

---

**The Repowered and Extended Ben Aketil Wind Farm**  
Renantis UK Limited  
Appendix 7.3: Bats



# CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.2	Aims of the Study.....	1
1.3	Site Overview.....	1
<b>2</b>	<b>METHODOLOGY .....</b>	<b>2</b>
2.2	Desk Study.....	2
2.3	Field Surveys.....	3
2.4	Weather Data .....	6
2.5	Data Analysis and Assumptions of Bat Activity.....	6
2.6	Limitations.....	7
<b>3</b>	<b>RESULTS .....</b>	<b>8</b>
3.1	Desk Study.....	8
3.2	Field Surveys.....	9
<b>4</b>	<b>ASSESSMENT OF THE POTENTIAL RISKS TO BATS .....</b>	<b>16</b>
4.1	Risk Assessment.....	16
4.2	Stage 1 – Initial Site Risk Assessment.....	16
4.3	Stage 2 – Overall Risk Assessment .....	17

## **ANNEXES**

Annex 1: Scientific Names

Annex 2: Bat Activity Survey Effort

Annex 3: Weather Data for Bat Activity Survey Effort

Annex 4: Existing Bat Records

Annex 5: Photographic Plates

Annex 6: *Ecobat* Output Report

# 1 INTRODUCTION

- 1.1.1 This Technical Appendix has been prepared to accompany **Chapter 7: Ecology** of The Repowered and Extended Ben Aketil Wind Farm ('the Proposed Development') EIA Report.
- 1.1.2 It presents detailed methodologies and results of desk studies and field surveys completed to establish baseline conditions with regards to bat species, in order to inform the design and assessment of the Proposed Development.
- 1.1.3 It should be read with reference to the following specific figures, presented in Volume 2 of the EIA Report:
- **Figure 7.1** – Statutory Sites Designated for Ecological Interest;
  - **Figure 7.5** – Bat Roost Survey; and,
  - **Figure 7.6** – Bat Activity Survey
- 1.1.4 Only common names are used throughout this appendix. Scientific names are provided in **Annex 1**.

## 1.2 Aims of the Study

- 1.2.1 The aims of the bat surveys were to:
- Assess the habitats within the Site to identify:
    - features that have the potential to support maternity roosts and significant hibernation roosts; and
    - the location and extent of commuting and foraging habitat used by bats;
  - Identify bat species assemblage using the Site, and temporal and spatial variations in use;
  - Assess the level of activity of bats within the site; and,
  - Assess the potential risks to bats in line with NatureScot guidance (2021)<sup>1</sup>.

## 1.3 Site Overview

- 1.3.1 The Proposed Development as shown by the red-line application boundary in **Figure 7.1**, is located approximately 15 km to the west of Portree on the Isle of Skye, Scotland. There are no designated sites with bat interest within 10 km of the site.
- 1.3.2 The Proposed Development comprises the development of nine turbines with a tip height of up to 200 m.
- 1.3.3 The Site sits within broadly undulating upland moorland, gently sloping downwards from northeast to southwest and intersected by the River Caroy and several of its tributaries. Two of these tributaries, the Rageary Burn and the Aketil Burn, are bordered in part by narrow strips of woodland, but otherwise the Site is open in nature, and ranges in elevation from 20 m above ordnance datum (AOD)

---

<sup>1</sup> NatureScot (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Revised 2021: <https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation#6.1%C2%A0+Assessing+bat+activity+levels> [Accessed August 2022]

near the crossing of the A863 over the Caroy River, to the peak of Ben Aketil at 266 m AOD (**Figure 7.6**). Ben Sca, which peaks at 283 m, is located approximately 500 m to the northeast of the Site.

1.3.4 The operational Ben Aketil Wind Farm ('the existing wind farm') is located at the north of the Site. As well as being used for the generation of renewable energy, the Site is currently used predominantly for sheep grazing. Surrounding land uses include upland grazing, commercial forestry (located adjacent to the northern Site boundary), and the operational Edinbane Wind Farm lies approximately 1.8 km to the east.

1.3.5 The Bat Survey Area is shown on **Figure 7.5 and 7.6**.

1.3.6 Full habitat descriptions are provided in **Appendix 7.1 Habitats and Vegetation**.

## 2 METHODOLOGY

2.1.1 The approach to baseline information gathering with regards to bats has been undertaken with reference to current NatureScot guidance 'Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation' (NatureScot, 2021).

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

### 2.2 Desk Study

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

2.2.2 The desk study has included a review of:

- Aerial imagery and Ordnance Survey (OS) maps to identify any features of potential value to foraging, commuting or roosting bats;
- A review of SiteLink<sup>2</sup> to identify the proximity of the Proposed Development to any national or internationally designated sites for nature conservation, with bat qualifying interests;
- A review of existing bat records within 10 km of the Proposed Development, including species and roost records, obtained from Highland Biological Recording Group (HBRG);
- A review of the Proposed Development's location in relation to species known ranges in Scotland, with reference to the most recent UK Habitats Directive<sup>3</sup> Article 17 Report<sup>4</sup>; and,
- The location of other wind farm developments within 5 km of the Proposed Development, including the number of turbines and their size, through a review of Highland Wind Turbine Map<sup>5</sup>.

---

<sup>2</sup> <https://sitelink.nature.scot/home> [Accessed August 2022].

<sup>3</sup> Council Directive 92/43/EEC.

<sup>4</sup> <https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/#regularly-occurring-species-vertebrate-species-mammals-terrestrial> [Accessed August 2022].

<sup>5</sup> <https://highland.maps.arcgis.com/apps/webappviewer/index.html?id=5ec04b13a9b049f798cadbd5055f1787> [Accessed August 2022].

## 2.3 Field Surveys

2.3.1 The following baseline surveys have been completed:

- Habitat Assessment;
- Preliminary Roost Assessment; and,
- Ground-level Static Bat Activity Surveys.

2.3.2 The Habitat and Preliminary Roost Assessments and surveys were undertaken by Mr P. Higginson, a suitably competent ecologist and SNH licenced bat surveyor (licence number:148524), with considerable experience of undertaking bat surveys for proposed wind farm developments at comparable sites across Scotland.

### *Habitat Assessment*

2.3.3 An initial habitat assessment of the Site was undertaken between 14<sup>th</sup> – 16<sup>th</sup> September 2021, to appraise the potential value of habitats within the Site for commuting and foraging bats, using the criteria detailed within Bat Conservation Trust (BCT) guidance (Collins, 2016<sup>6</sup>). The assessment was informed through a review of aerial imagery and comprised a daylight walkover of potentially suitable habitat features within the Site.

### *Preliminary Roost Assessment*

2.3.4 Structures and trees with the potential to support maternity roosts and significant hibernation and/or swarming sites within 285 m (200 m of the Site, plus the candidate turbine rotor radius distance of 85 m) were identified through a review of aerial imagery and the preliminary habitat assessment.

2.3.5 Daytime, ground-level preliminary roost assessments in accordance with Collins guidance (2016), were therefore undertaken between 14<sup>th</sup> – 16<sup>th</sup> September 2021. Identified trees and structures were assessed from ground level and not subject to endoscope inspection or aerial inspection of elevated features.

### *Ground-level Static Surveys*

2.3.6 Automated static detectors were deployed within the site in June, July, August and September 2021 and May and June 2022, sampling the spring, summer and autumn periods (Spring: April - May, Summer: June - July, Autumn: late-August - September) in accordance with NatureScot guidance (2021).

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

2.3.8 Automated detectors were programmed to commence recording approximately 30 minutes before sunset and finish recording approximately 30 minutes after sunrise, with all automated detectors set up to record simultaneously, to allow comparison of activity recorded across the Site for the same monitoring period.

1.1.1. The total deployment duration of static monitoring is detailed in **Table 2.1**. Full bat activity survey effort is presented in **Annex 2**.

---

<sup>6</sup> Collins, J. (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition. Bat Conservation Trust, London.

- 1.1.2. The Proposed Development comprises nine turbines and so NatureScot guidance (2021), the requires the use of a minimum of nine automated MSs. A total of eleven MSs were deployed. The location of these is illustrated in **Figure 7.6** and detailed in **Table 2.2**.
- 2.3.9 Placement of the MSs considered minimum mitigation requirements for bats, including habitat feature setback distances, as outlined within current NatureScot guidance (2021), whilst ensuring a representative sampling of activity within different habitat types of potential interest to bats within the Site was obtained.
- 1.1.3. Automated detectors were deployed for a minimum of ten consecutive nights during each monitoring period at the onset of an appropriate weather window for bat activity i.e. forecast temperatures of >8°C (at dusk), maximum ground level wind speeds of 5m/s and no, or only very light, rainfall.

**Table 2.1: Total deployment duration of monitoring station (MS) during each monitoring period**

<b>Monitoring Period</b>	<b>Recording Location</b>	<b>Period Start</b>	<b>Period End</b>	<b>Total Deployment Duration (No. of nights)</b>
Summer	MS 1 - 11	09/06/2021	06/07/2021	27
Autumn	MS 1 - 11	24/08/2021	06/09/2021	13
Spring	MS 1 - 11	23/05/2022	06/06/2022	14
				<b>54</b>

**Table 2.2: Monitoring station (MS) recording period summary.**

MS Ref.	Grid Ref.	Phase 1 Habitat Classification	Linear Feature within 50m	Nearest Turbine	Phase 1 Habitat Classification at Nearest Turbine	No. of Successful Recording Nights (nights of unsuitable weather removed)			
						Summer	Autumn	Spring	Total
MS 1	NG 30190 48020	Wet modified bog.	N/A.	T9	Wet modified bog/Wet heath/Marshy grassland/Semi-improved acid grassland mosaic	21	0	10	31
MS 2	NG 30673 48469	Acid/neutral flush.	Watercourse.	T2	Blanket bog	21	13	10	44
MS 3	NG 31286 46470	Blanket bog.	N/A.	T7	Wet modified bog	0	13	10	23
MS 4	NG 31091 47978	Blanket bog.	N/A.	T2	Blanket bog	21	13	3	37
MS 5	NG 31563 46787	Wet modified bog.	Watercourse.	T7	Wet modified bog	13	13	10	36
MS 6	NG 31870 46793	Wet modified bog.	Watercourse.	T6	Wet modified bog	21	13	10	44
MS 7	NG 31913 46965	Wet modified bog.	N/A.	T6	Wet modified bog	21	13	10	44
MS 8	NG 32079 46136	Blanket bog	N/A.	T6	Wet modified bog	21	0	10	31
MS 9	NG 31704 47456	Blanket bog.	N/A.	T7	Wet modified bog	21	13	10	44
MS 10	NG 30704 48157	Wet modified bog.	Watercourse.	T2	Blanket bog	0	13	10	23
MS 11	NG 30181 48473	Wet modified bog.	Watercourse.	T1	Wet modified bog	21	13	10	44
						<b>181</b>	<b>117</b>	<b>103</b>	<b>401</b>



## 2.4 Weather Data

- 2.4.1 Weather data were collected from a weather station deployed within the Site at NG 31300 48453 (or the Time and Date<sup>7</sup> website where needed) for the static deployment periods. Temperature, rainfall and wind speed at dusk were collected. Weather conditions are summarised in **Annex 3**.
- 2.4.2 Weather data was also analysed to check for any periods of poor weather which could have affected bat activity. With nights of unsuitable weather that recorded no bats removed from the data set.

## 2.5 Data Analysis and Assumptions of Bat Activity

- 2.5.1 Analysis and interpretation of bat activity has followed principles presented within BCT (Collins, 2016) and NatureScot (2021) guidance.
- 2.5.2 Digital sonograms were analysed using Kaleidoscope Pro Version 5.3.3. A sample selection of sonograms were also manually checked prior to uploading to *Ecobat*, through Kaleidoscope Viewer and Analook (Titley Scientific).
- 2.5.3 As bat detectors record the passage of echolocating bats during surveys, this enables an estimation of relative bat activity levels at a particular location or feature within a study area, for subsequent use in assessment.
- 2.5.4 For the purpose of sonogram analysis, bat activity was taken as the number of 'bat registered calls' i.e., a sequence of echolocation calls consisting of two or more call notes (pulse of frequency), not separated by more than one second (White and Gehrt, 2001<sup>8</sup> and Gannon *et al.*, 2003<sup>9</sup>), with a minimum call note length of two milliseconds (Weller *et al.*, 2009<sup>10</sup>).
- 2.5.5 It should be noted that as an individual bat can pass a particular location or feature on several occasions while foraging it is not possible to estimate the number of individual bats recorded.

### **Assessment of Relative Activity Levels**

- 2.5.6 In accordance with NatureScot guidance (2021), *Ecobat*<sup>11</sup> was used to provide an objective interpretation of the relative importance of bat activity levels recorded within the Site.
- 2.5.7 Relative levels of activity are determined by *Ecobat* by comparison to a reference data set, the 'reference range'. When uploading data into the *Ecobat* tool, the reference range was stratified to only include the following records from the reference data set:
- Only records from within +/- 1 month from the survey start date.
  - Only records from within the region of Scotland North<sup>12</sup>.
- 2.5.8 The reference range of each species given by *Ecobat* are provided below:

---

<sup>7</sup> <https://www.timeanddate.com/weather/uk/portree/historic> [Accessed August 2022].

<sup>8</sup> White, E. & Gehrt, S. (2001). Effects of recording media on echolocation data from broadband bat detectors. *Wildlife Society Bulletin*, 29, pp. 974-978.

<sup>9</sup> Gannon, W., Sherwin, R. and Haymond, S. (2003). On the importance of articulating assumptions when conducting acoustic studies of habitat use by bats. *Wildlife Society Bulletin*, 31, pp. 45-61.

<sup>10</sup> Weller, T.J., Cryan, P.M., O'Shea, T.J. (2009) Broadening the focus of bat conservation and research in the USA for the 21st century. *Endang Species Res* 8:129–145.

<sup>11</sup> <http://www.ecobat.org.uk/about-ecobat> [Accessed August 2021]

<sup>12</sup> Based on the Met Office Climate Regions map as described in *Ecobat Help Document*:

[https://www.mammal.org.uk/wp-content/uploads/2022/07/Ecobat\\_Help\\_Document\\_v2.pdf](https://www.mammal.org.uk/wp-content/uploads/2022/07/Ecobat_Help_Document_v2.pdf) [Accessed August 2022].

- Common pipistrelle – 2,162 records; and
- Noctule – 90 records

2.5.9 For each night that bat activity is recorded, *Ecobat* reports the percentile and associated confidence limits of the data against the software’s reference range. These are then categorised from Low to High in line with parameters set out in NatureScot (2021) guidance.

## 2.6 Limitations

### *Field Surveys*

- 2.6.1 Due to delays in commissioning spring surveys could not be undertaken in 2021 and were therefore undertaken in the consecutive 2023. The summer deployment was conducted early in the summer sampling period and the MSs were deployed for 27 nights during this period to compensate. This ensured the correct level of survey effort was conducted in 2021, and a spring deployment was conducted in 2022 to capture data from earlier in the active season. As such, it is not considered that spring 2021 being missed will affect the validity of the data to inform impact assessment.
- 2.6.2 Due to an unforeseen detector malfunction, bat activity data captured at MS 3 and MS 10 during the summer 2021 and data captured at MS 1 and MS 8 during the autumn 2021 surveys could not be retrieved. The summer and autumn surveys still captured the minimum recording nights required; 181 in summer and 117 in autumn recorded out of the recommended 110 nights. This therefore is not considered to affect the validity of the results and activity in these seasons across the Site is representative.
- 2.6.3 MS4 only recorded 3 nights in spring, below the minimum recommended 10 nights; however detectors in comparable habitats to MS4 (MS3, 8 and 9) recorded the minimum 10 nights subsequently overall, no limitations to the spring sample are anticipated.
- 2.6.4 The failures identified are not considered to affect the overall validity of the data set, particularly in upland locations comprising relatively homogenous habitat of low overall value to bats such as open blanket bog. When the 11 detector locations are combined, the total nights of recording for the Site equates to 401 out of the recommended 330, which is in excess of what is considered necessary to characterise bat interest and activity levels at a site of this type.
- 2.6.5 Weather constraints including temperatures < 8°C, heavy rain and/ or winds > 5 m/s were recorded at dusk on 12 nights during the summer 2022 survey and four nights during the spring 2022 survey. These weather conditions are likely to be representative for sites at this latitude; bat activity was still recorded on five of these nights and so has been included within the analysis, and not considered to represent a constraint to the validity of the assessment. Although it is recognised that poor weather can affect bat activity, excluding these data from the analysis skews the dataset and would remove some high collision risk species (noctule) from the dataset. Subsequently inclusion of these nights represents a precautionary approach. Furthermore, if these nights were excluded the number of nights sampled would still exceed the recommended 330 nights; spring: 99, summer: 174 and autumn: 117 nights.
- 2.6.6 Due to an unforeseen weather station malfunction it was not possible to retrieve the weather data for the summer 2021 survey period. Instead, the weather data for this static deployment period was obtained from the Time and Date website. Weather masts in this area are very limited with the closest Time and Date mast being at Portree approximately 14 km east. As a result, the weather data for summer may not be totally accurate for the Site; however, considering that bats were recorded on the majority of nights (17 of 27), including during nights deemed as having unsuitable weather, this is not considered to represent a significant limitation to the data.

### ***Sonogram Analysis***

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

### ***Ecobat Tool***

- 2.6.8 The *Ecobat* tool is in its infancy, and may have limited data in the reference range, reducing the confidence in the assigned category. The tool does, however, provide a guide for discussion along with Site-specific circumstances (e.g., habitats present, desk study information) and its use is advised in accordance with NatureScot guidance (2021).
- 2.6.9 *Ecobat* only considers nights with bat passes, which can skew results and elevate risk levels. Therefore, *Ecobat* output is regarded as an indicative assessment and to be considered alongside desk study information and professional judgement, rather than conclusive evidence of the importance of a site for bats.

## **3 RESULTS**

### **3.1 Desk Study**

#### ***Statutory Designated Sites for Nature Conservation***

- 3.1.1 In review of Sitelink, the Site is not located within 10 km of any national or internationally designated site for nature conservation, with bat qualifying interests.
- 3.1.2 In consultation with the HBRG, no non-statutory designated sites for nature conservation with bat interest are located within 2 km of the Proposed Development.

#### ***Existing Bat Records***

- 3.1.3 In consultation, the HBRG returned three bat records from within 10 km of the site; one common pipistrelle, one pipistrelle species and one unidentified bat species. All three records are located approximately 6 km away from the Site (all different locations) and all are old records, with the most recent dating from August 2006.
- 3.1.4 Full existing bat records are presented in **Annex 4**.

#### ***UK Bat Species Range***

- 3.1.5 In review of the UK Habitats Directive Article 17 Report 'Habitats Directive Report 2019: Species Conservation Status Assessments 2019' based on Mathews *et al.* (2018<sup>13</sup>), the Site is located within the known UK distribution range for common pipistrelle.
- 3.1.6 The Site is not within the published usual range of noctule bat; however noctule bat was recorded during the bat activity surveys and the *Ecobat* tool also includes noctule records (albeit below the

---

<sup>13</sup> Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C., McDonald, R.A., Shore, R.F (2018). A review of the population and conservation status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage.

recommended 200) within their reference range for within the same geographical region of the Site, and therefore the species is known to be present within the wider area.

### ***Other Wind Developments***

- 3.1.7 In review of Highland Wind Turbine map, excluding the operational Ben Aketil Wind Farm, the Site is located within 5 km of four additional wind farm developments as summarised in **Table 3.1**.

**Table 3.1: Wind farm developments within 5 km of the Site.**

<b>Wind Farm</b>	<b>Location</b>	<b>Description</b>
Ben Sca	c. 1.3 km north-east	7 turbines with a tip height of 135 m. Approved, not yet constructed.
Ben Sca Extension	c. 1.5 km north-east	2 turbines with a tip height of 145 m. Approved, not yet constructed.
Edinbane	c. 2 km east	18 turbines with a tip height of 100 m. Constructed and operational.
Glen Ullinish	c. 4 km south-east	20 turbines with tip heights between 119 m – 149 m. Approved, not yet constructed.

## **3.2 Field Surveys**

### ***Habitat Assessment***

- 3.2.1 Habitats within the Site are considered to be of low habitat risk for bats, in accordance with criteria presented in NatureScot guidelines (2021).
- 3.2.2 The predominantly blanket bog and wet modified bog habitats of the Site provide relatively poor foraging opportunities for bat species; however the small areas of broad-leaved semi-natural woodland and scrub in the centre of the Site; scattered trees and broadleaved plantation in the south of the Site and numerous small watercourses, including Ben Aketil Burn running throughout the Site offer more suitable foraging opportunities and also connectivity with potentially higher value habitats within the wider landscape.

### ***Preliminary Roost Assessment of Buildings and Trees***

- 3.2.3 Potential roost features within the Site were limited; the Site is dominated by open bog with limited trees which offers negligible roost opportunities and so is unlikely to support maternity or significant hibernation roosts.
- 3.2.4 Three structures; the Ben Aketil windfarm substation (Photograph 1) located at NG 31700 48140, a stone road bridge (Photograph 3) located at NG 30268 43935 and a wooden building (Photograph 4) located at NG 30044 45284, were present within the Site.
- 3.2.5 The substation and wooden building had limited features to support roosting bats and were considered to offer low roosting potential.
- 3.2.6 Both bridges had visible cracks and crevices and so were considered to offer moderate roosting potential.
- 3.2.7 A mature pine (Photograph 5), located at NG 30517 43763, was partially decaying with broken upper branches, and so was considered to offer moderate roosting potential. Three mature sycamore located at NG 29913 45627 had limited features to support roosting bats and were considered to offer low roosting potential.

3.2.8 Photographs of the structures and trees are presented in **Annex 5**.

**Bat Activity Surveys**

Summary of Results and Activity Levels

3.2.9 Bats were detected on 37 dates between 11/06/2021 and 05/06/2022, out of a possible 54 recording dates from 11 MSs.

3.2.10 Species identified are presented in **Table 3.2** along with potential collision risk and population vulnerability as described in NatureScot guidance (2021).

3.2.11 Overall, a total of 699 bat passes were recorded over a total of 401 survey nights (successful nights at all 11 detectors combined; see **Table 2.2**), as summarised in **Table 3.3**.

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

**Table 3.2: Bat species recorded, collision risk and population vulnerability.**

Species	Collision Risk	Population Vulnerability
Common pipistrelle	High	Medium
Noctule	High	High

**Table 3.31: Total number of bat passes.**

Species	Passes (No.)	Percentage of total (%)	Mean Passes per Night
Common pipistrelle	612	88	1.53
Noctule	87	12	0.22
<b>Total</b>	<b>699</b>	<b>100</b>	<b>1.74</b>

**Ecobat Results**

3.2.13 **Table 3.4** presents the number of nights species activity was recorded at each activity band.

3.2.14 **Table 3.5** presents the key metrics of the *Ecobat* output for each species. Data from all monitoring locations are used to provide Site-wide averages/medians.

**Table 3.4: Number of nights recorded bat activity fell into each activity band or each species within the Site.**

Species/Species Group	High Activity	Moderate/High Activity	Moderate Activity	Low/Moderate Activity	Low Activity
Common pipistrelle	1	0	1	8	95
Noctule	2	1	2	4	11

**Table 3.5: Percentiles for each species within the Site.**

Species/Species Group	Total Passes	Nights Recorded	Passes per Night		Median Percentile <sup>14</sup>	95% Cis <sup>15</sup>	Max Percentile <sup>16</sup>
			Recorded <sup>17</sup>	Included in <i>Ecobat</i> <sup>18</sup>			
Common pipistrelle	612	105	1.53	4.98	5	9 - 24	100
Noctule	87	20	0.22	0.71	15	8 - 55	100

### Species Assemblage Summary

- 3.2.15 Common pipistrelle was the most frequently recorded species representing 87.6% of all recordings. Activity overall was considered to be low, with the species being recorded on 105 nights out of 401 and representing 1.53 passes per night for the survey period. When compared with activity at other sites (*Ecobat* reference range and percentiles) common pipistrelle activity was concluded to be low at the 5<sup>th</sup> median percentile.
- 3.2.16 Noctule represented 12.4% of all recordings. Activity overall was considered to be low, with the species being recorded on 20 nights out of 401 and representing 0.22 passes per night for the survey period. When compared with activity at other sites (*Ecobat* reference range and percentiles), noctule activity was concluded to be low at the 15<sup>th</sup> median percentile.

### Spatial Distribution

- 3.2.17 The *Ecobat* output median and mean nightly pass rate (passes per hour, per night) of each species, at each detector for all months is presented in **Table 36**. The use of the median value is recognised to provide the more accurate representation of activity, as bat activity levels between nights can be highly variable, and thus the median provides a more reliable value than the mean or maximum (Lintott and Mathews, 2018<sup>19</sup>). In addition, the dataset is unlikely to be normally distributed, therefore the median is the most appropriate metric to report.
- 3.2.18 Data for ‘Includes Absences’ and ‘Excludes Absences’ are included in **Table 3.6**. Includes absences takes into account nights when no registrations of a species were recorded and therefore lowers the overall medians and means (note this does not include any nights when no bats of any species were recorded as these are filtered out by *Ecobat* in the initial data upload to the *Ecobat* tool).
- 3.2.19 When absences are excluded medians and means are higher and show peaks in the data, which is especially useful for sites with low bat activity when peaks can be easily overlooked in large data sets.

<sup>14</sup> A numerical representation of average activity levels relative to the surrounding landscape (within Scotland North) for each night of surveying.

<sup>15</sup> An indication of the confidence in the median percentile.

<sup>16</sup> A numerical representation of maximum activity levels on any one night relative to the surrounding landscape (within Scotland North) for each night of surveying

<sup>17</sup> Total recorded nights for the survey period (minus nights of unsuitable weather) was 401.

<sup>18</sup> A total of 123 nights out of the possible 401 were included in *Ecobat*’s analysis. Nights when no bats are recorded are excluded, this has led to an increase in passes per night average.

<sup>19</sup> Lintott, P.R. & Mathews, F. (2018) Basic mathematical errors may make ecological assessments unreliable.

Biodiversity and Conservation 27: 265-7.

3.2.20 Common pipistrelle activity was recorded at all eleven detectors. Highest activity was at MS 6, making up 43.78% of the total bat activity likely due to the MS being located close to a watercourse in the centre of the Site, however activity was still low with a median pass rate of 0.8. The median pass rate for all MS locations was below 1 and all had low activity levels.

3.2.21 Noctule bat activity was recorded at seven of the detectors, with no activity at MS 2, MS 3, MS 6 and MS 8. Highest activity was at MS 5 with low to moderate activity and a median pass rate of 0.7, followed by MS 10 and M 11 with low to moderate activity and both with a median pass rate of 0.5. The remaining detectors had low activity levels. The median pass rate for noctule at all detectors was below 1.

3.2.22 Activity for all species and MSs was consistently < 1 pass per hour, per night, per detector.

**Table 3.6: Median and Mean bat pass rate per species, per detector.**

*Detector locations not included recorded no bat passes.*

Species	Detector ID	Total Bat Passes	Nights Recorded	Median Pass Rate (passes per hour/night)		Mean Pass Rate (passes per hour/night)	
				Incl. Absences	Excl. Absences	Incl. Absences	Excl. Absences
Common pipistrelle	MS 1	3	2	0.1	0.2	0.1	0.2
	MS 2	13	9	0.2	0.2	0.2	0.2
	MS 3	63	12	0.4	0.4	0.6	0.6
	MS 4	68	16	0.3	0.3	0.5	0.5
	MS 5	40	12	0.2	0.3	0.3	0.4
	MS 6	306	17	0.8	0.8	2.2	2.2
	MS 7	59	7	0.3	0.5	0.7	0.9
	MS 8	8	5	0.2	0.2	0.3	0.3
	MS 9	20	7	0.1	0.2	0.2	0.3
	MS 10	24	11	0.2	0.2	0.2	0.2
	MS 11	8	6	0.1	0.1	0.1	0.1
Noctule	MS 1	3	2	0	0.2	0.1	0.2
	MS 4	1	1	0	0.1	0	0.1
	MS 5	15	3	0	0.7	0.2	0.8
	MS 7	3	2	0	0.2	0.1	0.2
	MS 9	33	6	0	0.3	0.4	0.9
	MS 10	3	1	0	0.5	0	0.5
	MS 11	29	5	0.1	0.5	0.5	0.9

**Table 3.7: Percentiles for each species per detector location for the whole survey period.**

Species	Detector ID	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Activity Level (Median Percentile)	Activity Level (Max Percentile)
Common pipistrelle	MS 1	2	2 - 2	2	2	Low	Low
	MS 2	2	2 - 5	5	9	Low	Low
	MS 3	11	6.5 - 15.5	20	12	Low	Low to Moderate
	MS 4	9	5.5 - 13.5	30	16	Low	Low to Moderate
	MS 5	7	3.5 - 12	19	12	Low	Low
	MS 6	13	9 - 24	100	17	Low	High
	MS 7	9	3.5 - 28.5	41	7	Low	Moderate
	MS 8	2	2 - 5.5	9	5	Low	Low
	MS 9	5	2 - 10.5	16	7	Low	Low
	MS 10	5	3.5 - 8	11	11	Low	Low
	MS 11	2	2 - 3.5	5	6	Low	Low
Noctule	MS 1	12	11.5 - 11.5	15	2	Low	Low
	MS 4	8	0	8	1	Low	Low
	MS 5	33	8 - 52	52	3	Low to Moderate	Moderate
	MS 7	12	11.5 - 11.5	15	2	Low	Low
	MS 9	18	8 - 55	82	6	Low	High
	MS 10	28	0	28	1	Low to Moderate	Low to Moderate
	MS 11	28	15 - 64	100	5	Low to Moderate	High

**Table 3.8: The number of nights sampled (detectors were operational for), the number of nights bats were recorded and the total number of bat recorded per monitoring station. Percentage distribution of no. bats is also presented.**

Detector ID	No. Nights Sampled	No. of nights Bats were Recorded	Percentage of Nights Bats were Recorded	Total No. Bats recorded	Percentage Distribution of No. Bats
MS 1	31	5	16.7%	6	0.86%
MS 2	44	9	20.9%	13	1.86%
MS 3	23	12	54.5%	63	9.01%
MS 4	37	17	45.9%	69	9.87%
MS 5	36	15	42.9%	55	7.87%



Detector ID	No. Nights Sampled	No. of nights Bats were Recorded	Percentage of Nights Bats were Recorded	Total No. Bats recorded	Percentage Distribution of No. Bats
MS 6	44	17	39.5%	306	43.78%
MS 7	44	9	20.9%	62	8.87%
MS 8	31	5	16.7%	8	1.14%
MS 9	44	13	30.2%	53	7.58%
MS 10	23	11	50.0%	27	3.86%
MS 11	44	10	23.3%	37	5.29%

### Temporal Activity

- 3.2.23 Activity levels were calculated by *Ecobat* per species (or species group) per month to allow for temporal variations in bat activity, as presented in **Table 3.9**. Median and maximum percentiles and corresponding activity levels are presented.
- 3.2.24 Common pipistrelle activity was recorded during all months, peaking in September 2021, with overall activity (based on the median) being low.
- 3.2.25 Noctule was recorded every month, with the exception of September, with overall activity for June and July 2021 being low to moderate (based on the median) and May 2022 and August 2021 being low (based on the median).
- 3.2.26 Overall, activity was generally low (based on the median), with only the summer months for noctule recording higher activity levels with low to moderate (based on the median).

