

Appendix 8.4: Bat Survey Report



Loch Liath Wind Farm Ltd

**Loch Liath Wind Farm
EIA**

**Appendix 8.4: Bat
Survey Report**

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Prepared by LUC
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Loch Liath Wind Farm Ltd

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Appendix 8.4

Bat Survey Report

Introduction

1.1 This Appendix presents the full methods and results of the bat surveys undertaken to inform the Ecological Impact Assessment (EclA) of the proposed Loch Liath Wind Farm (hereafter referred to as the 'Proposed Development'). The Ecological Impact Assessment is provided in **Chapter 8: Ecology** of the Environmental Impact Assessment (EIA Report).

Supporting Documents

1.2 This Appendix supports the EclA in addition to the following Appendices:

- **Appendix 8.1: Desk Study and Legal Context;**
- **Appendix 8.2: Habitats and Vegetation Survey Report;**
- **Appendix 8.3: Protected Species Surveys;** and
- **Appendix 8.5: Outline Restoration and Enhancement Plan.**

1.3 This Appendix is supported by the following figures which can be found in the EIA Report:

- **Figure 8.1: Ecology Survey Area;**
- **Figure 8.7: Bat Survey Area;** and
- **Figure 8.8: Bat Survey Results.**

Terminology

1.4 The following terminology will be used throughout this appendix:

- **Site**
 - All land within the red line boundary (as shown in **Figure 8.1**).
- **Proposed Development**
 - The physical process involved in the development of the land at Loch Liath Wind Farm including construction and operation of an up to 13 turbine wind farm and ancillary infrastructure (described in detail in **Chapter 4: Project Description** of the EIA Report).
- **Developable Area**
 - The area where the turbines are proposed to be sited (including all associated infrastructure).
- **Bat Survey Area (BSA)**
 - The area within which bat surveys were undertaken in line with good practice guidelines. The Bat Survey Area (BSA) is defined as a 200m buffer plus rotor radius¹ (77.5m) of proposed turbine locations (as shown in **Figure 8.1**), and a 50m buffer along the proposed new access track.
 - At the time of survey, the footprint of the Proposed Development extended beyond the Site boundary to the east, and so static bat detectors were deployed outwith the final BSA.
- **Access Survey Area (ASA)**

- The area within the red line boundary in which ecological survey was undertaken along the Bhlaraidh Wind Farm existing access track. This is defined at its southern end as the junction with the A887 in Glen Moriston, and at its northern end as the location at which the existing track ends), as shown in **Figure 8.1**.

- **Desk Study Area**

- The area within which the desk study was undertaken (10km radius of the Site)¹.

Methods

Survey Guidelines

1.5 NatureScot released new survey guidance in January 2019, which was updated with minor revisions in August 2021¹, with a view to standardising bat survey best practice in the UK. This guidance has been followed as far as reasonably practicable (see **Constraints and Limitations**).

Desk Study

1.6 A desk study was undertaken to provide information relating to the historical presence of bats within the Site and a 10km buffer. An account of the methods adopted, and findings, is provided in **Appendix 8.1: Desk Study and Legal Context**.

1.7 Where available, data was gathered from existing national surveys and incidental records, identified through publicly available records² within the Desk Study Area. Only records from the year 2000 onwards have been included in this study.

1.8 Additionally, a data request was submitted to the Highland Biological Recording Group (HBRG) on 11 July 2022 for protected species records which included bat records within 10km of the Site; data was received on 22 July 2022.

Field Surveys

Bat Roost Potential

1.9 An assessment for Bat Roost Potential (BRP) was undertaken on trees and built structures within the BSA in 2020 and 2021 following assessment criteria set out in standard guidance prepared by the Bat Conservation Trust (BCT)³.

1.10 The criteria used to categorise BRP are summarised in **Table 8.4.1**. The table also summarises what surveys, if any, are required for each category.

Table 8.4.1: Bat Roost Potential Categories

BRP Category	Roosting Habitat Features	Commuting and Habitat Features	Survey Requirement
Negligible	Negligible habitat features likely to support roosting, commuting or foraging bats.		No surveys required.
Low	Structures in this category offer one or more potential roost sites for individual, opportunistically roosting bats. These sites do not offer the space, shelter or appropriate conditions to support large numbers of bats or maternity roosts.	Habitat on and around the Site could be used by a small number of commuting bats. This category includes densely urbanised landscapes or linear vegetation features	One dusk or dawn survey required for structures. No surveys required for trees.

¹ NatureScot (2021) Bats and onshore wind turbines - survey, assessment and mitigation. Available at: <https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation> [Accessed July 2022].

² The National Biodiversity Network (NBN) Online Database. Available at: <https://records.nbnatlas.org/> [Accessed 10/08/2022].

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

BRP Category	Roosting Habitat Features	Commuting and Habitat Features	Survey Requirement
	Trees in this category include those of sufficient size and age to support suitable roosting features, but none are visible from the ground.	poorly connected to the wider landscape (e.g., gappy hedges in an agricultural context).	
Moderate	Structures and trees in this category offer one or more roost site that, due to their space, shelter or conditions, offer roosting potential for a range of species. Roosts may be more permanent, rather than opportunistic. Small maternity roosts of common species may form in one of these roost sites.	Habitat on and around the Site is well-connected to wider continuous habitat and offers commuting and foraging habitat to a larger number of species. (e.g., tree lines or linked gardens in the urban context, or continuous hedge/tree lines and watercourses in an agricultural setting).	One dusk and one dawn survey required for both structures and trees. Tree-climbing may be an appropriate alternative to dusk and dawn surveys.
High	Structures and trees in this category have one or more potential roost sites that are suitable for large number of bats. Roosts are likely to be permanent and include maternity roosts. Potential roost sites exist for a wide range of species or species of particular conservation interest.	Habitat on and around the Site is diverse, continuous and linked to extensive suitable habitat. This category includes well-vegetated rivers, streams, hedgerows and woodland edge. Habitat is sufficiently diverse to offer opportunities to a wide range of species or those of particular conservation interest.	Three surveys, including both dusk and dawn elements. Tree-climbing may be an appropriate alternative to dusk and dawn surveys.

Ground-level Static Surveys

1.11 In accordance with NatureScot bat guidance¹, 16 ground-level automated detectors were deployed across the Site, based on the turbine layout at the time of surveys which extended up to 26 turbines (the EIA Scoping layout). The survey was based on the footprint, oversail and anticipated land take of the 26 turbine layout, which extended over a wider area to the north and east than the 13 turbine layout of the Proposed Development.

1.12 The BSA consists of undulating blanket bog and heathland, with numerous waterbodies and watercourses. Detectors were deployed evenly across the Site where possible, while also being deployed as close as possible to a proposed turbine location (based on the EIA Scoping layout under consideration at the time of the surveys).

1.13 Sixteen Wildlife Acoustics full spectrum detectors were used, comprising a combination of detector types (Song Meter SM4 and SM Mini).

1.14 In line with best practice guidelines¹ with a minor variation as agreed with NatureScot (see **Constraints and Limitations**), detectors were deployed for a minimum of 10 consecutive nights in each of the designated survey 'seasons' of Summer 2020 (June – mid-August), Autumn 2020 (mid-August – October) and Spring 2021 (April-May). Details of survey periods are provided in **Table 8.4.2**.

1.15 A Davis 'Vantage View' weather station (Model No: 6120UK) was deployed (NH 37869 22327) across all survey seasons at an approximate elevation of 552m. Data collected from the weather station during the Summer 2020 and Spring 2021 surveys was used to provide climatical information. However, due to the length of its deployment in Autumn 2020, no data was available from the onsite weather station for the period that the static detectors were deployed as the device has limited memory and overwrote the data from

the start of the survey period; data from the weather station at Aviemore) (~51km east)⁴ was therefore used to supplement the onsite data.

1.16 To account for variations in climatical data as a result of differences in elevation, weather data collected within the Site from the 10 October – 3 November was compared to Aviemore weather station data collected during the same period. The average difference in average temperature and wind speed between both weather stations was then calculated. The average difference was applied to the Aviemore weather station data used to supplement onsite weather data during the Autumn survey period.

Table 8.4.2: Ground-level Static Detector Survey Deployment Dates

Season	Dates Deployed	Number of Consecutive Nights
Summer	17 June - 17 July 2020	30
Autumn	14 September - 5 October 2020	20
Spring	20 April - 30 April 2021	10

1.17 **Table 8.4.3** provides details of detector locations and their proximity to turbines⁵, as well as the surrounding habitat. Detector locations are shown in **Figure 8.7**.

Table 8.4.3: Detector Details

Detector Number	Grid Reference	Nearest Corresponding Turbine	Distance to Turbine (m)	Elevation (m)	Habitat
D1	NH 38520 25720	T13	690	514	Blanket bog
D3	NH 37795 24629	T10	189	555	Blanket bog
D5	NH 37240 23520	T7	229	565	Blanket bog
D7	NH 37330 22470	T1	310	547	Wet heathland
D9	NH 38908 25274	T13	626	488	Wet heathland 115m north-west of northern Loch nam Meur
D10	NH 38951 24657	T12	401	499	Blanket bog 145m south-west of northern Loch nam Meur
D11	NH 38372 24161	T11	119	523	Dry heathland 90m east of lochan
D12	NH 38148 23243	T2	234	503	Blanket bog 110m south of Loch na Ruighe Duibhe
D13	NH 38047 22556	T3	187	499	Blanket bog adjacent to lochan
D16	NH 38966 23569	T5	405	525	Blanket bog
D17	NH 38616 22986	T4	272	498	Blanket bog
D19	NH 39669 24016	T5	1,167	568	Wet heathland
D21	NH 39288 22427	T3	1,132	541	Blanket bog
D22	NH 40016 22935	T4	1,383	525	Dry heathland

⁴ Meteostat (2022). Aviemore Historic Weather Data. Available at: <https://meteostat.net/en/station/03063?t=2020-09-14/2020-10-05> [Accessed November 2022]

⁵ Proximity to turbines is based on the proposed 13 turbine layout.

Detector Number	Grid Reference	Nearest Corresponding Turbine	Distance to Turbine (m)	Elevation (m)	Habitat
D24	NH 40585 23226	T4	1,913	424	Dry heathland, adjacent to stream, 160m south-west of Loch Aslaich
D26	NH 40658 21970	T3	2,576	551	Dry heathland, 90m south-east of lochan

1.18 To allow for temporal comparison, where possible, detectors were deployed at the same locations during each season; however, minor changes to the placement of the detector may have occurred as a result of different surveyors undertaking the deployment.

1.19 Automatic static detectors were deployed as close as possible to proposed turbine locations at the time of survey (i.e. as per the EIA Scoping layout). As the layout of the Proposed Development now comprises up to 13 turbines over a smaller area, some detectors are no longer in the vicinity of these proposed turbines (see **Constraints and Limitations**).

1.20 All detectors were programmed to start recording 30 minutes before sunset and stop recording 30 minutes after sunrise.

1.21 Details of the deployment and collection dates, and detector locations, were recorded using the ArcGIS Collector app on a Samsung handheld tablet and are provided in **Table 8.4.2** and **Table 8.4.3** above.

Analysis

1.22 Bat passes from SM4 and SM mini detectors were analysed using Kaleidoscope Pro software. Data was analysed using auto ID and manual verification by suitably qualified ecologists.

1.23 A two-stage analysis of bat species data was undertaken with the traditional Bat Activity Index (BAI) calculated, in addition to processing data using Ecobat software.

Bat Activity Index (BAI)

1.24 To allow for an accurate and reliable comparison of bat passes between detector locations and across all three survey seasons, a Bat Activity Index (BAI) was calculated. BAI is calculated by taking the number of bat passes (in this instance per genus, per detector location) and dividing it by the number of hours recorded, this will give the number of bat passes per hour⁶.

1.25 Full-spectrum sound files are approximately 14 seconds long, so it is not always possible to distinguish if the file contains multiple calls from a single bat or single calls from multiple bats. For this reason, as a measure of standardisation, one individual was recorded for each species recorded in a single sound file and bat 'calls' are referred to as bat passes.

1.26 This calculation of BAI enables relative comparisons to allow exploration of patterns of usage within the BSA, as well as use of the BSA across different seasons. It also removes any bias created by the variation in the duration of the static detector deployment periods.

Ecobat

1.27 Ecobat⁷ is a web based tool, managed by The Mammal Society, which allows bat call data to be uploaded and compared with a database of other bat call data within a defined geographic region and similar time of year. In this case, the parameters selected to compare bat data collected in the BSA was bat call data within North Scotland⁸ and during a similar time of year (+/- 30 days). Ecobat allows an objective activity level to be assigned to uploaded bat data, indicating the relative importance of the data when compared with other data in the database.

1.28 Ecobat returns a percentile for each species and genus. This percentile indicates the relative importance of the activity level, for example an 80th percentile would indicate that the activity is greater than 80% of comparison records levels. Percentile levels have been given definitions to easily identify important data sets. Percentiles are split as follows:

- Low activity: 0-20th percentile;
- Low to Moderate activity: 21st-40th percentile;
- Moderate activity: 41st-60th percentile;
- Moderate to High activity: 61st-80th percentile; and
- High activity: 81st-100th percentile.

Risk Assessment

1.29 To quantify the risk of the Proposed Development to bats, site-based risk factors are incorporated into the analysis. This consists of a two-stage process. Stage one consists of scoring the predominant habitat based on habitat suitability for bats from low (1) to high (3)¹ based on the potential to support bats, by assessing the roosting, foraging and commuting opportunities present.

1.30 The second stage is to conduct a three-factor analysis utilising development-related features to score the project size from Low (1) to High (3)¹. This involves assessing the number of proposed turbines, the height of proposed turbines, and wind developments within 5km or 10km (dependent on number of proposed turbines) of the Site, to provide an overall project size score.

1.31 An overall 'Site Risk Level' for the Proposed Development can then be determined using the risk assessment matrix from the NatureScot guidance¹ (see **Table 8.4.14**). This is used in conjunction with Ecobat data to provide an overall collision risk category to bat species and genus (see **Chapter 8**).

Constraints and Limitations

1.32 Sixteen detectors were originally deployed based on the EIA Scoping layout of 26 turbines proposed at the time of survey. Guidance regarding the deployment of ground-level static detectors states "*detectors should be placed within the developable area at ten potential turbine locations plus a third of additional potential turbine sites*"; therefore 11 detectors are recommended for a development of 13 turbines. However, due to changes in the proposed layout, seven of the detectors are within the final BSA while the remaining nine are outwith the BSA but within the wider Site (see **Figure 8.7**). The number of detectors within the final BSA is therefore lower than recommended by guidance¹. However, the guidance also acknowledges that turbine locations are often subject to change. Given the higher number of detectors deployed overall, thereby providing information about use of the wider Site and landscape, this is not considered to be a material limitation to the assessment of activity levels and risk.

1.33 Due to travel restrictions imposed by the Scottish Government in Spring 2020 in response to the outbreak of Covid-19, it was not possible to deploy detectors during the Spring 2020 survey season. Bat detectors were deployed in Summer and Autumn 2020, and Spring 2021, as agreed with NatureScot⁹. This did not have a material effect on the outcome of the results as data was collected across the three seasons over a 12-month period.

1.34 During the Summer survey, Detector 26 failed to record due to a technical fault, and the microphone for Detector 17 was found dislodged and pointing towards the ground. During the Autumn survey, Detectors 11 and 12 failed to record due to water damage. These issues may have resulted in bat passes not being recorded. Given that the BSA consists of undulating blanket bog and heathland and 14 detectors were in similar habitats throughout Summer and Autumn, the technical faults are unlikely to have had a substantive effect of the results of the survey. Furthermore, excluding the detectors that were faulty, the number of detectors that were operational adheres to NatureScot guidance¹ in relation to the final proposed 13 turbine layout.

1.35 The onsite weather station was deployed in Autumn on 14th September 2020 and collected on 4th November 2020. The weather station only stored the past 28 days of weather information from the day it was collected; as a result, there was no weather data available for the period of 14th September to 5th October 2020.

1.36 Weather data from Aviemore weather station (NH 89333 13625) was used to supplement Autumn weather data information. The weather station at Aviemore is located approximately 51km east of the BSA at an elevation of 220m. A weather station at

⁶ Hundt, L. (2012). Bat Surveys: Good Practice Guidelines (2nd Edition). Bat Conservation Trust, London.

⁷ The Mammal Society (2017). Ecobat. Available at: <http://www.ecobat.org.uk/> [Accessed July 2022]

⁸ The Mammal Society categorise regions based on the Met Office template, available at: <https://www.metoffice.gov.uk/research/climate/maps-and-data/about/districts-map> [Accessed October 2022]

⁹ Email correspondence with NatureScot's Renewable Energy Casework Advisor [Dated April 2020]

Inverness Airport is closer (NH 77360 51093, approximately 47km north-east), but it is at an altitude of 15m which was considered to be less comparable than the Aviemore weather station. Climatic variations are likely between the BSA and Aviemore; as previously noted, the onsite weather station was deployed at an elevation of approximately 552m throughout the survey period, therefore temperatures in general are likely to be lower than at Aviemore as temperature decreases by approximately 1-3°C with every 300m in elevation gain¹⁰. These variations were accounted for and corroborated as previously addressed in the methods described in Ground-level Static Surveys in paragraph 1.46.

1.37 Minor changes to the placement of each detector have occurred as a result of different surveyors undertaking the deployment and the accuracy of GPS equipment which varied by a maximum of 10m. These differences were minimal and therefore the data recorded during each season was considered suitable to undertake a reliable comparison.

1.38 The timeframe in which a survey is undertaken provides a 'snapshot' of activity within the BSA and will not necessarily detect all evidence of use by a species. Ecological surveys are limited by a variety of factors which affect the presence of flora and fauna such as season, migration patterns and species behaviour. Evidence of species is not always discovered during the survey. This does not mean that a species is absent.

Results

Desk Study

1.39 Historical data identified records (132 in total) of the following species within the 10km Desk Study Area:

- Common pipistrelle *Pipistrellus pipistrellus* (62);
- Soprano pipistrelle *Pipistrellus pygmaeus* (11);
- Unidentified pipistrelle *Pipistrellus* spp. (43);
- Daubenton's bat *Myotis daubentonii* (2);
- Brown long-eared bat *Plecotus auritus* (10); and
- Unidentified bat *Chiroptera* (4).

1.40 None of the records listed above were from within the BSA.

1.41 A data request was submitted to the Highland Biological Recording Group, which identified records (44 in total) of the following species:

- Common pipistrelle *Pipistrellus pipistrellus* (6);
- Soprano pipistrelle *Pipistrellus pygmaeus* (4);
- Unidentified pipistrelle *Pipistrellus* spp. (26);
- Daubenton's bat *Myotis Daubentonii* (1);
- Brown long-eared bat *Plecotus auratus* (6); and
- Unidentified bat (1).

1.42 Several records of *Pipistrellus* spp. and brown long-eared bat roosts were identified; however, none were recorded within the BSA.

1.43 It is important to note that several bat records included multiple counts of individual bats where recorders had been surveying roosts, therefore the total number of individual bats recorded will exceed the number of records. The number of individual bats recorded is provided in **Appendix 8.1**.

Field Survey

Bat Roost Potential Surveys

1.44 The BSA does not contain woodland habitats or buildings. No structures or trees were identified within the BSA as having suitability to support roosting bats (and therefore necessitate further surveys).

1.45 Woodland habitats are present along the southern end of the ASA in Glen Moriston, including semi-natural and plantation types of vary species composition. However, many of the trees were noted to be recently planted or semi-mature and lacking suitable features for roosting bats. A small number of mature trees of sufficient size were noted to be within the ASA during the survey, although no suitability for roosting bats was recorded. No removal of trees is proposed.

Ground-level Static Survey

1.46 A total average of 497 hours of recording were undertaken across the three survey seasons as detailed in **Table 8.4.4**, below. Due to individual variations between detector deployment duration survey seasons, the average total number of hours recorded, the minimum and maximum total hours recorded, and the numbers of days are presented.

1.47 There is also some variation in number of hours due to the changes in night length and number of nights deployment.

Table 8.4.4: Recording Hours During Each Survey Season

Season	Average Total Number of Hours Recorded (minimum-maximum) ¹¹	Number of Consecutive Nights Recorded
Summer 2020	174 (154.5-188)	30
Autumn 2020	225.5 (224.75-226)	20
Spring 2021	97.5 (97.5)	10
Total	497	60

Weather Data Summary

1.48 Data from an onsite weather station, supplemented with data from the closest weather station (Aviemore) was analysed according to NatureScot guidance¹. Aviemore weather station data provides an overview of weather conditions for the entire Autumn 2020 survey period.

1.49 Data compared from Aviemore and the onsite weather station data between 10 October – 3 November 2020 showed that the onsite weather station reported an average daily temperature 3.6°C cooler and average daily wind speeds 11.2m/s faster when compared to Aviemore weather station.

1.50 A decrease of 3.6°C in temperature and increase of 11.2m/s in wind speed has been applied to Aviemore weather station data to account for differences in elevation between BSA and Aviemore weather station, as previously addressed in Ground-level Static Surveys in paragraph 1.46.

1.51 **Table 8.4.5** provides a summary of the onsite weather station and Aviemore weather station data.

Summer 2020 (onsite weather station)

1.52 The onsite weather station collected data for 26 out of 30 nights between 20 June – 15 July. A total of 11 nights recorded temperatures above the recommended 8°C, as recommended by guidance^{1,3}. The average wind speed was 11.9 m/s. Precipitation was generally low, average precipitation was 3.4mm per day.

¹⁰ letstalkscience (2020) Weather: Temperature. Available at: <https://letstalkscience.ca/educational-resources/backgrounders/weather-temperature> [Accessed August 2022]

¹¹ Detectors were collected over a two-to-three-day period which resulted in minor variations between detector deployment duration.

Autumn 2020 (Aviemore weather station)

1.53 A total of eight nights recorded temperatures above the recommended 8°C, as recommended by guidance^{1,3}. The average wind speed was 11.9 m/s. No precipitation data was available.

Spring 2021 (onsite weather station)

1.54 The onsite weather station collected data for 10 nights between 20-30 April. A total of seven nights recorded temperatures above the recommended 8°C, as recommended by guidance^{1,3}. The average windspeed was 0.2m/s with the highest single speed 1.3m/s and the lowest 0m/s. Precipitation was generally low, with the average precipitation was 0.8mm per day.

Table 8.4.5: Summary of Weather Station Data (averages and range provided)

Deployment Dates	Consecutive Nights Recorded	Temperature (°C)	Nights Above 8°C	Wind Speed (m/s)	Precipitation (mm)	Days ≤1mm
Summer 2020						
20 June – 15 July 2020	26	7.5 (5-15)	11	11.9 (5.4-19.7)	3.4 (0-11.2)	9
Autumn 2020¹²						
14 September – 5 October 2020	n/a	6.1 (0.3-12.1)	8	12.7 (10.7-16.6)	No data	No data
Spring 2021						
20 April – 30 April 2021	10	9.3 (6-14)	7	0.2 (0-1.3)	0.8 (0-3.6)	8

Bat Activity Index (BAI) Results

1.55 As stated in Constraints and Limitations above, it is important to note when interpreting the results that Detectors 11 and 12 (during Autumn), and Detector 26 (during Summer), did not record data due to technical faults. However, the volume and extent of data collected from all deployed detectors across all three survey period provides confidence that the dataset is sufficiently robust.

Species Variation

1.56 The following species were recorded during the static surveys:

- Common pipistrelle *Pipistrellus pipistrellus*;
- Soprano pipistrelle *Pipistrellus pygmaeus*;
- Brown long-eared bat *Plecotus auratus*; and
- *Myotis* spp.

1.57 To allow for a comprehensive assessment, all bats are referred to in terms of their genus (*Pipistrellus* spp., *Plecotus* spp., and *Myotis* spp.).

1.58 *Pipistrellus* spp. were dominant during the static surveys, accounting for 93% of the total bat passes recorded across all three seasons. *Myotis* spp. and *Plecotus* spp. were rarely recorded and accounted for 6.8% and 0.2% of bat activity, respectively.

1.59 BAI for each genus at each location, across each season, are presented in **Table 8.4.6** below.

Table 8.4.6: BAI According to Genus per Detector Across Survey Seasons

Detector Number ¹³	BAI per Survey Season		
	Spring	Summer	Autumn
1			
<i>Pipistrellus</i> spp.	0	0.14	0.04
<i>Myotis</i> spp.	0.01	0	0.01
<i>Plecotus</i> spp.	0	0	0
3			
<i>Pipistrellus</i> spp.	0	0.02	< 0.01
<i>Myotis</i> spp.	0	0	0
<i>Plecotus</i> spp.	0	0	0
5			
<i>Pipistrellus</i> spp.	0.01	0.05	0.01
<i>Myotis</i> spp.	0.01	0	0
<i>Plecotus</i> spp.	0	0	0
7			
<i>Pipistrellus</i> spp.	0.04	0.10	0.06
<i>Myotis</i> spp.	0.03	0.03	< 0.01
<i>Plecotus</i> spp.	0	0	0
9			
<i>Pipistrellus</i> spp.	0.01	0.12	0.04
<i>Myotis</i> spp.	0.01	0.01	0
<i>Plecotus</i> spp.	0	0	0
10			
<i>Pipistrellus</i> spp.	0.07	0.25	0.07
<i>Myotis</i> spp.	0	0.02	0
<i>Plecotus</i> spp.	0	0	0
11			
<i>Pipistrellus</i> spp.	0.02	0.06	No data

¹² Autumn data shown was obtained from Aviemore Airport weather station and a reduction of 3.6°C and increase of 11.2m/s was applied to account for climatic differences between the Site and Aviemore weather station data.

¹³ Sixteen detectors were deployed, although detectors were originally numbered according to the nearest turbine in the 26 turbine layout.

Detector Number ¹³	BAI per Survey Season		
	Spring	Summer	Autumn
<i>Myotis</i> spp.	0	0	No data
<i>Plecotus</i> spp.	0	0	No data
12			
<i>Pipistrellus</i> spp.	0.03	0.10	No data
<i>Myotis</i> spp.	0.01	0.01	No data
<i>Plecotus</i> spp.	0	0	No data
13			
<i>Pipistrellus</i> spp.	0.03	0.28	0.09
<i>Myotis</i> spp.	0.05	0.01	0
<i>Plecotus</i> spp.	0	0	0
16			
<i>Pipistrellus</i> spp.	0.02	0.05	< 0.01
<i>Myotis</i> spp.	0.01	0	0
<i>Plecotus</i> spp.	0	0	0
17			
<i>Pipistrellus</i> spp.	0.02	0.09	0.09
<i>Myotis</i> spp.	0	0.01	0.01
<i>Plecotus</i> spp.	0	0	0
19			
<i>Pipistrellus</i> spp.	0	0.05	0.01
<i>Myotis</i> spp.	0	0	0
<i>Plecotus</i> spp.	0	0	0
21			
<i>Pipistrellus</i> spp.	0.02	0.06	0.02
<i>Myotis</i> spp.	0.01	0	0
<i>Plecotus</i> spp.	0	0	0
22			
<i>Pipistrellus</i> spp.	0	0.01	0.08
<i>Myotis</i> spp.	0	0	0

Detector Number ¹³	BAI per Survey Season		
	Spring	Summer	Autumn
<i>Plecotus</i> spp.	0	0	0
24			
<i>Pipistrellus</i> spp.	0.06	1.31	1.20
<i>Myotis</i> spp.	0.02	0.07	0.04
<i>Plecotus</i> spp.	0.01	0	< 0.01
26			
<i>Pipistrellus</i> spp.	0	No data	< 0.01
<i>Myotis</i> spp.	0	No data	0
<i>Plecotus</i> spp.	0	No data	0

Spatial Variation – Total BAI

1.60 The results from the 16 detectors are shown in **Figure 8.8, Table 8.4.6, and Chart 8.4.1.**

1.61 Detector 24 was located outwith the BSA to the east and recorded the highest BAI. This detector was located outwith the Site in dry heathland, adjacent to a watercourse, 160m west from Loch Aslaich.

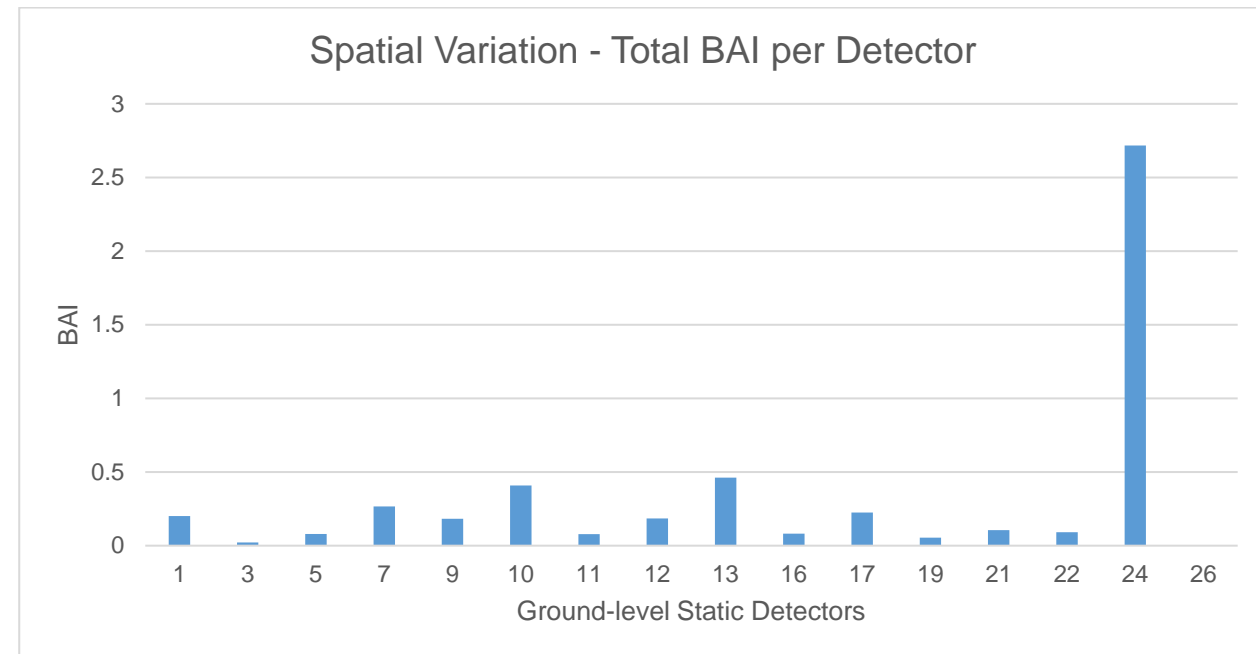
1.62 Detector 13 was located in the south of the BSA near T3 and recorded the second highest BAI. This detector was located adjacent to a lochan within blanket bog.

1.63 Detectors 10, 7 and 17 recorded the third to fifth highest BAI. Detector 10 was located outwith the BSA to the north-east, 150m west of Loch nam Meur. Detector 7 was located just outwith the BSA south-west of T1, in a valley floor between Loch a' Chrathaic and Loch na Leirisdein. Detector 17 was located on the edge of the BSA south of T4, in blanket bog 210m west of Loch nam Meur.

1.64 Areas that recorded the lowest BAI included Detectors 26, 3, 5, 19 and 21. Detector 26 was located outwith the BSA to the south-east in dry heathland at 542m. Detectors 3, 5 and 21 were all located in blanket bog; Detectors 3 and 5 were located in the west of the BSA near T5 and T9 respectively, while Detector 21 was located outwith the BSA to the south-east. Detector 19 was located in wet heath outwith the BSA to the east.

1.65 During the surveys, a higher BAI score was generally associated with watercourses and waterbodies. Conversely, open areas of blanket bog and heathland, lacking linear features, corresponded to lower BAI scores.

Chart 8.4.1: Spatial Variation - Total BAI per Detector

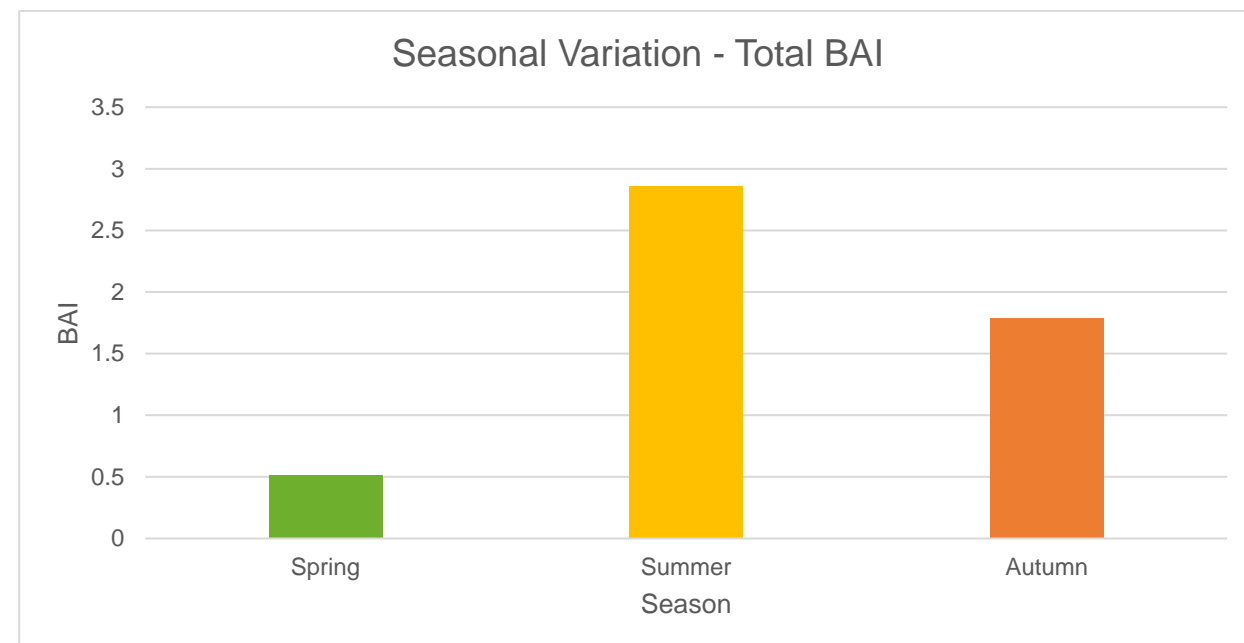


Seasonal Variation – Total BAI

1.66 Total BAI was calculated to allow comparison across the three survey seasons (Chart 8.4.2).

1.67 Activity levels in Summer (BAI 2.86) were higher than Autumn (BAI 1.79) and Spring (BAI 0.51). Activity levels in Spring were less than a fifth of that recorded in Summer.

Chart 8.4.2: Seasonal Variation – Total BAI



Spatial and Seasonal Variation – BAI per Season per Detector

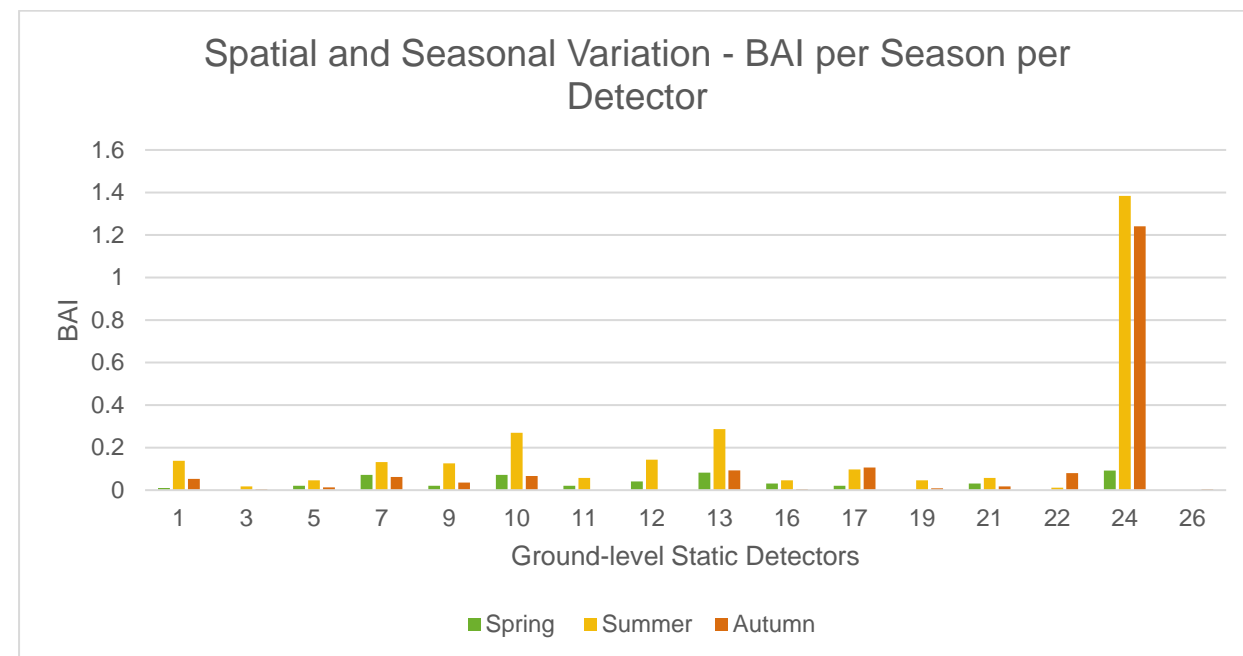
1.68 Seasonal variation across detector locations is shown in Chart 8.4.3.

1.69 Detector 24 recorded the highest BAI (BAI 1.38) in Summer. The remaining detectors all recorded appreciably lower BAI scores, with Detectors 13 (BAI 0.29), Detector 10 (BAI 0.27) and Detector 1 (BAI 0.14) scoring second to fourth highest BAI in Summer, respectively.

1.70 Detectors 3, 5, 11, 16, 19, 21, 22 and 26 had the lowest BAI scores, with all detectors recording ≤20 passes for the entire survey period. Detector 26 had the lowest BAI (<0.01), only recording a single bat pass for the entire survey period.

1.71 Summer recorded the highest BAI, with Detector 24 (BAI 1.38) accounting for 48% of all bat passes recorded during the Summer survey. Detectors 10 and 13 accounted for 19% of all bat passes recorded in Summer. A similar trend is also evident in Autumn and Spring, where the aforementioned detectors account for 78% of all bat passes recorded in Autumn and 48% of all bat passes recorded in Spring.

Chart 8.4.3: Spatial and Seasonal Variation - BAI per Season per Detector



Seasonal Variation – BAI per Genus

1.72 Table 8.4.7 and Chart 8.4.4 summarise BAI per genus, across the seasons.

1.73 *Pipistrellus* spp. activity levels follow the same pattern as the total activity, with the highest levels in Summer, lower levels in Autumn, and markedly lower in Spring comparative to Summer.

1.74 *Myotis* spp. activity levels were also highest during the Summer (BAI 0.19), with Spring recording a similar BAI (0.16). Autumn recorded the lowest *Myotis* spp. BAI (0.07).

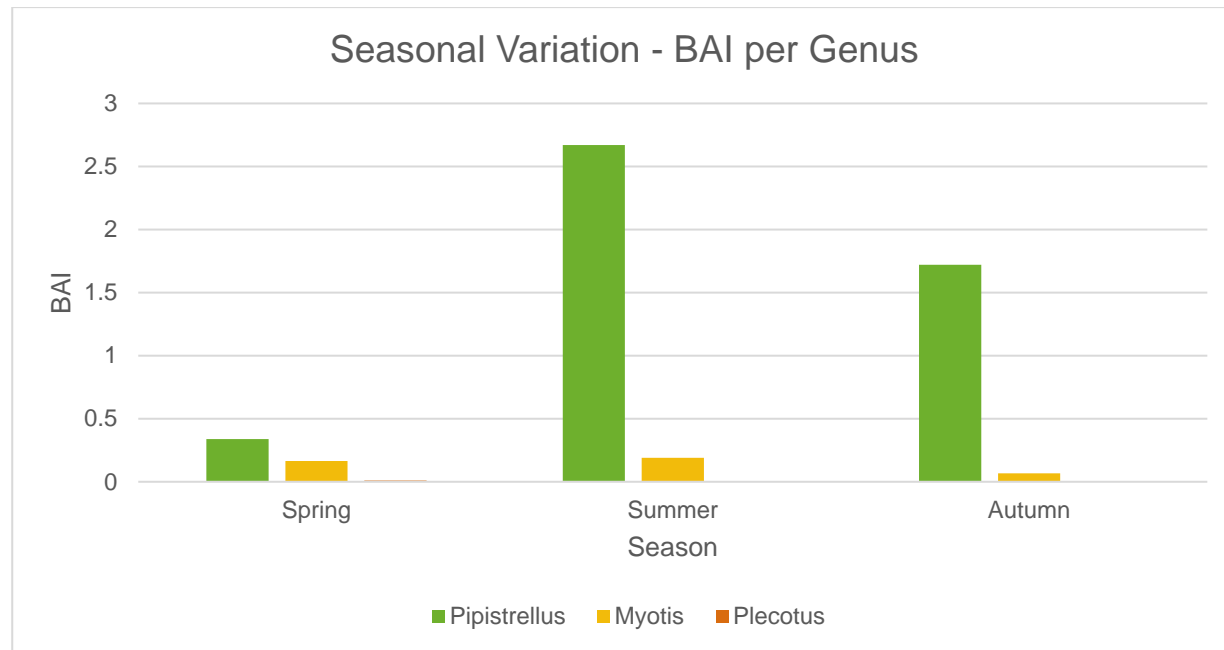
1.75 *Plecotus* spp. activity levels were very low, with only two passes in total recorded, both at Detector 24, with one each in Autumn and Spring. Due to the low number of bat passes recorded for *Plecotus* spp., no trends can be inferred.

Table 8.4.7: Seasonal Variation – BAI per Genus

Season	<i>Pipistrellus</i> spp.	<i>Myotis</i> spp.	<i>Plecotus</i> spp.
Spring	0.30	0.16	0.01
Summer	2.67	0.19	0

Season	<i>Pipistrellus</i> spp.	<i>Myotis</i> spp.	<i>Plecotus</i> spp.
Autumn	1.72	0.07	<0.01

Chart 8.4.4: Seasonal Variation - BAI per Genus



Ecobat Results

1.76 Full reports of Ecobat outputs for each survey season can be found in **Annex A**¹⁴.

1.77 The following tables display the percentiles and corresponding categories provided by Ecobat. Results are presented for the Summer survey (**Table 8.4.8**) and Autumn survey (**Table 8.4.9**). However, due to a very low number of passes recorded during the 2021 Spring survey period (50 passes), Ecobat did not return median percentiles for each genus.

1.78 A summary of the activity levels of each species or genus, across the Summer and Autumn 2020 seasons, is provided in **Table 8.4.10**. It is assumed that activity levels for each species or genus during the Spring 2021 survey period can be considered Low for the purposes of analysing the results, as shown in **Table 8.4.10**.

Table 8.4.8: Activity Categories per Species – Summer 2020

Species/Species Group	Median Percentile	Activity Level Category	95% CIs ¹⁵	Max Percentile	Nights recorded (out of 450)	Reference Range ¹⁶
<i>Pipistrellus pipistrellus</i>	42	Moderate	65 - 65	100	45	84
<i>Pipistrellus pygmaeus</i>	20	Low	30 - 60	100	81	381
<i>Myotis</i> spp.	57	Moderate	57 - 69	100	25	33

¹⁴ An electronic version of the Ecobat Outputs is available online. A printed version of the Ecobat Outputs is available on request.

¹⁵ Confidence Interval. Range of values within which the mean value for the data set lies.

¹⁶ Reference range is the number of nights of data already held by Ecobat which the uploaded data is compared against. Ecobat recommends a 200+ reference range to be confident in the relative activity level.

Table 8.4.9: Activity Categories per Species - Autumn 2020

Species/Species Group	Median Percentile	Activity Level Category	95% CIs ¹⁵	Max Percentile	Nights recorded (out of 280)	Reference Range ¹⁶
<i>Pipistrellus pipistrellus</i>	24	Low-Moderate	59 - 59	100	30	79
<i>Pipistrellus pygmaeus</i>	8	Low	8 - 8	100	32	308
<i>Pipistrellus</i> sp.	100	High ¹⁷	0	100	1	1
<i>Myotis</i> spp.	53	Moderate	73 - 100	100	9	15
<i>Plecotus auritus</i>	100	High ¹⁷	0	100	1	1

Table 8.4.10: Activity Categories from all Seasons

Species/Species Group	Activity Levels Category		
	Summer 2020	Autumn 2020	Spring 2021 ¹⁸
<i>Pipistrellus pipistrellus</i>	Moderate	Low to Moderate	Low
<i>Pipistrellus pygmaeus</i>	Low	Low	Low
<i>Pipistrellus</i> sp.	Not recorded	High ¹⁷	Not recorded
<i>Myotis</i> spp.	Moderate	Moderate	Low
<i>Plecotus auritus</i>	Not recorded	High ¹⁷	Low

1.79 *Pipistrellus pipistrellus* recorded Moderate activity levels in Summer 2020 (**Table 8.4.8**) and Low to Moderate activity levels in Autumn 2020 (**Table 8.4.9**).

1.80 *Pipistrellus pygmaeus* recorded Low activity levels in Summer 2020 (**Table 8.4.8**) and Autumn 2020 (**Table 8.4.9**).

1.81 All *Pipistrellus* spp. passes were identified to species level in Summer 2020 and Spring 2021, therefore no activity level has been assigned to *Pipistrellus* sp. by Ecobat in these survey seasons (**Table 8.4.10**).

1.82 A single bat pass recorded by Detector 10 in Autumn 2020 was identified only to genus level (*Pipistrellus* sp.) and included in the Ecobat analysis. Ecobat calculated a High activity level for *Pipistrellus* sp. based on this single pass, where only a Low activity level was assigned to *Pipistrellus pygmaeus* based on 79 passes. As a result of this, *Pipistrellus* sp. for Autumn 2020 data is included in **Table 8.4.10**, but is not considered statistically robust when compared to activity levels of *Pipistrellus pipistrellus* and *Pipistrellus pygmaeus*. Activity levels relating to *Pipistrellus* sp. are not considered further and are not used in the analysis presenting in **Discussion and Interpretation**.

1.83 *Myotis* spp. was assigned a Low activity level in Spring 2021, and Moderate activity level across Summer and Autumn 2020.

1.84 A single bat pass recorded by Detector 24 in Autumn 2020, was identified as *Plecotus auritus* and included in the Ecobat analysis. Ecobat calculated a High activity level for *Plecotus auritus* based on this single pass, which had a reference range of one. As Ecobat states that a reference range of 200 is required to be confident in the activity level assigned, *Plecotus auritus* for Autumn

¹⁷ Activity level is not considered statistically robust due to the low number of passes (1) and reference range (1).

¹⁸ Due to the low number of passes recorded during Spring, Ecobat was not able to calculate activity levels. Activity levels are therefore assumed to be Low for each species or genus recorded.

2020 data is included in **Table 8.4.10**, but is not considered statistically robust. Activity levels relating to *Plecotus auritus* are not considered further, and are not used in the analysis presenting in **Discussion and Interpretation**.

1.85 Activity levels at an individual location may be higher than the average across the wider area surveyed (see **Table 8.4.11** below).

Detector Location

1.86 **Table 8.4.11** presents the bat activity categories assigned to each species, at each detector location, across the seasons.

1.87 Ecobat data is separated by species rather than genus, as grouped above, however in this report data is discussed according to genus to allow comparison with BAI calculations. Where it is relevant to activity levels, individual species will be discussed.

1.88 Activity levels at each detector location during each season were quantified and compared with data held by Ecobat in a national reference dataset. As at the species level per season above, this allows a percentile to be assigned to each species at each detector location and from this a category of bat activity.

1.89 *Pipistrellus pygmaeus* activity levels were similar across all detectors, ranging from Low and Low to Moderate across Summer and Autumn 2020. Moderate to High activity levels for *Pipistrellus pipistrellus* were recorded at Detector 3 and 21 in Summer 2020, with the remaining detectors recording Moderate activity levels for *Pipistrellus pipistrellus* in Summer 2020. Autumn 2020 activity levels were comparatively lower, with the highest activity level being Moderate for *Pipistrellus pipistrellus* at Detectors 17,22 and 24.

1.90 Activity levels of *Myotis* spp. were generally Low to Moderate across all seasons. The exceptions were a High activity level assigned to Detector 24 in Summer and Autumn 2020, as well as Moderate activity levels assigned to Detectors 7,9,10,12,13 and 17 in Summer 2020.

1.91 Activity levels recorded during the Summer and Autumn 2020 survey period for *Pipistrellus pipistrellus*, *Pipistrellus* spp., *Myotis* spp. and *Plecotus auritus* are not considered fully robust as the reference range in each case was well below the 200 nights recommended by Ecobat (see **Table 8.4.10**); this level is recommended to ensure a high level of confidence in the relative activity level. As such the reported activity levels should be viewed with caution as the number of similar nights of data within the Ecobat database was not sufficient to give a statistically robust comparison with field data. This limitation is balanced by the BAI analysis as this still allows for the comparison of activity levels between genera. The date range and geographic region were not expanded to increase the searchable data in Ecobat as this would include nights from different seasons and areas with few geographic (hence climactic) similarities to the Site.

Table 8.4.11: Ecobat Activity Categories for Species/Species Groups at all Locations Across Summer and Autumn 2020¹⁹

Detector Number	Summer 2020				Autumn 2020				
	<i>Pipistrellus pipistrellus</i>	<i>Pipistrellus pygmaeus</i>	<i>Myotis</i> spp.	<i>Plecotus</i> spp.	<i>Pipistrellus pipistrellus</i>	<i>Pipistrellus pygmaeus</i>	<i>Pipistrellus</i> sp.	<i>Myotis</i> spp.	<i>Plecotus</i> spp.
1	Moderate	Low to Moderate	Nil	Nil	Low to Moderate	Low	Nil	Low to Moderate	Nil
3	Moderate to High	Nil	Nil	Nil	Low to Moderate	Nil	Nil	Nil	Nil
5	Moderate	Low	Nil	Nil	Low to Moderate	Low	Nil	Nil	Nil
7	Moderate	Low	Moderate	Nil	Low to Moderate	Low	Nil	Low to Moderate	Nil
9	Moderate	Low	Moderate	Nil	Low to Moderate	Low	Nil	Nil	Nil
10	Moderate	Low to Moderate	Moderate	Nil	Low to Moderate	Low	High ¹⁷	Nil	Nil
11	Moderate	Low to Moderate	Nil	Nil	No data	No data	No data	No data	No data
12	Moderate	Low	Moderate	Nil	No data	No data	No data	No data	No data
13	Moderate to High	Low to Moderate	Moderate	Nil	Low to Moderate	Low	Nil	Nil	Nil
16	Moderate	Low	Nil	Nil	Low to Moderate	Nil	Nil	Nil	Nil
17	Moderate	Low	Moderate	Nil	Moderate	Low	Nil	Moderate	Nil
19	Moderate	Low	Nil	Nil	Nil	Low	Nil	Nil	Nil
21	Moderate to High	Low	Nil	Nil	Low to Moderate	Low	Nil	Nil	Nil
22	Moderate	Low	Nil	Nil	Moderate	Low	Nil	Nil	Nil
24	Moderate	Moderate	High	Nil	Moderate	Low to Moderate	Nil	High	High ¹⁷
26	No data	No data	No data	No data	Nil	Low	Nil	Nil	Nil

¹⁹ No data is presented for the Spring 2021 survey period as there was insufficient data to quantify activity levels due to the low number of passes recorded. Cells that are defined as 'nil' are a result of either no data or insufficient data (no bat passes or a low number of bat passes) available to quantify activity levels. Cells that are defined as 'No data' refers to where a technical fault occurred, and the detector was not recording during the survey period.

Discussion and Interpretation

Bat Roost Potential

1.92 No structures or trees were identified within the BSA or ASA as having suitability to support roosting bats.

Ground-level Static Surveys

Interpretation Method

1.93 This section applies the data collection, and the Ecobat analysis, in identifying a series of risk types, according to the NatureScot guidance¹. The data is interpreted below in a sequential manner, to arrive at a conclusion of risk analysis.

Species Group Variation

1.94 Three genera of bats were recorded during the surveys: *Pipistrellus*, *Plecotus*, and *Myotis*.

1.95 *Pipistrellus* spp. dominated the bat activity recorded during the surveys (886 passes), accounting for 93% of all passes recorded. Detectors 24, 13, and 10, situated adjacent or within 150m of a watercourse or waterbody, accounted for 73% of *Pipistrellus* spp. passes. Of these, Detector 24 accounted for 57% of *Pipistrellus* spp. passes, and was located adjacent to a watercourse south-west of Loch Aslaich, outwith the Site.

1.96 In comparison with levels of *Pipistrellus* spp., all other species recorded during the surveys were found to be present in very low numbers. *Myotis* spp. (64 passes) accounted for 6.8% of total passes across all seasons, with the highest activity levels associated with Detectors 24 and 10, similar to *Pipistrellus* spp. *Plecotus* spp. accounted for 0.2%, with only two passes, both of which were at Detector 24 outwith the Site.

Spatial Variation

1.97 There was a noticeable difference in overall bat activity across the Site, with Detector 24 adjacent to a watercourse outwith the Site, accounting for 56% of all bat passes across the entire survey period. Detector 13, located adjacent to a lochan in the south of the BSA accounted for 8% of all bat passes recorded. Detectors 9, 10, 11 and 12 accounted for 15% of all bat passes recorded; each of these was located less than 200m from a lochan, although Detectors 9 and 10 are outwith the final BSA.

1.98 Detectors 1, 3, 5, 16, 17 and 21 were located in blanket bog, with no adjacent linear features; these detectors accounted for 13% of all bat passes recorded. This highlights the correlation between low bat activity and open habitats that lack linear features that could be used for commuting, and these habitats would therefore be expected to have relatively lower densities of flying invertebrates, thereby limiting the opportunities for foraging.

1.99 The highest number of passes (530 passes) was recorded at Detector 24, which was located next to a watercourse within dry heathland. The majority of these passes (95%) were attributed to High *Pipistrellus* spp. activity in Autumn and Moderate activity in Summer. This location is outwith the Site in the upper reaches of the River Coiltie, and it is likely that bats are navigating along the watercourse from the wooded riparian corridor a few kilometres north-east.

1.100 Detectors 13 and 10 recorded the second and third highest number of total passes across all seasons (79 and 69 passes respectively), and were also located adjacent to, or within, 150m of a lochan. Detectors 13 and 10 were assigned Low to Moderate levels of *Pipistrellus* spp. activity in Summer and Autumn.

1.101 *Myotis* spp. activity was low in comparison with *Pipistrellus* spp. activity. *Myotis* spp. was assigned a Low to Moderate activity level category at Detector 24 in Summer and Autumn and a Low to Moderate score at Detector 10 in Summer. Detector 24, outwith to the east of the Site, accounted for 36% of the total *Myotis* spp. passes. Detectors 7, 12 and 24 accounted for 64% of *Myotis* spp. passes, with Detectors 7 and 12 located within the south of the BSA and Detector 24 outwith the Site.

1.102 Only two *Plecotus* spp. passes were recorded throughout the entire survey period, with one call recorded in each of Summer and Autumn at Detector 24, outwith to the east of the Site. As such, it is difficult to infer the extent to which *Plecotus* spp. utilise the BSA.

1.103 Figure 8.7 provides an overview of the genus variation recorded at detectors across the BSA and surrounding portions of the Site.

Initial Site Risk Assessment

1.104 As per the guidance developed by NatureScot¹, a site risk assessment was conducted to quantify the risk posed to bat habitat by the Proposed Development.

1.105 The habitat is scored from Low to High based on the potential to support bats, by assessing the roosting, foraging and commuting opportunities present.

1.106 A three-factor analysis is carried out to score the project size from Low (1) to High (3). This involves assessing the number of proposed turbines, the height of proposed turbines, and wind developments within 5km or 10km (dependent on number of proposed turbines) of the Site, to provide an overall project size score.

1.107 An overall 'Site Risk Level' for the Proposed Development can then be determined using the risk assessment matrix from the NatureScot guidance¹ (see Table 8.4.12).

Table 8.4.12: Initial Site Risk Assessment Matrix

	Project Size			
		Small	Medium	Large
Habitat Risk	Low	1	2	3
	Medium	2	3	4
	High	3	4	5

Habitat Risk

1.108 The BSA generally lacks favourable roosting and commuting opportunities for bats. This is due to the lack of structures and woodland within the BSA with potential to support roosting bats. Regarding foraging opportunities, numerous waterbodies (e.g., Loch Liath, Loch Aslaich, Loch nam Meur and Loch na Ruighe Duibhe) and watercourses are present throughout the BSA. However, the absence of woodland limits the variety of foraging opportunities for bats in the BSA. Furthermore, the lack of extensive, prominent linear features e.g., hedgerows, extensive connected woodland, and anthropogenic linear features, means commuting opportunities for bats are limited. For the reasons stated, the habitat risk is considered to be **Low**.

Project size

1.109 The Proposed Development comprises up to 13 wind turbines. This number of turbines would equate to a Medium project size¹. However, the turbine blade tips are up to 200m height, which is considered to indicate a Large project size¹.

1.110 As of November 2022²⁰, there are three windfarms within 5km of the BSA. Bhlairaidh Extension, comprising 15 turbines, has recently been consented and is located 3km south of the BSA. Corrimony, comprising 5 turbines, is operational and located 4.4km west of the BSA. Finally, Bhlairaidh, comprising 32 turbines, is operational and located 4.6km south-west of the BSA. As there are other wind energy developments within 5km, this is considered to be indicative of a Large project size¹.

1.111 The project size is therefore arguably either Medium or Large. A conservative approach is preferred, and therefore a **Large** project size is applied in the following assessment.

²⁰ LUC (2022) Windfarm database. [Accessed November 2022]

Risk Assessment

1.112 Having evaluated the habitat risk as Low and the project size as Large, the BSA is assessed as having a Site Risk Level of 3, which equates to a **Medium** site risk for collision effects on bats as per **Table 8.4.12**.

Collision Risk Assessment

1.113 Following the steps outlined in the NatureScot guidance¹ the Site Risk level (determined using **Table 8.4.12** above) was used to determine the overall risk to each species categorised as 'high collision risk'.

1.114 High collision risk species in Scotland include the following species:

- Common pipistrelle *Pipistrellus pipistrellus*;
- Soprano pipistrelle *Pipistrellus pygmaeus*;
- Nathusius' pipistrelle *Pipistrellus nathusii*;
- Noctule *Nyctalus noctula*; and
- Leisler's bat *Nyctalus leisleri*.

1.115 High collision risk species recorded within the BSA were common and soprano pipistrelle, which accounted for the majority of activity recorded, with total passes of 710 for common pipistrelle, and 175 for soprano pipistrelle.

1.116 In addition, there was a single pass assigned to *Pipistrellus* sp., where the recording could only be verified to genus; due to most passes of pipistrelle bats having been identified to species level, the Ecobat activity level assigned to the *Pipistrellus* sp. data is not used as it is not considered to be statistically robust¹⁷.

1.117 For each high collision risk species, the guidance was followed to determine the 'Typical' and 'Peak' risks posed to these species by the Proposed Development.

- **Typical Risk:** The risk posed to a species by the Proposed Development based on the mean activity levels of that species. Used to determine the likely general effect of the Proposed Development on each species.
- **Peak Risk:** The risk posed by the Proposed Development based on the highest recorded activity level of that species. Used to identify the highest risk posed by the Proposed Development to account for peaks in bat activity.

1.118 To calculate the Typical Risk, the most common activity category provided by Ecobat was used. This was the most common category assigned to each high collision risk species at all locations over all survey seasons from **Table 8.4.11**:

- *Pipistrellus pipistrellus*: Moderate.
- *Pipistrellus pygmaeus*: Low.

1.119 To calculate the Peak Risk level, the highest activity level assigned to each high collision risk species in **Table 8.4.11** was used:

- *Pipistrellus pipistrellus*: Moderate to High.
- *Pipistrellus pygmaeus*: Moderate.

1.120 **Table 8.4.13** was used in accordance with NatureScot guidance¹ to return a numerical value for the Typical and Peak Risk for each high collision risk species.

1.121 Results of Typical and Peak Risks posed by the Proposed Development, to each high collision risk species are presented in **Table 8.4.14**.

Table 8.4.13: Overall Risk Assessment Matrix²¹

Site Level Risk	Ecobat Activity Category					
	Nil (0)	Low (1)	Low-moderate (2)	Moderate (3)	Moderate-high (4)	High (5)
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Medium (3)	0	3	6	9	12	15
High (4)	0	4	8	12	16	20
Highest (5)	0	5	10	15	20	25

Table 8.4.14: Overall Risk Outcomes per Species using the Site Risk Level and Tables 8.4.11 and 8.4.13

Species	'Typical Risk'	'Peak Risk'
<i>Pipistrellus pipistrellus</i>	9	12
<i>Pipistrellus pygmaeus</i>	3	9

1.122 From this overall assessment, risks posed by the Proposed Development to high collision risk species were grouped according to the NatureScot guidance¹:

- Low risk to species (green) 0–4;
- Medium risk to species (amber) 5–12; and
- High risk to species (red) 15–25.

1.123 The results indicate that across the BSA, there is a Medium Typical Risk to common pipistrelle and a Low Typical Risk to soprano pipistrelle. At times of peak activity, the Peak Risk to both common and soprano pipistrelle is Medium.

1.124 The data collected during these surveys indicates that the Typical Risk to each species by the Proposed Development is most relevant as there is generally a low level of activity across the BSA (and surrounding portions of the Site) and across seasons. For these reasons, the Typical Risk is considered more representative of the BSA.

Population Level Risk Assessment

1.125 Ecobat provides an objective analysis of activity levels of bat species within the BSA. Using the Ecobat data allows for the determination of the risks posed to each species recorded at the BSA.

1.126 As specified in the NatureScot guidance¹, the risk to each species is then considered at the population level, specifically those which have a high population vulnerability. However, no species identified during the surveys are classified as species of high population vulnerability.

1.127 Whilst the analysis of the bat activity data for the BSA calculates a Medium Typical Risk to common pipistrelle and Low Typical Risk to soprano pipistrelle, these are not considered species of high population vulnerability and so no further assessment of collision risk is required¹.

²¹ The Site Risk Level is assessed to be Medium (3), therefore the row used for calculating Typical and Peak Risks is highlighted.

Annex A: Ecobat Outputs

A.1 *An electronic version of the Ecobat Outputs is available online. A printed version of the Ecobat Outputs is available on request.

Bat Activity Analysis

Site Name: Loch Liath

Author: Martin Arthur

2022-09-28 12:56:51

Summary

The geographic filter was: **Region** The time filter was: +/- 1 month from survey start date

Bats were detected on 7 nights between 2021-04-21 and 2021-04-29, using 12 static bat detectors. Throughout this period 4 species were recorded. **Table 1.** Detectors were placed at the following locations:

latlon	date	Detector ID	Latitude	Longitude
57.29359_-4.68206	25/04/2021	1	57.29359	-4.68206
57.27333_-4.70127	23/04/2021	5	57.27333	-4.70127
57.26386_-4.69907	23/04/2021	7	57.26386	-4.69907
57.2898_-4.67473	23/04/2021	9	57.28980	-4.67473
57.27104_-4.68606	22/04/2021	12	57.27104	-4.68606
57.26492_-4.68708	23/04/2021	13	57.26492	-4.68708
57.26492_-4.68708	24/04/2021	13	57.26492	-4.68708
57.26492_-4.68708	21/04/2021	13	57.26492	-4.68708
57.26492_-4.68708	22/04/2021	13	57.26492	-4.68708
57.27406_-4.67173	26/04/2021	16	57.27406	-4.67173
57.26454_-4.66642	23/04/2021	21	57.26454	-4.66642
57.27179_-4.64556	22/04/2021	24	57.27179	-4.64556
57.27179_-4.64556	26/04/2021	24	57.27179	-4.64556
57.27333_-4.70127	24/04/2021	5	57.27333	-4.70127
57.26386_-4.69907	25/04/2021	7	57.26386	-4.69907
57.2898_-4.67473	22/04/2021	9	57.28980	-4.67473
57.28426_-4.67388	25/04/2021	10	57.28426	-4.67388
57.27915_-4.68278	26/04/2021	11	57.27915	-4.68278
57.27104_-4.68606	26/04/2021	12	57.27104	-4.68606
57.27104_-4.68606	25/04/2021	12	57.27104	-4.68606
57.26492_-4.68708	25/04/2021	13	57.26492	-4.68708
57.27406_-4.67173	22/04/2021	16	57.27406	-4.67173
57.26892_-4.67779	25/04/2021	17	57.26892	-4.67779
57.26454_-4.66642	30/04/2021	21	57.26454	-4.66642
57.26454_-4.66642	22/04/2021	21	57.26454	-4.66642
57.27179_-4.64556	25/04/2021	24	57.27179	-4.64556
57.27179_-4.64556	23/04/2021	24	57.27179	-4.64556
57.26386_-4.69907	22/04/2021	7	57.26386	-4.69907
57.26386_-4.69907	26/04/2021	7	57.26386	-4.69907
57.28426_-4.67388	26/04/2021	10	57.28426	-4.67388
57.28426_-4.67388	22/04/2021	10	57.28426	-4.67388
57.27915_-4.68278	25/04/2021	11	57.27915	-4.68278
57.27406_-4.67173	25/04/2021	16	57.27406	-4.67173
57.27179_-4.64556	21/04/2021	24	57.27179	-4.64556

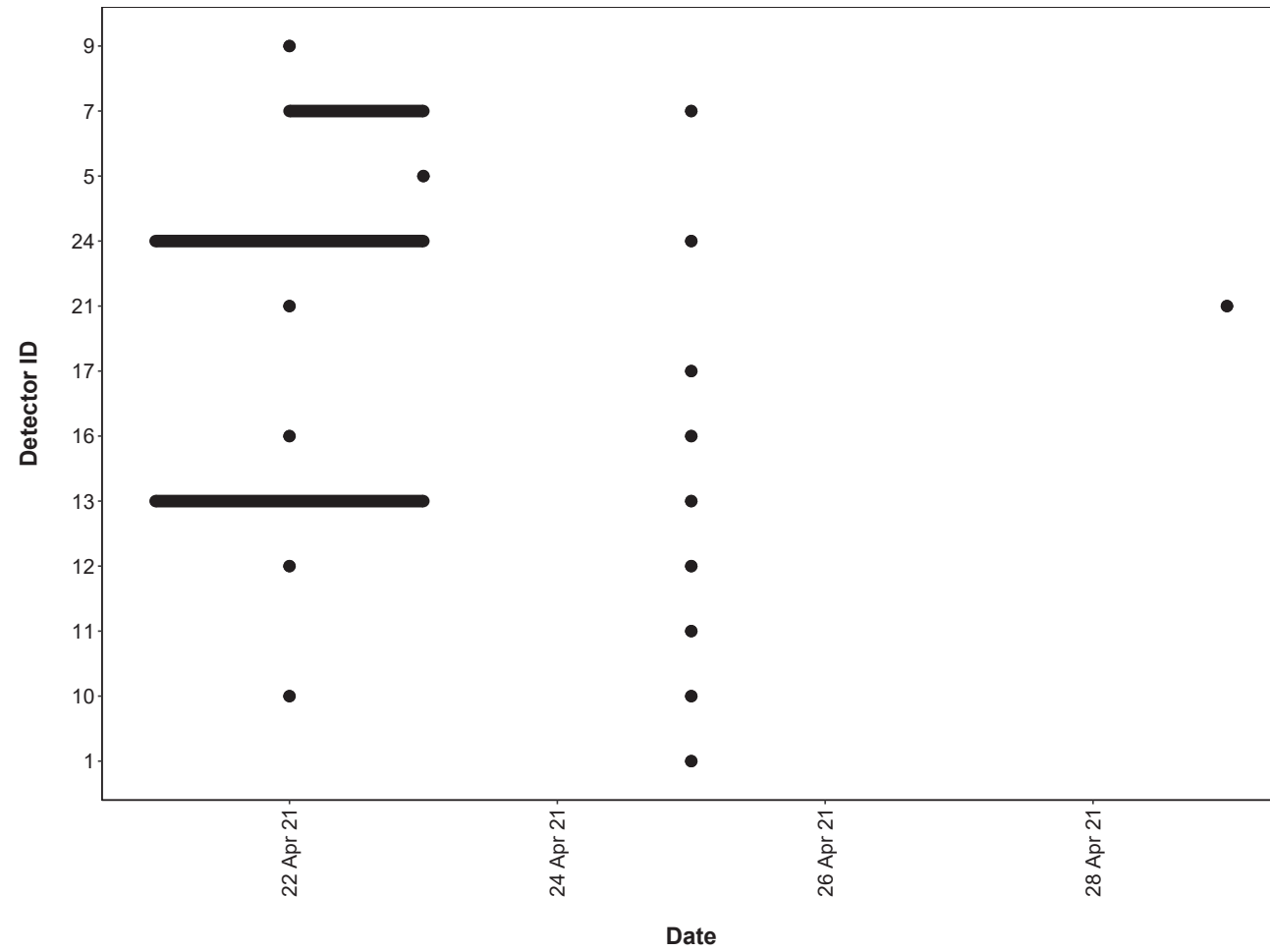
Survey Nights

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
1	1
10	2
11	1
12	3
13	4
16	2
17	1
21	2
24	4
5	2
7	3
9	2

Survey Nights

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



PART 1: Percentiles Analysis

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

The reference range dataset was stratified to include:

PER DETECTOR

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

Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
1	<i>Myotis</i>	0	1	0	0	0
10	<i>Pipistrellus pipistrellus</i>	1	1	0	0	0
10	<i>Pipistrellus pygmaeus</i>	1	0	0	0	0
11	<i>Pipistrellus pipistrellus</i>	0	1	0	0	0
11	<i>Pipistrellus pygmaeus</i>	0	0	1	0	0
12	<i>Myotis</i>	0	1	0	0	0
12	<i>Pipistrellus pygmaeus</i>	1	0	1	0	0
13	<i>Myotis</i>	0	2	0	0	0
13	<i>Pipistrellus pipistrellus</i>	0	1	0	0	0
13	<i>Pipistrellus pygmaeus</i>	1	0	0	0	0
16	<i>Myotis</i>	0	1	0	0	0
16	<i>Pipistrellus pipistrellus</i>	0	1	0	0	0
16	<i>Pipistrellus pygmaeus</i>	0	0	1	0	0
17	<i>Pipistrellus pygmaeus</i>	1	0	0	0	0
21	<i>Myotis</i>	0	1	0	0	0
21	<i>Pipistrellus pygmaeus</i>	0	0	2	0	0
24	<i>Myotis</i>	0	2	0	0	0
24	<i>Pipistrellus pipistrellus</i>	0	2	0	0	0
24	<i>Pipistrellus pygmaeus</i>	2	0	0	0	0
24	<i>Plecotus auritus</i>	1	0	0	0	0
5	<i>Myotis</i>	0	1	0	0	0
5	<i>Pipistrellus pygmaeus</i>	0	0	1	0	0
7	<i>Myotis</i>	2	0	0	0	0
7	<i>Pipistrellus pipistrellus</i>	0	2	0	0	0
7	<i>Pipistrellus pygmaeus</i>	0	0	2	0	0
9	<i>Myotis</i>	0	1	0	0	0
9	<i>Pipistrellus pygmaeus</i>	0	0	1	0	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.

Figures

Figure 2. The recorded activity of bats during the survey. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)

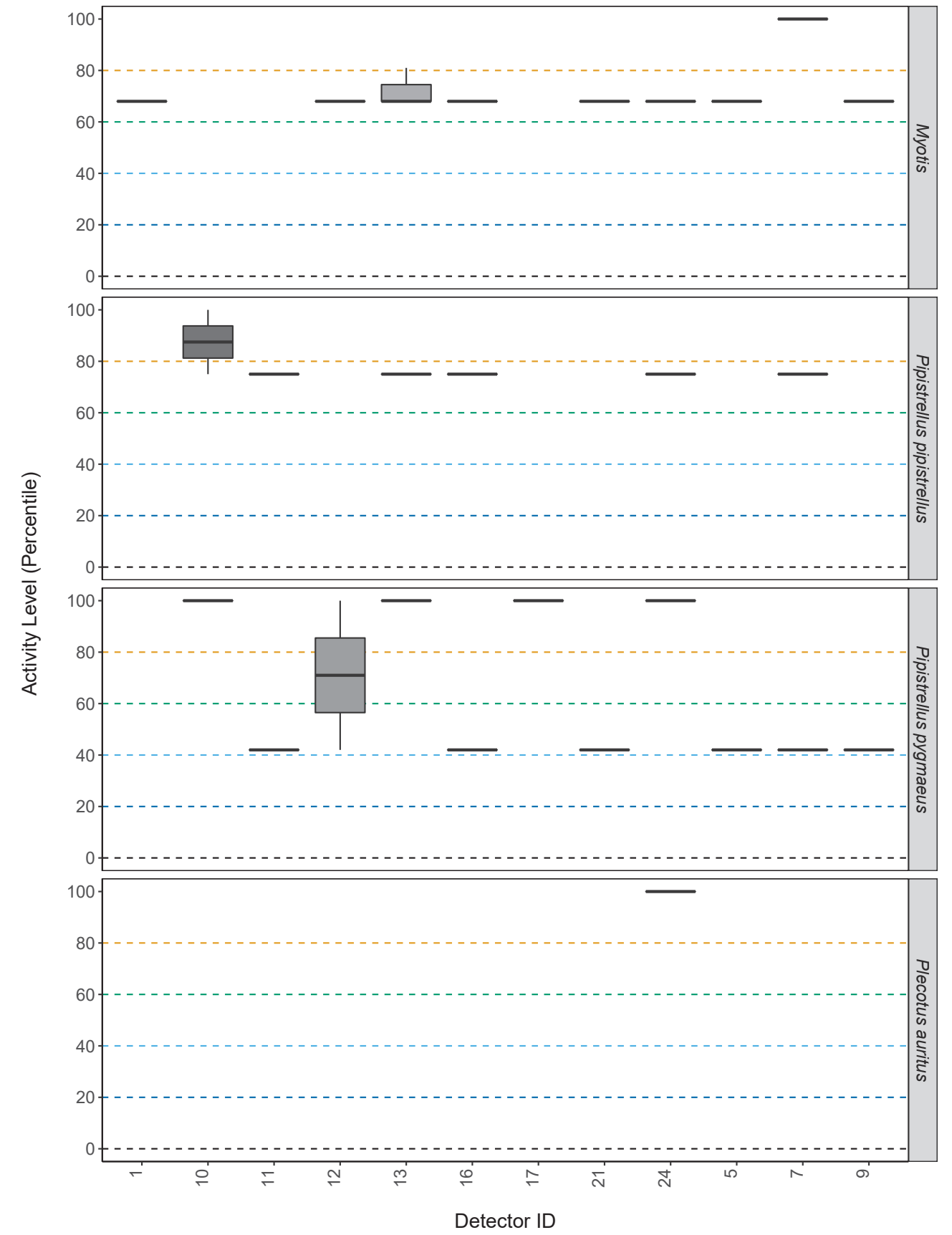
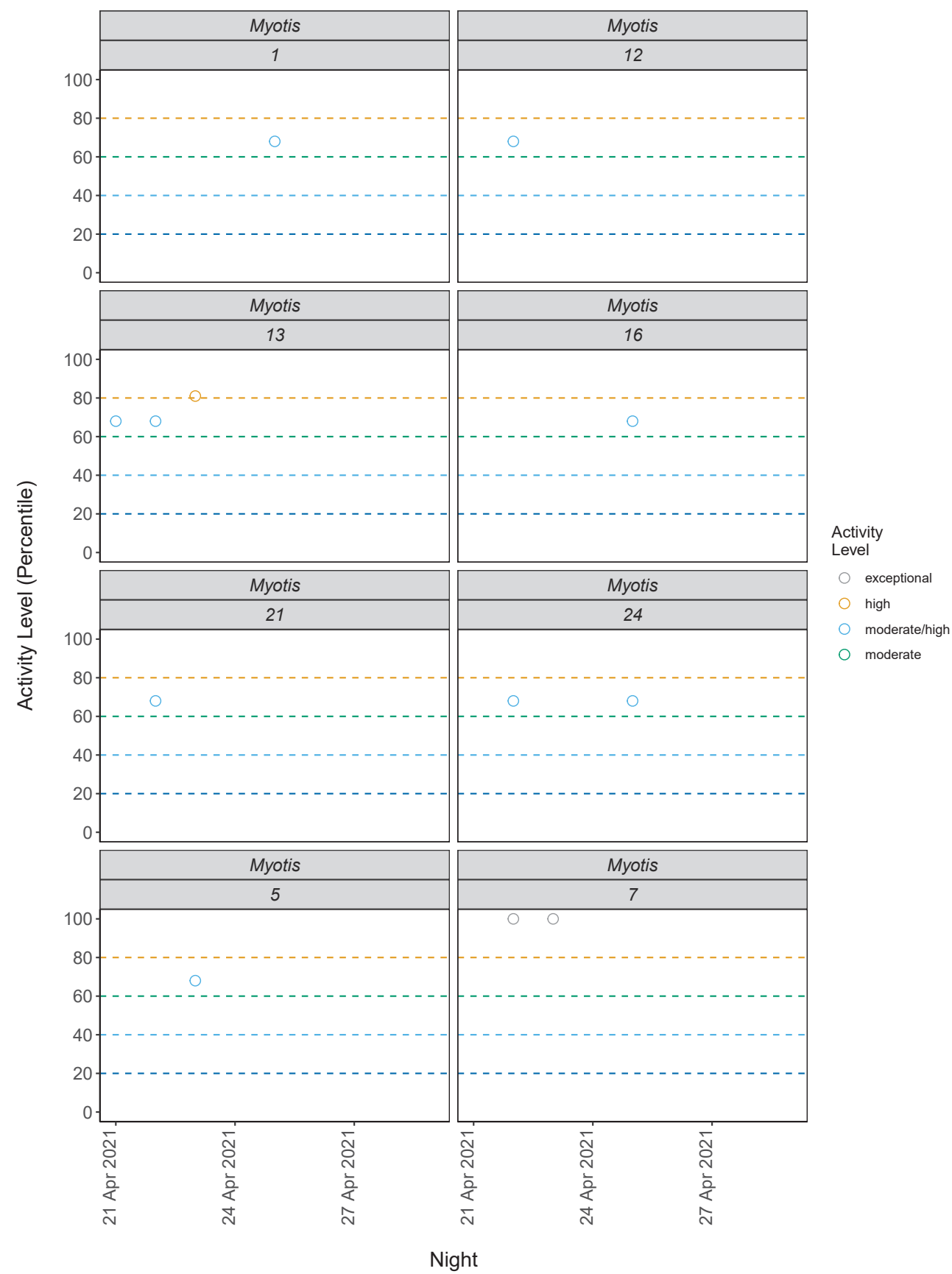
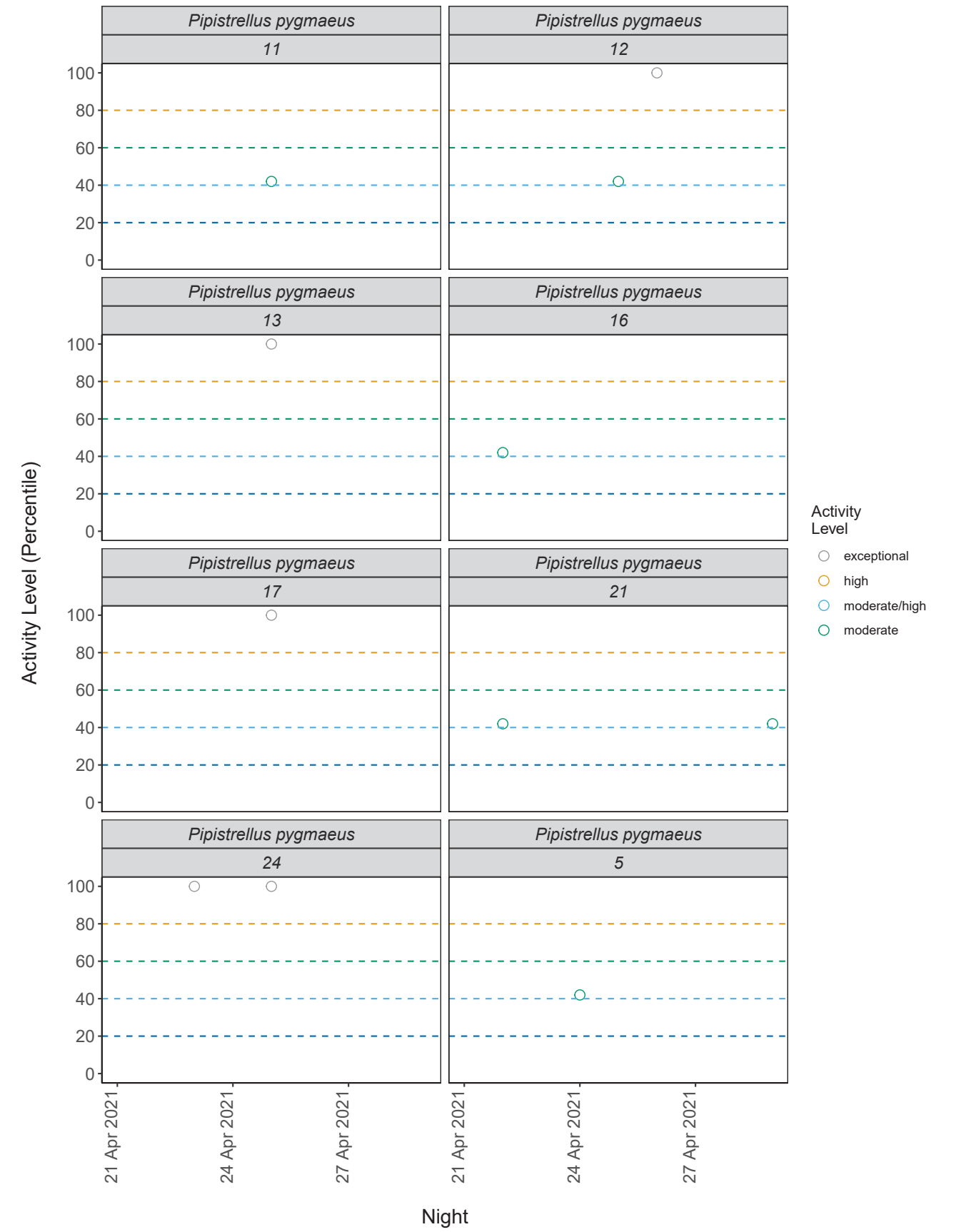
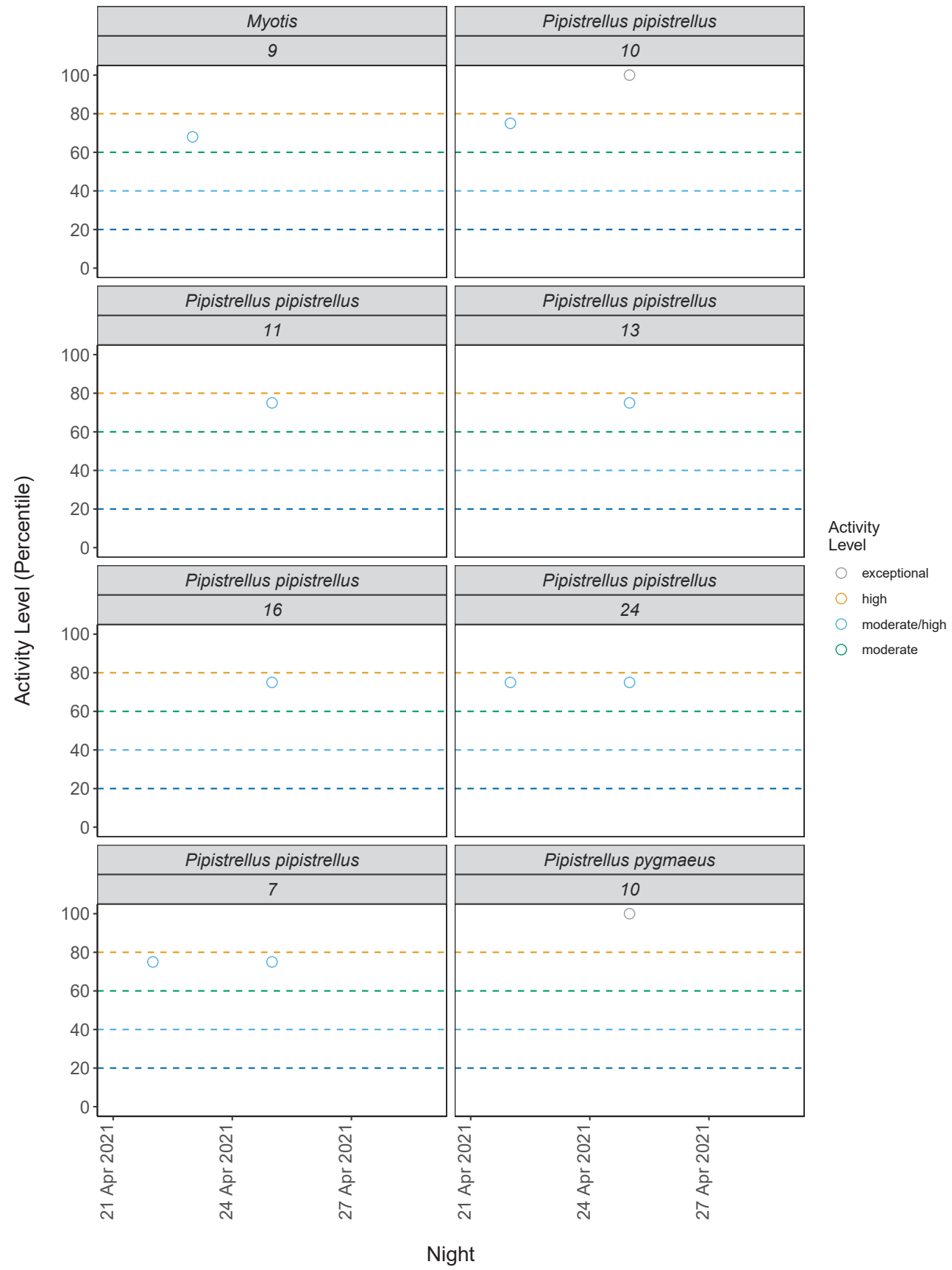
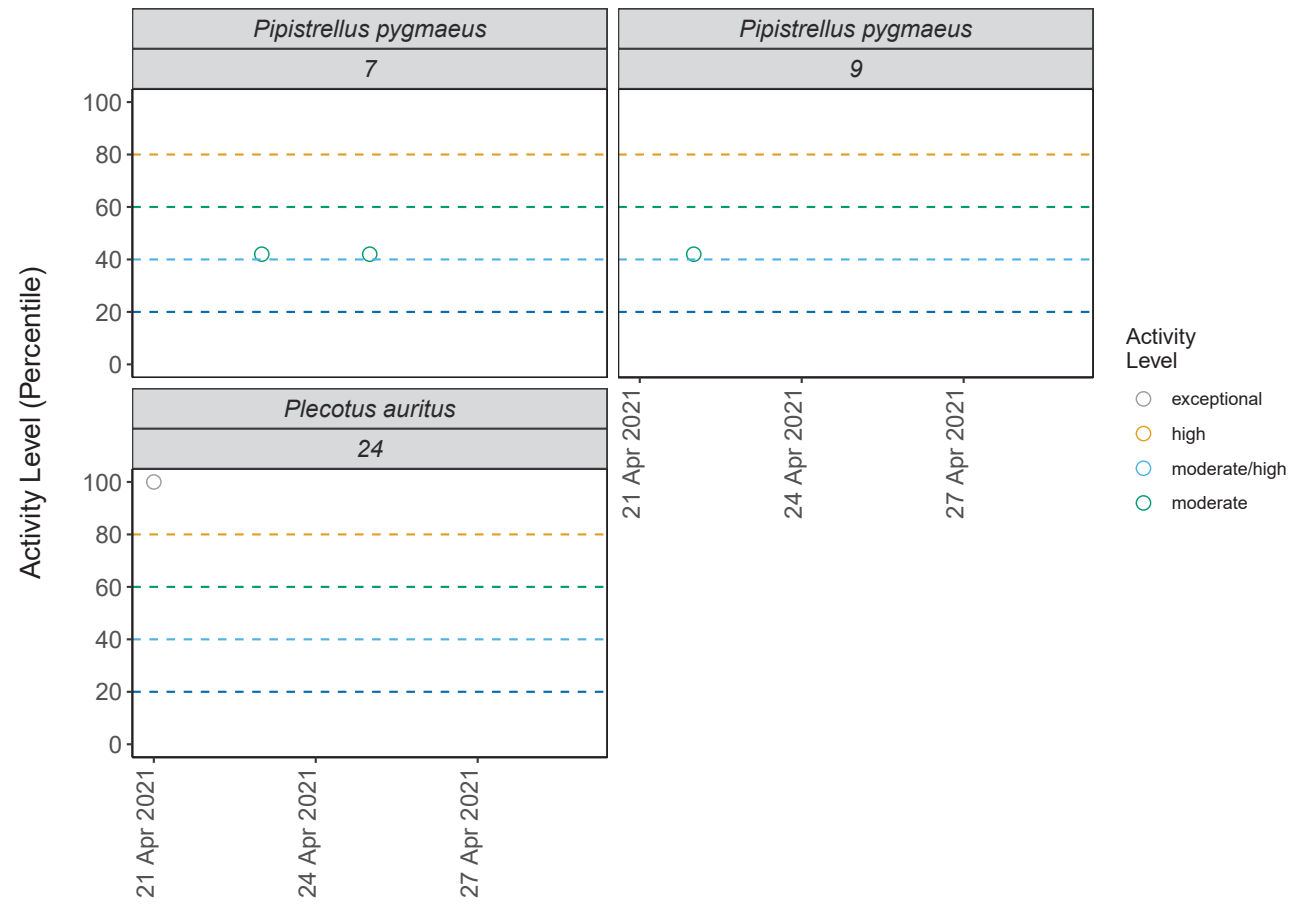


Figure 3. The activity level (percentile) of bats recorded across each night of the bat survey.







