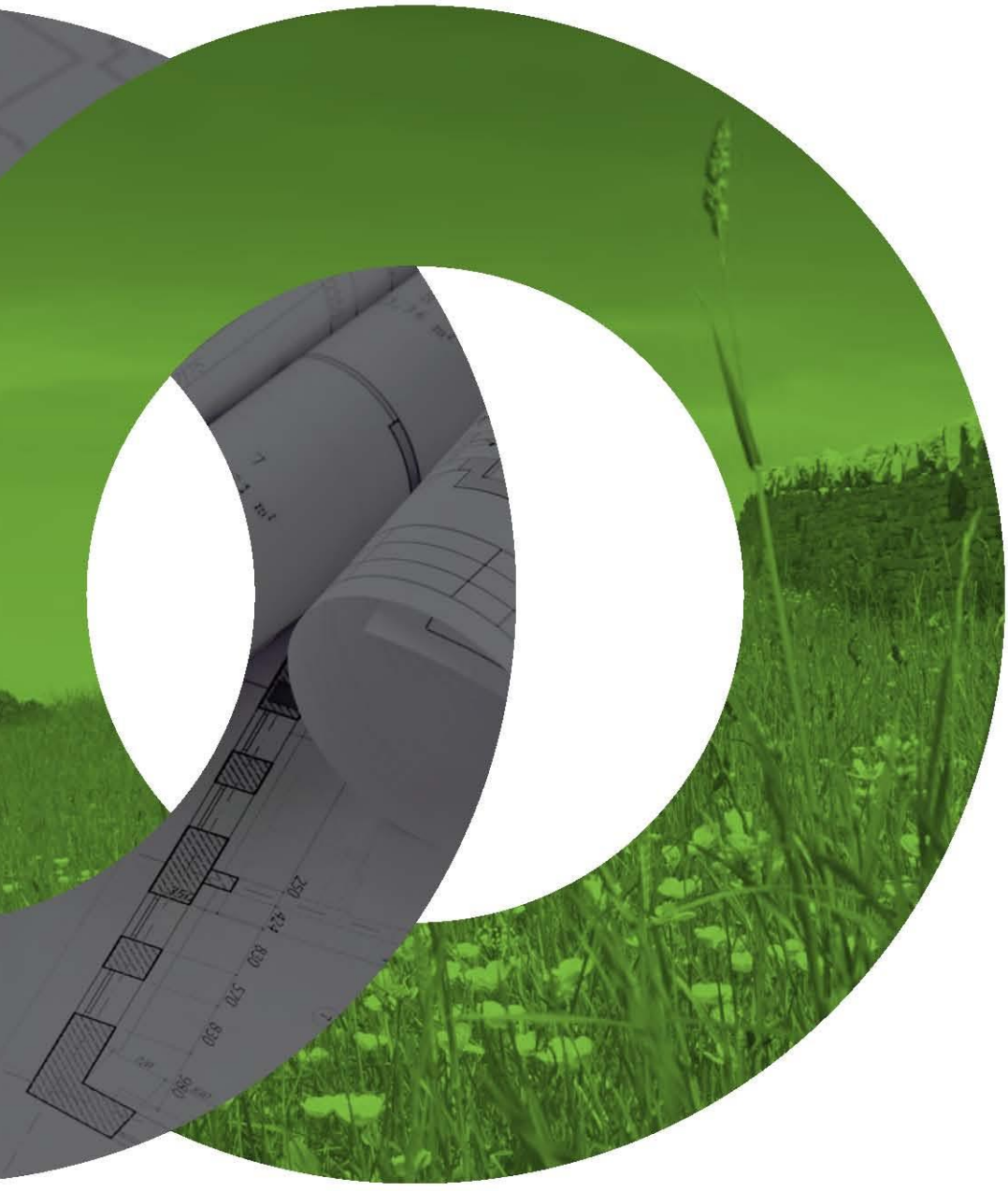
Carn Fearna Wind Farm

Technical Appendix 8.3: Bats



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CONTENTS

1 INTRODUCTION

1.1.1 This Technical Appendix has been prepared to accompany **Chapter 8: Ecology**, in **Volume 2**, of the Environmental Impact Assessment (EIA) Report for Carn Fearna Wind Farm (the Proposed Development).

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

1.1.3 The objectives of the baseline studies were to:

- Assess the habitats within the site to identify:
    - Features that have potential to support maternity roosts and significant hibernation roosts; and
    - the location and extent of commuting and foraging habitat which may be used by bats.
- Identify the bat species assemblage using the site, and the temporal and spatial variations in use; and
- Assess the relative level of activity of bats within the site.

1.1.4 This Technical Appendix also provides a Risk Assessment for bats in accordance with NatureScot guidance (2021) in **Section 4**.

1.1.5 It should be read with reference to the following figures presented in **Volume 3a** of the EIA Report:

- **Figure 8.6** - Bat Activity Survey Plan.
- **Figure 8.7a** - Potential Roost Features Plan (the site).
- **Figure 8.7b** - Potential Roost Features Plan (Off-site turning circle).
- **Confidential Figure 8.11**: Bat Desk Study Results (Sensitive).

1.1.6 Common names of bat species are used throughout this Technical Appendix, with scientific names presented in **Annex 1**.

2 METHODOLOGY

2.1 Desk Study

2.1.1 The desk study was undertaken to identify the proximity of the site to any statutory or non-statutory designated sites for nature conservation with bats as a qualifying feature, and to obtain any records of bats within the site and the surrounding wider area.

2.1.2 Key desk study sources, search areas and information obtained are summarised in **Table 2.1**.

Table 2.1: Desk study key sources and information sought.

Key Source	Date of Consultation	Information Sought	Study Area
NatureScot's Sitelink https://sitelink.nature.scot/home	November 2023	Proximity to statutory designated sites, with bat interests.	Within 10 km of the site.
Highland Biological Recording Group (HBRG)	April 2023	Existing ecological records, including non-statutory sites (from 2013 onwards).	Within 10 km of the site.

2.1.3 Furthermore, the following have also been reviewed:

- aerial imagery and Ordinance Survey (OS) maps to identify any features of potential value to foraging, commuting or roosting bats;
- a review of the site's location in relation to species known ranges in Scotland, with reference to the most recent UK Habitats Directive[1] Article 17 Report[2];
- the location of other wind farm developments within 10 km of the site, including the number of turbines and their size, through a review of the Highland Council local authority planning portal, and the Scottish Government Energy Consents Unit website[3]; and
- a review of publicly available information from planning applications relating to wind farms present in the cumulative list in **Table 7.7** of **Chapter 7: Landscape and Visual Impact Assessment** where relevant to the Proposed Development.

2.2 Field Surveys

2.2.1 The following field surveys were undertaken in support of the Proposed Development:

- Habitat Suitability Appraisal;
- Preliminary Roost Assessment; and
- Activity Surveys – Ground Level Automated Monitoring Surveys.

2.2.2 Survey methodology and subsequent interpretation of results made reference to the following key guidance documents:

- Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd Edition). The Bat Conservation Trust, London.
- Collins, J. (ed.) (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (4th Edition). The Bat Conservation Trust, London.

[1]Council Directive 92/43/EEC.
[2]https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/#regularly-occurring-species-vertebrate-species-mammals-terrestrial [Accessed November 2023].
[3] https://www.energyconsents.scot/ApplicationSearch.aspx [Accessed November 2023].

- Russ, J. (2012) *British Bat Calls: A Guide to Species Identification*. Pelagic Publishing, Exeter.
- NatureScot (2023) *General pre-application and scoping advice for onshore wind farms.*
- NatureScot (2021) *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*.

2.2.3 Additional peer reviewed literature and industry guidance has also been reviewed and is referred to where relevant.

Habitat Suitability Appraisal

2.2.4 A Habitat Suitability Assessment (HSA) of the site was informed by an initial walkover undertaken as part of an extended Phase 1 habitat survey, conducted by M. Wood on the 3rd of August 2023.

2.2.1 A HSA appraised habitats within the site for their potential to support bats in terms of both foraging and commuting opportunities, in accordance with current Bat Conservation Trust (BCT) guidance (Collins, 2023).

2.2.2 The HSA of the site has been used in reference to NatureScot guidance (2021) to help inform the Habitat Risk component of the Initial Risk Assessment (Table 3a; NatureScot, 2021) relative to wind turbines included within the Proposed Development.

Preliminary Roost Assessment

2.2.3 A ground-level Preliminary Roost Assessment (PRA) was also incorporated into an initial walkover undertaken as part of an Extended Phase 1 Habitat Survey, conducted by M. Wood on the 3rd of August 2023.

2.2.4 The walkover's survey area was comprised of the site and Off-site turning circle area, and utilised BCT guidance available at the time (Collins, 2016 and/or Collins, 2023).

2.2.5 The PRA appraised structures and trees for potential roost features (PRFs) within the areas surveyed. However, specific interest was given to areas within the PRA Survey Area (turbines plus 300 m) for potential maternity roosts and/or substantial hibernation or swarming sites relative to possible turbine zones of impact (NatureScot, 2021).

2.2.6 Additionally, a later Extended Phase 1 Habitat Survey of the Off-site turning circle conducted by J. Morton on the 23rd of July 2024, during which an assessment of trees present was also made relative to bat roost potential in line with updated BCT guidance (Collins, 2023).

2.2.7 PRFs recorded were appraised relative to updated BCT guidance (Collins, 2023) and factored into the Habitat Risk component of the Initial Risk Assessment (Table 3a; NatureScot, 2021) relative to wind turbines included within the Proposed Development, within the site.

Activity Surveys – Automated Monitoring

2.2.8 Bat activity surveys, comprising ground-level static surveys, were undertaken during spring (May), summer (July) and autumn (September) activity periods, in accordance with NatureScot guidance (2021). A summary of survey effort is outlined in **Table 2.2**.

Table 2.2: Total deployment duration of monitoring stations (MSs) during each monitoring period.

Monitoring Period	Recording Location	Period Start	Period End	Deployment Duration (No. of Nights)
Spring	MS1	15/05/2023	25/05/2023	10
	MS2	15/05/2023	25/05/2023	10
	MS3	15/05/2023	25/05/2023	10
	MS4	15/05/2023	25/05/2023	10
	MS5	15/05/2023	25/05/2023	10
	MS6	15/05/2023	25/05/2023	10
	MS7	15/05/2023	25/05/2023	10
	MS8	15/05/2023	25/05/2023	10
	MS9	15/05/2023	25/05/2023	10
	MS10	15/05/2023	25/05/2023	10
	MS11	15/05/2023	25/05/2023	10
	MS12	15/05/2023	25/05/2023	10
Summer	MS1	17/07/2023	25/07/2023	8*
	MS2	Failed	Failed	N/A**
	MS3	17/07/2023	31/07/2023	14
	MS4	17/07/2023	31/07/2023	14
	MS5	17/07/2023	31/07/2023	14
	MS6	17/07/2023	31/07/2023	14
	MS7	17/07/2023	29/07/2023	12
	MS8	17/07/2023	31/07/2023	14
	MS9	17/07/2023	31/07/2023	14
	MS10	17/07/2023	31/07/2023	14
	MS11	17/07/2023	31/07/2023	14
	MS12	17/07/2023	31/07/2023	14
Autumn	MS1	12/09/2023	26/09/2023	14
	MS2	12/09/2023	26/09/2023	14
	MS3	12/09/2023	25/09/2023	13
	MS4	12/09/2023	26/09/2023	14
	MS5	12/09/2023	26/09/2023	14
	MS6	12/09/2023	26/09/2023	14
	MS7	12/09/2023	26/09/2023	14
	MS8	12/09/2023	26/09/2023	14
	MS9	12/09/2023	25/09/2023	13
	MS10	12/09/2023	26/09/2023	14
	MS11	12/09/2023	17/09/2023	5*
	MS12	12/09/2023	26/09/2023	14

***Detectors for this period failed to record 10 nights of consecutive data.**

****Detectors failed to record data due to technical errors.**

2.2.9 The survey methodology employed the use of automated monitoring stations (MSs), each consisting of a full spectrum Songmeter Mini (SM Mini) or Songmeter 4 (SM4) bat detector fitted with a single omnidirectional microphone and attached to a 1 m high wooden stake.

2.2.10 In total, 12 MS's (MS1 – MS12) were deployed within the site during spring, summer and autumn recording periods; monitoring stations were located at each proposed turbine location identified at the time of survey, in accordance NatureScot guidance (2021).

2.2.11 Monitoring was undertaken between the time period spanning approximately 30 minutes before sunset and 30 minutes after sunrise, with equipment set up to record simultaneously, allowing comparison of activity recorded between monitoring stations and habitats present.

2.2.12 A recording summary of MS's deployed is detailed in **Table 2.3**, whilst deployment locations relative to the site are presented in **Figure 8.6.**

Table 2.3: Automated monitoring station locations and recording nights.

MS I.D.	Grid Ref	No. of Successful Recording Nights[4]			Nearest Turbine	Distance from Turbine (m)	Phase 1 Habitat Classification[5]	Closest Linear Feature per MS
		Spring	Summer	Autumn*				
MS1	NH 41417 62052	10	8	12	T7	851 m	Wet dwarf shrub (D2)	380 m N (Allt an Torra-Bheithe)
MS2	NH 42107 62906	10	Failed	12	T6	156m	Wet dwarf shrub (D2) / Blanket bog (E1.6.1)	313 m W (Loch a' Bhealaich tributary)
MS3	NH 41807 63384	10	14	11	T6	407 m	Blanket bog (E1.6.1)	530 m NW (Allt Abhagaith)
MS4	NH 42737 62078	10	14	12	T8	150 m	Wet dwarf shrub & blanket bog (D2/E1.6.1)	325 m NE (Allt Calltuinne)
MS5	NH 41354 62705	10	14	12	T6	733 m	Wet dwarf shrub & blanket bog (D2/E1.6.1)	260 m S (Allt an Torra-Bheithe)
MS6	NH 43822 62341	10	14	12	T4	347 m	Wet dwarf shrub & blanket bog (D2/E1.6.1)	737 m SW (Allt Calltuinne)
MS7	NH 43168 62649	10	12	12	T3	200 m	Wet dwarf shrub (D2)	365 m SW (Allt Calltuinne)
MS8	NH 42053 62415	10	14	12	T7	125 m	Wet dwarf shrub & blanket bog (D2/E1.6.1)	300 m SE (Allt Fearna)
MS9	NH 42542 63430	10	14	11	T1	222 m	Wet dwarf shrub heath/acid/neutral flush/blanket bog (D2/E2.1/E1.6.1)	62 m SW (Loch a' Bhealaich tributary)
MS10	NH 43984 61861	10	14	12	T5	465 m	Bracken/ Dry dwarf shrub heath/ Wet dwarf shrub heath (C1/D1/D2)	590 m SW (Allt Calltuinne))
MS11	NH 42141 63834	10	14	4	T1	347 m	Shrub/ Dry dwarf shrub heath/ Wet dwarf shrub heath/ Blanket bog (A2/D1/D2/E1.6.1)	100 m N (Allt Abhagaith)
MS12	NH 42907 61629	10	14	12	T9	150 m	Bracken/ Dry dwarf shrub heath/ Wet dwarf shrub heath (C1/D1/D2)	370 m NE (Allt Calltuinne)

***Autumn recording period excluded nights which featured both unsuitable conditions and the absence of bat activity.**

[4] Combined survey periods (where applicable), nights deemed unsuitable due to both poor weather conditions and no bat activity removed.

[5] JNCC (2010) Handbook for Phase 1 Habitat Survey – a technique for environmental audit. JNCC. Peterborough

2.3 Weather Data

2.3.1 Weather data were collected from a weather station located within the survey area during the spring and summer recording periods; however, following technical failure, weather data for autumn recording periods was sourced via the World Weather Online[6] website (with some dates during the summer recording period also supplemented following partial failure temperature and wind speed sensors).

2.3.2 Weather parameters collected included temperature (°C), rainfall (mm) and wind speed at dusk (metres per second; mps) and data were analysed to account for any periods of poor weather which could have affected bat activity. Weather conditions are summarised in **Annex 2**. Nights of unsuitable weather that also recorded no bats were removed from the dataset.

2.4 Data Analysis and Assumptions of Bat Activity

2.4.1 Data analysis and interpretation of results followed the principles presented in the BCT guidance (Collins, 2016). Data analysis was undertaken by L. Quarton *MSc BSc* (Hons.), an experienced bat ecologist who regularly carries out analysis of bat survey data.

2.4.2 Bat detectors recorded data onto digital media and were analysed using Kaleidoscope Pro (Wildlife Acoustics) software. Kaleidoscope Pro automatically identified sonograms, and a manual check was conducted to confirm species identified. Bat species were identified using diagnostic features (e.g., frequency, slope, duration, time between calls, minimum call length etc.).

2.4.3 For the purpose of sonogram analysis, the number of 'bat registered calls' were defined as a sequence of echolocation calls consisting of two or more call notes (pulse of frequency), not separated by more than one second (White and Gehrt, 2001 and Gannon *et al.*, 2003), with a minimum call note length of two milliseconds (Weller *et al*., 2009).

2.4.4 An individual bat can pass a particular feature on several occasions while foraging and therefore it was not possible to estimate the number of individual bats or draw a fair comparison where survey time differs. As such, bat activity is recorded as an index accounting for a bat pass rate per hour; the Bat Activity Index (BAI), based on BCT guidance (Collins, 2016), is defined as follows:

BAI (per hour) = Total number of bat 'registered calls' / number of hours of recording per night

2.4.5 When generating BAI outputs, standard summary statistics as outlined in BCT guidance (Collins, 2016) include the use of average (e.g., mean and median) and maximum BAI calculated over the course of a specified survey effort. As such, average and maximum BAI per monitoring station and per recording period have been used within this assessment to account for spatial and temporal activity.

2.4.6 Additionally, in reference to the assessment process used by the Ecobat web-based tool (as required for onshore wind farm developments), it is necessary to interpret average BAI relative to species presence and absences over the survey effort.

2.4.7 As such, BAI outputs account for an 'Includes Absences' variant, in which the median and mean are compared to all recording nights (i.e., including nights no bats were recorded, resulting in a lower BAI).

[6] https://www.worldweatheronline.com [Accessed November 2023].

Including absences are key to demonstrating the level of bat interest at a site as 'no bats' on a recording night where there were no technical issues or weather constraints is a valid result.

2.4.8 Conversely, BAI generated to account for an 'Excludes Absences' variant results in median and mean outputs that are compared to nights bats were recorded only (i.e., excluding non-active, but suitable sampled nights), resulting in a higher BAI.

2.4.9 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 either mean or maximum values (Lintott et al., 2018). In addition, the dataset is unlikely to be normally distributed, therefore the median is considered the most appropriate metric to report.

2.4.10 Likewise, the Ecobat assessment tool utilises median BAI (Excludes Absences) in order to output relative activity of recording species. Additionally, the higher BAI produced by excluding absences provides a more precautionary result. As such, median BAI of the 'Excludes Absences' variant is treated as the primary measure of bat activity within this report.

Assessment Tool – High Collision Risk Species

2.4.11 In accordance with NatureScot guidance (2021), it is advised that Ecobat should be used to provide an objective interpretation of the relative importance of bat activity levels recorded within a site. However, at present the Ecobat tool remains in the early stages of its re-distribution following a period of essential maintenance, which continues to require resolution from the Ecobat team at the Mammal Society. As such, an in-house approach has been utilised to assess bat activity, although reference to Ecobat outputs included within an accompanying report have been made where appliable (**Annex 4**).

2.4.12 To carry out a comparable risk assessment of wind farm developments in relation to bats, as required by NatureScot guidance (2021), Avian Ecology Ltd. (AEL) has developed an in-house method of assessing bat activity levels for high collision risk (HCR) species (i.e., *Pipistrellus* and *Nyctalus* species[7]) using similar principles as the Ecobat assessment tool.

Ecobat Assessment Tool

2.4.13 Ecobat utilised a database of user submitted data (i.e., a reference database), to determine bat activity levels within a given site. The reference database used geographical region (up to 200km radius) and dates (+/- 30 days) either side of a recording period for a given development site. Subsequently, relative bat activity would be generated based on median and maximum BAI percentile rankings in relation to pre-determined activity bands (**Table 2.4**) via a comparison of the reference database relative to the geographical and date parameters selected.

2.4.14 Ecobat also determined the validity of the determination of relative bat activity levels using a reference range derived from the reference database. The reference range comprised the number of bat recording nights (nights that bat passes were recorded) held within the Ecobat reference database for per species, relative to the parameters applied. Ecobat states that a reference range of at least 200 nights of activity is required to have confidence in the assigned relative activity level.

[7] In accordance with NatureScot guidance (2021) these are the bat groups that are required to be risk assessed.

AEL Assessment

2.4.15 AEL adopted the principles of the Ecobat assessment tool in determining relative activity by activity band (i.e., Low – High activity), utilising an in-house database of aggregated anonymised bat data compiled from wind farm projects previously worked on. The database includes data from 23 Scottish sites collected between 2019-2023 when conducting seasonal analysis. For analysis based on individual monitoring station locations, data was inputted from a total of seven sites, with records all dating from the 2023 survey season. Site sample sizes between spatial and temporal analysis varied due to fundamental differences in BAI analysis per night between recording periods and individual MSs and was limited only to the necessary number of sites needed to achieve a viable internal database capable of achieving the minimum reference range outlined by Ecobat (as outlined below).

2.4.16 Due to the smaller size of the AEL database relative to the one held by Ecobat, to achieve a reference range of 200 nights per HCR species the geographical region was increased to include held data from all sites within Scotland. Overall, these sites contain similar habitats to those within the site and are located in upland locations with similar climate/weather conditions. As such, these sites are considered likely to contain broadly comparable species compositions and activity levels. Although Ecobat states a preferred geographical region radius of up to 200 km, an option for the geographical region to be extended to include data from the wider radius within the UK is available should a reference range of 200 recordings nights for a given species not be reached; therefore, the parameters of the Ecobat tool are still comparable by including held data from sites throughout the whole of Scotland, and is necessary in this instance to increase statistical power of the analysis.

2.4.17 As such, AEL's approach to data parameters included stratifying the in-house reference database at a country level geographically (i.e., Scottish sites), and applying a +/- 30 days filter from a given recording period's start and end date relative to each seasonal recording period. In instances where a suitable reference range (i.e., 200 nights of activity) could not be achieved, the date filter applied to the reference range was extended by increments of +/- 15 days, until an acceptable sample size was achieved.

2.4.18 As the AEL database matches similar parameters given within the Ecobat tool, the reference range of 200 nights of activity is considered sufficient to determine relative activity levels of most HCR species. However, due to the scarcity in the number of Noctule and Leisler's records, these species were combined to form a collective higher *Nyctalus* species group so as to reach a sufficient reference range. Nathusius' pipistrelle was excluded from a relative activity assessment as it failed to reach a 200-night threshold but is still considered as part of a broader BAI analysis.

2.4.19 Recording nights of each HCR species (relevant to the site) included within a reference range for spatial analysis[8] of relative activity per monitoring stations included:

- Common pipistrelle – 1035 cumulative nights; and
- Soprano pipistrelle – 1026 cumulative nights.

[8] Spatial reference range includes records sourced from a total of 7 Scottish sites during 2023.

2.4.20 Alternatively, for analysis per recording season[9], records of each HCR species (relevant to this site) included within the comparable seasonal reference range per recording period are as follows:

- Common pipistrelle – spring (280 nights), summer (505 nights), autumn (371 nights).
- Soprano pipistrelle – spring (212 nights), summer (445 nights), (315 nights).

2.4.21 BAI for the site was then calculated for all data within the database, this was done by survey seasons and individual monitoring station locations. The BAI result of all the data within the database was then ranked to produce a percentile rank of bat activity levels, providing both a median and max percentile. The median and max percentile rank for the site data could then be extracted for each species during each season and at each monitoring station for subsequent use in site risk assessments (**Section 2.5 Risk Assessment**).

2.4.22 The median and max percentiles could then be used to determine the bat activity category as stated in the NatureScot guidance (2021) as replicated in **Table 2.4**.

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

2.5 Risk Assessment

2.5.1 In accordance with NatureScot guidance (2021), a risk assessment has been carried out to identify the potential risk to bat populations from the Proposed Development. Wind farm developments can impact upon bat populations as a result of:

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

[9] Seasonal reference range includes records sourced from a total of 23 Scottish sites between 2019-2023.

2.5.2 To ensure that bat species are protected by minimising the risk of collision, NatureScot guidance (2021) advises that an assessment of impact for a proposed wind farm development, requires a detailed appraisal of:

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

2.5.3 the risk of turbine-related mortality for all bat species recorded during bat activity surveys; and

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

Assessing Potential Risk

2.5.4 NatureScot guidance (2021) 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.

2.5.5 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.

2.6 Survey Limitations

Field Surveys

Post-Survey Design Changes

2.6.1 As is common for developments of this kind, design evolution throughout the baseline phase has meant that there have been changes to the number and location of turbines included within the Proposed Development since completion of activity surveys. As such, the majority of monitoring stations are now located at increased distance from the closest corresponding turbine location. Additionally, in some instances a single monitoring station is now most representative of more than one turbine location (e.g., as is the case with MS9, which is the closest detector deployed in proximity to both T1 and T2).

2.6.2 Whilst now located at increased distance, monitoring stations are still located within comparable open-space habitats of similar character to current proposed turbines, and as such baseline activity recorded is still representative of turbine locations in the Proposed Development. Likewise Overall Risk Assessments (**Section 4**) per monitoring station are also considered representative of baseline conditions for the Proposed Development.

2.6.3 NatureScot (2021) guidance states that monitoring stations should be placed at known turbine locations for developments which include <10 turbines, and MS deployment locations utilised throughout activity surveys are representative of turbine locations proposed at the time of survey. However, following subsequent changes to the Proposed Development (i.e., number of turbines and proposed locations) MS locations are not exact, but still representative of the Proposed Development area, and characteristic of both habitats and bat activity found in association. Likewise, NatureScot

guidance acknowledges turbine locations are subject to change, and that survey effort should provide a representative sample as close to known turbine locations as possible. As such, subsequent layout changes to the Proposed Development are not considered to be a substantial limitation.

2.6.4 The desk study records were gathered based on an original (reduced) site boundary. Given the final site boundary has only modestly altered from the original boundary, the desk study results are considered robust and have identified records of relevant bat species that may be present at the locality to supplement the field surveys.

Monitoring Station Failure

2.6.5 During automated static ground surveys, MS2 failed during the summer (July) recording period. Consequently, seasonal comparison within and between MS2 is limited. However, whilst a limiting factor if comparing seasonal activity per specific monitoring station, both Ecobat and in-house analysis account for an accumulative assessment of seasonal activity for HCR species relative to the overall site. In addition, guidance requires one monitoring station to be deployed per turbine up to 10 turbines. The Proposed Development comprises nine turbines, and 12 detectors were deployed, so data was collected from locations in excess of the required number. As such, the impact of failures on overall risk assessments is reduced. Likewise, the use of average BAI and activity percentiles is likely to reduce limitations relative to analysis of individual monitoring stations.

Survey Effort

2.6.6 The minimum survey effort (i.e., 10 days of consecutive days per detector, per season) was not reached for MS1 during the summer recording period (i.e., equating to 8 days of recording), and MS11 during the autumn recording period (e.g., 4 days of recording, after unsuitable dates were excluded from analysis). Whilst this is below the recommended survey effort for these detectors, the use of average BAI in analysis corrects for survey effort to account for failures, and as stated above more detectors were deployed than required by guidance and so the required number of nights was achieved for an appropriate number of sampling locations. NatureScot guidance does recognise that in practise, weather conditions in late seasons (and in northernly, elevated areas) is likely to preclude the likelihood of achieving ten nights of suitable conditions. As such, reduced survey effort is not likely to be a constraint to the validity of assessment conclusions drawn from the data.

Weather Conditions

2.6.7 Weather constraints, including temperatures below 8°C, heavy rain and/or winds exceeding 5 m/s, were recorded at dusk on 4 nights during the autumn recording period. However, bat activity was still recorded on 2 of these nights, which were subsequently retained within the analysis. Conversely, on the remaining 2 nights of unsuitable conditions, no bat activity was recorded, leading to 2 nights overall being excluded from analysis.

2.6.8 Although it is recognised that poor weather can affect bat activity, excluding these data from the analysis may skew the data, and would remove some high collision risk species from the dataset. Consequently, inclusion of these nights represents a precautionary approach and weather is considered representative of the conditions at the site.

2.6.9 Overall, any limitations to the overall survey effort are not thought to represent a substantive constraint relative to the baseline data collected, which is considered sufficient to achieve the objectives of the study.

Sonograms Analysis

2.6.10 Kaleidoscope software can identify certain bat species from sonograms, but some species within the *Myotis* and *Nyctalus* genus can be difficult to distinguish. In some cases, calls may be partially heard or distorted by external factors like passing cars, rain or wind, resulting in unknown or genus-only labels. Brown long-eared and barbastelle bat species have lower detectability and may not be detected during activity surveys relative to their hunting strategies in less open habitats. Survey results have been carefully interpreted across species.

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 10 km of any national or internationally designated sites for nature conservation which feature bat qualifying interests.

Non-statutory Designated Sites for Nature Conservation

3.1.2 In consultation with HBRG, the site is not located within 2 km of any non-statutory designated sites for nature conservation which specify bats as features of interest.

Existing Bat Records

3.1.3 A total of 113 recent bat records were returned by HBRG from within a 10 km radius of the site, accounting for four confirmed species overall, in addition to records relating to the *Pipistrellus* and *Nyctalus* genus. All bat records are provided in **Confidential Figure 8.11**.

3.1.4 A total of 17 of these records were also identified within a 2 km radius of the site, accounting for four species (i.e., common and soprano pipistrelle, Daubenton's bat and brown long-eared bat), and records relating to the *Pipistrellus* genus.

3.1.5 Records returned also included a total of 8 records relating to roosts within the search radius, two of which related to a *Pipistrellus* and brown long-eared bat roost within 2 km of the site, and a further six records relating to common pipistrelle, soprano pipistrelle and brown long-eared bats within 10 km of the site.

3.1.6 A summary of the bat records returned by HBRG is provided in **Table 3.1**.

Table 3.1: Desk study bat records returned.

Species	No. Records	Proximity to Site Boundary	Status*	Record Notes
Brown long-eared	15	1.1 km, south-west	HabReg, HabDir4, ScotBL, LBAP, UKBAP	Recent records range from 2014 to 2019, which include bat passes, observations, and roost emergence/signs. Closest record to

Species	No. Records	Proximity to Site Boundary	Status*	Record Notes
				site relates droppings identified in loft space of a building.
Common pipistrelle	32	550 m, south-west	HabReg, HabDir4, LBAP	Recent records range from 2014 to 2019, which include bat passes, observations of foraging, and roosts/signs (including a possible maternity roost >4.5 km from the Survey Area, with a juvenile bat carcass). Closest record to site relates to foraging activity in association with tree line to the west.
Daubenton's	22	1.1 km, south-west	HabReg, HabDir4, ScotBL, LBAP	Recent records range from 2013 to 2017, which include bat passes, observations of foraging. Closest records to site relate to foraging activity in association the river Allt an Dubh to the West.
Soprano pipistrelle	41	550 m, south-west	HabReg, HabDir4, ScotBL, LBAP, UKBAP	Recent records range from 2014 to 2019, which include bat passes, observations of foraging and roost emergence. The closest record to site relates to foraging activity in association with tree line to the West.
Nyctalus spp.	1	5.2 km, south-west	HabReg, HabDir4, ScotBL, UKBAP	Single record dating from 2019, and relating to an observation of a *Nyctalus* species, suggested but unverified as noctule.
Pipistrellus spp.	4	1.1 km, south-west	HabReg, HabDir4, ScotBL, LBAP, UKBAP	Recent records range from 2016 to 2019, which include observations of foraging, and roosting signs.

**HabReg: The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), HabDir2/4: Habitats Directive Annex 2/4, ScotBL: Scottish Biodiversity List, UKBAP United Kingdom Biodiversity Action Plan, LBAP: Local Biodiversity Action Plan.*

UK Bat Species Range

3.1.7 In review of the UK Habitats Directive Article 17 Report 'Habitats Directive Report 2019: Species Conservation Status Assessments 2019' based on Mathews *et al*. (2018), the site is located within the known UK distribution range for the following species:

- Common pipistrelle;

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

3.1.8 Consequently, the presence of pre-existing and recent records summarised in **Table 3.1**, would suggest these species could be present within the area.

3.1.9 The site is not within the typical range published for *Nyctalus* bat species, although recent and historic record for these species have been identified via the desk study (although in small numbers).

3.1.10 The site is also located within close proximity to a regional area of established distribution for Natterer's bat, which if present could represent a population at the edge of its distribution range.

Other Wind Developments

3.1.11 Identified operational and/or consented and potential wind farms within 10 km of the site are summarised in **Table 3.2**.

Table 3.2: Wind farm developments considered.

Wind Farm	Location	Status	No. Wind Turbines	Max Turbine Height (m)
Kirkan Wind Farm	~7km north-west	Consented	17	175m
Corriemoillie Wind Farm	~8km north-west	Operational	17	125m
Abhainn Dubh Wind Farm	~9.5km east	Application	9	149.9m
Lochluichart Wind Farm and Extension	~9km north-west	Operational	23	125m
Fairburn Wind Farm	~9km south	Operational (Constructed)	20	100m
Lochluichart Extension II	~10km north-west	Consented	5	149.9m

3.2 Habitat Suitability Appraisal

Site Overview

3.2.1 The site is mainly comprised of largely continuous areas of open habitat types located at varying elevation. Minimal areas of closed or edge habitats are distributed adjacent the western and south-western boundaries, in addition to the north-western area in association with the site access track. Three bodies of standing water are found centrally located within the site, whilst several streams are distributed throughout. Urban habitat is also limited, but includes built linear features, and residential and agricultural buildings localised to the site's north-western boundary.

3.2.2 The wider landscape includes large areas of woodland/plantation to the north-west, south and south-west, elevated open habitats to the north-northeast, and a series of standing water bodies and connecting watercourses throughout the area (e.g., the closest being Loch Garve and the Allt an Dubh

to the west and south-west). Small urban settlements are also distributed throughout the local area, the largest being Garve found south-west of the site.

3.2.3 A thorough summary of habitat types located on-site are included in **Appendix 8.1: Habitats and Vegetation** and presented on **Figure 8.2.**

Foraging Potential

3.2.4 Open habitats dominate the site, and primarily comprise wet dwarf heath, blanket bog, and associated habitat mosaics. Areas located at lower elevation which feature reduced grazing pressure, and increased diversity are likely to offer greater foraging suitability for generalist and open-space foraging species which utilise open habitats. Open habitat of highest value is likely associated with commuting/sheltering opportunities, marginally distributed adjacent woodland edge peripheries at the site borders. However, whilst largely continuous, the majority of open habitat on-site (specifically the area of the Proposed Development which includes proposed wind turbines) is isolated from commuting/sheltering opportunities; as such, most open habitat not in close association with marginal woodland/shelter is unlikely to form a significant foraging resource (particularly at higher elevation where commuting may be deterred due to exposure).

3.2.5 Closed and edge habitat niches are also present on-site (although limited in scope), with semi-natural woodland, coniferous plantation, and scrub habitats offering some foraging and sheltering opportunities for a wider range of bat guilds. However, these comprise small areas relative to the wider site and are generally localised areas along the north-western, western and south-western site boundaries. Likewise, relative to the Proposed Development areas within the site, closed and edge habitat opportunities are largely absent relative to proposed wind turbine areas, but present in proximity with the proposed accesses track in association with the site's north-western edge. Of localised woodland parcels present, it is likely that broad-leaved and associated scrub habitats offer greater habitat suitability given the increased structural and species diversity, in contrast to plantation woodlands.

3.2.6 Riparian features present, which include numerous streams distributed across the site, could offer suitable foraging potential, particularly those which include scrub along the riparian fringes which might offer additional shelter, although where exposed or isolated (e.g., within central and elevated areas of the site) viability as a foraging resource is likely reduced. Standing water bodies, and associated marginal habitats (e.g., swamp and scrub), are features of interest for generalist species and 'trawlers', and which might support abundance of invertebrate prey; however, these features are also generally located centrally and at relative distance from sheltered commuting routes and are subsequently unlikely to be as accessible as similar resources found within the local landscape.

Commuting Potential

3.2.7 Commuting routes of highest value on-site are likely to be concentrated along the site's western and southern borders, in association with marginal woodland and scrub habitats present. However, these flightpaths are in the majority supported by off-site habitat, some of which were partially surveyed during baseline surveys. These habitats form a larger network of connecting features within the local landscape, primarily associated with additional woodland and blue corridors (e.g., the Allt an Dubh and its marginal habitats), providing sheltered flightpaths. However, whilst a substantial commuting resource relative to the wider landscape, such features are largely absent from the site and central

Proposed Development area, with sheltered connectivity between proposed wind turbine locations and the site margins being relatively poor.

3.2.8 Within the central site, streams may provide some commuting opportunities to resources within (e.g., standing water bodies), but are likely only to be substantial where sheltered (e.g. bankside scrub). Open habitats present are noted to be continuous and could support commuting for species tolerant of open-ground flight/foraging. However, whilst species confirmed/likely to be present within the local landscape are noted to exploit open habitats to varying extents, sensitivity to isolation would likely limit most of the foraging/commuting activity to sheltered habitat opportunities localised to boundary areas considering the extent and elevation of open habitat present.

Overall Suitability

3.2.9 When considering the full extent of the site, substantial foraging and commuting opportunities are limited to localised resources which are proportionally minor in both their extent and distribution (e.g., marginal woodland and scrub habitats, and open habitat found directly adjacent). In contrast, the greater site area is comprised of open habitat, and whilst foraging and commuting potential is not negligible, resources here are largely isolated, exposed and located at increased elevation, lacking any substantial commuting features which might provide sheltered flightpaths to features of interest (e.g., standing water bodies and streams).

3.2.10 Overall, the site itself is considered to be of **Low** habitat suitability to bats, in reference to both BCT guidance (Collins, 2023) and NatureScot (2021) habitat descriptions relative to suitability and risk, respectively. The majority of the site area is isolated from the wider landscape, lacking any prominent commuting features to central areas, with the opportunities within being largely exposed and unlikely to be utilised extensively by local bat populations. Moreover, these conditions extend to the majority of the Proposed Development area (specifically the central site area where turbine locations are proposed). Areas within the site, which are representative of higher suitability, are proportionally minimal and distributed along site boundary edges, or in association with smaller components of the Proposed Development (i.e., the site access track) located outside the zone of impact from proposed turbines (i.e., the PRA Survey Area).

Off-Site Turning Circle Overview

3.2.11 The Off-site turning circle survey area is largely comprised of open grassland habitats, but marginal broadleaved woodland habitats along the western and southern survey area boundaries also provide edge and closed habitat niches for bats. Additionally, riparian habitat is present along the southern survey area's extent. An urban complex of residential and agricultural buildings is also found in association with the north-eastern boundary, and a public road adjacent the northern boundary.

3.2.12 A thorough summary of habitat types located within the Off-site turning circle are included in **Appendix 8.1: Habitats and Vegetation** and presented on **Figure 8.2b**.

Foraging Potential

3.2.13 Open habitats are dominant within the Off-site turning circle. Much of this comprised of improved grassland, subject to high grazing pressure, and is likely of poor foraging suitability due to reduced species structural composition. However, smaller parcels of grassland of increased diversity (e.g., neutral, marshy and acidic areas), or parcel ruderal vegetation, likely represent areas of increased

foraging suitability for open-foraging and generalist species, particularly areas in close association with edge habitats (although grazing pressure is still variable present within these areas).

3.2.14 Broad-leaved woodland habitats, found along marginal boundaries, provide both closed and edge-space foraging opportunities for local bat guilds, as well as facilitating foraging in adjacent open habitats in providing a sheltered resource. These habitats are further noted to be connected to additional woodland and riparian habitats within the local landscape, with the Allt an Dubh river bisecting the southern survey area being an additional foraging resource of high values. Scattered trees found in association with urban habitats within the Off-site turning circle are an additional resource, providing some foraging cover.

Commuting Potential

3.2.15 The Off-site turning circle area covers a relatively small area and is bordered by linear woodland and riparian features along both western and southern survey area boundaries. These features are functionally connected to expansive woodland habitat found both north and south of the survey area, providing sheltered flightpaths on and off the survey area, with the Allt an Dubh providing a substantial 'blue corridor'[10] within the local landscape. Likewise, whilst a public road runs through the northern margin of the Off-site turning circle area, this is unlikely to form a significant barrier for commuting given the area's isolation.

Overall Suitability

3.2.16 In line with the definition outlined within BCT guidelines (Collins, 2023), habitats within the Off-site turning circle area fall under **Moderate** suitability, with open habitat present being a relatively poor habitat resource in its majority, but with edge and closed foraging and commuting habitat provided by both woodland and riparian features being of higher value, in addition to being well connected to resources within the local landscape.

3.3 Preliminary Roost Inspection

Site Area

PRA Survey Area

3.3.1 A PRA Survey Area consisting of the site was adapted following baseline surveys to identify any PRFs within potential turbine specific impact zones. The PRA Survey Area relative to the site is presented on **Figure 8.7**. Accordingly, all habitats within at least 300 m of the turbines have been surveyed.

3.3.2 Terrestrial habitats present within the PRA Survey Area are largely comprised of open habitat types which are devoid of natural or artificial roost features, with the limited scrub cover or free-standing woody vegetation present being of insufficient age or character to support PRFs.

3.3.3 HBRG did not return any records of roosting bats from within, or directly adjacent to, the site, or within 300 m of turbine locations.

[10] Refers to watercourses and wetlands that provide commuting and foraging opportunities for bats.

3.3.4 Likewise, during the Extended Habitat Survey of the site undertaken on the 3rd August 2023, no PRFs were recorded within 300 m of the turbines.

Site Area

3.3.5 Within the site, but >300 m from turbine locations, terrestrial habitats are similarly dominated by open habitats. Lesser areas of scrub mosaic or free-standing woody vegetation are also noted to be of insufficient age or character to support PRFs. Localised parcels of broad-leaved and plantation woodland are distributed along the site's north-western, western and south-western boundary areas; one area of mature trees was identified in the north-west of the site (see **Figure 8.7**) as having PRFs, during the Extended Phase 1 Habitat survey undertaken on the 3rd August 2023. Some residential properties in close association with the mature trees in the north-west of the site also had PRFs. All these PRFs are located >300 m from the turbine locations and are approximately 130 m from the access track.

3.3.6 HBRG did not return any records of roosting bats from within or directly adjacent to the site boundary.

Off-Site Turning Circle

3.3.7 Possible roosting opportunities within the Off-site turning circle area are limited to marginal areas, where scattered broad-leaved trees are present, and have PRFs.

3.3.8 During the Phase 1 Habitat Survey which took place on the 23rd July 2024, possible PRFs were noted in association with a stand of mature beech (T1), whilst an adjacent stand of beech, sycamore and birch (T2) were noted for possible PRFs during the Phase 1 Habitat Survey undertaken on the 3rd August 2023.

Overview

3.3.9 A summary of potential PRFs recorded during baseline surveys are summarised in **Table 3.3**.

3.3.10 All locations considered to potentially support PRFs are located well in excess of 300 m from the nearest turbine.

