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CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

TULLAGHMORE WIND FARM

BAT SURVEY 2020 REPORT

Prepared for: Tullaghmore Windfarm Limited

Date: December 2022

NOTE: THIS REPORT CONTAINS SENSITIVE INFORMATION ON LOCATIONS OF BAT ROOSTS

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1. EXECUTIVE SUMMARY

The methodology for the 2020 bat survey at Tullaghmore wind farm adhered to Scottish National Heritage guidance published 2019 (SNH (2019) guidance) for assessing the impact of proposed wind farm developments on local bat species. The guidance has been updated since the surveys took place, however the changes to the guidance were minor and the survey methodology is in line with the 2021 NatureScot guidance. Activity surveys were undertaken between June and September 2020. Three rounds of static detectors were also deployed during this time period, for at least ten nights per round per detector.

During transect and emergence surveys, a total of five species of bats were recorded: Common Pipistrelle, Soprano Pipistrelle, Leisler's bat, Daubenton's Bat, Natterer's bat. Where the call could not be identified to species, the identification was determined to the highest level possible. The most commonly recorded species was Common and Soprano Pipistrelle, with much lower levels of Leisler's and Myotis spp.

The deployment locations for statics D1, D2, D5, D6, D10 and D12 are representative of the present study area. Deployment locations for statics D3, D4, D7, D8, D9, D11, D13 are representative of habitats now not within the final proposal, primarily set within conifer plantation to the east of the site. A final static; D14 was set within lowland native woodland for comparative purposes.

During the ongoing design of the proposed development including input from all departments and avoidance measures (including potential impacts to bat populations) outlined as part of the mitigation by design, the proposed turbine locations were all moved to areas of open heath lacking bat connective features.

All bats recorded during surveys are classified as 'Least Concern' on the Irish Red List No. 12 and protected under the EU Habitats Directive Annex IV and Wildlife Acts. The site is within the North Galway range for the EU Habitats Directive Annex II listed species lesser horseshoe bat however set within habitats unsuitable for this species.

Mitigation will be implemented during construction and operation of the main wind farm site.

2. INTRODUCTION

This report details the results of the bat surveys carried out during 2020. In addition to desktop study, the following surveys were undertaken within and adjacent to the proposed planning boundary:

- Preliminary roost assessment
- Bat activity (walked, driven transects and emergence surveys); and
- Static detector (three survey periods).

All surveys adhered to SNH (2019) guidelines at the time of survey, which are still compliant with the updated NatureScot guidance for 2021.

Activity surveys were conducted from June to September 2020 along predetermined walked transects. Static detector surveys were carried out between May and September 2020 in three rounds. The survey types were determined most appropriate to establish a baseline species assemblage, along with spatial and temporal distribution of species activity within the proposed planning boundary.

2.1 Site Location

The proposed wind farm site is located in west Co. Galway, approximately 30km north-west of Galway city. The Site is located approximately 9km north west of Oughterard and approximately 5km east of Maam Cross village.

The Site is located in a rural area. The settlement pattern in the area is linear, made up of one-off rural housing and farmyards generally located along the local road network.

The Site is situated within a single sub-catchments as defined by the WFD Joyce's_SC_010.

The main hydrology feature within the Site is the Tullaghmore 30, Tullaghmore and Owenwee Streams which flow into Lough Corrib to the north-west of the site. All surface runoff within site drains to the Owenwee Stream, which forms part of the Maumturk Mountains SAC prior to entering the Lough Corrib SAC & SPA.

The majority of site underlain by Podzols (Peaty), Lithosols, Peats and bedrock outcrops. Reference to bedrock exposure at surface to the north of the site. Bedrock geology is made up of Granites & other Igneous Intrusive rocks and Precambrian Quartzites, Gneisses & Schists.

There are no recorded karst features on the site. The groundwater aquifer is considered generally unproductive except for Local Zones (Pl – Poor Aquifer). Groundwater vulnerability is considered Extreme for the majority of the site, with Rock near surface to the north and areas of High and Medium to the south and south-west.

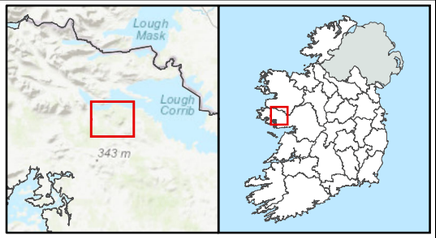
The wind farm site and GCR are located within the Uplands and Bog Landscape character area and the Lake Environs area (Galway County Development Plan, 2015-2021). The subject site sits within peatland habitats consistent with wet heath, dry heath and blanket-bog much of which appears modified and degraded. The site rises to the north peaking at 270m above sea level. The landscape is dominated by a mixture of moorland, extensive areas of conifer plantation and marginal agricultural land.

Corine 2018 landcover[1] has determined the habitats to comprise wetlands

There are ten European designated sites within 15km. Eight national designated sites (one Natural Heritage Areas (NHA) and seven proposed Natural Heritage Areas (pNHA) are present within 10 km of the study area.

[1] The Corine Land Cover (CLC) inventory is a Pan-European landuse and landcover mapping programme. It supplies spatial data on the state of the European environmental landscape and how it is changing over time.