Night

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
1	<i>Myotis</i>	Apr	0	0	1	0	0	0
10	<i>Pipistrellus pipistrellus</i>	Apr	1	0	1	0	0	0
10	<i>Pipistrellus pygmaeus</i>	Apr	1	0	0	0	0	0
11	<i>Pipistrellus pipistrellus</i>	Apr	0	0	1	0	0	0
11	<i>Pipistrellus pygmaeus</i>	Apr	0	0	0	1	0	0
12	<i>Myotis</i>	Apr	0	0	1	0	0	0
12	<i>Pipistrellus pygmaeus</i>	Apr	1	0	0	1	0	0
13	<i>Myotis</i>	Apr	0	1	2	0	0	0
13	<i>Pipistrellus pipistrellus</i>	Apr	0	0	1	0	0	0
13	<i>Pipistrellus pygmaeus</i>	Apr	1	0	0	0	0	0
16	<i>Myotis</i>	Apr	0	0	1	0	0	0
16	<i>Pipistrellus pipistrellus</i>	Apr	0	0	1	0	0	0
16	<i>Pipistrellus pygmaeus</i>	Apr	0	0	0	1	0	0
17	<i>Pipistrellus pygmaeus</i>	Apr	1	0	0	0	0	0
21	<i>Myotis</i>	Apr	0	0	1	0	0	0
21	<i>Pipistrellus pygmaeus</i>	Apr	0	0	0	2	0	0
24	<i>Myotis</i>	Apr	0	0	2	0	0	0
24	<i>Pipistrellus pipistrellus</i>	Apr	0	0	2	0	0	0
24	<i>Pipistrellus pygmaeus</i>	Apr	2	0	0	0	0	0
24	<i>Plecotus auritus</i>	Apr	1	0	0	0	0	0
5	<i>Myotis</i>	Apr	0	0	1	0	0	0
5	<i>Pipistrellus pygmaeus</i>	Apr	0	0	0	1	0	0
7	<i>Myotis</i>	Apr	2	0	0	0	0	0
7	<i>Pipistrellus pipistrellus</i>	Apr	0	0	2	0	0	0
7	<i>Pipistrellus pygmaeus</i>	Apr	0	0	0	2	0	0
9	<i>Myotis</i>	Apr	0	0	1	0	0	0
9	<i>Pipistrellus pygmaeus</i>	Apr	0	0	0	1	0	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.

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
<i>Myotis</i>	2	1	10	0	0	0
<i>Pipistrellus pipistrellus</i>	1	0	8	0	0	0
<i>Pipistrellus pygmaeus</i>	6	0	0	9	0	0
<i>Plecotus auritus</i>	1	0	0	0	0	0

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

Figures

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

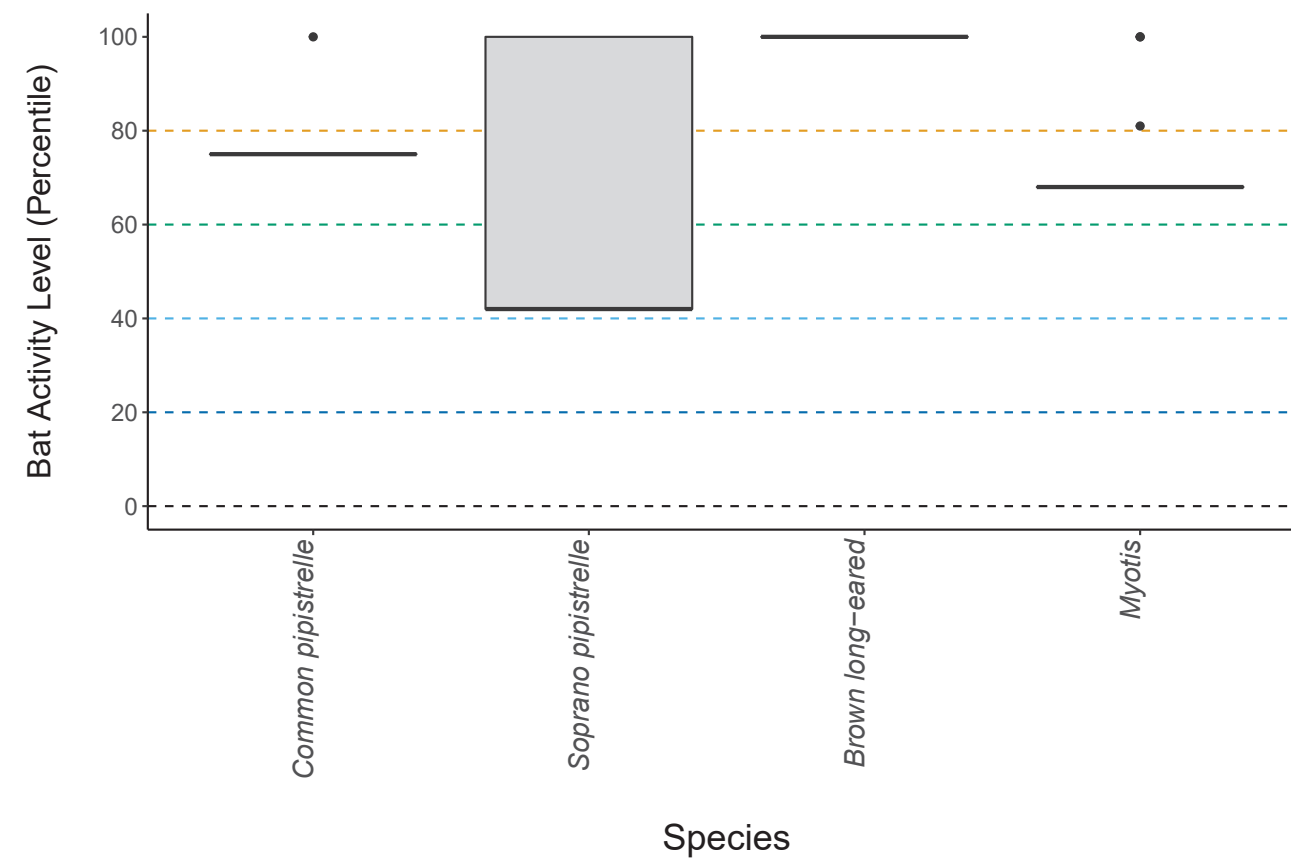
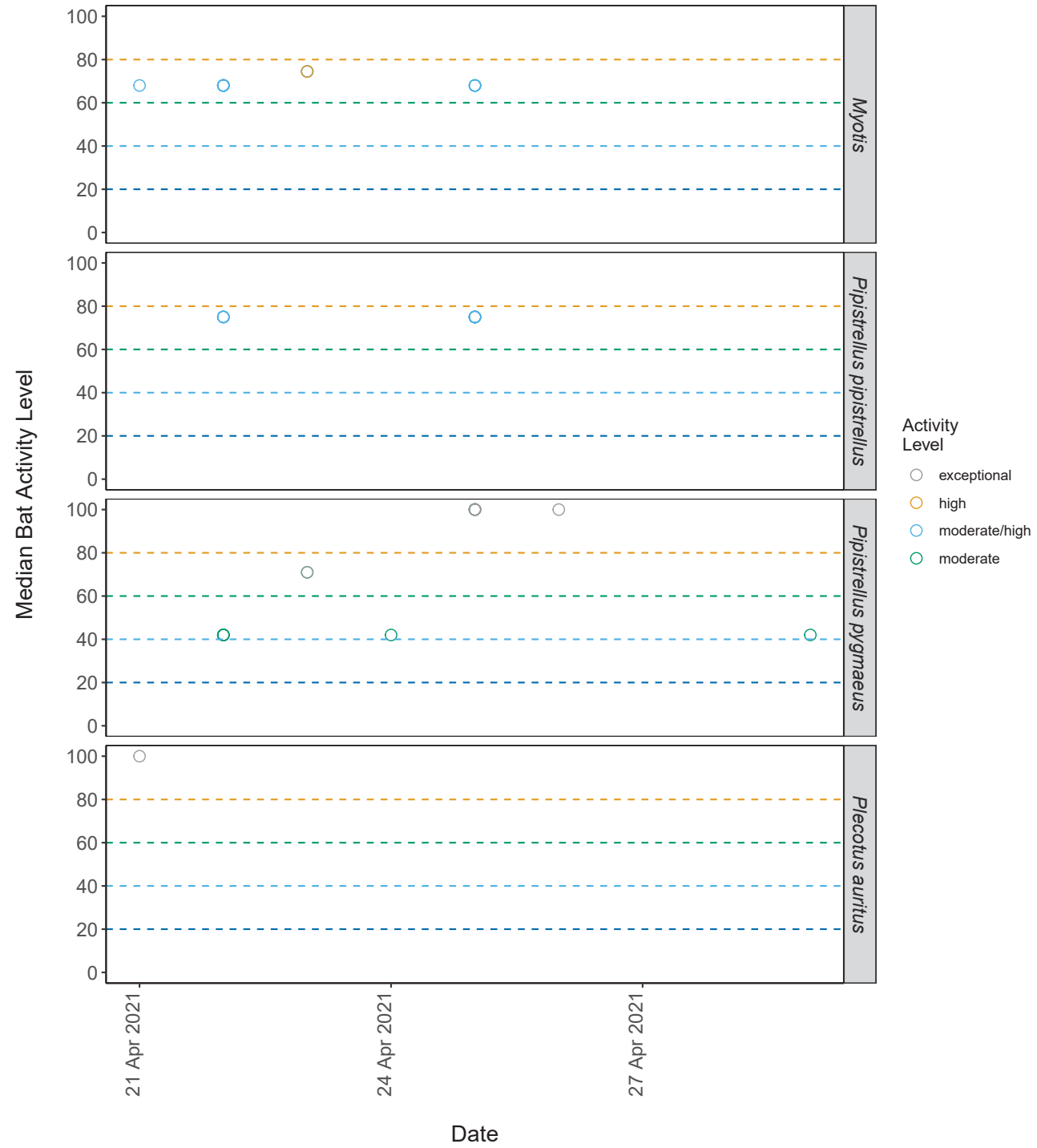


Figure 5. The median activity levels of bats recorded across all detectors each night.



PER SITE, PER MONTH

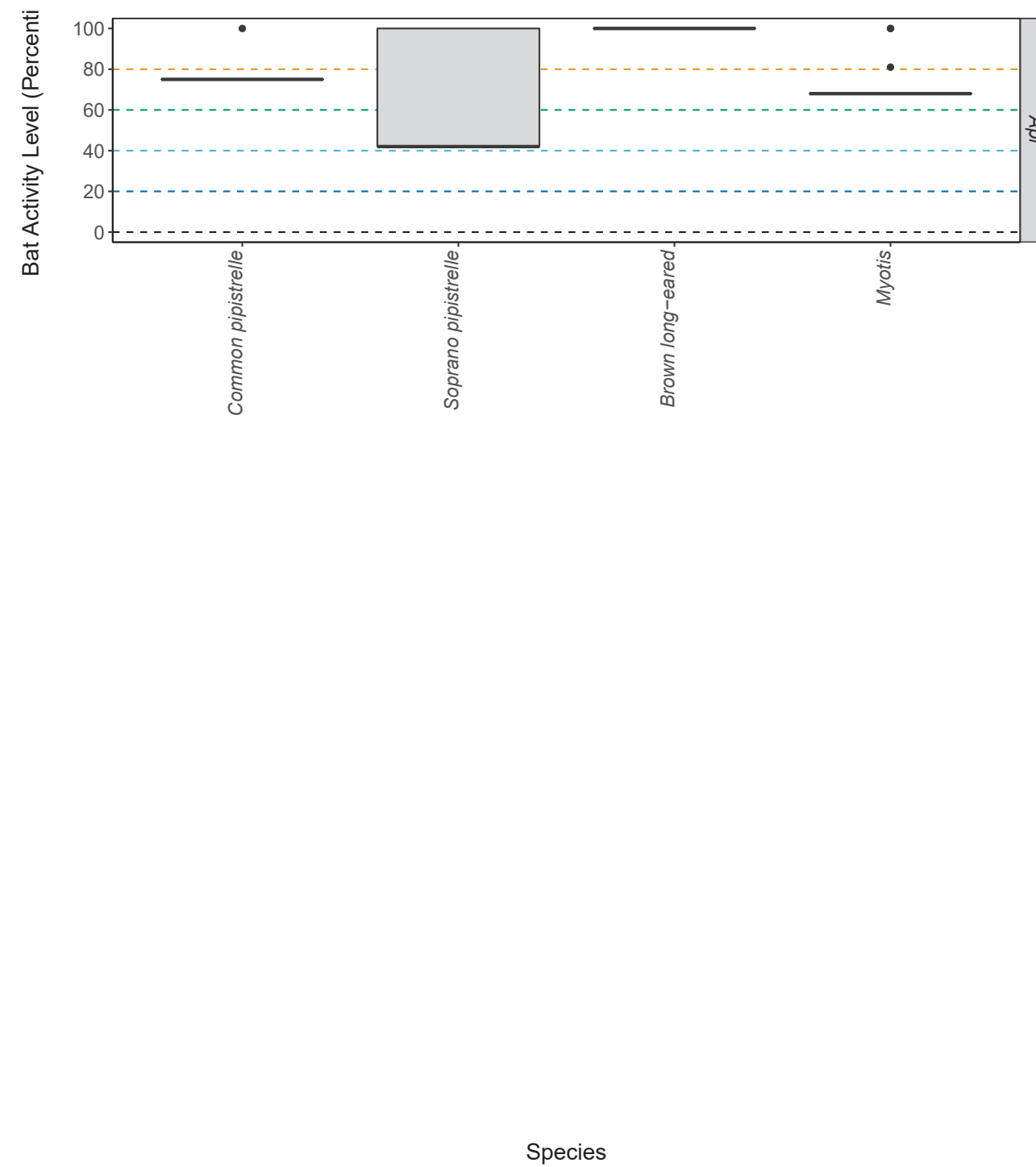
Table 9. Summary table showing the number of nights recorded bat activity fell into each activity band for each species during each month.

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
<i>Myotis</i>	Apr	2	1	10	0	0	0
<i>Pipistrellus pipistrellus</i>	Apr	1	0	8	0	0	0
<i>Pipistrellus pygmaeus</i>	Apr	6	0	0	9	0	0
<i>Plecotus auritus</i>	Apr	1	0	0	0	0	0

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

Figures

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



PART 2: Nightly Analysis

ENTIRE SURVEY PERIOD

Sunrise and Sunset Times

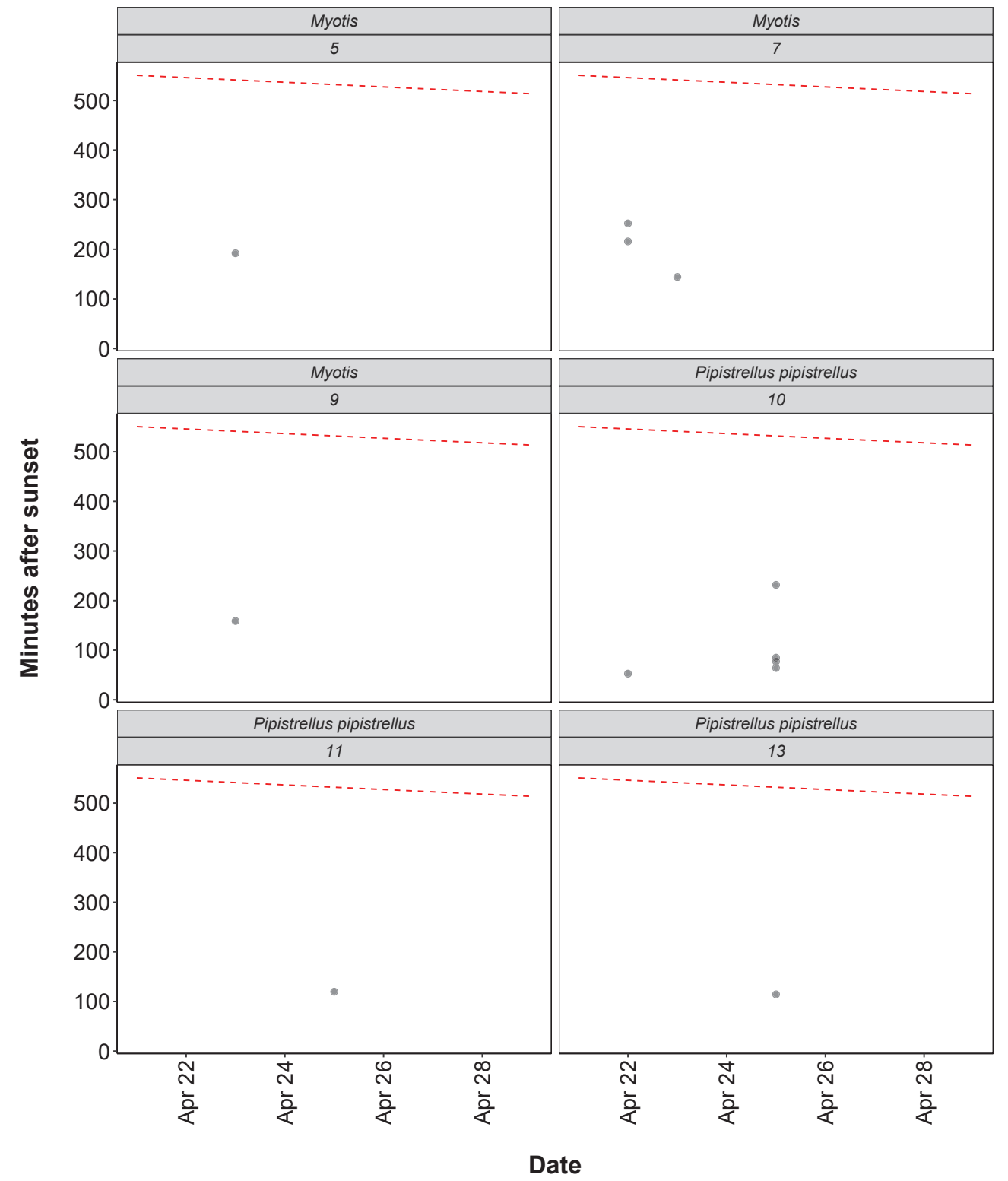
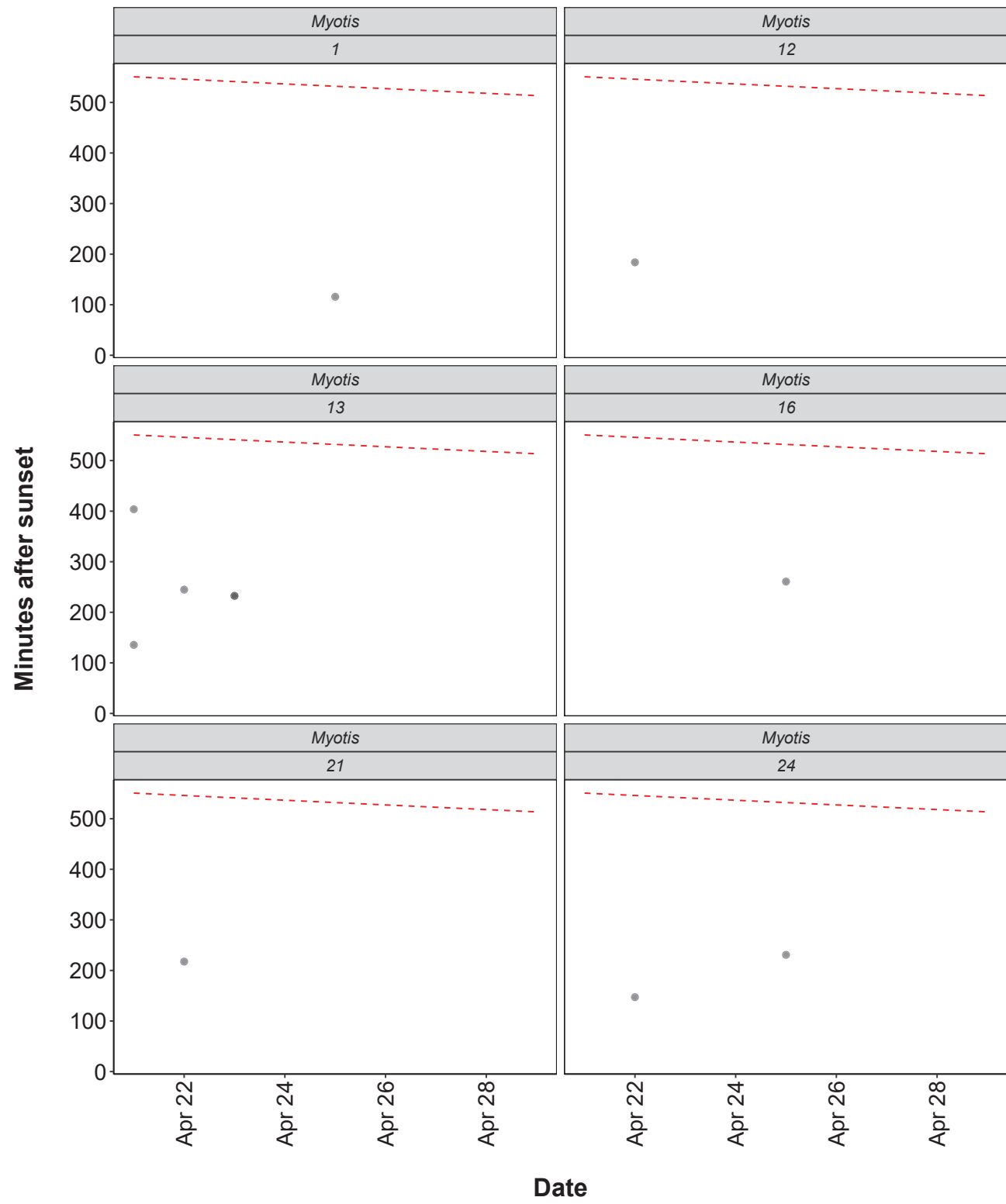
Table 11. The times of sunset and sunrise the following morning for surveys beginning on the date shown.

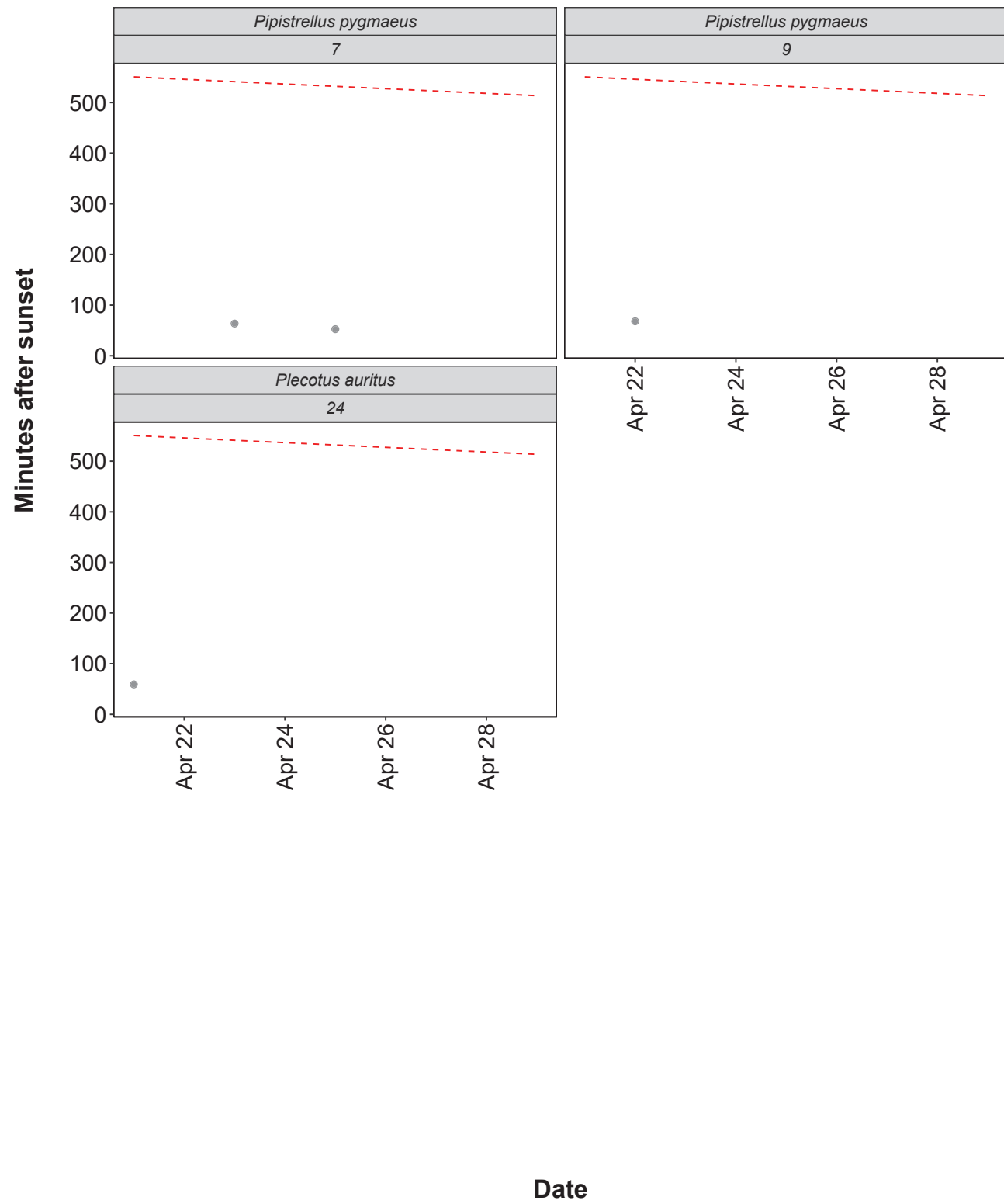
Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)	NA	NA
57.26492_-4.68708	21/04/2021	2021-04-21	20:41	05:52	9.2
57.26492_-4.68708	22/04/2021	2021-04-21	20:41	05:52	9.2
57.27179_-4.64556	21/04/2021	2021-04-21	20:41	05:52	9.2
57.26386_-4.69907	23/04/2021	2021-04-22	20:44	05:50	9.1
57.27104_-4.68606	22/04/2021	2021-04-22	20:44	05:50	9.1
57.26492_-4.68708	23/04/2021	2021-04-22	20:44	05:50	9.1
57.26454_-4.66642	23/04/2021	2021-04-22	20:44	05:50	9.1
57.27179_-4.64556	22/04/2021	2021-04-22	20:44	05:50	9.1
57.2898_-4.67473	22/04/2021	2021-04-22	20:44	05:50	9.1
57.27406_-4.67173	22/04/2021	2021-04-22	20:44	05:50	9.1
57.26454_-4.66642	22/04/2021	2021-04-22	20:44	05:50	9.1
57.26386_-4.69907	22/04/2021	2021-04-22	20:44	05:50	9.1
57.28426_-4.67388	22/04/2021	2021-04-22	20:44	05:50	9.1
57.27333_-4.70127	23/04/2021	2021-04-23	20:46	05:47	9.0
57.26386_-4.69907	23/04/2021	2021-04-23	20:46	05:47	9.0
57.2898_-4.67473	23/04/2021	2021-04-23	20:46	05:47	9.0
57.26492_-4.68708	24/04/2021	2021-04-23	20:46	05:47	9.0
57.27179_-4.64556	23/04/2021	2021-04-23	20:46	05:47	9.0
57.27333_-4.70127	24/04/2021	2021-04-24	20:48	05:45	8.9
57.29359_-4.68206	25/04/2021	2021-04-25	20:50	05:42	8.9
57.27406_-4.67173	26/04/2021	2021-04-25	20:50	05:42	8.9
57.27179_-4.64556	26/04/2021	2021-04-25	20:50	05:42	8.9
57.26386_-4.69907	25/04/2021	2021-04-25	20:50	05:42	8.9
57.28426_-4.67388	25/04/2021	2021-04-25	20:50	05:42	8.9
57.27915_-4.68278	26/04/2021	2021-04-25	20:50	05:42	8.9
57.27104_-4.68606	25/04/2021	2021-04-25	20:50	05:42	8.9
57.26492_-4.68708	25/04/2021	2021-04-25	20:50	05:42	8.9
57.26892_-4.67779	25/04/2021	2021-04-25	20:50	05:42	8.9
57.27179_-4.64556	25/04/2021	2021-04-25	20:50	05:42	8.9
57.26386_-4.69907	26/04/2021	2021-04-25	20:50	05:42	8.9
57.28426_-4.67388	26/04/2021	2021-04-25	20:50	05:42	8.9
57.27915_-4.68278	25/04/2021	2021-04-25	20:50	05:42	8.9
57.27406_-4.67173	25/04/2021	2021-04-25	20:50	05:42	8.9
57.27104_-4.68606	26/04/2021	2021-04-26	20:52	05:40	8.8
57.26454_-4.66642	30/04/2021	2021-04-29	20:59	05:32	8.6

Distribution of Bat Activity Across the Night through Time

Per Detector

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





Roost Emergence Time and Bat Observation

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

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

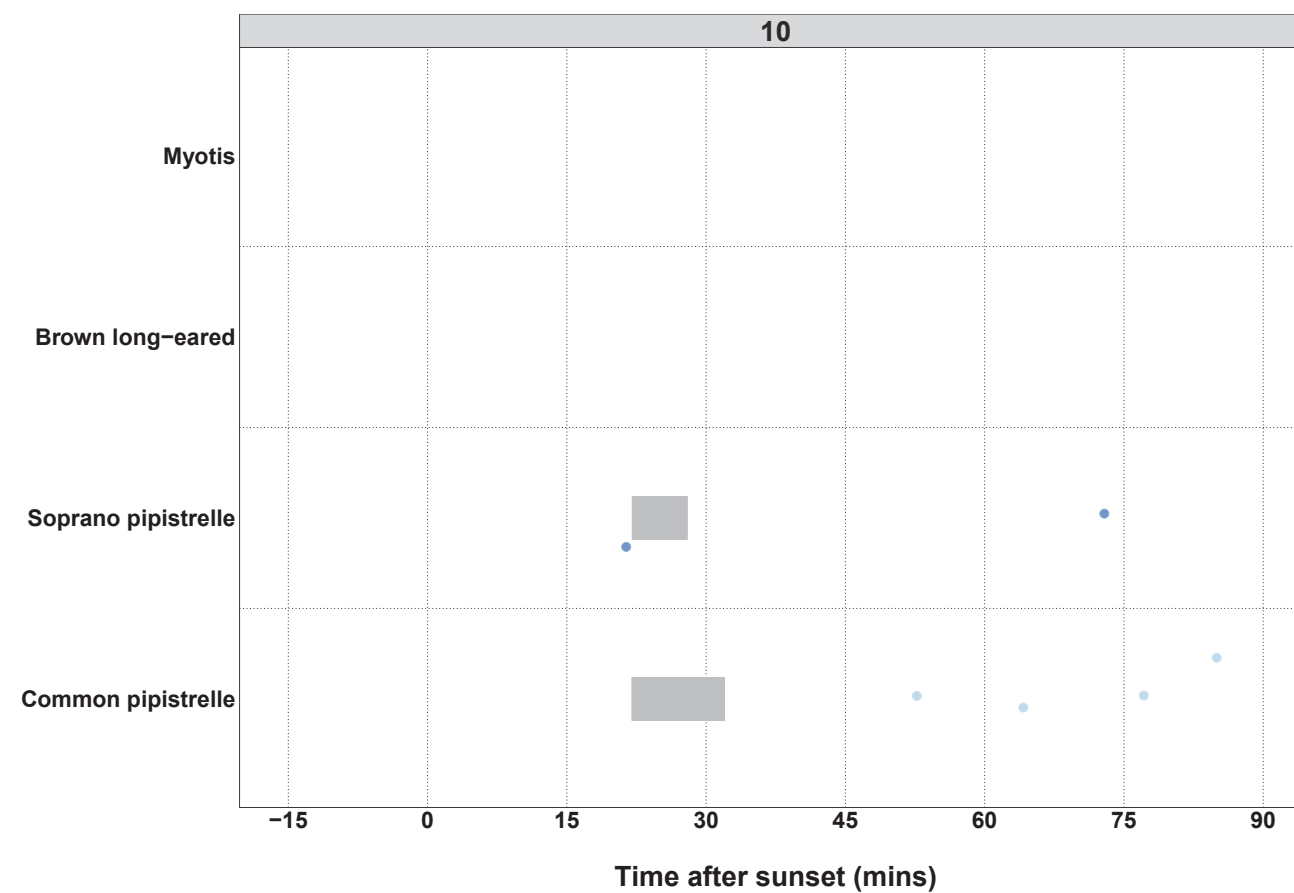
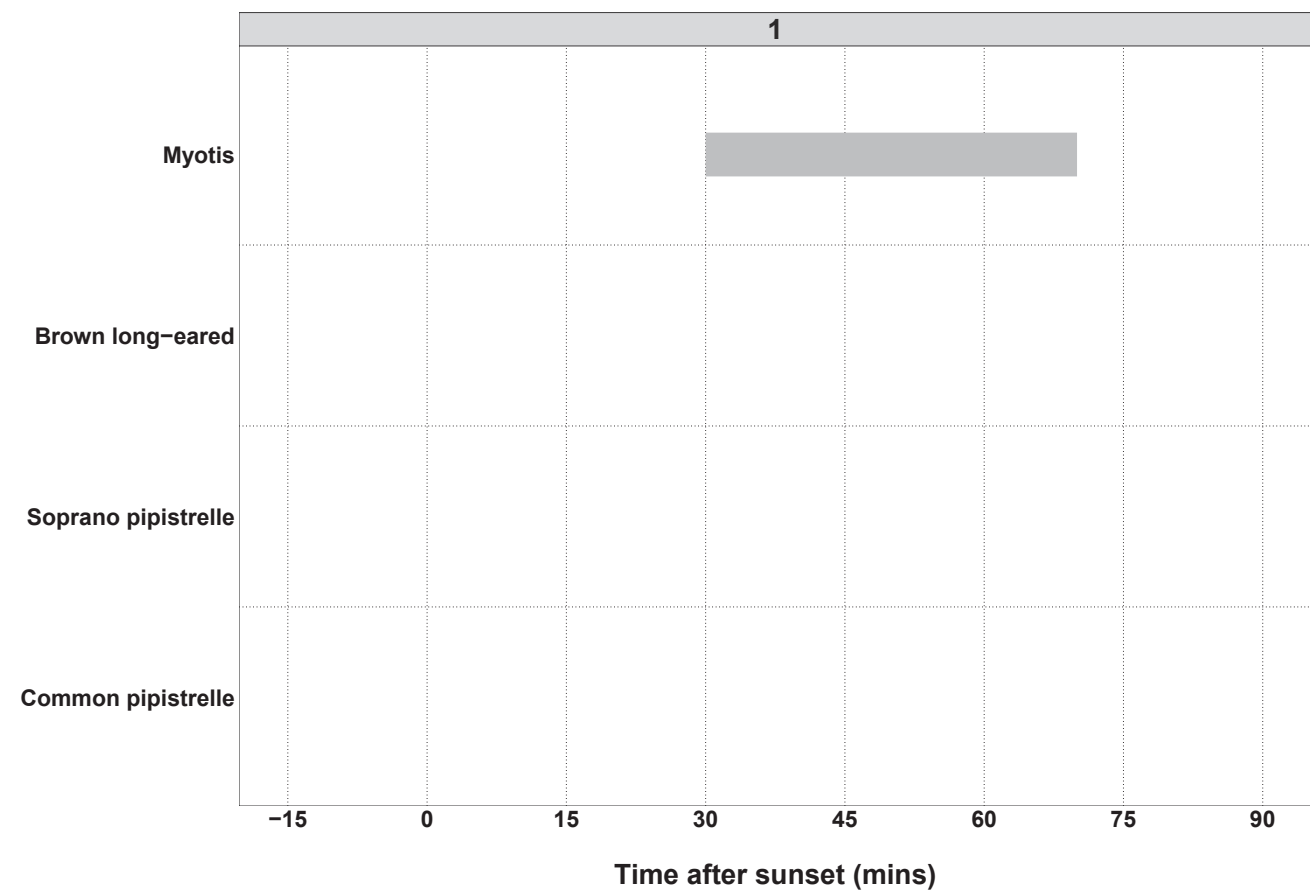
Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Table

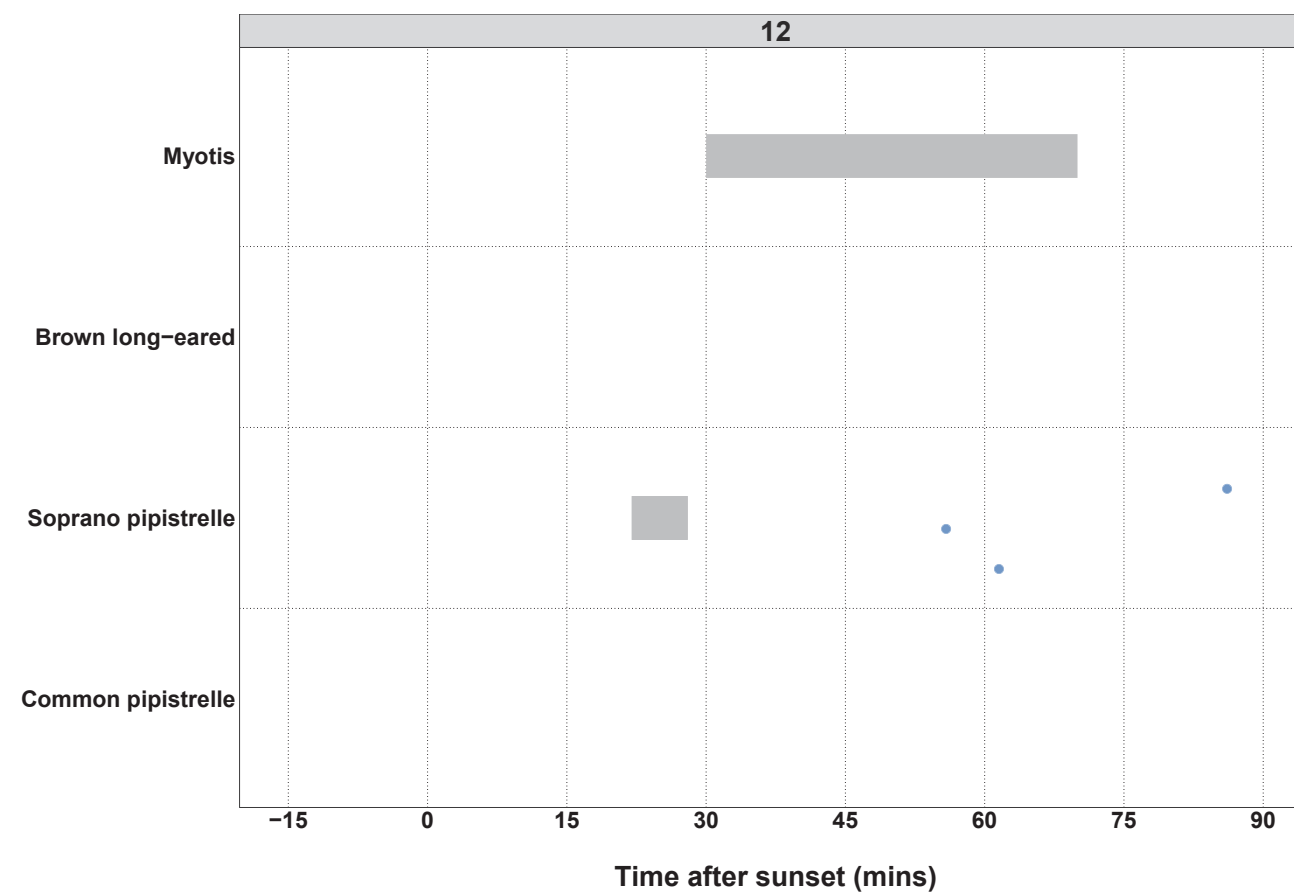
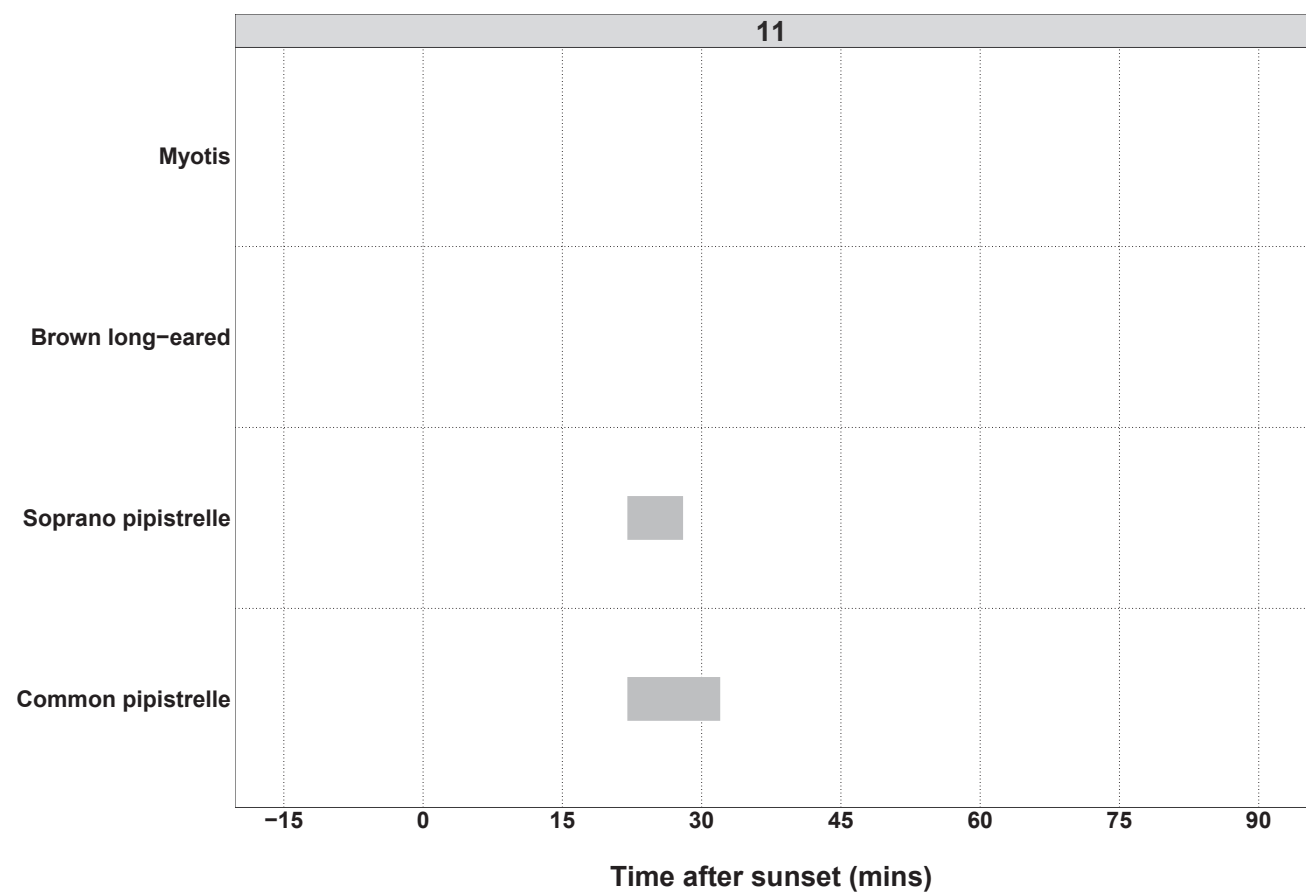
Table 12. Number of bat calls recorded before the upper time of the species-specific emergence time range, and which therefore may potentially indicate the presence of a nearby roost.

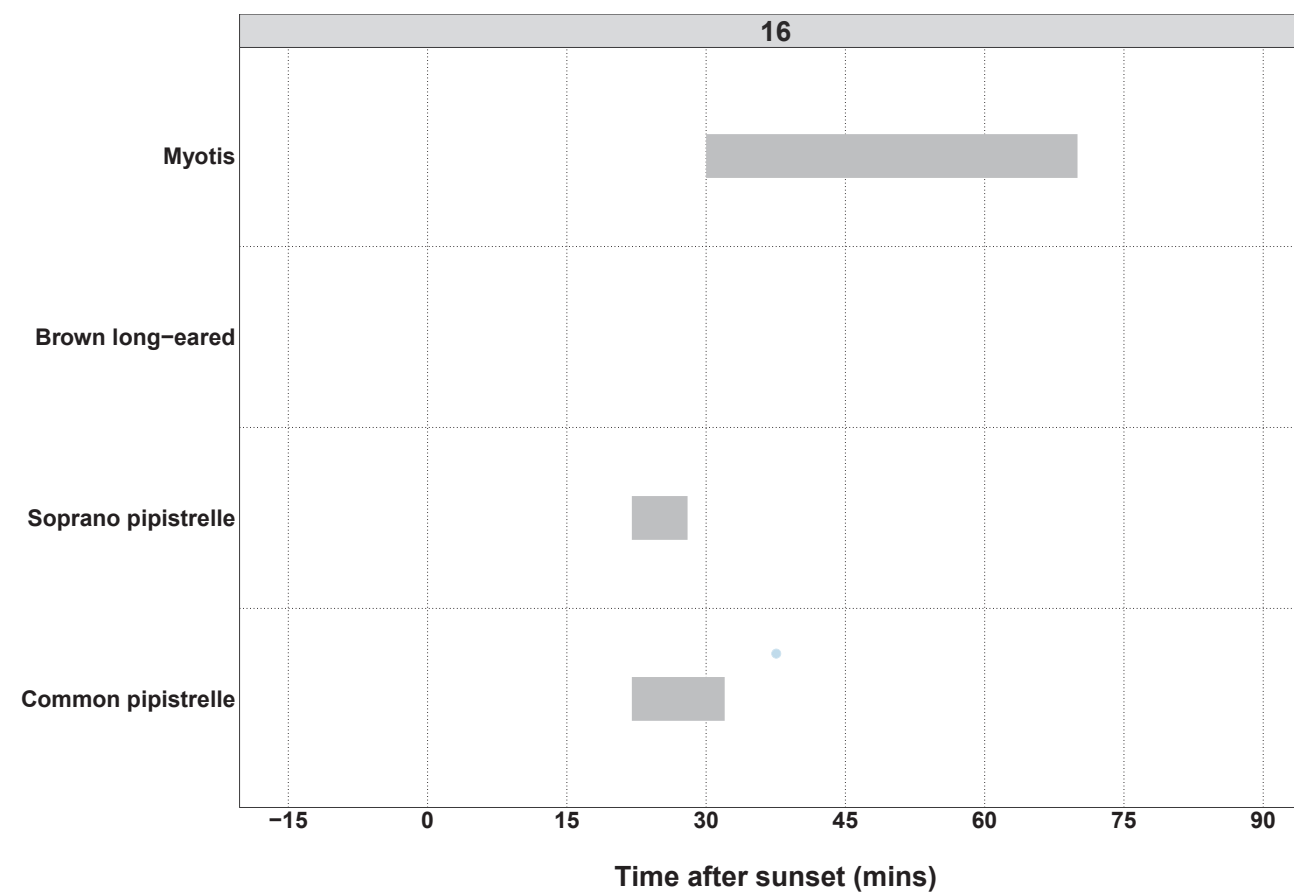
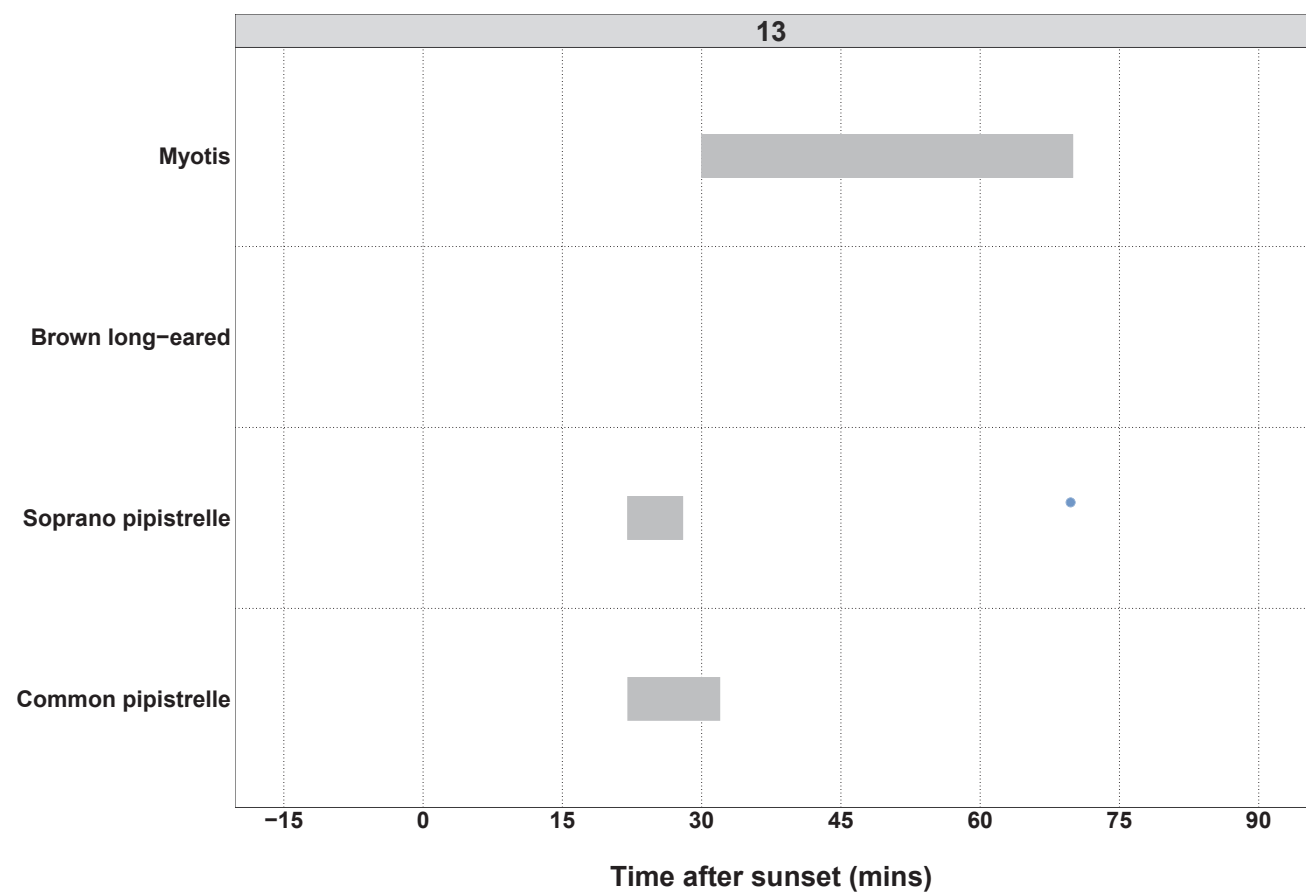
Species	Detector ID	2021-04-21	2021-04-22	2021-04-25
Soprano pipistrelle	10	0	0	1
Soprano pipistrelle	21	0	1	0
Brown long-eared	24	1	0	0

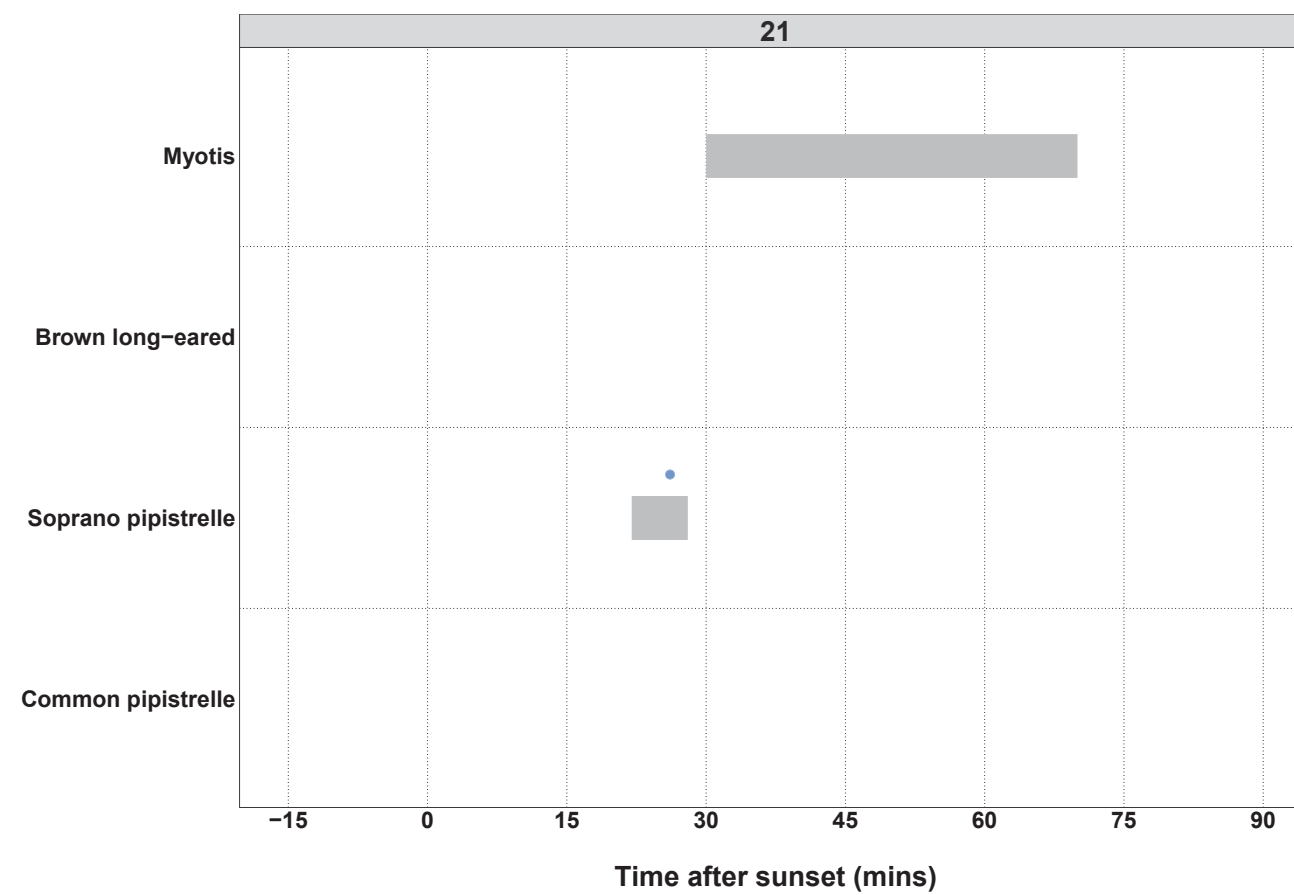
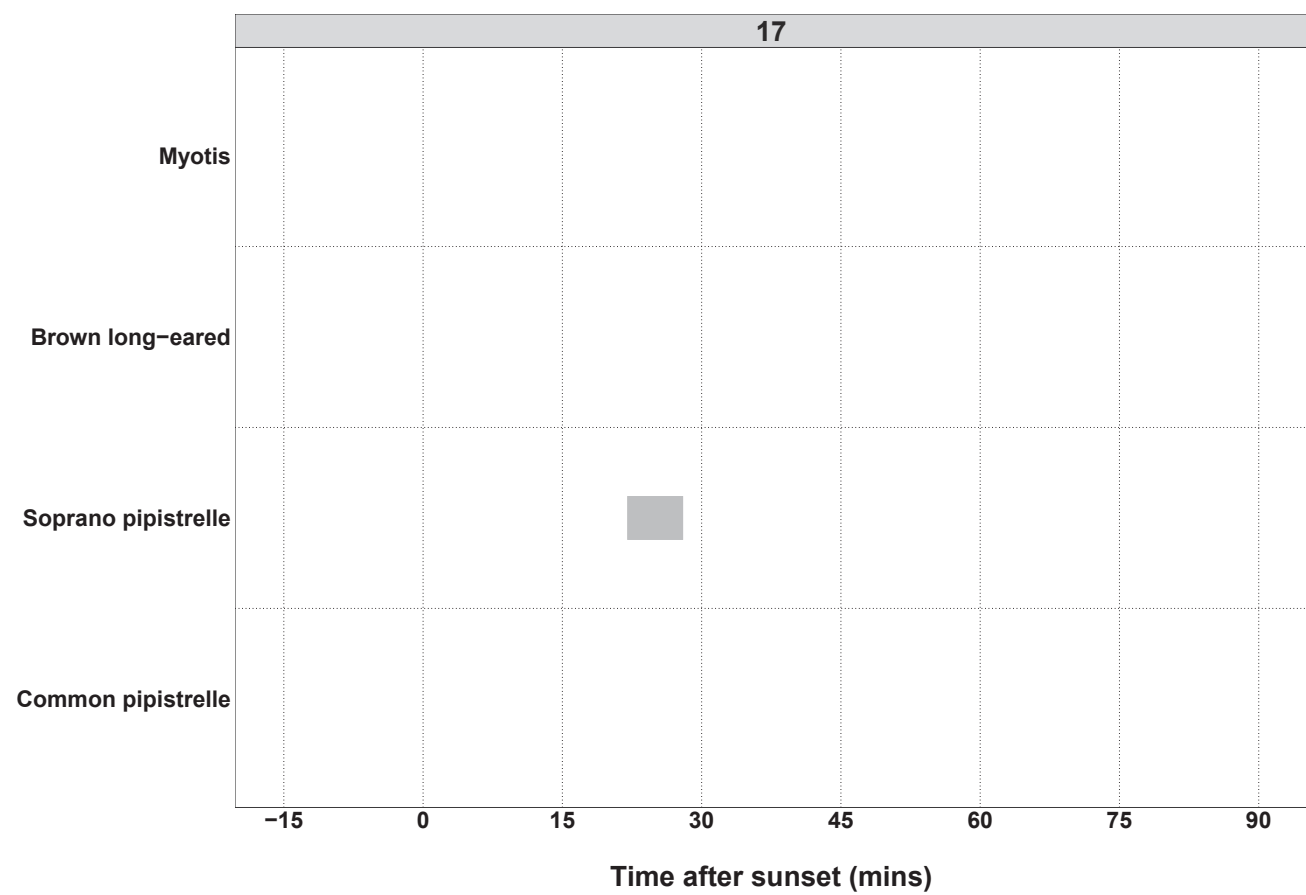
Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Figures

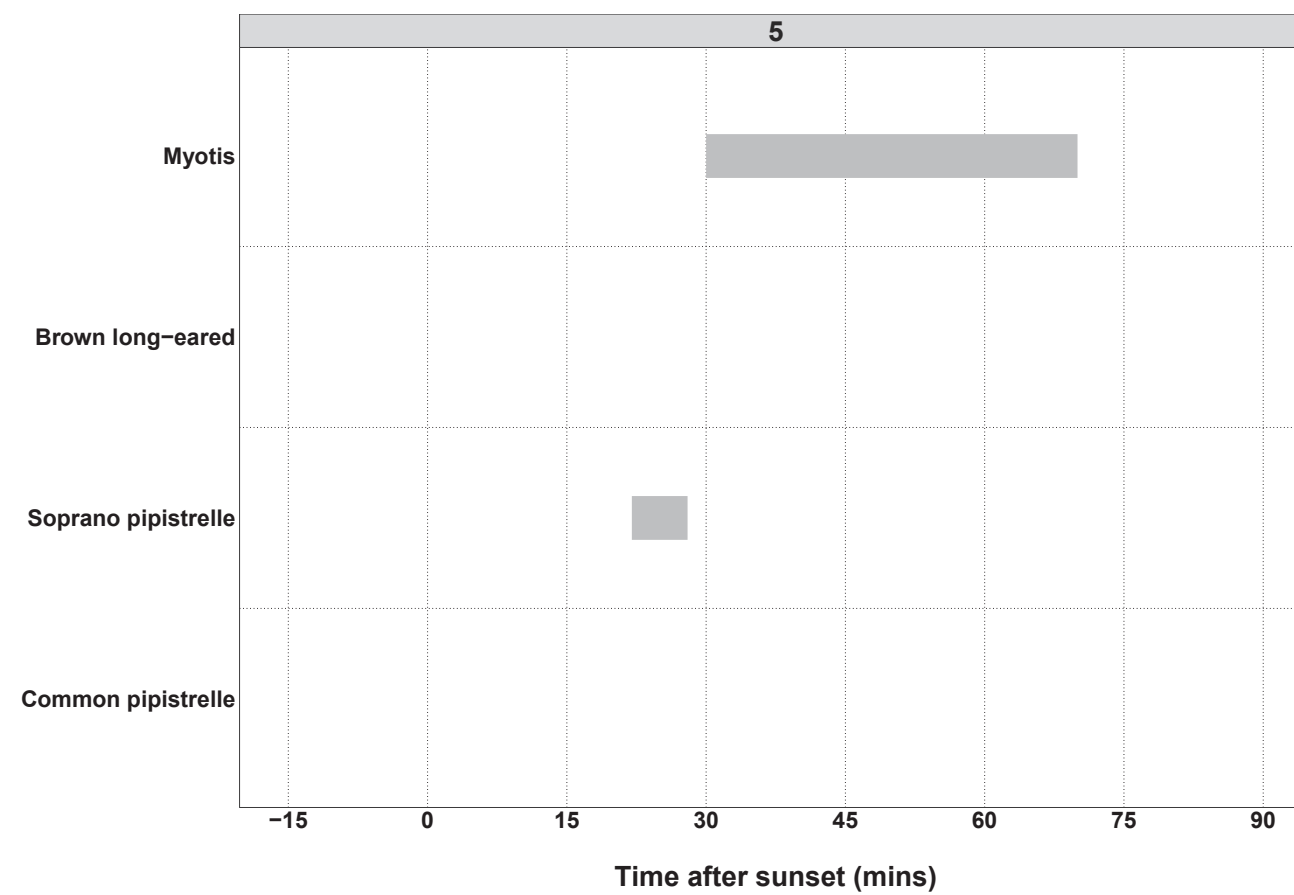
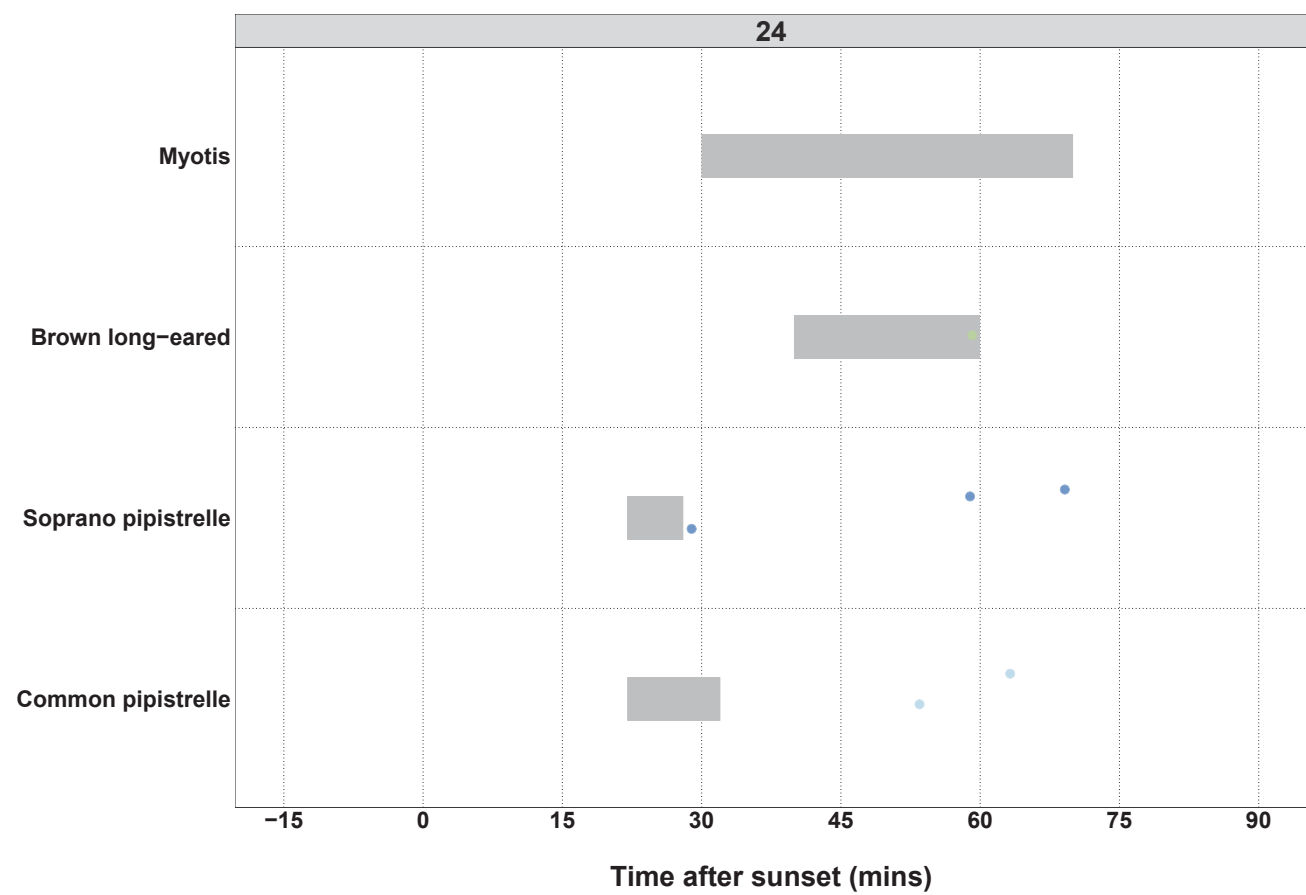
Figure 8. Time from 15 minutes before to 90 minutes after sunset. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occurring earlier than this time range, may potentially indicate the presence of a nearby roost.

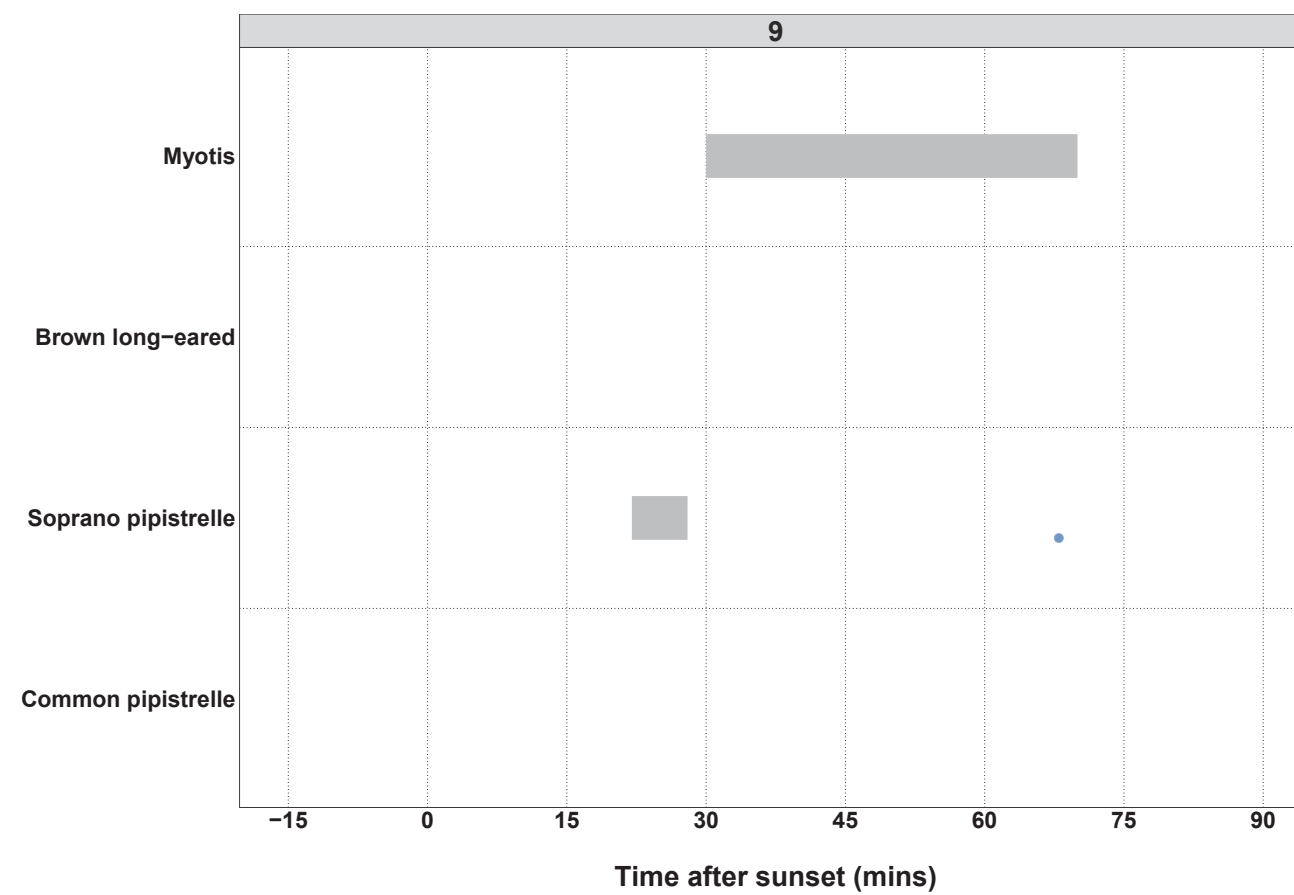
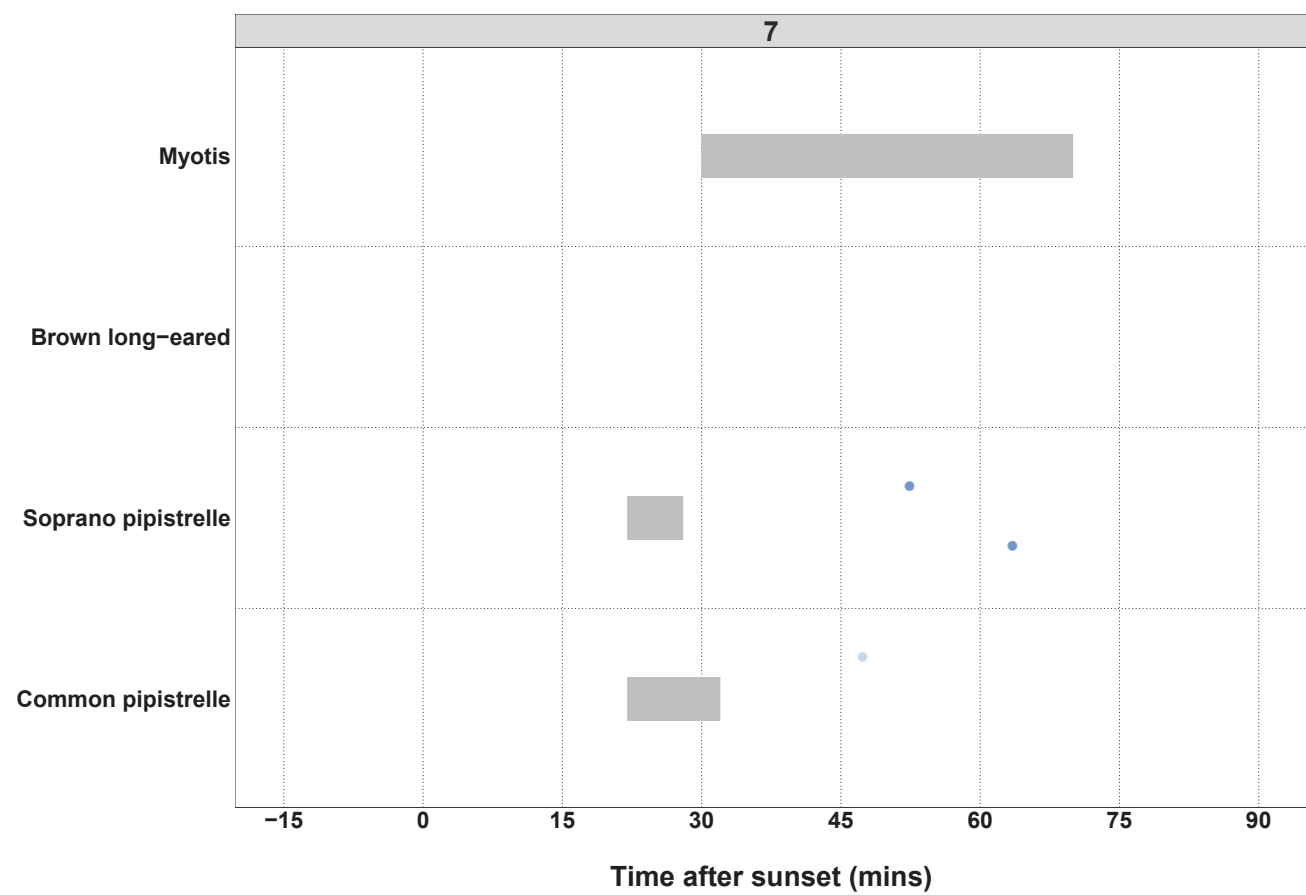












Counts of Bat Passes

All detectors

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

Species	Passes (No.)	Percentage of total (%)
Common pipistrelle	11	21.6
Soprano pipistrelle	21	41.2
Brown long-eared	1	2.0
Myotis	18	35.3
Total	51	100.1

Page Break

Counts of Bat Passes

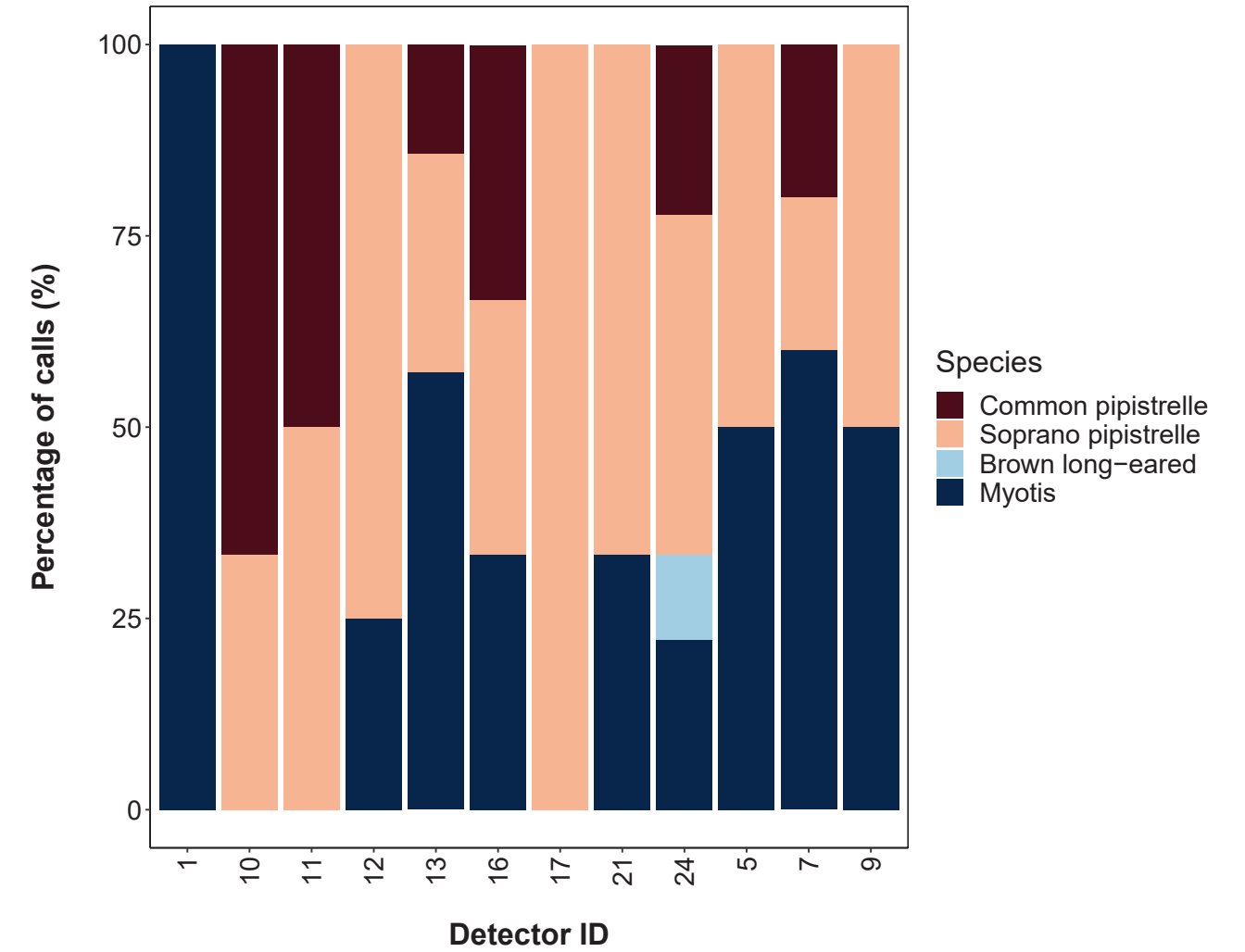
Per Detector

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

Species	Detector ID	Count (No)	Percentage by Detector (%)
Common pipistrelle	10	4	66.7
Common pipistrelle	11	1	50.0
Common pipistrelle	13	1	14.3
Common pipistrelle	16	1	33.3
Common pipistrelle	24	2	22.2
Common pipistrelle	7	2	20.0
Soprano pipistrelle	10	2	33.3
Soprano pipistrelle	11	1	50.0
Soprano pipistrelle	12	3	75.0
Soprano pipistrelle	13	2	28.6
Soprano pipistrelle	16	1	33.3
Soprano pipistrelle	17	2	100.0
Soprano pipistrelle	21	2	66.7
Soprano pipistrelle	24	4	44.4
Soprano pipistrelle	5	1	50.0
Soprano pipistrelle	7	2	20.0
Soprano pipistrelle	9	1	50.0
Brown long-eared	24	1	11.1
Myotis	1	1	100.0
Myotis	12	1	25.0
Myotis	13	4	57.1
Myotis	16	1	33.3
Myotis	21	1	33.3
Myotis	24	2	22.2
Myotis	5	1	50.0
Myotis	7	6	60.0
Myotis	9	1	50.0

Species Composition

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



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.

