**Earraghail Renewable Energy Development**
on behalf of ScottishPower Renewables
Technical Appendix 8.4: Bats



avianecology

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# 1      INTRODUCTION

1.1.1   This Technical Appendix has been prepared to accompany **Chapter 8** of ScottishPower Renewables' (SPR) Earraghail Renewable Energy Development (hereafter 'the proposed Development') Environmental Impact Assessment (EIA) Report.

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 3 of the EIA Report:

- **Figure 8.1** – Designated Sites for Nature Conservation;

- **Figure 8.6** – Bat Activity Survey Plan; and

- **Figure 8.7** – Bat Roost Survey Plan.

1.1.4   Only common species names are referred to within the main text of this Appendix. **Annex 1** provides a summary of all bat species referred to herein, within **Chapter 8** of the EIA Report and all other associated appendices and figures.

## 1.2    Site Overview

1.2.1   The location of the proposed Development, as shown by the application boundary in **Figure 8.1, 8.6** and **8.7** and hereafter referred to as the 'Site', is centred at NR 88596 63376 and lies within the Forestry and Land Scotland (FLS) forests of Skipness and Corranbuie, Kintyre, Argyll (see **Figure 8.1**).

1.2.2   The Site is predominantly comprised of commercial coniferous woodland of varying heights and maturity, with the centre 'open' part of the Site supporting areas of wet modified bog and dry heath. The Site is intersected by a number of watercourses and supports a number of lochans; the larger of which include Loch na Machrach Bige and Loch na Machrach Moire.

1.2.3   The surrounding wider area includes similar commercial forestry plantations, and larger expanses of open moorland to the west.

1.2.4   The Site has not been subject to any previous investigations for a potential large-scale renewable energy development. There have been investigations into wind farm developments in the surrounding area including the 'Cnoc an Fhionn' Wind Farm located immediately to the west, but none of these have been progressed into any publicly available planning consultation or submission. An operational hydro-power scheme is located along the Abhainn Achachoish.

1.2.5   The consented and currently under construction Inveraray to Crossaig Overhead Power Line also crosses the proposed access track to the Site, to the west.

1.2.6   A Phase 1 habitat plan for the Site is provided as **Figure 8.4** of the EIA Report, with further details of baseline habitat conditions within the Site provided in **Technical Appendix 8.3**, presented in **Volume 4** of the EIA Report.

# 2    METHODOLOGY

2.1.1   The approach to baseline information gathering with regards to bats has been undertaken with reference to Collins guidance (2016) and NatureScot (formerly Scottish Natural Heritage (SNH)) guidance (SNH, 2019).

2.1.2   Additional pieces of guidance and peer reviewed literature are also referenced where relevant.

## 2.2    Desk Study

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

2.2.2   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[1] 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;

  o   Records request to the Argyll Biological Records Centre (ABReC) via Highland Biological Recording Group (HBRG); and

  o   Sheirdrim Renewable Energy Development EIA Technical Appendix 8.3 (Arcus, 2018).

- A review of the Site's location in relation to species known ranges in Scotland, with reference to the most recent UK Habitats Directive[2] Article 17 Report, based on Mathews *et al*. (2018)[3]; and

- The location of other wind farm developments, including the number of turbines and their size within 10 km of the Site.

## 2.3    Field Surveys

2.3.1   The purpose of 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.

2.3.2   Surveys were undertaken between July 2019 and September 2020, consisting of a habitat assessment, roost surveys and ground-level static surveys.

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[1] https://sitelink.nature.scot/home [Accessed April 2021].
[2] Council Directive 92/43/EEC.
[3] https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/#regularly-occurring-species-vertebrate-species-mammals-terrestrial [Accessed April 2021].

### *Habitat Assessment*

2.3.3    An initial habitat assessment of the Site, focusing upon habitats within 200 m of proposed turbine locations, was undertaken in July 2019 to appraise the potential value of habitats present for commuting and foraging bats, in accordance with NatureScot guidance (2019) and using the criteria detailed within Table 4.1 of Collins guidance (2016).

2.3.4    The assessment was informed by a review of aerial imagery and comprised a daylight walkover of potentially suitable habitat features. The assessment was undertaken by Mr L. Carroll and Mr M. Wood, both suitably competent ecologists with considerable experience of undertaking bat roost habitat appraisals.

2.3.5    The assessment was subsequently updated by a Preliminary Roost Assessment (PRA) undertaken in September 2020.

### *Roost Surveys*

Preliminary Roost Assessment (PRA)

2.3.6    Features with the potential to support maternity roosts and significant hibernation and/or swarming sites within 200 m of the application boundary, plus the candidate turbine rotor radius (77.5 m), were identified through a review of aerial imagery and the preliminary habitat assessment.

2.3.7    This identified four single, or collections of, stone structures as shown within **Figure 8.7**:

- Altagalvash - NR 91712 60971 (located to the south of the Site);

- Glenskible - NR 88977 60218 (located to the west of the Site);

- Lagganroaig - NR 90778 64169 (located to the east of the Site); and

- Croit Bagh - NR 91561 61533 (located within the south east part of the Site).

2.3.8    A daylight, ground-level preliminary roost assessment in accordance with NatureScot guidance (2019) following the criteria detailed within Collins guidance (2016), was therefore undertaken in September 2020 by Mr M. Wood an experienced bat surveyor, with extensive experience in undertaking PRAs.

### *Ground-level Static Surveys*

2.3.9    Ground-level static surveys were undertaken in the spring (April to May), summer (June to mid-August) and autumn (mid-August to October) bat activity periods in accordance with NatureScot guidance (SNH, 2019).

2.3.10   The summer and autumn surveys were completed in 2019 by Gavia Environmental Ltd whilst the spring 2020 survey was undertaken by Avian Ecology Ltd.

2.3.11   The survey methodology employed the use of automated monitoring stations (MSs), each consisting of either an 'Anabat Swift' (2019 surveys) or a 'Song Meter SM4 Acoustic Recorder' (2020 surveys) full spectrum detectors, fitted with a single omnidirectional microphone and attached to a 1 m high wooden stake.

2.3.12   Detectors were programmed to commence recording approximately 30 minutes before sunset and finish recording half an hour after sunrise, with all stations set up to record simultaneously with the same settings, to allow comparison of activity recorded across the Site for the same monitoring period.

2.3.13   Detectors 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 5m/s and no, or only very light, rainfall.

2.3.14   A total of 10 detectors were deployed in the same locations across the 2019 and 2020 surveys. At the time of the surveys a final turbine layout was not available and therefore the locations of detectors were focused in parts of the Site where turbines were most likely to be located (since confirmed that 14 turbines will form the proposed Development). Placement also 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.

2.3.15   Recording periods are summarised within **Table 2.3**. Detailed survey effort is presented in **Annex 2**.

*Table 2.3: Monitoring station (MS) recording period summary.*

| Monitoring Station Ref. (Figure 8.7) | Grid Ref. | No. of Successful Recording Nights | | | Habitat Summary | Linear Feature within 50 m |
|---|---|---|---|---|---|---|
| | | Summer 2019[4] | Autumn 2019[5] | Spring 2020[6] | | |
| MS7 | NR8751964079 | 46 | 32 | 0 | Wet modified bog with flush and spring habitats and parcels of dry dwarf shrub heath | None |
| MS9 | NR8782063301 | 46 | 32 | 0 | Wet modified bog with flush and spring habitats and parcels of dry dwarf shrub heath | None |
| MS11 | NR8838662269 | 46 | 0 | 0 | Coniferous plantation | None |
| MS12 | NR8925263401 | 46 | 32 | 31 | Coniferous plantation | Woodland edge |
| MS13 | NR8892262789 | 46 | 32 | 31 | Coniferous plantation | Woodland edge |
| MS16 | NR8955162703 | 46 | 32 | 31 | Coniferous plantation | Woodland edge |
| MS17 | NR8949761598 | 46 | 0 | 31 | Bracken with adjacent acid grassland and wet modified bog | None |
| MS18 | NR9085461069 | 46 | 32 | 30 | Coniferous plantation | Woodland edge |
| MS19 | NR9062962206 | 46 | 32 | 30 | Coniferous plantation with some areas recently felled | Woodland edge |
| MS20 | NR8961961926 | 46 | 32 | 30 | Coniferous plantation with adjacent wet modified bog habitat | None |

[4] Detectors deployed for 46 nights in total in Summer 2019
[5] Detectors deployed for 32 nights in total in Autumn 2019
[6] Detectors deployed for 31 nights in total in Spring 2020

<u>Bat Data Analysis</u>

2.3.16 Sonogram analysis of the summer and autumn 2019 survey periods was undertaken by Gavia Environmental Ltd using Anabat Insight software.

2.3.17 Sonogram analysis of spring 2020 was undertaken by Avian Ecology Ltd. using Kaleidoscope Software.

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

<u>Ecobat Tool</u>

2.3.19 In accordance with NatureScot guidance (SNH, 2019), 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* 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). |
| 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 2.4**), 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. |

2.3.20 Relative levels of activity are determined by *Ecobat* by comparison to a reference data set, the 'reference range'. A reference range of at least 200 is recommended. 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.

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

- Common pipistrelle – 1,096 records;

- Soprano pipistrelle – 1,567 records;

- Pipistrellus spp – 1,776 records;

- Brown long-eared – 43 records; and

- Myotis spp – 536 records.

2.3.22 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 2.4** presents the percentile and associated bat activity category, replicated from NatureScot guidance (SNH, 2019).

*Table 2.4: 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                  |

Assessing Potential Risk

2.3.23   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, barotrauma 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 turbines may form barriers to commuting or seasonal movements, and can result in severance of foraging habitat);

- Loss of, or damage or disturbance to, roosts; and

- Displacement of individuals or populations (due to wind turbine construction or because bats avoid the wind turbine areas).

2.3.24   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 renewable energy development requires a detailed appraisal of:

- The level of activity of all bat species recorded at a site, assessed both spatially and temporally;

- The risk of wind turbine related mortality for all bat species recorded at a site during bat activity surveys; and

-  The effect on the species' population status if predicted impacts are not mitigated.

2.3.25   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.

2.3.26   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.

## 2.4    Limitations

### *Field Surveys*

2.4.1    The original site extent considered during bat surveys was more extensive than the current application boundary, with the southern boundary extending out by approximately 1 km to include a larger area of commercial conifer plantation. The previous boundary in the north extended out to a maximum of approximately 2 km to the west from the access track, and the eastern extreme included Tarbert Wood Special Area of Conservation (SAC) and Tarbert to Skipness Coast Site of Special Scientific Interest (SSSI). The Site was subsequently reduced to the application boundary as shown in **Figures 8.1, 8.6** and **8.7**. Although the application boundary has altered over the course of the survey period (reduced in extent in June 2021), the study areas for all bat surveys were covered, given the application boundary was at its greatest extent when these were undertaken.

2.4.2    A total of 10 detectors were deployed in the same locations across the 2019 and 2020 surveys. At the time of the surveys a final wind turbine number and layout was not available and therefore the locations of detectors were focused in parts of the Site where turbines were most likely to be located. It has since been confirmed that 14 turbines will form the proposed Development. As such, individual turbine locations have not been surveyed but the area covered is considered to be representative of the turbine locations and so sufficient to inform the assessment.

2.4.3    Due to unforeseen detector malfunctions, bat activity data captured at MS11 and MS17 during the autumn 2019 survey could not be retrieved. The isolated nature and rough terrain of the Site coupled with poor autumnal weather conditions following the survey meant that it was not possible to re-deploy these detectors in autumn 2019. Failures were also encountered at MS7, MS9 and MS11 during the spring 2020 survey and no bat data could be retrieved. Due to the Covid-19 restrictions in 2020, it was not possible to re-deploy these detectors to record during the same survey window.

2.4.4    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 the 15th May 2020.

2.4.5    Given the deployment lengths of 46, 32 and 31 days (summer and autumn 2019 and spring 2020 respectively), NatureScot guidance (SNH, 2019) requirements of a minimum of *10 consecutive* monitoring nights for each of the activity periods, was far exceeded at the minimum number of monitoring stations required for the proposed Development and therefore, the survey constraints outlined above are not considered to be a significant limitation.

2.4.6    Due to an unforeseen weather station malfunction it was not possible to retrieve the weather data for the spring 2020 survey. Instead, the weather data for this static deployment period was obtained from the Time and Date website[7]. This is not considered to represent a significant limitation to the data.

### *Sonogram Analysis*

2.4.7    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 when 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.

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[7] https://www.timeanddate.com/weather/ [Accessed August 2020].

2.4.8    The detectability of some bat species, such as brown long-eared, is lower than that of, for example, noctule and pipistrelle. The echolocation calls of brown long-eared 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*

2.4.9    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).

2.4.10   The data within the reference range used to compare activity levels between Site data and other records within 100 km$^2$ is likely to be 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'). This may explain why low levels of bat passes recorded have resulted in a higher level of activity (e.g. *Pipistrellus* species were recorded on 22 nights out of a possible 930, but activity level was considered to be high).

2.4.11   The reference range used for brown long-eared bats is below the recommended range of 200 and therefore confidence is reduced.

2.4.12   The *Ecobat* tool does not include nights where zero bat activity has been recorded and this can result in some data bias.

# 3    RESULTS

## 3.1    Desk Study

### *Statutory Designated Sites for Nature Conservation*

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

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

### *Existing Bat Records*

<u>HBRG</u>

3.1.3    HBRG returned a total of 2 bat records from 2014 from within 10km of the Site. Records were attributable to common pipistrelle and Natterer's bat with further details provided in **Annex 3**.

3.1.4    In review, no specific roost records were returned, with all records considered to comprise species observations, including bat detector passes.

<u>Other Renewable Energy Development (RED) EIA Documentation</u>

3.1.5    A summary of existing bat records identified in a review of EIA documentation for Sheirdrim Renewable Energy Development, located *c*.8km south west of the Site, is provided in **Table 3.1**.

*Table 3.1: Existing records of bat species – adjacent wind farm EIA documentation.*

| RED | Summary |
|---|---|
| Sheirdrim 19/02424/S36 | Baseline bat surveys were undertaken between May and September 2018, comprising remote static surveys. Bat activity recorded was attributable to common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, brown long-eared bat, *Myotis* species and *Pipistrelle* species. Low levels of activity were concluded. Surveys pre-date the NatureScot guidance (SNH, 2019). |

### *UK Bat Species Range*

3.1.6    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;

- Brown long-eared bat; and

- Daubenton's bat.

## 3.2 Field Surveys

### *Habitat Assessment*

3.2.1 The habitats within the Site are considered to be of low habitat risk for bats, in accordance with criteria presented in Table 3a of NatureScot guidelines (SNH, 2019).

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

3.2.3 Forestry compartment edges and rides are likely to provide higher value habitats for bats and also connectivity with potentially higher value habitats within the wider landscape. Lochans within the Site, where sheltered by surrounding plantation may also provide potentially higher quality and sheltered foraging habitats however, no turbines are located within close proximity to these features.

3.2.4 Connectivity between the Site and potentially higher value habitats for bats within wider landscape is also likely to be provided through the steep ridge line along the eastern boundary of the Site, which falls down to the coast and supports areas of broadleaved woodland within the Tarbert Woods Special Area of Conservation (SAC) and Tarbert to Skipness Coast Site of Special Scientific Interest (SSSI) (**Figure 8.1**).

3.2.5 No features with the potential to support roosting bats were identified within the Site or within 200 m (plus rotor radius) of proposed turbine locations. A number of stone structures were identified outside the Site. Tree specimens of coniferous plantation woodlands within the Site provide negligible roosting habitat suitability.

### *Bat Roost Surveys*

<u>Preliminary Roost Assessment</u>

3.2.6 The findings of the PRA for the four stone buildings identified in **Figure 8.7** and conclusions of roost suitability in accordance with Collins guidance (2016) are presented in **Table 3.2** which should be read with reference to Photographic Plates (1-10), presented in **Annex 4**.

*Table 3.2: Preliminary Roost Assessment - Findings.*

| Structure Ref. (Figure 8.8) | Assessment | Roost Suitability (Collins, 2016) |
|---|---|---|
| Altagalvash | A collection of several low roofless stone structures, with some external and internal walls remaining intact but in varying states of decay and stability. Cracks and joints were infilled in parts with mortar or vegetation. Walls were generally single brick thick and cracks and joins inspected were insubstantial and mostly filled with vegetation and mosses. <br><br> At least one structure supported the remains of a chimney, with an open chimney breast and a low (<1 m) entrance. <br><br> Tall ruderals other vegetation encircled all of the wall bases of the structures, with scrub roosting through one or two structures. <br><br> A thorough internal inspection of all wall bases and chimney breasts for bat droppings and other signs of use was hindered by overgrown vegetation and unsafe access, but no evidence of | Negligible/Low |

| Structure Ref. (Figure 8.8) | Assessment | Roost Suitability (Collins, 2016) |
|---|---|---|
| | droppings or staining was identified in, on or about any structure.<br><br>The open and poor structural integrity coupled with the structures position on an exposed coastal cliff location, with little (if any) shelter provided by surrounding typography and woodlands, creates relatively inhospitable suitability for roosting bats. | |
| Glenskible | Two low roofless stone structures, with some walls remaining intact but in varying states of decay. Cracks and joints remained mostly infilled with mortar or vegetation, with those inspected generally insubstantial and not deep.<br><br>One structure supported remains of a chimney, with the chimney breast open and featuring a low (<1 m) entrance, blocked with tall ruderal vegetation.<br><br>Tall ruderal and other vegetation also encircled all the wall basis and internal floor areas, with remaining masonry generally considered fragile and unstable in parts.<br><br>No evidence of bat droppings or staining was identified in, on or about the structures. | Negligible/Low |
| Lagganroaig | Single low roofless stone structure, with some walls remaining intact but in varying states of decay. Wall were generally single stone thick, with cracks and joints remaining mostly infilled with mortar or vegetation. Cracks inspected were generally insubstantial and not deep, being open at both wall sides.<br><br>Structure supported remains of a chimney, with the chimney breast open and featuring a low (<1 m) entrance, blocked with tall ruderal vegetation.<br><br>Tall ruderal and other vegetation also encircled all the wall basis and internal floor areas.<br><br>No evidence of bat droppings or staining was identified in, on or about the structure and the structure is located in an exposed coastal cliff location. | Low |
| Croit Bagh | Collection of low-level stone wall ruins overgrown with vegetation, supporting no suitable features for bats and not subject to a detailed inspection. | Negligible |

### Ground-level Static Surveys

3.2.7   A summary of results is presented below. Weather data are provided in **Annex 5** and the full Ecobat output report is provided in **Annex 6**.

<u>Summary of Results and Activity Levels</u>

3.2.8   Bats were detected on 96 dates out of a possible 109 sampled survey dates over the full survey period between July 2019 and June 2020.

3.2.9   Species identified are presented in **Table 3.3** along with potential collision risk and population vulnerability as described in Table 2 of NatureScot guidance (SNH, 2019).

3.2.10  A total of 15,014 bat passes were recorded over a total of 930 survey nights (all detectors combined) as summarised in **Table 3.4**.

*Table 3.3: Bat species recorded, collision risk and population vulnerability.*

| Species | Collision Risk | Population Vulnerability |
|---|---|---|
| Common Pipistrelle | High | Medium |
| Soprano pipistrelle | High | Medium |
| *Pipistrellus* spp. | High | Medium |
| *Myotis* spp. | Low | Low/Medium |
| Brown long-eared | Low | Low |

*Table 3.41: Total number of bat passes.*

| Species | Passes (No.) | Percentage of total (%) |
|---|---|---|
| Common Pipistrelle | 5,086 | 33.9 |
| Soprano pipistrelle | 7,081 | 47.2 |
| *Pipistrellus* spp. | 2,601 | 17.3 |
| *Myotis* spp. | 187 | 1.2 |
| Brown long-eared | 59 | 0.4 |
| **Total** | 15,014 | 100.0 |

<u>Ecobat Output</u>

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

3.2.12  **Table 3.5** presents the total numbers of nights bat activity fell under each band of high to low activity (see **Table 2.4**) and **Table 3.6** presents the percentiles and key metrics of the *Ecobat* output for each species.

*Table 3.5: 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 |
|---|---|---|---|---|---|
| Common pipistrelle | 66 | 57 | 57 | 47 | 73 |
| Soprano pipistrelle | 76 | 81 | 67 | 39 | 104 |
| *Pipistrellus* spp. | 18 | 4 | 0 | 0 | 0 |
| *Myotis* | 0 | 9 | 17 | 10 | 22 |
| Brown long-eared | 0 | 0 | 5 | 9 | 24 |

*Table 3.6: Percentiles for each species within the Site.*

| Species/Species Group | Total Passes | Passes per Night | | Median Percentile[8] | 95% CIs[9] | Max Percentile[10] | Nights Recorded |
|---|---|---|---|---|---|---|---|
| | | Recorded[11] | Included in *Ecobat*[12] | | | | |
| Common Pipistrelle | 5086 | 5.47 | 12.02 | 52 | 72.5 - 83.5 | 95 | 300 |
| Soprano pipistrelle | 7081 | 7.61 | 16.74 | 52 | 78.5 - 85.5 | 97 | 367 |
| *Pipistrellus* spp. | 2601 | 2.8 | 6.15 | 88 | 85 - 95 | 98 | 22 |
| *Myotis* spp. | 187 | 0.2 | 0.44 | 31 | 44.5 - 61 | 75 | 58 |
| Brown long-eared | 59 | 0.06 | 0.14 | 1 | 16 - 37 | 52 | 38 |

Spatial Distribution

3.2.13 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 3.7**. 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

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[8] A numerical representation of average activity levels relative to the surrounding landscape (within 200 km) for each night of surveying.

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

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

[11] Total recorded nights for the survey period is 930

[12] A total of 423 nights were included in *Ecobat*s analysis. Nights when no bats are recorded are excluded.

(Lintott *et al.*, 2018). In addition, the dataset is unlikely to be normally distributed, therefore the median is the most appropriate metric to report.

3.2.14 Data for 'Includes Absences' and 'Excludes Absences' are included in **Table 3.7**. 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.

3.2.15 When absences are excluded medians and means are higher and show peaks in the data, which is especially useful for sites with low bat activity when peaks can be easily overlooked in large data sets. For example, when absences are included, brown long-eared bats medians result in 0.0, but when excluding absences, the value increases to 0.3 for some detectors.

3.2.16 **Table 3.8** presents the relative bat activity levels (percentiles) per detector, per species.

*Table 3.7: 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) | |
| --- | --- | --- | --- | --- | --- | --- |
| | | | Excl. Absences | Incl. Absences | Excl. Absences | Incl. Absences |
| Common pipistrelle | MS 7 | 6 | 0.1 | 0.0 | 0.1 | 0.0 |
| | MS 9 | 13 | 0.1 | 0.1 | 0.2 | 0.2 |
| | MS 11 | 6 | 0.1 | 0.0 | 0.1 | 0.1 |
| | MS 12 | 100 | 0.3 | 0.2 | 0.5 | 0.3 |
| | MS 13 | 84 | 0.3 | 0.1 | 0.4 | 0.2 |
| | MS 16 | 48 | 0.2 | 0.1 | 0.3 | 0.1 |
| | MS 17 | 1121 | 0.9 | 0.9 | 2.8 | 2.6 |
| | MS 18 | 2828 | 3.2 | 2.8 | 5.7 | 5.0 |
| | MS 19 | 698 | 1.1 | 0.4 | 2.2 | 1.6 |
| | MS 20 | 182 | 0.3 | 0.1 | 0.5 | 0.3 |
| Soprano pipistrelle | MS 7 | 12 | 0.1 | 0.1 | 0.1 | 0.1 |
| | MS 9 | 6 | 0.1 | 0.1 | 0.1 | 0.1 |
| | MS 11 | 10 | 0.1 | 0.1 | 0.1 | 0.1 |
| | MS 12 | 97 | 0.2 | 0.1 | 0.5 | 0.3 |
| | MS 13 | 188 | 0.2 | 0.2 | 0.7 | 0.6 |
| | MS 16 | 318 | 0.4 | 0.3 | 1.0 | 0.9 |
| | MS 17 | 1705 | 1.6 | 1.5 | 4.3 | 4.0 |
| | MS 18 | 3790 | 4.5 | 3.7 | 7.0 | 6.4 |
| | MS 19 | 665 | 0.4 | 0.4 | 1.7 | 1.6 |
| | MS 20 | 290 | 0.3 | 0.3 | 0.5 | 0.5 |
| *Pipistrellus* spp. | MS 17 | 177 | 2.9 | 0.0 | 3.7 | 0.4 |
| | MS 18 | 2238 | 14.8 | 0.0 | 16.0 | 3.3 |
| | MS 19 | 186 | 16.8 | 0.0 | 16.8 | 0.3 |
| | MS 12 | 5 | 0.2 | 0.0 | 0.2 | 0.0 |

| Species | Detector ID | Total Bat Passes | Median Pass Rate (passes per hour/night) | | Mean Pass Rate (passes per hour/night) | |
|---|---|---|---|---|---|---|
| | | | Excl. Absences | Incl. Absences | Excl. Absences | Incl. Absences |
| *Myotis* spp. | MS 13 | 1 | 0.2 | 0.0 | 0.2 | 0.0 |
| | MS 16 | 2 | 0.2 | 0.0 | 0.2 | 0.0 |
| | MS 17 | 126 | 0.6 | 0.0 | 0.8 | 0.3 |
| | MS 18 | 38 | 0.4 | 0.0 | 0.4 | 0.1 |
| | MS 19 | 6 | 0.2 | 0.0 | 0.2 | 0.0 |
| | MS 20 | 9 | 0.2 | 0.0 | 0.2 | 0.0 |
| Brown long-eared | MS 12 | 1 | 0.1 | 0.0 | 0.1 | 0.0 |
| | MS 16 | 2 | 0.1 | 0.0 | 0.1 | 0.0 |
| | MS 17 | 12 | 0.2 | 0.0 | 0.2 | 0.0 |
| | MS 18 | 34 | 0.3 | 0.0 | 0.3 | 0.1 |
| | MS 19 | 7 | 0.2 | 0.0 | 0.2 | 0.0 |
| | MS 20 | 3 | 0.2 | 0.0 | 0.2 | 0.0 |

*Table 3.8: Percentiles for each species per detector location for the whole survey period.*
*Activity Level is based on the median percentile.*

| Species/Species Group | Detector ID | Median Percentile | 95% CIs | Max Percentile | Nights Recorded | Activity Level |
|---|---|---|---|---|---|---|
| Common pipistrelle | MS 7 | 1 | 1 - 1 | 1 | 6 | Low |
| | MS 9 | 1 | 1 - 29.5 | 58 | 7 | Low |
| | MS 11 | 1 | 1 - 1 | 31 | 5 | Low |
| | MS 12 | 31 | 16 - 43 | 83 | 27 | Low to moderate |
| | MS 13 | 31 | 26.5 - 44.5 | 80 | 24 | Low to moderate |
| | MS 16 | 31 | 16 - 31 | 61 | 23 | Low to moderate |
| | MS 17 | 65 | 45.5 - 66.5 | 93 | 57 | Moderate to high |
| | MS 18 | 83 | 72.5 - 83.5 | 95 | 64 | High |
| | MS 19 | 70 | 50.5 - 71 | 95 | 37 | Moderate to high |
| | MS 20 | 31 | 22 - 41.5 | 83 | 50 | Low to moderate |
| Soprano pipistrelle | MS 7 | 1 | 1 - 1 | 1 | 12 | Low |
| | MS 9 | 1 | 1 - 1 | 1 | 6 | Low |
| | MS 11 | 1 | 1 - 1 | 31 | 9 | Low |
| | MS 12 | 16 | 16 - 33 | 86 | 28 | Low |
| | MS 13 | 31 | 16 - 37 | 91 | 37 | Low to moderate |
| | MS 16 | 43 | 29.5 - 52 | 92 | 38 | Moderate |

| Species/Species Group | Detector ID | Median Percentile | 95% CIs | Max Percentile | Nights Recorded | Activity Level |
|---|---|---|---|---|---|---|
| | MS 17 | 75 | 67.5 - 77.5 | 95 | 57 | Moderate to high |
| | MS 18 | 85 | 78.5 - 85.5 | 97 | 67 | High |
| | MS 19 | 48 | 36 - 57 | 94 | 46 | Moderate |
| | MS 20 | 43 | 31 - 44.5 | 82 | 67 | Moderate |
| *Pipistrellus* spp. | MS 17 | 82 | 76 - 86 | 90 | 6 | High |
| | MS 18 | 93 | 85 - 95 | 98 | 15 | High |
| | MS 19 | 95 | 0 | 95 | 1 | High |
| *Myotis* spp. | MS 12 | 1 | 1 - 1 | 31 | 4 | Low |
| | MS 13 | 1 | 0 | 1 | 1 | Low |
| | MS 16 | 1 | 1 - 1 | 1 | 2 | Low |
| | MS 17 | 58 | 44.5 - 61 | 75 | 23 | Moderate |
| | MS 18 | 43 | 22 - 43 | 65 | 15 | Low to moderate |
| | MS 19 | 1 | 1 - 1 | 31 | 5 | Low |
| | MS 20 | 1 | 1 - 1 | 31 | 8 | Low |
| Brown long-eared | MS 12 | 1 | 0 | 1 | 1 | Low |
| | MS 16 | 1 | 1 - 1 | 1 | 2 | Low |
| | MS 17 | 1 | 1 - 1 | 31 | 10 | Low |
| | MS 18 | 31 | 16 - 37 | 52 | 17 | Low to moderate |
| | MS 19 | 1 | 1 - 16 | 31 | 5 | Low |
| | MS 20 | 1 | 1 - 1 | 1 | 3 | Low |

Table 3.9: The number of nights sampled (detectors were operational for), the number of nights bats were recorded and the total number of bat recorded per monitoring station. Percentage distribution of no. bats is also presented.

| 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 7 | 78 | 16 | 20.5% | 18 | 0.1% |
| MS 9 | 78 | 9 | 11.5% | 19 | 0.1% |
| MS 11 | 46 | 12 | 26.1% | 16 | 0.1% |
| MS 12 | 109 | 39 | 35.8% | 203 | 1.4% |
| MS 13 | 109 | 44 | 40.4% | 273 | 1.8% |
| MS 16 | 109 | 42 | 38.5% | 370 | 2.5% |
| MS 17 | 77 | 61 | 79.2% | 3141 | 20.9% |
| MS 18 | 108 | 73 | 67.6% | 8928 | 59.5% |
| MS 19 | 108 | 50 | 46.3% | 1,562 | 10.4% |

| 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 20 | 108 | 77 | 71.3% | 484 | 3.2% |

Temporal Activity

3.2.17 A summary of results per season is provided in **Table 3.10**.

3.2.18 Activity levels were calculated by *Ecobat* per species (or species group) per month to allow for temporal variations in bat activity, as presented in **Table 3.10**. Median and maximum percentiles and corresponding activity levels are presented.

*Table 3.10: Percentiles for each species each month within the site. Activity Level is based on the median percentile.*

| Species/ Species Group | Month | Median Percentile | 95% CIs | Max Percentile | Nights Recorded | Activity Level |
|---|---|---|---|---|---|---|
| Common pipistrelle | May | 60 | 72.5 - 83.5 | 93 | 52 | Moderate |
| | June | 63 | 72.5 - 83.5 | 95 | 62 | Moderate to high |
| | July | 52 | 72.5 - 83.5 | 89 | 46 | Moderate |
| | August | 43 | 72.5 - 83.5 | 95 | 92 | Moderate |
| | September | 31 | 72.5 - 83.5 | 91 | 48 | Low to moderate |
| Soprano pipistrelle | May | 70 | 78.5 - 85.5 | 91 | 59 | Moderate to high |
| | June | 67 | 78.5 - 85.5 | 95 | 67 | Moderate to high |
| | July | 37 | 78.5 - 85.5 | 94 | 58 | Low to moderate |
| | August | 52 | 78.5 - 85.5 | 97 | 106 | Moderate |
| | September | 31 | 78.5 - 85.5 | 96 | 77 | Low to moderate |
| *Pipistrellus* spp. | July | 86 | 85 - 95 | 96 | 6 | High |
| | August | 87 | 85 - 95 | 98 | 9 | High |
| | September | 95 | 85 - 95 | 97 | 7 | High |
| *Myotis* spp. | May | 43 | 44.5 - 61 | 71 | 31 | Moderate |
| | June | 31 | 44.5 - 61 | 75 | 27 | Low to moderate |
| Brown long-eared | May | 1 | 16 - 37 | 52 | 19 | Low |
| | June | 1 | 16 - 37 | 43 | 19 | Low |

Potential bat roosts within or close to the site

3.2.19 *Ecobat* analysis showed that bat activity was recorded within the species-specific emergence time for five monitoring locations. This is detailed in **Table 3.11**.

*Table 3.11: Bat activity recorded within the species-specific emergence time*

| Detector ID | Species/Species Group | Nights Recorded[13] | Peak Count | Month of Peak Count |
|---|---|---|---|---|
| MS 16 | Common pipistrelle | 2 | 3 | June |
| MS 16 | Soprano pipistrelle | 9 | 8 | June |
| MS 17 | Common pipistrelle | 17 | 33 | May |
| MS 17 | Soprano pipistrelle | 25 | 51 | June |
| MS 17 | Brown long-eared | 2 | 1 | May and June |
| MS 18 | Common pipistrelle | 32 | 28 | June |
| MS 18 | Soprano pipistrelle | 22 | 14 | May |
| MS 18 | *Pipistrellus* spp. | 1 | 1 | September |
| MS 19 | Common pipistrelle | 2 | 1 | August and September |
| MS 19 | Soprano pipistrelle | 6 | 1 | May, June, August and September |
| MS 20 | Common pipistrelle | 1 | 1 | May |
| MS 20 | Soprano pipistrelle | 4 | 1 | May, June and August |

3.2.20    No activity was recorded within any species-specific emergence time at MS 7, 9, 11, 12 or 13.

3.2.21    Based on the *Ecobat* analysis above, it is possible that roosts for common and soprano pipistrelle are located within proximity to MS 17 and MS 18. Roosts of *Pipistrellus* and brown long-eared may also be present within the Site locale.

### *Weather Conditions*

3.2.22    Weather conditions are presented in **Annex 4.**

3.2.23    In the main, the 2019 summer and autumn periods have been dry and warm, with temperatures only falling below 8°C on one occasion in October 2019.

3.2.24    Moderate to heavy rain fall was recorded during October 2019 survey dates. Common pipistrelle was still recorded and these nights are therefore not excluded from analysis.

3.2.25    Wind data was greater than 5 mph on most survey nights. The extended survey periods adopted demonstrates that the Site does not regularly record less than 5 mph, and therefore recording periods were undertaken in conditions representative of the Site. The maximum wind speed recorded was 16 mph in September 2019. Bat activity was still recorded on this night.

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

# 4 DISCUSSION AND CONCLUSIONS

## 4.1 Desk Study

4.1.1 No statutory or non- statutory designated sites, with bat qualifying interests, were identified within 10 km of the Site.

4.1.2 The desk study identified the presence of common pipistrelle and Natterer's bat within proximity to the Site.

## 4.2 Field Surveys

### *Habitat Assessment*

4.2.1 The habitats within the Site are considered to be of low habitat risk for bats, in accordance with criteria presented in Table 3a of NatureScot guidelines (SNH, 2019).

### *Roosts*

4.2.2 No structures with the potential to support maternity or hibernation roosts were identified within at least 200 m plus rotor radius (77.5 m) of proposed turbine locations. A small number of stone structures were subject to a PRA however these were located outside the Site (closest 900 m from the nearest proposed turbine) and were considered to support negligible or low suitability for roosting bats and therefore unlikely to support maternity or hibernation roosts.

4.2.3 The Ecobat tool identified the possible presence of roosts of common and soprano pipistrelle and brown long-eared bat within proximity of the Site based on activity levels recorded within their species-specific emergence times.

### *Ground-level Static Surveys*

4.2.4 Surveys identified the following species:

- Common pipistrelle;

- Soprano pipistrelle;

- *Pipistrellus* species;

- *Myotis* species; and

- Brown long-eared bat.

4.2.5 Soprano pipistrelle was the most frequently recorded species representing 47.2% of all recordings. The species was recorded on 367 nights out of 930, representing 7.61 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 at the 52nd percentile.

4.2.6 Common pipistrelle represented 33.9% of the activity, recorded on 300 nights and 5.47 passes per night for the survey period. Common pipistrelle activity was also concluded to be moderate at the 52nd percentile.

4.2.7 *Pipistrellus* species represented 17.3% of all recordings, identified on 22 nights, representing 2.8 passes per night. This indicates high activity at the 88th percentile.

4.2.8    *Myotis* species and brown long-eared 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 these species was considered to be low to moderate and low respectively.

Spatial Distribution of Bat Activity

4.2.9    Common and soprano pipistrelle activity was recorded at all 10 detectors. Highest activity was at MS 18 in coniferous plantation with 5.7 and 7.0 mean pass rate (passes per hour, per night) respectively (excluding absences). Spatial variation at other locations was low and, in the majority, below 1 median pass rate (with the exception of MS 17 and MS 19).

4.2.10   *Pipistrellus* species activity was recorded at three detectors and the highest activity was at MS 18 and MS 19 with 16.0 and 16.8 mean pass rate (excluding absences). Activity at MS 17 was lower with 3.7 mean pass rate.

4.2.11   *Myotis* species and brown long-eared bats were only recorded at 7 and 6 of the locations respectively, and spatial variation amongst these was low, with less than 0.6 median pass rate (passes per hour, per night) for both species (excluding absences).

4.2.12   Overall, bat activity was higher at MS 17, 18 and 19 which are located on plantation woodland edge or within plantation woodland in the southern part of the Site.