**Table 3.9: Percentiles for each species each month within the site.**

Species	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Ecobat Activity Level	
						Median Percentile	Max Percentile
Common pipistrelle	May	2	9 - 24	9	9	Low	Low
	June	5	9 - 24	28	27	Low	Low to Moderate
	July	5	9 - 24	30	15	Low	Low to Moderate
	August	9	9 - 24	100	33	Low	High
	September	11	9 - 24	39	21	Low	Low to Moderate
Noctule	May	18	0	28	2	Low	Low to Moderate
	June	22	8 - 55	100	14	Low to Moderate	High
	July	28	8 - 55	28	1	Low to Moderate	Low to Moderate
	August	8	8 - 55	8	3	Low	Low

#### Potential bat roosts within or close to the site

3.2.27 *Ecobat* analysis showed that activity was recorded within the species-specific emergence time for three monitoring locations. This is detailed in **Table 3.10**.

3.2.28 The *Ecobat* tool identified the possible presence of roosts of noctule bat within proximity of the Site based on recording of activity at the Site within their species-specific emergence times.

**Table 3.10: Bat activity recorded within the species-specific emergence time**

Detector ID	Species/Species Group	Nights Recorded	Peak Count	Month of Peak Count
MS 1	Noctule	1	1	June
MS 7	Noctule	1	1	June
MS 9	Noctule	2	3	July

3.2.29 Noctule are tree-roosting bats, and there are no trees within 500 m of MS1, MS7 or MS9. Based on the *Ecobat* analysis above, it is considered possible that there are small roosts comprising low numbers of bats in the wider area (potentially in the plantation to the north of the Proposed Development), although due to the low number of both nights recorded and peak count it is considered unlikely that these will be significant roosts such as maternity roosts.

3.2.30 The full *Ecobat* output is presented in **Annex 6**.

#### ***Weather Conditions***

3.2.31 The majority of survey dates were undertaken in suitable weather conditions (43 out of 54) and the surveying period was extended beyond the requirements of NatureScot guidance (2019). Subsequently the bat survey data recorded is considered to be representative for the Site.

3.2.32 Weather data are presented in **Annex 5**.

## 4 ASSESSMENT OF THE POTENTIAL RISKS TO BATS

### 4.1 Risk Assessment

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

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

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

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

#### *Assessing Potential Risk*

4.1.3 NatureScot guidance (2021) presents a two-stage process for assessing the potential risk to bats as a result of onshore wind turbine developments:

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

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

### 4.2 Stage 1 – Initial Site Risk Assessment

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

4.2.2 The values and classification criteria provided within Table 3a of NatureScot guidance (2021) are intended to be taken as a guide, with habitat and development-related features at proposed wind

farm sites rarely matching rigid descriptions. Professional judgement has therefore been applied to interpret and assign risk categories and conclude on the overall risk level for the Site.

4.2.3 The Site has been assessed as having an overall 'Site Risk' of **2**, represent a **Low Site Risk**:

- The Site 'Habitat Risk is classified as **Low**.
- The Site 'Project Size' is classified as being **Medium**, comprising a development of nine turbines of up to 200 m tip height, with one other operational wind farm development (Edinbane x18 turbines) and two other approved wind farm developments (Ben Sca (x7 turbines) and Glen Ullinish (x20 turbines)) located within 5 km of the Site (distances measures between the nearest turbines). The 12-turbine operational Ben Aketil Wind Farm is also within 5 km. However, the repowering of this is part of the Proposed Development, and so it will not exist in addition to the Proposed Development.

### 4.3 Stage 2 – Overall Risk Assessment

4.3.1 In accordance with NatureScot guidance (2021), Stage 2 should be carried out separately for all high collision risk species recorded, which includes the following species recorded during bat activity surveys for the Proposed Development:

- Common pipistrelle; and,
- Noctule.

4.3.2 In order to derive an 'Overall Risk Assessment' the determined Bat Activity Category derived from the *Ecobat* Tool Output Report is compared against the site Risk Level (Stage 1) using the matrix presented in Table 3b in SNH (2019) to determine the level of overall risk. This is presented for both the median percentile and max percentile per MS location and per month in **Table 4.1** and **Table 4.2**.

4.3.3 The matrix provided in Table 3b of the guidance is intended to be interpreted as a guide, therefore the Overall Risk Category concluded in **Tables 4.1 and 4.2** is determined with due recognition of the *Ecobat* output, acknowledgement of its limitations and using professional judgement on the basis of all other available information.

4.3.4 As outlined, the *Ecobat* tool is in its infancy and given current limitations in available bat survey data on the database, definitive bat activity for regions are not generated and bat activity representations are instead indicative for each region.

**4.3.5 In conclusion, in recognition of all available information, the Overall Risk Assessment is considered to fall under "Low Site Risk" for common pipistrelle and "Low/Medium Site Risk" for noctule.**

4.3.6 Increased risk is identified at the maximum percentile, as to be expected. This identified peaks in activity at MS6 for common pipistrelle and MS9 and MS11 for noctule; and August for common pipistrelle and June for noctule. These areas of increased risk can help to inform mitigation strategies, if required.

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

Species / species group	MS Location	Median Percentile	Percentile Category	Overall Risk Assessment (Stage 2)	Species / species group	MS Location	Max Percentile	Percentile Category	Overall Risk Assessment (Stage 2)
Common pipistrelle	MS 1	2	Low	2	Common pipistrelle	MS 1	2	Low	2
	MS 2	2	Low	2		MS 2	5	Low	2
	MS 3	11	Low	2		MS 3	20	Low to Moderate	4
	MS 4	9	Low	2		MS 4	30	Low to Moderate	4
	MS 5	7	Low	2		MS 5	19	Low	2
	MS 6	13	Low	2		MS 6	100	High	10
	MS 7	9	Low	2		MS 7	41	Moderate	6
	MS 8	2	Low	2		MS 8	9	Low	2
	MS 9	5	Low	2		MS 9	16	Low	2
	MS 10	5	Low	2		MS 10	11	Low	2
	MS 11	2	Low	2		MS 11	5	Low	2
Noctule	MS1	12	Low	2	Noctule	MS1	15	Low	2
	MS4	8	Low	2		MS4	8	Low	2
	MS5	33	Low to Moderate	4		MS5	52	Moderate	6
	MS7	12	Low	2		MS7	15	Low	2
	MS9	18	Low	2		MS9	82	High	10
	MS10	28	Low to Moderate	4		MS10	28	Low to Moderate	4
	MS11	28	Low to Moderate	4		MS11	100	High	10

**Table 5.3: Overall Risk Assessment (Table 3b from SNH (2019) guidance) per month. Key: green = Low, Amber = Medium, Red = High**

Species / species group	Month	Median Percentile	Percentile Category	Overall Risk Assessment (Stage 2)	Species / species group	Month	Max Percentile	Percentile Category	Overall Risk Assessment (Stage 2)
Common pipistrelle	May	2	Low	2	Common pipistrelle	May	9	Low	2
	June	5	Low	2		June	28	Low to Moderate	4
	July	5	Low	2		July	30	Low to Moderate	4
	August	9	Low	2		August	100	High	10
	September	11	Low	2		September	39	Low to Moderate	4
Noctule	May	18	Low	2	Noctule	May	28	Low to Moderate	4
	June	22	Low to Moderate	4		June	100	High	10
	July	28	Low to Moderate	4		July	28	Low to Moderate	4
	August	8	Low	2		August	8	Low	2

## ANNEX 1: SCIENTIFIC NAMES

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

**Table A1.1: Species Names.**

Common Name	Scientific Name
Common pipistrelle	<i>Pipistrellus pipistrellus</i>
Noctule	<i>Nyctalus noctula</i>
Barbastelle	<i>Barbastella barbastellus</i>

## ANNEX 2: BAT ACTIVITY SURVEY EFFORT

Table A4.1 below provides further details of bat activity surveys.

**Table A4.1: Bat Activity Survey Effort**

MS Ref.	MS Grid Ref.	Date Start	Date End	No. Nights
MS 1	NG 30190 48020	09/06/2021	06/07/2021	27
MS 2	NG 30673 48469	09/06/2021	06/07/2021	27
MS 3	NG 31286 46470	09/06/2021	06/07/2021	27
MS 4	NG 31091 47978	09/06/2021	06/07/2021	27
MS 5	NG 31563 46787	09/06/2021	06/07/2021	27
MS 6	NG 31870 46793	09/06/2021	06/07/2021	27
MS 7	NG 31913 46965	09/06/2021	06/07/2021	27
MS 8	NG 32079 46136	09/06/2021	06/07/2021	27
MS 9	NG 31704 47456	09/06/2021	06/07/2021	27
MS 10	NG 30704 48157	09/06/2021	06/07/2021	27
MS 11	NG 30181 48473	09/06/2021	06/07/2021	27
MS 1	NG 30190 48020	24/08/2021	06/09/2021	13
MS 2	NG 30673 48469	24/08/2021	06/09/2021	13
MS 3	NG 31286 46470	24/08/2021	06/09/2021	13
MS 4	NG 31091 47978	24/08/2021	06/09/2021	13
MS 5	NG 31563 46787	24/08/2021	06/09/2021	13
MS 6	NG 31870 46793	24/08/2021	06/09/2021	13
MS 7	NG 31913 46965	24/08/2021	06/09/2021	13
MS 8	NG 32079 46136	24/08/2021	06/09/2021	13
MS 9	NG 31704 47456	24/08/2021	06/09/2021	13
MS 10	NG 30704 48157	24/08/2021	06/09/2021	13
MS 11	NG 30181 48473	24/08/2021	06/09/2021	13
MS 1	NG 30190 48020	23/05/2022	06/06/2022	14
MS 2	NG 30673 48469	23/05/2022	06/06/2022	14
MS 3	NG 31286 46470	23/05/2022	06/06/2022	14
MS 4	NG 31091 47978	23/05/2022	06/06/2022	14
MS 5	NG 31563 46787	23/05/2022	06/06/2022	14
MS 6	NG 31870 46793	23/05/2022	06/06/2022	14
MS 7	NG 31913 46965	23/05/2022	06/06/2022	14
MS 8	NG 32079 46136	23/05/2022	06/06/2022	14
MS 9	NG 31704 47456	23/05/2022	06/06/2022	14
MS 10	NG 30704 48157	23/05/2022	06/06/2022	14
MS 11	NG 30181 48473	23/05/2022	06/06/2022	14



## ANNEX 3: WEATHER CONDITIONS

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

**Table A5.1: Weather Conditions.**

Date	Temp at Dusk (°C)	Rainfall (mm)	Maximum Wind Speed (m/s)
24/08/2021	12	0	0.4
25/08/2021	12	0	0.4
26/08/2021	8	0	0.4
27/08/2021	11	0	0.4
28/08/2021	10	0	1.0
29/08/2021	9	0	1.2
30/08/2021	9	0	1.1
31/08/2021	9	0	0.4
01/09/2021	16	0	0.0
02/09/2021	16	0	0.0
03/09/2021	17	0	0.0
04/09/2021	15	0	0.0
05/09/2021	23	0	0.0
09/06/2021	10	3	5.3
10/06/2021	11	0.3	8.3
11/06/2021	11	1	6.1
12/06/2021	7	0.4	5.8
13/06/2021	12	4.7	5.3
14/06/2021	11	0.6	7.2
15/06/2021	8	3.6	8.3
16/06/2021	12	0.1	5.0
17/06/2021	11	0	3.9
18/06/2021	12	0	2.2
19/06/2021	13	0.2	2.8
20/06/2021	13	0	3.9
21/06/2021	11	0	3.9
22/06/2021	10	0	6.1
23/06/2021	9	0.4	3.6
24/06/2021	11	9.3	5.0
25/06/2021	12	0	5.8
26/06/2021	14	0	2.5
27/06/2021	14	0	3.3
28/06/2021	15	0	2.2

Date	Temp at Dusk (°C)	Rainfall (mm)	Maximum Wind Speed (m/s)
29/06/2021	15	0	3.3
30/06/2021	17	0	2.2
01/07/2021	16	0	0.8
02/07/2021	17	0	2.2
03/07/2021	14	0.1	0.3
04/07/2021	14	0	1.4
05/07/2021	4	0	0.8
23/05/2022	18	0	0.0
24/05/2022	19	0	0.0
25/05/2022	7	0	2.2
26/05/2022	7	0	1.8
27/05/2022	8	0.2	1.3
28/05/2022	6	0	3.1
29/05/2022	6	0	2.2
30/05/2022	8	0	0.0
31/05/2022	9	0	2.2
01/06/2022	8	0	0.9
02/06/2022	9	0	0.0
03/06/2022	8	0	0.0
04/06/2022	10	0	0.4
05/06/2022	10	0	1.8

## ANNEX 4: EXISTING BAT RECORDS – HBRG

Table A2.1 provides details of bat records provided by HBRG within 10 km of the Site.

**Table A2.1: Existing Bat Records**

Species	Date	Grid Reference	Abundances	Comment
<i>Chiroptera sp.</i> Unidentified bat	01/05/2000	NG268433	1 count	Field record
<i>Pipistrellus sp.</i> Pipistrelle species	22/06/1999	NG290415	-	Field record
<i>Pipistrellus pipistrellus</i> Common pipistrelle	01/08/2006	NG3644	-	Field record

## ANNEX 5: PHOTOGRAPHS

Table A3.1 below provides photographs from the Site.

**Table A3.1: Photographs**

	<p><b>Photograph 1</b></p> <p>Substation building with low bat roost potential located at NG 31700 48140.</p>
	<p><b>Photograph 2</b></p> <p>A863 road bridge with moderate bat roost potential located at NG 30276 43855.</p>



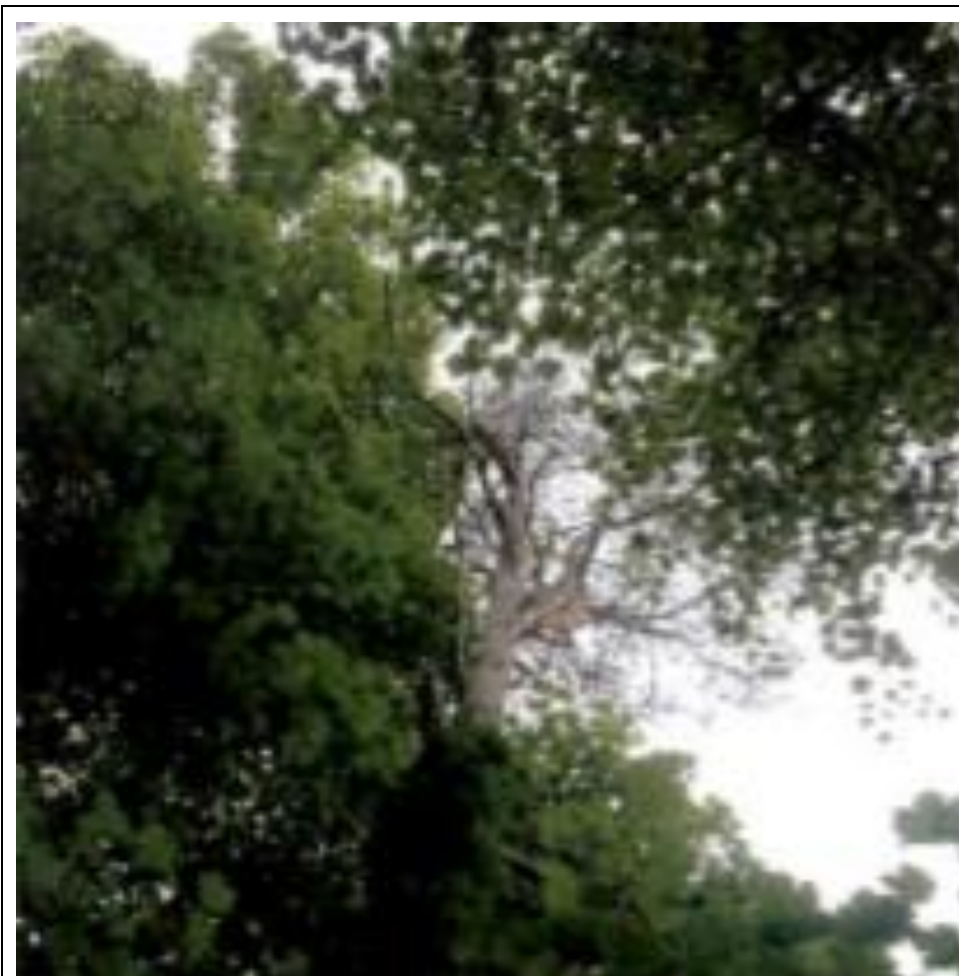
**Photograph 3**

Stone bridge with moderate bat roost potential located at NG 30268 43935.



**Photograph 4**

Wooden building with low/moderate bat roost potential located at NG 30044 45284.



**Photograph 5**

Pine tree with moderate bat roost potential located at NG 30517 43763.

# ANNEX 6: ECOBAT TOOL OUTPUT REPORT

# Bat Activity Analysis

Site Name: Ben Aketil

Author: Andrew Hulme

2022-08-09 13:26:42

Error in eval(expr, envir, enclos): object 'newmaster' not found

## Summary

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

Bats were detected on **37** nights between **2021-06-11** and **2022-06-05**, using **11** static bat detectors. Throughout this period **2** species were recorded. **Table 1.** Detectors were placed at the following locations:

latlon	date	Detector ID	Latitude	Longitude
57.442055_-6.498366	24/06/2021	Location 1	57.44206	-6.498366
57.431826_-6.474212	14/06/2021	Location 5	57.43183	-6.474212
57.431826_-6.474212	24/06/2021	Location 5	57.43183	-6.474212
57.433627_-6.468596	28/06/2021	Location 7	57.43363	-6.468596
57.433627_-6.468596	21/06/2021	Location 7	57.43363	-6.468596
57.437901_-6.472603	19/06/2021	Location 9	57.43790	-6.472603
57.437901_-6.472603	29/06/2021	Location 9	57.43790	-6.472603
57.437901_-6.472603	20/06/2021	Location 9	57.43790	-6.472603
57.437901_-6.472603	04/07/2021	Location 9	57.43790	-6.472603
57.437901_-6.472603	30/06/2021	Location 9	57.43790	-6.472603
57.437901_-6.472603	25/08/2021	Location 9	57.43790	-6.472603
57.437901_-6.472603	27/08/2021	Location 9	57.43790	-6.472603
57.446106_-6.4990141	12/06/2021	Location 11	57.44611	-6.499014
57.446106_-6.4990141	24/06/2021	Location 11	57.44611	-6.499014
57.446106_-6.4990141	21/06/2021	Location 11	57.44611	-6.499014
57.446106_-6.4990141	27/06/2021	Location 11	57.44611	-6.499014
57.446106_-6.4990141	26/08/2021	Location 11	57.44611	-6.499014
57.442055_-6.498366	03/06/2022	Location 1	57.44206	-6.498366
57.442213_-6.483356	28/05/2022	Location 4	57.44221	-6.483356
57.431826_-6.474212	05/06/2022	Location 5	57.43183	-6.474212
57.443587_-6.48998	31/05/2022	Location 10	57.44359	-6.489980
57.442055_-6.498366	04/07/2021	Location 1	57.44206	-6.498366
57.442055_-6.498366	26/06/2021	Location 1	57.44206	-6.498366
57.446362_-6.490838	28/06/2021	Location 2	57.44636	-6.490838
57.446362_-6.490838	26/06/2021	Location 2	57.44636	-6.490838
57.446362_-6.490838	20/06/2021	Location 2	57.44636	-6.490838
57.446362_-6.490838	03/07/2021	Location 2	57.44636	-6.490838
57.446362_-6.490838	15/06/2021	Location 2	57.44636	-6.490838
57.446362_-6.490838	29/06/2021	Location 2	57.44636	-6.490838
57.446362_-6.490838	27/08/2021	Location 2	57.44636	-6.490838
57.428824_-6.4784639	04/09/2021	Location 3	57.42882	-6.478464
57.428824_-6.4784639	03/09/2021	Location 3	57.42882	-6.478464
57.428824_-6.4784639	24/08/2021	Location 3	57.42882	-6.478464
57.428824_-6.4784639	26/08/2021	Location 3	57.42882	-6.478464
57.428824_-6.4784639	27/08/2021	Location 3	57.42882	-6.478464



latlon	date	Detector ID	Latitude	Longitude
57.428824_-6.4784639	02/09/2021	Location 3	57.42882	-6.478464
57.428824_-6.4784639	25/08/2021	Location 3	57.42882	-6.478464
57.428824_-6.4784639	30/08/2021	Location 3	57.42882	-6.478464
57.428824_-6.4784639	29/08/2021	Location 3	57.42882	-6.478464
57.442213_-6.483356	29/06/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	03/07/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	04/07/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	28/06/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	20/06/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	02/07/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	26/06/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	25/06/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	03/09/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	02/09/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	04/09/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	26/08/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	29/08/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	30/08/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	01/09/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	27/08/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	24/08/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	25/08/2021	Location 4	57.44221	-6.483356
57.442213_-6.483356	05/09/2021	Location 4	57.44221	-6.483356
57.431826_-6.474212	20/06/2021	Location 5	57.43183	-6.474212
57.431826_-6.474212	21/06/2021	Location 5	57.43183	-6.474212
57.431826_-6.474212	26/08/2021	Location 5	57.43183	-6.474212
57.431826_-6.474212	25/08/2021	Location 5	57.43183	-6.474212
57.431826_-6.474212	27/08/2021	Location 5	57.43183	-6.474212
57.431826_-6.474212	29/08/2021	Location 5	57.43183	-6.474212
57.431826_-6.474212	03/09/2021	Location 5	57.43183	-6.474212
57.431826_-6.474212	30/08/2021	Location 5	57.43183	-6.474212
57.432061_-6.469121	29/06/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	20/06/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	04/07/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	02/07/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	03/07/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	05/07/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	27/08/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	03/09/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	26/08/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	04/09/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	25/08/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	02/09/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	24/08/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	05/09/2021	Location 6	57.43206	-6.469121
57.432061_-6.469121	29/08/2021	Location 6	57.43206	-6.469121
57.433627_-6.468596	03/07/2021	Location 7	57.43363	-6.468596
57.433627_-6.468596	04/07/2021	Location 7	57.43363	-6.468596
57.433627_-6.468596	27/08/2021	Location 7	57.43363	-6.468596
57.433627_-6.468596	04/09/2021	Location 7	57.43363	-6.468596
57.433627_-6.468596	24/08/2021	Location 7	57.43363	-6.468596
57.433627_-6.468596	02/09/2021	Location 7	57.43363	-6.468596
57.426301_-6.464933	03/07/2021	Location 8	57.42630	-6.464933
57.426301_-6.464933	20/06/2021	Location 8	57.42630	-6.464933
57.426301_-6.464933	01/07/2021	Location 8	57.42630	-6.464933
57.426301_-6.464933	04/07/2021	Location 8	57.42630	-6.464933
57.437901_-6.472603	03/09/2021	Location 9	57.43790	-6.472603

latlon	date	Detector ID	Latitude	Longitude
57.437901_-6.472603	28/08/2021	Location 9	57.43790	-6.472603
57.437901_-6.472603	02/09/2021	Location 9	57.43790	-6.472603
57.437901_-6.472603	24/08/2021	Location 9	57.43790	-6.472603
57.443587_-6.48998	05/09/2021	Location 10	57.44359	-6.489980
57.443587_-6.48998	04/09/2021	Location 10	57.44359	-6.489980
57.443587_-6.48998	24/08/2021	Location 10	57.44359	-6.489980
57.443587_-6.48998	02/09/2021	Location 10	57.44359	-6.489980
57.443587_-6.48998	27/08/2021	Location 10	57.44359	-6.489980
57.443587_-6.48998	03/09/2021	Location 10	57.44359	-6.489980
57.443587_-6.48998	28/08/2021	Location 10	57.44359	-6.489980
57.443587_-6.48998	25/08/2021	Location 10	57.44359	-6.489980
57.443587_-6.48998	26/08/2021	Location 10	57.44359	-6.489980
57.446106_-6.4990141	05/07/2021	Location 11	57.44611	-6.499014
57.446106_-6.4990141	03/09/2021	Location 11	57.44611	-6.499014
57.446106_-6.4990141	25/08/2021	Location 11	57.44611	-6.499014
57.446106_-6.4990141	04/09/2021	Location 11	57.44611	-6.499014
57.446106_-6.4990141	30/08/2021	Location 11	57.44611	-6.499014
57.442055_-6.498366	24/05/2022	Location 1	57.44206	-6.498366
57.446362_-6.490838	02/06/2022	Location 2	57.44636	-6.490838
57.446362_-6.490838	31/05/2022	Location 2	57.44636	-6.490838
57.428824_-6.4784639	03/06/2022	Location 3	57.42882	-6.478464
57.428824_-6.4784639	02/06/2022	Location 3	57.42882	-6.478464
57.428824_-6.4784639	04/06/2022	Location 3	57.42882	-6.478464
57.428824_-6.4784639	30/05/2022	Location 3	57.42882	-6.478464
57.442213_-6.483356	23/05/2022	Location 4	57.44221	-6.483356
57.431826_-6.474212	04/06/2022	Location 5	57.43183	-6.474212
57.431826_-6.474212	06/06/2022	Location 5	57.43183	-6.474212
57.431826_-6.474212	31/05/2022	Location 5	57.43183	-6.474212
57.431826_-6.474212	24/05/2022	Location 5	57.43183	-6.474212
57.432061_-6.469121	06/06/2022	Location 6	57.43206	-6.469121
57.432061_-6.469121	04/06/2022	Location 6	57.43206	-6.469121
57.432061_-6.469121	27/05/2022	Location 6	57.43206	-6.469121
57.432061_-6.469121	28/05/2022	Location 6	57.43206	-6.469121
57.432061_-6.469121	01/06/2022	Location 6	57.43206	-6.469121
57.426301_-6.464933	06/06/2022	Location 8	57.42630	-6.464933
57.437901_-6.472603	06/06/2022	Location 9	57.43790	-6.472603
57.443587_-6.48998	02/06/2022	Location 10	57.44359	-6.489980
57.443587_-6.48998	30/05/2022	Location 10	57.44359	-6.489980
57.443587_-6.48998	04/06/2022	Location 10	57.44359	-6.489980