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

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

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

Species	Detector ID	Median Pass Rate
Common pipistrelle	10	0.2
Common pipistrelle	11	0.1
Common pipistrelle	13	0.1
Common pipistrelle	16	0.1
Common pipistrelle	24	0.1
Common pipistrelle	7	0.1
Soprano pipistrelle	10	0.2
Soprano pipistrelle	11	0.1
Soprano pipistrelle	12	0.2
Soprano pipistrelle	13	0.2
Soprano pipistrelle	16	0.1
Soprano pipistrelle	17	0.2
Soprano pipistrelle	21	0.1
Soprano pipistrelle	24	0.2
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.1
Soprano pipistrelle	9	0.1
Brown long-eared	24	0.1
Myotis	1	0.1
Myotis	12	0.1
Myotis	13	0.1
Myotis	16	0.1
Myotis	21	0.1
Myotis	24	0.1
Myotis	5	0.1
Myotis	7	0.3
Myotis	9	0.1

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

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

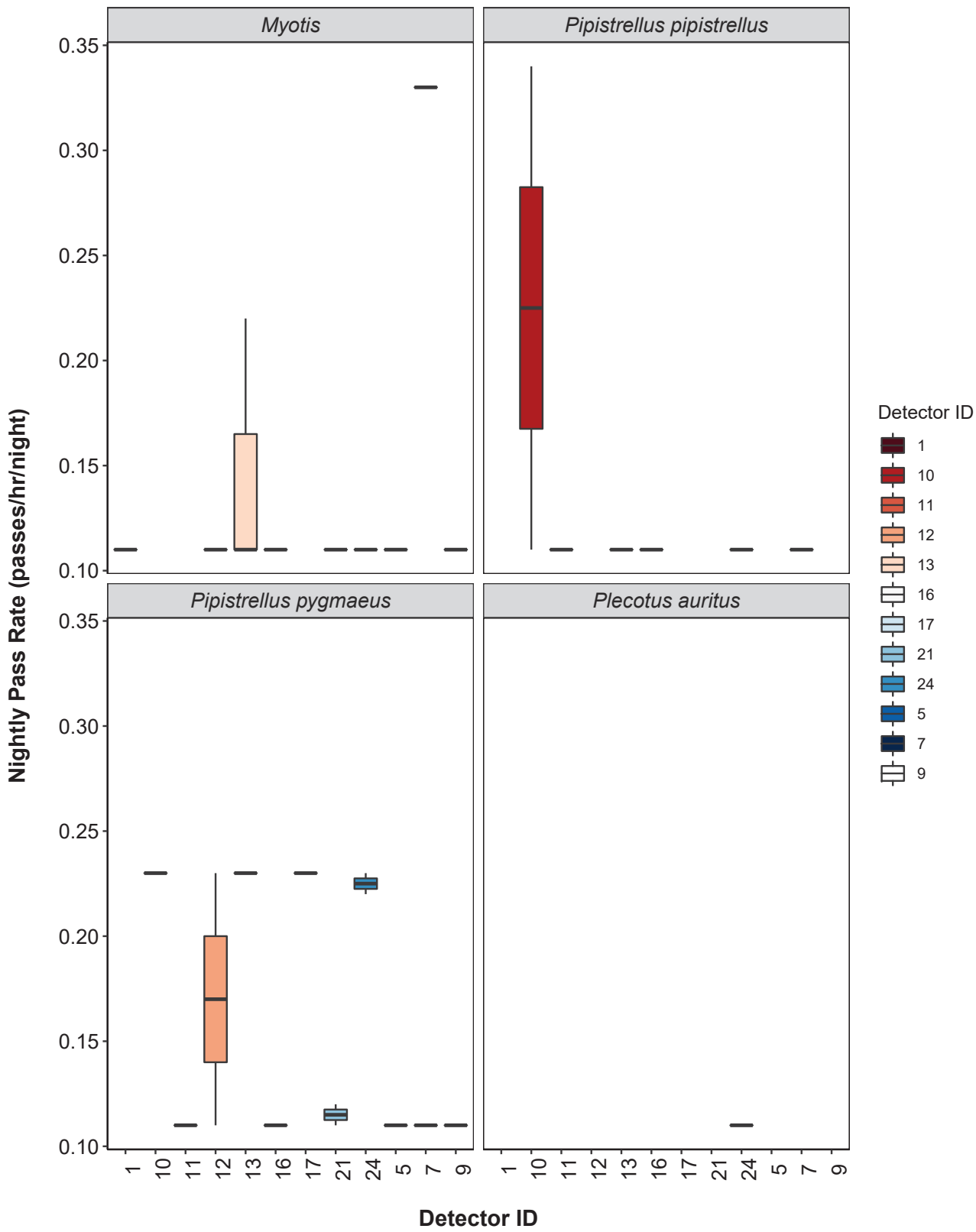
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Mean Pass Rate
Common pipistrelle	10	0.2
Common pipistrelle	11	0.1
Common pipistrelle	13	0.1
Common pipistrelle	16	0.1
Common pipistrelle	24	0.1
Common pipistrelle	7	0.1
Soprano pipistrelle	10	0.2
Soprano pipistrelle	11	0.1
Soprano pipistrelle	12	0.2
Soprano pipistrelle	13	0.2
Soprano pipistrelle	16	0.1
Soprano pipistrelle	17	0.2
Soprano pipistrelle	21	0.1
Soprano pipistrelle	24	0.2
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.1
Soprano pipistrelle	9	0.1
Brown long-eared	24	0.1
Myotis	1	0.1
Myotis	12	0.1
Myotis	13	0.1
Myotis	16	0.1
Myotis	21	0.1
Myotis	24	0.1
Myotis	5	0.1
Myotis	7	0.3
Myotis	9	0.1

Nightly Bat Passes (Bat passes per hour)

Per Detector - Figures

Figure 11. Boxplots for the number of bat passes per hour each night, for each detector. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.



SPLIT BY MONTH

Total Bat Passes per Detector, each Month

Per Detector

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

Species	Detector ID	Apr
Common pipistrelle	10	4
Common pipistrelle	11	1
Common pipistrelle	13	1
Common pipistrelle	16	1
Common pipistrelle	24	2
Common pipistrelle	7	2
Soprano pipistrelle	10	2
Soprano pipistrelle	11	1
Soprano pipistrelle	12	3
Soprano pipistrelle	13	2
Soprano pipistrelle	16	1
Soprano pipistrelle	17	2
Soprano pipistrelle	21	2
Soprano pipistrelle	24	4
Soprano pipistrelle	5	1
Soprano pipistrelle	7	2
Soprano pipistrelle	9	1
Brown long-eared	24	1
Myotis	1	1
Myotis	12	1
Myotis	13	4
Myotis	16	1
Myotis	21	1
Myotis	24	2
Myotis	5	1
Myotis	7	6
Myotis	9	1

Survey Effort

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

Month	Detector ID	No. of Survey Nights
Apr	1	1
Apr	10	2
Apr	11	1
Apr	12	3
Apr	13	4
Apr	16	2
Apr	17	1
Apr	21	2
Apr	24	4
Apr	5	2
Apr	7	3
Apr	9	2

Nightly Bat Pass Rate for each Month

Median Per Detector

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

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

Species	Detector ID	Apr
Common pipistrelle	10	0.2
Common pipistrelle	11	0.1
Common pipistrelle	13	0.1
Common pipistrelle	16	0.1
Common pipistrelle	24	0.1
Common pipistrelle	7	0.1
Soprano pipistrelle	10	0.2
Soprano pipistrelle	11	0.1
Soprano pipistrelle	12	0.2
Soprano pipistrelle	13	0.2
Soprano pipistrelle	16	0.1
Soprano pipistrelle	17	0.2
Soprano pipistrelle	21	0.1
Soprano pipistrelle	24	0.2
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.1
Soprano pipistrelle	9	0.1
Brown long-eared	24	0.1
Myotis	1	0.1
Myotis	12	0.1
Myotis	13	0.1
Myotis	16	0.1
Myotis	21	0.1
Myotis	24	0.1
Myotis	5	0.1
Myotis	7	0.3
Myotis	9	0.1

Nightly Bat Pass Rate for each Month

Mean per Detector

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

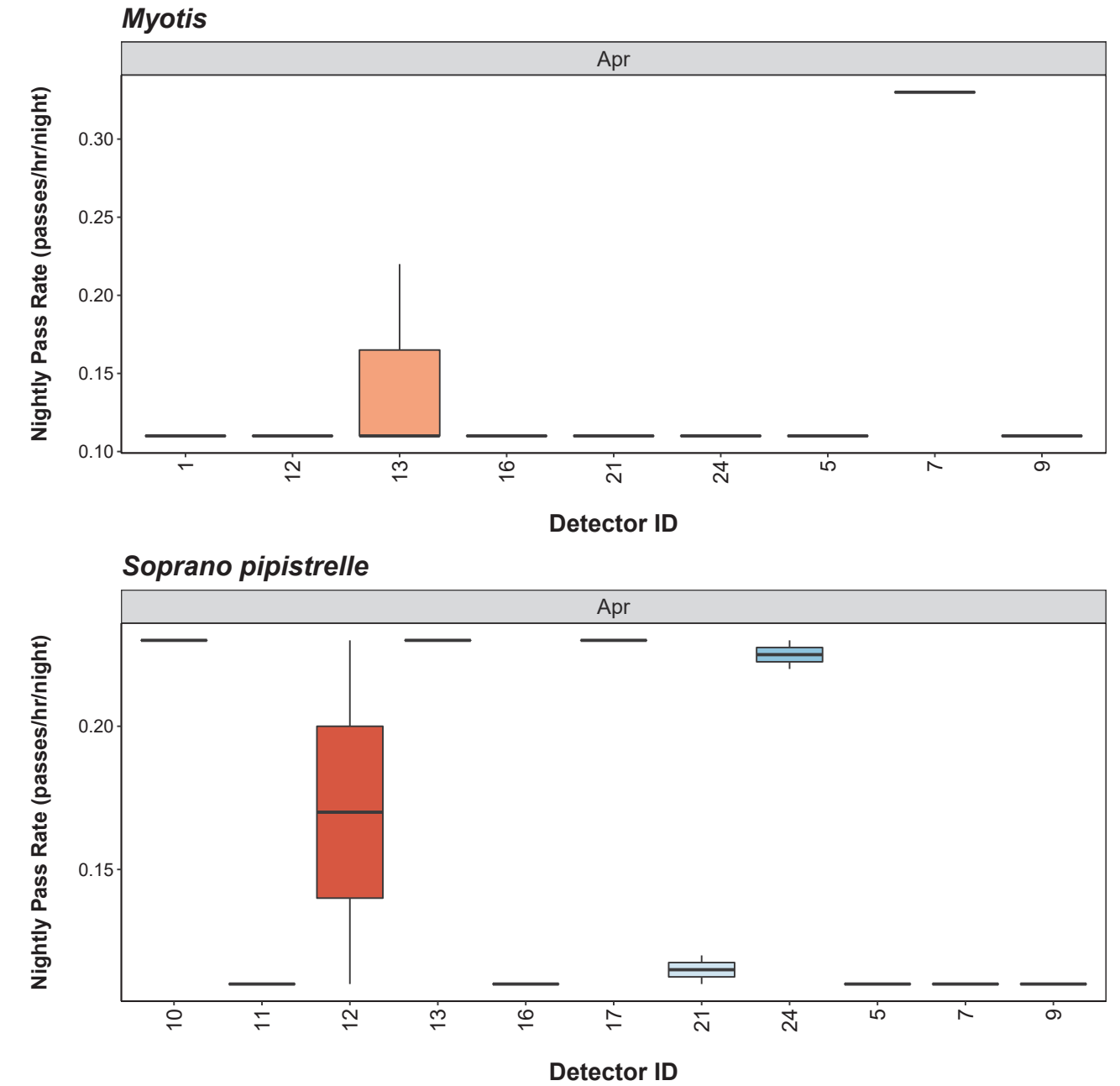
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

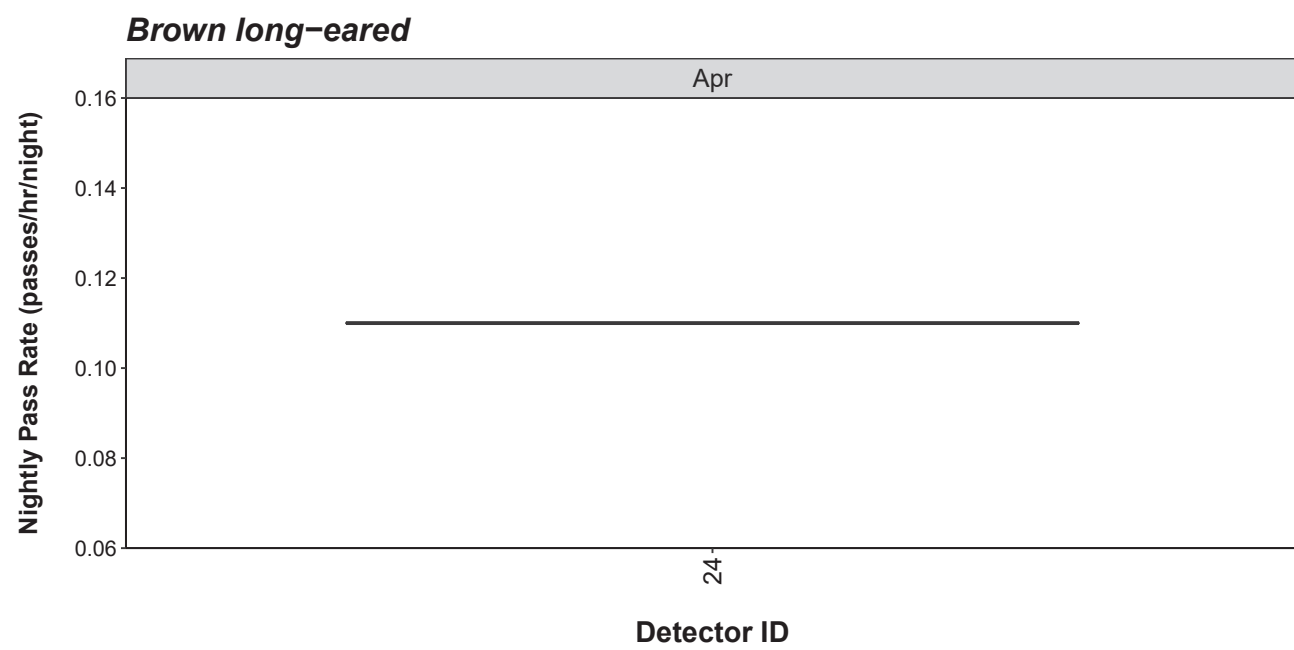
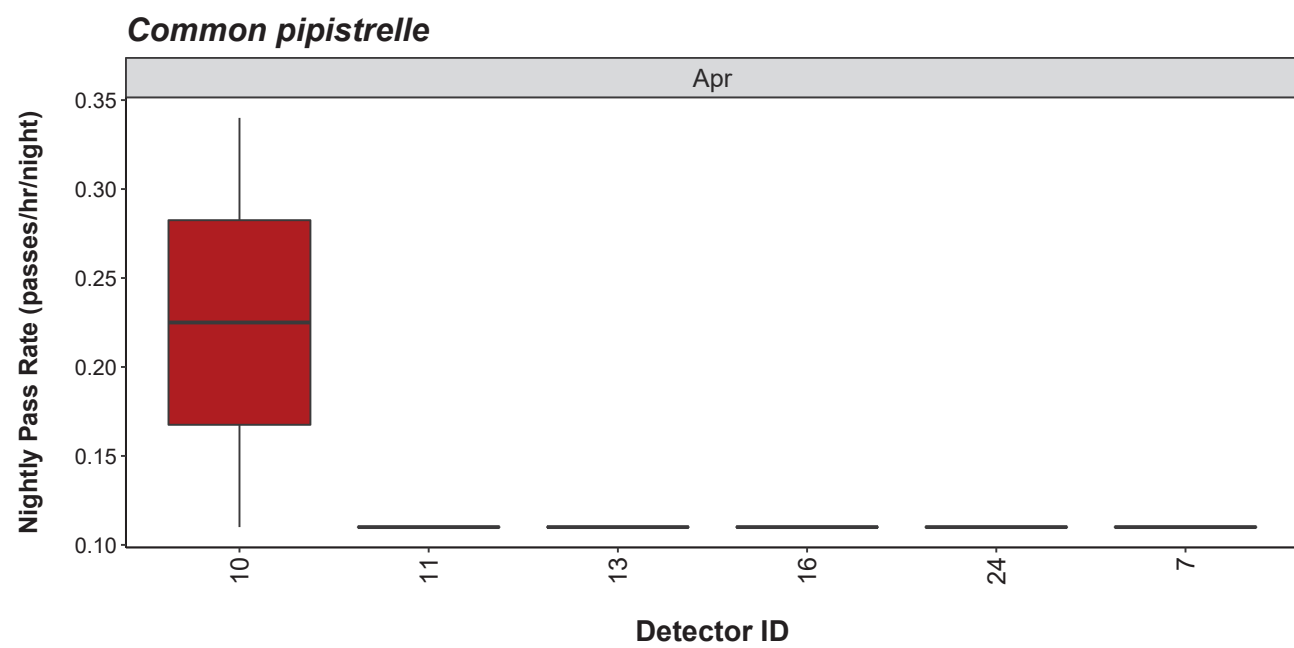
Species	Detector ID	Apr
Common pipistrelle	10	0.2
Common pipistrelle	11	0.1
Common pipistrelle	13	0.1
Common pipistrelle	16	0.1
Common pipistrelle	24	0.1
Common pipistrelle	7	0.1
Soprano pipistrelle	10	0.2
Soprano pipistrelle	11	0.1
Soprano pipistrelle	12	0.2
Soprano pipistrelle	13	0.2
Soprano pipistrelle	16	0.1
Soprano pipistrelle	17	0.2
Soprano pipistrelle	21	0.1
Soprano pipistrelle	24	0.2
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.1
Soprano pipistrelle	9	0.1
Brown long-eared	24	0.1
Myotis	1	0.1
Myotis	12	0.1
Myotis	13	0.1
Myotis	16	0.1
Myotis	21	0.1
Myotis	24	0.1
Myotis	5	0.1
Myotis	7	0.3
Myotis	9	0.1

Nightly Bat Pass Rate for each Month

Per Detector - Figures

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





Bat Activity per Detector Location

Figure 13. Detector ID reference:

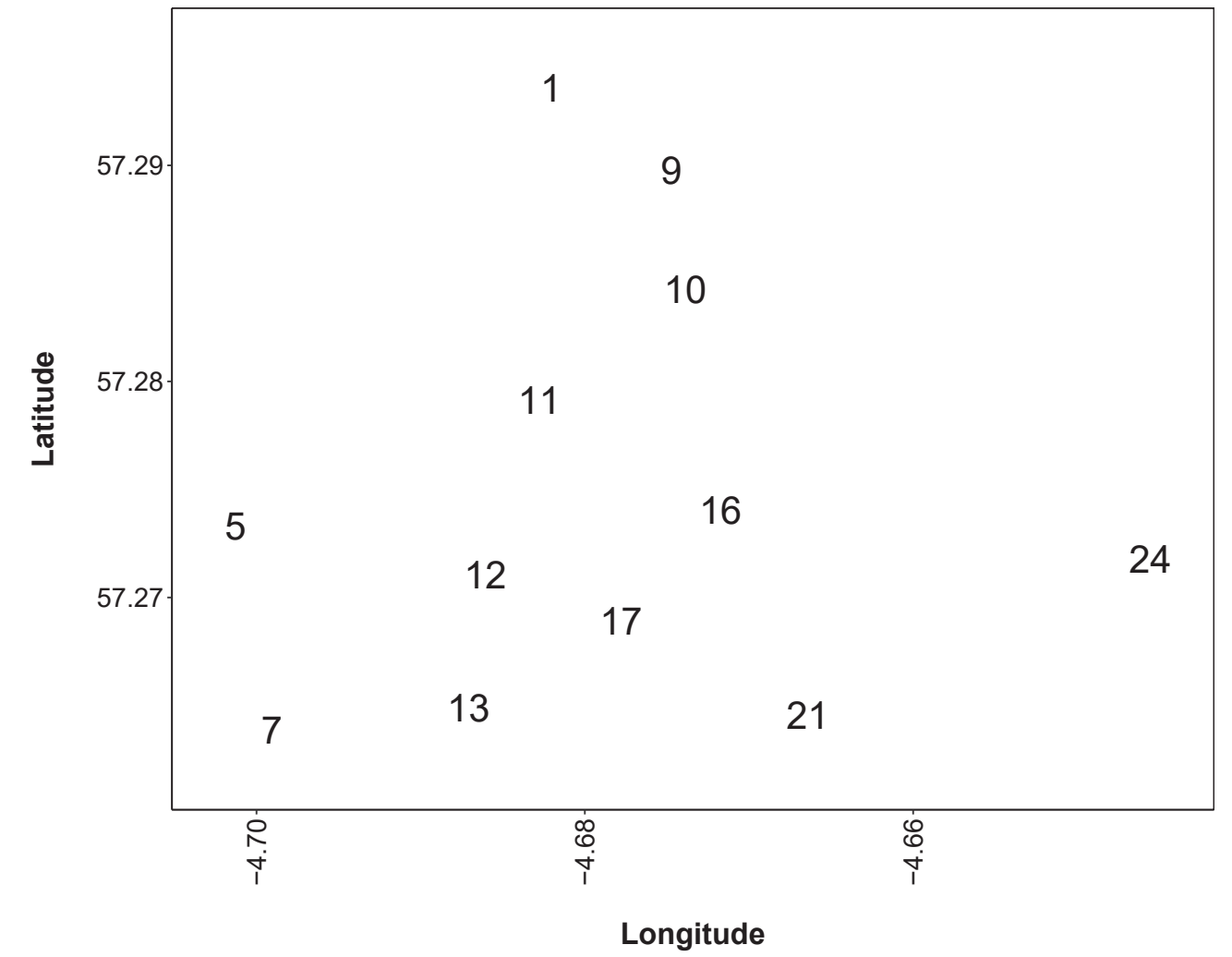


Figure 14. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

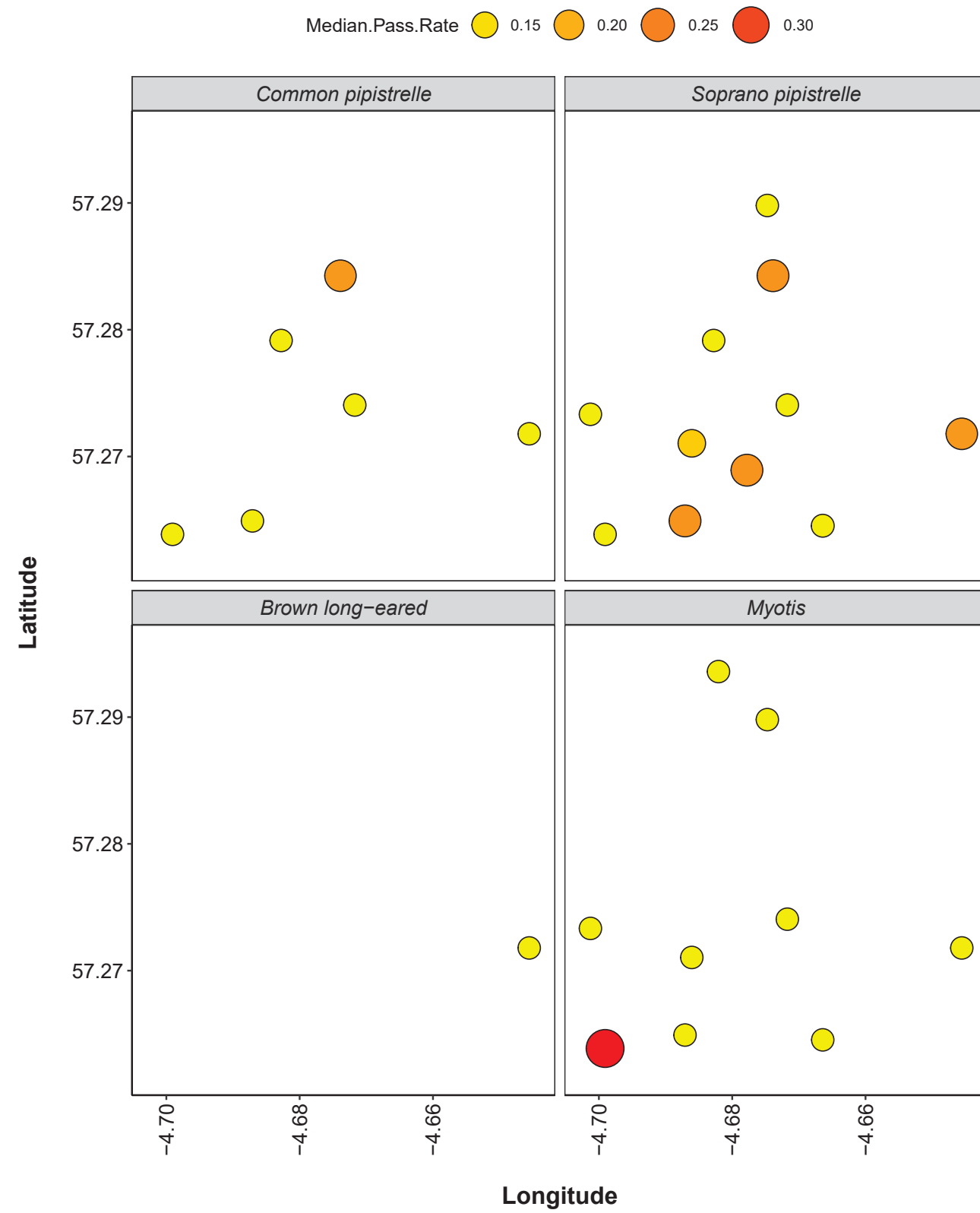
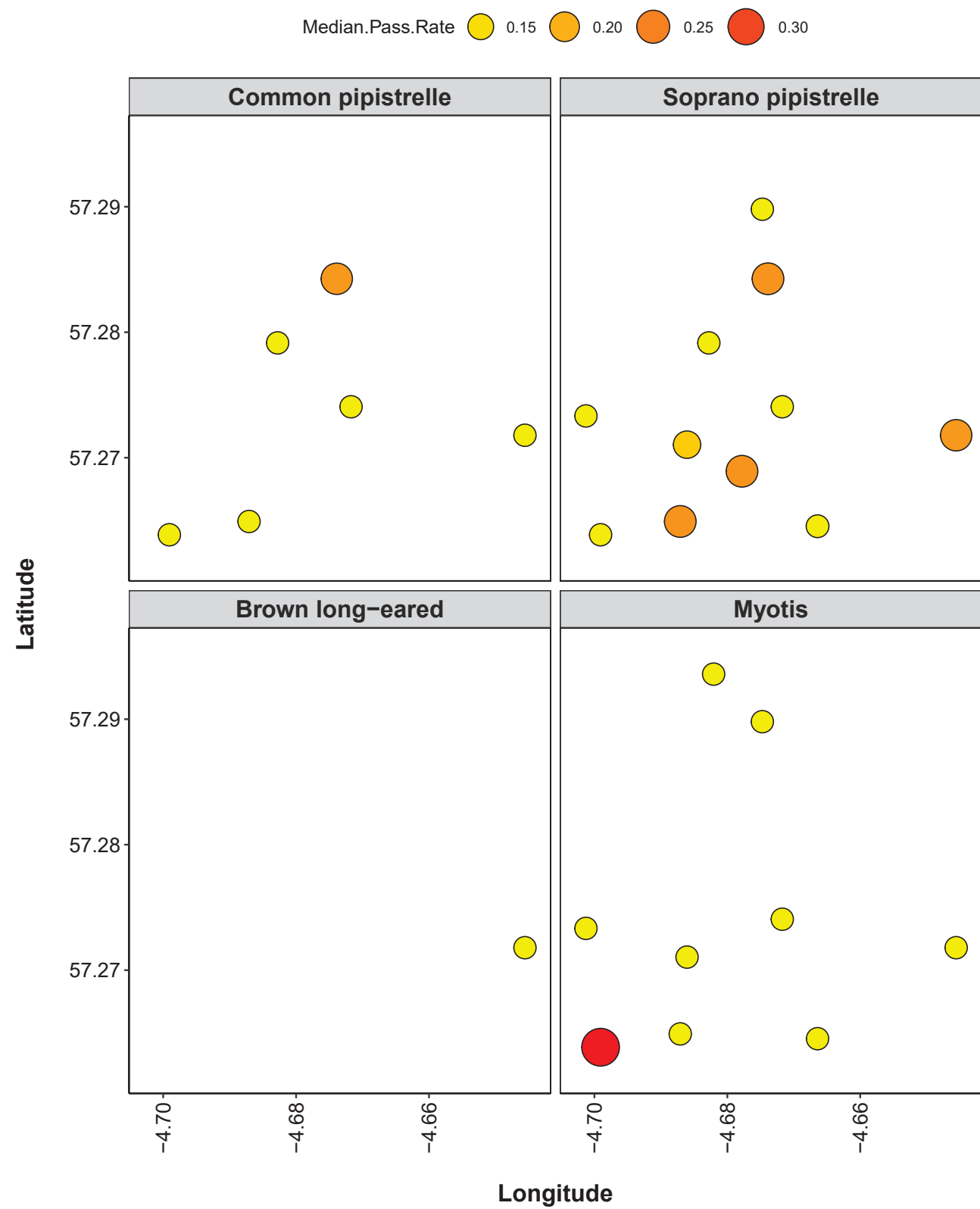
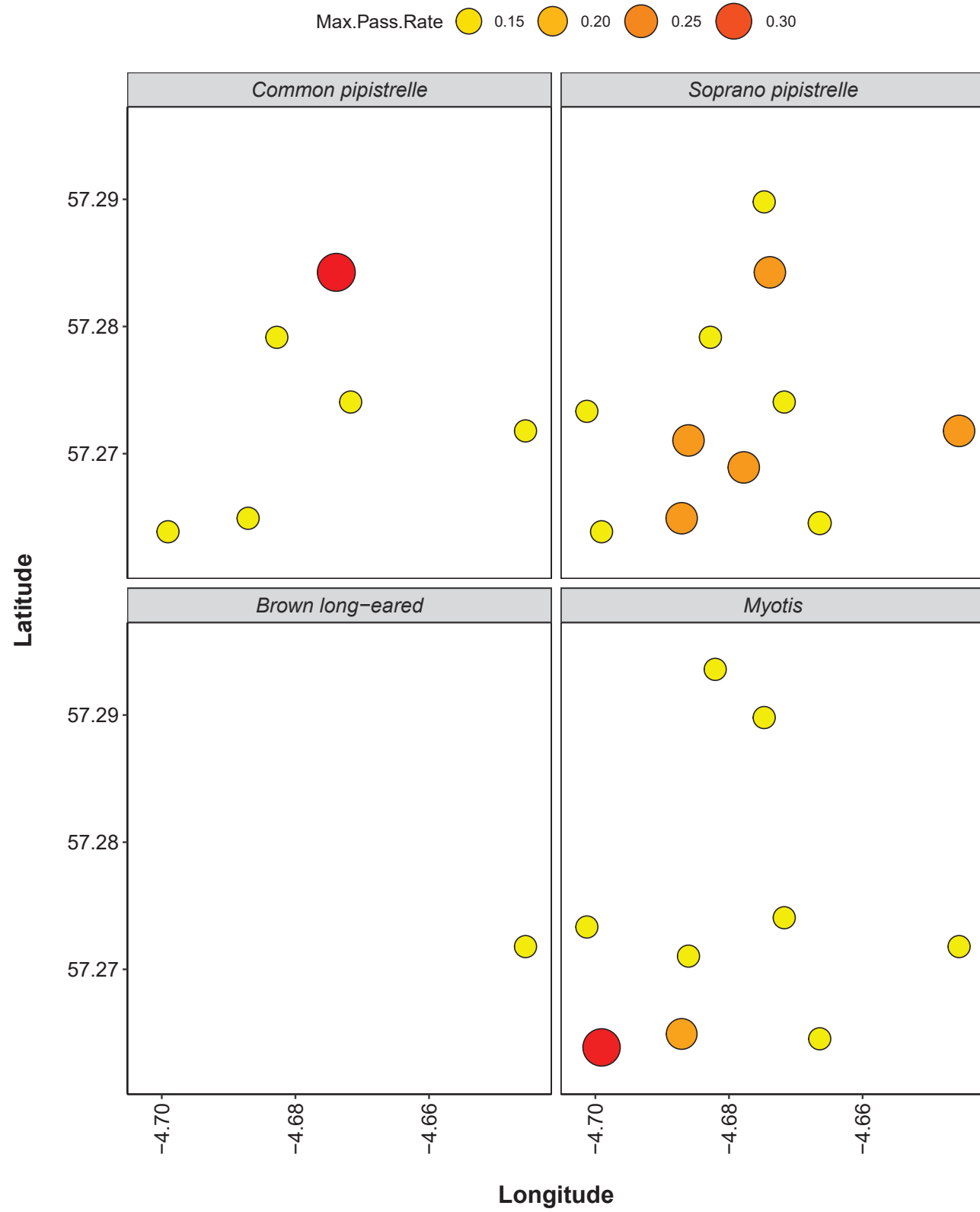


Figure 15. Maximum Nightly Pass Rate (bat passes/hr/night) recorded in a single night throughout the survey period - represented by the size and colour of the point at each detector location.



PART 2B: Includes absences

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

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

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

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

Species	Detector ID	Median Pass Rate
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.1
Soprano pipistrelle	9	0.1

Species	Detector ID	Median Pass Rate
Brown long-eared	1	0.0
Brown long-eared	10	0.0
Brown long-eared	11	0.0
Brown long-eared	12	0.0
Brown long-eared	13	0.0
Brown long-eared	16	0.0
Brown long-eared	17	0.0
Brown long-eared	21	0.0
Brown long-eared	24	0.0
Brown long-eared	5	0.0
Brown long-eared	7	0.0
Brown long-eared	9	0.0
Common pipistrelle	1	0.0
Common pipistrelle	10	0.2
Common pipistrelle	11	0.1
Common pipistrelle	12	0.0
Common pipistrelle	13	0.0
Common pipistrelle	16	0.1
Common pipistrelle	17	0.0
Common pipistrelle	21	0.0
Common pipistrelle	24	0.1
Common pipistrelle	5	0.0
Common pipistrelle	7	0.1
Common pipistrelle	9	0.0
Myotis	1	0.1
Myotis	10	0.0
Myotis	11	0.0
Myotis	12	0.0
Myotis	13	0.1
Myotis	16	0.1
Myotis	17	0.0
Myotis	21	0.1
Myotis	24	0.1
Myotis	5	0.1
Myotis	7	0.3
Myotis	9	0.1
Soprano pipistrelle	1	0.0
Soprano pipistrelle	10	0.1
Soprano pipistrelle	11	0.1
Soprano pipistrelle	12	0.1
Soprano pipistrelle	13	0.0
Soprano pipistrelle	16	0.1
Soprano pipistrelle	17	0.2
Soprano pipistrelle	21	0.1
Soprano pipistrelle	24	0.1

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

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

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

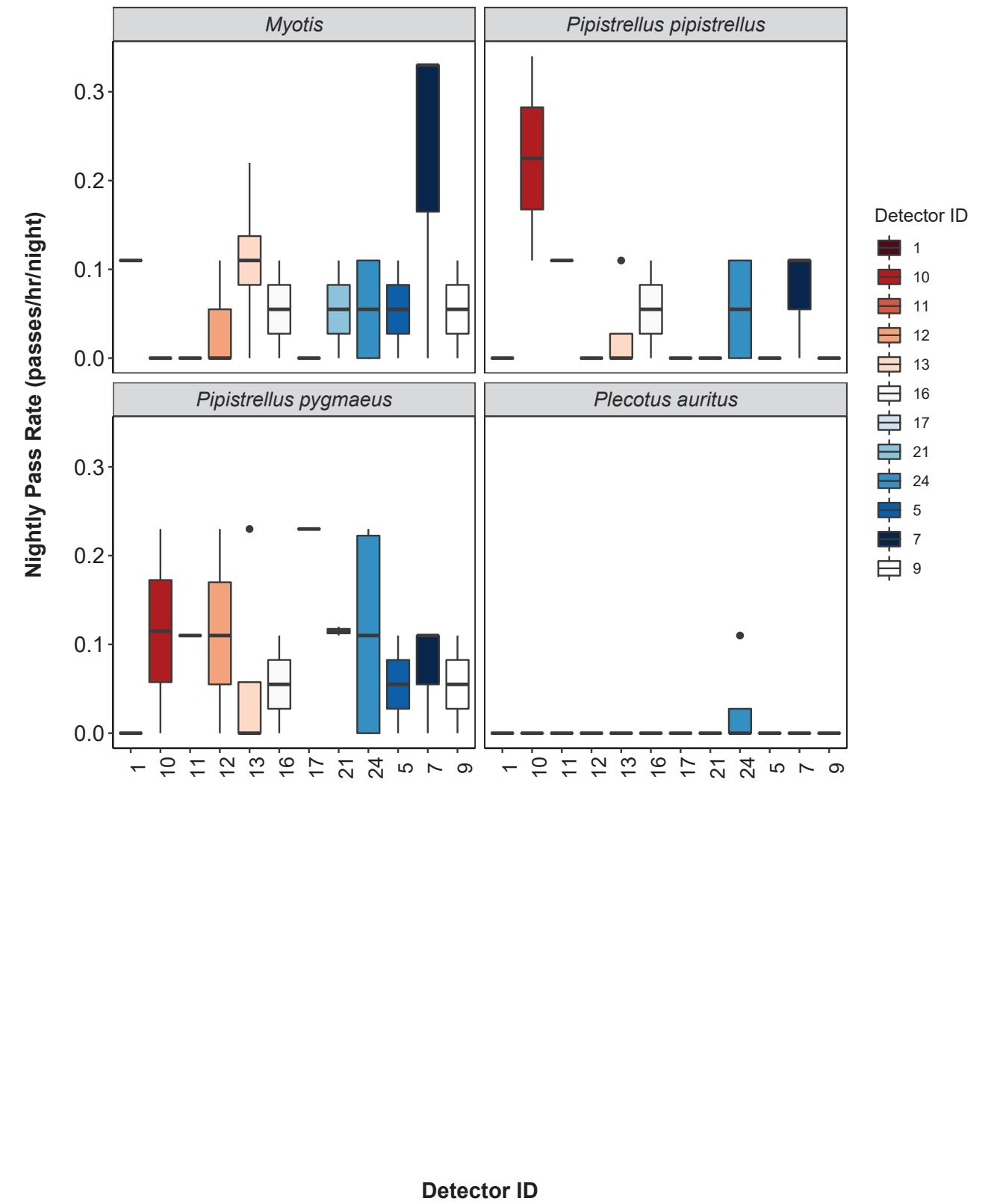
Species	Detector ID	Mean Pass Rate
Brown long-eared	1	0.0
Brown long-eared	10	0.0
Brown long-eared	11	0.0
Brown long-eared	12	0.0
Brown long-eared	13	0.0
Brown long-eared	16	0.0
Brown long-eared	17	0.0
Brown long-eared	21	0.0
Brown long-eared	24	0.0
Brown long-eared	5	0.0
Brown long-eared	7	0.0
Brown long-eared	9	0.0
Common pipistrelle	1	0.0
Common pipistrelle	10	0.2
Common pipistrelle	11	0.1
Common pipistrelle	12	0.0
Common pipistrelle	13	0.0
Common pipistrelle	16	0.1
Common pipistrelle	17	0.0
Common pipistrelle	21	0.0
Common pipistrelle	24	0.1
Common pipistrelle	5	0.0
Common pipistrelle	7	0.1
Common pipistrelle	9	0.0
Myotis	1	0.1
Myotis	10	0.0
Myotis	11	0.0
Myotis	12	0.0
Myotis	13	0.1
Myotis	16	0.1
Myotis	17	0.0
Myotis	21	0.1
Myotis	24	0.1
Myotis	5	0.1
Myotis	7	0.2
Myotis	9	0.1
Soprano pipistrelle	1	0.0
Soprano pipistrelle	10	0.1
Soprano pipistrelle	11	0.1
Soprano pipistrelle	12	0.1
Soprano pipistrelle	13	0.1
Soprano pipistrelle	16	0.1
Soprano pipistrelle	17	0.2
Soprano pipistrelle	21	0.1
Soprano pipistrelle	24	0.1
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.1

Species	Detector ID	Mean Pass Rate
Soprano pipistrelle	9	0.1

Nightly Bat Passes (Bat passes per hour)

Per Detector - Figures

Figure 16. Figures show boxplots for the number of bat passes per hour each night, for each detector. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.



Survey Effort

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

Month	Detector ID	No of Survey Nights
Apr	1	1
Apr	10	2
Apr	11	1
Apr	12	3
Apr	13	4
Apr	16	2
Apr	17	1
Apr	21	2
Apr	24	4
Apr	5	2
Apr	7	3
Apr	9	2

Nightly Bat Pass Rate for each Month

Median Per Detector

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

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

Species	Detector ID	Apr
Brown long-eared	1	0.0
Brown long-eared	10	0.0
Brown long-eared	11	0.0
Brown long-eared	12	0.0
Brown long-eared	13	0.0
Brown long-eared	16	0.0
Brown long-eared	17	0.0
Brown long-eared	21	0.0
Brown long-eared	24	0.0
Brown long-eared	5	0.0
Brown long-eared	7	0.0
Brown long-eared	9	0.0
Common pipistrelle	1	0.0
Common pipistrelle	10	0.2
Common pipistrelle	11	0.1
Common pipistrelle	12	0.0
Common pipistrelle	13	0.0
Common pipistrelle	16	0.1
Common pipistrelle	17	0.0
Common pipistrelle	21	0.0
Common pipistrelle	24	0.1
Common pipistrelle	5	0.0
Common pipistrelle	7	0.1
Common pipistrelle	9	0.0
Myotis	1	0.1
Myotis	10	0.0
Myotis	11	0.0
Myotis	12	0.0
Myotis	13	0.1
Myotis	16	0.1
Myotis	17	0.0
Myotis	21	0.1
Myotis	24	0.1
Myotis	5	0.1
Myotis	7	0.3
Myotis	9	0.1
Soprano pipistrelle	1	0.0
Soprano pipistrelle	10	0.1
Soprano pipistrelle	11	0.1
Soprano pipistrelle	12	0.1
Soprano pipistrelle	13	0.0
Soprano pipistrelle	16	0.1
Soprano pipistrelle	17	0.2
Soprano pipistrelle	21	0.1
Soprano pipistrelle	24	0.1

Species	Detector ID	Apr
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.1
Soprano pipistrelle	9	0.1

Nightly Bat Pass Rate for each Month

Mean per Detector

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

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

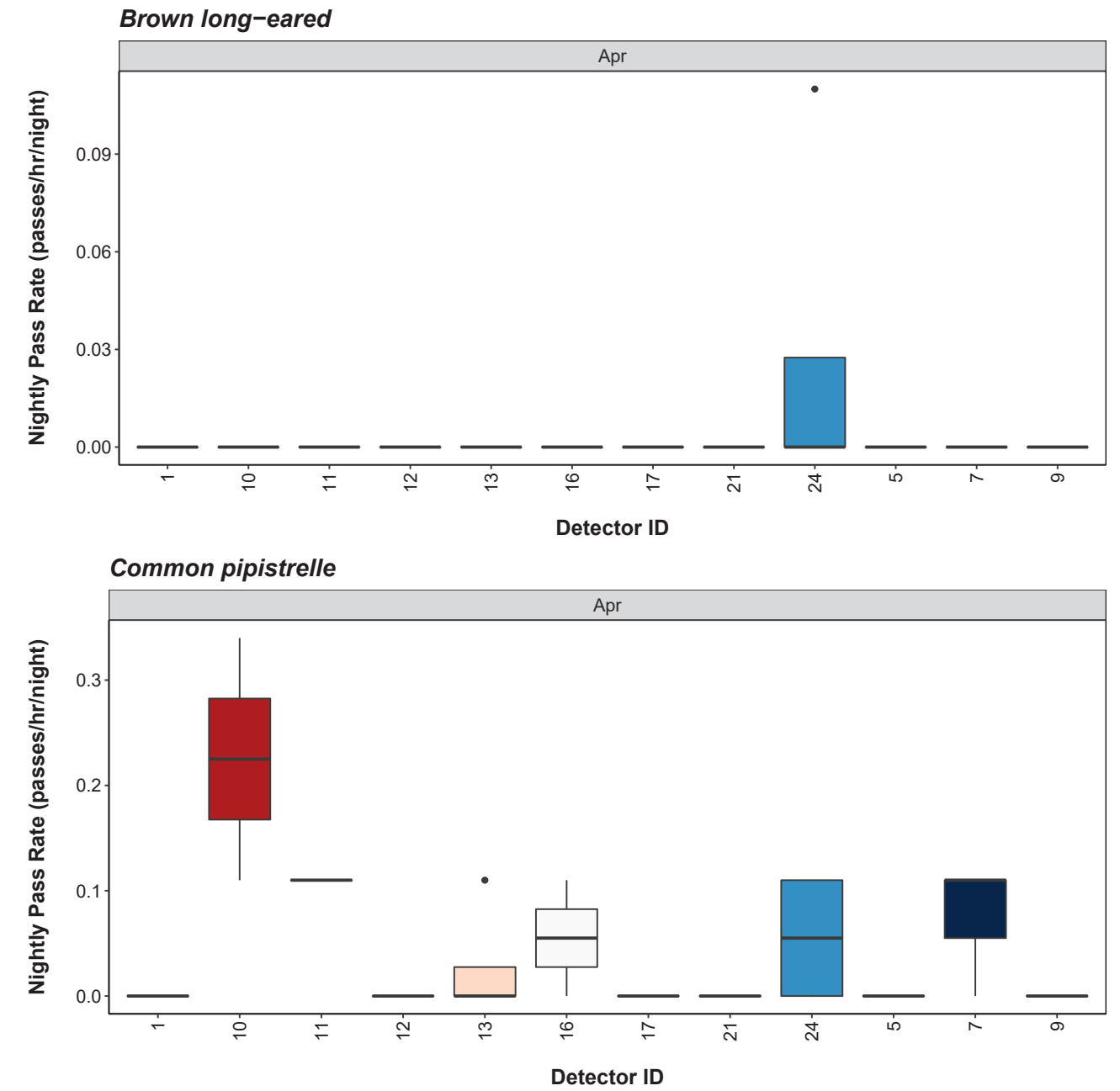
Species	Detector ID	Apr
Brown long-eared	1	0.0
Brown long-eared	10	0.0
Brown long-eared	11	0.0
Brown long-eared	12	0.0
Brown long-eared	13	0.0
Brown long-eared	16	0.0
Brown long-eared	17	0.0
Brown long-eared	21	0.0
Brown long-eared	24	0.0
Brown long-eared	5	0.0
Brown long-eared	7	0.0
Brown long-eared	9	0.0
Common pipistrelle	1	0.0
Common pipistrelle	10	0.2
Common pipistrelle	11	0.1
Common pipistrelle	12	0.0
Common pipistrelle	13	0.0
Common pipistrelle	16	0.1
Common pipistrelle	17	0.0
Common pipistrelle	21	0.0
Common pipistrelle	24	0.1
Common pipistrelle	5	0.0
Common pipistrelle	7	0.1
Common pipistrelle	9	0.0
Myotis	1	0.1
Myotis	10	0.0
Myotis	11	0.0
Myotis	12	0.0
Myotis	13	0.1
Myotis	16	0.1
Myotis	17	0.0
Myotis	21	0.1
Myotis	24	0.1
Myotis	5	0.1
Myotis	7	0.2
Myotis	9	0.1
Soprano pipistrelle	1	0.0
Soprano pipistrelle	10	0.1
Soprano pipistrelle	11	0.1
Soprano pipistrelle	12	0.1
Soprano pipistrelle	13	0.1
Soprano pipistrelle	16	0.1
Soprano pipistrelle	17	0.2
Soprano pipistrelle	21	0.1
Soprano pipistrelle	24	0.1
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.1

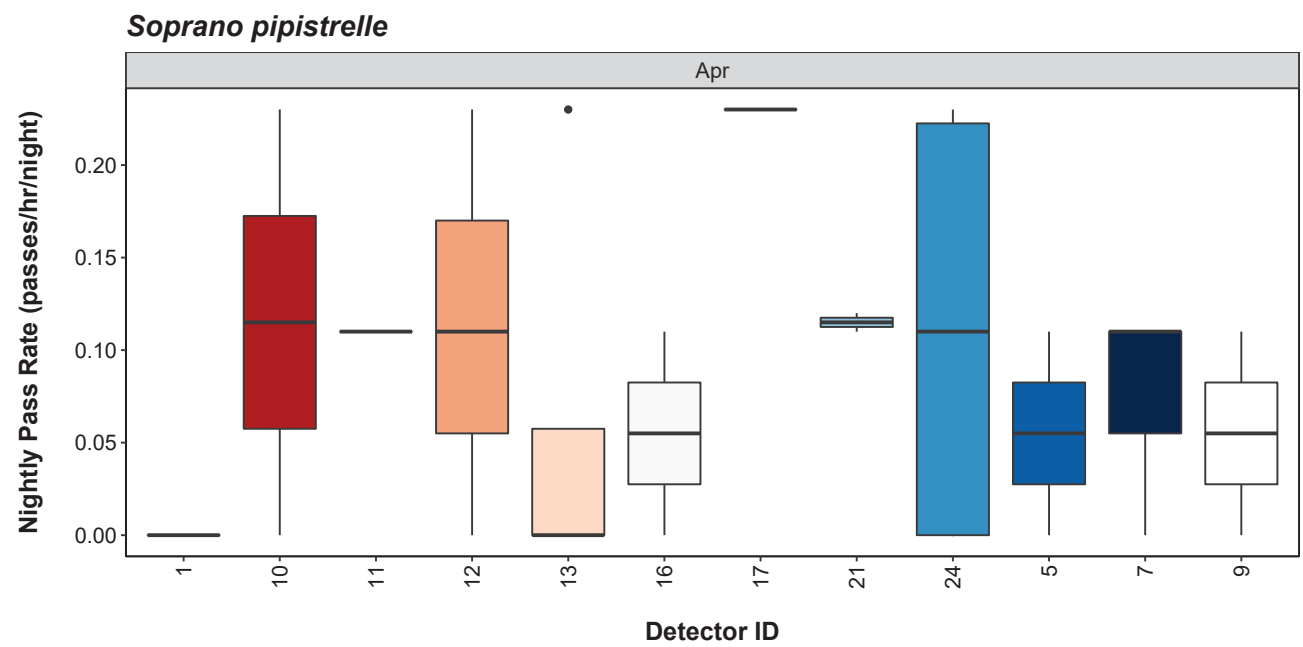
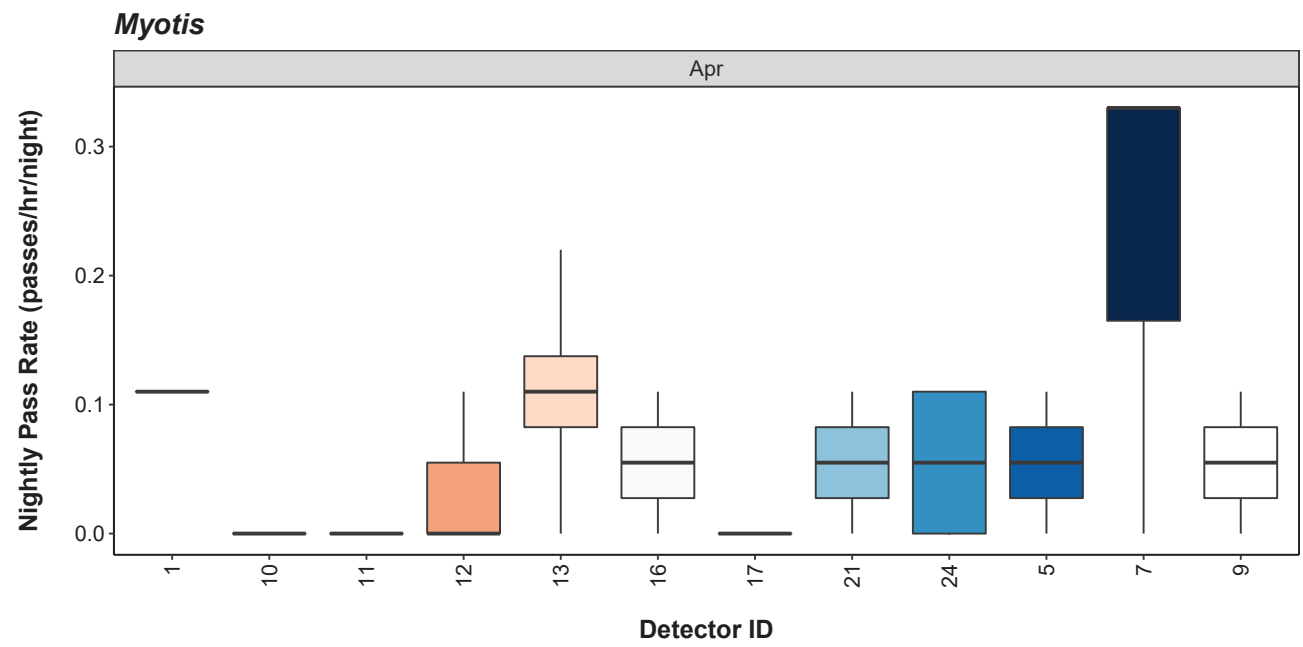
Species	Detector ID	Apr
Soprano pipistrelle	9	0.1

Nightly Bat Pass Rate for each Month

Per Detector - Figures

Figure 17. Figures show boxplots for the number of bat passes per hour by detector, for each month. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.





Bat Activity per Detector Location

Figure 18. Detector ID reference:

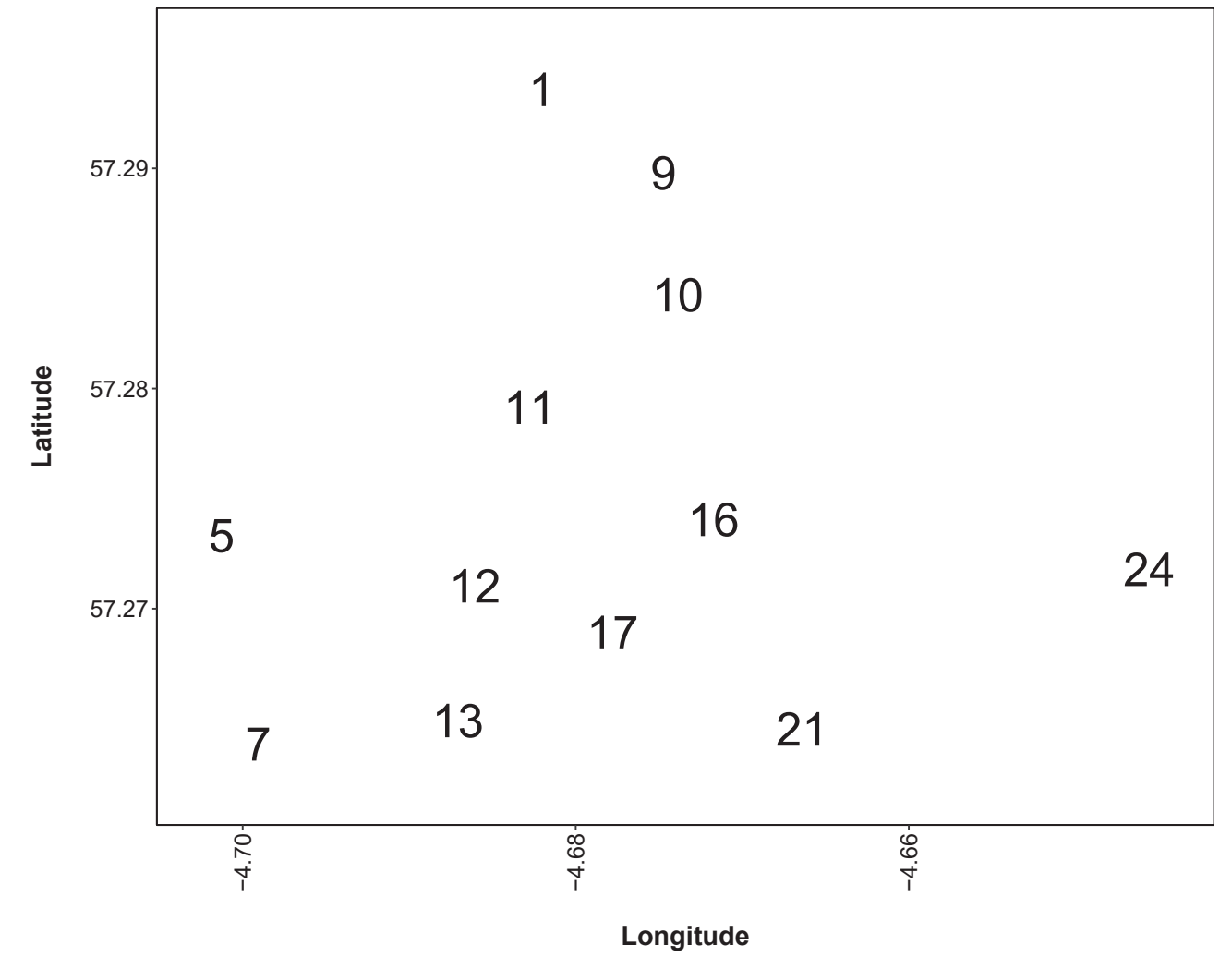


Figure 19. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

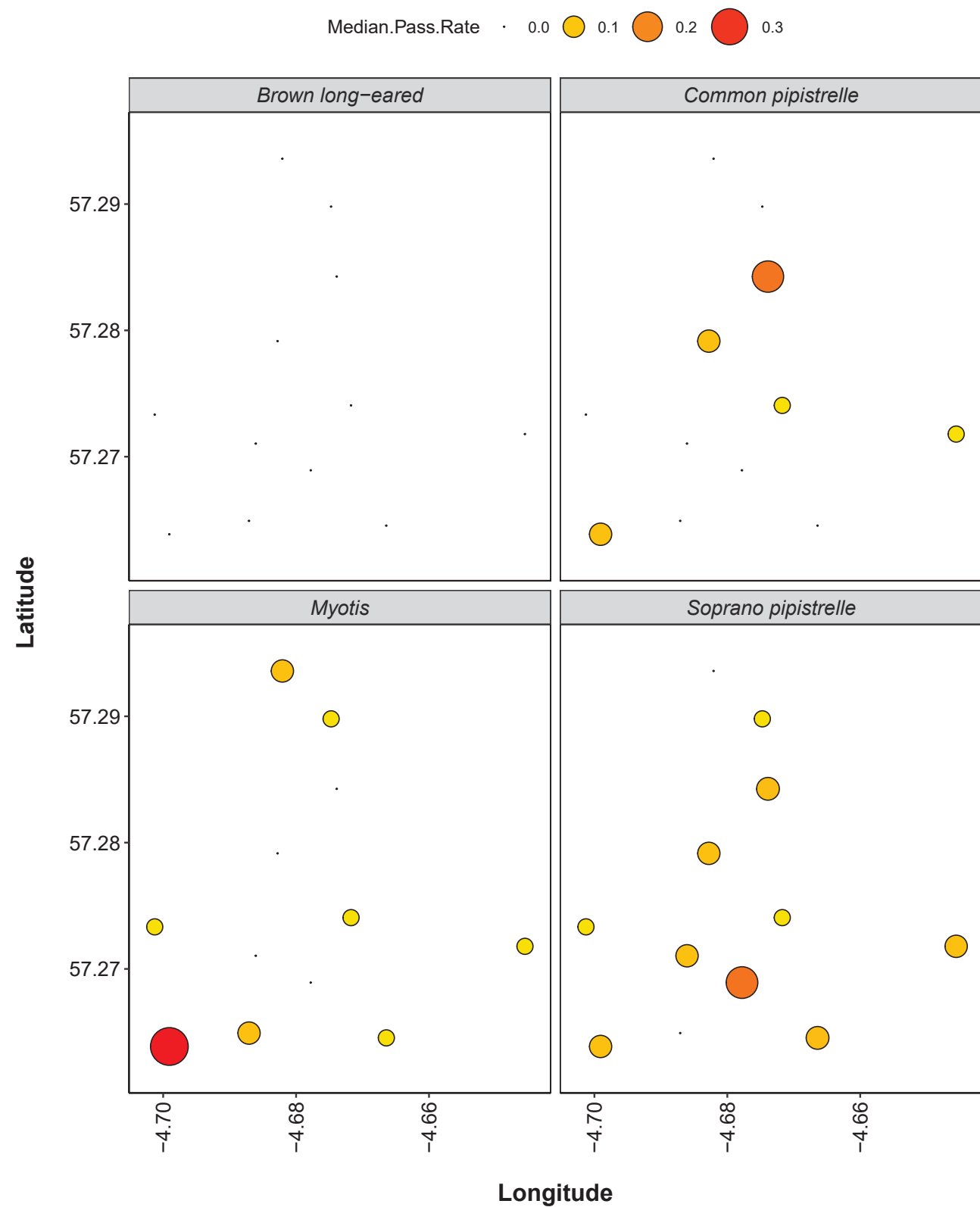
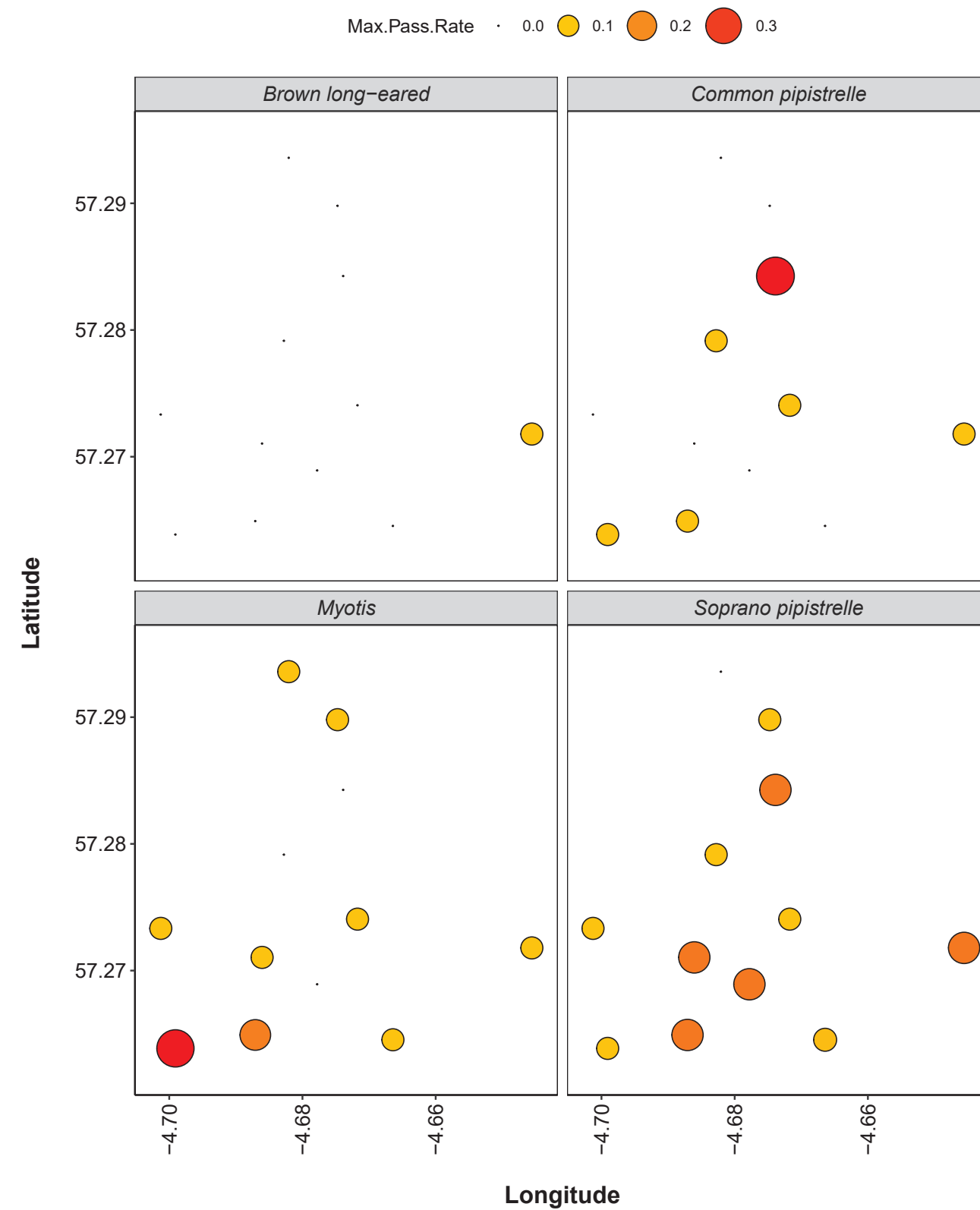


Figure 20. Maximum Nightly Pass Rate (bat passes/hr/night) recorded in a single night throughout the survey period - represented by the size and colour of the point at each detector location.



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

Bat Activity Analysis

Site Name: Loch Liath

Author: Martin Arthur

2022-09-28 13:00:41

Summary

The geographic filter was: **Region** The time filter was: +/- 1 month from survey start date

Bats were detected on **24** nights between **2020-06-17** and **2020-07-15**, using **15** static bat detectors. Throughout this period **3** species were recorded. **Table 1.** Detectors were placed at the following locations:

latlon	date	Detector ID	Latitude	Longitude
57.268009_-4.654986	25/06/2020	22	57.26801	-4.654986
57.264536_-4.666425	25/06/2020	21	57.26454	-4.666425
57.264536_-4.666425	02/07/2020	21	57.26454	-4.666425
57.274059_-4.671733	26/06/2020	16	57.27406	-4.671733
57.274059_-4.671733	02/07/2020	16	57.27406	-4.671733
57.264923_-4.687083	25/06/2020	13	57.26492	-4.687083
57.264923_-4.687083	27/06/2020	13	57.26492	-4.687083
57.264923_-4.687083	26/06/2020	13	57.26492	-4.687083
57.264923_-4.687083	20/06/2020	13	57.26492	-4.687083
57.293592_-4.682064	25/06/2020	1	57.29359	-4.682064
57.293592_-4.682064	19/06/2020	1	57.29359	-4.682064
57.293592_-4.682064	20/06/2020	1	57.29359	-4.682064
57.293592_-4.682064	27/06/2020	1	57.29359	-4.682064
57.293592_-4.682064	02/07/2020	1	57.29359	-4.682064
57.273325_-4.701266	15/07/2020	5	57.27332	-4.701266
57.273325_-4.701266	26/06/2020	5	57.27332	-4.701266
57.278776_-4.660523	12/07/2020	19	57.27878	-4.660523
57.278776_-4.660523	15/07/2020	19	57.27878	-4.660523
57.271787_-4.645561	25/06/2020	24	57.27179	-4.645561
57.271787_-4.645561	15/07/2020	24	57.27179	-4.645561
57.271787_-4.645561	02/07/2020	24	57.27179	-4.645561
57.271787_-4.645561	27/06/2020	24	57.27179	-4.645561
57.271787_-4.645561	12/07/2020	24	57.27179	-4.645561
57.263864_-4.69907	14/07/2020	7	57.26386	-4.699070
57.263864_-4.69907	02/07/2020	7	57.26386	-4.699070
57.263864_-4.69907	25/06/2020	7	57.26386	-4.699070
57.263864_-4.69907	20/06/2020	7	57.26386	-4.699070
57.263864_-4.69907	15/07/2020	7	57.26386	-4.699070
57.263864_-4.69907	03/07/2020	7	57.26386	-4.699070
57.279154_-4.682782	26/06/2020	11	57.27915	-4.682782
57.279154_-4.682782	27/06/2020	11	57.27915	-4.682782
57.2898_-4.674735	26/06/2020	9	57.28980	-4.674735
57.2898_-4.674735	25/06/2020	9	57.28980	-4.674735
57.2898_-4.674735	01/07/2020	9	57.28980	-4.674735
57.271036_-4.686061	25/06/2020	12	57.27104	-4.686061

latlon	date	Detector ID	Latitude	Longitude
57.271036_-4.686061	26/06/2020	12	57.27104	-4.686061
57.271036_-4.686061	15/07/2020	12	57.27104	-4.686061
57.283616_-4.694095	25/06/2020	3	57.28362	-4.694095
57.268915_-4.677791	10/07/2020	17	57.26891	-4.677791
57.268915_-4.677791	25/06/2020	17	57.26891	-4.677791
57.268915_-4.677791	08/07/2020	17	57.26891	-4.677791
57.284262_-4.673881	24/06/2020	10	57.28426	-4.673881
57.284262_-4.673881	25/06/2020	10	57.28426	-4.673881
57.284262_-4.673881	20/06/2020	10	57.28426	-4.673881
57.284262_-4.673881	03/07/2020	10	57.28426	-4.673881
57.284262_-4.673881	17/06/2020	10	57.28426	-4.673881
57.284262_-4.673881	08/07/2020	10	57.28426	-4.673881
57.284262_-4.673881	15/07/2020	10	57.28426	-4.673881
57.284262_-4.673881	11/07/2020	10	57.28426	-4.673881
57.284262_-4.673881	26/06/2020	10	57.28426	-4.673881
57.268009_-4.654986	02/07/2020	22	57.26801	-4.654986
57.264536_-4.666425	15/07/2020	21	57.26454	-4.666425
57.274059_-4.671733	25/06/2020	16	57.27406	-4.671733
57.274059_-4.671733	14/07/2020	16	57.27406	-4.671733
57.274059_-4.671733	24/06/2020	16	57.27406	-4.671733
57.274059_-4.671733	27/06/2020	16	57.27406	-4.671733
57.274059_-4.671733	16/07/2020	16	57.27406	-4.671733
57.264923_-4.687083	30/06/2020	13	57.26492	-4.687083
57.264923_-4.687083	24/06/2020	13	57.26492	-4.687083
57.264923_-4.687083	29/06/2020	13	57.26492	-4.687083
57.264923_-4.687083	14/07/2020	13	57.26492	-4.687083
57.293592_-4.682064	26/06/2020	1	57.29359	-4.682064
57.293592_-4.682064	03/07/2020	1	57.29359	-4.682064
57.293592_-4.682064	24/06/2020	1	57.29359	-4.682064
57.293592_-4.682064	10/07/2020	1	57.29359	-4.682064
57.293592_-4.682064	07/07/2020	1	57.29359	-4.682064
57.273325_-4.701266	14/07/2020	5	57.27332	-4.701266
57.273325_-4.701266	02/07/2020	5	57.27332	-4.701266
57.273325_-4.701266	20/06/2020	5	57.27332	-4.701266
57.273325_-4.701266	27/06/2020	5	57.27332	-4.701266
57.278776_-4.660523	25/06/2020	19	57.27878	-4.660523
57.278776_-4.660523	27/06/2020	19	57.27878	-4.660523
57.278776_-4.660523	26/06/2020	19	57.27878	-4.660523
57.278776_-4.660523	10/07/2020	19	57.27878	-4.660523
57.271787_-4.645561	16/07/2020	24	57.27179	-4.645561
57.271787_-4.645561	03/07/2020	24	57.27179	-4.645561
57.271787_-4.645561	26/06/2020	24	57.27179	-4.645561
57.271787_-4.645561	14/07/2020	24	57.27179	-4.645561
57.271787_-4.645561	21/06/2020	24	57.27179	-4.645561
57.271787_-4.645561	30/06/2020	24	57.27179	-4.645561
57.271787_-4.645561	22/06/2020	24	57.27179	-4.645561
57.271787_-4.645561	20/06/2020	24	57.27179	-4.645561
57.271787_-4.645561	19/06/2020	24	57.27179	-4.645561
57.263864_-4.69907	26/06/2020	7	57.26386	-4.699070
57.263864_-4.69907	27/06/2020	7	57.26386	-4.699070
57.279154_-4.682782	25/06/2020	11	57.27915	-4.682782
57.279154_-4.682782	20/06/2020	11	57.27915	-4.682782
57.279154_-4.682782	02/07/2020	11	57.27915	-4.682782
57.2898_-4.674735	27/06/2020	9	57.28980	-4.674735
57.2898_-4.674735	20/06/2020	9	57.28980	-4.674735
57.2898_-4.674735	19/06/2020	9	57.28980	-4.674735
57.2898_-4.674735	28/06/2020	9	57.28980	-4.674735

latlon	date	Detector ID	Latitude	Longitude
57.2898_-4.674735	02/07/2020	9	57.28980	-4.674735
57.2898_-4.674735	21/06/2020	9	57.28980	-4.674735
57.271036_-4.686061	29/06/2020	12	57.27104	-4.686061
57.271036_-4.686061	30/06/2020	12	57.27104	-4.686061
57.271036_-4.686061	09/07/2020	12	57.27104	-4.686061
57.271036_-4.686061	20/06/2020	12	57.27104	-4.686061
57.271036_-4.686061	27/06/2020	12	57.27104	-4.686061
57.271036_-4.686061	06/07/2020	12	57.27104	-4.686061
57.271036_-4.686061	10/07/2020	12	57.27104	-4.686061
57.268915_-4.677791	29/06/2020	17	57.26891	-4.677791
57.268915_-4.677791	27/06/2020	17	57.26891	-4.677791
57.268915_-4.677791	14/07/2020	17	57.26891	-4.677791
57.268915_-4.677791	26/06/2020	17	57.26891	-4.677791
57.268915_-4.677791	20/06/2020	17	57.26891	-4.677791
57.268915_-4.677791	09/07/2020	17	57.26891	-4.677791
57.284262_-4.673881	18/06/2020	10	57.28426	-4.673881
57.284262_-4.673881	19/06/2020	10	57.28426	-4.673881
57.284262_-4.673881	02/07/2020	10	57.28426	-4.673881
57.284262_-4.673881	01/07/2020	10	57.28426	-4.673881
57.284262_-4.673881	14/07/2020	10	57.28426	-4.673881
57.284262_-4.673881	30/06/2020	10	57.28426	-4.673881
57.284262_-4.673881	27/06/2020	10	57.28426	-4.673881
57.264923_-4.687083	03/07/2020	13	57.26492	-4.687083
57.271036_-4.686061	07/07/2020	12	57.27104	-4.686061
57.271036_-4.686061	04/07/2020	12	57.27104	-4.686061
57.268915_-4.677791	13/07/2020	17	57.26891	-4.677791
57.268915_-4.677791	11/07/2020	17	57.26891	-4.677791

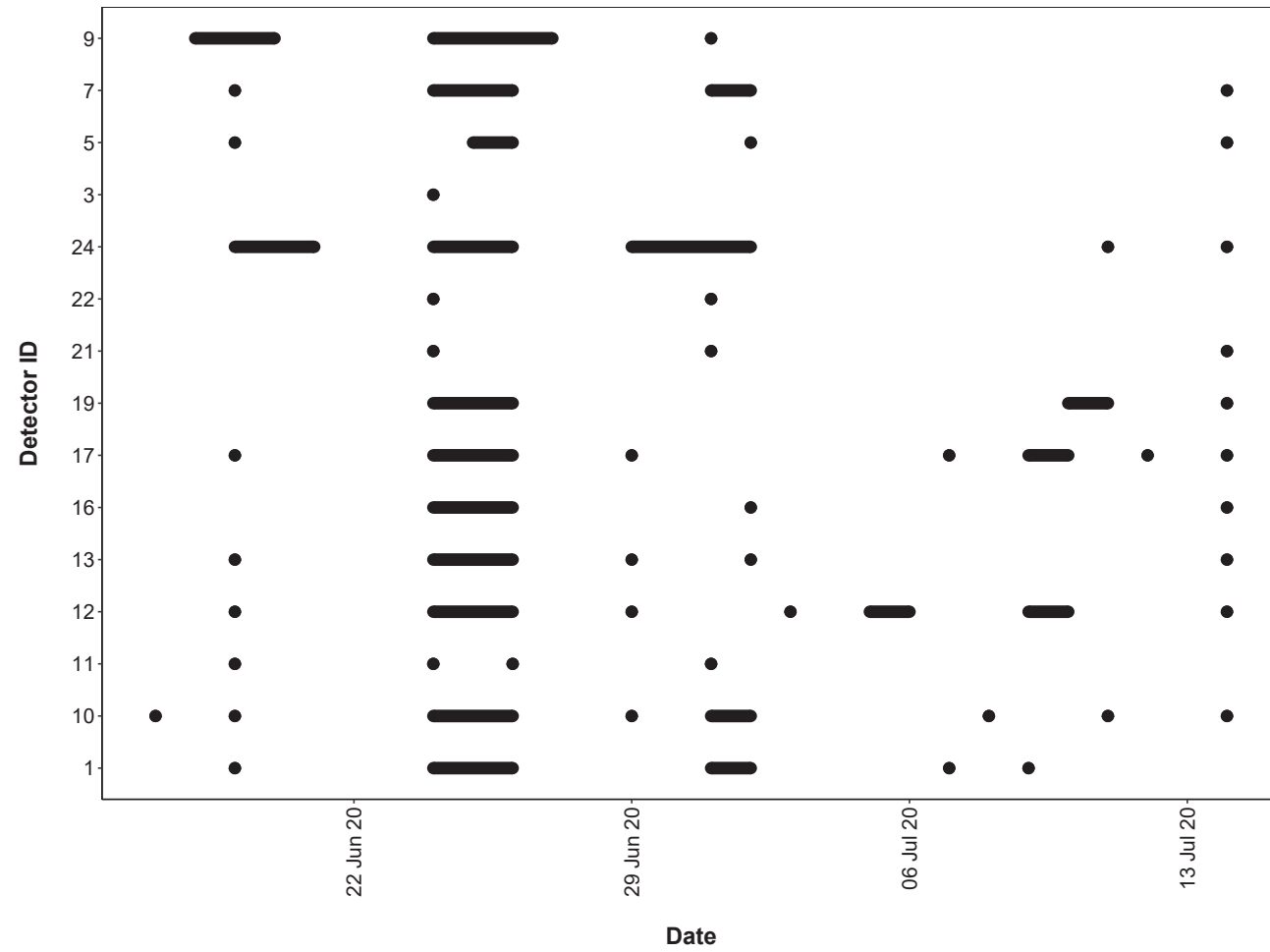
Survey Nights

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
1	8
10	11
11	4
12	11
13	7
16	6
17	10
19	6
21	3
22	2
24	13
3	1
5	5
7	7
9	8

Survey Nights

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



PART 1: Percentiles Analysis

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

The reference range dataset was stratified to include:

PER DETECTOR

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

Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
1	<i>Pipistrellus pipistrellus</i>	0	1	0	3	0
1	<i>Pipistrellus pygmaeus</i>	0	0	0	0	4
10	<i>Myotis</i>	0	0	0	3	0
10	<i>Pipistrellus pipistrellus</i>	0	0	0	8	0
10	<i>Pipistrellus pygmaeus</i>	0	0	0	1	6
11	<i>Pipistrellus pipistrellus</i>	0	0	0	1	0
11	<i>Pipistrellus pygmaeus</i>	0	0	0	0	3
12	<i>Myotis</i>	0	2	0	4	0
12	<i>Pipistrellus pipistrellus</i>	0	0	1	2	0
12	<i>Pipistrellus pygmaeus</i>	0	0	0	0	3
13	<i>Myotis</i>	0	0	0	2	0
13	<i>Pipistrellus pipistrellus</i>	0	0	2	2	0
13	<i>Pipistrellus pygmaeus</i>	0	0	1	0	2
16	<i>Pipistrellus pipistrellus</i>	0	0	0	2	0
16	<i>Pipistrellus pygmaeus</i>	0	0	0	0	0
17	<i>Myotis</i>	0	0	0	2	0
17	<i>Pipistrellus pipistrellus</i>	0	0	1	2	0
17	<i>Pipistrellus pygmaeus</i>	0	0	0	0	3
19	<i>Pipistrellus pipistrellus</i>	0	0	0	2	0
19	<i>Pipistrellus pygmaeus</i>	0	0	0	0	1
21	<i>Pipistrellus pipistrellus</i>	0	1	0	1	0
21	<i>Pipistrellus pygmaeus</i>	0	0	0	0	1
22	<i>Pipistrellus pipistrellus</i>	0	0	0	1	0
22	<i>Pipistrellus pygmaeus</i>	0	0	0	0	0
24	<i>Myotis</i>	2	2	0	2	0
24	<i>Pipistrellus pipistrellus</i>	1	1	0	3	0
24	<i>Pipistrellus pygmaeus</i>	1	0	1	6	4
3	<i>Pipistrellus pipistrellus</i>	0	0	1	0	0

Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
5	<i>Pipistrellus pipistrellus</i>	0	0	0	2	0
5	<i>Pipistrellus pygmaeus</i>	0	0	0	0	1
7	<i>Myotis</i>	0	0	0	5	0
7	<i>Pipistrellus pipistrellus</i>	0	0	0	4	0
7	<i>Pipistrellus pygmaeus</i>	0	0	0	0	3
9	<i>Myotis</i>	0	0	0	1	0
9	<i>Pipistrellus pipistrellus</i>	0	0	0	3	0
9	<i>Pipistrellus pygmaeus</i>	0	0	0	1	5

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
1	<i>Pipistrellus pipistrellus</i>	42	42 - 42	82	4	84
1	<i>Pipistrellus pygmaeus</i>	21	13 - 32	36	8	381
10	<i>Myotis</i>	57	57 - 57	57	3	33
10	<i>Pipistrellus pipistrellus</i>	42	42 - 48	54	8	84
10	<i>Pipistrellus pygmaeus</i>	28	16.5 - 36	49	9	381
11	<i>Pipistrellus pipistrellus</i>	42	0	42	1	84
11	<i>Pipistrellus pygmaeus</i>	20	20 - 20	20	4	381
12	<i>Myotis</i>	57	57 - 69	81	6	33
12	<i>Pipistrellus pipistrellus</i>	42	42 - 42	72	3	84
12	<i>Pipistrellus pygmaeus</i>	13	13 - 24.5	36	7	381
13	<i>Myotis</i>	57	57 - 57	57	2	33
13	<i>Pipistrellus pipistrellus</i>	57	42 - 72	72	4	84
13	<i>Pipistrellus pygmaeus</i>	28	13 - 47	66	5	381
16	<i>Pipistrellus pipistrellus</i>	42	42 - 42	42	2	84
16	<i>Pipistrellus pygmaeus</i>	13	13 - 13	13	5	381
17	<i>Myotis</i>	57	57 - 57	57	2	33
17	<i>Pipistrellus pipistrellus</i>	42	42 - 42	72	3	84
17	<i>Pipistrellus pygmaeus</i>	13	13 - 20.5	28	7	381
19	<i>Pipistrellus pipistrellus</i>	42	42 - 42	42	2	84
19	<i>Pipistrellus pygmaeus</i>	13	13 - 13	28	4	381
21	<i>Pipistrellus pipistrellus</i>	65	65 - 65	88	2	84
21	<i>Pipistrellus pygmaeus</i>	21	20.5 - 20.5	28	2	381
22	<i>Pipistrellus pipistrellus</i>	42	0	42	1	84
22	<i>Pipistrellus pygmaeus</i>	13	0	13	1	381
24	<i>Myotis</i>	81	57 - 100	100	6	33
24	<i>Pipistrellus pipistrellus</i>	54	42 - 82	100	5	84
24	<i>Pipistrellus pygmaeus</i>	40	30 - 60	100	13	381
3	<i>Pipistrellus pipistrellus</i>	72	0	72	1	84
5	<i>Pipistrellus pipistrellus</i>	48	48 - 48	54	2	84
5	<i>Pipistrellus pygmaeus</i>	13	13 - 13	20	4	381
7	<i>Myotis</i>	57	57 - 57	57	5	33
7	<i>Pipistrellus pipistrellus</i>	42	42 - 42	54	4	84
7	<i>Pipistrellus pygmaeus</i>	20	16.5 - 24	28	4	381
9	<i>Myotis</i>	57	0	57	1	33
9	<i>Pipistrellus pipistrellus</i>	42	42 - 42	42	3	84
9	<i>Pipistrellus pygmaeus</i>	20	16.5 - 30.5	41	8	381

Figures

Figure 2. The recorded activity of bats during the survey. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)