Temporal Distribution of Bat Activity

4.2.13   Common and soprano pipistrelle were recorded across the entire survey period. Common pipistrelle activity was highest in May 2020 whilst soprano pipistrelle activity was highest in May and June 2020, all representing moderate to high activity.

4.2.14   *Pipistrellus* species were recorded between July and September 2019 and activity was high across the three months.

4.2.15   Brown long-eared bat was only recorded in May and June 2020 but overall activity was low.

4.2.16   Myotis species was also only recorded in May and June 2020 with activity being moderate in May and low to moderate in June.

4.2.17   Overall, activity was generally higher in the spring months with lower activity consistently recorded in autumn.

Bat Activity Relative to Other Sites

4.2.18   On nights where common and 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*.

4.2.19   On nights where *Pipistrellus* species was recorded, the level of activity most frequently represented high activity when compared against records from a similar date in a similar geographical location in *Ecobat*; however, *Pipistrellus* species was only recorded at three monitoring stations out of the 10, so activity is considered to be low overall.

4.2.20   On nights where *Myotis* and brown long-eared 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*.

4.2.21   Overall, it is concluded that activity of common and soprano pipistrelle is moderate and activity of all other species is low. This is in recognition of the *Ecobat* tool output but also considering the limitations

of the tool and the numbers of nights excluded in the calculations which will inflate pass rates (nights when no bat passes are recorded are excluded).

# 5 ASSESSMENT OF THE POTENTIAL RISKS TO BATS

## 5.1 Stage 1 – Initial Site Risk Assessment

5.1.1 In accordance with NatureScot guidance (SNH, 2019) an assessment of the potential risk level of the Site, has been undertaken based on a consideration of habitat and development related features detailed in **Table 5.1.**

5.1.2 The values and classification criteria provided within **Table 5.1**, 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.

5.1.3 The Site has been assessed as having an overall 'Site Risk' of **2**, representing **Low Site Risk**:

- The Site 'Habitat Risk is classified as **Low**.

- The Site 'Project Size' is classified as being **Medium**, comprising a development of 14 turbines of up to 180m tip height, with no other operational wind farm developments located within 5km of the Site.

*Table 5.1: Stage 1- Initial Site Risk Assessment (Table 3a of NatureScot guidance (SNH, 2019)).*

| Site Risk Level (1-5) | Project Size | | | |
|---|---|---|---|---|
| **Habitat Risk** | | Small | Medium | Large |
| | **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. |

## 5.2 Stage 2 – Overall Risk Assessment

5.2.1 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.

5.2.2 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:

- Common pipistrelle;

- Soprano pipistrelle; and

- *Pipistrellus* species.

5.2.3 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 5.2 (based on Table 3b in SNH (2019) to determine the level of overall risk.

*Table 5.2: Overall Risk Assessment (Table 3b from NatureScot guidance (SNH, 2019)).*
*Green = Low, Amber = Medium, Red = High.*

| Site Risk Level | Ecobat Activity Category | | | | | |
|---|---|---|---|---|---|---|
| | Nil | Low | Low-Moderate | Moderate | Moderate-High | 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 |

5.2.4 The calculated 'Overall Risk Assessment' per species, both temporally and spatially is presented in **Table 5.3**. The values as presented in the matrix in **Table 5.2** 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*.

5.2.5 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 is not generated and bat activity representations are instead indicative for each region.

5.2.6 In summary, the Overall Risk Assessment for common pipistrelle and soprano pipistrelle is considered to fall under "Low/Medium Site Risk" and "Medium Site Risk" for *Pipistrellus* species.

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

*Table 5.2: Overall Risk Assessment (Table 3b from SNH (2019) guidance). Key: green = Low, Amber = Medium, Red = High.*

| Species / species group | I.D | Median Percentile[14] | Percentile Category | Overall Risk Assessment (Stage 2) | Species / species group | Month | Median Percentile | Percentile Category | Overall Risk Assessment (Stage 2) |
|---|---|---|---|---|---|---|---|---|---|
| Common pipistrelle | MS 7 | 1 | Low | Low (2) | Common pipistrelle | May | 60 | Moderate | Medium (6) |
| | MS 9 | 1 | Low | Low (2) | | June | 63 | Moderate to high | Medium (8) |
| | MS 11 | 1 | Low | Low (2) | | July | 52 | Moderate | Medium (6) |
| | MS 12 | 31 | Low to moderate | Low (4) | | August | 43 | Moderate | Medium (6) |
| | MS 13 | 31 | Low to moderate | Low (4) | | September | 31 | Low to moderate | Low (2) |
| | MS 16 | 31 | Low to moderate | Low (4) | Soprano pipistrelle | May | 70 | Moderate to high | Medium (8) |
| | MS 17 | 65 | Moderate to high | Medium (8) | | June | 67 | Moderate to high | Medium (8) |
| | MS 18 | 83 | High | Medium (10) | | July | 37 | Low to moderate | Low (2) |
| | MS 19 | 70 | Moderate to high | Medium (8) | | August | 52 | Moderate | Medium (6) |
| | MS 20 | 31 | Low to moderate | Low (4) | | September | 31 | Low to moderate | Low (2) |
| | MS 7 | 1 | Low | Low (2) | Pipistrellus | July | 86 | High | Medium (10) |
| | MS 9 | 1 | Low | Low (2) | | August | 87 | High | Medium (10) |
| | MS 11 | 1 | Low | Low (2) | | September | 95 | High | Medium (10) |
| Soprano pipistrelle | MS 12 | 16 | Low | Low (2) | | | | | |
| | MS 13 | 31 | Low to moderate | Low (4) | | | | | |
| | MS 16 | 43 | Moderate | Medium (6) | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | MS 17 | 75 | Moderate to high | Medium (8) | |
| | MS 18 | 85 | High | Medium (10) | |
| | MS 19 | 48 | Moderate | Medium (6) | |
| | MS 20 | 43 | Moderate | Medium (6) | |
| *Pipistrellus* | MS 17 | 82 | High | Medium (10) | |
| | MS 18 | 93 | High | Medium (10) | |
| | MS 19 | 95 | High | Medium (10) | |

[14] Based on the Median Percentile

# 6    REFERENCES

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# ANNEX 1: BAT SPECIES SCIENTIFIC NAMES

- Common pipistrelle *Pipistrellus pipstrellus*;

- Soprano pipistrelle *Pipistrellus pygmaeus*;

- *Pipistrellus* spp.;

- *Myotis* spp.; and,

- Brown long-eared bat *Plecotus auritus*.

# 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 |
|---|---|---|---|---|
| MS7 | NR8751964079 | 17/09/2019 | 15/06/2020 | 78 |
| MS9 | NR8782063301 | 17/09/2019 | 15/06/2020 | 78 |
| MS11 | NR8838662269 | 17/09/2019 | 15/06/2020 | 46 |
| MS12 | NR8925263401 | 17/09/2019 | 15/06/2020 | 109 |
| MS13 | NR8892262789 | 17/09/2019 | 15/06/2020 | 109 |
| MS16 | NR8955162703 | 17/09/2019 | 15/06/2020 | 109 |
| MS17 | NR8949761598 | 17/09/2019 | 15/06/2020 | 77 |
| MS18 | NR9085461069 | 17/09/2019 | 15/06/2020 | 108 |
| MS19 | NR9062962206 | 17/09/2019 | 15/06/2020 | 108 |
| MS20 | NR8961961926 | 17/09/2019 | 15/06/2020 | 108 |

# ANNEX 3: EXISTING BAT SPECIES RECORDS – HBRG

**Table A3.1** below provides further details of bat records provided by HBRG from within 10km of the Site.

*Table A3.1: Existing bat species records – HBRG.*

| Species | Date | Location | Sample Spatial Reference | Abundances | Comment |
|---------|------|----------|--------------------------|------------|---------|
| Pipistrelle Bat species *Pipistrellus* | 1986 - 1987 | Watten | ND2557 | - | From IMAG database. |
| Pipistrelle Bat species *Pipistrellus* | 06/09/2002 | Castletown Bay | ND199684 | - | Seen. |
| Pipistrelle Bat species *Pipistrellus* | 03/09/2008 | Castle of Mey | ND297736 | - | 26 passes foraging along hedge at drive. |
| Pipistrelle Bat species *Pipistrellus* | 03/09/2008 | Castle of Mey | ND290739 | - | 6 passes at open entrance. |
| Pipistrelle Bat species *Pipistrellus* | 30/09/2008 | Castlehill | ND201682 | - | At dawn, several foraging around avenue of trees at road. One pair chasing each other at ruined lodge. |
| Pipistrelle Bat species *Pipistrellus* | 29/04/2009 | Castlehill | ND198686 | 1 Count | - |
| Pipistrelle Bat species *Pipistrellus* | 30/04/2009 | Hill of Ratter | ND244733 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 02/05/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 05/05/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 08/05/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 10/05/2009 | Clett cottage | ND262711 | - | - |

| Species | Date | Location | Sample Spatial Reference | Abundances | Comment |
|---|---|---|---|---|---|
| Pipistrelle Bat species *Pipistrellus* | 11/05/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 19/05/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 25/05/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 01/06/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 09/06/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 15/06/2009 | Dunnet | ND223692 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 15/07/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species *Pipistrellus* | 10/09/2009 | Harrow | ND281742 | 2 Count | At old work sheds. |
| Pipistrelle Bat species *Pipistrellus* | 10/09/2009 | Harrow | ND281742 | 5 Count | Between ice house and barn. |
| Pipistrelle Bat species *Pipistrellus* | 26/10/2009 | Clett cottage | ND262711 | - | - |
| Pipistrelle Bat species Pipistrellus | 02/04/2015 | Camster | ND210609 | 4 Count of Adult | First sight of year |
| Common Pipistrelle *Pipistrellus pipistrellus* | 16/08/2010 | John o' Groats | ND379735 | - | Detector contacts at dusk & dawn. WAV files analysed with BatSound. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 25/04/2012 | Lower Seater | ND2461 | - | Bat Detector, 1, detected at 22:21. |

| Species | Date | Location | Sample Spatial Reference | Abundances | Comment |
|---|---|---|---|---|---|
| Common Pipistrelle *Pipistrellus pipistrellus* | 29/04/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 00:16. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 01/05/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 00:23. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 01/05/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 23:43. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 02/05/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 01:52. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 02/05/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 02:38. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 06/05/2012 | Lochend | ND2769 | - | Bat Detector, 1 detected at 22:28. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 12/05/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 22:06. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 21/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 22:51. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 21/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 23:07. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 21/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 23:23. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 21/07/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 23:10. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 21/07/2012 | Lochend | ND2668 | - | Bat Detector, 1 detected. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 21/07/2012 | Lochend | ND2768 | - | Bat Detector, 1 detected. |

| Species | Date | Location | Sample Spatial Reference | Abundances | Comment |
|---|---|---|---|---|---|
| Common Pipistrelle *Pipistrellus pipistrellus* | 22/07/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 02:43. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 22/07/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 03:03. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 23/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 23:26. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 23/07/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 23:19. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 24/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 03:24. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 24/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 23:16. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 24/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 23:36. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 24/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 23:40. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 25/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 00:31. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 25/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 02:54. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 26/07/2012 | Lower Seater | ND26 | - | Bat Detector, 8 passes. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 28/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 00:13. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 28/07/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 03:25. |

| Species | Date | Location | Sample Spatial Reference | Abundances | Comment |
|---|---|---|---|---|---|
| Common Pipistrelle *Pipistrellus pipistrellus* | 15/09/2012 | Lochend | ND2769 | - | Bat Detector, 1 detected. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 15/09/2012 | Lochend | ND2668 | - | Bat Detector, 1 detected. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 15/09/2012 | Lochend | ND2668 | - | Bat Detector, 1 detected. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 16/09/2012 | Lochend | ND2769 | - | Bat Detector, Pass at 20:27. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 16/09/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 04:09. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 16/09/2012 | Lower Seater | ND2560 | - | Bat Detector, Pass at 20:42. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 20/09/2012 | Lower Seater | ND2559 | - | Bat Detector, 2 passes at 20:17. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 22/09/2012 | Lochend | ND2668 | - | Bat Detector, 2 passes. |
| Common Pipistrelle *Pipistrellus pipistrellus* | 22/08/2018 | Stangergill | ND2066067714 | 1 Count of Adult | Dead on pavement. |

# ANNEX 4: PHOTOGRAPHIC PLATES

**Table A4.1** below provides photographs from the Site.

*Table 4.1: Photographic plates from roost surveys.*

| | |
|---|---|
|  |  |
| **Plate 1:** Altagalvash stone structure. | **Plate 2:** Altagalvash stone structure. |
|  |  |
| **Plate 3:** Altagalvash stone structure. | **Plate 4:** Altagalvash stone structure. |

| **Plate 5:** Glenskible stone structure. | **Plate 6:** Glenskible stone structure. |
|---|---|





| **Plate 7:** Lagganroaig stone structure. | **Plate 8:** Lagganroaig stone structure. |
|---|---|

| **Plate 9:** Lagganroaig stone structure. | **Plate 10:** Croit Bagh stone structure. |
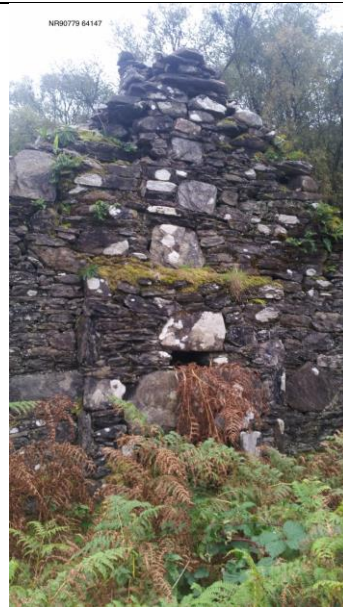
# ANNEX 5: WEATHER CONDITIONS

**Table A5.1** provides weather conditions for Bat Activity Survey periods.

*Table A5.1: Weather Conditions.*

| Date | Temp at Dusk (ºC) | Rainfall | Maximum Wind Speed (mph) |
|---|---|---|---|
| 19/07/2019 | 15 | 0 | 2 |
| 20/07/2019 | 17 | 0 | 6 |
| 21/07/2019 | 14 | Light | 2 |
| 22/07/2019 | 20 | 0 | 5 |
| 23/07/2019 | 20 | 0 | 3 |
| 24/07/2019 | 17 | 0 | 5 |
| 25/07/2019 | 21 | 0 | 7 |
| 26/07/2019 | 20 | 0 | 5 |
| 27/07/2019 | 16 | 0 | 3 |
| 28/07/2019 | 16 | 0 | 1 |
| 29/07/2019 | 15 | Light | 4 |
| 30/07/2019 | 19 | 0 | 1 |
| 31/07/2019 | 20 | 0 | 5 |
| 01/08/2019 | 19 | 0 | 2 |
| 02/08/2019 | 21 | 0 | 3 |
| 03/08/2019 | 21 | 0 | 5 |
| 04/08/2019 | 16 | 0 | 4 |
| 05/08/2019 | 16 | 0 | 3 |
| 06/08/2019 | 15 | 0 | 1 |
| 07/08/2019 | 17 | 0 | 6 |
| 08/08/2019 | 18 | 0 | 3 |
| 09/08/2019 | 15 | 0 | 6 |
| 10/08/2019 | 20 | 0 | 3 |
| 11/08/2019 | 11 | Light | 6 |
| 12/08/2019 | 15 | 0 | 5 |
| 01/09/2019 | 11 | 0 | 5 |
| 02/09/2019 | 13 | Light | 13 |
| 03/09/2019 | 15 | Light | 12 |

| Date | Temp at Dusk (ºC) | Rainfall | Maximum Wind Speed (mph) |
|---|---|---|---|
| 04/09/2019 | 12 | 0 | 16 |
| 05/09/2019 | 12 | 0 | 9 |
| 06/09/2019 | 11 | 0 | 6 |
| 07/09/2019 | 11 | 0 | 3 |
| 08/09/2019 | 10 | 0 | 1 |
| 09/09/2019 | 12 | Light | 2 |
| 10/09/2019 | 11 | 0 | 6 |
| 11/09/2019 | 13 | 0 | 6 |
| 12/09/2019 | 15 | 0 | 5 |
| 13/09/2019 | 12 | 0 | 3 |
| 14/09/2019 | 15 | 0 | 7 |
| 15/09/2019 | 11 | Light | 2 |
| 16/09/2019 | 12 | 0 | 3 |
| 17/09/2019 | 12 | 0 | 5 |
| 18/09/2019 | 13 | 0 | 9 |
| 19/09/2019 | 15 | 0 | 1 |
| 20/09/2019 | 16 | 0 | 8 |
| 21/09/2019 | 18 | 0 | 7 |
| 22/09/2019 | 15 | 0 | 3 |
| 23/09/2019 | 14 | Heavy rain | 9 |
| 24/09/2019 | 14 | 0 | 8 |
| 25/09/2019 | 14 | 0 | 1 |
| 26/09/2019 | 13 | 0 | 13 |
| 27/09/2019 | 11 | 0 | 10 |
| 28/09/2019 | 12 | 0 | 7 |
| 29/09/2019 | 11 | 0 | 10 |
| 30/09/2019 | 11 | Heavy rain | 7 |
| 01/10/2019 | 7 | 0 | 9 |

| Date | Temp at Dusk (ºC) | Rainfall | Maximum Wind Speed (mph) |
|---|---|---|---|
| 02/10/2019 | 7 | 0 | 5 |
| 15/05/2020 | 9 | 0 | 15 |
| 16/05/2020 | 11 | Light | 14 |
| 17/05/2020 | 12 | Light | 17 |
| 18/05/2020 | 11 | Light | 7 |
| 19/05/2020 | 14 | 0 | 5 |
| 20/05/2020 | 12 | 0 | 6 |
| 21/05/2020 | 15 | Light | 9 |
| 22/05/2020 | 11 | Light | 30 |
| 23/05/2020 | 10 | Light | 23 |
| 24/05/2020 | 12 | 0 | 5 |
| 25/05/2020 | 13 | 0 | 9 |
| 26/05/2020 | 11 | 0 | 7 |
| 27/05/2020 | 14 | 0 | 5 |
| 28/05/2020 | 19 | 0 | 7 |
| 29/05/2020 | 18 | 0 | 7 |
| 30/05/2020 | 16 | 0 | 16 |
| 31/05/2020 | 16 | 0 | 16 |
| 01/06/2020 | 18 | 0 | 8 |
| 02/06/2020 | 14 | Light | 15 |
| 03/06/2020 | 11 | 0 | 6 |
| 04/06/2020 | 9 | Light | 10 |
| 05/06/2020 | 12 | Light | 13 |
| 06/06/2020 | 12 | 0 | 10 |
| 07/06/2020 | 12 | 0 | 15 |
| 08/06/2020 | 11 | 0 | 6 |
| 09/06/2020 | 10 | Light (all night) | 7 |
| 10/06/2020 | 12 | Light | 17 |
| 11/06/2020 | 13 | 0 | 7 |
| 12/06/2020 | 13 | 0 | 12 |
| 13/06/2020 | 14 | 0 | 10 |
| 14/06/2020 | 17 | 0 | 10 |
| 15/06/2020 | 17 | 0 | 9 |
| 16/06/2020 | 16 | Light | 10 |

# ANNEX 6: ECOBAT TOOL OUTPUT REPORT

# Bat Activity Analysis

## Site Name: Earraghail

Author: Lizi Pimlott

14/06/2021

## 7 SUMMARY

Bats were detected on **96** nights between **2019-07-16** and **2020-06-15**, using **10** static bat detectors. Throughout this period **5** species were recorded. **Table 1.** Detectors were placed at the following locations:

| Detector ID | Latitude | Longitude |
|---|---|---|
| MS 12 | 55.81773 | -5.365471 |
| MS 13 | 55.81211 | -5.370238 |
| MS 13 | 55.81210 | -5.370269 |
| MS 16 | 55.81165 | -5.360124 |
| MS 16 | 55.81160 | -5.360183 |
| MS 17 | 55.80173 | -5.360194 |
| MS 17 | 55.80167 | -5.360189 |
| MS 18 | 55.79756 | -5.338464 |
| MS 18 | 55.79751 | -5.338172 |
| MS 19 | 55.80756 | -5.342593 |
| MS 19 | 55.80761 | -5.342630 |
| MS 20 | 55.80461 | -5.358734 |
| MS 20 | 55.80466 | -5.358499 |
| MS 11 | 55.80720 | -5.378402 |
| MS 12 | 55.81773 | -5.365487 |
| MS 9 | 55.81621 | -5.388222 |
| MS 7 | 55.82306 | -5.393624 |

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## 8 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.
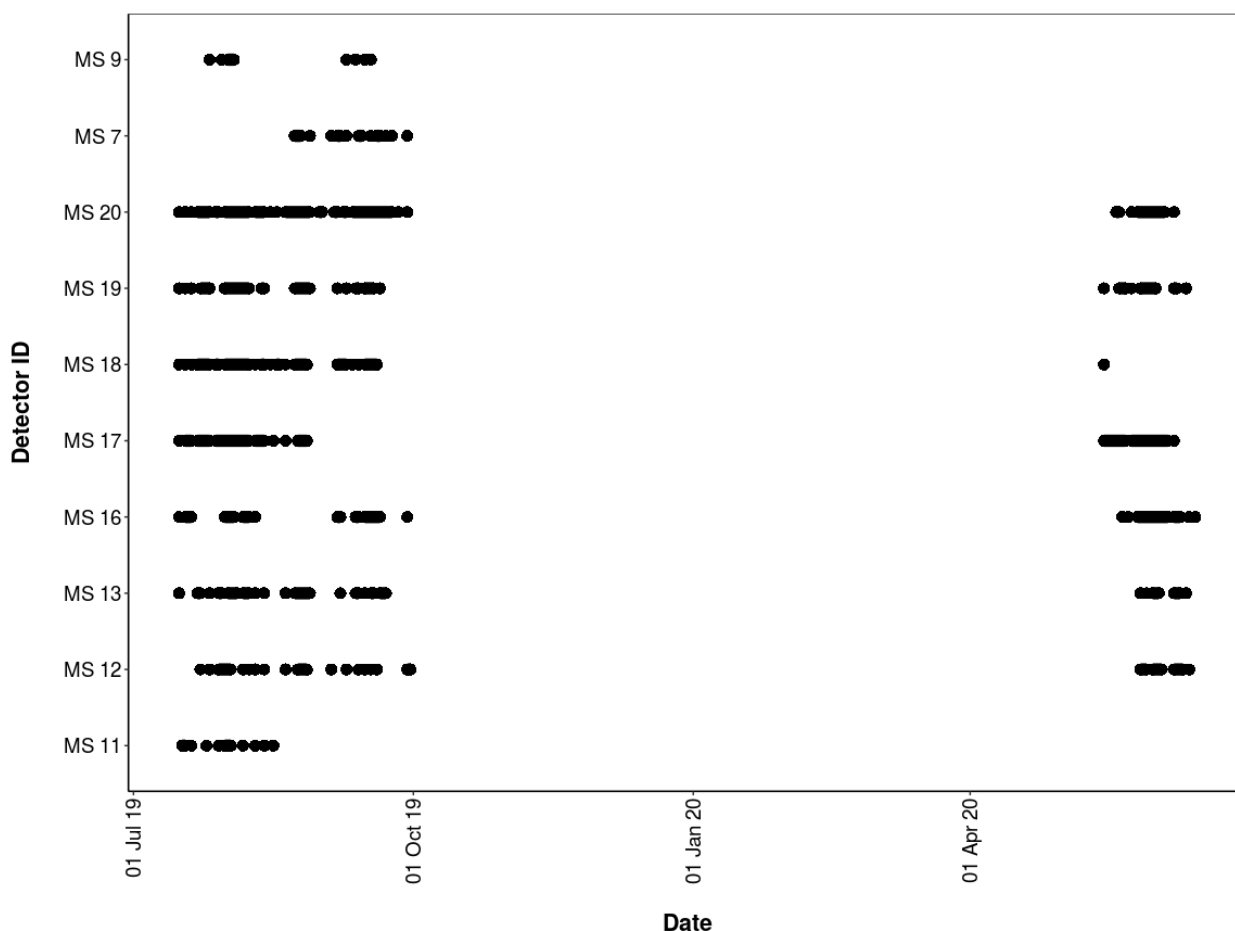
| Detector ID | No. of nights |
|---|---|
| MS 11 | 12 |
| MS 12 | 39 |
| MS 13 | 44 |
| MS 16 | 42 |

| | |
|---|---|
| MS 17 | 61 |
| MS 18 | 73 |
| MS 19 | 50 |
| MS 20 | 77 |
| MS 7 | 16 |
| MS 9 | 9 |

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# 9 SURVEY NIGHTS

**Figure 1.** Horizontal bars show nights when acoustic detectors recorded bats.



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## 9.1 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 100km radius of the survey location.

- Records using any make of bat detector.

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## 9.2 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 |
|---|---|---|---|---|---|---|
| MS 11 | *Pipistrellus pipistrellus* | 0 | 0 | 0 | 1 | 4 |
| MS 11 | *Pipistrellus pygmaeus* | 0 | 0 | 0 | 1 | 8 |
| MS 12 | *Myotis* | 0 | 0 | 0 | 1 | 3 |
| MS 12 | *Pipistrellus pipistrellus* | 1 | 4 | 6 | 7 | 9 |
| MS 12 | *Pipistrellus pygmaeus* | 1 | 1 | 7 | 5 | 14 |
| MS 12 | *Plecotus auritus* | 0 | 0 | 0 | 0 | 1 |
| MS 13 | *Myotis* | 0 | 0 | 0 | 0 | 1 |
| MS 13 | *Pipistrellus pipistrellus* | 1 | 2 | 7 | 8 | 6 |
| MS 13 | *Pipistrellus pygmaeus* | 1 | 4 | 7 | 8 | 17 |
| MS 16 | *Myotis* | 0 | 0 | 0 | 0 | 2 |
| MS 16 | *Pipistrellus pipistrellus* | 0 | 1 | 6 | 6 | 10 |
| MS 16 | *Pipistrellus pygmaeus* | 3 | 9 | 9 | 5 | 12 |
| MS 16 | *Plecotus auritus* | 0 | 0 | 0 | 0 | 2 |
| MS 17 | *Myotis* | 0 | 8 | 10 | 4 | 1 |
| MS 17 | *Pipistrellus* | 5 | 1 | 0 | 0 | 0 |
| MS 17 | *Pipistrellus pipistrellus* | 17 | 16 | 7 | 7 | 10 |
| MS 17 | *Pipistrellus pygmaeus* | 21 | 23 | 8 | 1 | 4 |
| MS 17 | *Plecotus auritus* | 0 | 0 | 0 | 2 | 8 |
| MS 18 | *Myotis* | 0 | 1 | 7 | 3 | 4 |
| MS 18 | *Pipistrellus* | 12 | 3 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| MS 18 | *Pipistrellus pipistrellus* | 38 | 13 | 9 | 1 | 3 |
| MS 18 | *Pipistrellus pygmaeus* | 41 | 19 | 3 | 2 | 2 |
| MS 18 | *Plecotus auritus* | 0 | 0 | 5 | 5 | 7 |
| MS 19 | *Myotis* | 0 | 0 | 0 | 1 | 4 |
| MS 19 | *Pipistrellus* | 1 | 0 | 0 | 0 | 0 |
| MS 19 | *Pipistrellus pipistrellus* | 8 | 13 | 7 | 5 | 4 |
| MS 19 | *Pipistrellus pygmaeus* | 7 | 12 | 9 | 6 | 12 |
| MS 19 | *Plecotus auritus* | 0 | 0 | 0 | 2 | 3 |
| MS 20 | *Myotis* | 0 | 0 | 0 | 1 | 7 |
| MS 20 | *Pipistrellus pipistrellus* | 1 | 8 | 14 | 10 | 17 |
| MS 20 | *Pipistrellus pygmaeus* | 2 | 13 | 24 | 11 | 17 |
| MS 20 | *Plecotus auritus* | 0 | 0 | 0 | 0 | 3 |
| MS 7 | *Pipistrellus pipistrellus* | 0 | 0 | 0 | 0 | 6 |
| MS 7 | *Pipistrellus pygmaeus* | 0 | 0 | 0 | 0 | 12 |
| MS 9 | *Pipistrellus pipistrellus* | 0 | 0 | 1 | 2 | 4 |
| MS 9 | *Pipistrellus pygmaeus* | 0 | 0 | 0 | 0 | 6 |

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**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 |
|---|---|---|---|---|---|---|
| MS 11 | *Pipistrellus pipistrellus* | 1 | 1 - 1 | 31 | 5 | 1096 |
| MS 11 | *Pipistrellus pygmaeus* | 1 | 1 - 1 | 31 | 9 | 1567 |
| MS 12 | *Myotis* | 1 | 1 - 1 | 31 | 4 | 536 |
| MS 12 | *Pipistrellus pipistrellus* | 31 | 16 - 43 | 83 | 27 | 1096 |
| MS 12 | *Pipistrellus pygmaeus* | 16 | 16 - 33 | 86 | 28 | 1567 |
| MS 12 | *Plecotus auritus* | 1 | 0 | 1 | 1 | 43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| MS 13 | *Myotis* | 1 | 0 | 1 | 1 | 536 |
| MS 13 | *Pipistrellus pipistrellus* | 31 | 26.5 - 44.5 | 80 | 24 | 1096 |
| MS 13 | *Pipistrellus pygmaeus* | 31 | 16 - 37 | 91 | 37 | 1567 |
| MS 16 | *Myotis* | 1 | 1 - 1 | 1 | 2 | 536 |
| MS 16 | *Pipistrellus pipistrellus* | 31 | 16 - 31 | 61 | 23 | 1096 |
| MS 16 | *Pipistrellus pygmaeus* | 43 | 29.5 - 52 | 92 | 38 | 1567 |
| MS 16 | *Plecotus auritus* | 1 | 1 - 1 | 1 | 2 | 43 |
| MS 17 | *Myotis* | 58 | 44.5 - 61 | 75 | 23 | 536 |
| MS 17 | *Pipistrellus* | 82 | 76 - 86 | 90 | 6 | 1776 |
| MS 17 | *Pipistrellus pipistrellus* | 65 | 45.5 - 66.5 | 93 | 57 | 1096 |
| MS 17 | *Pipistrellus pygmaeus* | 75 | 67.5 - 77.5 | 95 | 57 | 1567 |
| MS 17 | *Plecotus auritus* | 1 | 1 - 1 | 31 | 10 | 43 |
| MS 18 | *Myotis* | 43 | 22 - 43 | 65 | 15 | 536 |
| MS 18 | *Pipistrellus* | 93 | 85 - 95 | 98 | 15 | 1776 |
| MS 18 | *Pipistrellus pipistrellus* | 83 | 72.5 - 83.5 | 95 | 64 | 1096 |
| MS 18 | *Pipistrellus pygmaeus* | 85 | 78.5 - 85.5 | 97 | 67 | 1567 |
| MS 18 | *Plecotus auritus* | 31 | 16 - 37 | 52 | 17 | 43 |
| MS 19 | *Myotis* | 1 | 1 - 1 | 31 | 5 | 536 |
| MS 19 | *Pipistrellus* | 95 | 0 | 95 | 1 | 1776 |
| MS 19 | *Pipistrellus pipistrellus* | 70 | 50.5 - 71 | 95 | 37 | 1096 |
| MS 19 | *Pipistrellus pygmaeus* | 48 | 36 - 57 | 94 | 46 | 1567 |
| MS 19 | *Plecotus auritus* | 1 | 1 - 16 | 31 | 5 | 43 |
| MS 20 | *Myotis* | 1 | 1 - 1 | 31 | 8 | 536 |
| MS 20 | *Pipistrellus pipistrellus* | 31 | 22 - 41.5 | 83 | 50 | 1096 |
| MS 20 | *Pipistrellus pygmaeus* | 43 | 31 - 44.5 | 82 | 67 | 1567 |
| MS 20 | *Plecotus auritus* | 1 | 1 - 1 | 1 | 3 | 43 |

| MS 7 | *Pipistrellus pipistrellus* | 1 | 1 - 1 | 1 | 6 | 1096 |
|------|------|---|-------|---|----|------|
| MS 7 | *Pipistrellus pygmaeus* | 1 | 1 - 1 | 1 | 12 | 1567 |
| MS 9 | *Pipistrellus pipistrellus* | 1 | 1 - 29.5 | 58 | 7 | 1096 |
| MS 9 | *Pipistrellus pygmaeus* | 1 | 1 - 1 | 1 | 6 | 1567 |

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###Figures

**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)

Activity Level (Percentile)
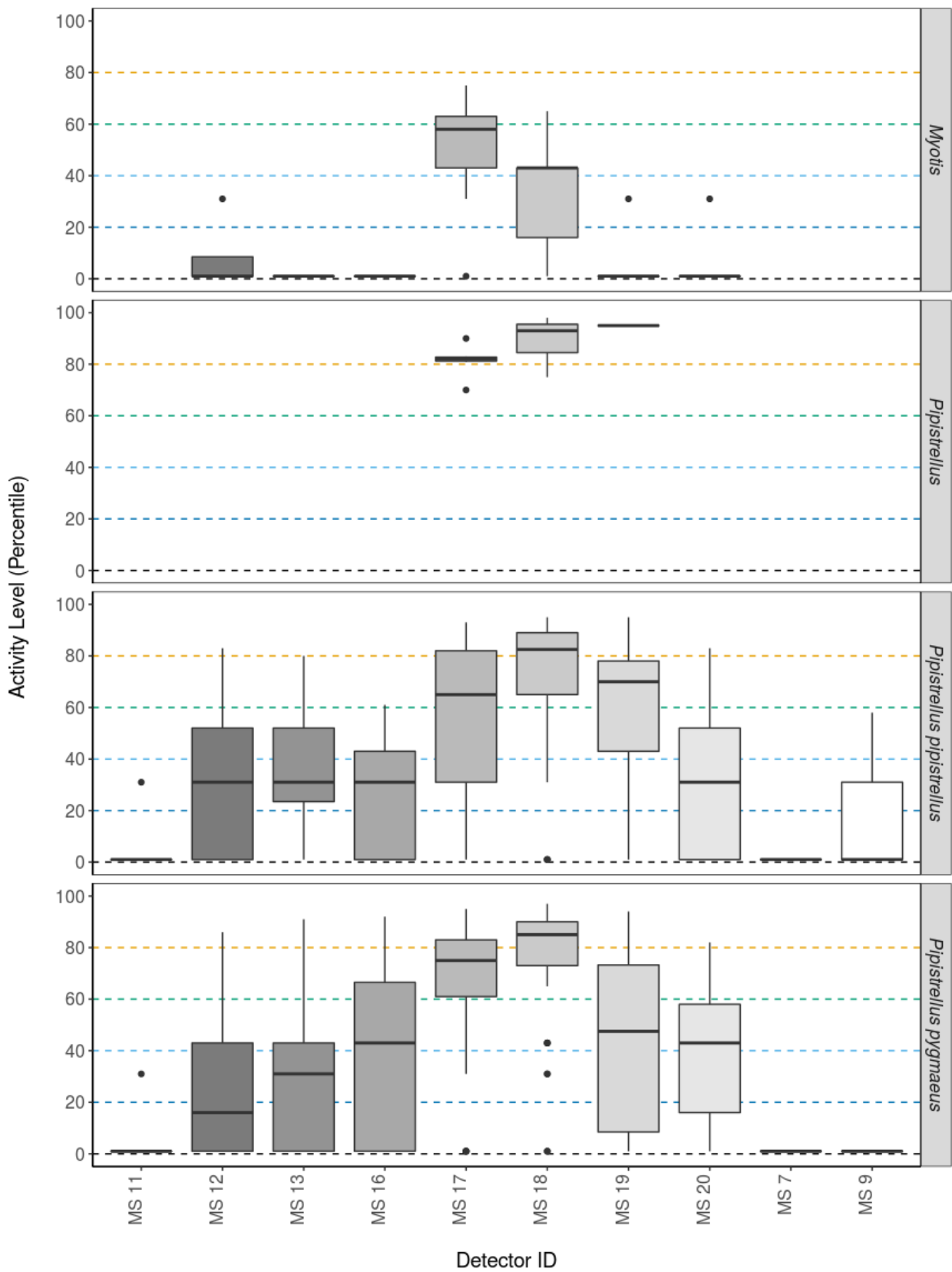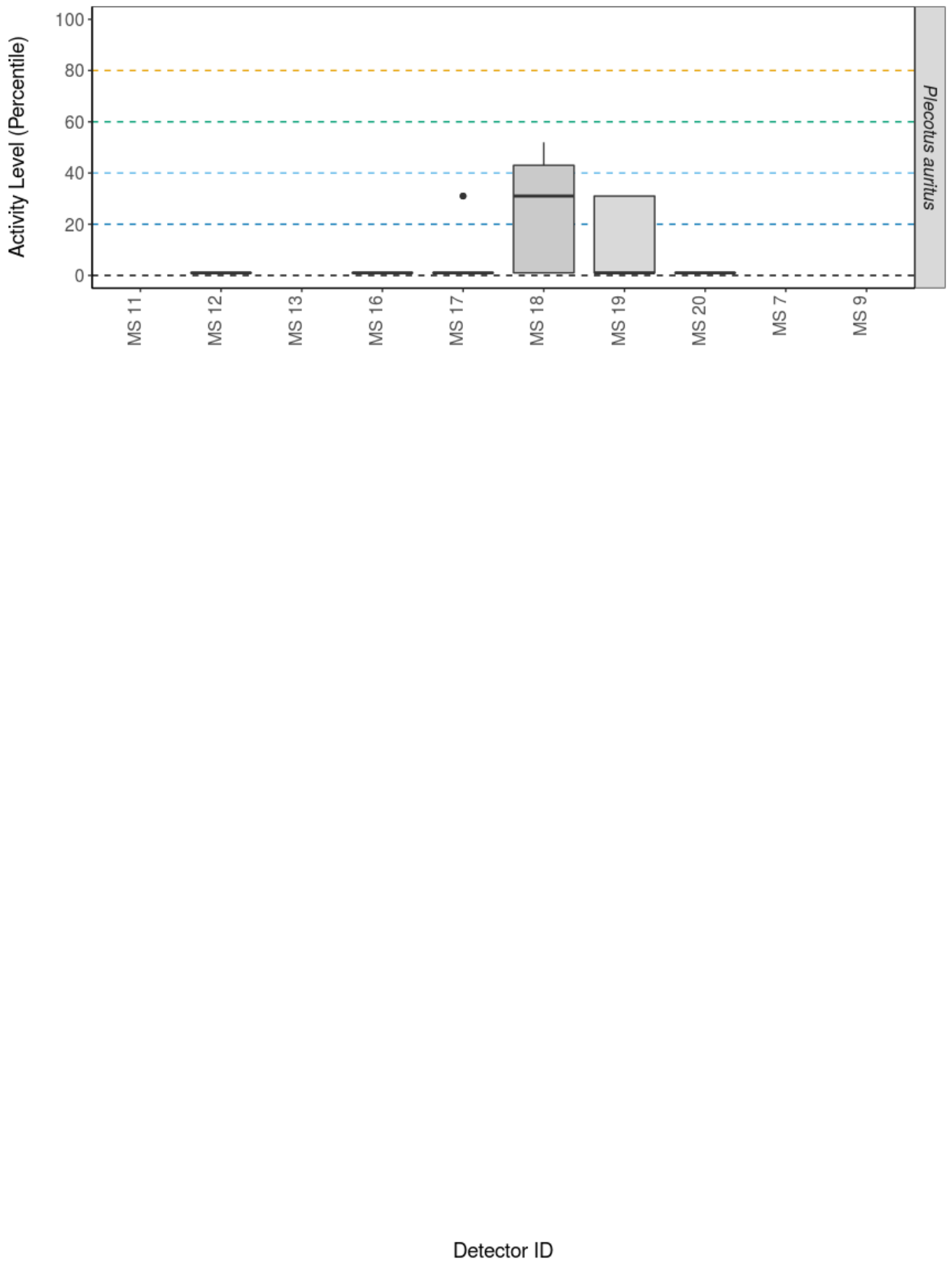
Detector ID