Table 3.3: Bat Roost Potential of features identified within the Site and Off-site turning circle survey areas.

Target Note	Grid Reference	Habitat Type	Bat Roost Potential	Surveyor Comments
-	NH 40713 63940	Agricultural Building	Negligible*	A large shed made of metal sheet panelling. In use at time of survey. Likely unsuitable for bats, however a barn owl box is located along the side of one of the structures.
-	NH 40503 63793	Domestic Building	FAR**	Occupied home. Detached buildings with sloping tiled or metal roofs. They may have some potential as bat roosts.
T1	NH 39978 69421	Broad-leaved Trees	FAR**	Stand of mature beech trees, approximately 20 m in height. May hold bat roost potential (unclear from ground level).

Target Note	Grid Reference	Habitat Type	Bat Roost Potential	Surveyor Comments
T2	NH 40018 69406	Broad-leaved Trees	FAR	A small area of mature broad-leaf trees adjacent to roadside farm. Includes a mix of beech, sycamore and birch, ranging from 15 to 20 m in height. Some of these trees features holes or crevices that could act as potential bat roots.

*__Negligible:__ ‘No obvious habitat features likely to be used by roosting bats; however, a small element of uncertainty remains…’ as paraphrased from Table 4.1 of BCT guidance (Collins, 2023).

**__FAR:__ ‘Further assessment required to establish if PRFs are present per tree’, as defined by Table 4.2 on guidelines for assessing the suitability of trees for bats of BCT guidance (Collins, 2023). Note, if feature not to be affected then no further surveys are required.

3.4 Activity Surveys – Automated Monitoring

Overview

3.4.1 Bats were detected on 27 dates out of a possible 36 sampled dates over the course of each survey period, ranging from May (Spring), July (Summer) and September (Autumn) 2023.

3.4.2 Species identified are presented in **Table 3.4** along with potential collision risk and population vulnerability as described in Table 2 of NatureScot guidance (2021).

Table 3.4: Bat species recorded, collision risk and population vulnerability.

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

3.4.3 A total of 192 bat passes were recorded over a period of 36 nights across all detectors combined.

3.4.4 Soprano pipistrelle was noted to be the most abundantly recorded species, with a total of 61 passes recorded (i.e., 31.77% of total bat calls recorded) over the duration of the survey period.

3.4.5 However, brown long-eared bat was noted to be the most frequently recorded species, registering across 18 nights (i.e., 50.00% of sampled nights).

3.4.6 A summary of the total number/percentage of bat passes for species recorded on-site is presented in **Table 3.5**.

Table 3.5: Total number/percentage of bat passes, per species.

Species	No. Nights Bats Recorded	Percentage of Nights Bats Recorded[11]	Passes (No.)	Percentage (%)
Common pipistrelle	8	22.2%	33	17.19%
Soprano pipistrelle	12	33.3%	61	31.77%
Myotis species	16	44.4%	59	30.73
Brown long-eared	18	50.0%	39	20.31
Total			**192**	**100.00%**

3.4.1 Regarding the spatial distribution of bat recordings, a summary of bat activity per monitoring station is presented in **Table 3.6**.

3.4.2 Bats were recorded on 21.2 % of combined nights (successful nights of bat recordings at each monitoring station combined).

3.4.3 MS11 was noted to have recorded the most bat passes (i.e., 42 passes), and also the highest number, accounting for 21.25 % of the combined bat activity recorded across the survey period.

3.4.4 Likewise, MS11 also featured the highest number of bat passes relative to the number of nights sampled throughout the survey period (i.e., 57.14% of recorded nights in total).

Table 3.6: Bat activity survey results per monitoring station (MS)[12].

Detector ID	No. Nights Sampled	No. of Nights Bats Recorded	Percentage of Nights Bats Recorded	Total No. Passes Recorded	Percentage Distribution of No. Bats
MS1	30	3	10.00 %	5	2.60 %
MS2	22	2	9.09 %	3	1.56 %
MS3	36	6	17.14 %	18	9.38 %
MS4	36	4	11.11 %	9	4.69 %
MS5	36	5	13.89 %	11	5.73 %
MS6	36	6	16.67 %	9	4.69 %
MS7	34	7	20.59 %	9	4.69 %
MS8	36	13	36.11 %	39	20.31 %
MS9	35	2	5.71 %	7	3.65 %
MS10	36	8	22.22 %	15	7.81 %
MS11	28	16	57.14 %	42	21.88 %
MS12	36	13	36.11 %	25	13.02 %
Total	**401**	**85**	21.25 %	**192**	**100.00 %**

3.4.5 An additional summary of bat recordings per season is presented in **Table 3.7**.

3.4.6 Across the span of nights recorded, relative to the general survey area, bats were recorded at a minimum of one monitoring station per survey period, although recordings were made across only 47.22% of nights surveyed overall.

[11] Percentage of nights bats were recorded within the 36 sampled nights.

[12] The number of dates sampled is the number of nights each detector was operational for throughout the survey period, taking account of detector failures and unsuitable weather conditions.

3.4.7 Notably, the number of bat passes were recorded per season was greatest during the summer deployment period, accounting for 119 passes (i.e., 61.98% passes recorded on-site). However, this period also accounted for increased survey effort).

Table 3.7: Bat activity survey results per season, monitoring stations (MS) combined.

Recording Period	No. Nights Sampled	No. Nights Bats Recorded	Percentage Nights Bats Recorded	Total No. Passes Recorded	Percentage Distribution of Bats Recorded
Spring	10	5	50.00 %	14	7.29 %
Summer	14	12	85.71 %	119	61.98 %
Autumn	12	10	83.33 %	59	30.73 %
Total	**36**	**17**	**47.22 %**	**192**	100.00 %

High Collision Risk Species

Nightly Activity

3.4.8 **Table 3.8** presents the total numbers of nights bat activity for HCR species which fell under each relative activity band (i.e., **Low** to **High** activity) in reference to **Table 2.4**.

3.4.9 Nightly activity was noted to range from **Low** to **Moderate**, with **Low** activity being the most frequent for both common and soprano pipistrelle.

Table 3.8: Number of nights recorded bat activity fell into each activity band per species.

Species	High Activity	Moderate/ High Activity	Moderate Activity	Low/Moderate Activity	Low Activity
Common pipistrelle	0	0	1	6	16
Soprano pipistrelle	0	0	3	10	18

Overall Site Activity

3.4.10 **Table 3.9** presents the relative activity percentiles, confidence intervals (CI) and key metrics outputs derived from in-house data analysis for each HCR species.

3.4.11 Soprano pipistrelle was noted to have the highest median BAI, equating to 0.26 passes per hour (Excluding Absences) across combined monitoring stations over the total survey effort.

3.4.12 Likewise, when compared against an internal reference range of sites, soprano pipistrelle activity equated to **Low** activity at the 12th median percentile, but **Moderate** at the 45th maximum percentile.

3.4.13 Common pipistrelle activity across combined monitoring stations over the total survey effort equated to a median BAI of 0.19 passes per hour (Excluding Absences).

3.4.14 Compared against an internal reference range, common pipistrelle activity was ranked as **Low** at the 9th median percentile, but **Moderate** at the 45th maximum percentile.

Table 3.9: *Relative activity percentiles and BAI (passes per night) for HCR species over the total survey effort.*

Species	Total Passes	Median BAI (Passes per Hour)		Mean BAI (Passer per Hour)		Median Percentile[13]	95% CIs[14]	Max BAI	Max Percentile[15]
		Incl. Absences	Excl. Absences	Including Absences	Excluding Absences				
Common pipistrelle	33	0.00	0.14	0.01	0.19	12th	9th-12th	0.53	45th
Soprano pipistrelle	61	0.00	0.14	0.02	0.26	9th	6th-22nd	0.69	45th

Spatial Analysis

3.4.15 **Table 3.10** presents the Median, Mean and Maximum BAI for HCR species, and includes BAI outputs which include and exclude absences during the survey effort.

Table 3.10: Median, Mean and Maximum bat pass rate per species, per detector.

Species	MS ID	Total Bat Passes	Median Pass Rate (passes per hour/night)		Mean Pass Rate (passes per hour/night)		Max Pass Rate (passes per hour/night)
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences	
Common pipistrelle	MS1	0	0.00	0.00	0.00	0.00	0.00
	MS2	1	0.00	0.14	0.01	0.14	0.14
	MS3	4	0.00	0.14	0.02	0.19	0.28
	MS4	0	0.00	0.00	0.00	0.00	0.00
	MS5	4	0.00	0.14	0.02	0.18	0.28
	MS6	2	0.00	0.28	0.01	0.28	0.28
	MS7	0	0.00	0.00	0.00	0.00	0.00
	MS8	4	0.00	0.40	0.01	0.27	0.40
	MS9	5	0.00	0.14	0.02	0.34	0.53
	MS10	3	0.00	0.14	0.01	0.14	0.14
	MS11	4	0.00	0.14	0.02	0.18	0.27
	MS12	6	0.00	0.14	0.02	0.16	0.28
Soprano pipistrelle	MS1	2	0.00	0.17	0.01	0.17	0.17
	MS2	0	0.00	0.00	0.00	0.00	0.00
	MS3	12	0.00	0.14	0.05	0.41	0.69
	MS4	0	0.00	0.00	0.00	0.00	0.00
	MS5	5	0.00	0.27	0.02	0.23	0.28
	MS6	2	0.00	0.28	0.02	0.28	0.28
	MS7	2	0.00	0.28	0.01	0.28	0.28
	MS8	11	0.00	0.14	0.04	0.25	0.41
	MS9	1	0.00	0.13	0.00	0.13	0.13
	MS10	8	0.00	0.41	0.03	0.36	0.53
	MS11	11	0.00	0.14	0.05	0.18	0.55
	MS12	7	0.00	0.14	0.03	0.32	0.69

3.4.16 **Table 3.11** also presents the corresponding median and maximum bat activity levels (percentiles) per detector, for each HCR species relative to BAI (Excludes Absences) (**Table 3.10**).

[13] A numerical representation of average activity levels relative to 7 sites during 2023 located within Scotland.
[14] An indication of the confidence in the median percentile.
[15] A numerical representation of maximum activity levels on any one night relative to 7 sites during 2023 located within similar habitats and climatic conditions.

Table 3.11: Percentiles for each species per detector location for the whole survey period.

Species	Detector ID	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level (Median Percentile)	Activity Level (Max Percentile)
Common pipistrelle	MS1	0th	n/a	0th	0	n/a	n/a
	MS2	9th	0.12 - 0.25	9th	1	Low	Low
	MS3	12th	0.08 - 0.25	25th	3	Low	Low to Moderate
	MS4	0th	n/a	0th	0	n/a	n/a
	MS5	9th	0.09 - 0.38	9th	3	Low	Low
	MS6	25th	0.09 - 0.45	25th	1	Low to Moderate	Low to Moderate
	MS7	0th	0.08 - 0.12	0th	0	n/a	n/a
	MS8	9th	0.09 - 0.25	38th	2	Low	Low to Moderate
	MS9	9th	0.01 - 0.25	46th	2	Low	Moderate
	MS10	9th	n/a	12th	3	Low	Low
	MS11	12th	0.12 - 0.25	25th	3	Low	Low to Moderate
	MS12	12th	0.08 - 0.25	25th	5	Low	Low to Moderate
Soprano pipistrelle	MS1	18th	n/a	18th	1	Low	Low
	MS2	0th	n/a	0th	0	n/a	n/a
	MS3	9th	0.09 - 0.44	45th	4	Low	Moderate
	MS4	0th	n/a	0th	0	n/a	n/a
	MS5	22nd	0.06 - 0.22	22nd	3	Low to Moderate	Low to Moderate
	MS6	22nd	n/a	22nd	1	Low to Moderate	Low to Moderate
	MS7	22nd	n/a	22nd	1	Low to Moderate	Low to Moderate
	MS8	6th	0.06 - 0.32	32nd	6	Low	Low to Moderate
	MS9	5th	n/a	13th	1	Low	Low
	MS10	32nd	0.05 - 0.39	39th	3	Low to Moderate	Low to Moderate
	MS11	6th	0.05 - 0.06	39th	8	Low	Low to Moderate
	MS12	6th	0.06 - 0.45	45th	3	Low	Moderate

Common pipistrelle

3.4.17 Common pipistrelle activity was not recorded at all monitoring stations deployed on-site (i.e., being absent from MS1, MS4 and MS7).

3.4.18 Median pass rate (Excludes Absences) for common pipistrelle ranged from 0.14 to 0.28 passes per hour and were highest at MS6. Maximum pass rates ranged from 0.14 to 0.53 passes per hour and were highest at MS9.

3.4.19 Relative activity equating to **Low** at the 14th percentile for the majority of detectors, and **Low** to **Moderate** at the maximum percentile (i.e., the latter being greatest at the 46th percentile at MS9).

Soprano pipistrelle

3.4.20 Soprano pipistrelle activity was also not recorded at all monitoring stations deployed on-site (i.e., being absent from MS2 and MS4).

3.4.21 Median pass rate (Excludes Absences) ranged from 0.13 to 0.41 passes per hour, with the highest median pass rate recorded at MS10. Maximum pass rates ranged from 0.13 to 0.69 passes per hour, being highest at MS3 and MS12.

3.4.22 Relative activity at the median percentile was noted to range from **Low** to **Low – Moderate**, with the highest ranked at the 32nd median percentile (MS10). Likewise, maximum percentiles ranged from **Low** to **Moderate**, the latter being ranked at the 45th percentile (MS3).

Ecobat Assessment

3.4.23 In reference to the accompanying Ecobat report (**Annex 4**), median and maximum activity percentiles for both common and soprano pipistrelle accounted for **Low** activity per MS, where presence was recorded (**Table A3.1**).

Temporal Activity

3.4.24 **Table 3.12** presents the Median, Mean and Max BAI for HCR species relative to seasonal activity.

Table 3.12: Median, Mean and Max bat pass rate per species, per season.

Species	Season	Total Bat Passes	Median Pass Rate (passes per hour/night)		Mean Pass Rate (passes per hour/night)		Max Pass Rate (passes per hour/night)
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences	
Common pipistrelle	Spring	3	0.00	0.21	0.04	0.21	0.21
	Summer	29	0.00	0.43	0.28	0.79	1.47
	Autumn	1	0.00	0.09	0.01	0.09	0.09
Soprano pipistrelle	Spring	3	0.00	0.14	0.04	0.14	0.14
	Summer	55	0.07	0.55	0.54	1.07	3.45
	Autumn	3	0.00	0.13	0.02	0.13	0.13

3.4.25 **Table 3.13**. presents the relative bat activity levels (percentiles) per season, per HCR species, relative to corresponding BAI metrics presented in **Table 3.12**.

Table 3.13: Percentiles for each species per month for the whole monitoring period.

Species	Season	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level (Median Percentile)	Activity Level (Max Percentile)
Common pipistrelle	Spring	7th	7 - 21	22nd	2	Low	Low to Moderate
	Summer	14th	11 - 32	32nd	5	Low	Low to Moderate
	Autumn	8th	n/a	8th	1	Low	Low
Soprano pipistrelle	Spring	5th	5 - 6	6th	3	Low	Low
	Summer	18th	5 -36	43rd	7	Low	Moderate
	Autumn	5th	5 - 12	12th	2	Low	Low

Common pipistrelle

3.4.26 Common pipistrelle was recorded during each of the spring, summer, and autumn recording periods.

3.4.27 Median BAI (Excludes Absences) between recording periods ranged from 0.09 – 0.43 passes per hour, and was highest during the summer recording period (**Table 3.13**). However, activity was broadly comparable between seasons, with each recording period accounting for an overall median BAI of < 1 pass per hour.

3.4.28 Maximum BAI ranged from 0.09 to 1.47 passes per hour and was also relatively higher during the autumn recoding periods (this was the only recording period to account for > 1 pass per hour).

3.4.29 Relative activity on-site was noted to equate to **Low** activity (i.e., <21st percentile) at the median percentile for each season but was noted to be highest during summer at the 14th percentile.

3.4.30 However, in considering maximum percentiles, activity equated to **Low** activity during the autumn recording period at the 8th maximum percentile, and **Low – Moderate** during the spring and summer periods at the 24th and 32nd maximum percentile, respectively.

Soprano pipistrelle

3.4.31 Soprano pipistrelle was also recorded during each of the spring, summer, and autumn recording periods.

3.4.32 Median BAI (Excludes Absences) between recording periods ranged from 0.13 – 0.55 passes per hour and was highest during the summer recording period (**Table 3.13**). However, activity was broadly comparable between seasons, with each recording period accounting for an overall median BAI of <1 pass per hour.

3.4.33 Maximum BAI ranged from 0.13 to 3.45 passes per hour and was also relatively higher during the autumn recoding periods (this was the only recording period to account for >1 pass per hour).

3.4.34 Relative activity on-site was noted to equate to **Low** activity (i.e., <21st percentile) at the median percentile for each season. Relatively, activity was noted to be highest during summer at the 18th percentile.

3.4.35 However, in considering maximum percentiles, activity equated to **Low** activity during the spring and autumn recording periods at the 6th and 12th maximum percentile respectively, and **Moderate** during the summer period at the 43rd maximum percentile.

Ecobat Assessment

3.4.36 In reference to the accompanying Ecobat report (**Annex 4**), median and maximum activity percentiles for both common and soprano pipistrelle accounted for **Low** activity per recording period (**Table A3.2**).

Within Night Peak Activity

3.4.37 A summary of peak hours of bat passes per monitoring station, per season are summarised in **Table 3.14.**

Common pipistrelle

3.4.38 In relation to common pipistrelle, activity was not recorded consistently between detectors, or between seasons. When recorded, spring peak activity varied between detectors, and was alternatingly recorded at 23:00 – 00:00 (MS2), 03:00 – 04:00 (MS11) or 02:00 - 03:00 (MS12). However, maximum peak counts totalled only a single pass between peak recording hours.

3.4.39 During the summer recording period, peak activity was recorded between the hours of either 23:00 – 00:00 (MS3, MS5, MS8, MS9) or 22:00 – 23:00 (MS6, MS9, MS10, MS11, MS12). Maximum peak counts totalled 3 passes at two detectors (i.e., MS3 and MS11).

3.4.40 During the autumn recording period, only a single pass was recorded between the hours of 05:00 – 06:00, detected at MS12.

Soprano pipistrelle

3.4.41 In relation to soprano pipistrelle, activity again varied between detectors and seasons. During spring, peak activity was recorded between 20:00 – 21:00 (MS3 and MS11) and 22:00 – 23:00 (MS8), although maximum peak counts recorded were limited to a single pass per detector.

3.4.42 During summer periods, peak activity most frequently occurred between 23:00 – 00:00 (MS3, MS5, MS6, MS8, and MS9), or 22:00 – 23:00 (MS6, MS7, MS10, MS11 and MS12). However, maximum peak counts totalled at 6 passes, recorded at separate four detectors (i.e., MS3, MS10, MS11, and MS12).

3.4.43 During the autumn recording period, peak activity occurred most frequently between 20:00 – 21:00 (MS1 and MS11), or alternatively between 22:00 - 23:00 (MS7). However maximum peak counts totalled two passes recorded at MS1.

HCR species combined

3.4.44 When considering HCR species collectively, peak hours and counts showed some variation. During the spring recording period, peak activity was recorded most frequently at 23:00 – 00:00 (MS2 and MS11) and 02:00 – 03:00 (MS11 and MS12), with alternative peak hours recorded at 21:00 – 22:00 (MS3) and 22:00 – 23:00 (MS8). Maximum peak counts totalled at two passes, recorded at MS11.

3.4.45 Collective peak activity during summer was recorded most frequently between 22:00 – 23:00 (MS6, MS8, M10, MS11, MS12), or alternatively between 23:00 – 00:00 (MS3, MS5, MS8, MS9). However, maximum peak counts totalled 9 passes (MS3, MS11).

3.4.46 Finally, during the autumn recording period, collective peak activity was recorded between 20:00 - 21:00 (M1, MS11, MS12); maximum peak count totalled two passes (MS1).

Table 3.14: Peak hours of bat passes for high collision risk (HCR) species per species and combined.

Detector ID	Season	Peak Hour	Passes within Peak Hour
Common pipistrelle			
MS2	Spring	23:00 - 00:00	1
	Summer	n/a	n/a
	Autumn	n/a	n/a
MS3	Spring	n/a	n/a
	Summer	23:00 - 00:00	3
	Autumn	n/a	n/a
MS5	Spring	n/a	n/a
	Summer	23:00 - 00:00	2
	Autumn	n/a	n/a
MS6	Spring	n/a	n/a
	Summer	22:00 - 23:00	2
	Autumn	n/a	n/a
MS8	Spring	n/a	n/a
	Summer	23:00 - 00:00	2
	Autumn	n/a	n/a
MS9	Spring	n/a	n/a

Detector ID	Season	Peak Hour	Passes within Peak Hour
Common pipistrelle			
	Summer	22:00 – 23:00 / 23:00 – 00:00	2
	Autumn	n/a	n/a
MS10	Spring	n/a	n/a
	Summer	22:00 - 23:00	2
	Autumn	n/a	n/a
MS11	Spring	03:00 - 04:00	1
	Summer	22:00 - 23:00	3
	Autumn	n/a	n/a
MS12	Spring	02:00 - 03:00	1
	Summer	22:00 - 23:00	2
	Autumn	05:00 - 06:00	1
Soprano pipistrelle			
MS1	Spring	n/a	n/a
	Summer	n/a	n/a
	Autumn	20:00 - 21:00	2
MS3	Spring	21:00 - 22:00	1
	Summer	23:00 - 00:00	6
	Autumn	n/a	n/a
MS5	Spring	n/a	n/a
	Summer	23:00 - 00:00	3
	Autumn	n/a	n/a
MS6	Spring	n/a	n/a
	Summer	22:00 – 23:00 / 23:00 – 00:00	1
	Autumn	n/a	n/a
MS7	Spring	n/a	n/a
	Summer	22:00 - 23:00	2
	Autumn	22:00 - 23:00	1
MS8	Spring	22:00 - 23:00	1
	Summer	22:00 - 23:00	5
	Autumn	n/a	n/a
MS9	Spring	n/a	n/a
	Summer	23:00 - 00:00	1
	Autumn	n/a	n/a
MS10	Spring	n/a	n/a
	Summer	22:00 - 00:00	6
	Autumn	n/a	n/a
MS11	Spring	21:00 - 22:00	1
	Summer	22:00 -23:00	6
	Autumn	20:00 - 21:00	1
MS12	Spring	n/a	n/a
	Summer	22:00 -23:00	6
	Autumn	n/a	n/a
Combined HCR species			
MS1	Spring	n/a	n/a

Detector ID	Season	Peak Hour	Passes within Peak Hour
Common pipistrelle			
	Summer	n/a	n/a
	Autumn	20:00 - 21:00	2
MS2	Spring	23:00 - 00:00	1
	Summer	n/a	n/a
	Autumn	n/a	n/a
MS3	Spring	21:00 - 22:00	1
	Summer	23:00 - 00:00	9
	Autumn	n/a	n/a
MS5	Spring	n/a	n/a
	Summer	23:00 - 00:00	5
	Autumn	n/a	n/a
MS6	Spring	n/a	n/a
	Summer	22:00 - 23:00	3
	Autumn	n/a	n/a
MS7	Spring	n/a	n/a
	Summer	22:00 - 23:00	2
	Autumn	n/a	n/a
MS8	Spring	22:00 - 23:00	1
	Summer	22:00 – 23:00 / 23:00 - 00:00	6
	Autumn	n/a	n/a
MS9	Spring	n/a	n/a
	Summer	23:00 - 00:00	3
	Autumn	n/a	n/a
MS10	Spring	n/a	n/a
	Summer	22:00 - 23:00	5
	Autumn	n/a	n/a
MS11	Spring	23:00 - 03:00	2
	Summer	22:00 - 23:00	9
	Autumn	20:00 - 21:00	1
MS12	Spring	02:00 - 03:00	1
	Summer	22:00 - 23:00	8
	Autumn	20:00 - 21:00	1

Other Species

3.4.47 Average and maximum BAI per static and per season for other species (i.e., non-HCR species) recorded on-site over the survey effort are summarised below.

Myotis

3.4.48 *Myotis* bats were detected across most monitoring stations deployed but went undetected at both MS9 and MS10 throughout the survey period (**Table 3.15**). Likewise, *Myotis* species were detected on-site during each of the spring, summer and autumn recording periods (**Table 3.16**).

3.4.49 A total of 59 *Myotis* passes were recorded over the survey period, accounting for a median BAI of 0.22 passes per hour (Excluding Absences) for the overall site.

3.4.50 Per monitoring station median activity (Excluding Absences) ranged from 0.09 to 0.16 passes per hour, being notably highest at MS12. However, all monitoring stations accounted for relatively comparable activity, with BAI uniformly recorded as <1 pass per hour. Maximum activity per monitoring station ranged from 0.09 to 1.24 passes per hour and was relatively higher at MS8 (the only monitoring station which accounted for a BAI of <1 pass per hour).

3.4.51 Seasonally, median BAI (Excludes Absences) between recording periods ranged from 0.14 – 0.47 passes per hour, increasing consecutively between spring, summer, and autumn recording periods (**Table 3.16**). However, activity was broadly comparable between seasons, with each recording period accounting for an overall median BAI of <1 pass per hour. Maximum BAI ranged from 0.14 to 1.78 passes per hour and also increased consecutively between spring, summer and autumn recoding periods (**Table 3.16**). However, maximum autumn activity was the only recording period to account for >1 pass per hour).

Table 3.15: Median, Mean and Maximum BAI per monitoring for Myotis bats.

Species	Detector ID	Total Bat Passes	Median Pass Rate (passes per hour/night)		Mean Pass Rate (passes per hour/night)		Max Pass Rate (passes per hour/night)
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences	
Myotis species	MS1	2	0.00	0.09	0.01	0.09	0.09
	MS2	2	0.00	0.14	0.01	0.14	0.14
	MS3	1	0.00	0.13	0.004	0.13	0.13
	MS4	5	0.00	0.09	0.01	0.11	0.18
	MS5	1	0.00	0.14	0.004	0.14	0.14
	MS6	2	0.00	0.11	0.01	0.11	0.13
	MS7	7	0.00	0.09	0.02	0.10	0.18
	MS8	23	0.00	0.14	0.06	0.27	1.24
	MS9	0	n/a	n/a	n/a	n/a	n/a
	MS10	0	n/a	n/a	n/a	n/a	n/a
	MS11	6	0.00	0.13	0.02	0.14	0.18
	MS12	10	0.00	0.16	0.03	0.16	0.27
	Total	59	0.00	0.22	0.16	0.36	1.78

Table 3.16: Median, Mean and Maximum BAI per monitoring for Myotis bats.

Species	Detector ID	Total Bat Passes	Median Pass Rate (passes per hour/night)		Mean Pass Rate (passes per hour/night)		Max Pass Rate (passes per hour/night)
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences	
Myotis species	Spring	2	0.00	0.14	0.03	0.14	0.14
	Summer	9	0.00	0.27	0.09	0.25	0.40
	Autumn	48	0.17	0.47	0.36	0.36	1.78

Brown long-eared

3.4.52 Brown long-eared bat was recorded across most monitoring stations deployed on-site over the survey effort but went unrecorded at MS2 and MS7 (**Table 3.17**). Likewise, brown long-eared activity was also recorded on-site during most each seasonal recording period (**Table 3.18**).

3.4.53 A total of 39 brown long-eared passes were recorded over the survey period, accounting for a median BAI (Excluding Absences) of 0.22 passes per hour for the overall site.

3.4.54 Median BAI (Excludes Absences) per monitoring station for brown long-eared bats ranged from 0.09 – 0.29 passes per hour, being relatively higher at MS12. However, median BAI across monitoring stations was broadly comparable and accounted for <1 pass per hour. Maximum BAI per monitoring station ranged from 0.09 to 1.33 passes per hour and was highest at MS12 (the only monitoring station which accounted for a maximum BAI >1 pass per hour).

3.4.55 Seasonally, median BAI (Excludes Absences) between recording periods ranged from 0.14 - 0.30 passes per hour, being relatively higher during summer in comparison to spring and autumn (**Table 3.18**), although each recording period accounted for a median BAI of <1 pass per hour. Likewise, maximum BAI between recording periods ranged from 0.27 to 1.33 passes per hour and was notable higher during summer (the only season which accounted for maximum activity of >1 pass per hour).

Table 3.17: Median, Mean and Maximum BAI per monitoring for brown long-eared bat.

Species	MS ID	Total Bat Passes	Median Pass Rate (passes per hour/night)		Mean Pass Rate (passes per hour/night)		Max Pass Rate (passes per hour/night)
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences	
Brown long-eared	MS1	1	0.00	0.09	0.003	0.09	0.09
	MS2	0	0.00	0.00	0.00	0.00	0.00
	MS3	1	0.00	0.14	0.004	0.14	0.14
	MS4	4	0.00	0.18	0.01	0.18	0.27
	MS5	1	0.00	0.14	0.004	0.14	0.14
	MS6	3	0.00	0.09	0.01	0.10	0.14
	MS7	0	0.00	0.00	0.00	0.00	0.00
	MS8	1	0.00	0.14	0.004	0.14	0.14
	MS9	1	0.00	0.13	0.004	0.13	0.13
	MS10	4	0.00	0.14	0.02	0.14	0.14
	MS11	21	0.00	0.27	0.08	0.34	1.33
	MS12	2	0.00	0.29	0.01	0.29	0.29
	Total	39	0.04	0.22	0.14	0.29	1.33

Table 3.18: Median, Mean and Maximum BAI per monitoring station for brown long-eared bat.

Species	Season	Total Bat Passes	Median Pass Rate (passes per hour/night)		Mean Pass Rate (passes per hour/night)		Max Pass Rate (passes per hour/night)
			Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences	
Brown long-eared	Spring	6	0.07	0.14	0.08	0.17	0.28
	Summer	26	0.21	0.30	0.27	0.41	1.33
	Autumn	7	0.00	0.14	0.05	0.16	0.27

Emergence Activity

3.4.56 Static monitoring data was cross-referenced with species specific emergence times outlined in current BCT guidance (Collins, 2023) to identify any calls detected within an accepted emergence window[16], which might indicate the potential presence of roosts within the vicinity of the site.

3.4.57 Data analysis showed that activity was recorded within the species-specific emergence times for six monitoring sites with calls relating to three species, as detailed in **Table 3.19**.

Table 3.19: Bat activity recorded within the species-specific emergence time.

Detector ID	Species / Genus	Nights Recorded	Peak Count	Month of Peak Count
MS2	*Myotis* species	1	1	Spring
MS3	Soprano pipistrelle	1	1	Spring
MS6	Soprano pipistrelle	1	1	Summer
MS9	Brown long-eared	1	1	Summer
MS10	Soprano pipistrelle	1	1	Summer
	Brown long-eared	2	1	Spring
MS11	Soprano pipistrelle	1	1	Summer
	Brown long-eared	1	1	Spring

4 ASSESSMENT OF THE POTENTIAL RISKS TO BATS

4.1 Stage 1 – Initial Site Risk Assessment

4.1.1 In accordance with NatureScot guidance (2021), an assessment of the potential risk level of the Proposed Development has been undertaken based on a consideration of both habitat and development-related features detailed in Table 3a of the NatureScot guidance (2021).

4.1.2 The values and classification criteria provided within Table 3a of NatureScot guidance (2021) 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 to conclude on the overall risk level for the site.

4.1.3 The site has been assessed as having an 'Initial Site Risk' of **2** representing a **Low Site Risk**:

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

4.1.4 The site 'Project Size' is classified as being **Medium**, comprising a development of **9** turbines of up to 200 m tip height, with **no** other operational wind farm developments located within 5 km of the site (distances measured between the nearest turbines).

[16] Soprano pipistrelle (54 minutes after sunset); Myotis and brown long-eared bat (94 minutes after sunset).

4.2 Stage 2 – Overall Risk Assessment

4.2.1 In accordance with NatureScot guidance (2021), 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.

4.2.2 In order to derive an 'Overall Risk Assessment' the determined Bat Activity Category derived from the substitute of Ecobat produced by AEL is compared against the Site Risk Level (Stage 1) using the matrix presented in Table 3b in NatureScot (2021) to determine the level of Overall Risk.

4.2.3 As calculated using NatureScot (2021) guidance, 'Overall Risk Assessment' for each species recorded on-site, both spatially and temporally, is presented in **Table 4.1** and **Table 4.2**.

4.2.4 In considering Overall Risk Assessment per MS location (**Table 4.1)** HCR species assessments equated to 'Low Risk' when considering median activity percentile for both common and soprano pipistrelles. In considering maximum activity percentiles, Overall Risk Assessment ranged from 'Low Risk' to 'Medium Risk', but most frequently equated to 'Low Risk' relative to both common and soprano pipistrelle. In reference to the accompanying Ecobat report assessment (see **Annex 4**), HCR species both accounted for 'Low Risk' at both median and maximum activity percentiles, per MS (**Table A3.1**).

4.2.5 In considering Overall Risk Assessment per recording period (**Table 4.2**), Overall Risk Assessment for common and soprano pipistrelle equated to 'Low Risk' when considering median activity percentiles. At the maximum activity percentile, common pipistrelle also uniformly equated to 'Low Risk', but ranged from 'Low Risk' to 'Medium Risk' relative to soprano pipistrelle. However, activity most frequently equated to 'Low Risk' across recording periods. In reference to the accompanying Ecobat report assessment (see **Annex 4**), HCR species both accounted for 'Low Risk' at both median and maximum activity percentiles, per recording period (**Table A3.2**).

Table 4.1: Overall Risk Assessment per MS location for both the median and max percentiles (Table 3b from NatureScot (2021) guidance). Key: green = Low, Amber = Medium, Red = High. Yellow are those MSs which are not located near any turbine but are included to provide Site context.

Species	MS	Median Percentile	Percentile Category	Overall Risk Assessment (Stage 2)		Species / Genus	MS	Max Percentile	Percentile Category	Overall Risk Assessment (Stage 2)
Common pipistrelle	MS1	n/a	n/a	**n/a**		Common pipistrelle	MS1	n/a	n/a	**n/a**
	MS2	9th	Low	**Low (2)**			MS2	9th	Low	**Low (2)**
	MS3	12th	Low	**Low (2)**			MS3	25th	Low to Moderate	**Low (4)**
	MS4	n/a	n/a	**n/a**			MS4	n/a	n/a	**n/a**
	MS5	9th	Low	**Low (2)**			MS5	9th	Low	**Low (2)**
	MS6	25th	Low to Moderate	**Low (4)**			MS6	25th	Low to Moderate	**Low (4)**
	MS7	n/a	n/a	**n/a**			MS7	n/a	n/a	**n/a**
	MS8	9th	Low	**Low (2)**			MS8	38th	Low to Moderate	**Low (4)**
	MS9	9th	Low	**Low (2)**			MS9	46th	Moderate	**Medium (6)**
	MS10	9th	Low	**Low (2)**			MS10	12th	Low	**Low (2)**
	MS11	12th	Low	**Low (2)**			MS11	25th	Low to Moderate	**Low (4)**
	MS12	12th	Low	**Low (2)**			MS12	25th	Low to Moderate	**Low (4)**
Soprano pipistrelle	MS1	18th	Low	**Low (2)**		Soprano pipistrelle	MS1	18th	Low	**Low (2)**
	MS2	n/a	n/a	**n/a**			MS2	n/a	n/a	**n/a**
	MS3	9th	Low	**Low (2)**			MS3	45th	Moderate	**Medium (6)**
	MS4	n/a	n/a	**n/a**			MS4	n/a	n/a	**n/a**
	MS5	22nd	Low to Moderate	**Low (4)**			MS5	22nd	Low to Moderate	**Low (4)**
	MS6	22nd	Low to Moderate	**Low (4)**			MS6	22nd	Low to Moderate	**Low (4)**
	MS7	22nd	Low to Moderate	**Low (4)**			MS7	22nd	Low to Moderate	**Low (4)**
	MS8	6th	Low	**Low (2)**			MS8	32nd	Low to Moderate	**Low (4)**
	MS9	5th	Low	**Low (2)**			MS9	13th	Low	**Low (2)**
	MS10	32nd	Low to Moderate	**Low (4)**			MS10	39th	Low to Moderate	**Low (4)**
	MS11	6th	Low	**Low (2)**			MS11	39th	Low to Moderate	**Low (4)**
	MS12	6th	Low	**Low (2)**			MS12	45th	Moderate	**Medium (6)**

Table 4.2: Overall Risk Assessment per month for both the median and max percentiles (Table 3b from SNH (2021) guidance). Key: green = Low, Amber = Medium, Red = High.

Species	Month	Median Percentile	Percentile Category	Overall Risk Assessment (Stage 2)		Species / Genus	Month	Max Percentile	Percentile Category	Overall Risk Assessment (Stage 2)
Common pipistrelle	Spring	7th	Low	**Low (2)**		Common pipistrelle	Spring	22nd	Low to Moderate	**Low (4)**
	Summer	14th	Low	**Low (2)**			Summer	32nd	Low to Moderate	**Low (4)**
	Autumn	8th	Low	**Low (2)**			Autumn	8th	Low	**Low (2)**
Soprano pipistrelle	Spring	5th	Low	**Low (2)**		Soprano pipistrelle	Spring	6th	Low	**Low (2)**
	Summer	18th	Low	**Low (2)**			Summer	43rd	Moderate	**Medium (6)**
	Autumn	5th	Low	**Low (2)**			Autumn	12th	Low	**Low (2)**

5 REFERENCES

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ANNEX 1 - SCIENTIFIC NAMES

Table A1.1 provides common and scientific names of bat species included in this Technical Appendix.

Common Name	Scientific Name
Soprano pipistrelle	*Pipistrellus pygmaeus*
Common pipistrelle	*Pipistrellus pipistrellus*
Myotis species	*Myotis* spp.
Whiskered bat	*Myotis mystacinus*
Natterer's bat	*Myotis nattereri*
Daubenton's bat	*Myotis daubentonii*
Brandt's bat	*Myotis brandtii*
Nyctalus species	*Nyctalus* spp.
Noctule	*Nyctalus noctula*
Leisler's bat	*Nyctalus leisleri*
Brown long-eared	*Plecotus auritus*

ANNEX 2 - SURVEY WEATHER CONDITIONS

Table A2.1 below provides weather conditions for bat activity survey periods. Those values in red font represent less suitable weather conditions for bats.

Date	Temp at Dusk (°C)	Rainfall (mm)	Maximum Wind Speed (m/s)
15/05/2023	8	0	3.33
16/05/2023	9.4	0	0.50
17/05/2023	9.9	0.1	0.86
18/05/2023	11.2	0	0.36
19/05/2023	12.1	0	0.11
20/05/2023	11.7	1.3	0.25
21/05/2023	10.6	0	0.25
22/05/2023	10.2	0	0.61
23/05/2023	11.9	0	0.50
24/05/2023	12.3	0	0.36
17/07/2023	12	0	1.39
18/07/2023	13.4	0.2	0.56
19/07/2023	12.7	0	2.50
20/07/2023	12	0	1.39
21/07/2023	23.1	0.3	1.11
22/07/2023	20.1	0	2.50
23/07/2023	19.4	0	2.50
24/07/2023	20.4	0.1	1.67
25/07/2023	20.2	0	1.67
26/07/2023	21.3	0	2.78
27/07/2023	22.2	0	1.39
28/07/2023	22.8	0	1.67
29/07/2023	21.6	0	1.94
30/07/2023	21.2	0	1.39
12/09/2023	10	0	1.11
13/09/2023	9	0	2.50
14/09/2023	12	0	**5.00**
15/09/2023	8	0	1.67
16/09/2023	**7**	0	0.56
17/09/2023	10	1.3	1.67
18/09/2023	8	0.2	3.06
19/09/2023	10	0.6	1.94
20/09/2023	9	0.1	**7.22**
21/09/2023	8	0	4.72
22/09/2023	8	0.1	3.89
23/09/2023	**4**	0	0.83

Date	Temp at Dusk (°C)	Rainfall (mm)	Maximum Wind Speed (m/s)
24/09/2023	13	0.1	4.72
25/09/2023	9	0	4.17

ANNEX 3 - ECOBAT OVERALL RISK ASSESSMENT RESULTS

Table A3.1: Overall Risk Assessment per MS location for both the median and max percentiles (Table 3b from NatureScot (2021) guidance, as interpreted from Table 4 of the accompanying Ecobat Report (Reference Range: >200 nights per species). Key: green = Low, Amber = Medium, Red = High.