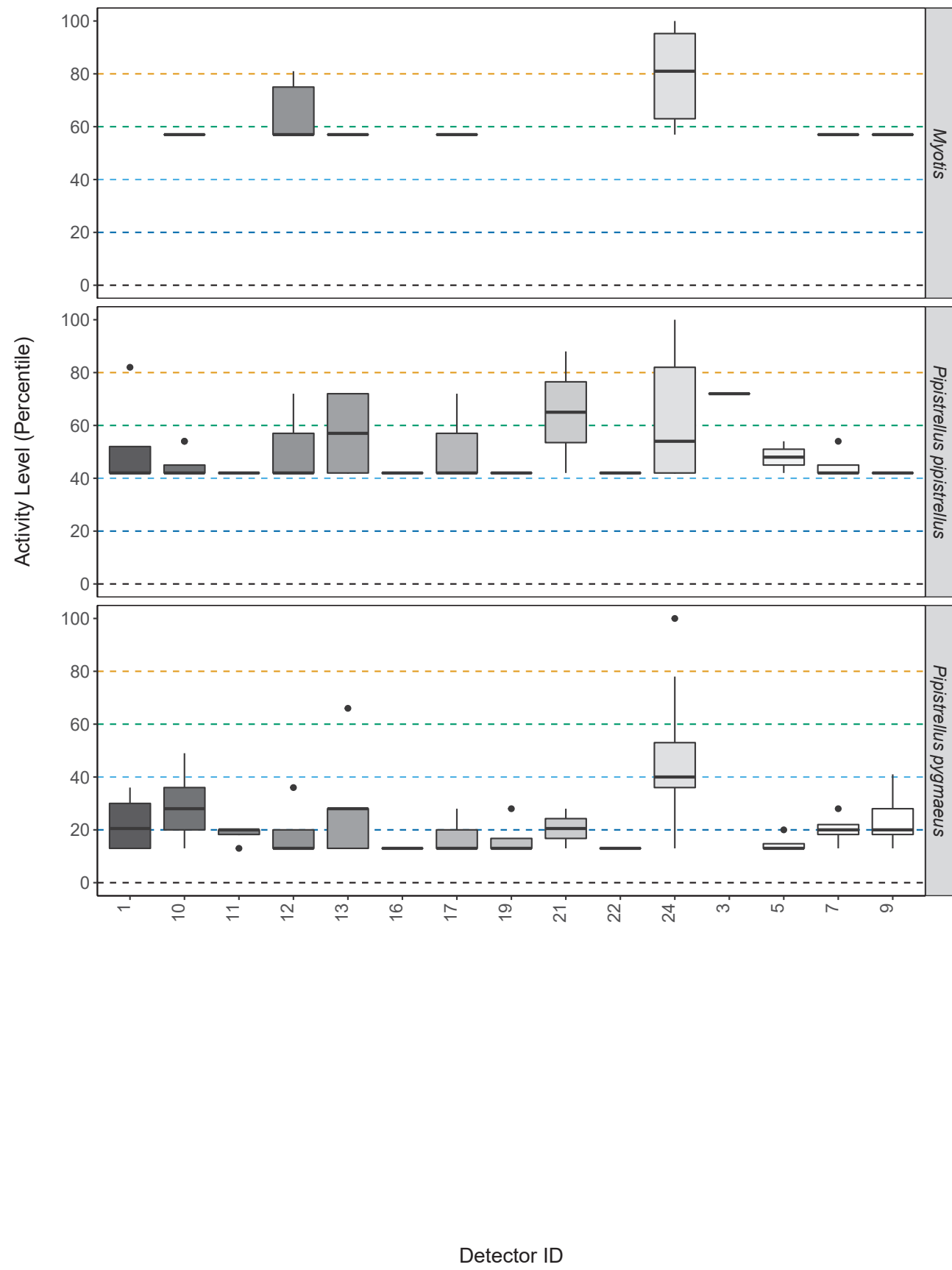
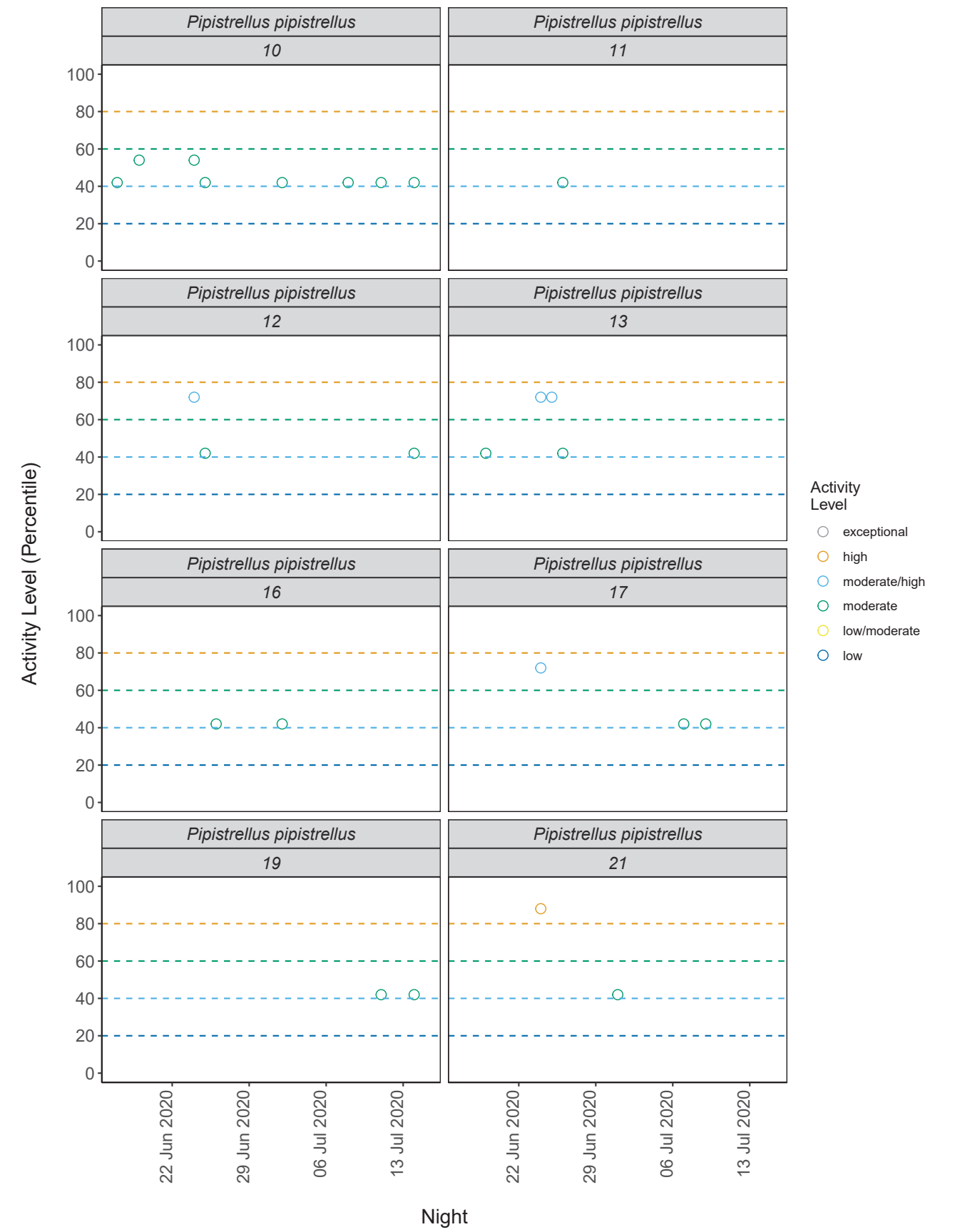
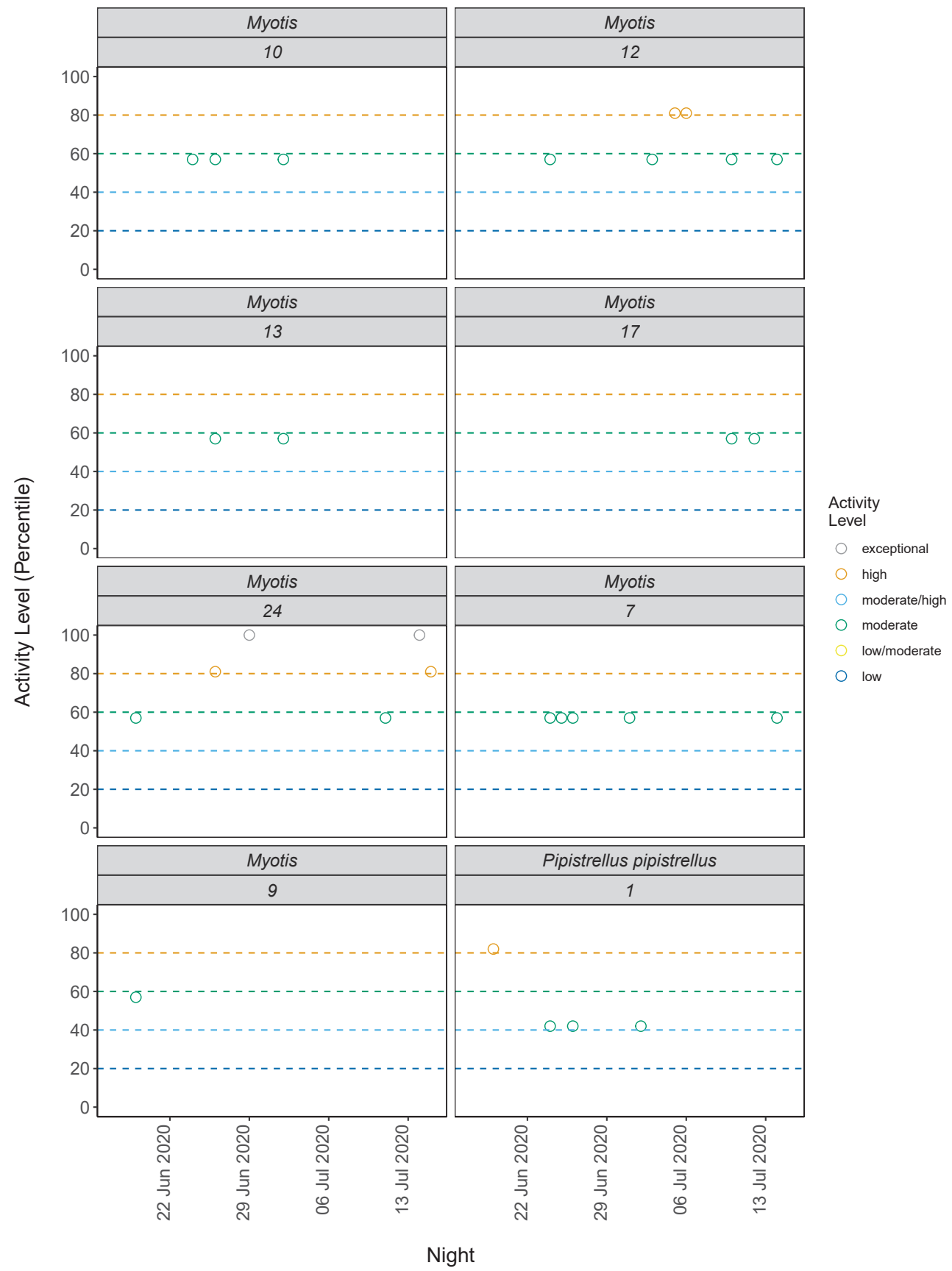
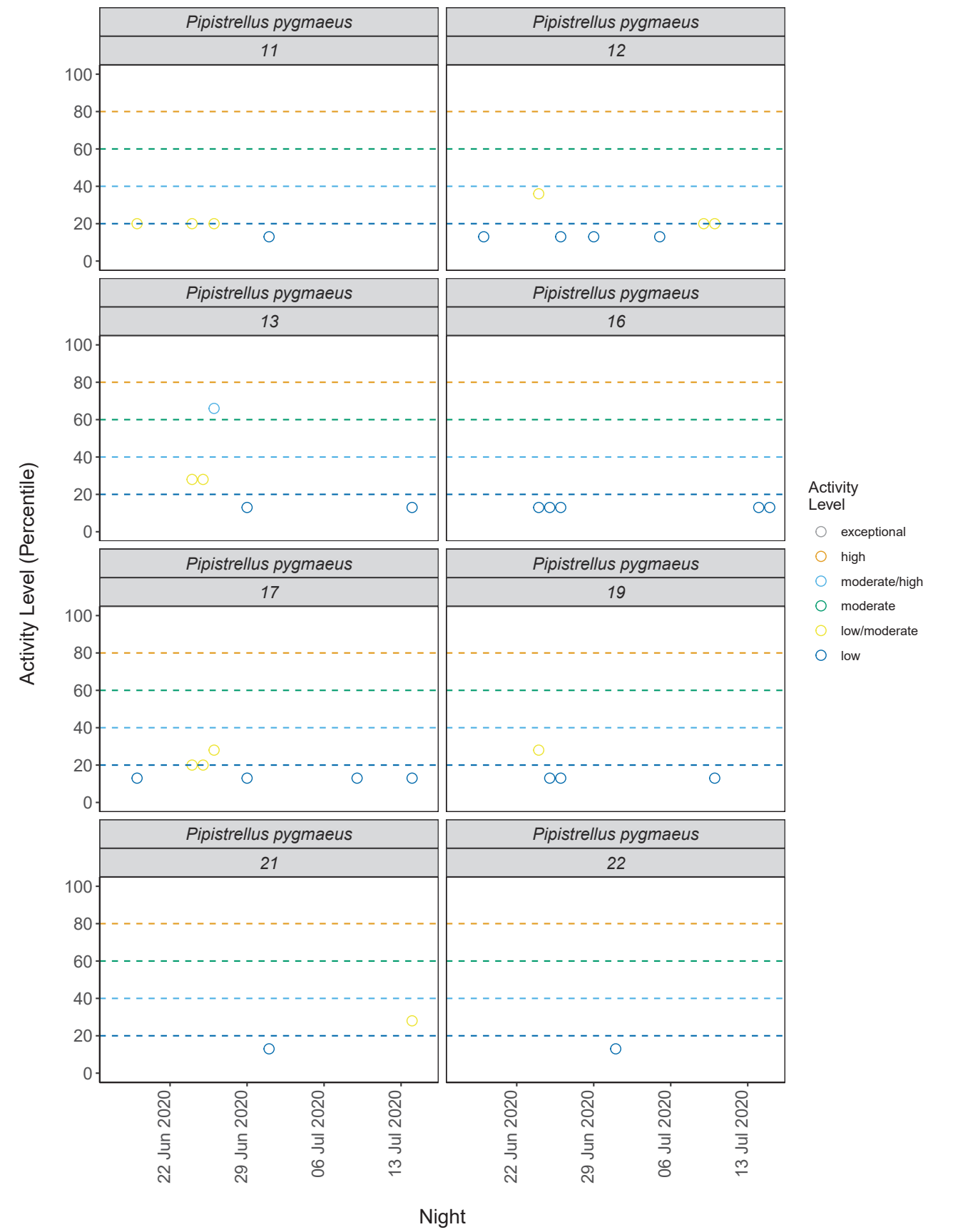
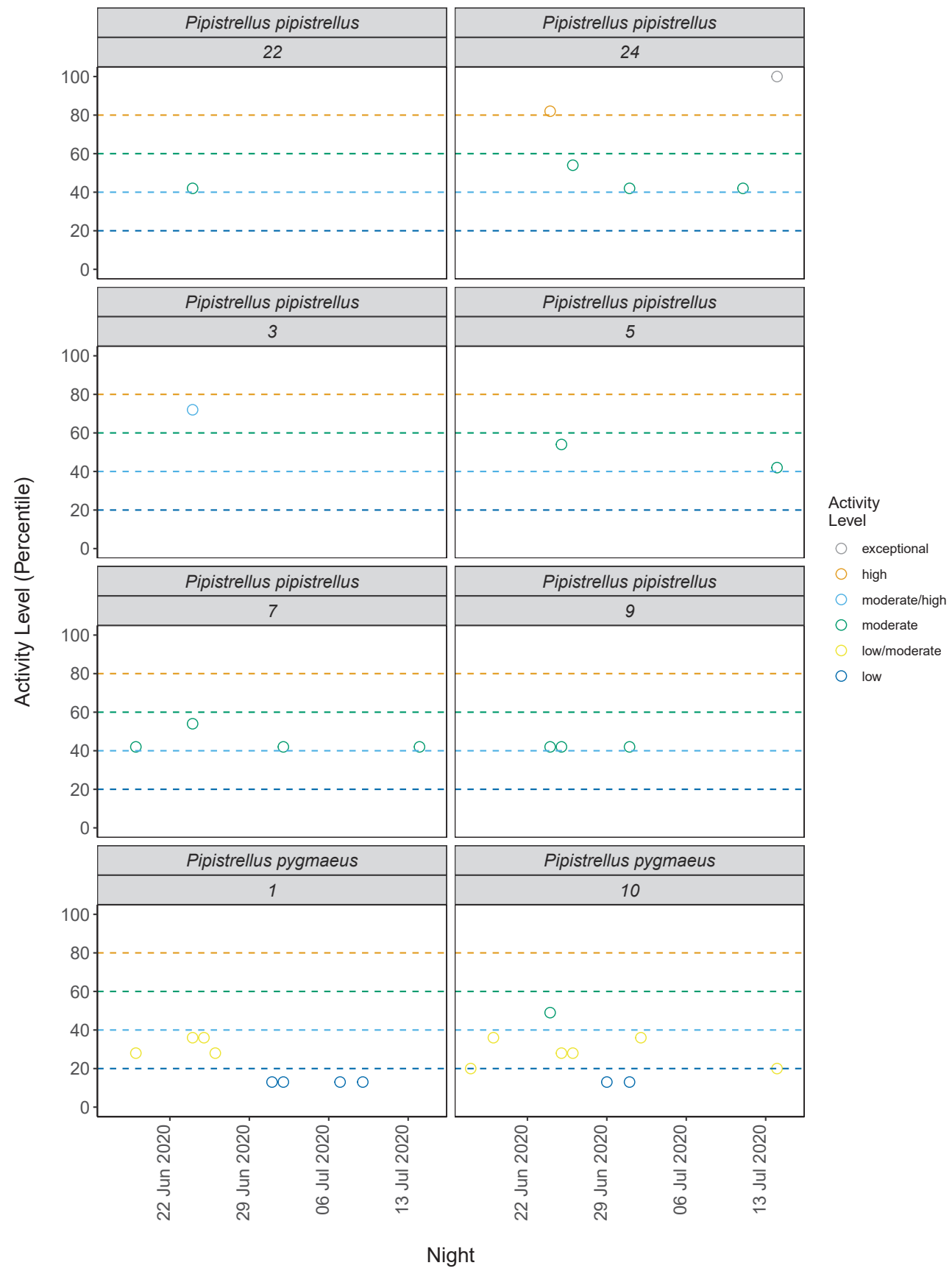
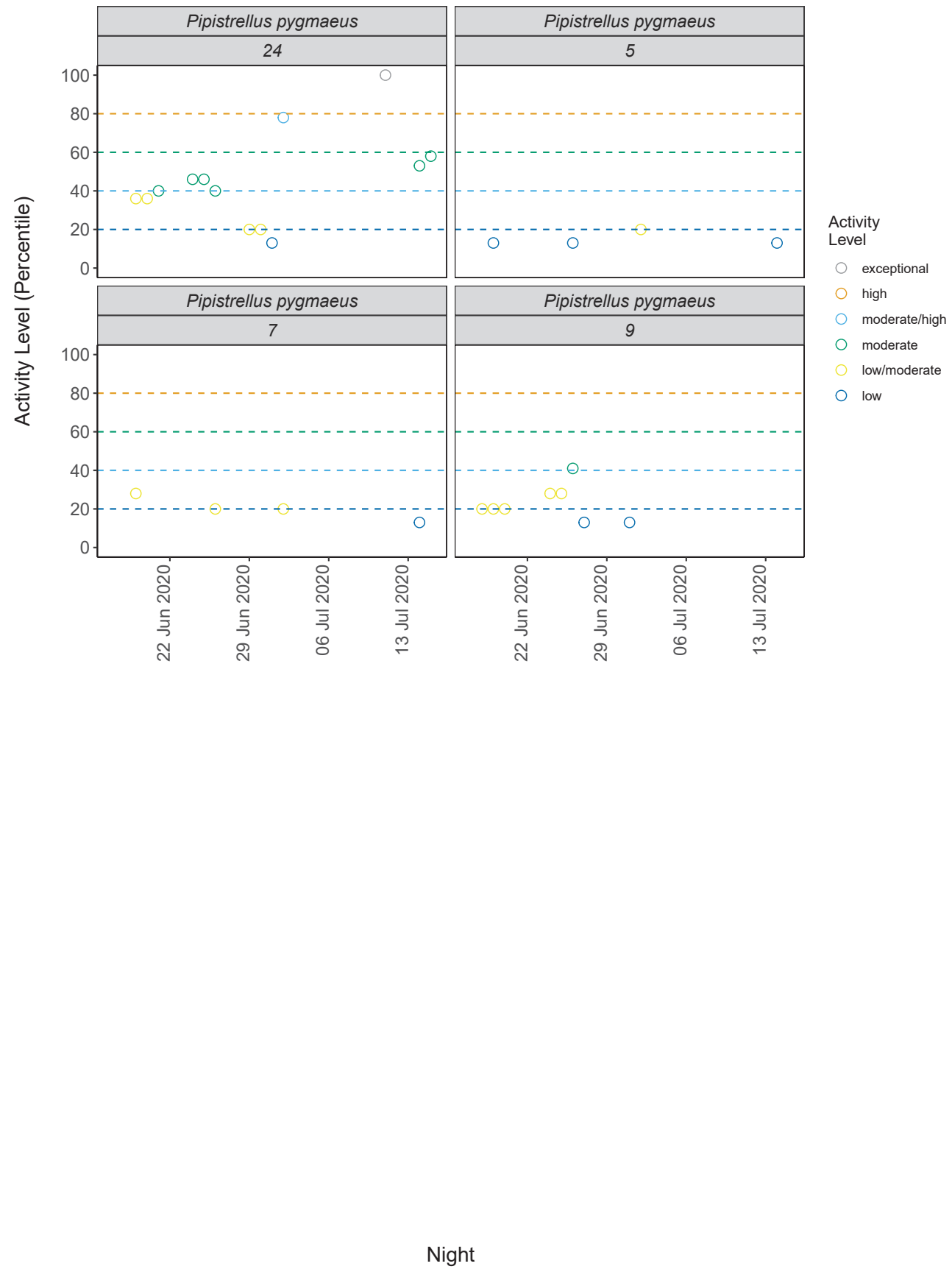


Figure 3. The activity level (percentile) of bats recorded across each night of the bat survey.







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
1	<i>Pipistrellus pipistrellus</i>	Jun	0	1	0	2	0	0
1	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	1	0	0
1	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	0	4	0
1	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	0	4
10	<i>Myotis</i>	Jun	0	0	0	2	0	0
10	<i>Myotis</i>	Jul	0	0	0	1	0	0
10	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	4	0	0
10	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	4	0	0
10	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	1	4	1
10	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	2	1
11	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	1	0	0
11	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	0	3	0
11	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	0	1
12	<i>Myotis</i>	Jun	0	0	0	1	0	0
12	<i>Myotis</i>	Jul	0	2	0	3	0	0
12	<i>Pipistrellus pipistrellus</i>	Jun	0	0	1	1	0	0
12	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	1	0	0
12	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	0	1	3
12	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	2	1
13	<i>Myotis</i>	Jun	0	0	0	1	0	0
13	<i>Myotis</i>	Jul	0	0	0	1	0	0
13	<i>Pipistrellus pipistrellus</i>	Jun	0	0	2	2	0	0
13	<i>Pipistrellus pygmaeus</i>	Jun	0	0	1	0	2	1
13	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	0	1
16	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	1	0	0
16	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	1	0	0
16	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	0	0	3
16	<i>Pipistrellus pygmaeus</i>	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
17	<i>Myotis</i>	Jul	0	0	0	2	0	0
17	<i>Pipistrellus pipistrellus</i>	Jun	0	0	1	0	0	0
17	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	2	0	0
17	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	0	3	2
17	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	0	2
19	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	2	0	0
19	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	0	1	2
19	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	0	1
21	<i>Pipistrellus pipistrellus</i>	Jun	0	1	0	0	0	0
21	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	1	0	0
21	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	1	1
22	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	1	0	0
22	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	0	1
24	<i>Myotis</i>	Jun	1	1	0	1	0	0
24	<i>Myotis</i>	Jul	1	1	0	1	0	0
24	<i>Pipistrellus pipistrellus</i>	Jun	0	1	0	1	0	0
24	<i>Pipistrellus pipistrellus</i>	Jul	1	0	0	2	0	0
24	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	4	4	0
24	<i>Pipistrellus pygmaeus</i>	Jul	1	0	1	2	0	1
3	<i>Pipistrellus pipistrellus</i>	Jun	0	0	1	0	0	0
5	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	1	0	0
5	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	1	0	0
5	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	0	0	2
5	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	1	1
7	<i>Myotis</i>	Jun	0	0	0	3	0	0
7	<i>Myotis</i>	Jul	0	0	0	2	0	0
7	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	2	0	0
7	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	2	0	0
7	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	0	2	0
7	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	1	1

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
9	<i>Myotis</i>	Jun	0	0	0	1	0	0
9	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	2	0	0
9	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	1	0	0
9	<i>Pipistrellus pygmaeus</i>	Jun	0	0	0	1	5	1
9	<i>Pipistrellus pygmaeus</i>	Jul	0	0	0	0	0	1

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

Detector ID	Species/Species Group	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded
1	<i>Pipistrellus pipistrellus</i>	Jun	42	42 - 42	82	3
1	<i>Pipistrellus pipistrellus</i>	Jul	42	42 - 42	42	1
1	<i>Pipistrellus pygmaeus</i>	Jun	32	13 - 32	36	4
1	<i>Pipistrellus pygmaeus</i>	Jul	13	13 - 32	13	4
10	<i>Myotis</i>	Jun	57	57 - 57	57	2
10	<i>Myotis</i>	Jul	57	57 - 57	57	1
10	<i>Pipistrellus pipistrellus</i>	Jun	48	42 - 48	54	4
10	<i>Pipistrellus pipistrellus</i>	Jul	42	42 - 48	42	4
10	<i>Pipistrellus pygmaeus</i>	Jun	28	16.5 - 36	49	6
10	<i>Pipistrellus pygmaeus</i>	Jul	20	16.5 - 36	36	3
11	<i>Pipistrellus pipistrellus</i>	Jun	42	0	42	1
11	<i>Pipistrellus pygmaeus</i>	Jun	20	20 - 20	20	3
11	<i>Pipistrellus pygmaeus</i>	Jul	13	20 - 20	13	1
12	<i>Myotis</i>	Jun	57	57 - 69	57	1
12	<i>Myotis</i>	Jul	57	57 - 69	81	5
12	<i>Pipistrellus pipistrellus</i>	Jun	57	42 - 42	72	2
12	<i>Pipistrellus pipistrellus</i>	Jul	42	42 - 42	42	1
12	<i>Pipistrellus pygmaeus</i>	Jun	13	13 - 24.5	36	4
12	<i>Pipistrellus pygmaeus</i>	Jul	20	13 - 24.5	20	3
13	<i>Myotis</i>	Jun	57	57 - 57	57	1
13	<i>Myotis</i>	Jul	57	57 - 57	57	1
13	<i>Pipistrellus pipistrellus</i>	Jun	57	42 - 72	72	4
13	<i>Pipistrellus pygmaeus</i>	Jun	28	13 - 47	66	4
13	<i>Pipistrellus pygmaeus</i>	Jul	13	13 - 47	13	1
16	<i>Pipistrellus pipistrellus</i>	Jun	42	42 - 42	42	1
16	<i>Pipistrellus pipistrellus</i>	Jul	42	42 - 42	42	1
16	<i>Pipistrellus pygmaeus</i>	Jun	13	13 - 13	13	3
16	<i>Pipistrellus pygmaeus</i>	Jul	13	13 - 13	13	2
17	<i>Myotis</i>	Jul	57	57 - 57	57	2
17	<i>Pipistrellus pipistrellus</i>	Jun	72	42 - 42	72	1
17	<i>Pipistrellus pipistrellus</i>	Jul	42	42 - 42	42	2
17	<i>Pipistrellus pygmaeus</i>	Jun	20	13 - 20.5	28	5
17	<i>Pipistrellus pygmaeus</i>	Jul	13	13 - 20.5	13	2
19	<i>Pipistrellus pipistrellus</i>	Jul	42	42 - 42	42	2
19	<i>Pipistrellus pygmaeus</i>	Jun	13	13 - 13	28	3
19	<i>Pipistrellus pygmaeus</i>	Jul	13	13 - 13	13	1
21	<i>Pipistrellus pipistrellus</i>	Jun	88	65 - 65	88	1
21	<i>Pipistrellus pipistrellus</i>	Jul	42	65 - 65	42	1
21	<i>Pipistrellus pygmaeus</i>	Jul	21	20.5 - 20.5	28	2
22	<i>Pipistrellus pipistrellus</i>	Jun	42	0	42	1
22	<i>Pipistrellus pygmaeus</i>	Jul	13	0	13	1
24	<i>Myotis</i>	Jun	81	57 - 100	100	3
24	<i>Myotis</i>	Jul	81	57 - 100	100	3
24	<i>Pipistrellus pipistrellus</i>	Jun	68	42 - 82	82	2
24	<i>Pipistrellus pipistrellus</i>	Jul	42	42 - 82	100	3
24	<i>Pipistrellus pygmaeus</i>	Jun	38	30 - 60	46	8
24	<i>Pipistrellus pygmaeus</i>	Jul	58	30 - 60	100	5
3	<i>Pipistrellus pipistrellus</i>	Jun	72	0	72	1
5	<i>Pipistrellus pipistrellus</i>	Jun	54	48 - 48	54	1
5	<i>Pipistrellus pipistrellus</i>	Jul	42	48 - 48	42	1
5	<i>Pipistrellus pygmaeus</i>	Jun	13	13 - 13	13	2
5	<i>Pipistrellus pygmaeus</i>	Jul	17	13 - 13	20	2
7	<i>Myotis</i>	Jun	57	57 - 57	57	3

Detector ID	Species/Species Group	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded
7	<i>Myotis</i>	Jul	57	57 - 57	57	2
7	<i>Pipistrellus pipistrellus</i>	Jun	48	42 - 42	54	2
7	<i>Pipistrellus pipistrellus</i>	Jul	42	42 - 42	42	2
7	<i>Pipistrellus pygmaeus</i>	Jun	24	16.5 - 24	28	2
7	<i>Pipistrellus pygmaeus</i>	Jul	17	16.5 - 24	20	2
9	<i>Myotis</i>	Jun	57	0	57	1
9	<i>Pipistrellus pipistrellus</i>	Jun	42	42 - 42	42	2
9	<i>Pipistrellus pipistrellus</i>	Jul	42	42 - 42	42	1
9	<i>Pipistrellus pygmaeus</i>	Jun	20	16.5 - 30.5	41	7
9	<i>Pipistrellus pygmaeus</i>	Jul	13	16.5 - 30.5	13	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
<i>Myotis</i>	2	4	0	19	0	0
<i>Pipistrellus pipistrellus</i>	1	3	5	36	0	0
<i>Pipistrellus pygmaeus</i>	1	0	2	8	36	34

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

Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded
<i>Myotis</i>	57	57 - 69	100	25
<i>Pipistrellus pipistrellus</i>	42	65 - 65	100	45
<i>Pipistrellus pygmaeus</i>	20	30 - 60	100	81

Figures

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

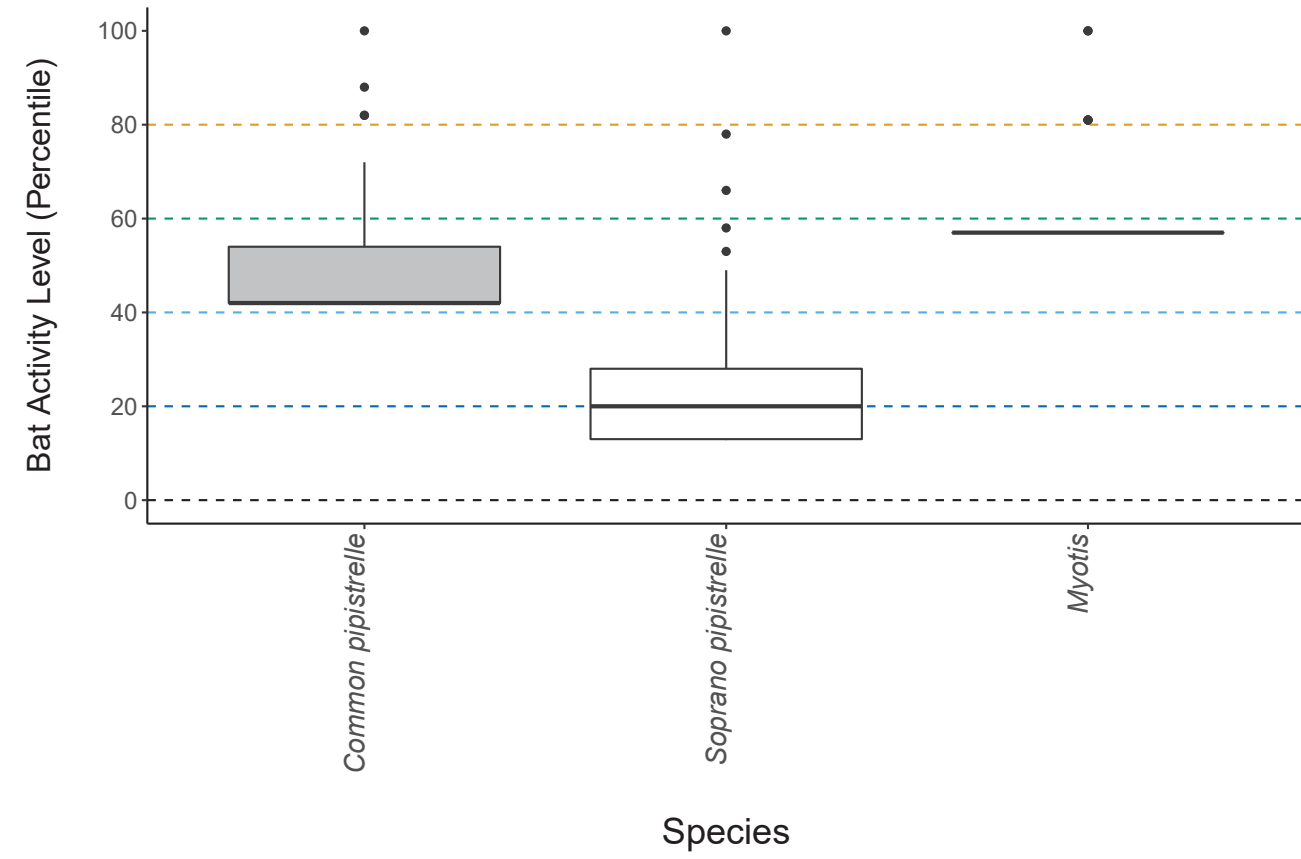
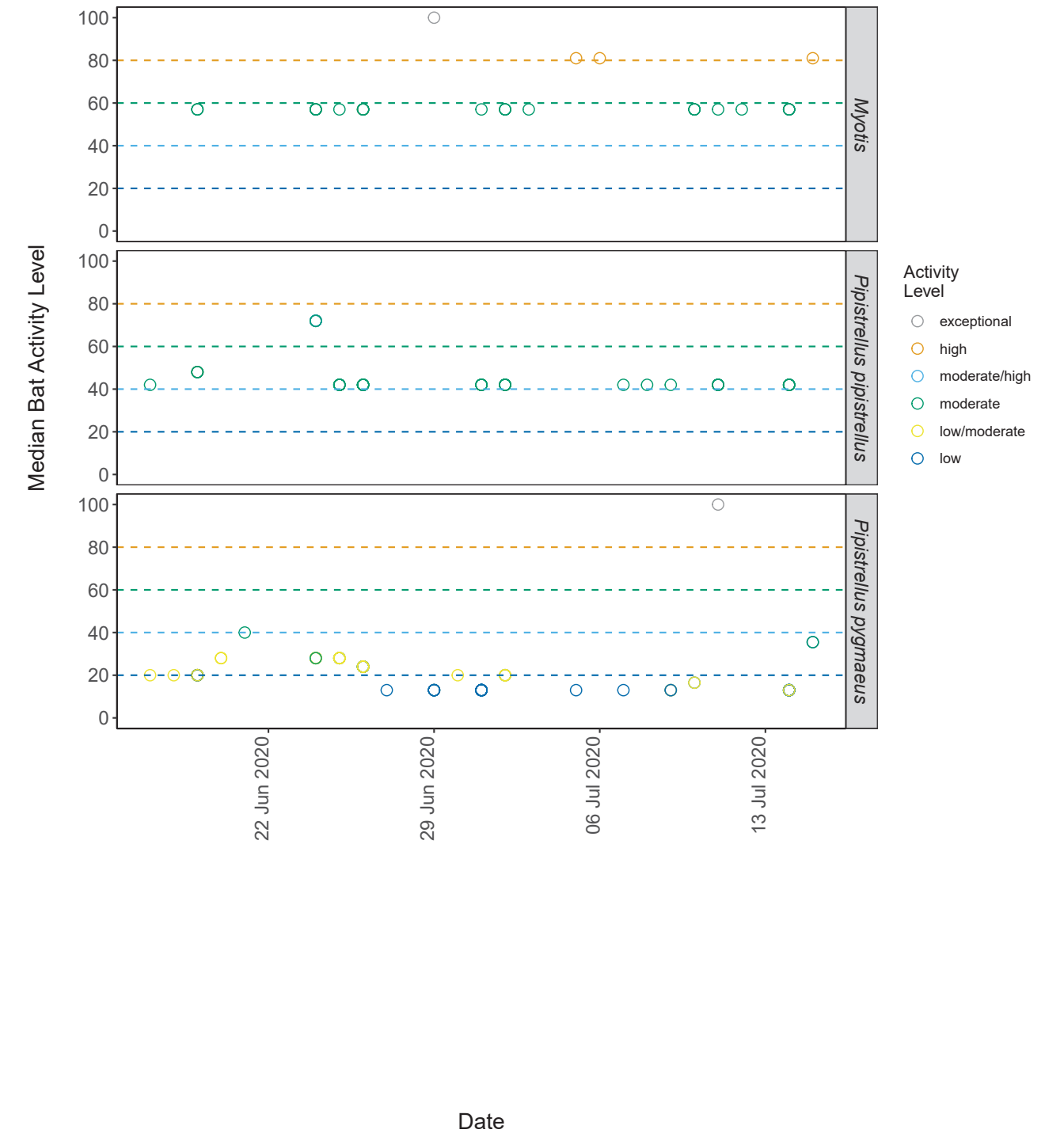


Figure 5. The median activity levels of bats recorded across all detectors each night.



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.

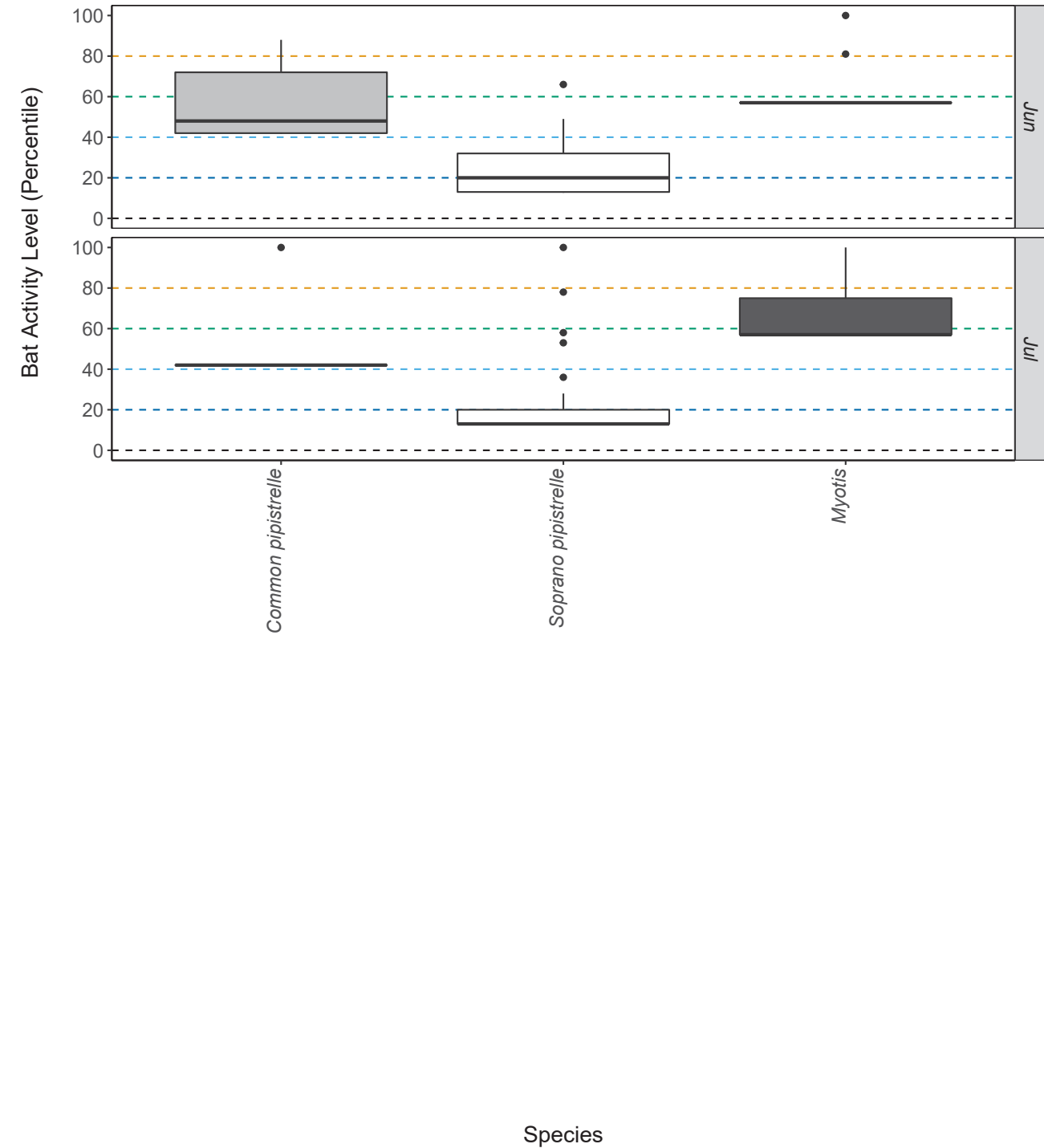
Species/Species Group	Month	Nights of Exceptional Activity	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
<i>Myotis</i>	Jun	1	1	0	9	0	0
<i>Myotis</i>	Jul	1	3	0	10	0	0
<i>Pipistrellus pipistrellus</i>	Jun	0	3	5	18	0	0
<i>Pipistrellus pipistrellus</i>	Jul	1	0	0	18	0	0
<i>Pipistrellus pygmaeus</i>	Jun	0	0	1	6	29	15
<i>Pipistrellus pygmaeus</i>	Jul	1	0	1	2	7	19

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
<i>Myotis</i>	Jun	57	57 - 69	100	11
<i>Myotis</i>	Jul	57	57 - 69	100	14
<i>Pipistrellus pipistrellus</i>	Jun	48	65 - 65	88	26
<i>Pipistrellus pipistrellus</i>	Jul	42	65 - 65	100	19
<i>Pipistrellus pygmaeus</i>	Jun	20	30 - 60	66	51
<i>Pipistrellus pygmaeus</i>	Jul	13	30 - 60	100	30

Figures

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



PART 2: Nightly Analysis

ENTIRE SURVEY PERIOD

Sunrise and Sunset Times

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

Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)	NA	NA
57.284262_-4.673881	17/06/2020	2020-06-17	22:19	04:22	6.1
57.284262_-4.673881	18/06/2020	2020-06-17	22:19	04:22	6.1
57.2898_-4.674735	19/06/2020	2020-06-18	22:19	04:22	6.0
57.264923_-4.687083	20/06/2020	2020-06-19	22:20	04:22	6.0
57.293592_-4.682064	19/06/2020	2020-06-19	22:20	04:22	6.0
57.293592_-4.682064	20/06/2020	2020-06-19	22:20	04:22	6.0
57.263864_-4.69907	20/06/2020	2020-06-19	22:20	04:22	6.0
57.284262_-4.673881	20/06/2020	2020-06-19	22:20	04:22	6.0
57.273325_-4.701266	20/06/2020	2020-06-19	22:20	04:22	6.0
57.271787_-4.645561	20/06/2020	2020-06-19	22:20	04:22	6.0
57.271787_-4.645561	19/06/2020	2020-06-19	22:20	04:22	6.0
57.279154_-4.682782	20/06/2020	2020-06-19	22:20	04:22	6.0
57.2898_-4.674735	20/06/2020	2020-06-19	22:20	04:22	6.0
57.2898_-4.674735	19/06/2020	2020-06-19	22:20	04:22	6.0
57.271036_-4.686061	20/06/2020	2020-06-19	22:20	04:22	6.0
57.268915_-4.677791	20/06/2020	2020-06-19	22:20	04:22	6.0
57.284262_-4.673881	19/06/2020	2020-06-19	22:20	04:22	6.0
57.271787_-4.645561	21/06/2020	2020-06-20	22:20	04:22	6.0
57.271787_-4.645561	20/06/2020	2020-06-20	22:20	04:22	6.0
57.2898_-4.674735	20/06/2020	2020-06-20	22:20	04:22	6.0
57.2898_-4.674735	21/06/2020	2020-06-20	22:20	04:22	6.0
57.271787_-4.645561	22/06/2020	2020-06-21	22:20	04:23	6.0
57.268009_-4.654986	25/06/2020	2020-06-24	22:20	04:24	6.1
57.264536_-4.666425	25/06/2020	2020-06-24	22:20	04:24	6.1
57.264923_-4.687083	25/06/2020	2020-06-24	22:20	04:24	6.1
57.293592_-4.682064	25/06/2020	2020-06-24	22:20	04:24	6.1
57.271787_-4.645561	25/06/2020	2020-06-24	22:20	04:24	6.1
57.263864_-4.69907	25/06/2020	2020-06-24	22:20	04:24	6.1
57.2898_-4.674735	25/06/2020	2020-06-24	22:20	04:24	6.1
57.271036_-4.686061	25/06/2020	2020-06-24	22:20	04:24	6.1
57.283616_-4.694095	25/06/2020	2020-06-24	22:20	04:24	6.1
57.268915_-4.677791	25/06/2020	2020-06-24	22:20	04:24	6.1
57.284262_-4.673881	24/06/2020	2020-06-24	22:20	04:24	6.1
57.284262_-4.673881	25/06/2020	2020-06-24	22:20	04:24	6.1
57.274059_-4.671733	25/06/2020	2020-06-24	22:20	04:24	6.1
57.274059_-4.671733	24/06/2020	2020-06-24	22:20	04:24	6.1
57.264923_-4.687083	24/06/2020	2020-06-24	22:20	04:24	6.1
57.293592_-4.682064	24/06/2020	2020-06-24	22:20	04:24	6.1
57.278776_-4.660523	25/06/2020	2020-06-24	22:20	04:24	6.1
57.279154_-4.682782	25/06/2020	2020-06-24	22:20	04:24	6.1
57.264923_-4.687083	26/06/2020	2020-06-25	22:20	04:24	6.1
57.273325_-4.701266	26/06/2020	2020-06-25	22:20	04:24	6.1
57.2898_-4.674735	26/06/2020	2020-06-25	22:20	04:24	6.1
57.271036_-4.686061	26/06/2020	2020-06-25	22:20	04:24	6.1
57.284262_-4.673881	26/06/2020	2020-06-25	22:20	04:24	6.1
57.274059_-4.671733	26/06/2020	2020-06-25	22:20	04:24	6.1
57.293592_-4.682064	26/06/2020	2020-06-25	22:20	04:24	6.1
57.293592_-4.682064	25/06/2020	2020-06-25	22:20	04:24	6.1

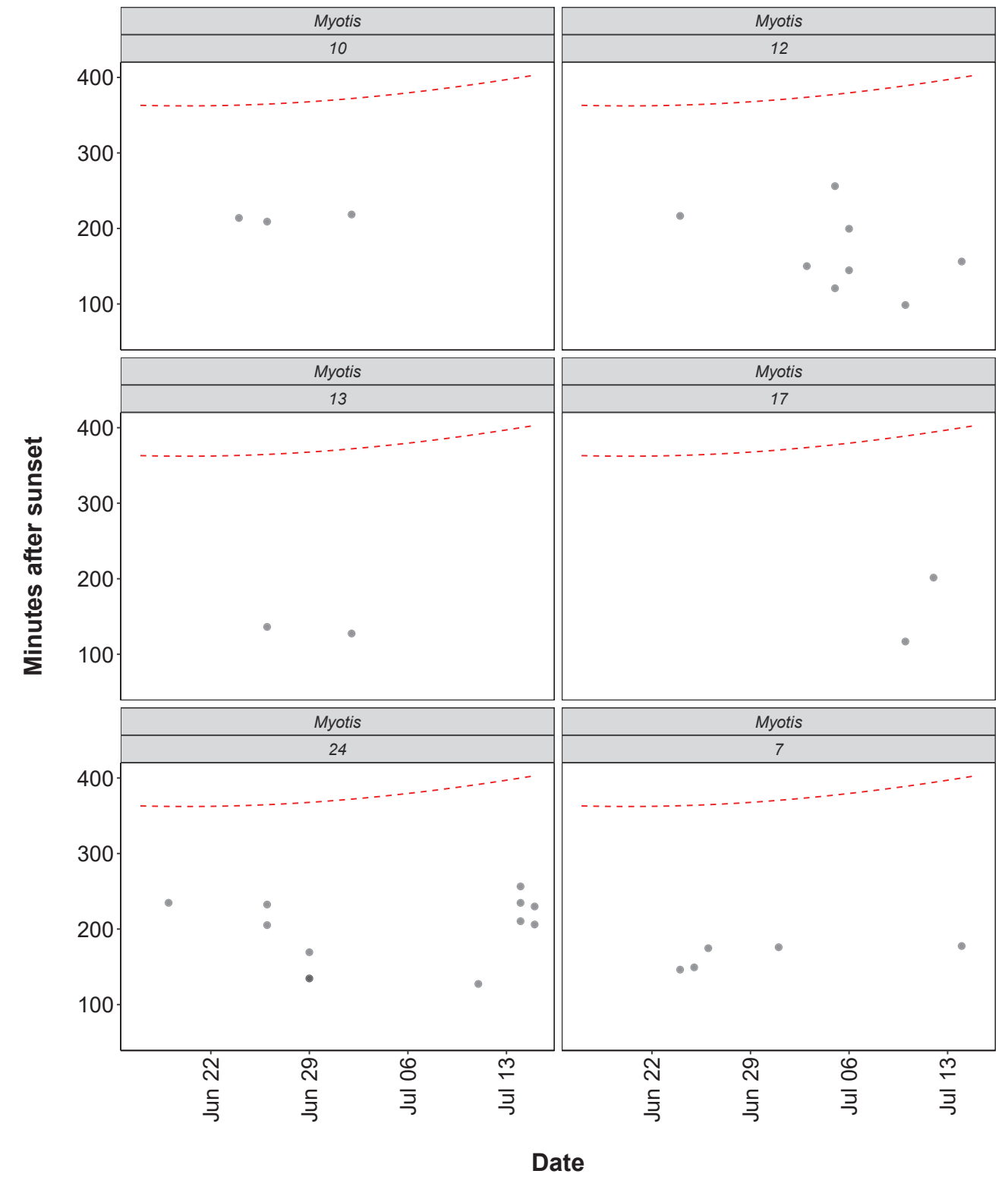
Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)	NA	NA
57.278776_-4.660523	26/06/2020	2020-06-25	22:20	04:24	6.1
57.271787_-4.645561	26/06/2020	2020-06-25	22:20	04:24	6.1
57.271787_-4.645561	25/06/2020	2020-06-25	22:20	04:24	6.1
57.2898_-4.674735	25/06/2020	2020-06-25	22:20	04:24	6.1
57.268915_-4.677791	26/06/2020	2020-06-25	22:20	04:24	6.1
57.268915_-4.677791	25/06/2020	2020-06-25	22:20	04:24	6.1
57.263864_-4.69907	26/06/2020	2020-06-25	22:20	04:24	6.1
57.274059_-4.671733	26/06/2020	2020-06-26	22:20	04:25	6.1
57.264923_-4.687083	27/06/2020	2020-06-26	22:20	04:25	6.1
57.293592_-4.682064	27/06/2020	2020-06-26	22:20	04:25	6.1
57.271787_-4.645561	27/06/2020	2020-06-26	22:20	04:25	6.1
57.279154_-4.682782	26/06/2020	2020-06-26	22:20	04:25	6.1
57.279154_-4.682782	27/06/2020	2020-06-26	22:20	04:25	6.1
57.274059_-4.671733	27/06/2020	2020-06-26	22:20	04:25	6.1
57.293592_-4.682064	26/06/2020	2020-06-26	22:20	04:25	6.1
57.273325_-4.701266	27/06/2020	2020-06-26	22:20	04:25	6.1
57.278776_-4.660523	27/06/2020	2020-06-26	22:20	04:25	6.1
57.271787_-4.645561	26/06/2020	2020-06-26	22:20	04:25	6.1
57.263864_-4.69907	26/06/2020	2020-06-26	22:20	04:25	6.1
57.263864_-4.69907	27/06/2020	2020-06-26	22:20	04:25	6.1
57.2898_-4.674735	27/06/2020	2020-06-26	22:20	04:25	6.1
57.271036_-4.686061	27/06/2020	2020-06-26	22:20	04:25	6.1
57.268915_-4.677791	27/06/2020	2020-06-26	22:20	04:25	6.1
57.284262_-4.673881	26/06/2020	2020-06-26	22:20	04:25	6.1
57.284262_-4.673881	27/06/2020	2020-06-26	22:20	04:25	6.1
57.2898_-4.674735	28/06/2020	2020-06-27	22:20	04:26	6.1
57.264923_-4.687083	30/06/2020	2020-06-29	22:19	04:27	6.1
57.264923_-4.687083	29/06/2020	2020-06-29	22:19	04:27	6.1
57.271787_-4.645561	30/06/2020	2020-06-29	22:19	04:27	6.1
57.271036_-4.686061	29/06/2020	2020-06-29	22:19	04:27	6.1
57.271036_-4.686061	30/06/2020	2020-06-29	22:19	04:27	6.1
57.268915_-4.677791	29/06/2020	2020-06-29	22:19	04:27	6.1
57.284262_-4.673881	30/06/2020	2020-06-29	22:19	04:27	6.1
57.271787_-4.645561	30/06/2020	2020-06-30	22:19	04:28	6.2
57.264536_-4.666425	02/07/2020	2020-07-01	22:18	04:29	6.2
57.271787_-4.645561	02/07/2020	2020-07-01	22:18	04:29	6.2
57.2898_-4.674735	01/07/2020	2020-07-01	22:18	04:29	6.2
57.268009_-4.654986	02/07/2020	2020-07-01	22:18	04:29	6.2
57.293592_-4.682064	02/07/2020	2020-07-01	22:18	04:29	6.2
57.279154_-4.682782	02/07/2020	2020-07-01	22:18	04:29	6.2
57.2898_-4.674735	02/07/2020	2020-07-01	22:18	04:29	6.2
57.284262_-4.673881	01/07/2020	2020-07-01	22:18	04:29	6.2
57.263864_-4.69907	02/07/2020	2020-07-01	22:18	04:29	6.2
57.274059_-4.671733	02/07/2020	2020-07-02	22:18	04:30	6.2
57.293592_-4.682064	02/07/2020	2020-07-02	22:18	04:30	6.2
57.263864_-4.69907	02/07/2020	2020-07-02	22:18	04:30	6.2
57.263864_-4.69907	03/07/2020	2020-07-02	22:18	04:30	6.2
57.284262_-4.673881	03/07/2020	2020-07-02	22:18	04:30	6.2
57.293592_-4.682064	03/07/2020	2020-07-02	22:18	04:30	6.2
57.273325_-4.701266	02/07/2020	2020-07-02	22:18	04:30	6.2
57.271787_-4.645561	03/07/2020	2020-07-02	22:18	04:30	6.2
57.284262_-4.673881	02/07/2020	2020-07-02	22:18	04:30	6.2
57.264923_-4.687083	03/07/2020	2020-07-02	22:18	04:30	6.2
57.271036_-4.686061	04/07/2020	2020-07-03	22:17	04:31	6.2
57.271036_-4.686061	06/07/2020	2020-07-05	22:16	04:33	6.3
57.271036_-4.686061	07/07/2020	2020-07-06	22:15	04:34	6.3
57.268915_-4.677791	08/07/2020	2020-07-07	22:14	04:36	6.4

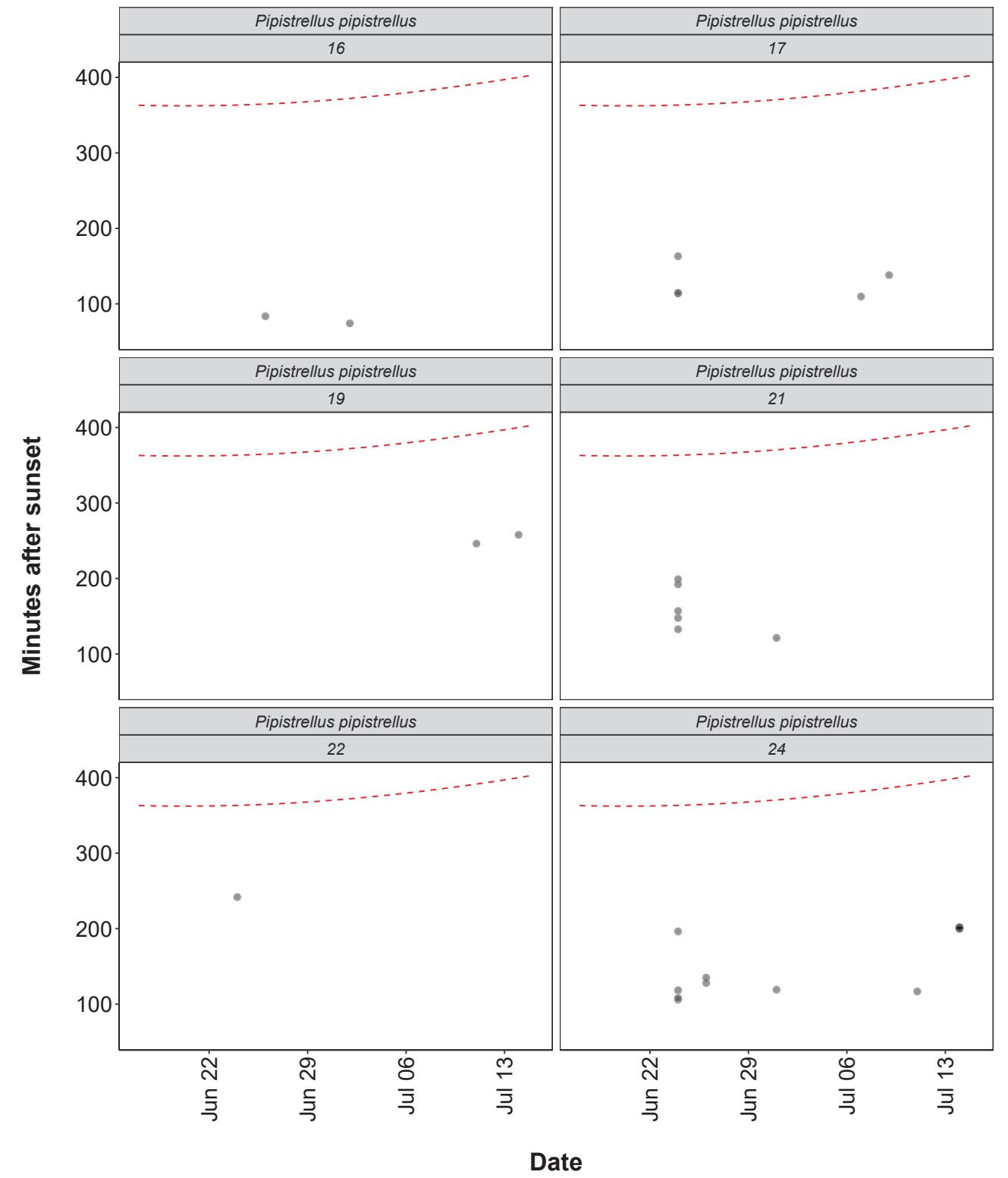
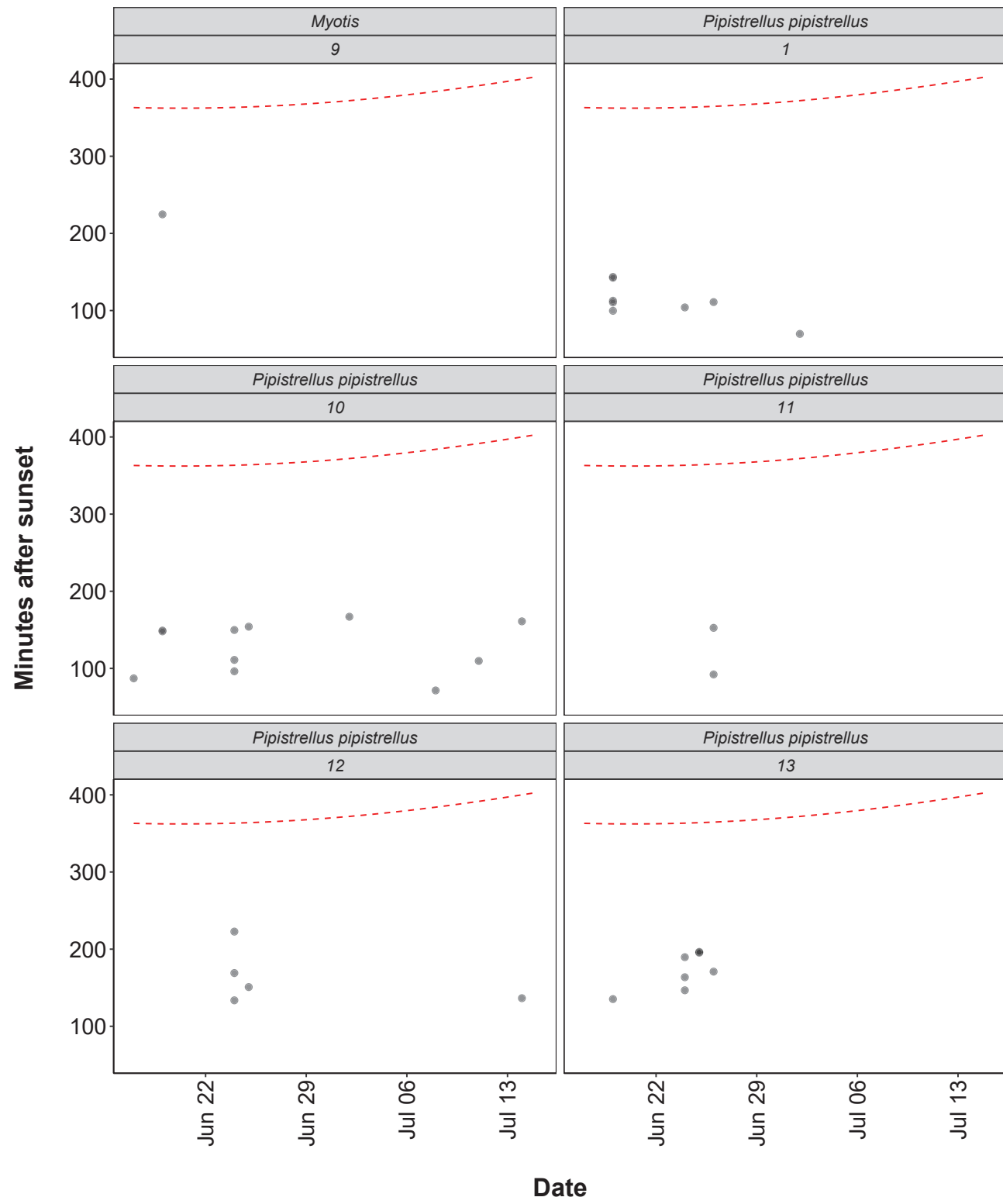
Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)	NA	NA
57.293592_-4.682064	07/07/2020	2020-07-07	22:14	04:36	6.4
57.284262_-4.673881	08/07/2020	2020-07-08	22:13	04:37	6.4
57.268915_-4.677791	10/07/2020	2020-07-09	22:12	04:38	6.4
57.293592_-4.682064	10/07/2020	2020-07-09	22:12	04:38	6.4
57.271036_-4.686061	09/07/2020	2020-07-09	22:12	04:38	6.4
57.271036_-4.686061	10/07/2020	2020-07-09	22:12	04:38	6.4
57.268915_-4.677791	09/07/2020	2020-07-09	22:12	04:38	6.4
57.278776_-4.660523	10/07/2020	2020-07-10	22:11	04:40	6.5
57.271036_-4.686061	10/07/2020	2020-07-10	22:11	04:40	6.5
57.268915_-4.677791	11/07/2020	2020-07-10	22:11	04:40	6.5
57.278776_-4.660523	12/07/2020	2020-07-11	22:10	04:41	6.5
57.271787_-4.645561	12/07/2020	2020-07-11	22:10	04:41	6.5
57.284262_-4.673881	11/07/2020	2020-07-11	22:10	04:41	6.5
57.268915_-4.677791	13/07/2020	2020-07-12	22:09	04:43	6.6
57.273325_-4.701266	15/07/2020	2020-07-14	22:06	04:46	6.7
57.278776_-4.660523	15/07/2020	2020-07-14	22:06	04:46	6.7
57.271787_-4.645561	15/07/2020	2020-07-14	22:06	04:46	6.7
57.263864_-4.69907	15/07/2020	2020-07-14	22:06	04:46	6.7
57.271036_-4.686061	15/07/2020	2020-07-14	22:06	04:46	6.7
57.284262_-4.673881	15/07/2020	2020-07-14	22:06	04:46	6.7
57.264536_-4.666425	15/07/2020	2020-07-14	22:06	04:46	6.7
57.274059_-4.671733	14/07/2020	2020-07-14	22:06	04:46	6.7
57.264923_-4.687083	14/07/2020	2020-07-14	22:06	04:46	6.7
57.273325_-4.701266	14/07/2020	2020-07-14	22:06	04:46	6.7
57.271787_-4.645561	14/07/2020	2020-07-14	22:06	04:46	6.7
57.268915_-4.677791	14/07/2020	2020-07-14	22:06	04:46	6.7
57.284262_-4.673881	14/07/2020	2020-07-14	22:06	04:46	6.7
57.274059_-4.671733	16/07/2020	2020-07-15	22:05	04:48	6.7
57.271787_-4.645561	16/07/2020	2020-07-15	22:05	04:48	6.7
57.271787_-4.645561	15/07/2020	2020-07-15	22:05	04:48	6.7

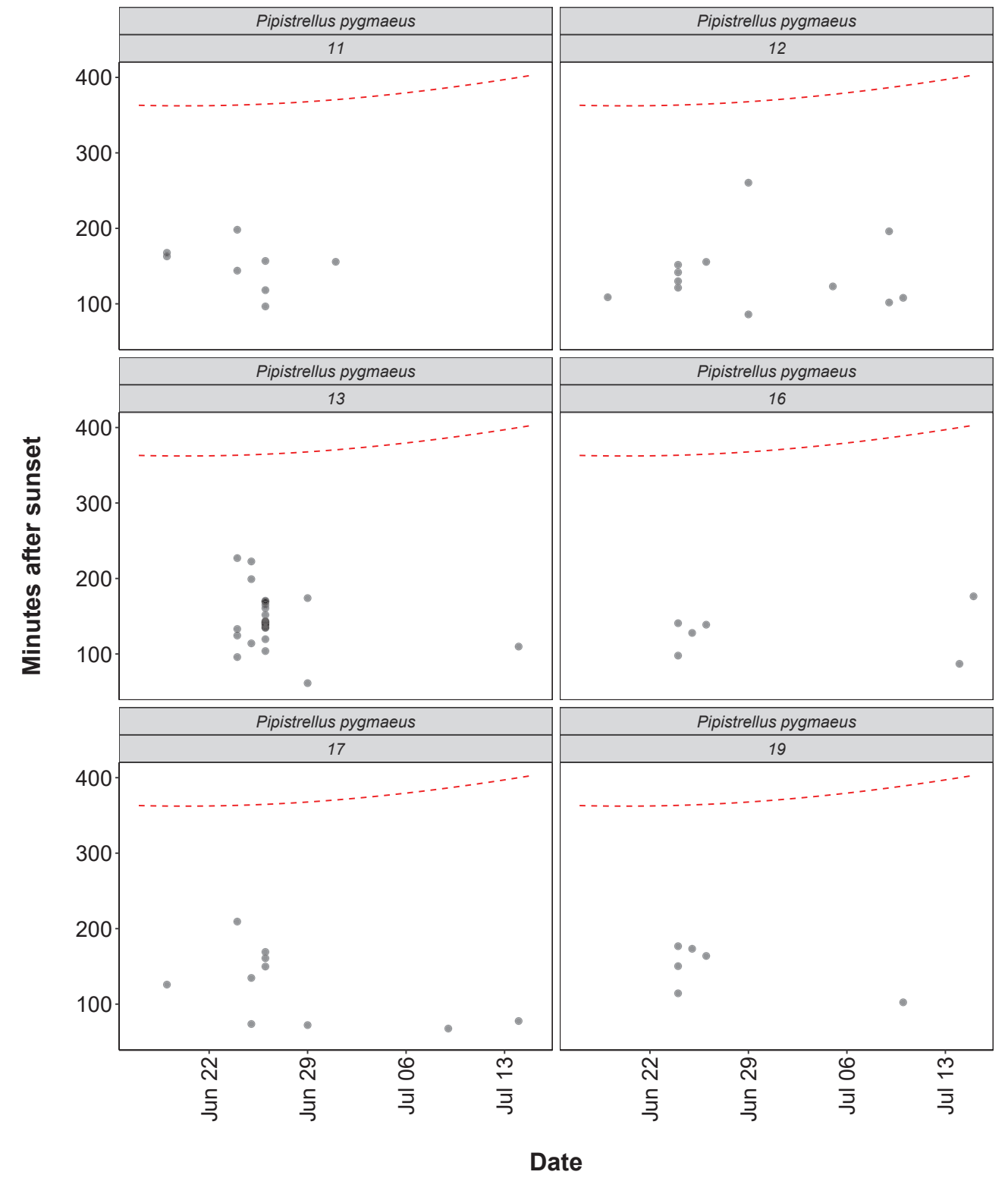
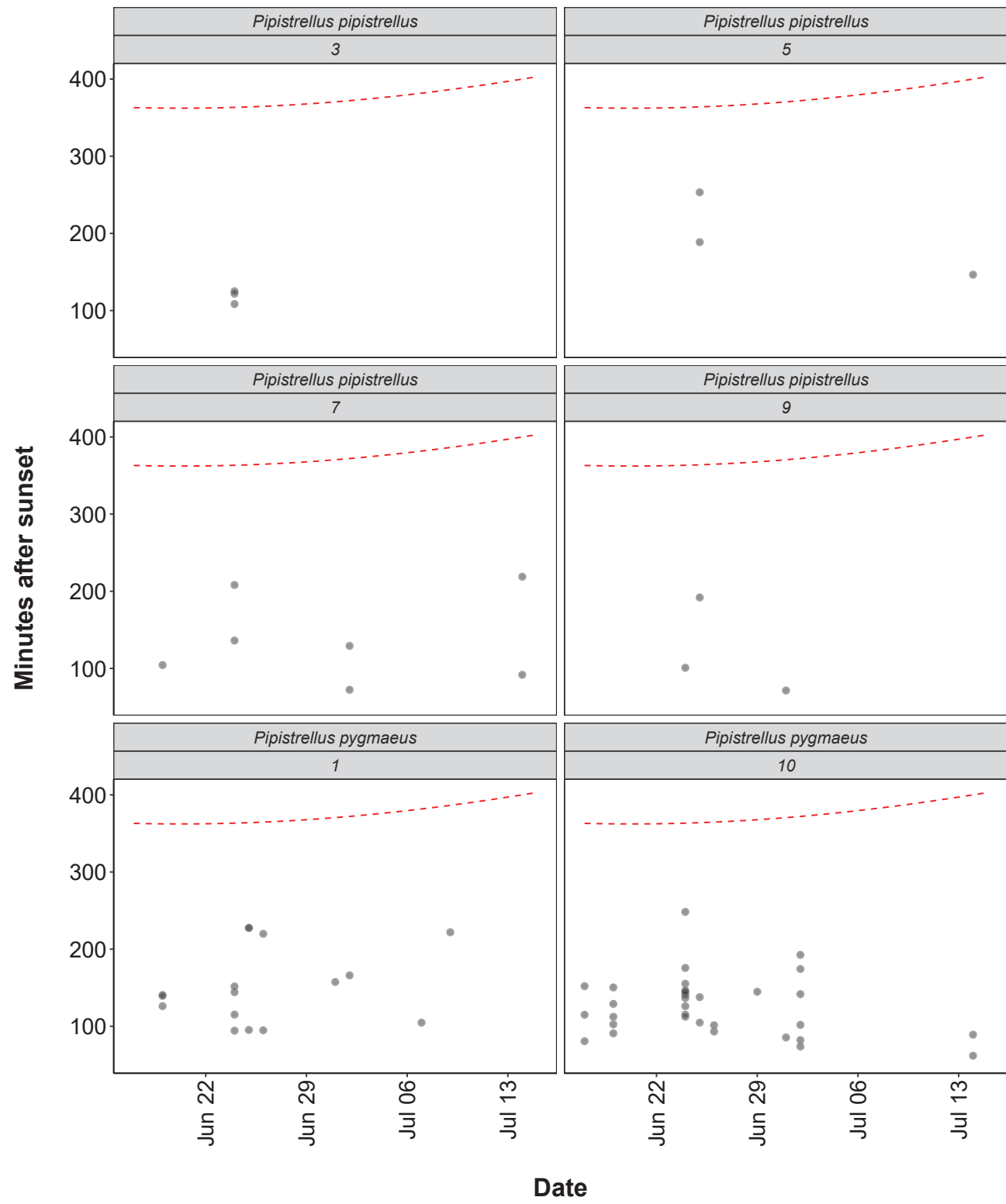
Distribution of Bat Activity Across the Night through Time

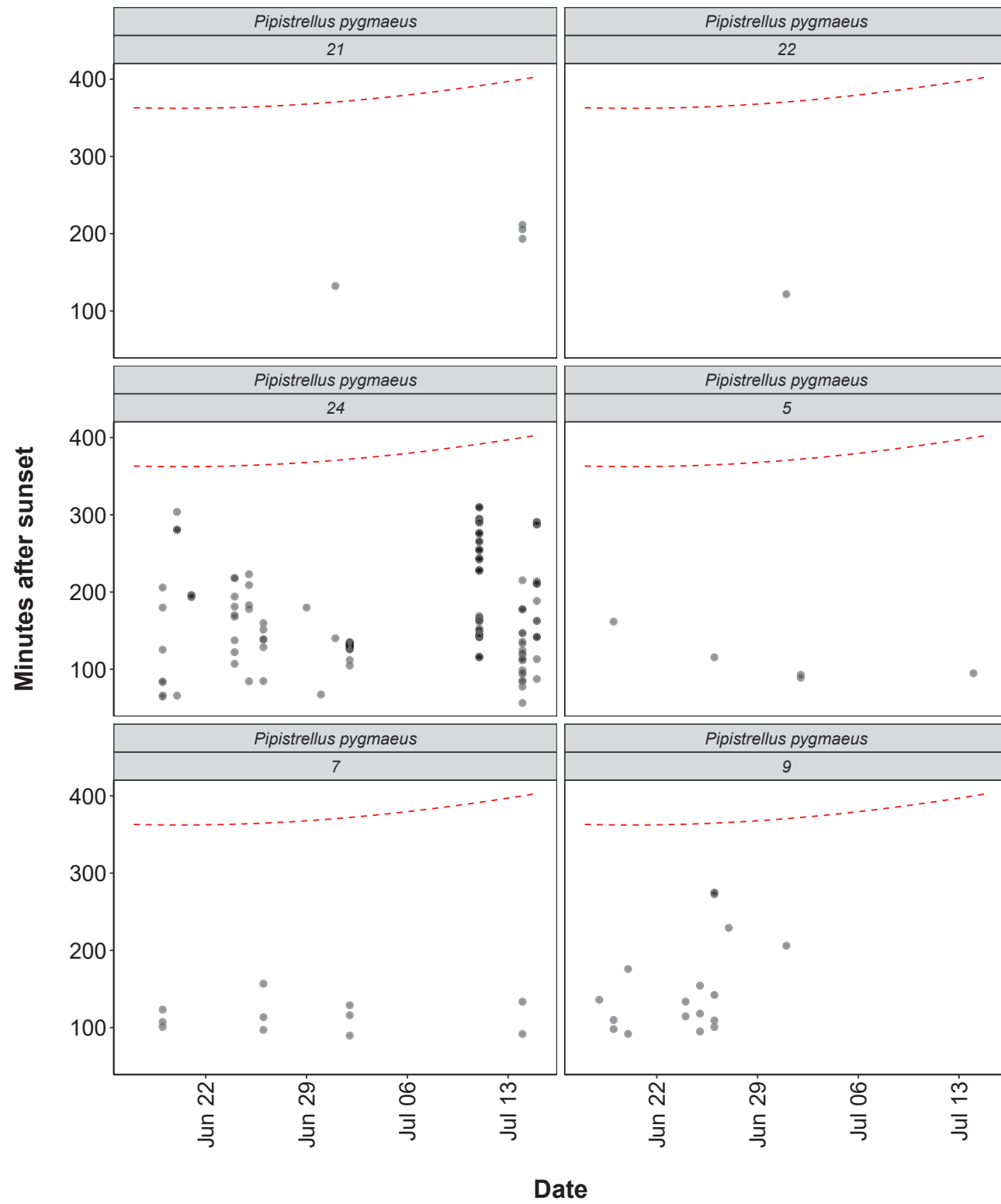
Per Detector

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









Roost Emergence Time and Bat Observation

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

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

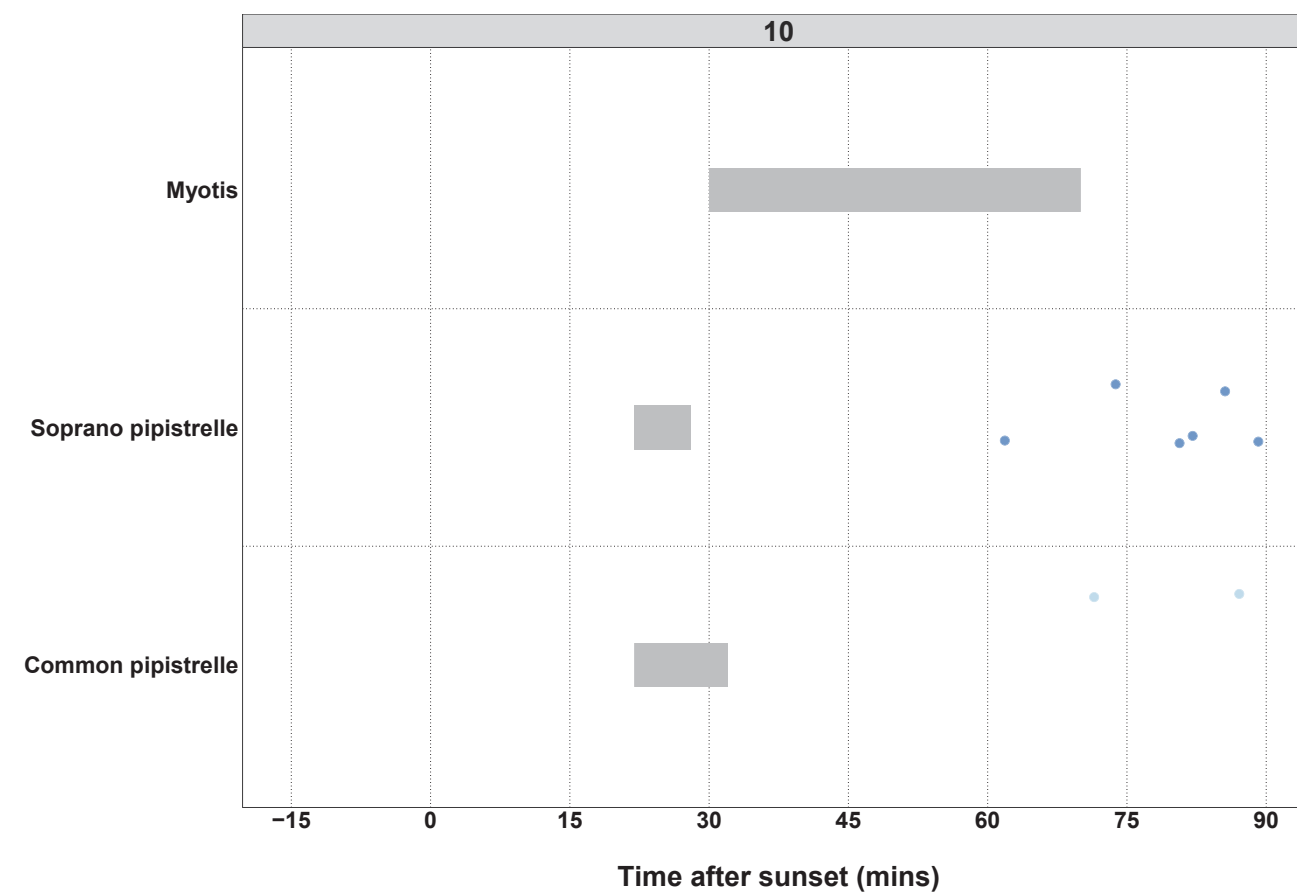
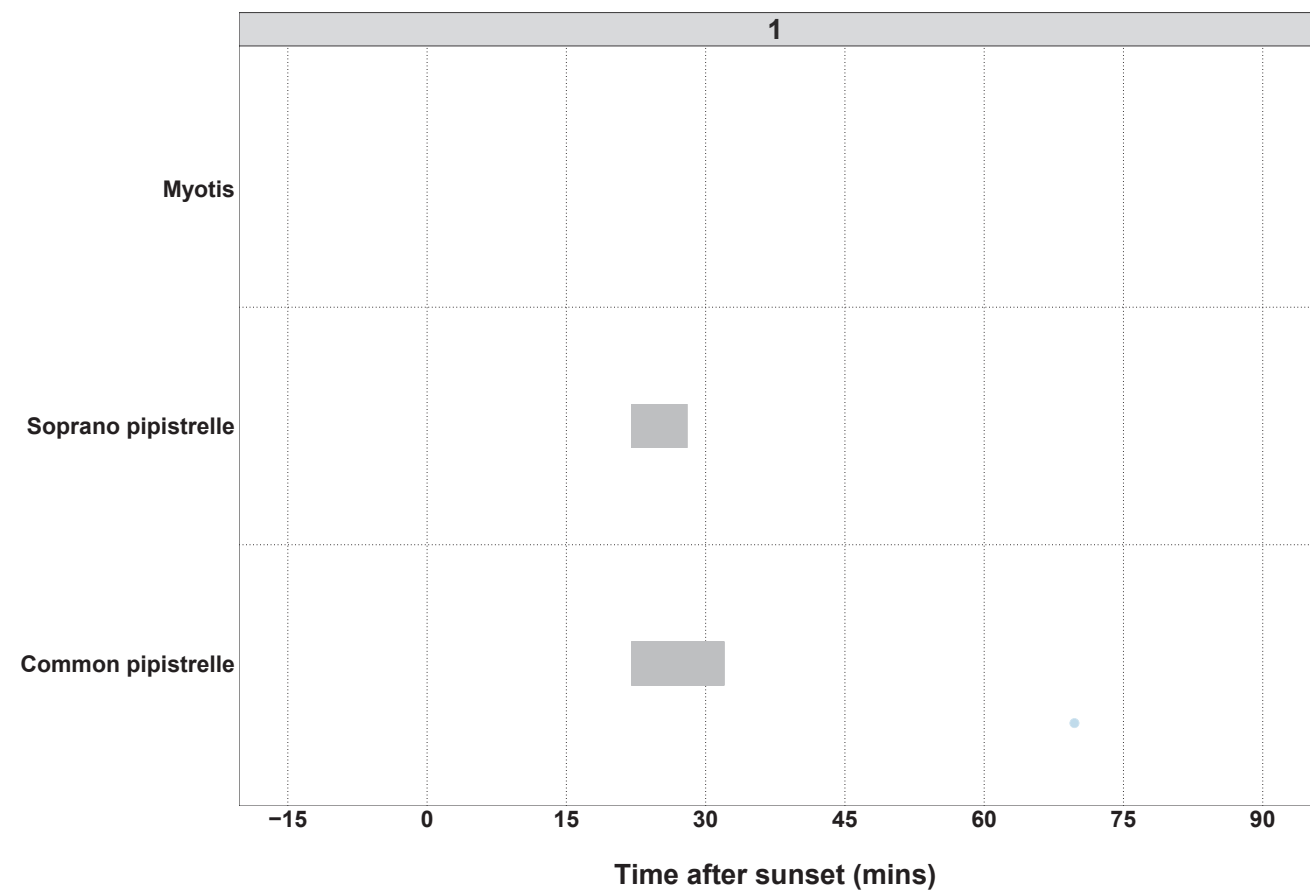
Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Table

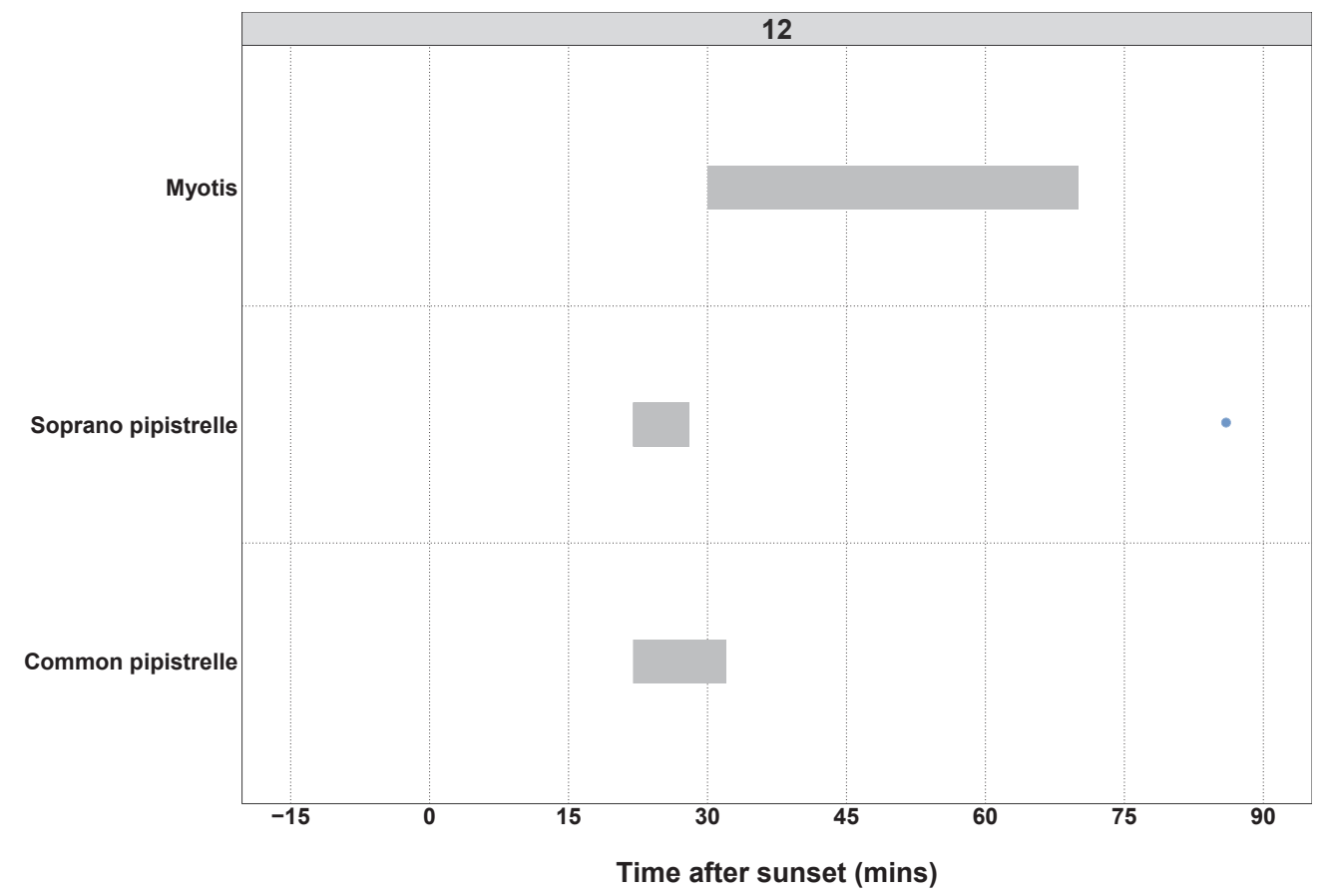
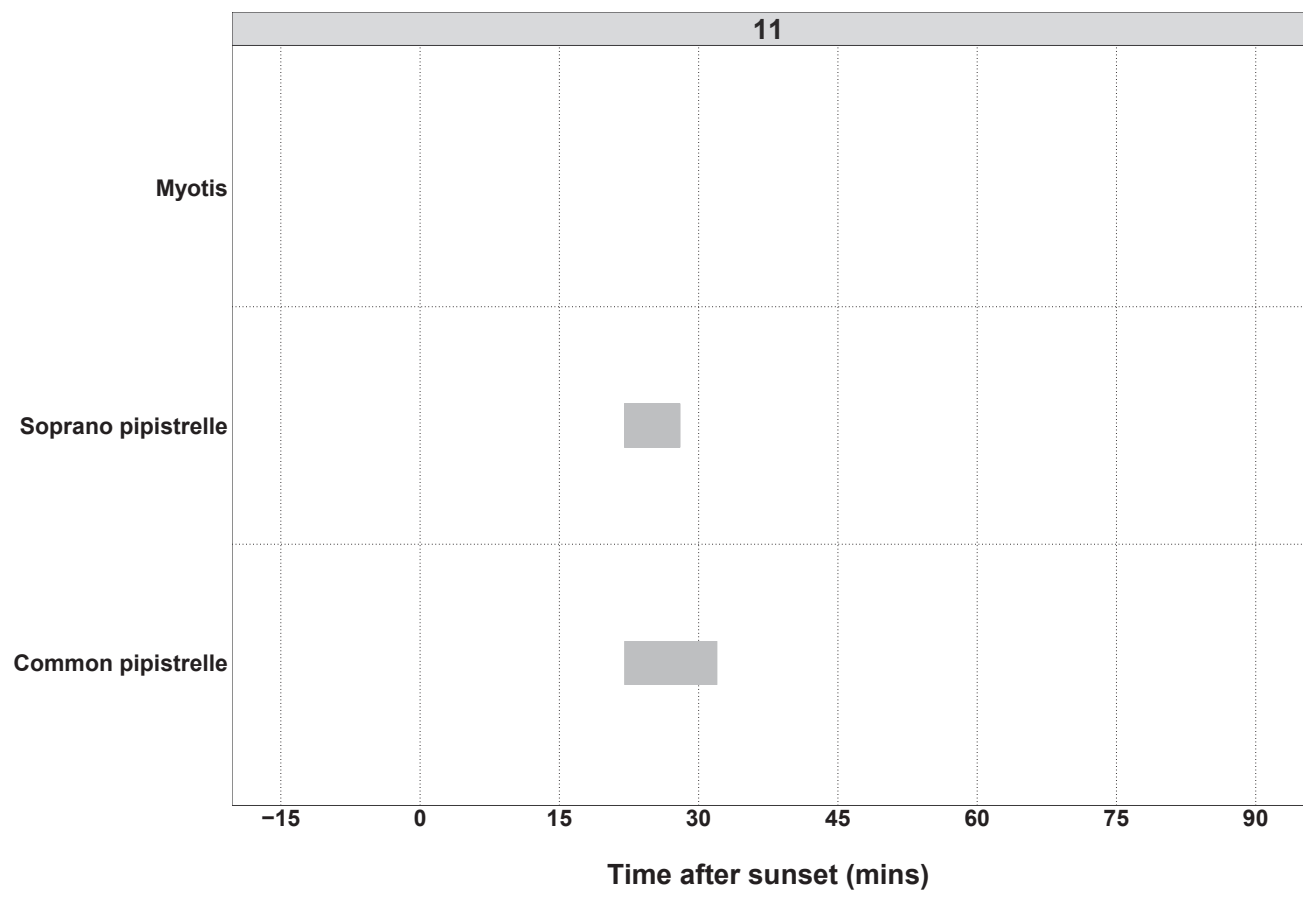
Table 12. Number of bat calls recorded before the upper time of the species-specific emergence time range, and which therefore may potentially indicate the presence of a nearby roost.