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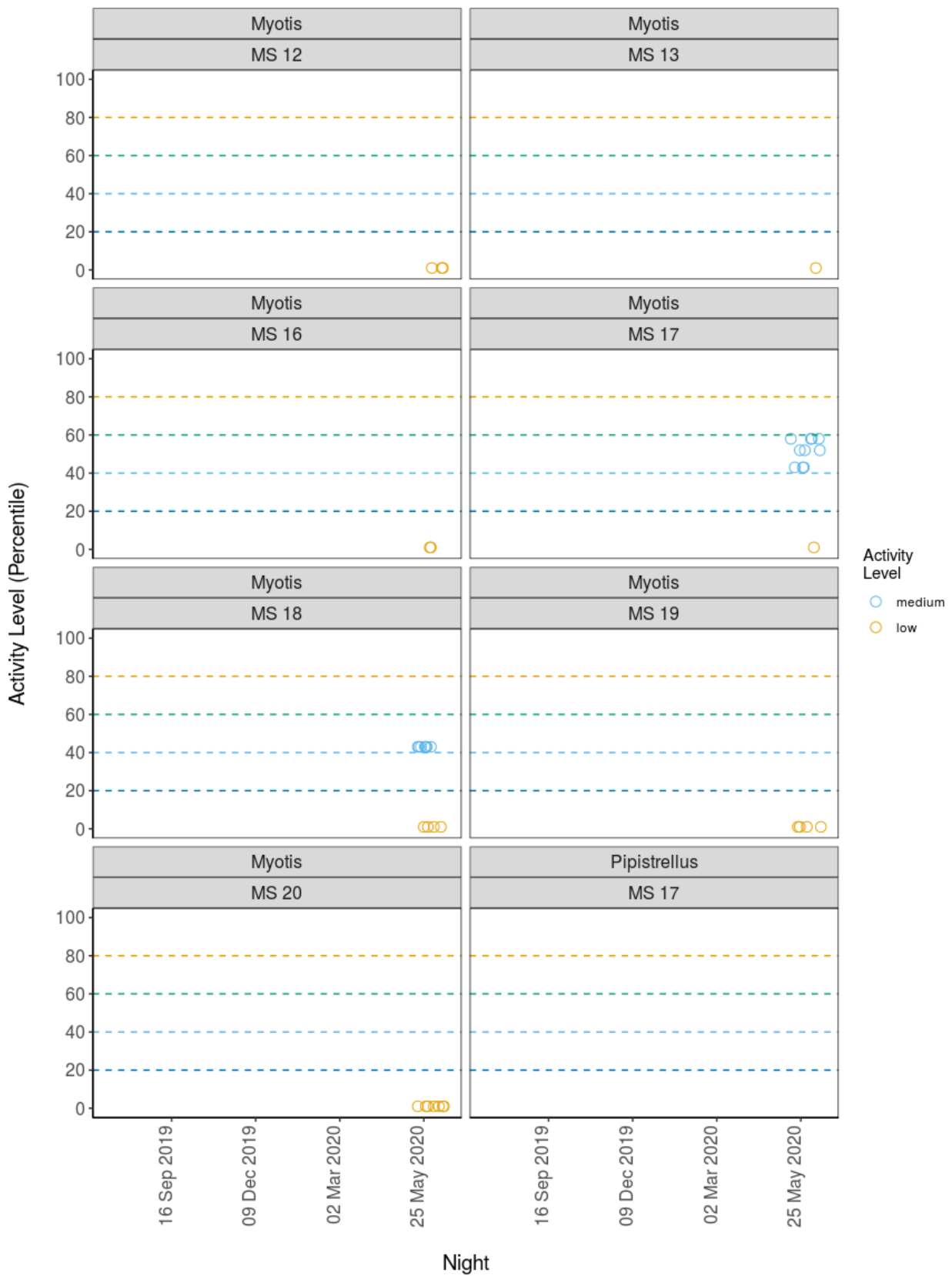
Night

## 9.3 PER DETECTOR, PER MONTH

**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.

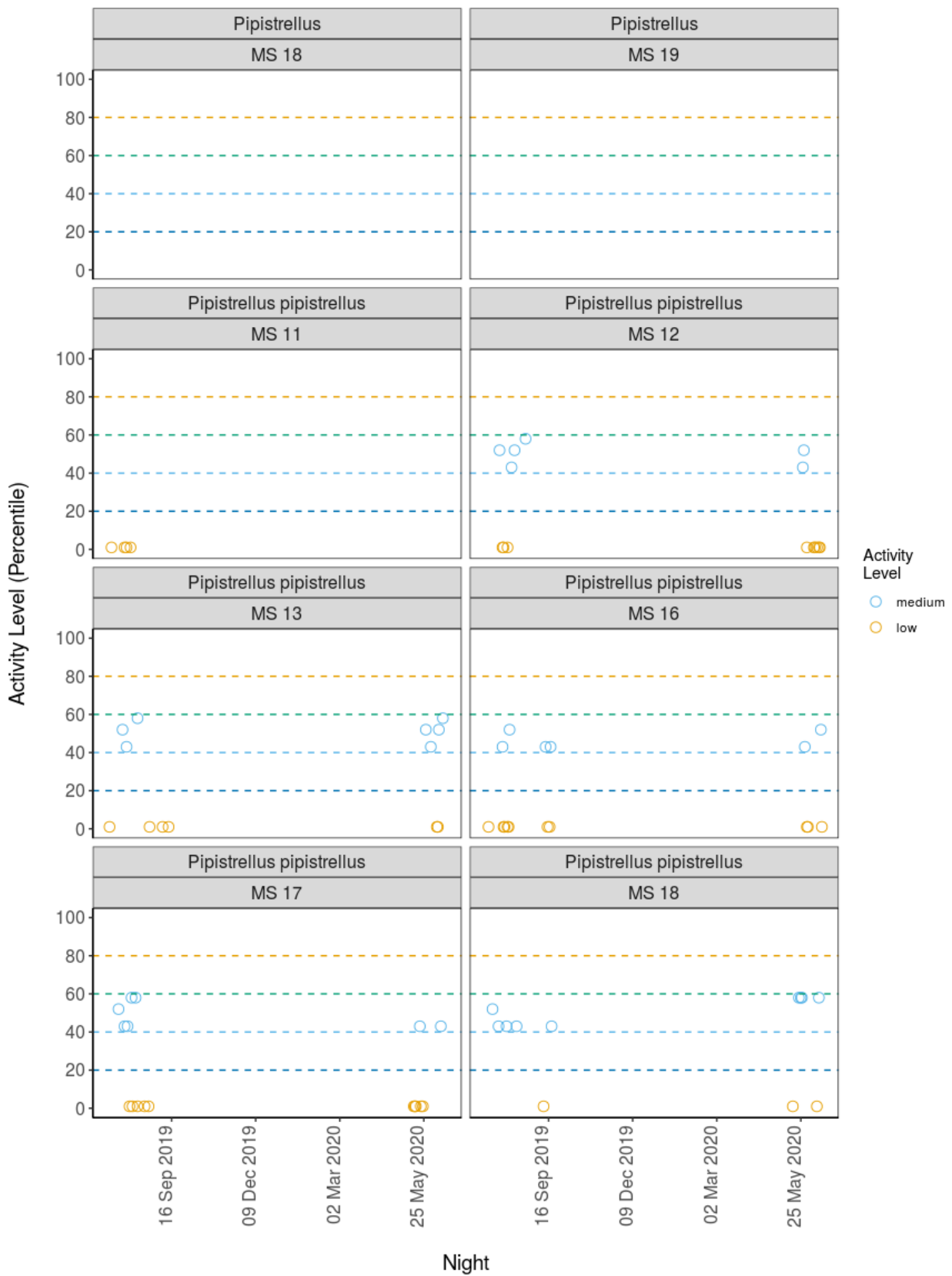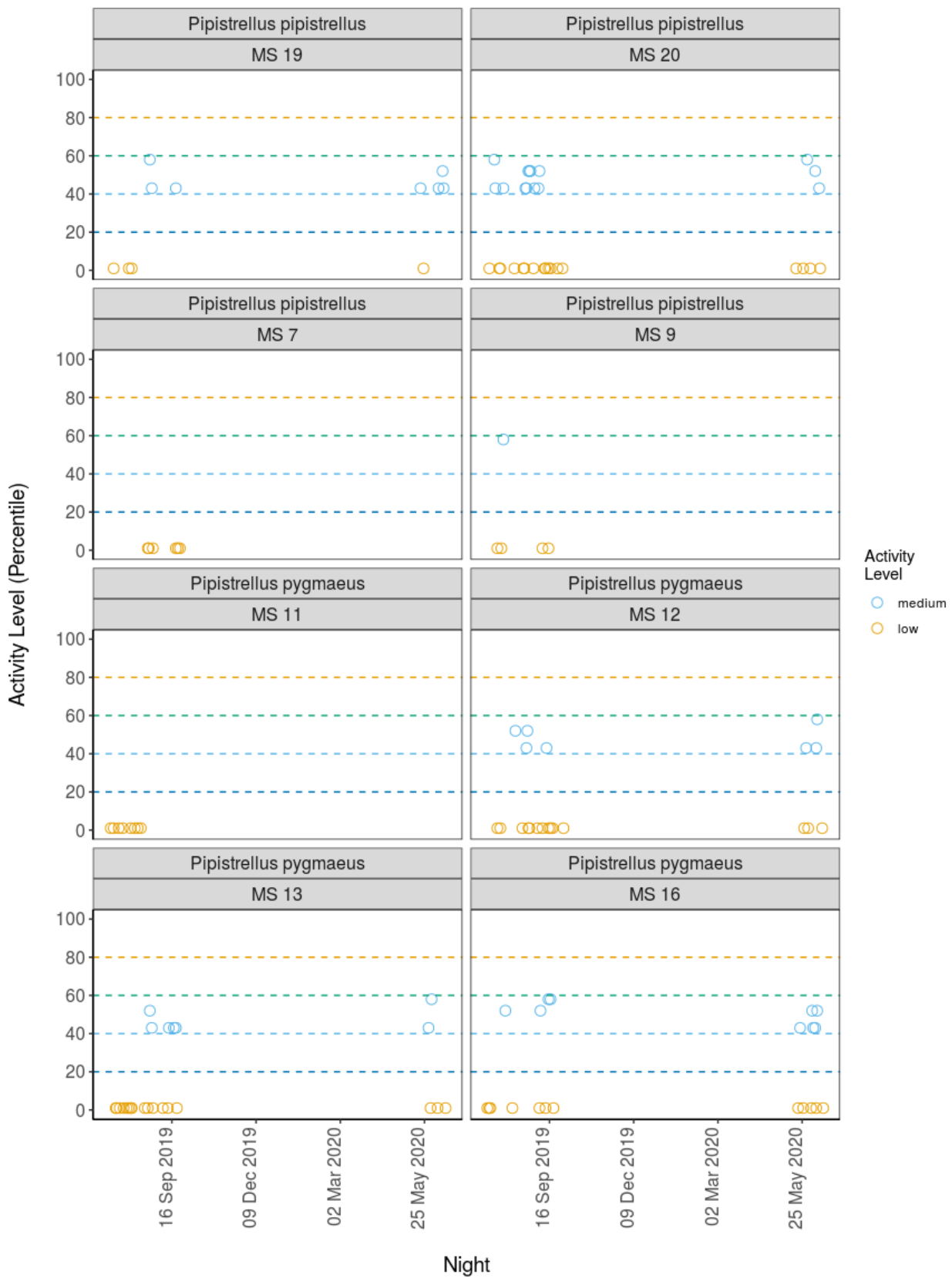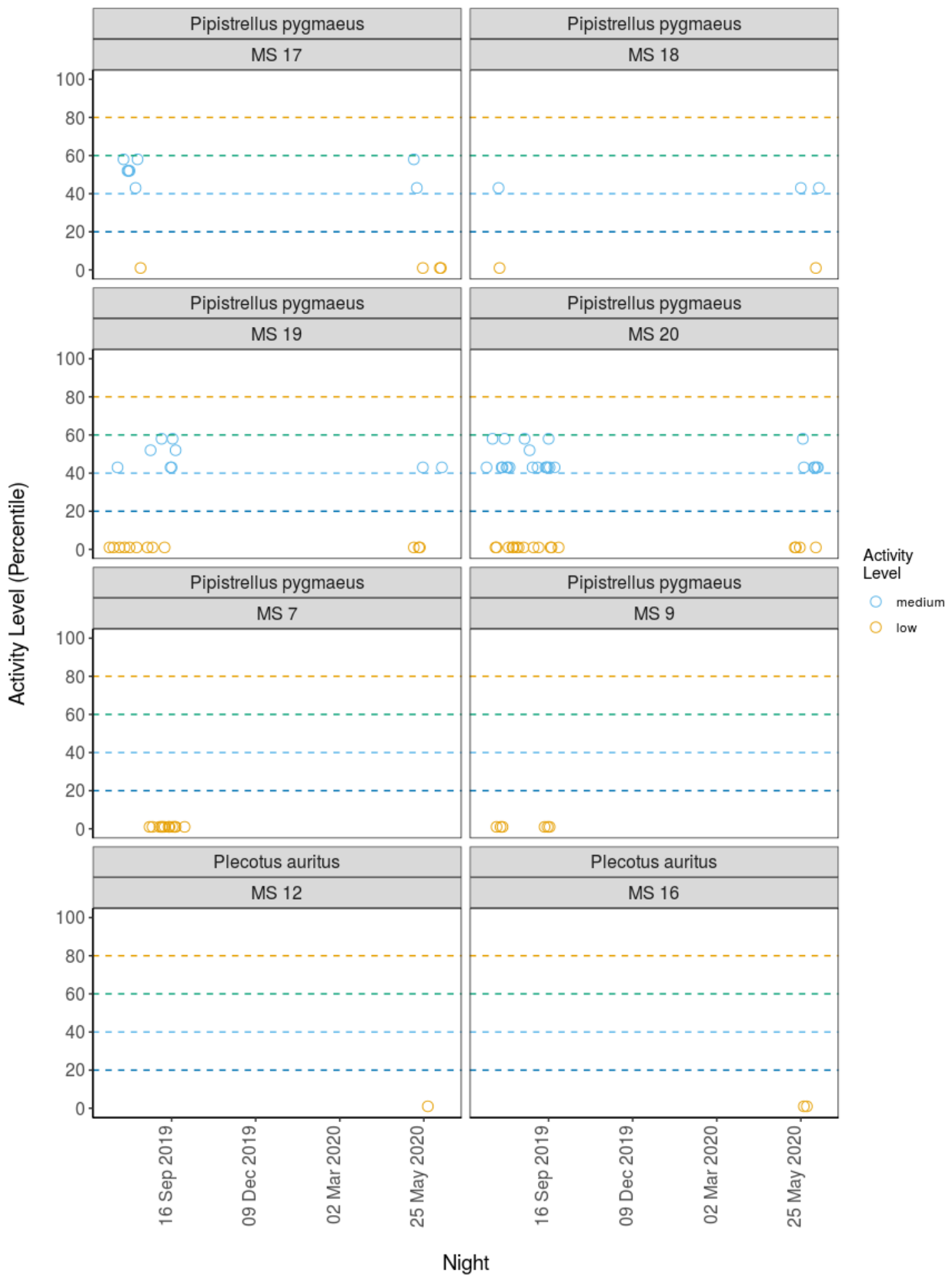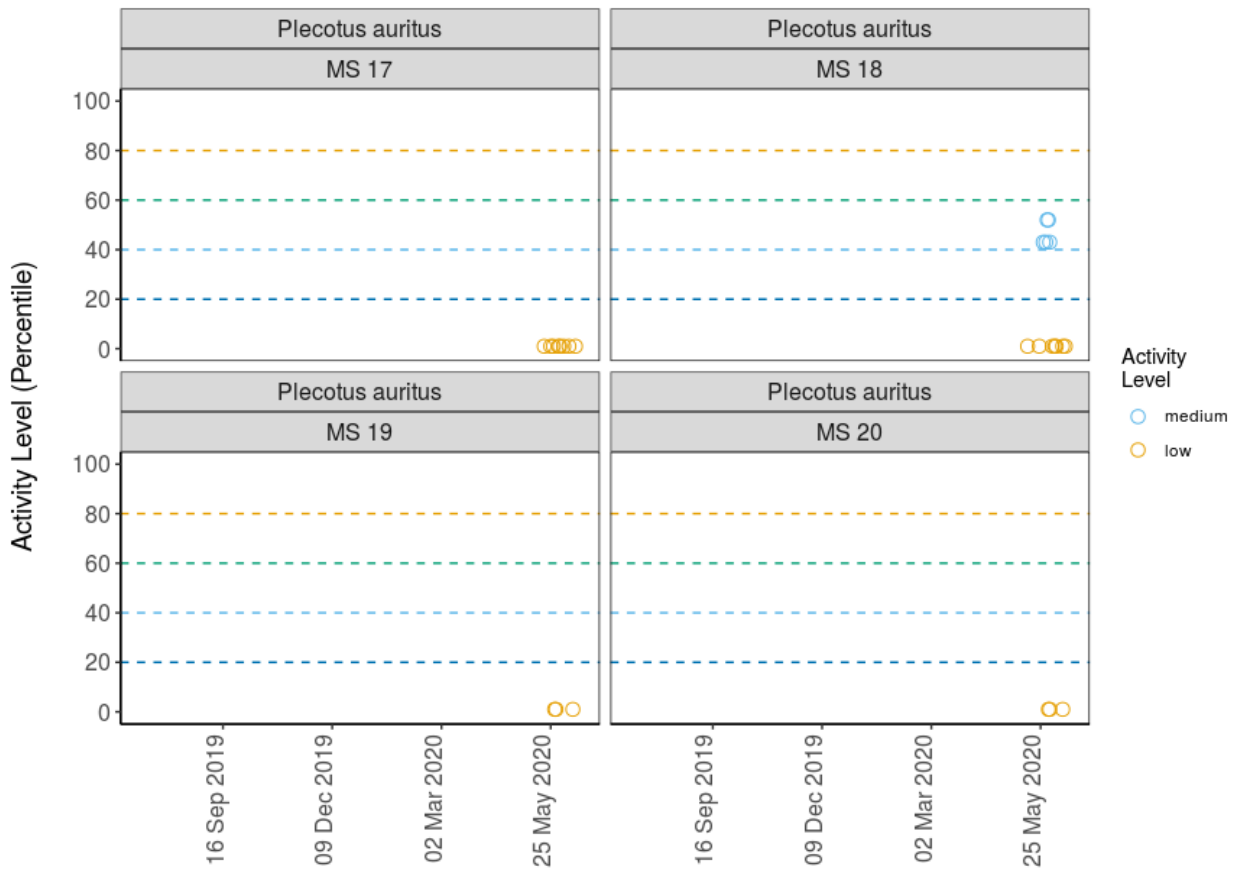| Detector ID | Species/Species Group | Month | Nights of High Activity | Nights of Moderate/ High Activity | Nights of Moderate Activity | Nights of Low/ Moderate Activity | Nights of Low Activity |
|---|---|---|---|---|---|---|---|
| MS 11 | *Pipistrellus pipistrellus* | Jul | 0 | 0 | 0 | 0 | 2 |
| MS 11 | *Pipistrellus pipistrellus* | Aug | 0 | 0 | 0 | 1 | 2 |
| MS 11 | *Pipistrellus pygmaeus* | Jul | 0 | 0 | 0 | 0 | 4 |
| MS 11 | *Pipistrellus pygmaeus* | Aug | 0 | 0 | 0 | 1 | 4 |
| MS 12 | *Myotis* | Jun | 0 | 0 | 0 | 1 | 3 |
| MS 12 | *Pipistrellus pipistrellus* | May | 0 | 0 | 2 | 1 | 1 |
| MS 12 | *Pipistrellus pipistrellus* | Jun | 1 | 2 | 0 | 2 | 5 |
| MS 12 | *Pipistrellus pipistrellus* | Jul | 0 | 0 | 1 | 2 | 0 |
| MS 12 | *Pipistrellus pipistrellus* | Aug | 0 | 0 | 3 | 2 | 3 |
| MS 12 | *Pipistrellus pipistrellus* | Sep | 0 | 2 | 0 | 0 | 0 |
| MS 12 | *Pipistrellus pygmaeus* | May | 1 | 0 | 1 | 0 | 2 |
| MS 12 | *Pipistrellus pygmaeus* | Jun | 0 | 1 | 2 | 2 | 1 |
| MS 12 | *Pipistrellus pygmaeus* | Jul | 0 | 0 | 0 | 1 | 2 |
| MS 12 | *Pipistrellus pygmaeus* | Aug | 0 | 0 | 3 | 1 | 3 |
| MS 12 | *Pipistrellus pygmaeus* | Sep | 0 | 0 | 1 | 1 | 6 |
| MS 12 | *Plecotus auritus* | May | 0 | 0 | 0 | 0 | 1 |
| MS 13 | *Myotis* | Jun | 0 | 0 | 0 | 0 | 1 |
| MS 13 | *Pipistrellus pipistrellus* | May | 0 | 0 | 1 | 1 | 0 |
| MS 13 | *Pipistrellus pipistrellus* | Jun | 0 | 1 | 3 | 1 | 2 |
| MS 13 | *Pipistrellus pipistrellus* | Jul | 0 | 1 | 1 | 0 | 1 |
| MS 13 | *Pipistrellus pipistrellus* | Aug | 1 | 0 | 2 | 4 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS 13 | *Pipistrellus pipistrellus* | Sep | 0 | 0 | 0 | 2 | 2 |
| MS 13 | *Pipistrellus pygmaeus* | May | 0 | 0 | 1 | 0 | 1 |
| MS 13 | *Pipistrellus pygmaeus* | Jun | 1 | 3 | 1 | 2 | 2 |
| MS 13 | *Pipistrellus pygmaeus* | Jul | 0 | 0 | 0 | 1 | 4 |
| MS 13 | *Pipistrellus pygmaeus* | Aug | 0 | 1 | 2 | 4 | 7 |
| MS 13 | *Pipistrellus pygmaeus* | Sep | 0 | 0 | 3 | 1 | 3 |
| MS 16 | *Myotis* | May | 0 | 0 | 0 | 0 | 1 |
| MS 16 | *Myotis* | Jun | 0 | 0 | 0 | 0 | 1 |
| MS 16 | *Pipistrellus pipistrellus* | May | 0 | 0 | 1 | 1 | 1 |
| MS 16 | *Pipistrellus pipistrellus* | Jun | 0 | 1 | 1 | 1 | 2 |
| MS 16 | *Pipistrellus pipistrellus* | Jul | 0 | 0 | 0 | 2 | 1 |
| MS 16 | *Pipistrellus pipistrellus* | Aug | 0 | 0 | 2 | 0 | 4 |
| MS 16 | *Pipistrellus pipistrellus* | Sep | 0 | 0 | 2 | 2 | 2 |
| MS 16 | *Pipistrellus pygmaeus* | May | 2 | 3 | 1 | 0 | 2 |
| MS 16 | *Pipistrellus pygmaeus* | Jun | 0 | 3 | 4 | 0 | 3 |
| MS 16 | *Pipistrellus pygmaeus* | Jul | 0 | 0 | 0 | 2 | 3 |
| MS 16 | *Pipistrellus pygmaeus* | Aug | 0 | 1 | 1 | 1 | 1 |
| MS 16 | *Pipistrellus pygmaeus* | Sep | 1 | 2 | 3 | 2 | 3 |
| MS 16 | *Plecotus auritus* | May | 0 | 0 | 0 | 0 | 2 |
| MS 17 | *Myotis* | May | 0 | 3 | 6 | 3 | 0 |
| MS 17 | *Myotis* | Jun | 0 | 5 | 4 | 1 | 1 |
| MS 17 | *Pipistrellus* | Jul | 3 | 0 | 0 | 0 | 0 |
| MS 17 | *Pipistrellus* | Aug | 2 | 1 | 0 | 0 | 0 |
| MS 17 | *Pipistrellus pipistrellus* | May | 4 | 3 | 1 | 1 | 5 |
| MS 17 | *Pipistrellus pipistrellus* | Jun | 8 | 4 | 1 | 1 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS 17 | *Pipistrellus pipistrellus* | Jul | 4 | 5 | 2 | 0 | 0 |
| MS 17 | *Pipistrellus pipistrellus* | Aug | 1 | 4 | 3 | 5 | 5 |
| MS 17 | *Pipistrellus pygmaeus* | May | 3 | 7 | 2 | 1 | 1 |
| MS 17 | *Pipistrellus pygmaeus* | Jun | 10 | 2 | 0 | 0 | 2 |
| MS 17 | *Pipistrellus pygmaeus* | Jul | 7 | 5 | 1 | 0 | 0 |
| MS 17 | *Pipistrellus pygmaeus* | Aug | 1 | 9 | 5 | 0 | 1 |
| MS 17 | *Plecotus auritus* | May | 0 | 0 | 0 | 1 | 4 |
| MS 17 | *Plecotus auritus* | Jun | 0 | 0 | 0 | 1 | 4 |
| MS 18 | *Myotis* | May | 0 | 1 | 6 | 2 | 2 |
| MS 18 | *Myotis* | Jun | 0 | 0 | 1 | 1 | 2 |
| MS 18 | *Pipistrellus* | Jul | 2 | 1 | 0 | 0 | 0 |
| MS 18 | *Pipistrellus* | Aug | 5 | 1 | 0 | 0 | 0 |
| MS 18 | *Pipistrellus* | Sep | 5 | 1 | 0 | 0 | 0 |
| MS 18 | *Pipistrellus pipistrellus* | May | 9 | 2 | 3 | 0 | 1 |
| MS 18 | *Pipistrellus pipistrellus* | Jun | 10 | 0 | 1 | 0 | 1 |
| MS 18 | *Pipistrellus pipistrellus* | Jul | 3 | 5 | 2 | 0 | 0 |
| MS 18 | *Pipistrellus pipistrellus* | Aug | 11 | 6 | 2 | 0 | 0 |
| MS 18 | *Pipistrellus pipistrellus* | Sep | 5 | 0 | 1 | 1 | 1 |
| MS 18 | *Pipistrellus pygmaeus* | May | 12 | 0 | 1 | 1 | 0 |
| MS 18 | *Pipistrellus pygmaeus* | Jun | 6 | 4 | 1 | 0 | 1 |
| MS 18 | *Pipistrellus pygmaeus* | Jul | 5 | 4 | 1 | 0 | 1 |
| MS 18 | *Pipistrellus pygmaeus* | Aug | 14 | 6 | 0 | 0 | 0 |
| MS 18 | *Pipistrellus pygmaeus* | Sep | 4 | 5 | 0 | 1 | 0 |
| MS 18 | *Plecotus auritus* | May | 0 | 0 | 4 | 2 | 2 |
| MS 18 | *Plecotus auritus* | Jun | 0 | 0 | 1 | 3 | 5 |
| MS 19 | *Myotis* | May | 0 | 0 | 0 | 1 | 3 |
| MS 19 | *Myotis* | Jun | 0 | 0 | 0 | 0 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MS 19 | *Pipistrellus* | Sep | 1 | 0 | 0 | 0 | 0 |
| MS 19 | *Pipistrellus pipistrellus* | May | 2 | 2 | 1 | 1 | 1 |
| MS 19 | *Pipistrellus pipistrellus* | Jun | 1 | 3 | 3 | 0 | 0 |
| MS 19 | *Pipistrellus pipistrellus* | Jul | 0 | 1 | 0 | 2 | 1 |
| MS 19 | *Pipistrellus pipistrellus* | Aug | 2 | 4 | 2 | 0 | 2 |
| MS 19 | *Pipistrellus pipistrellus* | Sep | 3 | 3 | 1 | 2 | 0 |
| MS 19 | *Pipistrellus pygmaeus* | May | 4 | 0 | 1 | 1 | 3 |
| MS 19 | *Pipistrellus pygmaeus* | Jun | 0 | 5 | 1 | 0 | 0 |
| MS 19 | *Pipistrellus pygmaeus* | Jul | 0 | 1 | 1 | 1 | 4 |
| MS 19 | *Pipistrellus pygmaeus* | Aug | 2 | 5 | 1 | 3 | 4 |
| MS 19 | *Pipistrellus pygmaeus* | Sep | 1 | 1 | 5 | 1 | 1 |
| MS 19 | *Plecotus auritus* | May | 0 | 0 | 0 | 0 | 2 |
| MS 19 | *Plecotus auritus* | Jun | 0 | 0 | 0 | 2 | 1 |
| MS 20 | *Myotis* | May | 0 | 0 | 0 | 0 | 3 |
| MS 20 | *Myotis* | Jun | 0 | 0 | 0 | 1 | 4 |
| MS 20 | *Pipistrellus pipistrellus* | May | 0 | 4 | 1 | 0 | 2 |
| MS 20 | *Pipistrellus pipistrellus* | Jun | 1 | 2 | 2 | 0 | 2 |
| MS 20 | *Pipistrellus pipistrellus* | Jul | 0 | 0 | 2 | 3 | 3 |
| MS 20 | *Pipistrellus pipistrellus* | Aug | 0 | 1 | 6 | 3 | 4 |
| MS 20 | *Pipistrellus pipistrellus* | Sep | 0 | 1 | 3 | 4 | 6 |
| MS 20 | *Pipistrellus pygmaeus* | May | 0 | 3 | 2 | 0 | 3 |
| MS 20 | *Pipistrellus pygmaeus* | Jun | 2 | 2 | 4 | 1 | 1 |
| MS 20 | *Pipistrellus pygmaeus* | Jul | 0 | 1 | 3 | 2 | 2 |
| MS 20 | *Pipistrellus pygmaeus* | Aug | 0 | 5 | 8 | 3 | 6 |

| MS 20 | *Pipistrellus pygmaeus* | Sep | 0 | 2 | 7 | 5 | 5 |
| MS 20 | *Plecotus auritus* | May | 0 | 0 | 0 | 0 | 1 |
| MS 20 | *Plecotus auritus* | Jun | 0 | 0 | 0 | 0 | 2 |
| MS 7 | *Pipistrellus pipistrellus* | Aug | 0 | 0 | 0 | 0 | 3 |
| MS 7 | *Pipistrellus pipistrellus* | Sep | 0 | 0 | 0 | 0 | 3 |
| MS 7 | *Pipistrellus pygmaeus* | Aug | 0 | 0 | 0 | 0 | 2 |
| MS 7 | *Pipistrellus pygmaeus* | Sep | 0 | 0 | 0 | 0 | 10 |
| MS 9 | *Pipistrellus pipistrellus* | Jul | 0 | 0 | 0 | 0 | 2 |
| MS 9 | *Pipistrellus pipistrellus* | Aug | 0 | 0 | 1 | 2 | 0 |
| MS 9 | *Pipistrellus pipistrellus* | Sep | 0 | 0 | 0 | 0 | 2 |
| MS 9 | *Pipistrellus pygmaeus* | Jul | 0 | 0 | 0 | 0 | 2 |
| MS 9 | *Pipistrellus pygmaeus* | Aug | 0 | 0 | 0 | 0 | 1 |
| MS 9 | *Pipistrellus pygmaeus* | Sep | 0 | 0 | 0 | 0 | 3 |