Species	MS	Median Percentile	Percentile Category	Overall Risk Assessment (Stage 2)		Species / Genus	MS	Max Percentile	Percentile Category	Overall Risk Assessment (Stage 2)
Common pipistrelle	MS1	n/a	n/a	n/a		Common pipistrelle	MS1	n/a	n/a	**n/a**
	MS2	0th	Low	**Low (2)**			MS2	0th	Low	**Low (2)**
	MS3	0th	Low	**Low (2)**			MS3	0th	Low	**Low (2)**
	MS4	n/a	n/a	n/a			MS4	n/a	n/a	**n/a**
	MS5	0th	Low	**Low (2)**			MS5	0th	0th	**Low (2)**
	MS6	0th	Low	**Low (2)**			MS6	0th	Low	**Low (2)**
	MS7	n/a	n/a	n/a			MS7	n/a	n/a	**n/a**
	MS8	0th	Low	**Low (2)**			MS8	0th	Low	**Low (2)**
	MS9	1st	Low	**Low (2)**			MS9	0th	Low	**Low (2)**
	MS10	0th	Low	**Low (2)**			MS10	0th	Low	**Low (2)**
	MS11	0th	Low	**Low (2)**			MS11	0th	Low	**Low (2)**
	MS12	0th	Low	**Low (2)**			MS12	0th	Low	**Low (2)**
Soprano pipistrelle	MS1	1st	Low	**Low (2)**		Soprano pipistrelle	MS1	1st	Low	**Low (2)**
	MS2	n/a	n/a	n/a			MS2	n/a	n/a	**n/a**
	MS3	3rd	Low	**Low (2)**			MS3	9th	Low	**Low (2)**
	MS4	n/a	n/a	n/a			MS4	n/a	n/a	**n/a**
	MS5	0th	Low	**Low (2)**			MS5	1st	Low	**Low (2)**
	MS6	1st	Low	**Low (2)**			MS6	1st	Low	**Low (2)**
	MS7	1st	Low	**Low (2)**			MS7	1st	Low	**Low (2)**
	MS8	1st	Low	**Low (2)**			MS8	3rd	Low	**Low (2)**
	MS9	0th	Low	**Low (2)**			MS9	0th	Low	**Low (2)**
	MS10	1st	Low	**Low (2)**			MS10	3rd	Low	**Low (2)**
	MS11	0th	Low	**Low (2)**			MS11	5th	Low	**Low (2)**
	MS12	0th	Low	**Low (2)**			MS12	9th	Low	**Low (2)**

Table A3.2: *Overall Risk Assessment per month for both the median and max percentiles (Table 3b from SNH (2021) guidance). As interpreted from Table 10 of the accompanying Ecobat Report (Reference Range: > 200 nights per species). Key: green = Low, Amber = Medium, Red = High.*

Species	Month	Median Percentile	Percentile Category	Overall Risk Assessment (Stage 2)		Species / Genus	Month	Max Percentile	Percentile Category	Overall Risk Assessment (Stage 2)
Common pipistrelle	Spring	0th	Low	**Low (2)**		Common pipistrelle	Spring	0th	Low	**Low (2)**
	Summer	0th	Low	**Low (2)**			Summer	1st	Low	**Low (2)**
	Autumn	0th	Low	**Low (2)**			Autumn	0th	Low	**Low (2)**
Soprano pipistrelle	Spring	0th	Low	**Low (2)**		Soprano pipistrelle	Spring	0th	Low	**Low (2)**
	Summer	1st	Low	**Low (2)**			Summer	9th	Low	**Low (2)**
	Autumn	1st	Low	**Low (2)**			Autumn	1st	Low	**Low (2)**

ANNEX 4 - ECOBAT RISK ASSESSMENT RESULTS

Ecobat Report

2024-10-13

Geo filter: region, Time filter: +- 1 month

Summary

Bats were detected on **27** nights between **16/05/2023** and **26/09/2023**, using **12** static bat detectors. Throughout this period, **4** species were recorded. **Table 1.** Detectors were placed at the following locations:

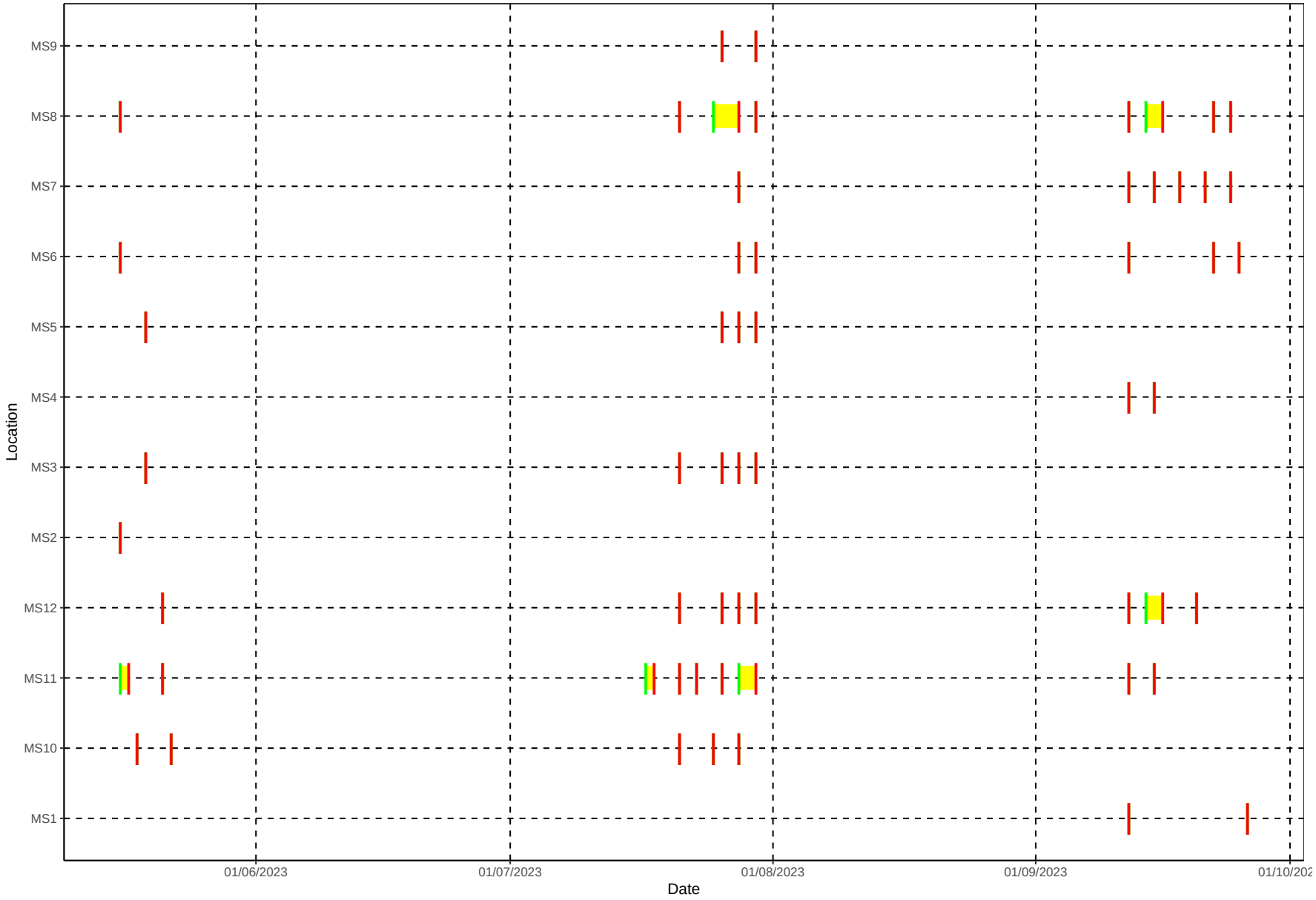
Detector ID	Latitude	Longitude
MS1	57.62047	-4.656837
MS2	57.62837	-4.645856
MS3	57.63255	-4.651187
MS4	57.62116	-4.634780
MS5	57.62630	-4.658320
MS6	57.62390	-4.616805
MS7	57.62643	-4.627942
MS8	57.62394	-4.646439
MS11	57.63671	-4.645893
MS12	57.61719	-4.631646
MS9	57.63322	-4.638921
MS10	57.61965	-4.613786

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
MS1	2
MS10	7
MS11	14
MS12	10
MS2	1
MS3	5
MS4	3
MS5	4
MS6	6
MS7	6
MS8	13
MS9	2

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


MS9
MS8
MS7
MS6
MS5
MS4
MS3
MS2
MS12
MS11
MS10
MS1
Location
01/06/2023
01/07/2023
01/08/2023
01/09/2023
01/10/202
Date

Part 1: Percentile 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.

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 Exceptional Activity	Nights of High Activity	Nights of Moderate/High Activity	Nights of Moderate Activity	Nights of Low/Moderate Activity	Nights of Low Activity
MS1	Myotis	0	0	0	1	0	0
MS1	Pipistrellus pygmaeus	0	0	0	0	0	1
MS1	Plecotus auritus	0	0	0	0	1	0
MS10	Pipistrellus pipistrellus	0	0	0	0	0	3
MS10	Pipistrellus pygmaeus	0	0	0	0	0	3
MS10	Plecotus auritus	0	0	0	0	4	0
MS11	Myotis	0	0	1	4	0	0
MS11	Pipistrellus pipistrellus	0	0	0	0	0	3
MS11	Pipistrellus pygmaeus	0	0	0	0	0	6
MS11	Plecotus auritus	2	0	2	0	3	0
MS12	Myotis	0	1	2	2	0	0
MS12	Pipistrellus pipistrellus	0	0	0	0	0	4
MS12	Pipistrellus pygmaeus	0	0	0	0	0	3
MS12	Plecotus auritus	0	0	1	0	0	0
MS2	Myotis	0	0	0	1	0	0
MS2	Pipistrellus pipistrellus	0	0	0	0	0	1
MS3	Myotis	0	0	0	1	0	0
MS3	Pipistrellus pipistrellus	0	0	0	0	0	2
MS3	Pipistrellus pygmaeus	0	0	0	0	0	4
MS3	Plecotus auritus	0	0	0	0	1	0

Detector ID	Species/Species Group	Nights of Exceptional Activity	Nights of High Activity	Nights of Moderate/High Activity	Nights of Moderate Activity	Nights of Low/Moderate Activity	Nights of Low Activity
MS4	Myotis	0	0	1	2	0	0
MS4	Plecotus auritus	0	1	0	0	1	0
MS5	Myotis	0	0	0	1	0	0
MS5	Pipistrellus pipistrellus	0	0	0	0	0	3
MS5	Pipistrellus pygmaeus	0	0	0	0	0	3
MS5	Plecotus auritus	0	0	0	0	1	0
MS6	Myotis	0	0	0	2	0	0
MS6	Pipistrellus pipistrellus	0	0	0	0	0	1
MS6	Pipistrellus pygmaeus	0	0	0	0	0	1
MS6	Plecotus auritus	0	0	0	0	3	0
MS7	Myotis	0	0	1	4	0	0
MS7	Pipistrellus pygmaeus	0	0	0	0	0	1
MS8	Myotis	1	0	2	5	0	0
MS8	Pipistrellus pipistrellus	0	0	0	0	0	2
MS8	Pipistrellus pygmaeus	0	0	0	0	0	6
MS8	Plecotus auritus	0	0	0	0	1	0
MS9	Pipistrellus pipistrellus	0	0	0	0	0	2
MS9	Pipistrellus pygmaeus	0	0	0	0	0	1
MS9	Plecotus auritus	0	0	0	0	1	0

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
MS1	Myotis	54	0	54	1	118
MS1	Pipistrellus pygmaeus	1	0	1	1	3803
MS1	Plecotus auritus	21	0	21	1	179
MS10	Pipistrellus pipistrellus	0	0 - 0	0	3	28366
MS10	Pipistrellus pygmaeus	1	2 - 2	3	3	3803
MS10	Plecotus auritus	21	21 - 21	21	4	179
MS11	Myotis	54	54 - 54	78	5	118
MS11	Pipistrellus pipistrellus	0	0 - 0	0	3	28366
MS11	Pipistrellus pygmaeus	0	0 - 0	5	6	3803
MS11	Plecotus auritus	68	21 - 84	100	7	179
MS12	Myotis	78	54 - 83	88	5	118
MS12	Pipistrellus pipistrellus	0	0 - 0	0	4	28366
MS12	Pipistrellus pygmaeus	0	0 - 0	9	3	3803
MS12	Plecotus auritus	68	0	68	1	179
MS2	Myotis	54	0	54	1	118
MS2	Pipistrellus pipistrellus	0	0	0	1	28366
MS3	Myotis	54	0	54	1	118
MS3	Pipistrellus pipistrellus	0	0 - 0	0	2	28366
MS3	Pipistrellus pygmaeus	3	7 - 7	9	4	3803
MS3	Plecotus auritus	21	0	21	1	179
MS4	Myotis	54	54 - 54	78	3	118
MS4	Plecotus auritus	55	55 - 55	89	2	179
MS5	Myotis	54	0	54	1	118
MS5	Pipistrellus pipistrellus	0	0 - 0	0	3	28366
MS5	Pipistrellus pygmaeus	0	0 - 0	1	3	3803
MS5	Plecotus auritus	21	0	21	1	179
MS6	Myotis	54	54 - 54	54	2	118
MS6	Pipistrellus pipistrellus	0	0	0	1	28366
MS6	Pipistrellus pygmaeus	1	0	1	1	3803
MS6	Plecotus auritus	21	21 - 21	21	3	179
MS7	Myotis	54	54 - 54	78	5	118
MS7	Pipistrellus pygmaeus	1	0	1	1	3803
MS8	Myotis	54	54 - 77	100	8	118

Detector ID	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
MS8	Pipistrellus pipistrellus	0	0 - 0	0	2	28366
MS8	Pipistrellus pygmaeus	1	1 - 3	3	6	3803
MS8	Plecotus auritus	21	0	21	1	179
MS9	Pipistrellus pipistrellus	1	0.5 - 0.5	1	2	28366
MS9	Pipistrellus pygmaeus	0	0	0	1	3803
MS9	Plecotus auritus	21	0	21	1	179

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).

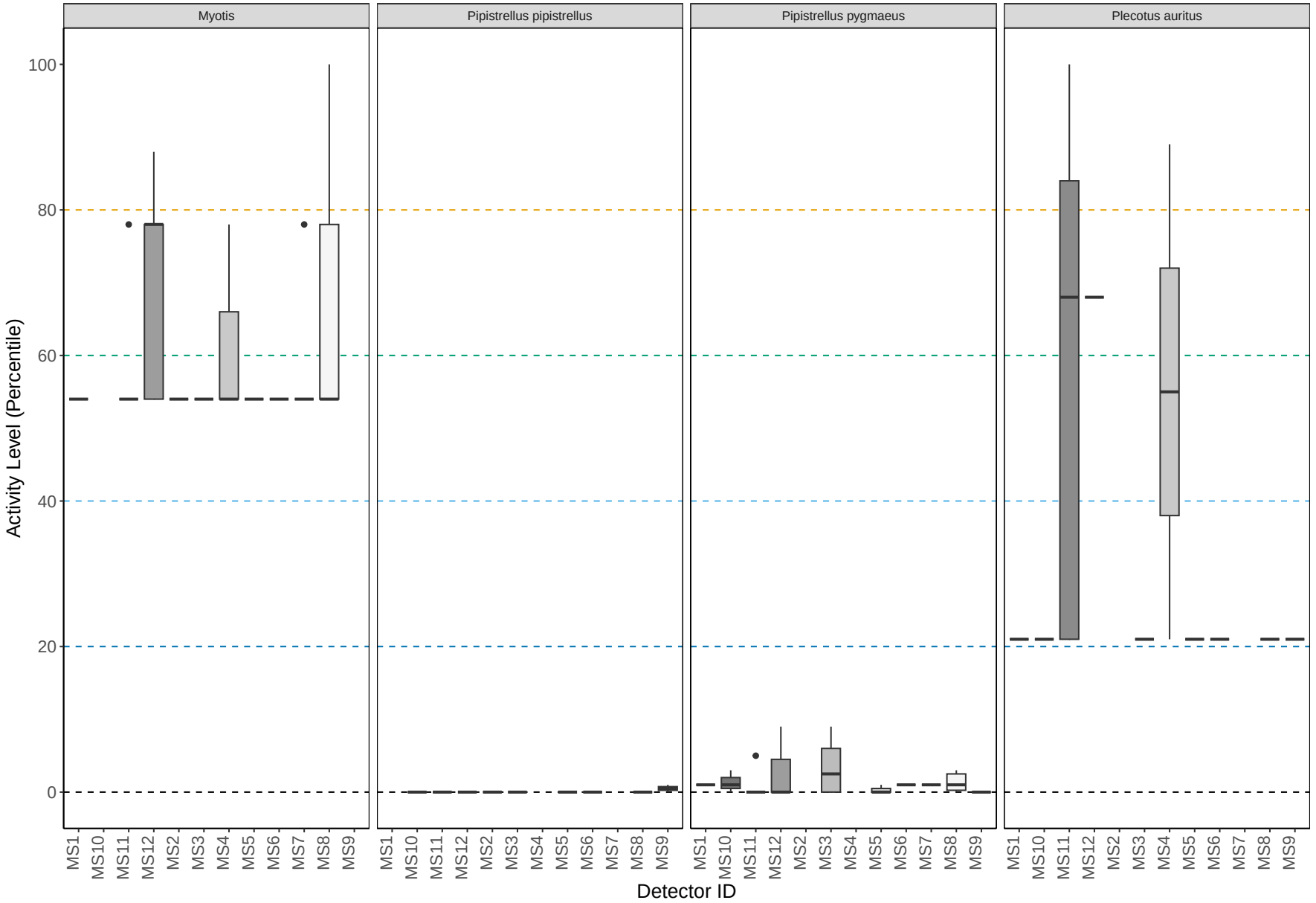
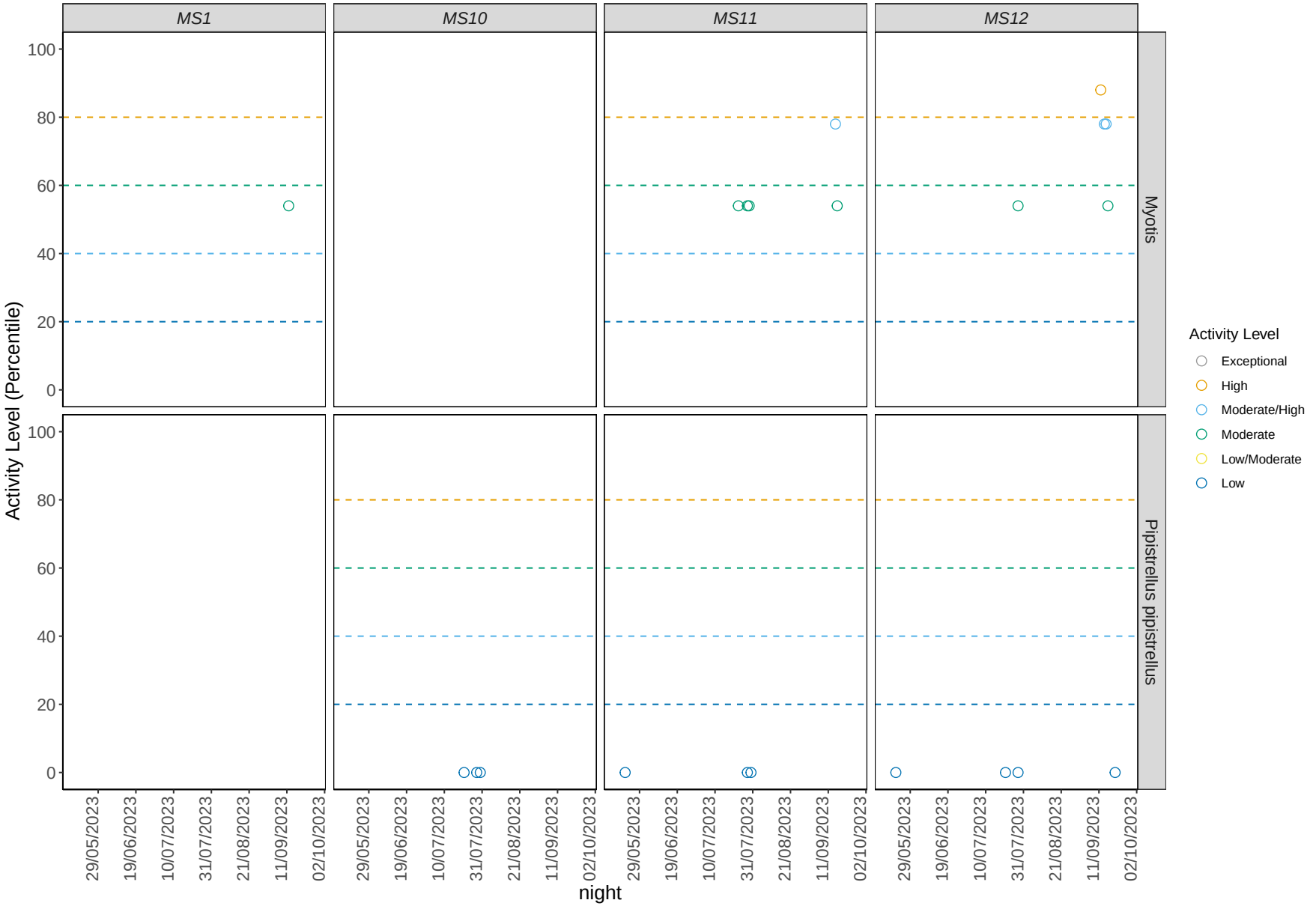
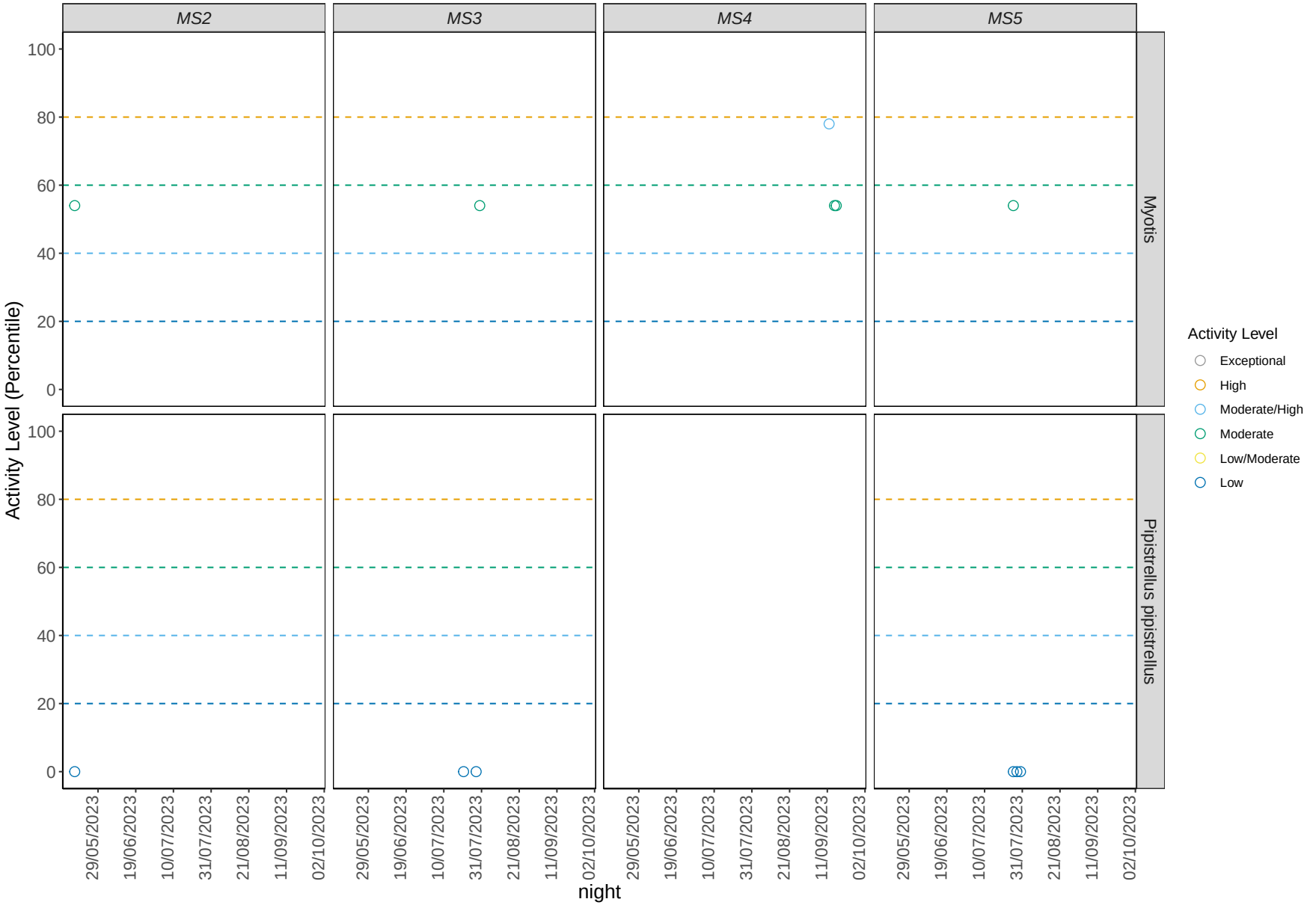
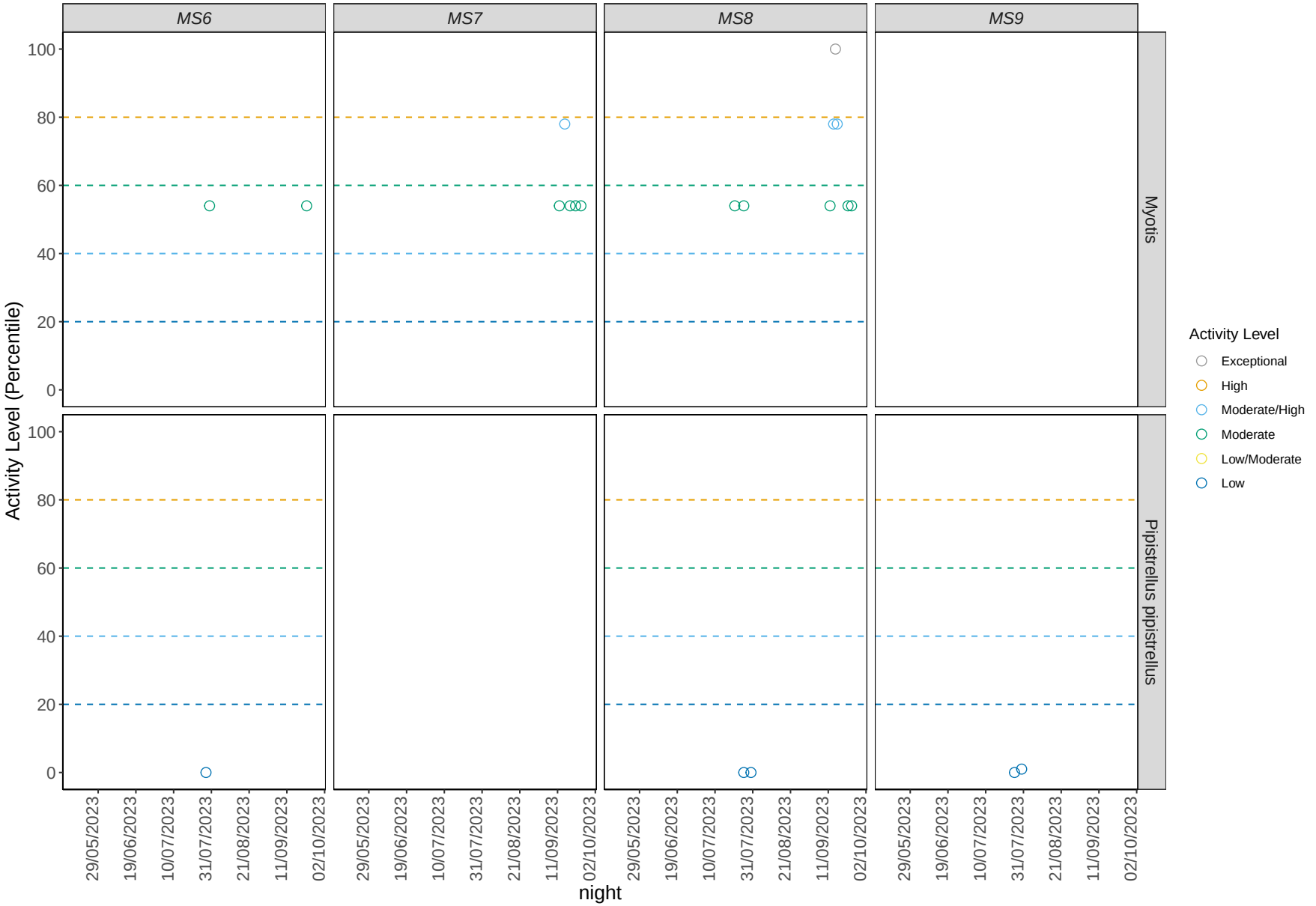
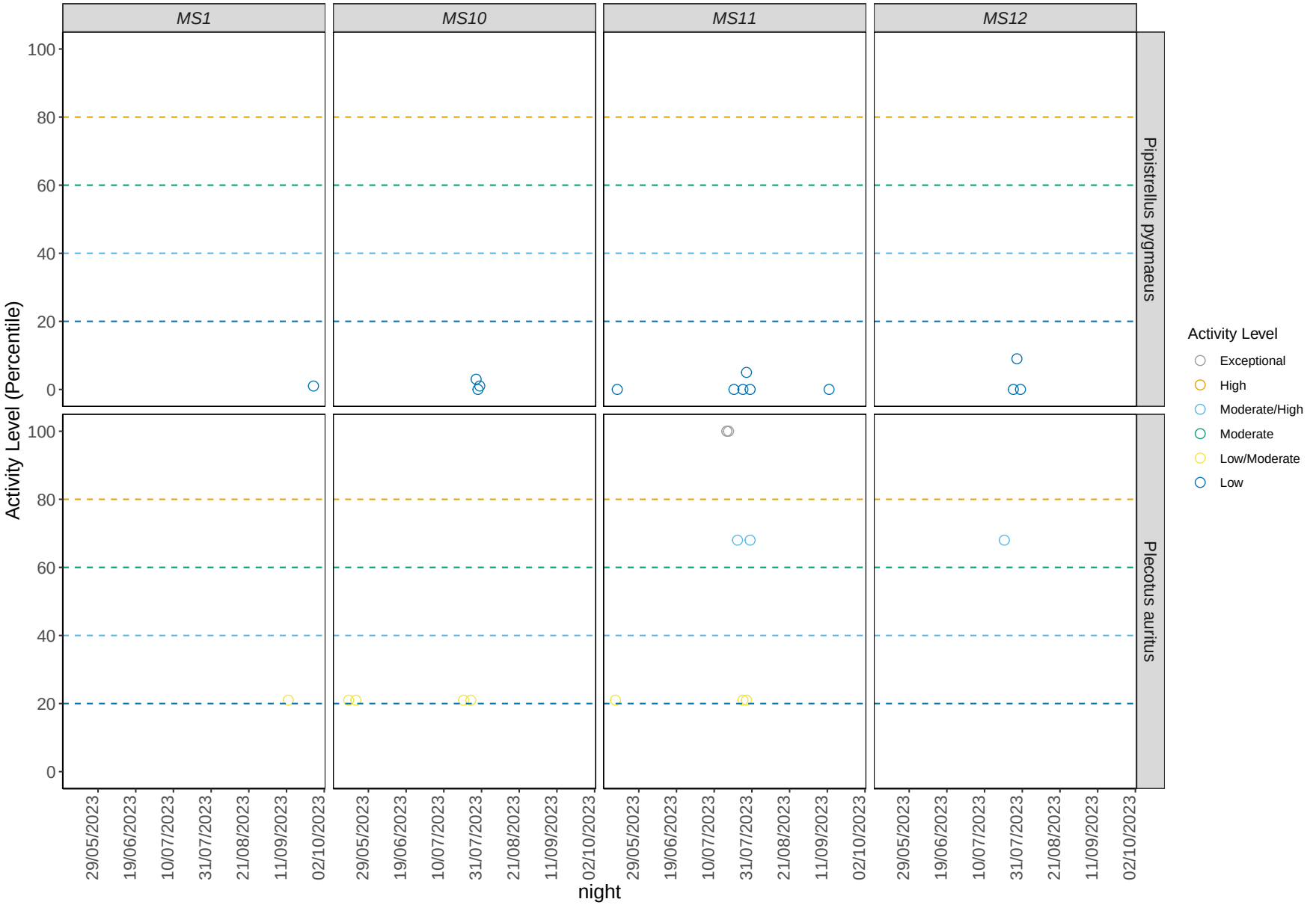

Myotis
Pipistrellus pipistrellus
Pipistrellus pygmaeus
Plecotus auritus
Activity Level (Percentile)
100
80
60
40
20
0
MS1
MS10
MS11
MS12
MS2
MS3
MS4
MS5
MS6
MS7
MS8
MS9
Detector ID

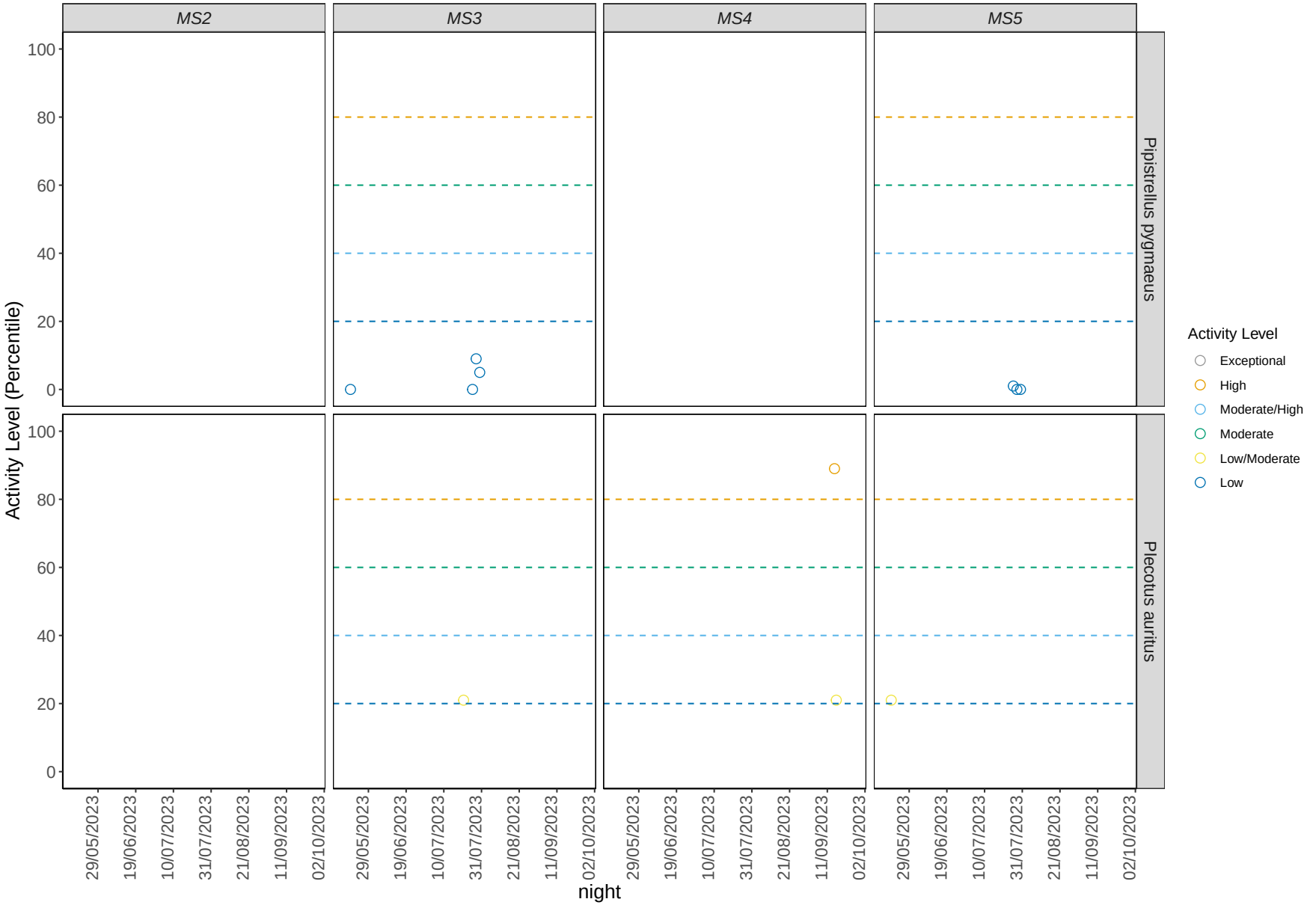
Figure 3. The activity level (percentile) of bats recorded across each night of the bat survey.


MS1
MS10
MS11
MS12
Myotis
Pipistrellus pipistrellus
Activity Level (Percentile)
100
80
60
40
20
0
29/05/2023
19/06/2023
10/07/2023
31/07/2023
21/08/2023
11/09/2023
02/10/2023
night
Activity Level
Exceptional
High
Moderate/High
Moderate
Low/Moderate
Low


MS2
MS3
MS4
MS5
Myotis
Pipistrellus pipistrellus
Activity Level (Percentile)
100
80
60
40
20
0
29/05/2023
19/06/2023
10/07/2023
31/07/2023
21/08/2023
11/09/2023
02/10/2023
night
Activity Level
Exceptional
High
Moderate/High
Moderate
Low/Moderate
Low


MS6
MS7
MS8
MS9
Myotis
Pipistrellus pipistrellus
Activity Level (Percentile)
100
80
60
40
20
0
29/05/2023
19/06/2023
10/07/2023
31/07/2023
21/08/2023
11/09/2023
02/10/2023
night
Activity Level
Exceptional
High
Moderate/High
Moderate
Low/Moderate
Low


MS1
MS10
MS11
MS12
Pipistrellus pygmaeus
Plecotus auritus
Activity Level (Percentile)
100
80
60
40
20
0
night
29/05/2023
19/06/2023
10/07/2023
31/07/2023
21/08/2023
11/09/2023
02/10/2023
Activity Level
Exceptional
High
Moderate/High
Moderate
Low/Moderate
Low


MS2
MS3
MS4
MS5
Pipistrellus pygmaeus
Plecotus auritus
Activity Level (Percentile)
100
80
60
40
20
0
night
29/05/2023
19/06/2023
10/07/2023
31/07/2023
21/08/2023
11/09/2023
02/10/2023
Activity Level
Exceptional
High
Moderate/High
Moderate
Low/Moderate
Low

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 Exceptional Activity	Nights of High Activity	Nights of Moderate/High Activity	Nights of Moderate Activity	Nights of Low/Moderate Activity	Nights of Low Activity
MS1	Myotis	Sep	0	0	0	1	0	0
MS1	Pipistrellus pygmaeus	Sep	0	0	0	0	0	1
MS1	Plecotus auritus	Sep	0	0	0	0	1	0
MS10	Pipistrellus pipistrellus	Jul	0	0	0	0	0	3
MS10	Pipistrellus pygmaeus	Jul	0	0	0	0	0	3
MS10	Plecotus auritus	May	0	0	0	0	2	0
MS10	Plecotus auritus	Jul	0	0	0	0	2	0
MS11	Myotis	Jul	0	0	0	3	0	0
MS11	Myotis	Sep	0	0	1	1	0	0
MS11	Pipistrellus pipistrellus	May	0	0	0	0	0	1
MS11	Pipistrellus pipistrellus	Jul	0	0	0	0	0	2
MS11	Pipistrellus pygmaeus	May	0	0	0	0	0	1
MS11	Pipistrellus pygmaeus	Jul	0	0	0	0	0	4
MS11	Pipistrellus pygmaeus	Sep	0	0	0	0	0	1
MS11	Plecotus auritus	May	0	0	0	0	1	0
MS11	Plecotus auritus	Jul	2	0	2	0	2	0
MS12	Myotis	Jul	0	0	0	1	0	0
MS12	Myotis	Sep	0	1	2	1	0	0
MS12	Pipistrellus pipistrellus	May	0	0	0	0	0	1
MS12	Pipistrellus pipistrellus	Jul	0	0	0	0	0	2

Detector ID	Species/Species Group	month	Nights of Exceptional Activity	Nights of High Activity	Nights of Moderate/High Activity	Nights of Moderate Activity	Nights of Low/Moderate Activity	Nights of Low Activity
MS12	Pipistrellus pipistrellus	Sep	0	0	0	0	0	1
MS12	Pipistrellus pygmaeus	Jul	0	0	0	0	0	3
MS12	Plecotus auritus	Jul	0	0	1	0	0	0
MS2	Myotis	May	0	0	0	1	0	0
MS2	Pipistrellus pipistrellus	May	0	0	0	0	0	1
MS3	Myotis	Jul	0	0	0	1	0	0
MS3	Pipistrellus pipistrellus	Jul	0	0	0	0	0	2
MS3	Pipistrellus pygmaeus	May	0	0	0	0	0	1
MS3	Pipistrellus pygmaeus	Jul	0	0	0	0	0	3
MS3	Plecotus auritus	Jul	0	0	0	0	1	0
MS4	Myotis	Sep	0	0	1	2	0	0
MS4	Plecotus auritus	Sep	0	1	0	0	1	0
MS5	Myotis	Jul	0	0	0	1	0	0
MS5	Pipistrellus pipistrellus	Jul	0	0	0	0	0	3
MS5	Pipistrellus pygmaeus	Jul	0	0	0	0	0	3
MS5	Plecotus auritus	May	0	0	0	0	1	0
MS6	Myotis	Jul	0	0	0	1	0	0
MS6	Myotis	Sep	0	0	0	1	0	0
MS6	Pipistrellus pipistrellus	Jul	0	0	0	0	0	1
MS6	Pipistrellus pygmaeus	Jul	0	0	0	0	0	1
MS6	Plecotus auritus	May	0	0	0	0	1	0
MS6	Plecotus auritus	Sep	0	0	0	0	2	0
MS7	Myotis	Sep	0	0	1	4	0	0

Detector ID	Species/Species Group	month	Nights of Exceptional Activity	Nights of High Activity	Nights of Moderate/High Activity	Nights of Moderate Activity	Nights of Low/Moderate Activity	Nights of Low Activity
MS7	Pipistrellus pygmaeus	Jul	0	0	0	0	0	1
MS8	Myotis	Jul	0	0	0	2	0	0
MS8	Myotis	Sep	1	0	2	3	0	0
MS8	Pipistrellus pipistrellus	Jul	0	0	0	0	0	2
MS8	Pipistrellus pygmaeus	May	0	0	0	0	0	1
MS8	Pipistrellus pygmaeus	Jul	0	0	0	0	0	5
MS8	Plecotus auritus	May	0	0	0	0	1	0
MS9	Pipistrellus pipistrellus	Jul	0	0	0	0	0	2
MS9	Pipistrellus pygmaeus	Jul	0	0	0	0	0	1
MS9	Plecotus auritus	Jul	0	0	0	0	1	0

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
MS1	Myotis	Sep	54	0	54	1
MS1	Pipistrellus pygmaeus	Sep	1	0	1	1
MS1	Plecotus auritus	Sep	21	0	21	1
MS10	Pipistrellus pipistrellus	Jul	0	0 - 0	0	3
MS10	Pipistrellus pygmaeus	Jul	1	2 - 2	3	3
MS10	Plecotus auritus	May	21	21 - 21	21	2
MS10	Plecotus auritus	Jul	21	21 - 21	21	2
MS11	Myotis	Jul	54	54 - 54	54	3
MS11	Myotis	Sep	66	54 - 54	78	2
MS11	Pipistrellus pipistrellus	May	0	0 - 0	0	1
MS11	Pipistrellus pipistrellus	Jul	0	0 - 0	0	2
MS11	Pipistrellus pygmaeus	May	0	0 - 0	0	1
MS11	Pipistrellus pygmaeus	Jul	0	0 - 0	5	4
MS11	Pipistrellus pygmaeus	Sep	0	0 - 0	0	1
MS11	Plecotus auritus	May	21	21 - 84	21	1
MS11	Plecotus auritus	Jul	68	21 - 84	100	6
MS12	Myotis	Jul	54	54 - 83	54	1
MS12	Myotis	Sep	78	54 - 83	88	4
MS12	Pipistrellus pipistrellus	May	0	0 - 0	0	1
MS12	Pipistrellus pipistrellus	Jul	0	0 - 0	0	2
MS12	Pipistrellus pipistrellus	Sep	0	0 - 0	0	1
MS12	Pipistrellus pygmaeus	Jul	0	0 - 0	9	3
MS12	Plecotus auritus	Jul	68	0	68	1
MS2	Myotis	May	54	0	54	1
MS2	Pipistrellus pipistrellus	May	0	0	0	1
MS3	Myotis	Jul	54	0	54	1
MS3	Pipistrellus pipistrellus	Jul	0	0 - 0	0	2
MS3	Pipistrellus pygmaeus	May	0	7 - 7	0	1
MS3	Pipistrellus pygmaeus	Jul	5	7 - 7	9	3
MS3	Plecotus auritus	Jul	21	0	21	1
MS4	Myotis	Sep	54	54 - 54	78	3
MS4	Plecotus auritus	Sep	55	55 - 55	89	2
MS5	Myotis	Jul	54	0	54	1

