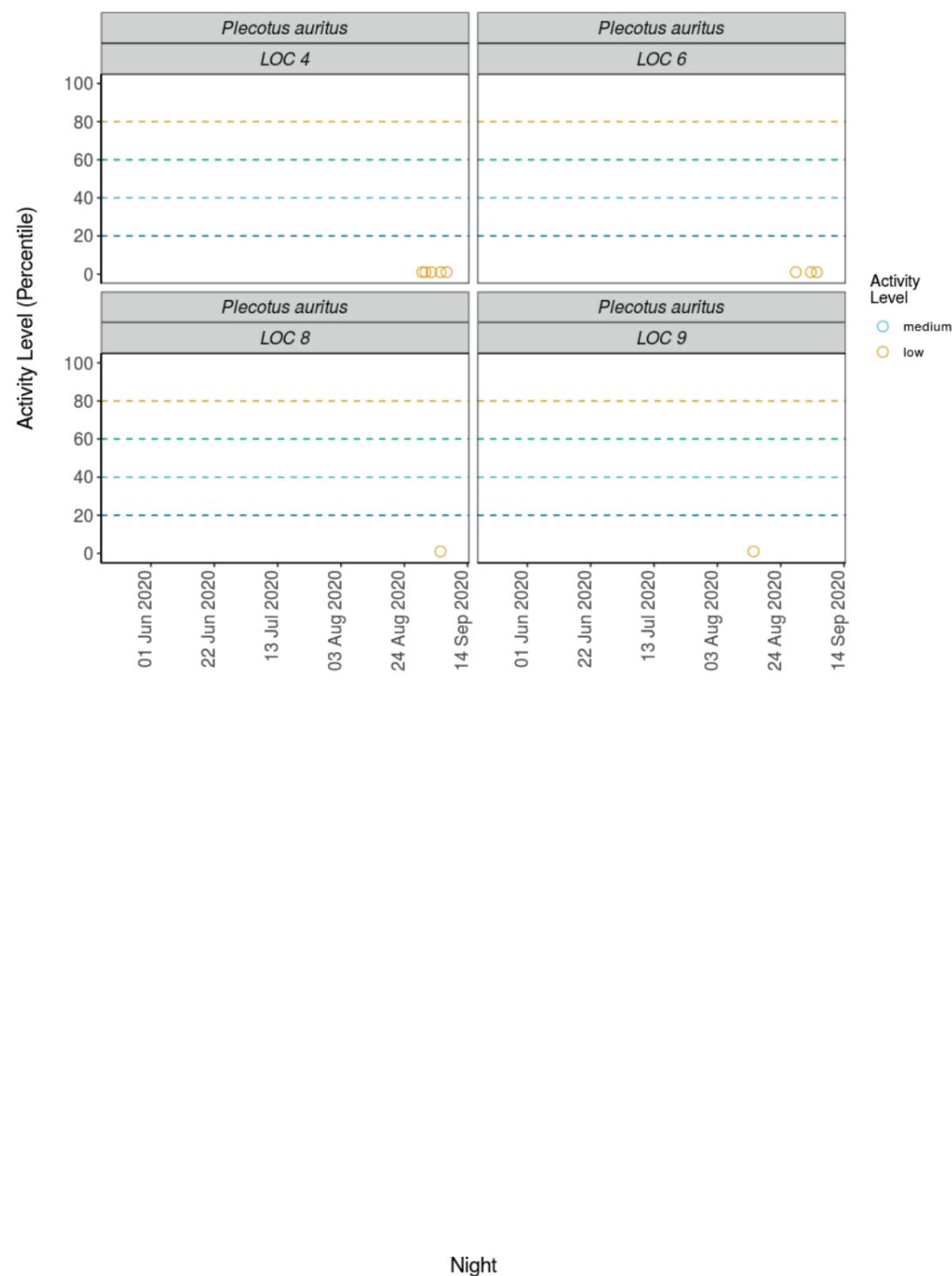| Detector ID	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
LOC 1	*Myotis*	38	1 - 42	46	6	230
LOC 1	*Pipistrellus pipistrellus*	26	1 - 39.5	78	9	1208
LOC 1	*Pipistrellus pygmaeus*	26	13.5 - 46	63	7	558
LOC 1	*Plecotus auritus*	1	0	1	1	31
LOC 10	*Myotis*	38	13.5 - 57.5	68	9	230
LOC 10	*Nyctalus noctula*	26	13.5 - 43.5	74	17	169
LOC 10	*Pipistrellus pipistrellus*	72	38.5 - 82	97	16	1208
LOC 10	*Pipistrellus pygmaeus*	38	19.5 - 62	86	13	558
LOC 10	*Plecotus auritus*	1	1 - 1	26	4	31
LOC 11	*Myotis*	51	30 - 55	67	17	230
LOC 11	*Nyctalus noctula*	26	26 - 47	91	22	169
LOC 11	*Pipistrellus pipistrellus*	89	70.5 - 92	99	18	1208
LOC 11	*Pipistrellus pygmaeus*	85	78 - 88	97	16	558
LOC 11	*Plecotus auritus*	1	1 - 19.5	38	5	31
LOC 2	*Nyctalus noctula*	26	1 - 51	51	3	169
LOC 3	*Nyctalus noctula*	20	19.5 - 19.5	38	2	169
LOC 4	*Myotis*	59	30 - 67	75	9	230
LOC 4	*Nyctalus noctula*	1	1 - 1	38	5	169
LOC 4	*Pipistrellus pipistrellus*	61	38 - 91	99	12	1208
LOC 4	*Pipistrellus pygmaeus*	51	23.5 - 78.5	86	10	558
LOC 4	*Plecotus auritus*	1	1 - 1	1	5	31
LOC 5	*Myotis*	26	1 - 41	56	10	230
LOC 5	*Nyctalus noctula*	26	1 - 48	83	9	169
LOC 5	*Pipistrellus pipistrellus*	64	43.5 - 74.5	82	8	1208
LOC 5	*Pipistrellus pygmaeus*	38	1 - 61	68	9	558
LOC 6	*Myotis*	38	13.5 - 51	71	11	230
LOC 6	*Nyctalus noctula*	26	1 - 44.5	86	9	169
LOC 6	*Pipistrellus pipistrellus*	78	68 - 85	99	17	1208
LOC 6	*Pipistrellus pygmaeus*	67	45 - 73	94	16	558
LOC 6	*Plecotus auritus*	1	1 - 1	1	3	31
LOC 7	*Myotis*	46	0	46	1	230
LOC 7	*Nyctalus noctula*	75	63 - 81	92	23	169
LOC 7	*Pipistrellus pipistrellus*	92	68 - 94	94	3	1208
LOC 7	*Pipistrellus pygmaeus*	90	78 - 94	94	3	558
LOC 8	*Myotis*	46	19.5 - 52.5	67	13	230
LOC 8	*Nyctalus noctula*	1	1 - 1	38	8	169
LOC 8	*Pipistrellus pipistrellus*	81	55 - 85	98	19	1208
LOC 8	*Pipistrellus pygmaeus*	59	37.5 - 73.5	87	14	558
LOC 8	*Plecotus auritus*	14	13.5 - 13.5	26	2	31
LOC 9	*Myotis*	46	19.5 - 52.5	59	7	230
LOC 9	*Nyctalus noctula*	56	38.5 - 64	80	20	169
LOC 9	*Pipistrellus pipistrellus*	51	26 - 78	83	9	1208
LOC 9	*Pipistrellus pygmaeus*	55	13.5 - 74.5	85	8	558
LOC 9	*Plecotus auritus*	26	13.5 - 32	38	4	31

Figure 2. The recorded activity of bats during the survey. 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)

Figure 3. The activity level (percentile) of bats recorded across each night of the bat survey.

Table 5. Summary table showing the number of nights recorded bat activity fell into each activity band for each species at each detector during each month.

Detector ID	Species/Species Group	Month	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
LOC 1	*Myotis*	Aug	0	0	1	1	1
LOC 1	*Myotis*	Sep	0	0	0	2	1
LOC 1	*Pipistrellus pipistrellus*	Jul	0	0	0	1	0
LOC 1	*Pipistrellus pipistrellus*	Aug	0	1	0	1	3
LOC 1	*Pipistrellus pipistrellus*	Sep	0	0	0	2	1
LOC 1	*Pipistrellus pygmaeus*	Jul	0	0	0	0	1
LOC 1	*Pipistrellus pygmaeus*	Aug	0	1	1	0	1
LOC 1	*Pipistrellus pygmaeus*	Sep	0	0	0	3	0
LOC 1	*Plecotus auritus*	Aug	0	0	0	0	1
LOC 10	*Myotis*	Aug	0	1	0	1	2
LOC 10	*Myotis*	Sep	0	1	2	2	0
LOC 10	*Nyctalus noctula*	May	0	3	1	3	3
LOC 10	*Nyctalus noctula*	Jun	0	0	2	2	1
LOC 10	*Nyctalus noctula*	Aug	0	0	0	0	2
LOC 10	*Pipistrellus pipistrellus*	Jul	0	1	1	0	0
LOC 10	*Pipistrellus pipistrellus*	Aug	2	4	0	0	2
LOC 10	*Pipistrellus pipistrellus*	Sep	2	3	0	0	1
LOC 10	*Pipistrellus pygmaeus*	Jul	0	0	0	0	1
LOC 10	*Pipistrellus pygmaeus*	Aug	1	1	0	2	2

Location	Species	Month					
LOC 10	*Pipistrellus pygmaeus*	Sep	1	2	0	2	1
LOC 10	*Plecotus auritus*	Aug	0	0	0	1	1
LOC 10	*Plecotus auritus*	Sep	0	0	0	0	2
LOC 11	*Myotis*	Jul	0	0	1	0	2
LOC 11	*Myotis*	Aug	0	1	4	3	1
LOC 11	*Myotis*	Sep	0	1	3	1	0
LOC 11	*Nyctalus noctula*	May	1	1	2	3	0
LOC 11	*Nyctalus noctula*	Jun	0	0	1	2	2
LOC 11	*Nyctalus noctula*	Jul	0	0	0	1	0
LOC 11	*Nyctalus noctula*	Aug	0	0	1	2	1
LOC 11	*Nyctalus noctula*	Sep	0	1	0	4	0
LOC 11	*Pipistrellus pipistrellus*	Jul	2	0	1	0	1
LOC 11	*Pipistrellus pipistrellus*	Aug	9	0	0	0	0
LOC 11	*Pipistrellus pipistrellus*	Sep	3	1	1	0	0
LOC 11	*Pipistrellus pygmaeus*	Jul	2	0	0	0	0
LOC 11	*Pipistrellus pygmaeus*	Aug	6	3	0	0	0
LOC 11	*Pipistrellus pygmaeus*	Sep	2	3	0	0	0
LOC 11	*Plecotus auritus*	Aug	0	0	0	1	2
LOC 11	*Plecotus auritus*	Sep	0	0	0	1	1
LOC 2	*Nyctalus noctula*	May	0	0	0	0	1
LOC 2	*Nyctalus noctula*	Jun	0	0	1	1	0
LOC 3	*Nyctalus noctula*	Jun	0	0	0	1	1
LOC 4	*Myotis*	Aug	0	0	3	0	0
LOC 4	*Myotis*	Sep	0	3	1	1	1
LOC 4	*Nyctalus noctula*	Aug	0	0	0	1	1
LOC 4	*Nyctalus noctula*	Sep	0	0	0	0	3
LOC 4	*Pipistrellus pipistrellus*	Aug	2	0	0	1	1
LOC 4	*Pipistrellus pipistrellus*	Sep	4	0	0	3	1
LOC 4	*Pipistrellus pygmaeus*	Aug	2	0	0	1	0
LOC 4	*Pipistrellus pygmaeus*	Sep	1	1	2	1	2
LOC 4	*Plecotus auritus*	Aug	0	0	0	0	2
LOC 4	*Plecotus auritus*	Sep	0	0	0	0	3
LOC 5	*Myotis*	Aug	0	0	2	1	0
LOC 5	*Myotis*	Sep	0	0	0	3	4
LOC 5	*Nyctalus noctula*	May	0	1	0	2	2
LOC 5	*Nyctalus noctula*	Jun	1	0	0	0	0
LOC 5	*Nyctalus noctula*	Aug	0	0	0	0	1
LOC 5	*Nyctalus noctula*	Sep	0	0	0	1	1
LOC 5	*Pipistrellus pipistrellus*	Aug	1	1	0	0	0
LOC 5	*Pipistrellus pipistrellus*	Sep	0	3	2	1	0
LOC 5	*Pipistrellus pygmaeus*	Aug	0	2	0	0	1
LOC 5	*Pipistrellus pygmaeus*	Sep	0	1	0	3	2
LOC 6	*Myotis*	Jul	0	0	0	0	2
LOC 6	*Myotis*	Aug	0	0	2	1	1
LOC 6	*Myotis*	Sep	0	1	2	1	1
LOC 6	*Nyctalus noctula*	Jun	1	0	0	0	0
LOC 6	*Nyctalus noctula*	Jul	0	0	0	0	3
LOC 6	*Nyctalus noctula*	Aug	0	0	1	2	0

Location	Species	Month					
LOC 6	*Nyctalus noctula*	Sep	0	0	1	0	1
LOC 6	*Pipistrellus pipistrellus*	Jul	0	3	0	0	0
LOC 6	*Pipistrellus pipistrellus*	Aug	3	3	2	0	0
LOC 6	*Pipistrellus pipistrellus*	Sep	5	1	0	0	0
LOC 6	*Pipistrellus pygmaeus*	Jul	0	0	0	2	0
LOC 6	*Pipistrellus pygmaeus*	Aug	1	3	1	3	0
LOC 6	*Pipistrellus pygmaeus*	Sep	2	3	0	1	0
LOC 6	*Plecotus auritus*	Aug	0	0	0	0	1
LOC 6	*Plecotus auritus*	Sep	0	0	0	0	2
LOC 7	*Myotis*	Aug	0	0	1	0	0
LOC 7	*Nyctalus noctula*	May	8	2	0	1	0
LOC 7	*Nyctalus noctula*	Jun	3	5	1	1	0
LOC 7	*Nyctalus noctula*	Jul	0	1	0	0	0
LOC 7	*Nyctalus noctula*	Aug	0	0	0	0	1
LOC 7	*Pipistrellus pipistrellus*	Aug	2	1	0	0	0
LOC 7	*Pipistrellus pygmaeus*	Aug	2	1	0	0	0
LOC 8	*Myotis*	Jul	0	0	0	0	4
LOC 8	*Myotis*	Aug	0	1	1	0	0
LOC 8	*Myotis*	Sep	0	0	5	2	0
LOC 8	*Nyctalus noctula*	May	0	0	0	1	2
LOC 8	*Nyctalus noctula*	Jul	0	0	0	0	1
LOC 8	*Nyctalus noctula*	Aug	0	0	0	0	1
LOC 8	*Nyctalus noctula*	Sep	0	0	0	0	3
LOC 8	*Pipistrellus pipistrellus*	Jul	6	0	0	1	0
LOC 8	*Pipistrellus pipistrellus*	Aug	1	1	1	0	0
LOC 8	*Pipistrellus pipistrellus*	Sep	3	2	2	0	2
LOC 8	*Pipistrellus pygmaeus*	Jul	2	1	0	1	0
LOC 8	*Pipistrellus pygmaeus*	Aug	1	1	0	0	1
LOC 8	*Pipistrellus pygmaeus*	Sep	1	1	2	2	1
LOC 8	*Plecotus auritus*	Sep	0	0	0	1	1
LOC 9	*Myotis*	Aug	0	0	4	1	2
LOC 9	*Nyctalus noctula*	May	0	2	4	1	0
LOC 9	*Nyctalus noctula*	Jun	0	6	3	0	1
LOC 9	*Nyctalus noctula*	Aug	0	0	1	0	2
LOC 9	*Pipistrellus pipistrellus*	Aug	1	3	2	1	0
LOC 9	*Pipistrellus pipistrellus*	Sep	0	0	1	0	1
LOC 9	*Pipistrellus pygmaeus*	Aug	1	3	0	1	1
LOC 9	*Pipistrellus pygmaeus*	Sep	0	0	1	0	1
LOC 9	*Plecotus auritus*	Aug	0	0	0	3	1

Table 6. Summary table showing key metrics for each species recorded per month. Please note that we cannot split the reference range by month, hence this column is not shown in this table.

Detector ID	Species/Species Group	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded
LOC 1	*Myotis*	Aug	38	1 - 42	46	3
LOC 1	*Myotis*	Sep	38	1 - 42	38	3
LOC 1	*Pipistrellus pipistrellus*	Jul	26	1 - 39.5	26	1
LOC 1	*Pipistrellus pipistrellus*	Aug	1	1 - 39.5	78	5
LOC 1	*Pipistrellus pipistrellus*	Sep	26	1 - 39.5	26	3
LOC 1	*Pipistrellus pygmaeus*	Jul	1	13.5 - 46	1	1
LOC 1	*Pipistrellus pygmaeus*	Aug	46	13.5 - 46	63	3
LOC 1	*Pipistrellus pygmaeus*	Sep	26	13.5 - 46	38	3
LOC 1	*Plecotus auritus*	Aug	1	0	1	1
LOC 10	*Myotis*	Aug	20	13.5 - 57.5	68	4
LOC 10	*Myotis*	Sep	51	13.5 - 57.5	64	5
LOC 10	*Nyctalus noctula*	May	26	13.5 - 43.5	74	10
LOC 10	*Nyctalus noctula*	Jun	26	13.5 - 43.5	51	5
LOC 10	*Nyctalus noctula*	Aug	1	13.5 - 43.5	1	2
LOC 10	*Pipistrellus pipistrellus*	Jul	64	38.5 - 82	71	2
LOC 10	*Pipistrellus pipistrellus*	Aug	70	38.5 - 82	97	8
LOC 10	*Pipistrellus pipistrellus*	Sep	76	38.5 - 82	97	6
LOC 10	*Pipistrellus pygmaeus*	Jul	1	19.5 - 62	1	1
LOC 10	*Pipistrellus pygmaeus*	Aug	38	19.5 - 62	86	6
LOC 10	*Pipistrellus pygmaeus*	Sep	53	19.5 - 62	81	6
LOC 10	*Plecotus auritus*	Aug	14	1 - 1	26	2
LOC 10	*Plecotus auritus*	Sep	1	1 - 1	1	2
LOC 11	*Myotis*	Jul	1	30 - 55	46	3
LOC 11	*Myotis*	Aug	51	30 - 55	67	9
LOC 11	*Myotis*	Sep	51	30 - 55	63	5
LOC 11	*Nyctalus noctula*	May	46	26 - 47	91	7
LOC 11	*Nyctalus noctula*	Jun	26	26 - 47	56	5
LOC 11	*Nyctalus noctula*	Jul	26	26 - 47	26	1
LOC 11	*Nyctalus noctula*	Aug	32	26 - 47	59	4
LOC 11	*Nyctalus noctula*	Sep	26	26 - 47	71	5
LOC 11	*Pipistrellus pipistrellus*	Jul	66	70.5 - 92	97	4
LOC 11	*Pipistrellus pipistrellus*	Aug	90	70.5 - 92	93	9
LOC 11	*Pipistrellus pipistrellus*	Sep	94	70.5 - 92	99	5
LOC 11	*Pipistrellus pygmaeus*	Jul	87	78 - 88	88	2
LOC 11	*Pipistrellus pygmaeus*	Aug	85	78 - 88	93	9
LOC 11	*Pipistrellus pygmaeus*	Sep	71	78 - 88	97	5
LOC 11	*Plecotus auritus*	Aug	1	1 - 19.5	26	3
LOC 11	*Plecotus auritus*	Sep	20	1 - 19.5	38	2
LOC 2	*Nyctalus noctula*	May	1	1 - 51	1	1
LOC 2	*Nyctalus noctula*	Jun	39	1 - 51	51	2
LOC 3	*Nyctalus noctula*	Jun	20	19.5 - 19.5	38	2
LOC 4	*Myotis*	Aug	59	30 - 67	59	3
LOC 4	*Myotis*	Sep	56	30 - 67	75	6
LOC 4	*Nyctalus noctula*	Aug	20	1 - 1	38	2
LOC 4	*Nyctalus noctula*	Sep	1	1 - 1	1	3
LOC 4	*Pipistrellus pipistrellus*	Aug	65	38 - 91	98	4
LOC 4	*Pipistrellus pipistrellus*	Sep	61	38 - 91	99	8
LOC 4	*Pipistrellus pygmaeus*	Aug	84	23.5 - 78.5	86	3
LOC 4	*Pipistrellus pygmaeus*	Sep	46	23.5 - 78.5	84	7
LOC 4	*Plecotus auritus*	Aug	1	1 - 1	1	2
LOC 4	*Plecotus auritus*	Sep	1	1 - 1	1	3
LOC 5	*Myotis*	Aug	46	1 - 41	56	3
LOC 5	*Myotis*	Sep	1	1 - 41	38	7
LOC 5	*Nyctalus noctula*	May	26	1 - 48	70	5
LOC 5	*Nyctalus noctula*	Jun	83	1 - 48	83	1

LOC 5	*Nyctalus noctula*	Aug	1	1 - 48	1	1
LOC 5	*Nyctalus noctula*	Sep	14	1 - 48	26	2
LOC 5	*Pipistrellus pipistrellus*	Aug	72	43.5 - 74.5	82	2
LOC 5	*Pipistrellus pipistrellus*	Sep	57	43.5 - 74.5	71	6
LOC 5	*Pipistrellus pygmaeus*	Aug	67	1 - 61	68	3
LOC 5	*Pipistrellus pygmaeus*	Sep	32	1 - 61	61	6
LOC 6	*Myotis*	Jul	1	13.5 - 51	1	2
LOC 6	*Myotis*	Aug	36	13.5 - 51	51	4
LOC 6	*Myotis*	Sep	51	13.5 - 51	71	5
LOC 6	*Nyctalus noctula*	Jun	86	1 - 44.5	86	1
LOC 6	*Nyctalus noctula*	Jul	1	1 - 44.5	1	3
LOC 6	*Nyctalus noctula*	Aug	38	1 - 44.5	51	3
LOC 6	*Nyctalus noctula*	Sep	26	1 - 44.5	51	2
LOC 6	*Pipistrellus pipistrellus*	Jul	73	68 - 85	76	3
LOC 6	*Pipistrellus pipistrellus*	Aug	73	68 - 85	99	8
LOC 6	*Pipistrellus pipistrellus*	Sep	85	68 - 85	94	6
LOC 6	*Pipistrellus pygmaeus*	Jul	26	45 - 73	26	2
LOC 6	*Pipistrellus pygmaeus*	Aug	58	45 - 73	94	8
LOC 6	*Pipistrellus pygmaeus*	Sep	72	45 - 73	85	6
LOC 6	*Plecotus auritus*	Aug	1	1 - 1	1	1
LOC 6	*Plecotus auritus*	Sep	1	1 - 1	1	2
LOC 7	*Myotis*	Aug	46	0	46	1
LOC 7	*Nyctalus noctula*	May	82	63 - 81	92	11
LOC 7	*Nyctalus noctula*	Jun	73	63 - 81	86	10
LOC 7	*Nyctalus noctula*	Jul	68	63 - 81	68	1
LOC 7	*Nyctalus noctula*	Aug	1	63 - 81	1	1
LOC 7	*Pipistrellus pipistrellus*	Aug	92	68 - 94	94	3
LOC 7	*Pipistrellus pygmaeus*	Aug	90	78 - 94	94	3
LOC 8	*Myotis*	Jul	1	19.5 - 52.5	1	4
LOC 8	*Myotis*	Aug	63	19.5 - 52.5	67	2
LOC 8	*Myotis*	Sep	46	19.5 - 52.5	59	7
LOC 8	*Nyctalus noctula*	May	1	1 - 1	38	3
LOC 8	*Nyctalus noctula*	Jul	1	1 - 1	1	1
LOC 8	*Nyctalus noctula*	Aug	1	1 - 1	1	1
LOC 8	*Nyctalus noctula*	Sep	1	1 - 1	1	3
LOC 8	*Pipistrellus pipistrellus*	Jul	87	55 - 85	96	7
LOC 8	*Pipistrellus pipistrellus*	Aug	72	55 - 85	98	3
LOC 8	*Pipistrellus pipistrellus*	Sep	72	55 - 85	96	9
LOC 8	*Pipistrellus pygmaeus*	Jul	79	37.5 - 73.5	87	4
LOC 8	*Pipistrellus pygmaeus*	Aug	61	37.5 - 73.5	86	3
LOC 8	*Pipistrellus pygmaeus*	Sep	51	37.5 - 73.5	86	7
LOC 8	*Plecotus auritus*	Sep	14	13.5 - 13.5	26	2
LOC 9	*Myotis*	Aug	46	19.5 - 52.5	59	7
LOC 9	*Nyctalus noctula*	May	51	38.5 - 64	76	7
LOC 9	*Nyctalus noctula*	Jun	67	38.5 - 64	80	10
LOC 9	*Nyctalus noctula*	Aug	1	38.5 - 64	46	3
LOC 9	*Pipistrellus pipistrellus*	Aug	72	26 - 78	83	7
LOC 9	*Pipistrellus pipistrellus*	Sep	26	26 - 78	51	2
LOC 9	*Pipistrellus pygmaeus*	Aug	68	13.5 - 74.5	85	6
LOC 9	*Pipistrellus pygmaeus*	Sep	24	13.5 - 74.5	46	2
LOC 9	*Plecotus auritus*	Aug	26	13.5 - 32	38	4

PER SITE

In this 'Per Site' section of the analysis, all values are taken from across all of the detectors to provide site-wide averages/medians.