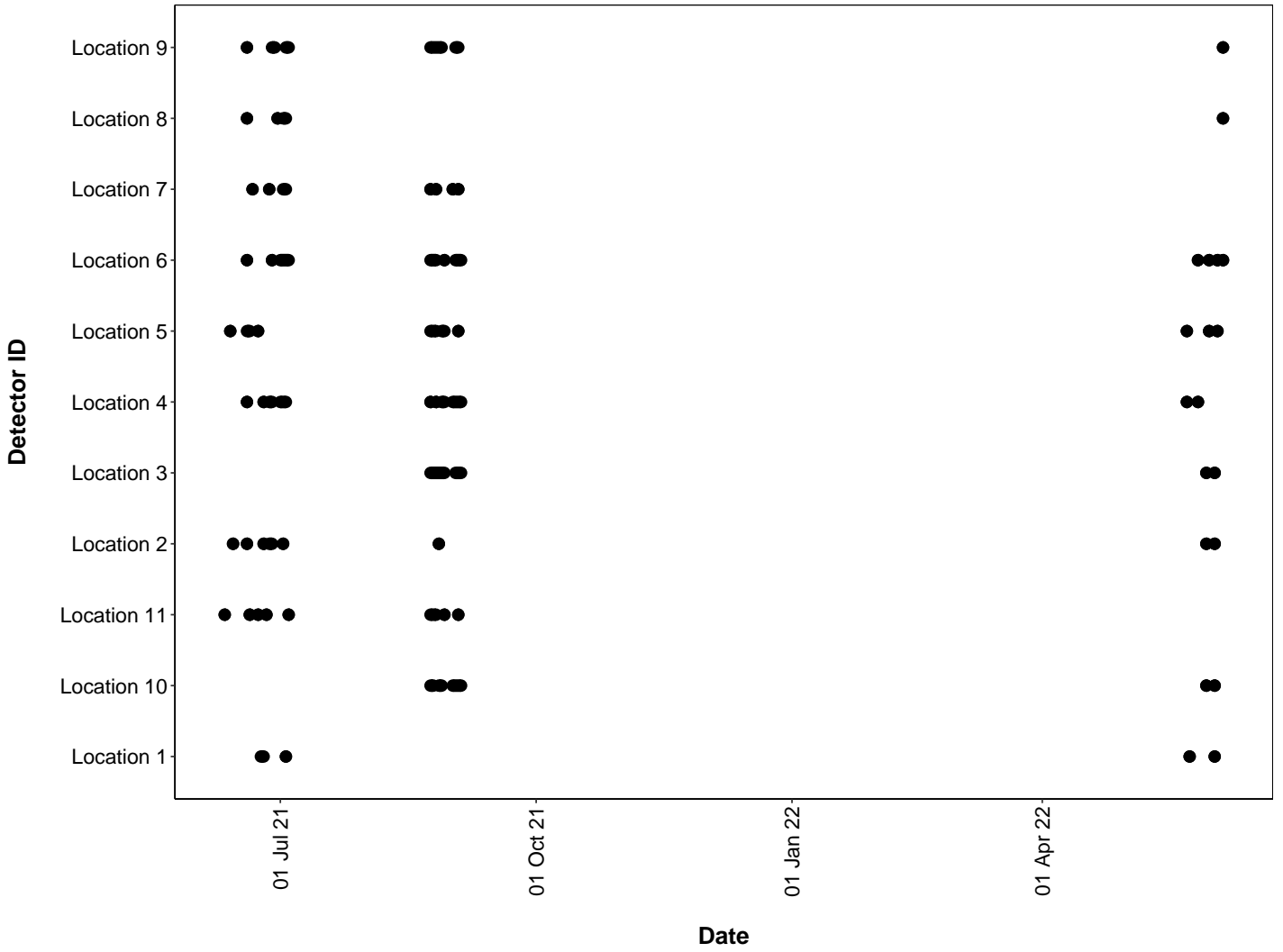
## Survey Nights

**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
Location 1	5
Location 10	11
Location 11	10
Location 2	9
Location 3	12
Location 4	17
Location 5	15
Location 6	17
Location 7	9
Location 8	5
Location 9	13

# 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
Location 1	<i>Nyctalus noctula</i>	0	0	0	0	2
Location 1	<i>Pipistrellus pipistrellus</i>	0	0	0	0	3
Location 10	<i>Nyctalus noctula</i>	0	0	0	1	0
Location 10	<i>Pipistrellus pipistrellus</i>	0	0	0	0	11
Location 11	<i>Nyctalus noctula</i>	1	0	0	1	2
Location 11	<i>Pipistrellus pipistrellus</i>	0	0	0	0	6
Location 2	<i>Pipistrellus pipistrellus</i>	0	0	0	0	9
Location 3	<i>Pipistrellus pipistrellus</i>	0	0	0	2	10
Location 4	<i>Nyctalus noctula</i>	0	0	0	0	1
Location 4	<i>Pipistrellus pipistrellus</i>	0	0	0	1	15
Location 5	<i>Nyctalus noctula</i>	0	0	0	1	1
Location 5	<i>Pipistrellus pipistrellus</i>	0	0	0	0	12
Location 6	<i>Pipistrellus pipistrellus</i>	1	0	0	5	11
Location 7	<i>Nyctalus noctula</i>	0	0	0	0	2
Location 7	<i>Pipistrellus pipistrellus</i>	0	0	0	1	6
Location 8	<i>Pipistrellus pipistrellus</i>	0	0	0	0	5
Location 9	<i>Nyctalus noctula</i>	0	1	1	0	3
Location 9	<i>Pipistrellus pipistrellus</i>	0	0	0	0	7

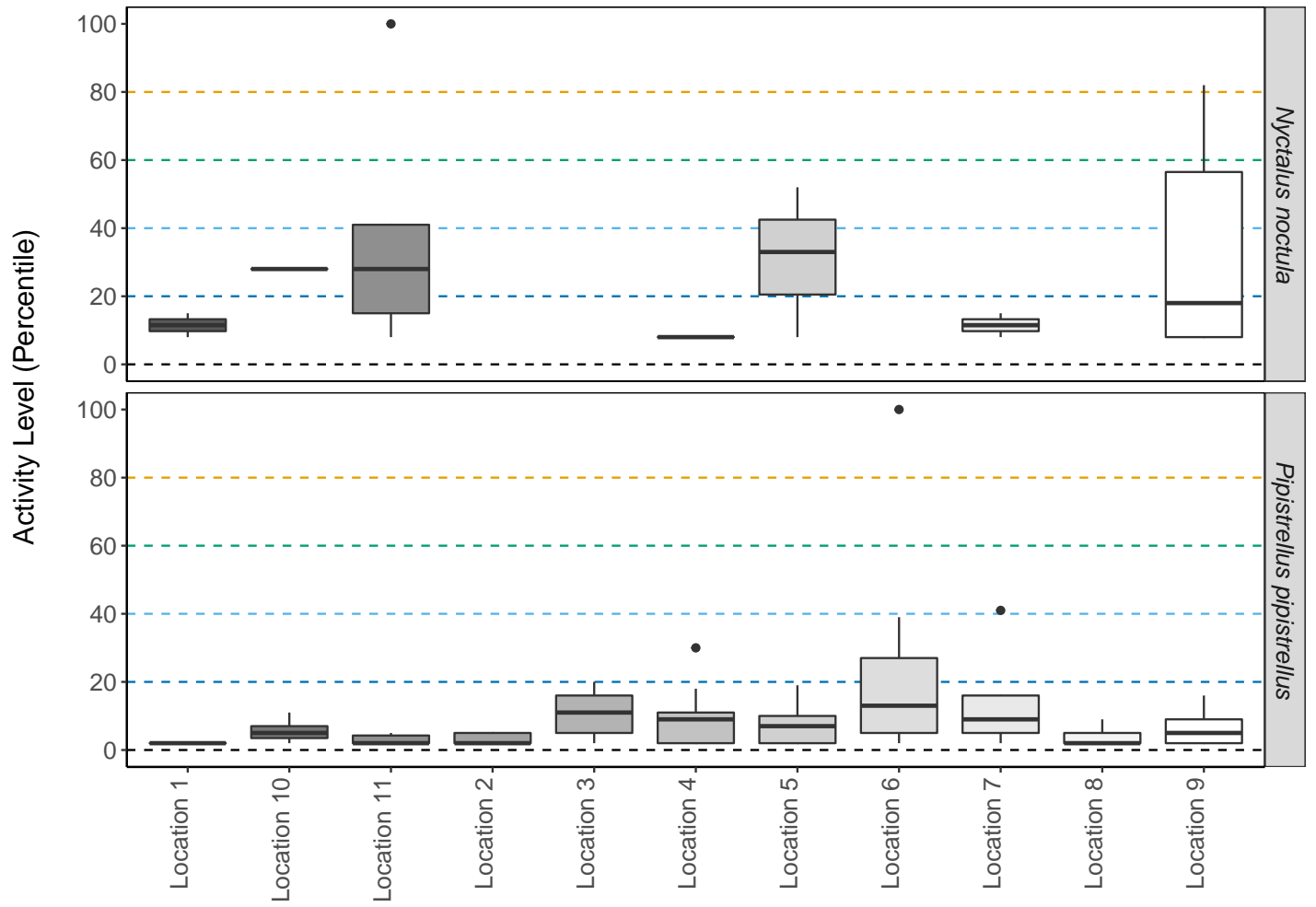
**Table 4.** Summary table showing key metrics for each species recorded. The reference range is the number of nights for each species that your data were compared to. We recommend a Reference Range of 200+ to be confident in the relative activity level.

Detector ID	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
Location 1	<i>Nyctalus noctula</i>	12	11.5 - 11.5	15	2	90
Location 1	<i>Pipistrellus pipistrellus</i>	2	2 - 2	2	3	2162
Location 10	<i>Nyctalus noctula</i>	28	0	28	1	90
Location 10	<i>Pipistrellus pipistrellus</i>	5	3.5 - 8	11	11	2162
Location 11	<i>Nyctalus noctula</i>	28	15 - 64	100	5	90
Location 11	<i>Pipistrellus pipistrellus</i>	2	2 - 3.5	5	6	2162
Location 2	<i>Pipistrellus pipistrellus</i>	2	2 - 5	5	9	2162
Location 3	<i>Pipistrellus pipistrellus</i>	11	6.5 - 15.5	20	12	2162
Location 4	<i>Nyctalus noctula</i>	8	0	8	1	90
Location 4	<i>Pipistrellus pipistrellus</i>	9	5.5 - 13.5	30	16	2162
Location 5	<i>Nyctalus noctula</i>	33	8 - 52	52	3	90
Location 5	<i>Pipistrellus pipistrellus</i>	7	3.5 - 12	19	12	2162
Location 6	<i>Pipistrellus pipistrellus</i>	13	9 - 24	100	17	2162
Location 7	<i>Nyctalus noctula</i>	12	11.5 - 11.5	15	2	90
Location 7	<i>Pipistrellus pipistrellus</i>	9	3.5 - 28.5	41	7	2162
Location 8	<i>Pipistrellus pipistrellus</i>	2	2 - 5.5	9	5	2162
Location 9	<i>Nyctalus noctula</i>	18	8 - 55	82	6	90
Location 9	<i>Pipistrellus pipistrellus</i>	5	2 - 10.5	16	7	2162

## Figures

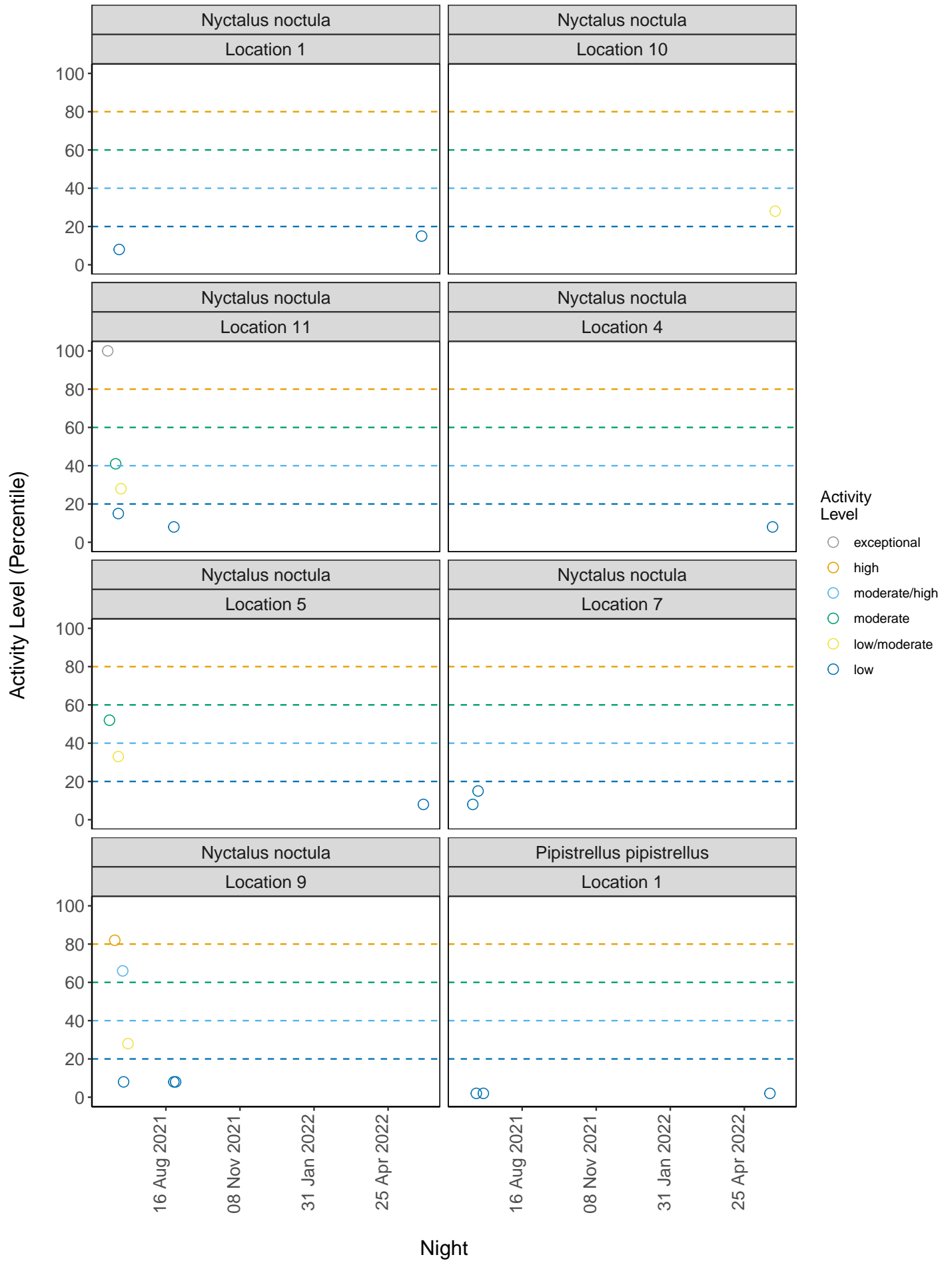
**Figure 2.** The recorded activity of bats during the survey. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)

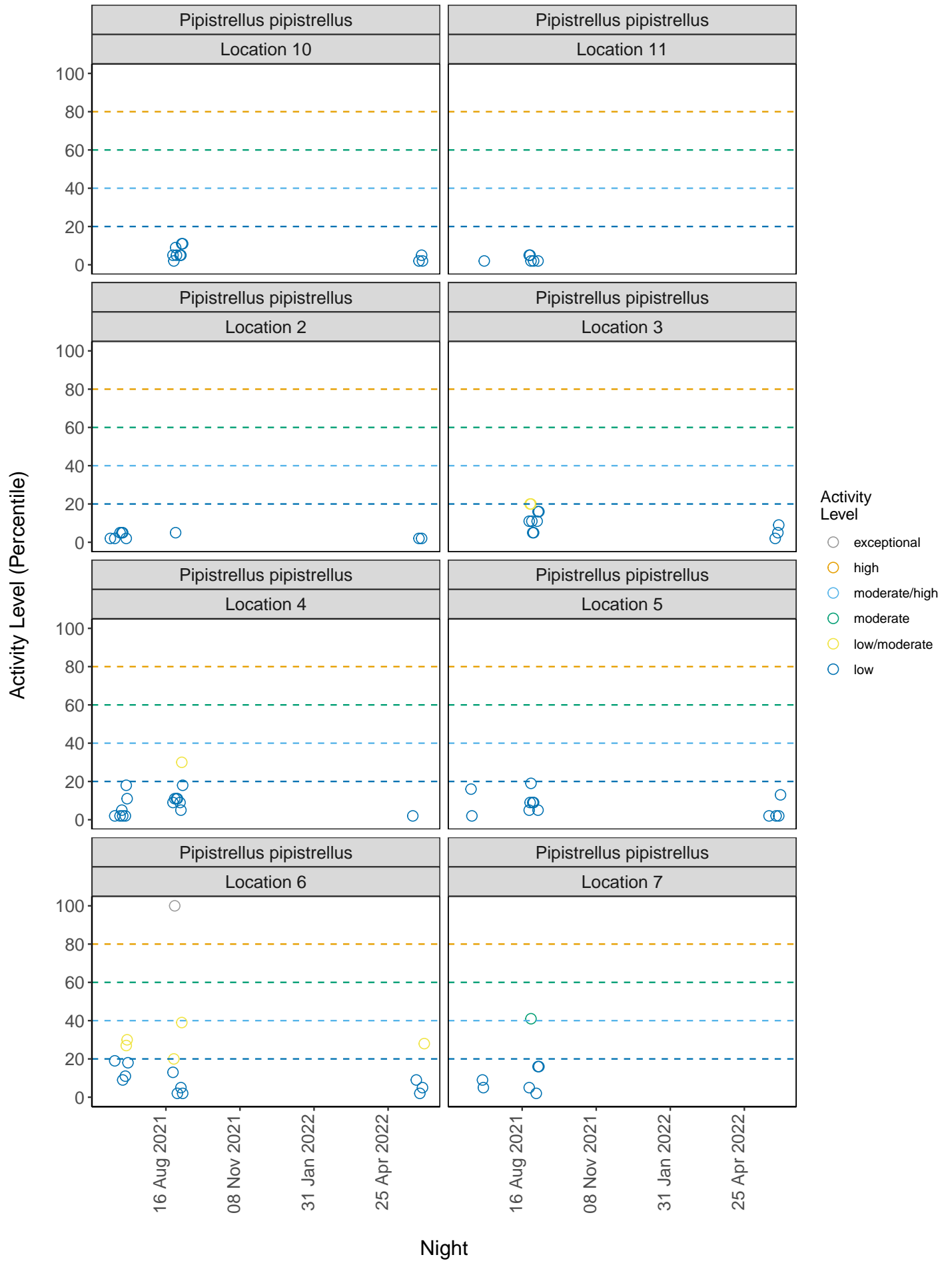


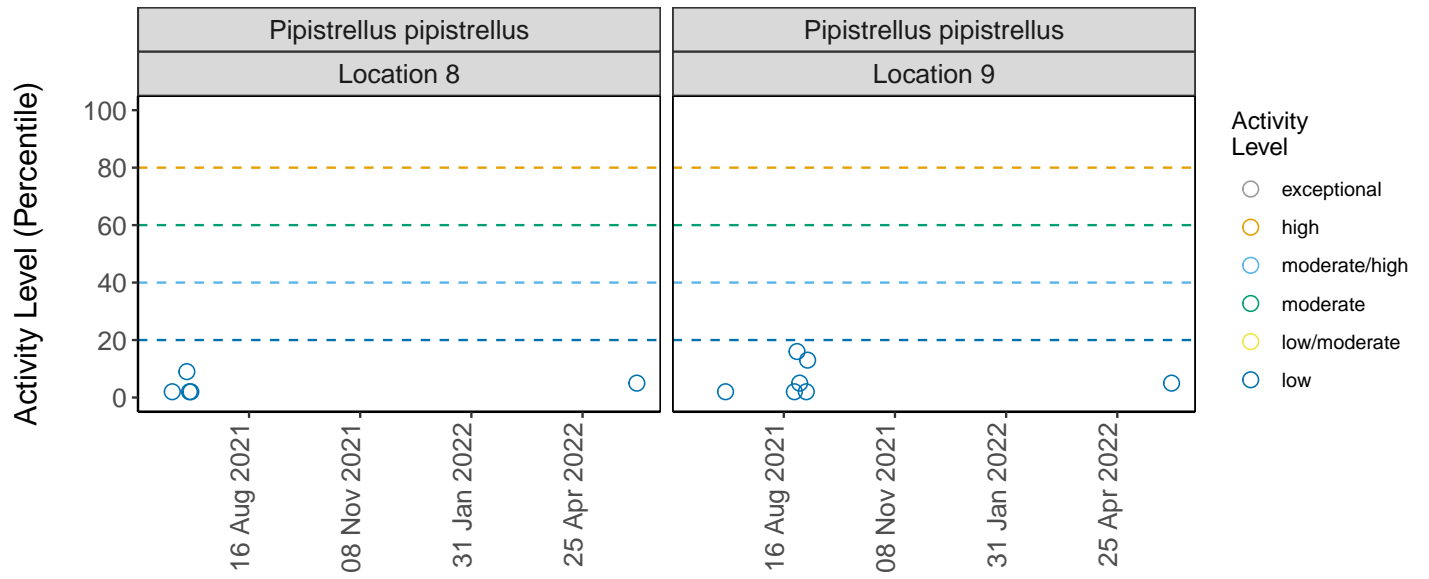


Detector ID

**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
Location 1	<i>Nyctalus noctula</i>	Jun	0	0	0	0	0	2
Location 1	<i>Pipistrellus pipistrellus</i>	May	0	0	0	0	0	1
Location 1	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	0	1
Location 1	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	0	0	1
Location 10	<i>Nyctalus noctula</i>	May	0	0	0	0	1	0
Location 10	<i>Pipistrellus pipistrellus</i>	May	0	0	0	0	0	1
Location 10	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	0	2
Location 10	<i>Pipistrellus pipistrellus</i>	Aug	0	0	0	0	0	4
Location 10	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	0	4
Location 11	<i>Nyctalus noctula</i>	Jun	1	0	0	1	1	1
Location 11	<i>Nyctalus noctula</i>	Aug	0	0	0	0	0	1
Location 11	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	0	0	1
Location 11	<i>Pipistrellus pipistrellus</i>	Aug	0	0	0	0	0	4
Location 11	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	0	1
Location 2	<i>Pipistrellus pipistrellus</i>	May	0	0	0	0	0	1
Location 2	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	0	6
Location 2	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	0	0	1
Location 2	<i>Pipistrellus pipistrellus</i>	Aug	0	0	0	0	0	1
Location 3	<i>Pipistrellus pipistrellus</i>	May	0	0	0	0	0	1
Location 3	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	0	2
Location 3	<i>Pipistrellus pipistrellus</i>	Aug	0	0	0	0	2	4
Location 3	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	0	3
Location 4	<i>Nyctalus noctula</i>	May	0	0	0	0	0	1
Location 4	<i>Pipistrellus pipistrellus</i>	May	0	0	0	0	0	1
Location 4	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	0	4

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
Location 4	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	0	0	3
Location 4	<i>Pipistrellus pipistrellus</i>	Aug	0	0	0	0	0	4
Location 4	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	1	3
Location 5	<i>Nyctalus noctula</i>	Jun	0	0	0	1	1	1
Location 5	<i>Pipistrellus pipistrellus</i>	May	0	0	0	0	0	2
Location 5	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	0	4
Location 5	<i>Pipistrellus pipistrellus</i>	Aug	0	0	0	0	0	5
Location 5	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	0	1
Location 6	<i>Pipistrellus pipistrellus</i>	May	0	0	0	0	0	2
Location 6	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	1	3
Location 6	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	0	2	2
Location 6	<i>Pipistrellus pipistrellus</i>	Aug	1	0	0	0	1	2
Location 6	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	1	2
Location 7	<i>Nyctalus noctula</i>	Jun	0	0	0	0	0	2
Location 7	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	0	0	2
Location 7	<i>Pipistrellus pipistrellus</i>	Aug	0	0	0	1	0	1
Location 7	<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	0	3
Location 8	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	0	3
Location 8	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	0	0	2
Location 9	<i>Nyctalus noctula</i>	Jun	0	1	1	0	0	1
Location 9	<i>Nyctalus noctula</i>	Jul	0	0	0	0	1	0
Location 9	<i>Nyctalus noctula</i>	Aug	0	0	0	0	0	2
Location 9	<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	0	1
Location 9	<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	0	0	1
Location 9	<i>Pipistrellus pipistrellus</i>	Aug	0	0	0	0	0	3
Location 9	<i>Pipistrellus pipistrellus</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
Location 1	<i>Nyctalus noctula</i>	Jun	12	11.5 - 11.5	15	2
Location 1	<i>Pipistrellus pipistrellus</i>	May	2	2 - 2	2	1
Location 1	<i>Pipistrellus pipistrellus</i>	Jun	2	2 - 2	2	1
Location 1	<i>Pipistrellus pipistrellus</i>	Jul	2	2 - 2	2	1
Location 10	<i>Nyctalus noctula</i>	May	28	0	28	1
Location 10	<i>Pipistrellus pipistrellus</i>	May	2	3.5 - 8	2	1
Location 10	<i>Pipistrellus pipistrellus</i>	Jun	4	3.5 - 8	5	2
Location 10	<i>Pipistrellus pipistrellus</i>	Aug	5	3.5 - 8	9	4
Location 10	<i>Pipistrellus pipistrellus</i>	Sep	8	3.5 - 8	11	4
Location 11	<i>Nyctalus noctula</i>	Jun	35	15 - 64	100	4
Location 11	<i>Nyctalus noctula</i>	Aug	8	15 - 64	8	1
Location 11	<i>Pipistrellus pipistrellus</i>	Jul	2	2 - 3.5	2	1
Location 11	<i>Pipistrellus pipistrellus</i>	Aug	4	2 - 3.5	5	4
Location 11	<i>Pipistrellus pipistrellus</i>	Sep	2	2 - 3.5	2	1
Location 2	<i>Pipistrellus pipistrellus</i>	May	2	2 - 5	2	1
Location 2	<i>Pipistrellus pipistrellus</i>	Jun	4	2 - 5	5	6
Location 2	<i>Pipistrellus pipistrellus</i>	Jul	2	2 - 5	2	1
Location 2	<i>Pipistrellus pipistrellus</i>	Aug	5	2 - 5	5	1
Location 3	<i>Pipistrellus pipistrellus</i>	May	2	6.5 - 15.5	2	1
Location 3	<i>Pipistrellus pipistrellus</i>	Jun	7	6.5 - 15.5	9	2
Location 3	<i>Pipistrellus pipistrellus</i>	Aug	11	6.5 - 15.5	20	6
Location 3	<i>Pipistrellus pipistrellus</i>	Sep	16	6.5 - 15.5	16	3
Location 4	<i>Nyctalus noctula</i>	May	8	0	8	1
Location 4	<i>Pipistrellus pipistrellus</i>	May	2	5.5 - 13.5	2	1
Location 4	<i>Pipistrellus pipistrellus</i>	Jun	2	5.5 - 13.5	5	4
Location 4	<i>Pipistrellus pipistrellus</i>	Jul	11	5.5 - 13.5	18	3
Location 4	<i>Pipistrellus pipistrellus</i>	Aug	11	5.5 - 13.5	11	4
Location 4	<i>Pipistrellus pipistrellus</i>	Sep	14	5.5 - 13.5	30	4
Location 5	<i>Nyctalus noctula</i>	Jun	33	8 - 52	52	3
Location 5	<i>Pipistrellus pipistrellus</i>	May	2	3.5 - 12	2	2
Location 5	<i>Pipistrellus pipistrellus</i>	Jun	8	3.5 - 12	16	4
Location 5	<i>Pipistrellus pipistrellus</i>	Aug	9	3.5 - 12	19	5
Location 5	<i>Pipistrellus pipistrellus</i>	Sep	5	3.5 - 12	5	1
Location 6	<i>Pipistrellus pipistrellus</i>	May	6	9 - 24	9	2
Location 6	<i>Pipistrellus pipistrellus</i>	Jun	14	9 - 24	28	4
Location 6	<i>Pipistrellus pipistrellus</i>	Jul	23	9 - 24	30	4
Location 6	<i>Pipistrellus pipistrellus</i>	Aug	17	9 - 24	100	4
Location 6	<i>Pipistrellus pipistrellus</i>	Sep	5	9 - 24	39	3
Location 7	<i>Nyctalus noctula</i>	Jun	12	11.5 - 11.5	15	2
Location 7	<i>Pipistrellus pipistrellus</i>	Jul	7	3.5 - 28.5	9	2
Location 7	<i>Pipistrellus pipistrellus</i>	Aug	23	3.5 - 28.5	41	2
Location 7	<i>Pipistrellus pipistrellus</i>	Sep	16	3.5 - 28.5	16	3
Location 8	<i>Pipistrellus pipistrellus</i>	Jun	5	2 - 5.5	9	3
Location 8	<i>Pipistrellus pipistrellus</i>	Jul	2	2 - 5.5	2	2
Location 9	<i>Nyctalus noctula</i>	Jun	66	8 - 55	82	3
Location 9	<i>Nyctalus noctula</i>	Jul	28	8 - 55	28	1
Location 9	<i>Nyctalus noctula</i>	Aug	8	8 - 55	8	2
Location 9	<i>Pipistrellus pipistrellus</i>	Jun	5	2 - 10.5	5	1
Location 9	<i>Pipistrellus pipistrellus</i>	Jul	2	2 - 10.5	2	1
Location 9	<i>Pipistrellus pipistrellus</i>	Aug	5	2 - 10.5	16	3
Location 9	<i>Pipistrellus pipistrellus</i>	Sep	8	2 - 10.5	13	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.