Detector ID	Species/Species Group	month	Median Percentile	95% CIs	Max. Percentile	Nights Recorded
MS5	Pipistrellus pipistrellus	Jul	0	0 - 0	0	3
MS5	Pipistrellus pygmaeus	Jul	0	0 - 0	1	3
MS5	Plecotus auritus	May	21	0	21	1
MS6	Myotis	Jul	54	54 - 54	54	1
MS6	Myotis	Sep	54	54 - 54	54	1
MS6	Pipistrellus pipistrellus	Jul	0	0	0	1
MS6	Pipistrellus pygmaeus	Jul	1	0	1	1
MS6	Plecotus auritus	May	21	21 - 21	21	1
MS6	Plecotus auritus	Sep	21	21 - 21	21	2
MS7	Myotis	Sep	54	54 - 54	78	5
MS7	Pipistrellus pygmaeus	Jul	1	0	1	1
MS8	Myotis	Jul	54	54 - 77	54	2
MS8	Myotis	Sep	66	54 - 77	100	6
MS8	Pipistrellus pipistrellus	Jul	0	0 - 0	0	2
MS8	Pipistrellus pygmaeus	May	0	1 - 3	0	1
MS8	Pipistrellus pygmaeus	Jul	1	1 - 3	3	5
MS8	Plecotus auritus	May	21	0	21	1
MS9	Pipistrellus pipistrellus	Jul	1	0.5 - 0.5	1	2
MS9	Pipistrellus pygmaeus	Jul	0	0	0	1
MS9	Plecotus auritus	Jul	21	0	21	1

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 Exceptional Activity	Nights of High Activity	Nights of Moderate/High Activity	Nights of Moderate Activity	Nights of Low/Moderate Activity	Nights of Low Activity
Myotis	1	1	7	23	0	0
Pipistrellus pipistrellus	0	0	0	0	0	21
Pipistrellus pygmaeus	0	0	0	0	0	29
Plecotus auritus	2	1	3	0	16	0

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

Species/Species Group	Median Percentile	95% CIs	Max. Percentile	Nights Recorded
Myotis	54	54 - 83	100	32
Pipistrellus pipistrellus	0	0.5 - 0.5	1	21
Pipistrellus pygmaeus	0	7 - 7	9	29
Plecotus auritus	21	55 - 55	100	22

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

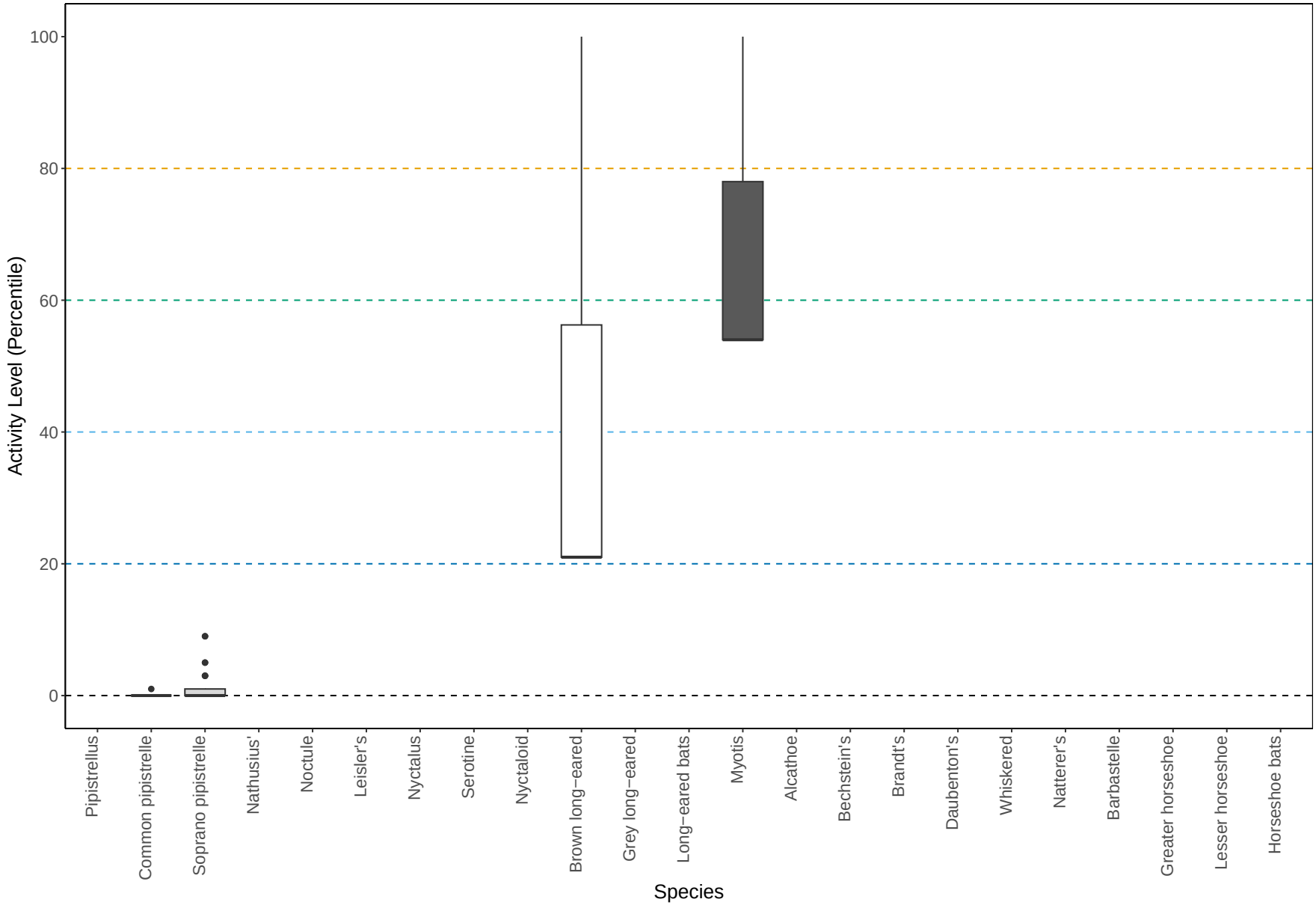
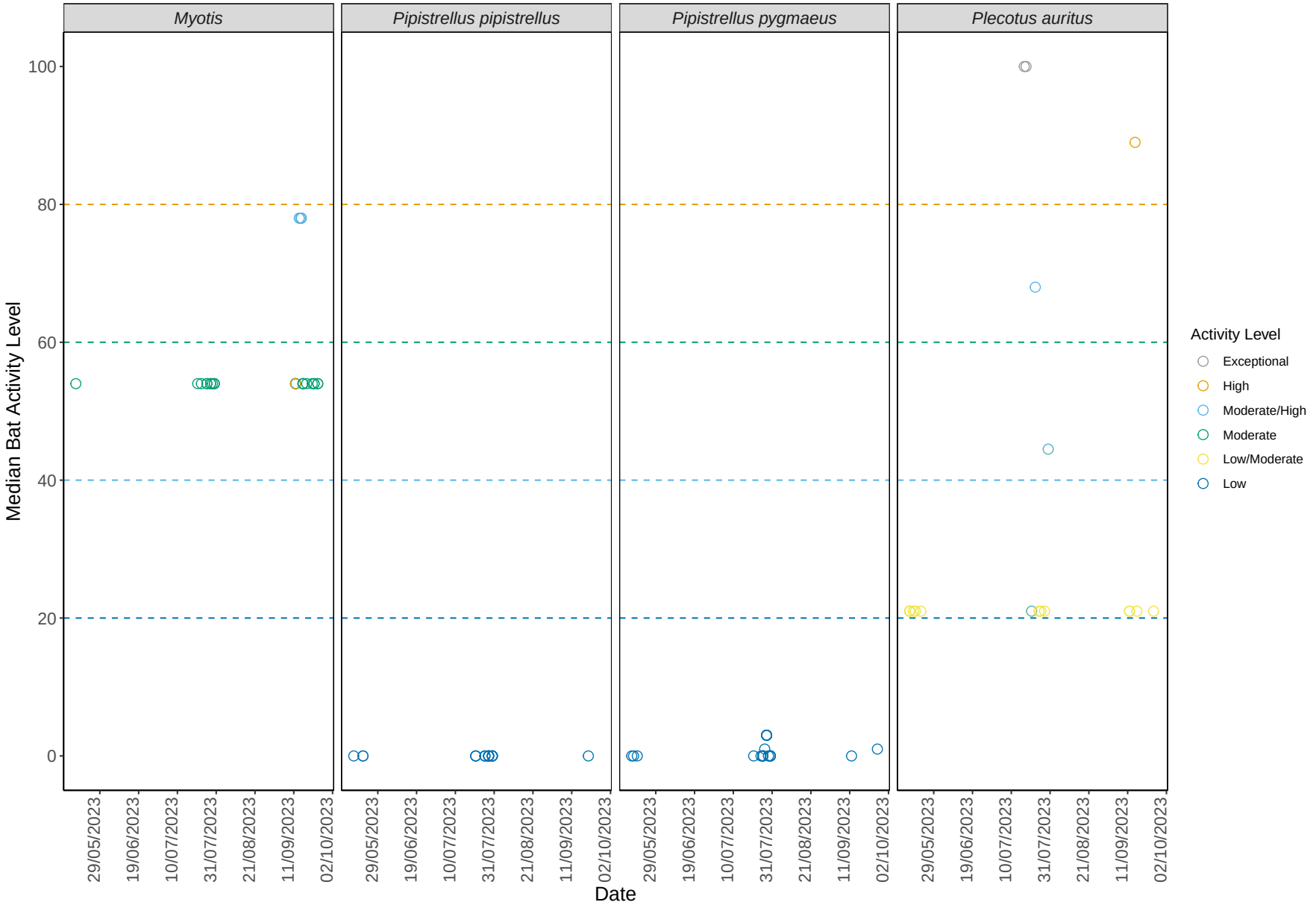

Activity Level (Percentile)
100
80
60
40
20
0
Pipistrellus
Common pipistrelle
Soprano pipistrelle
Nathusius'
Noctule
Leisler's
Nyctalus
Serotine
Nyctaloid
Brown long−eared
Grey long−eared
Long−eared bats
Myotis
Alcathoe
Bechstein's
Brandt's
Daubenton's
Whiskered
Natterer's
Barbastelle
Greater horseshoe
Lesser horseshoe
Horseshoe bats
Species

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


Myotis
Pipistrellus pipistrellus
Pipistrellus pygmaeus
Plecotus auritus
Median Bat Activity Level
100
80
60
40
20
0
29/05/2023
19/06/2023
10/07/2023
31/07/2023
21/08/2023
11/09/2023
02/10/2023
Date
Activity Level
Exceptional
High
Moderate/High
Moderate
Low/Moderate
Low

Per Site, Per Month

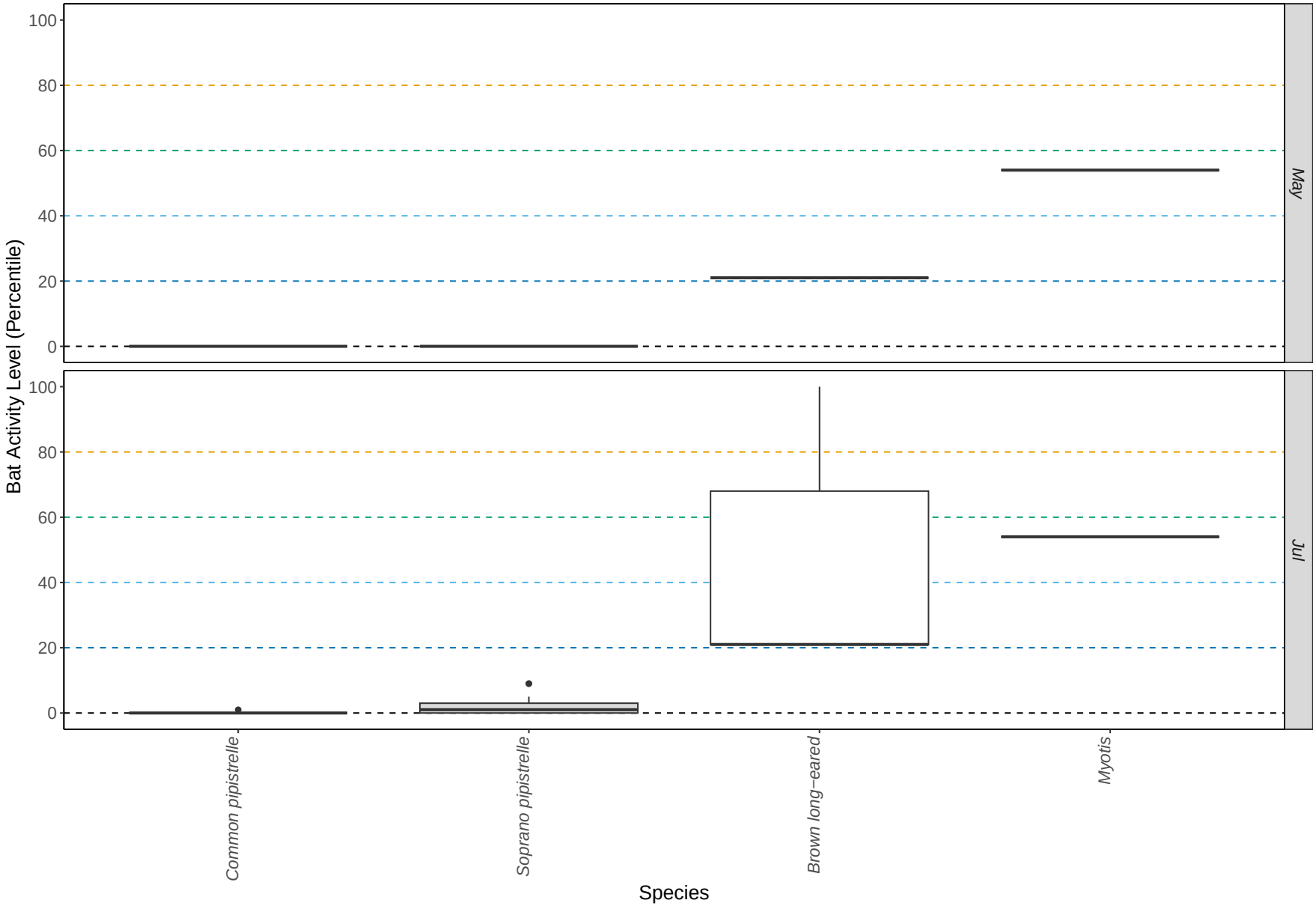
Table 9. Summary table showing the number of nights recorded bat activity fell into each activity band for each species during each month.

Species/Species Group	month	Nights of Exceptional Activity	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	0	0	1	0	0
Myotis	Jul	0	0	0	9	0	0
Myotis	Sep	1	1	7	13	0	0
Pipistrellus pipistrellus	May	0	0	0	0	0	3
Pipistrellus pipistrellus	Jul	0	0	0	0	0	17
Pipistrellus pipistrellus	Sep	0	0	0	0	0	1
Pipistrellus pygmaeus	May	0	0	0	0	0	3
Pipistrellus pygmaeus	Jul	0	0	0	0	0	24
Pipistrellus pygmaeus	Sep	0	0	0	0	0	2
Plecotus auritus	May	0	0	0	0	6	0
Plecotus auritus	Jul	2	0	3	0	6	0
Plecotus auritus	Sep	0	1	0	0	4	0

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	54	0	54	1
Myotis	Jul	54	54 - 83	54	9
Myotis	Sep	54	54 - 83	100	22
Pipistrellus pipistrellus	May	0	0 - 0	0	3
Pipistrellus pipistrellus	Jul	0	0.5 - 0.5	1	17
Pipistrellus pipistrellus	Sep	0	0 - 0	0	1
Pipistrellus pygmaeus	May	0	7 - 7	0	3
Pipistrellus pygmaeus	Jul	1	7 - 7	9	24
Pipistrellus pygmaeus	Sep	1	0 - 0	1	2
Plecotus auritus	May	21	21 - 84	21	6
Plecotus auritus	Jul	21	21 - 84	100	11
Plecotus auritus	Sep	21	55 - 55	89	5

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


Bat Activity Level (Percentile)
100
80
60
40
20
0
May
Jul
Common pipistrelle
Soprano pipistrelle
Brown long−eared
Myotis
Species

Part 2: Nightly Analysis

Entire Survey Period

Sunrise and Sunset Times

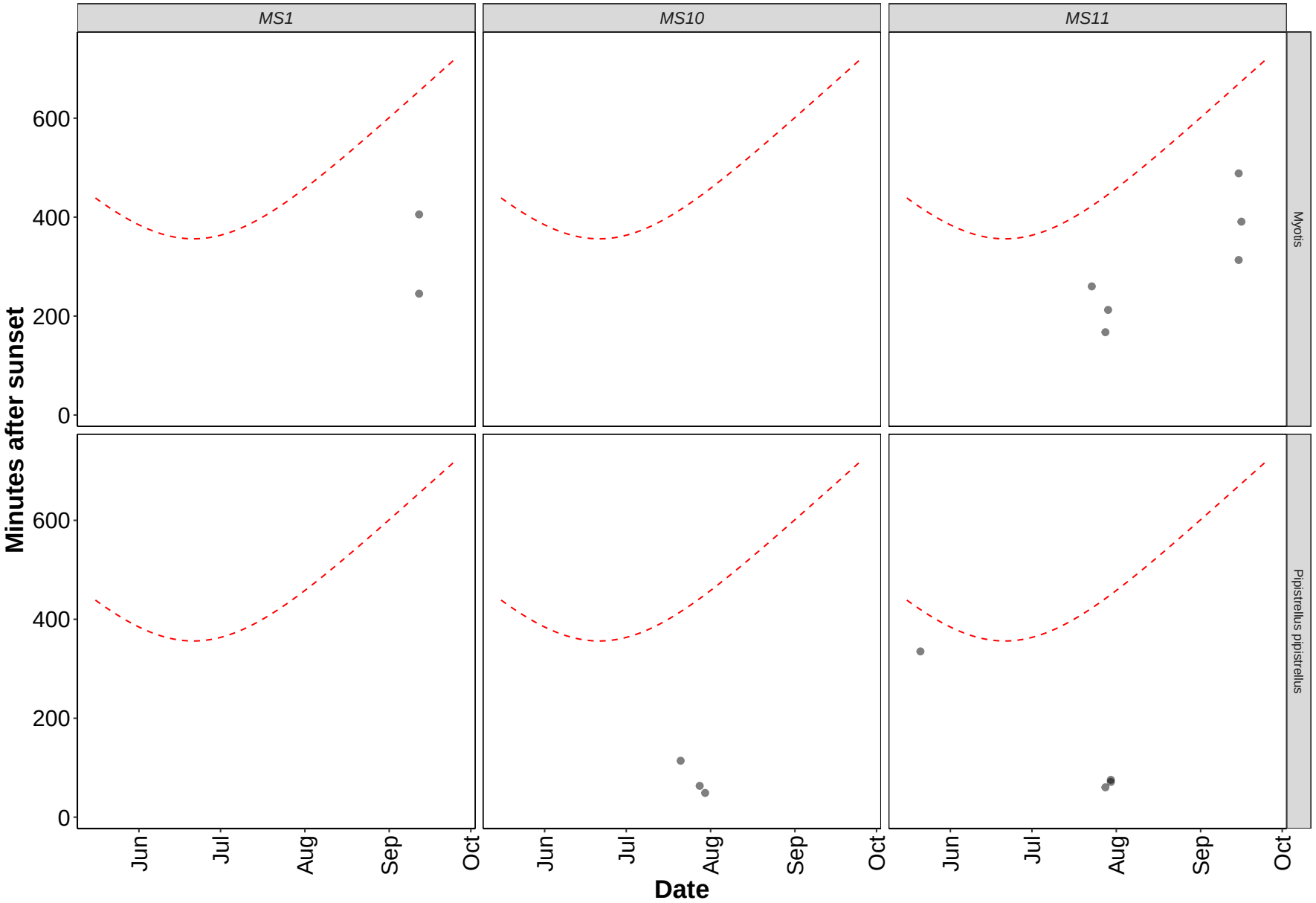
Table 11. The times of sunset and sunrise the following morning for surveys beginning on the date shown.

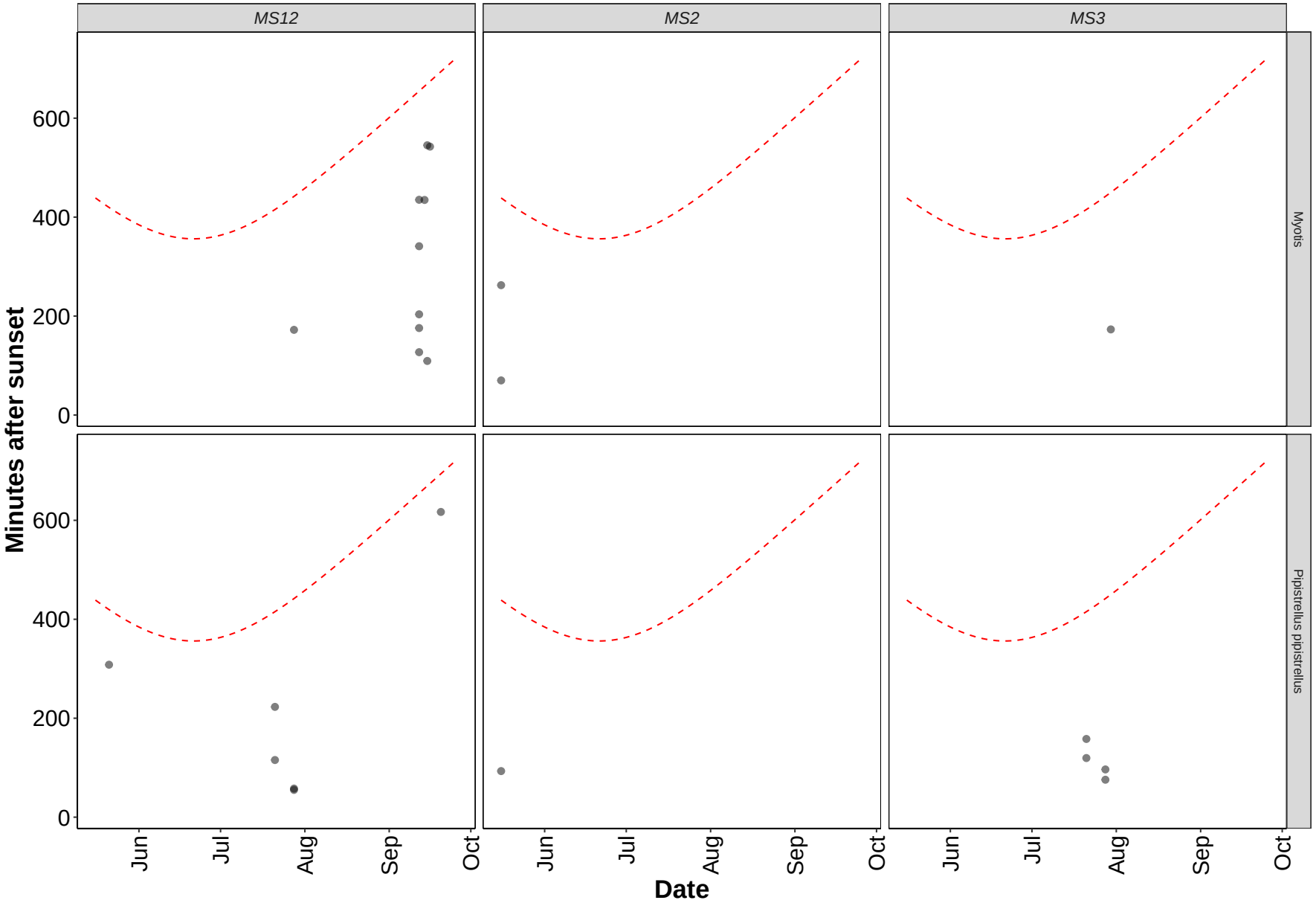
Night (y-m-d)	Sunset (h:m)	Sunrise (h:m)	Night Length (hours)
2023-05-16	21:35	04:54	7.3
2023-05-17	21:38	04:52	7.2
2023-05-18	21:40	04:50	7.2
2023-05-19	21:42	04:49	7.1
2023-05-21	21:45	04:45	7.0
2023-05-22	21:47	04:43	6.9
2023-07-17	22:05	04:47	6.7
2023-07-18	22:04	04:49	6.8
2023-07-21	21:59	04:54	6.9
2023-07-23	21:55	04:58	7.0
2023-07-25	21:52	05:02	7.2
2023-07-26	21:50	05:04	7.2
2023-07-27	21:48	05:06	7.3
2023-07-28	21:46	05:08	7.4
2023-07-29	21:44	05:10	7.4
2023-07-30	21:42	05:12	7.5
2023-09-12	19:50	06:44	10.9
2023-09-14	19:44	06:49	11.1
2023-09-15	19:41	06:51	11.2
2023-09-16	19:38	06:53	11.2
2023-09-18	19:33	06:57	11.4
2023-09-20	19:27	07:01	11.6
2023-09-21	19:24	07:03	11.6
2023-09-22	19:21	07:05	11.7
2023-09-24	19:16	07:09	11.9
2023-09-25	19:13	07:12	12.0
2023-09-26	19:10	07:14	12.1

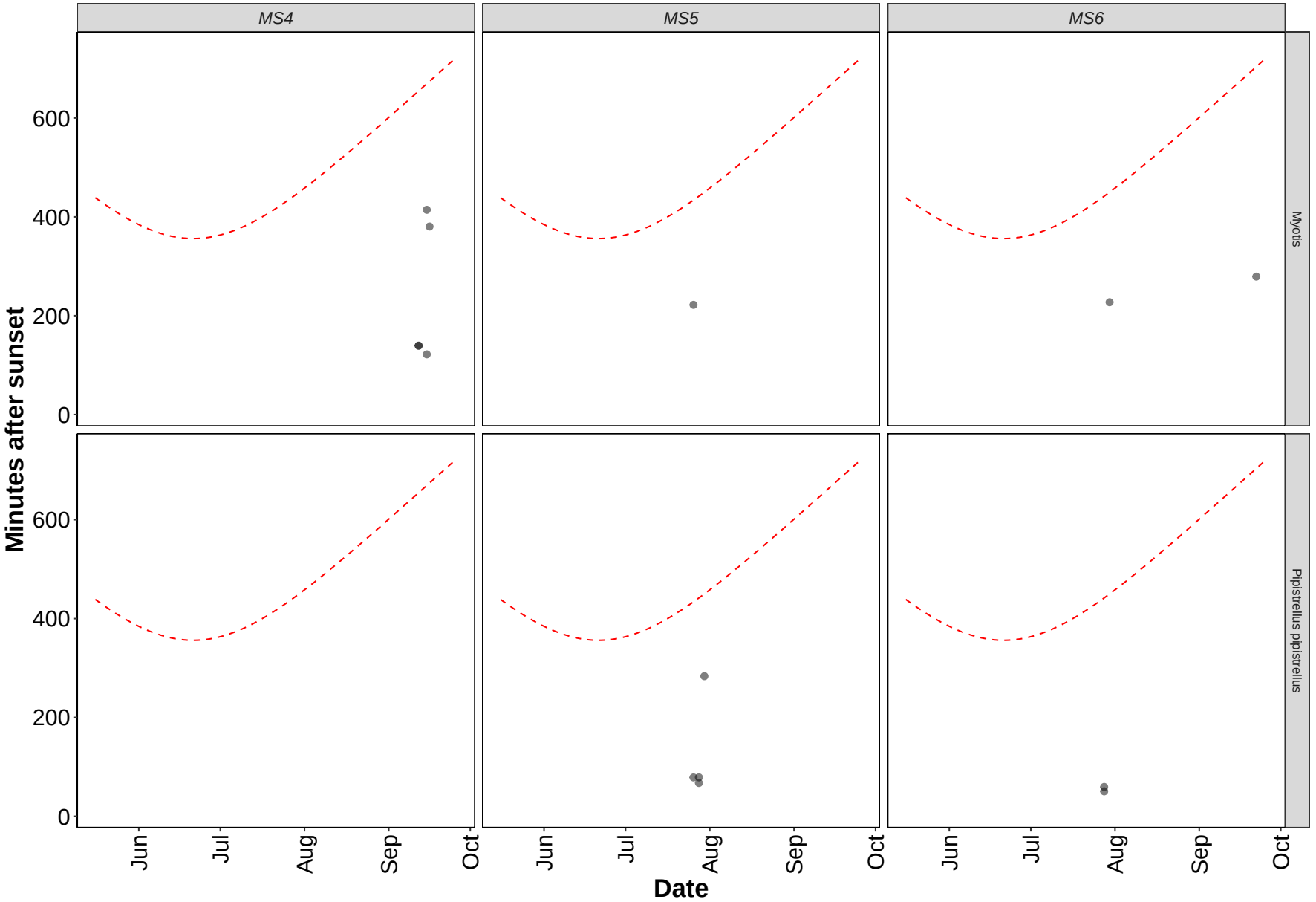
Distribution of Bat Activity Across the Night through Time

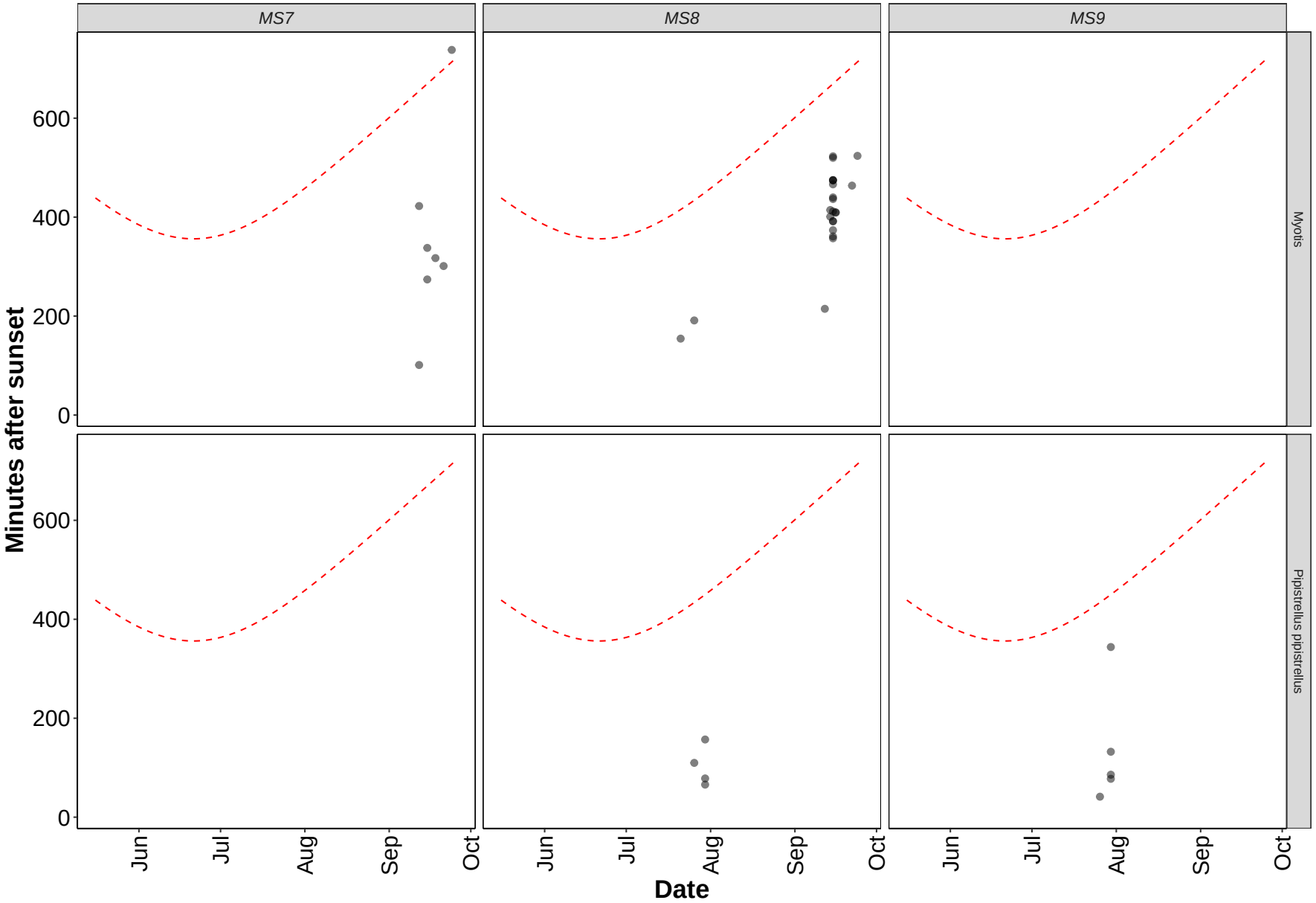
Per Detector

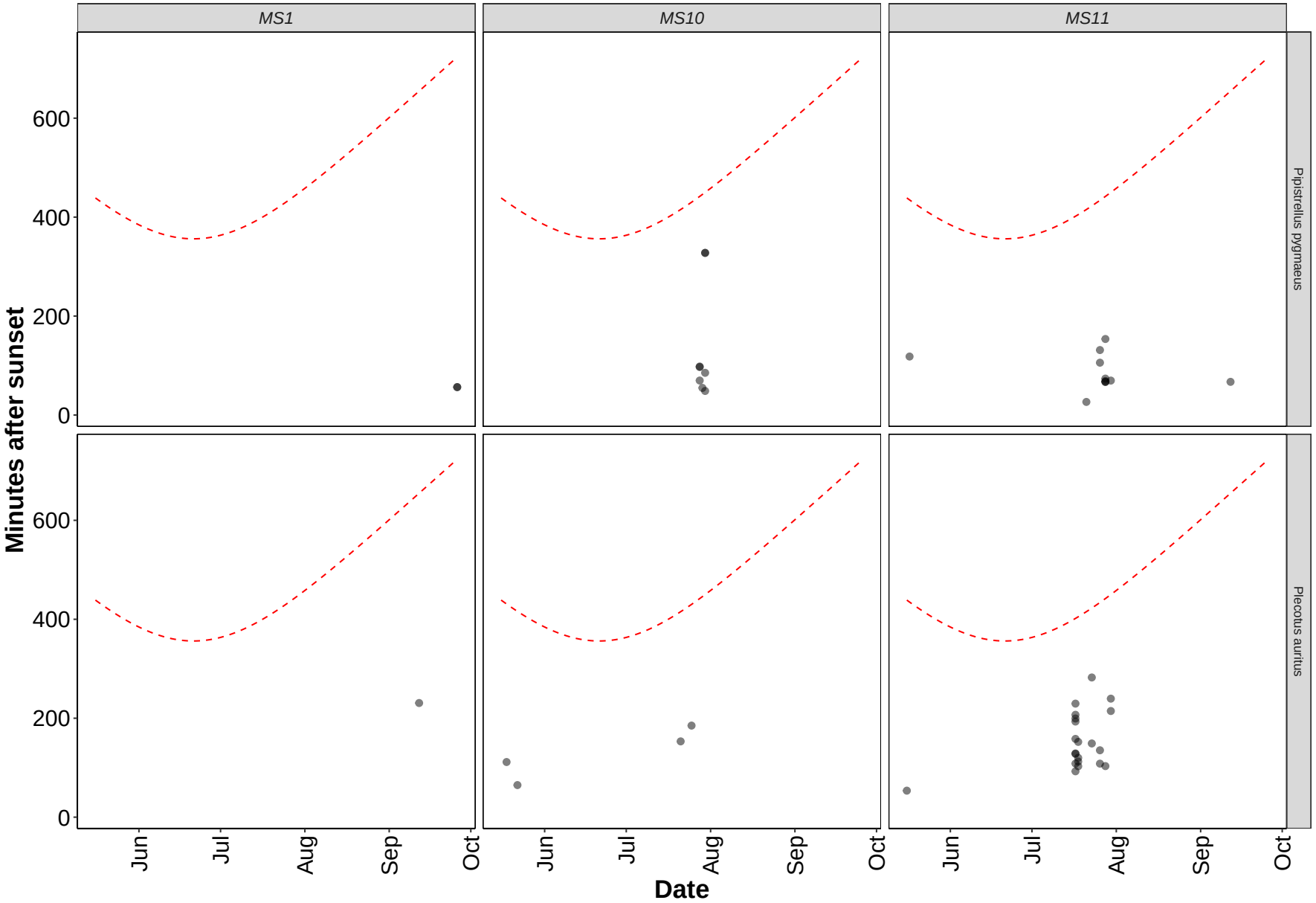
Figure 7. Timing of bat calls plotted as minutes before/after sunset, whereby 0 on the y axis represents sunset. Sunrise throughout the survey period is depicted as the red dashed line. Colours indicate kernel densities, with darkest colours showing peaks of activity. These colours are comparative only within each plot, and do not account for overall activity.

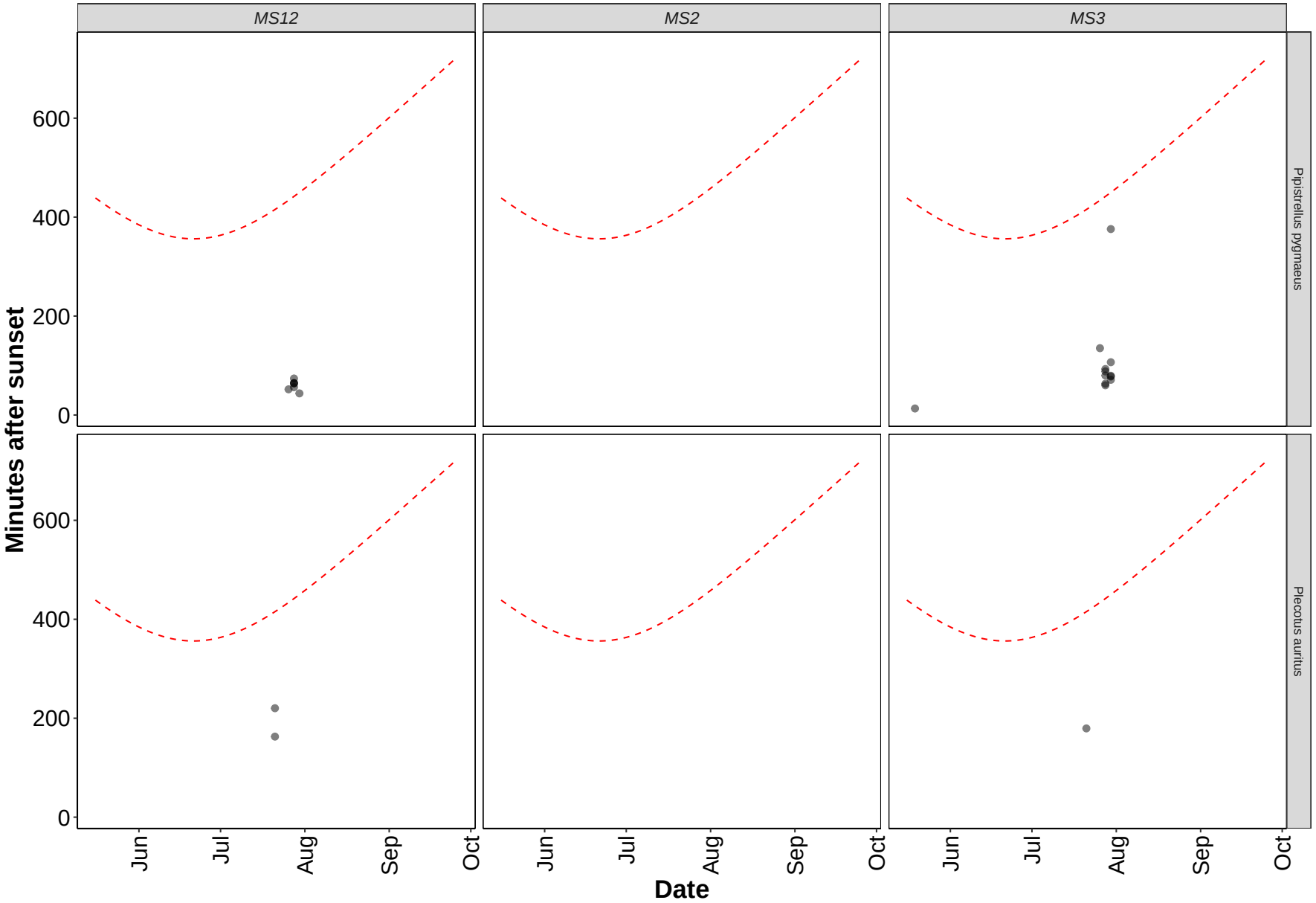

MS1
MS10
MS11
Myotis
Pipistrellus pipistrellus
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Oct
Date

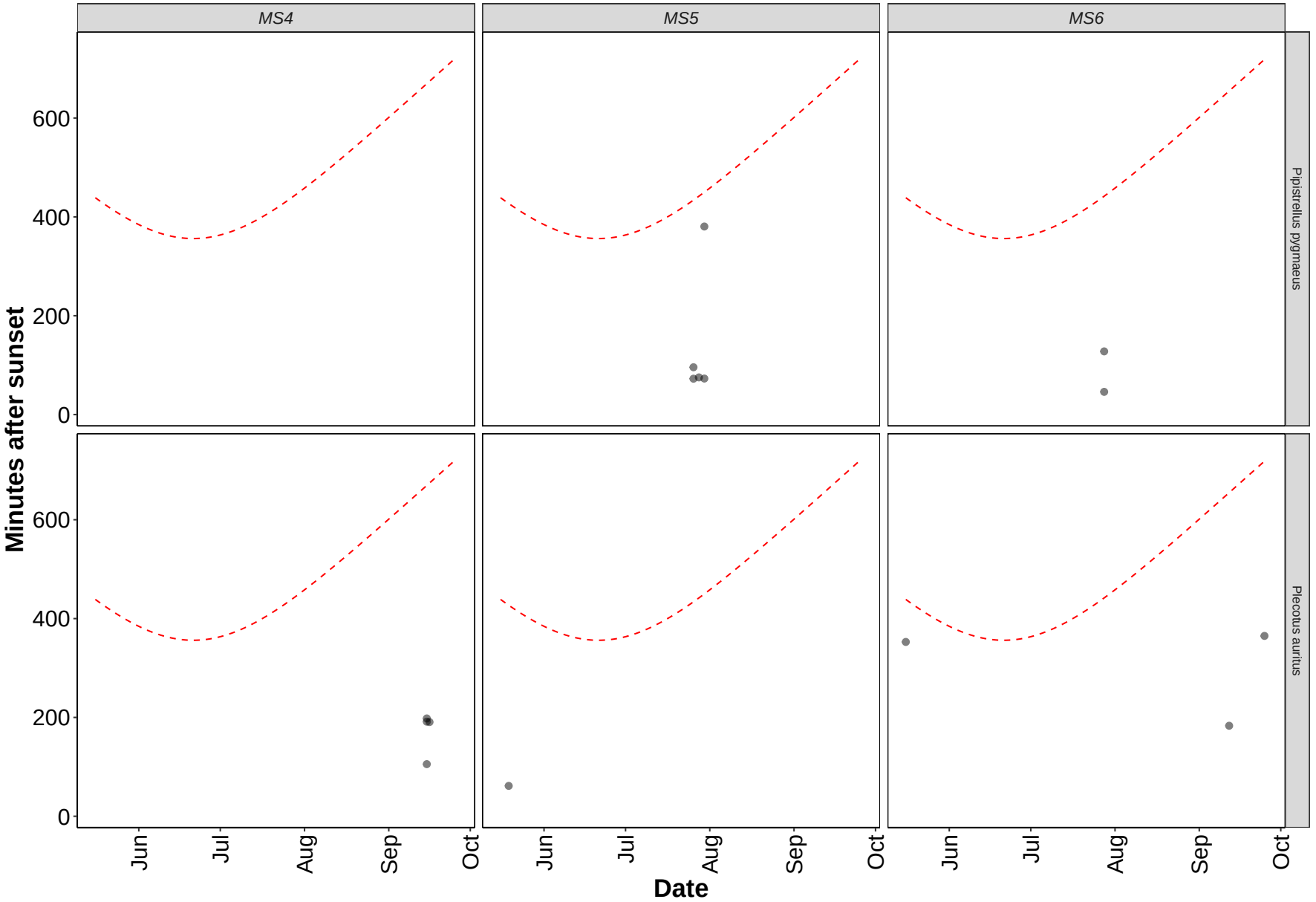

MS12
MS2
MS3
Myotis
Pipistrellus pipistrellus
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Oct
Date


MS4
MS5
MS6
Myotis
Pipistrellus pipistrellus
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Oct
Date


MS7
MS8
MS9
Myotis
Pipistrellus pipistrellus
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Oct
Date


MS1
MS10
MS11
Pipistrellus pygmaeus
Plecotus auritus
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Oct
Date


MS12
MS2
MS3
Pipistrellus pygmaeus
Plecotus auritus
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Oct
Date


MS4
MS5
MS6
Pipistrellus pygmaeus
Plecotus auritus
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Oct
Date

Roost Emergence Time and Bat Observation

Based on: Russ, Jon. 2012. British Bat Calls a Guide to species Identification. Pelagic Publishing.