Path: R:\Map Production\2019\P2220\Workspace\Bats\P2220_GIS_Fig2-1_Tullaghboy_SiteLocation_A3.mxd



Legend

Site Boundary

Kilometers
0 0.5 1 2

TITLE:	Site Location		
PROJECT:	Tullaghmore Wind Farm, Co. Galway		
FIGURE NO:	2-1		
CLIENT:	EMPower		
SCALE:	1:22000	**REVISION:**	0
DATE:	13/12/2022	**PAGE SIZE:**	A3

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2.2 Bat Species

Bats belong to the Order Chiroptera and to date, nine species are recorded as resident in Ireland. These nine species are divided into two families:

1. Vespertilionidae, which contains nine Irish species (Daubenton's bat, natterer's bat, whiskered bat, Leisler's bat, brown long-eared bat, Soprano Pipistrelle, Common Pipistrelle and Nathusius's pipistrelle; and
2. Rhinolophidae, which contain one Irish species, the Lesser Horseshoe bat.

See Appendix A for species details.

Brandt's bat *Myotis brandii* has only been recorded once in Ireland from a site in Co. Wicklow and is classified as a vagrant. In 2013, a single male greater horseshoe bat *Rhinolophus ferrumequinum* was recorded in Co. Wexford. In 2020 an individual was also recorded in Glendalough, Co. Wicklow. Both were considered to be vagrants. The development sits within the North Galway / Mayo Lesser Horseshoe bat range (Roche, 2015) however the site is situated within unsuitable feeding or commuting habitat for the species (NPWS, 2018).

2.3 Legislation

Irish Legislation

In the Republic of Ireland, under Schedule 5 of the Wildlife Acts 1976 to 2019, all bats and their roosts are protected by law. It is an offence to disturb either without the appropriate licence. This Act was further strengthened by the Wildlife Amendment Act 2000.

E.U. Legislation

Under the Habitats Directive 1992 (EEC 92/43), each member state of the E.U. was requested to identify habitats of national importance and priority species of flora and fauna. These habitats are now designated as Special Areas of Conservation (SAC).

In Ireland, all bat species are classified as Annex IV species under the Habitats Directive. Annex IV species are species in need of strict protection. Lesser Horseshoe bat is also classified as an Annex II species (Priority Species). Annex II species require the designation of Special Areas of Conservation specifically for their protection.

All species of bat in Ireland are strictly protected under the Habitats Directive to include deliberate disturbance of these species, particularly during the periods of breeding, rearing and hibernation. It also specifies deterioration or destruction of breeding or resting places.

International Legislation

Ireland has ratified two international wildlife laws pertaining to bats:

a) The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) – part of this convention stipulates that all bat species and their habitats are to be conserved.

b) The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, Enacted 1983). This was instigated to protect migrant species across all European boundaries.

2.4 Relevant Guidance Documents

This report will draw on guidelines already available in Europe and will use the following documents:

- National Roads Authority (2006) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes
- Collins, J. (Editor) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust, London
- McAney, K. (2006) A conservation plan for Irish vesper bats, Irish Wildlife Manual No. 20 National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- The status of EU protected habitats and species in Ireland: Conservation status in Ireland of habitats and species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.
- NRA (2006b). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority (now named Transport Infrastructure Ireland), Ireland.
- Aughney, T., Kelleher, C. & Mullen, D. (2008). Bat Survey Guidelines: Traditional Farm Buildings Scheme. The Heritage Council, Áras na hOidhreachta, Church Lane, Kilkenny.
- BTHK (2018). Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Pelagic Publishing, Exeter UK.
- European Commission (2021). Commission notice. Guidance document on the strict protection of animal species of Community interest under the Habitats Directive
- CIEEM (2021). Bat Mitigation Guidelines. A guide to impact assessment, mitigation and compensation for developments affecting bats. Beta version 1.0.
- NIEA, Natural Environment Division (2021). Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland.
- CIEEM (2021). Bat Mitigation Guidelines. A guide to impact assessment, mitigation and compensation for developments affecting bats. Beta version 1.0.
- NPWS (2022). Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134.

2.4.1 Relevant Wind Farm Guidance Documents

A large array of publications has been produced to date on the potential impact of wind turbines on bats.

It is important to be aware of these publications to understand the recommended survey protocols and accepted bat mitigation measures implemented across Europe to address potential impacts of wind turbines on local bat populations. These include:

- Bats and onshore wind turbines: Survey, Assessment and Mitigations. Scottish Natural Heritage January 2019.
- Bats and onshore wind turbines - survey, assessment and mitigation. Scottish Natural Heritage. August 2021
- UNEP/EUROBATS: Guideline for consideration of bats in wind farm projects, Publication Series No. 3.
- Natural England Technical Information Note TIN051: Bats and onshore wind turbines – Interim Report
- Guide to Turbines and Wind Farms. Bat Conservation Ireland 2012.
- Bat Conservation Ireland Guidelines for consideration of bats in wind farm projects - Revision 2014
- Wind Turbine/Wind Farm Development Bat Survey Guidelines (BCI, 2012);
- NIEA (2011). Bat survey – specific requirements for wind farm proposals. Northern Ireland Environment Agency, Department of the Environment, Belfast.
- European Commission (2020). Guidance document on wind energy developments and EU nature legislation. Brussels, 18.11.2020 C(2020) 7730 final.
- NIEA, Natural Environment Division (2021). Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland.