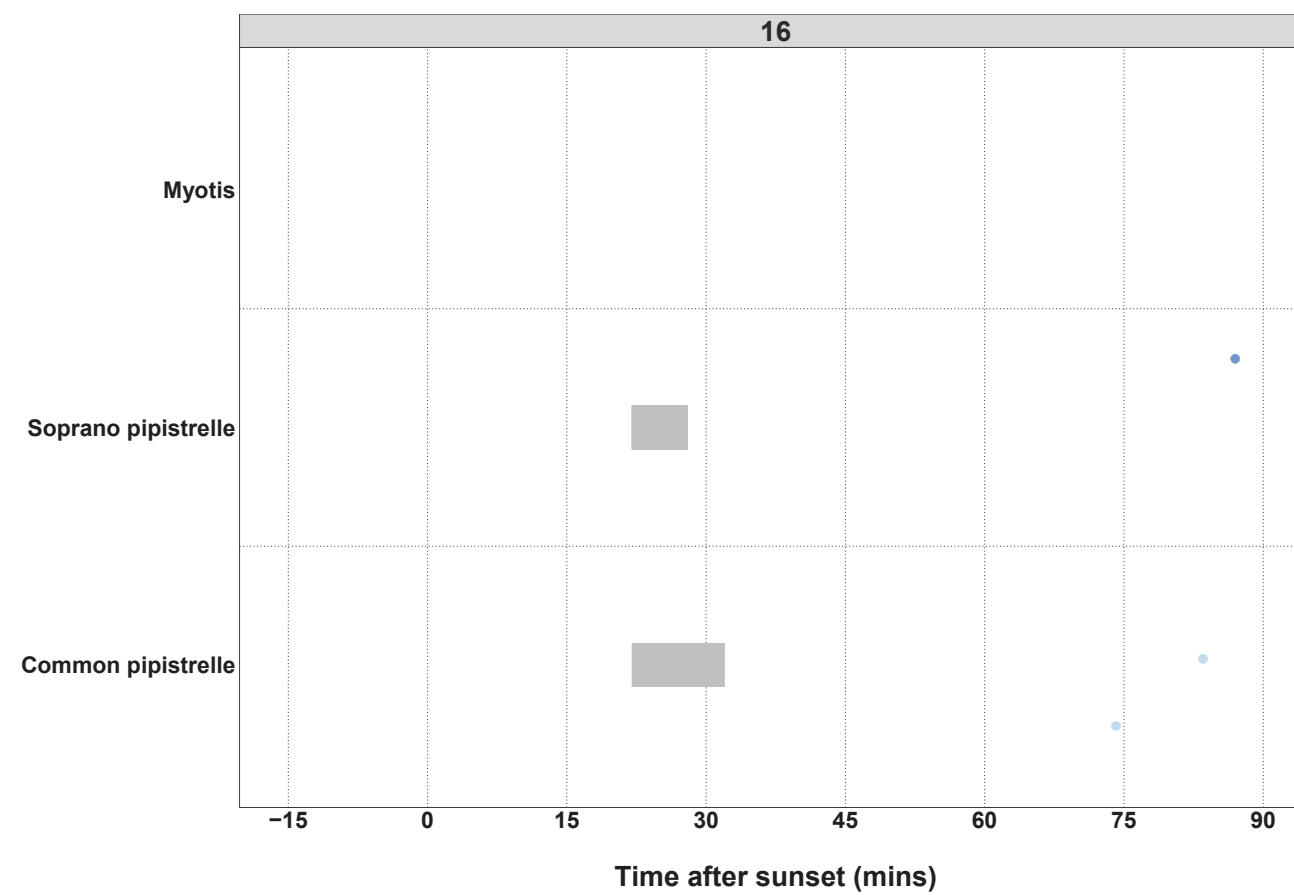
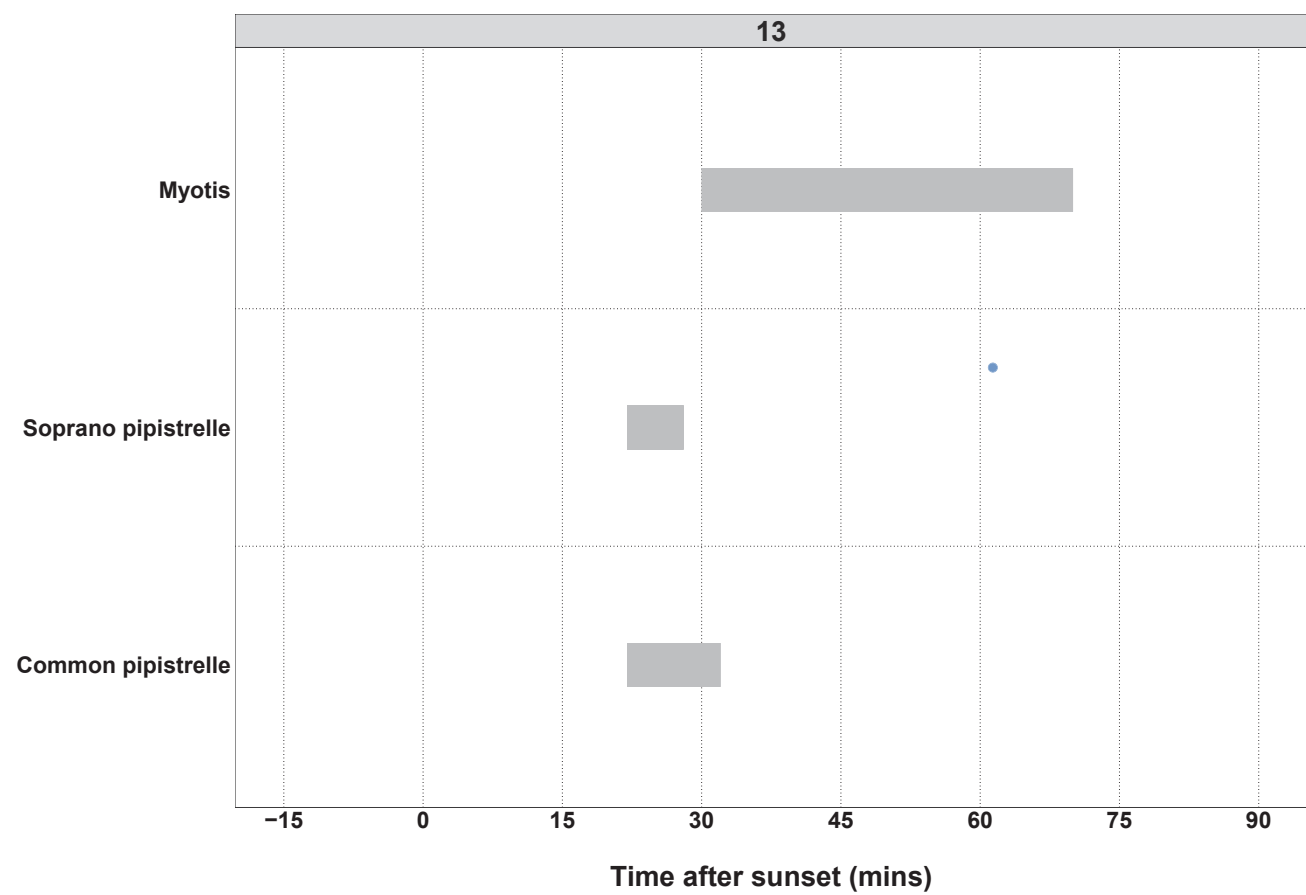
Species	Detector ID
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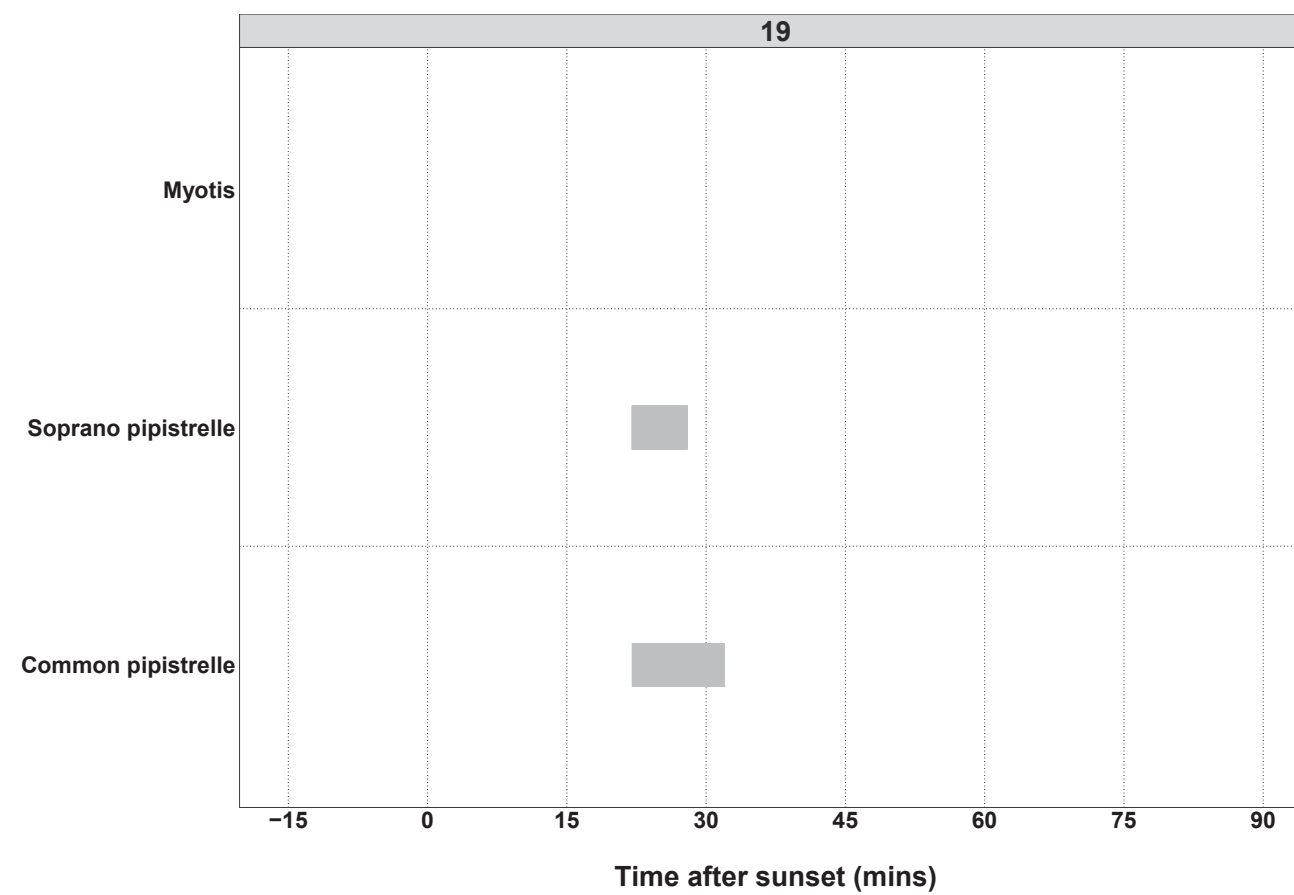
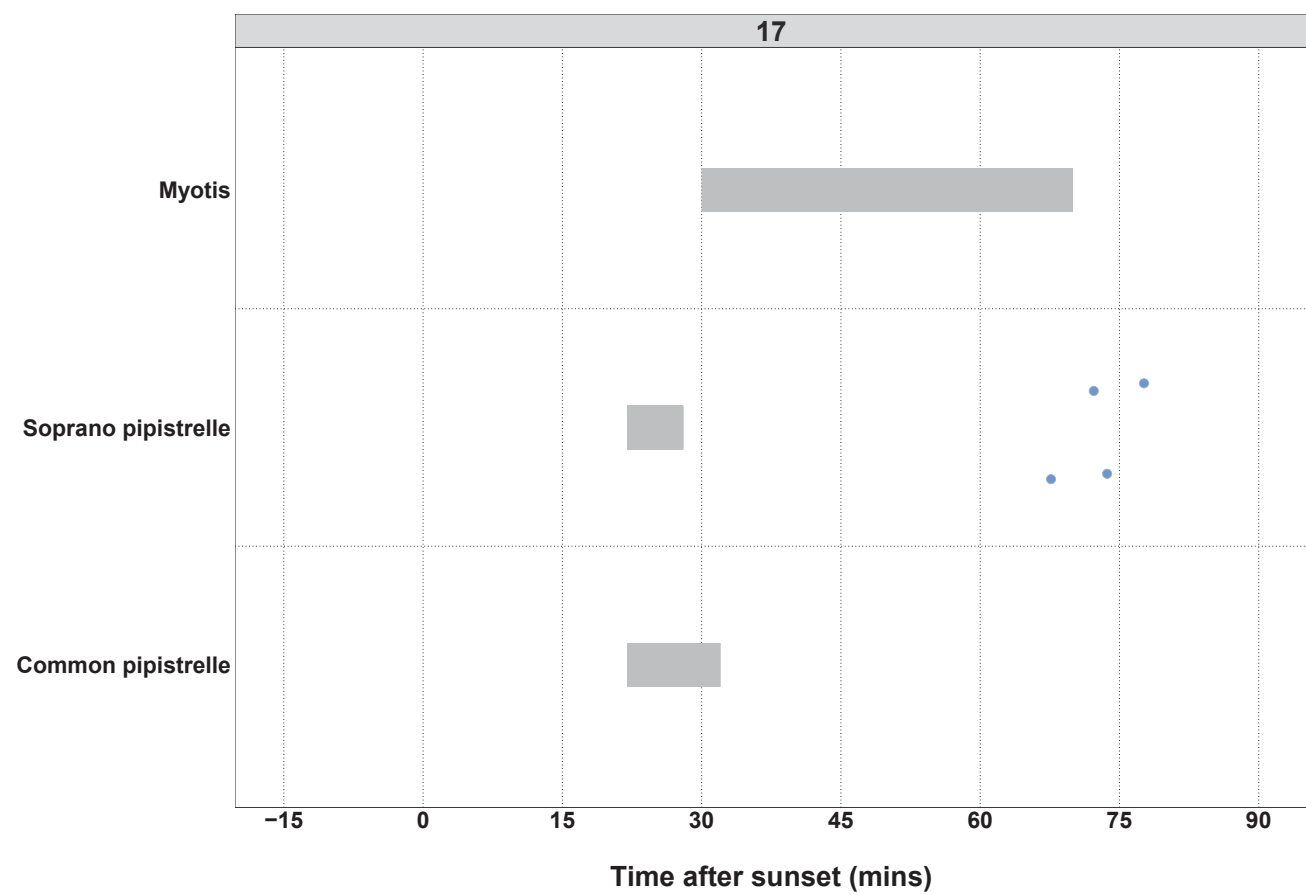
Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Figures

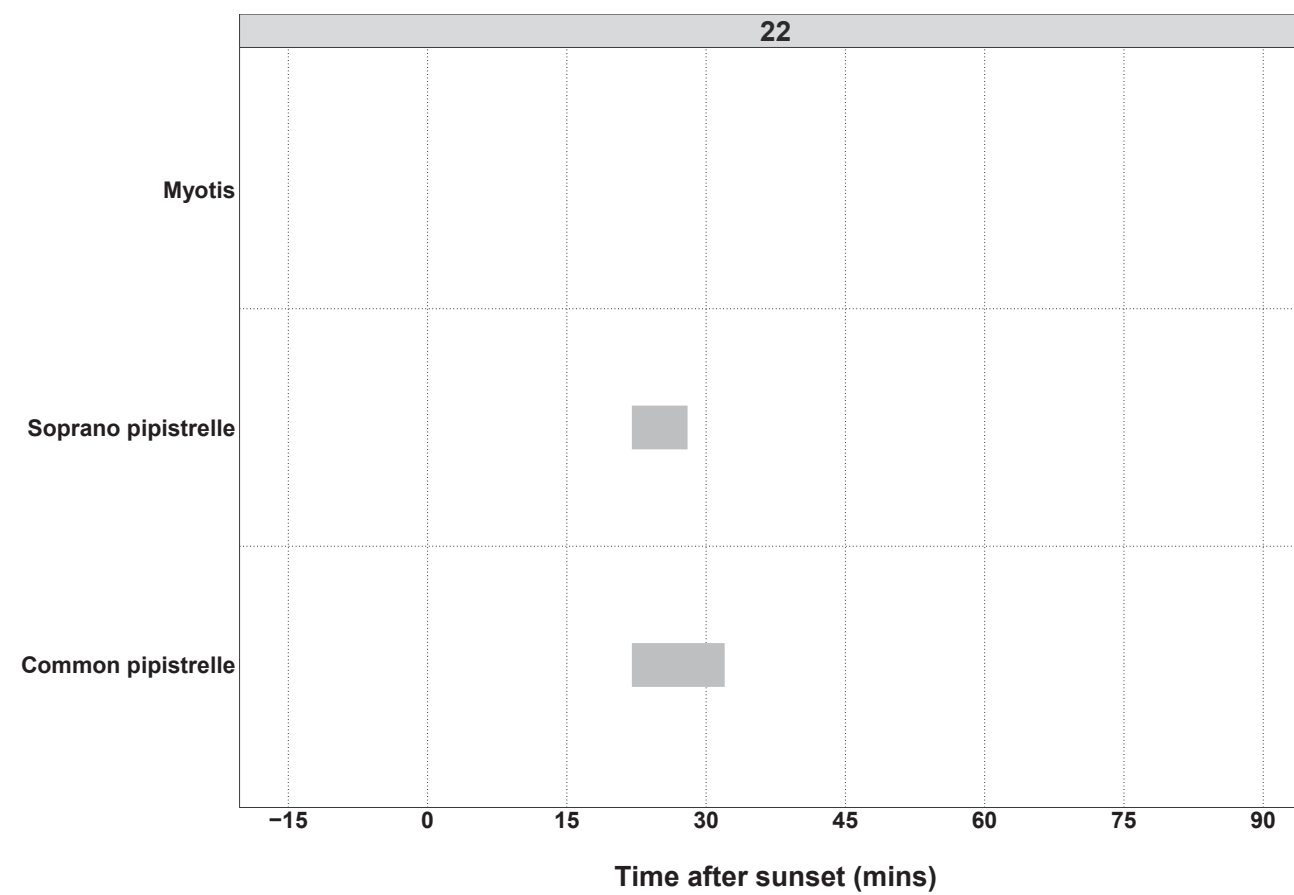
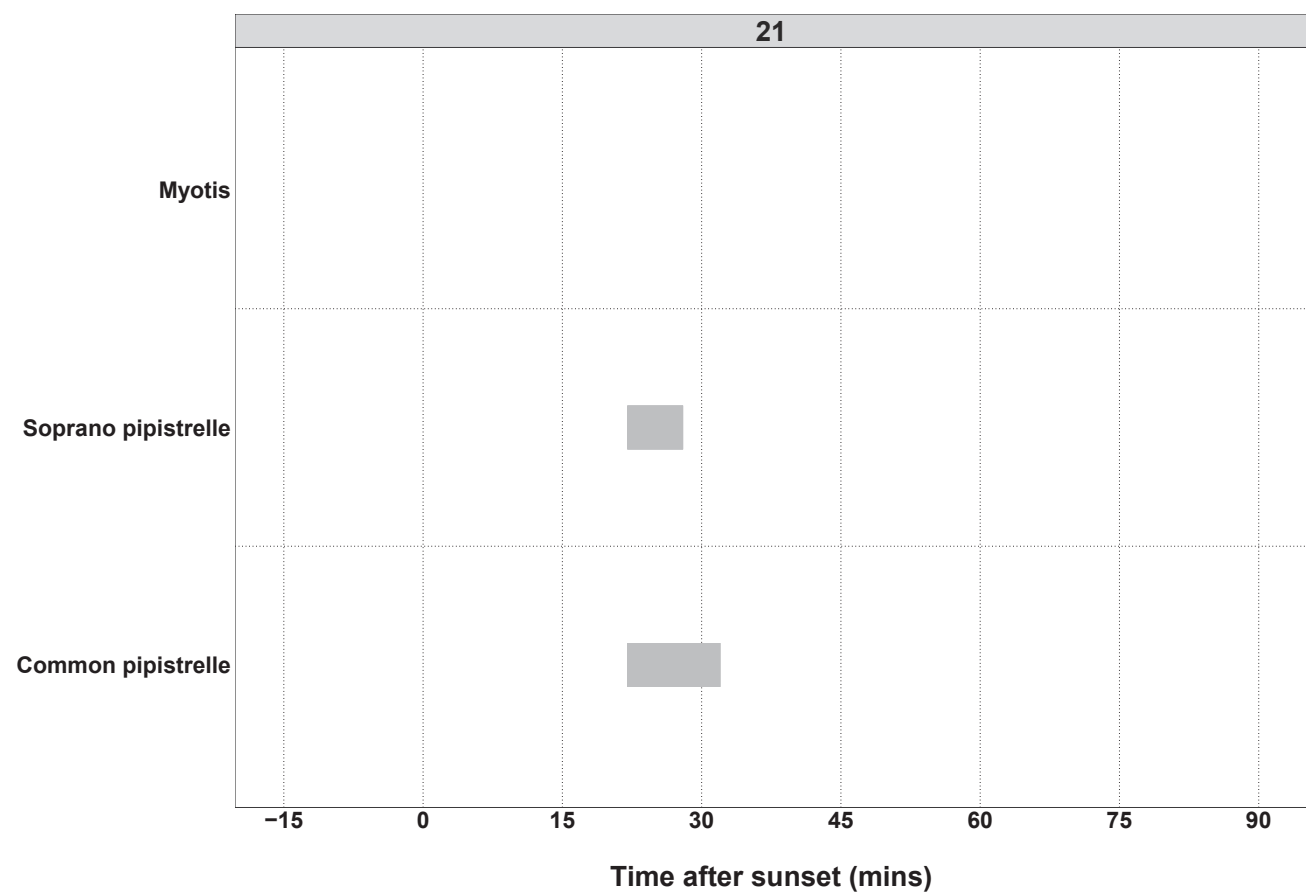
Figure 8. Time from 15 minutes before to 90 minutes after sunset. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occurring earlier than this time range, may potentially indicate the presence of a nearby roost.

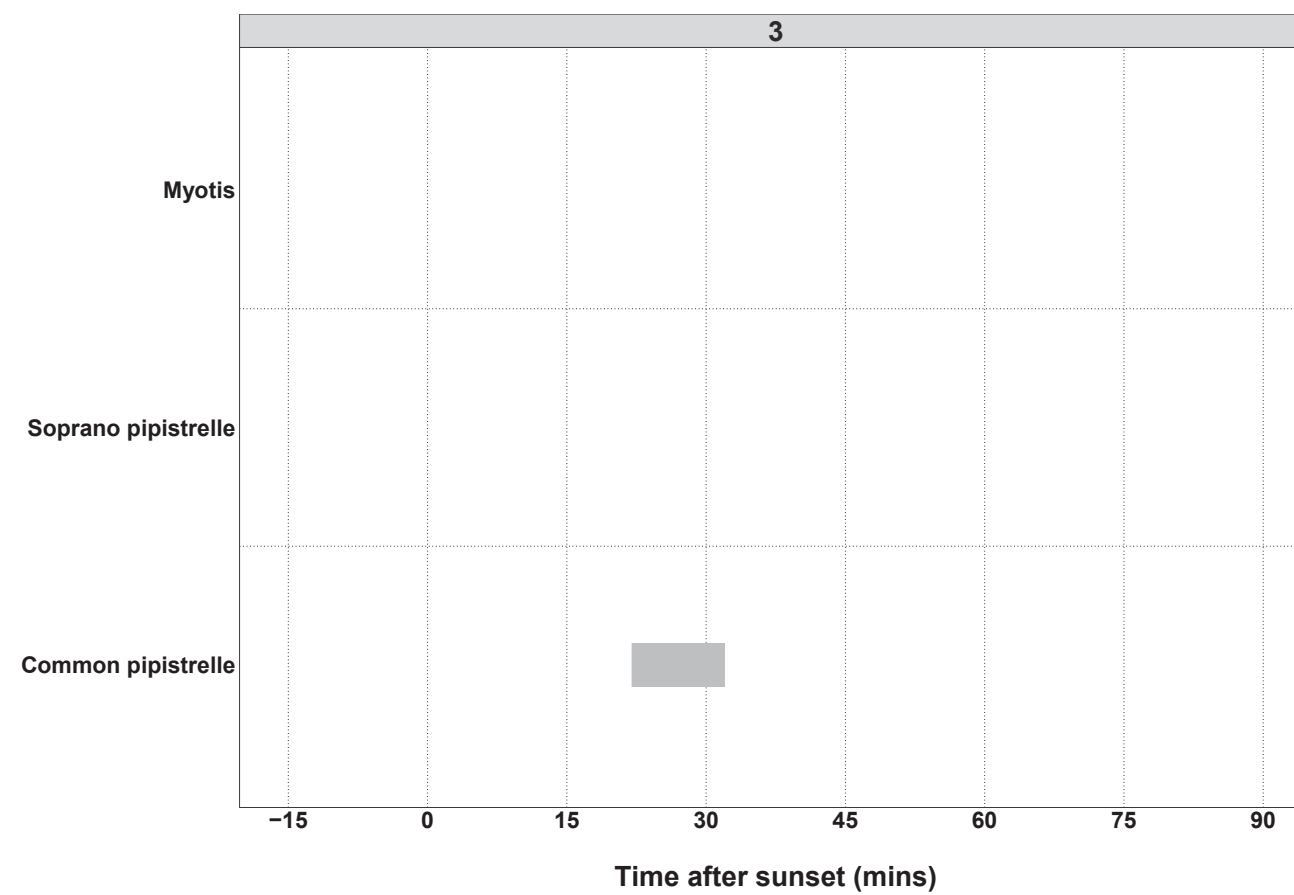
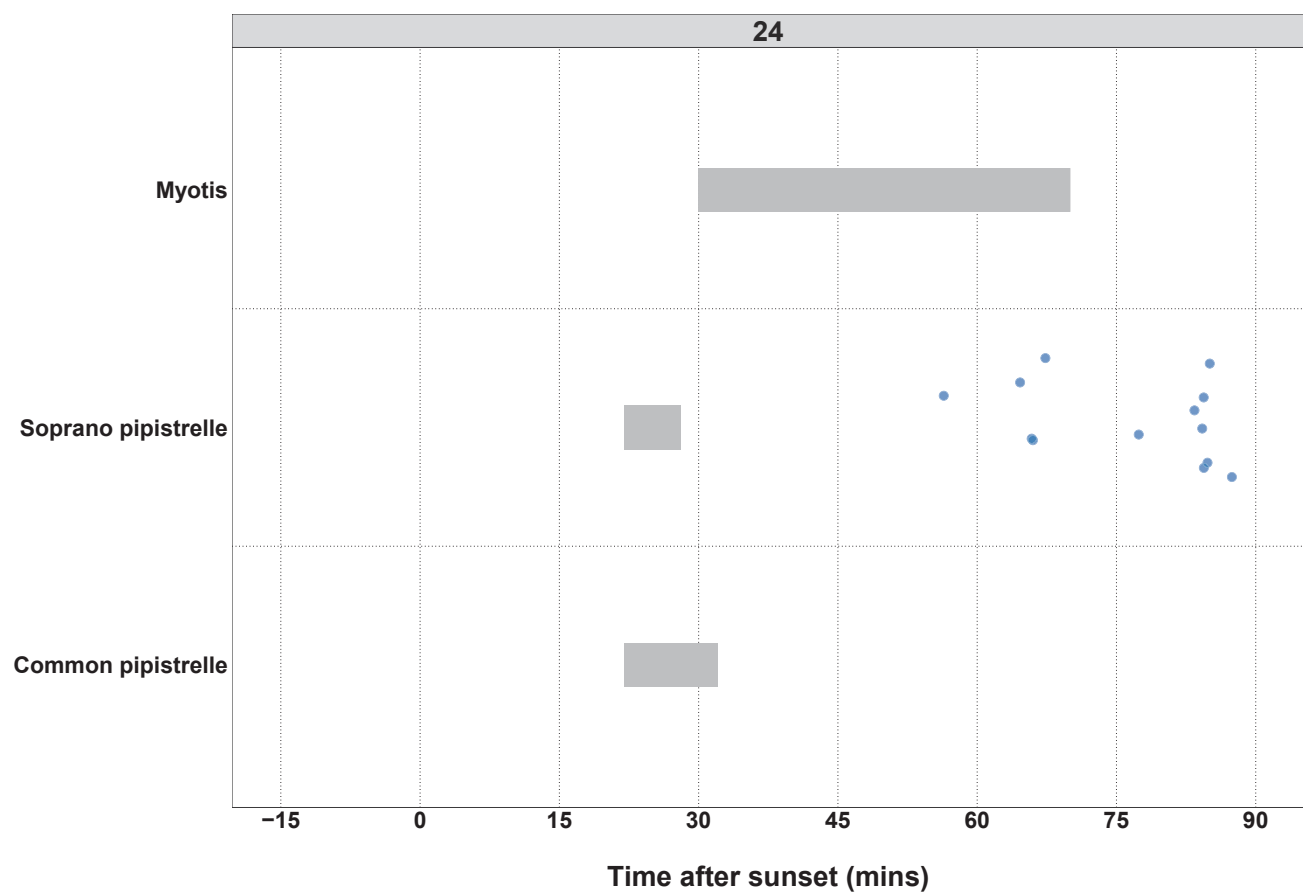


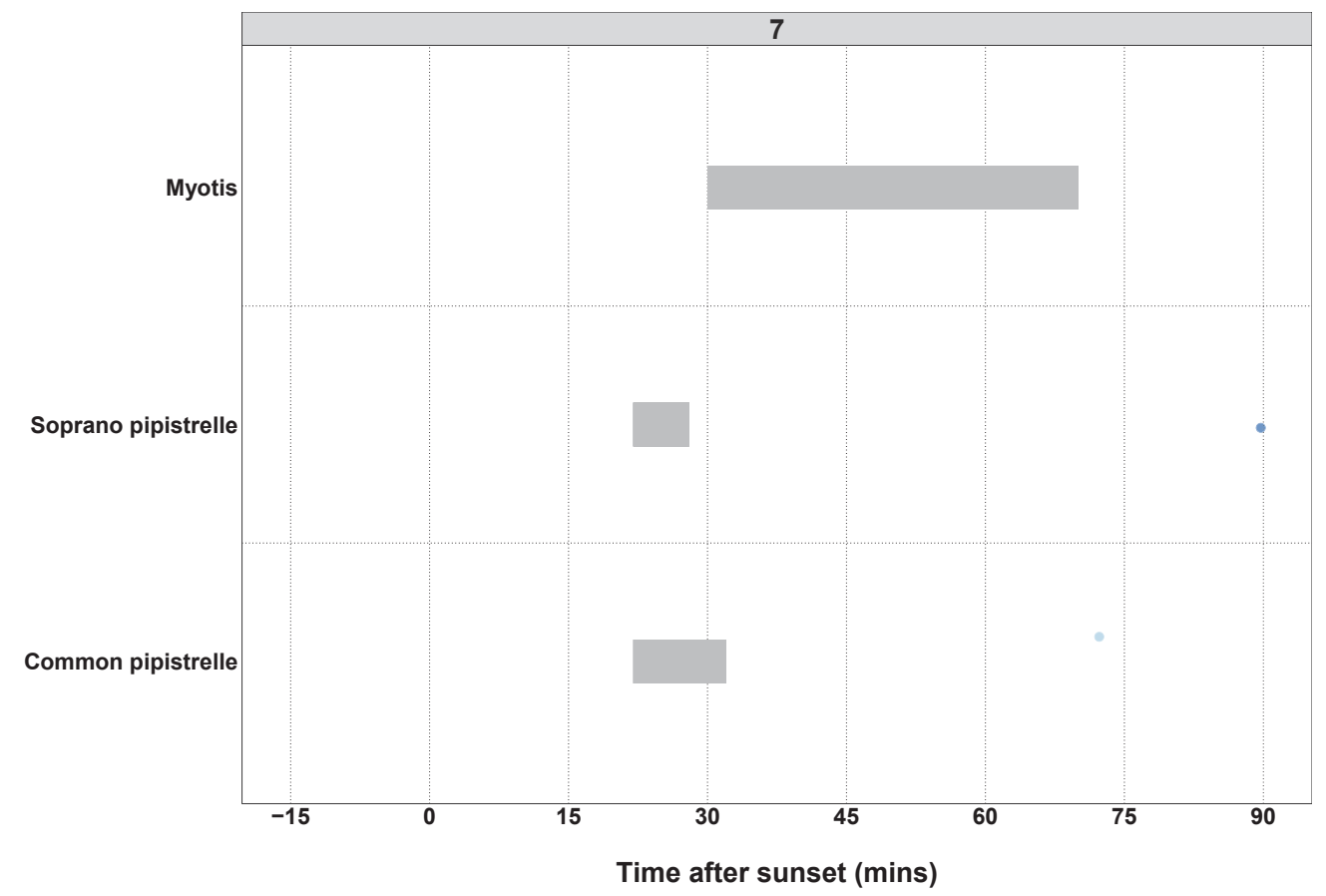
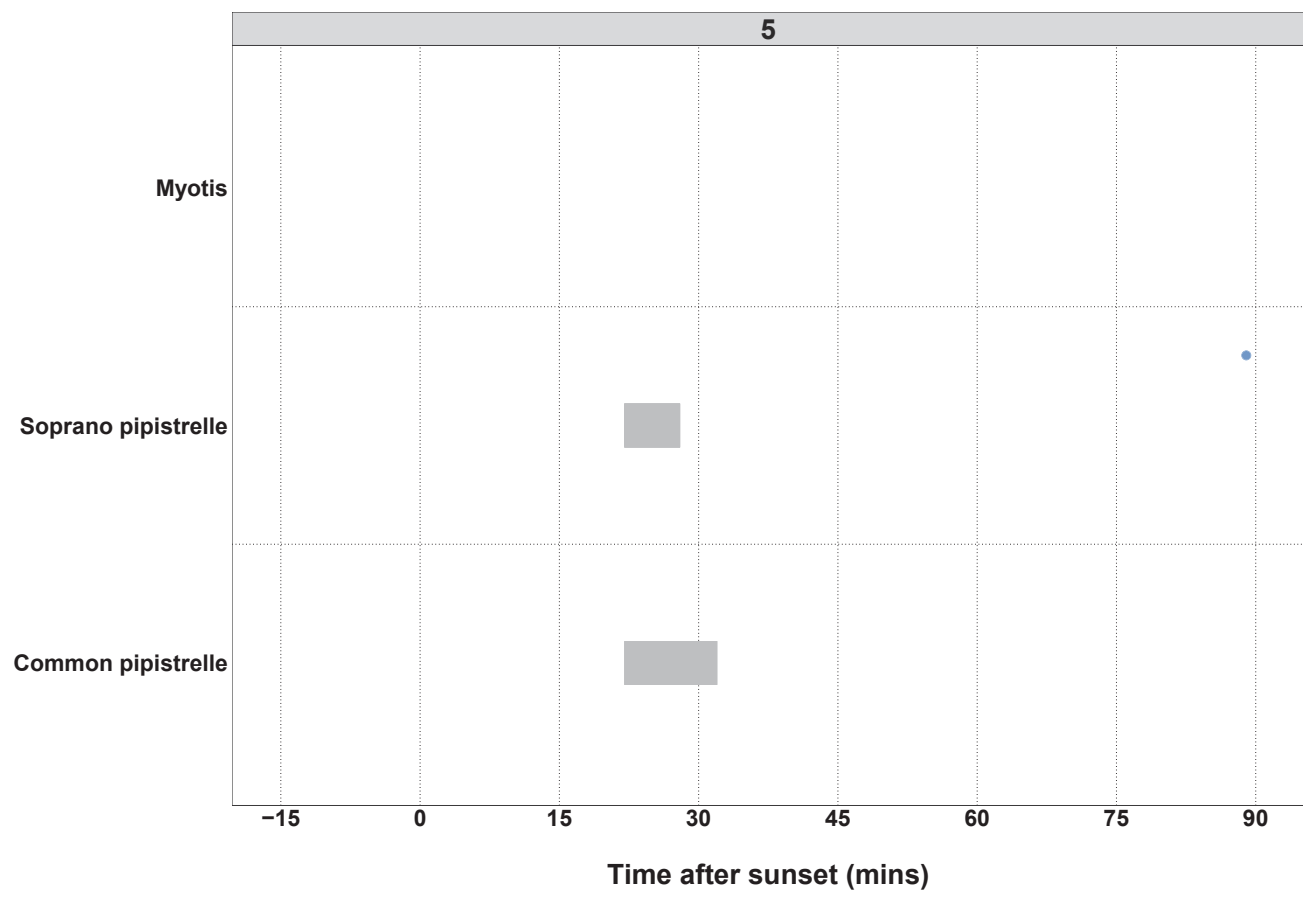


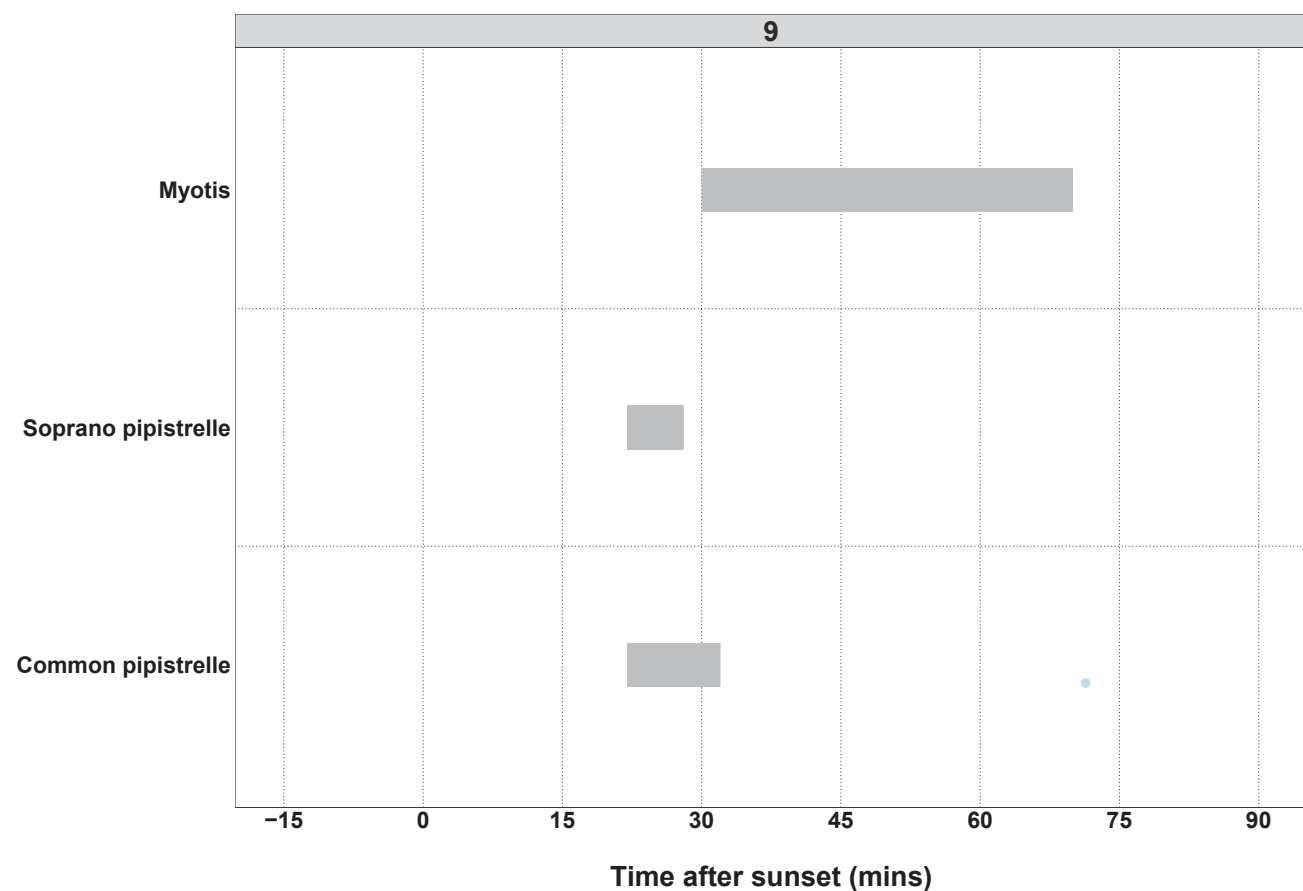












Counts of Bat Passes

All detectors

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

Species	Passes (No.)	Percentage of total (%)
Common pipistrelle	79	16.4
Soprano pipistrelle	371	76.8
Myotis	33	6.8
Total	483	100.0

Page Break

Counts of Bat Passes

Per Detector

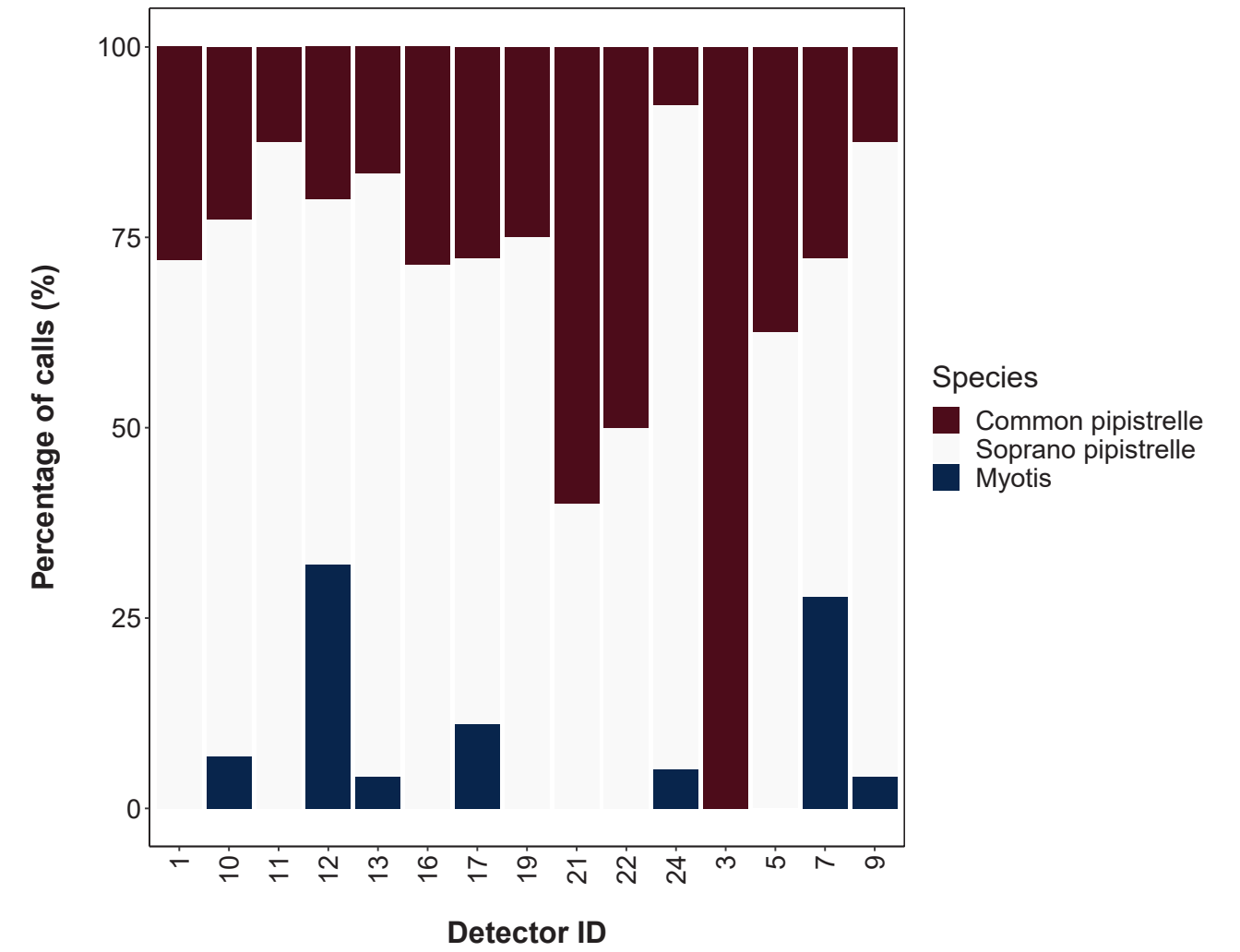
Table 15. The number of passes recorded for each species at each detector.

Species	Detector ID	Count (No)	Percentage by Detector (%)
Common pipistrelle	1	7	28.0
Common pipistrelle	10	10	22.7
Common pipistrelle	11	1	12.5
Common pipistrelle	12	5	20.0
Common pipistrelle	13	8	16.7
Common pipistrelle	16	2	28.6
Common pipistrelle	17	5	27.8
Common pipistrelle	19	2	25.0
Common pipistrelle	21	6	60.0
Common pipistrelle	22	1	50.0
Common pipistrelle	24	18	7.7
Common pipistrelle	3	3	100.0
Common pipistrelle	5	3	37.5
Common pipistrelle	7	5	27.8
Common pipistrelle	9	3	12.5
Soprano pipistrelle	1	18	72.0
Soprano pipistrelle	10	31	70.5
Soprano pipistrelle	11	7	87.5
Soprano pipistrelle	12	12	48.0
Soprano pipistrelle	13	38	79.2
Soprano pipistrelle	16	5	71.4
Soprano pipistrelle	17	11	61.1
Soprano pipistrelle	19	6	75.0
Soprano pipistrelle	21	4	40.0
Soprano pipistrelle	22	1	50.0
Soprano pipistrelle	24	205	87.2
Soprano pipistrelle	5	5	62.5
Soprano pipistrelle	7	8	44.4
Soprano pipistrelle	9	20	83.3
Myotis	10	3	6.8
Myotis	12	8	32.0

Species	Detector ID	Count (No)	Percentage by Detector (%)
Myotis	13	2	4.2
Myotis	17	2	11.1
Myotis	24	12	5.1
Myotis	7	5	27.8
Myotis	9	1	4.2

Species Composition

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



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.

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

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

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

Species	Detector ID	Median Pass Rate
Common pipistrelle	1	0.2
Common pipistrelle	10	0.2
Common pipistrelle	11	0.2
Common pipistrelle	12	0.2
Common pipistrelle	13	0.3
Common pipistrelle	16	0.2
Common pipistrelle	17	0.2
Common pipistrelle	19	0.1
Common pipistrelle	21	0.5
Common pipistrelle	22	0.2
Common pipistrelle	24	0.3
Common pipistrelle	3	0.5
Common pipistrelle	5	0.2
Common pipistrelle	7	0.2
Common pipistrelle	9	0.2
Soprano pipistrelle	1	0.3
Soprano pipistrelle	10	0.5
Soprano pipistrelle	11	0.3
Soprano pipistrelle	12	0.2
Soprano pipistrelle	13	0.5
Soprano pipistrelle	16	0.2
Soprano pipistrelle	17	0.2
Soprano pipistrelle	19	0.2
Soprano pipistrelle	21	0.3
Soprano pipistrelle	22	0.2
Soprano pipistrelle	24	0.8
Soprano pipistrelle	5	0.2
Soprano pipistrelle	7	0.3
Soprano pipistrelle	9	0.3
Myotis	10	0.2
Myotis	12	0.2
Myotis	13	0.2
Myotis	17	0.1
Myotis	24	0.3
Myotis	7	0.2
Myotis	9	0.2

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

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

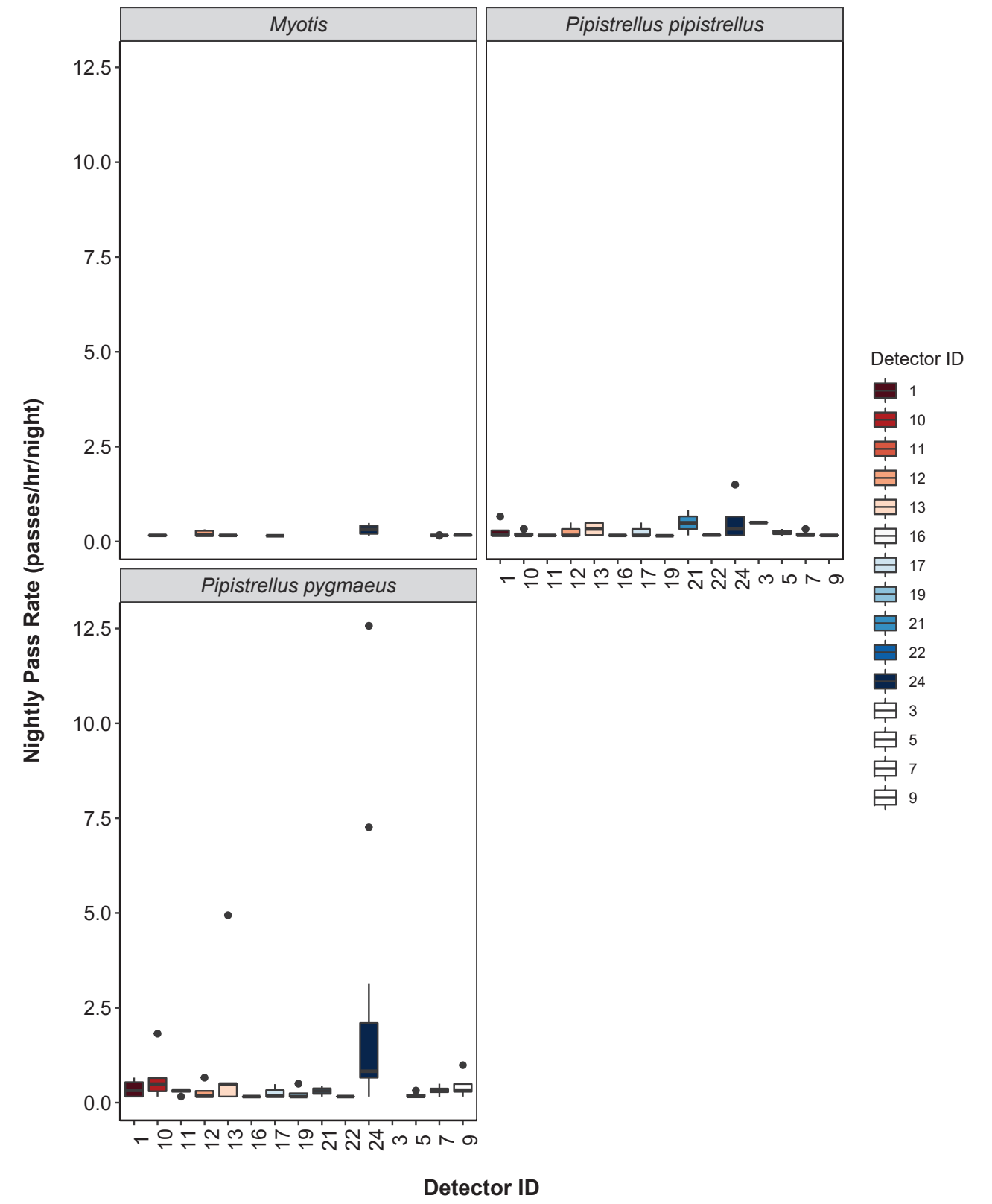
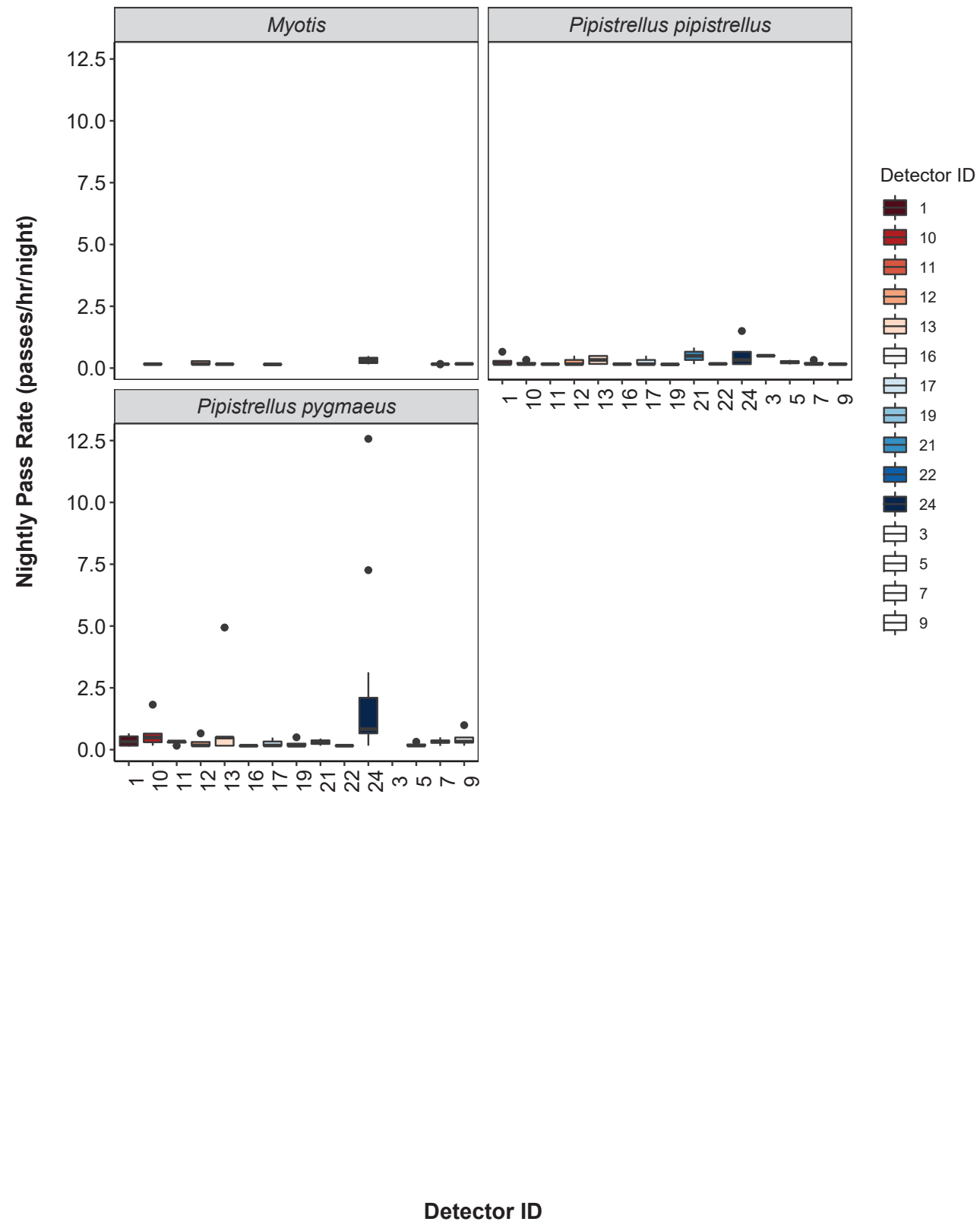
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

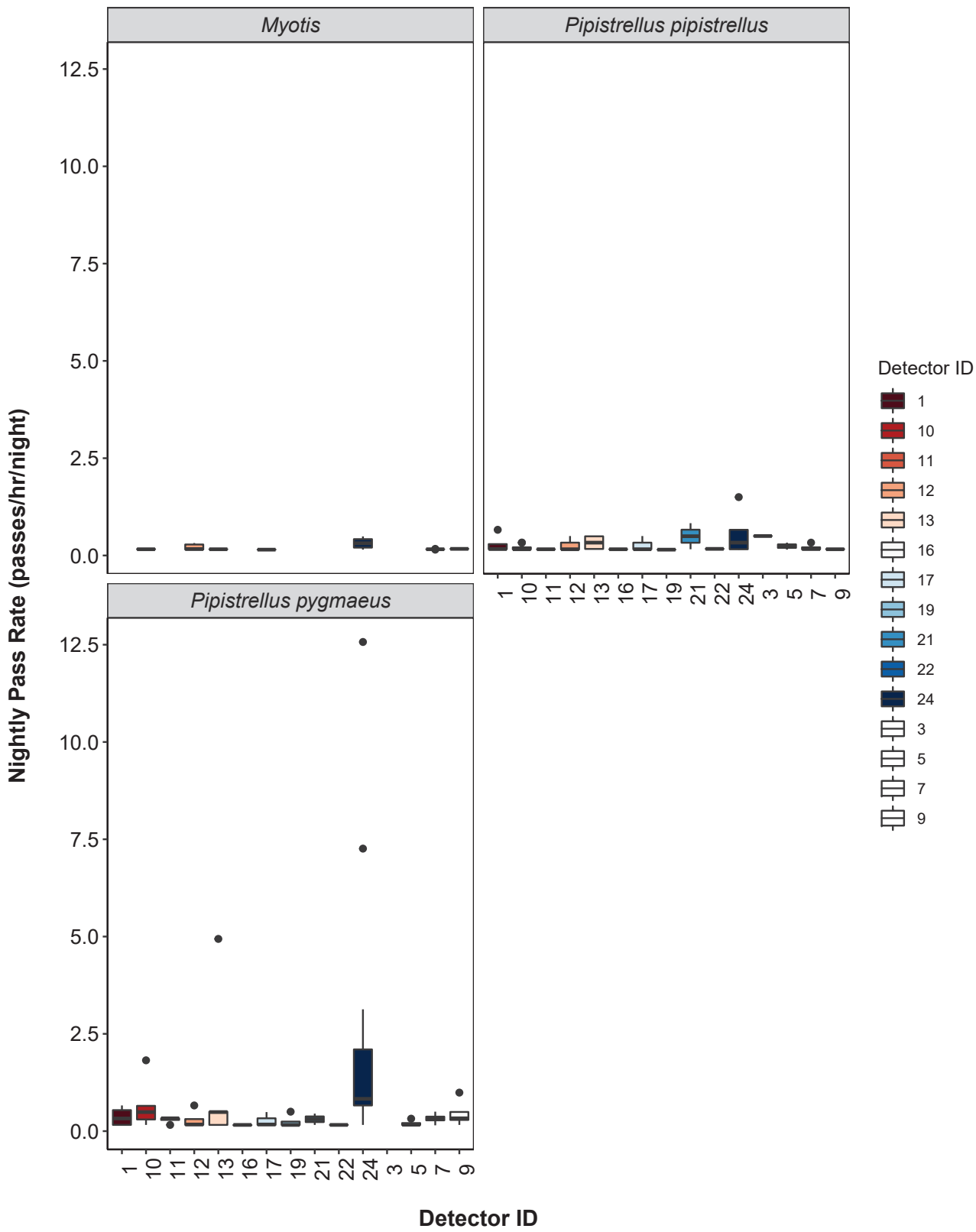
Species	Detector ID	Mean Pass Rate
Common pipistrelle	1	0.3
Common pipistrelle	10	0.2
Common pipistrelle	11	0.2
Common pipistrelle	12	0.3
Common pipistrelle	13	0.3
Common pipistrelle	16	0.2
Common pipistrelle	17	0.3
Common pipistrelle	19	0.1
Common pipistrelle	21	0.5
Common pipistrelle	22	0.2
Common pipistrelle	24	0.6
Common pipistrelle	3	0.5
Common pipistrelle	5	0.2
Common pipistrelle	7	0.2
Common pipistrelle	9	0.2
Soprano pipistrelle	1	0.4
Soprano pipistrelle	10	0.6
Soprano pipistrelle	11	0.3
Soprano pipistrelle	12	0.3
Soprano pipistrelle	13	1.2
Soprano pipistrelle	16	0.2
Soprano pipistrelle	17	0.3
Soprano pipistrelle	19	0.2
Soprano pipistrelle	21	0.3
Soprano pipistrelle	22	0.2
Soprano pipistrelle	24	2.5
Soprano pipistrelle	5	0.2
Soprano pipistrelle	7	0.3
Soprano pipistrelle	9	0.4
Myotis	10	0.2
Myotis	12	0.2
Myotis	13	0.2
Myotis	17	0.1
Myotis	24	0.3
Myotis	7	0.2
Myotis	9	0.2

Nightly Bat Passes (Bat passes per hour)

Per Detector - Figures

Figure 11. Boxplots for the number of bat passes per hour each night, for each detector. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.





SPLIT BY MONTH

Total Bat Passes per Detector, each Month

Per Detector

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

Species	Detector ID	Jun	Jul
Common pipistrelle	1	6	1
Common pipistrelle	10	6	4
Common pipistrelle	11	1	0
Common pipistrelle	12	4	1
Common pipistrelle	13	8	0
Common pipistrelle	16	1	1
Common pipistrelle	17	3	2
Common pipistrelle	19	0	2
Common pipistrelle	21	5	1
Common pipistrelle	22	1	0
Common pipistrelle	24	6	12
Common pipistrelle	3	3	0
Common pipistrelle	5	2	1
Common pipistrelle	7	3	2
Common pipistrelle	9	2	1
Soprano pipistrelle	1	14	4
Soprano pipistrelle	10	24	7
Soprano pipistrelle	11	6	1
Soprano pipistrelle	12	7	5
Soprano pipistrelle	13	37	1
Soprano pipistrelle	16	3	2
Soprano pipistrelle	17	9	2
Soprano pipistrelle	19	5	1
Soprano pipistrelle	21	0	4
Soprano pipistrelle	22	0	1
Soprano pipistrelle	24	42	163
Soprano pipistrelle	5	2	3
Soprano pipistrelle	7	5	3
Soprano pipistrelle	9	19	1
Myotis	10	2	1
Myotis	12	1	7
Myotis	13	1	1
Myotis	17	0	2
Myotis	24	6	6
Myotis	7	3	2
Myotis	9	1	0

Survey Effort

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

Month	Detector ID	No. of Survey Nights
Jun	1	4
Jun	10	6
Jun	11	3
Jun	12	5
Jun	13	5
Jun	16	3
Jun	17	5
Jun	19	3
Jun	21	1
Jun	22	1
Jun	24	8
Jun	3	1
Jun	5	3
Jun	7	4
Jun	9	7
Jul	1	4
Jul	10	5
Jul	11	1
Jul	12	6
Jul	13	2
Jul	16	3
Jul	17	5
Jul	19	3
Jul	21	2
Jul	22	1
Jul	24	5
Jul	5	2
Jul	7	3
Jul	9	1

Nightly Bat Pass Rate for each Month

Median Per Detector

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

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

Species	Detector ID	Jun	Jul
Common pipistrelle	1	0.2	0.2
Common pipistrelle	10	0.2	0.2
Common pipistrelle	11	0.2	NA
Common pipistrelle	12	0.3	0.1
Common pipistrelle	13	0.3	NA
Common pipistrelle	16	0.2	0.2
Common pipistrelle	17	0.5	0.2
Common pipistrelle	19	NA	0.1
Common pipistrelle	21	0.8	0.2
Common pipistrelle	22	0.2	NA
Common pipistrelle	24	0.5	0.2
Common pipistrelle	3	0.5	NA
Common pipistrelle	5	0.3	0.1
Common pipistrelle	7	0.2	0.2
Common pipistrelle	9	0.2	0.2
Soprano pipistrelle	1	0.6	0.2
Soprano pipistrelle	10	0.5	0.3
Soprano pipistrelle	11	0.3	0.2
Soprano pipistrelle	12	0.2	0.3
Soprano pipistrelle	13	0.5	0.1
Soprano pipistrelle	16	0.2	0.1
Soprano pipistrelle	17	0.3	0.2
Soprano pipistrelle	19	0.2	0.1
Soprano pipistrelle	21	NA	0.3
Soprano pipistrelle	22	NA	0.2
Soprano pipistrelle	24	0.7	3.1
Soprano pipistrelle	5	0.2	0.2
Soprano pipistrelle	7	0.4	0.2
Soprano pipistrelle	9	0.3	0.2
Myotis	10	0.2	0.2
Myotis	12	0.2	0.2
Myotis	13	0.2	0.2
Myotis	17	NA	0.1
Myotis	24	0.3	0.3
Myotis	7	0.2	0.2
Myotis	9	0.2	NA

Nightly Bat Pass Rate for each Month

Mean per Detector

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

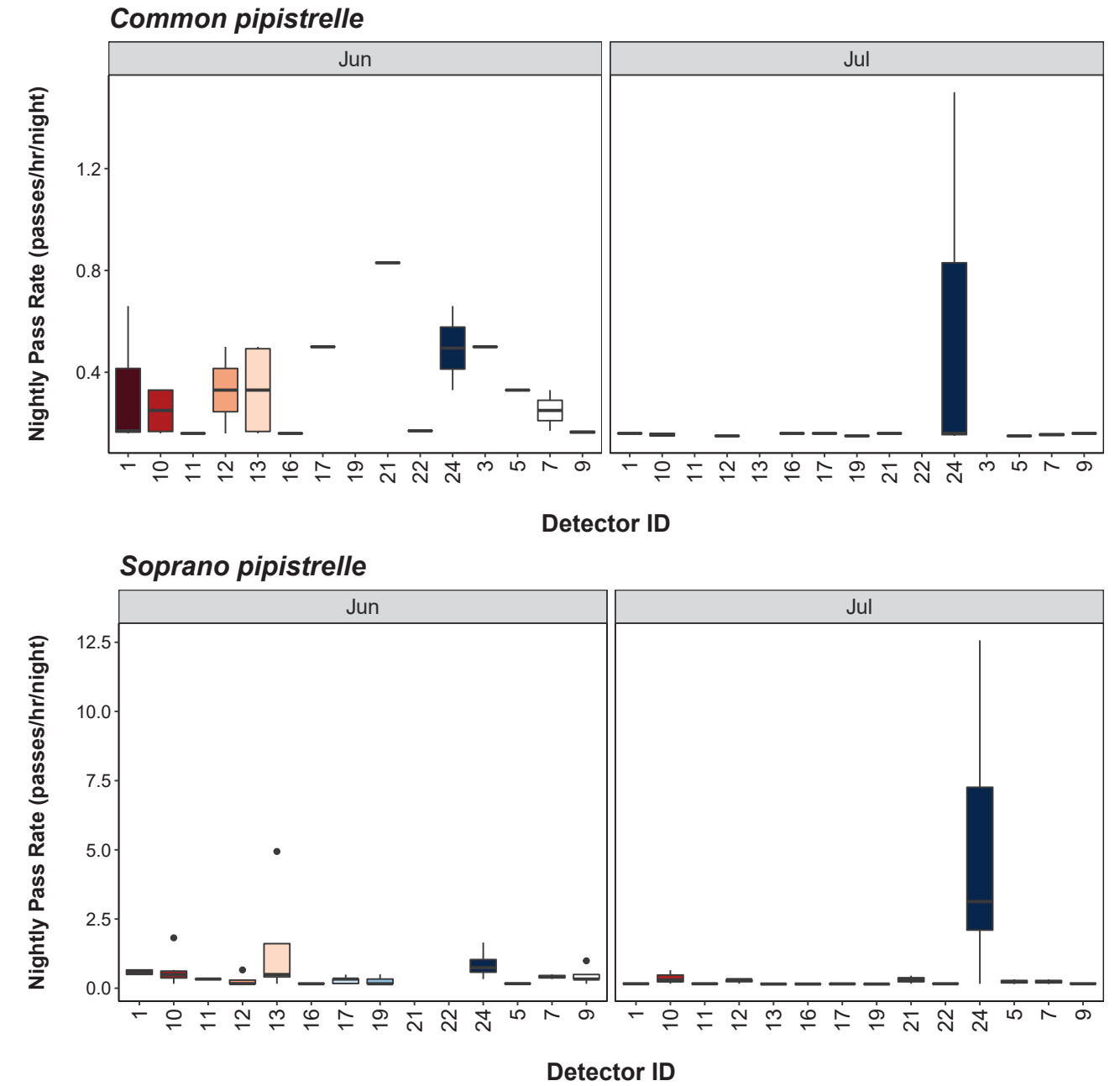
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

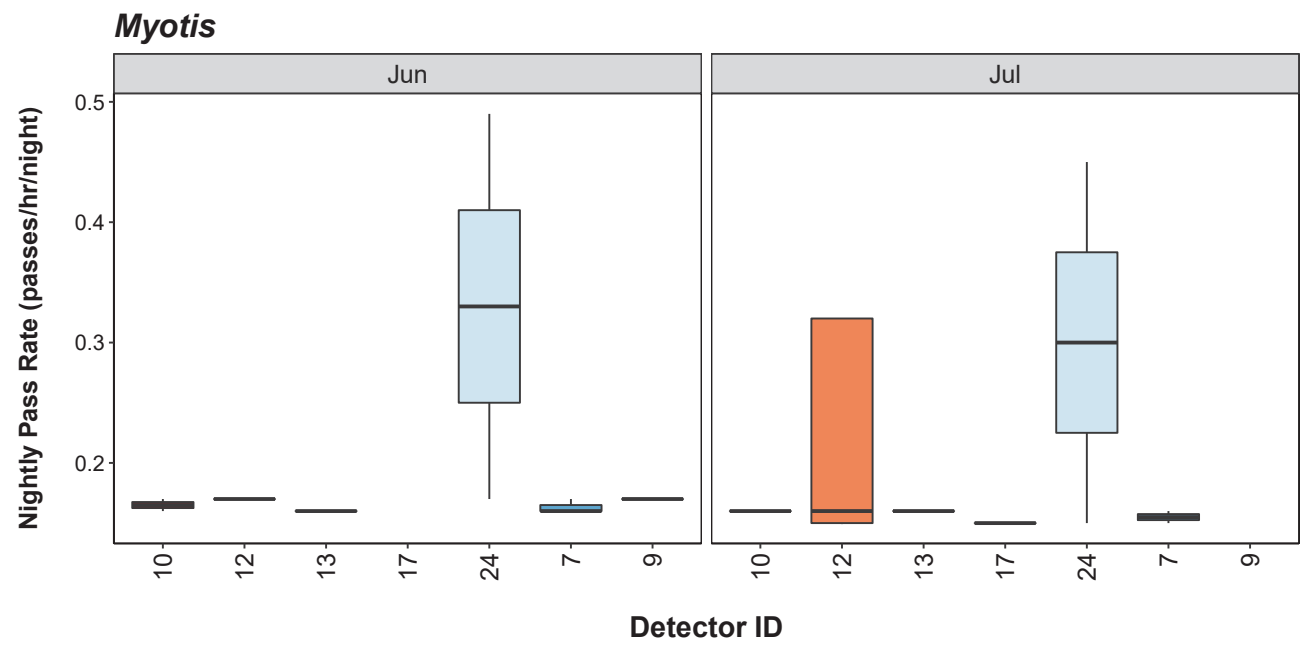
Species	Detector ID	Jun	Jul
Common pipistrelle	1	0.3	0.2
Common pipistrelle	10	0.2	0.2
Common pipistrelle	11	0.2	NA
Common pipistrelle	12	0.3	0.1
Common pipistrelle	13	0.3	NA
Common pipistrelle	16	0.2	0.2
Common pipistrelle	17	0.5	0.2
Common pipistrelle	19	NA	0.1
Common pipistrelle	21	0.8	0.2
Common pipistrelle	22	0.2	NA
Common pipistrelle	24	0.5	0.6
Common pipistrelle	3	0.5	NA
Common pipistrelle	5	0.3	0.1
Common pipistrelle	7	0.2	0.2
Common pipistrelle	9	0.2	0.2
Soprano pipistrelle	1	0.6	0.2
Soprano pipistrelle	10	0.7	0.4
Soprano pipistrelle	11	0.3	0.2
Soprano pipistrelle	12	0.3	0.3
Soprano pipistrelle	13	1.5	0.1
Soprano pipistrelle	16	0.2	0.1
Soprano pipistrelle	17	0.3	0.2
Soprano pipistrelle	19	0.3	0.1
Soprano pipistrelle	21	NA	0.3
Soprano pipistrelle	22	NA	0.2
Soprano pipistrelle	24	0.9	5.0
Soprano pipistrelle	5	0.2	0.2
Soprano pipistrelle	7	0.4	0.2
Soprano pipistrelle	9	0.4	0.2
Myotis	10	0.2	0.2
Myotis	12	0.2	0.2
Myotis	13	0.2	0.2
Myotis	17	NA	0.1
Myotis	24	0.3	0.3
Myotis	7	0.2	0.2
Myotis	9	0.2	NA

Nightly Bat Pass Rate for each Month

Per Detector - Figures

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





Bat Activity per Detector Location

Figure 13. Detector ID reference:

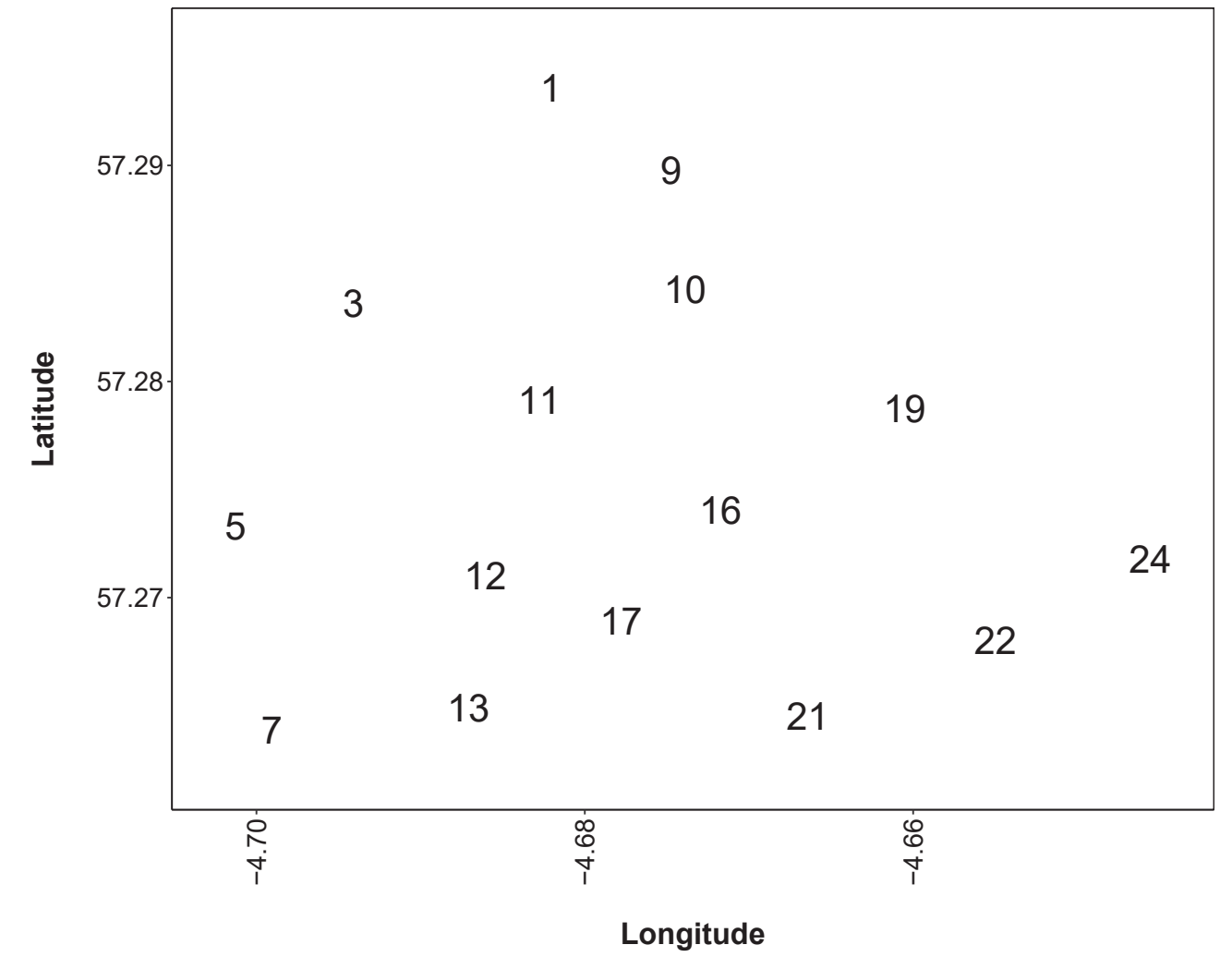


Figure 14. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

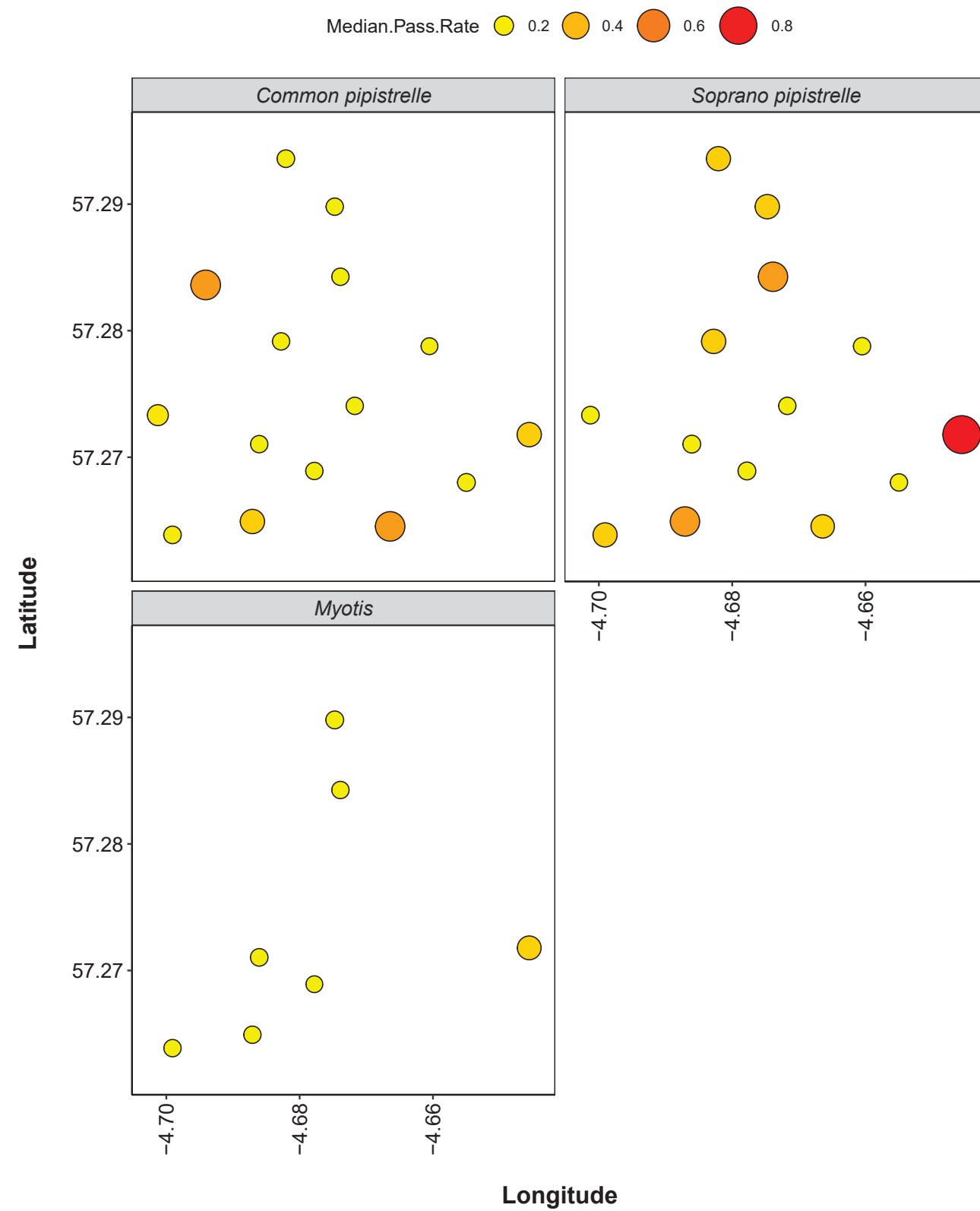
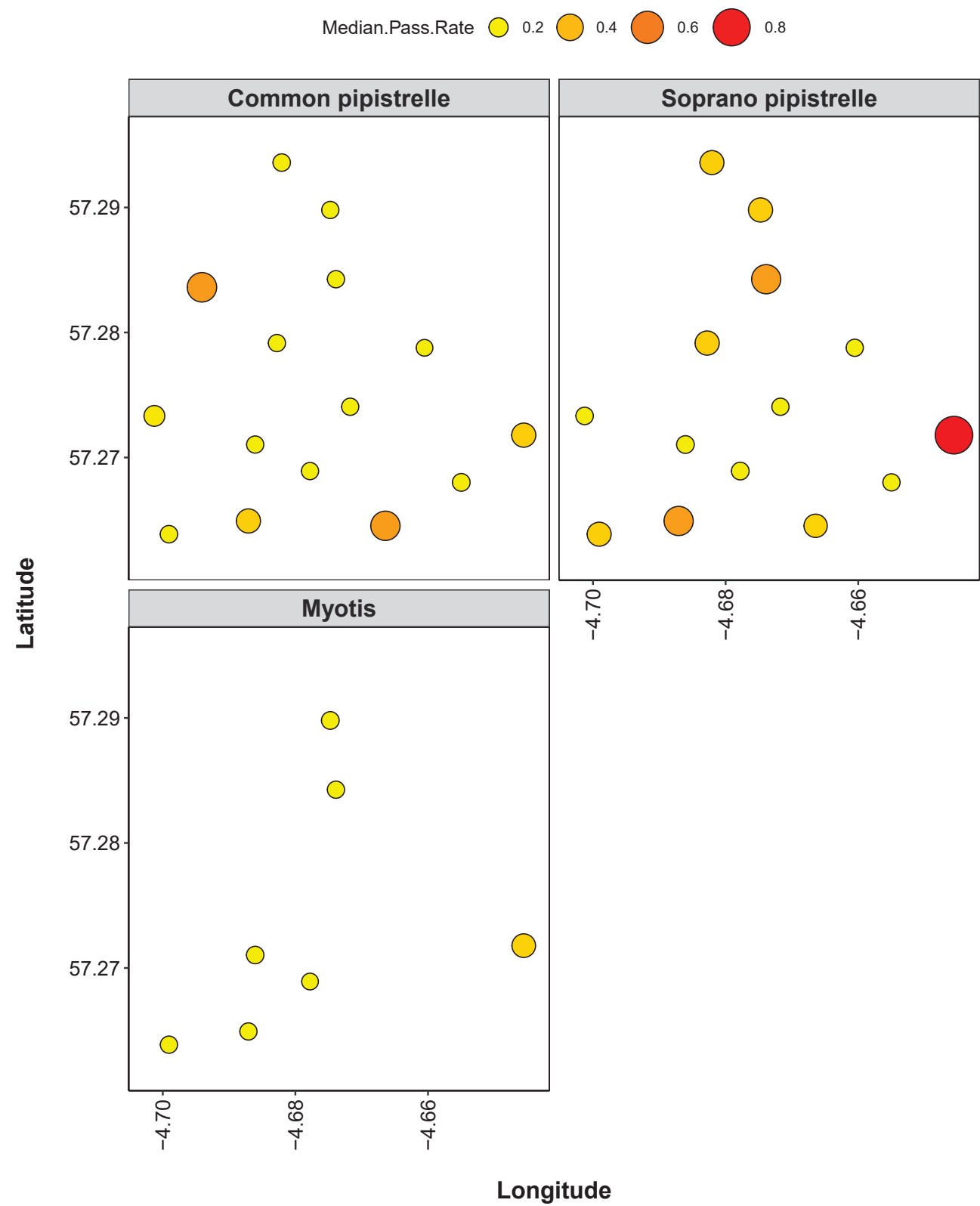
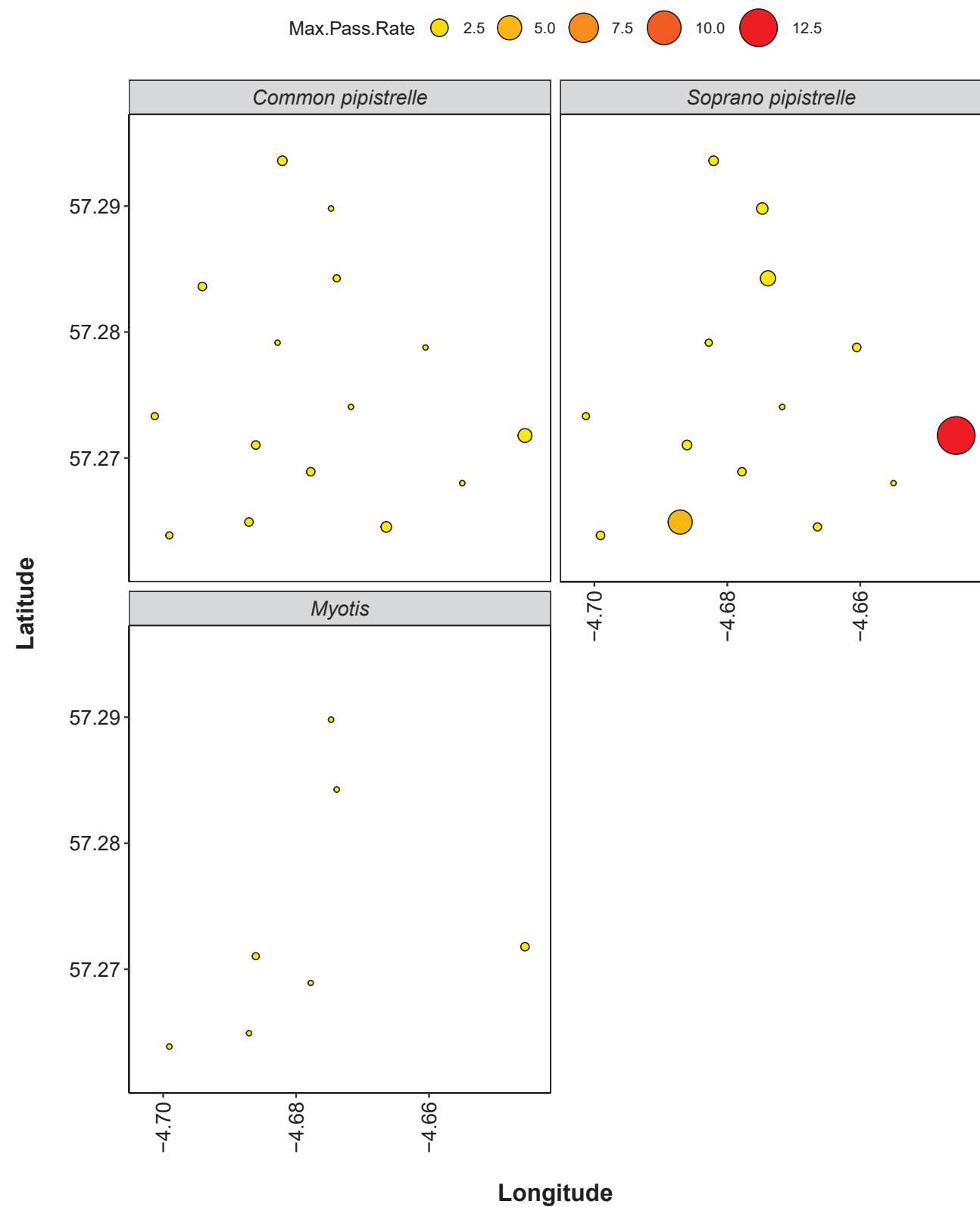


Figure 15. Maximum Nightly Pass Rate (bat passes/hr/night) recorded in a single night throughout the survey period - represented by the size and colour of the point at each detector location.