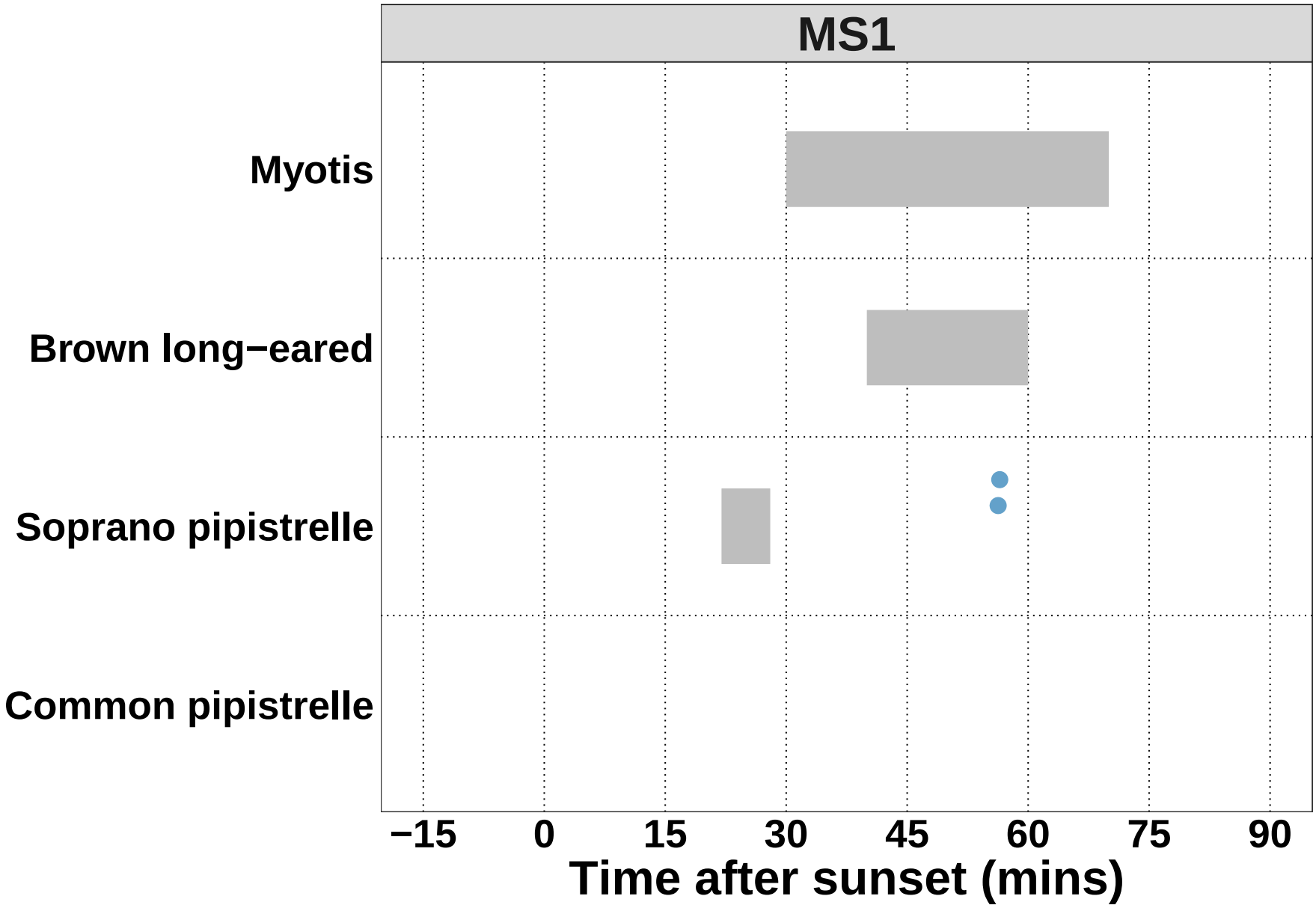
Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012)

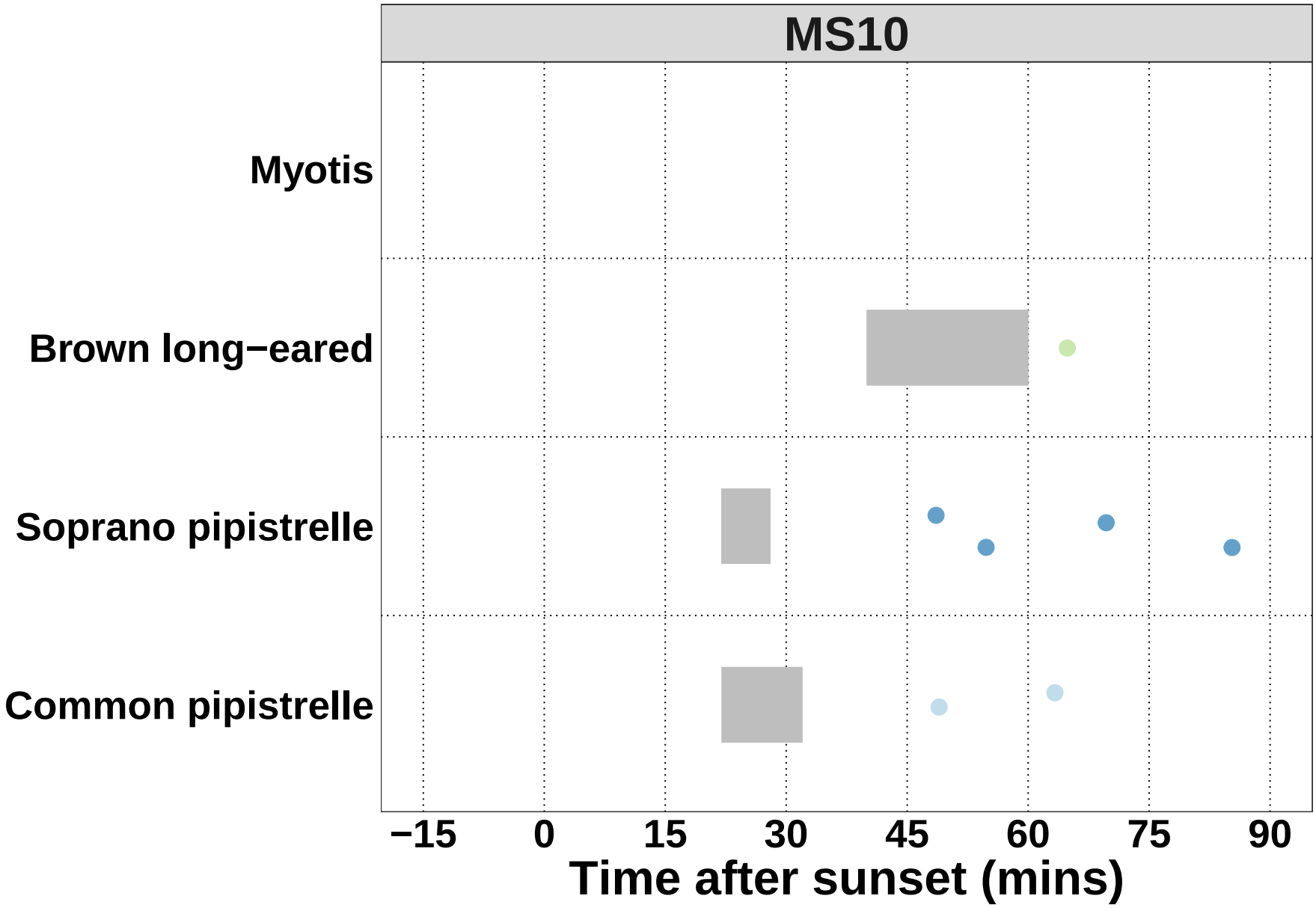
Table 12. Number of bat calls recorded before the upper time of the species-specific emergence time range, and which therefore may potentially indicate the presence of a nearby roost.

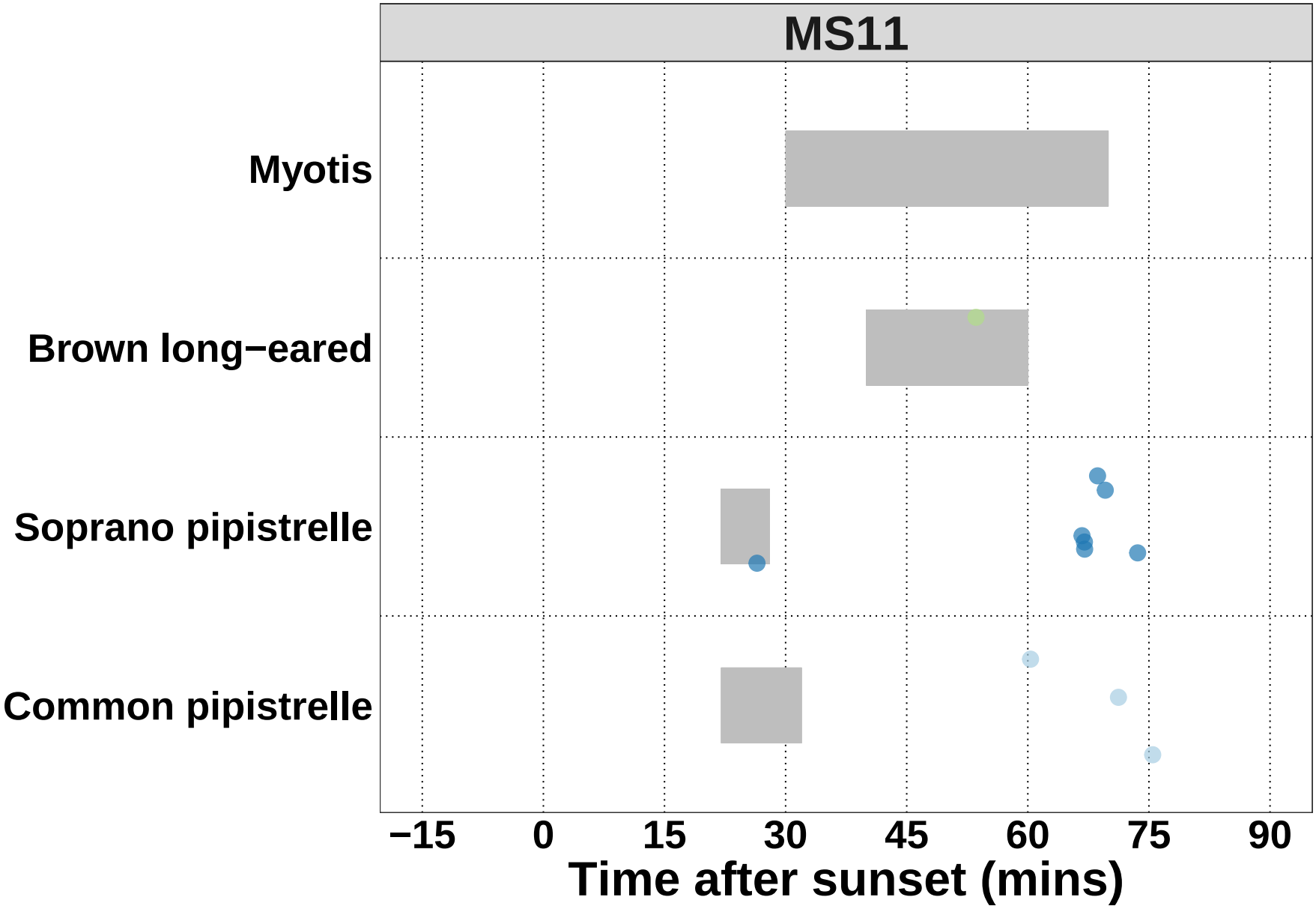
Species	Detector ID	2023-05-16	2023-05-19	2023-07-21
Soprano pipistrelle	MS11	0	0	1
Soprano pipistrelle	MS3	0	1	0
Brown long-eared	MS11	1	0	0
Myotis	MS2	1	0	0

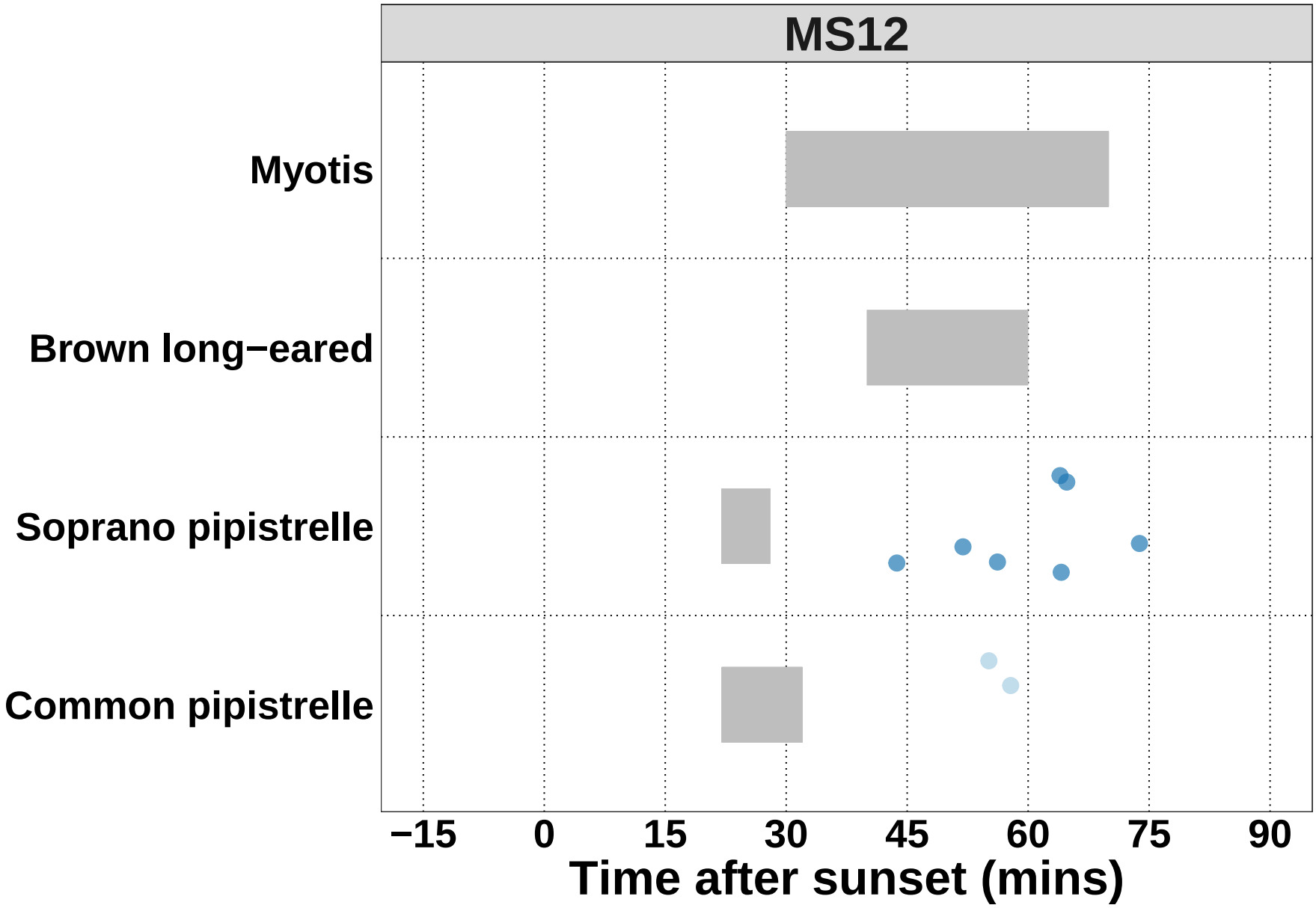
Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012)

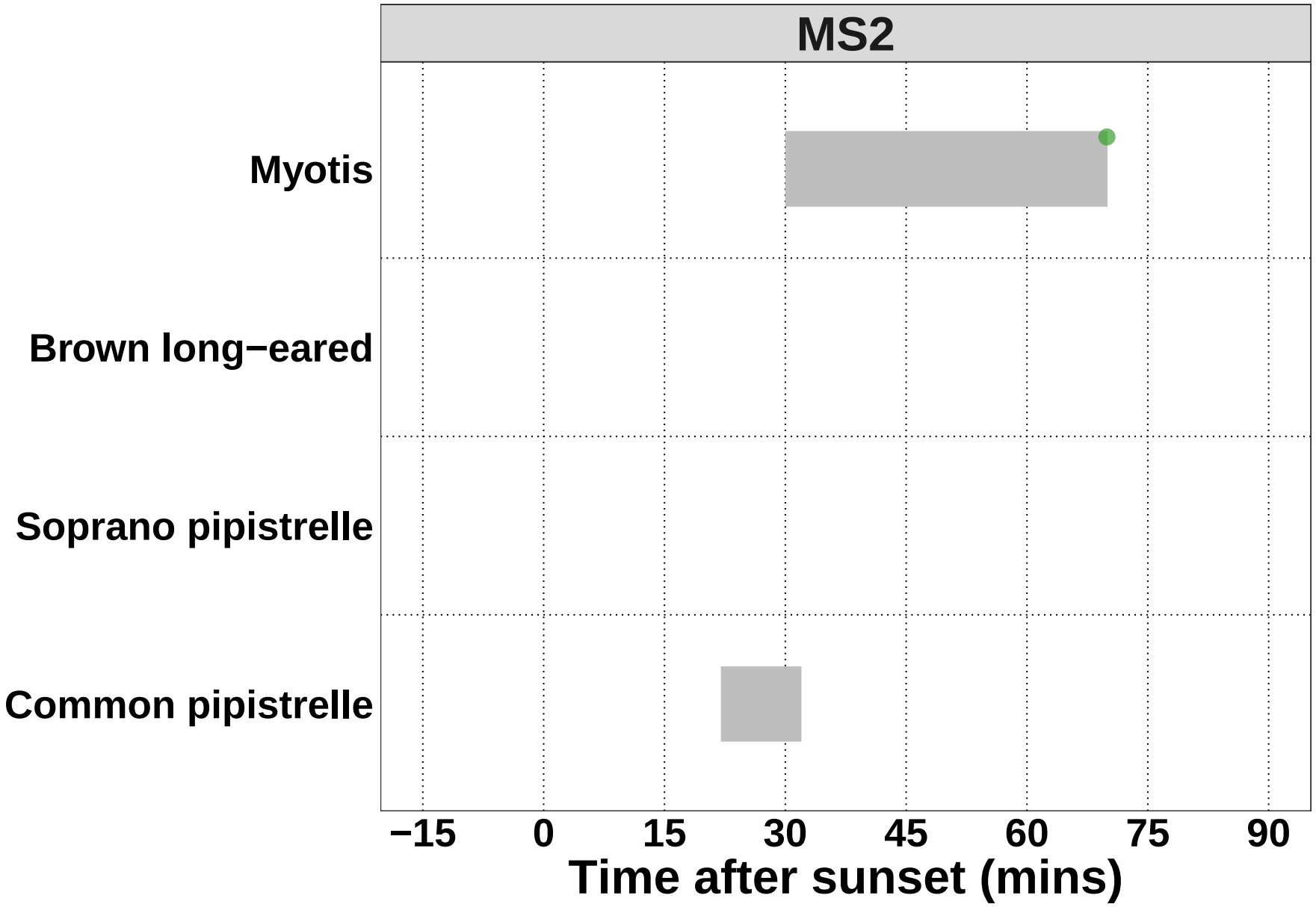
Figure 8. Time from 15 minutes before to 90 minutes after sunset. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occuring earlier than this time range, may potentially indicate the presence of a nearby roost.

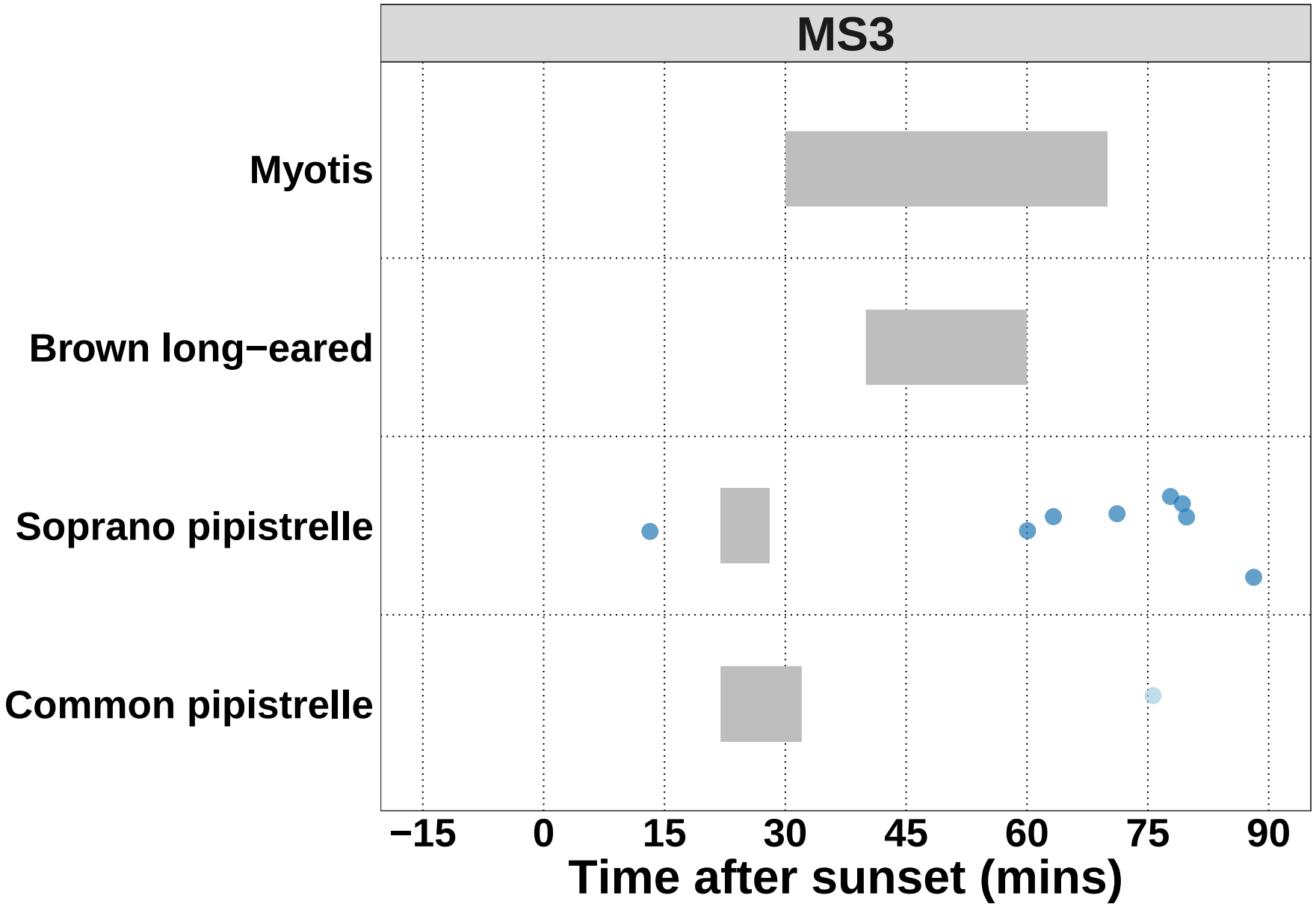

MS1
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

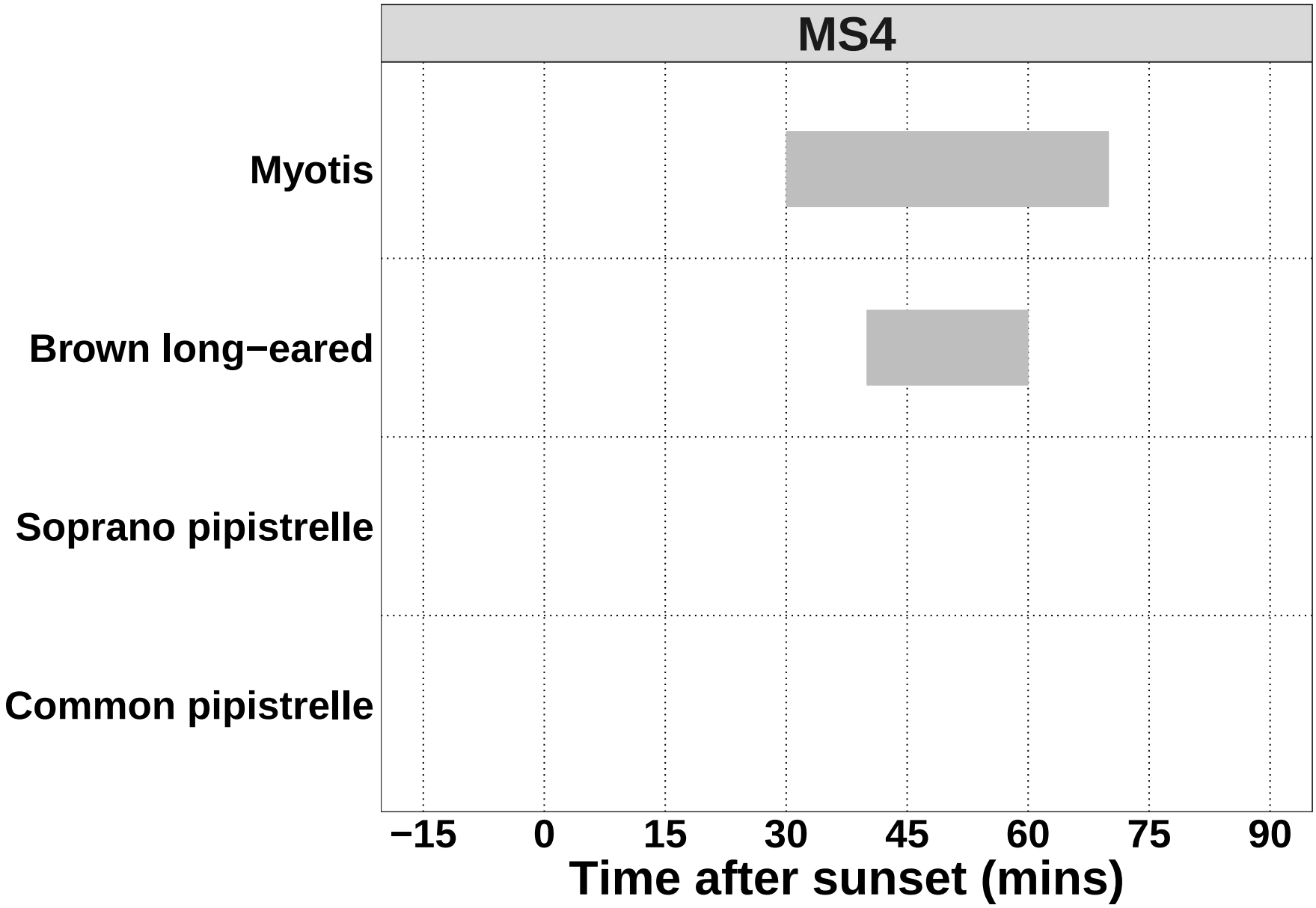

MS10
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

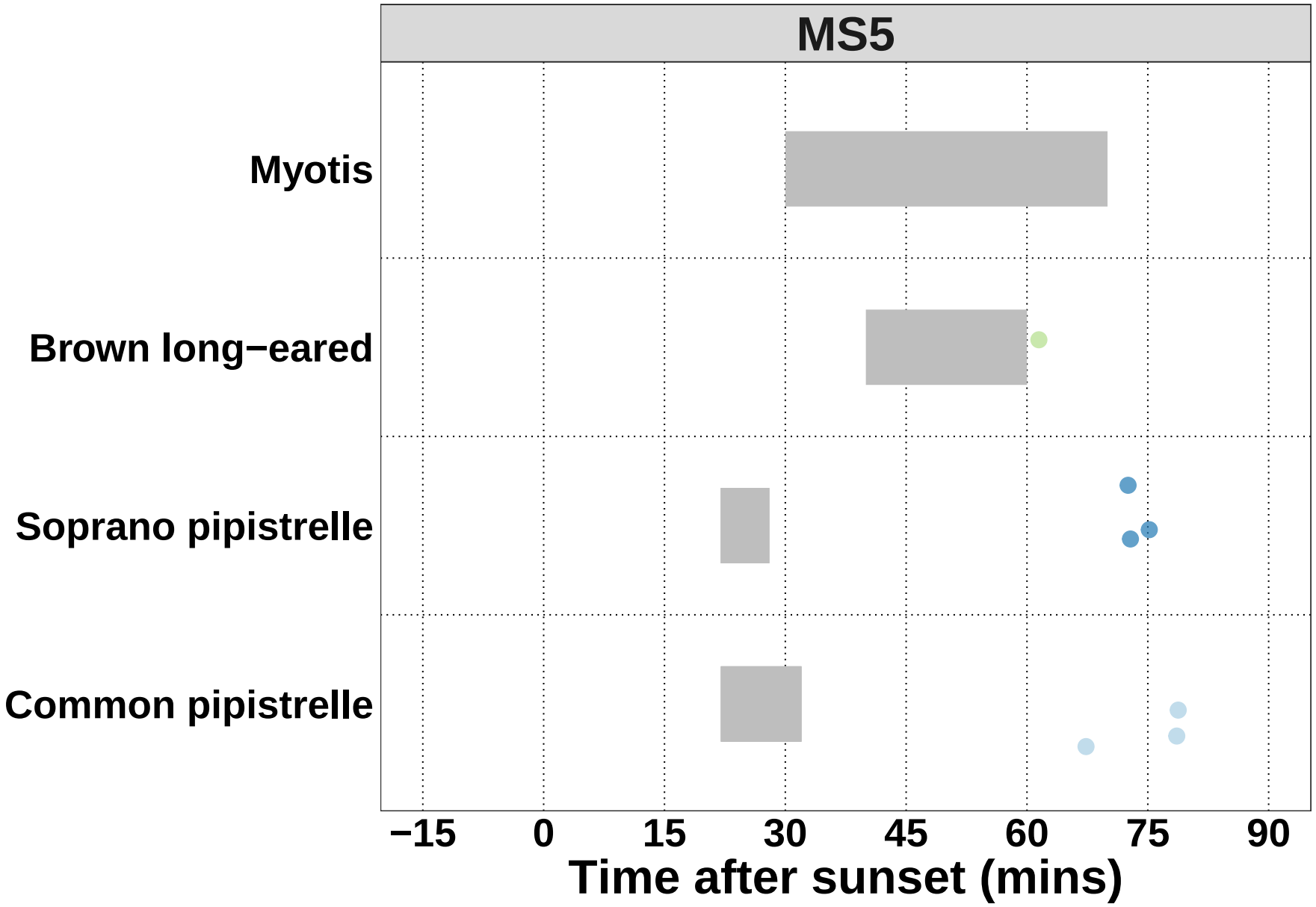

MS11
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

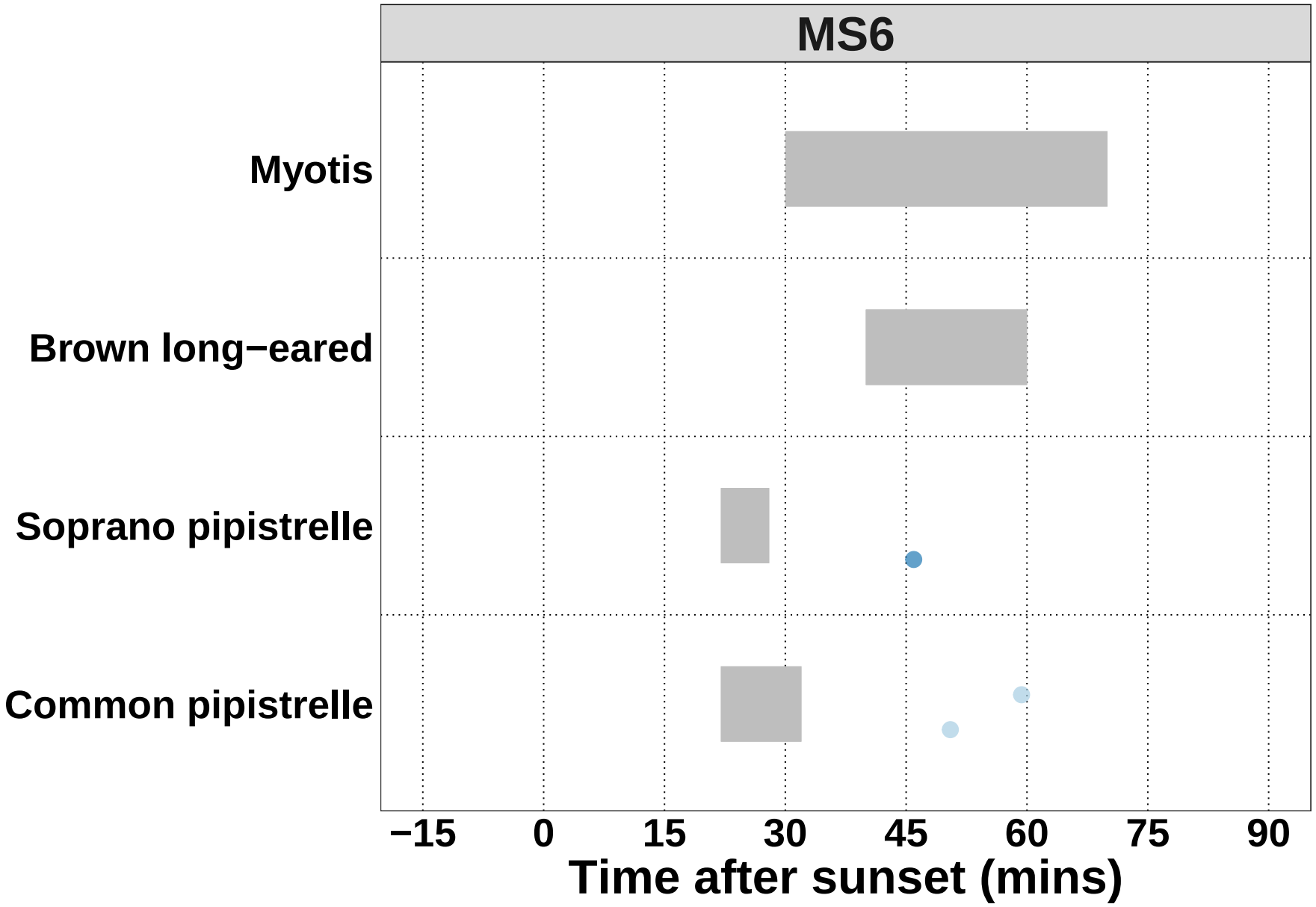

MS12
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

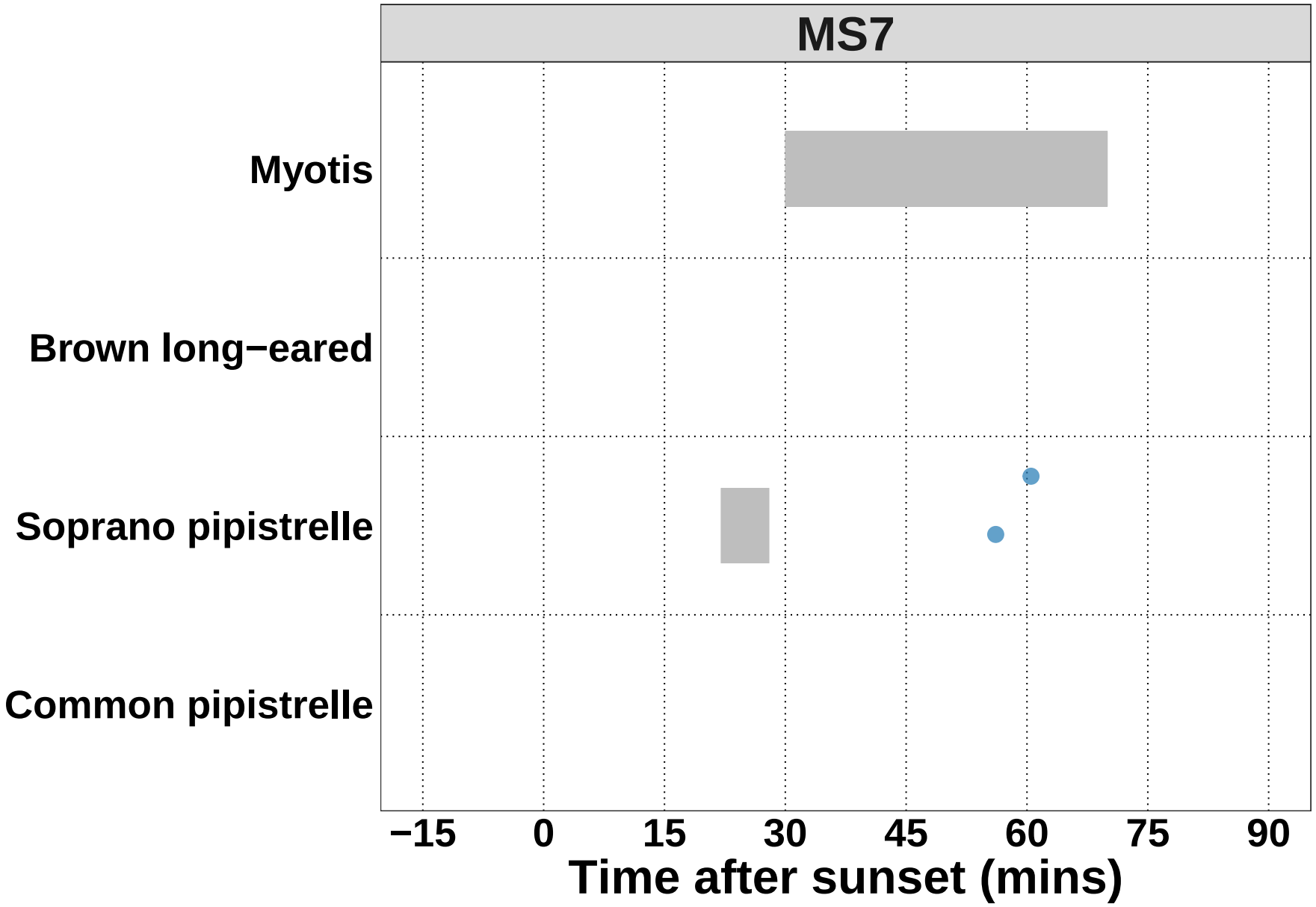

MS2
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

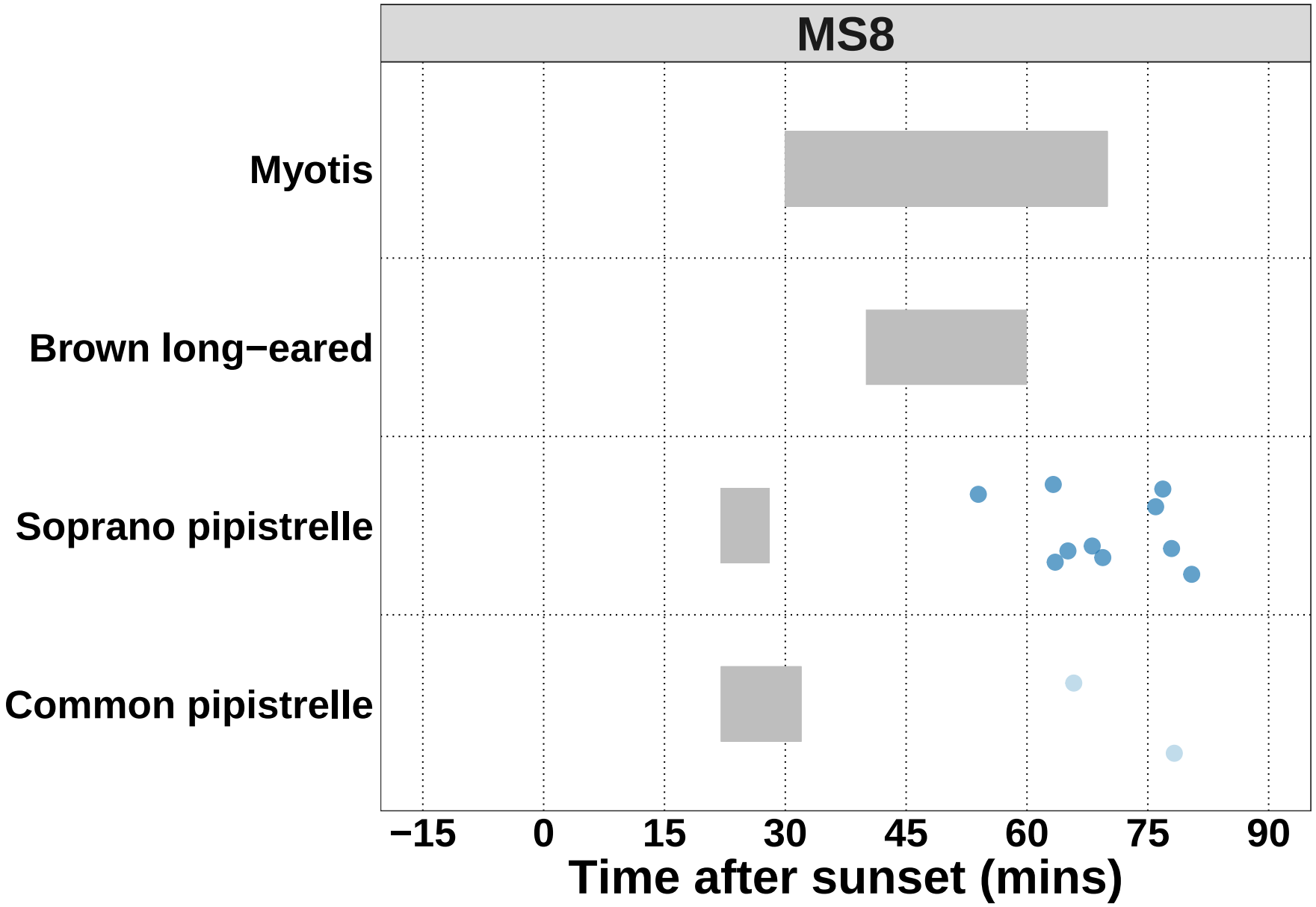

MS3
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

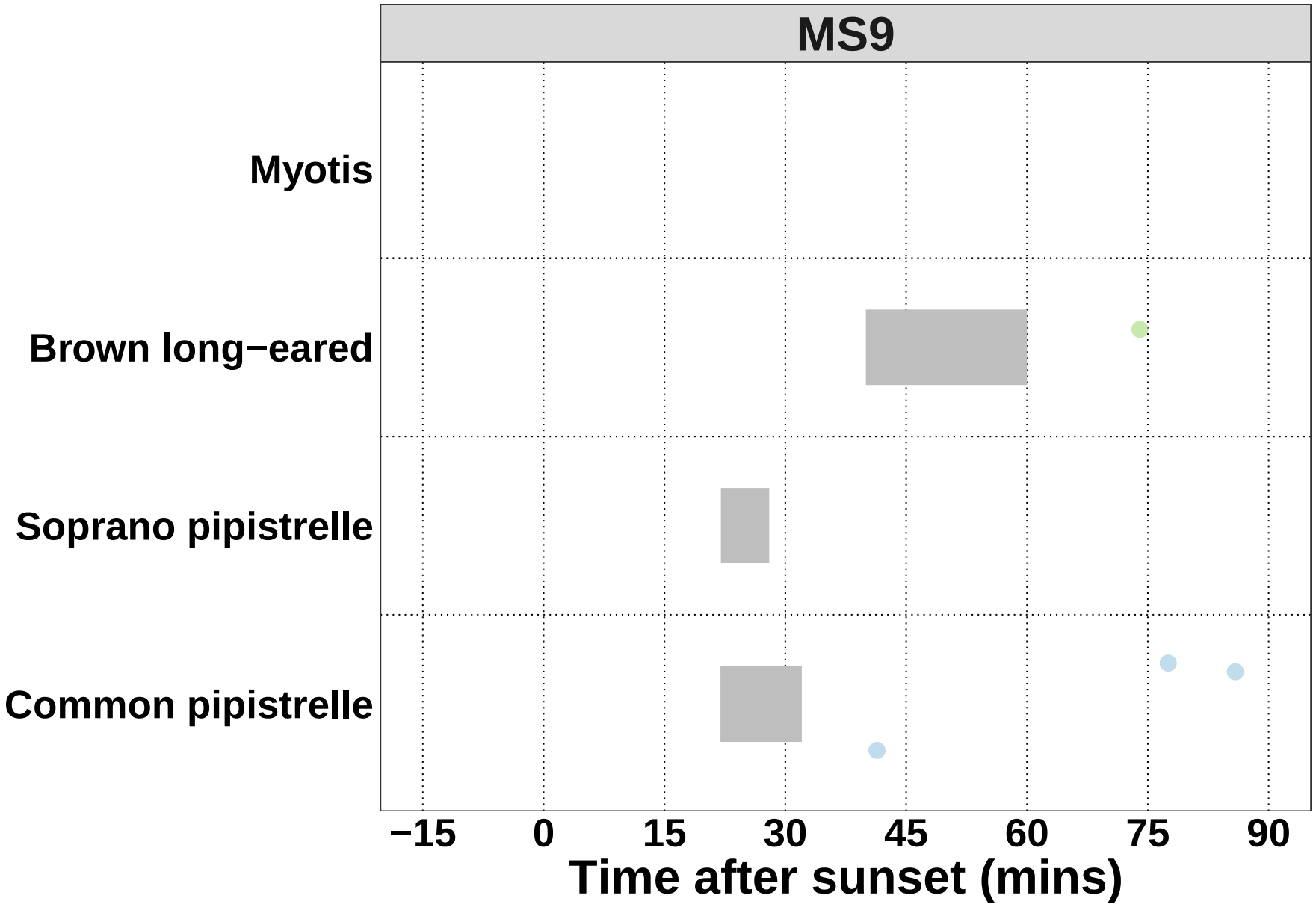

MS4
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)