3. METHODOLOGY

3.1 Desktop Study

A data search was conducted in December 2022 in order to collate existing information from the footprint of the proposed planning boundary. The data search comprised the following information sources:

- Collation of known bat records within a 10 km radius of the proposed sites from the Bat Conservation Ireland database;
- Collation of adhoc and observational bat records from the National Bat Database held by the National Biodiversity Data Centre within the 10km grid square overlapping the site (www.biodiversityireland.ie);
- Review of Ordnance Survey mapping and aerial photography of the proposed wind farm boundaries and their environs (i.e., 200 m plus rotor radius of the boundary of the proposed development[2]);
- Records of designated sites within a 15 km radius of the proposed sites where bats form part or all of the reason for designation (https://www.npws.ie/protected-sites);
- Collation of Lesser Horseshoe bat records within a 15 km radius of the proposed sites from the National Parks and Wildlife Service Lesser Horseshoe bat database (https://www.npws.ie);
- Collation of data on known caves within a 4 km radius of the proposed sites from the Cave Database for the Republic of Ireland, compiled by Trinity College (http://www.ubss.org.uk/search_irishcaves.php); and
- Review of bat survey data from Ecological Impact Assessments from proposed and permitted developments within the wider environs of the site.

3.1.1 Bat Landscapes

Bat Conservation Ireland produced a landscape conservation guide for Irish bat species using their database of species records collated during the 2000-2009 survey seasons. An analysis of the habitat and landscape associations of all bat species deemed resident in Ireland was undertaken and reported in Lundy *et al.*, 2011. The degree of favourability ranges from 0 – 100, with 0 being least favourable and 100 most favourable for bats. The values of the grid squares represent the range of habitat suitability values the bat species can tolerate within each individual square.

A caveat is attached to the model and it is that the model is based on records held on the Bat Conservation Ireland database, while core areas have been identified, areas outside the core area should not be discounted as unimportant as bats are a landscape species and can travel many kilometres between roosts and foraging areas nightly and seasonally.

3.1.2 Designated Sites

A search was made for designated sites within 15 km of the proposed planning boundary. These included sites designated at the European level (in the context for bats, this refers to Special Areas for Conservation or SACs) and the Irish level (Natural Heritage Areas or NHAs and proposed Natural Heritage Areas or pNHAs).

[2] As per SNH (2021) guidance.

The Habitats Directive (Article 6) forms a basis for the designation of SACs. Further information on the context of SACs for bats is given in section 4.1.2.

NHAs are areas considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

All pNHAs were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. However, for the purposes of this assessment all pNHAs have been considered as fully designated sites.

Both NHAs and pNHAs may be designated due to the presence of bats.

3.2 2020 Surveys

The 2020 bat surveys were undertaken in accordance with SNH 2019 guidance (and compliant with the later updated NatureScot 2021), Rodrigues et al (2015) BTHK (2018) and Collins (2016).

A total of seven no. bat transect and roost search surveys, and three no. static detector surveys were carried out during 2020 (refer to Table 3-1 for details) within the study area (within the wind farm planning application boundary).

Table 3-1: Bat Surveys 2020

Survey Type	Survey Date	Surveyor
Bat Activity Survey 1 - Dusk	08/06/2020	John Curtin
Bat Activity Survey 2 – Dawn	09/06/2020	John Curtin
Bat Activity Survey 3 – Dusk	28/07/2020	John Curtin
Bat Activity Survey 4 – Dawn	29/07/2020	John Curtin
Bat Activity Survey 5 – Dusk	26/08/2020	John Curtin
Bat Activity Survey 6 – Dawn	27/08/2020	John Curtin
Bat Activity Survey 7 – Dusk	21/09/2020	John Curtin
Static Detector Survey	19/05/2020 – 28/05/2020	John Curtin
Static Detector Survey	28/07/2020 – 13/08/2020 [3]	John Curtin
Static Detector Survey	10/09/2020 – 19/09/2020	John Curtin

[3] Detector 10 malfunctioned during the summer period so was reset recording from the 22nd to the 31st of Aug 2020.

3.2.1 Surveyor Information

Bat surveys were undertaken by John Curtin BSc. John qualified in Environmental Science at NUI Galway in 2010 and has been working as an ecologist ever since. John has been conducting bat surveys at windfarm sites since 2012. He has also completed the Bat Conservation Ireland, Bat Detector Workshop and Bat Handling Workshop which are the standard training for the carrying out of bat surveys in Ireland. In addition, John is an active member of Bat Conservation Ireland, which monitor bat populations in Ireland, and facilitate the education of bat communities to the public. John holds the following licences.

Description	Licence No
Licence to capture protected wild animals for educational, scientific or other purposes (bats)	C231/2020
Roost disturbance (bats)	Der/Bat 2020-114
Licence to photograph / film wild animals (bats)	06/2021

3.2.2 Roost assessment

Searches were completed using ladder, high powered torch, RIDGID micro CA-350 Inspection Camera and a Seek Reveal XR FF thermal imaging device. Evidence of bat usage sought during the surveys include:

- Live bats
- Bat droppings (these will accumulate under an established roost or under access points);
- Insect remains (under feeding perches);
- Oil (from fur) and urine stains;
- Scratch marks; and
- Bat corpses.

Examples of crevice features examined include:

- Holes;
- Cracks/splits in major limbs of trees;
- Loose bark; and
- Hollows/cavities.