Table 7. Summary table showing the number of nights recorded bat activity fell into each activity band for each species.
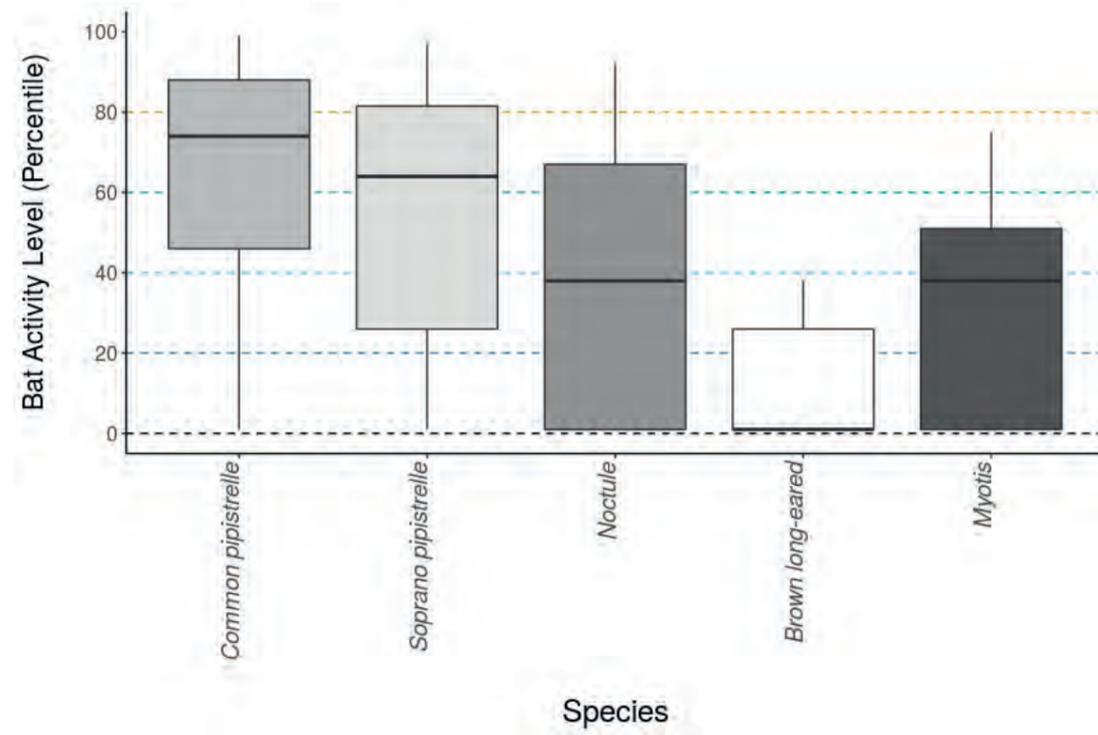
Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
Myotis	0	9	32	20	22
Nyctalus noctula	14	22	19	29	34
Pipistrellus pipistrellus	46	28	13	11	13
Pipistrellus pygmaeus	25	27	7	22	15
Plecotus auritus	0	0	0	7	17

Table 8. Summary table showing key metrics for each species recorded.

Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded
Myotis	38	30 - 67	75	83
Nyctalus noctula	38	63 - 81	92	118
Pipistrellus pipistrellus	74	70.5 - 92	99	111
Pipistrellus pygmaeus	64	78 - 94	97	96
Plecotus auritus	1	13.5 - 32	38	24

Figure 4. The activity level (percentile) of bats recorded across each night of the bat survey for the **entire site**.

Figure 5. The median activity levels of bats recorded across all detectors each night.

PER SITE, PER MONTH

Table 9. Summary table showing the number of nights recorded bat activity fell into each activity band for each species during each month.

| Species/Species Group	Month	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
Myotis	Jul	0	0	1	0	8
Myotis	Aug	0	3	18	8	7
Myotis	Sep	0	6	13	12	7
Nyctalus noctula	May	9	9	7	11	8
Nyctalus noctula	Jun	5	11	8	7	5
Nyctalus noctula	Jul	0	1	0	1	4
Nyctalus noctula	Aug	0	0	3	5	9
Nyctalus noctula	Sep	0	1	1	5	8
Pipistrellus pipistrellus	Jul	8	4	2	2	1
Pipistrellus pipistrellus	Aug	21	14	5	3	6
Pipistrellus pipistrellus	Sep	17	10	6	6	6
Pipistrellus pygmaeus	Jul	4	1	0	3	2
Pipistrellus pygmaeus	Aug	14	15	2	7	6
Pipistrellus pygmaeus	Sep	7	11	5	12	7
Plecotus auritus	Aug	0	0	0	5	8
Plecotus auritus	Sep	0	0	0	2	9

Table 10. Summary table showing key metrics for each species recorded per month.

Species/Species Group	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded
Myotis	Jul	1	30 - 55	46	9
Myotis	Aug	46	30 - 67	68	36
Myotis	Sep	42	30 - 67	75	38
Nyctalus noctula	May	51	63 - 81	92	44
Nyctalus noctula	Jun	56	63 - 81	86	36
Nyctalus noctula	Jul	1	63 - 81	68	6
Nyctalus noctula	Aug	1	63 - 81	59	17
Nyctalus noctula	Sep	1	26 - 47	71	15
Pipistrellus pipistrellus	Jul	76	70.5 - 92	97	17
Pipistrellus pipistrellus	Aug	78	70.5 - 92	99	49
Pipistrellus pipistrellus	Sep	72	70.5 - 92	99	45
Pipistrellus pygmaeus	Jul	56	78 - 88	88	10
Pipistrellus pygmaeus	Aug	70	78 - 94	94	44
Pipistrellus pygmaeus	Sep	49	78 - 88	97	42
Plecotus auritus	Aug	1	13.5 - 32	38	13
Plecotus auritus	Sep	1	13.5 - 13.5	38	11

Figure 6. The activity level (percentile) of bats recorded across each night of the bat survey for the entire site, split between months.
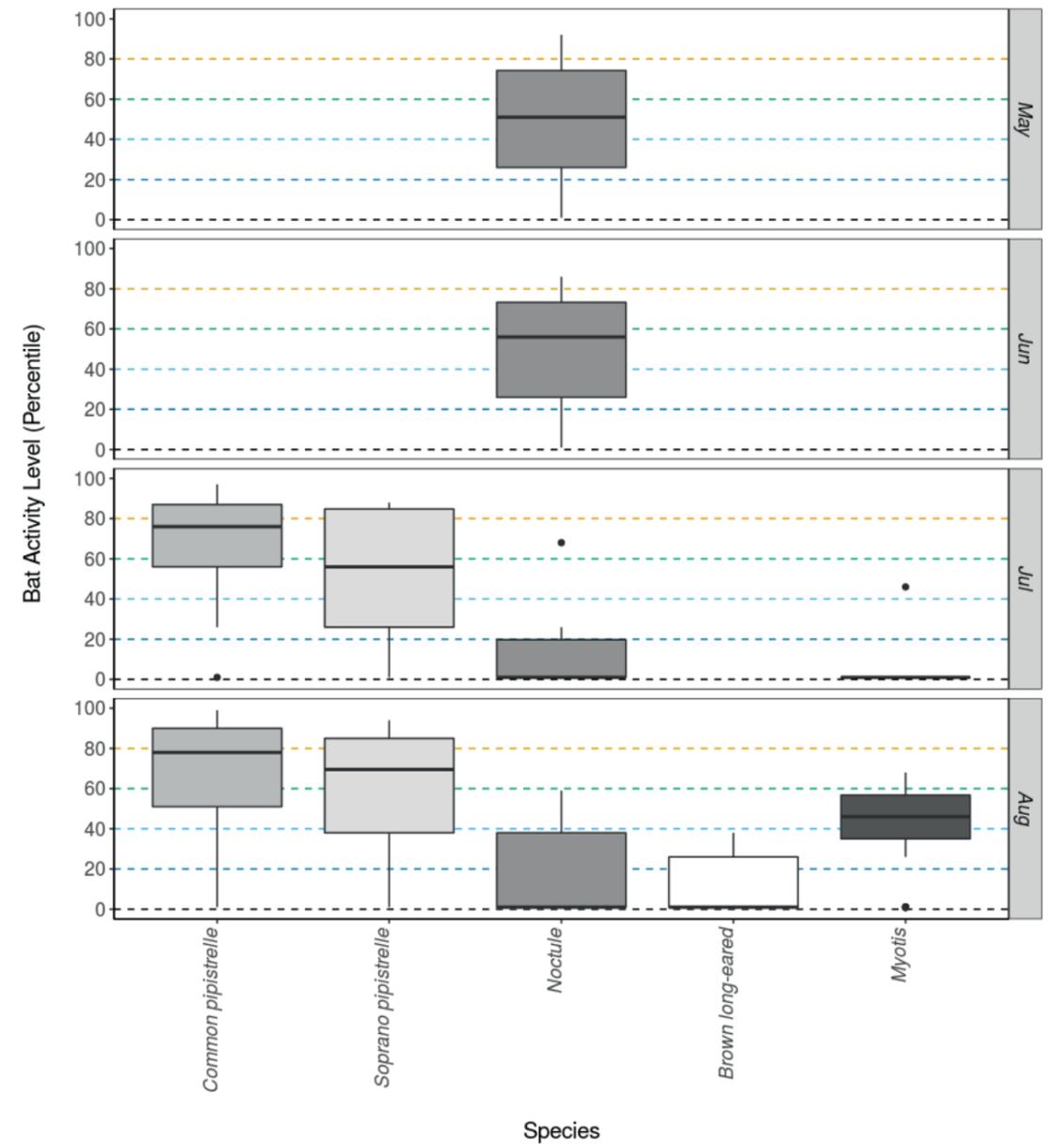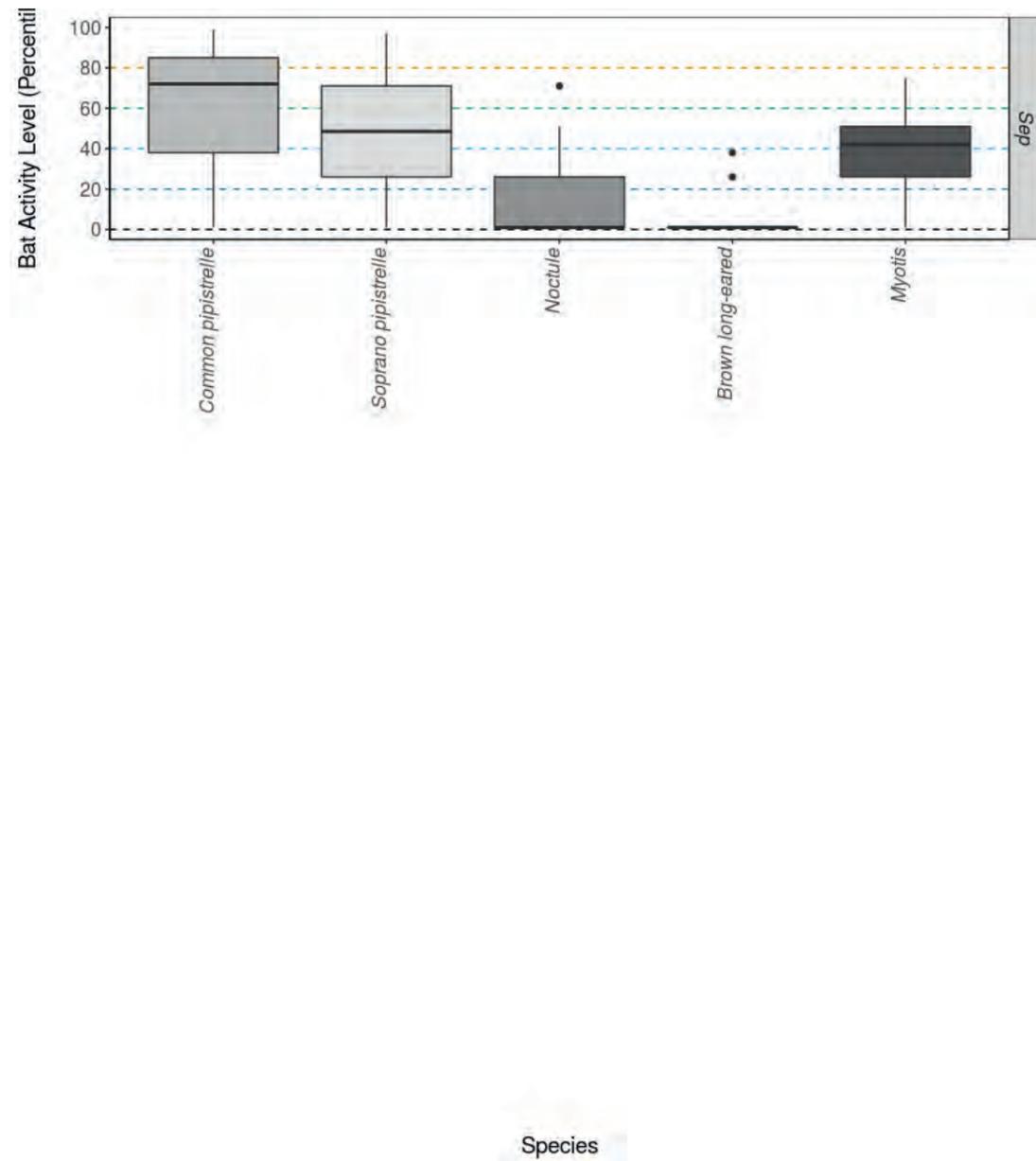
PART 2: Nightly Analysis

ENTIRE SURVEY PERIOD

Sunrise and Sunset Times

**Table 11. The times of sunset and sunrise the following morning for surveys beginning on the date shown.**

Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)
2020-05-21	21:39	04:39	7.0
2020-05-22	21:41	04:37	6.9
2020-05-23	21:43	04:35	6.9
2020-05-24	21:44	04:34	6.8
2020-05-25	21:46	04:32	6.8
2020-05-26	21:48	04:31	6.7
2020-05-27	21:50	04:29	6.7
2020-05-28	21:51	04:28	6.6
2020-05-29	21:53	04:27	6.6
2020-05-30	21:54	04:26	6.5
2020-05-31	21:56	04:24	6.5
2020-06-01	21:57	04:23	6.4
2020-06-02	21:59	04:22	6.4
2020-06-03	22:00	04:21	6.3
2020-06-04	22:02	04:20	6.3
2020-06-05	22:03	04:19	6.3
2020-06-06	22:04	04:19	6.2
2020-06-07	22:05	04:18	6.2
2020-06-08	22:06	04:17	6.2
2020-06-09	22:07	04:16	6.2
2020-06-10	22:08	04:16	6.1
2020-07-13	22:02	04:37	6.6
2020-07-14	22:00	04:38	6.6
2020-07-15	21:59	04:40	6.7
2020-07-16	21:57	04:42	6.7
2020-07-17	21:56	04:43	6.8
2020-07-18	21:54	04:45	6.8
2020-07-19	21:53	04:47	6.9
2020-07-28	21:36	05:04	7.5
2020-07-29	21:34	05:06	7.5

2020-07-30	21:32	05:08	7.6
2020-07-31	21:30	05:10	7.7
2020-08-01	21:28	05:12	7.7
2020-08-02	21:26	05:14	7.8
2020-08-03	21:24	05:16	7.9
2020-08-04	21:22	05:18	7.9
2020-08-05	21:19	05:20	8.0
2020-08-13	21:01	05:37	8.6
2020-08-14	20:58	05:39	8.7
2020-08-15	20:56	05:41	8.8
2020-08-16	20:53	05:43	8.8
2020-08-17	20:51	05:46	8.9
2020-08-18	20:48	05:48	9.0
2020-08-19	20:46	05:50	9.1
2020-08-27	20:25	06:07	9.7
2020-08-28	20:22	06:09	9.8
2020-08-29	20:19	06:11	9.9
2020-08-30	20:17	06:13	9.9
2020-08-31	20:14	06:15	10.0
2020-09-01	20:11	06:17	10.1
2020-09-02	20:08	06:19	10.2
2020-09-03	20:06	06:21	10.3
2020-09-04	20:03	06:23	10.3
2020-09-05	20:00	06:25	10.4
2020-09-06	19:57	06:27	10.5
2020-09-07	19:55	06:29	10.6
2020-09-08	19:52	06:31	10.7
2020-09-09	19:49	06:34	10.7