MS5
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)


MS6
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)


MS7
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

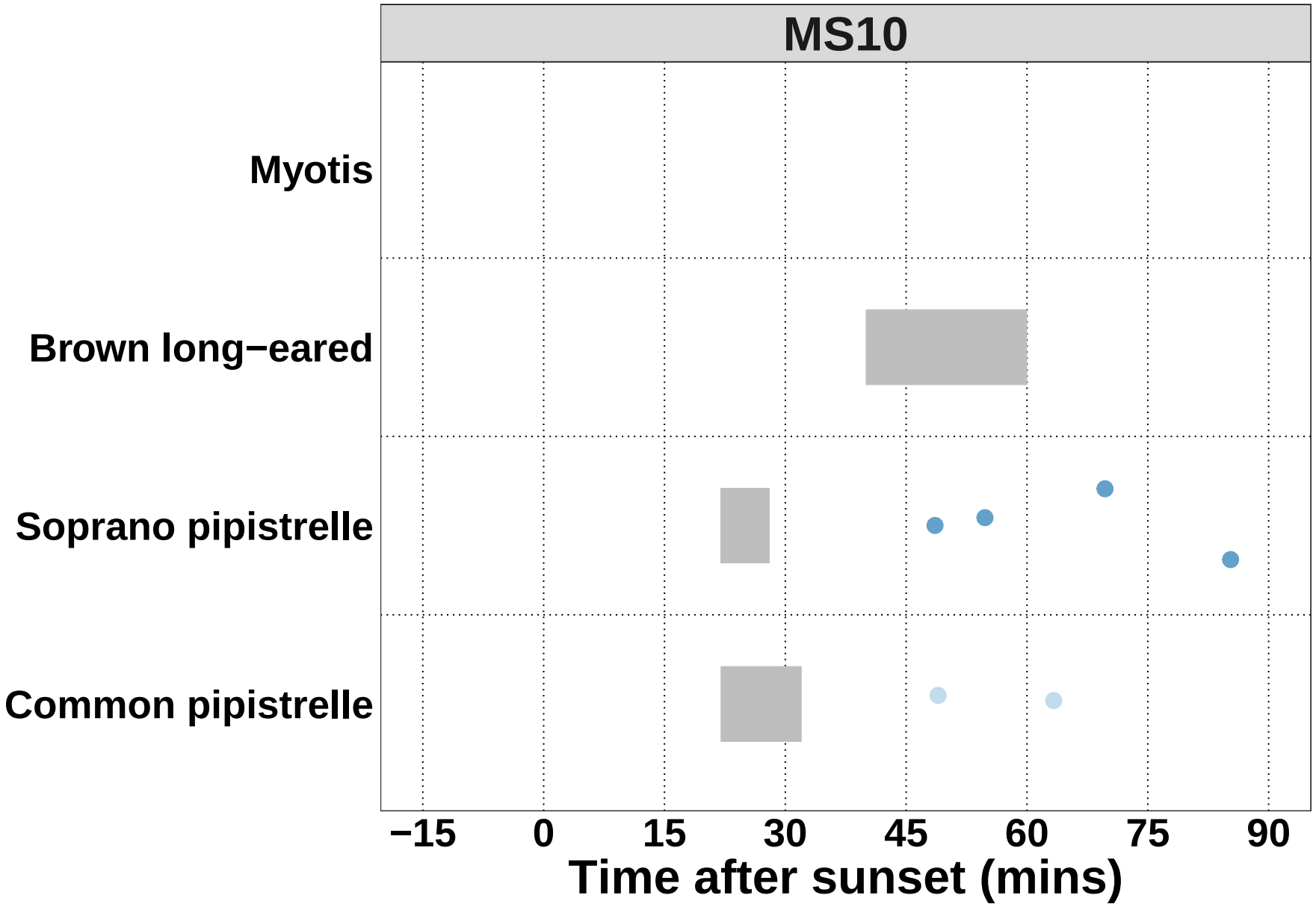

MS8
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

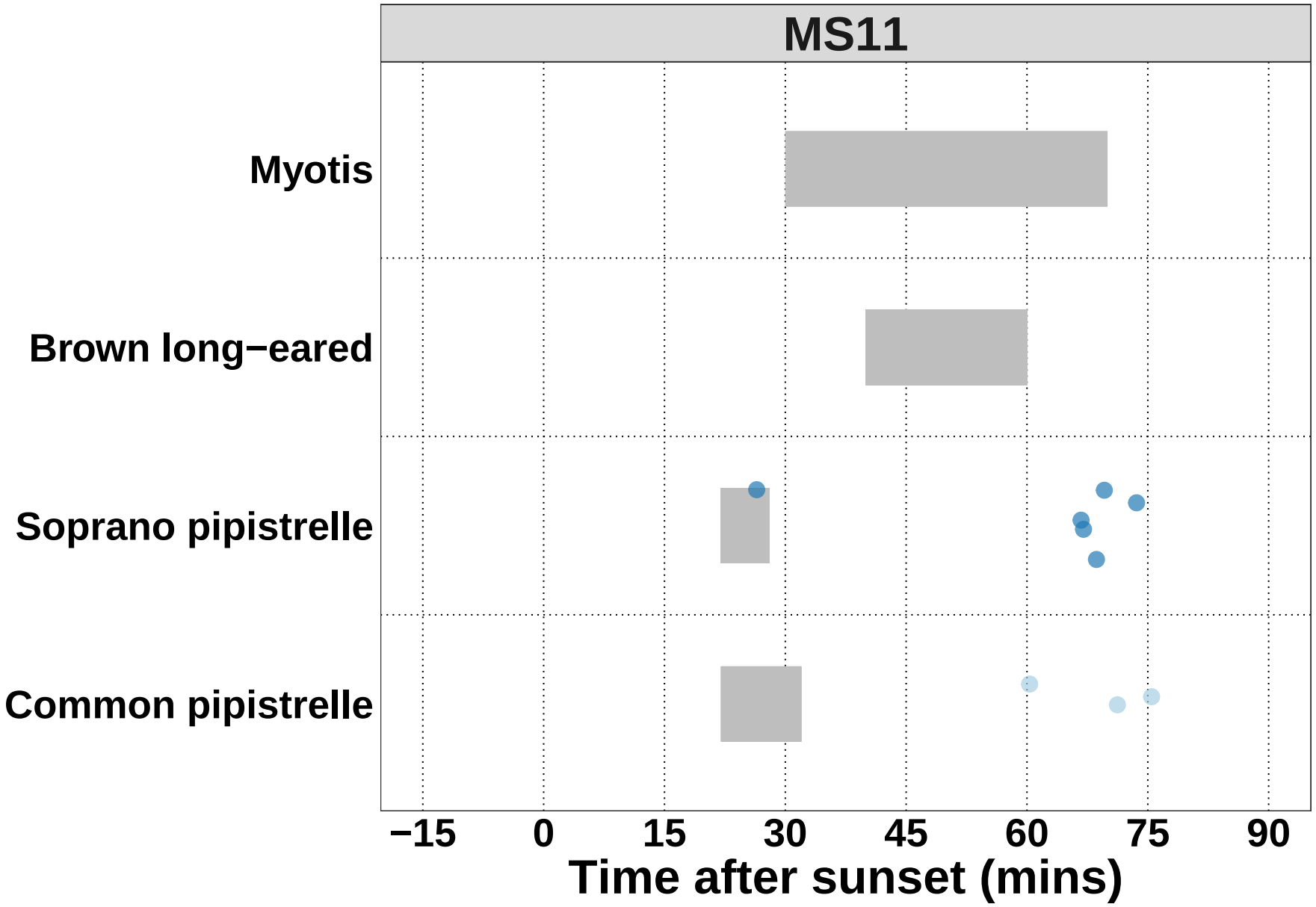

MS9
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

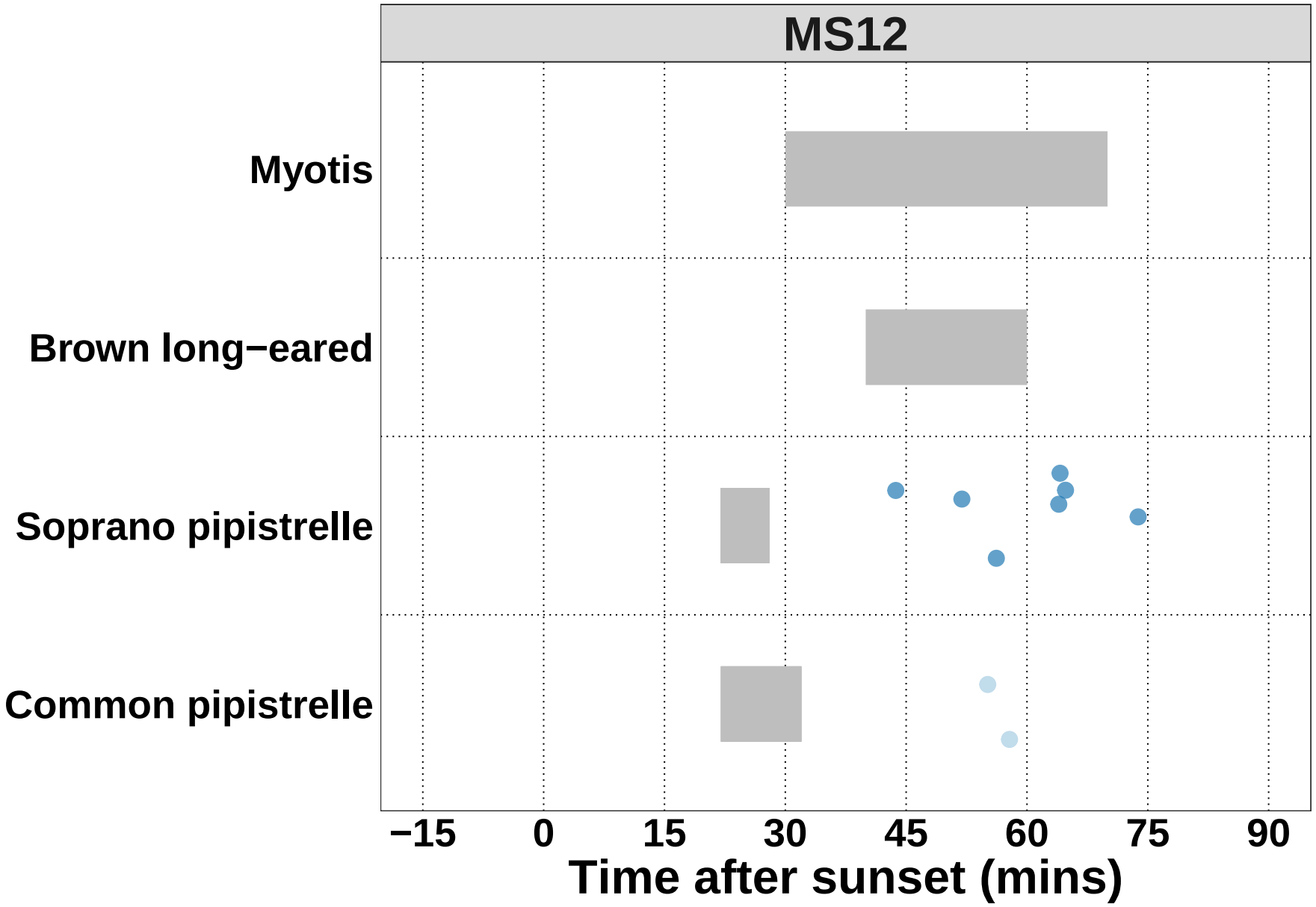
Bat Passes Potentially Indicating Close Proximity to a Roost (Maternity Period Only) - *Maternity period defined as 15th June - 30th July.

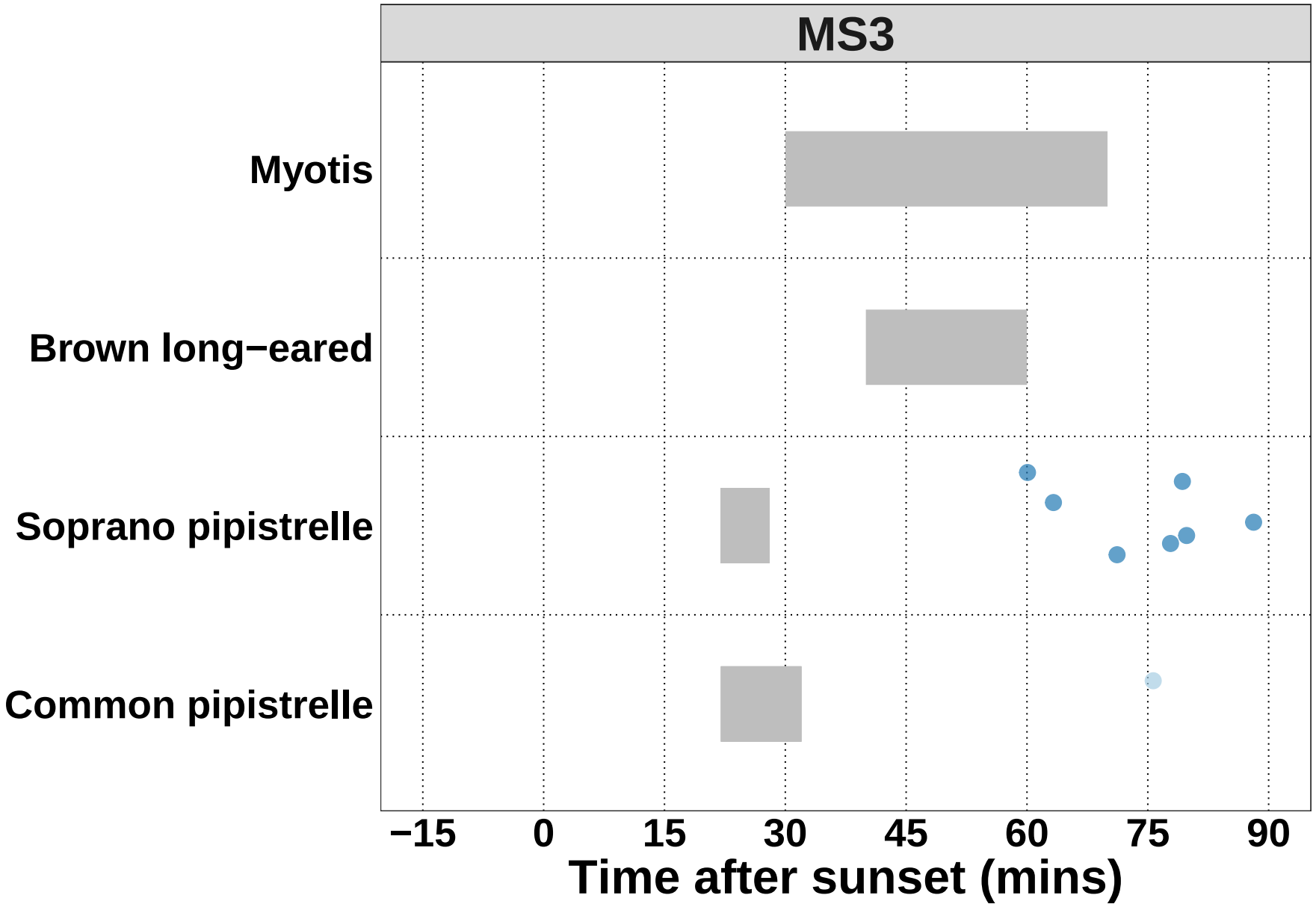
Species	Detector ID	2023-07-21
Soprano pipistrelle	MS11	1

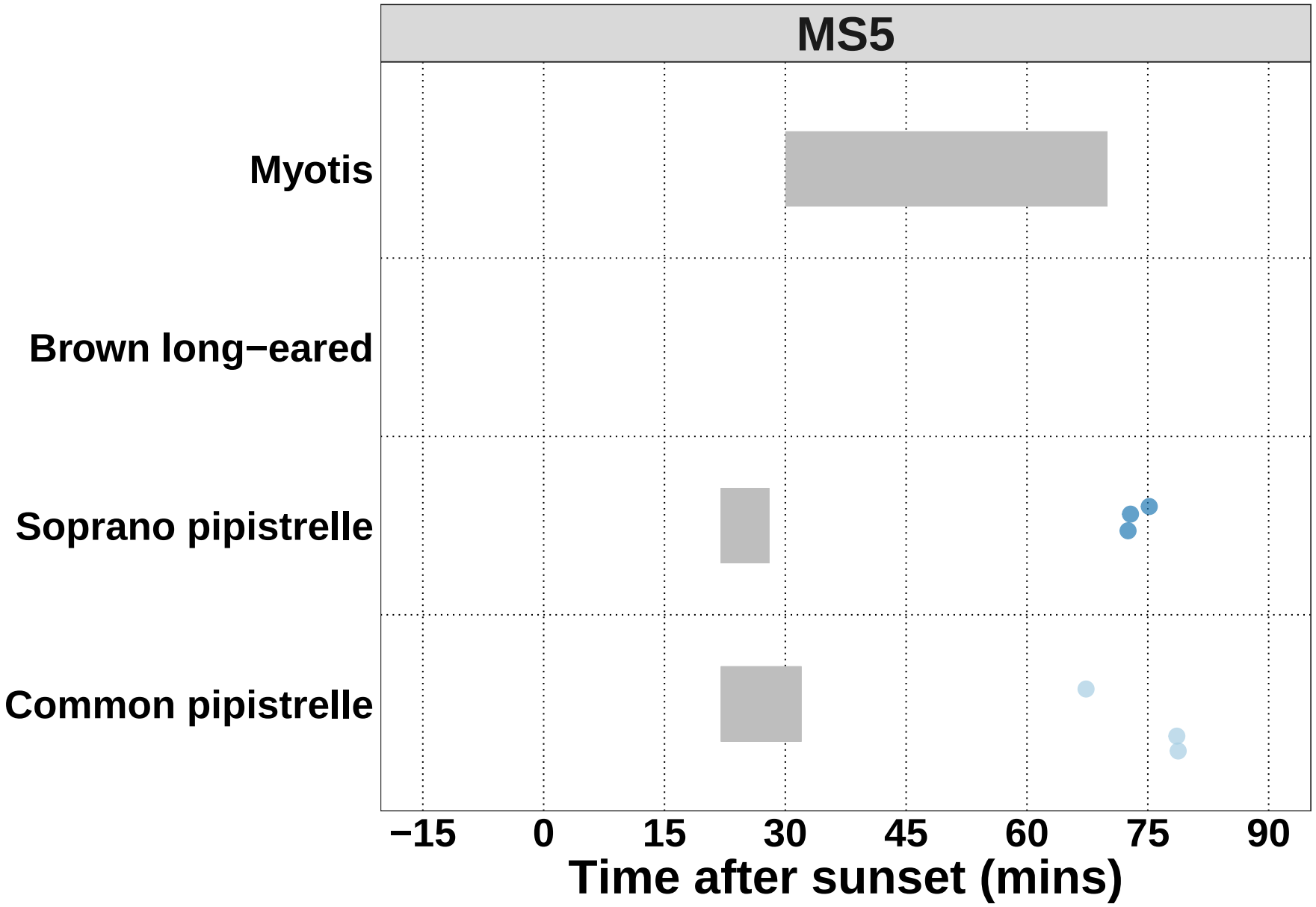
Bat Passes Potentially Indicating Close Proximity to a Roost (Maternity Period Only) - Maternity period defined as 15th June - 30th July.

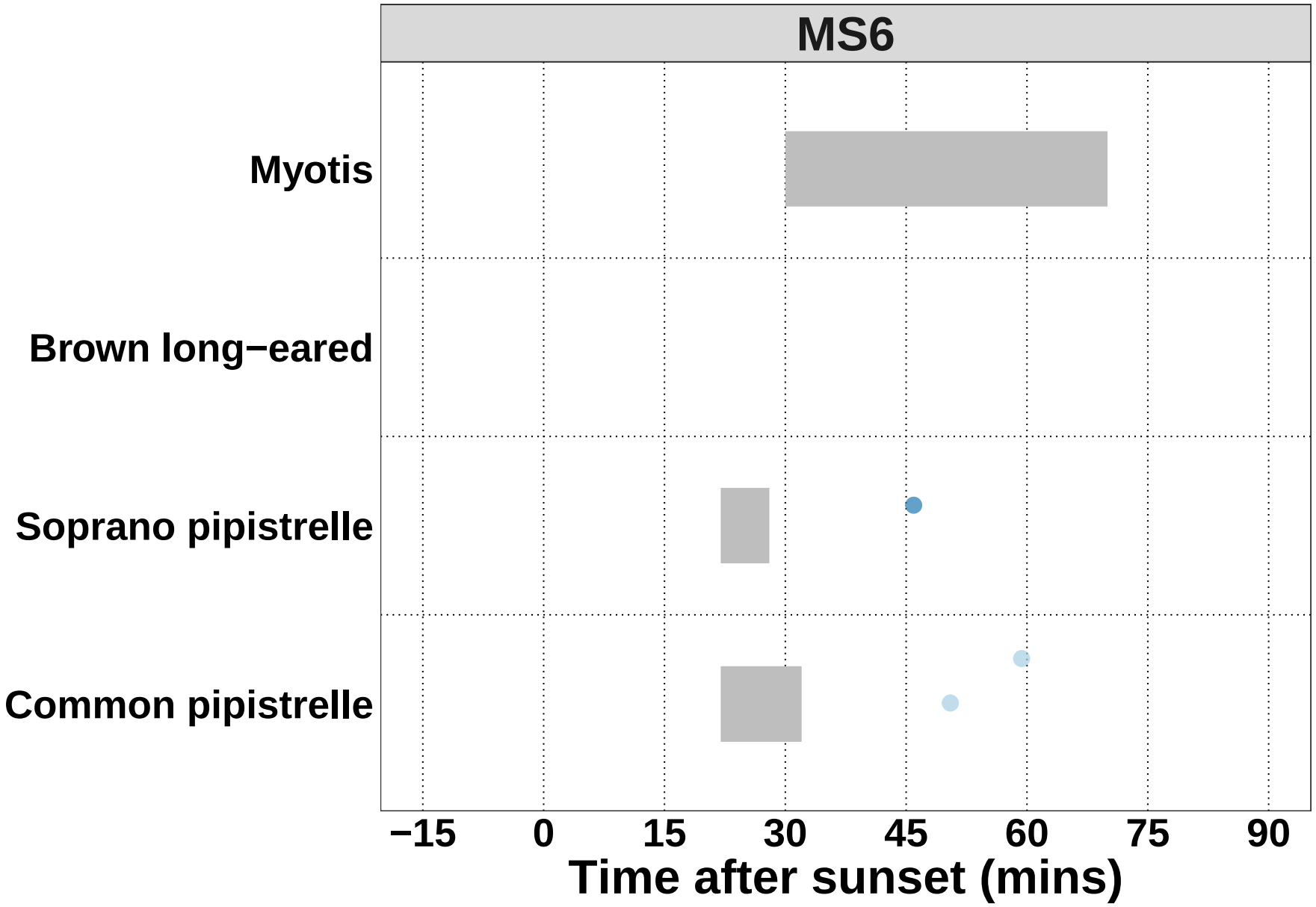

MS10
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

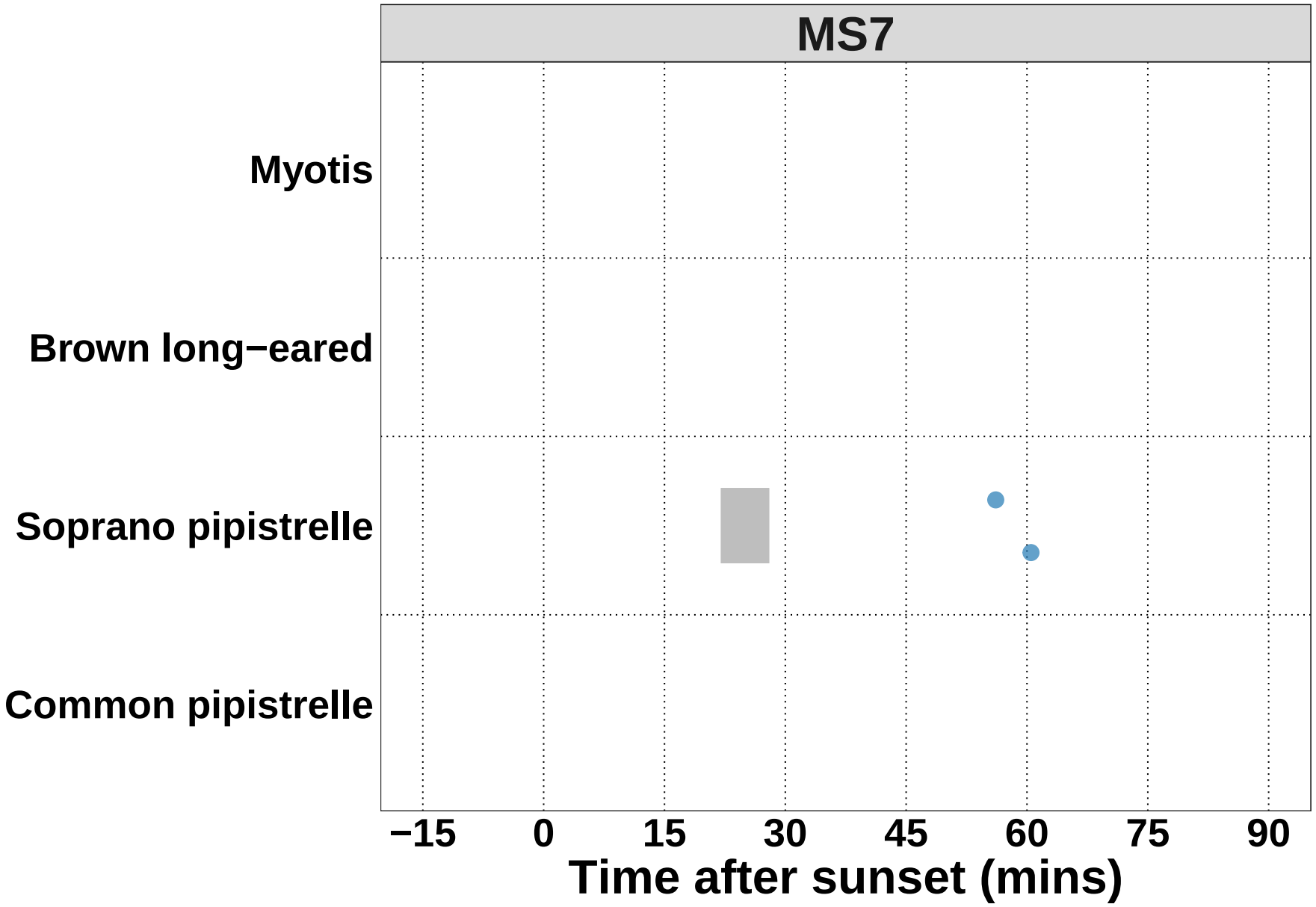

MS11
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

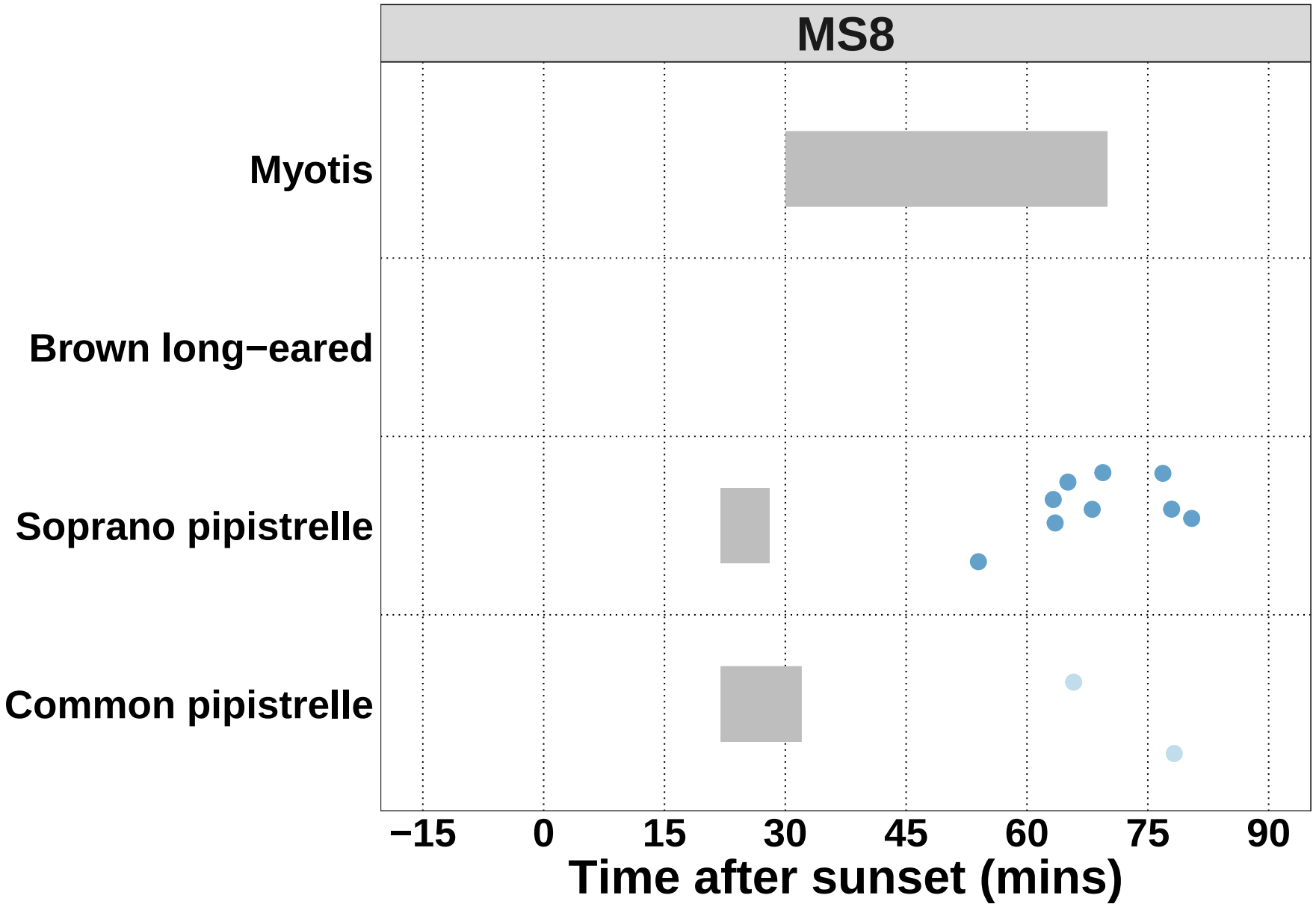

MS12
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

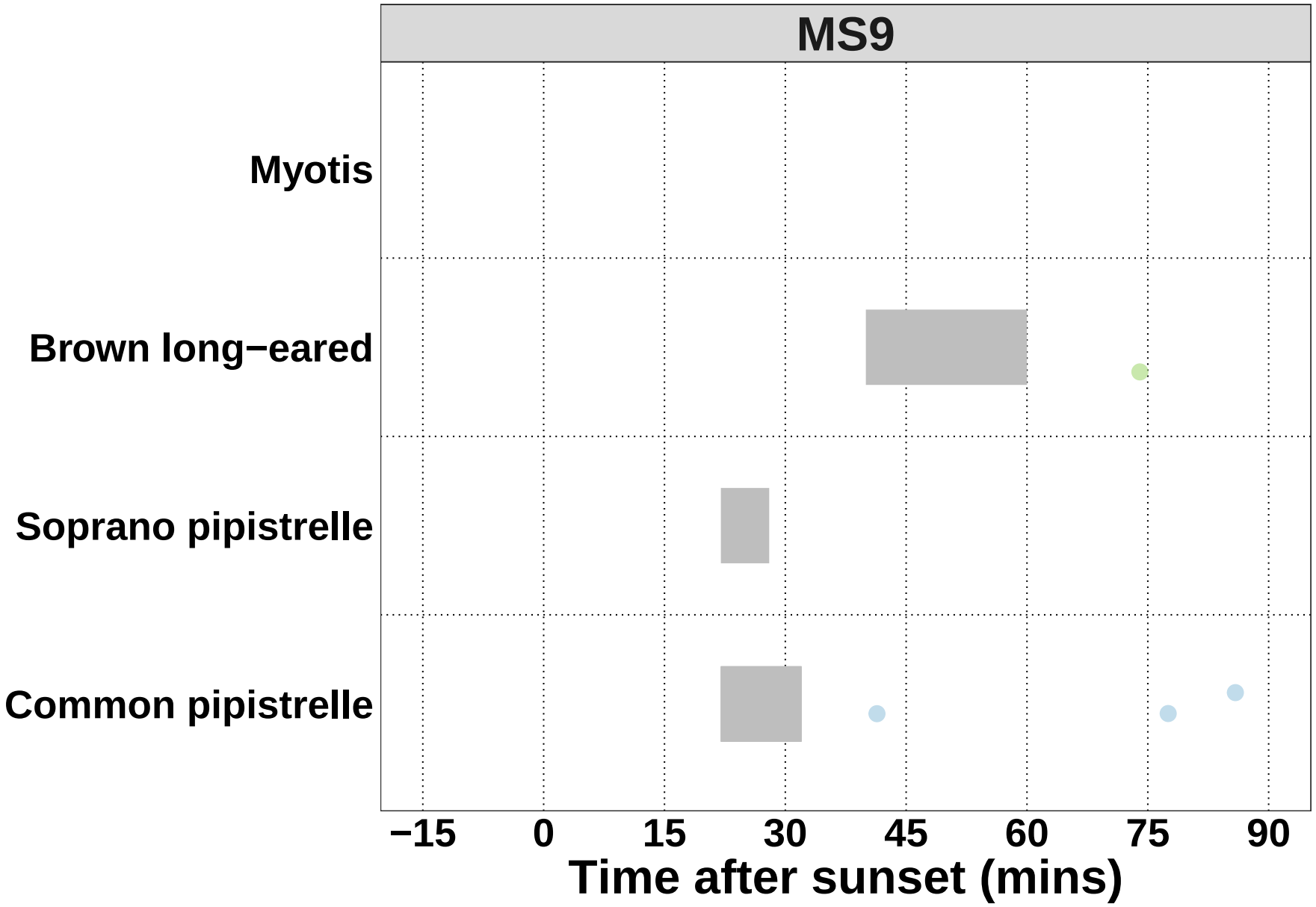

MS3
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)


MS5
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)


MS6
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)


MS7
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)


MS8
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)


MS9
Myotis
Brown long−eared
Soprano pipistrelle
Common pipistrelle
−15
0
15
30
45
60
75
90
Time after sunset (mins)

Count of Bat Passes

All Detectors

Table 14. The total number of passes recorded for each species across all of the detectors.

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

Species	Passes (no.)	Percentage of Total (%)
Common pipistrelle	29	15.93407
Soprano pipistrelle	56	30.76923
Brown long-eared	43	23.62637
Myotis	54	29.67033
Total	182	100.00000

Per Detector

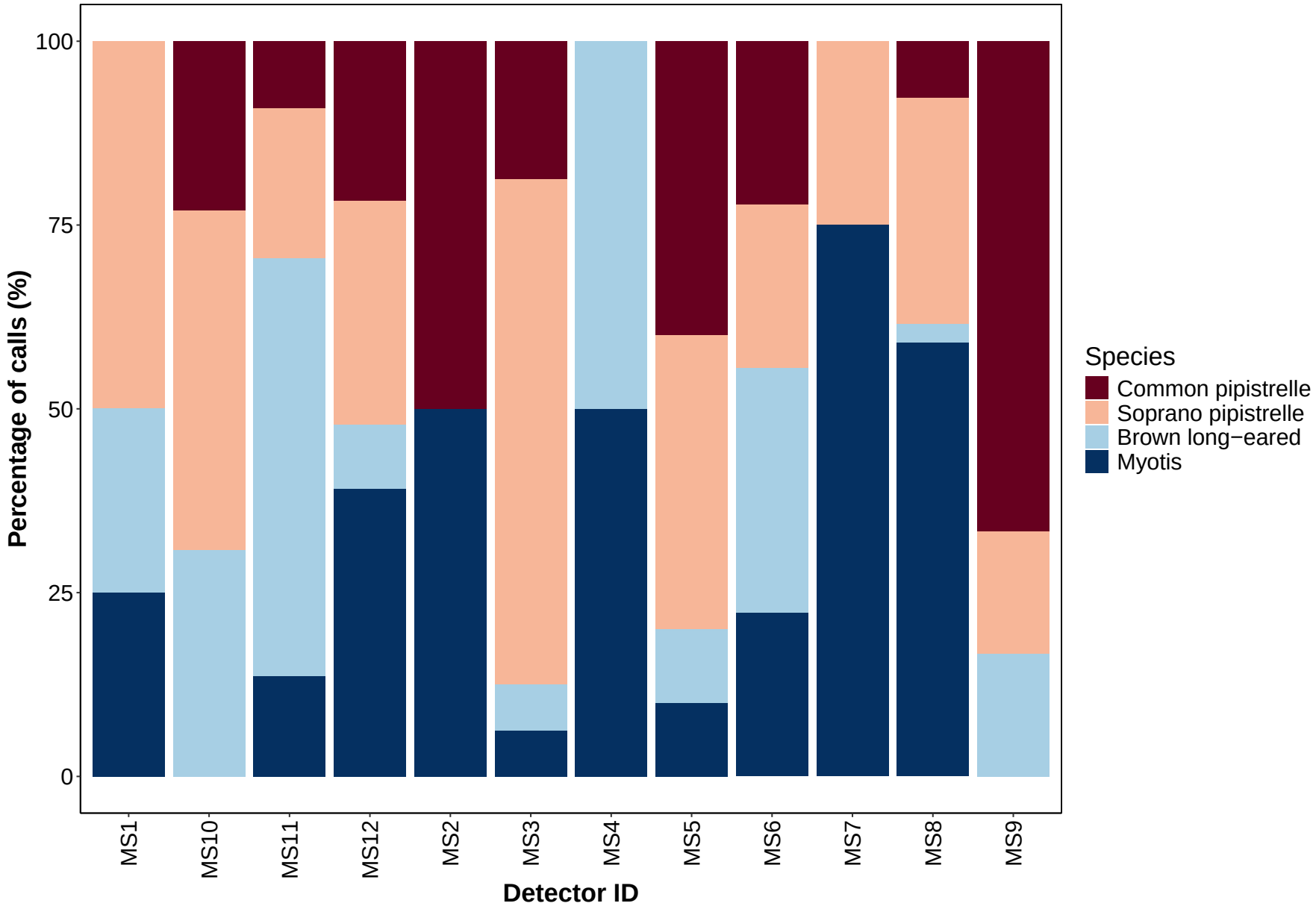
The number of passes recorded for each species at each detector.