3.2.3 Bat activity and emergence surveys

The bat detector used during the walked and driven surveys was a Wildlife Acoustics Inc. (Massachusetts, USA) Echo Meter EM3 bat detector or an Echo Meter Touch Pro2 which are triggered to record when a bat call is emitted louder than 18dB for 1sec. These detectors use full spectrum sampling; detecting all frequencies simultaneously, meaning that multiple bat calls can be recorded at the same time.

Night-time surveys combined emergence surveys towards dusk and dawn and a combination of walked and driven transects of bat favourable habitats within and surrounding the study area were conducted between June and September 2020 (Table 3-2).

Transects targeted a range of foraging and commuting habitats present within and surrounding the study area, those associated with linear features such as roadside margins, woodland plantation edges, hedgerows, treelines and waterbodies.[4] Full details of transects are shown in Table 3-2 and Figure 3-1 below.

Bat activity is governed by the activity of their insect prey and insect abundance is in turn governed by weather conditions and climate. Insects, and therefore bats, are unlikely to be present at temperatures below 7°C or during periods of strong winds or heavy rainfall so surveying in such conditions is not possible. All field surveys were undertaken within the active bat season and during good weather conditions (dry conditions and temperature at 8°C and greater).

Nocturnal bat activity is mainly bimodal taking advantage of increased insect numbers on the wing in the periods after dusk and before dawn, with a lull in activity in the middle of the night. This is particularly true of 'hawking' species – i.e., bats which capture prey in the open air. However, 'gleaning' species remain active throughout the night as prey is available on foliage for longer periods. Gleaning is the term for taking prey from foliage or the ground.

Emergence surveys took place at time when bats emerge from roosts and attempted to identify roost entrances. The surveyor stood in place at a pre-selected point (identified in the initial roost assessment survey) waiting for bats to emerge or re-enter.

Bats were identified by their ultrasonic calls coupled with behavioural and flight observations and on computer by sound analysis of recorded echolocation and social calls with dedicated software (Wildlife Acoustic's Kaleidoscope Pro; version 2.1.0). [5]

4 At the time of survey, the proposed site extended to include conifer plantation, recently cut plantation and tracks to the east of the site. Given these habitats represented higher quality bat habitats than open peatland, the surveyor focused a higher portion of attention to these areas.

[5] Although there are later editions to this software the surveyor manually verified all calls rather than depending on auto identification. It is the surveyor's opinion that auto-id features frequently misidentify bat species.

Table 3-2: Transect Details

Survey	Date	Survey type	Start Time	End Time	Location	Grid ref (Lat / Long) Start / Finish		Sunset / sunrise
1	08/06/2020	Emergence survey	21:34	23:14	Examined broadleaf sycamores for roost potential features and emerging bats	53.45862827 -9.451190357		22:01
		Walked transect	23:14	00:34	Walked transect through conifer plantation	53.45411431 - 9.444697276	53.47324304 - 9.448148905	
2	09/06/2020	Emergence survey	03:09	05:10	Derelict house within recently cut conifers. Also examined adjacent tree with potential roost feature (prf)	53.45797897 -9.44915034		05:09
3	28/07/2020	Walked transect	21:07	23:20	Walked transect along road until 22:20. After this point a transect was completed within bog along eastern end of site. Stuck to within 50m of conifer edge.	53.45136729 - 9.459223827	53.46832501 - 9.452741199	21:37
		Walked transect	23:30	00:07	Walked transect by Lough Bofin to South	53.44159647 -9.45047434	53.44162359 -9.46078656	
4	29/07/2020	Emergence survey	03:28	05:50	Dawn survey by derelict house to west of site	53.45738521 -9.476356027		05:48
5	26/08/2020	Walked transect	20:08	21:40	Transect through native woodland to north of site down to shore of Lough Corrib	53.47605509 - 9.422046393	53.48322431 - 9.427559858	20:38
		Driven transect	21:50	23:00	Transect through conifer plantation track, east of site	53.45411431 - 9.444697276	53.47324304 - 9.448148905	

Survey	Date	Survey type	Start Time	End Time	Location	Grid ref (Lat / Long) Start / Finish		Sunset / sunrise
		Walked transect	23:12	23:45	Another transect through Northern native woodlands	53.47605509 - 9.422046393	53.48322431 - 9.427559858	
6	27/08/2020	Walked transect	04:37	06:37	Transect through conifer plantation track, east of site	53.45411431 - 9.444697276	53.47324304 - 9.448148905	06:37
7	21/09/2020	Walked transect	19:06	00:06	Long transect across bog to small lake to north of site. Also completed lap of bog and main route within conifers	53.46439981 - 9.453284909	53.46666849 - 9.481513052	19:36