Distribution of Bat Activity Across the Night through Time

Per Detector

Figure 7. 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.
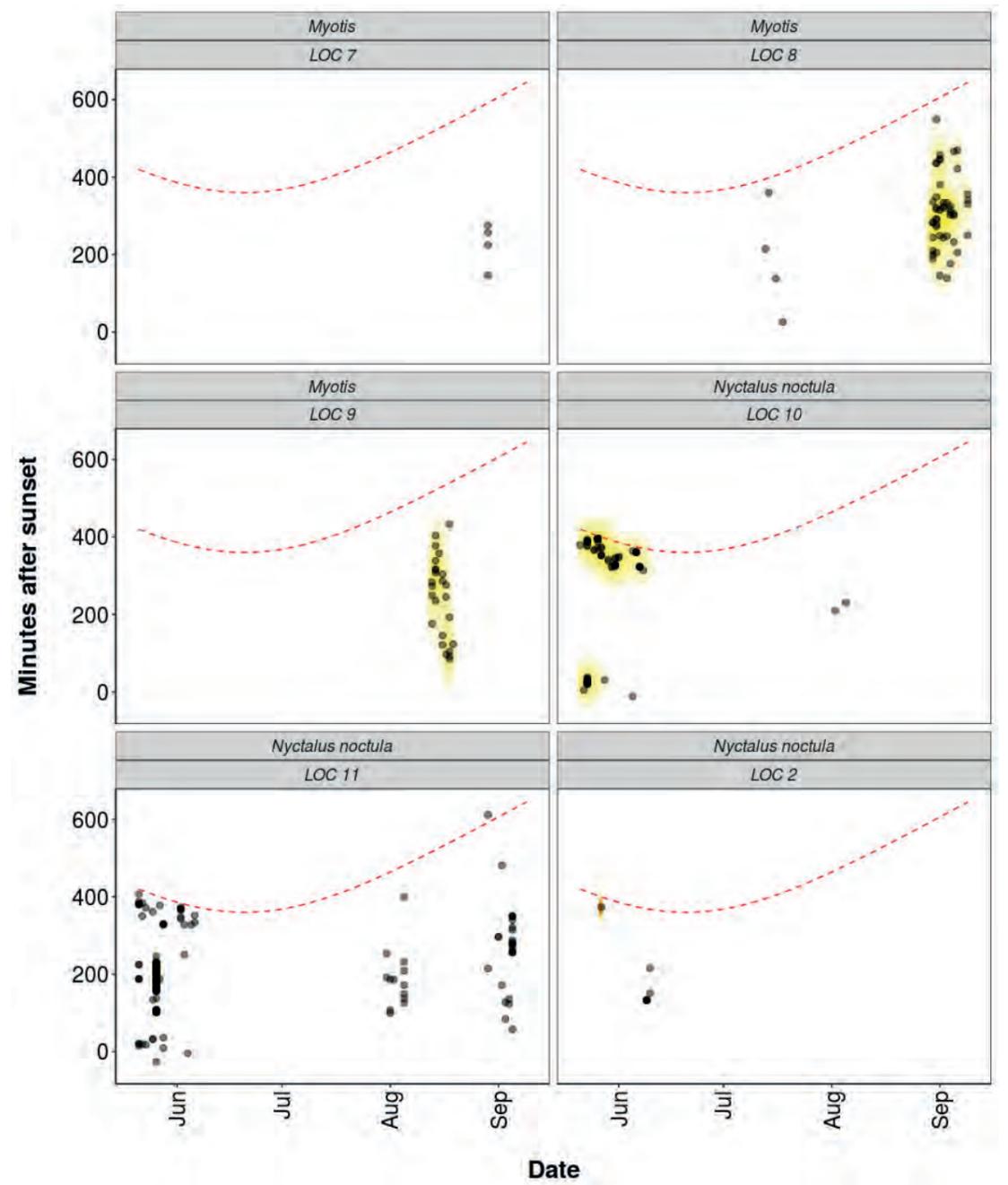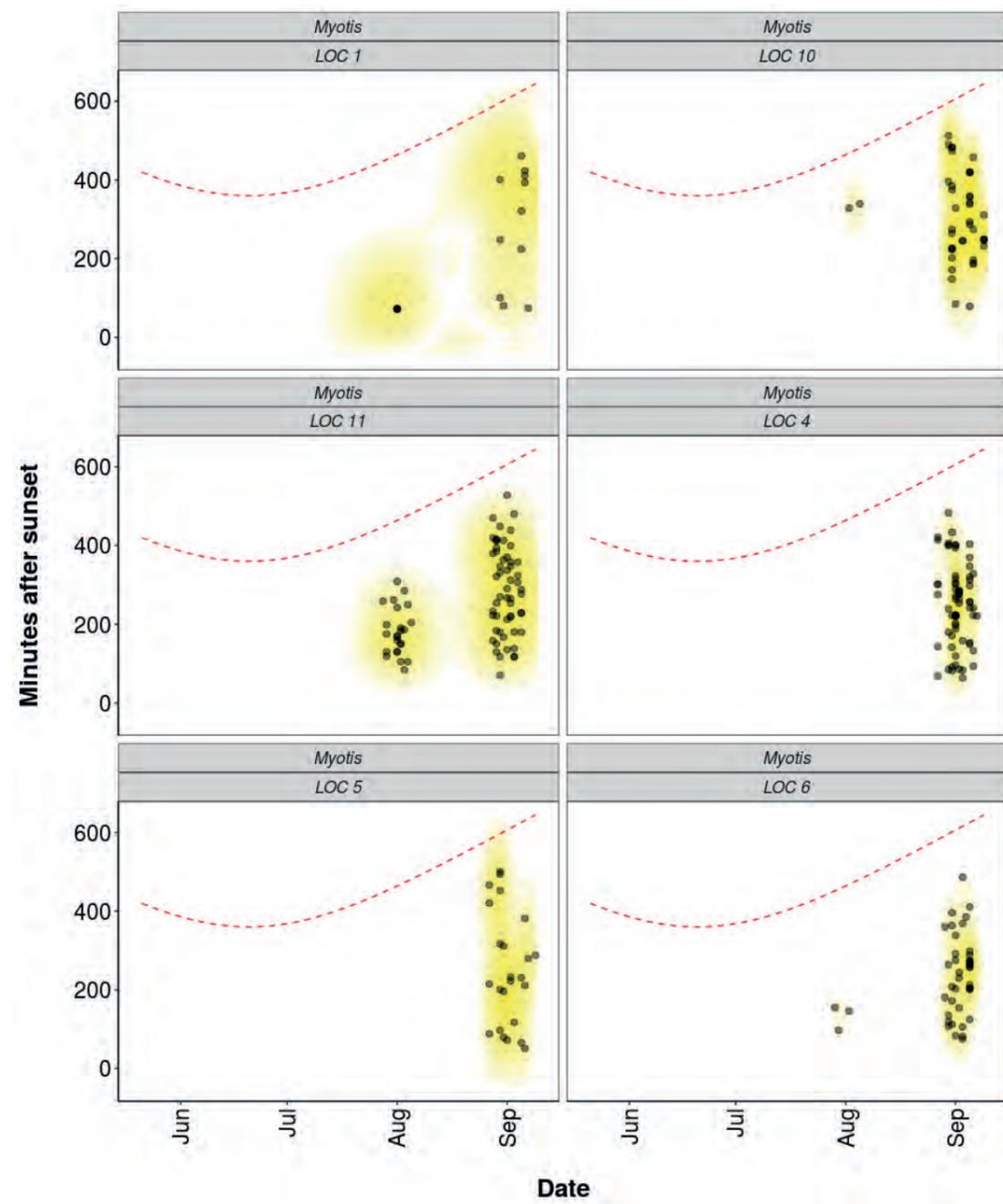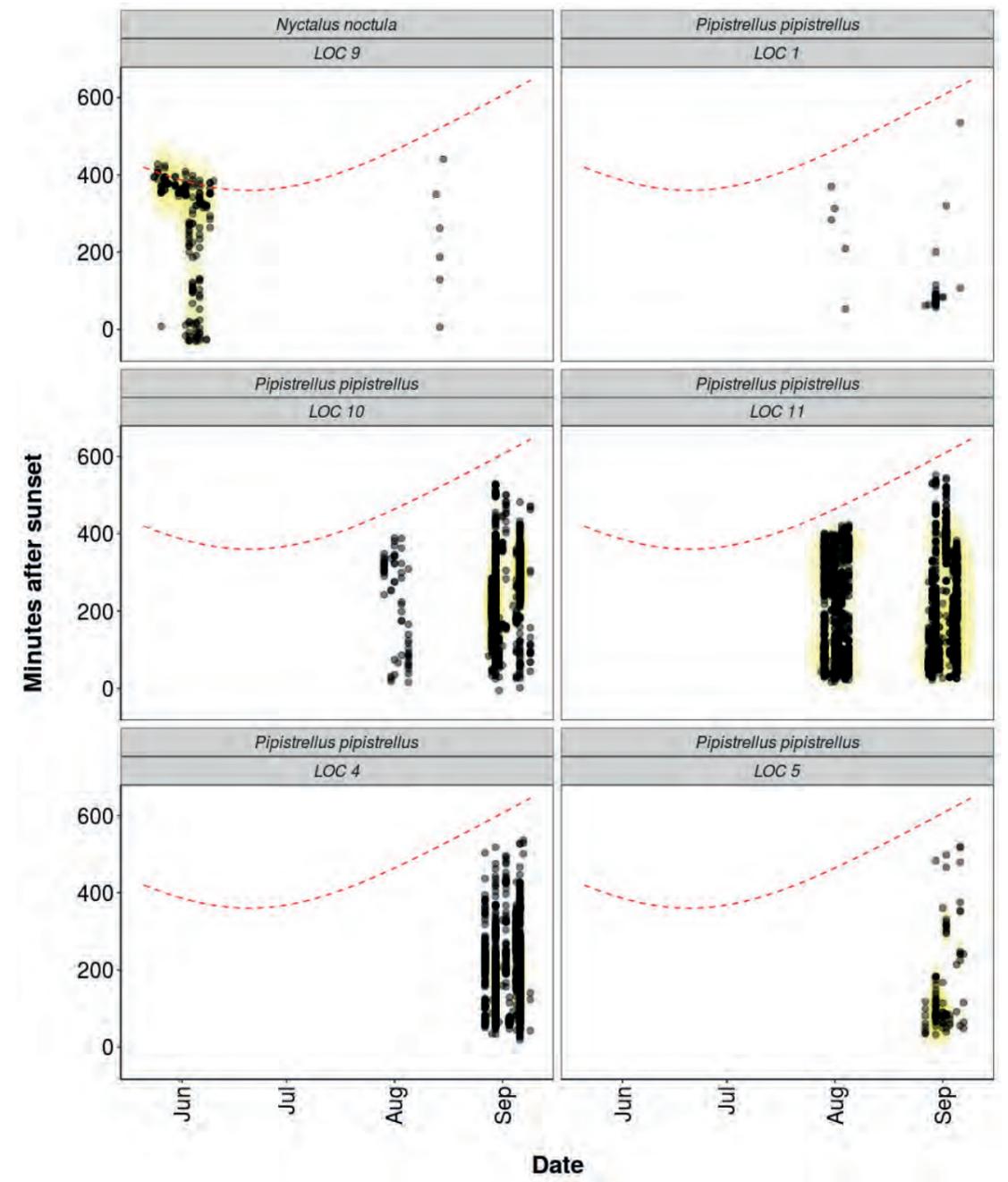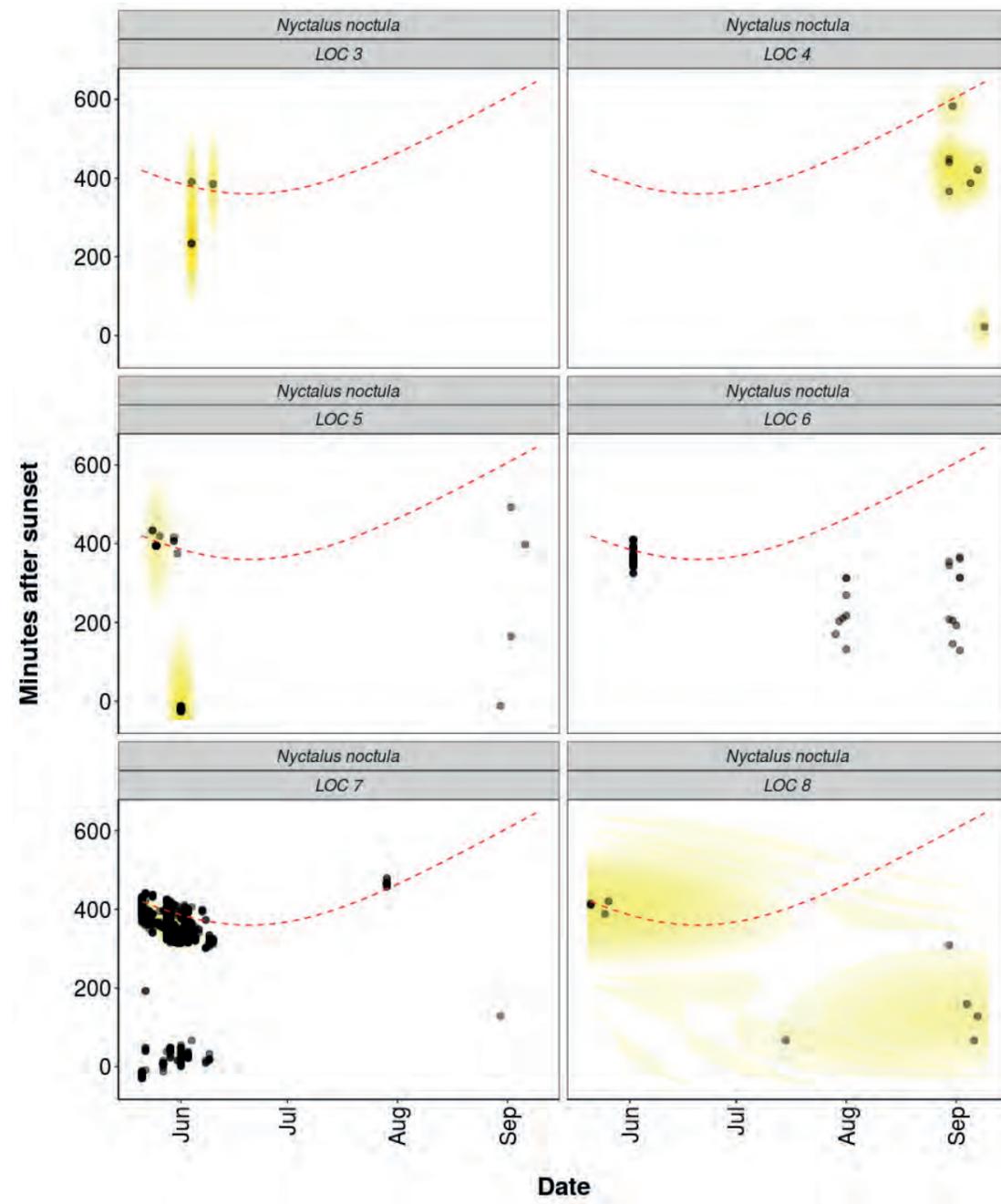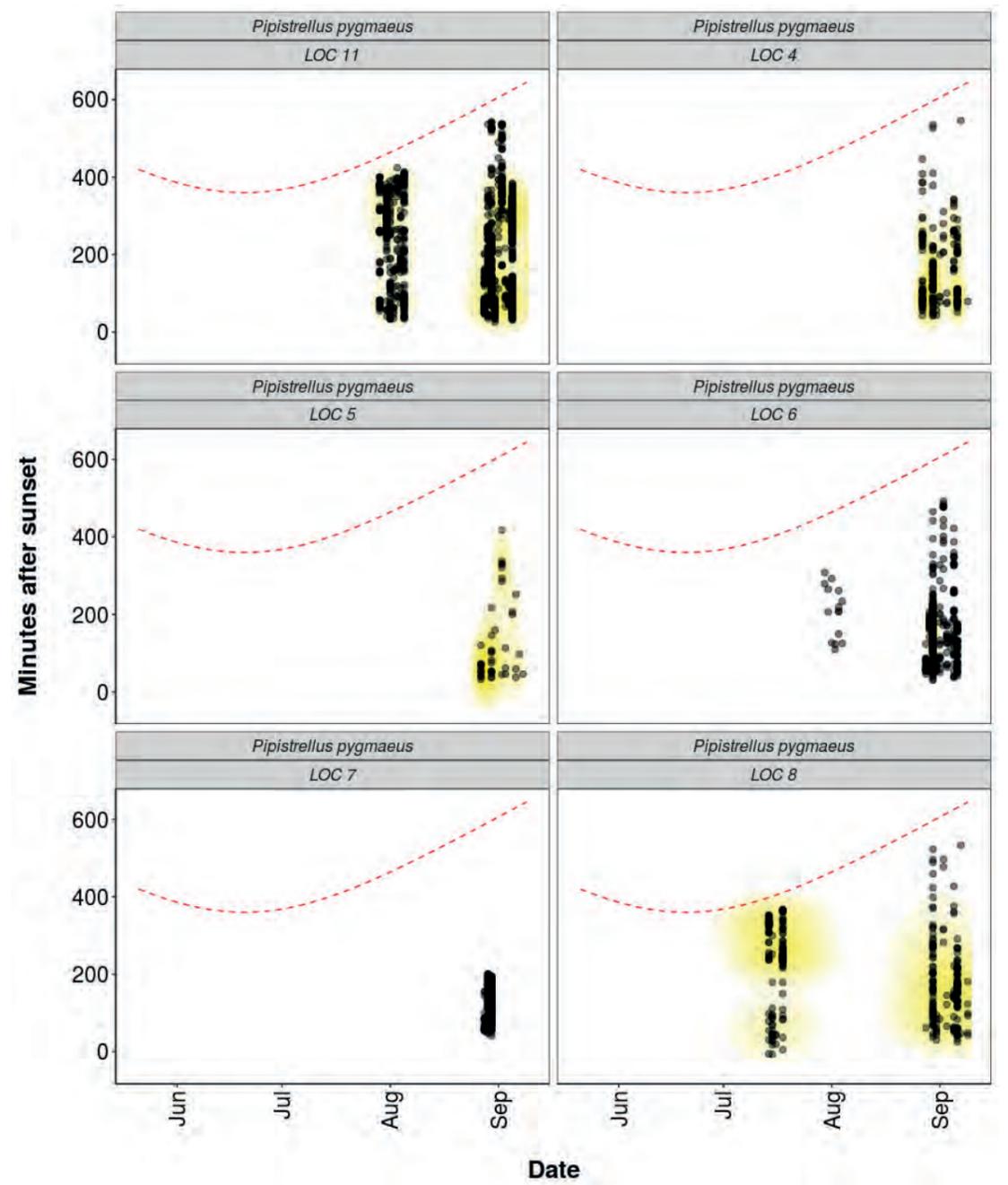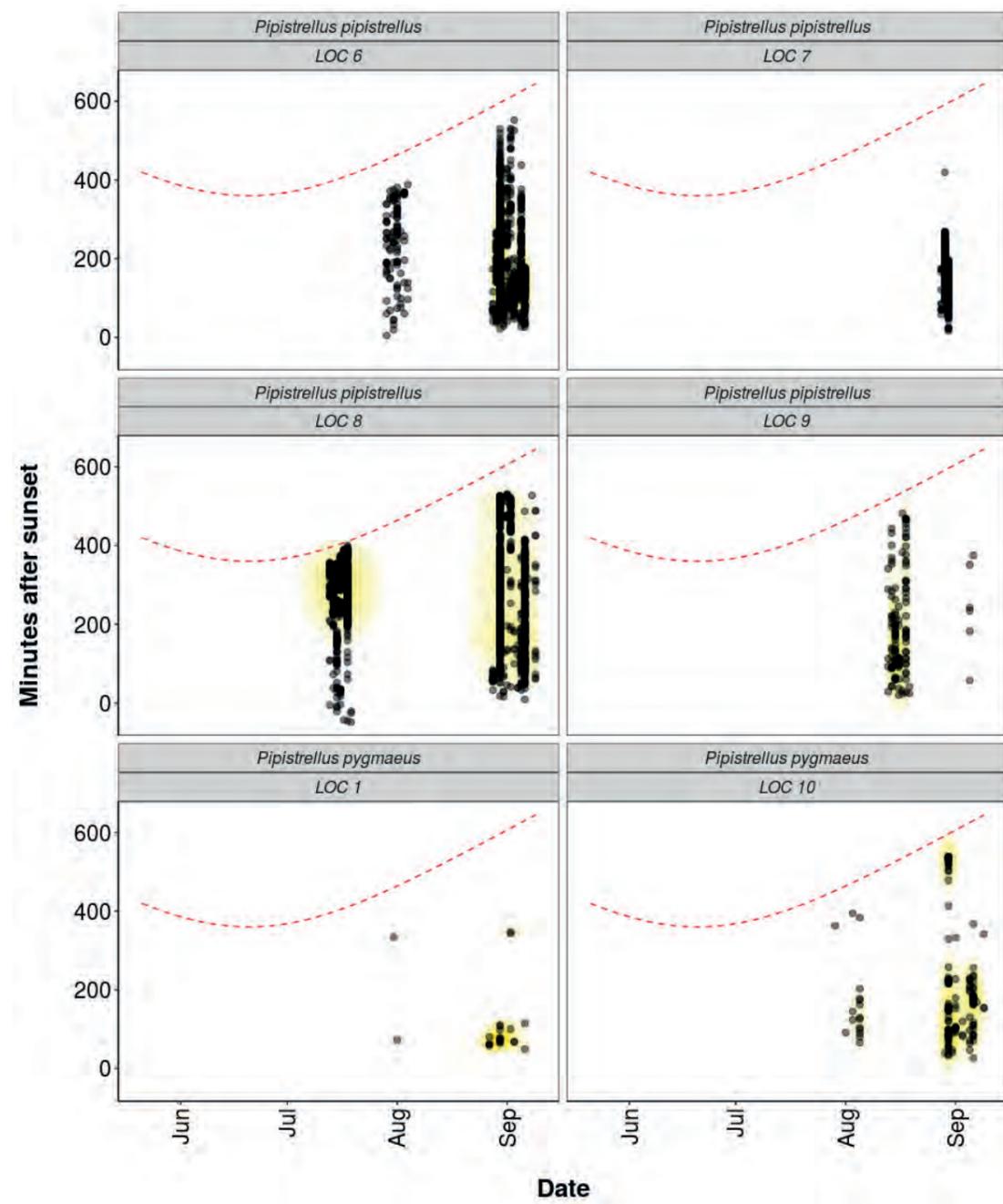
Roost Emergence Time and Bat Observation
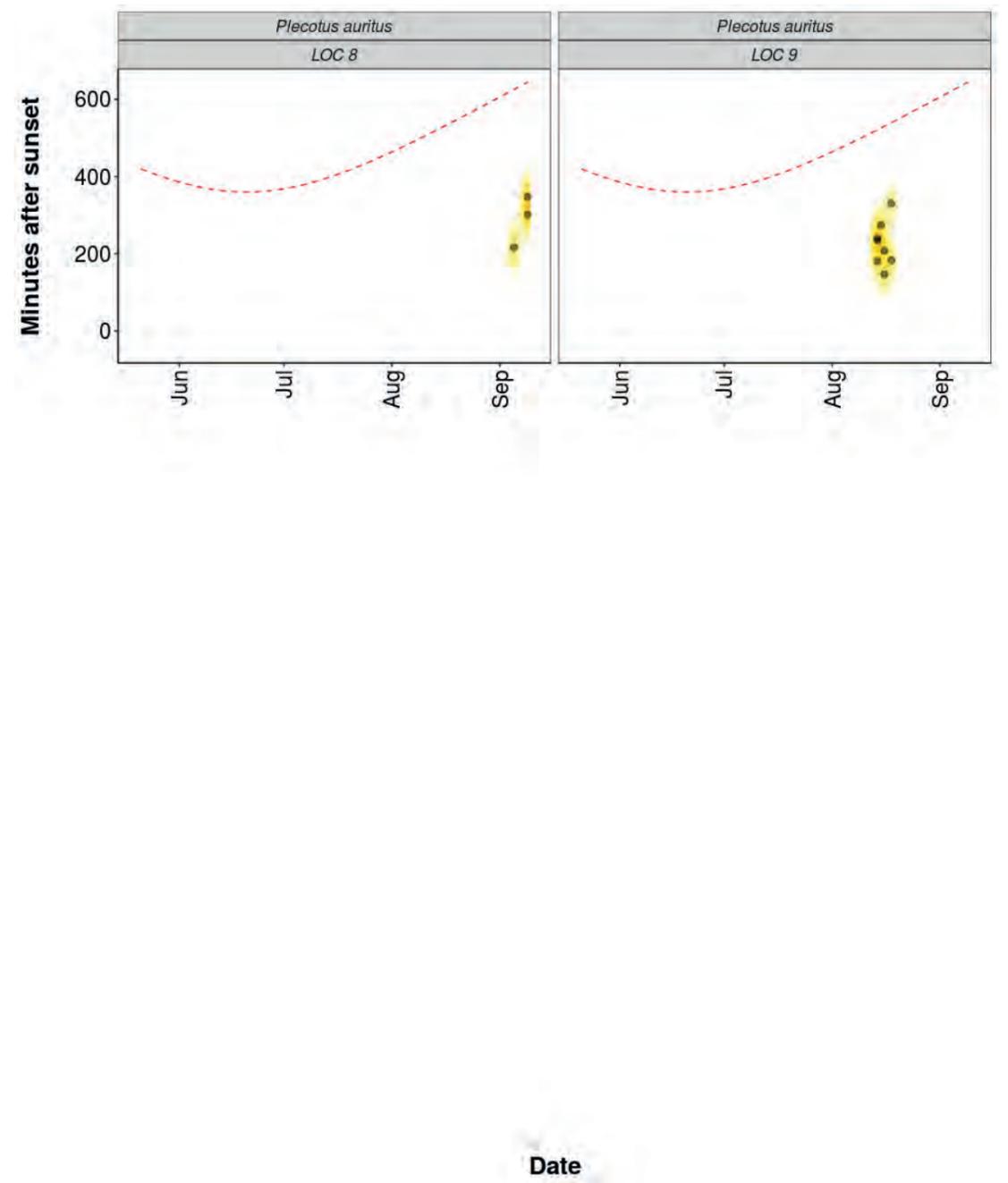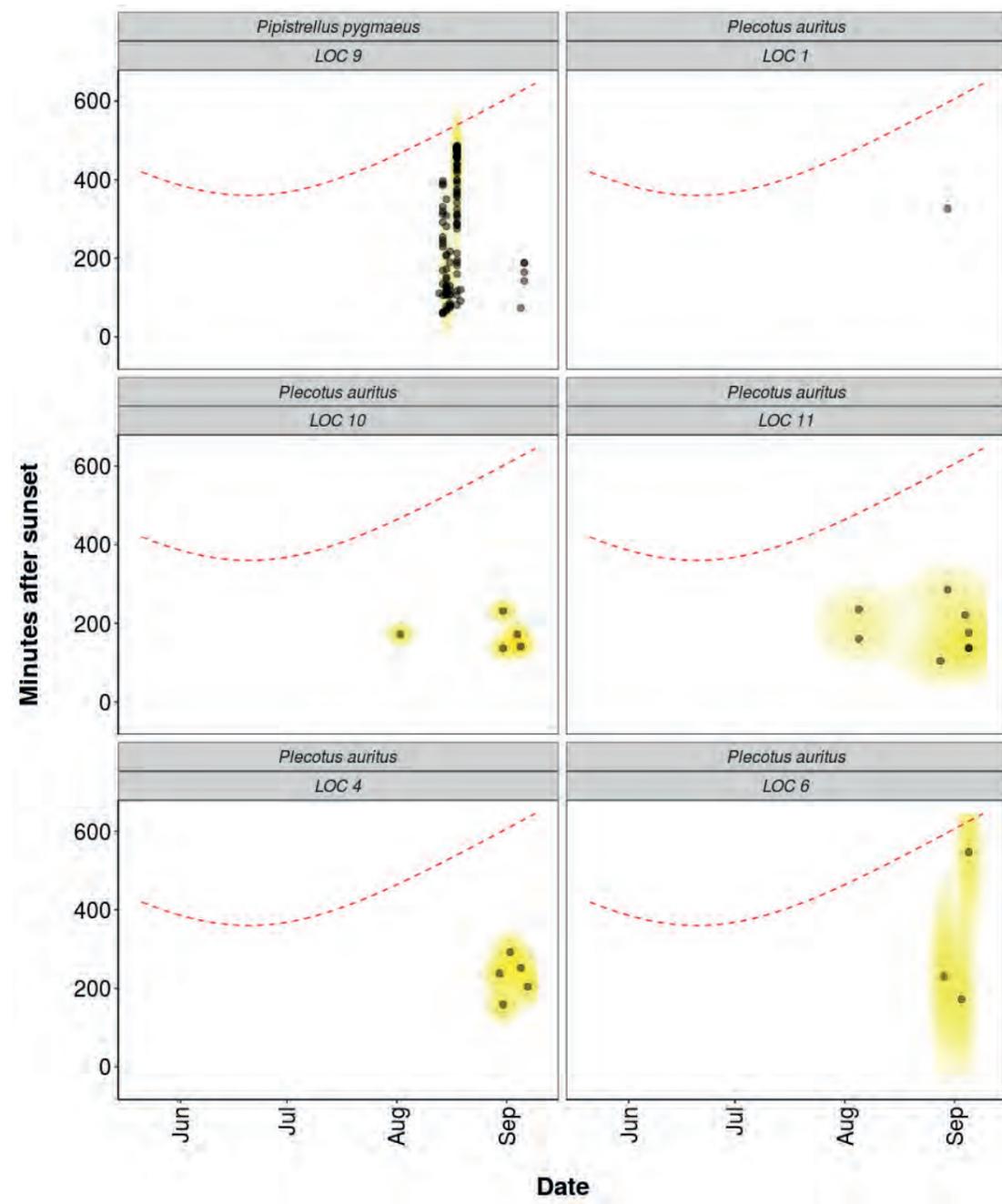
Based on: *Russ, Jon. 2012. British Bat Calls a Guide to species Identification. Pelagic Publishing.*

For more information see https://rbats-blog.updog.co/2018/05/29/bat-emergence/

Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Table

Table 12. Number of bat calls recorded before the upper time of the species-specific emergence time range, and which therefore may potentially indicate the presence of a nearby roost.