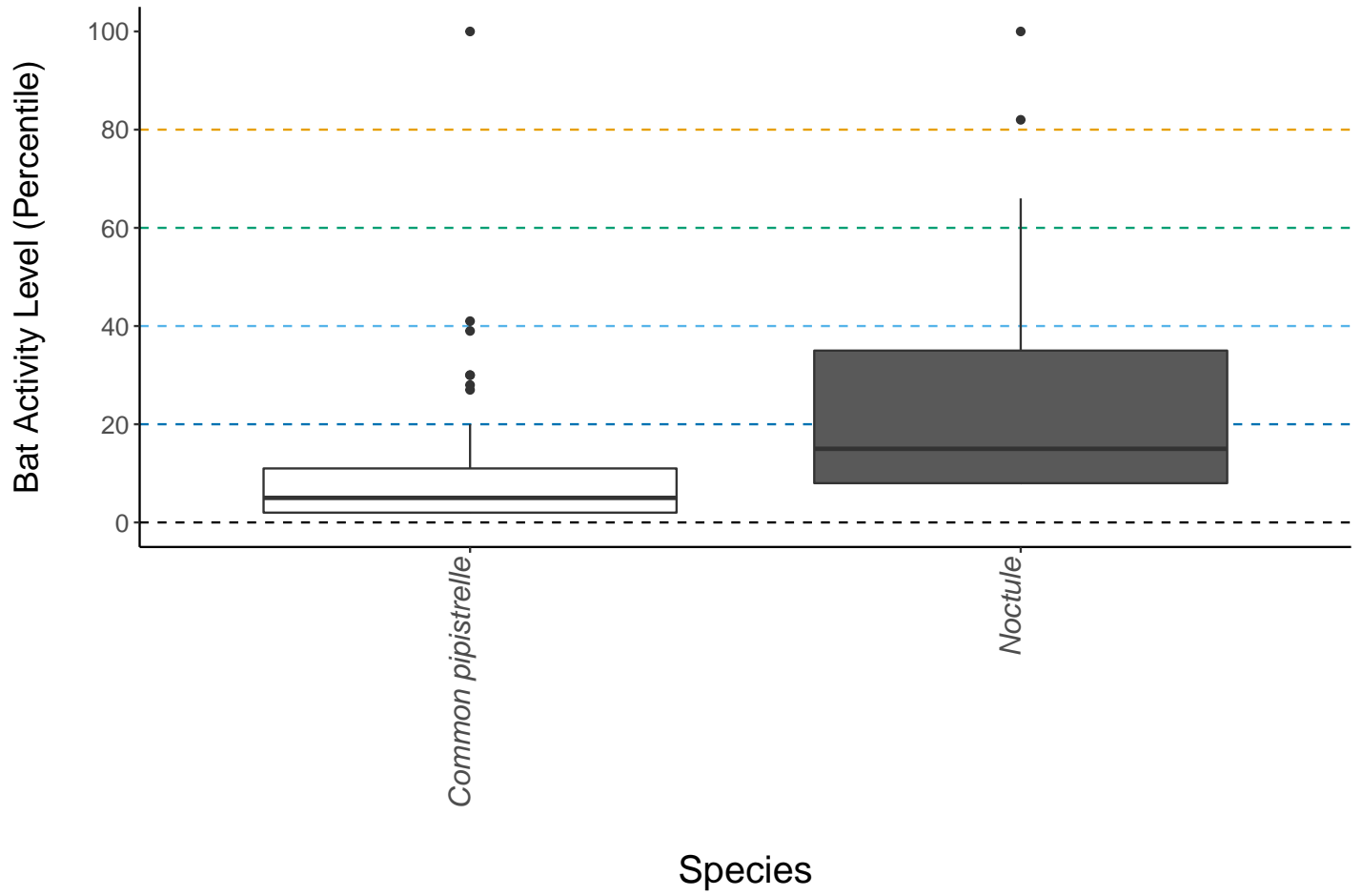
Species/Species Group	Nights of Exceptional Activity	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
<i>Nyctalus noctula</i>	1	1	1	2	4	11
<i>Pipistrellus pipistrellus</i>	1	0	0	1	8	95

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

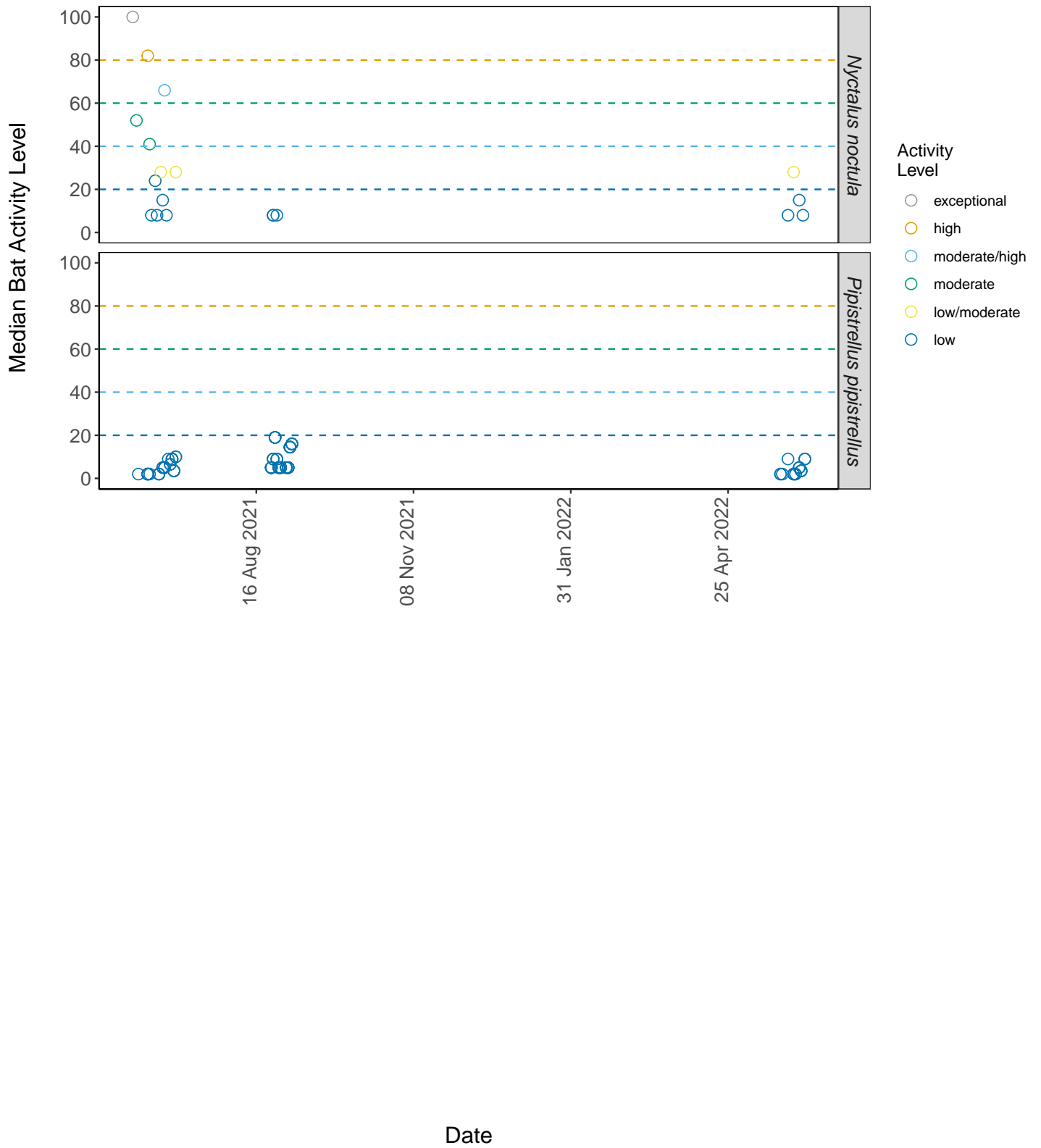
Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded
<i>Nyctalus noctula</i>	15	8 - 55	100	20
<i>Pipistrellus pipistrellus</i>	5	9 - 24	100	105

**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.

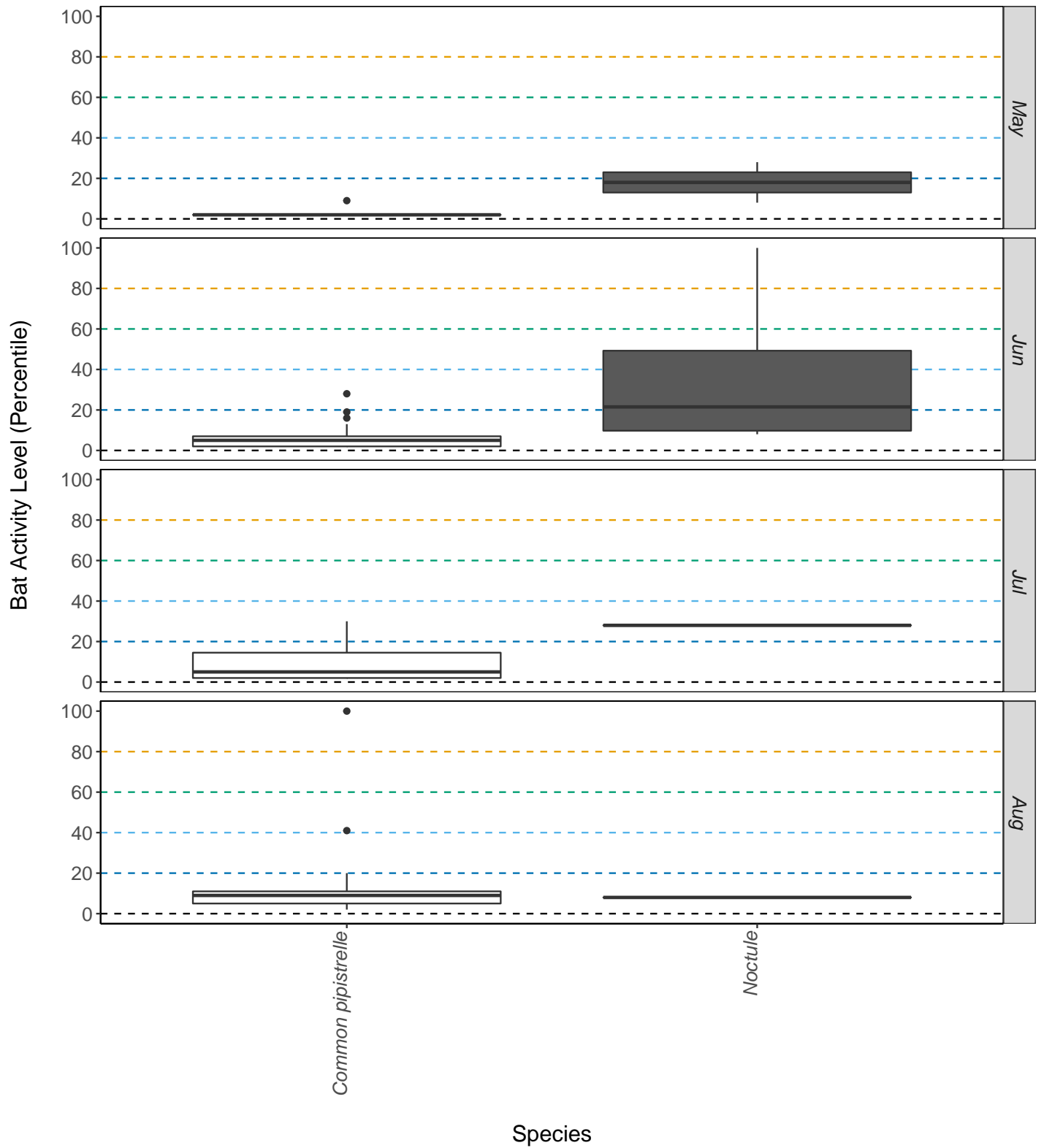
Species/Species Group	Month	Nights of Exceptional Activity	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
<i>Nyctalus noctula</i>	May	0	0	0	0	1	1
<i>Nyctalus noctula</i>	Jun	1	1	1	2	2	7
<i>Nyctalus noctula</i>	Jul	0	0	0	0	1	0
<i>Nyctalus noctula</i>	Aug	0	0	0	0	0	3
<i>Pipistrellus pipistrellus</i>	May	0	0	0	0	0	9
<i>Pipistrellus pipistrellus</i>	Jun	0	0	0	0	1	26
<i>Pipistrellus pipistrellus</i>	Jul	0	0	0	0	2	13
<i>Pipistrellus pipistrellus</i>	Aug	1	0	0	1	3	28
<i>Pipistrellus pipistrellus</i>	Sep	0	0	0	0	2	19

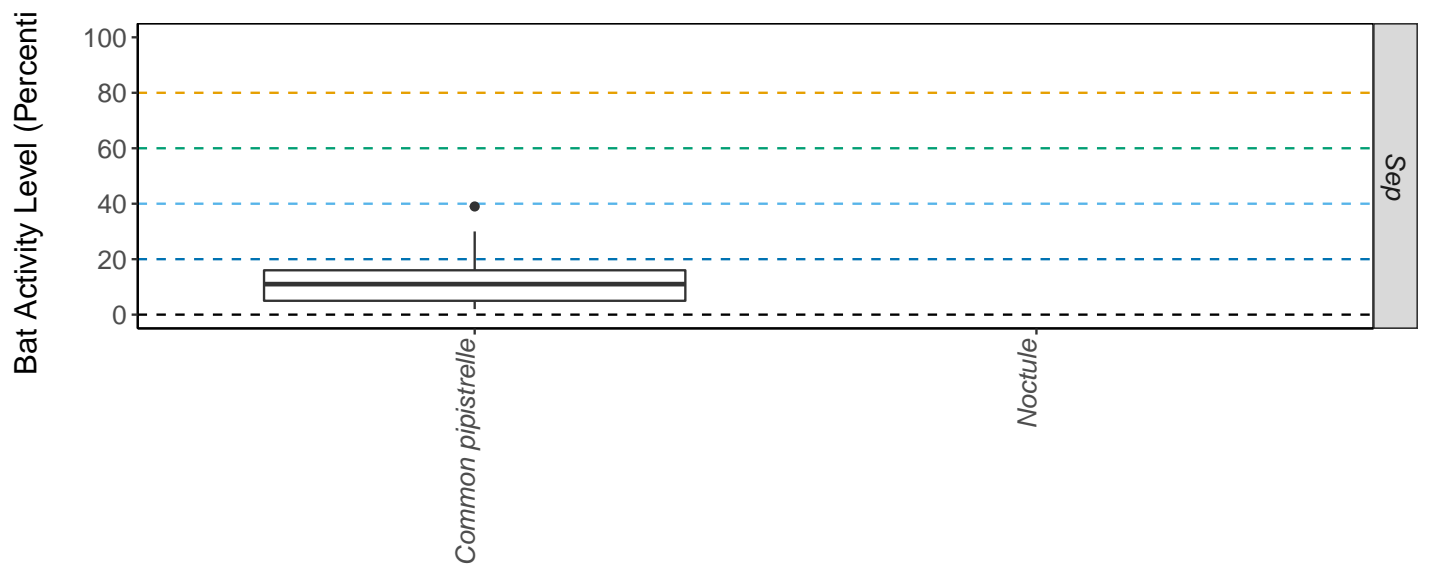
**Table 10.** Summary table showing key metrics for each species recorded per month.

Species/Species Group	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded
<i>Nyctalus noctula</i>	May	18	0	28	2
<i>Nyctalus noctula</i>	Jun	22	8 - 55	100	14
<i>Nyctalus noctula</i>	Jul	28	8 - 55	28	1
<i>Nyctalus noctula</i>	Aug	8	8 - 55	8	3
<i>Pipistrellus pipistrellus</i>	May	2	9 - 24	9	9
<i>Pipistrellus pipistrellus</i>	Jun	5	9 - 24	28	27
<i>Pipistrellus pipistrellus</i>	Jul	5	9 - 24	30	15
<i>Pipistrellus pipistrellus</i>	Aug	9	9 - 24	100	33
<i>Pipistrellus pipistrellus</i>	Sep	11	9 - 24	39	21

**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
57.446106_-6.4990141	12/06/2021	2021-06-11	22:23	04:29	6.1
57.431826_-6.474212	14/06/2021	2021-06-13	22:25	04:28	6.1
57.446362_-6.490838	15/06/2021	2021-06-14	22:26	04:28	6.0
57.437901_-6.472603	19/06/2021	2021-06-19	22:28	04:28	6.0
57.437901_-6.472603	20/06/2021	2021-06-19	22:28	04:28	6.0
57.446362_-6.490838	20/06/2021	2021-06-19	22:28	04:28	6.0
57.442213_-6.483356	20/06/2021	2021-06-19	22:28	04:28	6.0
57.431826_-6.474212	20/06/2021	2021-06-19	22:28	04:28	6.0
57.432061_-6.469121	20/06/2021	2021-06-19	22:28	04:28	6.0
57.426301_-6.464933	20/06/2021	2021-06-19	22:28	04:28	6.0
57.446106_-6.4990141	21/06/2021	2021-06-20	22:29	04:28	6.0
57.431826_-6.474212	21/06/2021	2021-06-20	22:29	04:28	6.0
57.433627_-6.468596	21/06/2021	2021-06-21	22:29	04:28	6.0
57.431826_-6.474212	24/06/2021	2021-06-23	22:29	04:29	6.0
57.446106_-6.4990141	24/06/2021	2021-06-23	22:29	04:29	6.0
57.442055_-6.498366	24/06/2021	2021-06-24	22:29	04:29	6.0
57.442055_-6.498366	26/06/2021	2021-06-25	22:29	04:30	6.0
57.446362_-6.490838	26/06/2021	2021-06-25	22:29	04:30	6.0
57.442213_-6.483356	26/06/2021	2021-06-25	22:29	04:30	6.0
57.442213_-6.483356	25/06/2021	2021-06-25	22:29	04:30	6.0
57.446106_-6.4990141	27/06/2021	2021-06-26	22:29	04:31	6.0
57.433627_-6.468596	28/06/2021	2021-06-27	22:29	04:31	6.0
57.446362_-6.490838	28/06/2021	2021-06-27	22:29	04:31	6.0
57.442213_-6.483356	28/06/2021	2021-06-27	22:29	04:31	6.0
57.437901_-6.472603	29/06/2021	2021-06-28	22:28	04:32	6.1
57.446362_-6.490838	29/06/2021	2021-06-28	22:28	04:32	6.1
57.442213_-6.483356	29/06/2021	2021-06-28	22:28	04:32	6.1
57.432061_-6.469121	29/06/2021	2021-06-28	22:28	04:32	6.1
57.437901_-6.472603	30/06/2021	2021-06-29	22:28	04:33	6.1
57.426301_-6.464933	01/07/2021	2021-06-30	22:28	04:34	6.1
57.442213_-6.483356	02/07/2021	2021-07-01	22:27	04:35	6.1
57.432061_-6.469121	02/07/2021	2021-07-01	22:27	04:35	6.1
57.446362_-6.490838	03/07/2021	2021-07-02	22:27	04:36	6.1
57.442213_-6.483356	03/07/2021	2021-07-02	22:27	04:36	6.1
57.432061_-6.469121	03/07/2021	2021-07-02	22:27	04:36	6.1
57.433627_-6.468596	03/07/2021	2021-07-02	22:27	04:36	6.1
57.426301_-6.464933	03/07/2021	2021-07-02	22:27	04:36	6.1
57.442055_-6.498366	04/07/2021	2021-07-03	22:26	04:37	6.2
57.442213_-6.483356	04/07/2021	2021-07-03	22:26	04:37	6.2
57.432061_-6.469121	04/07/2021	2021-07-03	22:26	04:37	6.2
57.432061_-6.469121	03/07/2021	2021-07-03	22:26	04:37	6.2
57.433627_-6.468596	04/07/2021	2021-07-03	22:26	04:37	6.2
57.426301_-6.464933	04/07/2021	2021-07-03	22:26	04:37	6.2
57.437901_-6.472603	04/07/2021	2021-07-03	22:26	04:37	6.2
57.437901_-6.472603	04/07/2021	2021-07-04	22:25	04:38	6.2
57.432061_-6.469121	05/07/2021	2021-07-04	22:25	04:38	6.2
57.446106_-6.4990141	05/07/2021	2021-07-04	22:25	04:38	6.2
57.428824_-6.4784639	24/08/2021	2021-08-24	20:47	06:13	9.4
57.428824_-6.4784639	25/08/2021	2021-08-24	20:47	06:13	9.4
57.442213_-6.483356	24/08/2021	2021-08-24	20:47	06:13	9.4

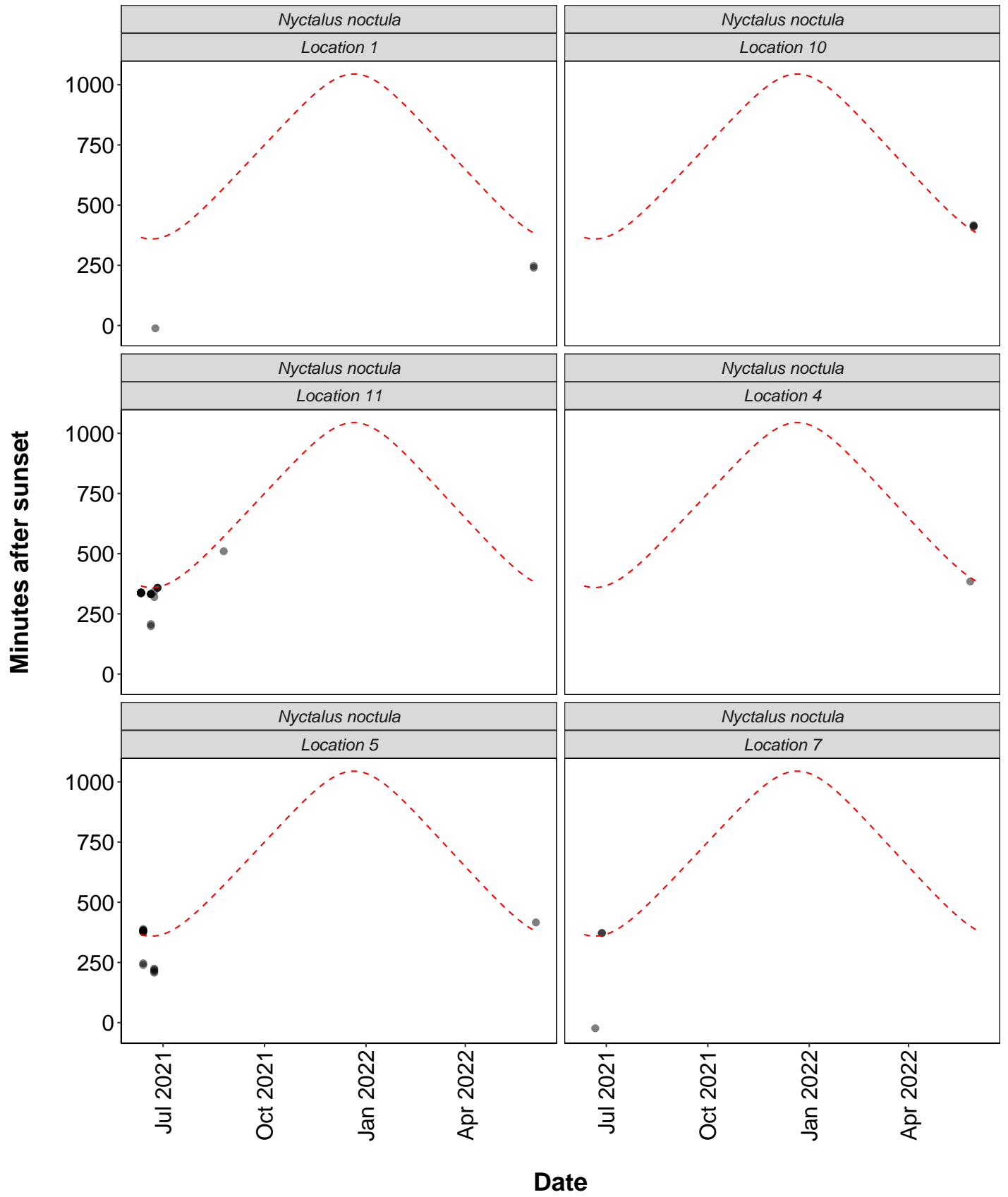
Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)	NA	NA
57.442213_-6.483356	25/08/2021	2021-08-24	20:47	06:13	9.4
57.431826_-6.474212	25/08/2021	2021-08-24	20:47	06:13	9.4
57.432061_-6.469121	25/08/2021	2021-08-24	20:47	06:13	9.4
57.432061_-6.469121	24/08/2021	2021-08-24	20:47	06:13	9.4
57.433627_-6.468596	24/08/2021	2021-08-24	20:47	06:13	9.4
57.437901_-6.472603	24/08/2021	2021-08-24	20:47	06:13	9.4
57.443587_-6.48998	24/08/2021	2021-08-24	20:47	06:13	9.4
57.443587_-6.48998	25/08/2021	2021-08-24	20:47	06:13	9.4
57.446106_-6.4990141	25/08/2021	2021-08-24	20:47	06:13	9.4
57.437901_-6.472603	25/08/2021	2021-08-25	20:44	06:16	9.5
57.446106_-6.4990141	26/08/2021	2021-08-25	20:44	06:16	9.5
57.428824_-6.4784639	26/08/2021	2021-08-25	20:44	06:16	9.5
57.428824_-6.4784639	25/08/2021	2021-08-25	20:44	06:16	9.5
57.431826_-6.474212	26/08/2021	2021-08-25	20:44	06:16	9.5
57.432061_-6.469121	26/08/2021	2021-08-25	20:44	06:16	9.5
57.443587_-6.48998	26/08/2021	2021-08-25	20:44	06:16	9.5
57.446106_-6.4990141	25/08/2021	2021-08-25	20:44	06:16	9.5
57.428824_-6.4784639	27/08/2021	2021-08-26	20:42	06:18	9.6
57.428824_-6.4784639	26/08/2021	2021-08-26	20:42	06:18	9.6
57.442213_-6.483356	26/08/2021	2021-08-26	20:42	06:18	9.6
57.442213_-6.483356	27/08/2021	2021-08-26	20:42	06:18	9.6
57.431826_-6.474212	26/08/2021	2021-08-26	20:42	06:18	9.6
57.431826_-6.474212	27/08/2021	2021-08-26	20:42	06:18	9.6
57.432061_-6.469121	27/08/2021	2021-08-26	20:42	06:18	9.6
57.432061_-6.469121	26/08/2021	2021-08-26	20:42	06:18	9.6
57.433627_-6.468596	27/08/2021	2021-08-26	20:42	06:18	9.6
57.437901_-6.472603	27/08/2021	2021-08-26	20:42	06:18	9.6
57.446106_-6.4990141	26/08/2021	2021-08-26	20:42	06:18	9.6
57.437901_-6.472603	27/08/2021	2021-08-27	20:39	06:20	9.7
57.446362_-6.490838	27/08/2021	2021-08-27	20:39	06:20	9.7
57.428824_-6.4784639	27/08/2021	2021-08-27	20:39	06:20	9.7
57.443587_-6.48998	27/08/2021	2021-08-27	20:39	06:20	9.7
57.428824_-6.4784639	29/08/2021	2021-08-28	20:36	06:22	9.8
57.442213_-6.483356	29/08/2021	2021-08-28	20:36	06:22	9.8
57.431826_-6.474212	29/08/2021	2021-08-28	20:36	06:22	9.8
57.437901_-6.472603	28/08/2021	2021-08-28	20:36	06:22	9.8
57.443587_-6.48998	28/08/2021	2021-08-28	20:36	06:22	9.8
57.428824_-6.4784639	30/08/2021	2021-08-29	20:34	06:24	9.8
57.428824_-6.4784639	29/08/2021	2021-08-29	20:34	06:24	9.8
57.442213_-6.483356	29/08/2021	2021-08-29	20:34	06:24	9.8
57.442213_-6.483356	30/08/2021	2021-08-29	20:34	06:24	9.8
57.431826_-6.474212	29/08/2021	2021-08-29	20:34	06:24	9.8
57.431826_-6.474212	30/08/2021	2021-08-29	20:34	06:24	9.8
57.432061_-6.469121	29/08/2021	2021-08-29	20:34	06:24	9.8
57.446106_-6.4990141	30/08/2021	2021-08-29	20:34	06:24	9.8
57.442213_-6.483356	01/09/2021	2021-09-01	20:26	06:30	10.1
57.433627_-6.468596	02/09/2021	2021-09-01	20:26	06:30	10.1
57.443587_-6.48998	02/09/2021	2021-09-01	20:26	06:30	10.1
57.428824_-6.4784639	03/09/2021	2021-09-02	20:23	06:32	10.2
57.428824_-6.4784639	02/09/2021	2021-09-02	20:23	06:32	10.2
57.442213_-6.483356	02/09/2021	2021-09-02	20:23	06:32	10.2
57.432061_-6.469121	02/09/2021	2021-09-02	20:23	06:32	10.2
57.437901_-6.472603	02/09/2021	2021-09-02	20:23	06:32	10.2
57.443587_-6.48998	02/09/2021	2021-09-02	20:23	06:32	10.2
57.428824_-6.4784639	04/09/2021	2021-09-03	20:20	06:34	10.2
57.428824_-6.4784639	03/09/2021	2021-09-03	20:20	06:34	10.2
57.442213_-6.483356	03/09/2021	2021-09-03	20:20	06:34	10.2