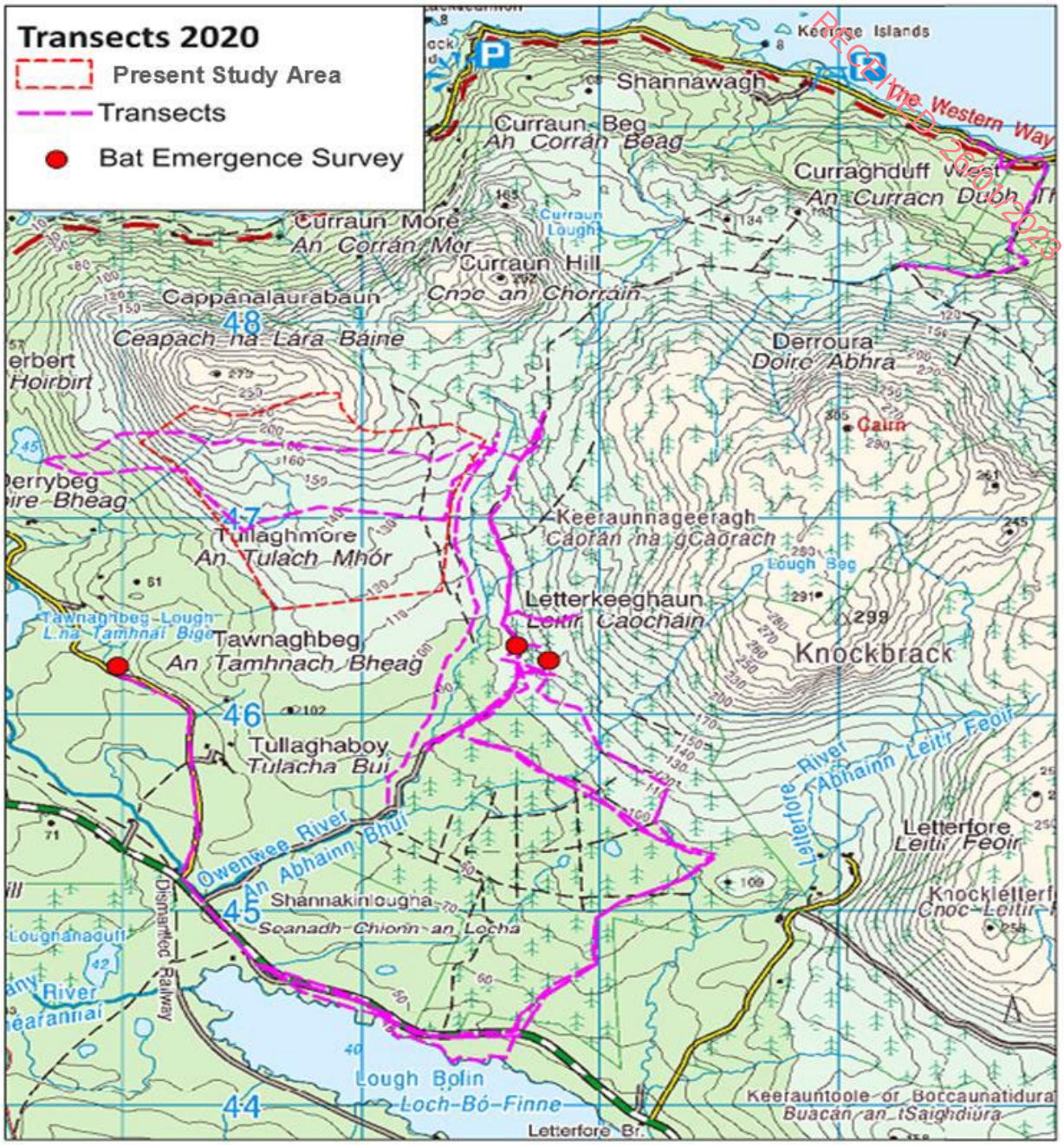


Figure 3-1: Transect and roost survey locations

3.2.4 Static Detector Surveys

Passive Static Bat Surveys involve leaving a static bat detector unit (with ultrasonic microphone) in a specific location and set to record for a specified period of time (i.e., a bat detector is left in the field where is no observer present and bats which pass the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector is effectively used as a bat activity data logger. This results in a far greater sampling effort over a shorter period of time. Bat detectors with ultrasonic microphones are used as the ultrasonic calls produced by bats cannot be heard by human hearing.

Song Meter Mini and SM4BAT Full spectrum bat recorders use Real Time recording as a technique to record bat echolocation calls and using specific software, the recorded calls are identified. It is these sonograms (2-d sound pictures) that are digitally stored on the SD card (or micro-SD cards depending on the model) and downloaded for analysis. These results are depicted on a graph showing the number of bat passes per species per hour/night. Each bat pass does not correlate to an individual bat but is representative of bat activity levels. Some species such as the pipistrelles will continuously fly around a habitat and therefore it is likely that a series of bat passes within a similar time frame is one individual bat. On the other hand, Leisler's bats tend to travel through an area quickly and therefore an individual sequence or bat pass is more likely to be indicative of individual bats.

Per SNH (2019) guidance, and the updated NatureScot 2021 guidance, static units (Song Meter SM4BAT and SM-Mini) were programmed to commence half an hour before sunset and finish half an hour after sunrise to ensure that bat species that emerge early in the evening and return to roosts late are recorded. Detectors were left out for a minimum of 10 consecutive nights across three survey periods: spring (May), summer (July - early August) and autumn (September). See Table 3.3 below for further details.

SNH (2021) guidance states that "Detectors should be placed at all known turbine locations at wind farms containing less than ten proposed turbines. Where developments have more than ten turbines, detectors should be placed within the developable area at ten potential turbine locations plus a third of additional potential turbine sites up to a maximum of 40 detectors for the largest developments". At the time of survey, the proposed development was significantly larger, encompassing an area of conifer plantation to the east with a proposal for eighteen turbines. In addition, turbine locations had yet to be fixed thus detectors were located based on landscape features. In total thirteen detectors were deployed, four set within peatland, two within peatland but close to linear features such as conifer edge and watercourses and seven to the east within conifer plantation and cut conifer. Detectors situated within conifer were set at edge habitat as dense stands do not provide suitable representation of the habitat this will be present after construction.