Page Break

**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 |
|---|---|---|---|---|---|---|
| MS 11 | *Pipistrellus pipistrellus* | Jul | 1 | 1 - 1 | 1 | 2 |
| MS 11 | *Pipistrellus pipistrellus* | Aug | 1 | 1 - 1 | 31 | 3 |
| MS 11 | *Pipistrellus pygmaeus* | Jul | 1 | 1 - 1 | 1 | 4 |
| MS 11 | *Pipistrellus pygmaeus* | Aug | 1 | 1 - 1 | 31 | 5 |
| MS 12 | *Myotis* | Jun | 1 | 1 - 1 | 31 | 4 |
| MS 12 | *Pipistrellus pipistrellus* | May | 37 | 16 - 43 | 52 | 4 |
| MS 12 | *Pipistrellus pipistrellus* | Jun | 16 | 16 - 43 | 83 | 10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| MS 12 | *Pipistrellus pipistrellus* | Jul | 31 | 16 - 43 | 52 | 3 |
| MS 12 | *Pipistrellus pipistrellus* | Aug | 31 | 16 - 43 | 58 | 8 |
| MS 12 | *Pipistrellus pipistrellus* | Sep | 63 | 16 - 43 | 65 | 2 |
| MS 12 | *Pipistrellus pygmaeus* | May | 22 | 16 - 33 | 86 | 4 |
| MS 12 | *Pipistrellus pygmaeus* | Jun | 37 | 16 - 33 | 65 | 6 |
| MS 12 | *Pipistrellus pygmaeus* | Jul | 1 | 16 - 33 | 31 | 3 |
| MS 12 | *Pipistrellus pygmaeus* | Aug | 31 | 16 - 33 | 52 | 7 |
| MS 12 | *Pipistrellus pygmaeus* | Sep | 1 | 16 - 33 | 43 | 8 |
| MS 12 | *Plecotus auritus* | May | 1 | 0 | 1 | 1 |
| MS 13 | *Myotis* | Jun | 1 | 0 | 1 | 1 |
| MS 13 | *Pipistrellus pipistrellus* | May | 42 | 26.5 - 44.5 | 52 | 2 |
| MS 13 | *Pipistrellus pipistrellus* | Jun | 43 | 26.5 - 44.5 | 67 | 7 |
| MS 13 | *Pipistrellus pipistrellus* | Jul | 52 | 26.5 - 44.5 | 61 | 3 |
| MS 13 | *Pipistrellus pipistrellus* | Aug | 31 | 26.5 - 44.5 | 80 | 8 |
| MS 13 | *Pipistrellus pipistrellus* | Sep | 16 | 26.5 - 44.5 | 31 | 4 |
| MS 13 | *Pipistrellus pygmaeus* | May | 22 | 16 - 37 | 43 | 2 |
| MS 13 | *Pipistrellus pygmaeus* | Jun | 58 | 16 - 37 | 91 | 9 |
| MS 13 | *Pipistrellus pygmaeus* | Jul | 1 | 16 - 37 | 31 | 5 |
| MS 13 | *Pipistrellus pygmaeus* | Aug | 16 | 16 - 37 | 73 | 14 |
| MS 13 | *Pipistrellus pygmaeus* | Sep | 31 | 16 - 37 | 43 | 7 |
| MS 16 | *Myotis* | May | 1 | 1 - 1 | 1 | 1 |
| MS 16 | *Myotis* | Jun | 1 | 1 - 1 | 1 | 1 |
| MS 16 | *Pipistrellus pipistrellus* | May | 31 | 16 - 31 | 43 | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| MS 16 | *Pipistrellus pipistrellus* | Jun | 31 | 16 - 31 | 61 | 5 |
| MS 16 | *Pipistrellus pipistrellus* | Jul | 31 | 16 - 31 | 31 | 3 |
| MS 16 | *Pipistrellus pipistrellus* | Aug | 1 | 16 - 31 | 52 | 6 |
| MS 16 | *Pipistrellus pipistrellus* | Sep | 31 | 16 - 31 | 43 | 6 |
| MS 16 | *Pipistrellus pygmaeus* | May | 70 | 29.5 - 52 | 84 | 8 |
| MS 16 | *Pipistrellus pygmaeus* | Jun | 48 | 29.5 - 52 | 80 | 10 |
| MS 16 | *Pipistrellus pygmaeus* | Jul | 1 | 29.5 - 52 | 31 | 5 |
| MS 16 | *Pipistrellus pygmaeus* | Aug | 42 | 29.5 - 52 | 65 | 4 |
| MS 16 | *Pipistrellus pygmaeus* | Sep | 52 | 29.5 - 52 | 92 | 11 |
| MS 16 | *Plecotus auritus* | May | 1 | 1 - 1 | 1 | 2 |
| MS 17 | *Myotis* | May | 48 | 44.5 - 61 | 71 | 12 |
| MS 17 | *Myotis* | Jun | 58 | 44.5 - 61 | 75 | 11 |
| MS 17 | *Pipistrellus* | Jul | 83 | 76 - 86 | 90 | 3 |
| MS 17 | *Pipistrellus* | Aug | 81 | 76 - 86 | 82 | 3 |
| MS 17 | *Pipistrellus pipistrellus* | May | 52 | 45.5 - 66.5 | 88 | 14 |
| MS 17 | *Pipistrellus pipistrellus* | Jun | 83 | 45.5 - 66.5 | 93 | 14 |
| MS 17 | *Pipistrellus pipistrellus* | Jul | 76 | 45.5 - 66.5 | 88 | 11 |
| MS 17 | *Pipistrellus pipistrellus* | Aug | 31 | 45.5 - 66.5 | 80 | 18 |
| MS 17 | *Pipistrellus pygmaeus* | May | 67 | 67.5 - 77.5 | 91 | 14 |
| MS 17 | *Pipistrellus pygmaeus* | Jun | 86 | 67.5 - 77.5 | 95 | 14 |
| MS 17 | *Pipistrellus pygmaeus* | Jul | 80 | 67.5 - 77.5 | 87 | 13 |
| MS 17 | *Pipistrellus pygmaeus* | Aug | 69 | 67.5 - 77.5 | 85 | 16 |
| MS 17 | *Plecotus auritus* | May | 1 | 1 - 1 | 31 | 5 |
| MS 17 | *Plecotus auritus* | Jun | 1 | 1 - 1 | 31 | 5 |

| MS 18 | *Myotis* | May | 43 | 22 - 43 | 65 | 11 |
|---|---|---|---|---|---|---|
| MS 18 | *Myotis* | Jun | 16 | 22 - 43 | 43 | 4 |
| MS 18 | *Pipistrellus* | Jul | 88 | 85 - 95 | 96 | 3 |
| MS 18 | *Pipistrellus* | Aug | 91 | 85 - 95 | 98 | 6 |
| MS 18 | *Pipistrellus* | Sep | 95 | 85 - 95 | 97 | 6 |
| MS 18 | *Pipistrellus pipistrellus* | May | 84 | 72.5 - 83.5 | 93 | 15 |
| MS 18 | *Pipistrellus pipistrellus* | Jun | 89 | 72.5 - 83.5 | 95 | 12 |
| MS 18 | *Pipistrellus pipistrellus* | Jul | 75 | 72.5 - 83.5 | 89 | 10 |
| MS 18 | *Pipistrellus pipistrellus* | Aug | 81 | 72.5 - 83.5 | 93 | 19 |
| MS 18 | *Pipistrellus pipistrellus* | Sep | 87 | 72.5 - 83.5 | 91 | 8 |
| MS 18 | *Pipistrellus pygmaeus* | May | 88 | 78.5 - 85.5 | 91 | 14 |
| MS 18 | *Pipistrellus pygmaeus* | Jun | 83 | 78.5 - 85.5 | 95 | 12 |
| MS 18 | *Pipistrellus pygmaeus* | Jul | 79 | 78.5 - 85.5 | 94 | 11 |
| MS 18 | *Pipistrellus pygmaeus* | Aug | 86 | 78.5 - 85.5 | 97 | 20 |
| MS 18 | *Pipistrellus pygmaeus* | Sep | 80 | 78.5 - 85.5 | 96 | 10 |
| MS 18 | *Plecotus auritus* | May | 37 | 16 - 37 | 52 | 8 |
| MS 18 | *Plecotus auritus* | Jun | 1 | 16 - 37 | 43 | 9 |
| MS 19 | *Myotis* | May | 1 | 1 - 1 | 31 | 4 |
| MS 19 | *Myotis* | Jun | 1 | 1 - 1 | 1 | 1 |
| MS 19 | *Pipistrellus* | Sep | 95 | 0 | 95 | 1 |
| MS 19 | *Pipistrellus pipistrellus* | May | 78 | 50.5 - 71 | 85 | 7 |
| MS 19 | *Pipistrellus pipistrellus* | Jun | 65 | 50.5 - 71 | 83 | 7 |
| MS 19 | *Pipistrellus pipistrellus* | Jul | 31 | 50.5 - 71 | 71 | 4 |
| MS 19 | *Pipistrellus pipistrellus* | Aug | 73 | 50.5 - 71 | 95 | 10 |
| MS 19 | *Pipistrellus pipistrellus* | Sep | 74 | 50.5 - 71 | 90 | 9 |
| MS 19 | *Pipistrellus pygmaeus* | May | 43 | 36 - 57 | 86 | 9 |

| MS 19 | *Pipistrellus pygmaeus* | Jun | 69 | 36 - 57 | 80 | 6 |
|---|---|---|---|---|---|---|
| MS 19 | *Pipistrellus pygmaeus* | Jul | 1 | 36 - 57 | 74 | 7 |
| MS 19 | *Pipistrellus pygmaeus* | Aug | 52 | 36 - 57 | 94 | 15 |
| MS 19 | *Pipistrellus pygmaeus* | Sep | 52 | 36 - 57 | 92 | 9 |
| MS 19 | *Plecotus auritus* | May | 1 | 1 - 16 | 1 | 2 |
| MS 19 | *Plecotus auritus* | Jun | 31 | 1 - 16 | 31 | 3 |
| MS 20 | *Myotis* | May | 1 | 1 - 1 | 1 | 3 |
| MS 20 | *Myotis* | Jun | 1 | 1 - 1 | 31 | 5 |
| MS 20 | *Pipistrellus pipistrellus* | May | 65 | 22 - 41.5 | 71 | 7 |
| MS 20 | *Pipistrellus pipistrellus* | Jun | 52 | 22 - 41.5 | 83 | 7 |
| MS 20 | *Pipistrellus pipistrellus* | Jul | 31 | 22 - 41.5 | 58 | 8 |
| MS 20 | *Pipistrellus pipistrellus* | Aug | 37 | 22 - 41.5 | 65 | 14 |
| MS 20 | *Pipistrellus pipistrellus* | Sep | 31 | 22 - 41.5 | 67 | 14 |
| MS 20 | *Pipistrellus pygmaeus* | May | 51 | 31 - 44.5 | 75 | 8 |
| MS 20 | *Pipistrellus pygmaeus* | Jun | 43 | 31 - 44.5 | 82 | 10 |
| MS 20 | *Pipistrellus pygmaeus* | Jul | 37 | 31 - 44.5 | 67 | 8 |
| MS 20 | *Pipistrellus pygmaeus* | Aug | 43 | 31 - 44.5 | 76 | 22 |
| MS 20 | *Pipistrellus pygmaeus* | Sep | 31 | 31 - 44.5 | 70 | 19 |
| MS 20 | *Plecotus auritus* | May | 1 | 1 - 1 | 1 | 1 |
| MS 20 | *Plecotus auritus* | Jun | 1 | 1 - 1 | 1 | 2 |
| MS 7 | *Pipistrellus pipistrellus* | Aug | 1 | 1 - 1 | 1 | 3 |
| MS 7 | *Pipistrellus pipistrellus* | Sep | 1 | 1 - 1 | 1 | 3 |
| MS 7 | *Pipistrellus pygmaeus* | Aug | 1 | 1 - 1 | 1 | 2 |
| MS 7 | *Pipistrellus pygmaeus* | Sep | 1 | 1 - 1 | 1 | 10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| MS 9 | *Pipistrellus pipistrellus* | Jul | 1 | 1 - 29.5 | 1 | 2 |
| MS 9 | *Pipistrellus pipistrellus* | Aug | 31 | 1 - 29.5 | 58 | 3 |
| MS 9 | *Pipistrellus pipistrellus* | Sep | 1 | 1 - 29.5 | 1 | 2 |
| MS 9 | *Pipistrellus pygmaeus* | Jul | 1 | 1 - 1 | 1 | 2 |
| MS 9 | *Pipistrellus pygmaeus* | Aug | 1 | 1 - 1 | 1 | 1 |
| MS 9 | *Pipistrellus pygmaeus* | Sep | 1 | 1 - 1 | 1 | 3 |

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## 9.4   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.

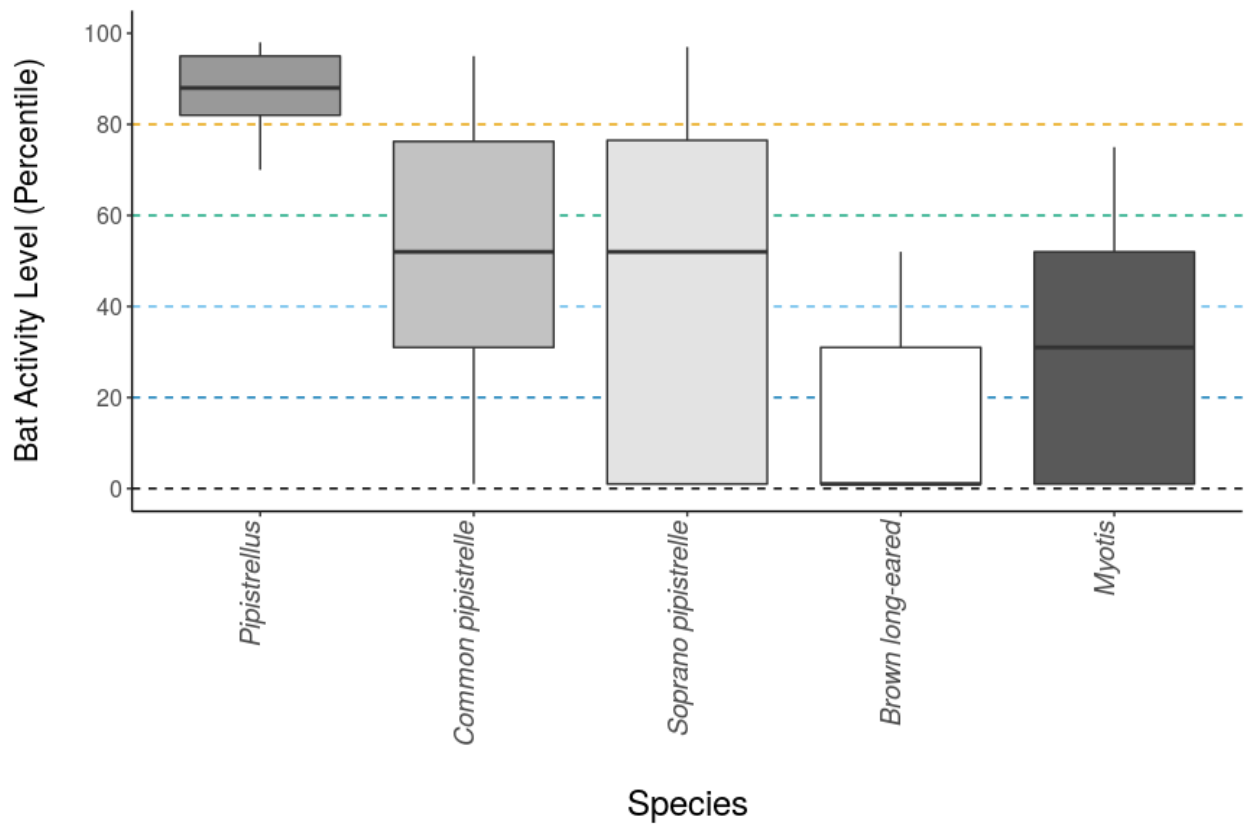| Species/Species Group | Nights of High Activity | Nights of Moderate/ High Activity | Nights of Moderate Activity | Nights of Low/ Moderate Activity | Nights of Low Activity |
|---|---|---|---|---|---|
| *Myotis* | 0 | 9 | 17 | 10 | 22 |
| *Pipistrellus* | 18 | 4 | 0 | 0 | 0 |
| *Pipistrellus pipistrellus* | 66 | 57 | 57 | 47 | 73 |
| *Pipistrellus pygmaeus* | 76 | 81 | 67 | 39 | 104 |
| *Plecotus auritus* | 0 | 0 | 5 | 9 | 24 |

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

| Species/Species Group | Median Percentile | 95% CIs | Max Percentile | Nights Recorded |
|---|---|---|---|---|
| *Myotis* | 31 | 44.5 - 61 | 75 | 58 |
| *Pipistrellus* | 88 | 85 - 95 | 98 | 22 |
| *Pipistrellus pipistrellus* | 52 | 72.5 - 83.5 | 95 | 300 |
| *Pipistrellus pygmaeus* | 52 | 78.5 - 85.5 | 97 | 367 |
| *Plecotus auritus* | 1 | 16 - 37 | 52 | 38 |

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###Figures

**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.

*Plecotus auritus*

**Activity Level**
- ○ medium
- ○ low
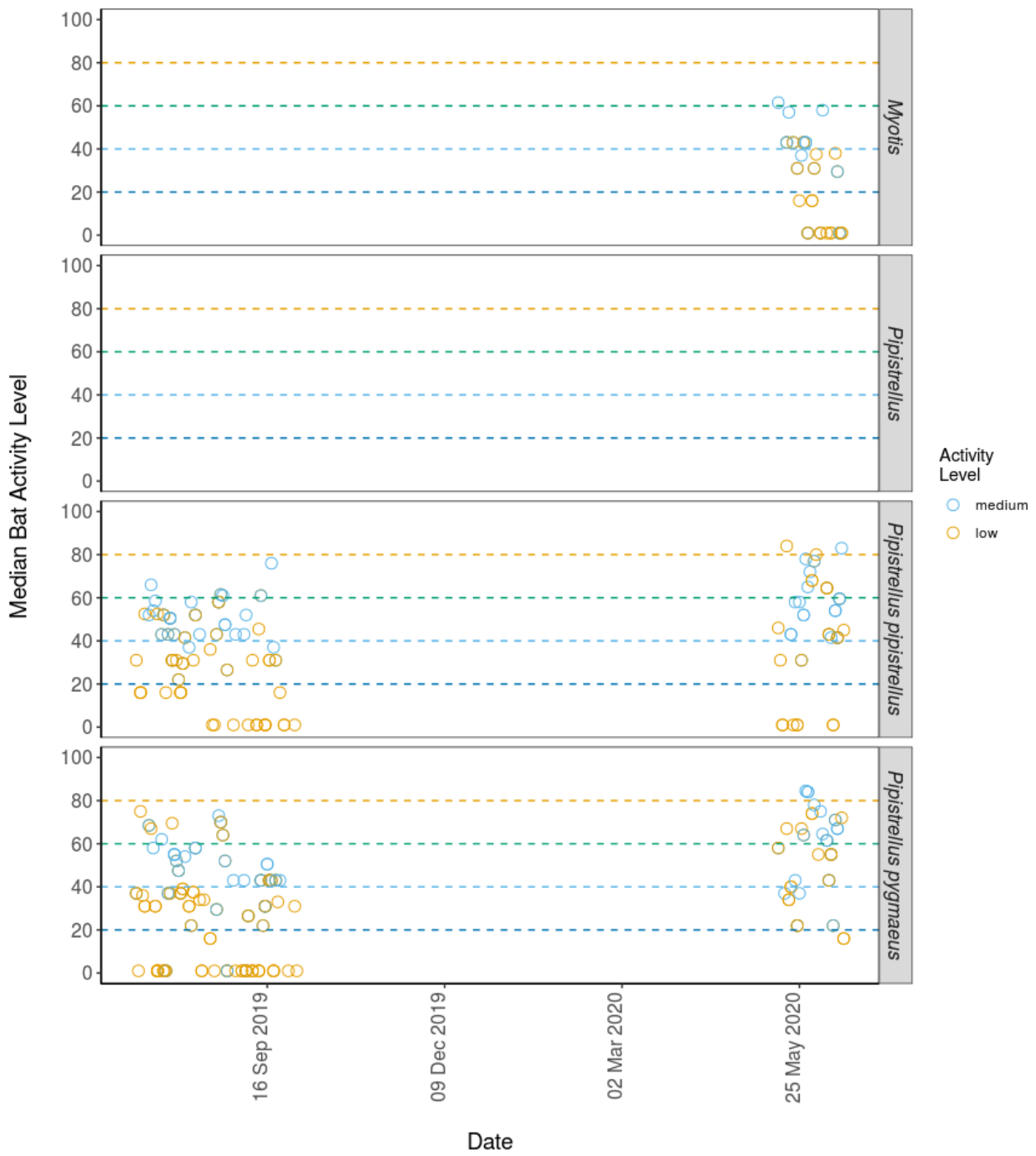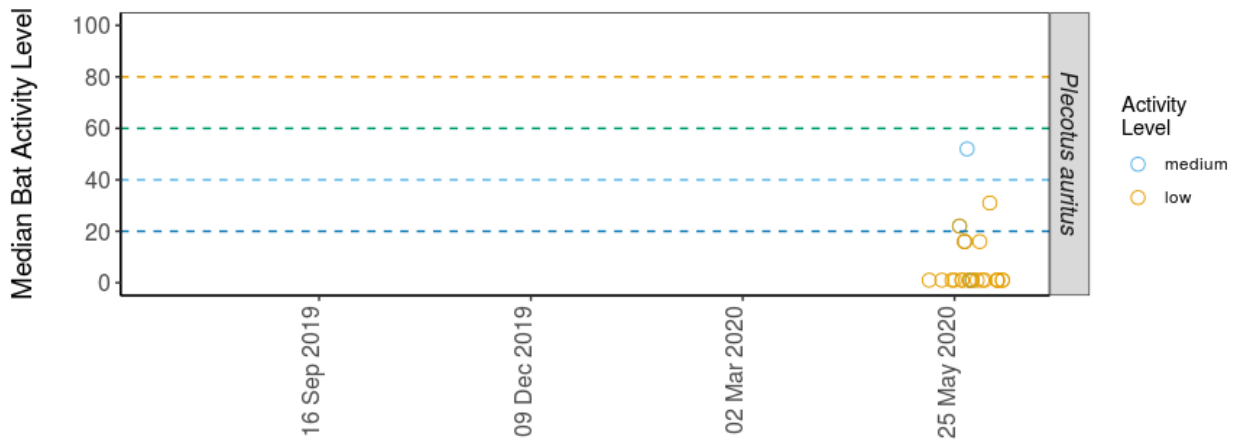
Date

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## 9.5    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* | May | 0 | 4 | 12 | 6 | 9 |
| *Myotis* | Jun | 0 | 5 | 5 | 4 | 13 |

| Pipistrellus | Jul | 5 | 1 | 0 | 0 | 0 |
| Pipistrellus | Aug | 7 | 2 | 0 | 0 | 0 |
| Pipistrellus | Sep | 6 | 1 | 0 | 0 | 0 |
| Pipistrellus pipistrellus | May | 15 | 11 | 10 | 5 | 11 |
| Pipistrellus pipistrellus | Jun | 21 | 13 | 11 | 5 | 12 |
| Pipistrellus pipistrellus | Jul | 7 | 12 | 8 | 9 | 10 |
| Pipistrellus pipistrellus | Aug | 15 | 15 | 21 | 17 | 24 |
| Pipistrellus pipistrellus | Sep | 8 | 6 | 7 | 11 | 16 |
| Pipistrellus pygmaeus | May | 22 | 13 | 9 | 3 | 12 |
| Pipistrellus pygmaeus | Jun | 19 | 20 | 13 | 5 | 10 |
| Pipistrellus pygmaeus | Jul | 12 | 11 | 6 | 7 | 22 |
| Pipistrellus pygmaeus | Aug | 17 | 27 | 20 | 13 | 29 |
| Pipistrellus pygmaeus | Sep | 6 | 10 | 19 | 11 | 31 |
| Plecotus auritus | May | 0 | 0 | 4 | 3 | 12 |
| Plecotus auritus | Jun | 0 | 0 | 1 | 6 | 12 |

Page Break

**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* | May | 43 | 44.5 - 61 | 71 | 31 |
| *Myotis* | Jun | 31 | 44.5 - 61 | 75 | 27 |
| *Pipistrellus* | Jul | 86 | 85 - 95 | 96 | 6 |
| *Pipistrellus* | Aug | 87 | 85 - 95 | 98 | 9 |
| *Pipistrellus* | Sep | 95 | 85 - 95 | 97 | 7 |
| *Pipistrellus pipistrellus* | May | 60 | 72.5 - 83.5 | 93 | 52 |
| *Pipistrellus pipistrellus* | Jun | 63 | 72.5 - 83.5 | 95 | 62 |
| *Pipistrellus pipistrellus* | Jul | 52 | 72.5 - 83.5 | 89 | 46 |

| | | | | | |
|---|---|---|---|---|---|
| *Pipistrellus pipistrellus* | Aug | 43 | 72.5 - 83.5 | 95 | 92 |
| *Pipistrellus pipistrellus* | Sep | 31 | 72.5 - 83.5 | 91 | 48 |
| *Pipistrellus pygmaeus* | May | 70 | 78.5 - 85.5 | 91 | 59 |
| *Pipistrellus pygmaeus* | Jun | 67 | 78.5 - 85.5 | 95 | 67 |
| *Pipistrellus pygmaeus* | Jul | 37 | 78.5 - 85.5 | 94 | 58 |
| *Pipistrellus pygmaeus* | Aug | 52 | 78.5 - 85.5 | 97 | 106 |
| *Pipistrellus pygmaeus* | Sep | 31 | 78.5 - 85.5 | 96 | 77 |
| *Plecotus auritus* | May | 1 | 16 - 37 | 52 | 19 |
| *Plecotus auritus* | Jun | 1 | 16 - 37 | 43 | 19 |

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###Figures

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

Species
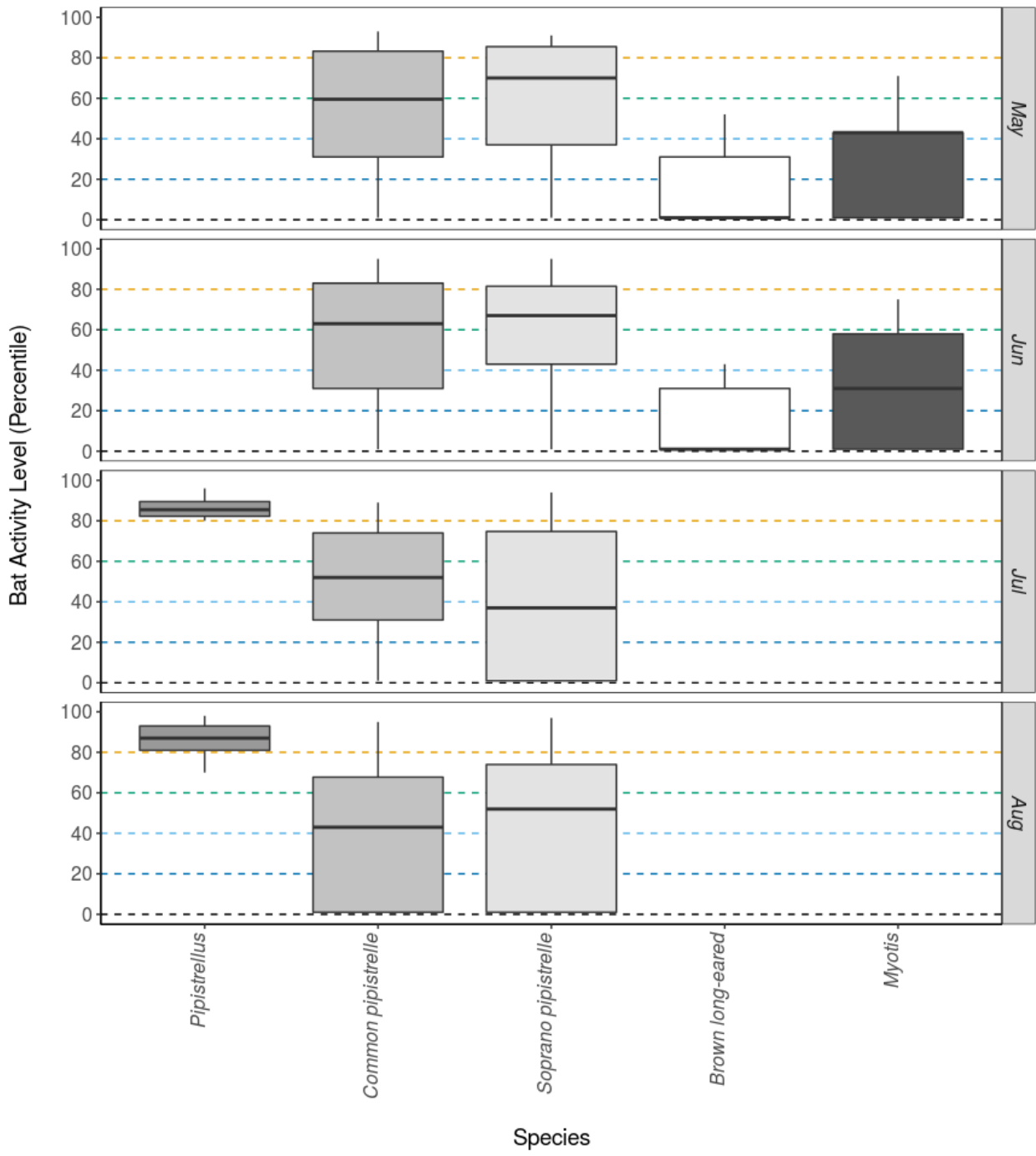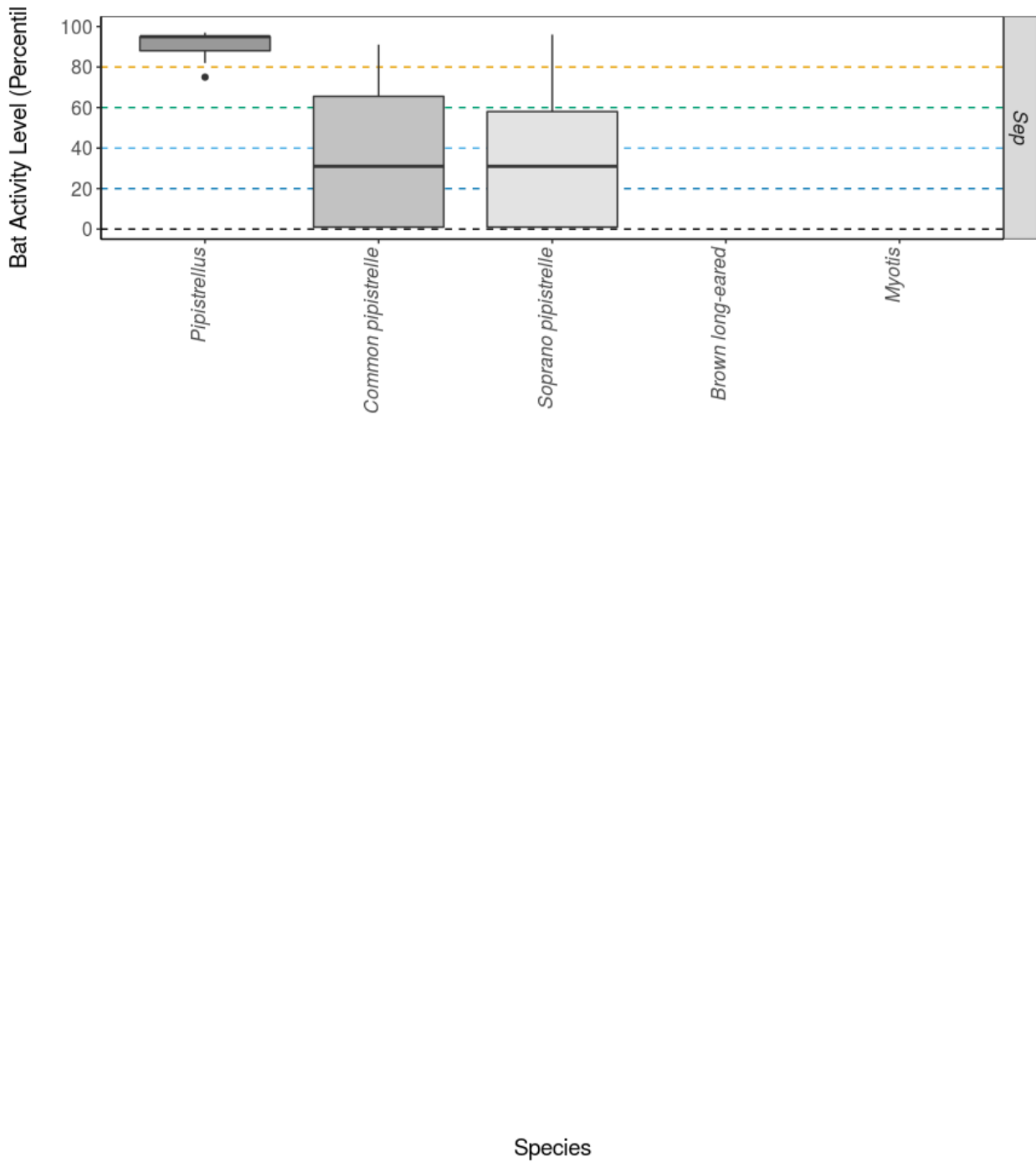
Page Break

## 9.6   PART 2: Nightly Analysis

# 10   ENTIRE SURVEY PERIOD

## 10.1   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) |
|---|---|---|---|
| 2019-07-16 | 21:57 | 05:01 | 7.1 |

| | | | |
|---|---|---|---|
| 2019-07-17 | 21:56 | 05:02 | 7.1 |
| 2019-07-18 | 21:54 | 05:04 | 7.2 |
| 2019-07-19 | 21:53 | 05:05 | 7.2 |
| 2019-07-20 | 21:51 | 05:07 | 7.3 |
| 2019-07-22 | 21:48 | 05:10 | 7.4 |
| 2019-07-23 | 21:47 | 05:12 | 7.4 |
| 2019-07-24 | 21:45 | 05:14 | 7.5 |
| 2019-07-25 | 21:43 | 05:15 | 7.5 |
| 2019-07-26 | 21:42 | 05:17 | 7.6 |
| 2019-07-28 | 21:38 | 05:21 | 7.7 |
| 2019-07-29 | 21:36 | 05:23 | 7.8 |
| 2019-07-30 | 21:34 | 05:24 | 7.8 |
| 2019-07-31 | 21:32 | 05:26 | 7.9 |
| 2019-08-01 | 21:31 | 05:28 | 8.0 |
| 2019-08-02 | 21:29 | 05:30 | 8.0 |
| 2019-08-03 | 21:27 | 05:32 | 8.1 |
| 2019-08-04 | 21:25 | 05:34 | 8.2 |
| 2019-08-05 | 21:23 | 05:36 | 8.2 |
| 2019-08-06 | 21:20 | 05:38 | 8.3 |
| 2019-08-07 | 21:18 | 05:40 | 8.4 |
| 2019-08-08 | 21:16 | 05:41 | 8.4 |
| 2019-08-10 | 21:12 | 05:45 | 8.6 |
| 2019-08-11 | 21:10 | 05:47 | 8.6 |
| 2019-08-12 | 21:07 | 05:49 | 8.7 |
| 2019-08-13 | 21:05 | 05:51 | 8.8 |
| 2019-08-15 | 21:01 | 05:55 | 8.9 |
| 2019-08-16 | 20:58 | 05:57 | 9.0 |
| 2019-08-17 | 20:56 | 05:59 | 9.1 |
| 2019-08-18 | 20:54 | 06:01 | 9.1 |
| 2019-08-20 | 20:49 | 06:05 | 9.3 |
| 2019-08-21 | 20:46 | 06:07 | 9.3 |
| 2019-08-22 | 20:44 | 06:09 | 9.4 |
| 2019-08-23 | 20:41 | 06:11 | 9.5 |
| 2019-08-24 | 20:39 | 06:13 | 9.6 |
| 2019-08-25 | 20:37 | 06:15 | 9.6 |
| 2019-08-26 | 20:34 | 06:16 | 9.7 |
| 2019-08-27 | 20:32 | 06:18 | 9.8 |
| 2019-08-28 | 20:29 | 06:20 | 9.9 |
| 2019-08-31 | 20:21 | 06:26 | 10.1 |

| | | | |
|---|---|---|---|
| 2019-09-01 | 20:19 | 06:28 | 10.2 |
| 2019-09-04 | 20:11 | 06:34 | 10.4 |
| 2019-09-05 | 20:09 | 06:36 | 10.5 |
| 2019-09-06 | 20:06 | 06:38 | 10.5 |
| 2019-09-07 | 20:03 | 06:40 | 10.6 |
| 2019-09-08 | 20:01 | 06:42 | 10.7 |
| 2019-09-09 | 19:58 | 06:44 | 10.8 |
| 2019-09-11 | 19:53 | 06:47 | 10.9 |
| 2019-09-12 | 19:50 | 06:49 | 11.0 |
| 2019-09-13 | 19:48 | 06:51 | 11.1 |
| 2019-09-14 | 19:45 | 06:53 | 11.1 |
| 2019-09-15 | 19:42 | 06:55 | 11.2 |
| 2019-09-16 | 19:40 | 06:57 | 11.3 |
| 2019-09-17 | 19:37 | 06:59 | 11.4 |
| 2019-09-18 | 19:34 | 07:01 | 11.4 |
| 2019-09-19 | 19:32 | 07:03 | 11.5 |
| 2019-09-20 | 19:29 | 07:05 | 11.6 |
| 2019-09-21 | 19:26 | 07:07 | 11.7 |
| 2019-09-22 | 19:24 | 07:08 | 11.7 |
| 2019-09-23 | 19:21 | 07:10 | 11.8 |
| 2019-09-24 | 19:18 | 07:12 | 11.9 |
| 2019-09-26 | 19:13 | 07:16 | 12.1 |
| 2019-09-29 | 19:05 | 07:22 | 12.3 |
| 2019-09-30 | 19:02 | 07:24 | 12.4 |
| 2020-05-15 | 21:27 | 05:08 | 7.7 |
| 2020-05-16 | 21:29 | 05:06 | 7.6 |
| 2020-05-17 | 21:31 | 05:05 | 7.6 |
| 2020-05-18 | 21:33 | 05:03 | 7.5 |
| 2020-05-19 | 21:35 | 05:01 | 7.4 |
| 2020-05-20 | 21:36 | 05:00 | 7.4 |
| 2020-05-21 | 21:38 | 04:58 | 7.3 |
| 2020-05-22 | 21:40 | 04:57 | 7.3 |
| 2020-05-23 | 21:42 | 04:55 | 7.2 |
| 2020-05-24 | 21:43 | 04:54 | 7.2 |
| 2020-05-25 | 21:45 | 04:52 | 7.1 |
| 2020-05-26 | 21:46 | 04:51 | 7.1 |
| 2020-05-27 | 21:48 | 04:50 | 7.0 |
| 2020-05-28 | 21:49 | 04:49 | 7.0 |
| 2020-05-29 | 21:51 | 04:47 | 6.9 |

| | | | |
|---|---|---|---|
| 2020-05-30 | 21:52 | 04:46 | 6.9 |
| 2020-05-31 | 21:54 | 04:45 | 6.9 |
| 2020-06-01 | 21:55 | 04:44 | 6.8 |
| 2020-06-02 | 21:56 | 04:43 | 6.8 |
| 2020-06-03 | 21:58 | 04:42 | 6.7 |
| 2020-06-04 | 21:59 | 04:42 | 6.7 |
| 2020-06-05 | 22:00 | 04:41 | 6.7 |
| 2020-06-06 | 22:01 | 04:40 | 6.6 |
| 2020-06-07 | 22:02 | 04:40 | 6.6 |
| 2020-06-08 | 22:03 | 04:39 | 6.6 |
| 2020-06-09 | 22:04 | 04:38 | 6.6 |
| 2020-06-10 | 22:05 | 04:38 | 6.5 |
| 2020-06-11 | 22:06 | 04:38 | 6.5 |
| 2020-06-12 | 22:07 | 04:37 | 6.5 |
| 2020-06-13 | 22:07 | 04:37 | 6.5 |
| 2020-06-14 | 22:08 | 04:37 | 6.5 |
| 2020-06-15 | 22:09 | 04:37 | 6.5 |