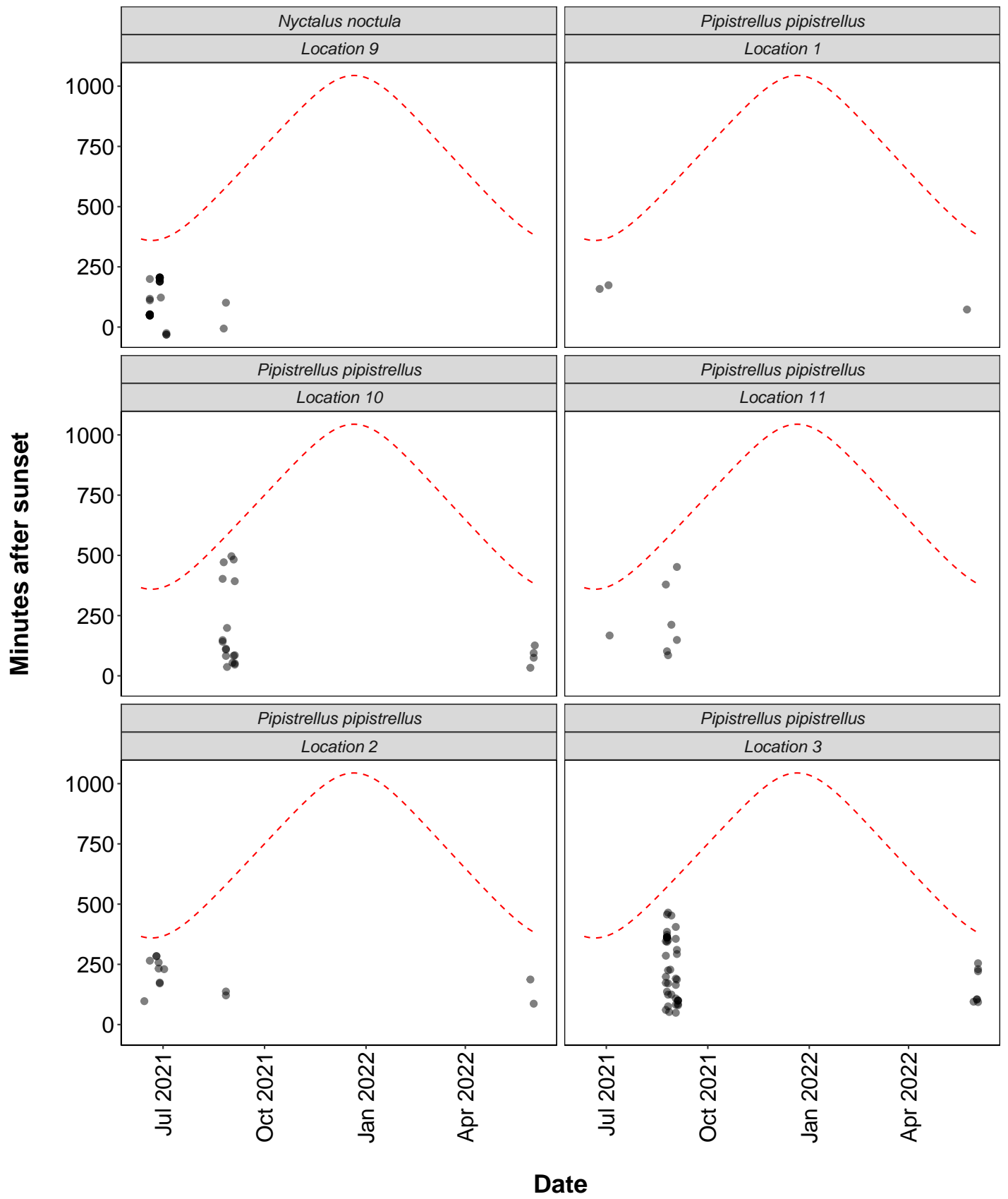
Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)	NA	NA
57.442213_-6.483356	04/09/2021	2021-09-03	20:20	06:34	10.2
57.431826_-6.474212	03/09/2021	2021-09-03	20:20	06:34	10.2
57.432061_-6.469121	03/09/2021	2021-09-03	20:20	06:34	10.2
57.432061_-6.469121	04/09/2021	2021-09-03	20:20	06:34	10.2
57.433627_-6.468596	04/09/2021	2021-09-03	20:20	06:34	10.2
57.437901_-6.472603	03/09/2021	2021-09-03	20:20	06:34	10.2
57.443587_-6.48998	04/09/2021	2021-09-03	20:20	06:34	10.2
57.443587_-6.48998	03/09/2021	2021-09-03	20:20	06:34	10.2
57.446106_-6.4990141	03/09/2021	2021-09-03	20:20	06:34	10.2
57.446106_-6.4990141	04/09/2021	2021-09-03	20:20	06:34	10.2
57.428824_-6.4784639	04/09/2021	2021-09-04	20:17	06:36	10.3
57.442213_-6.483356	04/09/2021	2021-09-04	20:17	06:36	10.3
57.442213_-6.483356	05/09/2021	2021-09-04	20:17	06:36	10.3
57.432061_-6.469121	05/09/2021	2021-09-04	20:17	06:36	10.3
57.433627_-6.468596	04/09/2021	2021-09-04	20:17	06:36	10.3
57.443587_-6.48998	05/09/2021	2021-09-04	20:17	06:36	10.3
57.443587_-6.48998	04/09/2021	2021-09-04	20:17	06:36	10.3
57.442213_-6.483356	23/05/2022	2022-05-23	21:56	04:50	6.9
57.431826_-6.474212	24/05/2022	2022-05-23	21:56	04:50	6.9
57.442055_-6.498366	24/05/2022	2022-05-24	21:58	04:48	6.8
57.442213_-6.483356	28/05/2022	2022-05-27	22:03	04:44	6.7
57.432061_-6.469121	27/05/2022	2022-05-27	22:03	04:44	6.7
57.432061_-6.469121	28/05/2022	2022-05-27	22:03	04:44	6.7
57.443587_-6.48998	31/05/2022	2022-05-30	22:08	04:40	6.5
57.446362_-6.490838	31/05/2022	2022-05-30	22:08	04:40	6.5
57.428824_-6.4784639	30/05/2022	2022-05-30	22:08	04:40	6.5
57.443587_-6.48998	30/05/2022	2022-05-30	22:08	04:40	6.5
57.431826_-6.474212	31/05/2022	2022-05-31	22:09	04:39	6.5
57.432061_-6.469121	01/06/2022	2022-05-31	22:09	04:39	6.5
57.442055_-6.498366	03/06/2022	2022-06-02	22:12	04:36	6.4
57.446362_-6.490838	02/06/2022	2022-06-02	22:12	04:36	6.4
57.428824_-6.4784639	02/06/2022	2022-06-02	22:12	04:36	6.4
57.443587_-6.48998	02/06/2022	2022-06-02	22:12	04:36	6.4
57.428824_-6.4784639	03/06/2022	2022-06-03	22:14	04:35	6.4
57.428824_-6.4784639	04/06/2022	2022-06-03	22:14	04:35	6.4
57.431826_-6.474212	04/06/2022	2022-06-03	22:14	04:35	6.4
57.432061_-6.469121	04/06/2022	2022-06-03	22:14	04:35	6.4
57.443587_-6.48998	04/06/2022	2022-06-03	22:14	04:35	6.4
57.431826_-6.474212	05/06/2022	2022-06-04	22:15	04:34	6.3
57.431826_-6.474212	06/06/2022	2022-06-05	22:16	04:33	6.3
57.432061_-6.469121	06/06/2022	2022-06-05	22:16	04:33	6.3
57.426301_-6.464933	06/06/2022	2022-06-05	22:16	04:33	6.3
57.437901_-6.472603	06/06/2022	2022-06-05	22:16	04:33	6.3

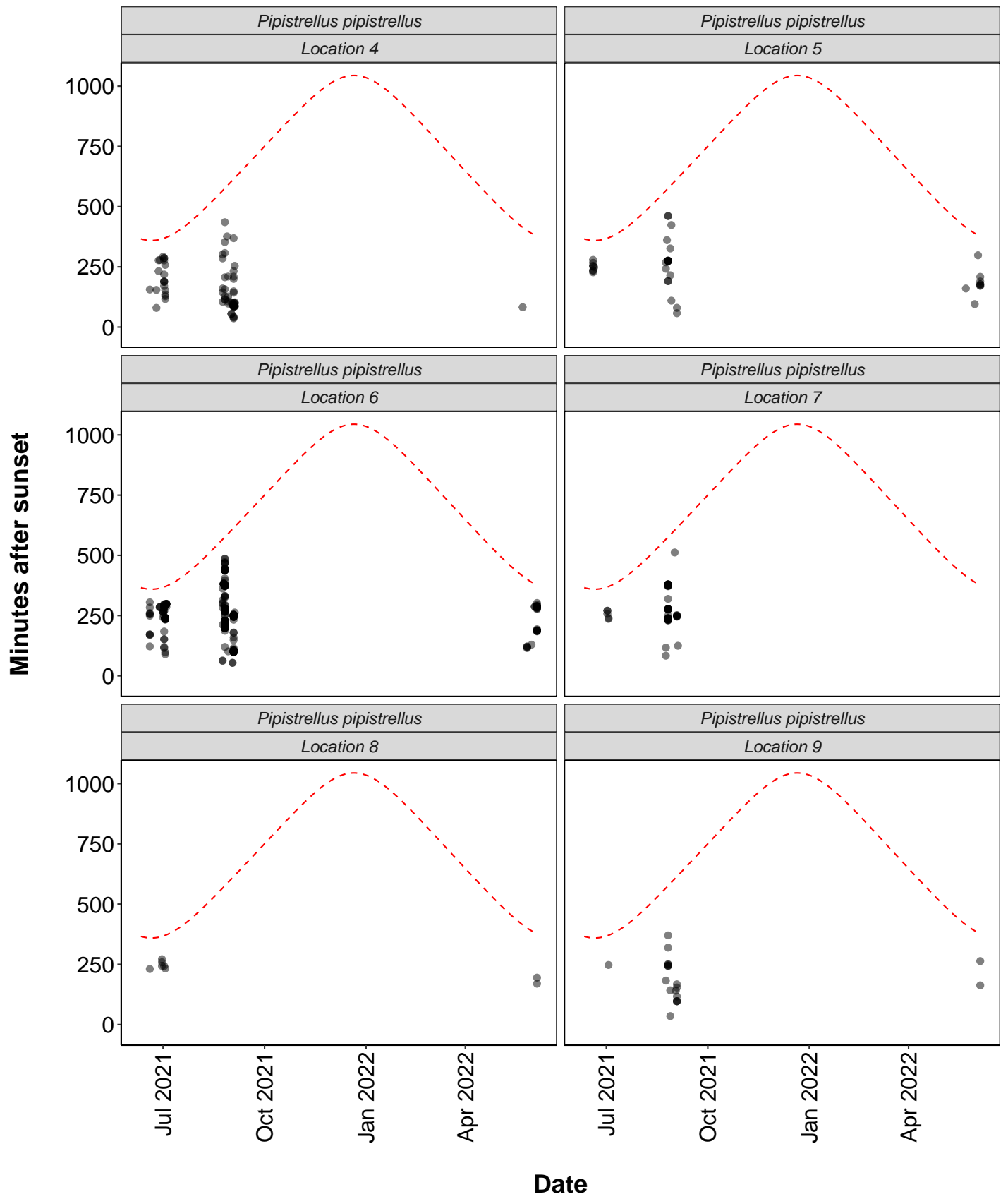
## Distribution of Bat Activity Across the Night through Time

### 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

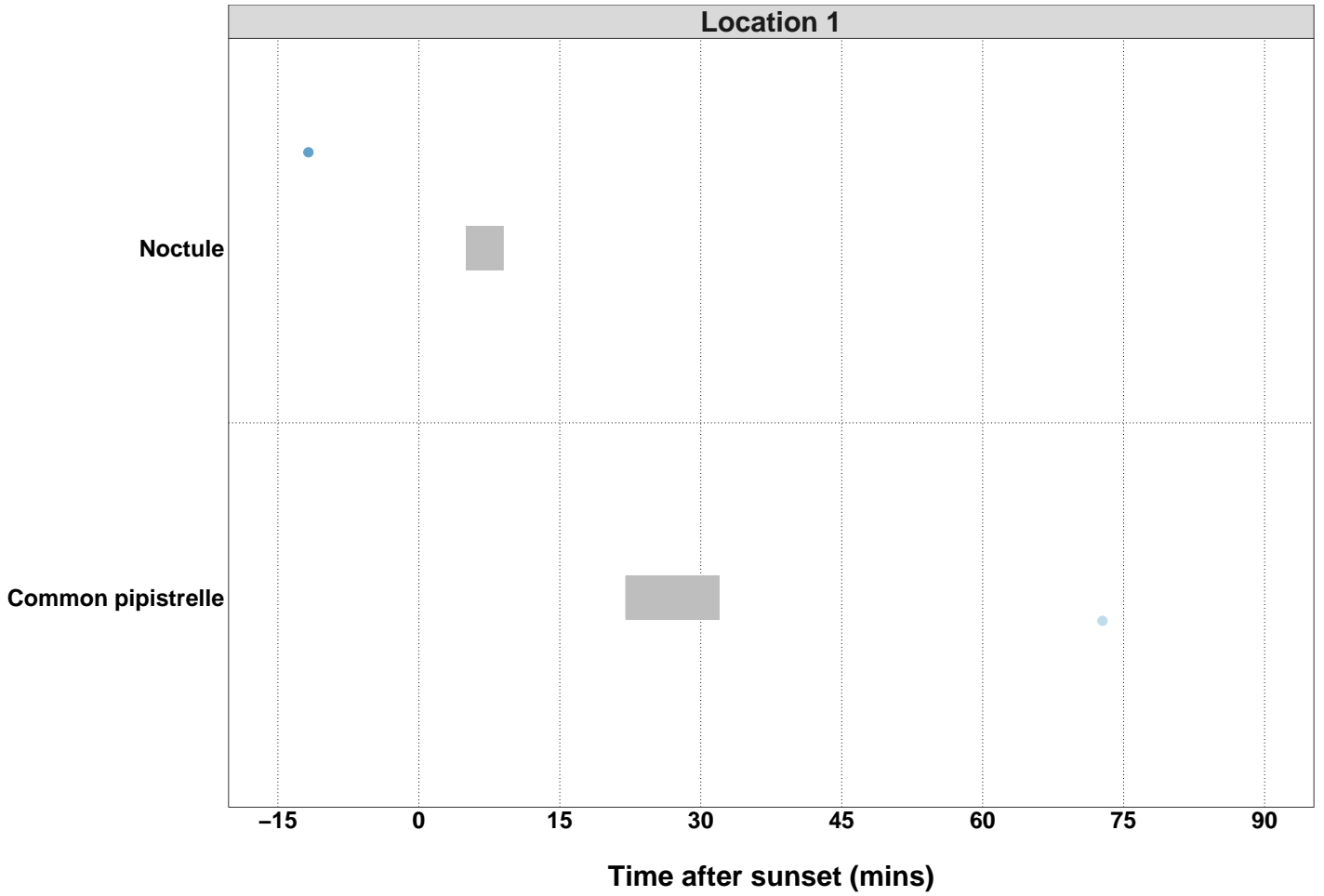
**Table 12. Number of bat calls recorded before the upper time of the species-specific emergence time range, and which therefore may potentially indicate the presence of a nearby roost.**

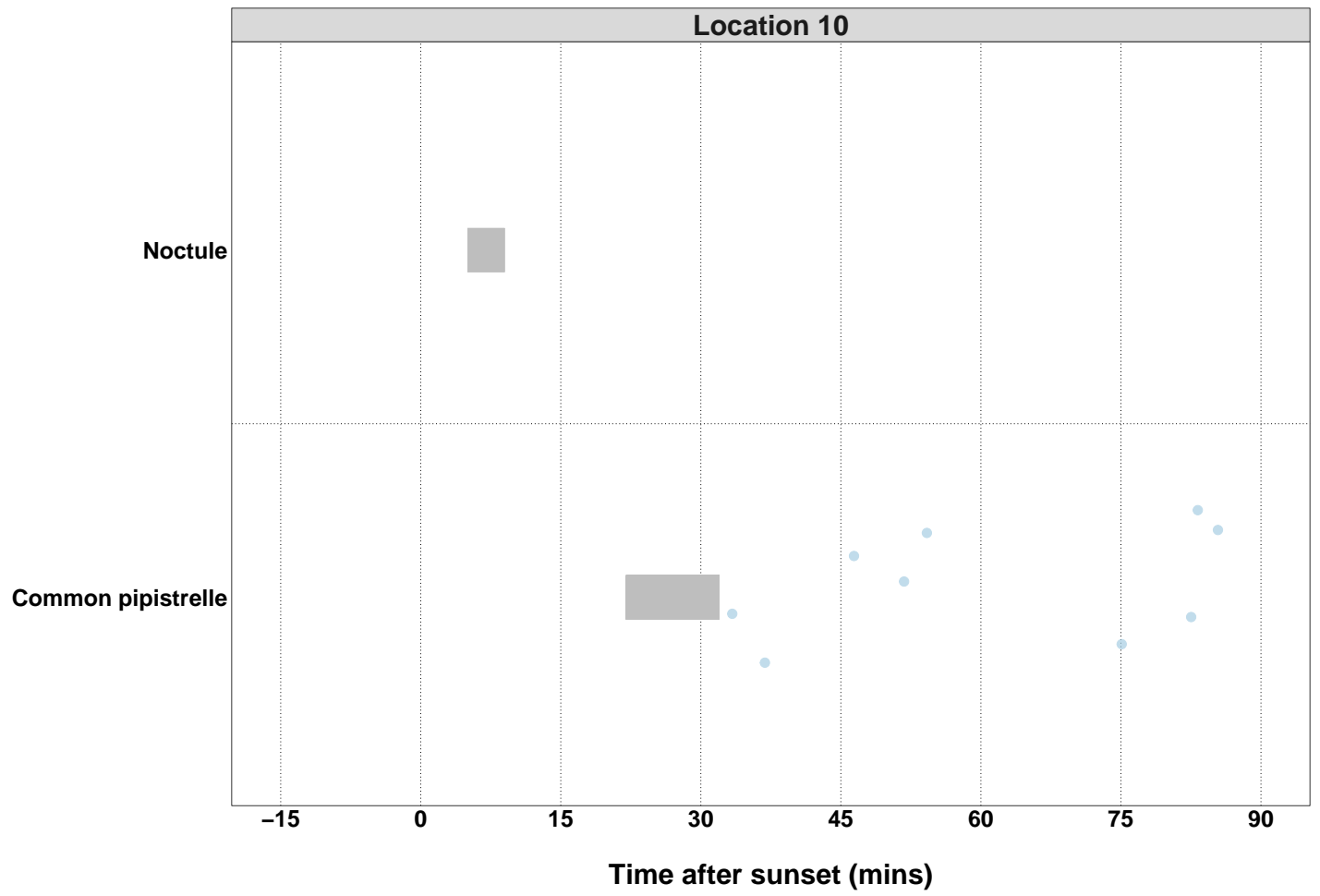
Species	Detector ID	2021-06-21	2021-06-24	2021-07-04	2021-08-25
Noctule	Location 1	0	1	0	0
Noctule	Location 7	1	0	0	0
Noctule	Location 9	0	0	3	1

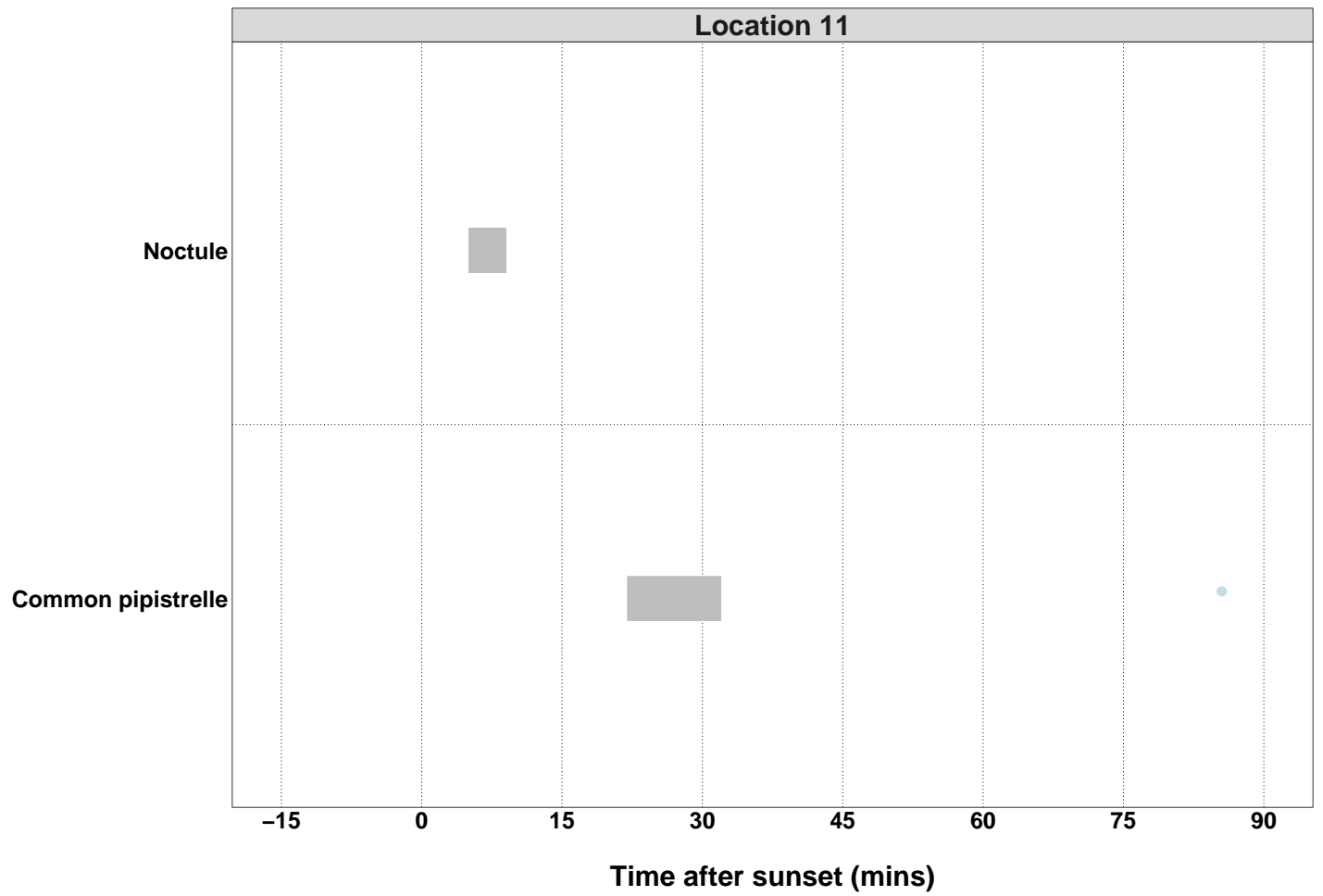


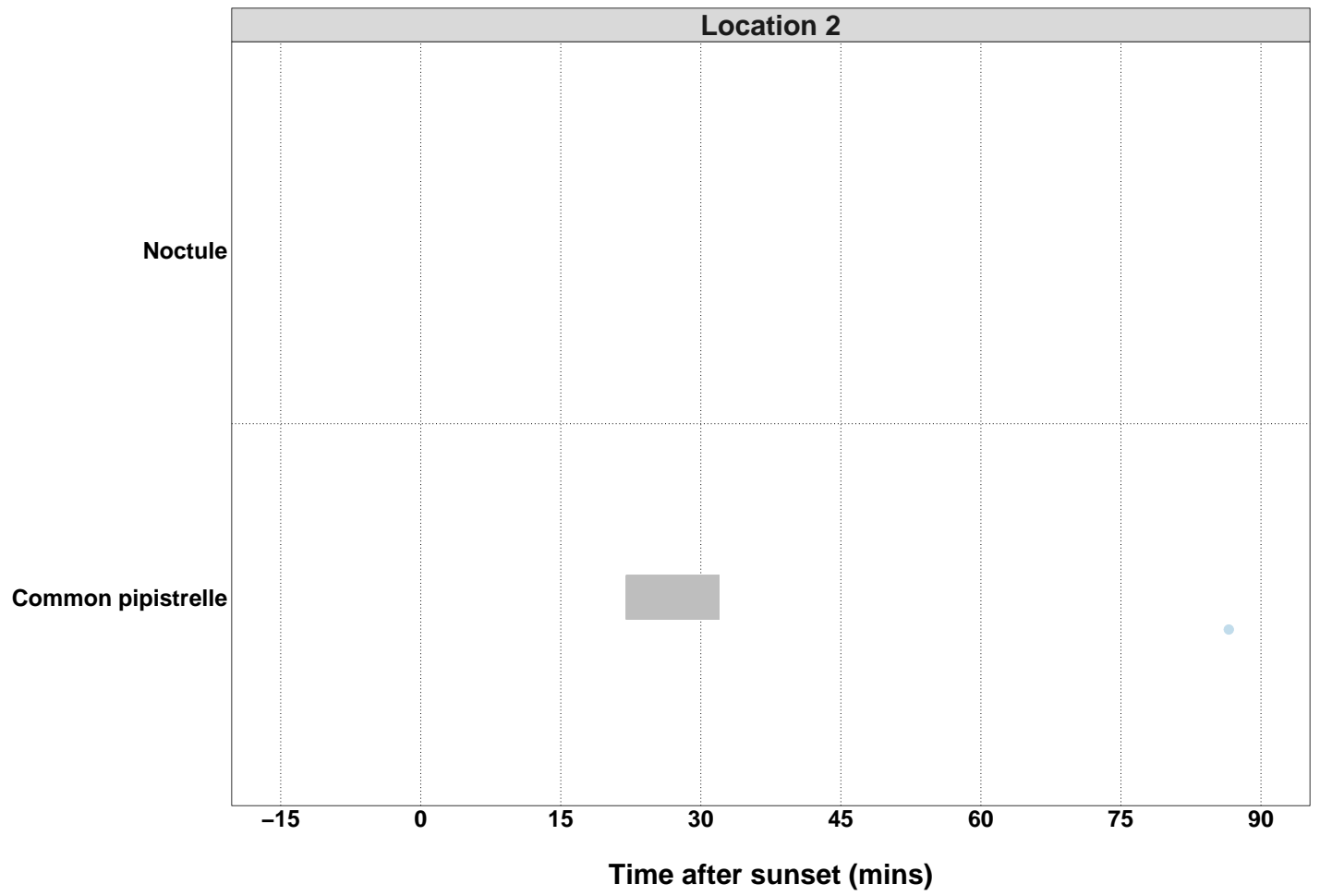
### Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Figures

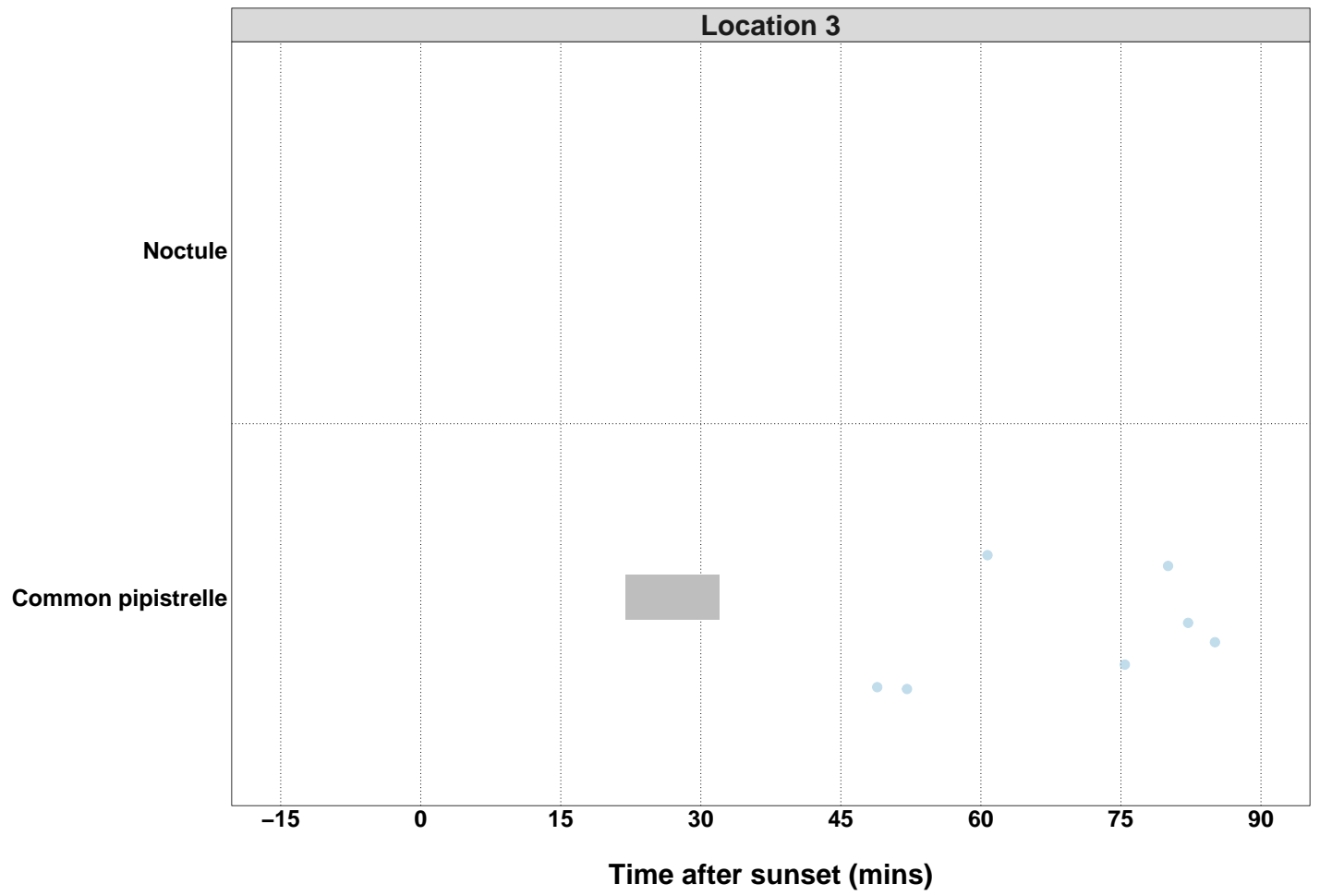
**Figure 8.** Time from 15 minutes before to 90 minutes after sunset. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occurring earlier than this time range, may potentially indicate the presence of a nearby roost.