The data was analysed with Wildlife Acoustic's Kaleidoscope Pro; version 2.1.0. This software identifies many of the calls made by Irish bats. All calls not labelled Soprano or Common Pipistrelle Bats were manually verified. Results presented below show some Myotis calls the surveyor is confident the bat is a Natterer's bat. Distinguishing between Myotis species recordings is difficult (unless distinctive social calls are recorded thus several calls are recorded to genus level only. These could be either Whiskered, Daubenton's or Natterer's bat. Similarly, several Pipistrelle calls were recorded with a peak frequency of around 40kHz. These calls are lower than expected for Common Pipistrelle but higher than typical for Nathusius's. Following the precautionary approach these calls have been included in ECOBAT as Nathusius Pipistrelle although it is likely many were Common Pipistrelle.

Where detectors were set in open bog a timber structure was erected ensuring microphone height was set at 2.5m

Plate 3-1 & Plate 3-2: Detectors set within the site

For each turbine in the present application, the distance to the nearest static detector used in the 2020 survey is given in Table 3-3 below.

Table 3-3: Details of static detector deployment and justification for using bat detector data for each turbine location.

Turbine No	Detectors used for assessing impacts	Approx. Distance between detector and nearest turbine	Habitat types at static deployment locations and turbines	Comments	Number of nights static deployed
1	D1 and D10	304m between D1 and turbine 1 737m between D10 and turbine 1	D1: Peatland. Only feature is a barbed wire fence. D10: Edge habitat between peatland and conifer plantation with stream slightly more developed than further north. Turbine 1: Peatland. 45m from fenceline. Over 230m from western stream and conifer edge.	T1 is located within peatland towards the south-east of the site. This turbine is positioned over 230m from conifer edge and the Tullaghmore stream. Detector 1 is located further west within similar peatland but has no connective features nearby (baring a short fence). Given the presence of the stream and woodland edge it is likely bat activity will be marginally higher at the turbine location over D1. Detector 10 was set recording attached to a Rowan tree adjacent to the Tullaghmore stream at a point where the stream was more developed. In addition, the detector was located adjacent to conifer edge and close to a pathway providing access from the south. It is the surveyor's opinion that detector 10's location is substantially higher quality bat habitat than turbine 1's.	D1: 10 nights spring 17 nights summer 10 nights autumn D10: 10 nights spring 10 nights summer 10 nights autumn
2	D6	244m between D6 and turbine 2	D6: Peatland. 115m from conifer edge to west. Tullaghmore stream is no more than wet flush at this point of little value for bat usage. Turbine 2: Peatland. Over 200m from conifer edge.	The turbine is located in similar peatland habitat to the detector. The detector is marginally closer to conifer edge. It is likely bat activity is similar at both locations.	D6: 10 nights spring 17 nights summer 10 nights autumn

Turbine No	Detectors used for assessing impacts	Approx. Distance between detector and nearest turbine	Habitat types at static deployment locations and turbines	Comments	Number of nights static deployed
3	D6 and D12	348m between D12 and turbine 3 678m between D6 and turbine e	D6: Peatland. 115m from conifer edge to west. D12: Peatland. Hill rises to the north Turbine 3: Peatland. Over 200m from conifer edge.	Turbine 3 is set in exposed rocky heath without surrounding bat friendly landscape features. The turbine site is less favourable for bats than D6 given the higher altitude but marginally better than D12 as this detector location lacks any nearby landscape features such as conifer edge.	D6 and D12: 10 nights spring 17 nights summer 10 nights autumn
4	D2, D5 and D12	618m between D2 and turbine 4 839m between D5 and turbine 4 668m between D12 and turbine 4	D2: Peatland. Shallow drain appears more of a flush than actual water feature D5: Peatland. No features surround D12: Peatland. Hill rises to the north Turbine 4: Peatland. Over 200m from conifer edge. Closest feature is small lake some 420m downhill to west.	Although the detectors lie a substantial distance from the turbine the subject site is particularly heterogeneous in habitat features. All locations are set within peatland with minimal bat landscape features surrounding.	D2, D5 and D12: 10 nights spring 17 nights summer 10 nights autumn

Turbine No	Detectors used for assessing impacts	Approx. Distance between detector and nearest turbine	Habitat types at static deployment locations and turbines	Comments	Number of nights static deployed
5	D2	19m between D2 and turbine 5	D2 & Turbine 5. Set in close proximity within peatland.	Turbine 5 is situated within peatland towards the west of the site with little surrounding features. A marginal watercourse can be found to the south however this is not a prominent feature. Detector 2 was positioned at this location.	D2: 10 nights spring 17 nights summer 10 nights autumn
6	D1	309m between D1 and turbine 6	D1: Peatland. Only feature is a barbed wire fence. Turbine 6: Peatland.	T6 is located to the west of D1 at similar altitude and set within similar habitats. A fence line directed east west passes close to both sites however it does not contain associated scrub. Although the turbine is set somewhat closer to an eastern section of woodland this habitat lies c.650m further west. It is likely bat activity is similar at both locations.	D1: 10 nights spring 17 nights summer 10 nights autumn
-	D3	-	D3 was set by a conifer edge and located close to driveable track	Typical upland conifer edge habitat.	D3: 10 nights spring 17 nights summer 10 nights autumn
-	D4	-	D4 was set within a semi-mature sycamore woodland strip c. 25m from the closest woodland edge.	Site chosen as a good location to investigate for the presence of woodland bats.	D4: 10 nights spring 17 nights summer 10 nights autumn
-	D7	-	D7 was set within conifers and located close to driveable track.	Typical upland conifer edge habitat. Most easterly set detector within original larger site boundary.	D7: 10 nights spring 17 nights summer 10 nights autumn