Species	Detector ID	Count (no.)	Percentage by Detector (%)
Common pipistrelle	MS10	3	23.076923
Common pipistrelle	MS11	4	9.090909
Common pipistrelle	MS12	5	21.739130
Common pipistrelle	MS2	1	50.000000
Common pipistrelle	MS3	3	18.750000
Common pipistrelle	MS5	4	40.000000
Common pipistrelle	MS6	2	22.222222
Common pipistrelle	MS8	3	7.692308
Common pipistrelle	MS9	4	66.666667
Soprano pipistrelle	MS1	2	50.000000
Soprano pipistrelle	MS10	6	46.153846
Soprano pipistrelle	MS11	9	20.454545
Soprano pipistrelle	MS12	7	30.434783
Soprano pipistrelle	MS3	11	68.750000
Soprano pipistrelle	MS5	4	40.000000
Soprano pipistrelle	MS6	2	22.222222
Soprano pipistrelle	MS7	2	25.000000
Soprano pipistrelle	MS8	12	30.769231
Soprano pipistrelle	MS9	1	16.666667
Brown long-eared	MS1	1	25.000000
Brown long-eared	MS10	4	30.769231
Brown long-eared	MS11	25	56.818182
Brown long-eared	MS12	2	8.695652
Brown long-eared	MS3	1	6.250000
Brown long-eared	MS4	4	50.000000
Brown long-eared	MS5	1	10.000000
Brown long-eared	MS6	3	33.333333
Brown long-eared	MS8	1	2.564103
Brown long-eared	MS9	1	16.666667
Myotis	MS1	1	25.000000
Myotis	MS11	6	13.636364
Myotis	MS12	9	39.130435

Species	Detector ID	Count (no.)	Percentage by Detector (%)
Myotis	MS2	1	50.000000
Myotis	MS3	1	6.250000
Myotis	MS4	4	50.000000
Myotis	MS5	1	10.000000
Myotis	MS6	2	22.222222
Myotis	MS7	6	75.000000
Myotis	MS8	23	58.974359

Species Composition

Figure 10. Percentage species composition of passes at each detector.


Percentage of calls (%)
100
75
50
25
0
MS1
MS10
MS11
MS12
MS2
MS3
MS4
MS5
MS6
MS7
MS8
MS9
Detector ID
Species
Common pipistrelle
Soprano pipistrelle
Brown long−eared
Myotis

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.

Nighlty Bat Passes Per Hour

Median Per Detector

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

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

Species	Detector ID	Median Pass Rate
Common pipistrelle	MS10	0.1
Common pipistrelle	MS11	0.1
Common pipistrelle	MS12	0.1
Common pipistrelle	MS2	0.1
Common pipistrelle	MS3	0.2
Common pipistrelle	MS5	0.1
Common pipistrelle	MS6	0.3
Common pipistrelle	MS8	0.2
Common pipistrelle	MS9	0.3
Soprano pipistrelle	MS1	0.2
Soprano pipistrelle	MS10	0.3
Soprano pipistrelle	MS11	0.1
Soprano pipistrelle	MS12	0.1
Soprano pipistrelle	MS3	0.3
Soprano pipistrelle	MS5	0.1
Soprano pipistrelle	MS6	0.3
Soprano pipistrelle	MS7	0.3
Soprano pipistrelle	MS8	0.3
Soprano pipistrelle	MS9	0.1
Brown long-eared	MS1	0.1
Brown long-eared	MS10	0.1
Brown long-eared	MS11	0.3
Brown long-eared	MS12	0.3
Brown long-eared	MS3	0.1
Brown long-eared	MS4	0.2
Brown long-eared	MS5	0.1
Brown long-eared	MS6	0.1
Brown long-eared	MS8	0.1
Brown long-eared	MS9	0.1
Myotis	MS1	0.1
Myotis	MS11	0.1
Myotis	MS12	0.2
Myotis	MS2	0.1
Myotis	MS3	0.1
Myotis	MS4	0.1
Myotis	MS5	0.1

Species	Detector ID	Median Pass Rate
Myotis	MS6	0.1
Myotis	MS7	0.1
Myotis	MS8	0.1

Mean Per Detector

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

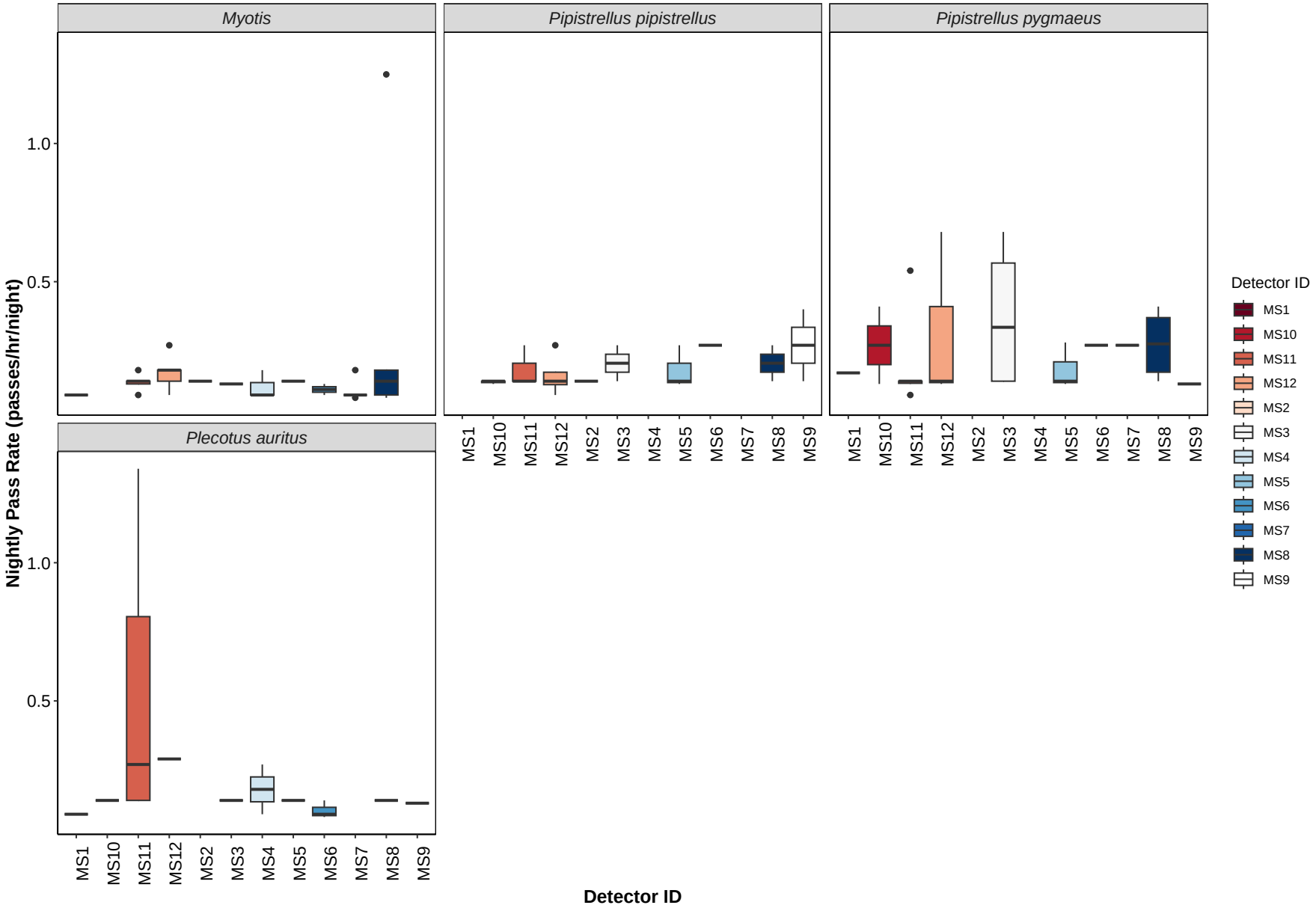
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Mean Pass Rate
Common pipistrelle	MS10	0.1
Common pipistrelle	MS11	0.2
Common pipistrelle	MS12	0.2
Common pipistrelle	MS2	0.1
Common pipistrelle	MS3	0.2
Common pipistrelle	MS5	0.2
Common pipistrelle	MS6	0.3
Common pipistrelle	MS8	0.2
Common pipistrelle	MS9	0.3
Soprano pipistrelle	MS1	0.2
Soprano pipistrelle	MS10	0.3
Soprano pipistrelle	MS11	0.2
Soprano pipistrelle	MS12	0.3
Soprano pipistrelle	MS3	0.4
Soprano pipistrelle	MS5	0.2
Soprano pipistrelle	MS6	0.3
Soprano pipistrelle	MS7	0.3
Soprano pipistrelle	MS8	0.3
Soprano pipistrelle	MS9	0.1
Brown long-eared	MS1	0.1
Brown long-eared	MS10	0.1
Brown long-eared	MS11	0.5
Brown long-eared	MS12	0.3
Brown long-eared	MS3	0.1
Brown long-eared	MS4	0.2
Brown long-eared	MS5	0.1
Brown long-eared	MS6	0.1
Brown long-eared	MS8	0.1
Brown long-eared	MS9	0.1
Myotis	MS1	0.1

Species	Detector ID	Mean Pass Rate
Myotis	MS11	0.1
Myotis	MS12	0.2
Myotis	MS2	0.1
Myotis	MS3	0.1
Myotis	MS4	0.1
Myotis	MS5	0.1
Myotis	MS6	0.1
Myotis	MS7	0.1
Myotis	MS8	0.3

Per Detector

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.


Myotis
Pipistrellus pipistrellus
Pipistrellus pygmaeus
Plecotus auritus
Nightly Pass Rate (passes/hr/night)
1.0
0.5
MS1
MS10
MS11
MS12
MS2
MS3
MS4
MS5
MS6
MS7
MS8
MS9
Detector ID
Detector ID

Split by Month

Total Bat Passes per Detector each Month

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	Jul	Sep
Common pipistrelle	MS10	0	3	0
Common pipistrelle	MS11	1	3	0
Common pipistrelle	MS12	1	3	1
Common pipistrelle	MS2	1	0	0
Common pipistrelle	MS3	0	3	0
Common pipistrelle	MS5	0	4	0
Common pipistrelle	MS6	0	2	0
Common pipistrelle	MS8	0	3	0
Common pipistrelle	MS9	0	4	0
Soprano pipistrelle	MS1	0	0	2
Soprano pipistrelle	MS10	0	6	0
Soprano pipistrelle	MS11	1	7	1
Soprano pipistrelle	MS12	0	7	0
Soprano pipistrelle	MS3	1	10	0
Soprano pipistrelle	MS5	0	4	0
Soprano pipistrelle	MS6	0	2	0
Soprano pipistrelle	MS7	0	2	0
Soprano pipistrelle	MS8	1	11	0
Soprano pipistrelle	MS9	0	1	0
Brown long-eared	MS1	0	0	1
Brown long-eared	MS10	2	2	0
Brown long-eared	MS11	1	24	0
Brown long-eared	MS12	0	2	0
Brown long-eared	MS3	0	1	0
Brown long-eared	MS4	0	0	4
Brown long-eared	MS5	1	0	0
Brown long-eared	MS6	1	0	2
Brown long-eared	MS8	1	0	0
Brown long-eared	MS9	0	1	0
Myotis	MS1	0	0	1
Myotis	MS11	0	3	3
Myotis	MS12	0	1	8
Myotis	MS2	1	0	0
Myotis	MS3	0	1	0
Myotis	MS4	0	0	4
Myotis	MS5	0	1	0

Species	Detector ID	May	Jul	Sep
Myotis	MS6	0	1	1
Myotis	MS7	0	0	6
Myotis	MS8	0	2	21

Survey Effort

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

month	Detector ID	No. of Survey Nights
May	MS10	2
May	MS11	3
May	MS12	1
May	MS2	1
May	MS3	1
May	MS5	1
May	MS6	1
May	MS8	1
Jul	MS10	5
Jul	MS11	8
Jul	MS12	4
Jul	MS3	4
Jul	MS5	3
Jul	MS6	2
Jul	MS7	1
Jul	MS8	6
Jul	MS9	2
Sep	MS1	2
Sep	MS11	3
Sep	MS12	5
Sep	MS4	3
Sep	MS6	3
Sep	MS7	5
Sep	MS8	6

Nightly Bat Passes for Each Month

Median Per Detector

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

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

Species	Detector ID	May	Jul	Sep
Common pipistrelle	MS10	NA	0.1	NA
Common pipistrelle	MS11	0.1	0.2	NA
Common pipistrelle	MS12	0.1	0.2	0.1
Common pipistrelle	MS2	0.1	NA	NA
Common pipistrelle	MS3	NA	0.2	NA
Common pipistrelle	MS5	NA	0.1	NA
Common pipistrelle	MS6	NA	0.3	NA
Common pipistrelle	MS8	NA	0.2	NA
Common pipistrelle	MS9	NA	0.3	NA
Soprano pipistrelle	MS1	NA	NA	0.2
Soprano pipistrelle	MS10	NA	0.3	NA
Soprano pipistrelle	MS11	0.1	0.1	0.1
Soprano pipistrelle	MS12	NA	0.1	NA
Soprano pipistrelle	MS3	0.1	0.5	NA
Soprano pipistrelle	MS5	NA	0.1	NA
Soprano pipistrelle	MS6	NA	0.3	NA
Soprano pipistrelle	MS7	NA	0.3	NA
Soprano pipistrelle	MS8	0.1	0.3	NA
Soprano pipistrelle	MS9	NA	0.1	NA
Brown long-eared	MS1	NA	NA	0.1
Brown long-eared	MS10	0.1	0.1	NA
Brown long-eared	MS11	0.1	0.3	NA
Brown long-eared	MS12	NA	0.3	NA
Brown long-eared	MS3	NA	0.1	NA
Brown long-eared	MS4	NA	NA	0.2
Brown long-eared	MS5	0.1	NA	NA
Brown long-eared	MS6	0.1	NA	0.1
Brown long-eared	MS8	0.1	NA	NA
Brown long-eared	MS9	NA	0.1	NA
Myotis	MS1	NA	NA	0.1
Myotis	MS11	NA	0.1	0.1
Myotis	MS12	NA	0.1	0.2
Myotis	MS2	0.1	NA	NA
Myotis	MS3	NA	0.1	NA
Myotis	MS4	NA	NA	0.1
Myotis	MS5	NA	0.1	NA

Species	Detector ID	May	Jul	Sep
Myotis	MS6	NA	0.1	0.1
Myotis	MS7	NA	NA	0.1
Myotis	MS8	NA	0.1	0.1

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.

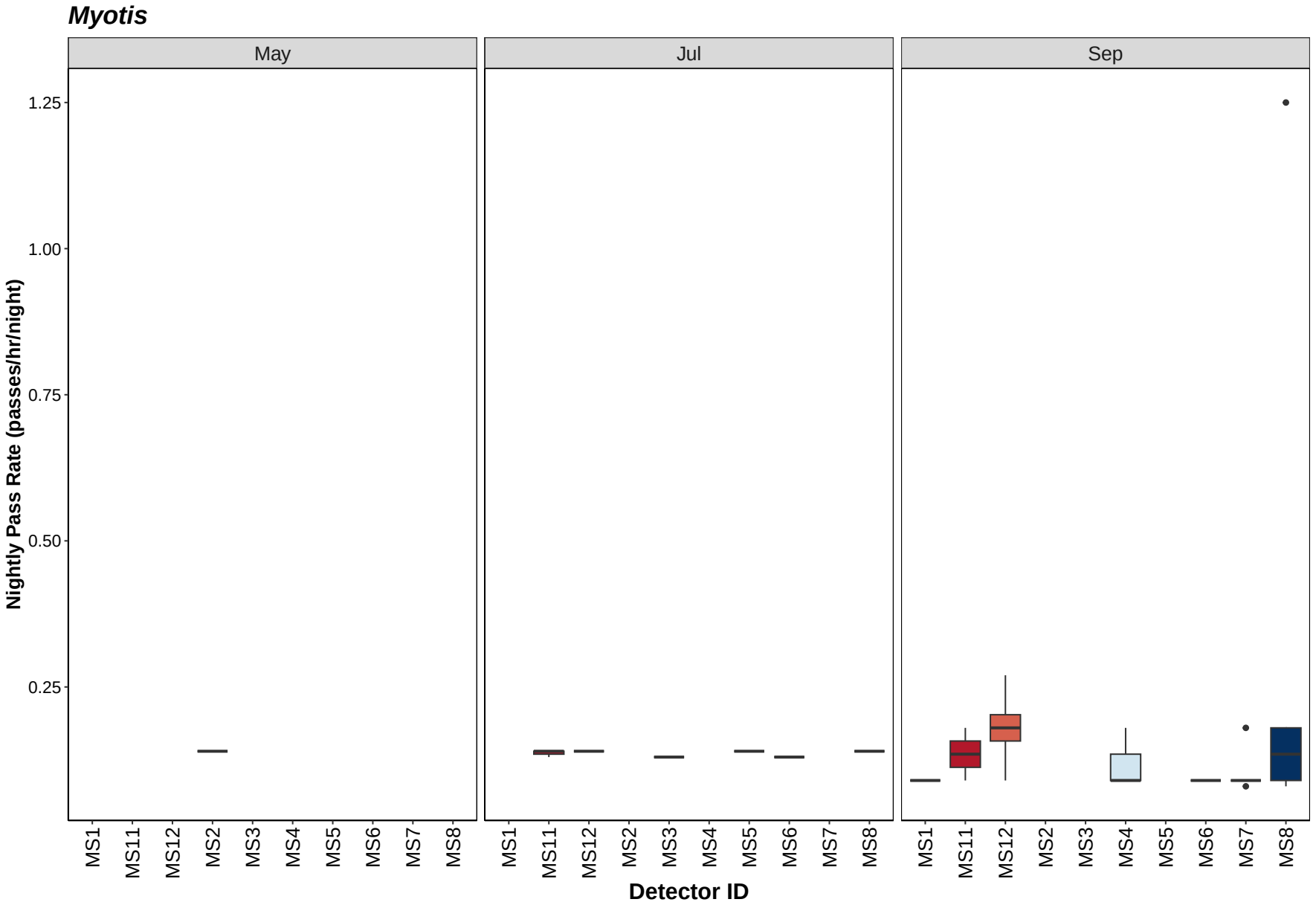
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

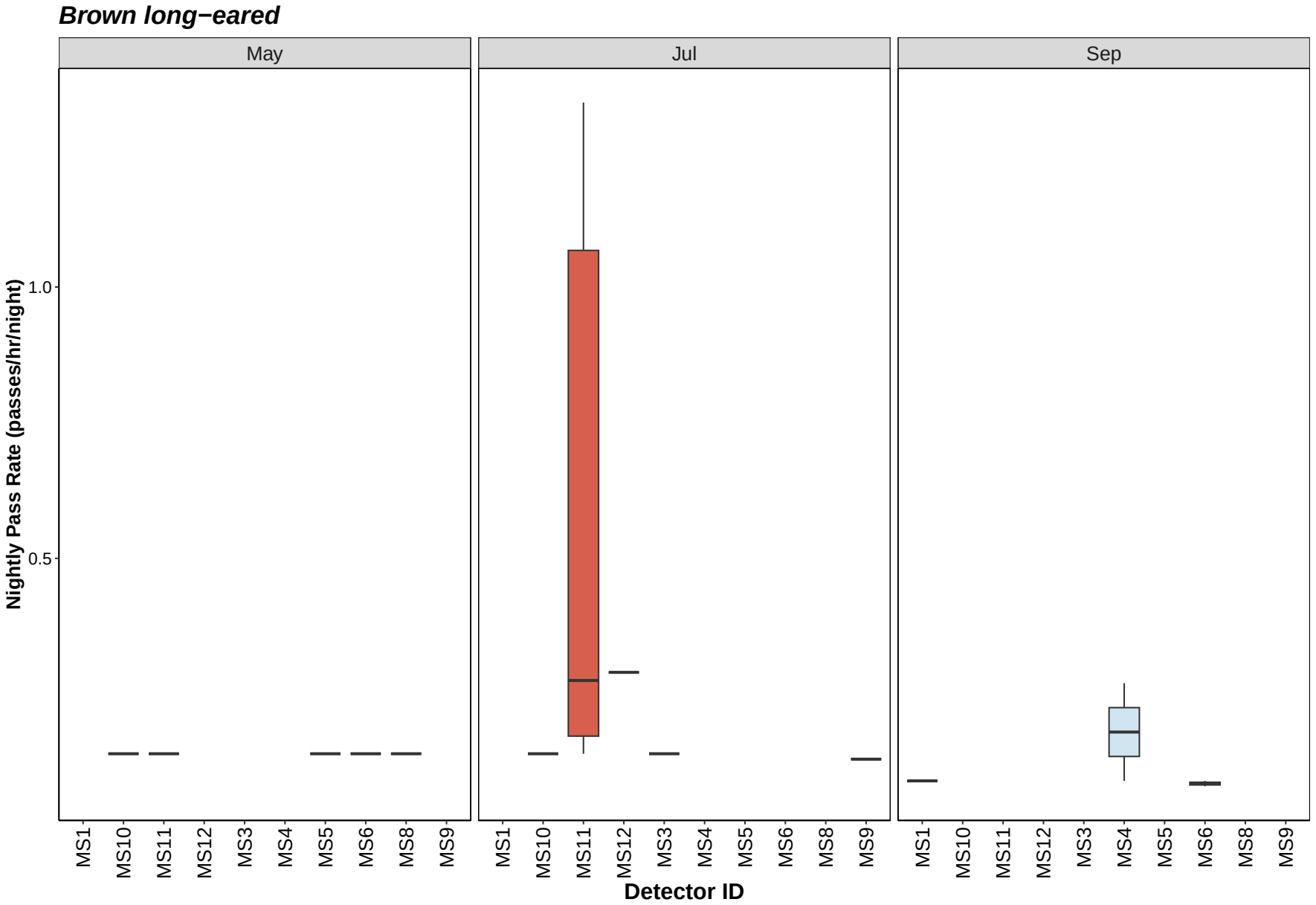
Species	Detector ID	May	Jul	Sep
Common pipistrelle	MS10	NA	0.1	NA
Common pipistrelle	MS11	0.1	0.2	NA
Common pipistrelle	MS12	0.1	0.2	0.1
Common pipistrelle	MS2	0.1	NA	NA
Common pipistrelle	MS3	NA	0.2	NA
Common pipistrelle	MS5	NA	0.2	NA
Common pipistrelle	MS6	NA	0.3	NA
Common pipistrelle	MS8	NA	0.2	NA
Common pipistrelle	MS9	NA	0.3	NA
Soprano pipistrelle	MS1	NA	NA	0.2
Soprano pipistrelle	MS10	NA	0.3	NA
Soprano pipistrelle	MS11	0.1	0.2	0.1
Soprano pipistrelle	MS12	NA	0.3	NA
Soprano pipistrelle	MS3	0.1	0.4	NA
Soprano pipistrelle	MS5	NA	0.2	NA
Soprano pipistrelle	MS6	NA	0.3	NA
Soprano pipistrelle	MS7	NA	0.3	NA
Soprano pipistrelle	MS8	0.1	0.3	NA
Soprano pipistrelle	MS9	NA	0.1	NA
Brown long-eared	MS1	NA	NA	0.1
Brown long-eared	MS10	0.1	0.1	NA
Brown long-eared	MS11	0.1	0.6	NA
Brown long-eared	MS12	NA	0.3	NA
Brown long-eared	MS3	NA	0.1	NA
Brown long-eared	MS4	NA	NA	0.2
Brown long-eared	MS5	0.1	NA	NA
Brown long-eared	MS6	0.1	NA	0.1
Brown long-eared	MS8	0.1	NA	NA
Brown long-eared	MS9	NA	0.1	NA
Myotis	MS1	NA	NA	0.1

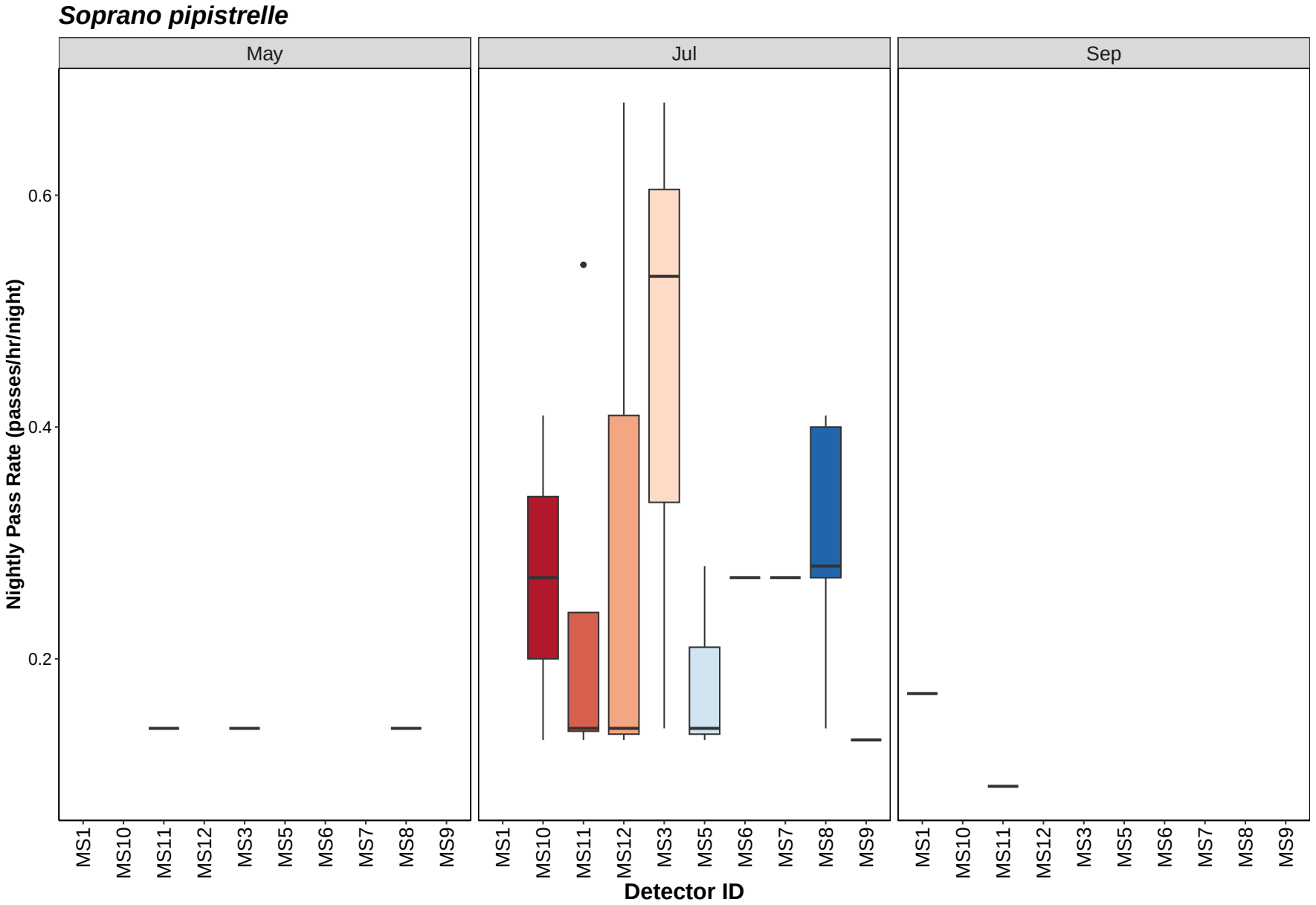
Species	Detector ID	May	Jul	Sep
Myotis	MS11	NA	0.1	0.1
Myotis	MS12	NA	0.1	0.2
Myotis	MS2	0.1	NA	NA
Myotis	MS3	NA	0.1	NA
Myotis	MS4	NA	NA	0.1
Myotis	MS5	NA	0.1	NA
Myotis	MS6	NA	0.1	0.1
Myotis	MS7	NA	NA	0.1
Myotis	MS8	NA	0.1	0.3

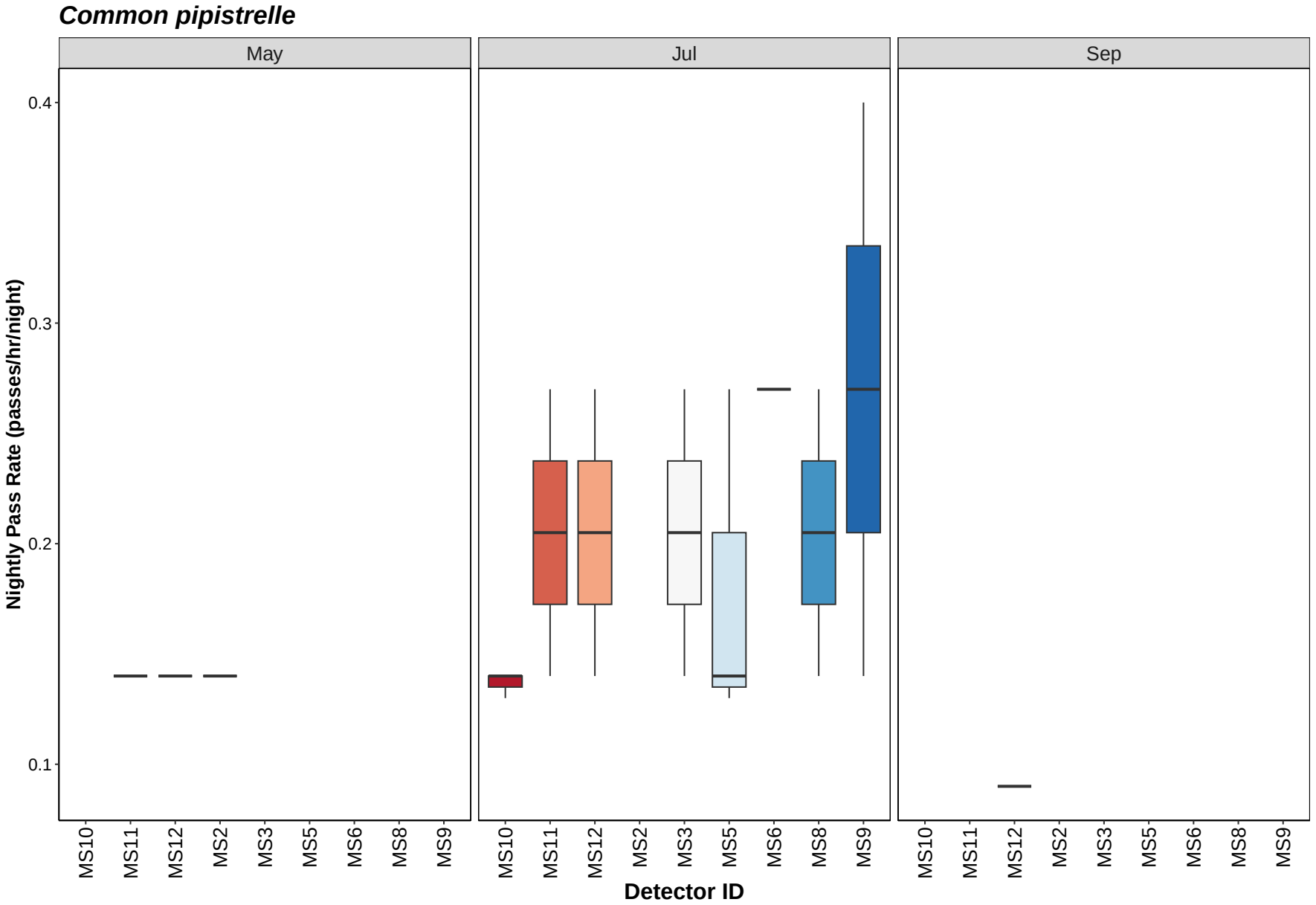
Per Detector

Figure 12. Figures show boxplots for the number of bat passes per hour by detector, for each month. The ‘box’ shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The ‘whiskers’ extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.


Myotis
May
Jul
Sep
Nightly Pass Rate (passes/hr/night)
1.25
1.00
0.75
0.50
0.25
MS1
MS11
MS12
MS2
MS3
MS4
MS5
MS6
MS7
MS8
Detector ID


Brown long−eared
May
Jul
Sep
Nightly Pass Rate (passes/hr/night)
1.0
0.5
MS1
MS10
MS11
MS12
MS3
MS4
MS5
MS6
MS8
MS9
Detector ID


Soprano pipistrelle
May
Jul
Sep
Nightly Pass Rate (passes/hr/night)
0.6
0.4
0.2
MS1
MS10
MS11
MS12
MS3
MS5
MS6
MS7
MS8
MS9
Detector ID


Common pipistrelle
May
Jul
Sep
Nightly Pass Rate (passes/hr/night)
0.4
0.3
0.2
0.1
MS10
MS11
MS12
MS2
MS3
MS5
MS6
MS8
MS9
Detector ID

Bat Activity per Detector Location

Figure 13. Detector ID reference:

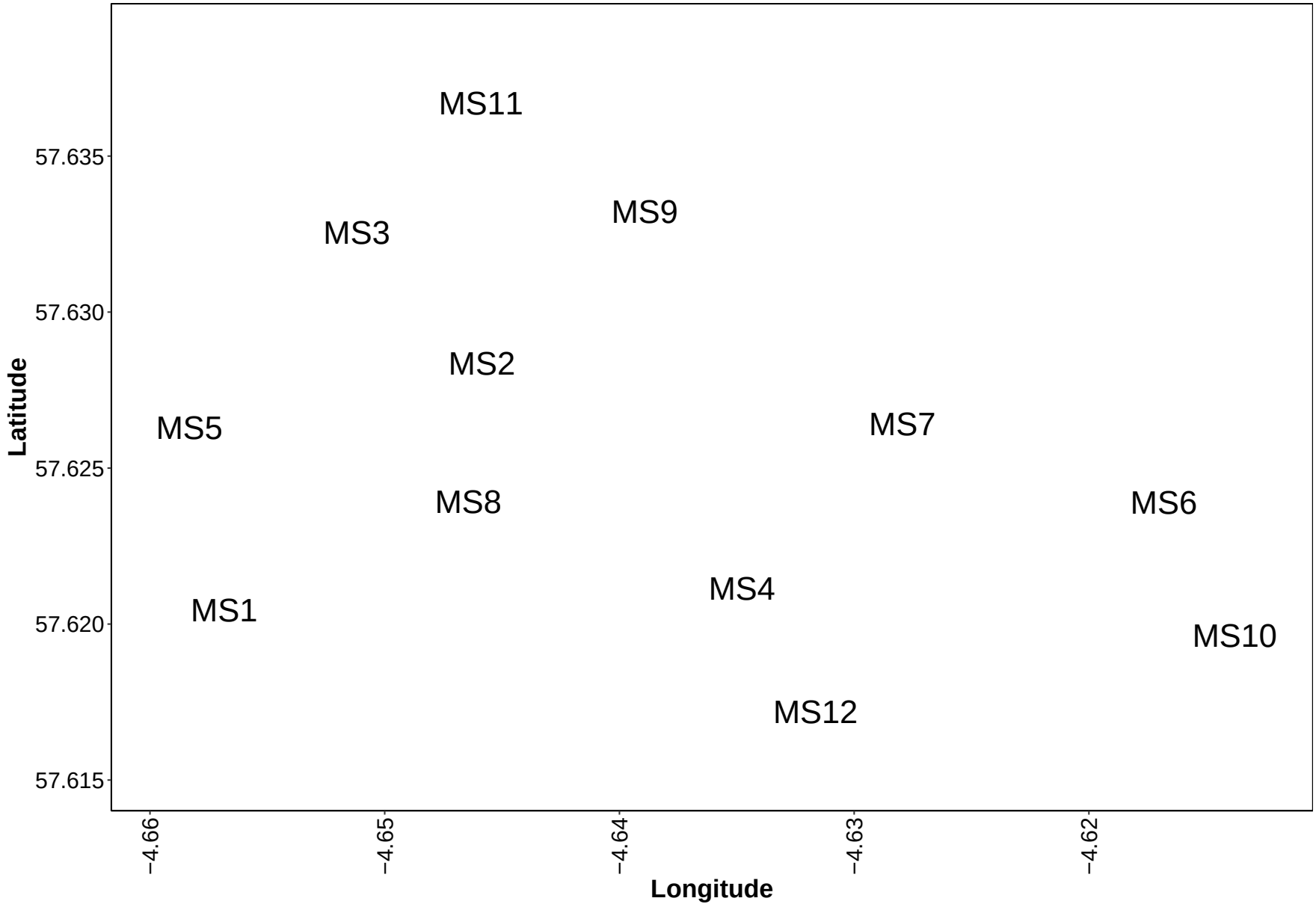

MS11
MS9
MS3
MS2
MS5
MS7
MS8
MS6
MS4
MS1
MS10
MS12
57.635
57.630
57.625
57.620
57.615
Latitude
−4.66
−4.65
−4.64
−4.63
−4.62
Longitude

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.

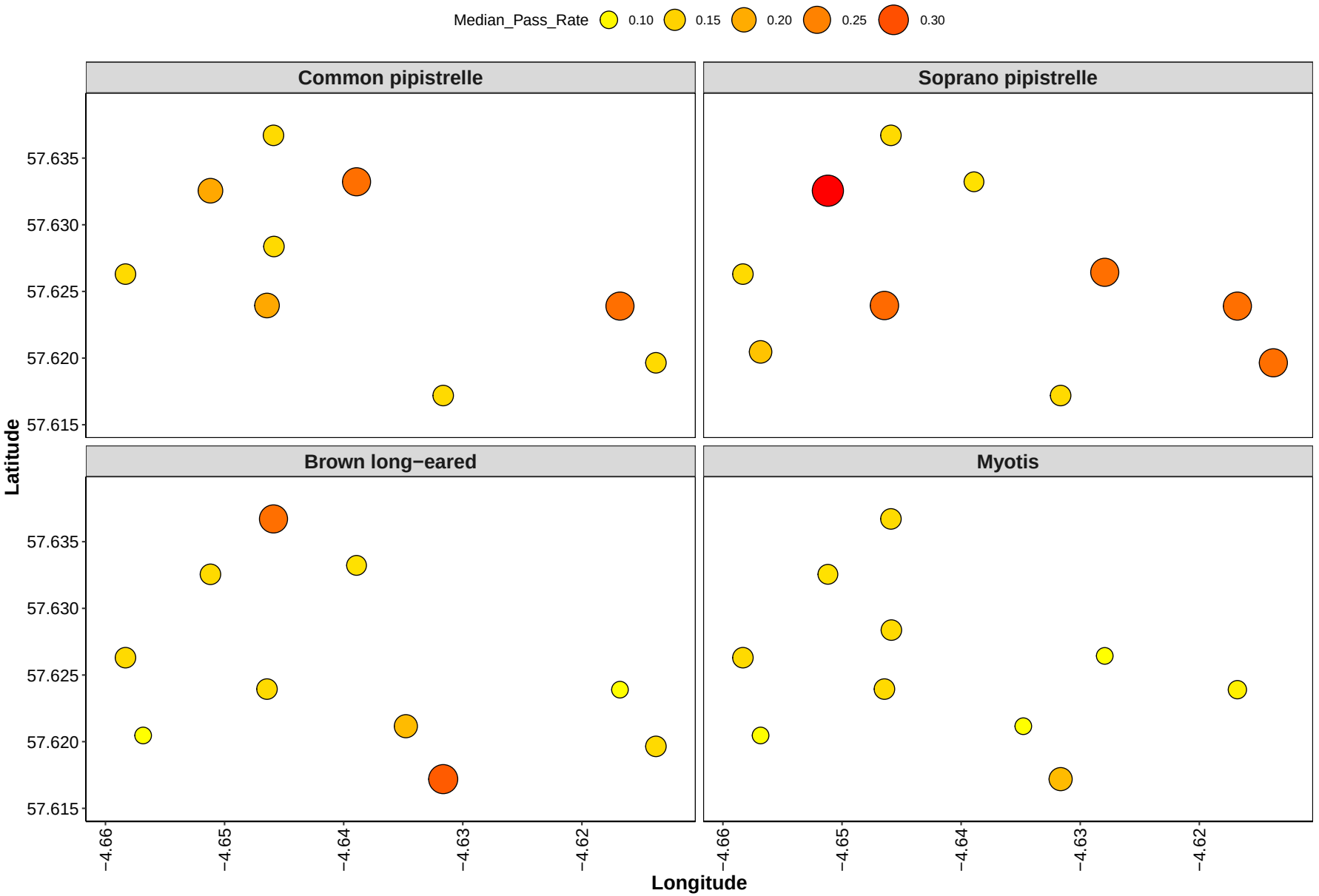
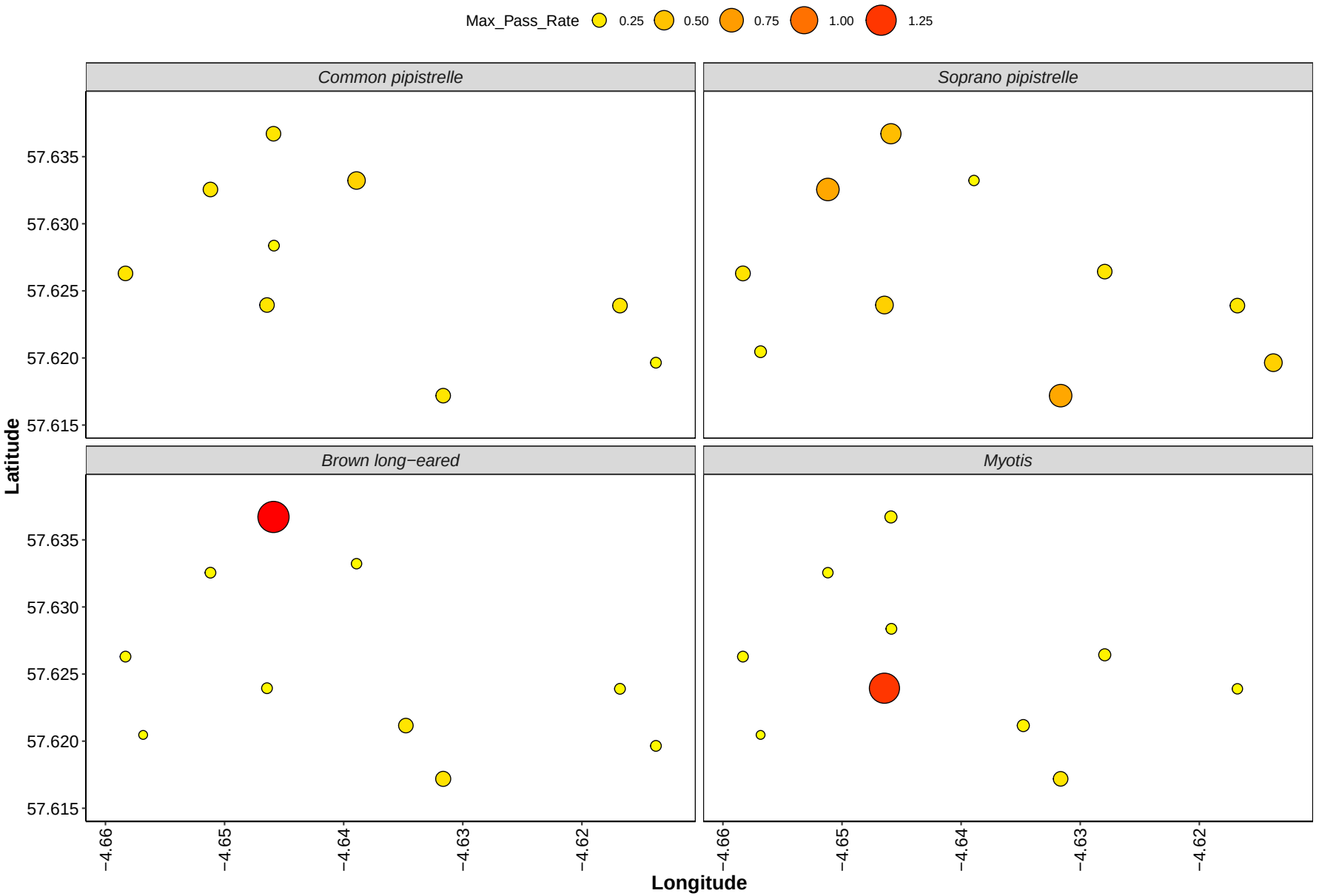

Median_Pass_Rate
0.10
0.15
0.20
0.25
0.30
Common pipistrelle
Soprano pipistrelle
Brown long−eared
Myotis
Latitude
57.635
57.630
57.625
57.620
57.615
−4.66
−4.65
−4.64
−4.63
−4.62
Longitude

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.