Table continues below

Species	Detector ID	2020-05-21	2020-05-22	2020-05-26	2020-05-27	2020-06-01
Common pipistrelle	LOC 10	0	0	0	0	0
Common pipistrelle	LOC 11	0	0	0	0	0
Common pipistrelle	LOC 4	0	0	0	0	0
Common pipistrelle	LOC 6	0	0	0	0	0
Common pipistrelle	LOC 7	0	0	0	0	0
Common pipistrelle	LOC 8	0	0	0	0	0
Common pipistrelle	LOC 9	0	0	0	0	0
Soprano pipistrelle	LOC 10	0	0	0	0	0
Soprano pipistrelle	LOC 11	0	0	0	0	0
Soprano pipistrelle	LOC 8	0	0	0	0	0
Noctule	LOC 10	0	1	0	0	0
Noctule	LOC 11	0	0	1	0	0
Noctule	LOC 5	0	0	0	0	40
Noctule	LOC 7	30	1	0	9	3
Noctule	LOC 9	0	0	1	0	0
Myotis	LOC 4	0	0	0	0	0
Myotis	LOC 5	0	0	0	0	0
Myotis	LOC 8	0	0	0	0	0

Table continues below

2020-06-02	2020-06-03	2020-06-04	2020-06-05	2020-06-06	2020-06-08	2020-07-13
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	1
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	1	0	0	0
0	0	1	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
1	5	0	6	5	2	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

Table continues below

2020-07-14	2020-07-15	2020-07-16	2020-07-17	2020-07-18	2020-07-19	2020-07-29
0	0	0	0	0	0	0
0	0	0	0	0	0	2
0	0	0	0	0	0	0
0	0	0	0	0	0	1
0	0	0	0	0	0	0
0	5	5	1	1	3	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
1	3	1	0	1	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	1	0	0

Table continues below

2020-07-31	2020-08-01	2020-08-02	2020-08-04	2020-08-05	2020-08-13	2020-08-14
3	0	0	0	1	0	0
2	5	1	9	1	0	0
0	0	0	0	0	0	0
1	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	1	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	1
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

Table continues below

2020-08-16	2020-08-17	2020-08-18	2020-08-19	2020-08-27	2020-08-29	2020-08-30
0	0	0	0	0	0	1
0	0	0	0	0	4	0
0	0	0	0	0	0	0
0	0	0	0	0	0	1
0	0	0	0	0	0	5
0	0	0	0	0	0	1
1	2	1	1	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	1
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	1	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

2020-08-31	2020-09-01	2020-09-03	2020-09-05	2020-09-06
2	0	0	2	2
0	1	6	3	0
0	0	0	0	3
1	0	0	1	1
0	0	0	0	0
3	0	0	0	1
0	0	0	0	0
0	0	0	0	1
1	0	0	0	0
0	0	0	0	1
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	1	0	0
0	0	0	1	1
0	0	0	0	0

Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Figures

Figure 8. Time 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.
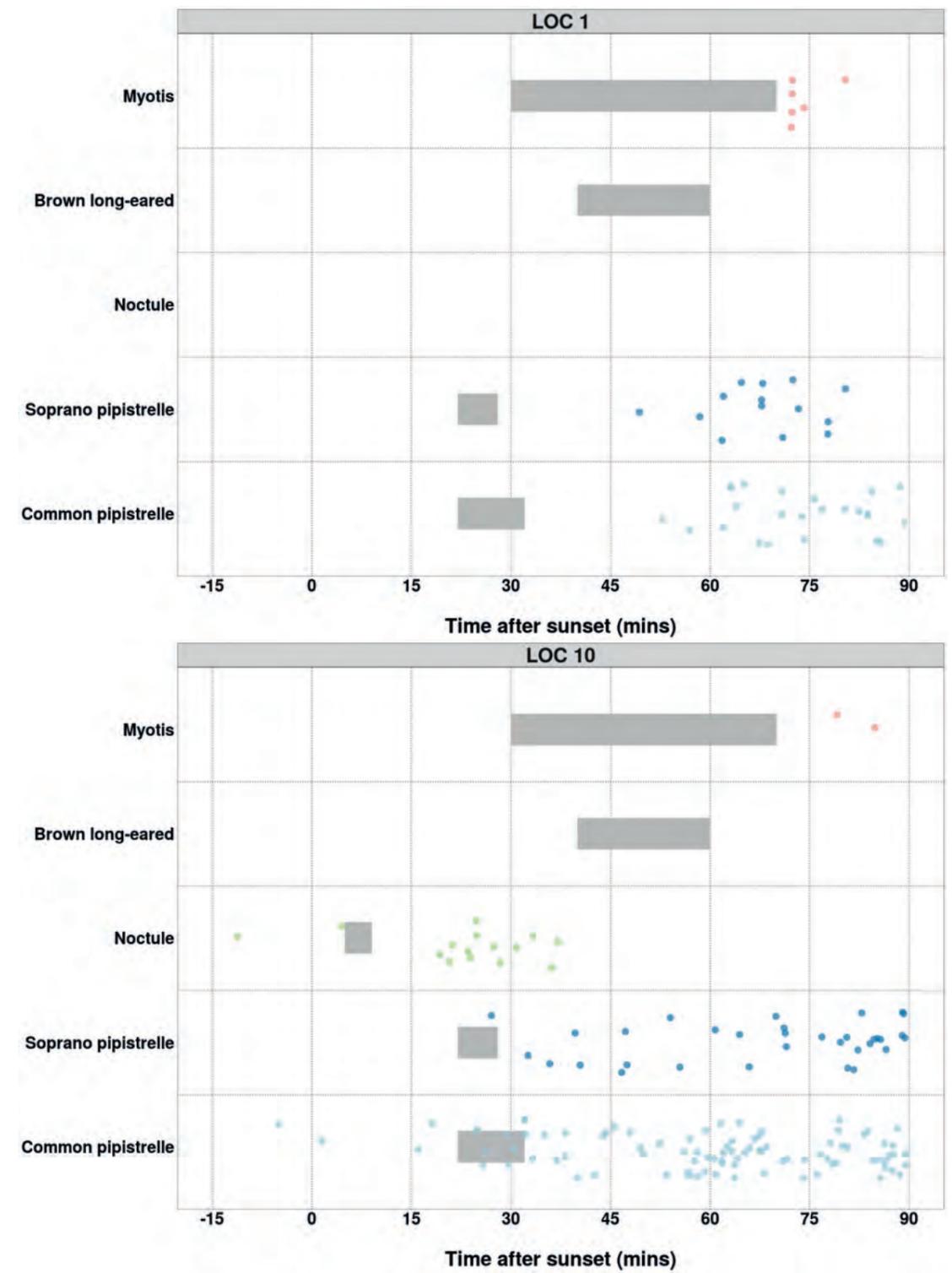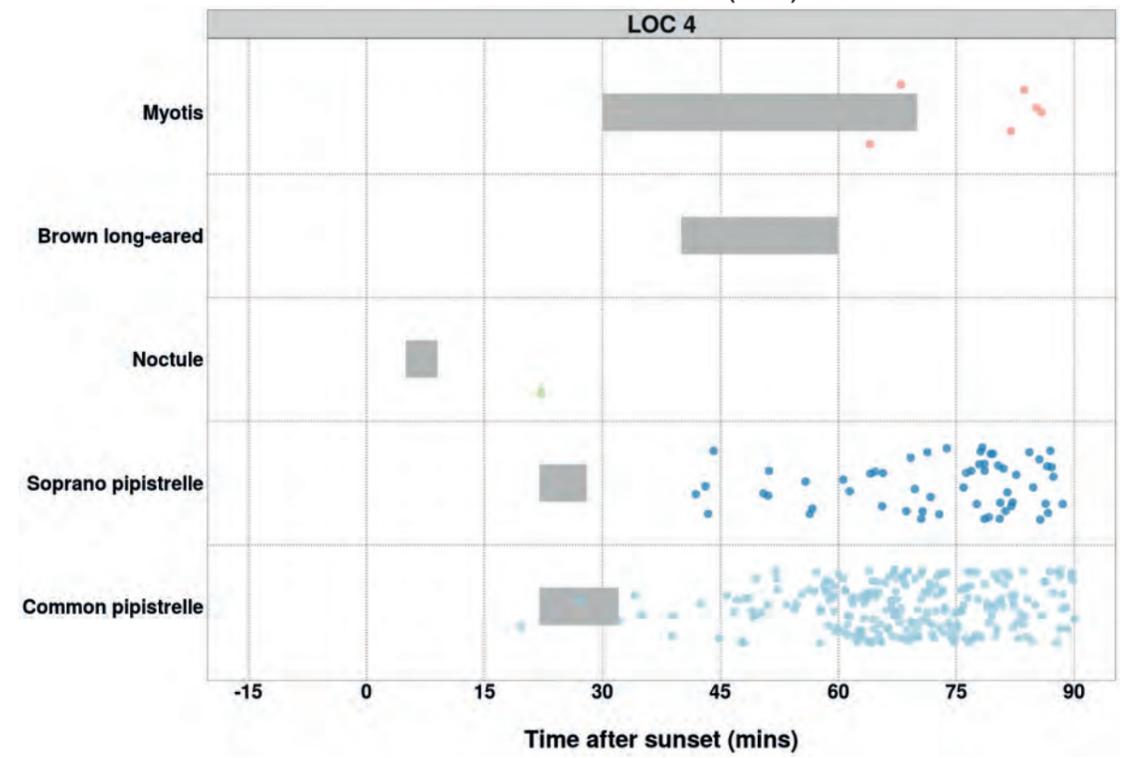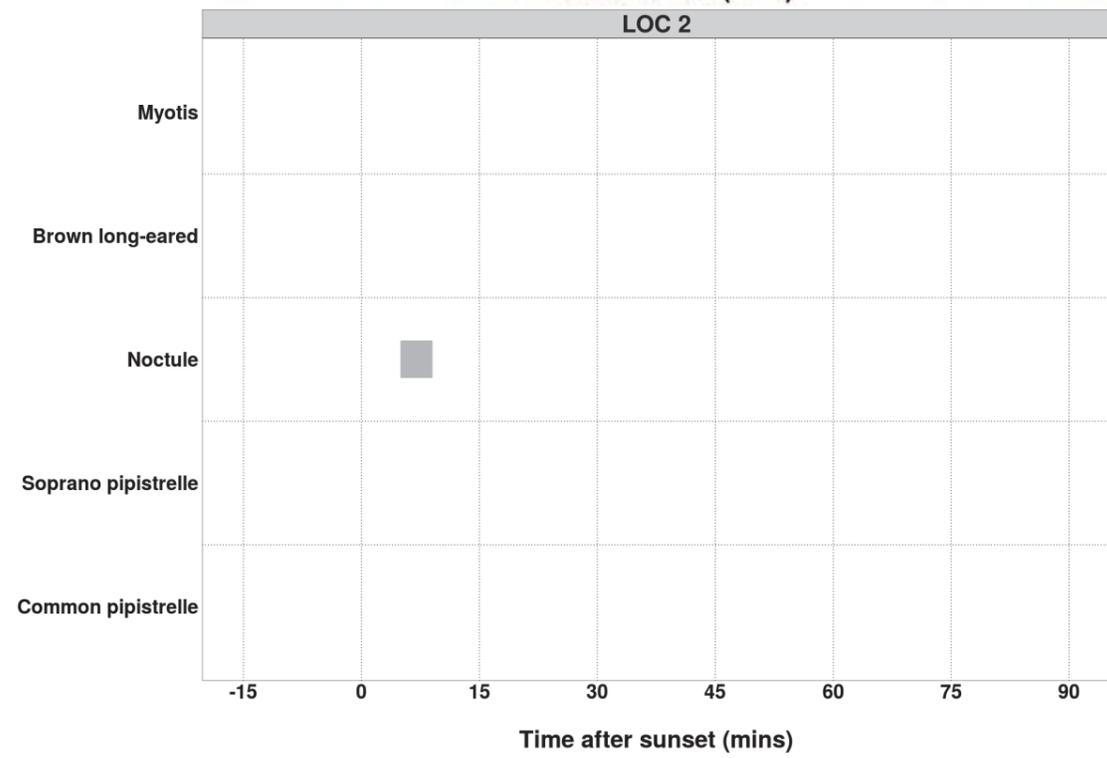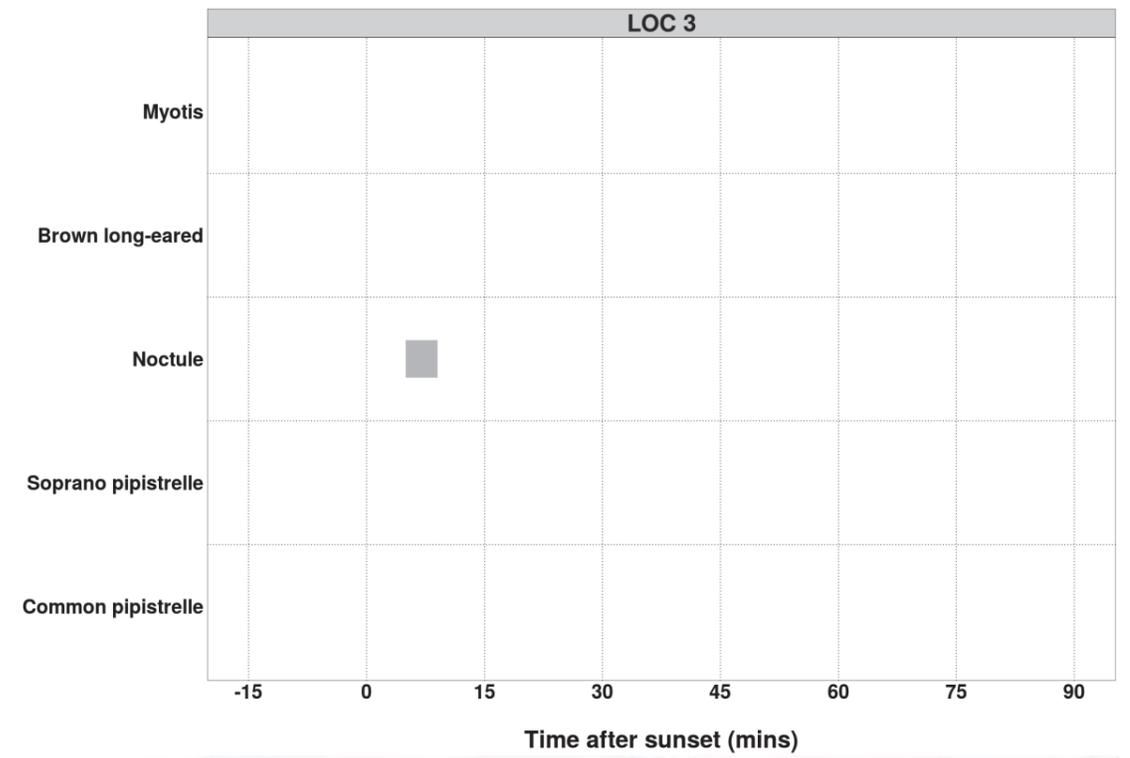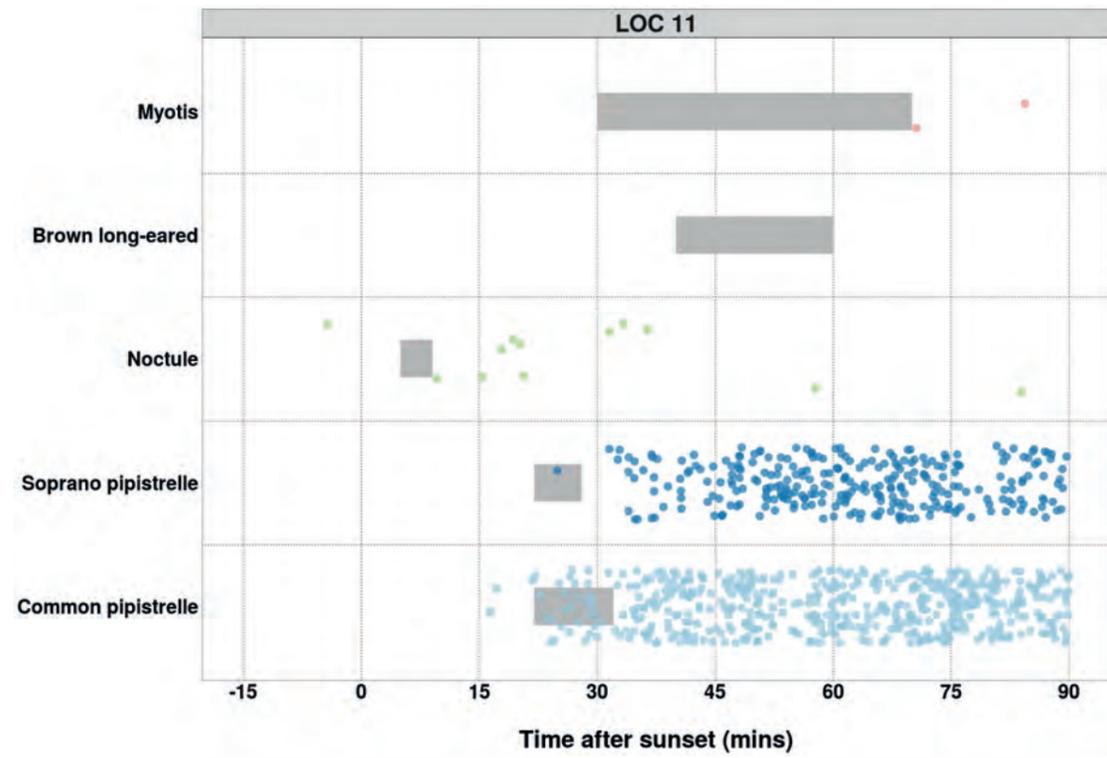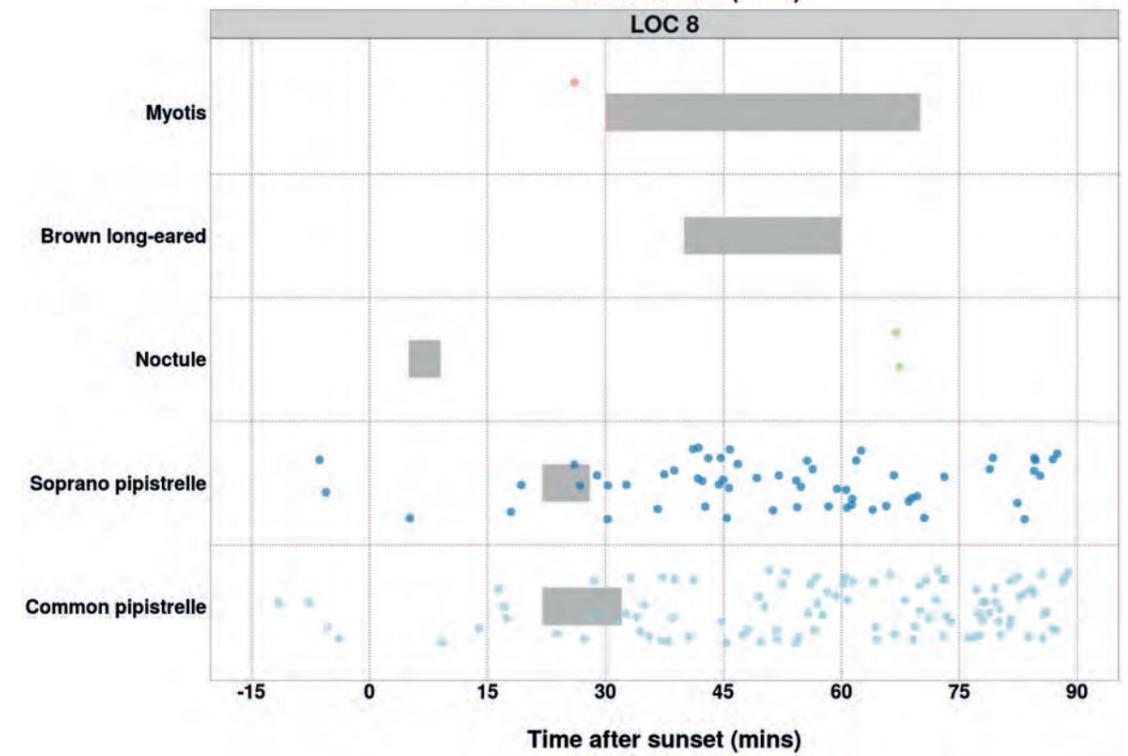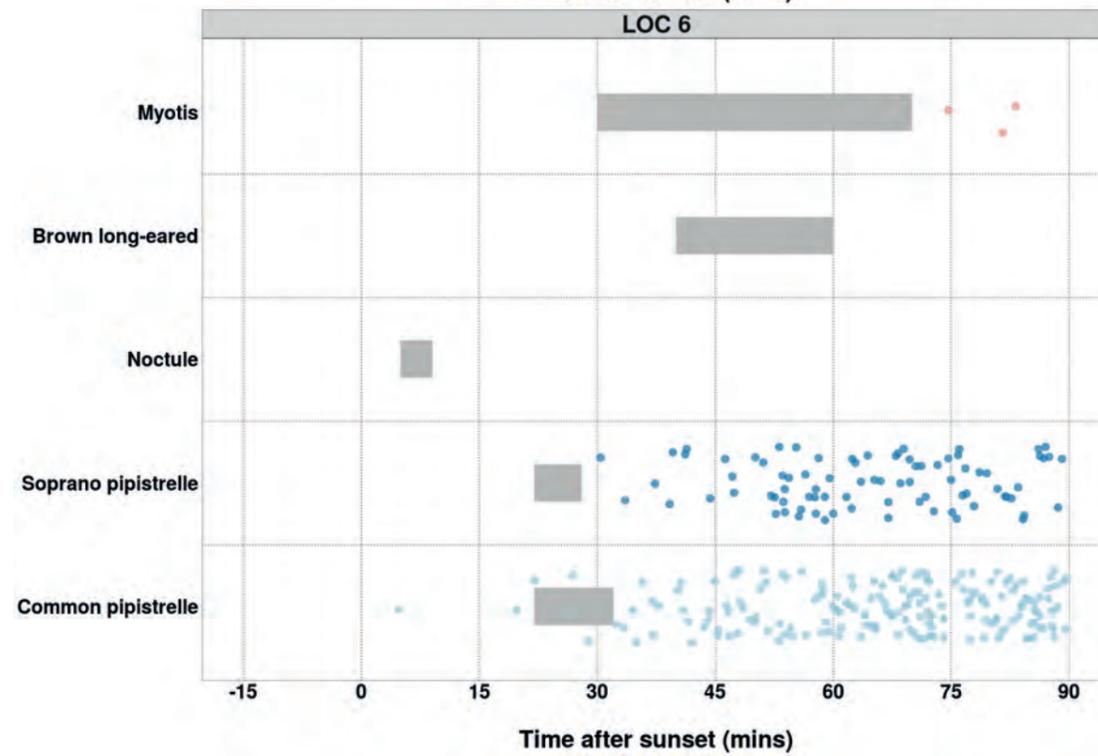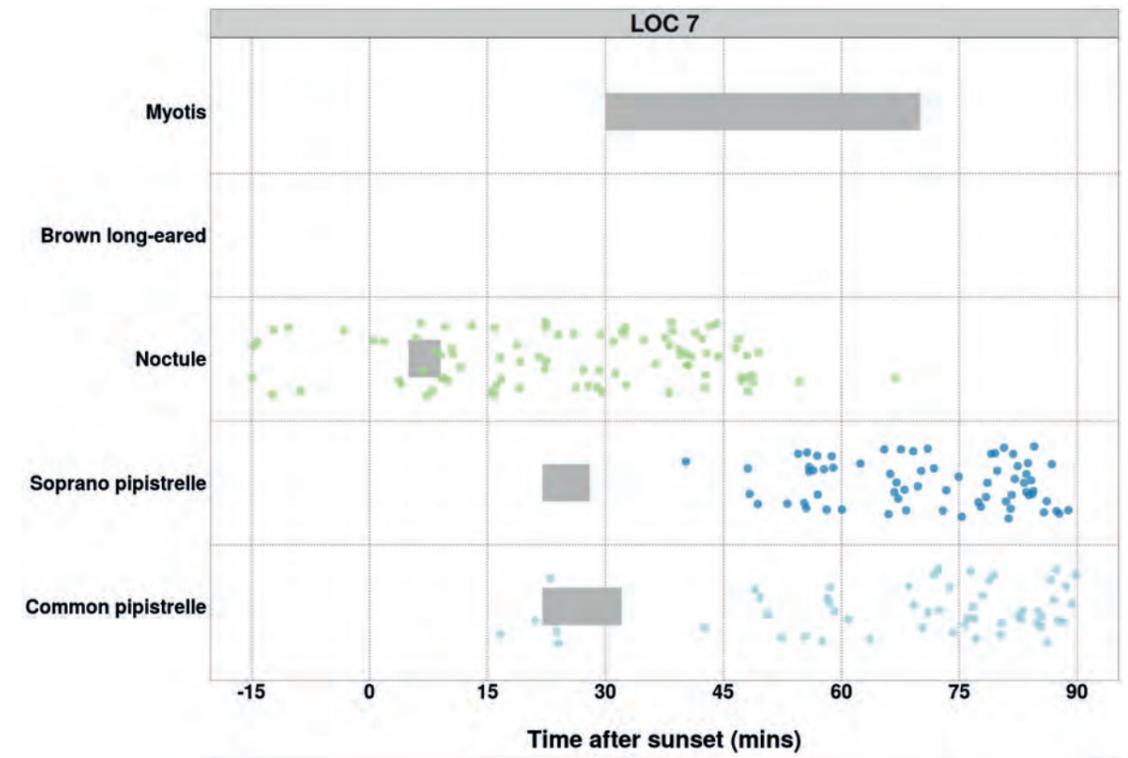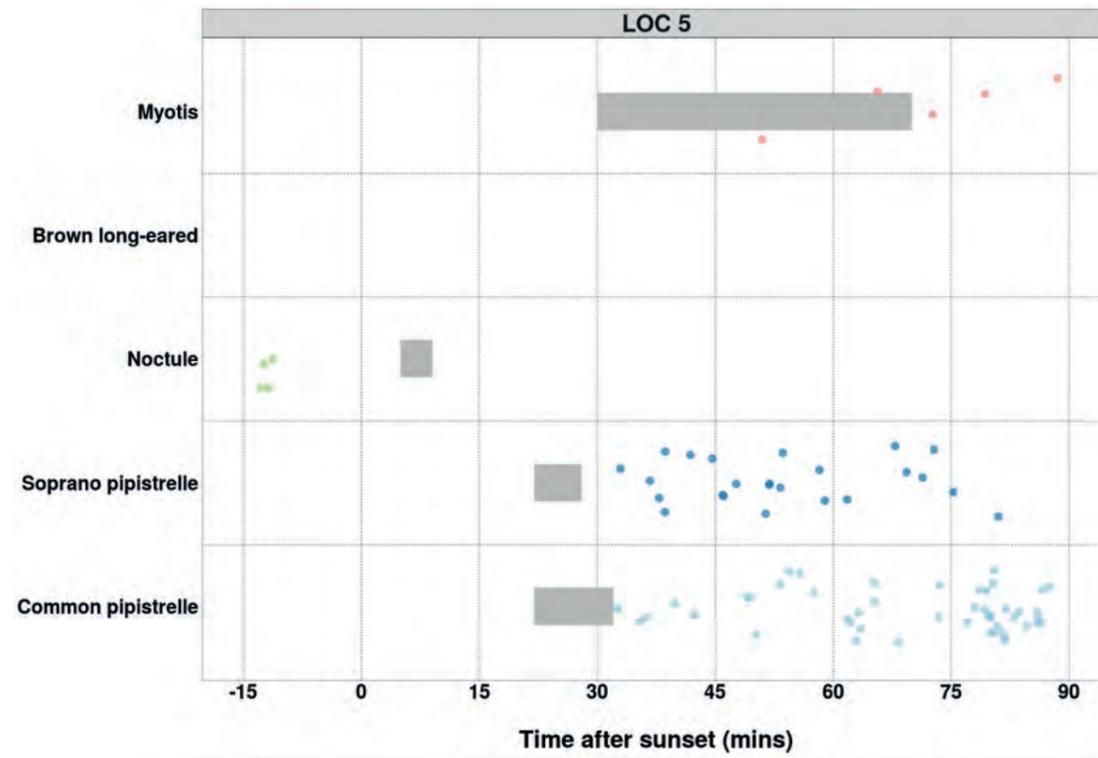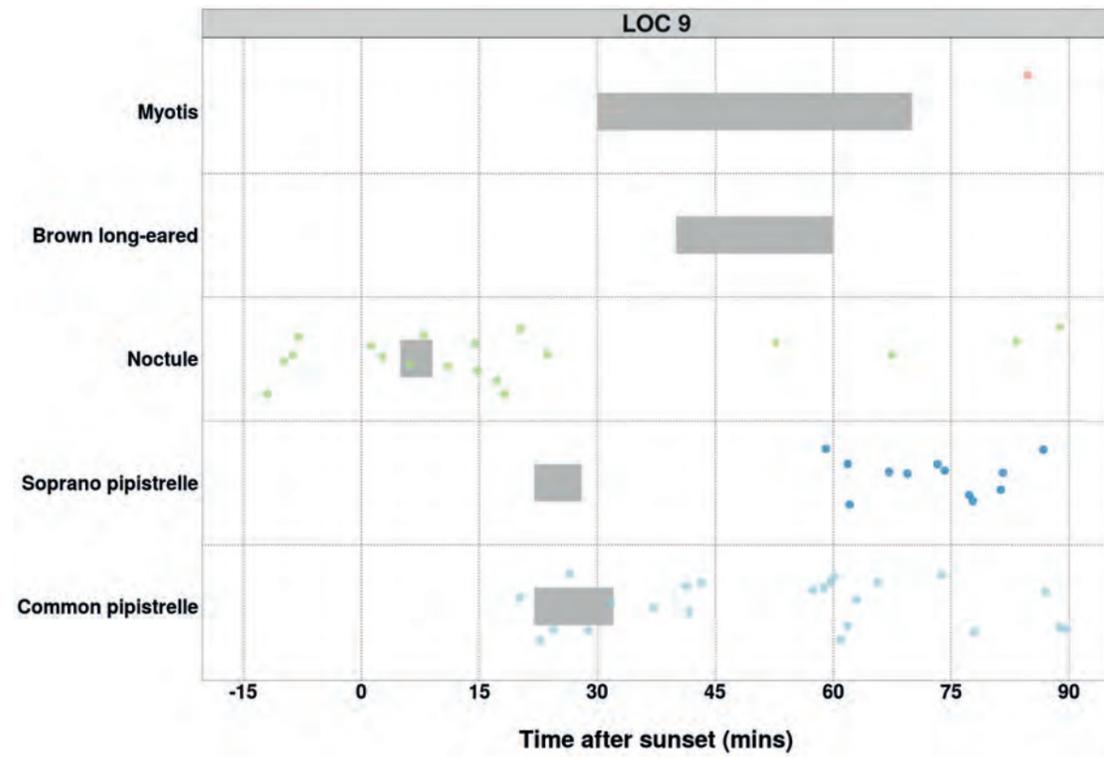
Counts of Bat Passes