Turbine No	Detectors used for assessing impacts	Approx. Distance between detector and nearest turbine	Habitat types at static deployment locations and turbines	Comments	Number of nights static deployed
-	D8	-	Set within recently cut conifer plantation and sheltered by surrounding woodland edge at an altitude of 90m.	Set south-east of the current proposed site at a lower altitude, more sheltered and with better bat friendly landscape features.	D8: 10 nights spring 17 nights summer 10 nights autumn
-	D9	-	Conifer plantation on peatland. Alt 160m. Detector was located close to narrow grassy track.	North of the subject site set in upland conifer plantation in a dip between two hills to the NW and SE.	D9: 10 nights spring 17 nights summer 10 nights autumn
-	D11	-	Set at edge between mature plantation and recently cut conifer plantation at an altitude of 115m.	A derelict dwelling and shed can be found c. 100m to the NW providing a potential bat roost site.	D11: 10 nights spring 17 nights summer 10 nights autumn
-	D13	-	Set on grassy track between mature conifers	Very sheltered edge habitat.	D13: 10 nights spring 17 nights summer 10 nights autumn
-	D14	-	Set to the north of the south by a stream flowing through lowland native woodland.	Ideal habitat for woodland bats. Detector only set for comparison purposes. This area will remain unaffected by the proposed development.	D14: 10 nights autumn

3.3 Table Data Analysis

3.3.1 Ecobat

All recordings were made in full spectrum, retaining all amplitude and harmonic information from the original bat call for subsequent analysis. Bat calls were analysed using Kaleidoscope Pro (2.1.0) Software. All files were split to a maximum duration of 15 seconds and automatically identified to species level, or genus level as appropriate, using auto-ID bat classifiers (Bats of UK 2.0.7)[6].

In order to ensure quality all calls not auto identified as Common or Soprano Pipistrelle were manually verified. The data was then entered into Ecobat [7] and a report was subsequently generated. Ecobat is an online tool which makes assessments of bat activity levels by comparing data entered by the user with bat survey information from similar areas at the same time of year. Specifically, a median bat activity level is calculated which corresponds to a bat activity category (Table 3-4).

An individual bat can pass a particular feature on several occasions while foraging. It is therefore not possible to estimate the number of individual bats. In accordance with best practice guidance (Collins, 2016) an activity index is used; calculated from bat records per hour which allows analysis of bat activity to estimate abundance and/ or activity. The calculation is as follows:

BAI (Bat Activity Index) = Total number of bat records / number of hours of recording.

Table 3-4: Median percentile range and corresponding bat activity

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

3.4 Survey and Analysis Limitations

- It is not always possible to identify a bat call to species level due to the recorded call not being clear. Recorded files from automated detectors may contain only fragments of a call, or the bat may be calling from a distance (from the detector) in which case it may not be clear enough to assign the call to a specific species. In these cases, the call has been assigned to genus level;

[6] There have been several updates to Kaleidoscope and the auto ID; Bats of UK 2.0.7. The author however feels auto-ID software regularly misidentifies bat calls that are not ID'ed as Common or Soprano Pipistrelle. As such all calls not identified as Common or Soprano Pipistrelle were manually verified. The software version used is adequate for organising data.
[7] http://www.ecobat.org.uk/

- Some caution must be taken when comparing activity levels between species, as bias can be shown towards those species with 'louder' or 'lower frequency' echolocation calls. For example, Nyctalus species have louder and low frequency echolocation calls which carry further than the quieter and more broad-band brown long-eared bat echolocation calls;
- A bat contact is defined as a single detector file which contains at least one bat call. Multiple contacts at any given detector location do not necessarily indicate the presence of more than one bat and should therefore be interpreted as a level of activity rather than the number of bats recorded;
- For the purposes of this analysis, if more than 1 species was present within the recorded files all species were accounted for in all analysis.
- The static detector relating to location D10 malfunctioned for period 2 thus was reset to record from the 15th of August for ten nights. SNH (2019) refer to this period as Autumn rather than Summer. Given this data was used in conjunction with detector 1 for estimating activity at turbine 1 the surveyor feels the altered dates will not significantly impact on analysis.

  Guidelines in the use of Ecobat recommend a Reference Range of 200+ nights of bat data to be confident in the relative activity level. The reference range is the stratified dataset of bat results recorded in the same region, at the same time of year, by which percentile outputs can be generated. This comprises all records of nightly bat activity across Ireland. Where the reference range fell below this level the comparison inputs were broadened by increasing the date ranger beyond 30 days.
- Ecobat analysis regarding genus level identification currently. If a genus level ID has been entered into the spreadsheets, for example "*Myotis*" then all identified *Myotis* species (including *nattereri*, *mystacinus* and *daubentonii*) will be included in the total for the date of the *Myotis*. To counter this the species level passes were deducted from the genus level data prior to imputing.
- Static detectors were originally deployed as close as possible to the proposed turbine locations. However, the proposed turbine locations were updated in 2021 after the surveillance period. The results are therefore representative of the study area.