Max_Pass_Rate
0.25
0.50
0.75
1.00
1.25
Common pipistrelle
Soprano pipistrelle
Brown long−eared
Myotis
Latitude
57.635
57.630
57.625
57.620
57.615
−4.66
−4.65
−4.64
−4.63
−4.62
Longitude

Part 2b: Includes Absences

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

Nightly Bat Pass Rate

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	MS1	0.0
Brown long-eared	MS10	0.1
Brown long-eared	MS11	0.1
Brown long-eared	MS12	0.0
Brown long-eared	MS2	0.0
Brown long-eared	MS3	0.0
Brown long-eared	MS4	0.1
Brown long-eared	MS5	0.0
Brown long-eared	MS6	0.0
Brown long-eared	MS7	0.0
Brown long-eared	MS8	0.0
Brown long-eared	MS9	0.1
Common pipistrelle	MS1	0.0
Common pipistrelle	MS10	0.0
Common pipistrelle	MS11	0.0
Common pipistrelle	MS12	0.0
Common pipistrelle	MS2	0.1
Common pipistrelle	MS3	0.0
Common pipistrelle	MS4	0.0
Common pipistrelle	MS5	0.1
Common pipistrelle	MS6	0.0
Common pipistrelle	MS7	0.0
Common pipistrelle	MS8	0.0
Common pipistrelle	MS9	0.3
Myotis	MS1	0.0
Myotis	MS10	0.0
Myotis	MS11	0.0
Myotis	MS12	0.0
Myotis	MS2	0.1
Myotis	MS3	0.0
Myotis	MS4	0.1
Myotis	MS5	0.0
Myotis	MS6	0.0
Myotis	MS7	0.1
Myotis	MS8	0.1
Myotis	MS9	0.0

Species	Detector ID	Median Pass Rate
Soprano pipistrelle	MS1	0.1
Soprano pipistrelle	MS10	0.0
Soprano pipistrelle	MS11	0.0
Soprano pipistrelle	MS12	0.0
Soprano pipistrelle	MS2	0.0
Soprano pipistrelle	MS3	0.1
Soprano pipistrelle	MS4	0.0
Soprano pipistrelle	MS5	0.1
Soprano pipistrelle	MS6	0.0
Soprano pipistrelle	MS7	0.0
Soprano pipistrelle	MS8	0.0
Soprano pipistrelle	MS9	0.1

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.

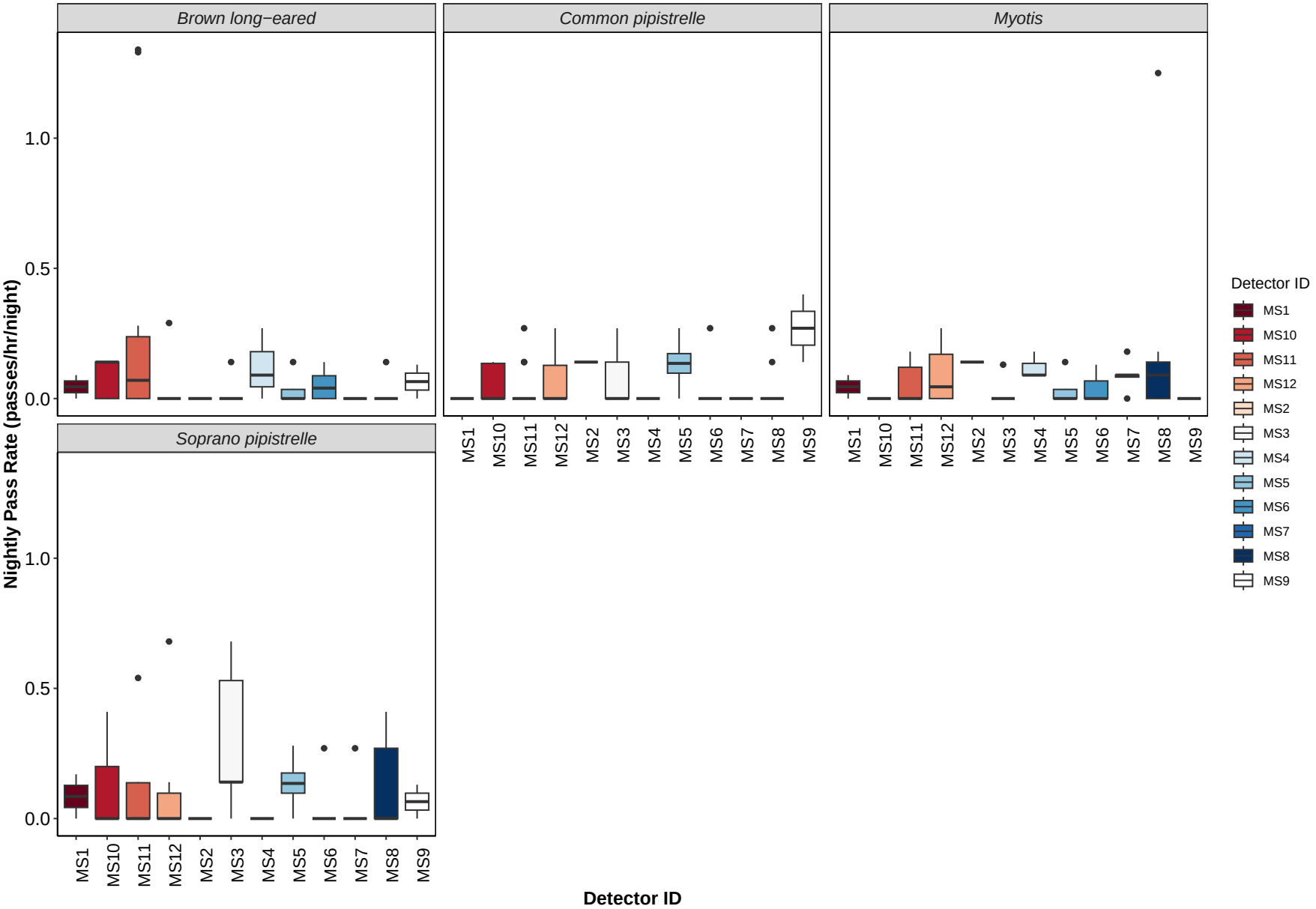
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Mean Pass Rate
Brown long-eared	MS1	0.0
Brown long-eared	MS10	0.1
Brown long-eared	MS11	0.3
Brown long-eared	MS12	0.0
Brown long-eared	MS2	0.0
Brown long-eared	MS3	0.0
Brown long-eared	MS4	0.1
Brown long-eared	MS5	0.0
Brown long-eared	MS6	0.1
Brown long-eared	MS7	0.0
Brown long-eared	MS8	0.0
Brown long-eared	MS9	0.1
Common pipistrelle	MS1	0.0
Common pipistrelle	MS10	0.1
Common pipistrelle	MS11	0.0
Common pipistrelle	MS12	0.1
Common pipistrelle	MS2	0.1
Common pipistrelle	MS3	0.1
Common pipistrelle	MS4	0.0
Common pipistrelle	MS5	0.1
Common pipistrelle	MS6	0.0
Common pipistrelle	MS7	0.0
Common pipistrelle	MS8	0.0
Common pipistrelle	MS9	0.3
Myotis	MS1	0.0
Myotis	MS10	0.0
Myotis	MS11	0.0
Myotis	MS12	0.1
Myotis	MS2	0.1
Myotis	MS3	0.0
Myotis	MS4	0.1
Myotis	MS5	0.0
Myotis	MS6	0.0
Myotis	MS7	0.1
Myotis	MS8	0.2
Myotis	MS9	0.0

Species	Detector ID	Mean Pass Rate
Soprano pipistrelle	MS1	0.1
Soprano pipistrelle	MS10	0.1
Soprano pipistrelle	MS11	0.1
Soprano pipistrelle	MS12	0.1
Soprano pipistrelle	MS2	0.0
Soprano pipistrelle	MS3	0.3
Soprano pipistrelle	MS4	0.0
Soprano pipistrelle	MS5	0.1
Soprano pipistrelle	MS6	0.0
Soprano pipistrelle	MS7	0.0
Soprano pipistrelle	MS8	0.1
Soprano pipistrelle	MS9	0.1

Per Detector

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.


Brown long−eared
Common pipistrelle
Myotis
Soprano pipistrelle
Nightly Pass Rate (passes/hr/night)
0.0
0.5
1.0
MS1
MS10
MS11
MS12
MS2
MS3
MS4
MS5
MS6
MS7
MS8
MS9
Detector ID

Survey Effort

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

month	Detector ID	No. of Survey Nights
May	MS10	2
May	MS11	3
May	MS12	1
May	MS2	1
May	MS3	1
May	MS5	1
May	MS6	1
May	MS8	1
Jul	MS10	5
Jul	MS11	8
Jul	MS12	4
Jul	MS3	4
Jul	MS5	3
Jul	MS6	2
Jul	MS7	1
Jul	MS8	6
Jul	MS9	2
Sep	MS1	2
Sep	MS11	3
Sep	MS12	5
Sep	MS4	3
Sep	MS6	3
Sep	MS7	5
Sep	MS8	6

Nighlty Bat Pass Rate for Each Month

Median per Detector

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

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

Species	Detector ID	Jul	May	Sep
Brown long-eared	MS1	NA	NA	0.0
Brown long-eared	MS10	0.0	0.1	NA
Brown long-eared	MS11	0.2	0.0	0.0
Brown long-eared	MS12	0.0	0.0	0.0
Brown long-eared	MS2	NA	0.0	NA
Brown long-eared	MS3	0.0	0.0	NA
Brown long-eared	MS4	NA	NA	0.1
Brown long-eared	MS5	0.0	0.1	NA
Brown long-eared	MS6	0.0	0.1	0.1
Brown long-eared	MS7	0.0	NA	0.0
Brown long-eared	MS8	0.0	0.1	0.0
Brown long-eared	MS9	0.1	NA	NA
Common pipistrelle	MS1	NA	NA	0.0
Common pipistrelle	MS10	0.1	0.0	NA
Common pipistrelle	MS11	0.0	0.0	0.0
Common pipistrelle	MS12	0.1	0.1	0.0
Common pipistrelle	MS2	NA	0.1	NA
Common pipistrelle	MS3	0.1	0.0	NA
Common pipistrelle	MS4	NA	NA	0.0
Common pipistrelle	MS5	0.1	0.0	NA
Common pipistrelle	MS6	0.1	0.0	0.0
Common pipistrelle	MS7	0.0	NA	0.0
Common pipistrelle	MS8	0.0	0.0	0.0
Common pipistrelle	MS9	0.3	NA	NA
Myotis	MS1	NA	NA	0.0
Myotis	MS10	0.0	0.0	NA
Myotis	MS11	0.0	0.0	0.1
Myotis	MS12	0.0	0.0	0.2
Myotis	MS2	NA	0.1	NA
Myotis	MS3	0.0	0.0	NA
Myotis	MS4	NA	NA	0.1
Myotis	MS5	0.0	0.0	NA
Myotis	MS6	0.1	0.0	0.0
Myotis	MS7	0.0	NA	0.1
Myotis	MS8	0.0	0.0	0.1
Myotis	MS9	0.0	NA	NA

Species	Detector ID	Jul	May	Sep
Soprano pipistrelle	MS1	NA	NA	0.1
Soprano pipistrelle	MS10	0.1	0.0	NA
Soprano pipistrelle	MS11	0.1	0.0	0.0
Soprano pipistrelle	MS12	0.1	0.0	0.0
Soprano pipistrelle	MS2	NA	0.0	NA
Soprano pipistrelle	MS3	0.3	0.1	NA
Soprano pipistrelle	MS4	NA	NA	0.0
Soprano pipistrelle	MS5	0.1	0.0	NA
Soprano pipistrelle	MS6	0.1	0.0	0.0
Soprano pipistrelle	MS7	0.3	NA	0.0
Soprano pipistrelle	MS8	0.3	0.1	0.0
Soprano pipistrelle	MS9	0.1	NA	NA

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.

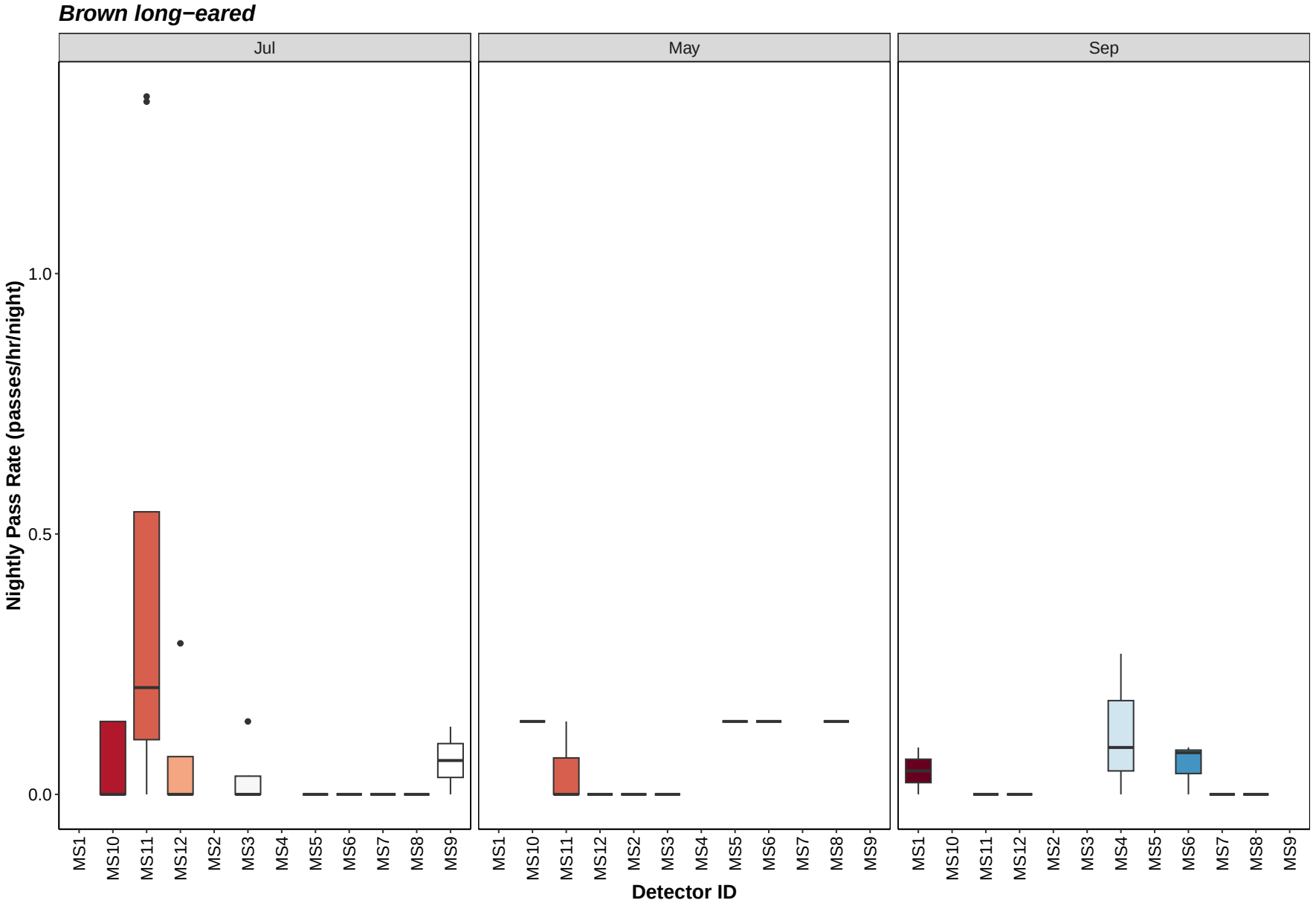
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

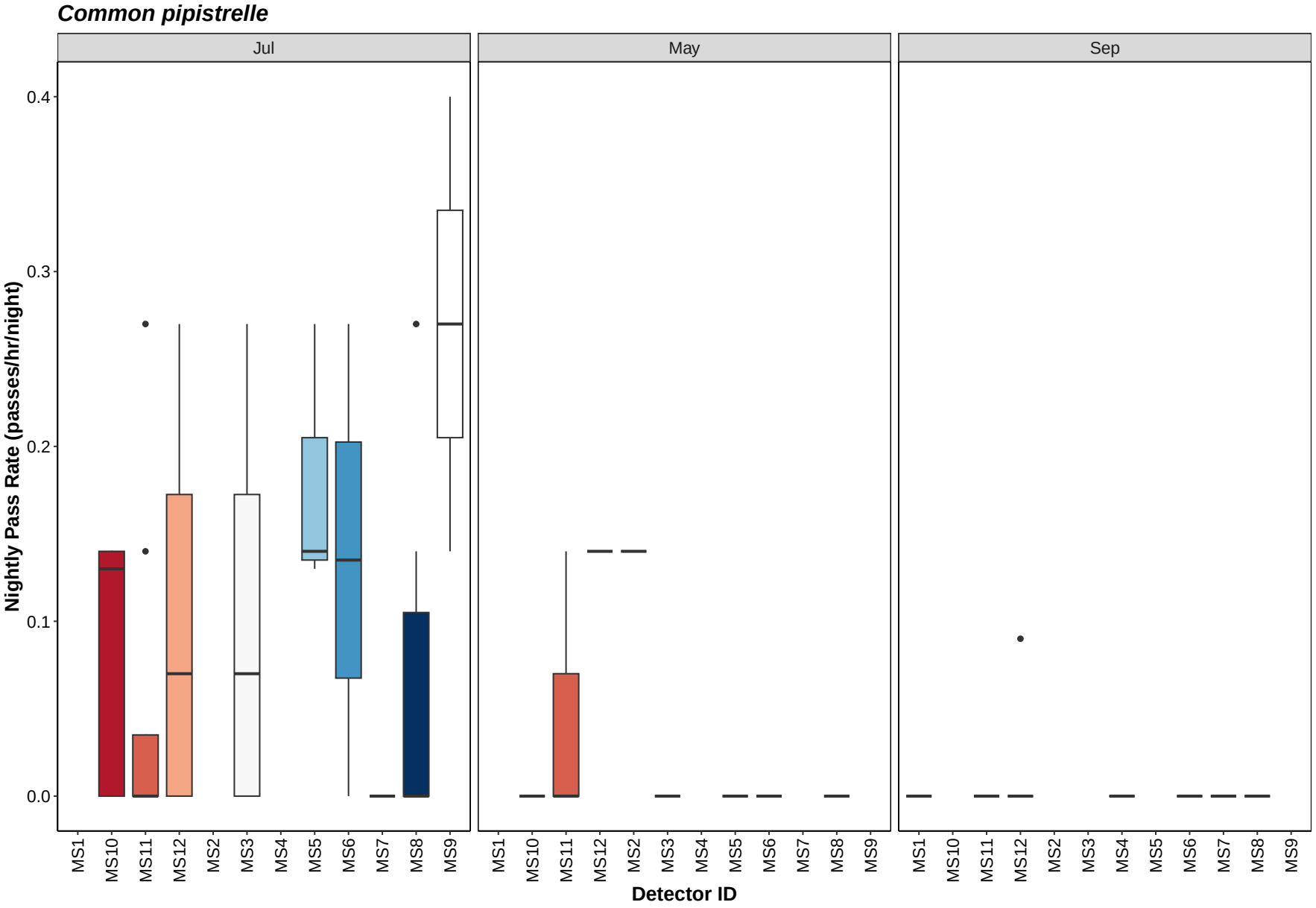
Species	Detector ID	Jul	May	Sep
Brown long-eared	MS1	NA	NA	0.0
Brown long-eared	MS10	0.1	0.1	NA
Brown long-eared	MS11	0.4	0.0	0.0
Brown long-eared	MS12	0.1	0.0	0.0
Brown long-eared	MS2	NA	0.0	NA
Brown long-eared	MS3	0.0	0.0	NA
Brown long-eared	MS4	NA	NA	0.1
Brown long-eared	MS5	0.0	0.1	NA
Brown long-eared	MS6	0.0	0.1	0.1
Brown long-eared	MS7	0.0	NA	0.0
Brown long-eared	MS8	0.0	0.1	0.0
Brown long-eared	MS9	0.1	NA	NA
Common pipistrelle	MS1	NA	NA	0.0
Common pipistrelle	MS10	0.1	0.0	NA
Common pipistrelle	MS11	0.1	0.0	0.0
Common pipistrelle	MS12	0.1	0.1	0.0
Common pipistrelle	MS2	NA	0.1	NA
Common pipistrelle	MS3	0.1	0.0	NA
Common pipistrelle	MS4	NA	NA	0.0
Common pipistrelle	MS5	0.2	0.0	NA
Common pipistrelle	MS6	0.1	0.0	0.0
Common pipistrelle	MS7	0.0	NA	0.0
Common pipistrelle	MS8	0.1	0.0	0.0
Common pipistrelle	MS9	0.3	NA	NA
Myotis	MS1	NA	NA	0.0
Myotis	MS10	0.0	0.0	NA
Myotis	MS11	0.1	0.0	0.1
Myotis	MS12	0.0	0.0	0.1
Myotis	MS2	NA	0.1	NA
Myotis	MS3	0.0	0.0	NA
Myotis	MS4	NA	NA	0.1
Myotis	MS5	0.0	0.0	NA
Myotis	MS6	0.1	0.0	0.0
Myotis	MS7	0.0	NA	0.1
Myotis	MS8	0.0	0.0	0.3
Myotis	MS9	0.0	NA	NA

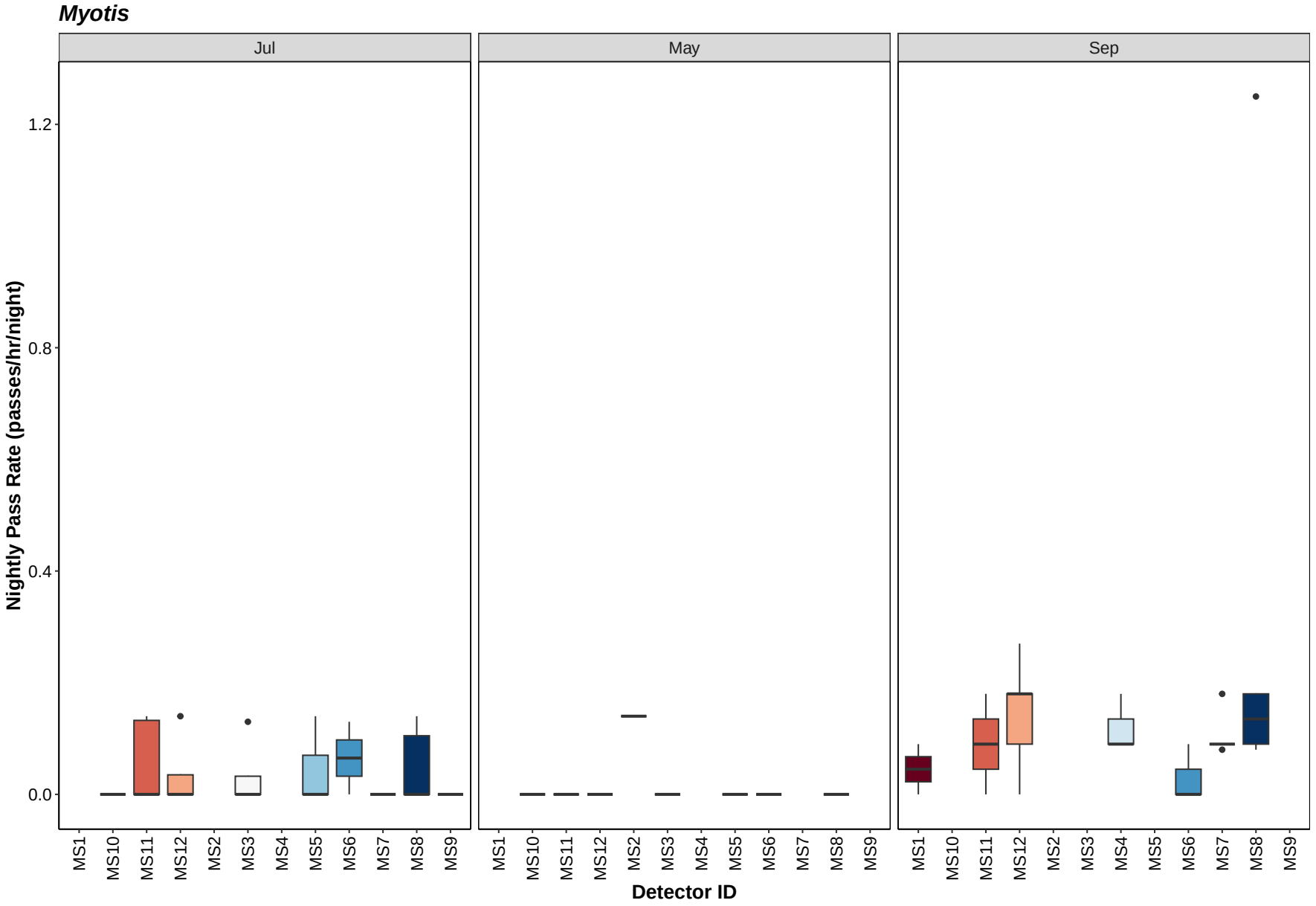
Species	Detector ID	Jul	May	Sep
Soprano pipistrelle	MS1	NA	NA	0.1
Soprano pipistrelle	MS10	0.2	0.0	NA
Soprano pipistrelle	MS11	0.1	0.0	0.0
Soprano pipistrelle	MS12	0.2	0.0	0.0
Soprano pipistrelle	MS2	NA	0.0	NA
Soprano pipistrelle	MS3	0.3	0.1	NA
Soprano pipistrelle	MS4	NA	NA	0.0
Soprano pipistrelle	MS5	0.2	0.0	NA
Soprano pipistrelle	MS6	0.1	0.0	0.0
Soprano pipistrelle	MS7	0.3	NA	0.0
Soprano pipistrelle	MS8	0.2	0.1	0.0
Soprano pipistrelle	MS9	0.1	NA	NA

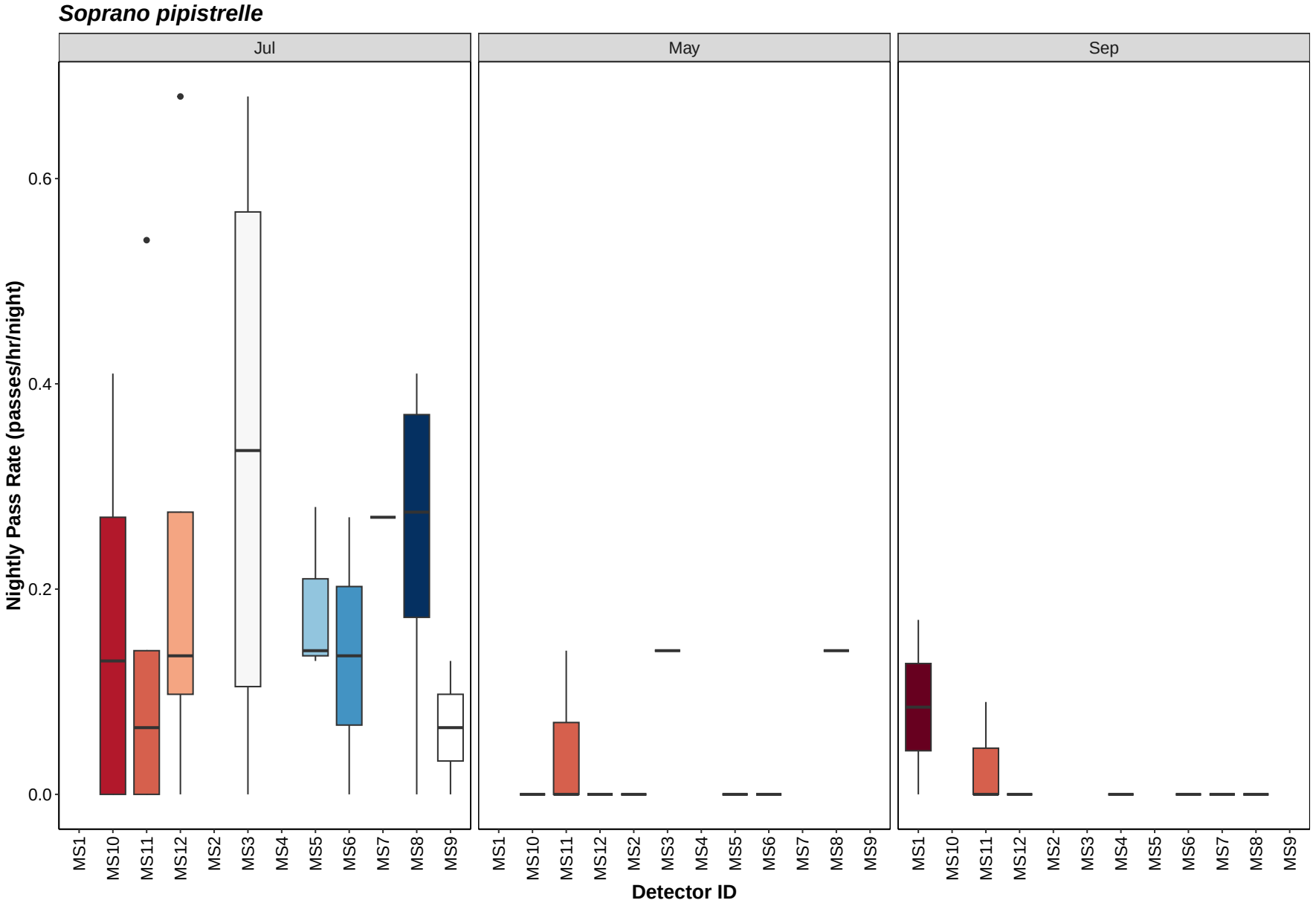
Per Detector

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.


Brown long−eared
Jul
May
Sep
Nightly Pass Rate (passes/hr/night)
1.0
0.5
0.0
MS1
MS10
MS11
MS12
MS2
MS3
MS4
MS5
MS6
MS7
MS8
MS9
Detector ID


Common pipistrelle
Jul
May
Sep
Nightly Pass Rate (passes/hr/night)
0.0
0.1
0.2
0.3
0.4
MS1
MS10
MS11
MS12
MS2
MS3
MS4
MS5
MS6
MS7
MS8
MS9
Detector ID


Myotis
Jul
May
Sep
Nightly Pass Rate (passes/hr/night)
1.2
0.8
0.4
0.0
MS1
MS10
MS11
MS12
MS2
MS3
MS4
MS5
MS6
MS7
MS8
MS9
Detector ID


Soprano pipistrelle
Jul
May
Sep
Nightly Pass Rate (passes/hr/night)
0.0
0.2
0.4
0.6
MS1
MS10
MS11
MS12
MS2
MS3
MS4
MS5
MS6
MS7
MS8
MS9
Detector ID

Bat Activity per Detector Location

Figure 18. Detector ID reference:

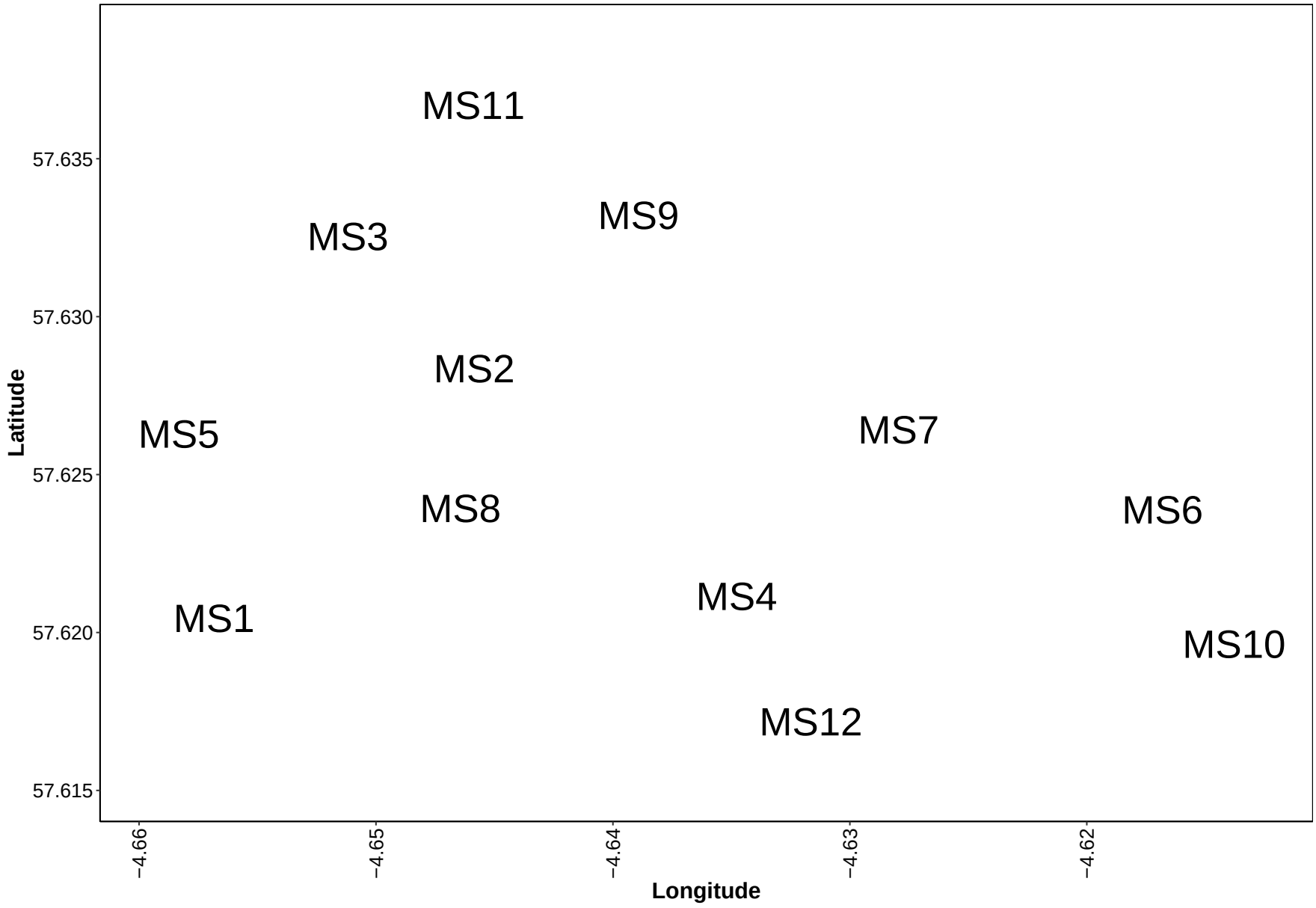

MS11
MS9
MS3
MS2
MS5
MS7
MS8
MS6
MS4
MS1
MS10
MS12
57.635
57.630
57.625
57.620
57.615
Latitude
−4.66
−4.65
−4.64
−4.63
−4.62
Longitude

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.

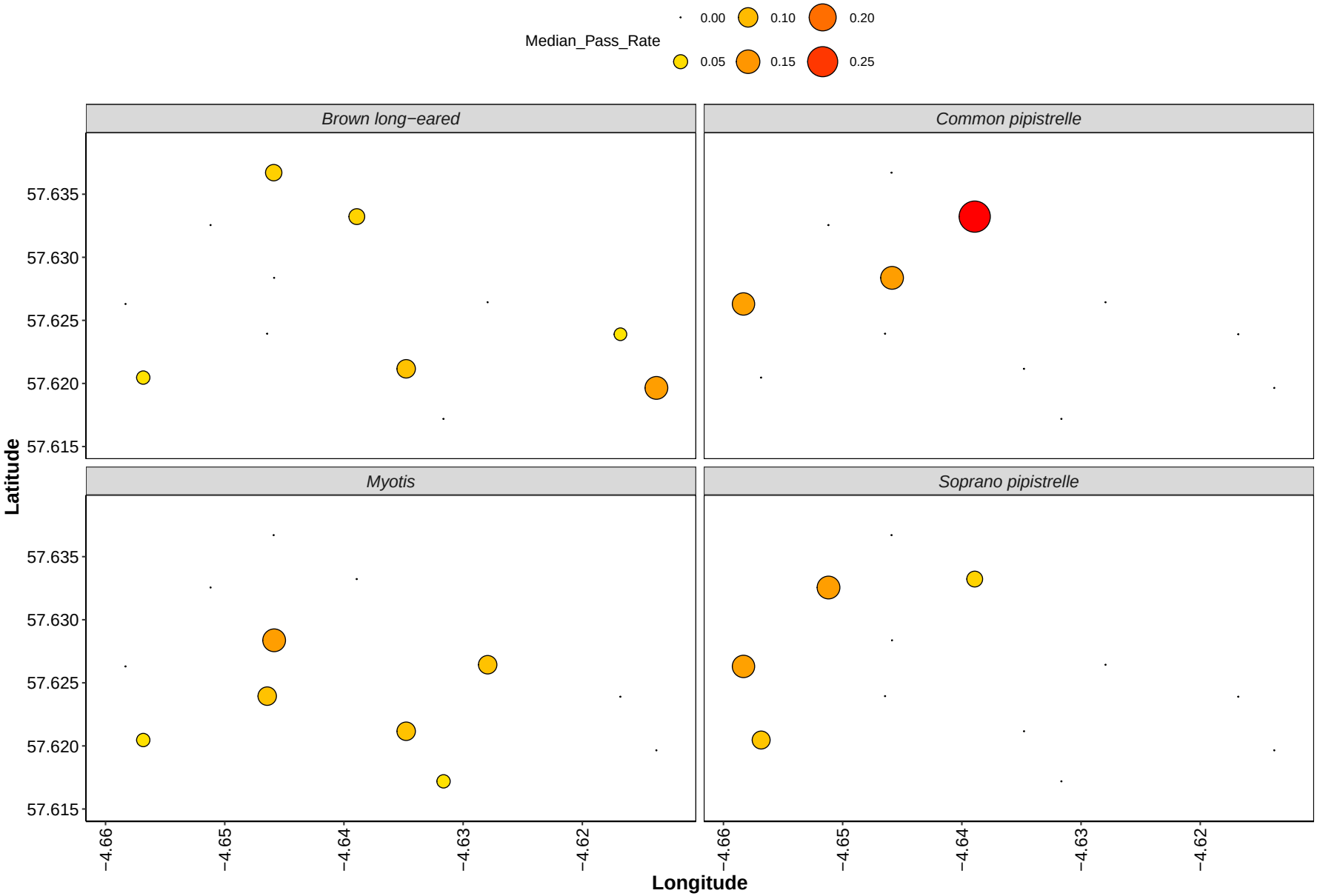
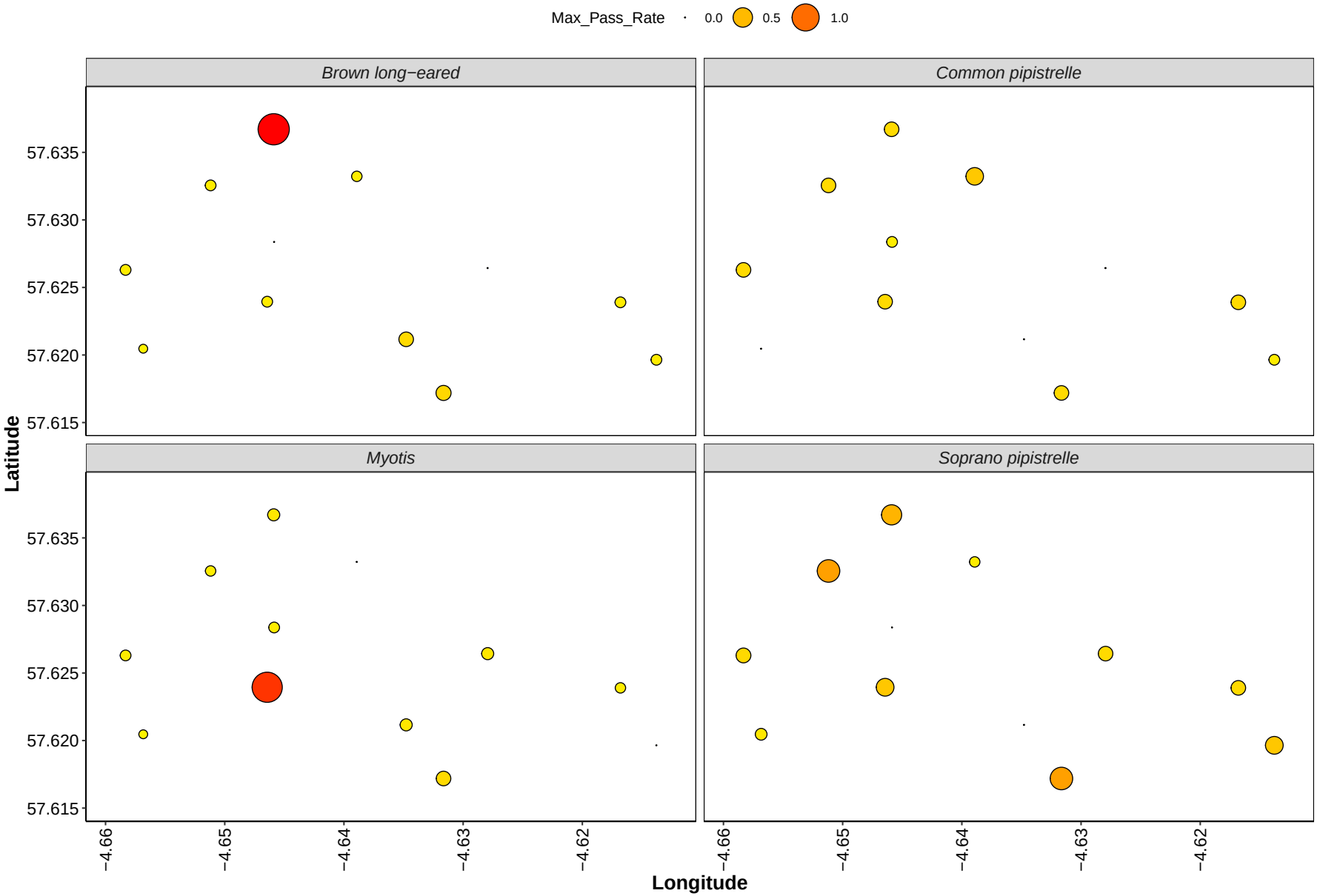

Median_Pass_Rate
0.00
0.05
0.10
0.15
0.20
0.25
Brown long−eared
Common pipistrelle
Myotis
Soprano pipistrelle
Latitude
57.635
57.630
57.625
57.620
57.615
−4.66
−4.65
−4.64
−4.63
−4.62
Longitude

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.


Max_Pass_Rate
0.0
0.5
1.0
Brown long−eared
Common pipistrelle
Myotis
Soprano pipistrelle
Latitude
57.635
57.630
57.625
57.620
57.615
−4.66
−4.65
−4.64
−4.63
−4.62
Longitude

Thank you for using Ecobat!