Page Break

# 11    DISTRIBUTION OF BAT ACTIVITY ACROSS THE NIGHT THROUGH TIME

## 11.1  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.
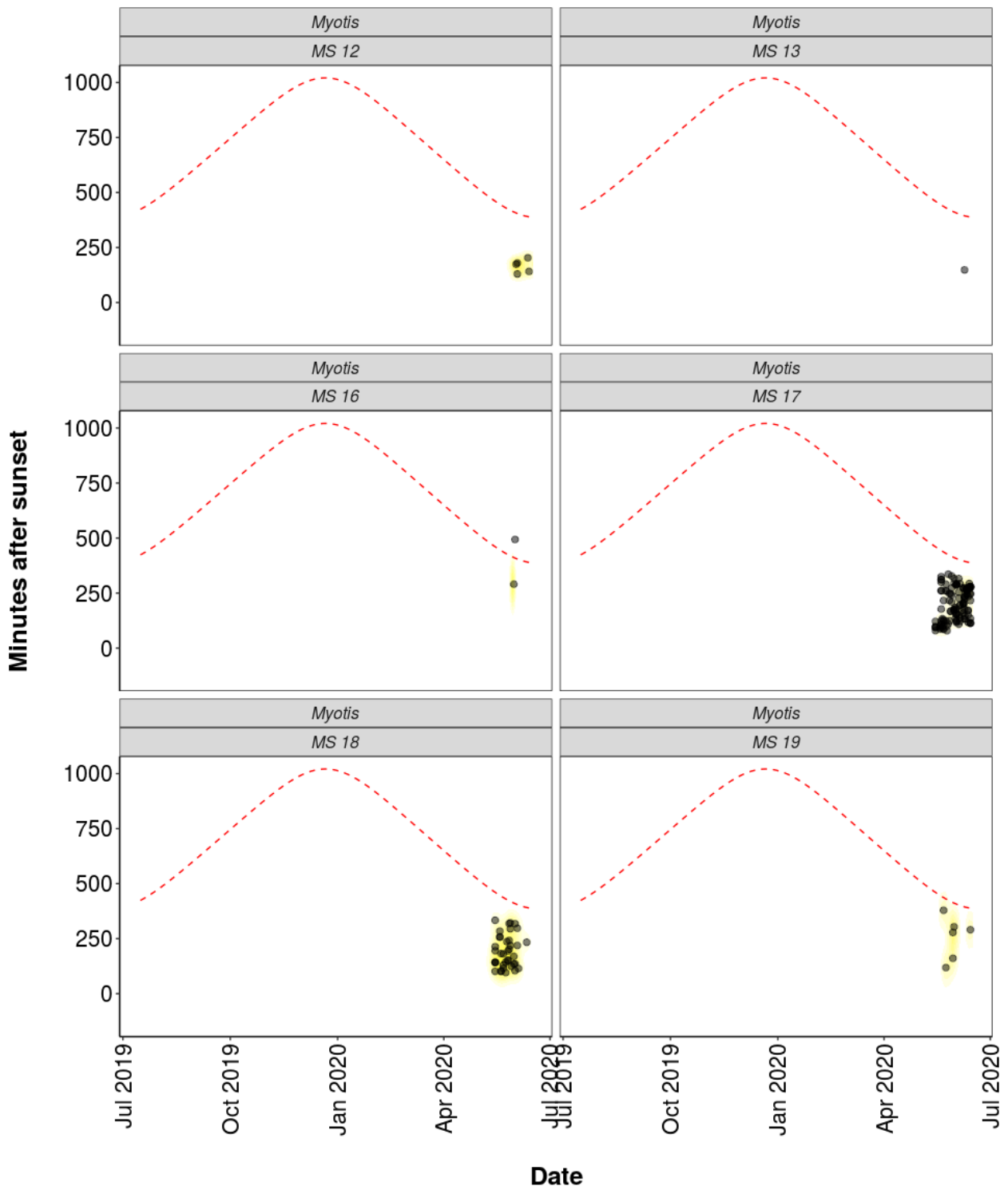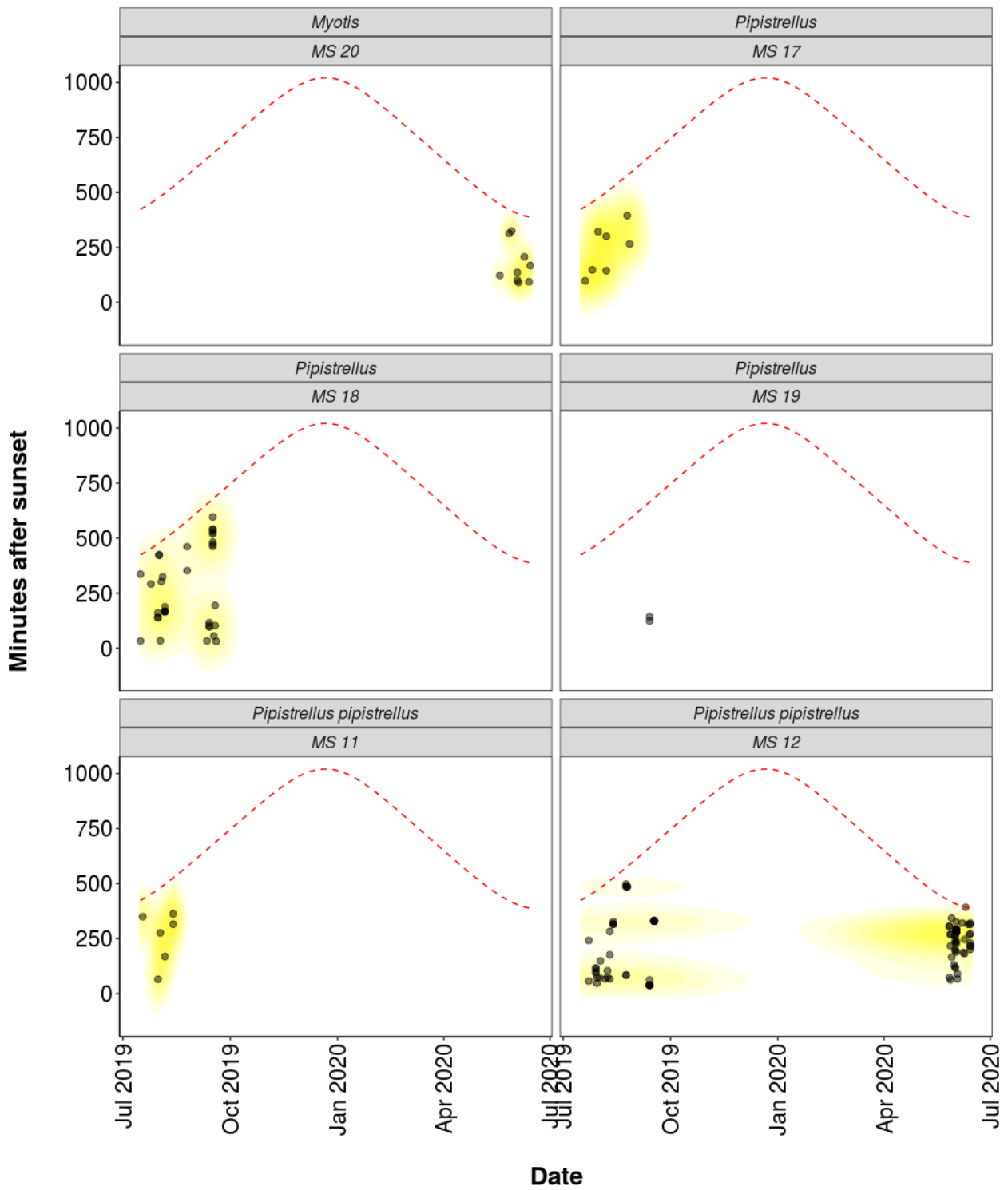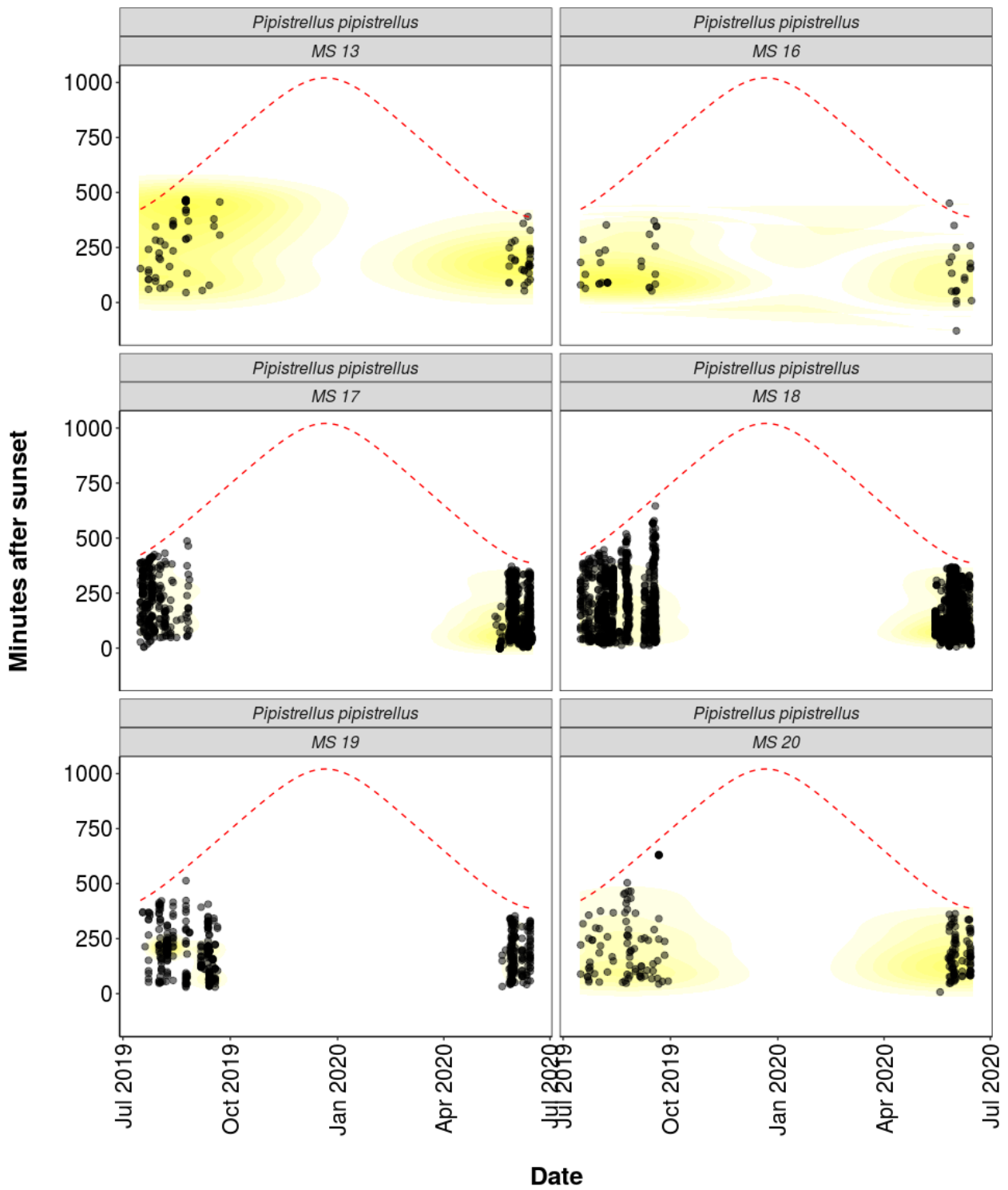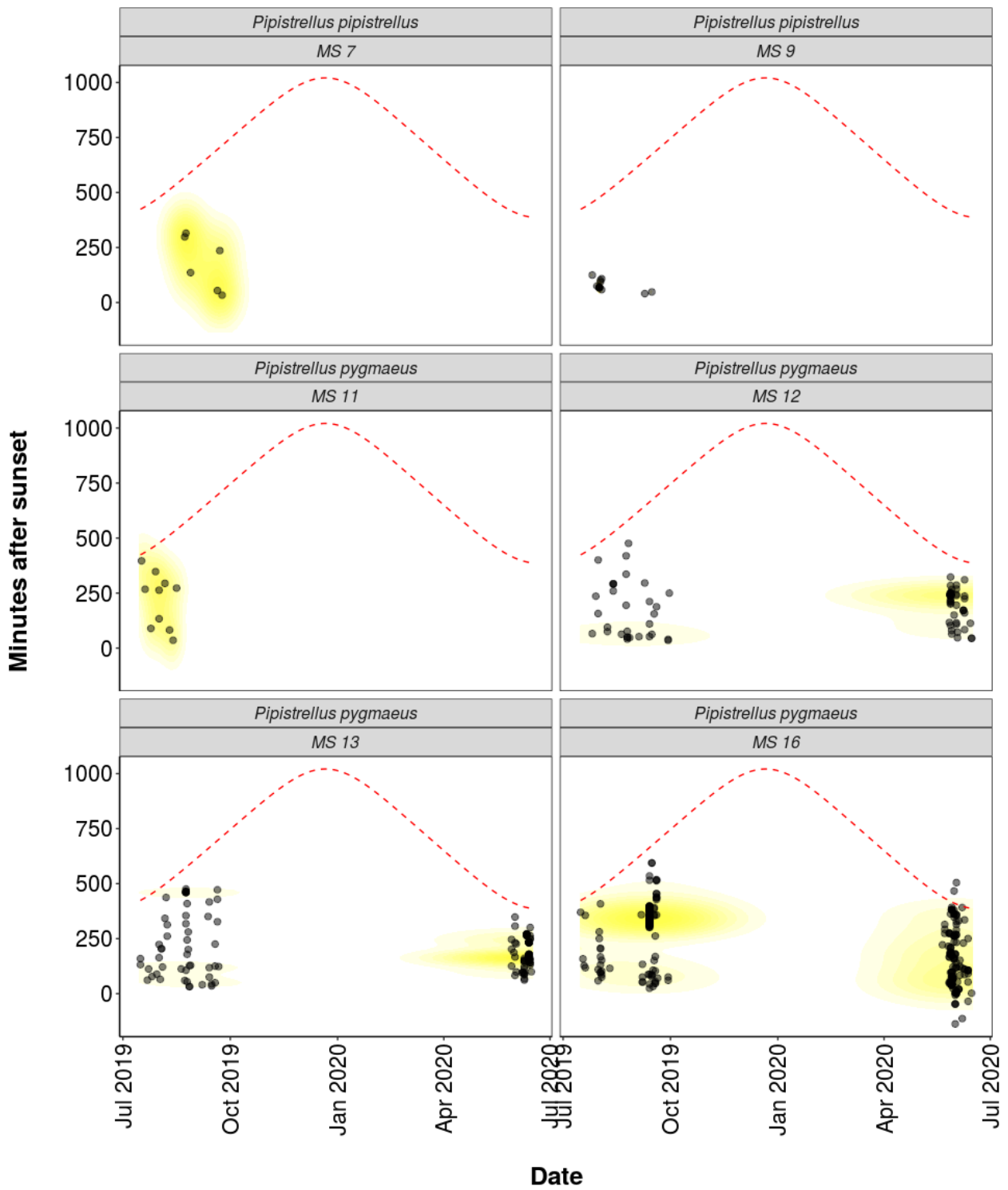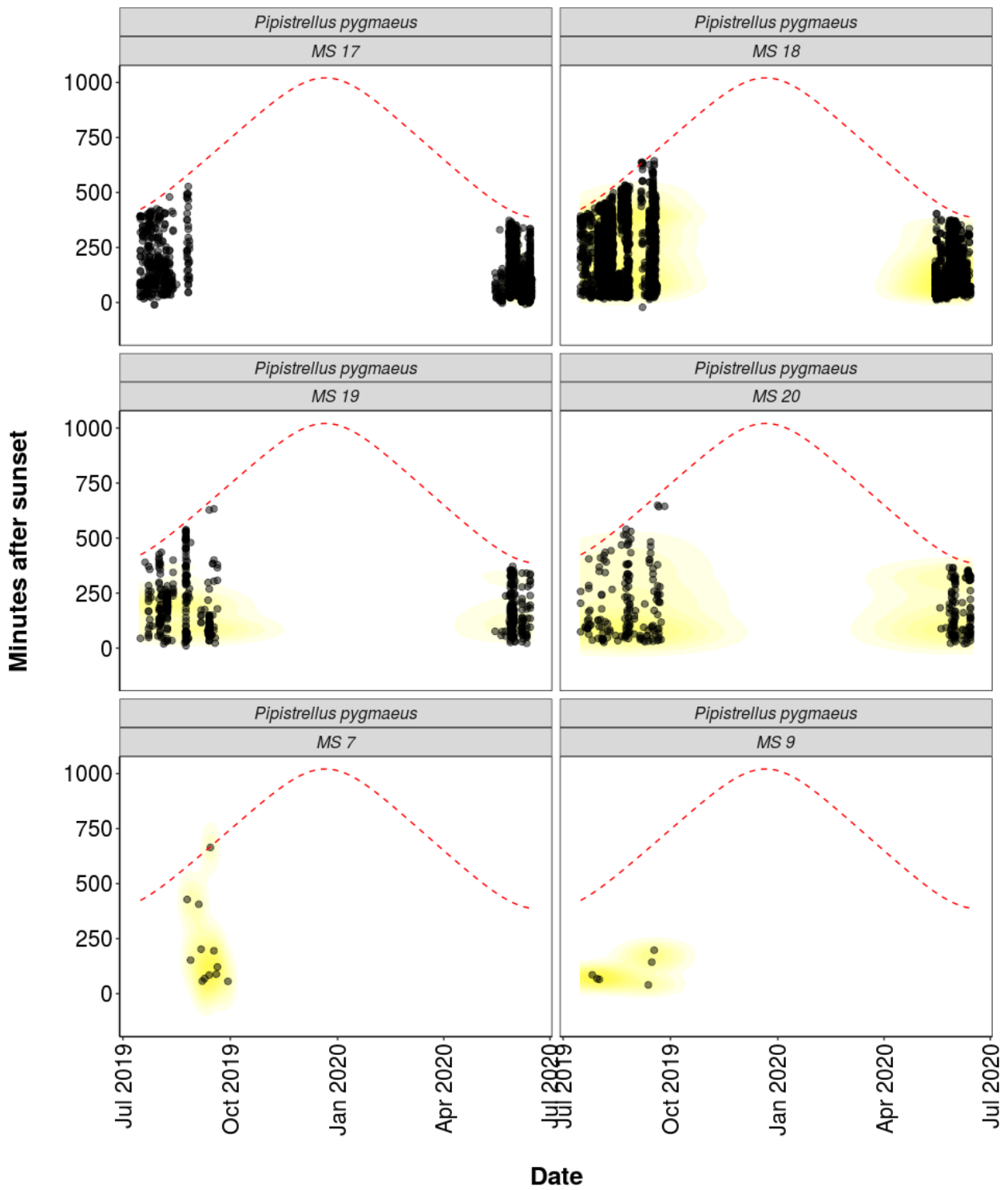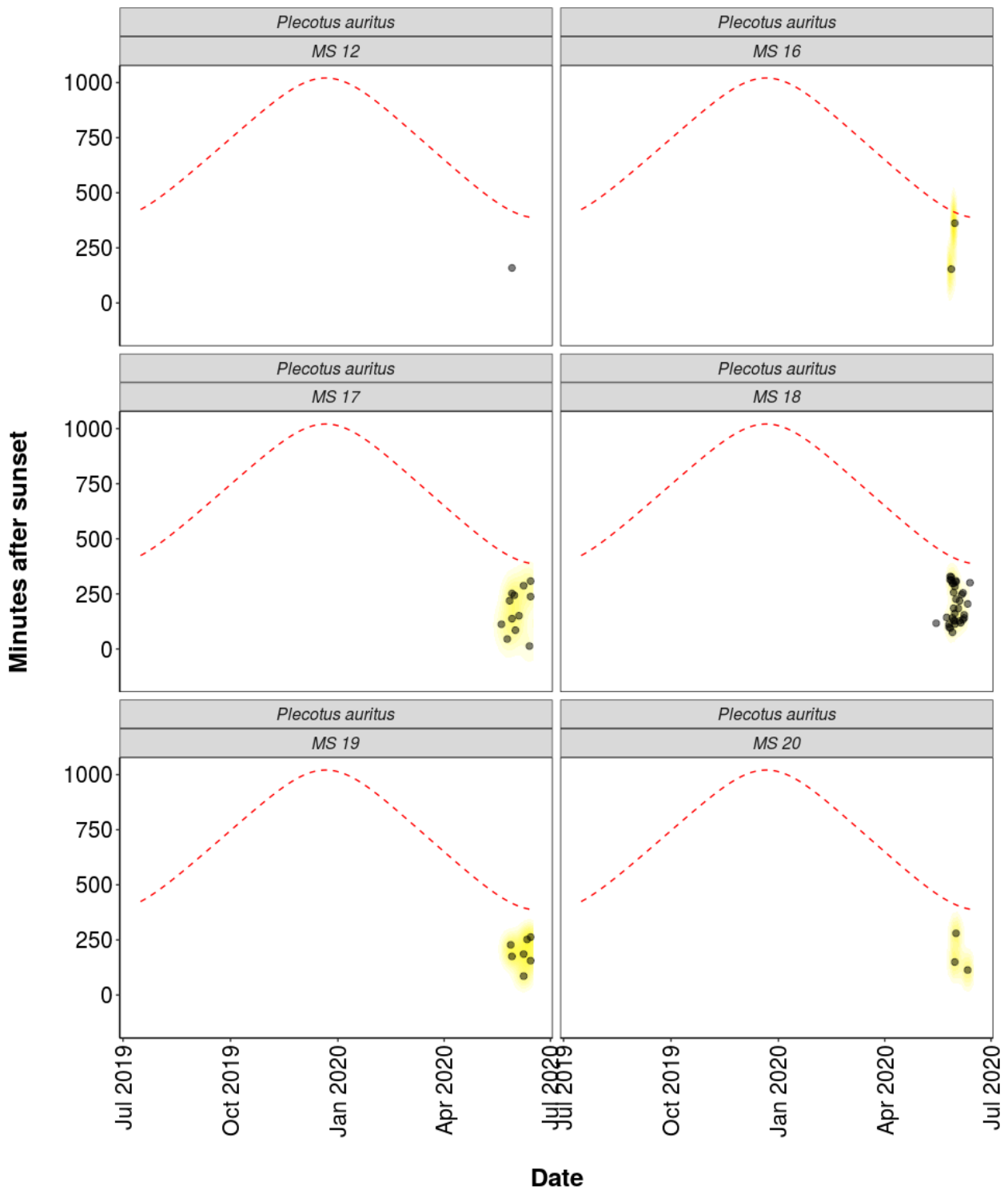
## 12 ROOST EMERGENCE TIME AND BAT OBSERVATION

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/

### 12.1 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.**

| Species | Detector ID | 2019-07-16 | 2019-07-19 | 2019-07-20 | 2019-07-22 | 2019-07-23 |
|---|---|---|---|---|---|---|
| Pipistrellus | MS 18 | 0 | 0 | 0 | 0 | 0 |
| Common pipistrelle | MS 16 | 0 | 0 | 0 | 0 | 0 |
| Common pipistrelle | MS 17 | 1 | 2 | 0 | 1 | 0 |
| Common pipistrelle | MS 18 | 0 | 0 | 0 | 0 | 1 |
| Common pipistrelle | MS 19 | 0 | 0 | 0 | 0 | 0 |
| Common pipistrelle | MS 20 | 0 | 0 | 0 | 0 | 0 |
| Soprano pipistrelle | MS 16 | 0 | 0 | 0 | 0 | 0 |
| Soprano pipistrelle | MS 17 | 2 | 1 | 1 | 0 | 0 |
| Soprano pipistrelle | MS 18 | 0 | 0 | 0 | 0 | 0 |
| Soprano pipistrelle | MS 19 | 0 | 0 | 0 | 0 | 0 |
| Soprano pipistrelle | MS 20 | 0 | 0 | 0 | 0 | 0 |
| Brown long-eared | MS 17 | 0 | 0 | 0 | 0 | 0 |

| 2019-07-24 | 2019-07-25 | 2019-07-28 | 2019-07-31 | 2019-08-01 | 2019-08-02 | 2019-08-03 |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 2 | 0 | 3 | 2 | 1 | 4 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 2 | 1 | 0 | 0 | 0 |
| 1 | 2 | 0 | 0 | 0 | 0 | 4 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| 2019-08-04 | 2019-08-05 | 2019-08-06 | 2019-08-08 | 2019-08-10 | 2019-08-12 | 2019-08-13 |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | 4 | 2 | 3 | 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 | 1 | 0 | 0 | 2 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Table continues below*

| 2019-08-15 | 2019-08-17 | 2019-08-20 | 2019-08-23 | 2019-08-24 | 2019-08-25 | 2019-08-26 |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 1 | 0 | 2 | 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 |
| 1 | 1 | 4 | 2 | 3 | 3 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Table continues below*

| 2019-08-27 | 2019-09-07 | 2019-09-08 | 2019-09-13 | 2019-09-17 | 2019-09-18 | 2019-09-19 |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 2 | 3 | 1 | 6 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 4 | 2 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Table continues below*

| 2020-05-16 | 2020-05-18 | 2020-05-19 | 2020-05-20 | 2020-05-21 | 2020-05-22 | 2020-05-24 |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 33 | 4 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 4 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2 | 5 | 1 | 7 | 0 | 0 |
| 9 | 0 | 8 | 1 | 0 | 0 | 14 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Table continues below*

| 2020-05-25 | 2020-05-27 | 2020-05-28 | 2020-05-29 | 2020-05-30 | 2020-05-31 | 2020-06-01 |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 0 | 12 | 1 | 2 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 8 |
| 0 | 1 | 12 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |

*Table continues below*

| 2020-06-02 | 2020-06-04 | 2020-06-05 | 2020-06-06 | 2020-06-07 | 2020-06-08 | 2020-06-09 |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 3 | 5 | 0 | 12 | 6 | 16 |
| 2 | 1 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 3 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 5 | 0 | 20 | 27 | 4 |

| 2020-06-10 | 2020-06-11 | 2020-06-12 | 2020-06-13 | 2020-06-14 | 2020-06-15 |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 |

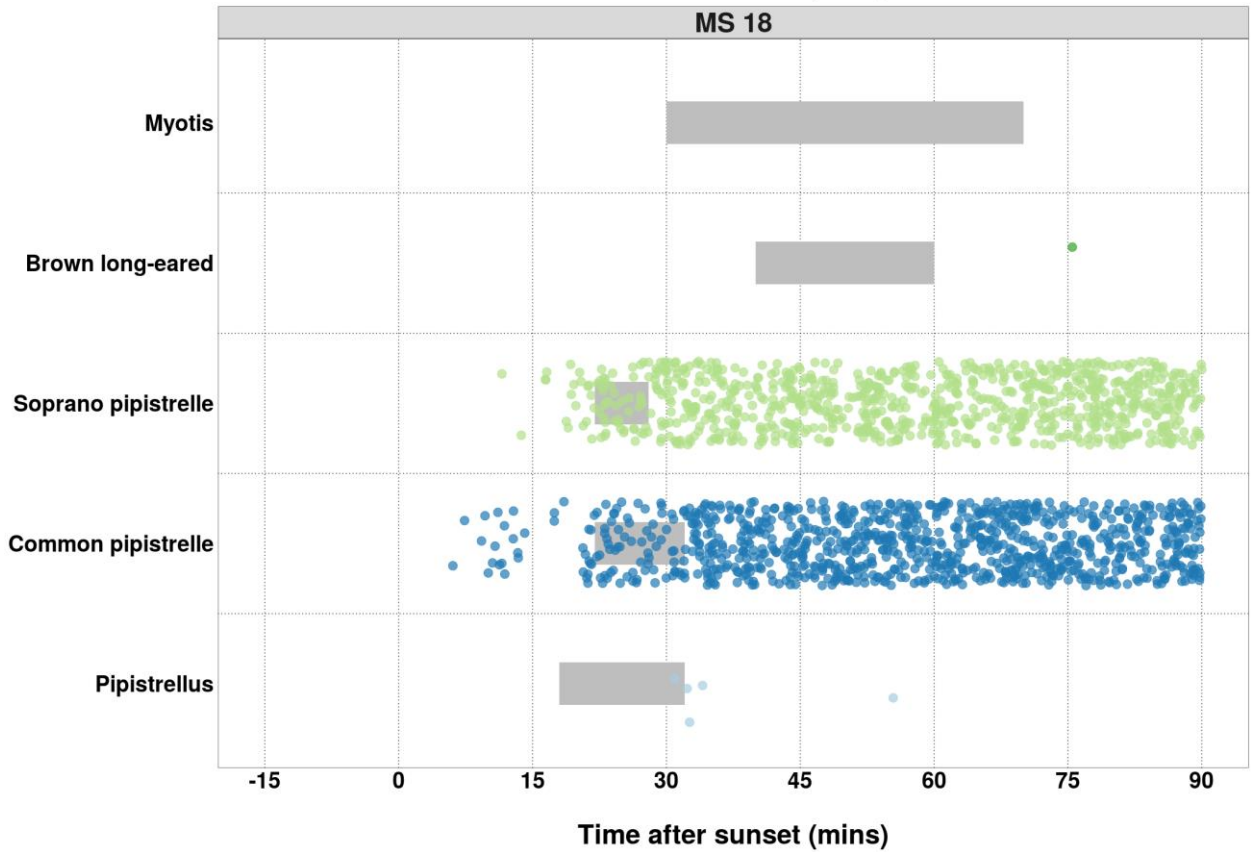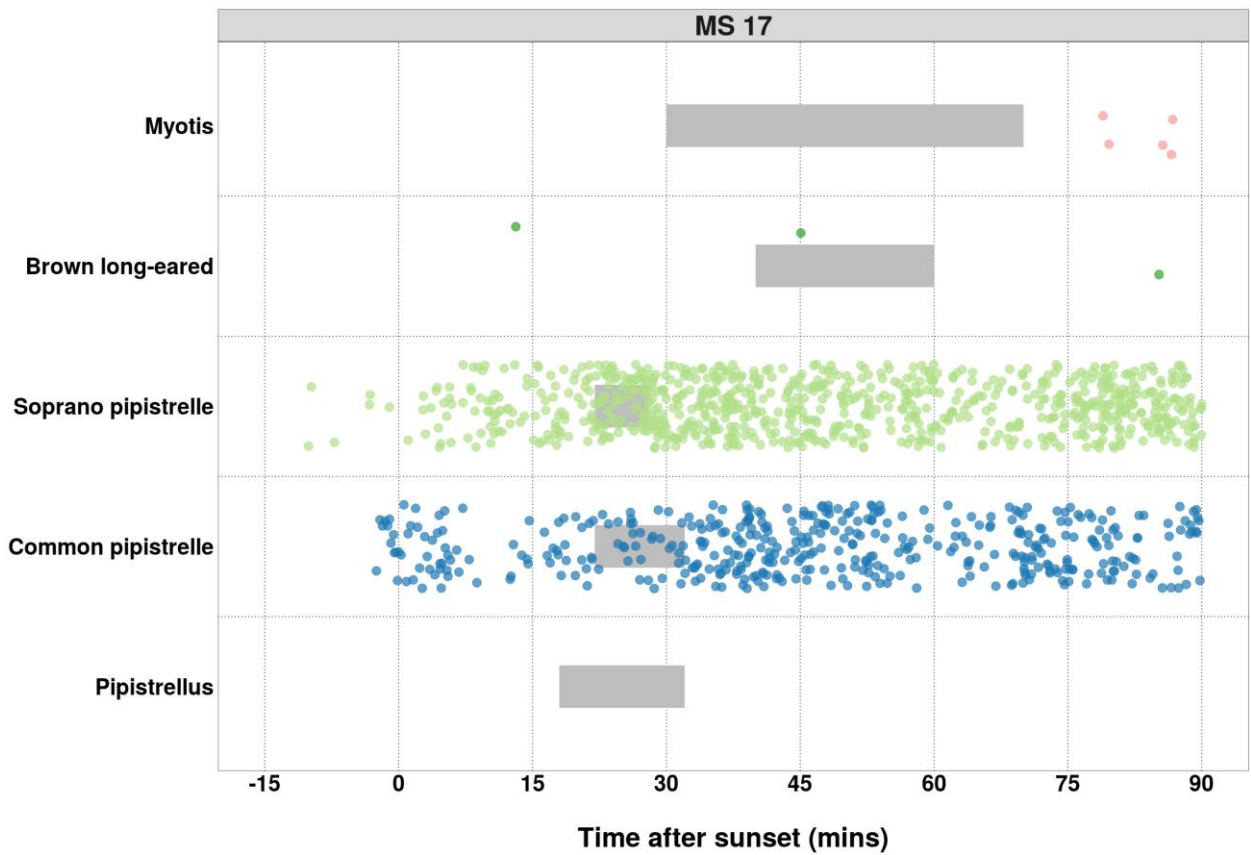| 2020-06-10 | 2020-06-11 | 2020-06-12 | 2020-06-13 | 2020-06-14 | 2020-06-15 |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 2 | 0 | 9 | 0 | 5 | 2 |
| 0 | 0 | 0 | 0 | 28 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 51 | 6 | 22 | 3 |
| 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 |

Page Break

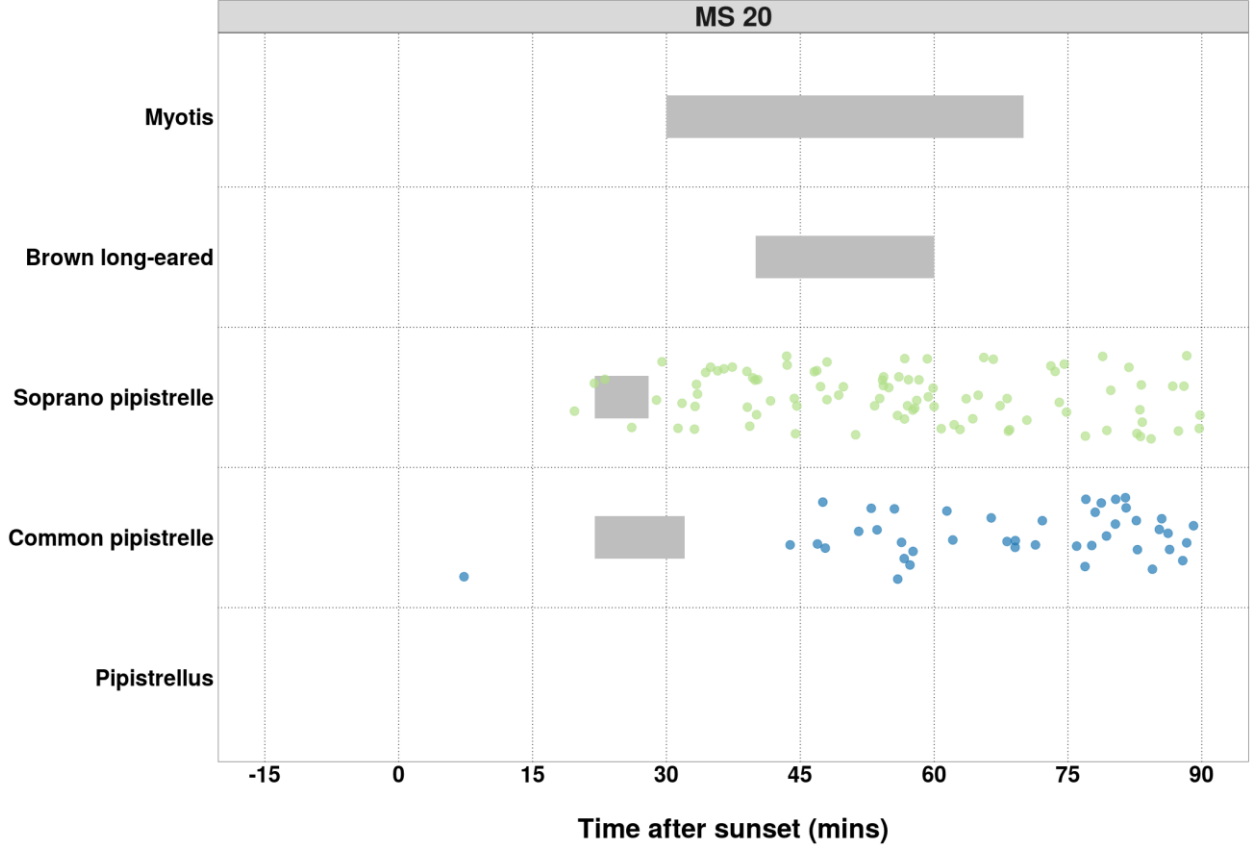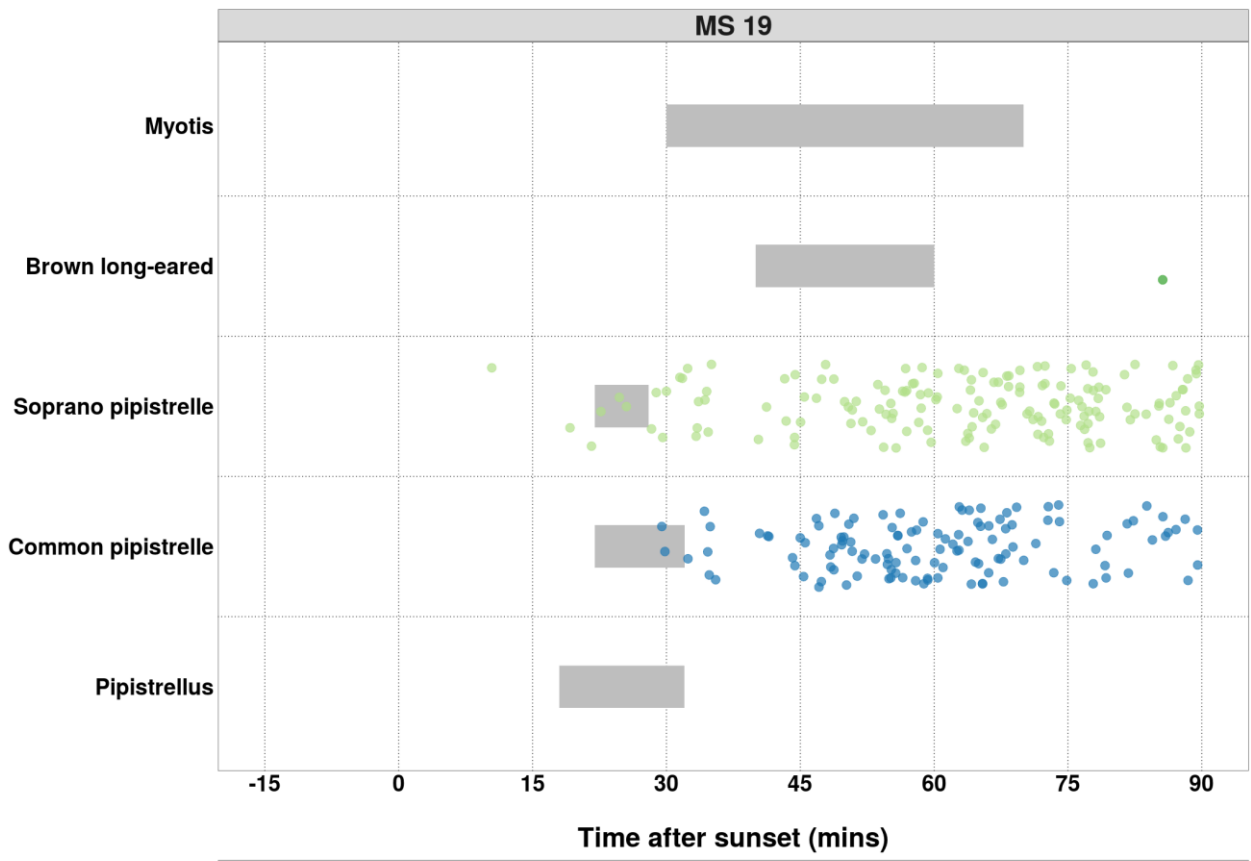***Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Figures***