All detectors

Table 14. The total number of passes recorded for each species across all of the detectors. The 'Total' percentage may not be exactly 100% due to rounding of the percentages per species.

Species	Passes (No.)	Percentage of total (%)
Common pipistrelle	8553	64.1
Soprano pipistrelle	2853	21.4
Noctule	1553	11.6
Brown long-eared	33	0.2
Myotis	353	2.6
Total	13345	99.9

Counts of Bat Passes

Per Detector

Table 15. The number of passes recorded for each species at each detector.

| Species	Detector ID	Count (No)	Percentage by Detector (%)
Common pipistrelle	LOC 1	36	48.6
Common pipistrelle	LOC 10	1133	81.2
Common pipistrelle	LOC 11	2422	60.7
Common pipistrelle	LOC 4	1514	84.3
Common pipistrelle	LOC 5	97	42.4
Common pipistrelle	LOC 6	1279	70.5
Common pipistrelle	LOC 7	368	22.7
Common pipistrelle	LOC 8	1576	80.4
Common pipistrelle	LOC 9	128	27.8
Soprano pipistrelle	LOC 1	22	29.7
Soprano pipistrelle	LOC 10	149	10.7
Soprano pipistrelle	LOC 11	1268	31.8
Soprano pipistrelle	LOC 4	201	11.2
Soprano pipistrelle	LOC 5	43	18.8
Soprano pipistrelle	LOC 6	406	22.4
Soprano pipistrelle	LOC 7	333	20.6
Soprano pipistrelle	LOC 8	318	16.2
Soprano pipistrelle	LOC 9	113	24.6
Noctule	LOC 10	67	4.8
Noctule	LOC 11	210	5.3
Noctule	LOC 2	8	100.0
Noctule	LOC 3	4	100.0
Noctule	LOC 4	7	0.4
Noctule	LOC 5	65	28.4
Noctule	LOC 6	83	4.6
Noctule	LOC 7	913	56.4
Noctule	LOC 8	10	0.5
Noctule	LOC 9	186	40.4
Brown long-eared	LOC 1	1	1.4
Brown long-eared	LOC 10	5	0.4
Brown long-eared	LOC 11	8	0.2
Brown long-eared	LOC 4	5	0.3
Brown long-eared	LOC 6	3	0.2
Brown long-eared	LOC 8	3	0.2
Brown long-eared	LOC 9	8	1.7
Myotis	LOC 1	15	20.3
Myotis	LOC 10	42	3.0
Myotis	LOC 11	80	2.0
Myotis	LOC 4	68	3.8
Myotis	LOC 5	24	10.5
Myotis	LOC 6	43	2.4
Myotis	LOC 7	4	0.2
Myotis	LOC 8	52	2.7
Myotis	LOC 9	25	5.4

Species Composition

Figure 10. Percentage species composition of passes at each detector.
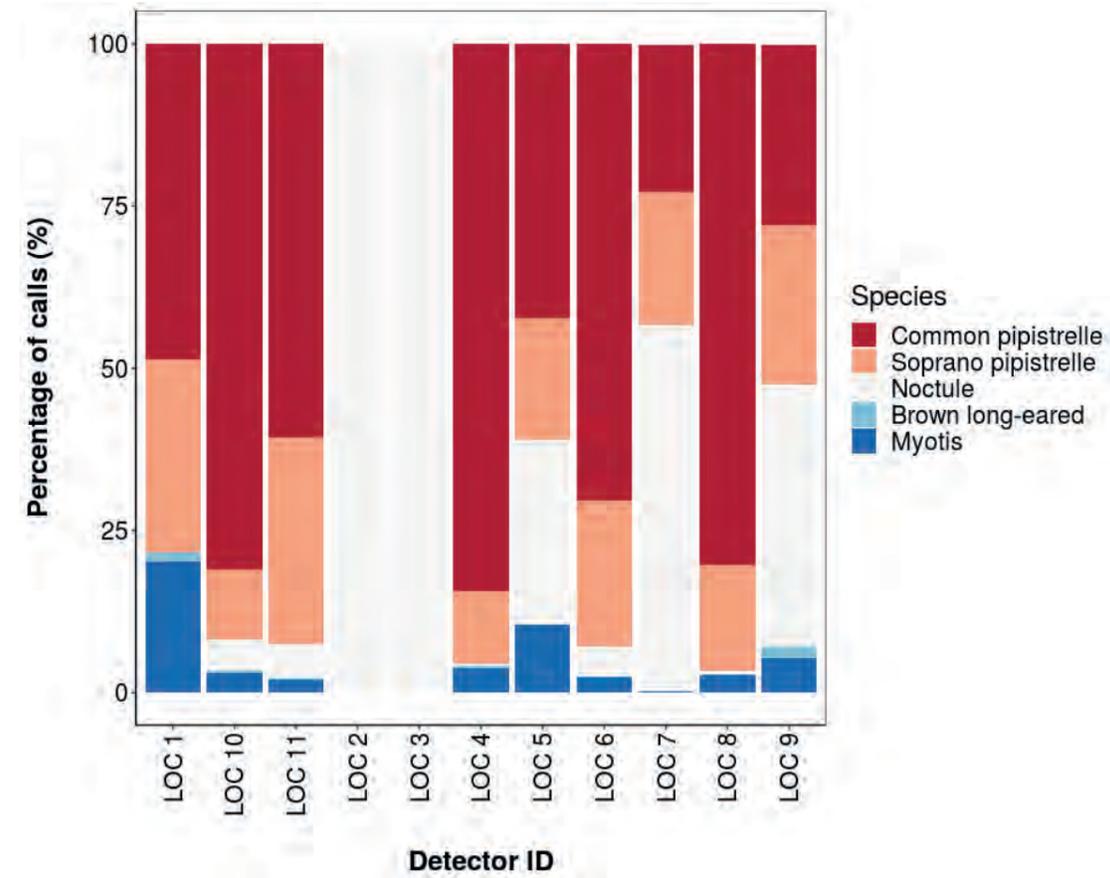
THE NEXT SECTION OF THE REPORT FEATURES THE RAW DATA SUPPLIED TO ECOBAT AND ONLY TAKES INTO ACCOUNT THE PRESENCE, AND NOT THE ABSENCE, OF EACH BAT SPECIES. FOR EACH NIGHT, THERE IS NO 'ZERO DATA' FOR WHEN SPECIES WERE NOT DETECTED.

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

Table 16. The median Nightly Pass Rate (bat passes per hour, per night) of each species. If NA, then no bat passes.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. In these circumstances, the median is likely to be a more useful summary of the 'average' activity than is the mean. For further information see: *Lintott, P. R., & Mathews, F. (2018). Basic mathematical errors may make ecological assessments unreliable. Biodiversity and Conservation, 27(1), 265-267.* https://doi.org/10.1007/s10531-017-1418-5

Species	Detector ID	Median Pass Rate
Common pipistrelle	LOC 1	0.2
Common pipistrelle	LOC 10	2.0
Common pipistrelle	LOC 11	10.0
Common pipistrelle	LOC 4	2.7
Common pipistrelle	LOC 5	0.9
Common pipistrelle	LOC 6	2.8
Common pipistrelle	LOC 7	15.7
Common pipistrelle	LOC 8	4.6
Common pipistrelle	LOC 9	0.6
Soprano pipistrelle	LOC 1	0.2
Soprano pipistrelle	LOC 10	0.3
Soprano pipistrelle	LOC 11	7.5
Soprano pipistrelle	LOC 4	0.5
Soprano pipistrelle	LOC 5	0.3
Soprano pipistrelle	LOC 6	1.2
Soprano pipistrelle	LOC 7	10.6
Soprano pipistrelle	LOC 8	0.7
Soprano pipistrelle	LOC 9	0.8
Noctule	LOC 10	0.3
Noctule	LOC 11	0.3
Noctule	LOC 2	0.3
Noctule	LOC 3	0.3
Noctule	LOC 4	0.1
Noctule	LOC 5	0.2
Noctule	LOC 6	0.2
Noctule	LOC 7	3.2
Noctule	LOC 8	0.1
Noctule	LOC 9	0.9
Brown long-eared	LOC 1	0.1
Brown long-eared	LOC 10	0.1
Brown long-eared	LOC 11	0.1
Brown long-eared	LOC 4	0.1
Brown long-eared	LOC 6	0.1
Brown long-eared	LOC 8	0.1
Brown long-eared	LOC 9	0.2
Myotis	LOC 1	0.3
Myotis	LOC 10	0.3
Myotis	LOC 11	0.5
Myotis	LOC 4	0.7
Myotis	LOC 5	0.2
Myotis	LOC 6	0.3
Myotis	LOC 7	0.4
Myotis	LOC 8	0.4
Myotis	LOC 9	0.4

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

Table 17. The mean Nightly Pass Rate (bat passes per hour, per night) of each species at each detector. Values are given to 1 decimal place.

We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.
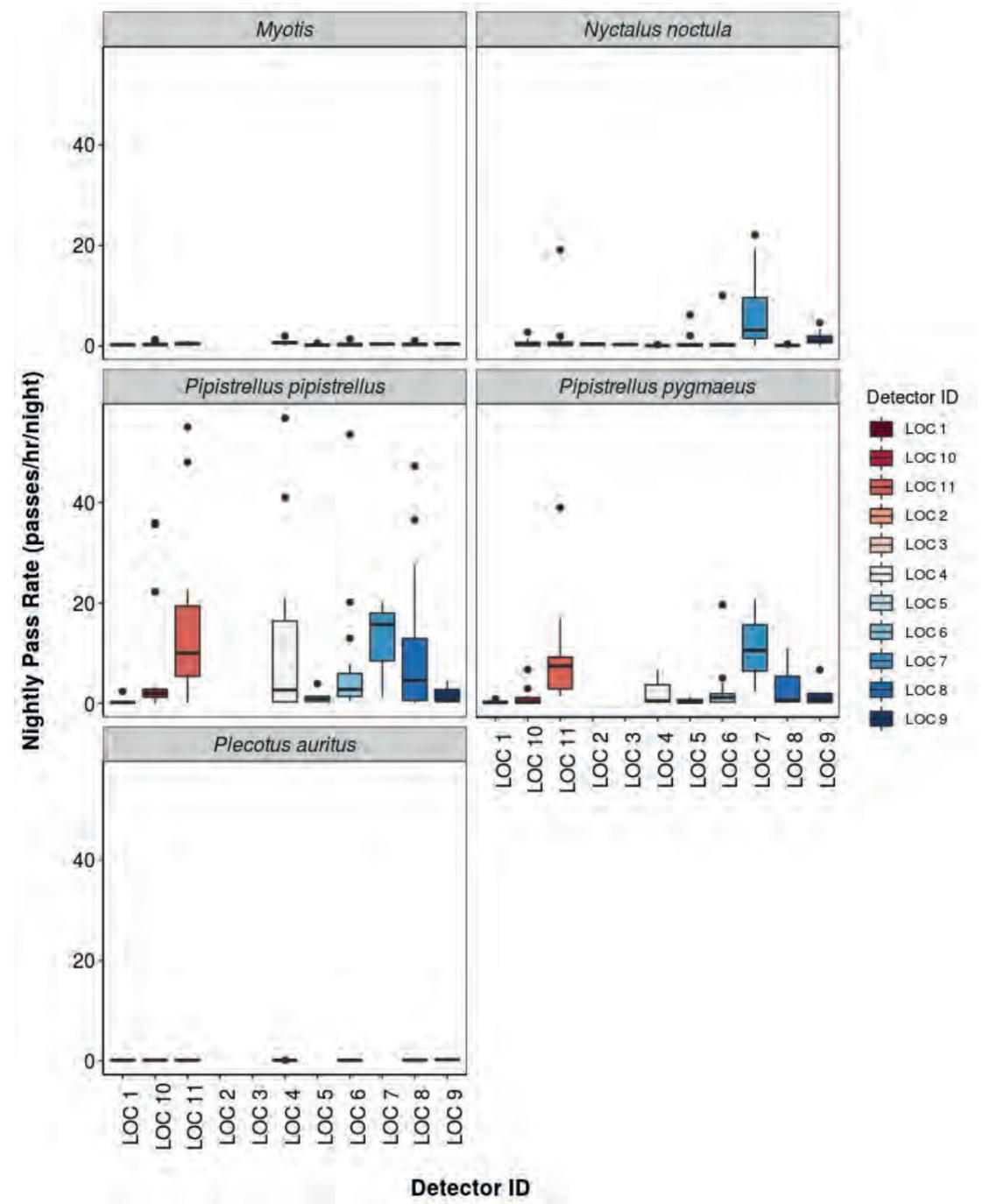
Species	Detector ID	Mean Pass Rate
Common pipistrelle	LOC 1	0.4
Common pipistrelle	LOC 10	7.1
Common pipistrelle	LOC 11	14.9
Common pipistrelle	LOC 4	12.3
Common pipistrelle	LOC 5	1.2
Common pipistrelle	LOC 6	7.6
Common pipistrelle	LOC 7	12.4
Common pipistrelle	LOC 8	9.8
Common pipistrelle	LOC 9	1.6
Soprano pipistrelle	LOC 1	0.3
Soprano pipistrelle	LOC 10	1.2
Soprano pipistrelle	LOC 11	8.5
Soprano pipistrelle	LOC 4	2.0
Soprano pipistrelle	LOC 5	0.5
Soprano pipistrelle	LOC 6	2.5
Soprano pipistrelle	LOC 7	11.2
Soprano pipistrelle	LOC 8	2.7
Soprano pipistrelle	LOC 9	1.6
Noctule	LOC 10	0.6
Noctule	LOC 11	1.3
Noctule	LOC 2	0.4
Noctule	LOC 3	0.3
Noctule	LOC 4	0.1
Noctule	LOC 5	1.1
Noctule	LOC 6	1.3
Noctule	LOC 7	6.0
Noctule	LOC 8	0.2
Noctule	LOC 9	1.4
Brown long-eared	LOC 1	0.1
Brown long-eared	LOC 10	0.1
Brown long-eared	LOC 11	0.2
Brown long-eared	LOC 4	0.1
Brown long-eared	LOC 6	0.1
Brown long-eared	LOC 8	0.1
Brown long-eared	LOC 9	0.2
Myotis	LOC 1	0.3
Myotis	LOC 10	0.5
Myotis	LOC 11	0.5
Myotis	LOC 4	0.7
Myotis	LOC 5	0.2
Myotis	LOC 6	0.4
Myotis	LOC 7	0.4
Myotis	LOC 8	0.4
Myotis	LOC 9	0.4

Nightly Bat Passes (Bat passes per hour)

Per Detector - Figures

Figure 11. Boxplots for the number of bat passes per hour each night, for each detector. 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.

SPLIT BY MONTH

Total Bat Passes per Detector, each Month

Per Detector

Table 18. The total number of bat passes of each species in each month at each detector. This table simply tells you how many bats of each species were recorded passing each detector during each month. These numbers are not standardised by the night length, or how many nights each detector was active for during each month.