PART 2B: Includes absences

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

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

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

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

Species	Detector ID	Median Pass Rate
Soprano pipistrelle	9	0.3

Species	Detector ID	Median Pass Rate
Common pipistrelle	1	0.1
Common pipistrelle	10	0.2
Common pipistrelle	11	0.0
Common pipistrelle	12	0.0
Common pipistrelle	13	0.2
Common pipistrelle	16	0.0
Common pipistrelle	17	0.0
Common pipistrelle	19	0.0
Common pipistrelle	21	0.2
Common pipistrelle	22	0.1
Common pipistrelle	24	0.0
Common pipistrelle	3	0.5
Common pipistrelle	5	0.0
Common pipistrelle	7	0.1
Common pipistrelle	9	0.0
Myotis	1	0.0
Myotis	10	0.0
Myotis	11	0.0
Myotis	12	0.1
Myotis	13	0.0
Myotis	16	0.0
Myotis	17	0.0
Myotis	19	0.0
Myotis	21	0.0
Myotis	22	0.0
Myotis	24	0.0
Myotis	3	0.0
Myotis	5	0.0
Myotis	7	0.2
Myotis	9	0.0
Soprano pipistrelle	1	0.3
Soprano pipistrelle	10	0.3
Soprano pipistrelle	11	0.3
Soprano pipistrelle	12	0.2
Soprano pipistrelle	13	0.2
Soprano pipistrelle	16	0.2
Soprano pipistrelle	17	0.2
Soprano pipistrelle	19	0.2
Soprano pipistrelle	21	0.2
Soprano pipistrelle	22	0.1
Soprano pipistrelle	24	0.8
Soprano pipistrelle	3	0.0
Soprano pipistrelle	5	0.2
Soprano pipistrelle	7	0.1

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

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

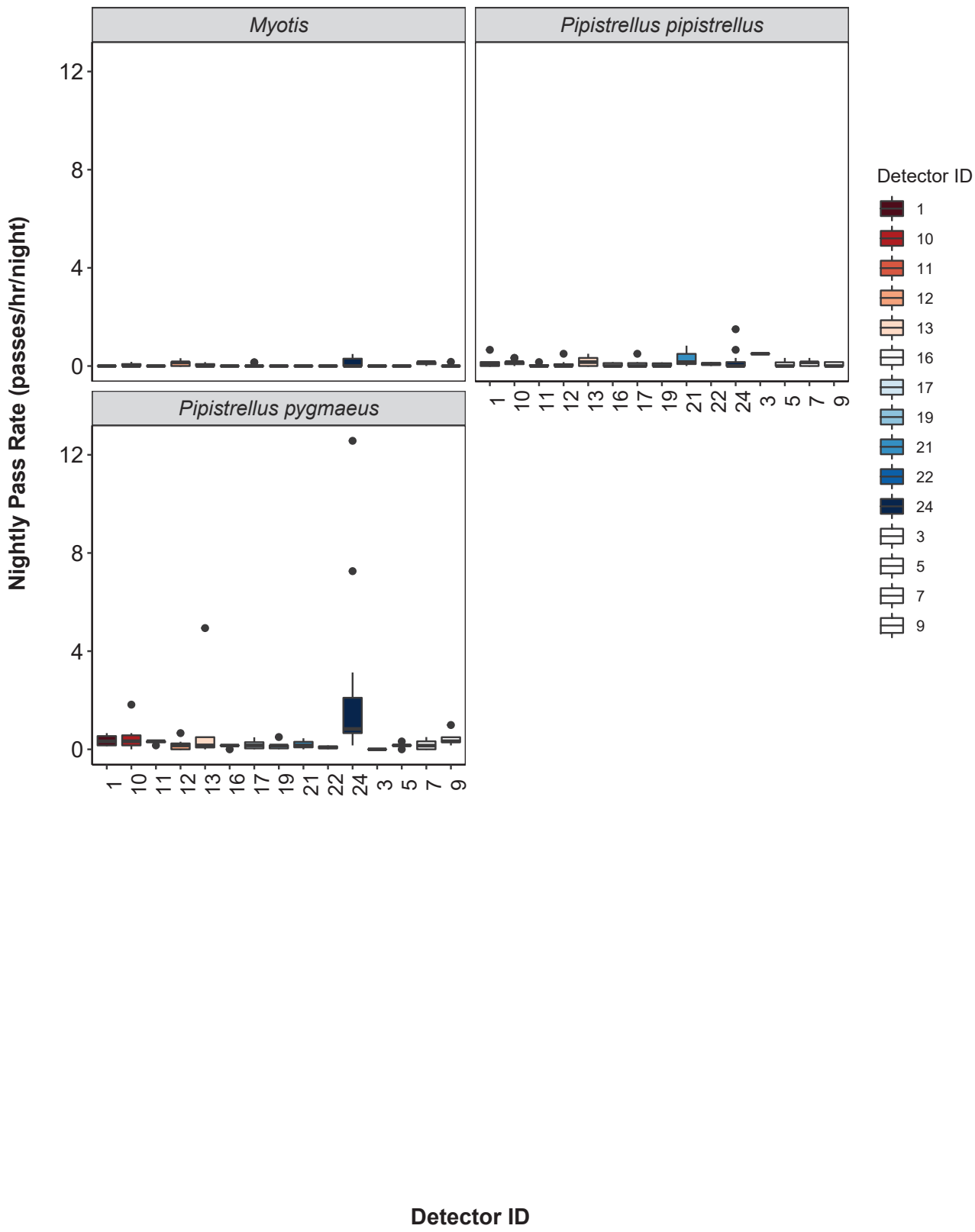
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Mean Pass Rate
Common pipistrelle	1	0.1
Common pipistrelle	10	0.1
Common pipistrelle	11	0.0
Common pipistrelle	12	0.1
Common pipistrelle	13	0.2
Common pipistrelle	16	0.1
Common pipistrelle	17	0.1
Common pipistrelle	19	0.0
Common pipistrelle	21	0.3
Common pipistrelle	22	0.1
Common pipistrelle	24	0.2
Common pipistrelle	3	0.5
Common pipistrelle	5	0.1
Common pipistrelle	7	0.1
Common pipistrelle	9	0.1
Myotis	1	0.0
Myotis	10	0.0
Myotis	11	0.0
Myotis	12	0.1
Myotis	13	0.0
Myotis	16	0.0
Myotis	17	0.0
Myotis	19	0.0
Myotis	21	0.0
Myotis	22	0.0
Myotis	24	0.1
Myotis	3	0.0
Myotis	5	0.0
Myotis	7	0.1
Myotis	9	0.0
Soprano pipistrelle	1	0.4
Soprano pipistrelle	10	0.5
Soprano pipistrelle	11	0.3
Soprano pipistrelle	12	0.2
Soprano pipistrelle	13	0.9
Soprano pipistrelle	16	0.1
Soprano pipistrelle	17	0.2
Soprano pipistrelle	19	0.2
Soprano pipistrelle	21	0.2
Soprano pipistrelle	22	0.1
Soprano pipistrelle	24	2.5
Soprano pipistrelle	3	0.0
Soprano pipistrelle	5	0.2
Soprano pipistrelle	7	0.2
Soprano pipistrelle	9	0.4

Nightly Bat Passes (Bat passes per hour)

Per Detector - Figures

Figure 16. Figures show boxplots for the number of bat passes per hour each night, for each detector. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.



Survey Effort

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

Month	Detector ID	No of Survey Nights
Jun	1	4
Jun	10	6
Jun	11	3
Jun	12	5
Jun	13	5
Jun	16	3
Jun	17	5
Jun	19	3
Jun	21	1
Jun	22	1
Jun	24	8
Jun	3	1
Jun	5	3
Jun	7	4
Jun	9	7
Jul	1	4
Jul	10	5
Jul	11	1
Jul	12	6
Jul	13	2
Jul	16	3
Jul	17	5
Jul	19	3
Jul	21	2
Jul	22	1
Jul	24	5
Jul	5	2
Jul	7	3
Jul	9	1

Nightly Bat Pass Rate for each Month

Median Per Detector

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

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

Species	Detector ID	Jul	Jun
Common pipistrelle	1	0.0	0.2
Common pipistrelle	10	0.1	0.2
Common pipistrelle	11	0.0	0.0
Common pipistrelle	12	0.0	0.0
Common pipistrelle	13	0.0	0.2
Common pipistrelle	16	0.0	0.0
Common pipistrelle	17	0.0	0.0
Common pipistrelle	19	0.1	0.0
Common pipistrelle	21	0.1	0.8
Common pipistrelle	22	0.0	0.2
Common pipistrelle	24	0.1	0.0
Common pipistrelle	3	NA	0.5
Common pipistrelle	5	0.1	0.0
Common pipistrelle	7	0.1	0.1
Common pipistrelle	9	0.2	0.0
Myotis	1	0.0	0.0
Myotis	10	0.0	0.0
Myotis	11	0.0	0.0
Myotis	12	0.2	0.0
Myotis	13	0.1	0.0
Myotis	16	0.0	0.0
Myotis	17	0.0	0.0
Myotis	19	0.0	0.0
Myotis	21	0.0	0.0
Myotis	22	0.0	0.0
Myotis	24	0.1	0.0
Myotis	3	NA	0.0
Myotis	5	0.0	0.0
Myotis	7	0.1	0.2
Myotis	9	0.0	0.0
Soprano pipistrelle	1	0.2	0.6
Soprano pipistrelle	10	0.2	0.5
Soprano pipistrelle	11	0.2	0.3
Soprano pipistrelle	12	0.1	0.2
Soprano pipistrelle	13	0.1	0.5
Soprano pipistrelle	16	0.1	0.2
Soprano pipistrelle	17	0.0	0.3
Soprano pipistrelle	19	0.0	0.2
Soprano pipistrelle	21	0.3	0.0
Soprano pipistrelle	22	0.2	0.0
Soprano pipistrelle	24	3.1	0.7
Soprano pipistrelle	3	NA	0.0
Soprano pipistrelle	5	0.2	0.2
Soprano pipistrelle	7	0.1	0.2

Species	Detector ID	Jul	Jun
Soprano pipistrelle	9	0.2	0.3

Nightly Bat Pass Rate for each Month

Mean per Detector

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

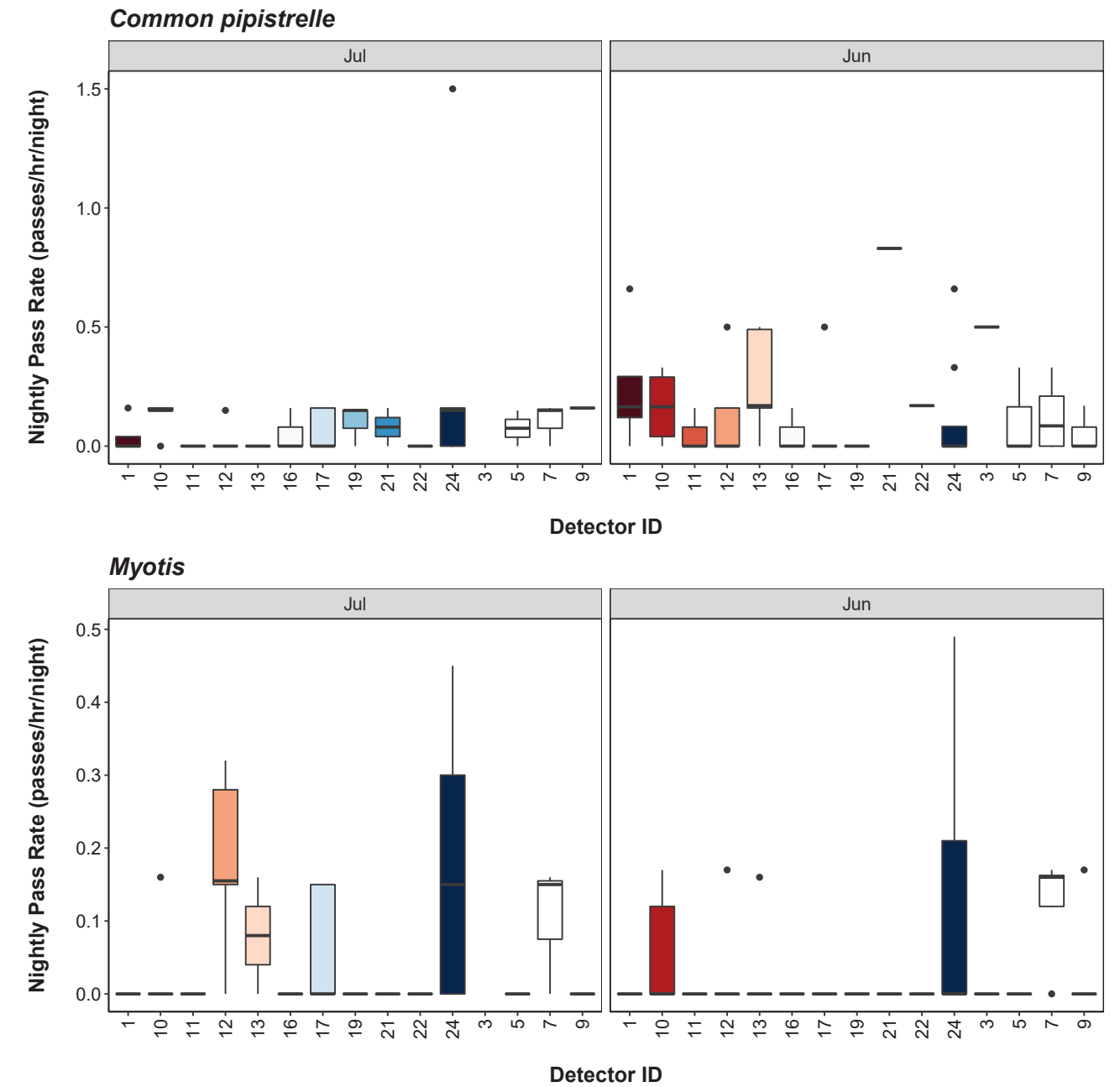
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

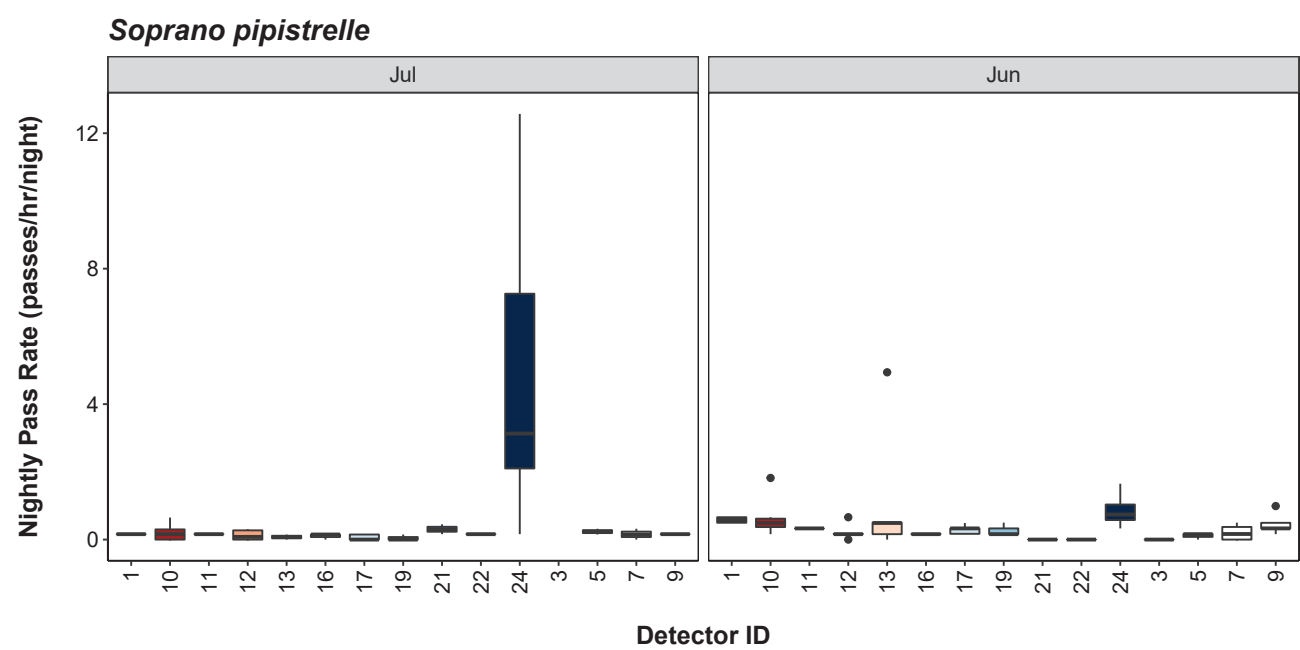
Species	Detector ID	Jul	Jun
Common pipistrelle	1	0.0	0.2
Common pipistrelle	10	0.1	0.2
Common pipistrelle	11	0.0	0.1
Common pipistrelle	12	0.0	0.1
Common pipistrelle	13	0.0	0.3
Common pipistrelle	16	0.1	0.1
Common pipistrelle	17	0.1	0.1
Common pipistrelle	19	0.1	0.0
Common pipistrelle	21	0.1	0.8
Common pipistrelle	22	0.0	0.2
Common pipistrelle	24	0.4	0.1
Common pipistrelle	3	NA	0.5
Common pipistrelle	5	0.1	0.1
Common pipistrelle	7	0.1	0.1
Common pipistrelle	9	0.2	0.0
Myotis	1	0.0	0.0
Myotis	10	0.0	0.1
Myotis	11	0.0	0.0
Myotis	12	0.2	0.0
Myotis	13	0.1	0.0
Myotis	16	0.0	0.0
Myotis	17	0.1	0.0
Myotis	19	0.0	0.0
Myotis	21	0.0	0.0
Myotis	22	0.0	0.0
Myotis	24	0.2	0.1
Myotis	3	NA	0.0
Myotis	5	0.0	0.0
Myotis	7	0.1	0.1
Myotis	9	0.0	0.0
Soprano pipistrelle	1	0.2	0.6
Soprano pipistrelle	10	0.2	0.7
Soprano pipistrelle	11	0.2	0.3
Soprano pipistrelle	12	0.1	0.2
Soprano pipistrelle	13	0.1	1.2
Soprano pipistrelle	16	0.1	0.2
Soprano pipistrelle	17	0.1	0.3
Soprano pipistrelle	19	0.0	0.3
Soprano pipistrelle	21	0.3	0.0
Soprano pipistrelle	22	0.2	0.0
Soprano pipistrelle	24	5.0	0.9
Soprano pipistrelle	3	NA	0.0
Soprano pipistrelle	5	0.2	0.1
Soprano pipistrelle	7	0.2	0.2
Soprano pipistrelle	9	0.2	0.4

Nightly Bat Pass Rate for each Month

Per Detector - Figures

Figure 17. Figures show boxplots for the number of bat passes per hour by detector, for each month. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.





Bat Activity per Detector Location

Figure 18. Detector ID reference:

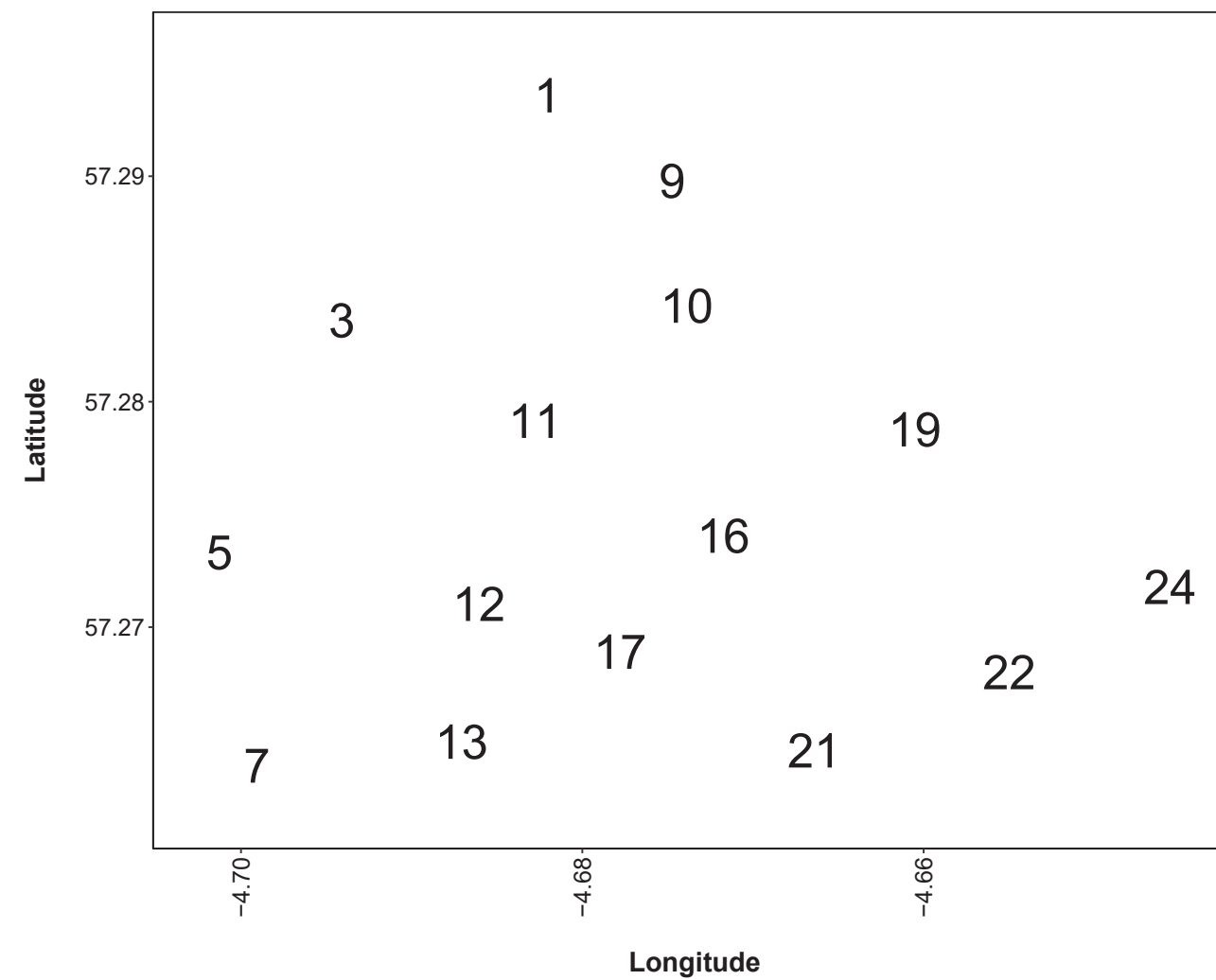


Figure 19. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

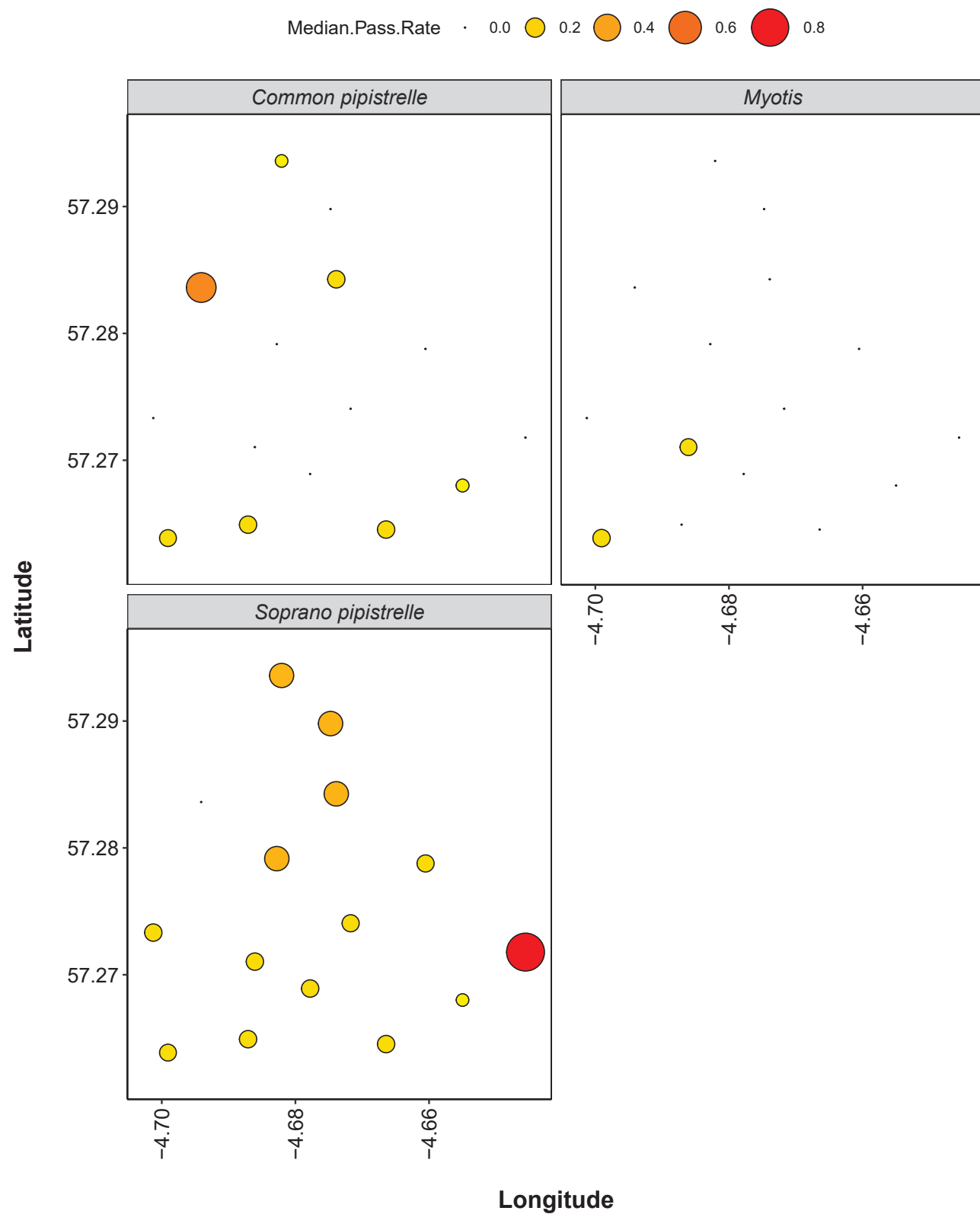
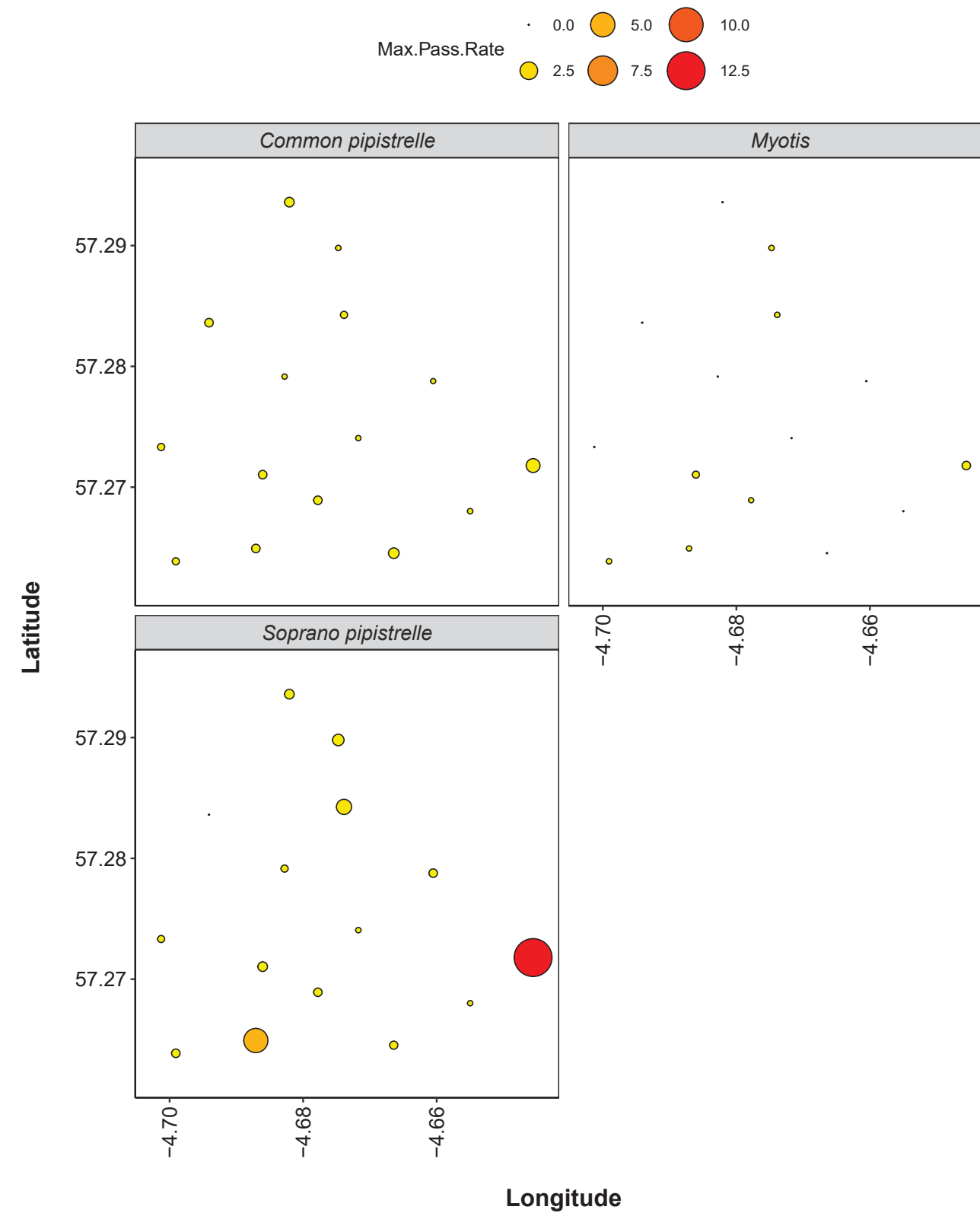


Figure 20. Maximum Nightly Pass Rate (bat passes/hr/night) recorded in a single night throughout the survey period - represented by the size and colour of the point at each detector location.



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

Bat Activity Analysis

Site Name: Loch Liath

Author: Martin Arthur

2022-09-28 12:54:05

latlon	date	Detector ID	Latitude	Longitude
57.29359_-4.68206	15/09/2020	1	57.29359	-4.68206
57.29359_-4.68206	05/10/2020	1	57.29359	-4.68206
57.27406_-4.67173	18/09/2020	16	57.27406	-4.67173
57.28426_-4.67388	16/09/2020	10	57.28426	-4.67388
57.28426_-4.67388	19/09/2020	10	57.28426	-4.67388
57.27179_-4.64556	20/09/2020	24	57.27179	-4.64556
57.2898_-4.67473	17/09/2020	9	57.28980	-4.67473
57.2898_-4.67473	20/09/2020	9	57.28980	-4.67473
57.28362_-4.69409	18/09/2020	3	57.28362	-4.69409
57.27179_-4.64556	21/09/2020	24	57.27179	-4.64556

Summary

The geographic filter was: **Region** The time filter was: **+/- 1 month from survey start date**

Bats were detected on **9** nights between **2020-09-14** and **2020-10-05**, using **14** static bat detectors. Throughout this period **5** species were recorded. **Table 1.** Detectors were placed at the following locations:

latlon	date	Detector ID	Latitude	Longitude
57.26046_-4.64349	18/09/2020	26	57.26046	-4.64349
57.27333_-4.70127	18/09/2020	5	57.27333	-4.70127
57.26386_-4.69907	15/09/2020	7	57.26386	-4.69907
57.26386_-4.69907	17/09/2020	7	57.26386	-4.69907
57.26386_-4.69907	19/09/2020	7	57.26386	-4.69907
57.26386_-4.69907	18/09/2020	7	57.26386	-4.69907
57.26386_-4.69907	14/09/2020	7	57.26386	-4.69907
57.26492_-4.68708	18/09/2020	13	57.26492	-4.68708
57.26492_-4.68708	15/09/2020	13	57.26492	-4.68708
57.26492_-4.68708	16/09/2020	13	57.26492	-4.68708
57.26492_-4.68708	19/09/2020	13	57.26492	-4.68708
57.26492_-4.68708	14/09/2020	13	57.26492	-4.68708
57.26492_-4.68708	17/09/2020	13	57.26492	-4.68708
57.26892_-4.67779	19/09/2020	17	57.26892	-4.67779
57.26892_-4.67779	15/09/2020	17	57.26892	-4.67779
57.26892_-4.67779	18/09/2020	17	57.26892	-4.67779
57.26892_-4.67779	20/09/2020	17	57.26892	-4.67779
57.26454_-4.66642	18/09/2020	21	57.26454	-4.66642
57.29359_-4.68206	16/09/2020	1	57.29359	-4.68206
57.26801_-4.65499	18/09/2020	22	57.26801	-4.65499
57.26801_-4.65499	15/09/2020	22	57.26801	-4.65499
57.28426_-4.67388	15/09/2020	10	57.28426	-4.67388
57.28426_-4.67388	18/09/2020	10	57.28426	-4.67388
57.28426_-4.67388	17/09/2020	10	57.28426	-4.67388
57.27878_-4.66052	18/09/2020	19	57.27878	-4.66052
57.27179_-4.64556	15/09/2020	24	57.27179	-4.64556
57.27179_-4.64556	18/09/2020	24	57.27179	-4.64556
57.27179_-4.64556	19/09/2020	24	57.27179	-4.64556
57.27179_-4.64556	16/09/2020	24	57.27179	-4.64556
57.27179_-4.64556	17/09/2020	24	57.27179	-4.64556
57.2898_-4.67473	15/09/2020	9	57.28980	-4.67473
57.2898_-4.67473	18/09/2020	9	57.28980	-4.67473
57.27333_-4.70127	20/09/2020	5	57.27333	-4.70127
57.26892_-4.67779	16/09/2020	17	57.26892	-4.67779
57.29359_-4.68206	18/09/2020	1	57.29359	-4.68206

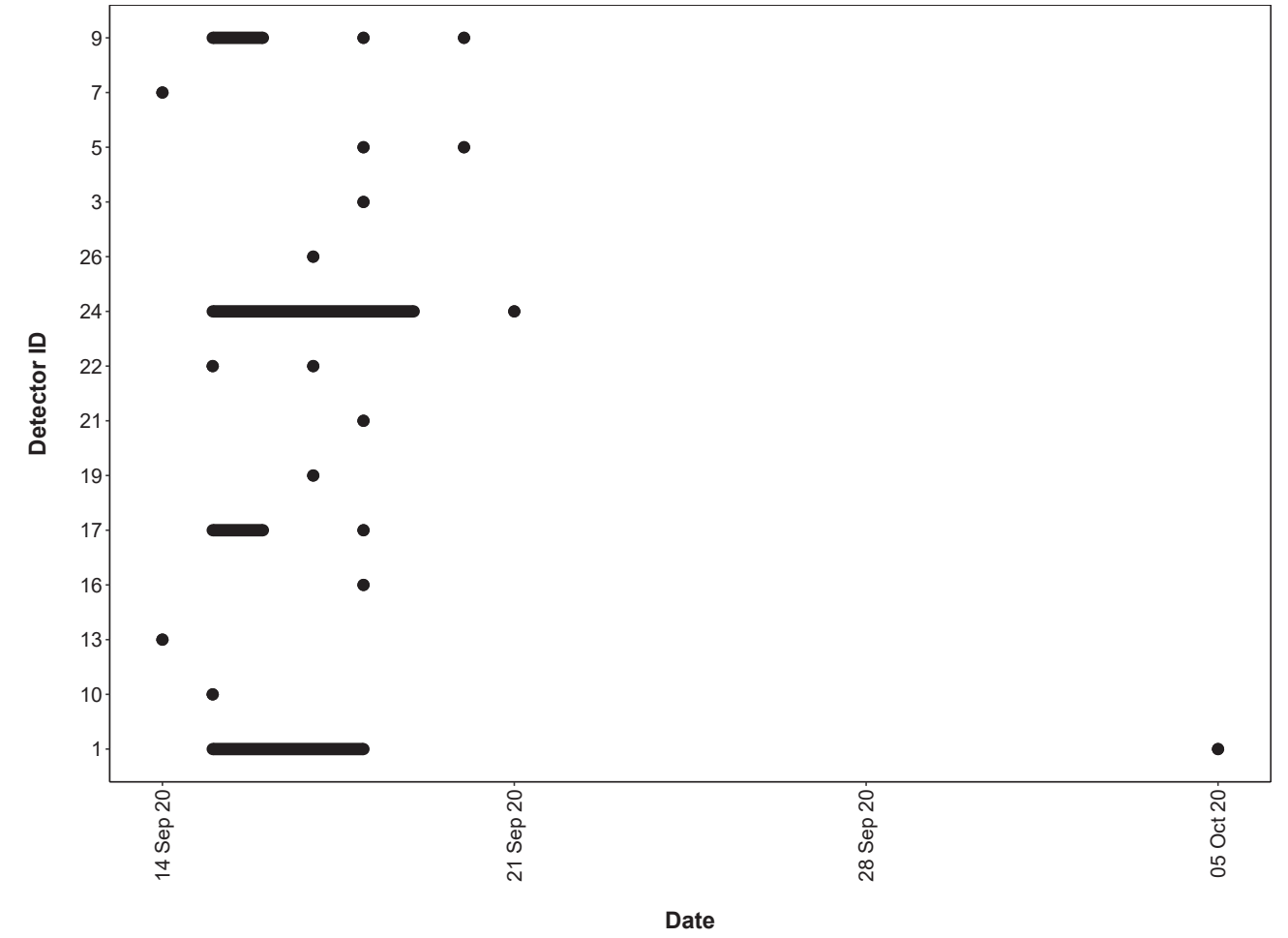
Survey Nights

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
1	5
10	5
13	6
16	1
17	4
19	2
21	1
22	3
24	6
26	1
3	1
5	2
7	6
9	4

Survey Nights

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



PART 1: Percentiles Analysis

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

The reference range dataset was stratified to include:

PER DETECTOR

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

Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
1	<i>Myotis</i>	0	0	0	2	0
1	<i>Pipistrellus pipistrellus</i>	0	0	0	2	0
1	<i>Pipistrellus pygmaeus</i>	0	0	0	0	1
10	<i>Pipistrellus pipistrellus</i>	1	0	0	0	0
10	<i>Pipistrellus pygmaeus</i>	0	0	0	1	0
10	<i>Pipistrellus pipistrellus</i>	0	0	0	0	3
13	<i>Pipistrellus pipistrellus</i>	0	0	0	0	2
13	<i>Pipistrellus pygmaeus</i>	0	0	0	2	4
16	<i>Pipistrellus pipistrellus</i>	0	0	0	1	0
17	<i>Myotis</i>	0	0	0	1	0
17	<i>Pipistrellus pipistrellus</i>	0	0	0	3	0
17	<i>Pipistrellus pygmaeus</i>	0	0	0	0	2
19	<i>Pipistrellus pygmaeus</i>	0	0	0	0	2
21	<i>Pipistrellus pipistrellus</i>	0	0	0	1	0
21	<i>Pipistrellus pygmaeus</i>	0	0	0	0	1
22	<i>Pipistrellus pipistrellus</i>	0	0	1	1	0
22	<i>Pipistrellus pygmaeus</i>	0	0	0	0	3
24	<i>Myotis</i>	2	0	2	0	0
24	<i>Pipistrellus pipistrellus</i>	1	0	1	0	0
24	<i>Pipistrellus pygmaeus</i>	2	0	0	1	1
24	<i>Plecotus auritus</i>	1	0	0	0	0
26	<i>Pipistrellus pygmaeus</i>	0	0	0	0	1
3	<i>Pipistrellus pipistrellus</i>	0	0	0	0	1
5	<i>Pipistrellus pipistrellus</i>	0	0	0	0	2
5	<i>Pipistrellus pygmaeus</i>	0	0	0	0	0
7	<i>Myotis</i>	0	0	0	0	1
7	<i>Pipistrellus pipistrellus</i>	0	0	0	0	3
7	<i>Pipistrellus pygmaeus</i>	0	0	0	0	0
7	<i>Pipistrellus pipistrellus</i>	0	0	0	0	4

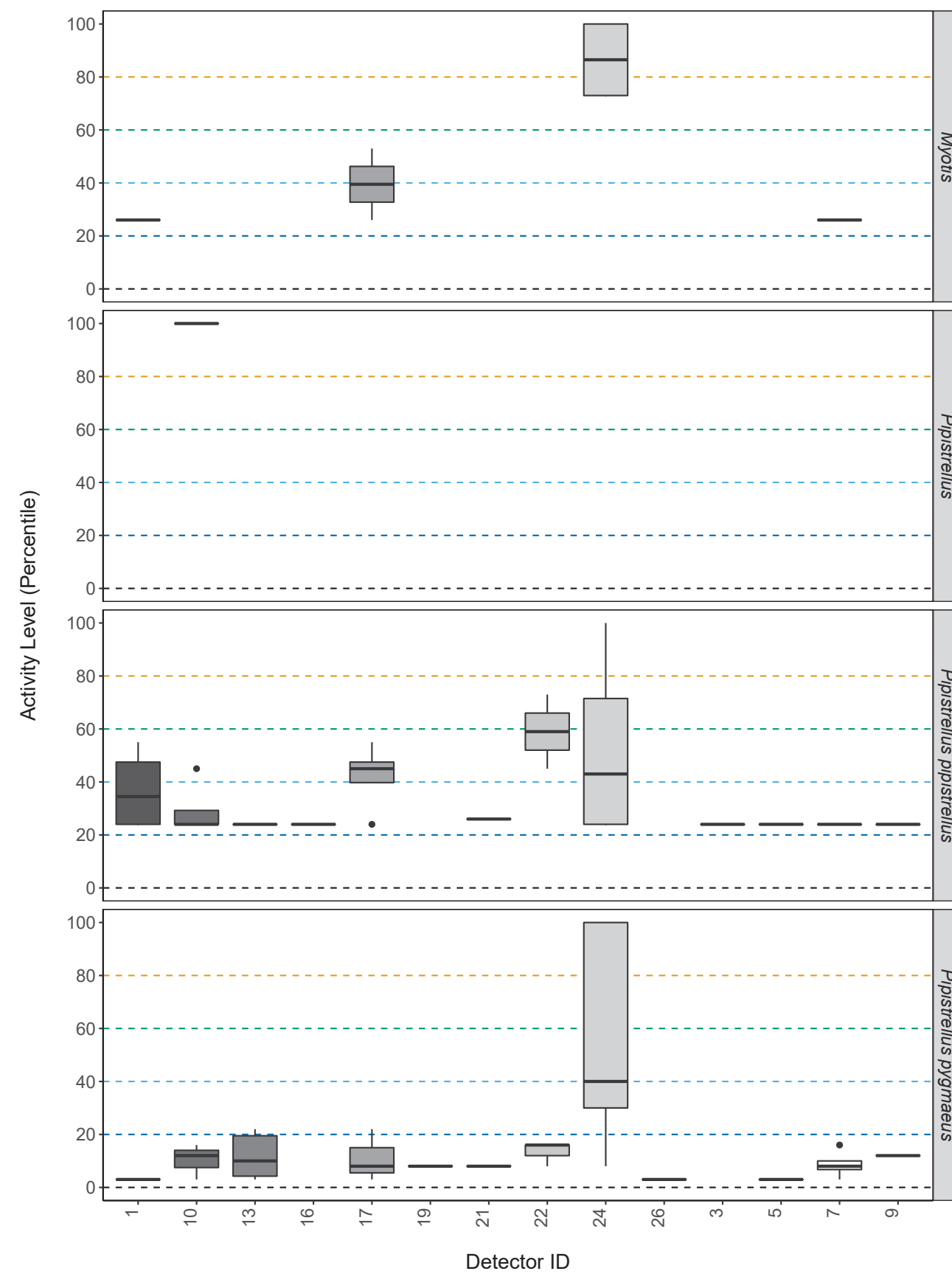
Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
9	<i>Pipistrellus pipistrellus</i>	0	0	0	2	0
9	<i>Pipistrellus pygmaeus</i>	0	0	0	0	2

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
1	<i>Myotis</i>	26	26 - 26	26	2	15
1	<i>Pipistrellus pipistrellus</i>	35	24 - 45	55	4	79
1	<i>Pipistrellus pygmaeus</i>	3	0	3	1	308
10	<i>Pipistrellus</i>	100	0	100	1	1
10	<i>Pipistrellus pipistrellus</i>	24	24 - 24	45	4	79
10	<i>Pipistrellus pygmaeus</i>	12	3 - 16	16	3	308
13	<i>Pipistrellus pipistrellus</i>	24	24 - 24	24	2	79
13	<i>Pipistrellus pygmaeus</i>	10	3 - 22	22	6	308
16	<i>Pipistrellus pipistrellus</i>	24	0	24	1	79
17	<i>Myotis</i>	40	39.5 - 39.5	53	2	15
17	<i>Pipistrellus pipistrellus</i>	45	34.5 - 50	55	4	79
17	<i>Pipistrellus pygmaeus</i>	8	3 - 22	22	3	308
19	<i>Pipistrellus pygmaeus</i>	8	8 - 8	8	2	308
21	<i>Pipistrellus pipistrellus</i>	26	0	26	1	79
21	<i>Pipistrellus pygmaeus</i>	8	0	8	1	308
22	<i>Pipistrellus pipistrellus</i>	59	59 - 59	73	2	79
22	<i>Pipistrellus pygmaeus</i>	16	16 - 16	16	3	308
24	<i>Myotis</i>	87	73 - 100	100	4	15
24	<i>Pipistrellus pipistrellus</i>	43	24 - 62	100	4	79
24	<i>Pipistrellus pygmaeus</i>	40	24 - 100	100	5	308
24	<i>Plecotus auritus</i>	100	0	100	1	1
26	<i>Pipistrellus pygmaeus</i>	3	0	3	1	308
3	<i>Pipistrellus pipistrellus</i>	24	0	24	1	79
5	<i>Pipistrellus pipistrellus</i>	24	24 - 24	24	2	79
5	<i>Pipistrellus pygmaeus</i>	3	0	3	1	308
7	<i>Myotis</i>	26	0	26	1	15
7	<i>Pipistrellus pipistrellus</i>	24	24 - 24	24	3	79
7	<i>Pipistrellus pygmaeus</i>	8	5.5 - 12	16	4	308
9	<i>Pipistrellus pipistrellus</i>	24	24 - 24	24	2	79
9	<i>Pipistrellus pygmaeus</i>	12	12 - 12	12	2	308

Figures

Figure 2. The recorded activity of bats during the survey. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)



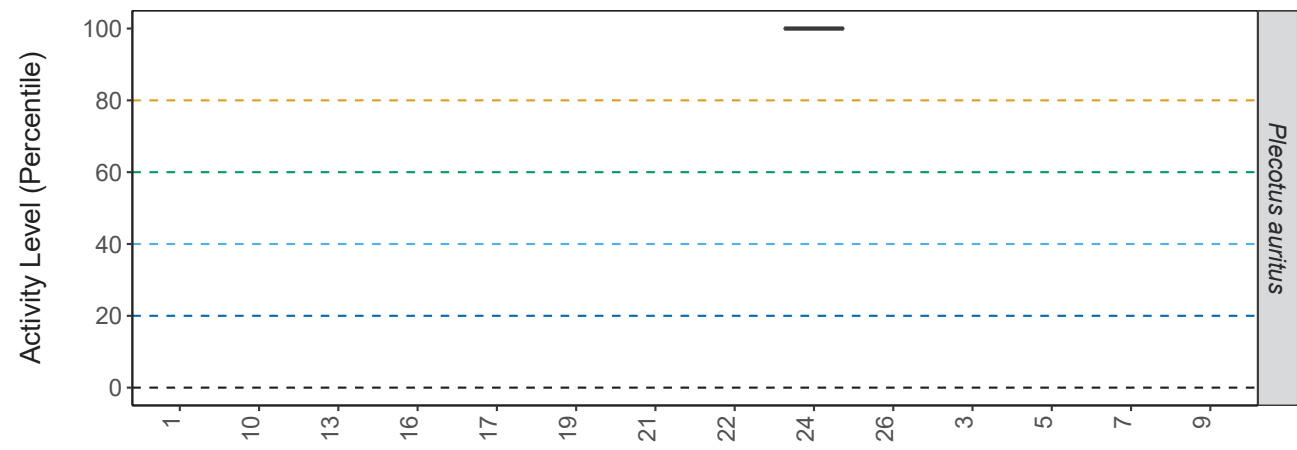
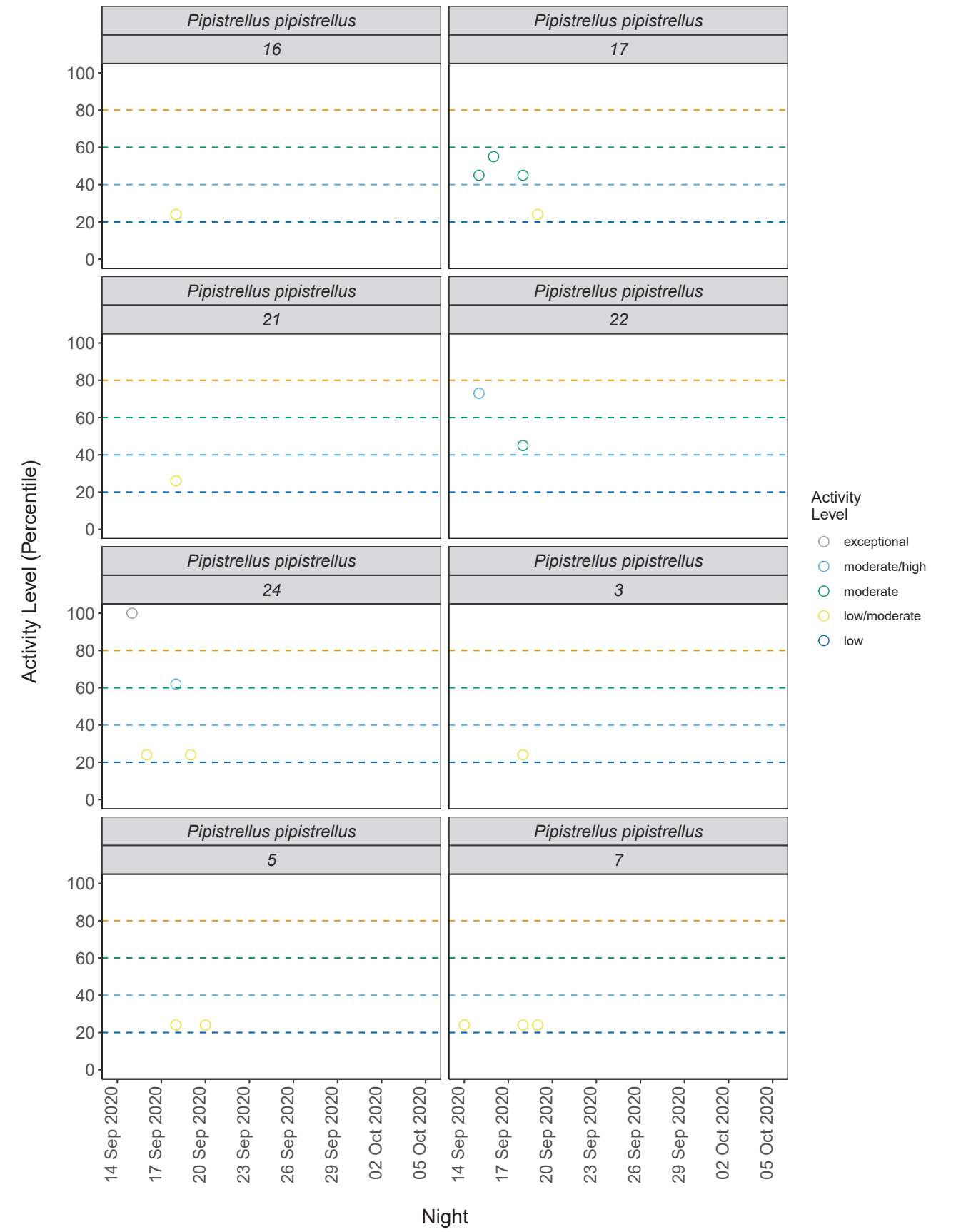
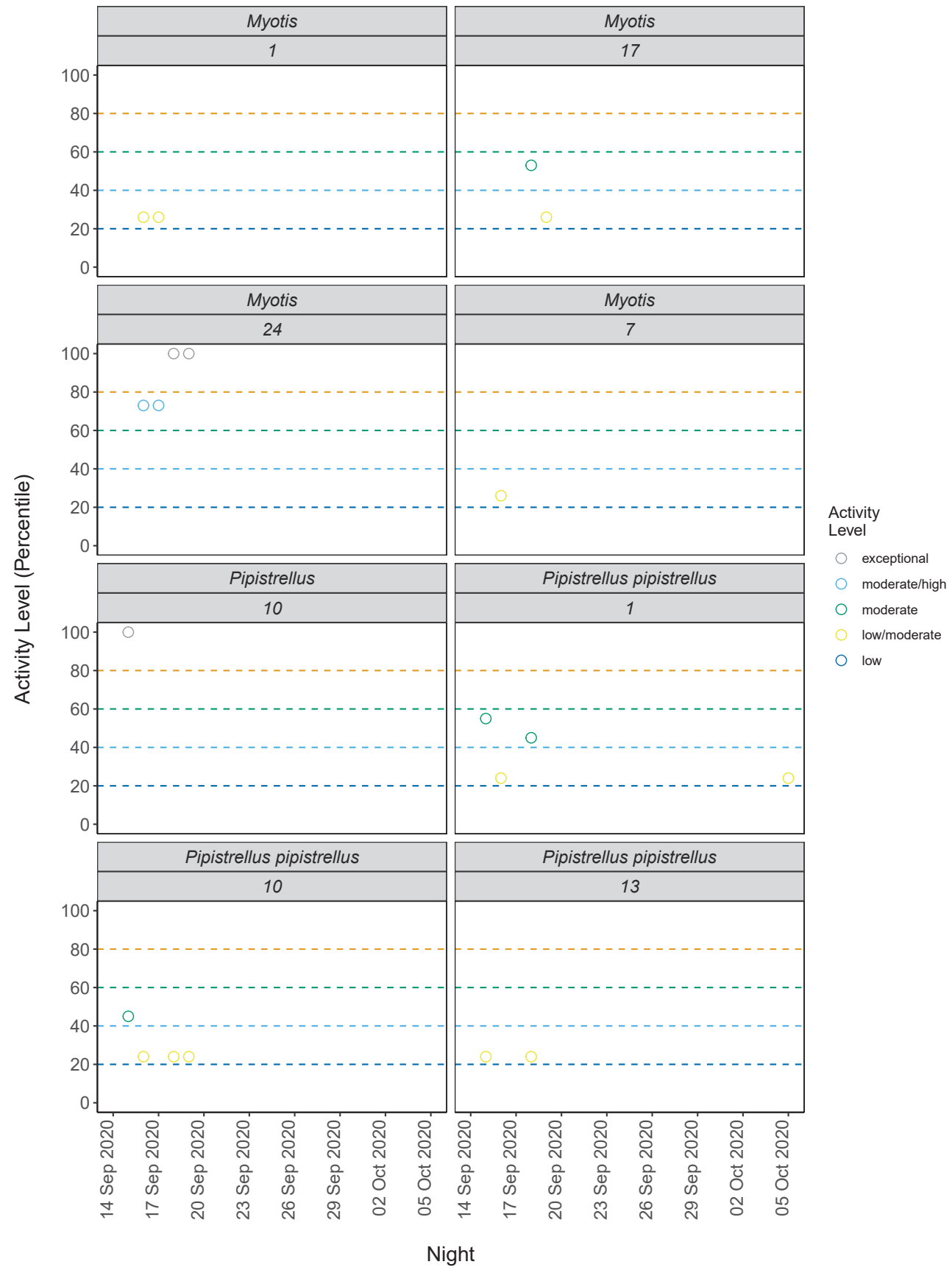
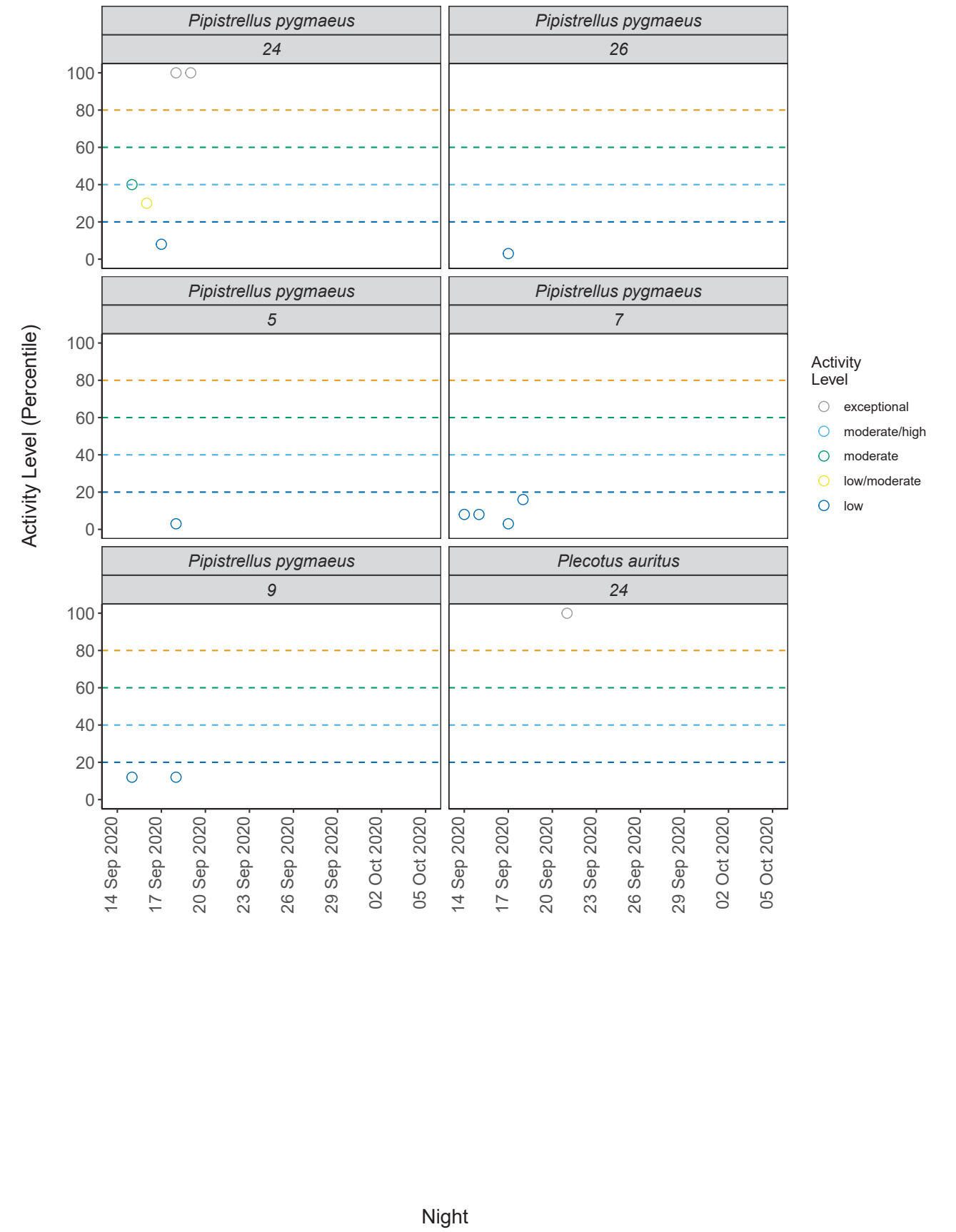
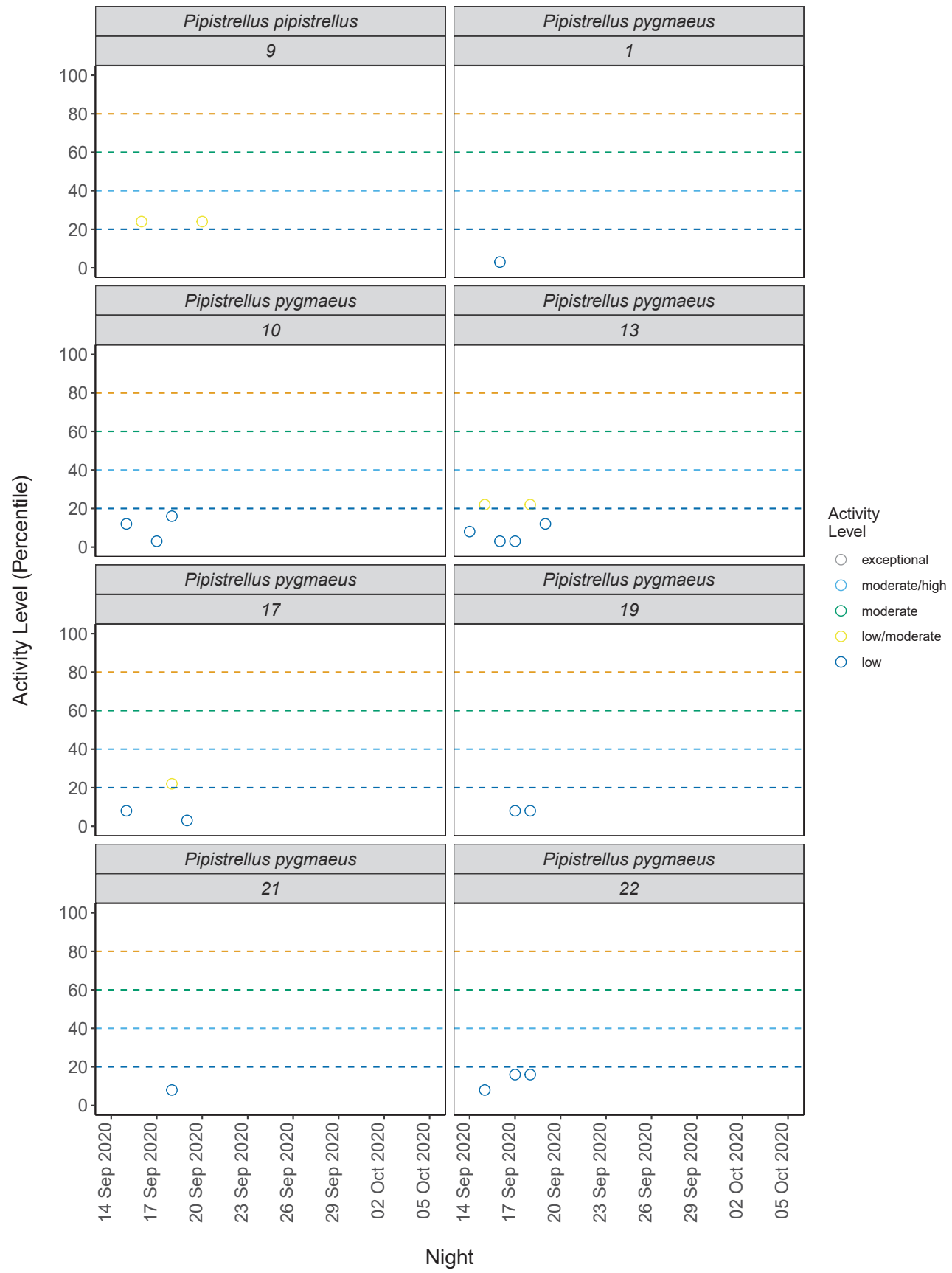


Figure 3. The activity level (percentile) of bats recorded across each night of the bat survey.

Detector ID





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
1	<i>Myotis</i>	Sep	0	0	0	0	2	0
1	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	2	1	0
1	<i>Pipistrellus pipistrellus</i>	Oct	0	0	0	0	1	0
1	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	0	1
10	<i>Pipistrellus pipistrellus</i>	Sep	1	0	0	0	0	0
10	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	1	3	0
10	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	0	3
13	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	2	0
13	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	2	4
16	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	1	0
17	<i>Myotis</i>	Sep	0	0	0	1	1	0
17	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	3	1	0
17	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	1	2
19	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	0	2
21	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	1	0
21	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	0	1
22	<i>Pipistrellus pipistrellus</i>	Sep	0	0	1	1	0	0
22	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	0	3
24	<i>Myotis</i>	Sep	2	0	2	0	0	0
24	<i>Pipistrellus pipistrellus</i>	Sep	1	0	1	0	2	0
24	<i>Pipistrellus pygmaeus</i>	Sep	2	0	0	1	1	1
24	<i>Plecotus auritus</i>	Sep	1	0	0	0	0	0
26	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	0	1
3	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	1	0
5	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	2	0
5	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	0	1
7	<i>Myotis</i>	Sep	0	0	0	0	1	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
7	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	3	0
7	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	0	4
9	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	2	0
9	<i>Pipistrellus pygmaeus</i>	Sep	0	0	0	0	0	2

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
1	<i>Myotis</i>	Sep	26	26 - 26	26	2
1	<i>Pipistrellus pipistrellus</i>	Sep	45	24 - 45	55	3
1	<i>Pipistrellus pipistrellus</i>	Oct	24	24 - 45	24	1
1	<i>Pipistrellus pygmaeus</i>	Sep	3	0	3	1
10	<i>Pipistrellus</i>	Sep	100	0	100	1
10	<i>Pipistrellus pipistrellus</i>	Sep	24	24 - 24	45	4
10	<i>Pipistrellus pygmaeus</i>	Sep	12	3 - 16	16	3
13	<i>Pipistrellus pipistrellus</i>	Sep	24	24 - 24	24	2
13	<i>Pipistrellus pygmaeus</i>	Sep	10	3 - 22	22	6
16	<i>Pipistrellus pipistrellus</i>	Sep	24	0	24	1
17	<i>Myotis</i>	Sep	40	39.5 - 39.5	53	2
17	<i>Pipistrellus pipistrellus</i>	Sep	45	34.5 - 50	55	4
17	<i>Pipistrellus pygmaeus</i>	Sep	8	3 - 22	22	3
19	<i>Pipistrellus pygmaeus</i>	Sep	8	8 - 8	8	2
21	<i>Pipistrellus pipistrellus</i>	Sep	26	0	26	1
21	<i>Pipistrellus pygmaeus</i>	Sep	8	0	8	1
22	<i>Pipistrellus pipistrellus</i>	Sep	59	59 - 59	73	2
22	<i>Pipistrellus pygmaeus</i>	Sep	16	16 - 16	16	3
24	<i>Myotis</i>	Sep	87	73 - 100	100	4
24	<i>Pipistrellus pipistrellus</i>	Sep	43	24 - 62	100	4
24	<i>Pipistrellus pygmaeus</i>	Sep	40	24 - 100	100	5
24	<i>Plecotus auritus</i>	Sep	100	0	100	1
26	<i>Pipistrellus pygmaeus</i>	Sep	3	0	3	1
3	<i>Pipistrellus pipistrellus</i>	Sep	24	0	24	1
5	<i>Pipistrellus pipistrellus</i>	Sep	24	24 - 24	24	2
5	<i>Pipistrellus pygmaeus</i>	Sep	3	0	3	1
7	<i>Myotis</i>	Sep	26	0	26	1
7	<i>Pipistrellus pipistrellus</i>	Sep	24	24 - 24	24	3
7	<i>Pipistrellus pygmaeus</i>	Sep	8	5.5 - 12	16	4
9	<i>Pipistrellus pipistrellus</i>	Sep	24	24 - 24	24	2
9	<i>Pipistrellus pygmaeus</i>	Sep	12	12 - 12	12	2

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
<i>Myotis</i>	2	0	2	1	4	0
<i>Pipistrellus</i>	1	0	0	0	0	0
<i>Pipistrellus pipistrellus</i>	1	0	2	7	20	0
<i>Pipistrellus pygmaeus</i>	2	0	0	1	4	25
<i>Plecotus auritus</i>	1	0	0	0	0	0

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

Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded
<i>Myotis</i>	53	73 - 100	100	9
<i>Pipistrellus</i>	100	0	100	1
<i>Pipistrellus pipistrellus</i>	24	59 - 59	100	30
<i>Pipistrellus pygmaeus</i>	8	8 - 8	100	32
<i>Plecotus auritus</i>	100	0	100	1

Figures

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

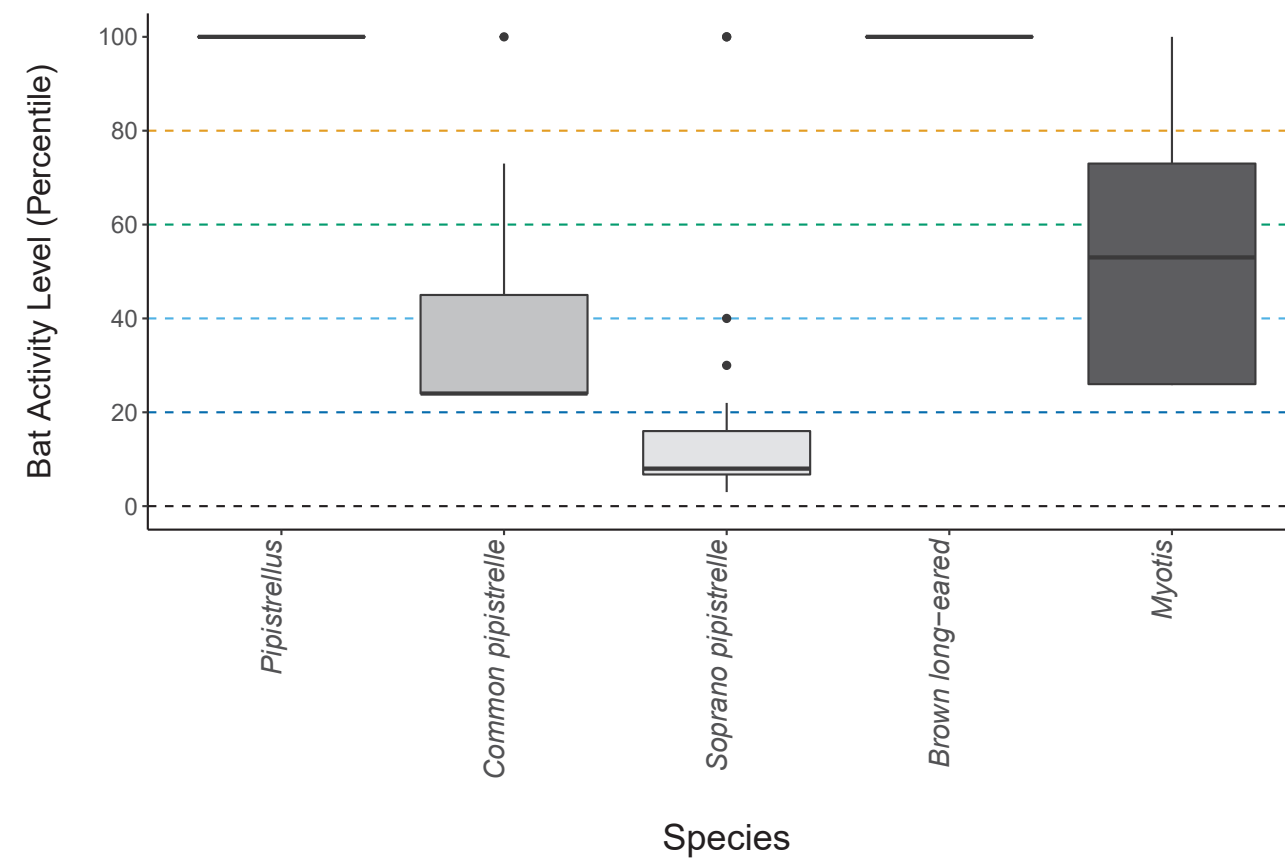
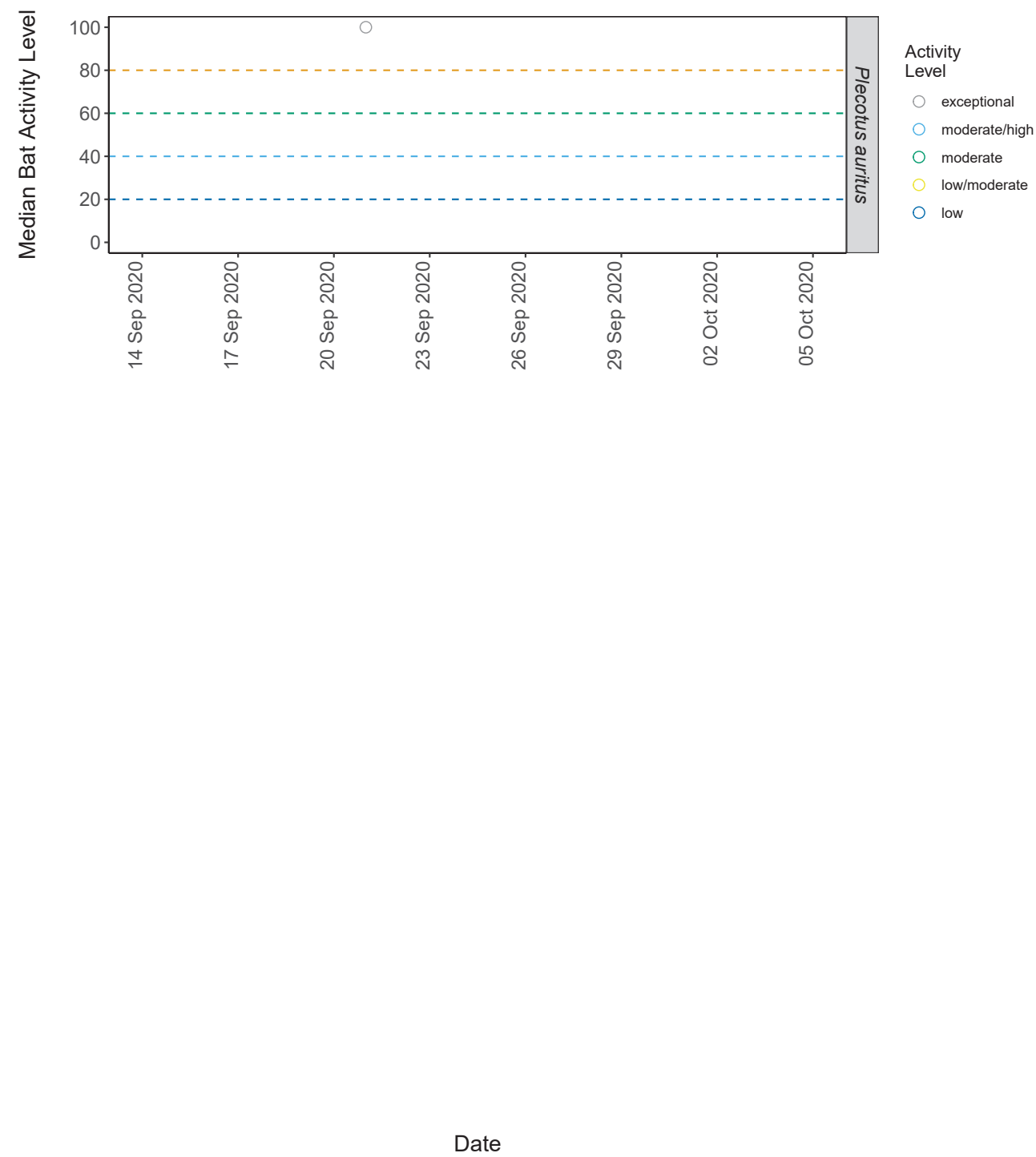
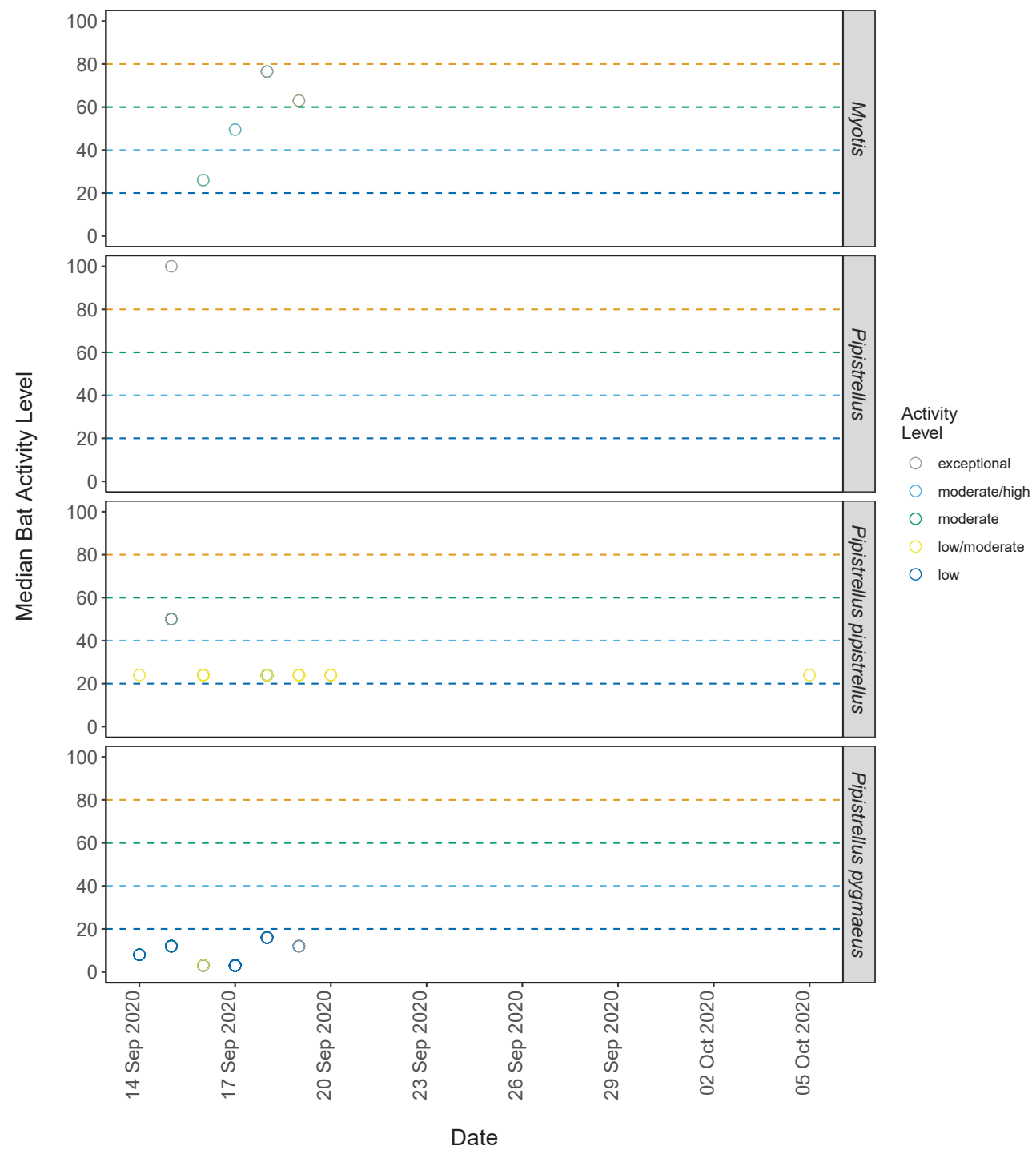


Figure 5. The median activity levels of bats recorded across all detectors each night.