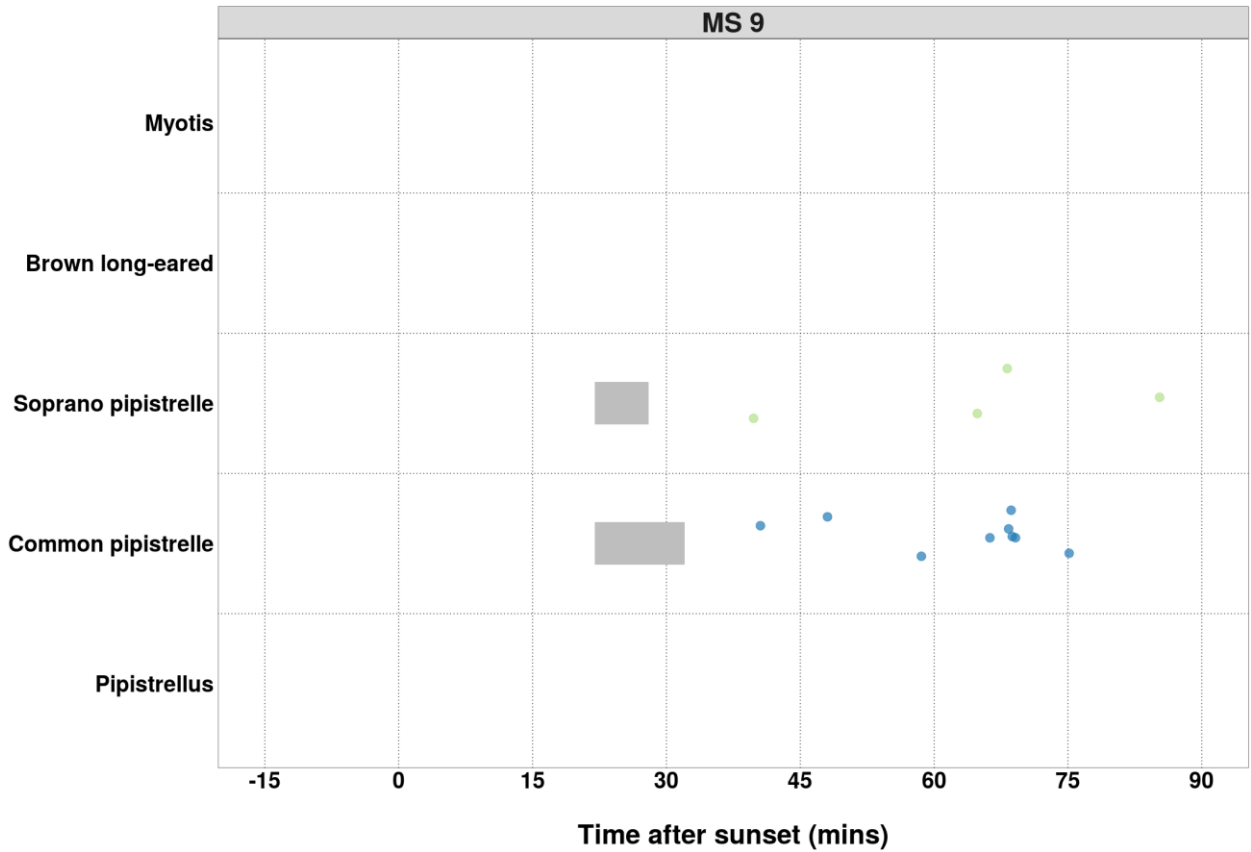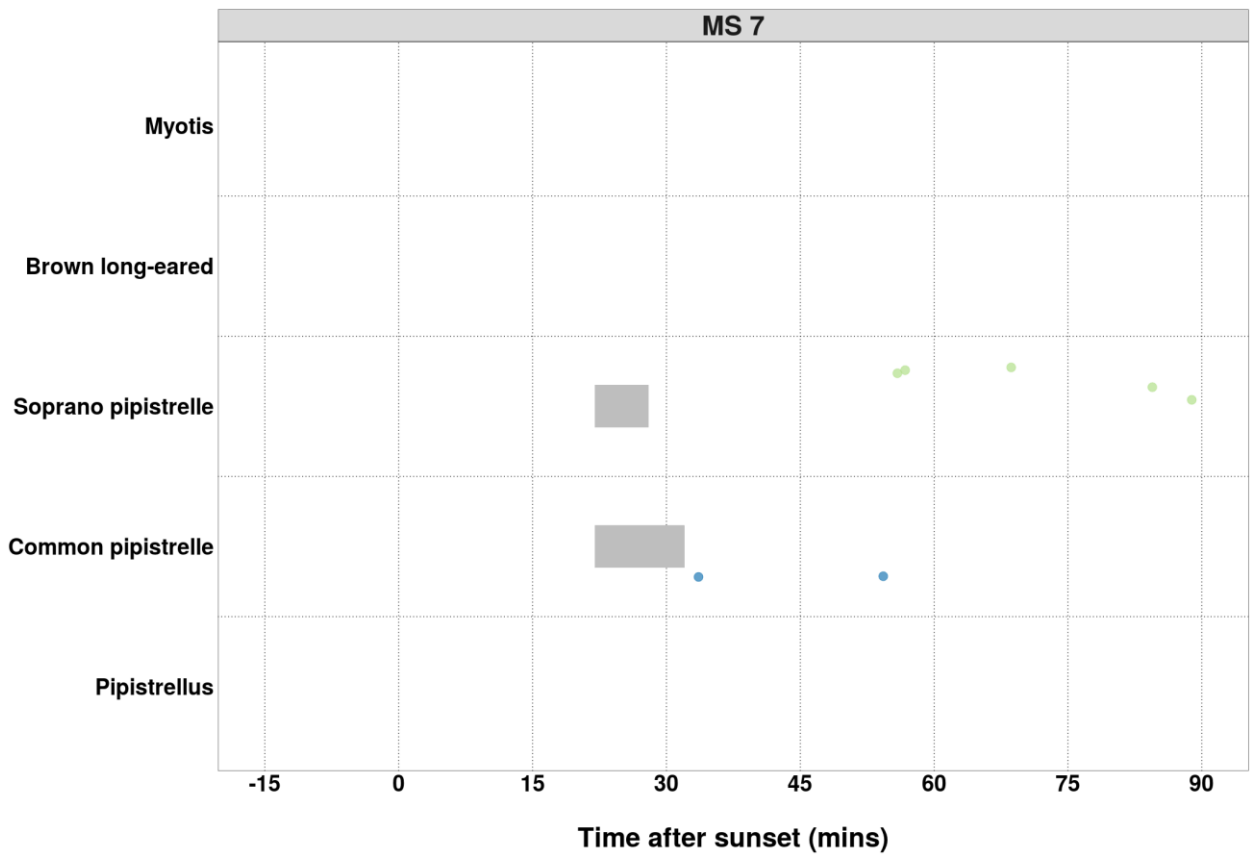**Figure 8.** Time from 15 minutes before to 90 minutes after sunset. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occuring earlier than this time range, may potentially indicate the presence of a nearby roost.

MS 19

Time after sunset (mins)



MS 20

Time after sunset (mins)

MS 7

Time after sunset (mins)

MS 9

Time after sunset (mins)
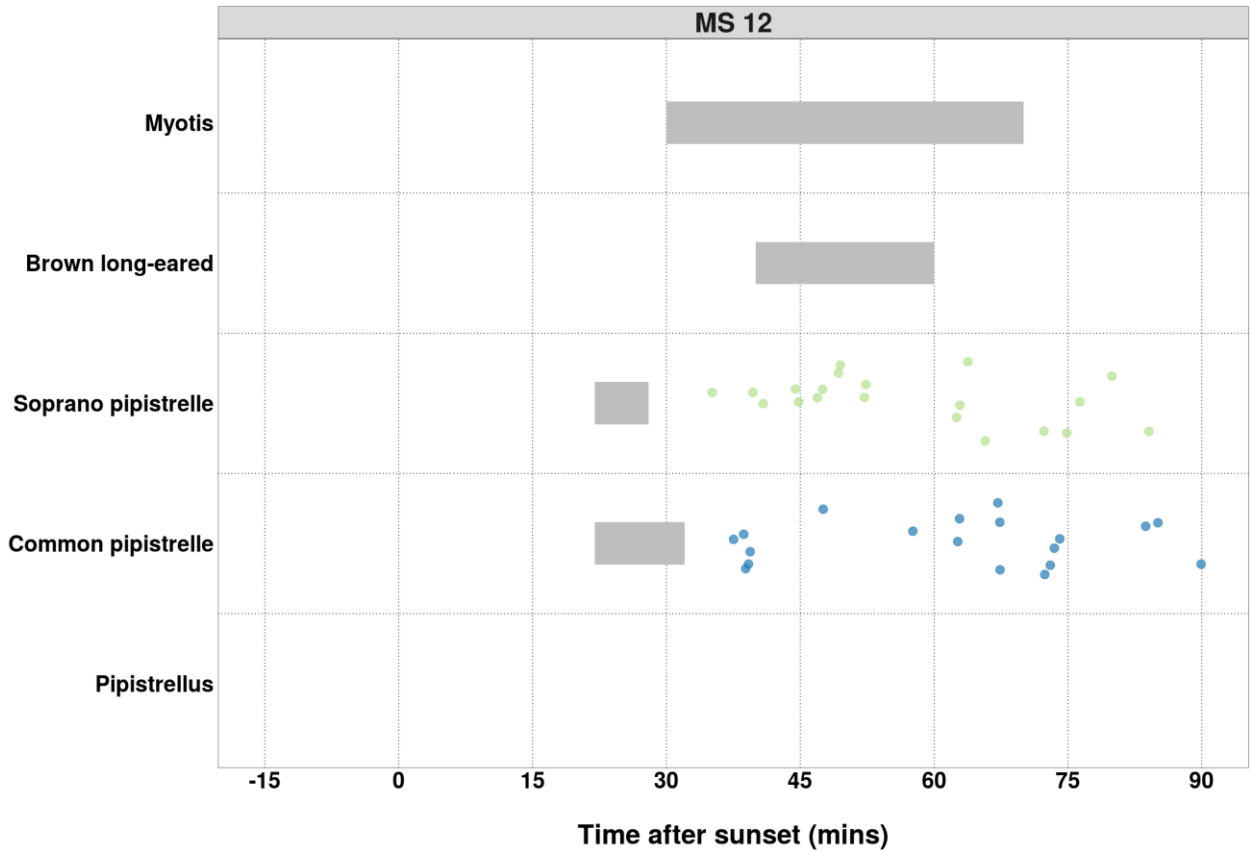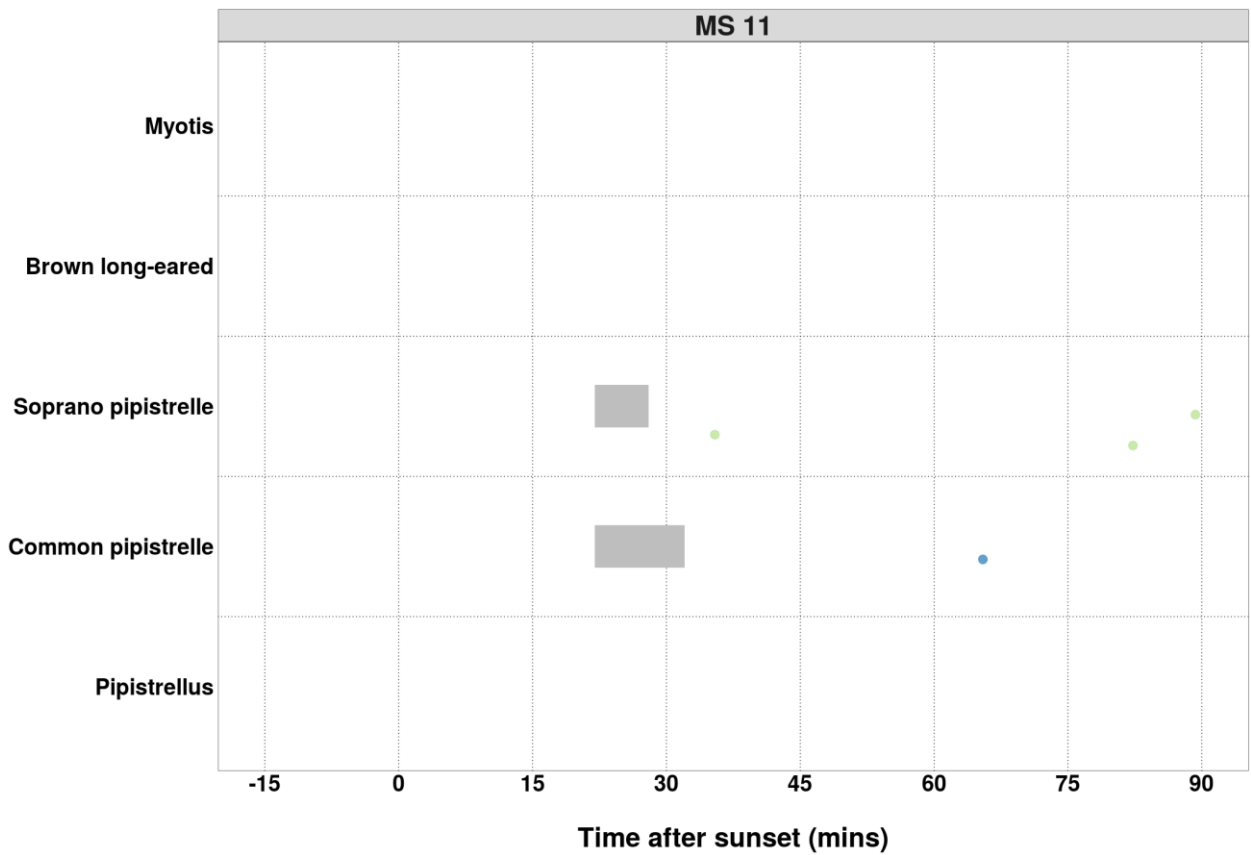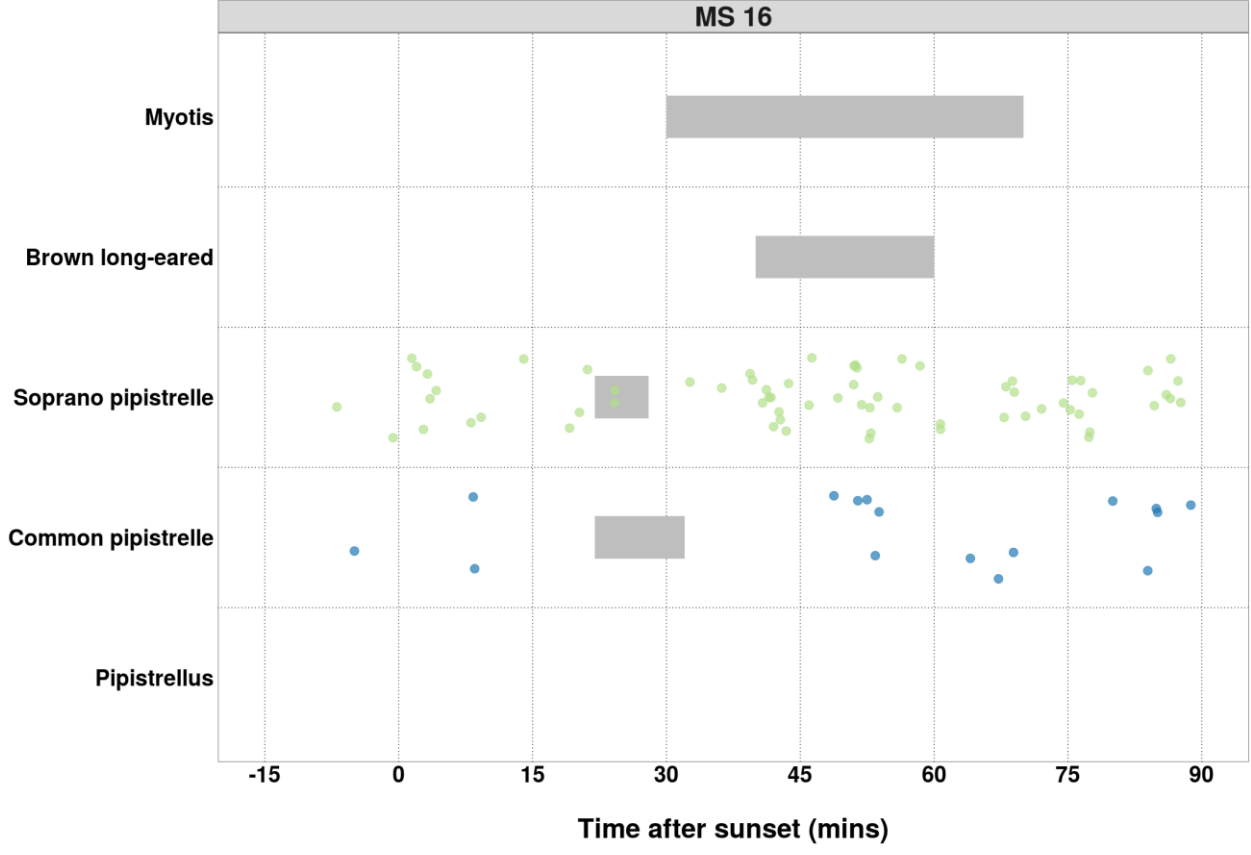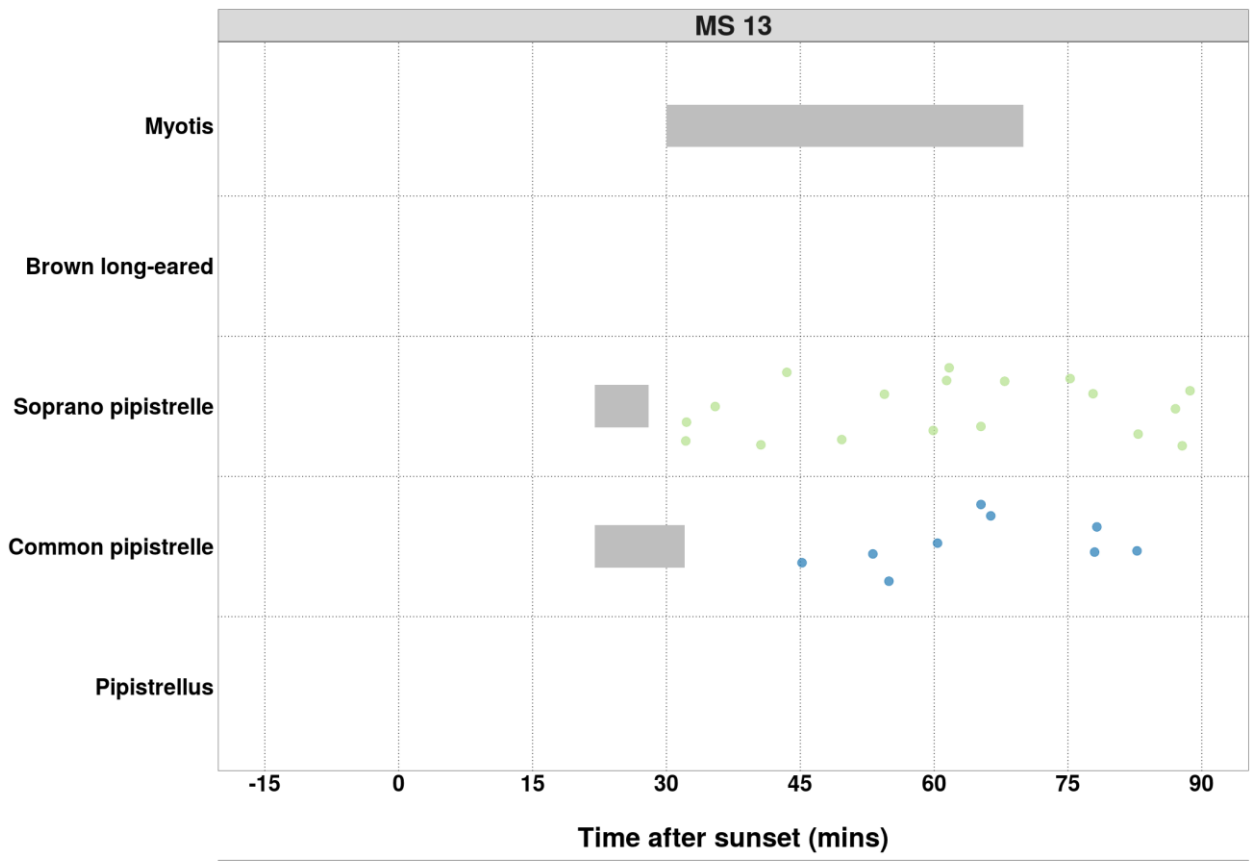
# 13 COUNTS OF BAT PASSES

## 13.1 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 (%) |
|---|---|---|
| Pipistrellus | 2601 | 17.3 |
| Common pipistrelle | 5086 | 33.9 |
| Soprano pipistrelle | 7081 | 47.2 |
| Brown long-eared | 59 | 0.4 |
| Myotis | 187 | 1.2 |
| Total | 15014 | 100.0 |

# 14 COUNTS OF BAT PASSES

## 14.1 Per Detector

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

| Species | Detector ID | Count (No) | Percentage by Detector (%) |
|---|---|---|---|
| Pipistrellus | MS 17 | 177 | 5.6 |
| Pipistrellus | MS 18 | 2238 | 25.1 |
| Pipistrellus | MS 19 | 186 | 11.9 |
| Common pipistrelle | MS 11 | 6 | 37.5 |
| Common pipistrelle | MS 12 | 100 | 49.3 |
| Common pipistrelle | MS 13 | 84 | 30.8 |
| Common pipistrelle | MS 16 | 48 | 13.0 |
| Common pipistrelle | MS 17 | 1121 | 35.7 |
| Common pipistrelle | MS 18 | 2828 | 31.7 |
| Common pipistrelle | MS 19 | 698 | 44.7 |
| Common pipistrelle | MS 20 | 182 | 37.6 |
| Common pipistrelle | MS 7 | 6 | 33.3 |
| Common pipistrelle | MS 9 | 13 | 68.4 |
| Soprano pipistrelle | MS 11 | 10 | 62.5 |
| Soprano pipistrelle | MS 12 | 97 | 47.8 |
| Soprano pipistrelle | MS 13 | 188 | 68.9 |
| Soprano pipistrelle | MS 16 | 318 | 85.9 |
| Soprano pipistrelle | MS 17 | 1705 | 54.3 |
| Soprano pipistrelle | MS 18 | 3790 | 42.5 |

| Soprano pipistrelle | MS 19 | 665 | 42.6 |
|---|---|---|---|
| Soprano pipistrelle | MS 20 | 290 | 59.9 |
| Soprano pipistrelle | MS 7 | 12 | 66.7 |
| Soprano pipistrelle | MS 9 | 6 | 31.6 |
| Brown long-eared | MS 12 | 1 | 0.5 |
| Brown long-eared | MS 16 | 2 | 0.5 |
| Brown long-eared | MS 17 | 12 | 0.4 |
| Brown long-eared | MS 18 | 34 | 0.4 |
| Brown long-eared | MS 19 | 7 | 0.4 |
| Brown long-eared | MS 20 | 3 | 0.6 |
| Myotis | MS 12 | 5 | 2.5 |
| Myotis | MS 13 | 1 | 0.4 |
| Myotis | MS 16 | 2 | 0.5 |
| Myotis | MS 17 | 126 | 4.0 |
| Myotis | MS 18 | 38 | 0.4 |
| Myotis | MS 19 | 6 | 0.4 |
| Myotis | MS 20 | 9 | 1.9 |

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# 15    SPECIES COMPOSITION

**Figure 10.** Percentage species composition of passes at each detector.
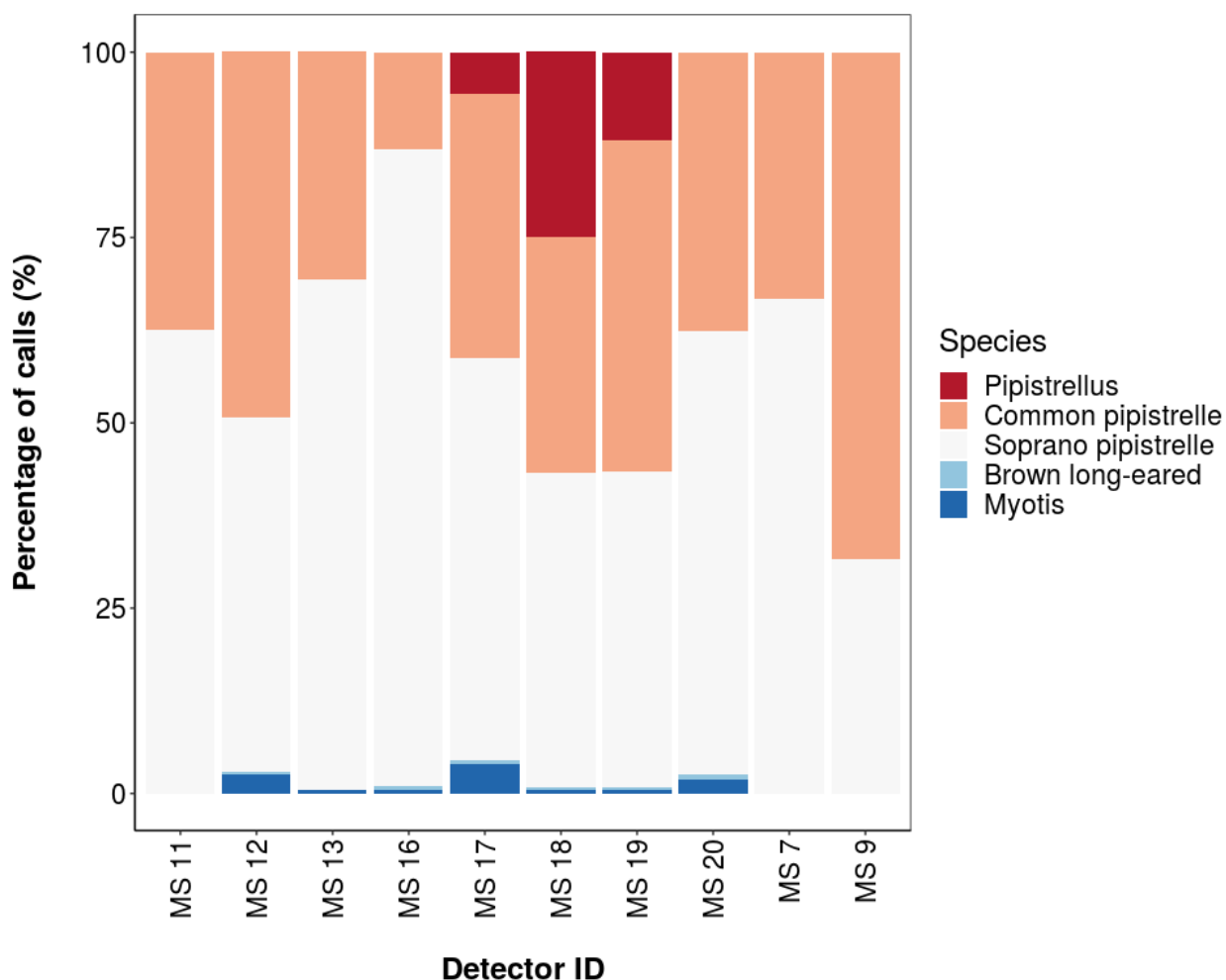
## 15.1   PART 2a: Presence Only

**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.**

## 15.2   Nightly Bat Pass Rate (Bat passes per hour)

# 16   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 |
|---|---|---|
| Pipistrellus | MS 17 | 2.9 |
| Pipistrellus | MS 18 | 14.8 |

| | | |
|---|---|---|
| Pipistrellus | MS 19 | 16.8 |
| Common pipistrelle | MS 11 | 0.1 |
| Common pipistrelle | MS 12 | 0.3 |
| Common pipistrelle | MS 13 | 0.3 |
| Common pipistrelle | MS 16 | 0.2 |
| Common pipistrelle | MS 17 | 0.9 |
| Common pipistrelle | MS 18 | 3.2 |
| Common pipistrelle | MS 19 | 1.1 |
| Common pipistrelle | MS 20 | 0.3 |
| Common pipistrelle | MS 7 | 0.1 |
| Common pipistrelle | MS 9 | 0.1 |
| Soprano pipistrelle | MS 11 | 0.1 |
| Soprano pipistrelle | MS 12 | 0.2 |
| Soprano pipistrelle | MS 13 | 0.2 |
| Soprano pipistrelle | MS 16 | 0.4 |
| Soprano pipistrelle | MS 17 | 1.6 |
| Soprano pipistrelle | MS 18 | 4.5 |
| Soprano pipistrelle | MS 19 | 0.4 |
| Soprano pipistrelle | MS 20 | 0.3 |
| Soprano pipistrelle | MS 7 | 0.1 |
| Soprano pipistrelle | MS 9 | 0.1 |
| Brown long-eared | MS 12 | 0.1 |
| Brown long-eared | MS 16 | 0.1 |
| Brown long-eared | MS 17 | 0.2 |
| Brown long-eared | MS 18 | 0.3 |
| Brown long-eared | MS 19 | 0.2 |
| Brown long-eared | MS 20 | 0.2 |
| Myotis | MS 12 | 0.2 |
| Myotis | MS 13 | 0.2 |
| Myotis | MS 16 | 0.2 |
| Myotis | MS 17 | 0.6 |
| Myotis | MS 18 | 0.4 |
| Myotis | MS 19 | 0.2 |
| Myotis | MS 20 | 0.2 |

## 16.1   Nightly Bat Pass Rate (Bat passes per hour)

# 17   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 |
| --- | --- | --- |
| Pipistrellus | MS 17 | 3.7 |
| Pipistrellus | MS 18 | 16.0 |
| Pipistrellus | MS 19 | 16.8 |
| Common pipistrelle | MS 11 | 0.1 |
| Common pipistrelle | MS 12 | 0.5 |
| Common pipistrelle | MS 13 | 0.4 |
| Common pipistrelle | MS 16 | 0.3 |
| Common pipistrelle | MS 17 | 2.8 |
| Common pipistrelle | MS 18 | 5.7 |
| Common pipistrelle | MS 19 | 2.2 |
| Common pipistrelle | MS 20 | 0.5 |
| Common pipistrelle | MS 7 | 0.1 |
| Common pipistrelle | MS 9 | 0.2 |
| Soprano pipistrelle | MS 11 | 0.1 |
| Soprano pipistrelle | MS 12 | 0.5 |
| Soprano pipistrelle | MS 13 | 0.7 |
| Soprano pipistrelle | MS 16 | 1.0 |
| Soprano pipistrelle | MS 17 | 4.3 |
| Soprano pipistrelle | MS 18 | 7.0 |
| Soprano pipistrelle | MS 19 | 1.7 |
| Soprano pipistrelle | MS 20 | 0.5 |
| Soprano pipistrelle | MS 7 | 0.1 |
| Soprano pipistrelle | MS 9 | 0.1 |
| Brown long-eared | MS 12 | 0.1 |
| Brown long-eared | MS 16 | 0.1 |
| Brown long-eared | MS 17 | 0.2 |
| Brown long-eared | MS 18 | 0.3 |
| Brown long-eared | MS 19 | 0.2 |
| Brown long-eared | MS 20 | 0.2 |
| Myotis | MS 12 | 0.2 |

| Myotis | MS 13 | 0.2 |
| Myotis | MS 16 | 0.2 |
| Myotis | MS 17 | 0.8 |
| Myotis | MS 18 | 0.4 |
| Myotis | MS 19 | 0.2 |
| Myotis | MS 20 | 0.2 |

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# 18    NIGHTLY BAT PASSES (BAT PASSES PER HOUR)

## 18.1   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.
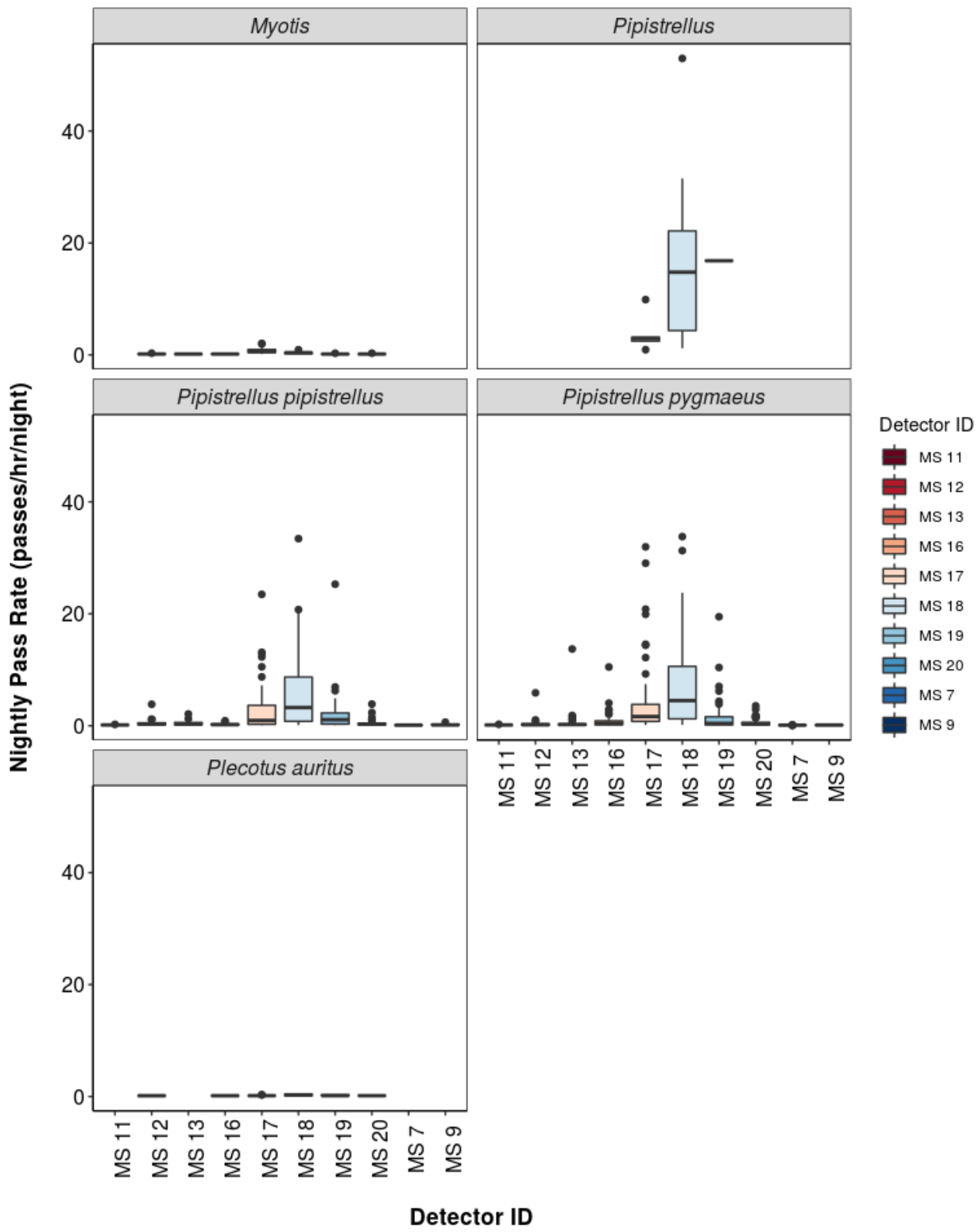
# 19 SPLIT BY MONTH