Species	Detector ID	May	Jun	Jul	Aug	Sep
Common pipistrelle	LOC 1	0	0	2	29	5
Common pipistrelle	LOC 10	0	0	21	644	468
Common pipistrelle	LOC 11	0	0	428	950	1044
Common pipistrelle	LOC 4	0	0	0	555	959
Common pipistrelle	LOC 5	0	0	0	47	50
Common pipistrelle	LOC 6	0	0	50	703	526
Common pipistrelle	LOC 7	0	0	0	368	0
Common pipistrelle	LOC 8	0	0	629	493	454
Common pipistrelle	LOC 9	0	0	0	122	6
Soprano pipistrelle	LOC 1	0	0	1	14	7
Soprano pipistrelle	LOC 10	0	0	1	87	61
Soprano pipistrelle	LOC 11	0	0	148	581	539
Soprano pipistrelle	LOC 4	0	0	0	122	79
Soprano pipistrelle	LOC 5	0	0	0	25	18
Soprano pipistrelle	LOC 6	0	0	4	257	145
Soprano pipistrelle	LOC 7	0	0	0	333	0
Soprano pipistrelle	LOC 8	0	0	144	71	103
Soprano pipistrelle	LOC 9	0	0	0	108	5
Noctule	LOC 10	51	14	0	2	0
Noctule	LOC 11	159	12	2	13	24
Noctule	LOC 2	1	7	0	0	0
Noctule	LOC 3	0	4	0	0	0
Noctule	LOC 4	0	0	0	4	3
Noctule	LOC 5	21	40	0	1	3
Noctule	LOC 6	0	64	3	10	6
Noctule	LOC 7	628	272	12	1	0
Noctule	LOC 8	5	0	1	1	3
Noctule	LOC 9	53	127	0	6	0
Brown long-eared	LOC 1	0	0	0	1	0
Brown long-eared	LOC 10	0	0	0	3	2
Brown long-eared	LOC 11	0	0	0	4	4
Brown long-eared	LOC 4	0	0	0	2	3
Brown long-eared	LOC 6	0	0	0	1	2
Brown long-eared	LOC 8	0	0	0	0	3
Brown long-eared	LOC 9	0	0	0	8	0
Myotis	LOC 1	0	0	0	8	7
Myotis	LOC 10	0	0	0	18	24
Myotis	LOC 11	0	0	6	45	29
Myotis	LOC 4	0	0	0	20	48
Myotis	LOC 5	0	0	0	13	11
Myotis	LOC 6	0	0	2	12	29
Myotis	LOC 7	0	0	0	4	0
Myotis	LOC 8	0	0	4	18	30
Myotis	LOC 9	0	0	0	25	0

Survey Effort

Table 19. The number of survey nights per month per detector.

Month	Detector ID	No. of Survey Nights
May	LOC 10	10
May	LOC 11	7
May	LOC 2	1
May	LOC 5	5
May	LOC 7	11
May	LOC 8	3
May	LOC 9	7
Jun	LOC 10	5
Jun	LOC 11	5
Jun	LOC 2	2
Jun	LOC 3	2
Jun	LOC 5	1
Jun	LOC 6	1
Jun	LOC 7	10
Jun	LOC 9	10
Jul	LOC 1	1
Jul	LOC 10	2
Jul	LOC 11	4
Jul	LOC 6	3
Jul	LOC 7	1
Jul	LOC 8	7
Aug	LOC 1	6
Aug	LOC 10	8
Aug	LOC 11	9
Aug	LOC 4	4
Aug	LOC 5	3
Aug	LOC 6	8
Aug	LOC 7	3
Aug	LOC 8	3
Aug	LOC 9	7
Sep	LOC 1	6
Sep	LOC 10	8
Sep	LOC 11	5
Sep	LOC 4	8
Sep	LOC 5	8
Sep	LOC 6	6
Sep	LOC 8	9
Sep	LOC 9	2

Nightly Bat Pass Rate for each Month

Median Per Detector

Table 20. The median Nightly Pass Rate (bat passes per hour, per night) of each species throughout each month. If NA, then no bat passes.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. In these circumstances, the median is likely to be a more useful summary of the 'average' activity than is the mean. For further information see: *Lintott, P. R., & Mathews, F. (2018). Basic mathematical errors may make ecological assessments unreliable. Biodiversity and Conservation, 27(1), 265-267.*
https://doi.org/10.1007/s10531-017-1418-5

Species	Detector ID	May	Jun	Jul	Aug	Sep
Common pipistrelle	LOC 1	NA	NA	0.3	0.1	0.2
Common pipistrelle	LOC 10	NA	NA	1.4	1.8	2.0
Common pipistrelle	LOC 11	NA	NA	4.3	11.2	20.5
Common pipistrelle	LOC 4	NA	NA	NA	7.6	2.7
Common pipistrelle	LOC 5	NA	NA	NA	2.4	0.7
Common pipistrelle	LOC 6	NA	NA	2.4	1.9	5.7
Common pipistrelle	LOC 7	NA	NA	NA	15.7	NA
Common pipistrelle	LOC 8	NA	NA	11.2	1.7	1.6
Common pipistrelle	LOC 9	NA	NA	NA	1.9	0.3
Soprano pipistrelle	LOC 1	NA	NA	0.1	0.4	0.2
Soprano pipistrelle	LOC 10	NA	NA	0.1	0.3	0.7
Soprano pipistrelle	LOC 11	NA	NA	9.7	7.2	1.6
Soprano pipistrelle	LOC 4	NA	NA	NA	5.4	0.4
Soprano pipistrelle	LOC 5	NA	NA	NA	1.1	0.2
Soprano pipistrelle	LOC 6	NA	NA	0.3	0.8	1.6
Soprano pipistrelle	LOC 7	NA	NA	NA	10.6	NA
Soprano pipistrelle	LOC 8	NA	NA	5.0	0.8	0.5
Soprano pipistrelle	LOC 9	NA	NA	NA	1.5	0.2
Noctule	LOC 10	0.3	0.3	NA	0.1	NA
Noctule	LOC 11	0.6	0.3	0.3	0.3	0.2
Noctule	LOC 2	0.2	0.6	NA	NA	NA
Noctule	LOC 3	NA	0.3	NA	NA	NA
Noctule	LOC 4	NA	NA	NA	0.2	0.1
Noctule	LOC 5	0.3	6.2	NA	0.1	0.2
Noctule	LOC 6	NA	10.0	0.1	0.3	0.3
Noctule	LOC 7	5.6	2.9	1.6	0.1	NA
Noctule	LOC 8	0.2	NA	0.2	0.1	0.1
Noctule	LOC 9	0.8	1.8	NA	0.1	NA
Brown long-eared	LOC 1	NA	NA	NA	0.1	NA
Brown long-eared	LOC 10	NA	NA	NA	0.2	0.1
Brown long-eared	LOC 11	NA	NA	NA	0.1	0.2
Brown long-eared	LOC 4	NA	NA	NA	0.1	0.1
Brown long-eared	LOC 6	NA	NA	NA	0.1	0.1
Brown long-eared	LOC 8	NA	NA	NA	NA	0.1
Brown long-eared	LOC 9	NA	NA	NA	0.2	NA
Myotis	LOC 1	NA	NA	NA	0.3	0.3
Myotis	LOC 10	NA	NA	NA	0.2	0.5
Myotis	LOC 11	NA	NA	0.1	0.6	0.5
Myotis	LOC 4	NA	NA	NA	0.7	0.6
Myotis	LOC 5	NA	NA	NA	0.4	0.1
Myotis	LOC 6	NA	NA	0.1	0.3	0.5
Myotis	LOC 7	NA	NA	NA	0.4	NA
Myotis	LOC 8	NA	NA	0.2	0.9	0.4
Myotis	LOC 9	NA	NA	NA	0.4	NA

Nightly Bat Pass Rate for each Month

Mean per Detector

Table 21: The mean Nightly Pass Rate (bat passes per hour, per night) of each species throughout each month. Values are given to 1 decimal place.

We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	May	Jun	Jul	Aug	Sep
Common pipistrelle	LOC 1	NA	NA	0.3	0.6	0.2
Common pipistrelle	LOC 10	NA	NA	1.4	8.3	7.4
Common pipistrelle	LOC 11	NA	NA	14.2	12.2	20.2
Common pipistrelle	LOC 4	NA	NA	NA	14.1	11.5
Common pipistrelle	LOC 5	NA	NA	NA	2.4	0.8
Common pipistrelle	LOC 6	NA	NA	2.2	9.1	8.5
Common pipistrelle	LOC 7	NA	NA	NA	12.4	NA
Common pipistrelle	LOC 8	NA	NA	13.3	16.5	4.8
Common pipistrelle	LOC 9	NA	NA	NA	2.0	0.3
Soprano pipistrelle	LOC 1	NA	NA	0.1	0.5	0.2
Soprano pipistrelle	LOC 10	NA	NA	0.1	1.5	1.0
Soprano pipistrelle	LOC 11	NA	NA	9.7	7.1	10.4
Soprano pipistrelle	LOC 4	NA	NA	NA	4.1	1.1
Soprano pipistrelle	LOC 5	NA	NA	NA	0.8	0.3
Soprano pipistrelle	LOC 6	NA	NA	0.3	3.3	2.3
Soprano pipistrelle	LOC 7	NA	NA	NA	11.2	NA
Soprano pipistrelle	LOC 8	NA	NA	5.3	2.4	1.4
Soprano pipistrelle	LOC 9	NA	NA	NA	2.0	0.2
Noctule	LOC 10	0.8	0.4	NA	0.1	NA
Noctule	LOC 11	3.4	0.4	0.3	0.4	0.5
Noctule	LOC 2	0.2	0.6	NA	NA	NA
Noctule	LOC 3	NA	0.3	NA	NA	NA
Noctule	LOC 4	NA	NA	NA	0.2	0.1
Noctule	LOC 5	0.6	6.2	NA	0.1	0.2
Noctule	LOC 6	NA	10.0	0.1	0.4	0.3
Noctule	LOC 7	8.5	4.3	1.6	0.1	NA
Noctule	LOC 8	0.2	NA	0.2	0.1	0.1
Noctule	LOC 9	1.1	2.0	NA	0.2	NA
Brown long-eared	LOC 1	NA	NA	NA	0.1	NA
Brown long-eared	LOC 10	NA	NA	NA	0.2	0.1
Brown long-eared	LOC 11	NA	NA	NA	0.2	0.2
Brown long-eared	LOC 4	NA	NA	NA	0.1	0.1
Brown long-eared	LOC 6	NA	NA	NA	0.1	0.1
Brown long-eared	LOC 8	NA	NA	NA	NA	0.1
Brown long-eared	LOC 9	NA	NA	NA	0.2	NA
Myotis	LOC 1	NA	NA	NA	0.3	0.2
Myotis	LOC 10	NA	NA	NA	0.5	0.5
Myotis	LOC 11	NA	NA	0.3	0.6	0.6
Myotis	LOC 4	NA	NA	NA	0.7	0.8
Myotis	LOC 5	NA	NA	NA	0.4	0.2
Myotis	LOC 6	NA	NA	0.1	0.3	0.6
Myotis	LOC 7	NA	NA	NA	0.4	NA
Myotis	LOC 8	NA	NA	0.2	0.9	0.4
Myotis	LOC 9	NA	NA	NA	0.4	NA

# Nightly Bat Pass Rate for each Month

Per Detector - Figures

Figure 12. Figures show boxplots for the number of bat passes per hour by detector, for each month. 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.
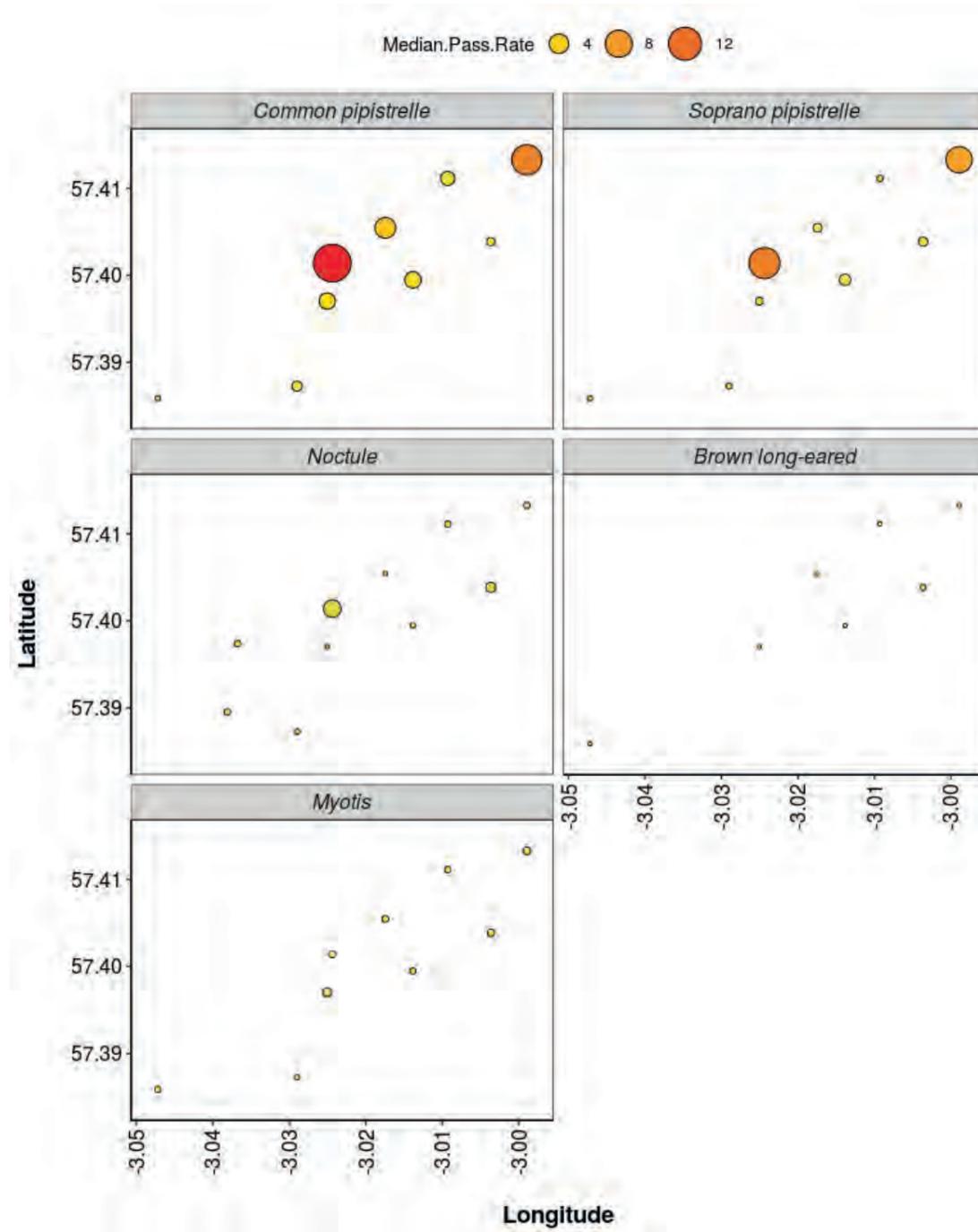

Myotis

Noctule

Common pipistrelle

Soprano pipistrelle

Brown long-eared
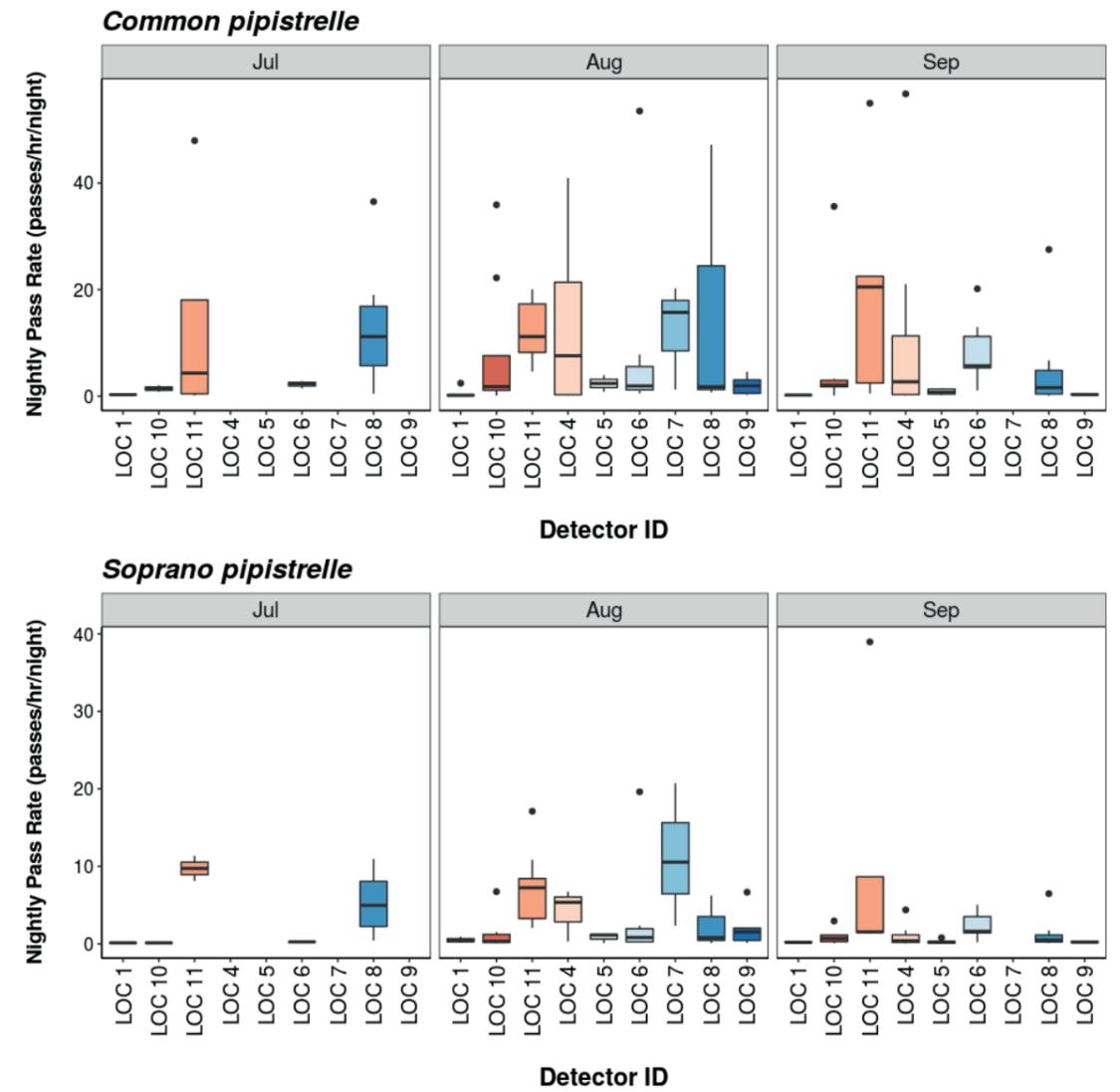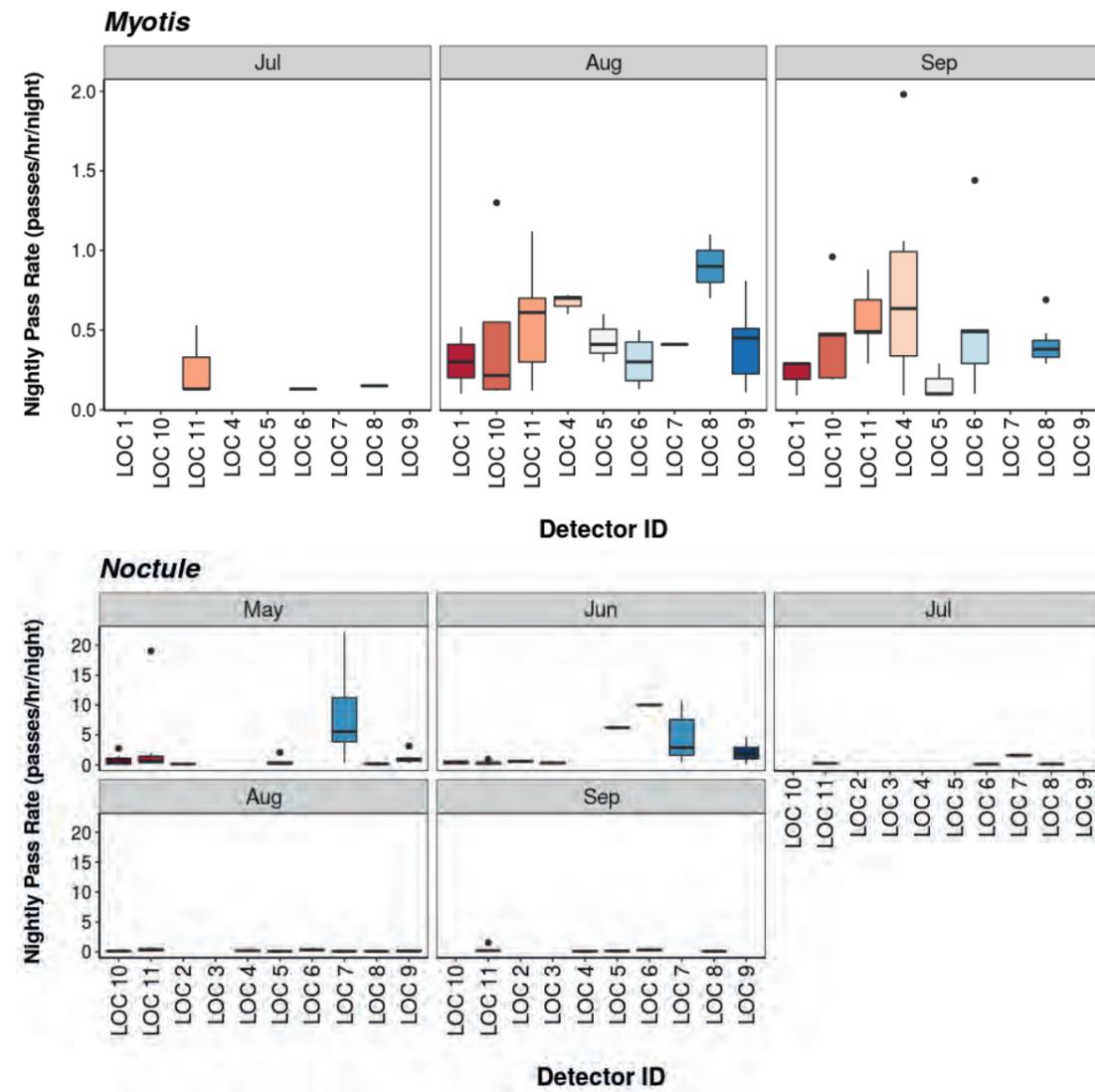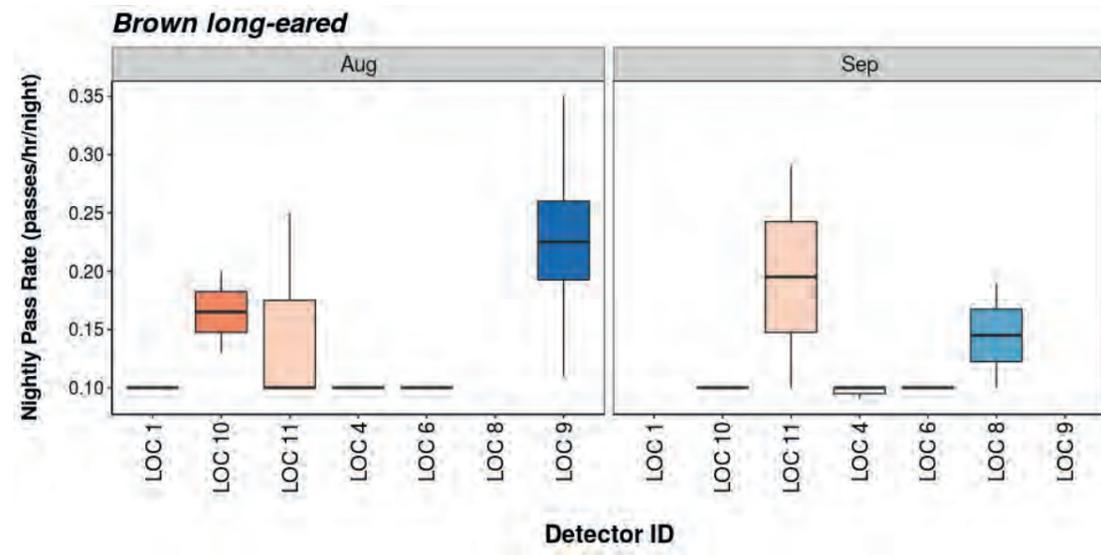
## Bat Activity per Detector Location