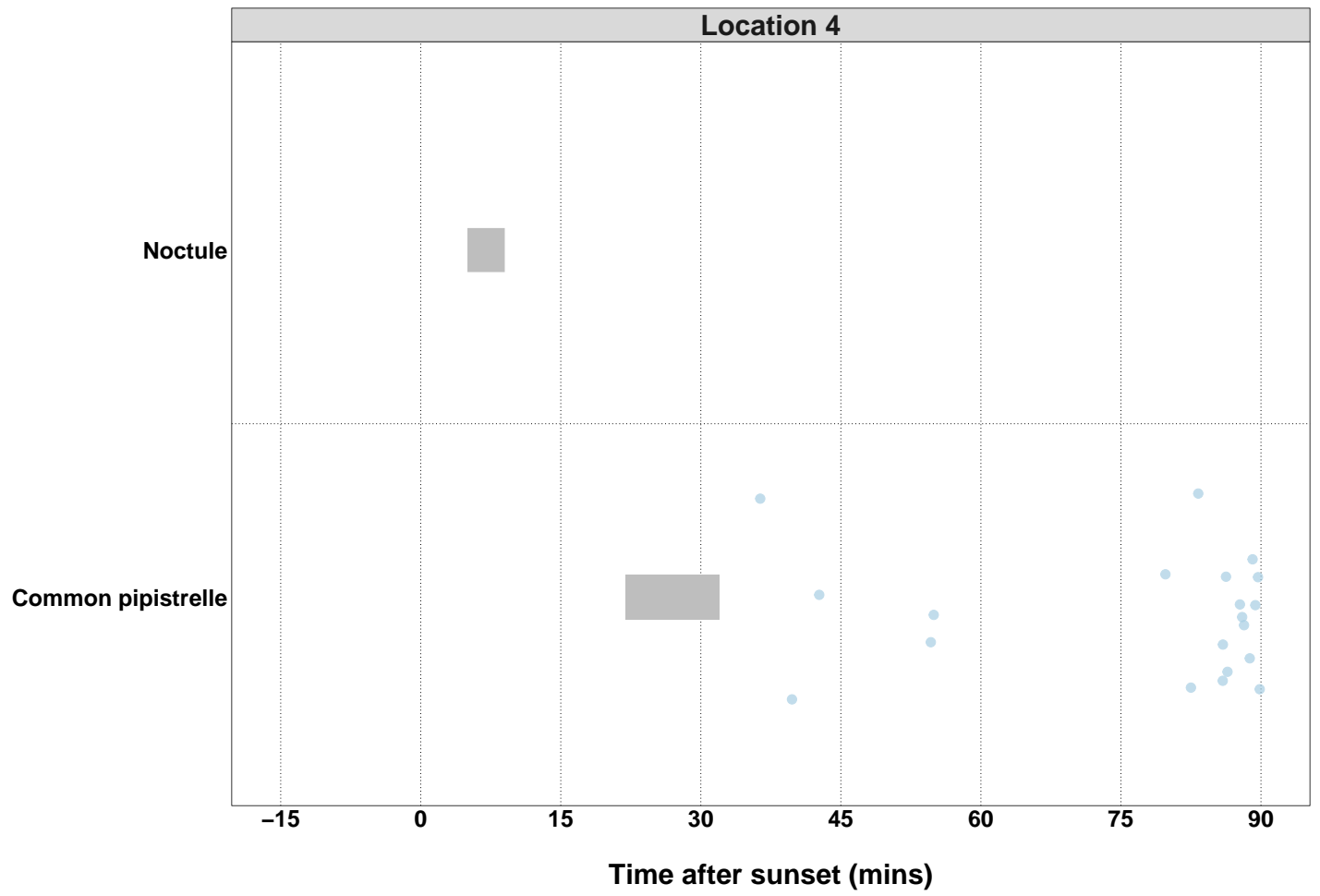


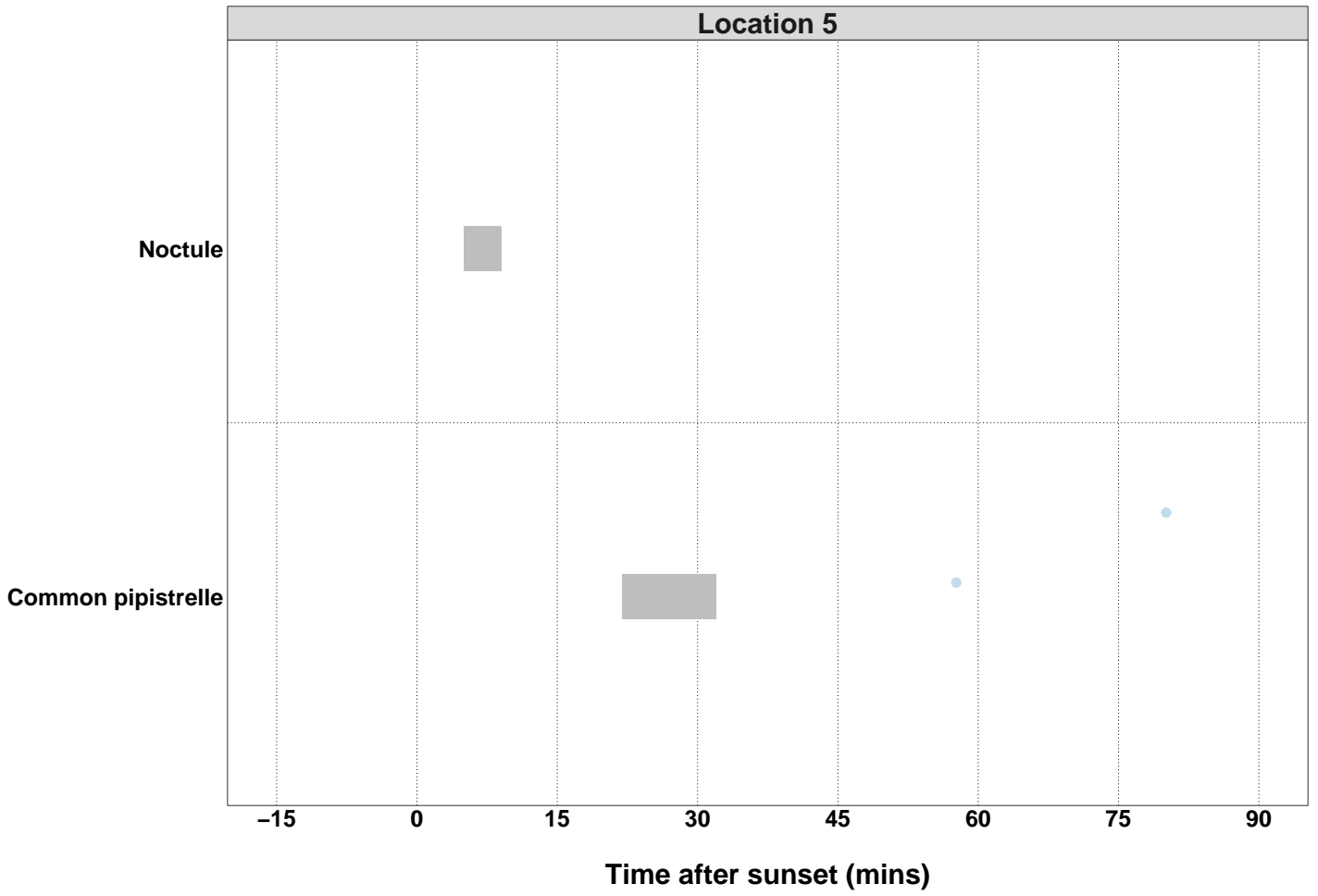


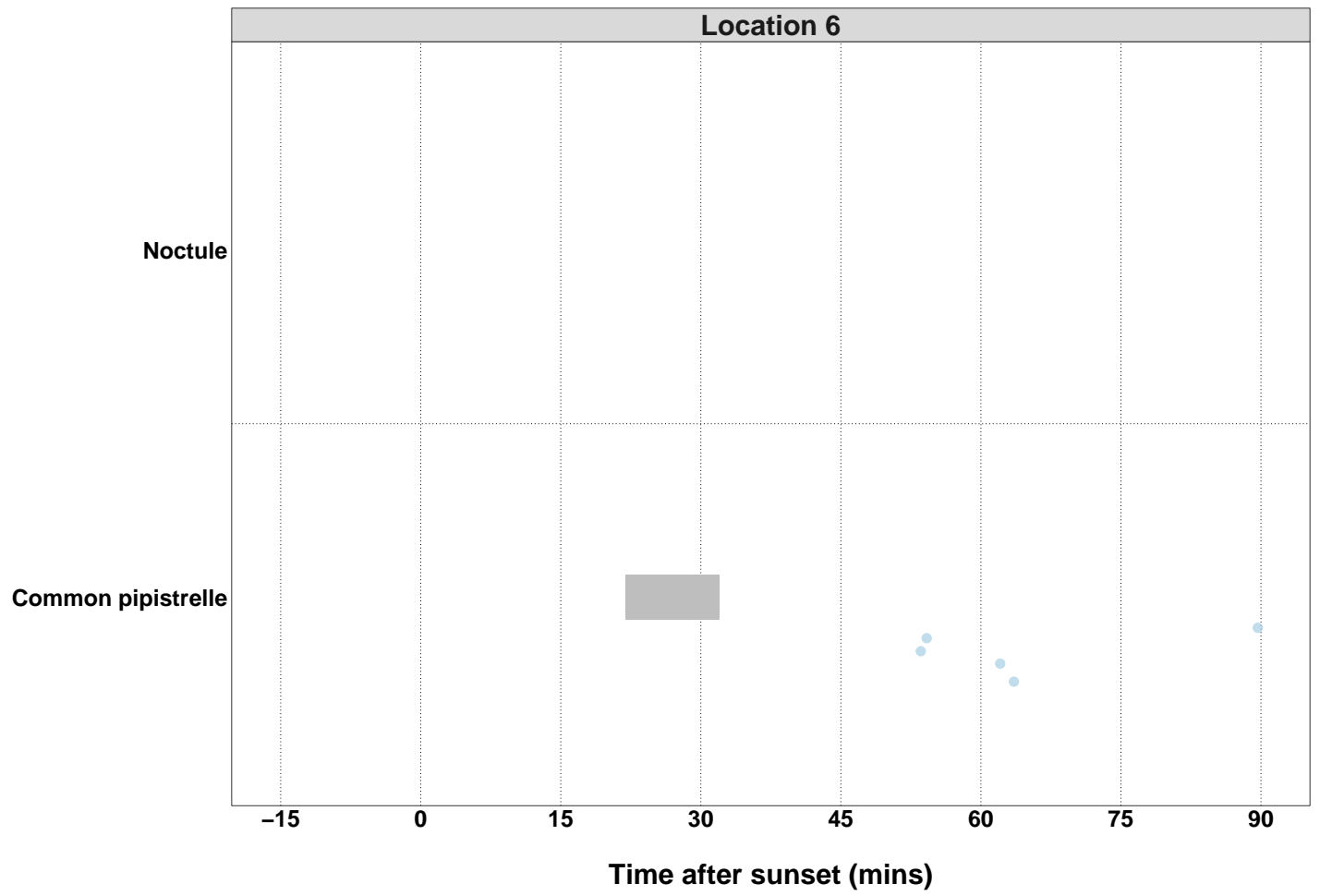




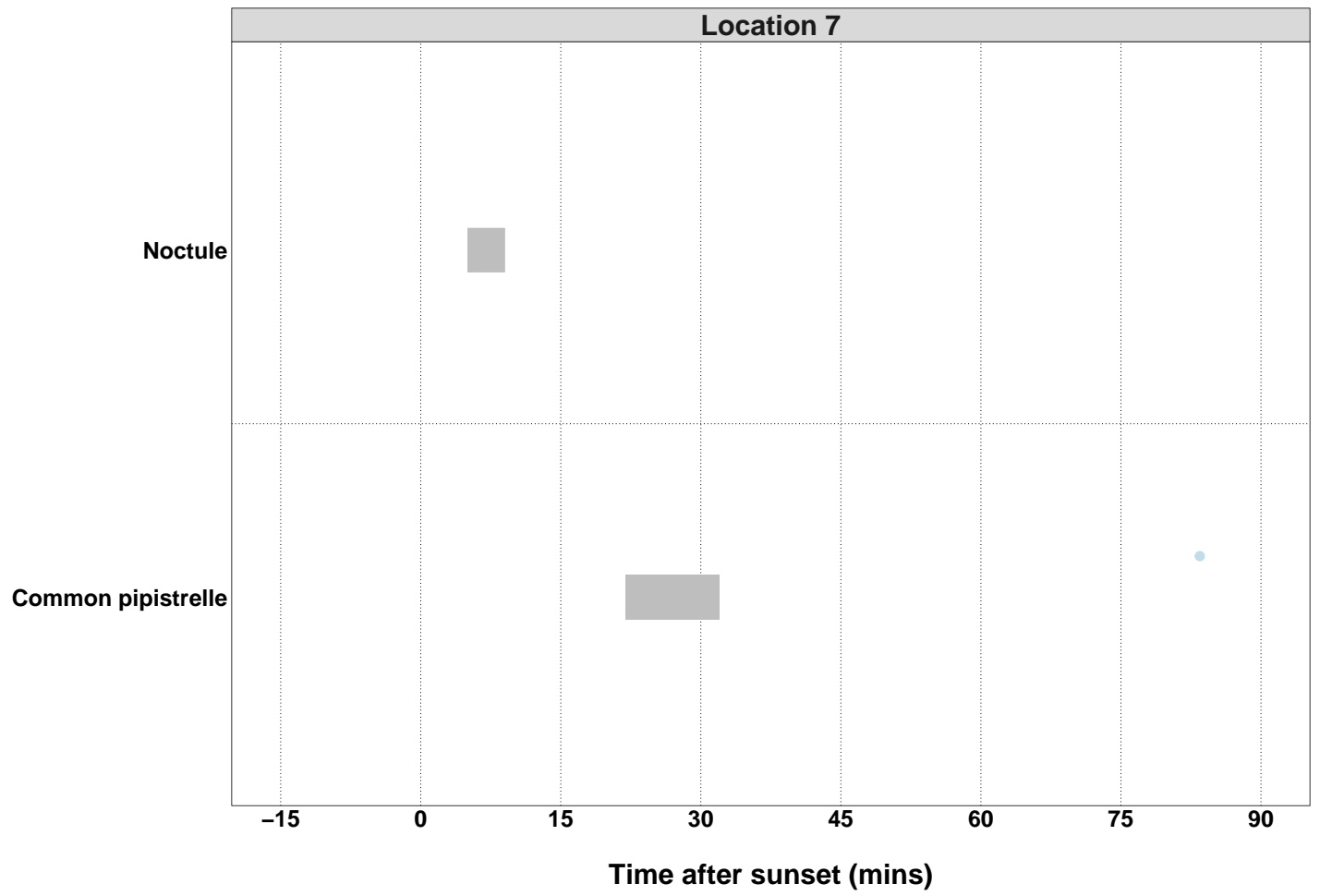


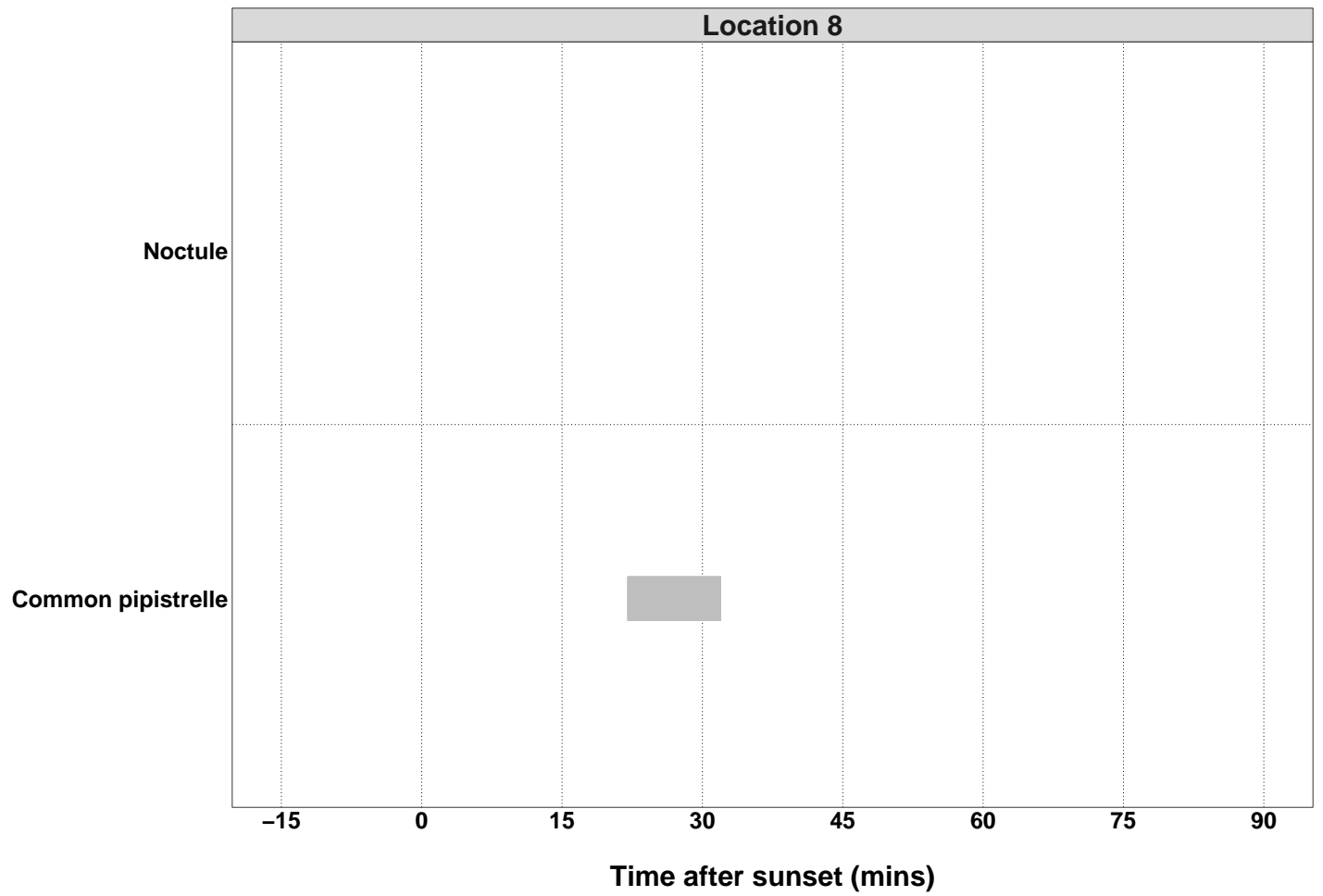


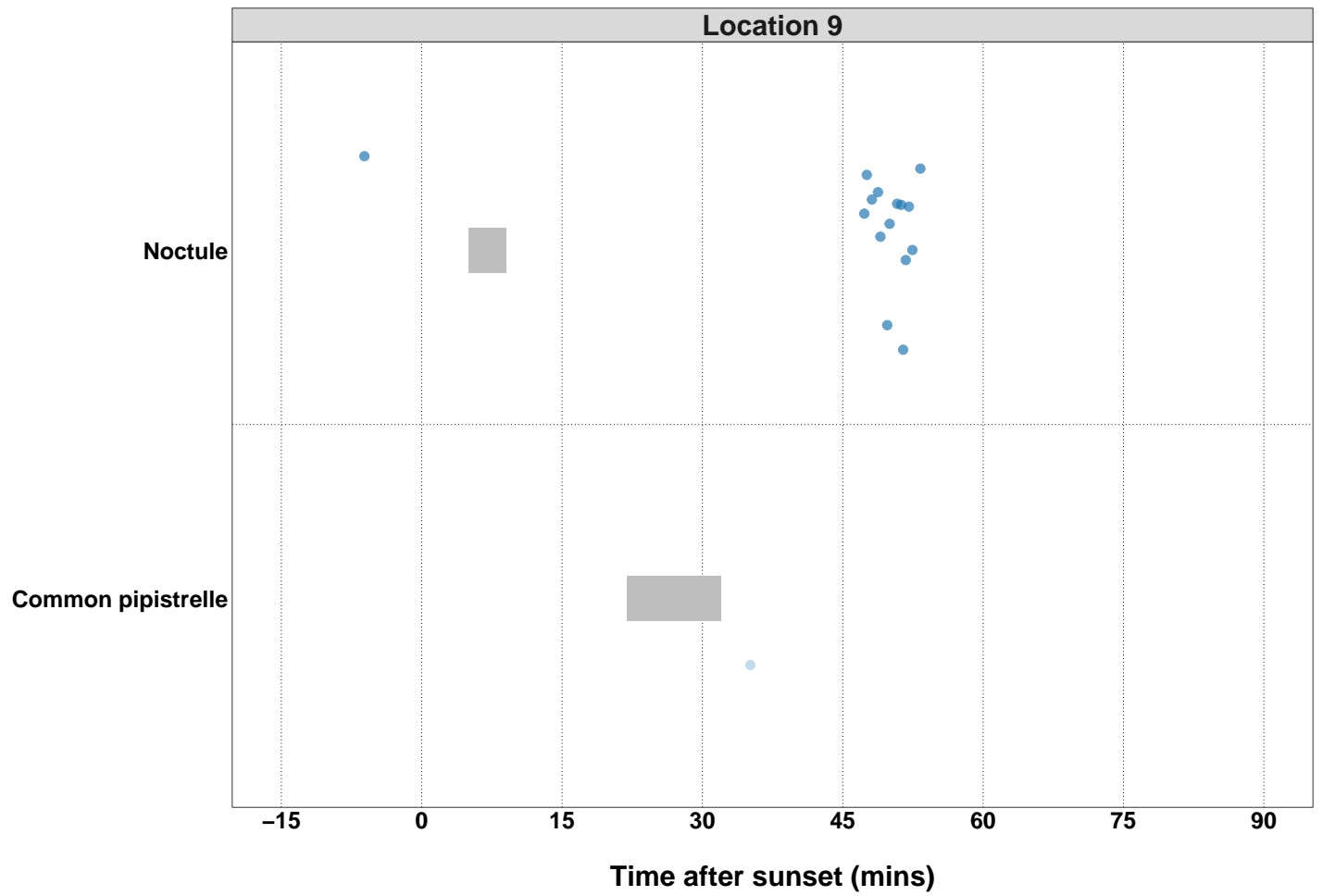












## Counts of Bat Passes

### 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	612	87.6
Noctule	87	12.4
Total	699	100.0

Page Break

## Counts of Bat Passes

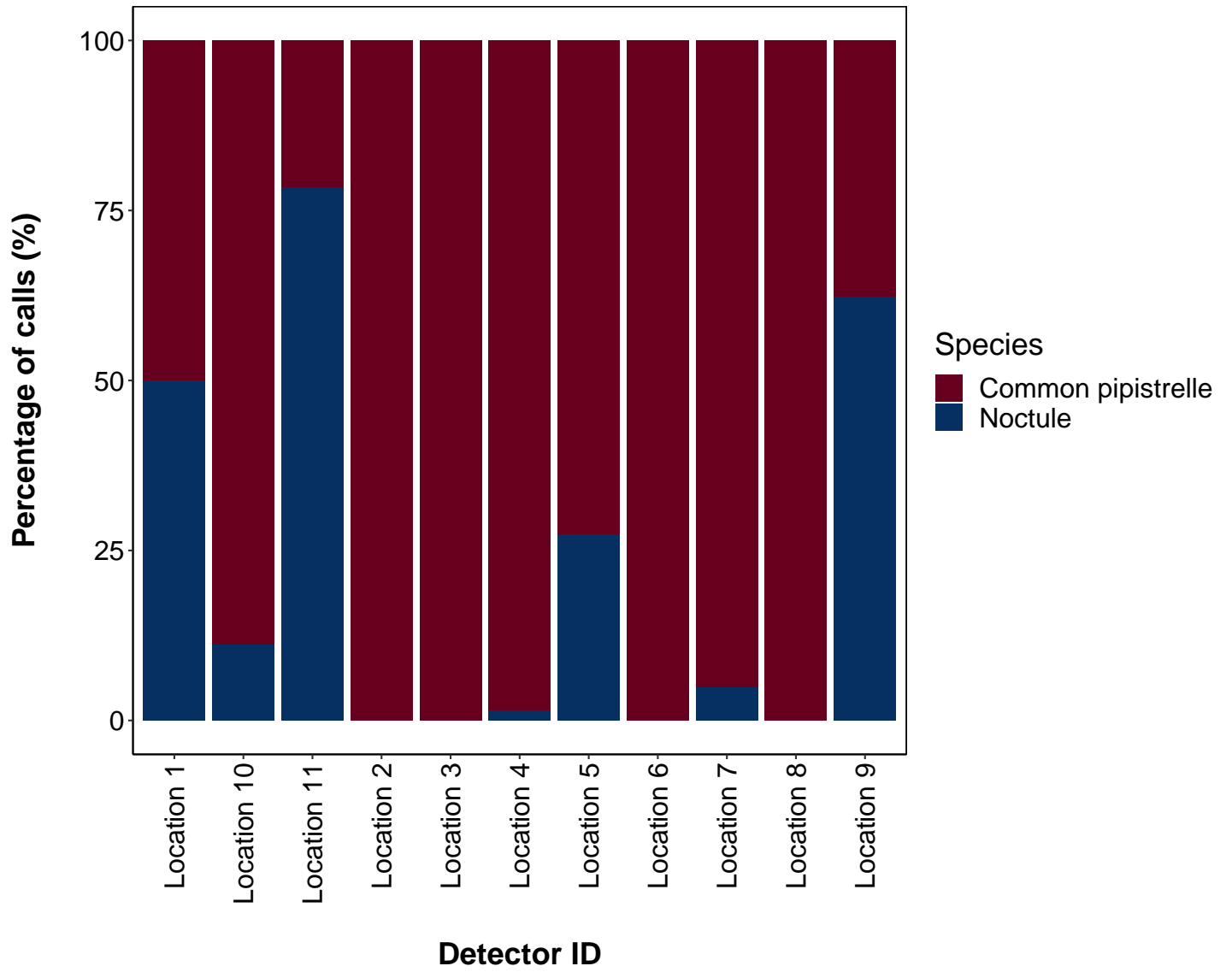
### Per Detector

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

Species	Detector ID	Count (No)	Percentage by Detector (%)
Common pipistrelle	Location 1	3	50.0
Common pipistrelle	Location 10	24	88.9
Common pipistrelle	Location 11	8	21.6
Common pipistrelle	Location 2	13	100.0
Common pipistrelle	Location 3	63	100.0
Common pipistrelle	Location 4	68	98.6
Common pipistrelle	Location 5	40	72.7
Common pipistrelle	Location 6	306	100.0
Common pipistrelle	Location 7	59	95.2
Common pipistrelle	Location 8	8	100.0
Common pipistrelle	Location 9	20	37.7
Noctule	Location 1	3	50.0
Noctule	Location 10	3	11.1
Noctule	Location 11	29	78.4
Noctule	Location 4	1	1.4
Noctule	Location 5	15	27.3
Noctule	Location 7	3	4.8
Noctule	Location 9	33	62.3

# 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	Location 1	0.2
Common pipistrelle	Location 10	0.2
Common pipistrelle	Location 11	0.1
Common pipistrelle	Location 2	0.2
Common pipistrelle	Location 3	0.4
Common pipistrelle	Location 4	0.3
Common pipistrelle	Location 5	0.3
Common pipistrelle	Location 6	0.8
Common pipistrelle	Location 7	0.5
Common pipistrelle	Location 8	0.2
Common pipistrelle	Location 9	0.2
Noctule	Location 1	0.2
Noctule	Location 10	0.5
Noctule	Location 11	0.5
Noctule	Location 4	0.1
Noctule	Location 5	0.7
Noctule	Location 7	0.2
Noctule	Location 9	0.3