# 20 TOTAL BAT PASSES PER DETECTOR, EACH MONTH

## 20.1 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 |
|---|---|---|---|---|---|---|
| Pipistrellus | MS 17 | 0 | 0 | 123 | 54 | 0 |
| Pipistrellus | MS 18 | 0 | 0 | 322 | 1008 | 908 |
| Pipistrellus | MS 19 | 0 | 0 | 0 | 0 | 186 |
| Common pipistrelle | MS 11 | 0 | 0 | 2 | 4 | 0 |
| Common pipistrelle | MS 12 | 10 | 50 | 8 | 19 | 13 |
| Common pipistrelle | MS 13 | 6 | 24 | 11 | 37 | 6 |
| Common pipistrelle | MS 16 | 6 | 14 | 5 | 11 | 12 |
| Common pipistrelle | MS 17 | 217 | 596 | 226 | 82 | 0 |
| Common pipistrelle | MS 18 | 786 | 776 | 183 | 751 | 332 |
| Common pipistrelle | MS 19 | 100 | 73 | 15 | 299 | 211 |
| Common pipistrelle | MS 20 | 39 | 56 | 17 | 38 | 32 |
| Common pipistrelle | MS 7 | 0 | 0 | 0 | 3 | 3 |
| Common pipistrelle | MS 9 | 0 | 0 | 2 | 9 | 2 |
| Soprano pipistrelle | MS 11 | 0 | 0 | 4 | 6 | 0 |
| Soprano pipistrelle | MS 12 | 46 | 20 | 4 | 16 | 11 |
| Soprano pipistrelle | MS 13 | 4 | 131 | 6 | 33 | 14 |
| Soprano pipistrelle | MS 16 | 86 | 58 | 7 | 14 | 153 |
| Soprano pipistrelle | MS 17 | 366 | 932 | 243 | 164 | 0 |
| Soprano pipistrelle | MS 18 | 828 | 654 | 341 | 1322 | 645 |
| Soprano pipistrelle | MS 19 | 132 | 56 | 21 | 310 | 146 |
| Soprano pipistrelle | MS 20 | 47 | 75 | 25 | 89 | 54 |
| Soprano pipistrelle | MS 7 | 0 | 0 | 0 | 2 | 10 |
| Soprano pipistrelle | MS 9 | 0 | 0 | 2 | 1 | 3 |
| Brown long-eared | MS 12 | 1 | 0 | 0 | 0 | 0 |
| Brown long-eared | MS 16 | 2 | 0 | 0 | 0 | 0 |
| Brown long-eared | MS 17 | 6 | 6 | 0 | 0 | 0 |
| Brown long-eared | MS 18 | 20 | 14 | 0 | 0 | 0 |
| Brown long-eared | MS 19 | 2 | 5 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Brown long-eared | MS 20 | 1 | 2 | 0 | 0 | 0 |
| Myotis | MS 12 | 0 | 5 | 0 | 0 | 0 |
| Myotis | MS 13 | 0 | 1 | 0 | 0 | 0 |
| Myotis | MS 16 | 1 | 1 | 0 | 0 | 0 |
| Myotis | MS 17 | 50 | 76 | 0 | 0 | 0 |
| Myotis | MS 18 | 31 | 7 | 0 | 0 | 0 |
| Myotis | MS 19 | 5 | 1 | 0 | 0 | 0 |
| Myotis | MS 20 | 3 | 6 | 0 | 0 | 0 |

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# 21    SURVEY EFFORT

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

| Month | Detector ID | No. of Survey Nights |
|---|---|---|
| May | MS 12 | 4 |
| May | MS 13 | 3 |
| May | MS 16 | 8 |
| May | MS 17 | 16 |
| May | MS 18 | 17 |
| May | MS 19 | 10 |
| May | MS 20 | 9 |
| Jun | MS 12 | 11 |
| Jun | MS 13 | 10 |
| Jun | MS 16 | 11 |
| Jun | MS 17 | 14 |
| Jun | MS 18 | 14 |
| Jun | MS 19 | 7 |
| Jun | MS 20 | 12 |
| Jul | MS 11 | 6 |
| Jul | MS 12 | 5 |
| Jul | MS 13 | 6 |
| Jul | MS 16 | 5 |
| Jul | MS 17 | 13 |
| Jul | MS 18 | 11 |
| Jul | MS 19 | 8 |
| Jul | MS 20 | 11 |
| Jul | MS 9 | 2 |
| Aug | MS 11 | 6 |
| Aug | MS 12 | 11 |
| Aug | MS 13 | 16 |

| | | | |
|---|---|---|---|
| Aug | MS 16 | 7 | |
| Aug | MS 17 | 18 | |
| Aug | MS 18 | 20 | |
| Aug | MS 19 | 16 | |
| Aug | MS 20 | 24 | |
| Aug | MS 7 | 4 | |
| Aug | MS 9 | 3 | |
| Sep | MS 12 | 8 | |
| Sep | MS 13 | 9 | |
| Sep | MS 16 | 11 | |
| Sep | MS 18 | 11 | |
| Sep | MS 19 | 9 | |
| Sep | MS 20 | 21 | |
| Sep | MS 7 | 12 | |
| Sep | MS 9 | 4 | |

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## 21.1 Nightly Bat Pass Rate for each Month

## 22 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 |
|---|---|---|---|---|---|---|
| Pipistrellus | MS 17 | NA | NA | 3.2 | 2.4 | NA |
| Pipistrellus | MS 18 | NA | NA | 7.7 | 13.3 | 16.5 |
| Pipistrellus | MS 19 | NA | NA | NA | NA | 16.8 |
| Common pipistrelle | MS 11 | NA | NA | 0.1 | 0.1 | NA |
| Common pipistrelle | MS 12 | 0.4 | 0.2 | 0.3 | 0.2 | 0.6 |
| Common pipistrelle | MS 13 | 0.4 | 0.4 | 0.5 | 0.2 | 0.1 |
| Common pipistrelle | MS 16 | 0.3 | 0.3 | 0.3 | 0.1 | 0.2 |
| Common pipistrelle | MS 17 | 0.6 | 3.9 | 1.8 | 0.2 | NA |
| Common pipistrelle | MS 18 | 3.9 | 9.4 | 1.8 | 2.8 | 4.1 |
| Common pipistrelle | MS 19 | 2.3 | 1.1 | 0.3 | 1.3 | 1.1 |
| Common pipistrelle | MS 20 | 1.0 | 0.6 | 0.3 | 0.3 | 0.2 |
| Common pipistrelle | MS 7 | NA | NA | NA | 0.1 | 0.1 |

| Species | Detector ID | | | | | |
|---|---|---|---|---|---|---|
| Common pipistrelle | MS 9 | NA | NA | 0.1 | 0.2 | 0.1 |
| Soprano pipistrelle | MS 11 | NA | NA | 0.1 | 0.1 | NA |
| Soprano pipistrelle | MS 12 | 0.3 | 0.4 | 0.1 | 0.2 | 0.1 |
| Soprano pipistrelle | MS 13 | 0.3 | 0.7 | 0.1 | 0.2 | 0.2 |
| Soprano pipistrelle | MS 16 | 1.3 | 0.5 | 0.1 | 0.4 | 0.4 |
| Soprano pipistrelle | MS 17 | 1.1 | 5.6 | 2.6 | 1.1 | NA |
| Soprano pipistrelle | MS 18 | 8.6 | 4.2 | 2.3 | 4.6 | 1.7 |
| Soprano pipistrelle | MS 19 | 0.4 | 1.4 | 0.1 | 0.4 | 0.3 |
| Soprano pipistrelle | MS 20 | 0.6 | 0.5 | 0.3 | 0.4 | 0.2 |
| Soprano pipistrelle | MS 7 | NA | NA | NA | 0.1 | 0.1 |
| Soprano pipistrelle | MS 9 | NA | NA | 0.1 | 0.1 | 0.1 |
| Brown long-eared | MS 12 | 0.1 | NA | NA | NA | NA |
| Brown long-eared | MS 16 | 0.1 | NA | NA | NA | NA |
| Brown long-eared | MS 17 | 0.1 | 0.2 | NA | NA | NA |
| Brown long-eared | MS 18 | 0.4 | 0.2 | NA | NA | NA |
| Brown long-eared | MS 19 | 0.1 | 0.3 | NA | NA | NA |
| Brown long-eared | MS 20 | 0.2 | 0.2 | NA | NA | NA |
| Myotis | MS 12 | NA | 0.2 | NA | NA | NA |
| Myotis | MS 13 | NA | 0.2 | NA | NA | NA |
| Myotis | MS 16 | 0.2 | 0.2 | NA | NA | NA |
| Myotis | MS 17 | 0.5 | 0.8 | NA | NA | NA |
| Myotis | MS 18 | 0.4 | 0.2 | NA | NA | NA |
| Myotis | MS 19 | 0.1 | 0.2 | NA | NA | NA |
| Myotis | MS 20 | 0.1 | 0.2 | NA | NA | NA |

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## 22.1  Nightly Bat Pass Rate for each Month

# 23  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 |
|---|---|---|---|---|---|---|
| Pipistrellus | MS 17 | NA | NA | 5.4 | 2.0 | NA |
| Pipistrellus | MS 18 | NA | NA | 13.9 | 19.6 | 13.4 |
| Pipistrellus | MS 19 | NA | NA | NA | NA | 16.8 |
| Common pipistrelle | MS 11 | NA | NA | 0.1 | 0.2 | NA |
| Common pipistrelle | MS 12 | 0.4 | 0.7 | 0.3 | 0.3 | 0.6 |
| Common pipistrelle | MS 13 | 0.4 | 0.5 | 0.5 | 0.5 | 0.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Common pipistrelle | MS 16 | 0.3 | 0.4 | 0.2 | 0.2 | 0.2 |
| Common pipistrelle | MS 17 | 2.2 | 6.5 | 2.8 | 0.5 | NA |
| Common pipistrelle | MS 18 | 7.3 | 9.7 | 2.4 | 4.6 | 3.7 |
| Common pipistrelle | MS 19 | 2.1 | 1.6 | 0.5 | 3.5 | 2.1 |
| Common pipistrelle | MS 20 | 0.8 | 1.2 | 0.3 | 0.3 | 0.2 |
| Common pipistrelle | MS 7 | NA | NA | NA | 0.1 | 0.1 |
| Common pipistrelle | MS 9 | NA | NA | 0.1 | 0.4 | 0.1 |
| Soprano pipistrelle | MS 11 | NA | NA | 0.1 | 0.1 | NA |
| Soprano pipistrelle | MS 12 | 1.6 | 0.5 | 0.2 | 0.2 | 0.1 |
| Soprano pipistrelle | MS 13 | 0.3 | 2.2 | 0.2 | 0.3 | 0.2 |
| Soprano pipistrelle | MS 16 | 1.5 | 0.9 | 0.2 | 0.4 | 1.3 |
| Soprano pipistrelle | MS 17 | 3.7 | 10.1 | 2.5 | 1.2 | NA |
| Soprano pipistrelle | MS 18 | 8.3 | 8.2 | 4.1 | 7.5 | 5.7 |
| Soprano pipistrelle | MS 19 | 2.1 | 1.4 | 0.4 | 2.4 | 1.5 |
| Soprano pipistrelle | MS 20 | 0.8 | 1.1 | 0.4 | 0.4 | 0.3 |
| Soprano pipistrelle | MS 7 | NA | NA | NA | 0.1 | 0.1 |
| Soprano pipistrelle | MS 9 | NA | NA | 0.1 | 0.1 | 0.1 |
| Brown long-eared | MS 12 | 0.1 | NA | NA | NA | NA |
| Brown long-eared | MS 16 | 0.1 | NA | NA | NA | NA |
| Brown long-eared | MS 17 | 0.2 | 0.2 | NA | NA | NA |
| Brown long-eared | MS 18 | 0.4 | 0.2 | NA | NA | NA |
| Brown long-eared | MS 19 | 0.1 | 0.3 | NA | NA | NA |
| Brown long-eared | MS 20 | 0.2 | 0.2 | NA | NA | NA |
| Myotis | MS 12 | NA | 0.2 | NA | NA | NA |
| Myotis | MS 13 | NA | 0.2 | NA | NA | NA |
| Myotis | MS 16 | 0.2 | 0.2 | NA | NA | NA |
| Myotis | MS 17 | 0.6 | 1.0 | NA | NA | NA |
| Myotis | MS 18 | 0.4 | 0.3 | NA | NA | NA |
| Myotis | MS 19 | 0.2 | 0.2 | NA | NA | NA |
| Myotis | MS 20 | 0.1 | 0.2 | NA | NA | NA |

## 23.1 Nightly Bat Pass Rate for each Month
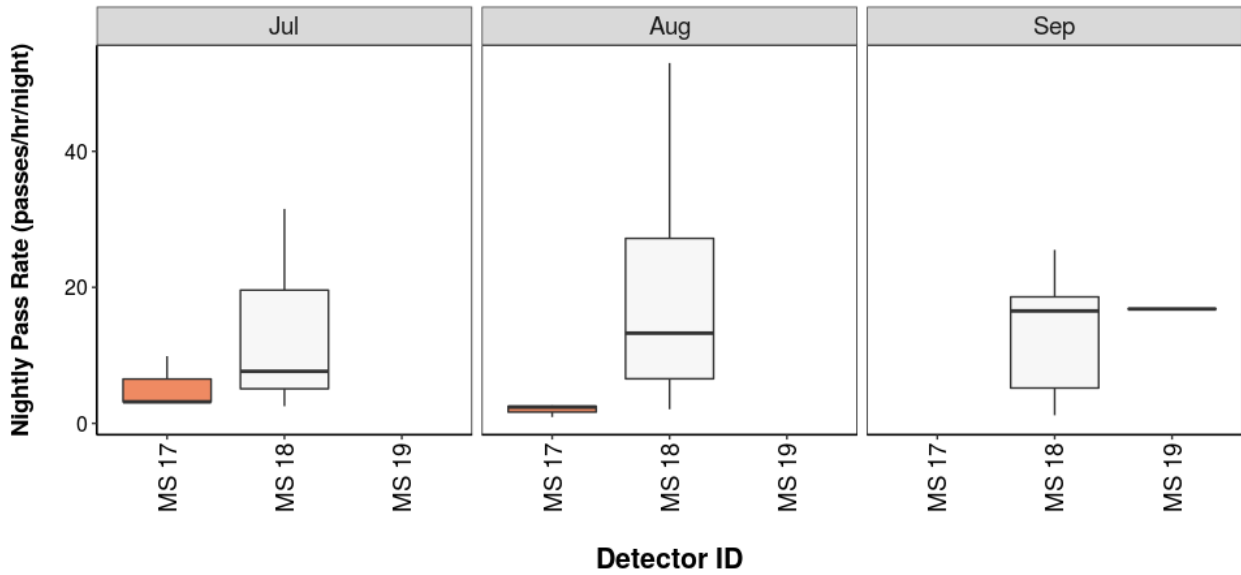
## 23.2 Per Detector - Figures

**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.
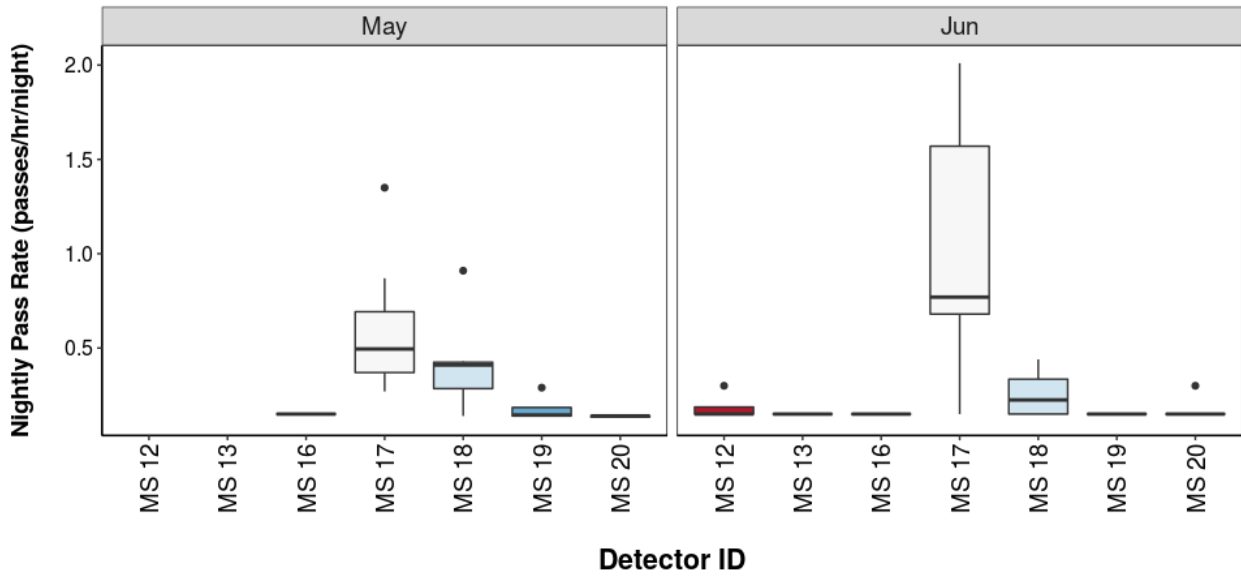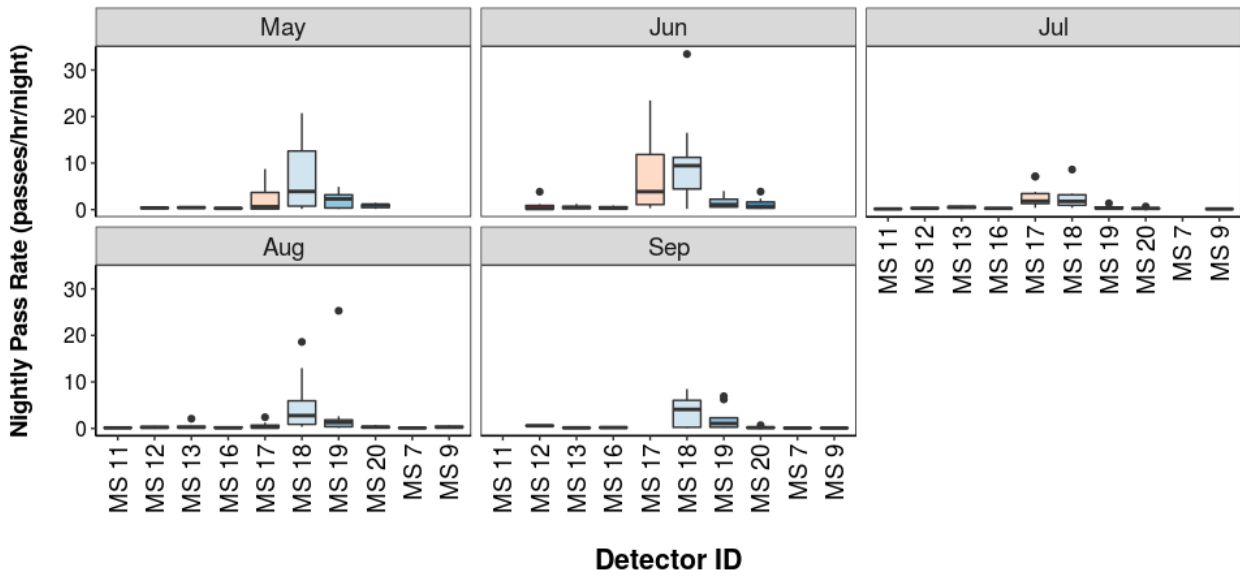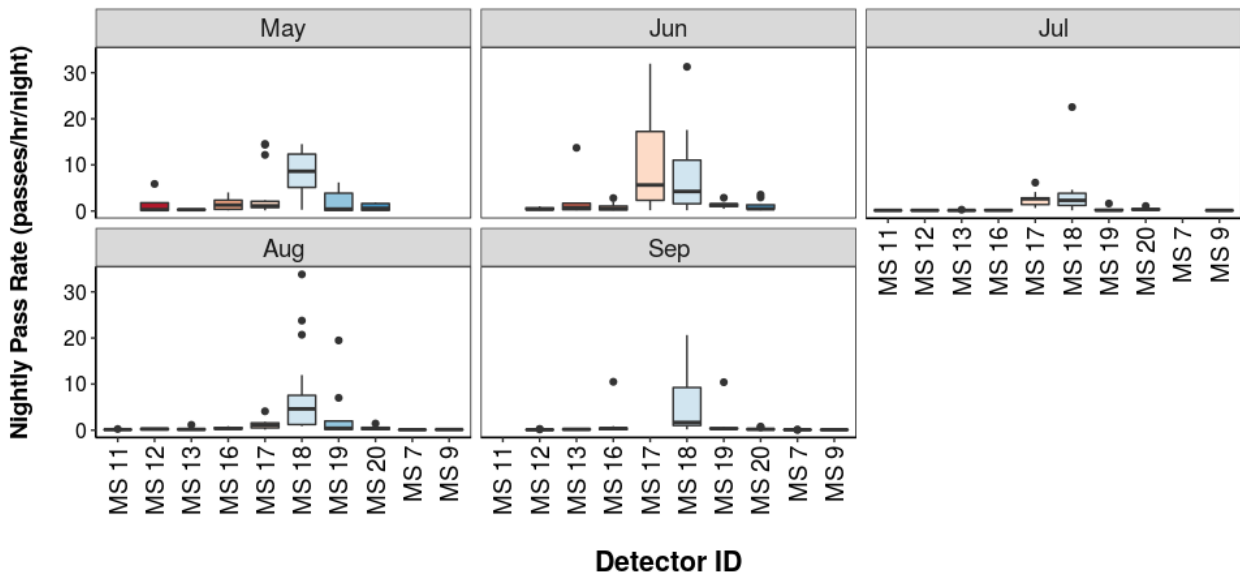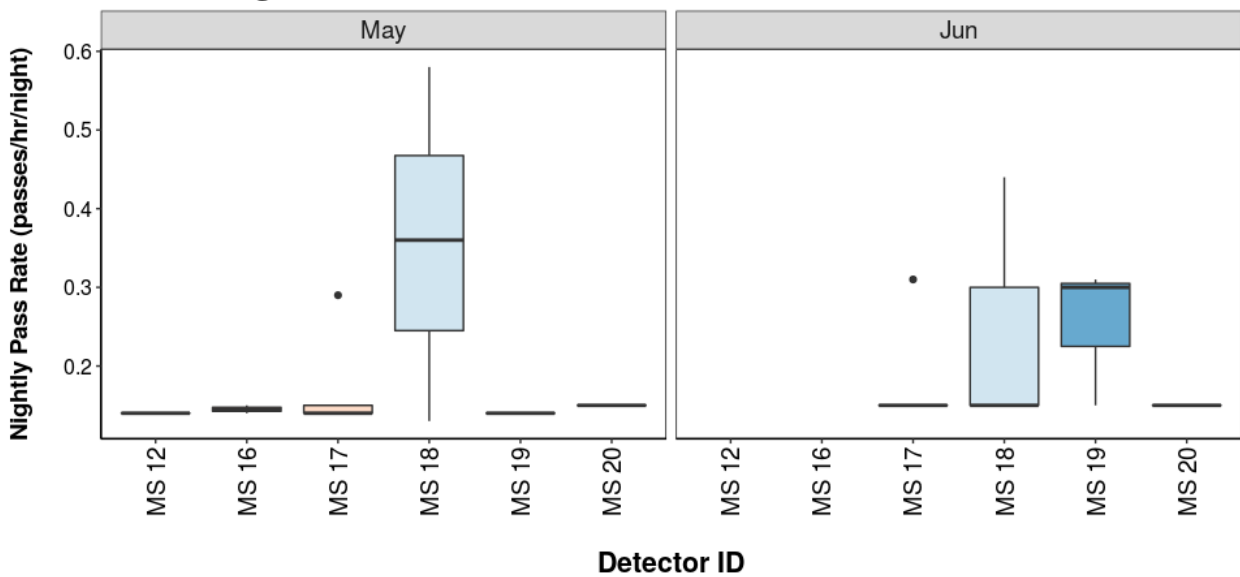
## Common pipistrelle

## Soprano pipistrelle

## Brown long-eared

## 24 BAT ACTIVITY PER DETECTOR LOCATION
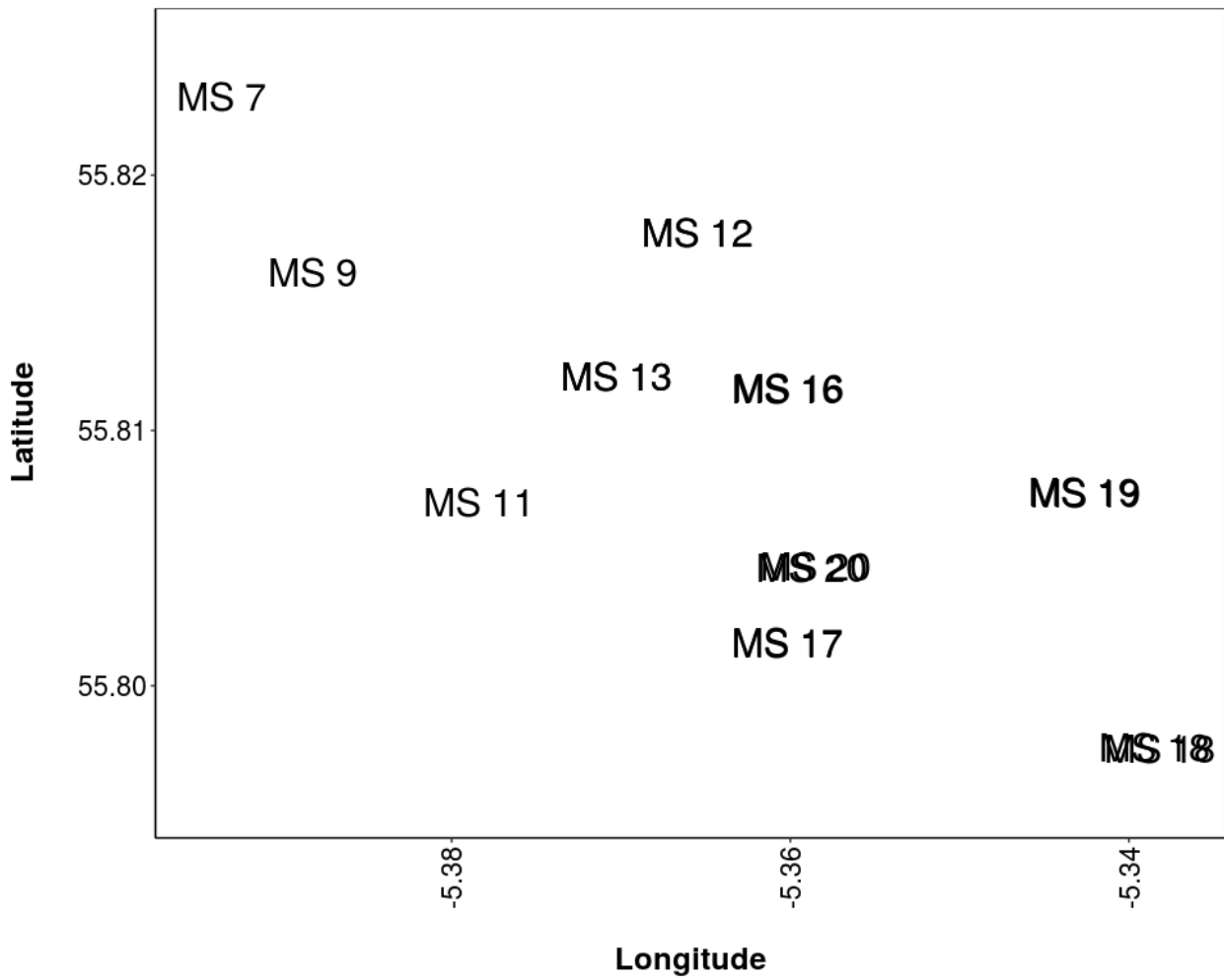
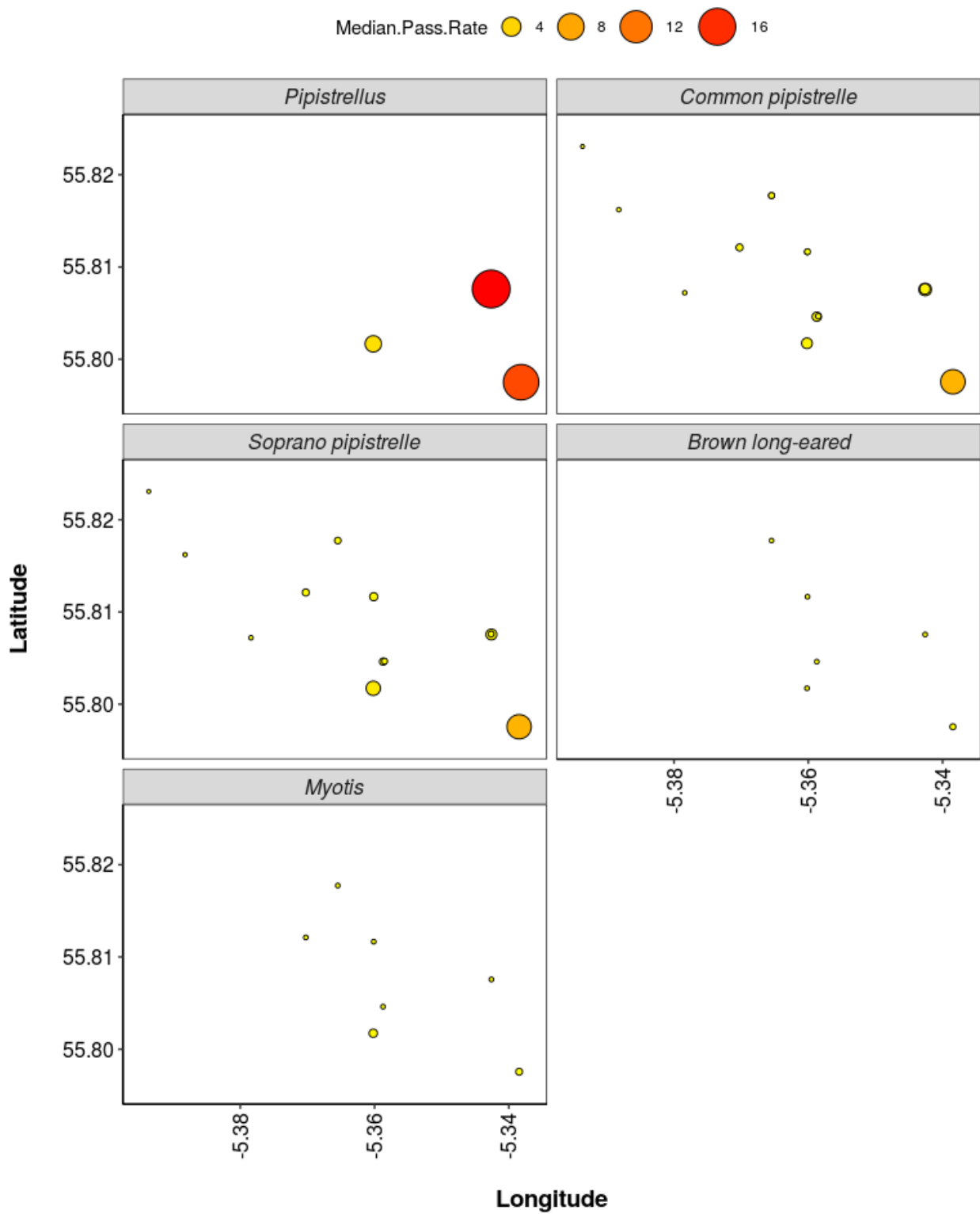**Figure 13.** Detector ID reference:

**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.

Page Break

**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.
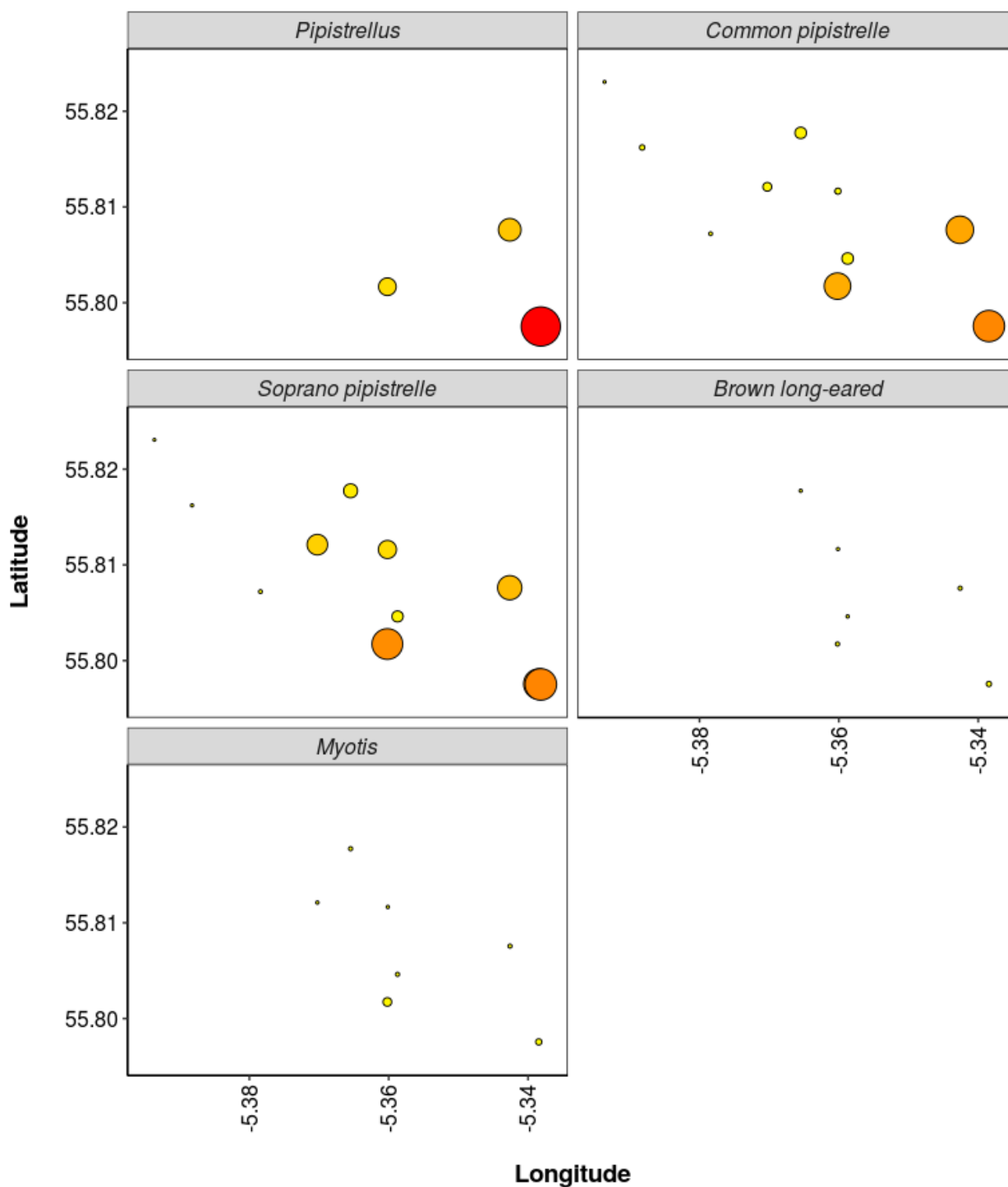
## 24.1   PART 2B: Includes absences

**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.**

## 24.2 Nightly Bat Pass Rate (Bat passes per hour)

# 25 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 | MS 11 | 0.0 |
| Brown long-eared | MS 12 | 0.0 |
| Brown long-eared | MS 13 | 0.0 |
| Brown long-eared | MS 16 | 0.0 |
| Brown long-eared | MS 17 | 0.0 |
| Brown long-eared | MS 18 | 0.0 |
| Brown long-eared | MS 19 | 0.0 |
| Brown long-eared | MS 20 | 0.0 |
| Brown long-eared | MS 7 | 0.0 |
| Brown long-eared | MS 9 | 0.0 |
| Common pipistrelle | MS 11 | 0.0 |
| Common pipistrelle | MS 12 | 0.2 |
| Common pipistrelle | MS 13 | 0.1 |
| Common pipistrelle | MS 16 | 0.1 |
| Common pipistrelle | MS 17 | 0.9 |
| Common pipistrelle | MS 18 | 2.8 |
| Common pipistrelle | MS 19 | 0.4 |
| Common pipistrelle | MS 20 | 0.1 |
| Common pipistrelle | MS 7 | 0.0 |
| Common pipistrelle | MS 9 | 0.1 |
| Myotis | MS 11 | 0.0 |
| Myotis | MS 12 | 0.0 |
| Myotis | MS 13 | 0.0 |
| Myotis | MS 16 | 0.0 |
| Myotis | MS 17 | 0.0 |
| Myotis | MS 18 | 0.0 |
| Myotis | MS 19 | 0.0 |
| Myotis | MS 20 | 0.0 |

| | | |
|---|---|---|
| Myotis | MS 7 | 0.0 |
| Myotis | MS 9 | 0.0 |
| Pipistrellus | MS 11 | 0.0 |
| Pipistrellus | MS 12 | 0.0 |
| Pipistrellus | MS 13 | 0.0 |
| Pipistrellus | MS 16 | 0.0 |
| Pipistrellus | MS 17 | 0.0 |
| Pipistrellus | MS 18 | 0.0 |
| Pipistrellus | MS 19 | 0.0 |
| Pipistrellus | MS 20 | 0.0 |
| Pipistrellus | MS 7 | 0.0 |
| Pipistrellus | MS 9 | 0.0 |
| Soprano pipistrelle | MS 11 | 0.1 |
| Soprano pipistrelle | MS 12 | 0.1 |
| Soprano pipistrelle | MS 13 | 0.2 |
| Soprano pipistrelle | MS 16 | 0.3 |
| Soprano pipistrelle | MS 17 | 1.5 |
| Soprano pipistrelle | MS 18 | 3.7 |
| Soprano pipistrelle | MS 19 | 0.4 |
| Soprano pipistrelle | MS 20 | 0.3 |
| Soprano pipistrelle | MS 7 | 0.1 |
| Soprano pipistrelle | MS 9 | 0.1 |

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## 25.1  Nightly Bat Pass Rate (Bat passes per hour)