Figure 13. Detector ID reference:
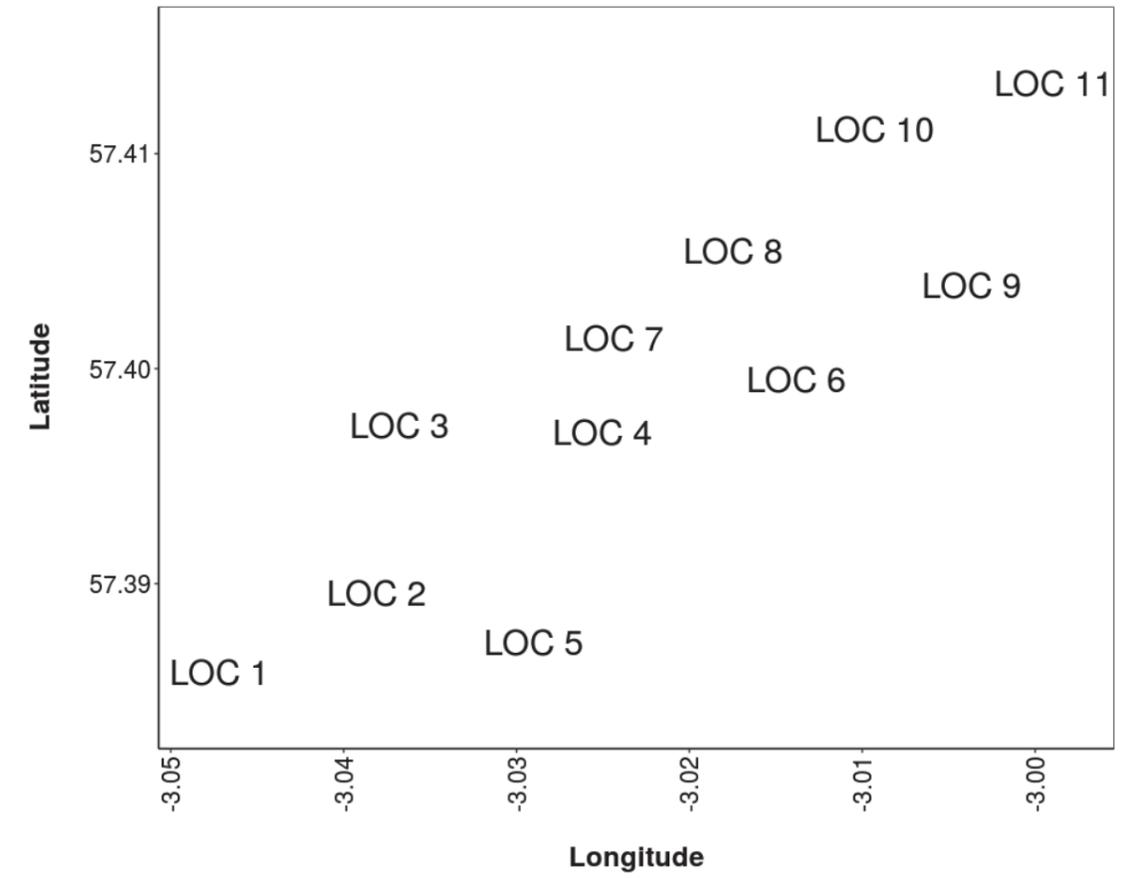
Figure 14. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

Figure 15. 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.
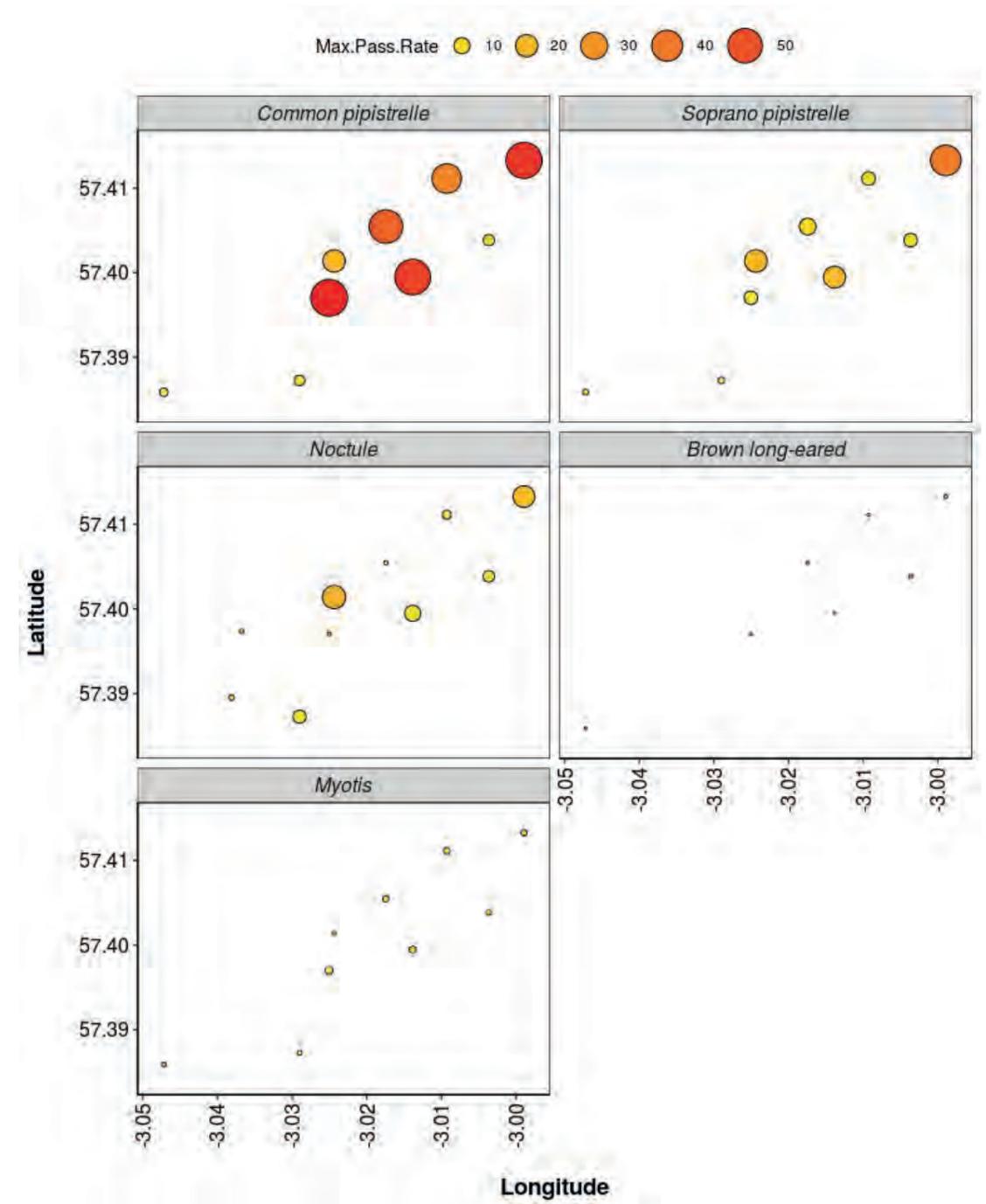
PART 2B: Includes absences

THE NEXT SECTION OF THE REPORT FEATURES THE DATA SUPPLIED TO ECOBAT BUT TAKES INTO ACCOUNT SPECIES ABSENCES, AND THEREFORE INCLUDES 'ZERO DATA' FOR WHEN SPECIES WERE NOT DETECTED AT EACH DETECTOR ON A NIGHT. THIS DRAMATICALLY LOWERS THE MEANS AND MEDIANS OF THE DATA PRESENTED.

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

Table 22. The median Nightly Pass Rate (bat passes per hour, per night) of each species. If NA, then no bat passes.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. In these circumstances, the median is likely to be a more useful summary of the 'average' activity than is the mean. For further information see: *Lintott, P. R., & Mathews, F. (2018). Basic mathematical errors may make ecological assessments unreliable. Biodiversity and Conservation, 27(1), 265-267.* https://doi.org/10.1007/s10531-017-1418-5

Species	Detector ID	Median Pass Rate
Brown long-eared	LOC 1	0.0
Brown long-eared	LOC 10	0.0
Brown long-eared	LOC 11	0.0
Brown long-eared	LOC 2	0.0
Brown long-eared	LOC 3	0.0
Brown long-eared	LOC 4	0.0
Brown long-eared	LOC 5	0.0
Brown long-eared	LOC 6	0.0
Brown long-eared	LOC 7	0.0
Brown long-eared	LOC 8	0.0
Brown long-eared	LOC 9	0.0
Common pipistrelle	LOC 1	0.1
Common pipistrelle	LOC 10	0.0
Common pipistrelle	LOC 11	1.5
Common pipistrelle	LOC 2	0.0
Common pipistrelle	LOC 3	0.0
Common pipistrelle	LOC 4	2.7
Common pipistrelle	LOC 5	0.0
Common pipistrelle	LOC 6	2.6
Common pipistrelle	LOC 7	0.0
Common pipistrelle	LOC 8	1.8
Common pipistrelle	LOC 9	0.0
Myotis	LOC 1	0.0
Myotis	LOC 10	0.0
Myotis	LOC 11	0.1
Myotis	LOC 2	0.0

Myotis	LOC 3	0.0
Myotis	LOC 4	0.5
Myotis	LOC 5	0.1
Myotis	LOC 6	0.1
Myotis	LOC 7	0.0
Myotis	LOC 8	0.2
Myotis	LOC 9	0.0
Noctule	LOC 1	0.0
Noctule	LOC 10	0.1
Noctule	LOC 11	0.2
Noctule	LOC 2	0.3
Noctule	LOC 3	0.3
Noctule	LOC 4	0.0
Noctule	LOC 5	0.1
Noctule	LOC 6	0.0
Noctule	LOC 7	3.0
Noctule	LOC 8	0.0
Noctule	LOC 9	0.8
Soprano pipistrelle	LOC 1	0.1
Soprano pipistrelle	LOC 10	0.0
Soprano pipistrelle	LOC 11	1.4
Soprano pipistrelle	LOC 2	0.0
Soprano pipistrelle	LOC 3	0.0
Soprano pipistrelle	LOC 4	0.4
Soprano pipistrelle	LOC 5	0.1
Soprano pipistrelle	LOC 6	0.8
Soprano pipistrelle	LOC 7	0.0
Soprano pipistrelle	LOC 8	0.2
Soprano pipistrelle	LOC 9	0.0

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

Table 23. The mean Nightly Pass Rate (bat passes per hour, per night) of each species at each detector. Values are given to 1 decimal place.

We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Mean Pass Rate
Brown long-eared	LOC 1	0.0
Brown long-eared	LOC 10	0.0
Brown long-eared	LOC 11	0.0
Brown long-eared	LOC 2	0.0
Brown long-eared	LOC 3	0.0
Brown long-eared	LOC 4	0.0
Brown long-eared	LOC 5	0.0
Brown long-eared	LOC 6	0.0
Brown long-eared	LOC 7	0.0
Brown long-eared	LOC 8	0.0
Brown long-eared	LOC 9	0.0
Common pipistrelle	LOC 1	0.3
Common pipistrelle	LOC 10	3.4
Common pipistrelle	LOC 11	8.9
Common pipistrelle	LOC 2	0.0
Common pipistrelle	LOC 3	0.0
Common pipistrelle	LOC 4	12.3
Common pipistrelle	LOC 5	0.6
Common pipistrelle	LOC 6	7.2
Common pipistrelle	LOC 7	1.5
Common pipistrelle	LOC 8	8.5
Common pipistrelle	LOC 9	0.6
Myotis	LOC 1	0.1
Myotis	LOC 10	0.1
Myotis	LOC 11	0.3
Myotis	LOC 2	0.0
Myotis	LOC 3	0.0
Myotis	LOC 4	0.6
Myotis	LOC 5	0.1

Myotis	LOC 6	0.2
Myotis	LOC 7	0.0
Myotis	LOC 8	0.2
Myotis	LOC 9	0.1
Noctule	LOC 1	0.0
Noctule	LOC 10	0.3
Noctule	LOC 11	1.0
Noctule	LOC 2	0.4
Noctule	LOC 3	0.3
Noctule	LOC 4	0.1
Noctule	LOC 5	0.6
Noctule	LOC 6	0.7
Noctule	LOC 7	5.5
Noctule	LOC 8	0.1
Noctule	LOC 9	1.1
Soprano pipistrelle	LOC 1	0.2
Soprano pipistrelle	LOC 10	0.5
Soprano pipistrelle	LOC 11	4.5
Soprano pipistrelle	LOC 2	0.0
Soprano pipistrelle	LOC 3	0.0
Soprano pipistrelle	LOC 4	1.7
Soprano pipistrelle	LOC 5	0.3
Soprano pipistrelle	LOC 6	2.3
Soprano pipistrelle	LOC 7	1.3
Soprano pipistrelle	LOC 8	1.7
Soprano pipistrelle	LOC 9	0.5

Nightly Bat Passes (Bat passes per hour)

Per Detector - Figures

Figure 16. Figures show boxplots for the number of bat passes per hour each night, for each detector. 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.
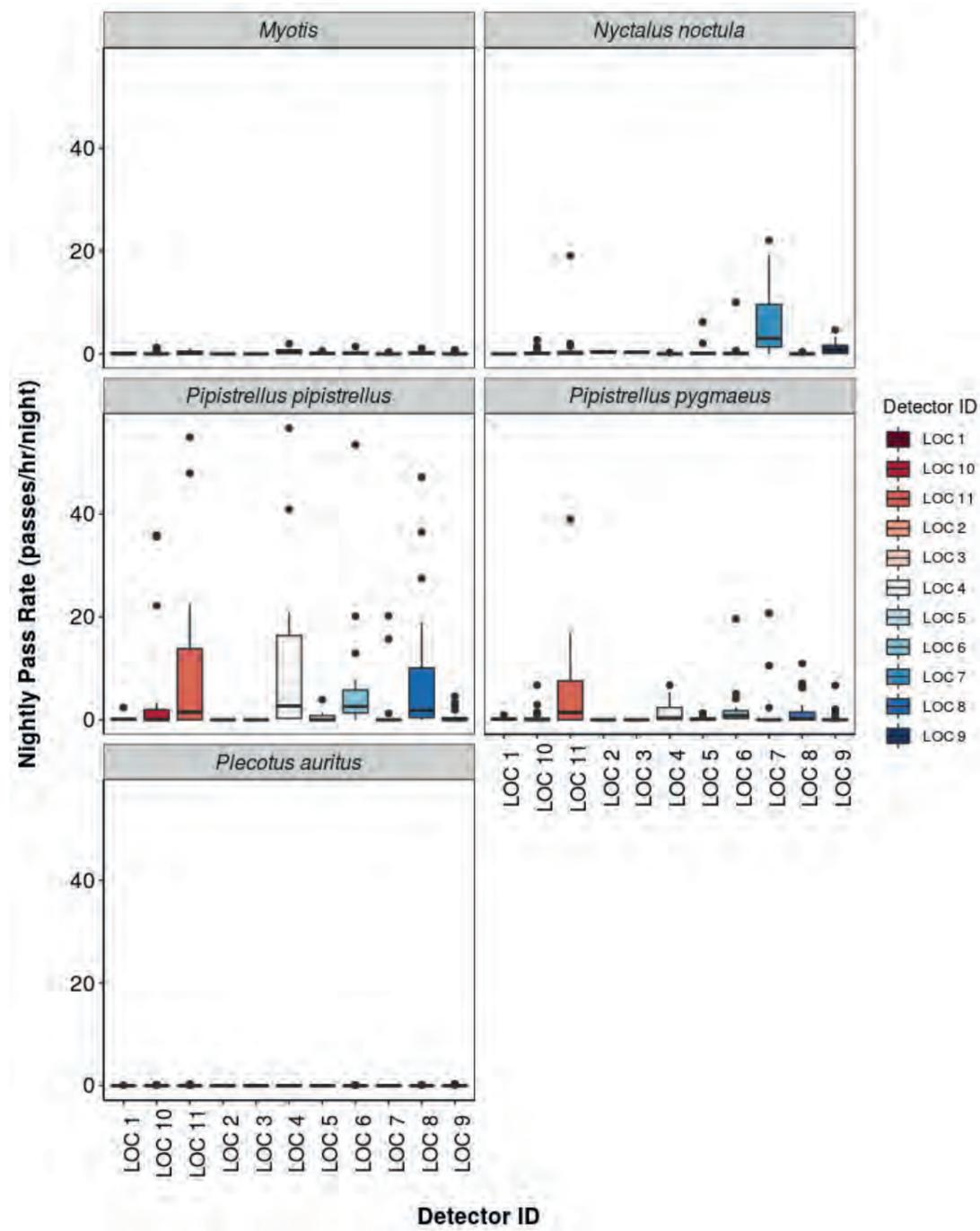
Survey Effort

Table 24. The number of nights bats were detected per month per detector.

Month	Detector ID	No of Survey Nights
May	LOC 10	10
May	LOC 11	7
May	LOC 2	1
May	LOC 5	5
May	LOC 7	11
May	LOC 8	3
May	LOC 9	7
Jun	LOC 10	5
Jun	LOC 11	5
Jun	LOC 2	2
Jun	LOC 3	2
Jun	LOC 5	1
Jun	LOC 6	1
Jun	LOC 7	10
Jun	LOC 9	10
Jul	LOC 1	1
Jul	LOC 10	2
Jul	LOC 11	4
Jul	LOC 6	3
Jul	LOC 7	1
Jul	LOC 8	7
Aug	LOC 1	6
Aug	LOC 10	8
Aug	LOC 11	9
Aug	LOC 4	4
Aug	LOC 5	3
Aug	LOC 6	8
Aug	LOC 7	3
Aug	LOC 8	3
Aug	LOC 9	7
Sep	LOC 1	6
Sep	LOC 10	8
Sep	LOC 11	5
Sep	LOC 4	8

Sep	LOC 5	8
Sep	LOC 6	6
Sep	LOC 8	9
Sep	LOC 9	2

Nightly Bat Pass Rate for each Month

Median Per Detector

Table 25. The median Nightly Pass Rate (bat passes per hour, per night) of each species throughout each month. If NA, then no bat passes.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. In these circumstances, the median is likely to be a more useful summary of the 'average' activity than is the mean. For further information see: *Lintott, P. R., & Mathews, F. (2018). Basic mathematical errors may make ecological assessments unreliable. Biodiversity and Conservation, 27(1), 265-267.* https://doi.org/10.1007/s10531-017-1418-5

Species	Detector ID	Aug	Jul	Jun	May	Sep
Brown long-eared	LOC 1	0.0	0.0	NA	NA	0.0
Brown long-eared	LOC 10	0.0	0.0	0.0	0.0	0.0
Brown long-eared	LOC 11	0.0	0.0	0.0	0.0	0.0
Brown long-eared	LOC 2	NA	NA	0.0	0.0	NA
Brown long-eared	LOC 3	NA	NA	0.0	NA	NA
Brown long-eared	LOC 4	0.0	NA	NA	NA	0.0
Brown long-eared	LOC 5	0.0	NA	0.0	0.0	0.0
Brown long-eared	LOC 6	0.0	0.0	0.0	NA	0.0
Brown long-eared	LOC 7	0.0	0.0	0.0	0.0	NA
Brown long-eared	LOC 8	0.0	0.0	NA	0.0	0.0
Brown long-eared	LOC 9	0.1	NA	0.0	0.0	0.0
Common pipistrelle	LOC 1	0.1	0.3	NA	NA	0.0
Common pipistrelle	LOC 10	1.8	1.4	0.0	0.0	1.8
Common pipistrelle	LOC 11	11.2	4.3	0.0	0.0	20.5
Common pipistrelle	LOC 2	NA	NA	0.0	0.0	NA
Common pipistrelle	LOC 3	NA	NA	0.0	NA	NA
Common pipistrelle	LOC 4	7.6	NA	NA	NA	2.7
Common pipistrelle	LOC 5	0.8	NA	0.0	0.0	0.4
Common pipistrelle	LOC 6	1.9	2.4	0.0	NA	5.7
Common pipistrelle	LOC 7	15.7	0.0	0.0	0.0	NA
Common pipistrelle	LOC 8	1.7	11.2	NA	0.0	1.6
Common pipistrelle	LOC 9	1.9	NA	0.0	0.0	0.3
Myotis	LOC 1	0.0	0.0	NA	NA	0.0
Myotis	LOC 10	0.1	0.0	0.0	0.0	0.2
Myotis	LOC 11	0.6	0.1	0.0	0.0	0.5
Myotis	LOC 2	NA	NA	0.0	0.0	NA

Myotis	LOC 3	NA	NA	0.0	NA	NA
Myotis	LOC 4	0.6	NA	NA	NA	0.4
Myotis	LOC 5	0.4	NA	0.0	0.0	0.1
Myotis	LOC 6	0.1	0.1	0.0	NA	0.4
Myotis	LOC 7	0.0	0.0	0.0	0.0	NA
Myotis	LOC 8	0.7	0.2	NA	0.0	0.4
Myotis	LOC 9	0.4	NA	0.0	0.0	0.0
Noctule	LOC 1	0.0	0.0	NA	NA	0.0
Noctule	LOC 10	0.0	0.0	0.3	0.3	0.0
Noctule	LOC 11	0.0	0.0	0.3	0.6	0.2
Noctule	LOC 2	NA	NA	0.6	0.2	NA
Noctule	LOC 3	NA	NA	0.3	NA	NA
Noctule	LOC 4	0.0	NA	NA	NA	0.0
Noctule	LOC 5	0.0	NA	6.2	0.3	0.0
Noctule	LOC 6	0.0	0.1	10.0	NA	0.0
Noctule	LOC 7	0.0	1.6	2.9	5.6	NA
Noctule	LOC 8	0.0	0.0	NA	0.2	0.0
Noctule	LOC 9	0.0	NA	1.8	0.8	0.0
Soprano pipistrelle	LOC 1	0.1	0.1	NA	NA	0.1
Soprano pipistrelle	LOC 10	0.2	0.1	0.0	0.0	0.3
Soprano pipistrelle	LOC 11	7.2	4.1	0.0	0.0	1.6
Soprano pipistrelle	LOC 2	NA	NA	0.0	0.0	NA
Soprano pipistrelle	LOC 3	NA	NA	0.0	NA	NA
Soprano pipistrelle	LOC 4	2.8	NA	NA	NA	0.3
Soprano pipistrelle	LOC 5	1.1	NA	0.0	0.0	0.1
Soprano pipistrelle	LOC 6	0.8	0.3	0.0	NA	1.6
Soprano pipistrelle	LOC 7	10.6	0.0	0.0	0.0	NA
Soprano pipistrelle	LOC 8	0.8	0.4	NA	0.0	0.3
Soprano pipistrelle	LOC 9	1.1	NA	0.0	0.0	0.2

Nightly Bat Pass Rate for each Month

Mean per Detector

Table 26. The mean Nightly Pass Rate (bat passes per hour, per night) of each species throughout each month. Values are given to 1 decimal place.