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.

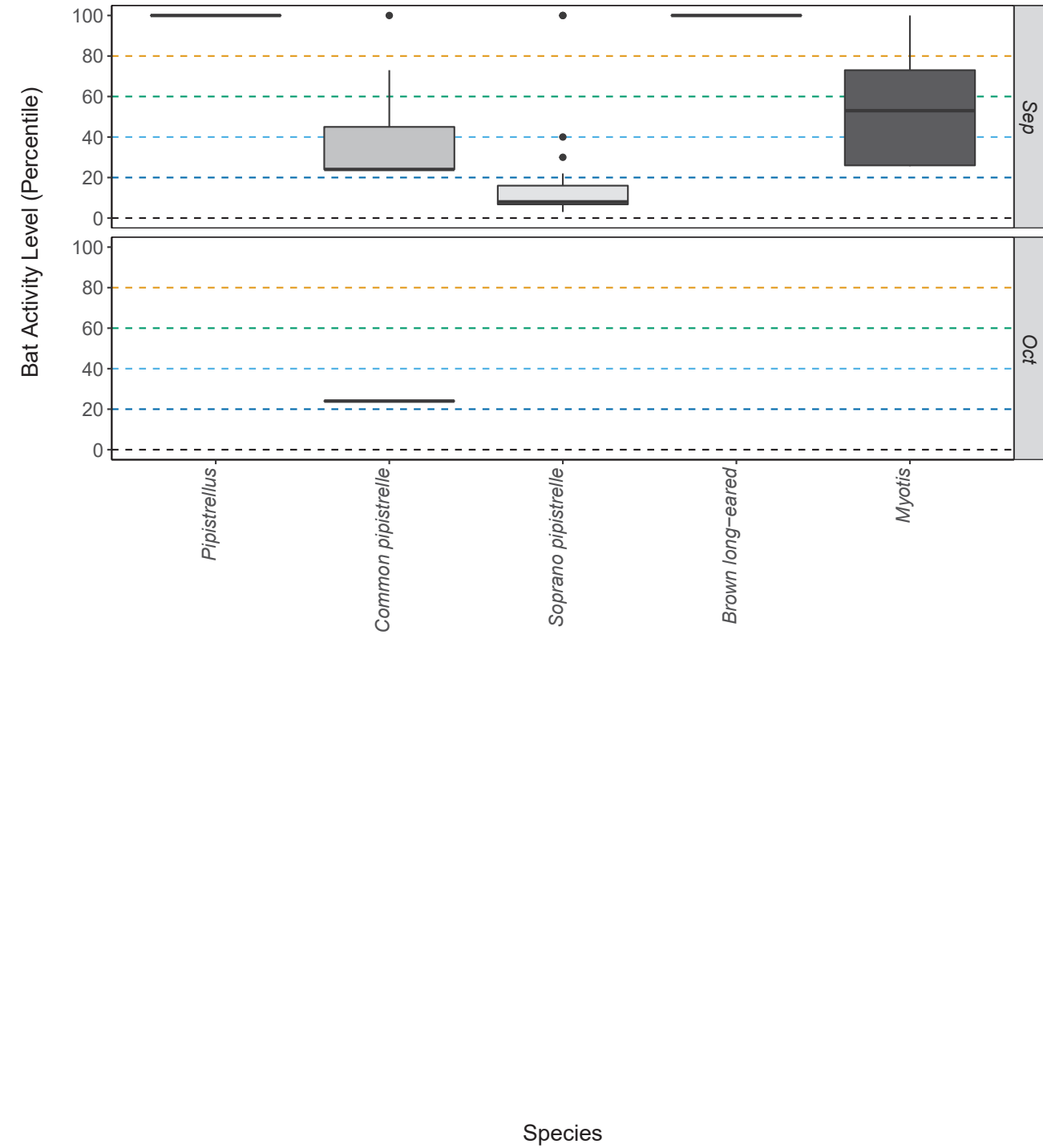
Species/Species Group	Month	Nights of Exceptional Activity	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
<i>Myotis</i>	Sep	2	0	2	1	4	0
<i>Pipistrellus</i>	Sep	1	0	0	0	0	0
<i>Pipistrellus pipistrellus</i>	Sep	1	0	2	7	19	0
<i>Pipistrellus pipistrellus</i>	Oct	0	0	0	0	1	0
<i>Pipistrellus pygmaeus</i>	Sep	2	0	0	1	4	25
<i>Plecotus auritus</i>	Sep	1	0	0	0	0	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
<i>Myotis</i>	Sep	53	73 - 100	100	9
<i>Pipistrellus</i>	Sep	100	0	100	1
<i>Pipistrellus pipistrellus</i>	Sep	24	59 - 59	100	29
<i>Pipistrellus pipistrellus</i>	Oct	24	24 - 45	24	1
<i>Pipistrellus pygmaeus</i>	Sep	8	8 - 8	100	32
<i>Plecotus auritus</i>	Sep	100	0	100	1

Figures

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



Species

PART 2: Nightly Analysis

ENTIRE SURVEY PERIOD

Sunrise and Sunset Times

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

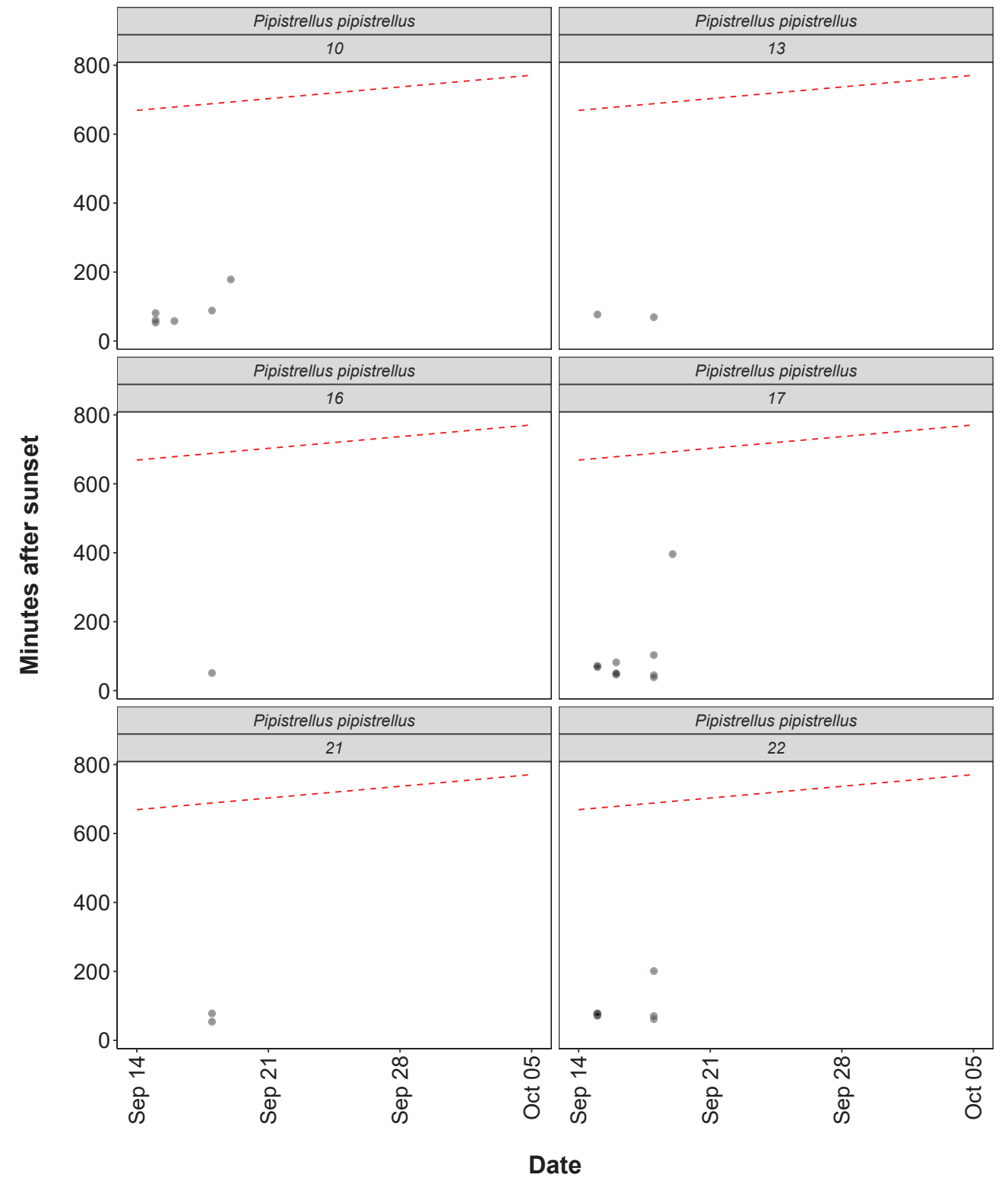
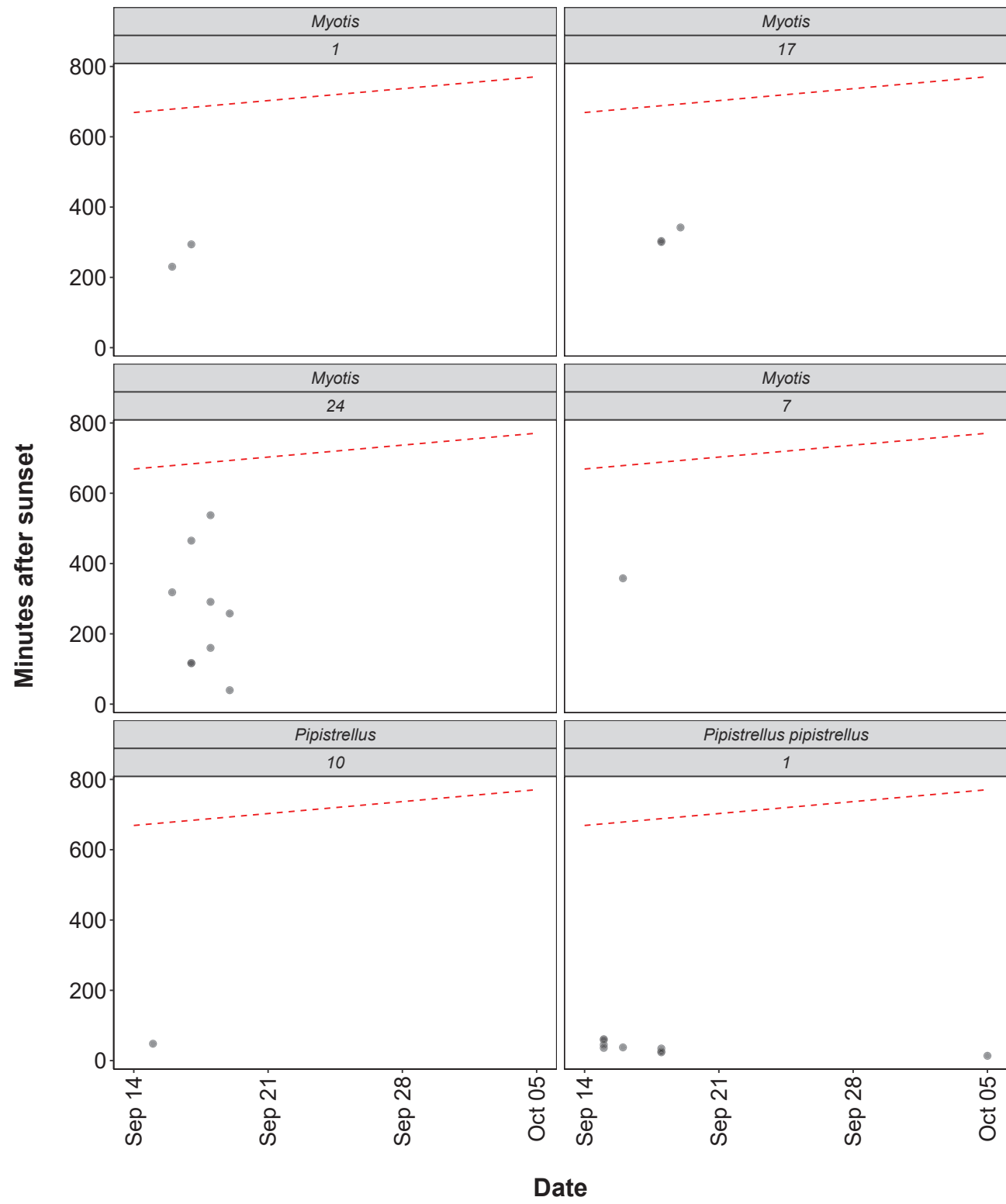
Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)	NA	NA
57.26386_-4.69907	14/09/2020	2020-09-14	19:41	06:51	11.2
57.26492_-4.68708	14/09/2020	2020-09-14	19:41	06:51	11.2
57.26386_-4.69907	15/09/2020	2020-09-15	19:39	06:53	11.2
57.26492_-4.68708	15/09/2020	2020-09-15	19:39	06:53	11.2
57.26892_-4.67779	15/09/2020	2020-09-15	19:39	06:53	11.2
57.26801_-4.65499	15/09/2020	2020-09-15	19:39	06:53	11.2
57.28426_-4.67388	15/09/2020	2020-09-15	19:39	06:53	11.2
57.27179_-4.64556	15/09/2020	2020-09-15	19:39	06:53	11.2
57.27179_-4.64556	16/09/2020	2020-09-15	19:39	06:53	11.2
57.2898_-4.67473	15/09/2020	2020-09-15	19:39	06:53	11.2
57.29359_-4.68206	15/09/2020	2020-09-15	19:39	06:53	11.2
57.26492_-4.68708	16/09/2020	2020-09-16	19:36	06:55	11.3
57.29359_-4.68206	16/09/2020	2020-09-16	19:36	06:55	11.3
57.27179_-4.64556	16/09/2020	2020-09-16	19:36	06:55	11.3
57.26892_-4.67779	16/09/2020	2020-09-16	19:36	06:55	11.3
57.28426_-4.67388	16/09/2020	2020-09-16	19:36	06:55	11.3
57.2898_-4.67473	17/09/2020	2020-09-16	19:36	06:55	11.3
57.26386_-4.69907	17/09/2020	2020-09-16	19:36	06:55	11.3
57.27179_-4.64556	17/09/2020	2020-09-16	19:36	06:55	11.3
57.26046_-4.64349	18/09/2020	2020-09-17	19:33	06:57	11.4
57.26386_-4.69907	17/09/2020	2020-09-17	19:33	06:57	11.4
57.26492_-4.68708	17/09/2020	2020-09-17	19:33	06:57	11.4
57.26801_-4.65499	18/09/2020	2020-09-17	19:33	06:57	11.4
57.28426_-4.67388	17/09/2020	2020-09-17	19:33	06:57	11.4
57.27878_-4.66052	18/09/2020	2020-09-17	19:33	06:57	11.4
57.27179_-4.64556	17/09/2020	2020-09-17	19:33	06:57	11.4
57.29359_-4.68206	18/09/2020	2020-09-17	19:33	06:57	11.4
57.27179_-4.64556	18/09/2020	2020-09-17	19:33	06:57	11.4
57.27333_-4.70127	18/09/2020	2020-09-18	19:30	06:59	11.5
57.26386_-4.69907	19/09/2020	2020-09-18	19:30	06:59	11.5
57.26386_-4.69907	18/09/2020	2020-09-18	19:30	06:59	11.5
57.26492_-4.68708	18/09/2020	2020-09-18	19:30	06:59	11.5
57.26892_-4.67779	18/09/2020	2020-09-18	19:30	06:59	11.5
57.26454_-4.66642	18/09/2020	2020-09-18	19:30	06:59	11.5
57.26801_-4.65499	18/09/2020	2020-09-18	19:30	06:59	11.5
57.28426_-4.67388	18/09/2020	2020-09-18	19:30	06:59	11.5
57.27878_-4.66052	18/09/2020	2020-09-18	19:30	06:59	11.5
57.27179_-4.64556	18/09/2020	2020-09-18	19:30	06:59	11.5
57.27179_-4.64556	19/09/2020	2020-09-18	19:30	06:59	11.5
57.2898_-4.67473	18/09/2020	2020-09-18	19:30	06:59	11.5
57.29359_-4.68206	18/09/2020	2020-09-18	19:30	06:59	11.5
57.27406_-4.67173	18/09/2020	2020-09-18	19:30	06:59	11.5
57.28362_-4.69409	18/09/2020	2020-09-18	19:30	06:59	11.5
57.26892_-4.67779	19/09/2020	2020-09-18	19:30	06:59	11.5
57.26492_-4.68708	19/09/2020	2020-09-19	19:28	07:01	11.6
57.26892_-4.67779	19/09/2020	2020-09-19	19:28	07:01	11.6
57.26892_-4.67779	20/09/2020	2020-09-19	19:28	07:01	11.6
57.27179_-4.64556	19/09/2020	2020-09-19	19:28	07:01	11.6

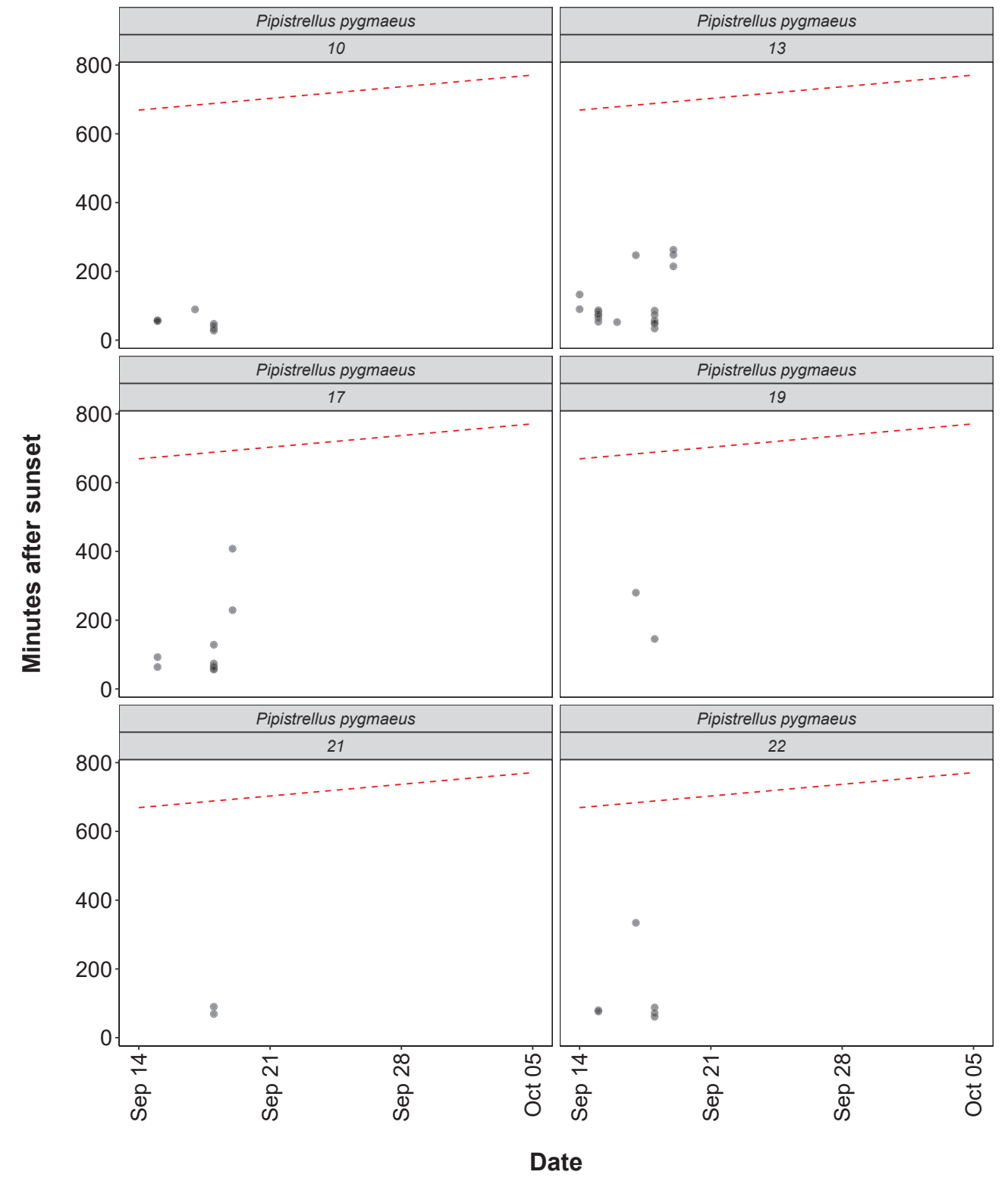
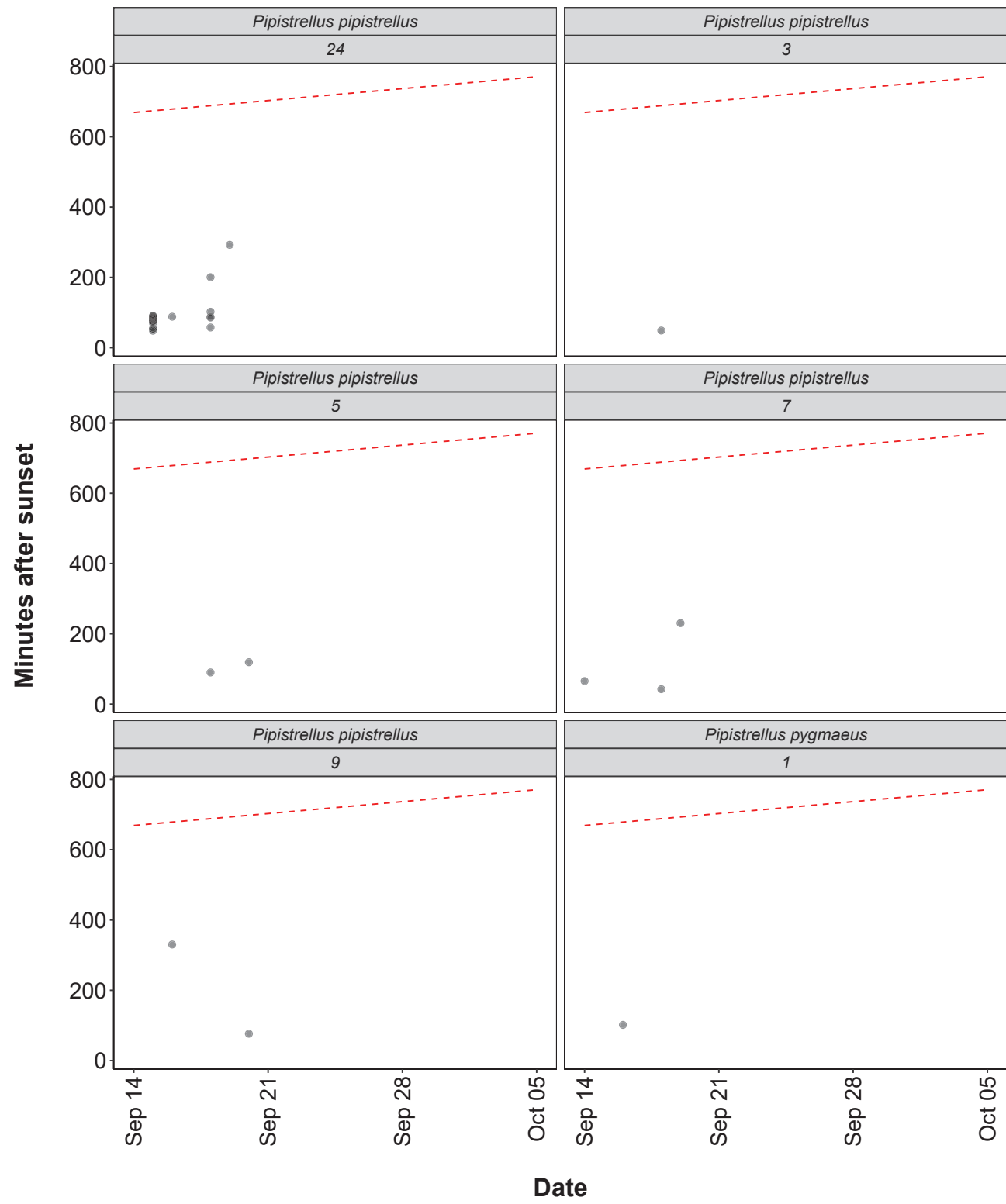
Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)	NA	NA
57.26386_-4.69907	19/09/2020	2020-09-19	19:28	07:01	11.6
57.28426_-4.67388	19/09/2020	2020-09-19	19:28	07:01	11.6
57.27179_-4.64556	20/09/2020	2020-09-19	19:28	07:01	11.6
57.27333_-4.70127	20/09/2020	2020-09-20	19:25	07:03	11.6
57.2898_-4.67473	20/09/2020	2020-09-20	19:25	07:03	11.6
57.27179_-4.64556	21/09/2020	2020-09-21	19:22	07:05	11.7
57.29359_-4.68206	05/10/2020	2020-10-05	18:43	07:34	12.8

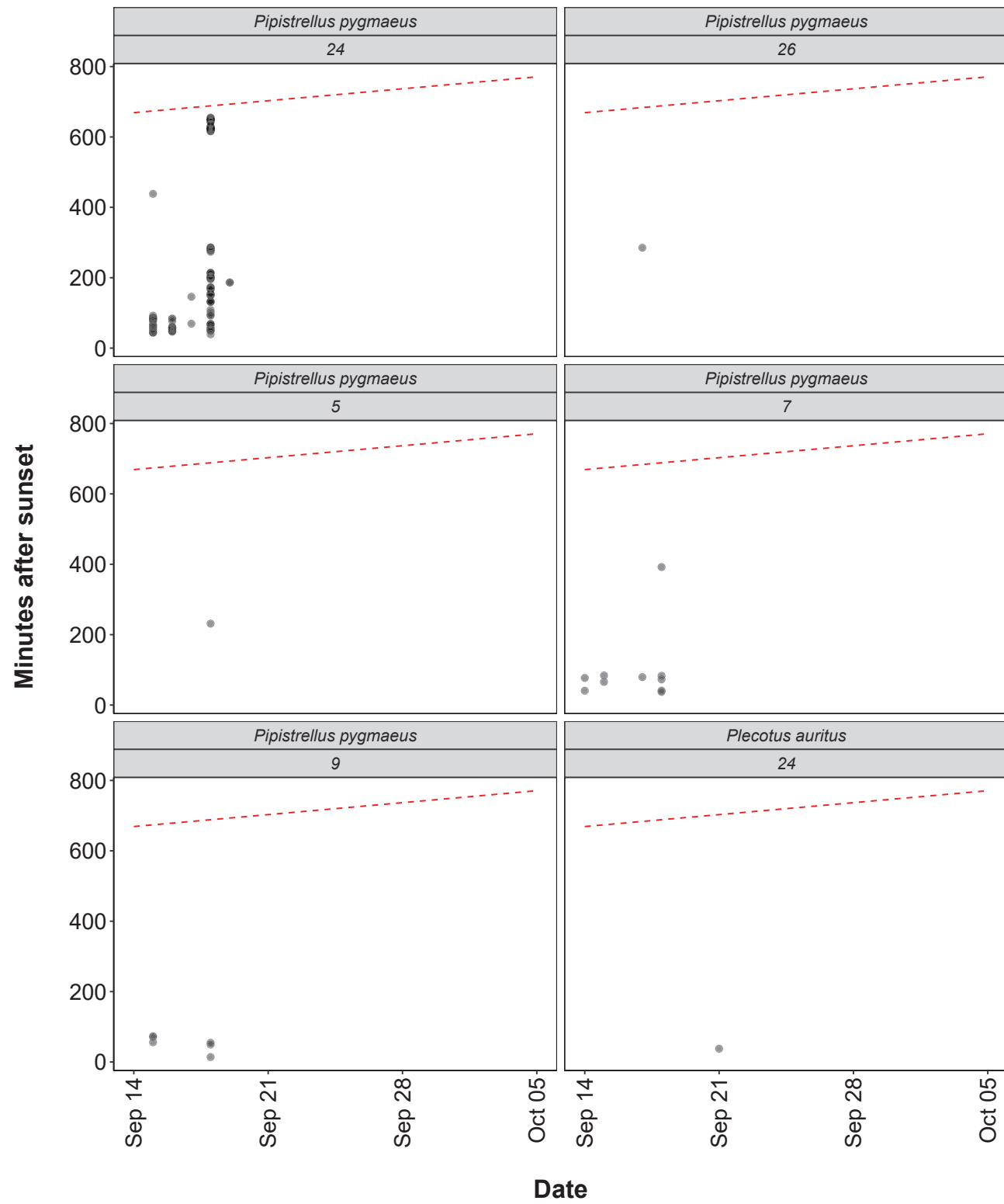
Distribution of Bat Activity Across the Night through Time

Per Detector

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







Roost Emergence Time and Bat Observation

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

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

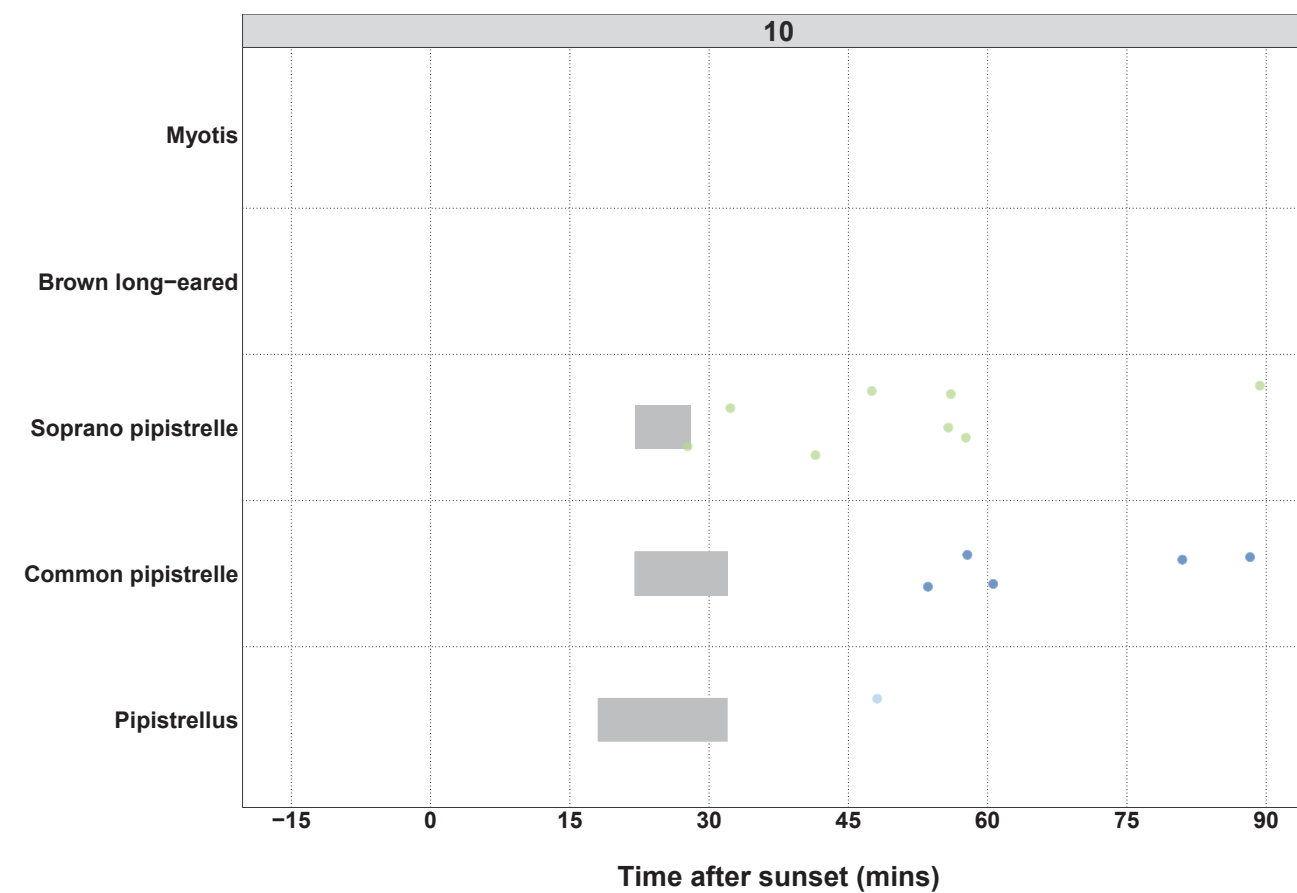
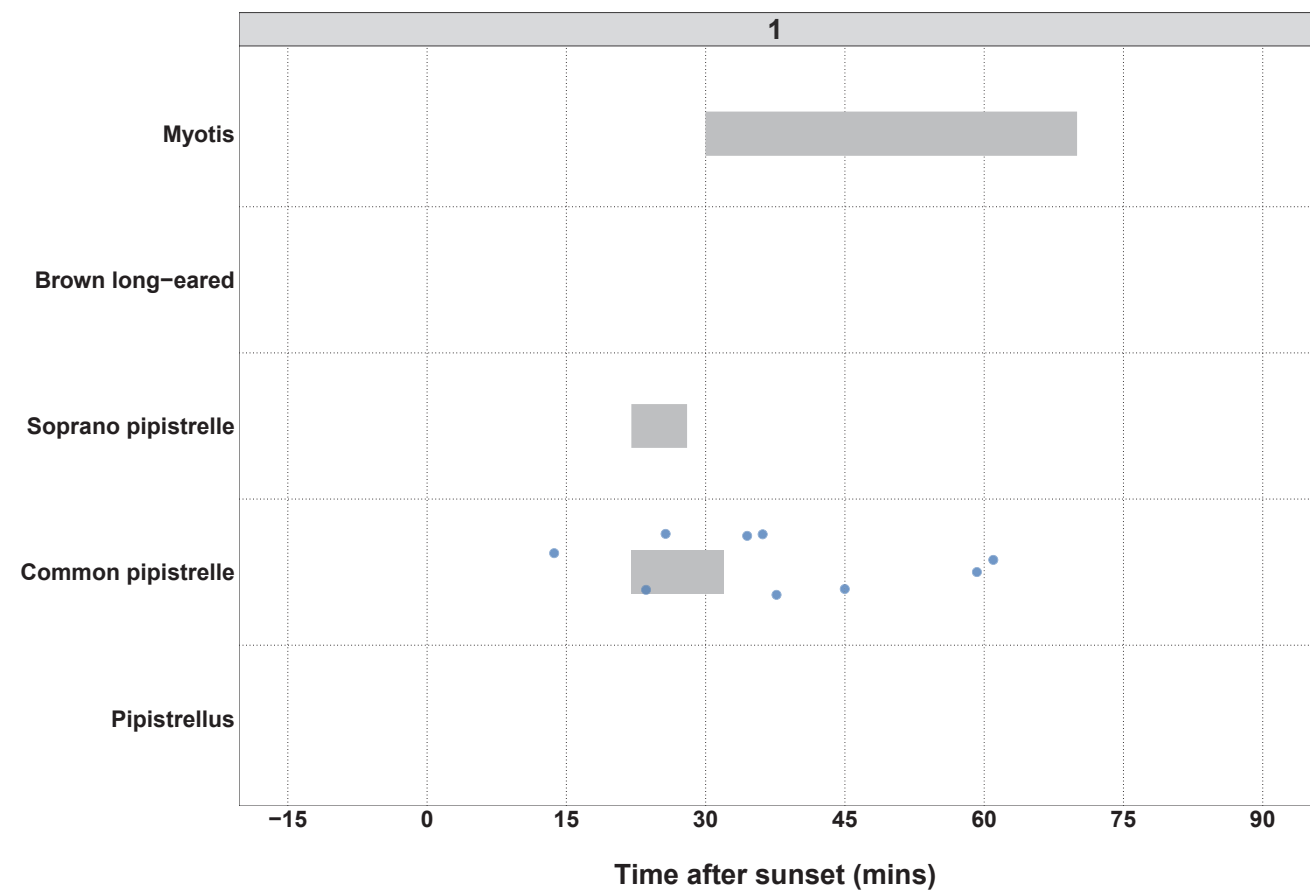
Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Table

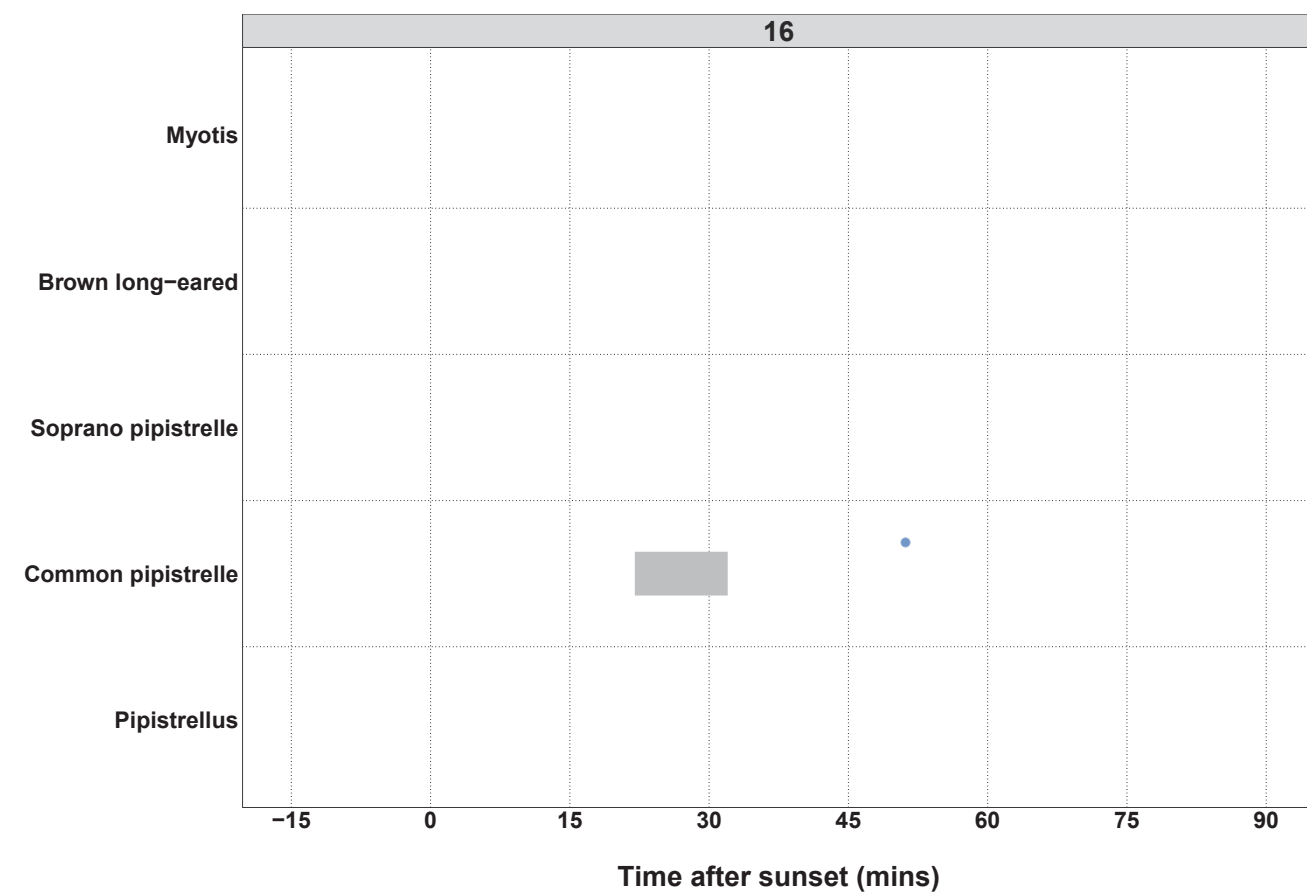
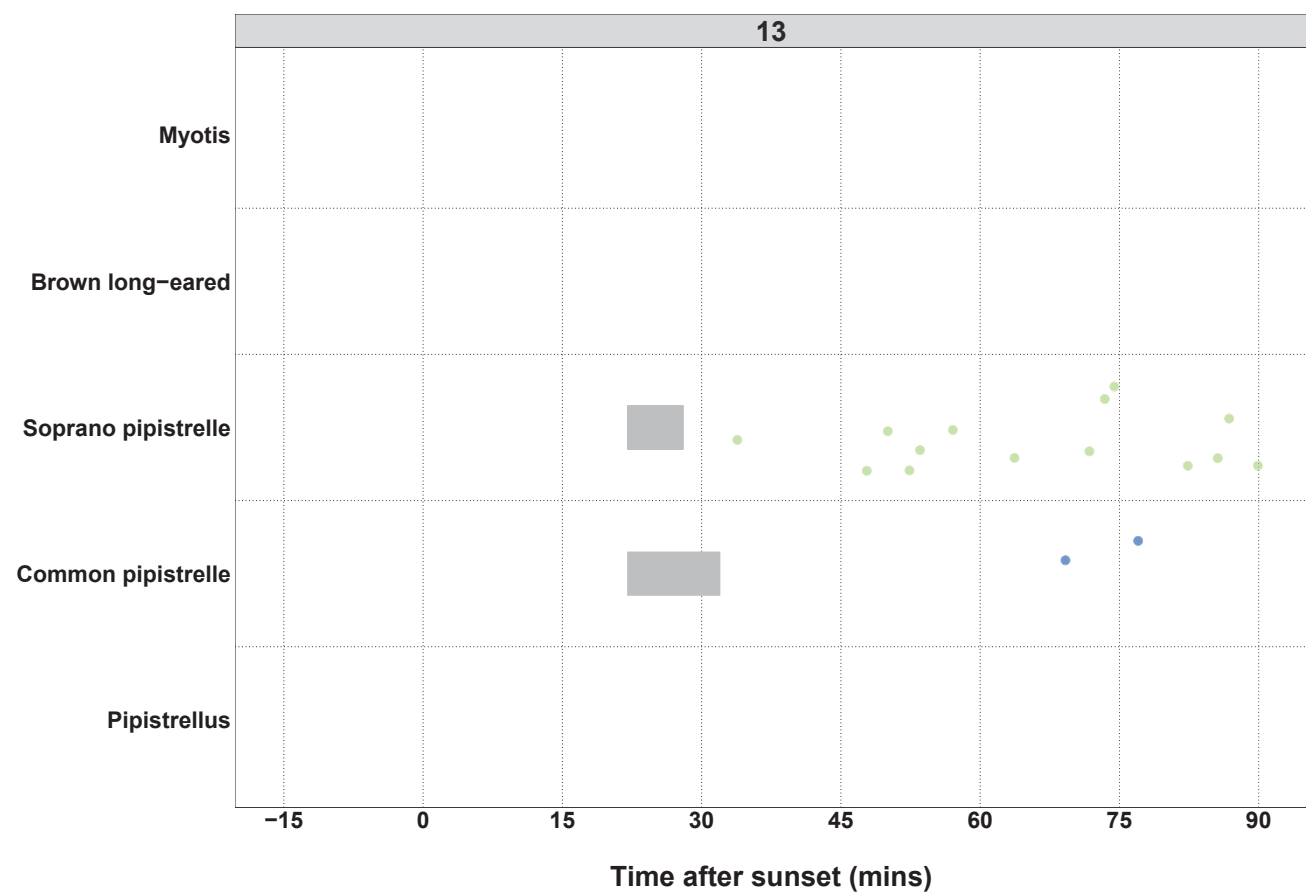
Table 12. Number of bat calls recorded before the upper time of the species-specific emergence time range, and which therefore may potentially indicate the presence of a nearby roost.

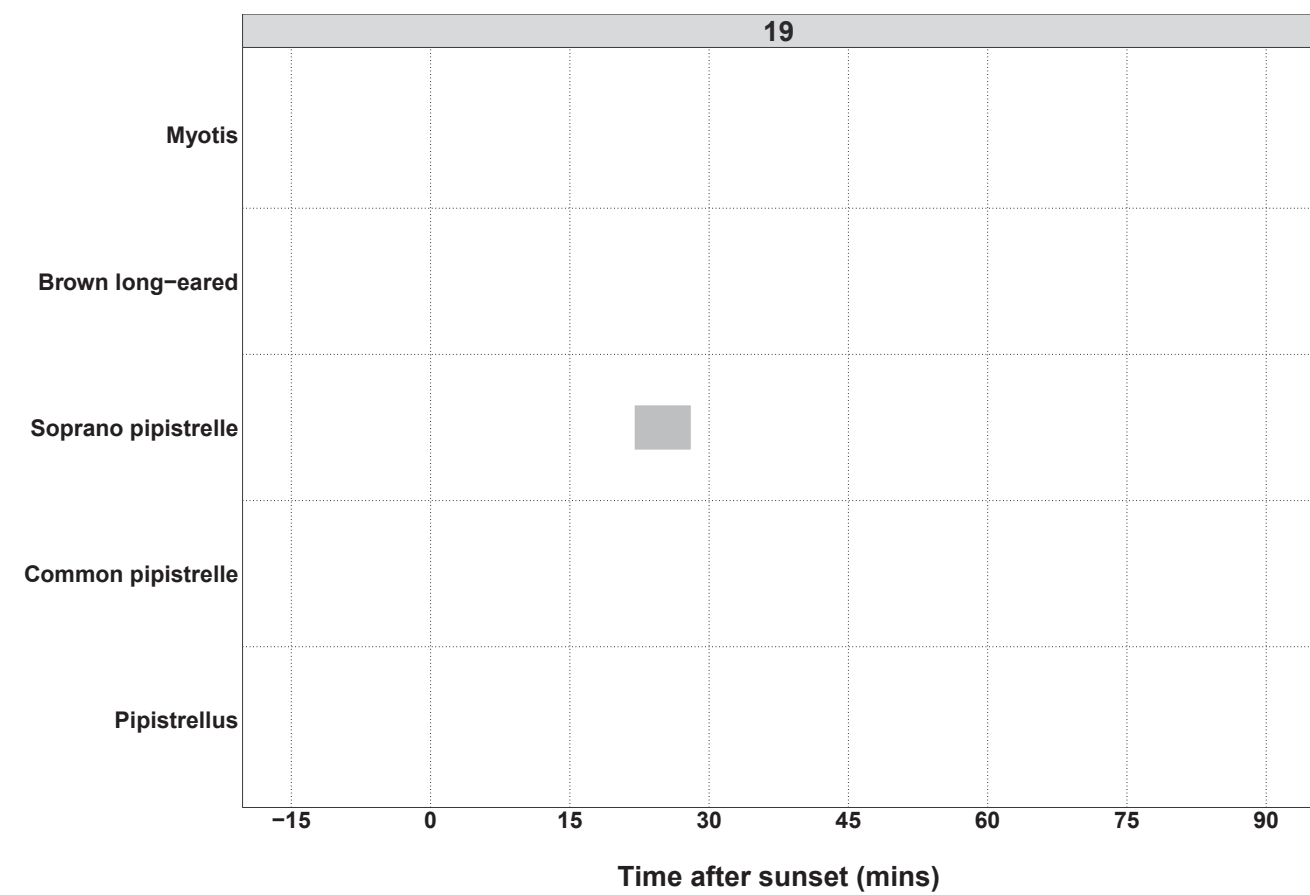
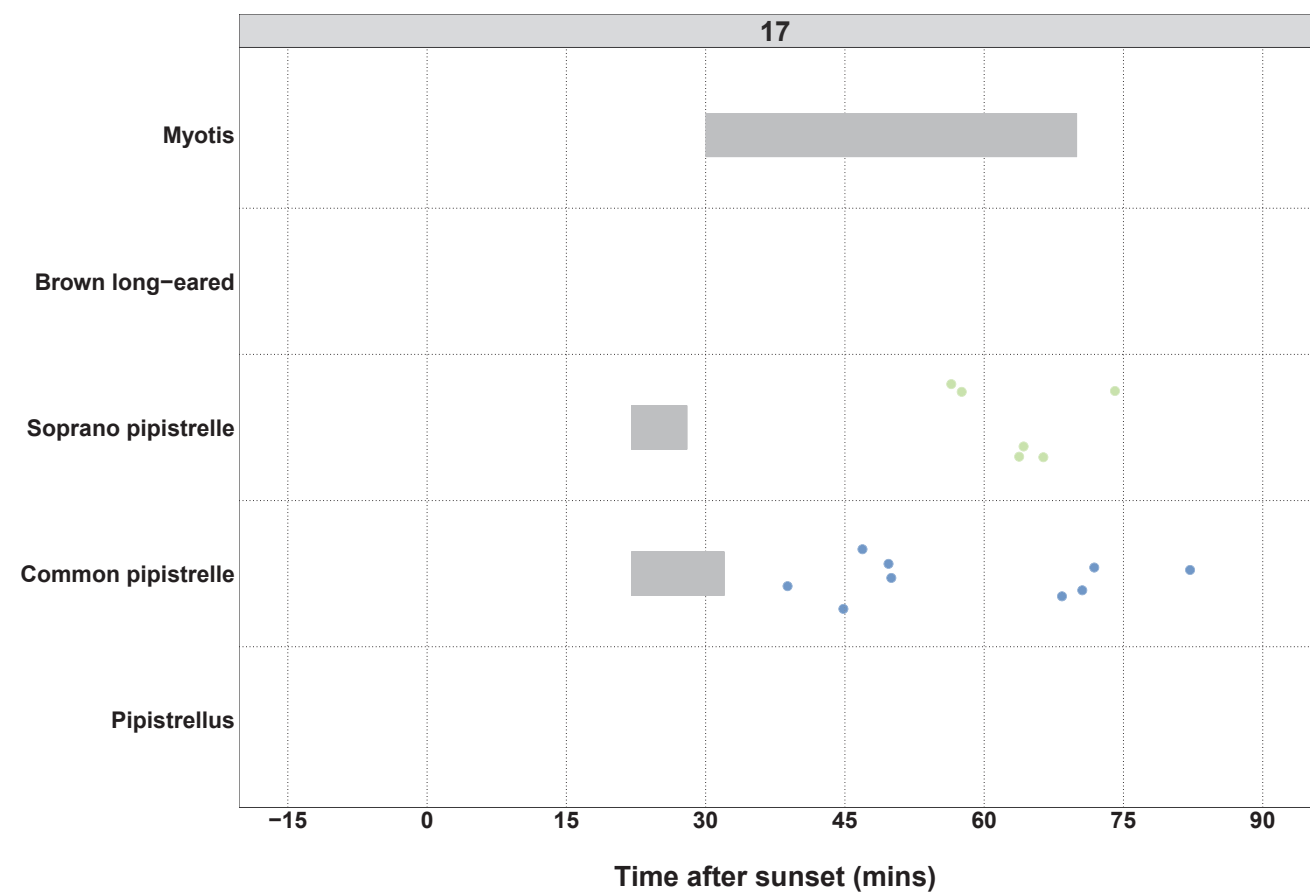
Species	Detector ID	2020-09-18	2020-09-19	2020-09-21	2020-10-05
Common pipistrelle	1	2	0	0	1
Soprano pipistrelle	10	1	0	0	0
Soprano pipistrelle	9	1	0	0	0
Brown long-eared	24	0	0	1	0
Myotis	24	0	1	0	0

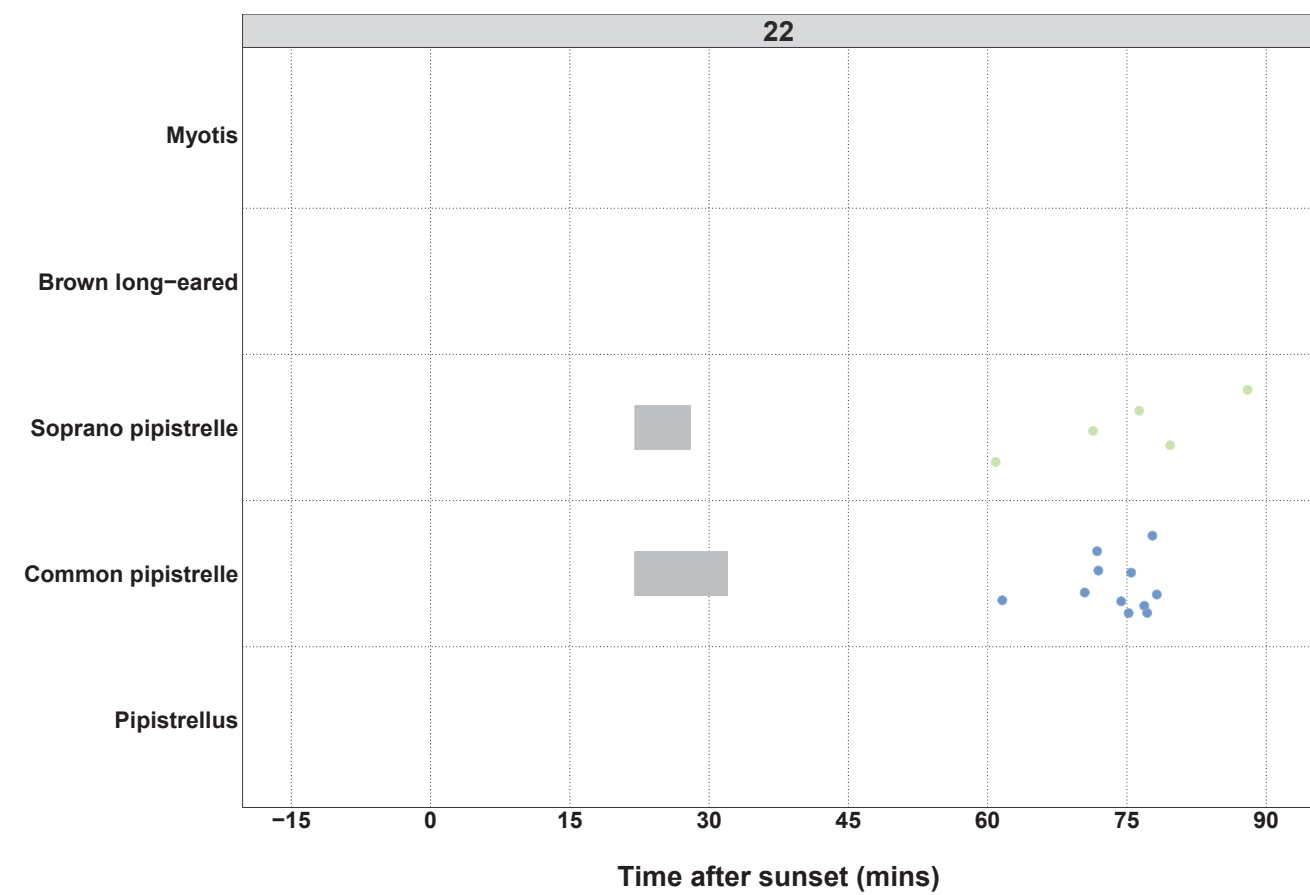
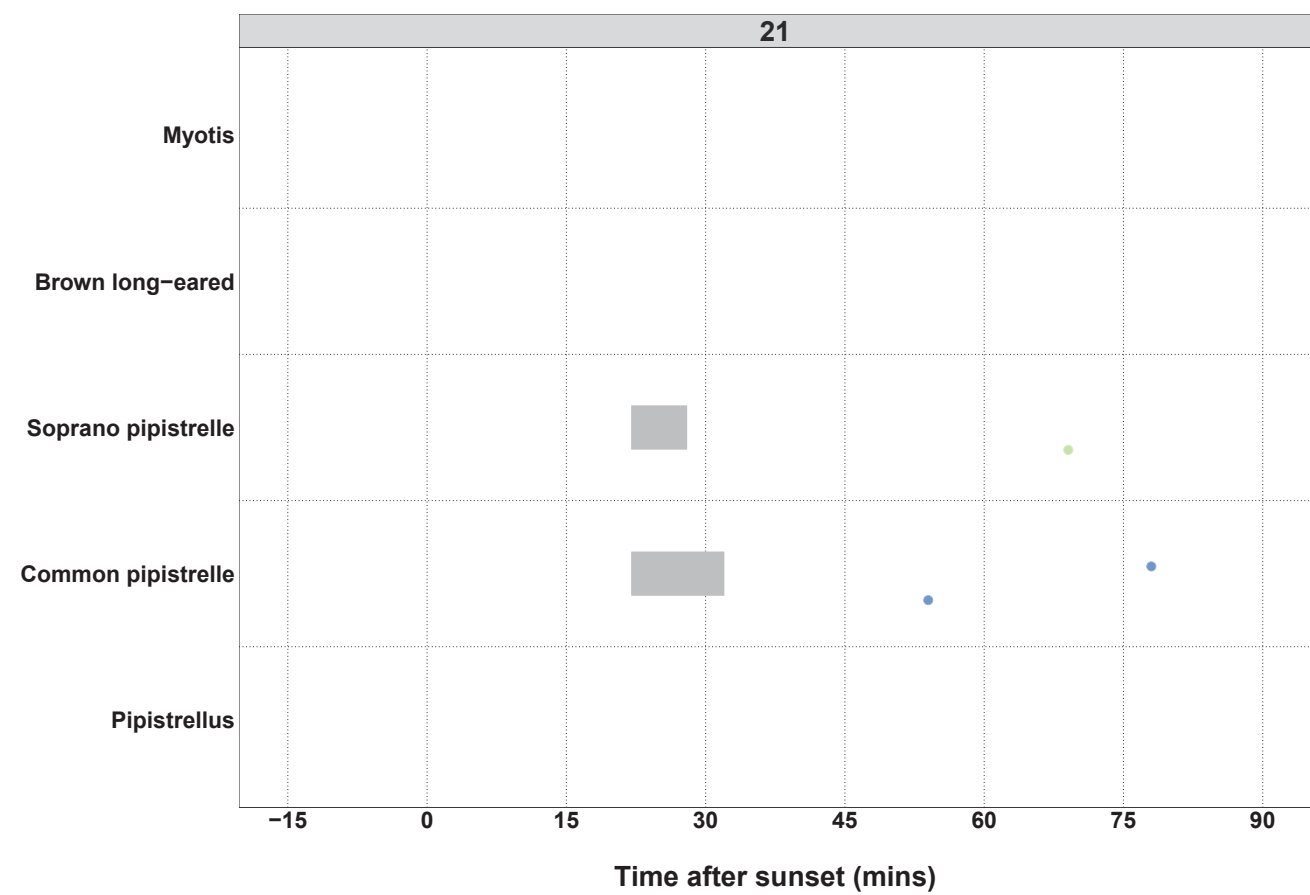
Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Figures

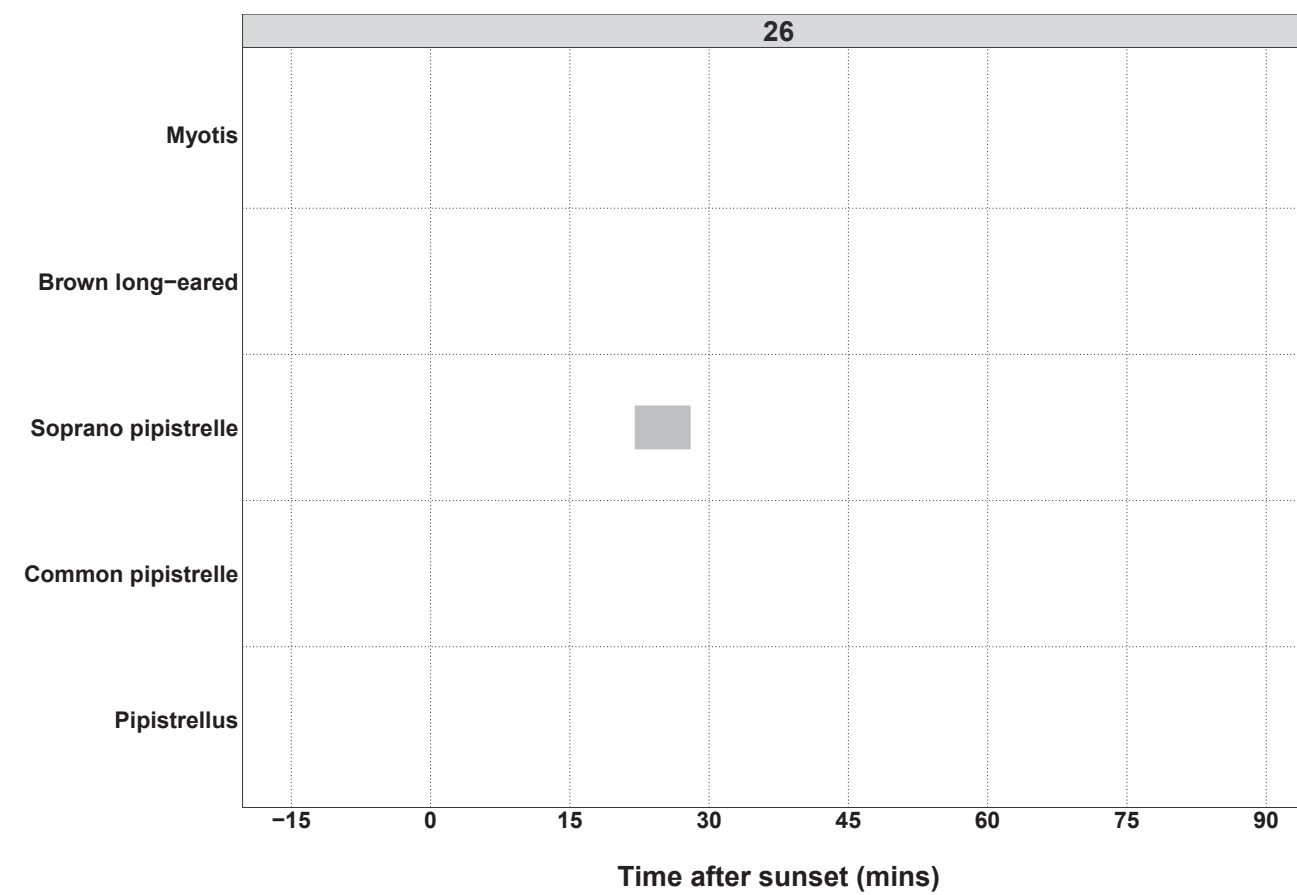
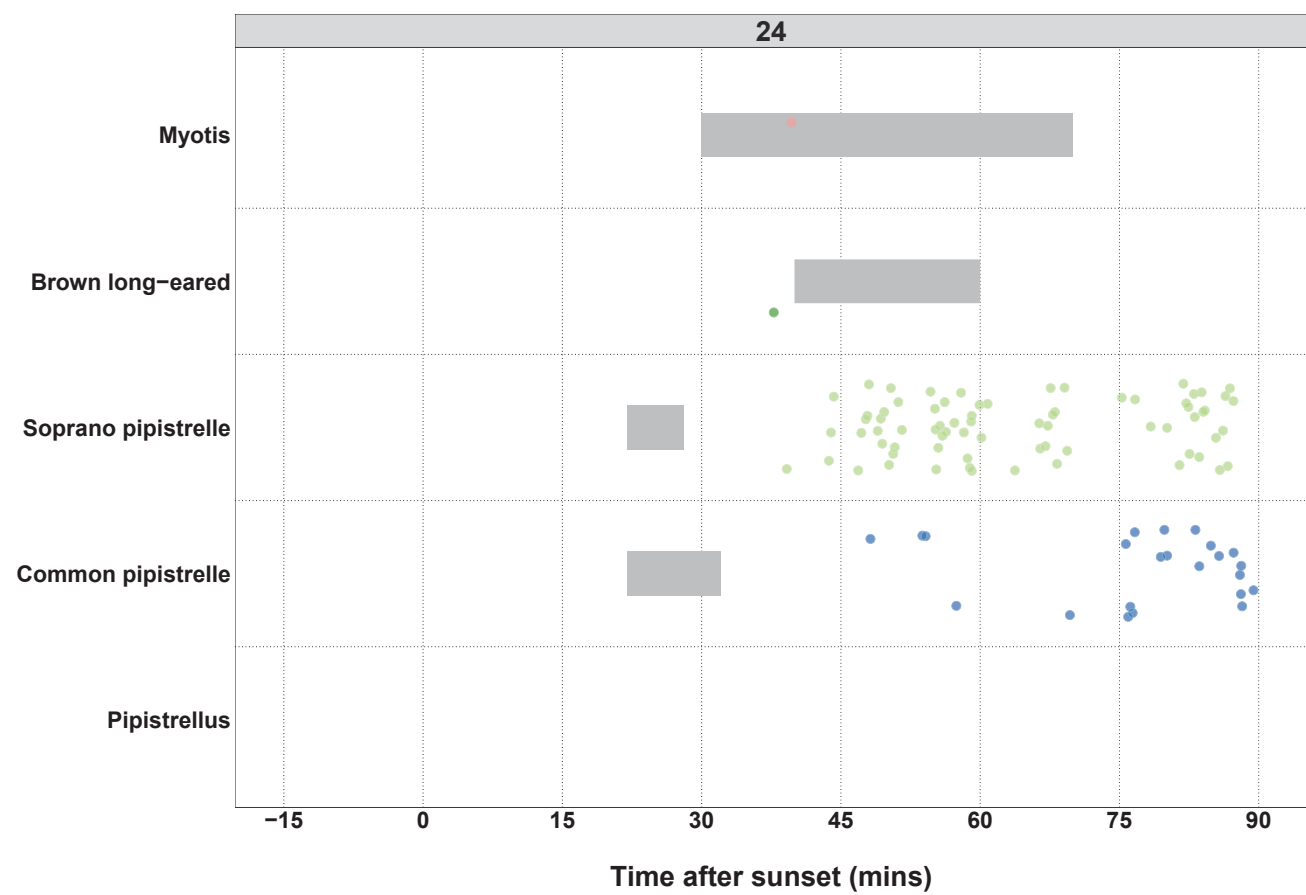
Figure 8. Time from 15 minutes before to 90 minutes after sunset. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occurring earlier than this time range, may potentially indicate the presence of a nearby roost.

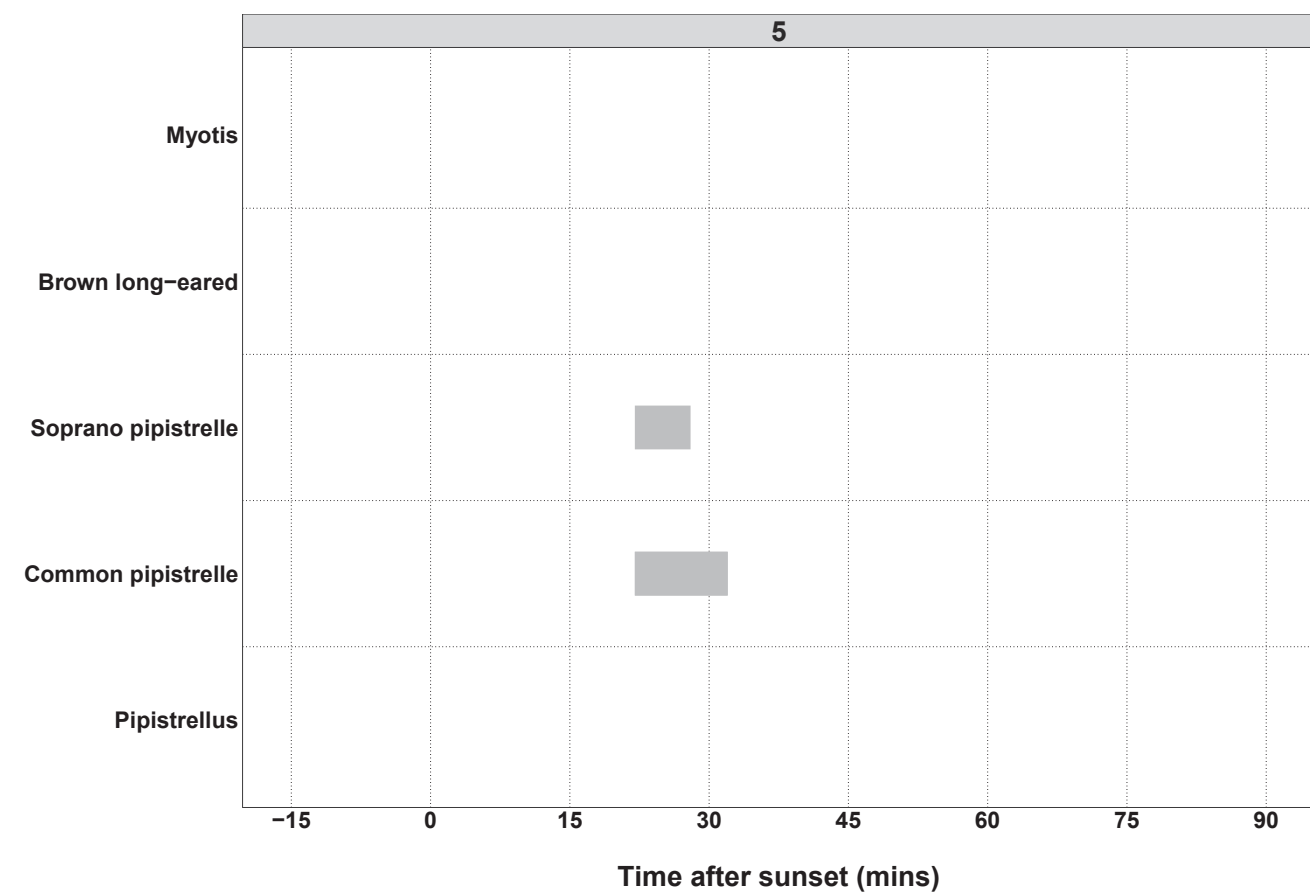
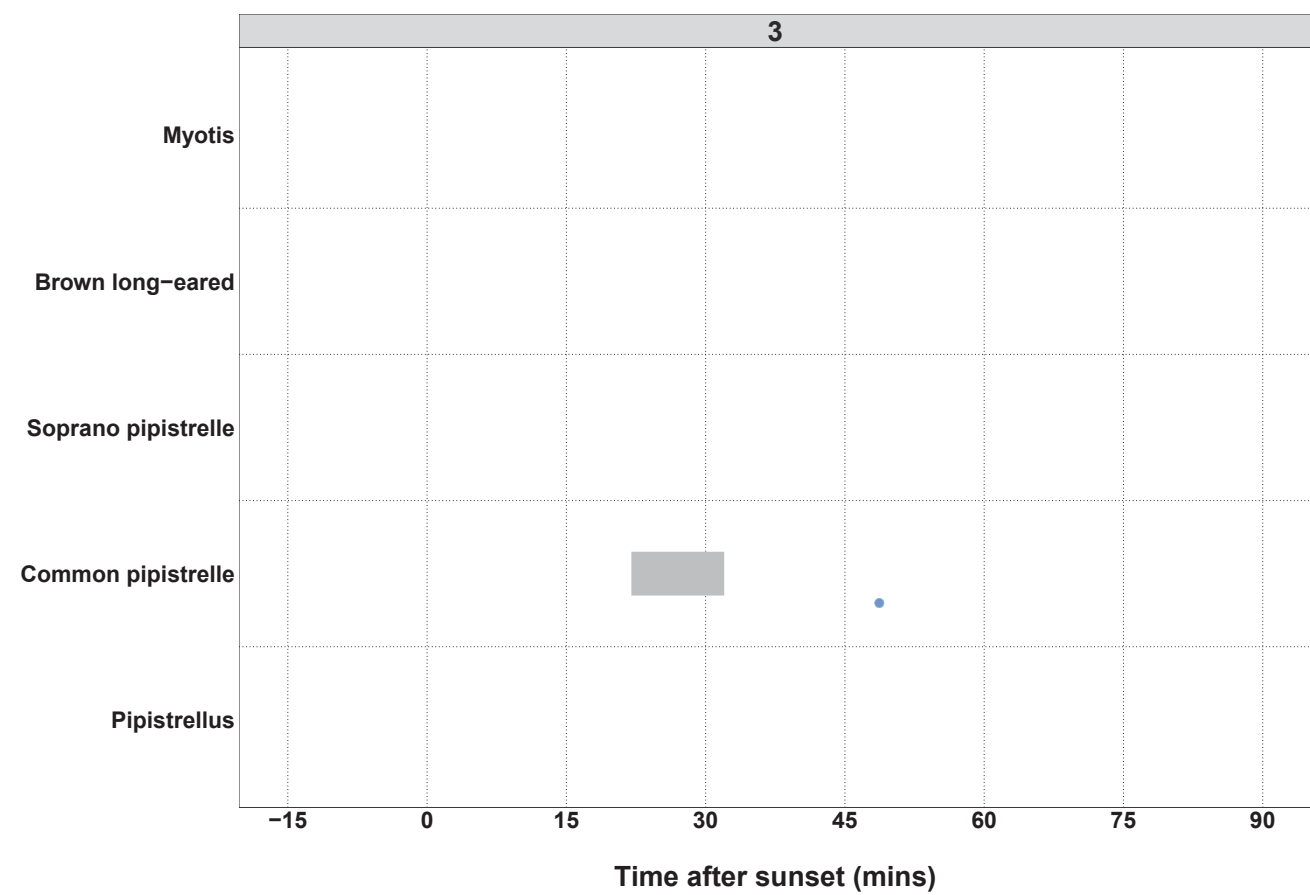


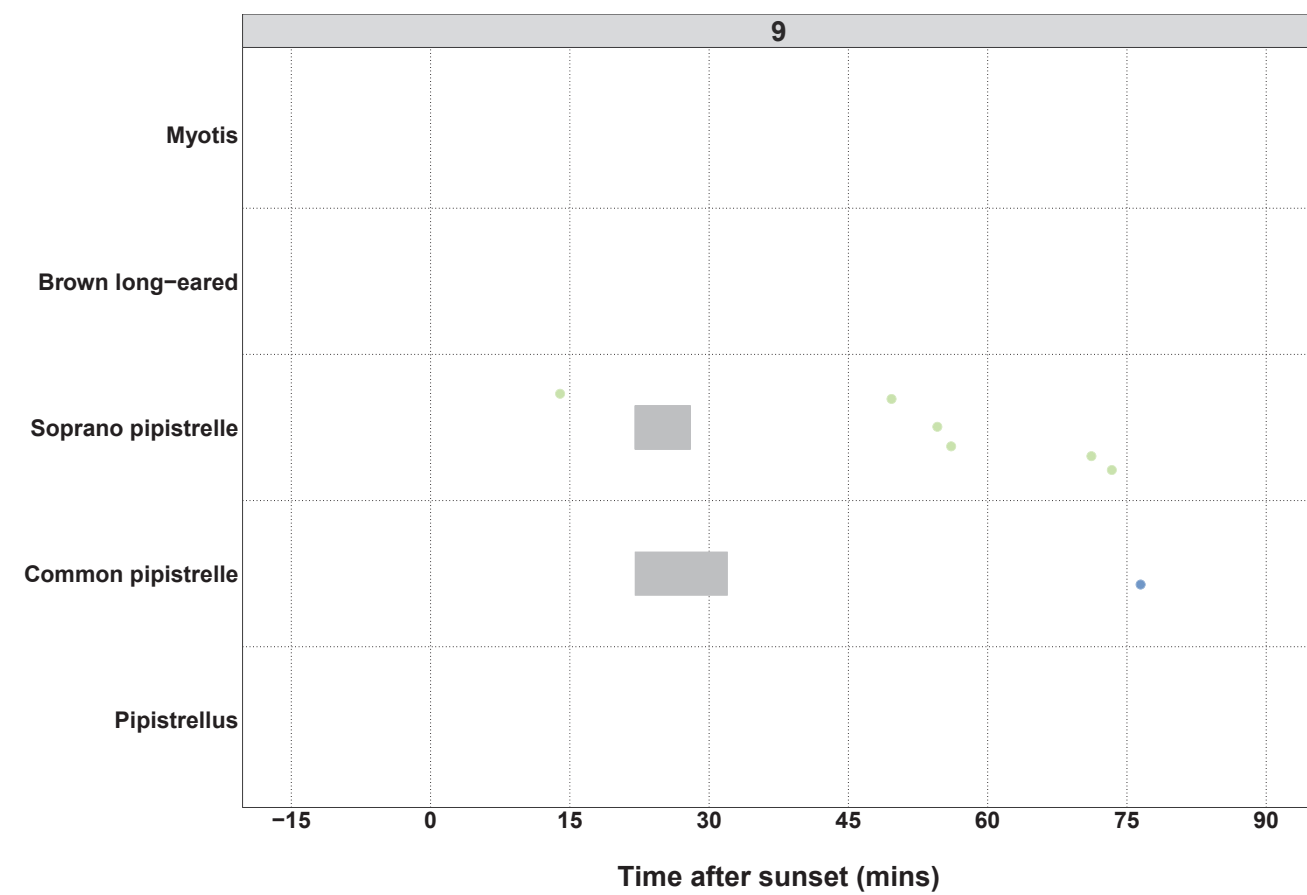
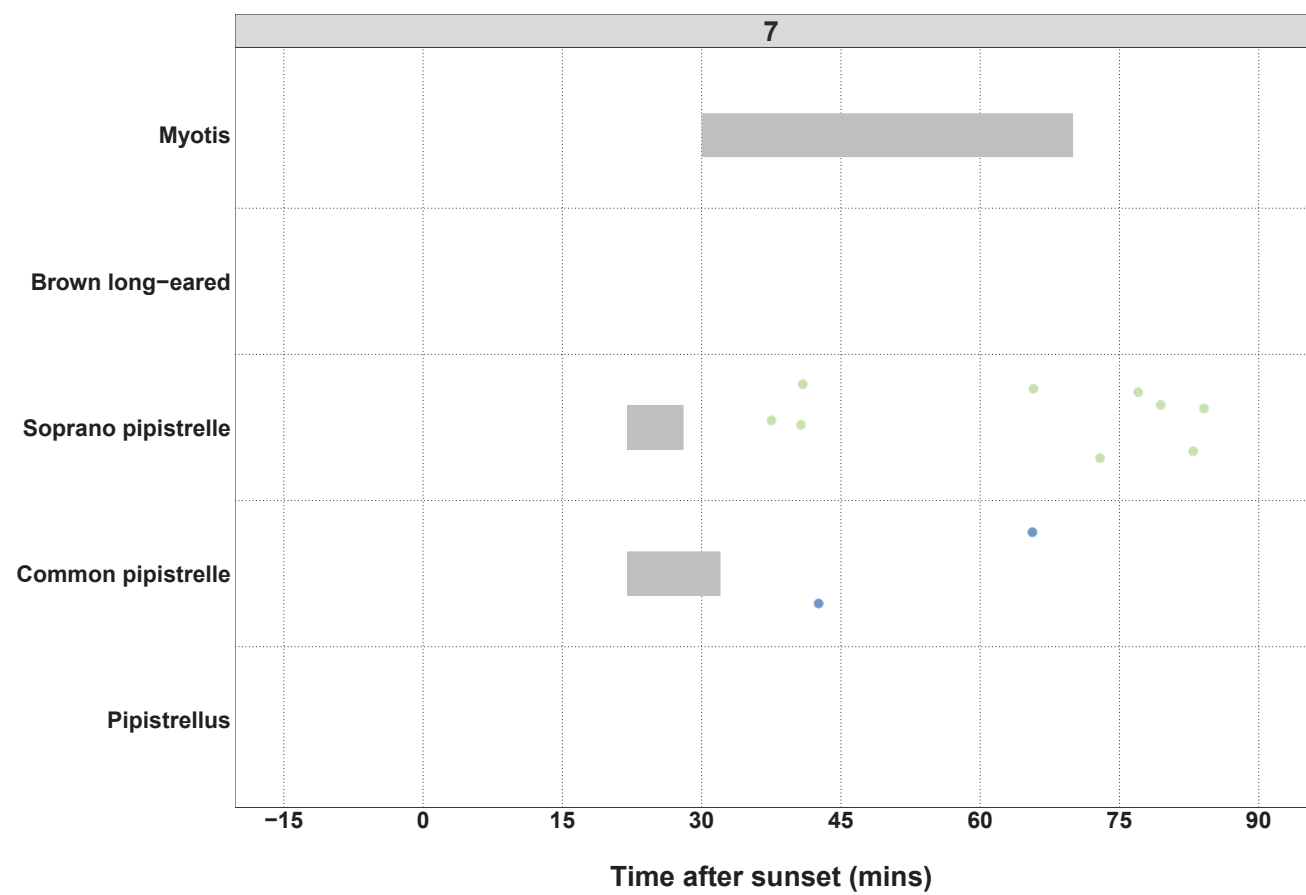












Counts of Bat Passes

All detectors

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

Species	Passes (No.)	Percentage of total (%)
Pipistrellus	1	0.2
Common pipistrelle	79	18.0
Soprano pipistrelle	339	77.0
Brown long-eared	1	0.2
Myotis	20	4.5
Total	440	99.9

Page Break

Counts of Bat Passes

Per Detector

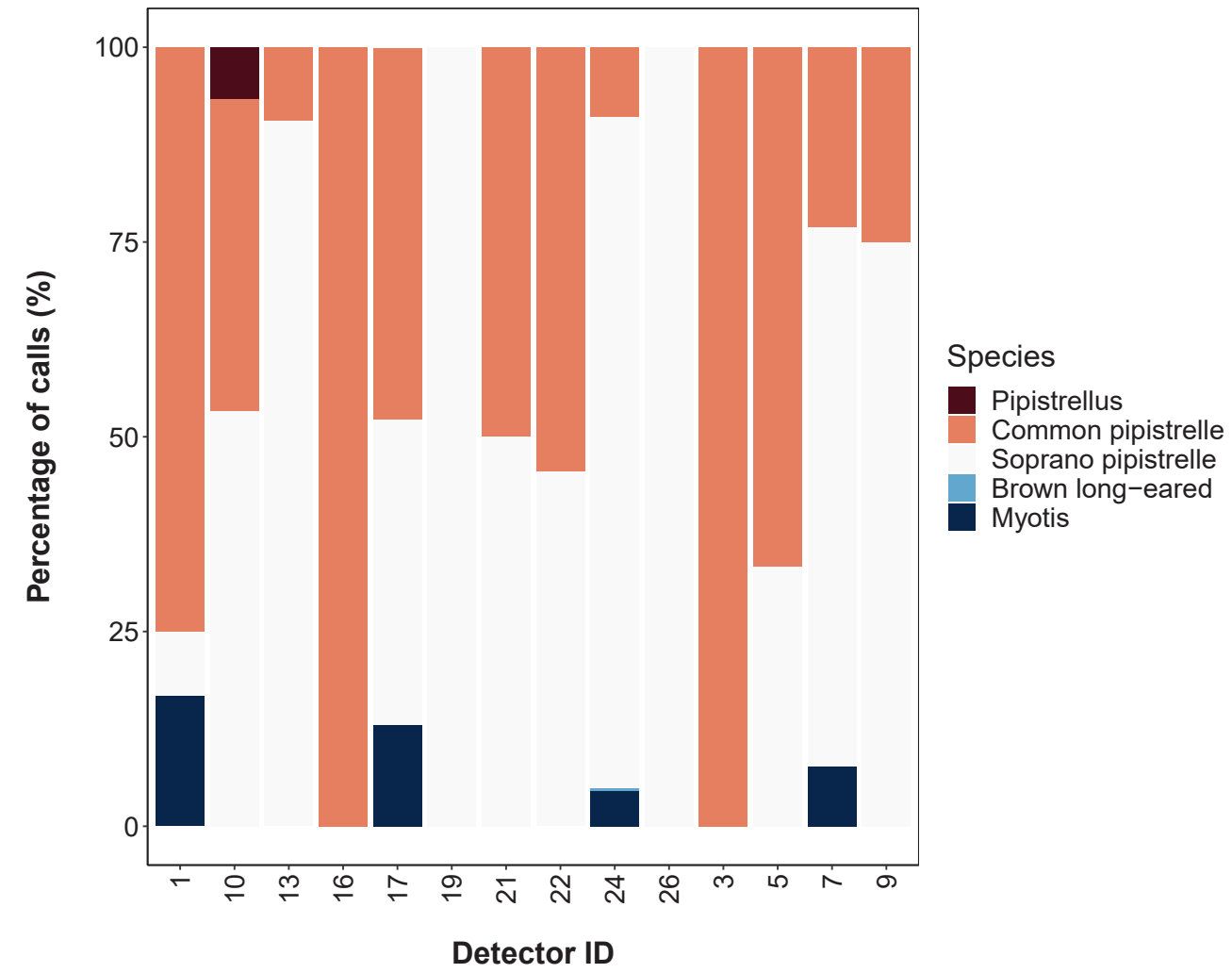
Table 15. The number of passes recorded for each species at each detector.