## 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.

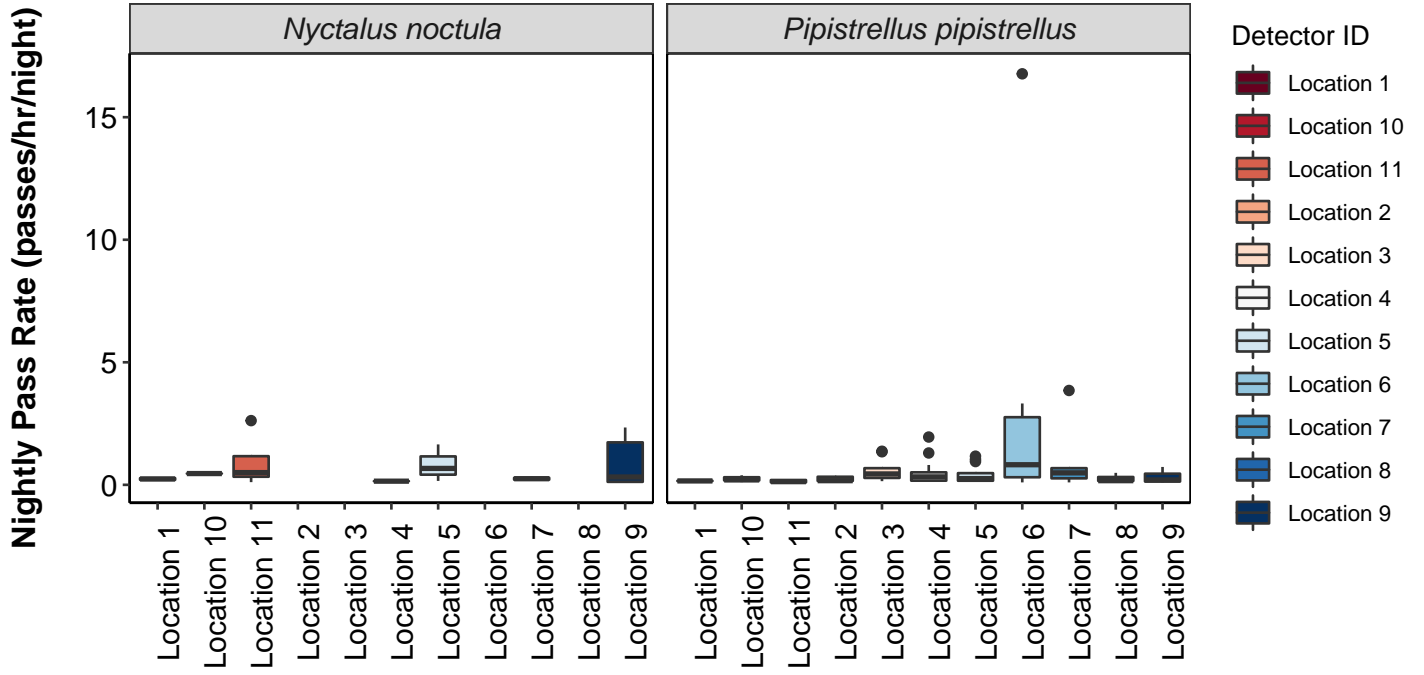
Species	Detector ID	Mean Pass Rate
Common pipistrelle	Location 1	0.2
Common pipistrelle	Location 10	0.2
Common pipistrelle	Location 11	0.1
Common pipistrelle	Location 2	0.2
Common pipistrelle	Location 3	0.6
Common pipistrelle	Location 4	0.5
Common pipistrelle	Location 5	0.4
Common pipistrelle	Location 6	2.2
Common pipistrelle	Location 7	0.9
Common pipistrelle	Location 8	0.3
Common pipistrelle	Location 9	0.3
Noctule	Location 1	0.2
Noctule	Location 10	0.5
Noctule	Location 11	0.9
Noctule	Location 4	0.1
Noctule	Location 5	0.8
Noctule	Location 7	0.2
Noctule	Location 9	0.9



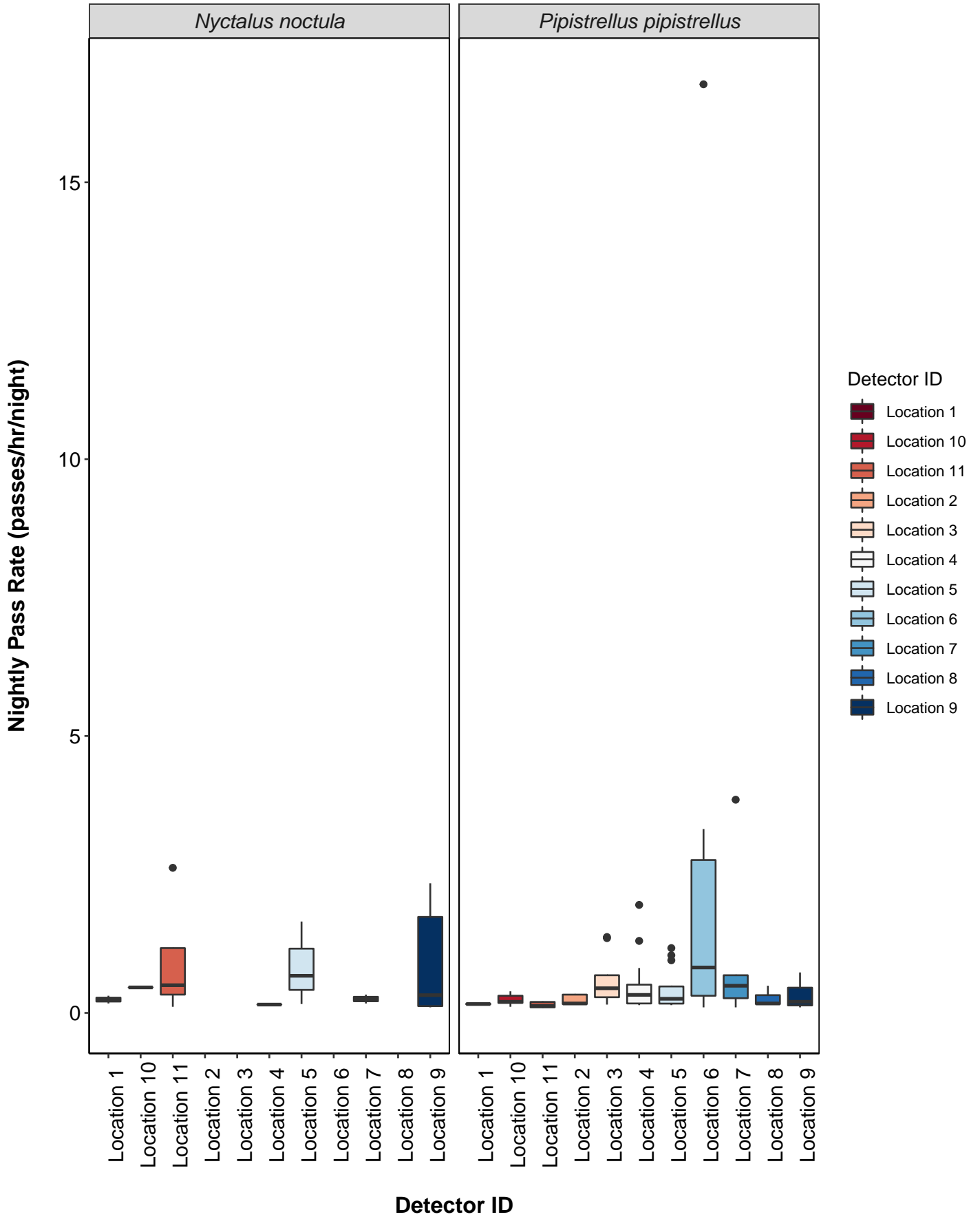
## Nightly Bat Passes (Bat passes per hour)

### Per Detector - Figures

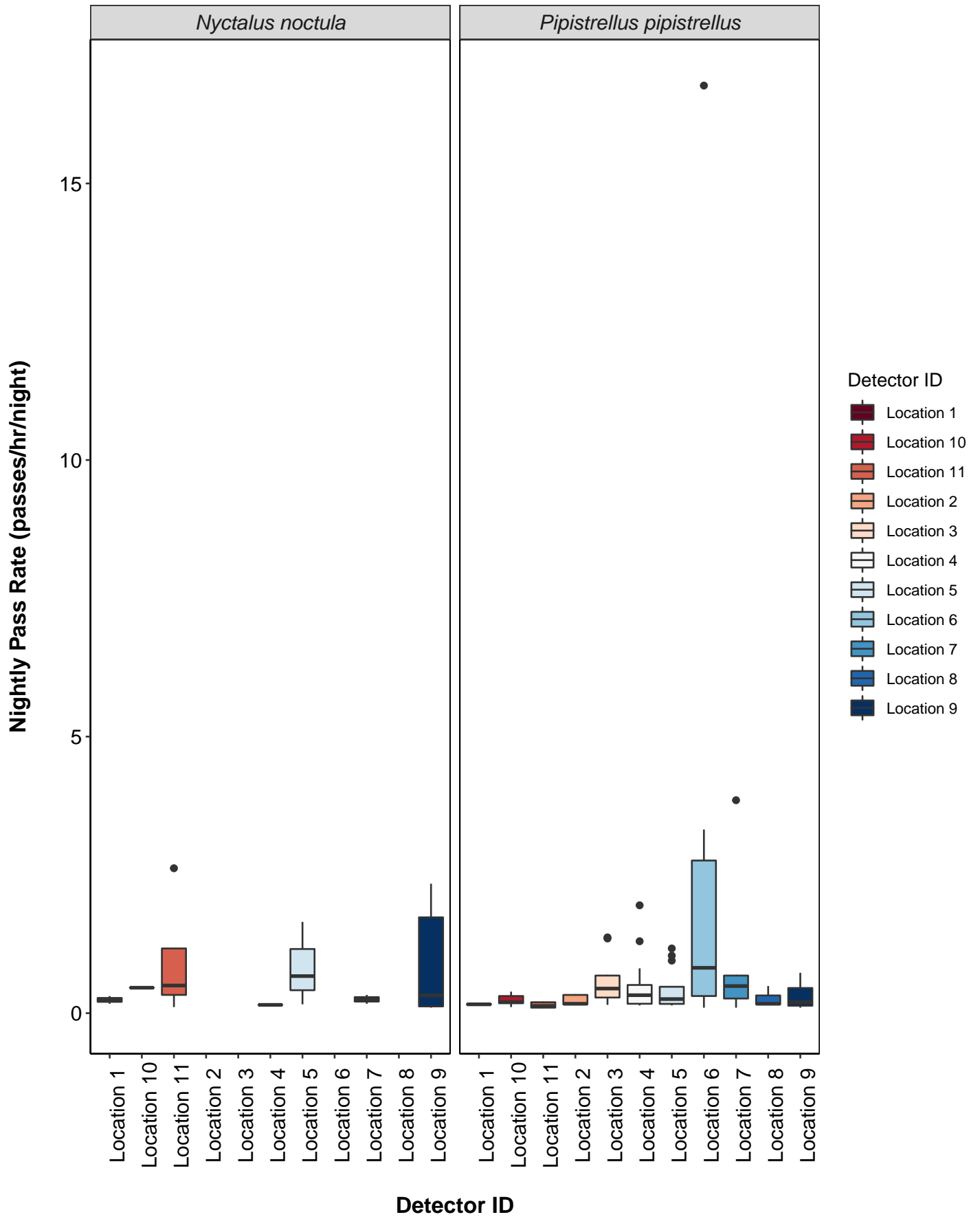
**Figure 11.** Boxplots for the number of bat passes per hour each night, for each detector. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the 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.



**Detector ID**



[[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	May	Jun	Jul	Aug	Sep
Common pipistrelle	Location 1	1	1	1	0	0
Common pipistrelle	Location 10	1	3	0	8	12
Common pipistrelle	Location 11	0	0	1	6	1
Common pipistrelle	Location 2	1	9	1	2	0
Common pipistrelle	Location 3	1	5	0	38	19
Common pipistrelle	Location 4	1	5	14	15	33
Common pipistrelle	Location 5	2	15	0	21	2
Common pipistrelle	Location 6	4	34	50	181	37
Common pipistrelle	Location 7	0	0	5	39	15
Common pipistrelle	Location 8	0	6	2	0	0
Common pipistrelle	Location 9	0	2	1	10	7
Noctule	Location 1	0	3	0	0	0
Noctule	Location 10	3	0	0	0	0
Noctule	Location 11	0	28	0	1	0
Noctule	Location 4	1	0	0	0	0
Noctule	Location 5	0	15	0	0	0
Noctule	Location 7	0	3	0	0	0
Noctule	Location 9	0	28	3	2	0

## Survey Effort

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

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

## Nightly Bat Pass Rate for each Month

### Median Per Detector

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

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

Species	Detector ID	May	Jun	Jul	Aug	Sep
Common pipistrelle	Location 1	0.1	0.2	0.2	NA	NA
Common pipistrelle	Location 10	0.1	0.2	NA	0.2	0.3
Common pipistrelle	Location 11	NA	NA	0.2	0.2	0.1
Common pipistrelle	Location 2	0.1	0.2	0.2	0.2	NA
Common pipistrelle	Location 3	0.1	0.4	NA	0.4	0.7
Common pipistrelle	Location 4	0.1	0.2	0.8	0.4	0.5
Common pipistrelle	Location 5	0.1	0.6	NA	0.3	0.2
Common pipistrelle	Location 6	0.3	1.1	2.0	1.0	0.2
Common pipistrelle	Location 7	NA	NA	0.4	2.0	0.7
Common pipistrelle	Location 8	NA	0.3	0.2	NA	NA
Common pipistrelle	Location 9	NA	0.3	0.2	0.2	0.3
Noctule	Location 1	NA	0.2	NA	NA	NA
Noctule	Location 10	0.5	NA	NA	NA	NA
Noctule	Location 11	NA	0.8	NA	0.1	NA
Noctule	Location 4	0.1	NA	NA	NA	NA
Noctule	Location 5	NA	0.7	NA	NA	NA
Noctule	Location 7	NA	0.2	NA	NA	NA
Noctule	Location 9	NA	2.1	0.5	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.

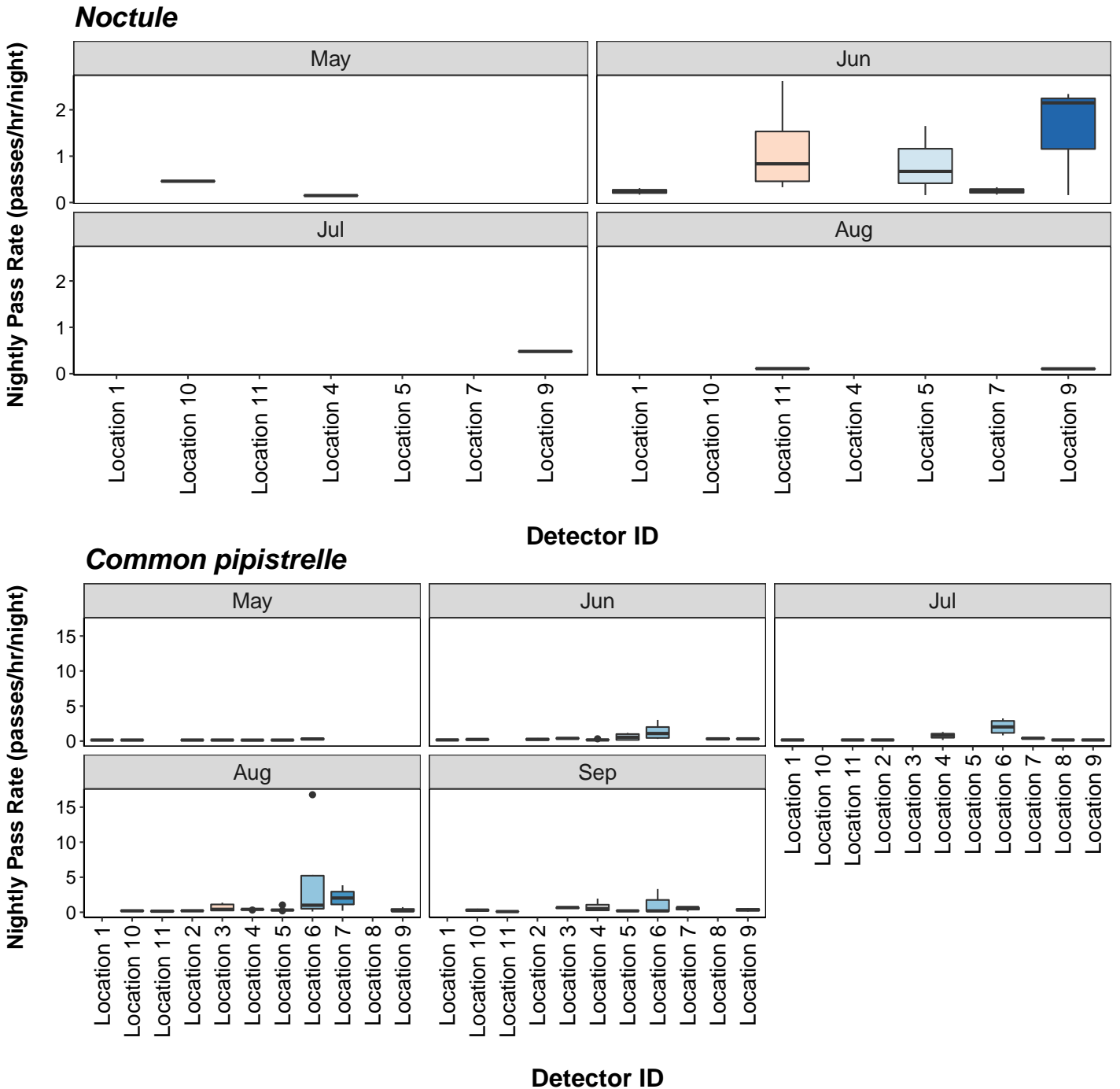
Species	Detector ID	May	Jun	Jul	Aug	Sep
Common pipistrelle	Location 1	0.1	0.2	0.2	NA	NA
Common pipistrelle	Location 10	0.1	0.2	NA	0.2	0.3
Common pipistrelle	Location 11	NA	NA	0.2	0.2	0.1
Common pipistrelle	Location 2	0.1	0.2	0.2	0.2	NA
Common pipistrelle	Location 3	0.1	0.4	NA	0.7	0.6
Common pipistrelle	Location 4	0.1	0.2	0.8	0.4	0.8
Common pipistrelle	Location 5	0.1	0.6	NA	0.4	0.2
Common pipistrelle	Location 6	0.3	1.4	2.0	4.7	1.2
Common pipistrelle	Location 7	NA	NA	0.4	2.0	0.5
Common pipistrelle	Location 8	NA	0.3	0.2	NA	NA
Common pipistrelle	Location 9	NA	0.3	0.2	0.3	0.3
Noctule	Location 1	NA	0.2	NA	NA	NA
Noctule	Location 10	0.5	NA	NA	NA	NA
Noctule	Location 11	NA	1.2	NA	0.1	NA
Noctule	Location 4	0.1	NA	NA	NA	NA
Noctule	Location 5	NA	0.8	NA	NA	NA
Noctule	Location 7	NA	0.2	NA	NA	NA
Noctule	Location 9	NA	1.5	0.5	0.1	NA



## Nightly Bat Pass Rate for each Month

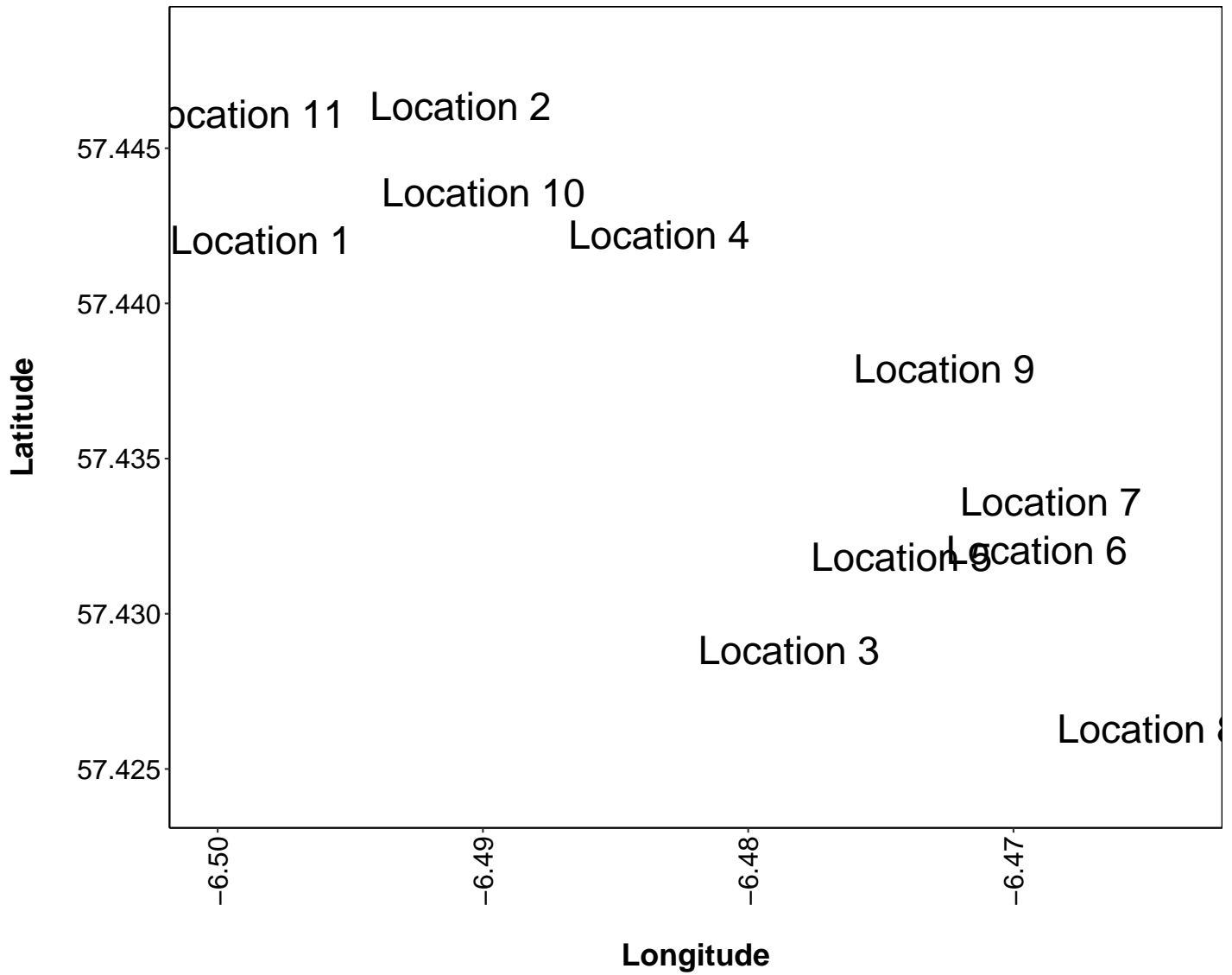
### Per Detector - Figures

**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.



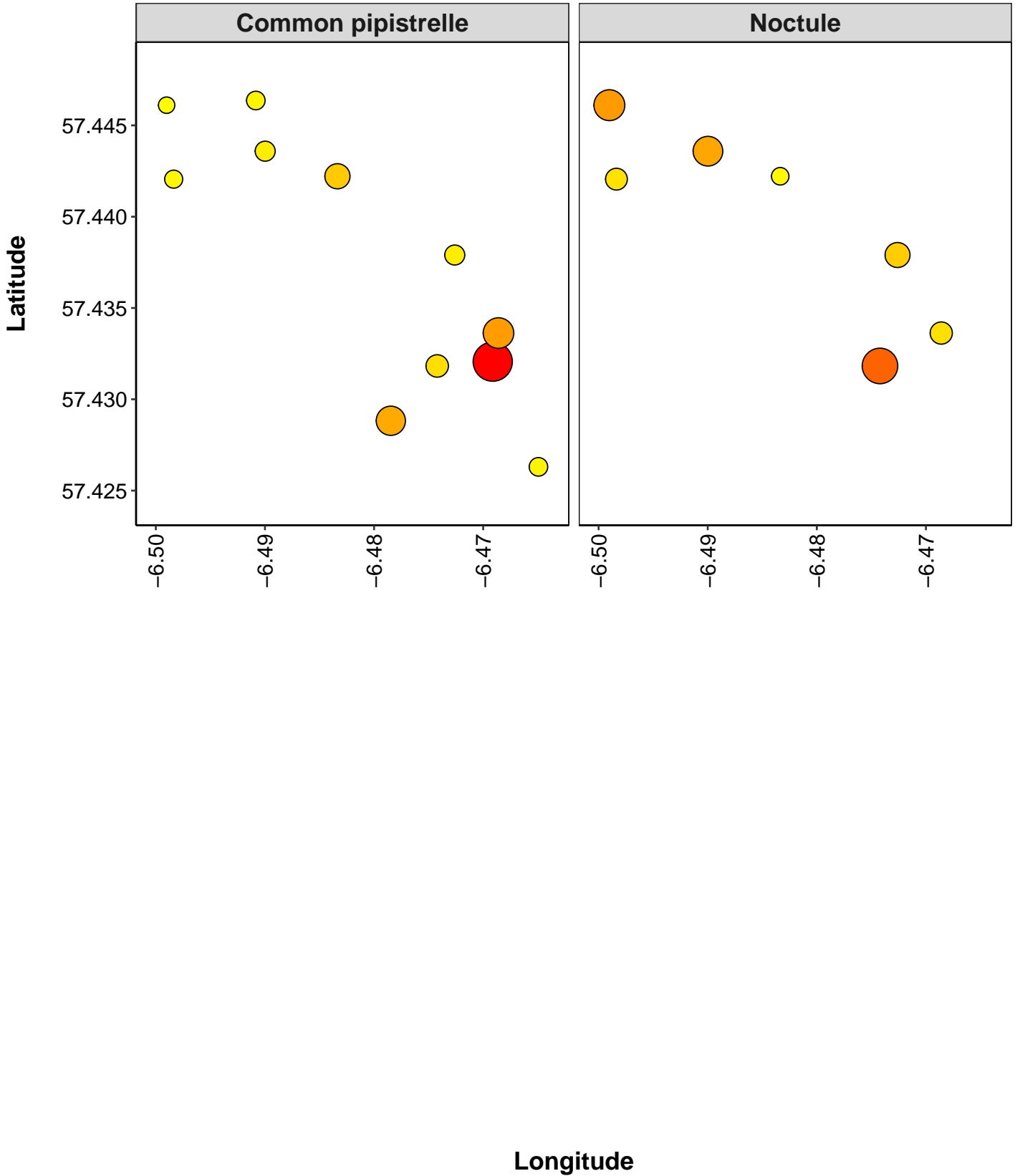
# Bat Activity per Detector Location

Figure 13. Detector ID reference:

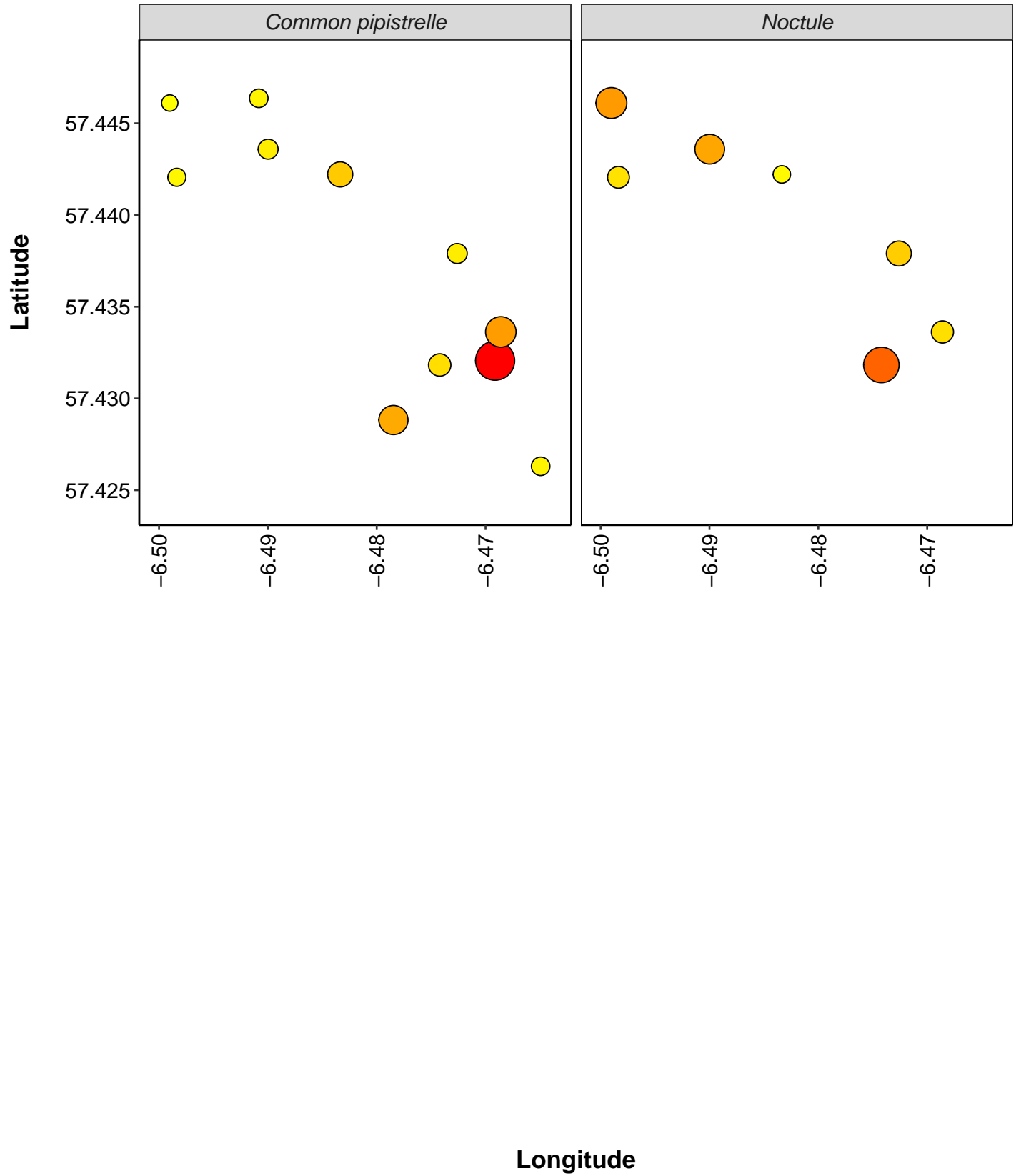


**Figure 14.** Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

Median.Pass.Rate    ● 0.2    ● 0.4    ● 0.6    ● 0.8

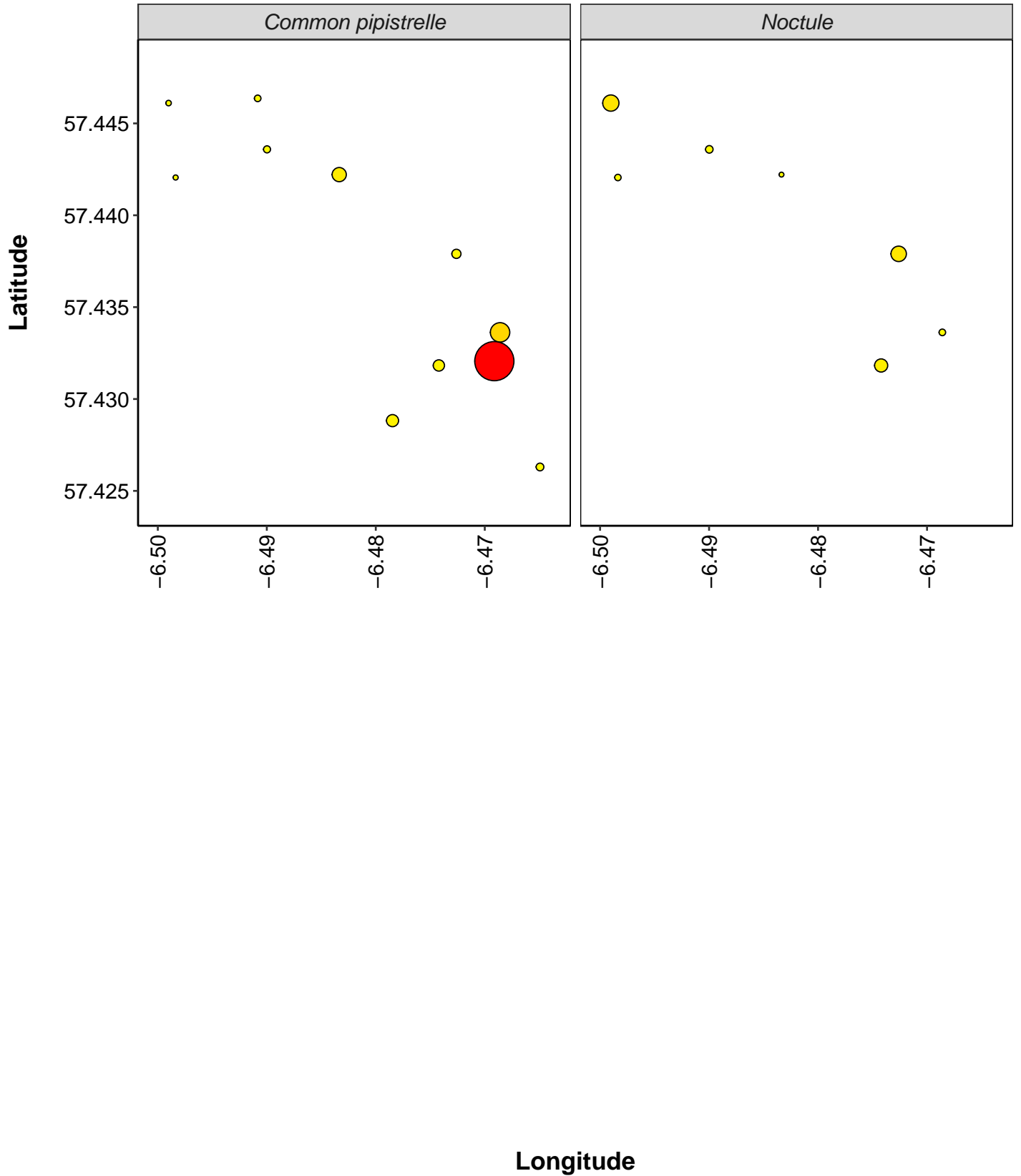


Median.Pass.Rate 0.2 0.4 0.6 0.8



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

Max.Pass.Rate    ● 4    ● 8    ● 12    ● 16



**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
Common pipistrelle	Location 1	0.1
Common pipistrelle	Location 10	0.2
Common pipistrelle	Location 11	0.1
Common pipistrelle	Location 2	0.2
Common pipistrelle	Location 3	0.4
Common pipistrelle	Location 4	0.3
Common pipistrelle	Location 5	0.2
Common pipistrelle	Location 6	0.8
Common pipistrelle	Location 7	0.3
Common pipistrelle	Location 8	0.2
Common pipistrelle	Location 9	0.1
Noctule	Location 1	0.0
Noctule	Location 10	0.0
Noctule	Location 11	0.1
Noctule	Location 2	0.0
Noctule	Location 3	0.0
Noctule	Location 4	0.0
Noctule	Location 5	0.0
Noctule	Location 6	0.0
Noctule	Location 7	0.0
Noctule	Location 8	0.0
Noctule	Location 9	0.0

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

### Mean per Detector

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

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

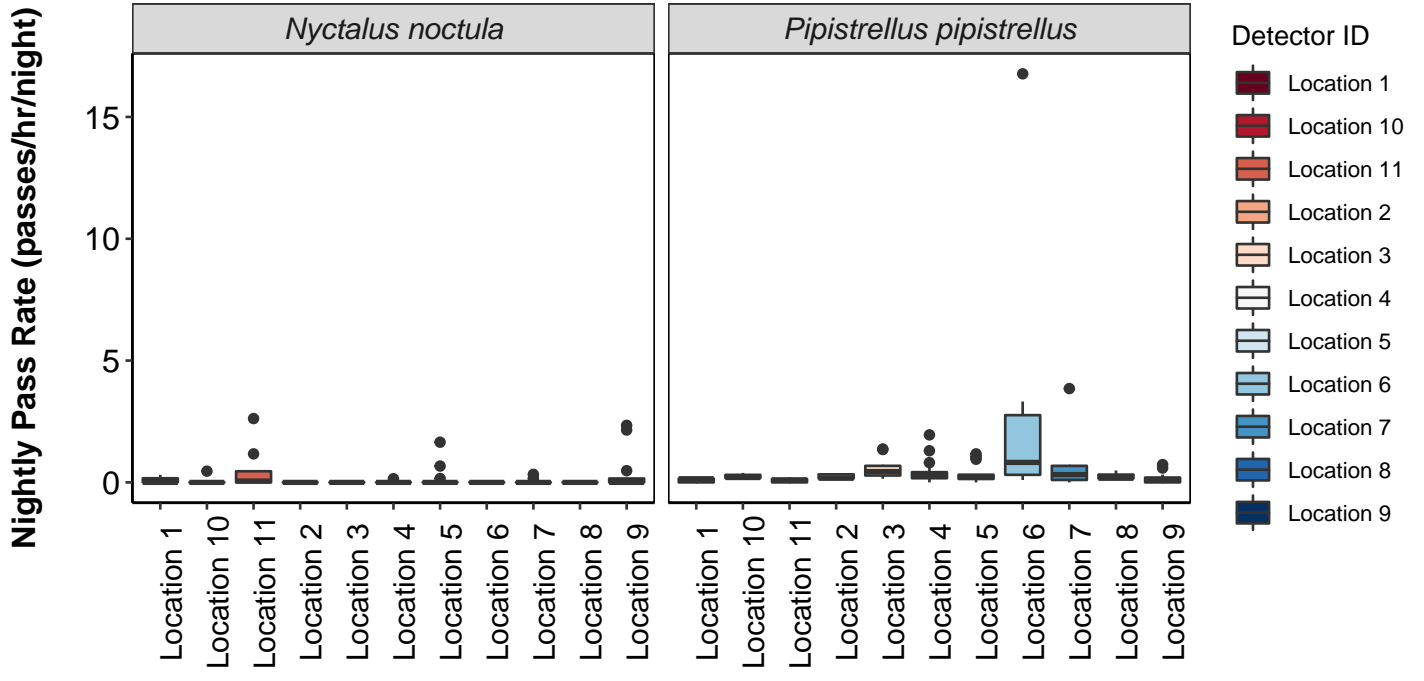
Species	Detector ID	Mean Pass Rate
Common pipistrelle	Location 1	0.1
Common pipistrelle	Location 10	0.2
Common pipistrelle	Location 11	0.1
Common pipistrelle	Location 2	0.2
Common pipistrelle	Location 3	0.6
Common pipistrelle	Location 4	0.5
Common pipistrelle	Location 5	0.3
Common pipistrelle	Location 6	2.2
Common pipistrelle	Location 7	0.7
Common pipistrelle	Location 8	0.3
Common pipistrelle	Location 9	0.2
Noctule	Location 1	0.1
Noctule	Location 10	0.0
Noctule	Location 11	0.5
Noctule	Location 2	0.0
Noctule	Location 3	0.0
Noctule	Location 4	0.0
Noctule	Location 5	0.2
Noctule	Location 6	0.0
Noctule	Location 7	0.1
Noctule	Location 8	0.0
Noctule	Location 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.



Detector ID

## Survey Effort

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

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

## Nightly Bat Pass Rate for each Month

### Median Per Detector

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

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

Species	Detector ID	Aug	Jul	Jun	May	Sep
Common pipistrelle	Location 1	NA	0.2	0.0	0.1	NA
Common pipistrelle	Location 10	0.2	NA	0.2	0.1	0.3
Common pipistrelle	Location 11	0.2	0.2	0.0	NA	0.1
Common pipistrelle	Location 2	0.2	0.2	0.2	0.1	NA
Common pipistrelle	Location 3	0.4	NA	0.4	0.1	0.7
Common pipistrelle	Location 4	0.4	0.8	0.2	0.1	0.5
Common pipistrelle	Location 5	0.3	NA	0.2	0.1	0.2
Common pipistrelle	Location 6	1.0	2.0	1.1	0.3	0.2
Common pipistrelle	Location 7	2.0	0.4	0.0	NA	0.7
Common pipistrelle	Location 8	NA	0.2	0.3	NA	NA
Common pipistrelle	Location 9	0.1	0.1	0.0	NA	0.3
Noctule	Location 1	NA	0.0	0.2	0.0	NA
Noctule	Location 10	0.0	NA	0.0	0.5	0.0
Noctule	Location 11	0.0	0.0	0.8	NA	0.0
Noctule	Location 2	0.0	0.0	0.0	0.0	NA
Noctule	Location 3	0.0	NA	0.0	0.0	0.0
Noctule	Location 4	0.0	0.0	0.0	0.1	0.0
Noctule	Location 5	0.0	NA	0.0	0.0	0.0
Noctule	Location 6	0.0	0.0	0.0	0.0	0.0
Noctule	Location 7	0.0	0.0	0.2	NA	0.0
Noctule	Location 8	NA	0.0	0.0	NA	NA
Noctule	Location 9	0.0	0.2	1.2	NA	0.0

## Nightly Bat Pass Rate for each Month

### Mean per Detector

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

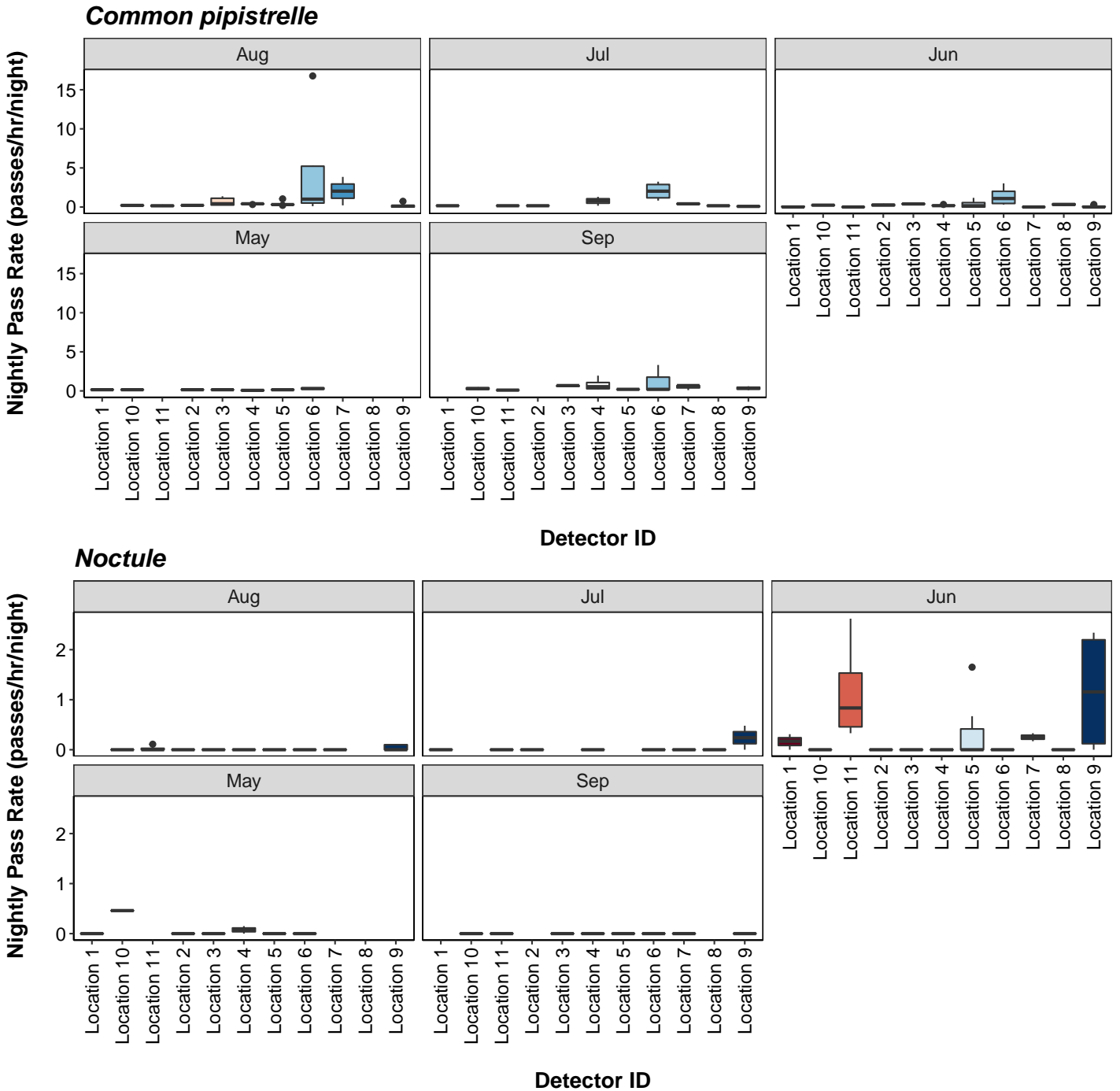
We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Aug	Jul	Jun	May	Sep
Common pipistrelle	Location 1	NA	0.2	0.1	0.1	NA
Common pipistrelle	Location 10	0.2	NA	0.2	0.1	0.3
Common pipistrelle	Location 11	0.2	0.2	0.0	NA	0.1
Common pipistrelle	Location 2	0.2	0.2	0.2	0.1	NA
Common pipistrelle	Location 3	0.7	NA	0.4	0.1	0.6
Common pipistrelle	Location 4	0.4	0.8	0.2	0.1	0.8
Common pipistrelle	Location 5	0.4	NA	0.3	0.1	0.2
Common pipistrelle	Location 6	4.7	2.0	1.4	0.3	1.2
Common pipistrelle	Location 7	2.0	0.4	0.0	NA	0.5
Common pipistrelle	Location 8	NA	0.2	0.3	NA	NA
Common pipistrelle	Location 9	0.2	0.1	0.1	NA	0.3
Noctule	Location 1	NA	0.0	0.2	0.0	NA
Noctule	Location 10	0.0	NA	0.0	0.5	0.0
Noctule	Location 11	0.0	0.0	1.2	NA	0.0
Noctule	Location 2	0.0	0.0	0.0	0.0	NA
Noctule	Location 3	0.0	NA	0.0	0.0	0.0
Noctule	Location 4	0.0	0.0	0.0	0.1	0.0
Noctule	Location 5	0.0	NA	0.4	0.0	0.0
Noctule	Location 6	0.0	0.0	0.0	0.0	0.0
Noctule	Location 7	0.0	0.0	0.2	NA	0.0
Noctule	Location 8	NA	0.0	0.0	NA	NA
Noctule	Location 9	0.0	0.2	1.2	NA	0.0

## Nightly Bat Pass Rate for each Month

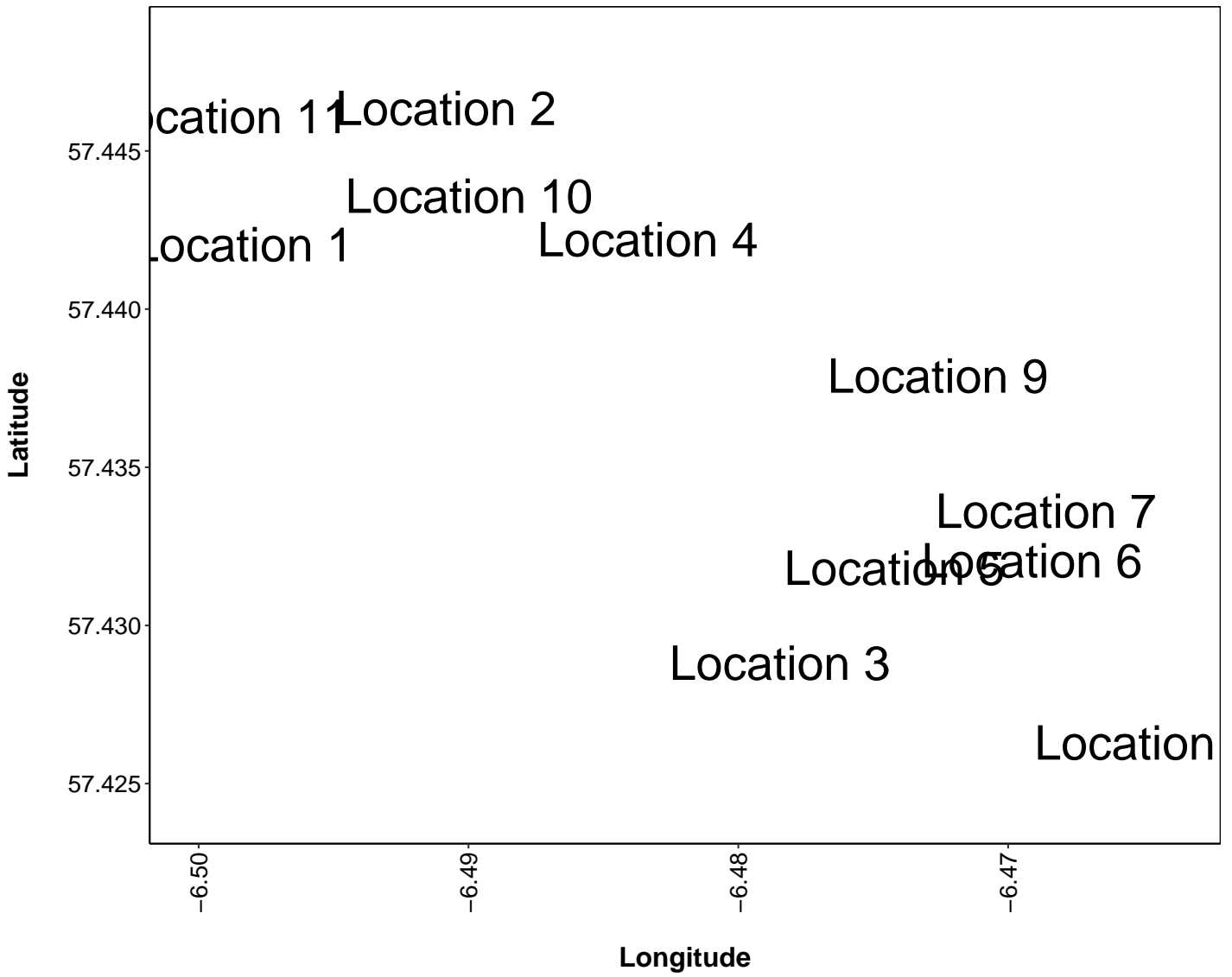
### Per Detector - Figures

**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.

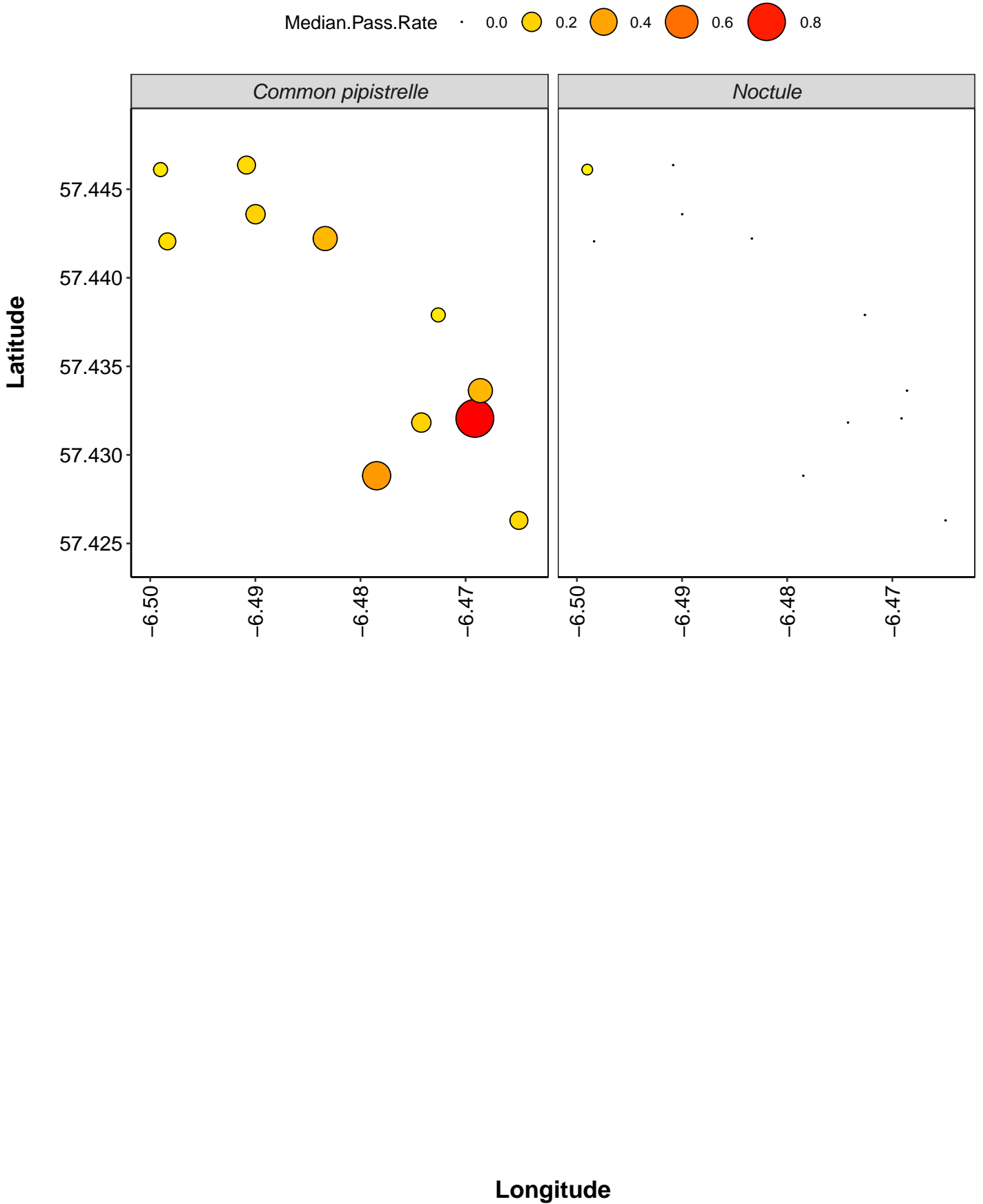


# Bat Activity per Detector Location

Figure 18. Detector ID reference:



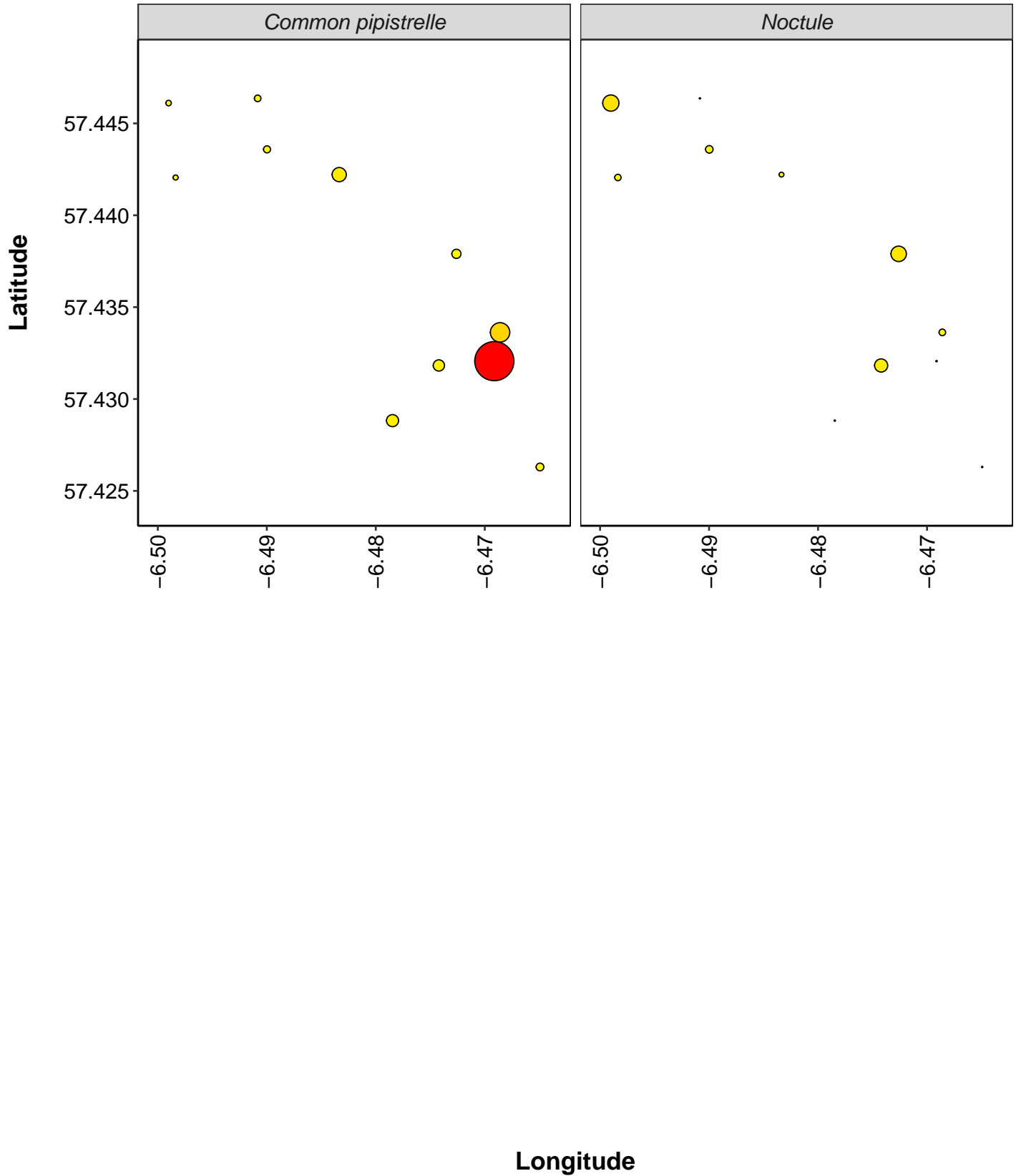
**Figure 19.** Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.





**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.

Max.Pass.Rate · 0 4 8 12 16



Thank you for using Ecobat! If you have any questions please email [info@themammalsociety.org](mailto:info@themammalsociety.org)