# 26  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 | MS 11 | 0.0 |
| Brown long-eared | MS 12 | 0.0 |
| Brown long-eared | MS 13 | 0.0 |
| Brown long-eared | MS 16 | 0.0 |
| Brown long-eared | MS 17 | 0.0 |
| Brown long-eared | MS 18 | 0.1 |
| Brown long-eared | MS 19 | 0.0 |
| Brown long-eared | MS 20 | 0.0 |

| | | |
|---|---|---|
| Brown long-eared | MS 7 | 0.0 |
| Brown long-eared | MS 9 | 0.0 |
| Common pipistrelle | MS 11 | 0.1 |
| Common pipistrelle | MS 12 | 0.3 |
| Common pipistrelle | MS 13 | 0.2 |
| Common pipistrelle | MS 16 | 0.1 |
| Common pipistrelle | MS 17 | 2.6 |
| Common pipistrelle | MS 18 | 5.0 |
| Common pipistrelle | MS 19 | 1.6 |
| Common pipistrelle | MS 20 | 0.3 |
| Common pipistrelle | MS 7 | 0.0 |
| Common pipistrelle | MS 9 | 0.2 |
| Myotis | MS 11 | 0.0 |
| Myotis | MS 12 | 0.0 |
| Myotis | MS 13 | 0.0 |
| Myotis | MS 16 | 0.0 |
| Myotis | MS 17 | 0.3 |
| Myotis | MS 18 | 0.1 |
| Myotis | MS 19 | 0.0 |
| Myotis | MS 20 | 0.0 |
| Myotis | MS 7 | 0.0 |
| Myotis | MS 9 | 0.0 |
| Pipistrellus | MS 11 | 0.0 |
| Pipistrellus | MS 12 | 0.0 |
| Pipistrellus | MS 13 | 0.0 |
| Pipistrellus | MS 16 | 0.0 |
| Pipistrellus | MS 17 | 0.4 |
| Pipistrellus | MS 18 | 3.3 |
| Pipistrellus | MS 19 | 0.3 |
| Pipistrellus | MS 20 | 0.0 |
| Pipistrellus | MS 7 | 0.0 |
| Pipistrellus | MS 9 | 0.0 |
| Soprano pipistrelle | MS 11 | 0.1 |
| Soprano pipistrelle | MS 12 | 0.3 |
| Soprano pipistrelle | MS 13 | 0.6 |
| Soprano pipistrelle | MS 16 | 0.9 |
| Soprano pipistrelle | MS 17 | 4.0 |
| Soprano pipistrelle | MS 18 | 6.4 |
| Soprano pipistrelle | MS 19 | 1.6 |

| Soprano pipistrelle | MS 20 | 0.5 |
| Soprano pipistrelle | MS 7 | 0.1 |
| Soprano pipistrelle | MS 9 | 0.1 |

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# 27    NIGHTLY BAT PASSES (BAT PASSES PER HOUR)

## 27.1   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.
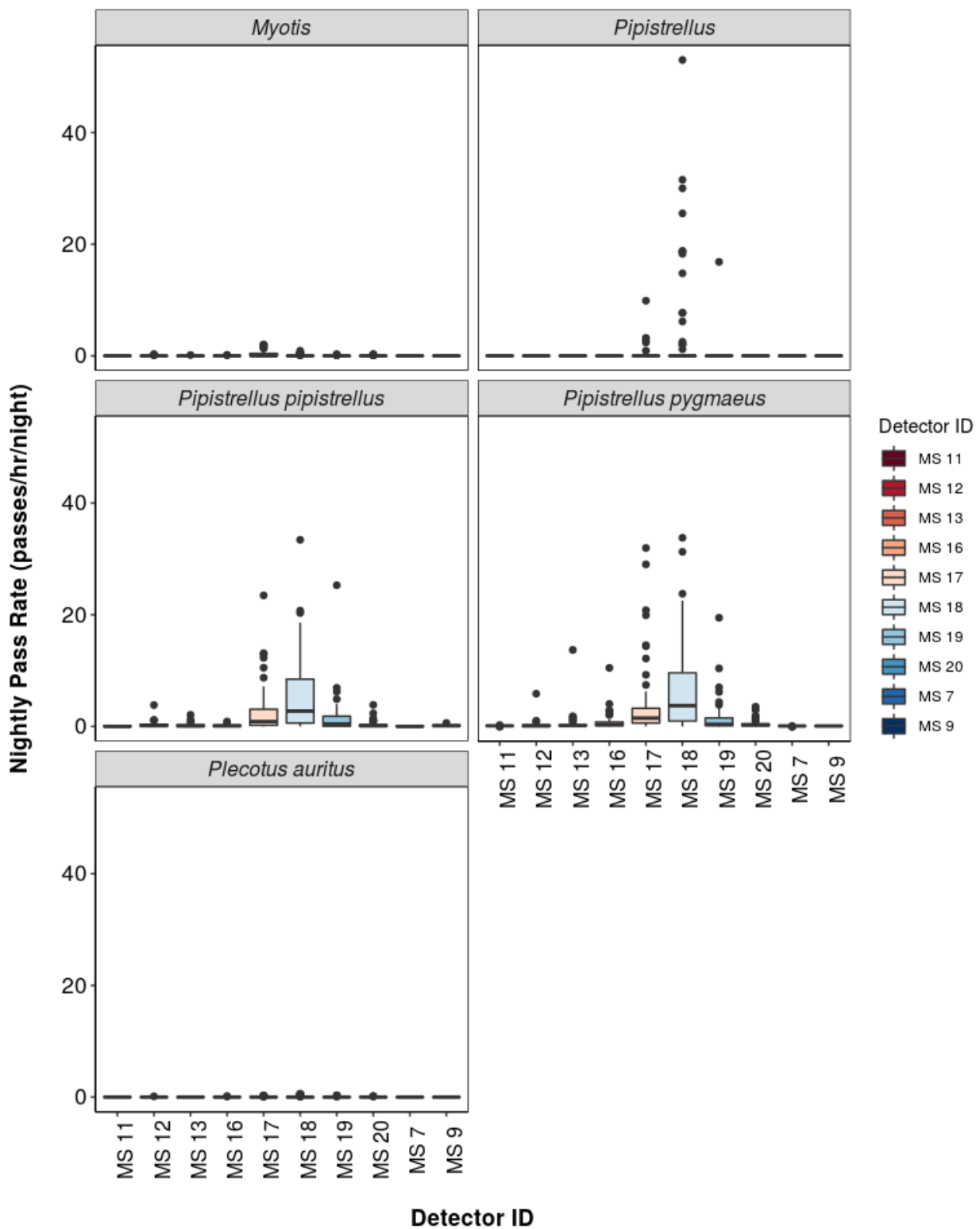
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# 28    SURVEY EFFORT

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

| Month | Detector ID | No of Survey Nights |
|-------|-------------|---------------------|
| May   | MS 12       | 4                   |
| May   | MS 13       | 3                   |

| | | |
|-----|-------|----|
| May | MS 16 | 8 |
| May | MS 17 | 16 |
| May | MS 18 | 17 |
| May | MS 19 | 10 |
| May | MS 20 | 9 |
| Jun | MS 12 | 11 |
| Jun | MS 13 | 10 |
| Jun | MS 16 | 11 |
| Jun | MS 17 | 14 |
| Jun | MS 18 | 14 |
| Jun | MS 19 | 7 |
| Jun | MS 20 | 12 |
| Jul | MS 11 | 6 |
| Jul | MS 12 | 5 |
| Jul | MS 13 | 6 |
| Jul | MS 16 | 5 |
| Jul | MS 17 | 13 |
| Jul | MS 18 | 11 |
| Jul | MS 19 | 8 |
| Jul | MS 20 | 11 |
| Jul | MS 9 | 2 |
| Aug | MS 11 | 6 |
| Aug | MS 12 | 11 |
| Aug | MS 13 | 16 |
| Aug | MS 16 | 7 |
| Aug | MS 17 | 18 |
| Aug | MS 18 | 20 |
| Aug | MS 19 | 16 |
| Aug | MS 20 | 24 |
| Aug | MS 7 | 4 |
| Aug | MS 9 | 3 |
| Sep | MS 12 | 8 |
| Sep | MS 13 | 9 |
| Sep | MS 16 | 11 |
| Sep | MS 18 | 11 |
| Sep | MS 19 | 9 |
| Sep | MS 20 | 21 |
| Sep | MS 7 | 12 |
| Sep | MS 9 | 4 |

## 28.1 Nightly Bat Pass Rate for each Month

# 29 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 | MS 11 | 0.0 | 0.0 | NA | NA | NA |
| Brown long-eared | MS 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Brown long-eared | MS 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Brown long-eared | MS 16 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Brown long-eared | MS 17 | 0.0 | 0.0 | 0.0 | 0.0 | NA |
| Brown long-eared | MS 18 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 |
| Brown long-eared | MS 19 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Brown long-eared | MS 20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Brown long-eared | MS 7 | 0.0 | NA | NA | NA | 0.0 |
| Brown long-eared | MS 9 | 0.0 | 0.0 | NA | NA | 0.0 |
| Common pipistrelle | MS 11 | 0.1 | 0.0 | NA | NA | NA |
| Common pipistrelle | MS 12 | 0.1 | 0.3 | 0.2 | 0.4 | 0.0 |
| Common pipistrelle | MS 13 | 0.0 | 0.1 | 0.2 | 0.3 | 0.0 |
| Common pipistrelle | MS 16 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 |
| Common pipistrelle | MS 17 | 0.2 | 1.6 | 3.9 | 0.3 | NA |
| Common pipistrelle | MS 18 | 2.6 | 1.6 | 7.4 | 2.9 | 0.3 |
| Common pipistrelle | MS 19 | 0.2 | 0.1 | 1.1 | 0.3 | 1.1 |
| Common pipistrelle | MS 20 | 0.1 | 0.1 | 0.2 | 0.7 | 0.1 |
| Common pipistrelle | MS 7 | 0.1 | NA | NA | NA | 0.0 |
| Common pipistrelle | MS 9 | 0.2 | 0.1 | NA | NA | 0.0 |
| Myotis | MS 11 | 0.0 | 0.0 | NA | NA | NA |
| Myotis | MS 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Myotis | MS 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Myotis | MS 16 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Myotis | MS 17 | 0.0 | 0.0 | 0.7 | 0.4 | NA |
| Myotis | MS 18 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Myotis | MS 19 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Myotis | MS 20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| Myotis | MS 7 | 0.0 | NA | NA | NA | 0.0 |
|---|---|---|---|---|---|---|
| Myotis | MS 9 | 0.0 | 0.0 | NA | NA | 0.0 |
| Pipistrellus | MS 11 | 0.0 | 0.0 | NA | NA | NA |
| Pipistrellus | MS 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pipistrellus | MS 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pipistrellus | MS 16 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pipistrellus | MS 17 | 0.0 | 0.0 | 0.0 | 0.0 | NA |
| Pipistrellus | MS 18 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 |
| Pipistrellus | MS 19 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pipistrellus | MS 20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pipistrellus | MS 7 | 0.0 | NA | NA | NA | 0.0 |
| Pipistrellus | MS 9 | 0.0 | 0.0 | NA | NA | 0.0 |
| Soprano pipistrelle | MS 11 | 0.1 | 0.1 | NA | NA | NA |
| Soprano pipistrelle | MS 12 | 0.1 | 0.1 | 0.2 | 0.3 | 0.1 |
| Soprano pipistrelle | MS 13 | 0.1 | 0.1 | 0.5 | 0.2 | 0.1 |
| Soprano pipistrelle | MS 16 | 0.1 | 0.1 | 0.4 | 1.3 | 0.4 |
| Soprano pipistrelle | MS 17 | 0.7 | 2.6 | 5.6 | 1.1 | NA |
| Soprano pipistrelle | MS 18 | 4.6 | 2.3 | 2.6 | 6.3 | 1.6 |
| Soprano pipistrelle | MS 19 | 0.3 | 0.1 | 1.2 | 0.4 | 0.3 |
| Soprano pipistrelle | MS 20 | 0.3 | 0.3 | 0.5 | 0.4 | 0.2 |
| Soprano pipistrelle | MS 7 | 0.0 | NA | NA | NA | 0.1 |
| Soprano pipistrelle | MS 9 | 0.0 | 0.1 | NA | NA | 0.1 |

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## 29.1 Nightly Bat Pass Rate for each Month

# 30 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 | MS 11 | 0.0 | 0.0 | NA | NA | NA |
| Brown long-eared | MS 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Brown long-eared | MS 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Brown long-eared | MS 16 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Brown long-eared | MS 17 | 0.0 | 0.0 | 0.1 | 0.1 | NA |
| Brown long-eared | MS 18 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 |
| Brown long-eared | MS 19 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| Brown long-eared | MS 20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Brown long-eared | MS 7 | 0.0 | NA | NA | NA | 0.0 |
| Brown long-eared | MS 9 | 0.0 | 0.0 | NA | NA | 0.0 |
| Common pipistrelle | MS 11 | 0.1 | 0.0 | NA | NA | NA |
| Common pipistrelle | MS 12 | 0.2 | 0.2 | 0.7 | 0.4 | 0.1 |
| Common pipistrelle | MS 13 | 0.3 | 0.2 | 0.4 | 0.3 | 0.1 |
| Common pipistrelle | MS 16 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 |
| Common pipistrelle | MS 17 | 0.5 | 2.4 | 6.5 | 1.9 | NA |
| Common pipistrelle | MS 18 | 4.3 | 2.2 | 8.3 | 6.5 | 2.7 |
| Common pipistrelle | MS 19 | 2.2 | 0.3 | 1.6 | 1.4 | 2.1 |
| Common pipistrelle | MS 20 | 0.2 | 0.2 | 0.7 | 0.6 | 0.1 |
| Common pipistrelle | MS 7 | 0.1 | NA | NA | NA | 0.0 |
| Common pipistrelle | MS 9 | 0.4 | 0.1 | NA | NA | 0.0 |
| Myotis | MS 11 | 0.0 | 0.0 | NA | NA | NA |
| Myotis | MS 12 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| Myotis | MS 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Myotis | MS 16 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Myotis | MS 17 | 0.0 | 0.0 | 0.8 | 0.4 | NA |
| Myotis | MS 18 | 0.0 | 0.0 | 0.1 | 0.3 | 0.0 |
| Myotis | MS 19 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |
| Myotis | MS 20 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| Myotis | MS 7 | 0.0 | NA | NA | NA | 0.0 |
| Myotis | MS 9 | 0.0 | 0.0 | NA | NA | 0.0 |
| Pipistrellus | MS 11 | 0.0 | 0.0 | NA | NA | NA |
| Pipistrellus | MS 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pipistrellus | MS 13 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pipistrellus | MS 16 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pipistrellus | MS 17 | 0.3 | 1.2 | 0.0 | 0.0 | NA |
| Pipistrellus | MS 18 | 5.9 | 3.8 | 0.0 | 0.0 | 7.3 |
| Pipistrellus | MS 19 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 |
| Pipistrellus | MS 20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pipistrellus | MS 7 | 0.0 | NA | NA | NA | 0.0 |
| Pipistrellus | MS 9 | 0.0 | 0.0 | NA | NA | 0.0 |
| Soprano pipistrelle | MS 11 | 0.1 | 0.1 | NA | NA | NA |
| Soprano pipistrelle | MS 12 | 0.2 | 0.1 | 0.3 | 1.6 | 0.1 |
| Soprano pipistrelle | MS 13 | 0.2 | 0.1 | 2.0 | 0.2 | 0.1 |
| Soprano pipistrelle | MS 16 | 0.2 | 0.2 | 0.8 | 1.5 | 1.3 |
| Soprano pipistrelle | MS 17 | 1.1 | 2.5 | 10.1 | 3.2 | NA |
| Soprano pipistrelle | MS 18 | 7.5 | 4.1 | 7.0 | 6.8 | 5.2 |
| Soprano pipistrelle | MS 19 | 2.2 | 0.4 | 1.2 | 1.9 | 1.5 |

| Soprano pipistrelle | MS 20 | 0.4 | 0.3 | 0.9 | 0.8 | 0.2 |
| Soprano pipistrelle | MS 7 | 0.0 | NA | NA | NA | 0.1 |
| Soprano pipistrelle | MS 9 | 0.0 | 0.1 | NA | NA | 0.1 |

## 30.1   Nightly Bat Pass Rate for each Month
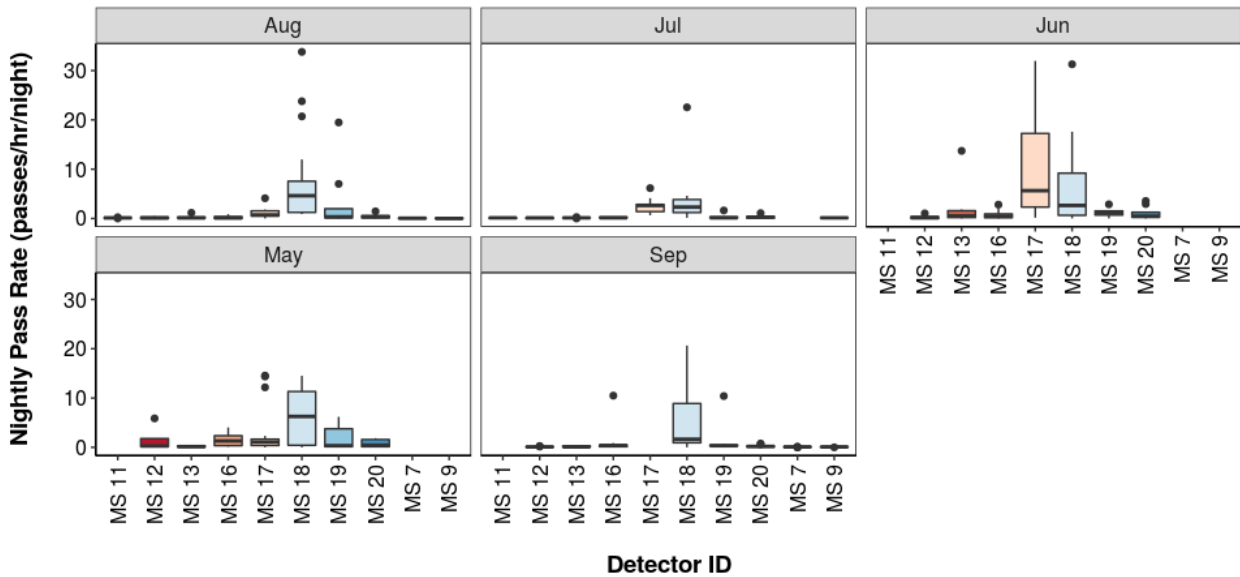
## 30.2   Per Detector - Figures

**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.
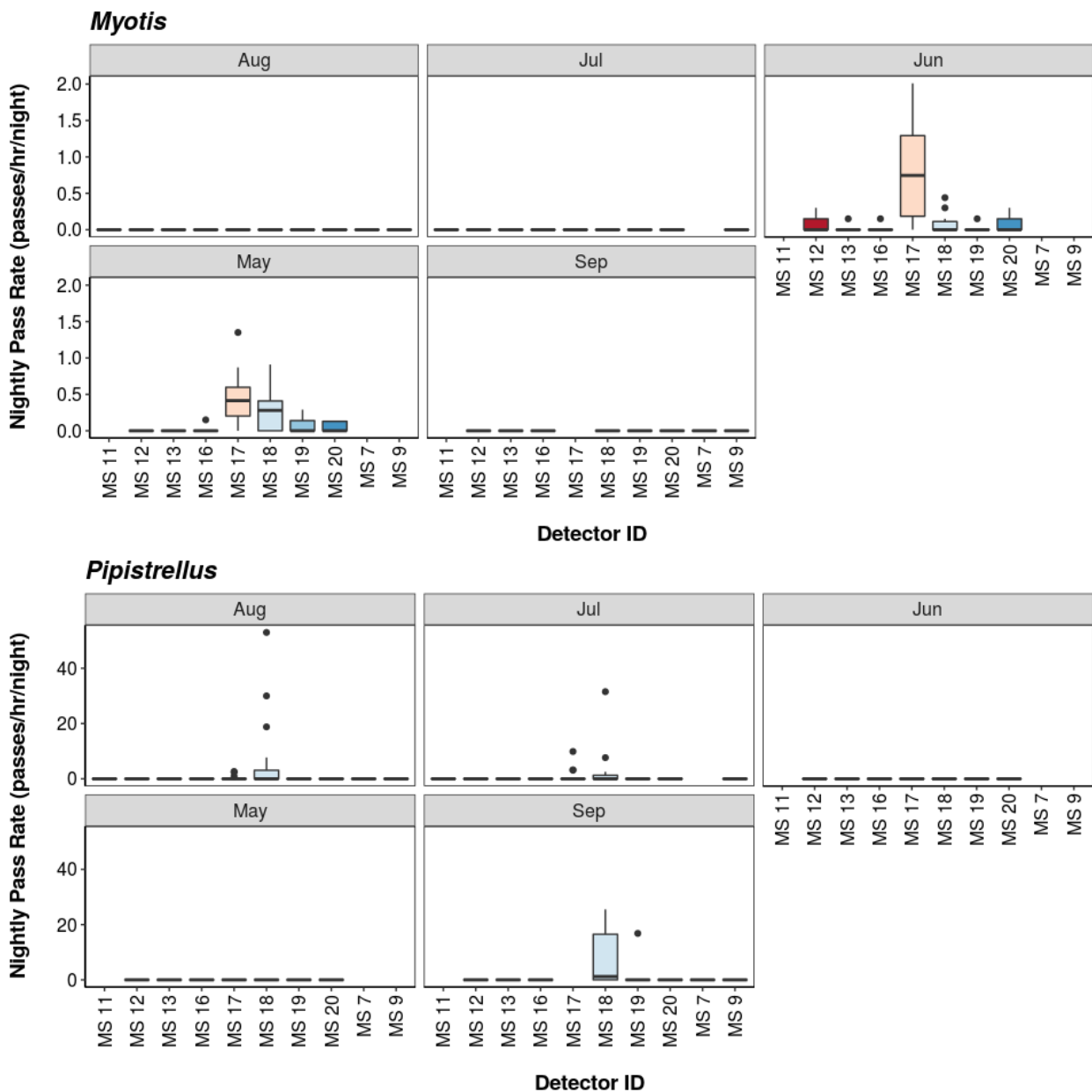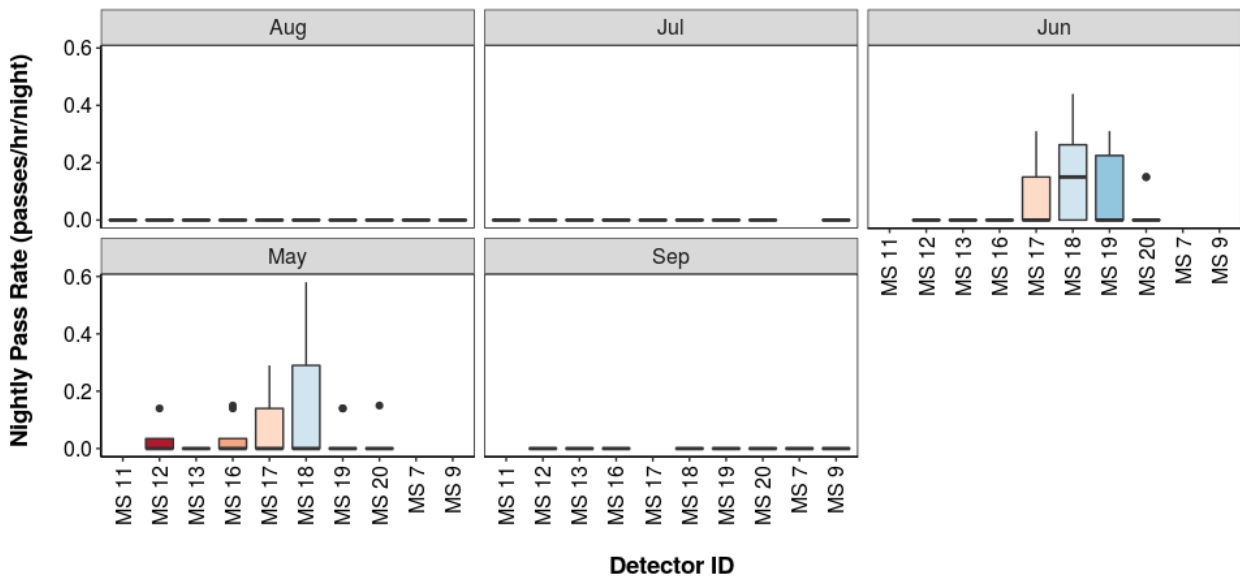
**Common pipistrelle**
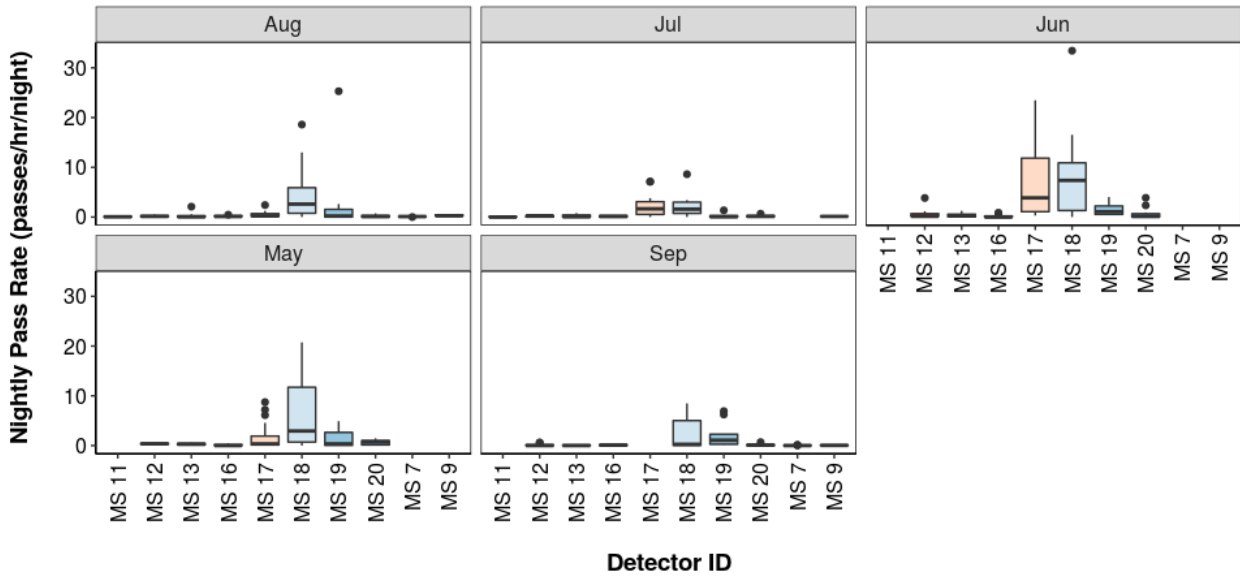
**Soprano pipistrelle**

**Brown long-eared**

# 31    BAT ACTIVITY PER DETECTOR LOCATION
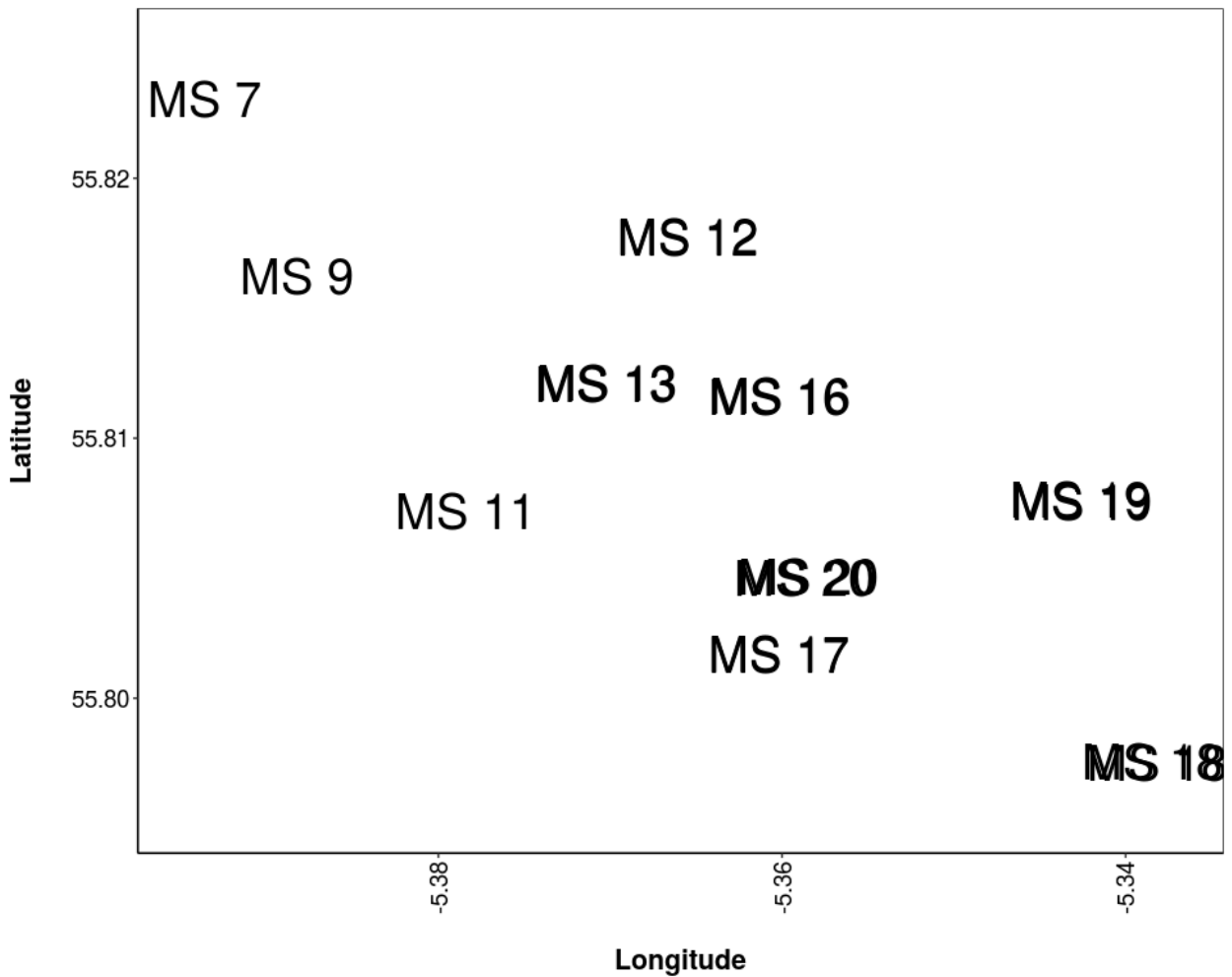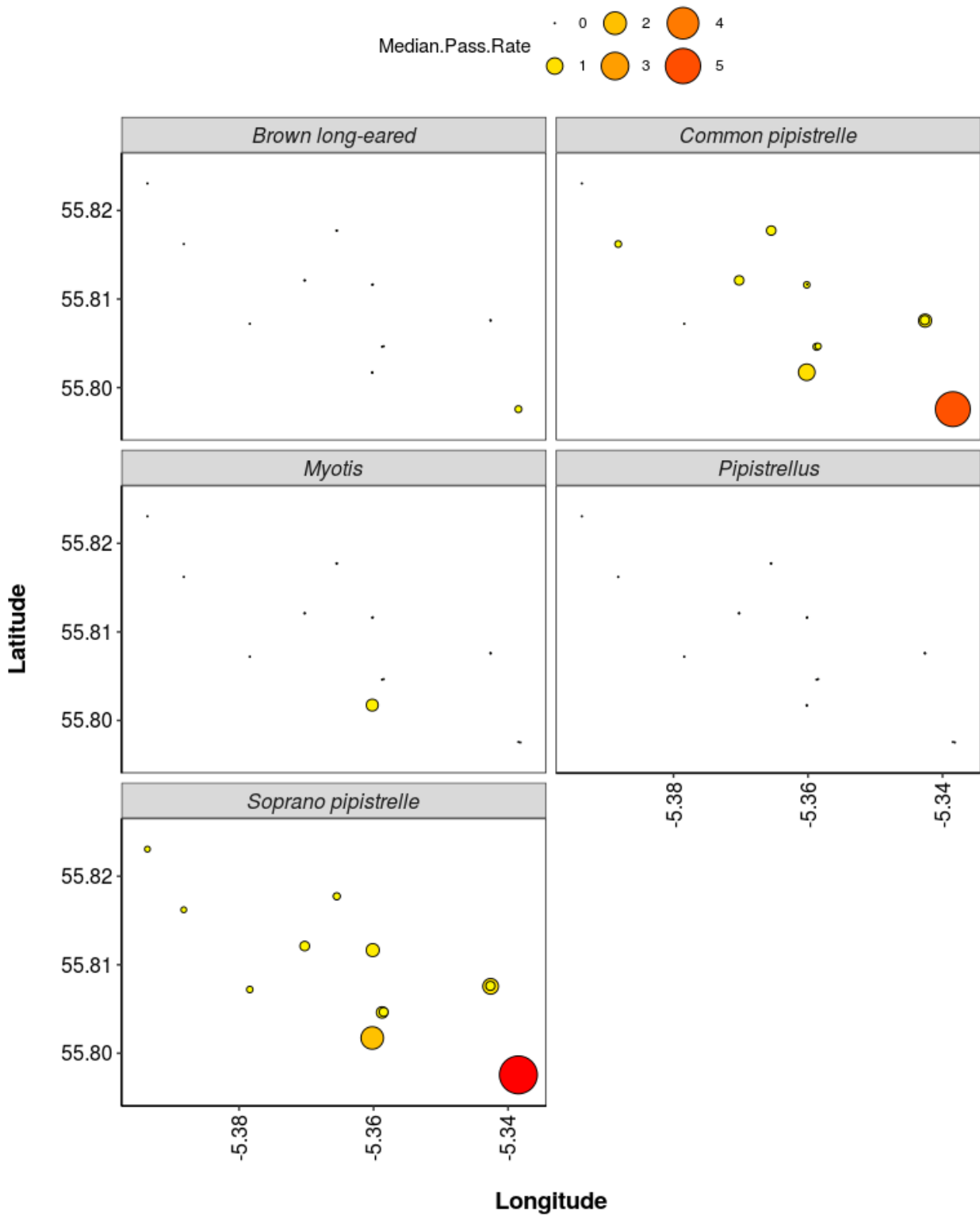
**Figure 18.** Detector ID reference:

**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.

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**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.
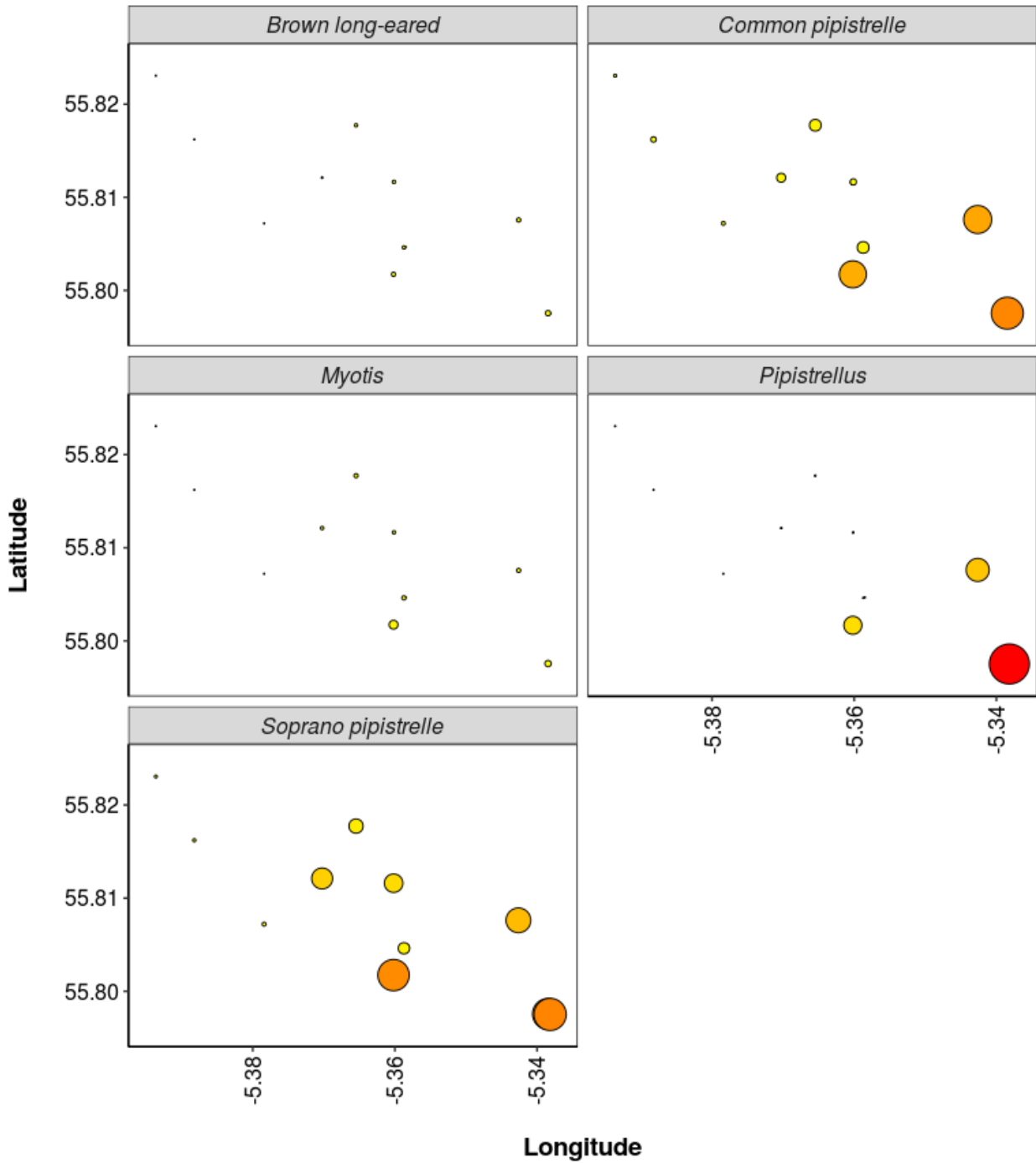
Thank you for using Ecobat! If you have any questions please email **info@themammalsociety.org.uk**