Species	Detector ID	Count (No)	Percentage by Detector (%)
Pipistrellus	10	1	6.7
Common pipistrelle	1	9	75.0
Common pipistrelle	10	6	40.0
Common pipistrelle	13	2	9.5
Common pipistrelle	16	1	100.0
Common pipistrelle	17	11	47.8
Common pipistrelle	21	2	50.0
Common pipistrelle	22	12	54.5
Common pipistrelle	24	28	9.0
Common pipistrelle	3	1	100.0
Common pipistrelle	5	2	66.7
Common pipistrelle	7	3	23.1
Common pipistrelle	9	2	25.0
Soprano pipistrelle	1	1	8.3
Soprano pipistrelle	10	8	53.3
Soprano pipistrelle	13	19	90.5
Soprano pipistrelle	17	9	39.1
Soprano pipistrelle	19	4	100.0
Soprano pipistrelle	21	2	50.0
Soprano pipistrelle	22	10	45.5
Soprano pipistrelle	24	269	86.2
Soprano pipistrelle	26	1	100.0
Soprano pipistrelle	5	1	33.3
Soprano pipistrelle	7	9	69.2
Soprano pipistrelle	9	6	75.0
Brown long-eared	24	1	0.3
Myotis	1	2	16.7
Myotis	17	3	13.0
Myotis	24	14	4.5

Species	Detector ID	Count (No)	Percentage by Detector (%)
Myotis	7	1	7.7

Species Composition

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



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.

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

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

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

Species	Detector ID	Median Pass Rate
Pipistrellus	10	0.1
Common pipistrelle	1	0.2
Common pipistrelle	10	0.1
Common pipistrelle	13	0.1
Common pipistrelle	16	0.1
Common pipistrelle	17	0.3
Common pipistrelle	21	0.2
Common pipistrelle	22	0.5
Common pipistrelle	24	0.3
Common pipistrelle	3	0.1
Common pipistrelle	5	0.1
Common pipistrelle	7	0.1
Common pipistrelle	9	0.1
Soprano pipistrelle	1	0.1
Soprano pipistrelle	10	0.3
Soprano pipistrelle	13	0.2
Soprano pipistrelle	17	0.2
Soprano pipistrelle	19	0.2
Soprano pipistrelle	21	0.2
Soprano pipistrelle	22	0.3
Soprano pipistrelle	24	2.8
Soprano pipistrelle	26	0.1
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.2
Soprano pipistrelle	9	0.3
Brown long-eared	24	0.1
Myotis	1	0.1
Myotis	17	0.1
Myotis	24	0.3
Myotis	7	0.1

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

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

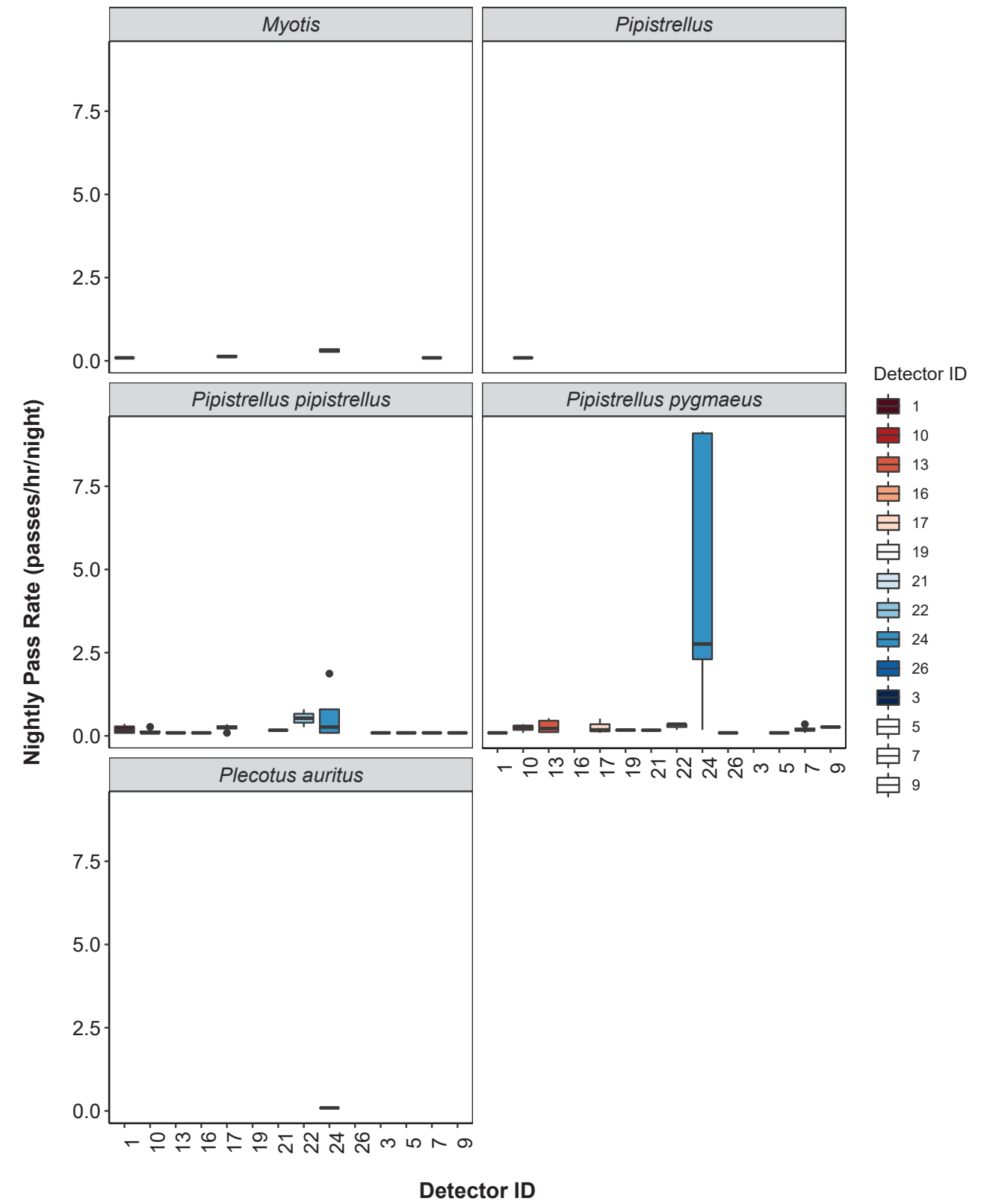
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

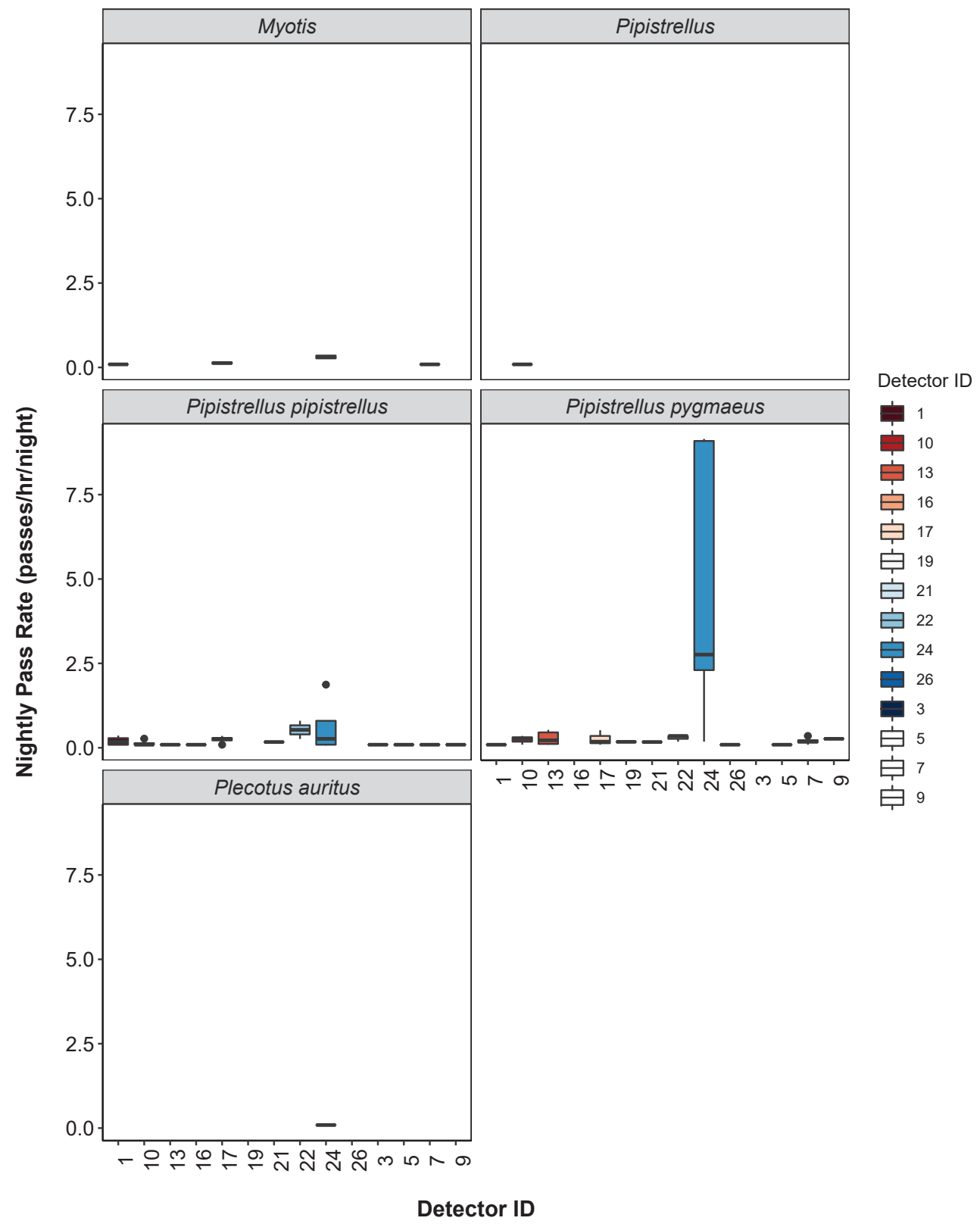
Species	Detector ID	Mean Pass Rate
Pipistrellus	10	0.1
Common pipistrelle	1	0.2
Common pipistrelle	10	0.1
Common pipistrelle	13	0.1
Common pipistrelle	16	0.1
Common pipistrelle	17	0.2
Common pipistrelle	21	0.2
Common pipistrelle	22	0.5
Common pipistrelle	24	0.6
Common pipistrelle	3	0.1
Common pipistrelle	5	0.1
Common pipistrelle	7	0.1
Common pipistrelle	9	0.1
Soprano pipistrelle	1	0.1
Soprano pipistrelle	10	0.2
Soprano pipistrelle	13	0.3
Soprano pipistrelle	17	0.3
Soprano pipistrelle	19	0.2
Soprano pipistrelle	21	0.2
Soprano pipistrelle	22	0.3
Soprano pipistrelle	24	4.7
Soprano pipistrelle	26	0.1
Soprano pipistrelle	5	0.1
Soprano pipistrelle	7	0.2
Soprano pipistrelle	9	0.3
Brown long-eared	24	0.1
Myotis	1	0.1
Myotis	17	0.1
Myotis	24	0.3
Myotis	7	0.1

Nightly Bat Passes (Bat passes per hour)

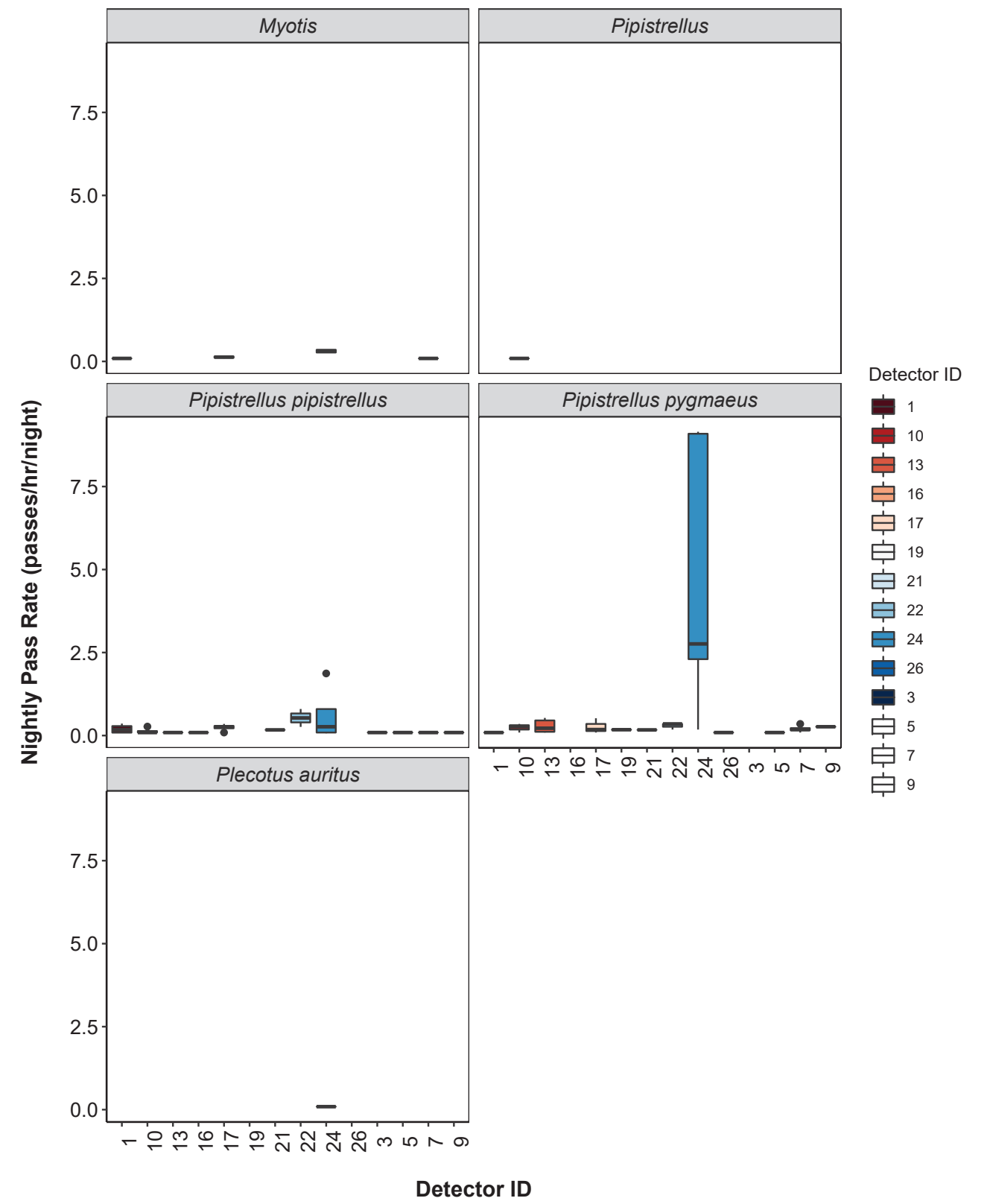
Per Detector - Figures

Figure 11. Boxplots for the number of bat passes per hour each night, for each detector. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.





[[1]]



SPLIT BY MONTH

Total Bat Passes per Detector, each Month

Per Detector

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

Species	Detector ID	Sep	Oct
Pipistrellus	10	1	0
Common pipistrelle	1	8	1
Common pipistrelle	10	6	0
Common pipistrelle	13	2	0
Common pipistrelle	16	1	0
Common pipistrelle	17	11	0
Common pipistrelle	21	2	0
Common pipistrelle	22	12	0
Common pipistrelle	24	28	0
Common pipistrelle	3	1	0
Common pipistrelle	5	2	0
Common pipistrelle	7	3	0
Common pipistrelle	9	2	0
Soprano pipistrelle	1	1	0
Soprano pipistrelle	10	8	0
Soprano pipistrelle	13	19	0
Soprano pipistrelle	17	9	0
Soprano pipistrelle	19	4	0
Soprano pipistrelle	21	2	0
Soprano pipistrelle	22	10	0
Soprano pipistrelle	24	269	0
Soprano pipistrelle	26	1	0
Soprano pipistrelle	5	1	0
Soprano pipistrelle	7	9	0
Soprano pipistrelle	9	6	0
Brown long-eared	24	1	0
Myotis	1	2	0
Myotis	17	3	0
Myotis	24	14	0
Myotis	7	1	0

Survey Effort

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

Month	Detector ID	No. of Survey Nights
Sep	1	4
Sep	10	5
Sep	13	6
Sep	16	1
Sep	17	4
Sep	19	2
Sep	21	1
Sep	22	3
Sep	24	6
Sep	26	1
Sep	3	1
Sep	5	2
Sep	7	6
Sep	9	4
Oct	1	1

Nightly Bat Pass Rate for each Month

Median Per Detector

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

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

Species	Detector ID	Sep	Oct
Pipistrellus	10	0.1	NA
Common pipistrelle	1	0.3	0.1
Common pipistrelle	10	0.1	NA
Common pipistrelle	13	0.1	NA
Common pipistrelle	16	0.1	NA
Common pipistrelle	17	0.3	NA
Common pipistrelle	21	0.2	NA
Common pipistrelle	22	0.5	NA
Common pipistrelle	24	0.3	NA
Common pipistrelle	3	0.1	NA
Common pipistrelle	5	0.1	NA
Common pipistrelle	7	0.1	NA
Common pipistrelle	9	0.1	NA
Soprano pipistrelle	1	0.1	NA
Soprano pipistrelle	10	0.3	NA
Soprano pipistrelle	13	0.2	NA
Soprano pipistrelle	17	0.2	NA
Soprano pipistrelle	19	0.2	NA
Soprano pipistrelle	21	0.2	NA
Soprano pipistrelle	22	0.3	NA
Soprano pipistrelle	24	2.8	NA
Soprano pipistrelle	26	0.1	NA
Soprano pipistrelle	5	0.1	NA
Soprano pipistrelle	7	0.2	NA
Soprano pipistrelle	9	0.3	NA
Brown long-eared	24	0.1	NA
Myotis	1	0.1	NA
Myotis	17	0.1	NA
Myotis	24	0.3	NA
Myotis	7	0.1	NA

Nightly Bat Pass Rate for each Month

Mean per Detector

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

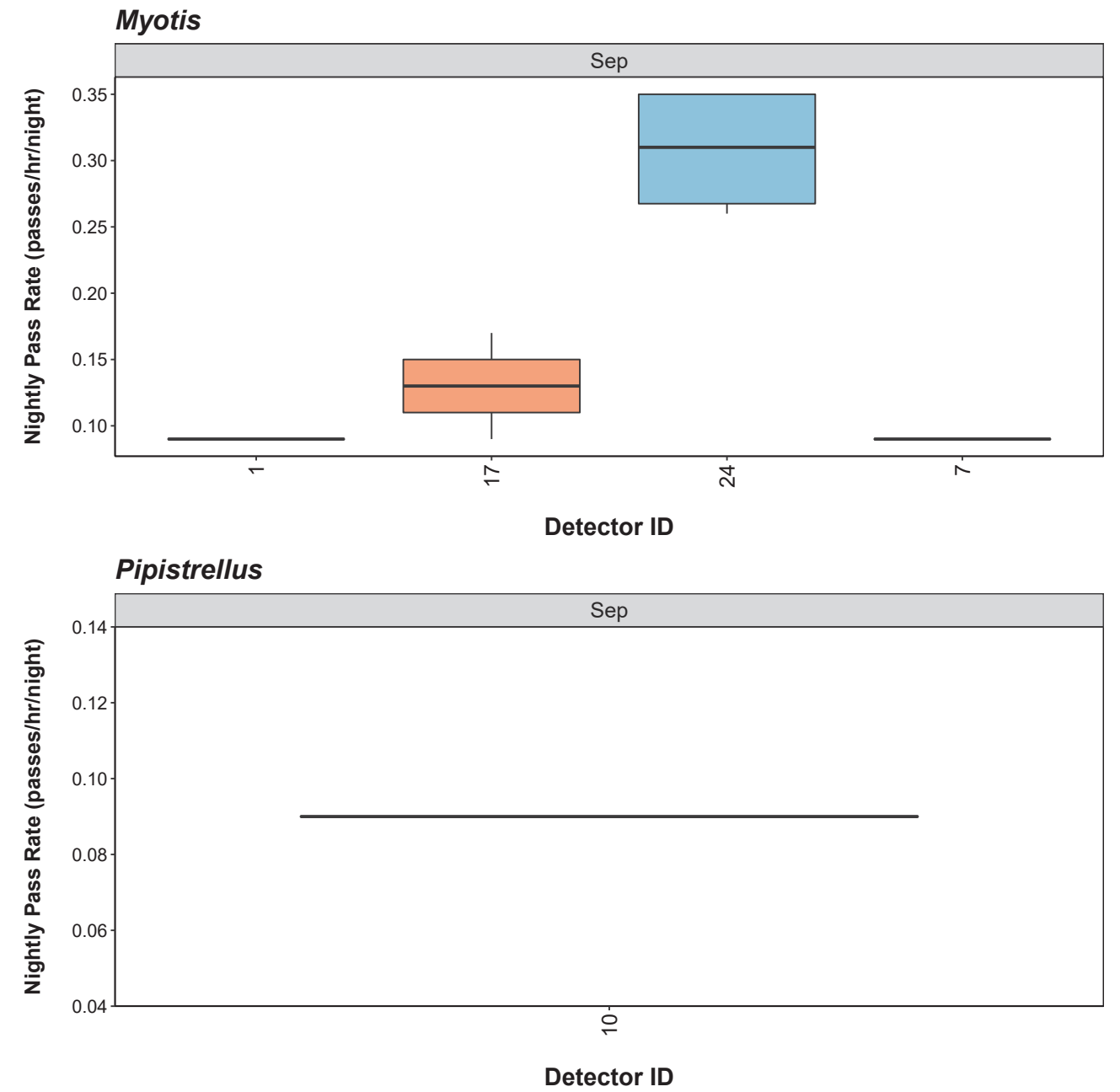
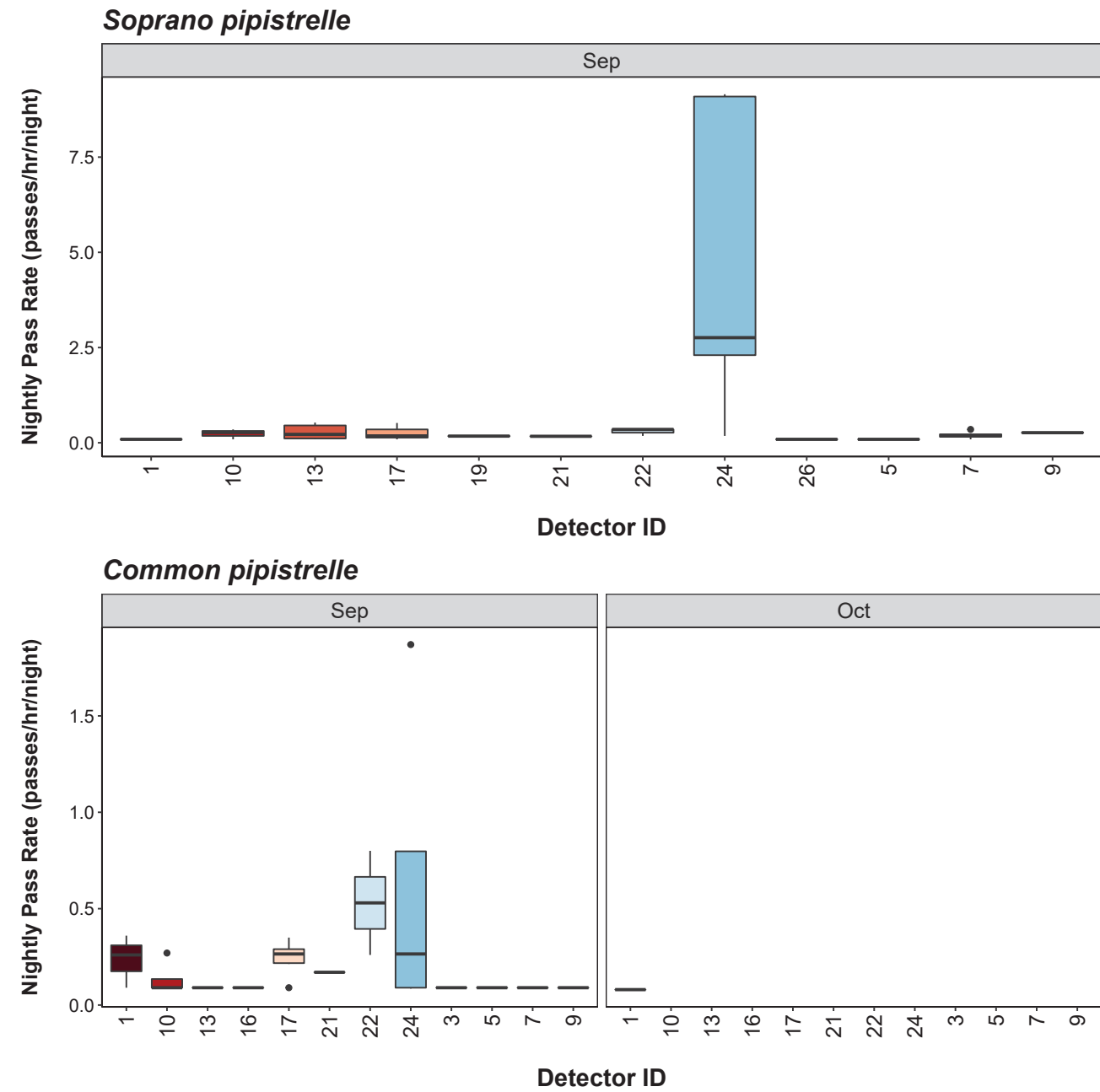
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

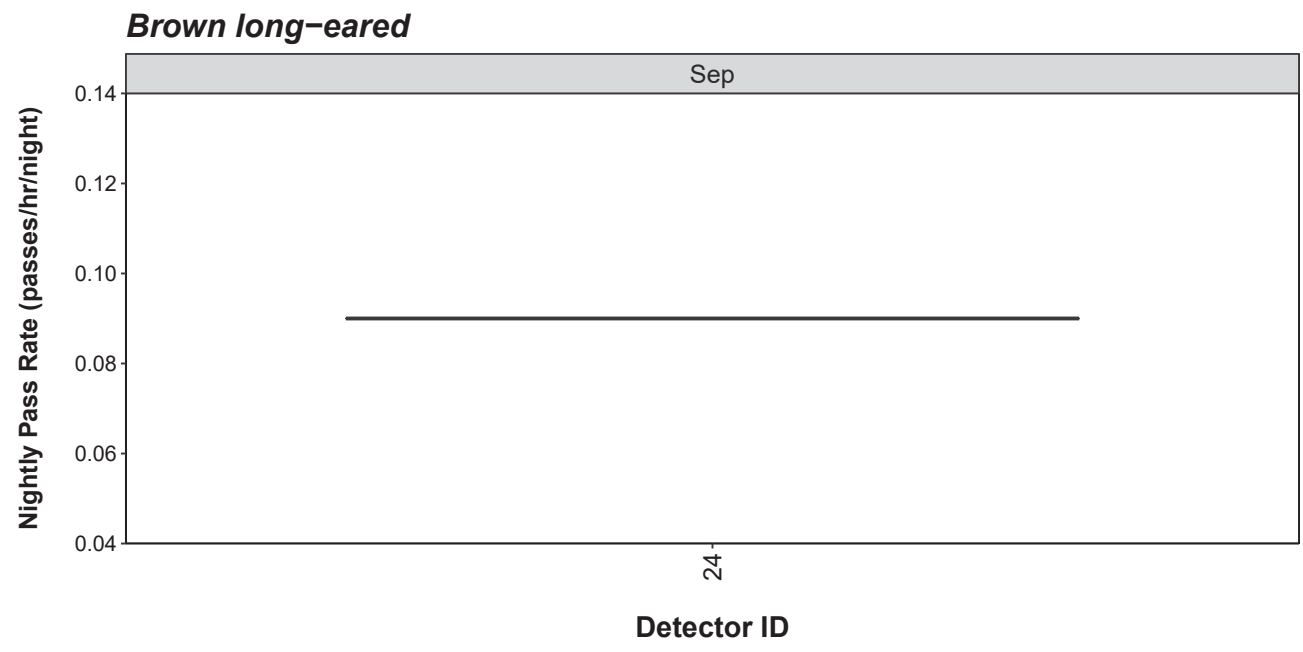
Species	Detector ID	Sep	Oct
Pipistrellus	10	0.1	NA
Common pipistrelle	1	0.2	0.1
Common pipistrelle	10	0.1	NA
Common pipistrelle	13	0.1	NA
Common pipistrelle	16	0.1	NA
Common pipistrelle	17	0.2	NA
Common pipistrelle	21	0.2	NA
Common pipistrelle	22	0.5	NA
Common pipistrelle	24	0.6	NA
Common pipistrelle	3	0.1	NA
Common pipistrelle	5	0.1	NA
Common pipistrelle	7	0.1	NA
Common pipistrelle	9	0.1	NA
Soprano pipistrelle	1	0.1	NA
Soprano pipistrelle	10	0.2	NA
Soprano pipistrelle	13	0.3	NA
Soprano pipistrelle	17	0.3	NA
Soprano pipistrelle	19	0.2	NA
Soprano pipistrelle	21	0.2	NA
Soprano pipistrelle	22	0.3	NA
Soprano pipistrelle	24	4.7	NA
Soprano pipistrelle	26	0.1	NA
Soprano pipistrelle	5	0.1	NA
Soprano pipistrelle	7	0.2	NA
Soprano pipistrelle	9	0.3	NA
Brown long-eared	24	0.1	NA
Myotis	1	0.1	NA
Myotis	17	0.1	NA
Myotis	24	0.3	NA
Myotis	7	0.1	NA

Nightly Bat Pass Rate for each Month

Per Detector - Figures

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





Bat Activity per Detector Location

Figure 13. Detector ID reference:

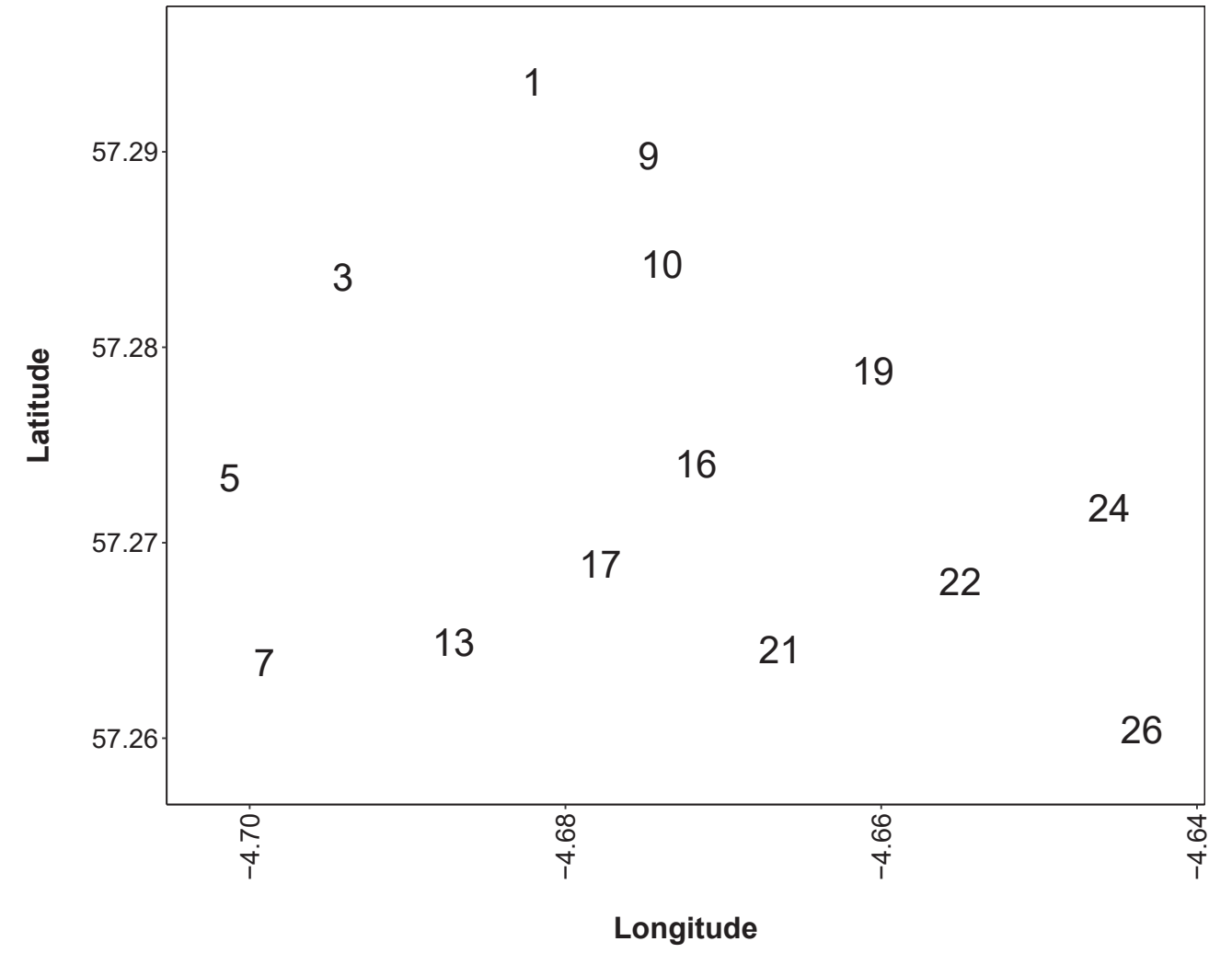


Figure 14. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

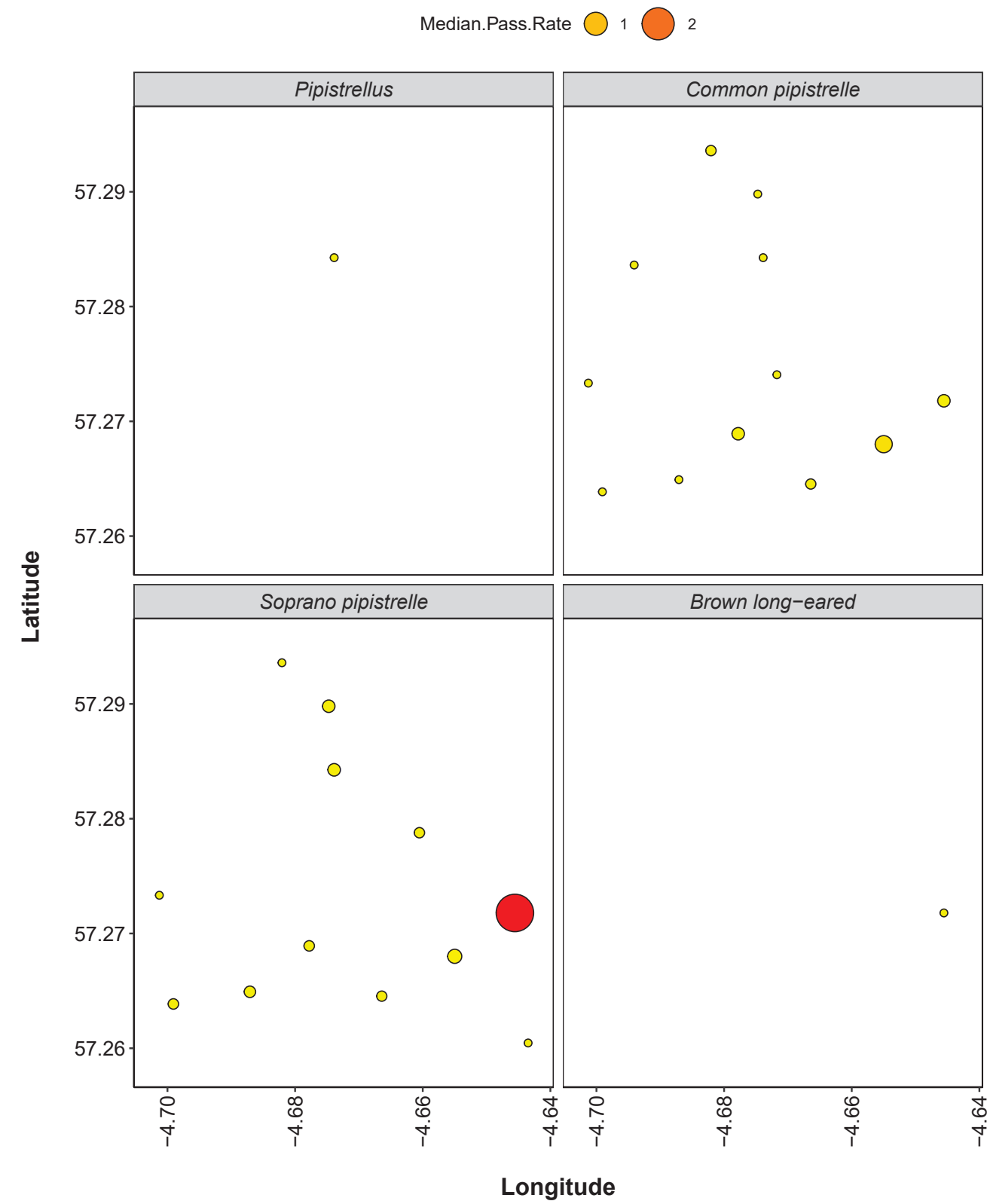
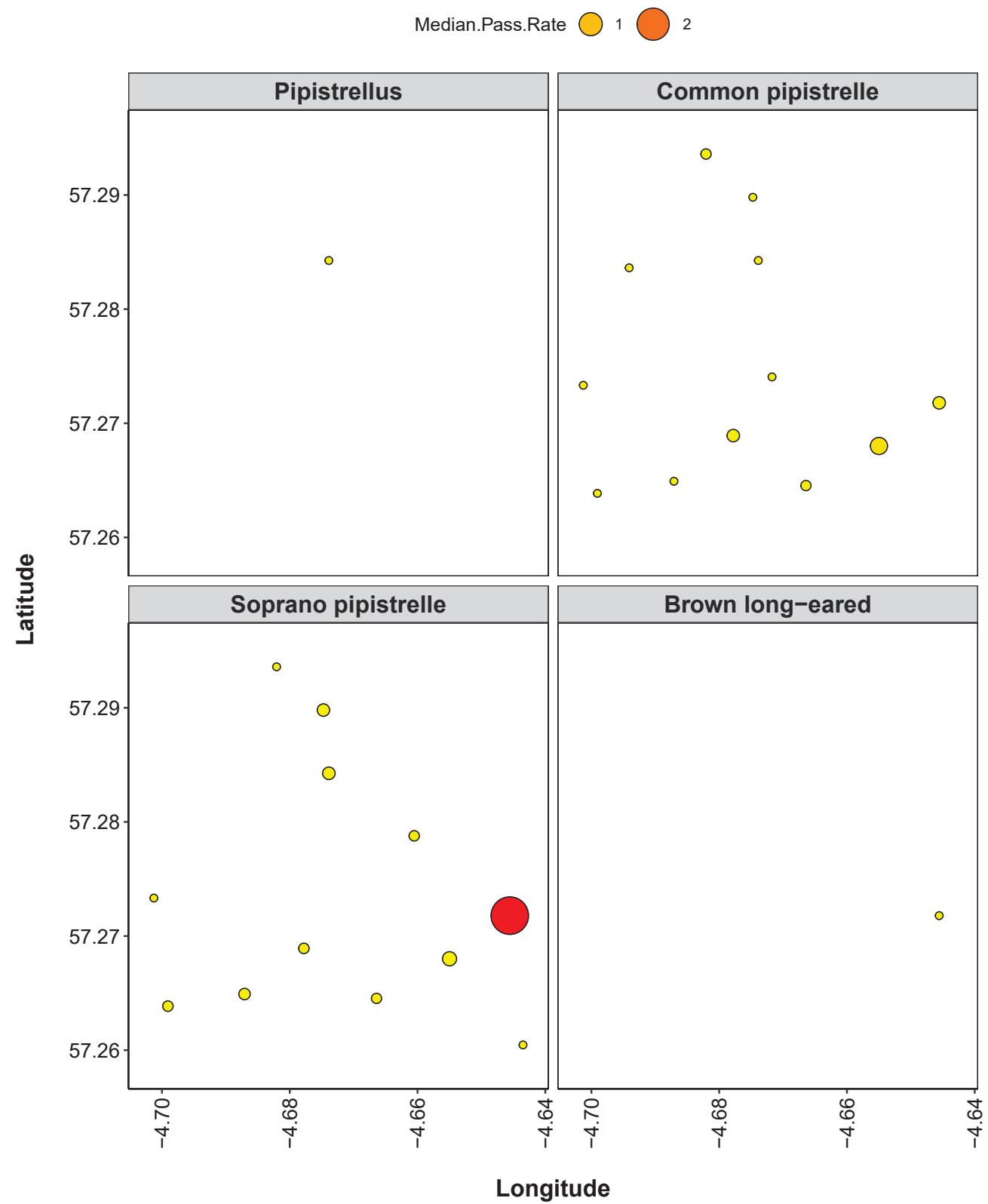
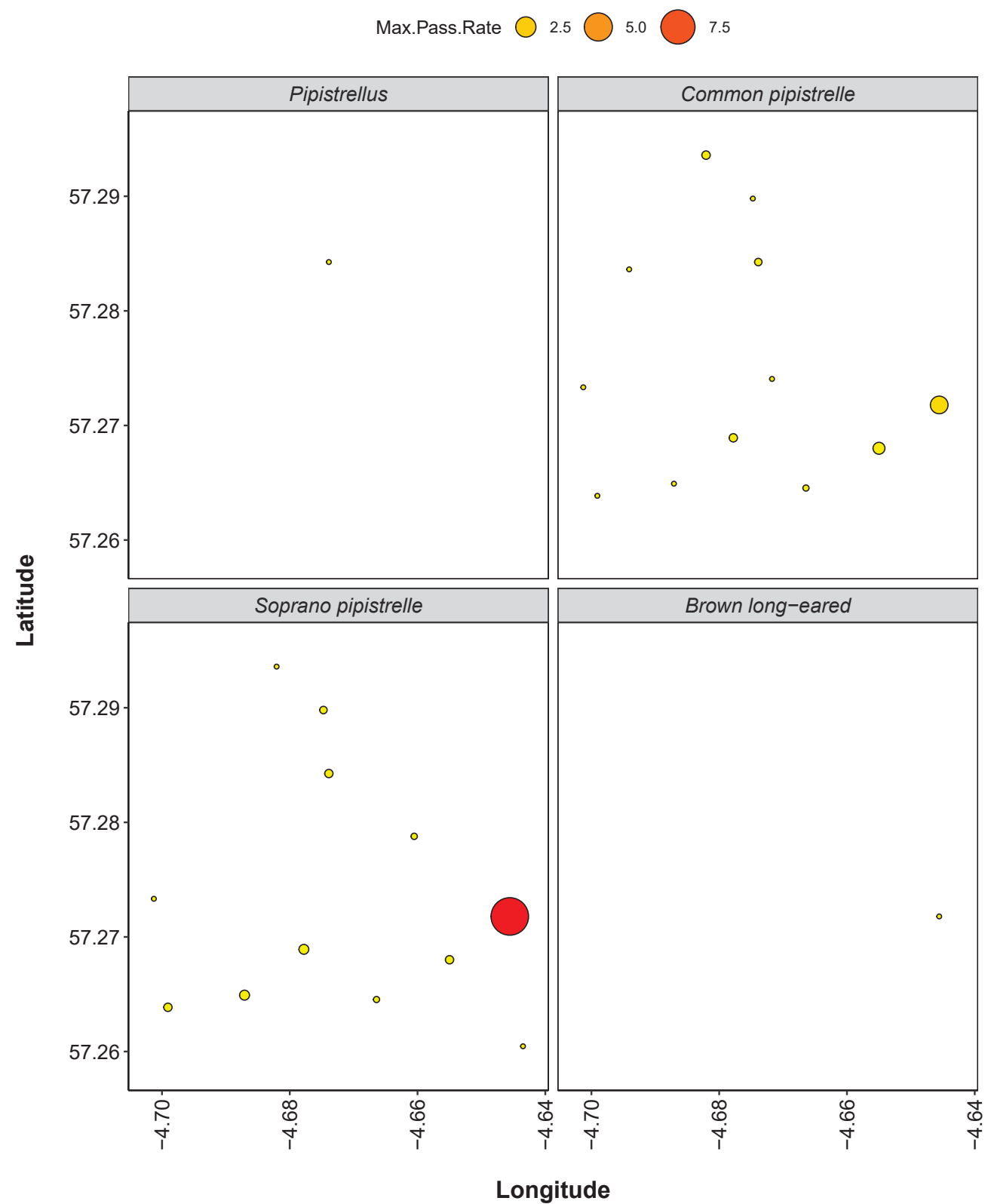


Figure 15. Maximum Nightly Pass Rate (bat passes/hr/night) recorded in a single night throughout the survey period - represented by the size and colour of the point at each detector location.



PART 2B: Includes absences

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

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

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

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

Species	Detector ID	Median Pass Rate
Brown long-eared	1	0.0
Brown long-eared	10	0.0
Brown long-eared	13	0.0
Brown long-eared	16	0.0
Brown long-eared	17	0.0
Brown long-eared	19	0.0
Brown long-eared	21	0.0
Brown long-eared	22	0.0
Brown long-eared	24	0.0
Brown long-eared	26	0.0
Brown long-eared	3	0.0
Brown long-eared	5	0.0
Brown long-eared	7	0.0
Brown long-eared	9	0.0
Common pipistrelle	1	0.1
Common pipistrelle	10	0.1
Common pipistrelle	13	0.0
Common pipistrelle	16	0.1
Common pipistrelle	17	0.3
Common pipistrelle	19	0.0
Common pipistrelle	21	0.2
Common pipistrelle	22	0.3
Common pipistrelle	24	0.1
Common pipistrelle	26	0.0
Common pipistrelle	3	0.1
Common pipistrelle	5	0.1
Common pipistrelle	7	0.0
Common pipistrelle	9	0.0
Myotis	1	0.0
Myotis	10	0.0
Myotis	13	0.0
Myotis	16	0.0
Myotis	17	0.0
Myotis	19	0.0
Myotis	21	0.0
Myotis	22	0.0
Myotis	24	0.3
Myotis	26	0.0
Myotis	3	0.0
Myotis	5	0.0
Myotis	7	0.0
Myotis	9	0.0
Pipistrellus	1	0.0
Pipistrellus	10	0.0
Pipistrellus	13	0.0

Species	Detector ID	Median Pass Rate
Pipistrellus	16	0.0
Pipistrellus	17	0.0
Pipistrellus	19	0.0
Pipistrellus	21	0.0
Pipistrellus	22	0.0
Pipistrellus	24	0.0
Pipistrellus	26	0.0
Pipistrellus	3	0.0
Pipistrellus	5	0.0
Pipistrellus	7	0.0
Pipistrellus	9	0.0
Soprano pipistrelle	1	0.0
Soprano pipistrelle	10	0.1
Soprano pipistrelle	13	0.2
Soprano pipistrelle	16	0.0
Soprano pipistrelle	17	0.1
Soprano pipistrelle	19	0.2
Soprano pipistrelle	21	0.2
Soprano pipistrelle	22	0.3
Soprano pipistrelle	24	2.5
Soprano pipistrelle	26	0.1
Soprano pipistrelle	3	0.0
Soprano pipistrelle	5	0.0
Soprano pipistrelle	7	0.1
Soprano pipistrelle	9	0.1

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

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

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

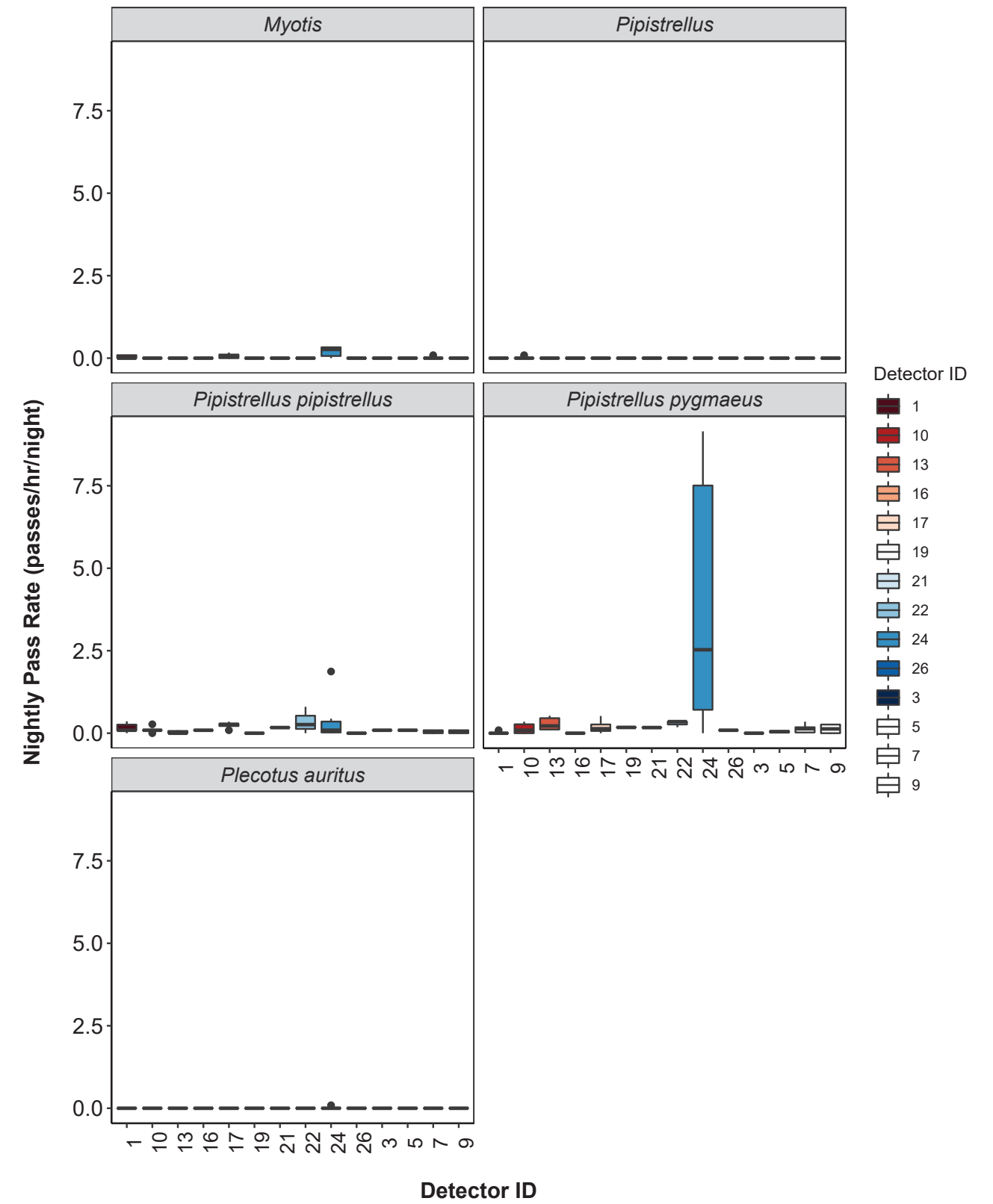
Species	Detector ID	Mean Pass Rate
Brown long-eared	1	0.0
Brown long-eared	10	0.0
Brown long-eared	13	0.0
Brown long-eared	16	0.0
Brown long-eared	17	0.0
Brown long-eared	19	0.0
Brown long-eared	21	0.0
Brown long-eared	22	0.0
Brown long-eared	24	0.0
Brown long-eared	26	0.0
Brown long-eared	3	0.0
Brown long-eared	5	0.0
Brown long-eared	7	0.0
Brown long-eared	9	0.0
Common pipistrelle	1	0.2
Common pipistrelle	10	0.1
Common pipistrelle	13	0.0
Common pipistrelle	16	0.1
Common pipistrelle	17	0.2
Common pipistrelle	19	0.0
Common pipistrelle	21	0.2
Common pipistrelle	22	0.4
Common pipistrelle	24	0.4
Common pipistrelle	26	0.0
Common pipistrelle	3	0.1
Common pipistrelle	5	0.1
Common pipistrelle	7	0.0
Common pipistrelle	9	0.0
Myotis	1	0.0
Myotis	10	0.0
Myotis	13	0.0
Myotis	16	0.0
Myotis	17	0.1
Myotis	19	0.0
Myotis	21	0.0
Myotis	22	0.0
Myotis	24	0.2
Myotis	26	0.0
Myotis	3	0.0
Myotis	5	0.0
Myotis	7	0.0
Myotis	9	0.0
Pipistrellus	1	0.0
Pipistrellus	10	0.0
Pipistrellus	13	0.0
Pipistrellus	16	0.0
Pipistrellus	17	0.0

Species	Detector ID	Mean Pass Rate
Pipistrellus	19	0.0
Pipistrellus	21	0.0
Pipistrellus	22	0.0
Pipistrellus	24	0.0
Pipistrellus	26	0.0
Pipistrellus	3	0.0
Pipistrellus	5	0.0
Pipistrellus	7	0.0
Pipistrellus	9	0.0
Soprano pipistrelle	1	0.0
Soprano pipistrelle	10	0.1
Soprano pipistrelle	13	0.3
Soprano pipistrelle	16	0.0
Soprano pipistrelle	17	0.2
Soprano pipistrelle	19	0.2
Soprano pipistrelle	21	0.2
Soprano pipistrelle	22	0.3
Soprano pipistrelle	24	3.9
Soprano pipistrelle	26	0.1
Soprano pipistrelle	3	0.0
Soprano pipistrelle	5	0.0
Soprano pipistrelle	7	0.1
Soprano pipistrelle	9	0.1

Nightly Bat Passes (Bat passes per hour)

Per Detector - Figures

Figure 16. Figures show boxplots for the number of bat passes per hour each night, for each detector. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.



Survey Effort

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

Month	Detector ID	No of Survey Nights
Sep	1	4
Sep	10	5
Sep	13	6
Sep	16	1
Sep	17	4
Sep	19	2
Sep	21	1
Sep	22	3
Sep	24	6
Sep	26	1
Sep	3	1
Sep	5	2
Sep	7	6
Sep	9	4
Oct	1	1

Nightly Bat Pass Rate for each Month

Median Per Detector

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

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

Species	Detector ID	Oct	Sep
Brown long-eared	1	0.0	0.0
Brown long-eared	10	NA	0.0
Brown long-eared	13	NA	0.0
Brown long-eared	16	NA	0.0
Brown long-eared	17	NA	0.0
Brown long-eared	19	NA	0.0
Brown long-eared	21	NA	0.0
Brown long-eared	22	NA	0.0
Brown long-eared	24	NA	0.0
Brown long-eared	26	NA	0.0
Brown long-eared	3	NA	0.0
Brown long-eared	5	NA	0.0
Brown long-eared	7	NA	0.0
Brown long-eared	9	NA	0.0
Common pipistrelle	1	0.1	0.2
Common pipistrelle	10	NA	0.1
Common pipistrelle	13	NA	0.0
Common pipistrelle	16	NA	0.1
Common pipistrelle	17	NA	0.3
Common pipistrelle	19	NA	0.0
Common pipistrelle	21	NA	0.2
Common pipistrelle	22	NA	0.3
Common pipistrelle	24	NA	0.1
Common pipistrelle	26	NA	0.0
Common pipistrelle	3	NA	0.1
Common pipistrelle	5	NA	0.1
Common pipistrelle	7	NA	0.0
Common pipistrelle	9	NA	0.0
Myotis	1	0.0	0.0
Myotis	10	NA	0.0
Myotis	13	NA	0.0
Myotis	16	NA	0.0
Myotis	17	NA	0.0
Myotis	19	NA	0.0
Myotis	21	NA	0.0
Myotis	22	NA	0.0
Myotis	24	NA	0.3
Myotis	26	NA	0.0
Myotis	3	NA	0.0
Myotis	5	NA	0.0
Myotis	7	NA	0.0
Myotis	9	NA	0.0
Pipistrellus	1	0.0	0.0
Pipistrellus	10	NA	0.0
Pipistrellus	13	NA	0.0

Species	Detector ID	Oct	Sep
Pipistrellus	16	NA	0.0
Pipistrellus	17	NA	0.0
Pipistrellus	19	NA	0.0
Pipistrellus	21	NA	0.0
Pipistrellus	22	NA	0.0
Pipistrellus	24	NA	0.0
Pipistrellus	26	NA	0.0
Pipistrellus	3	NA	0.0
Pipistrellus	5	NA	0.0
Pipistrellus	7	NA	0.0
Pipistrellus	9	NA	0.0
Soprano pipistrelle	1	0.0	0.0
Soprano pipistrelle	10	NA	0.1
Soprano pipistrelle	13	NA	0.2
Soprano pipistrelle	16	NA	0.0
Soprano pipistrelle	17	NA	0.1
Soprano pipistrelle	19	NA	0.2
Soprano pipistrelle	21	NA	0.2
Soprano pipistrelle	22	NA	0.3
Soprano pipistrelle	24	NA	2.5
Soprano pipistrelle	26	NA	0.1
Soprano pipistrelle	3	NA	0.0
Soprano pipistrelle	5	NA	0.0
Soprano pipistrelle	7	NA	0.1
Soprano pipistrelle	9	NA	0.1

Nightly Bat Pass Rate for each Month

Mean per Detector

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

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

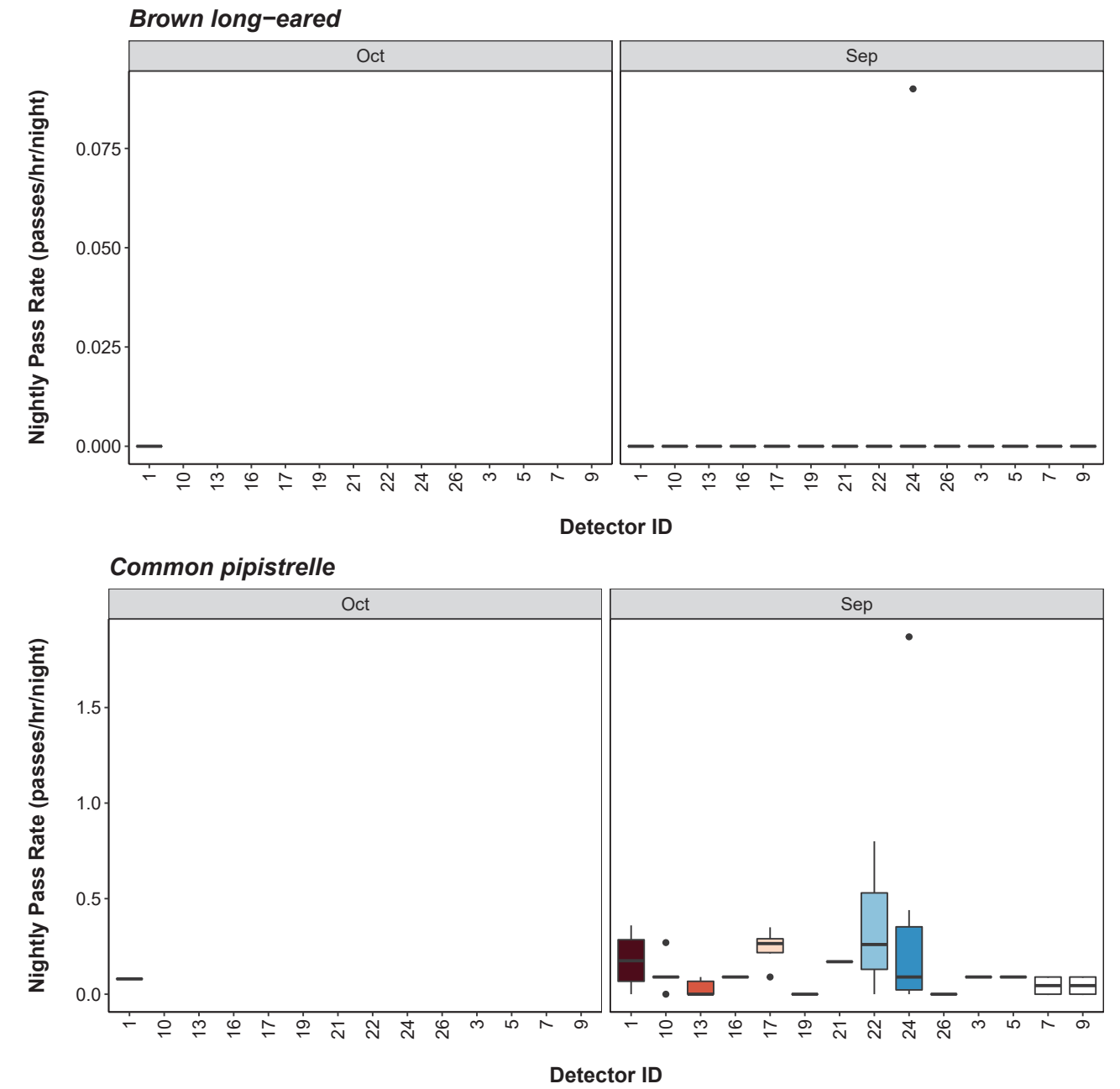
Species	Detector ID	Oct	Sep
Brown long-eared	1	0.0	0.0
Brown long-eared	10	NA	0.0
Brown long-eared	13	NA	0.0
Brown long-eared	16	NA	0.0
Brown long-eared	17	NA	0.0
Brown long-eared	19	NA	0.0
Brown long-eared	21	NA	0.0
Brown long-eared	22	NA	0.0
Brown long-eared	24	NA	0.0
Brown long-eared	26	NA	0.0
Brown long-eared	3	NA	0.0
Brown long-eared	5	NA	0.0
Brown long-eared	7	NA	0.0
Brown long-eared	9	NA	0.0
Common pipistrelle	1	0.1	0.2
Common pipistrelle	10	NA	0.1
Common pipistrelle	13	NA	0.0
Common pipistrelle	16	NA	0.1
Common pipistrelle	17	NA	0.2
Common pipistrelle	19	NA	0.0
Common pipistrelle	21	NA	0.2
Common pipistrelle	22	NA	0.4
Common pipistrelle	24	NA	0.4
Common pipistrelle	26	NA	0.0
Common pipistrelle	3	NA	0.1
Common pipistrelle	5	NA	0.1
Common pipistrelle	7	NA	0.0
Common pipistrelle	9	NA	0.0
Myotis	1	0.0	0.0
Myotis	10	NA	0.0
Myotis	13	NA	0.0
Myotis	16	NA	0.0
Myotis	17	NA	0.1
Myotis	19	NA	0.0
Myotis	21	NA	0.0
Myotis	22	NA	0.0
Myotis	24	NA	0.2
Myotis	26	NA	0.0
Myotis	3	NA	0.0
Myotis	5	NA	0.0
Myotis	7	NA	0.0
Myotis	9	NA	0.0
Pipistrellus	1	0.0	0.0
Pipistrellus	10	NA	0.0
Pipistrellus	13	NA	0.0
Pipistrellus	16	NA	0.0
Pipistrellus	17	NA	0.0

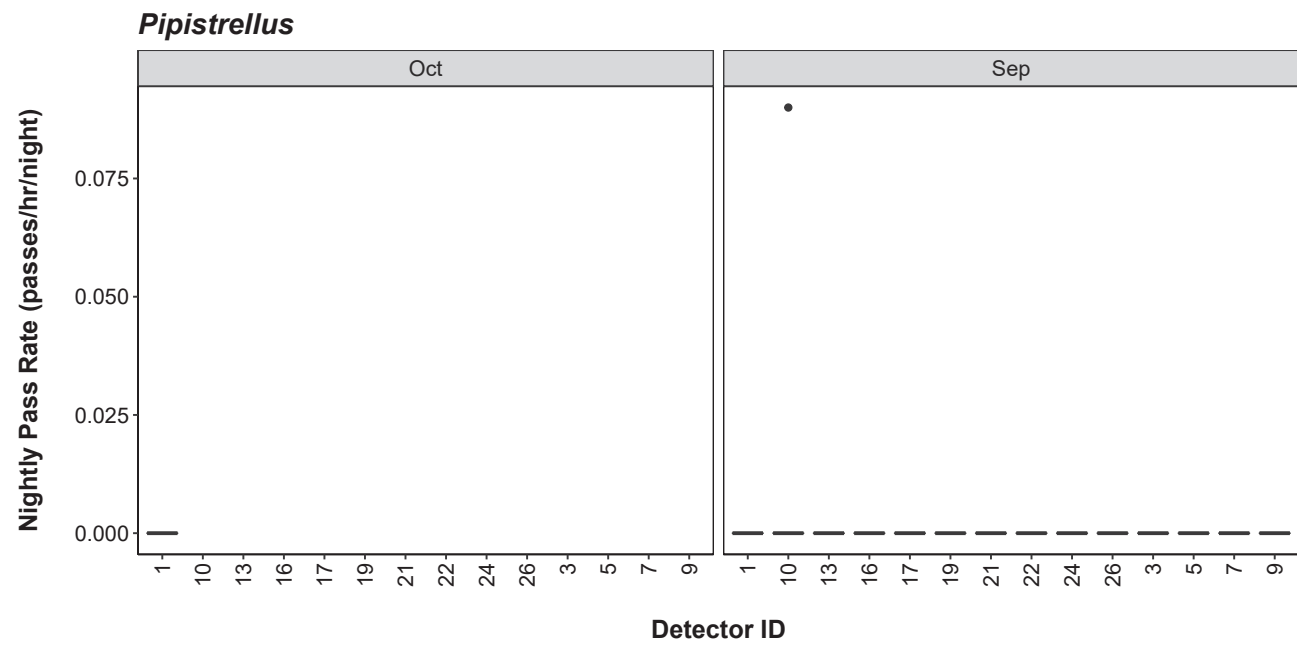
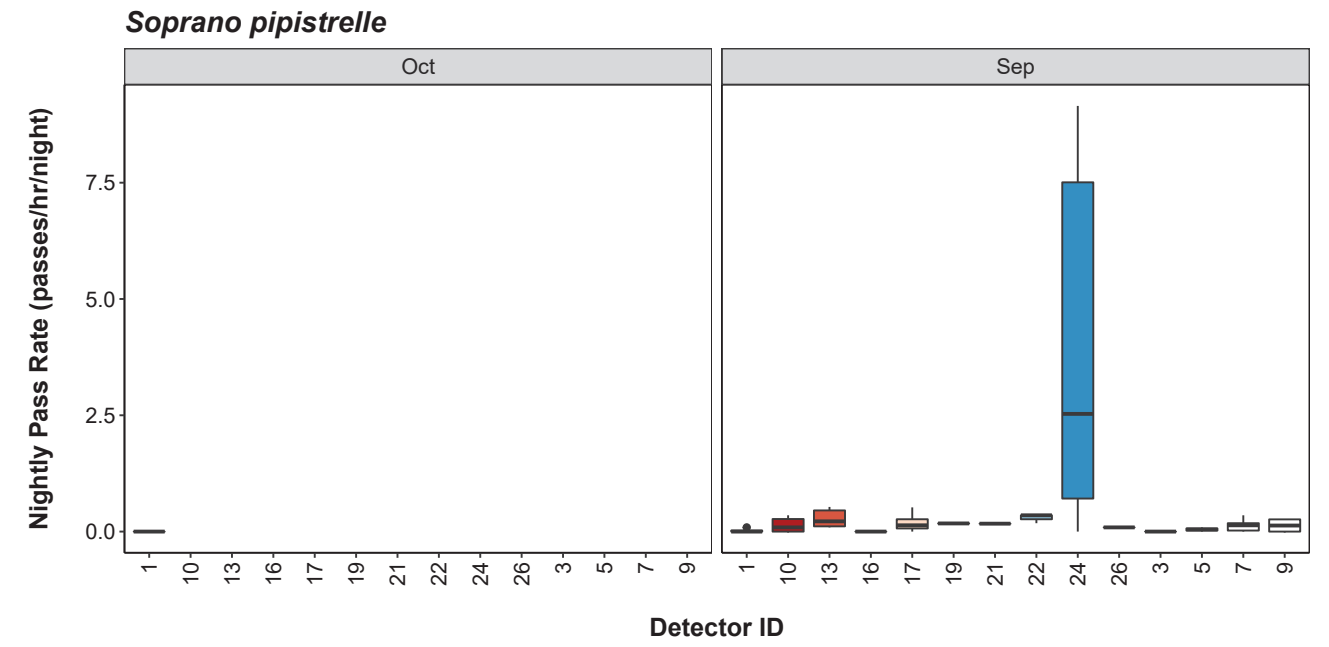
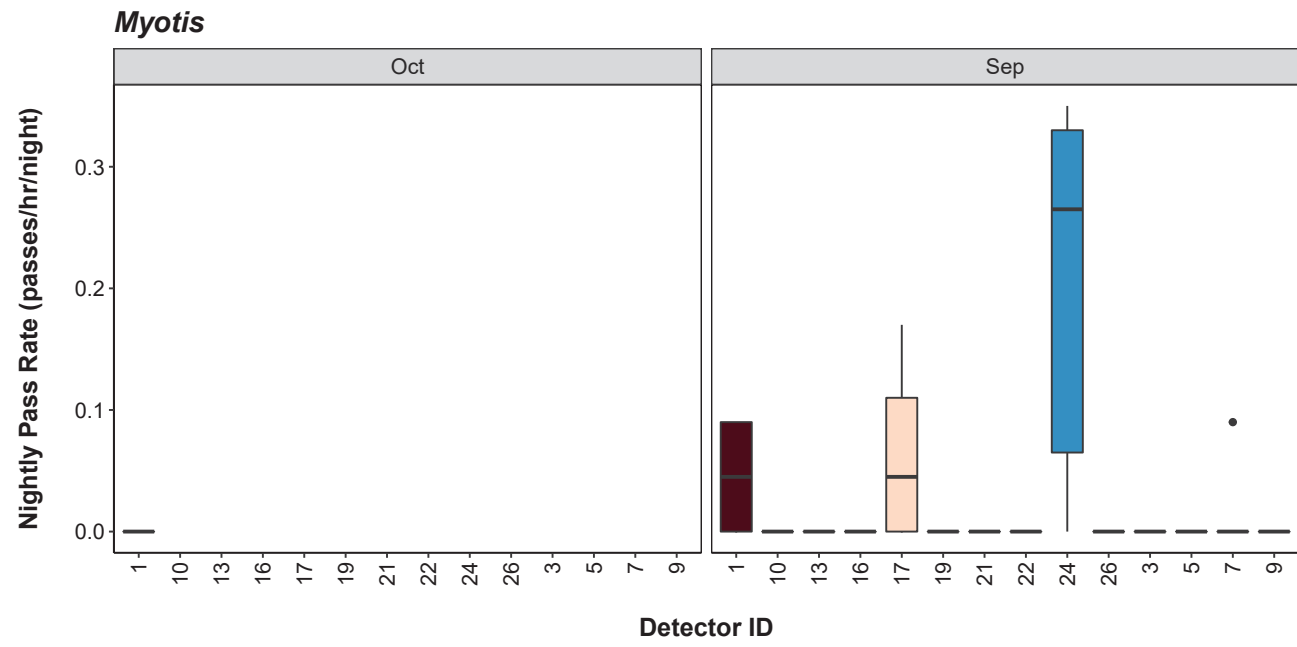
Species	Detector ID	Oct	Sep
Pipistrellus	19	NA	0.0
Pipistrellus	21	NA	0.0
Pipistrellus	22	NA	0.0
Pipistrellus	24	NA	0.0
Pipistrellus	26	NA	0.0
Pipistrellus	3	NA	0.0
Pipistrellus	5	NA	0.0
Pipistrellus	7	NA	0.0
Pipistrellus	9	NA	0.0
Soprano pipistrelle	1	0.0	0.0
Soprano pipistrelle	10	NA	0.1
Soprano pipistrelle	13	NA	0.3
Soprano pipistrelle	16	NA	0.0
Soprano pipistrelle	17	NA	0.2
Soprano pipistrelle	19	NA	0.2
Soprano pipistrelle	21	NA	0.2
Soprano pipistrelle	22	NA	0.3
Soprano pipistrelle	24	NA	3.9
Soprano pipistrelle	26	NA	0.1
Soprano pipistrelle	3	NA	0.0
Soprano pipistrelle	5	NA	0.0
Soprano pipistrelle	7	NA	0.1
Soprano pipistrelle	9	NA	0.1

Nightly Bat Pass Rate for each Month

Per Detector - Figures

Figure 17. Figures show boxplots for the number of bat passes per hour by detector, for each month. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.





Bat Activity per Detector Location

Figure 18. Detector ID reference:

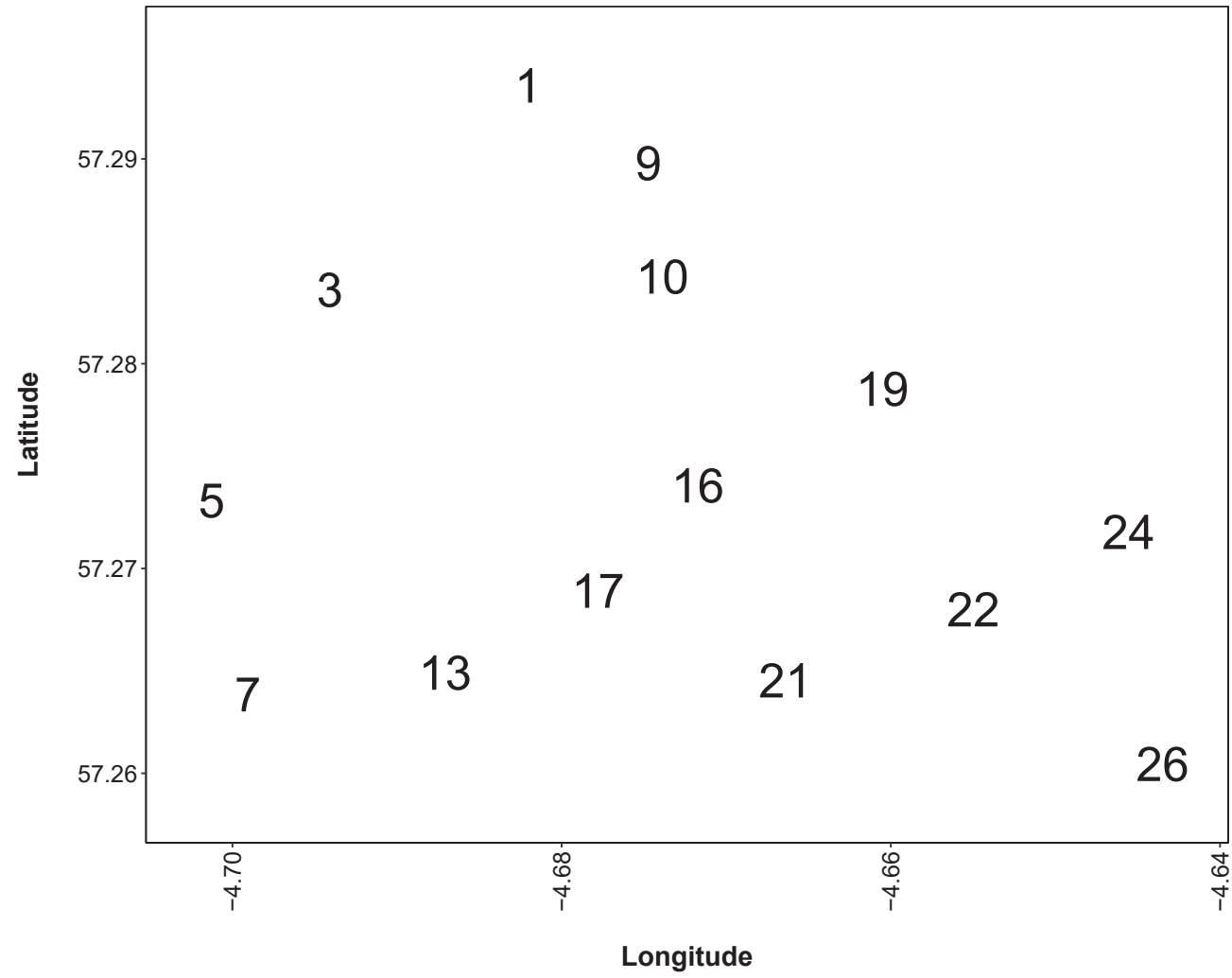


Figure 19. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

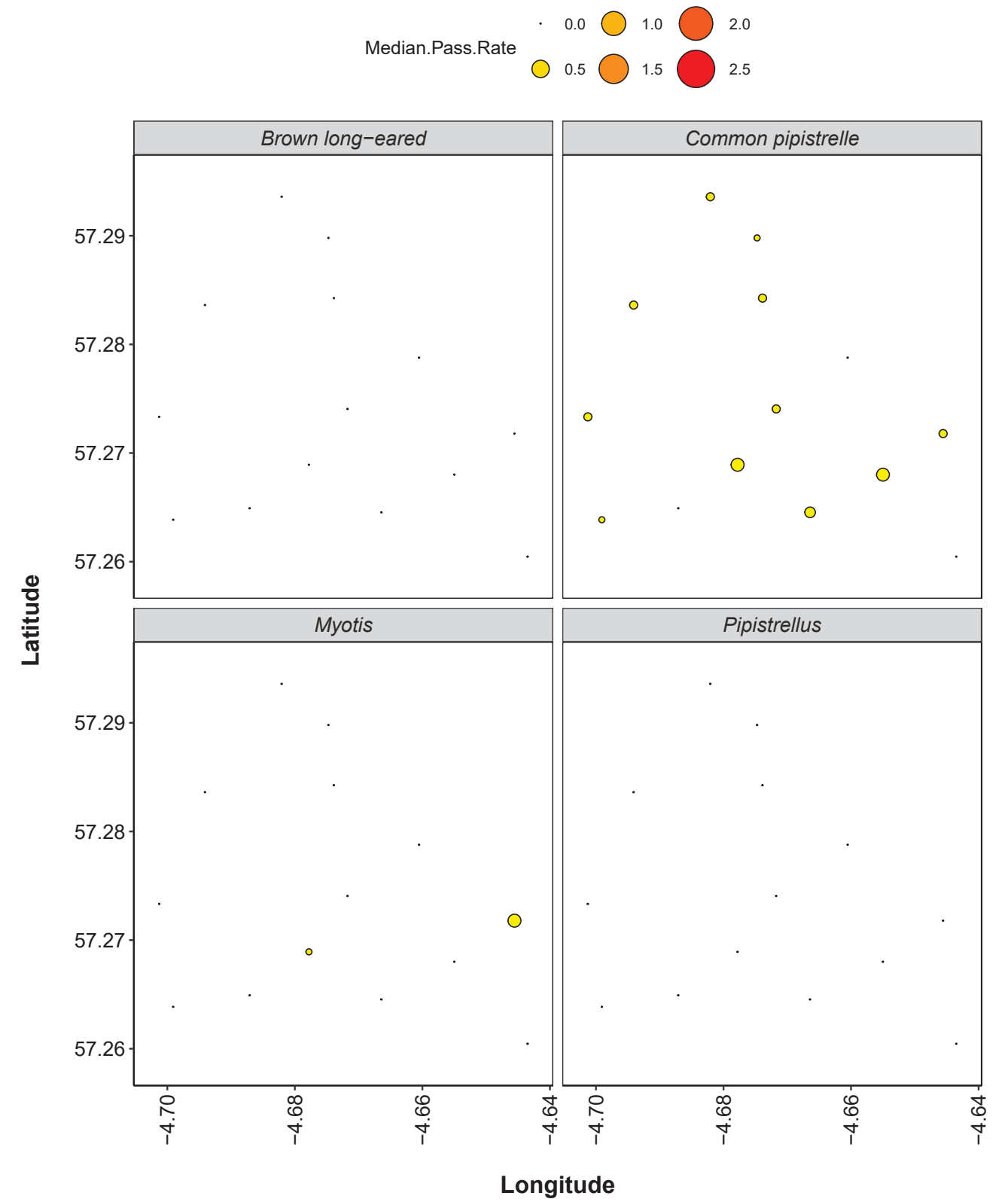
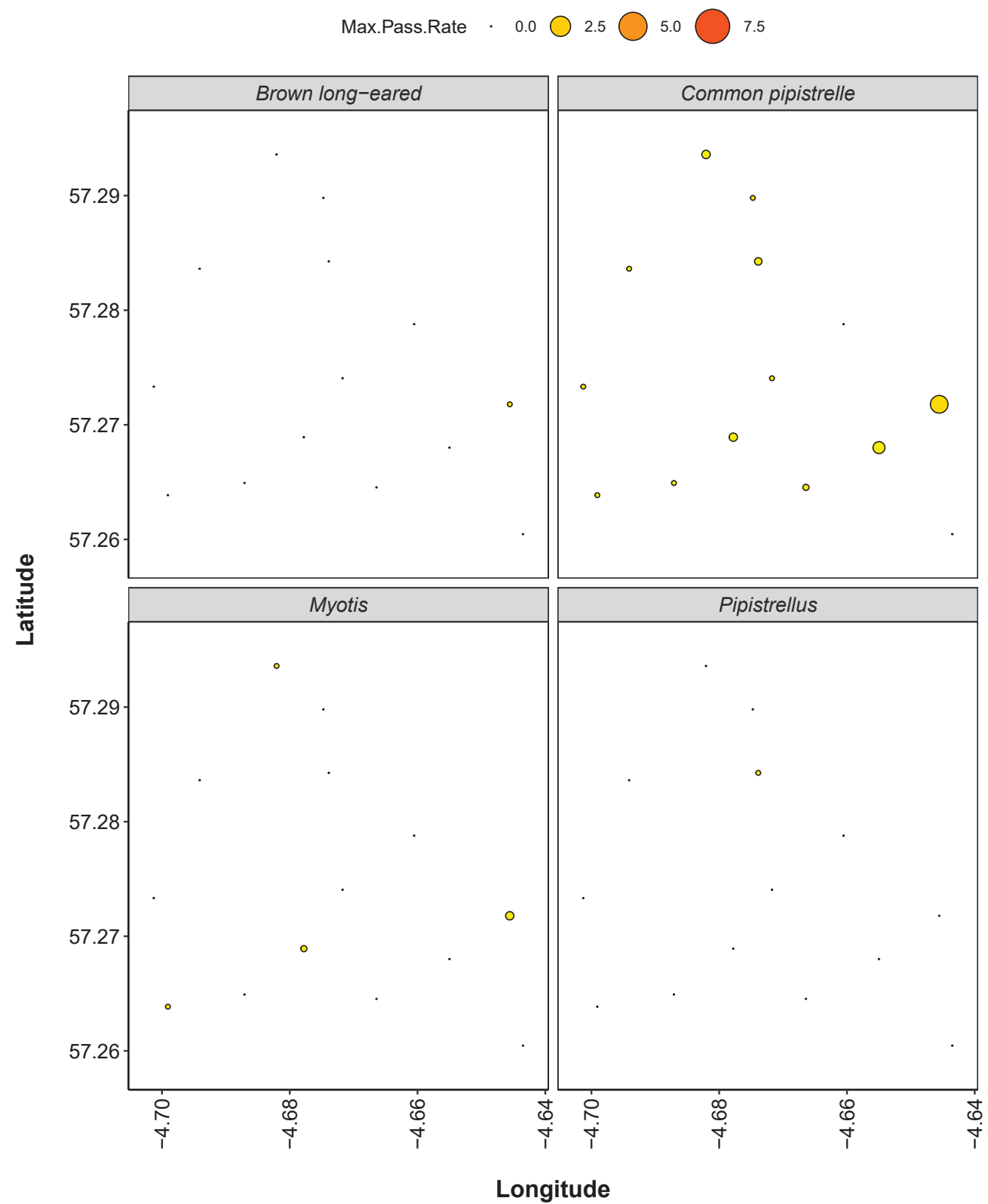


Figure 20. Maximum Nightly Pass Rate (bat passes/hr/night) recorded in a single night throughout the survey period - represented by the size and colour of the point at each detector location.



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