We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Aug	Jul	Jun	May	Sep
Brown long-eared	LOC 1	0.0	0.0	NA	NA	0.0
Brown long-eared	LOC 10	0.0	0.0	0.0	0.0	0.0
Brown long-eared	LOC 11	0.0	0.0	0.0	0.0	0.1
Brown long-eared	LOC 2	NA	NA	0.0	0.0	NA
Brown long-eared	LOC 3	NA	NA	0.0	NA	NA
Brown long-eared	LOC 4	0.0	NA	NA	NA	0.0
Brown long-eared	LOC 5	0.0	NA	0.0	0.0	0.0
Brown long-eared	LOC 6	0.0	0.0	0.0	NA	0.0
Brown long-eared	LOC 7	0.0	0.0	0.0	0.0	NA
Brown long-eared	LOC 8	0.0	0.0	NA	0.0	0.0
Brown long-eared	LOC 9	0.1	NA	0.0	0.0	0.0
Common pipistrelle	LOC 1	0.5	0.3	NA	NA	0.1
Common pipistrelle	LOC 10	8.3	1.4	0.0	0.0	5.6
Common pipistrelle	LOC 11	12.2	14.2	0.0	0.0	20.2
Common pipistrelle	LOC 2	NA	NA	0.0	0.0	NA
Common pipistrelle	LOC 3	NA	NA	0.0	NA	NA
Common pipistrelle	LOC 4	14.1	NA	NA	NA	11.5
Common pipistrelle	LOC 5	1.6	NA	0.0	0.0	0.6
Common pipistrelle	LOC 6	9.1	2.2	0.0	NA	8.5
Common pipistrelle	LOC 7	12.4	0.0	0.0	0.0	NA
Common pipistrelle	LOC 8	16.5	13.3	NA	0.0	4.8
Common pipistrelle	LOC 9	2.0	NA	0.0	0.0	0.3
Myotis	LOC 1	0.2	0.0	NA	NA	0.1
Myotis	LOC 10	0.2	0.0	0.0	0.0	0.3
Myotis	LOC 11	0.6	0.2	0.0	0.0	0.6
Myotis	LOC 2	NA	NA	0.0	0.0	NA
Myotis	LOC 3	NA	NA	0.0	NA	NA
Myotis	LOC 4	0.5	NA	NA	NA	0.6
Myotis	LOC 5	0.4	NA	0.0	0.0	0.1

| Species	Location					
Myotis	LOC 6	0.2	0.1	0.0	NA	0.5
Myotis	LOC 7	0.1	0.0	0.0	0.0	NA
Myotis	LOC 8	0.6	0.1	NA	0.0	0.3
Myotis	LOC 9	0.4	NA	0.0	0.0	0.0
Noctule	LOC 1	0.0	0.0	NA	NA	0.0
Noctule	LOC 10	0.0	0.0	0.4	0.8	0.0
Noctule	LOC 11	0.2	0.1	0.4	3.4	0.5
Noctule	LOC 2	NA	NA	0.6	0.2	NA
Noctule	LOC 3	NA	NA	0.3	NA	NA
Noctule	LOC 4	0.1	NA	NA	NA	0.0
Noctule	LOC 5	0.0	NA	6.2	0.6	0.0
Noctule	LOC 6	0.1	0.1	10.0	NA	0.1
Noctule	LOC 7	0.0	1.6	4.3	8.5	NA
Noctule	LOC 8	0.0	0.0	NA	0.2	0.0
Noctule	LOC 9	0.1	NA	2.0	1.1	0.0
Soprano pipistrelle	LOC 1	0.2	0.1	NA	NA	0.1
Soprano pipistrelle	LOC 10	1.1	0.1	0.0	0.0	0.7
Soprano pipistrelle	LOC 11	7.1	4.9	0.0	0.0	10.4
Soprano pipistrelle	LOC 2	NA	NA	0.0	0.0	NA
Soprano pipistrelle	LOC 3	NA	NA	0.0	NA	NA
Soprano pipistrelle	LOC 4	3.1	NA	NA	NA	0.9
Soprano pipistrelle	LOC 5	0.8	NA	0.0	0.0	0.2
Soprano pipistrelle	LOC 6	3.3	0.2	0.0	NA	2.3
Soprano pipistrelle	LOC 7	11.2	0.0	0.0	0.0	NA
Soprano pipistrelle	LOC 8	2.4	3.0	NA	0.0	1.1
Soprano pipistrelle	LOC 9	1.7	NA	0.0	0.0	0.2

Nightly Bat Pass Rate for each Month
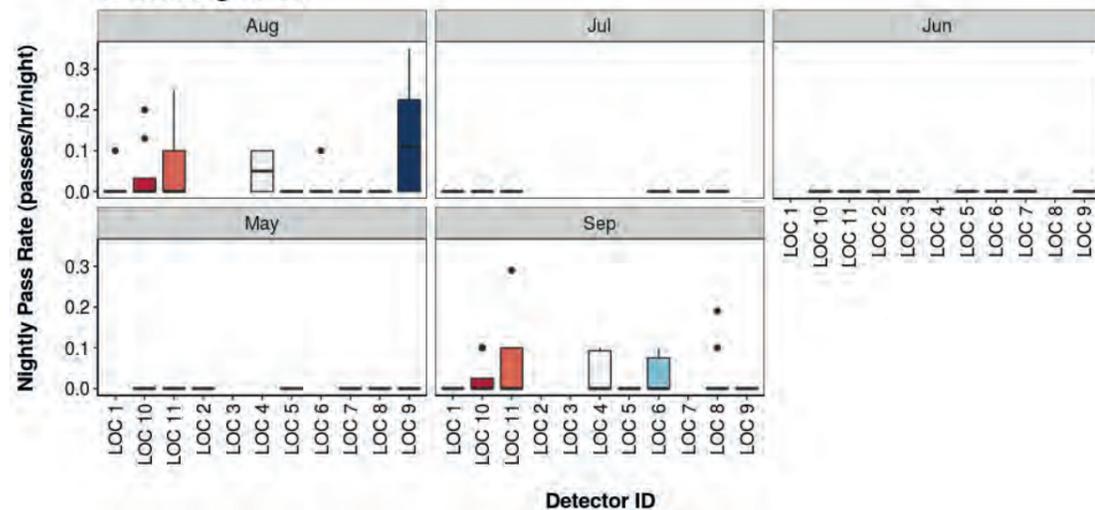
Per Detector - Figures

Figure 17. Figures show boxplots for the number of bat passes per hour by detector, for each month. 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.
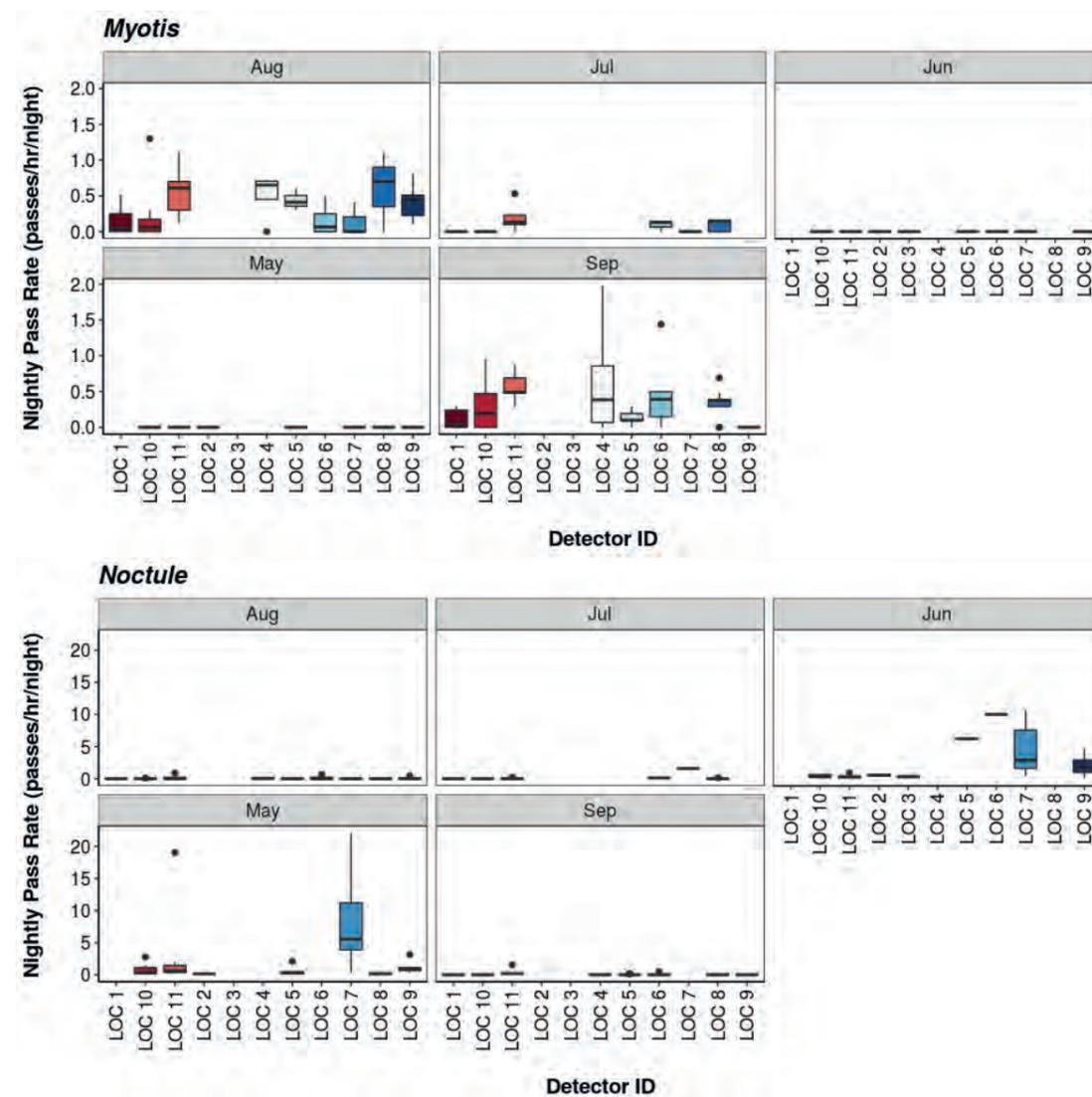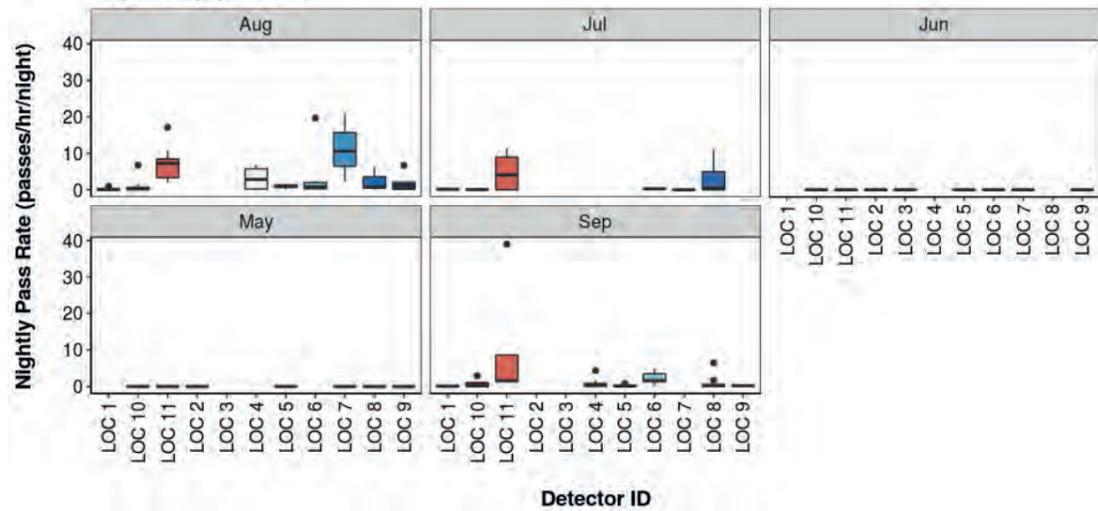
Common pipistrelle
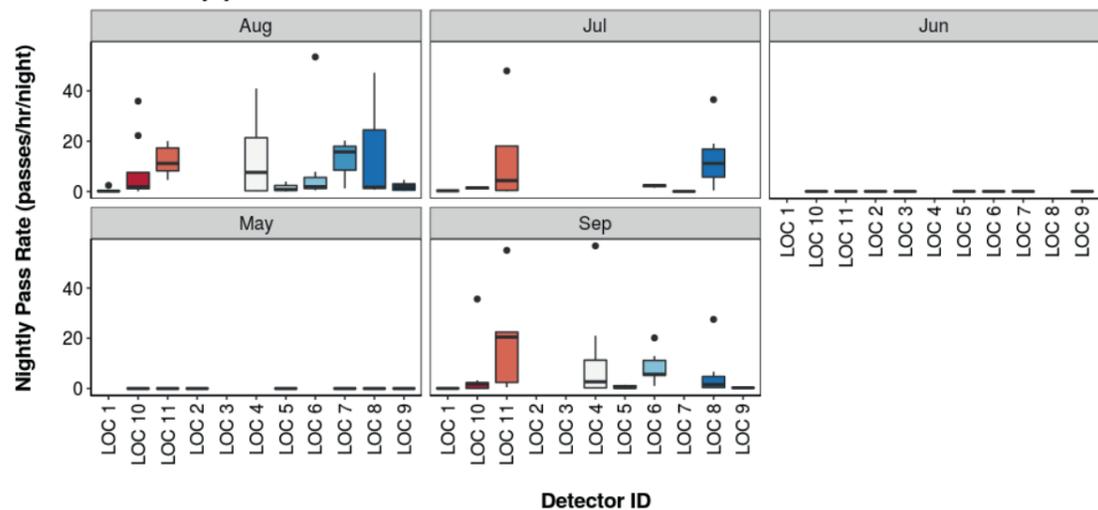
Brown long-eared

Soprano pipistrelle

Bat Activity per Detector Location
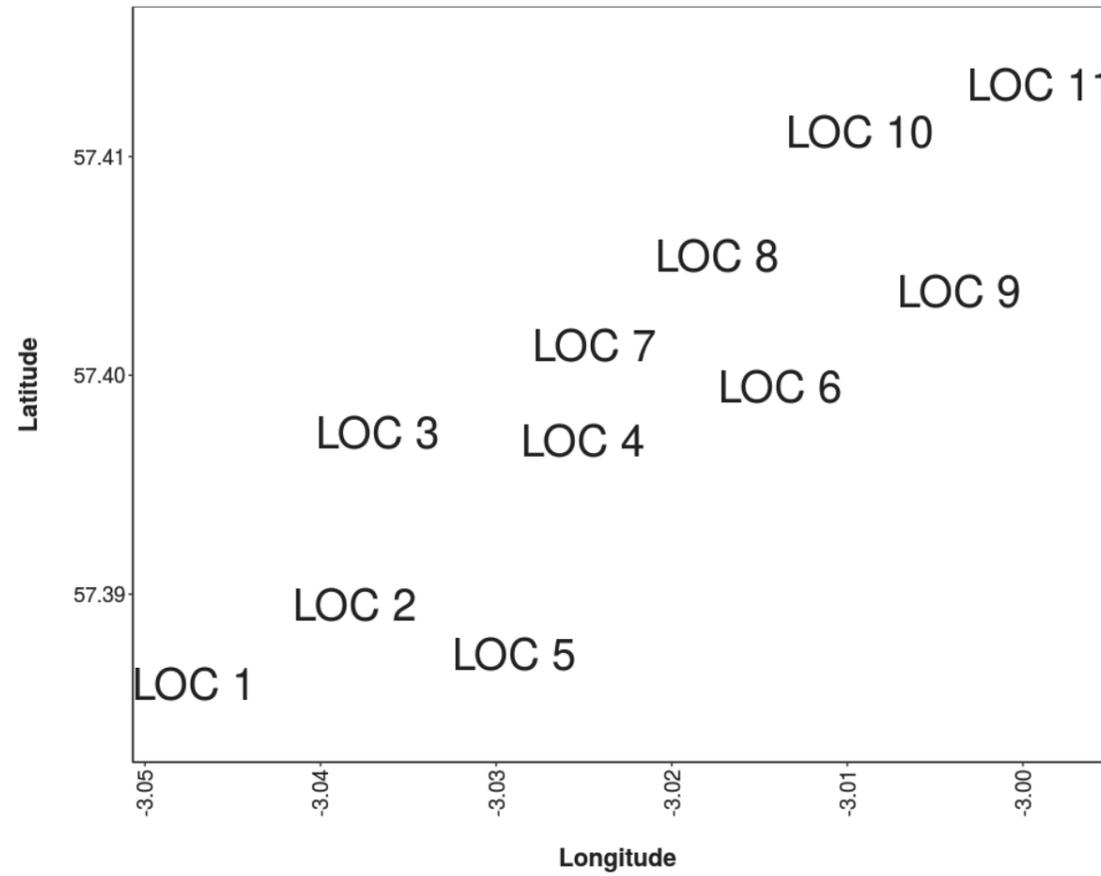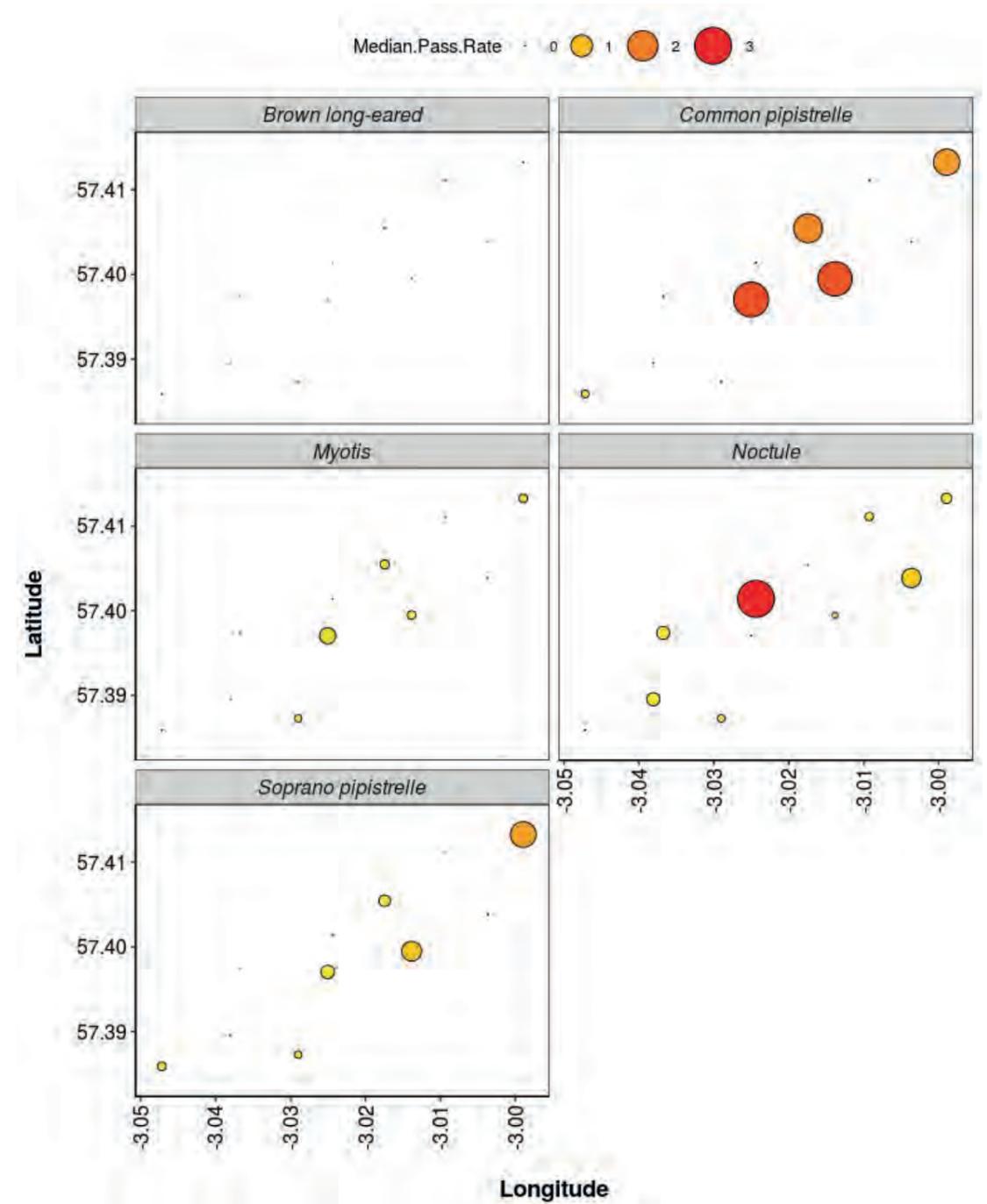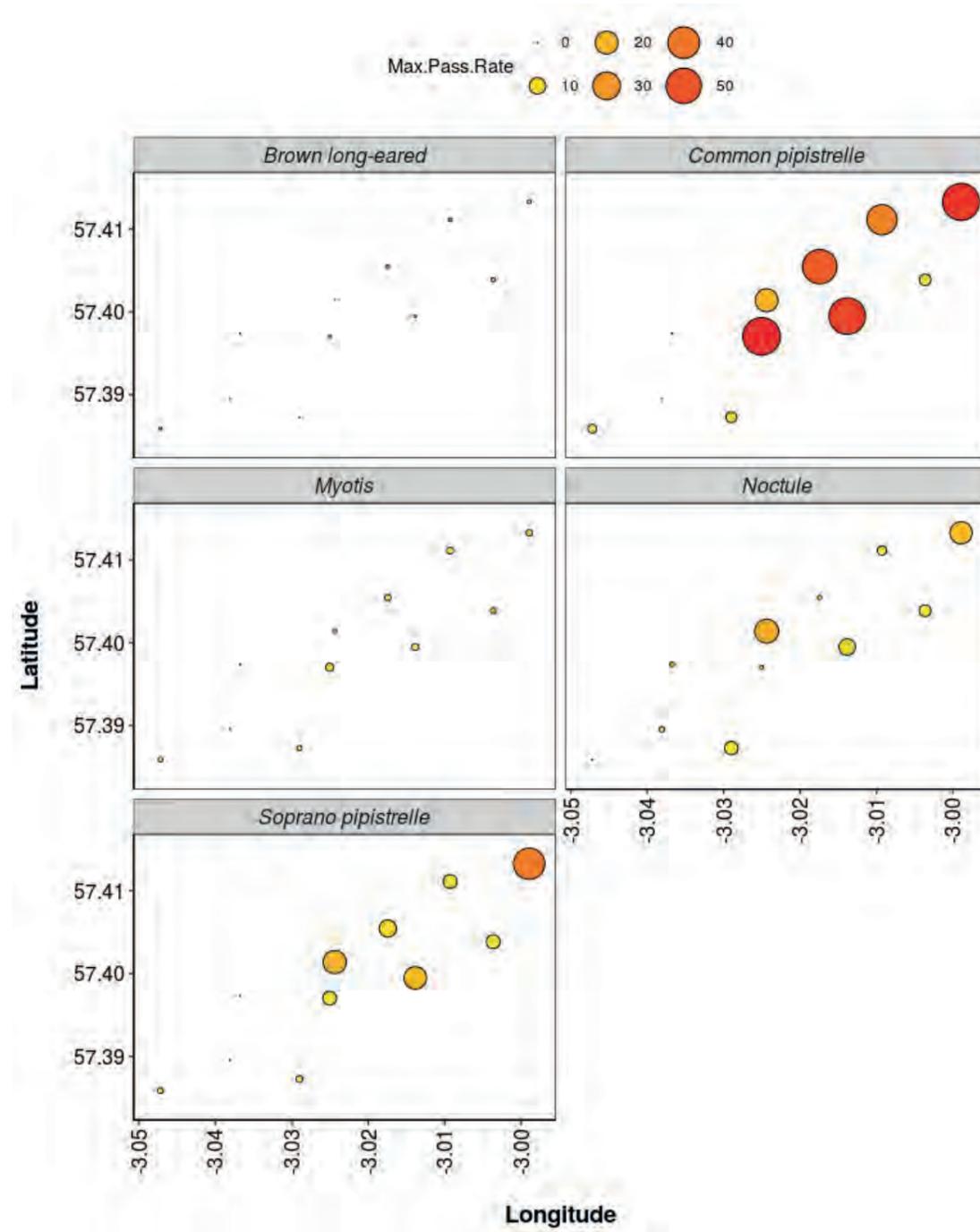
Figure 18. Detector ID reference:

Figure 19. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

Figure 20. 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.