4. RESULTS

4.1 Desktop Survey

A search of NBDC records in the grid square overlapping the proposed site (M04) was conducted on 14th December 2022. The following species of bat have been recorded in this grid square: Daubenton's, Leisler's, Natterer's, Common Pipistrelle and Soprano Pipistrelle (All of these observations were last made in 2009).

BCI and NBDC records indicate eight known bat roosts within 10 km of point 53.465011 -9.4648124 (central point within the proposed wind farm site). Table 4-1 provides information on these roosts and potential connectivity between the sites[8]. Five of the nine known Irish species of bat (Bat Conservation Ireland) have also been recorded (observed) within 5km of point 53.465011 -9.4648124. These are Common Pipistrelle, Soprano Pipistrelle, Leisler's bat, Daubenton's bat, Natterer's bat.

Review of the NPWS Lesser Horseshoe bat database indicates that there are no records of roosts within a 2.5 km buffer (Core Sustenance Zone (CSZ)) of the proposed wind farm site boundary (NPWS 2021).

The Cave Database for the Republic of Ireland does not hold any records of caves within a 4 km radius of the proposed wind farm site boundary.

Table 4-1: Recorded bat roosts in the surround 10km and observation records within 5km

Type of Record	Scientific name	Common name	Date of last record	Details	Potential connectivity with subject site (for roost records)
Roost	*Rhinolophus hipposideros*	Lesser Horseshoe	13/02/2003	C 5km 12 bats	Site sits outside the CSZ for this species. Roost situated far side of L. Corrib.
Roost	*Rhinolophus hipposideros*	Lesser Horseshoe	Sept 2001	c. 5.8km N. 1 bat.	Site sits outside the CSZ for this species. Roost situated far side of L. Corrib.
Roost	*Rhinolophus hipposideros*	Lesser Horseshoe	25/08/1988	C 6.5km 32 bats emerged	Site sits outside the CSZ for this species. Habitats within the site are not suitable for this species.
Roost	*Rhinolophus hipposideros*	Lesser Horseshoe	13/06/2006	C 7.5km 66 bats emerging	Site sits outside the CSZ for this species. Roost situated far side of L. Corrib.
Roost	*Rhinolophus hipposideros*	Lesser Horseshoe	27/05/2006	C 7.5km 45 bats emerged	Site sits outside the CSZ for this species. Roost situated far side of L. Corrib.
	Pipistrellus pygmaeus	Soprano Pipistrelle		49 bats emerged	Site sits outside the CSZ for this species. Roost situated far side of L. Corrib.

[8] It should be noted that some BCI data for roost locations are only given to a four-figure grid refence which is equal to 1 km squared. In addition, distances to Lesser horseshoe roosts have been rounded to deter identification of roost locations.

Type of Record	Scientific name	Common name	Date of last record	Details	Potential connectivity with subject site (for roost records)
Roost	Unknown bat		30/05/2009	8.5km east Droppings found in fissure	Lies outside CSZ for any Irish bat.
Roost	*Nyctalus leisleri*	Leisler's bat	15/07/2010	9.56km 50 bats	(Shiel, 1999) found that the maximum (mean) flight distance recorded for individuals from two Leisler's bat maternity roosts ranged from approximately 4.5 km to 7.5 km throughout the year. At 9.56km the subject sits outside the CSZ for this species.
Roost	*Nyctalus leisleri*	Leisler's bat	28/07/2011	9.1km 64 bats	As above, the subject sits outside the CSZ for this species.
Observation and Ad hoc records					
Observation	*Myotis nattereri*	Natterer's Bat	03/10/2009	4.2km SE. Batlas 2010 by L. Adrehid	
Observation	*Myotis daubentonii*	Daubenton's Bat	20/09/2009	4.2km SE. Batlas 2010 by L. Adrehid	
			03/10/2009	6.5km SW. Batlas 2010 on stream near L. Derryhallagh	
Observation	*Pipistrellus sensu lato*	Pipistrelle	03/10/2009	4.9km W. By stream in Gorterwulla	
Observation	*Pipistrellus pygmaeus*	Soprano Pipistrelle	03/10/2009	4.2km SE. Batlas 2010 by L. Adrehid	
			20/09/2009	6.5km SW. Batlas 2010 on stream near L. Derryhallagh	
Ad hoc	*Pipistrellus nathusii*	Nathusius's Pipistrelle	05/09/2007	c. 9.3km E. In Oughterard	
Adhoc	*Nyctalus leisleri*	Leisler's Bat	03/10/2009	4.2km SE. Batlas 2010 by L. Adrehid	
Observation			25/08/2001	4.8km N. Far side of L. Corrib	

4.1.1 Bat Landscapes

The bat landscape association model (Lundy *et al,* 2011) suggests that the proposed wind farm site boundary is part of a landscape that is of High (Amber) suitability for bat species as a whole (33.6). The landscape suitability is highest for Brown Long-eared bats and Soprano Pipistrelle, high for Natterer's bats and Leisler's bat and moderate for Common Pipistrelle and Daubenton's bat. The site is of low suitability for Lesser horseshoe and lowest for Nathusius's Pipistrelle and Whiskered bat.

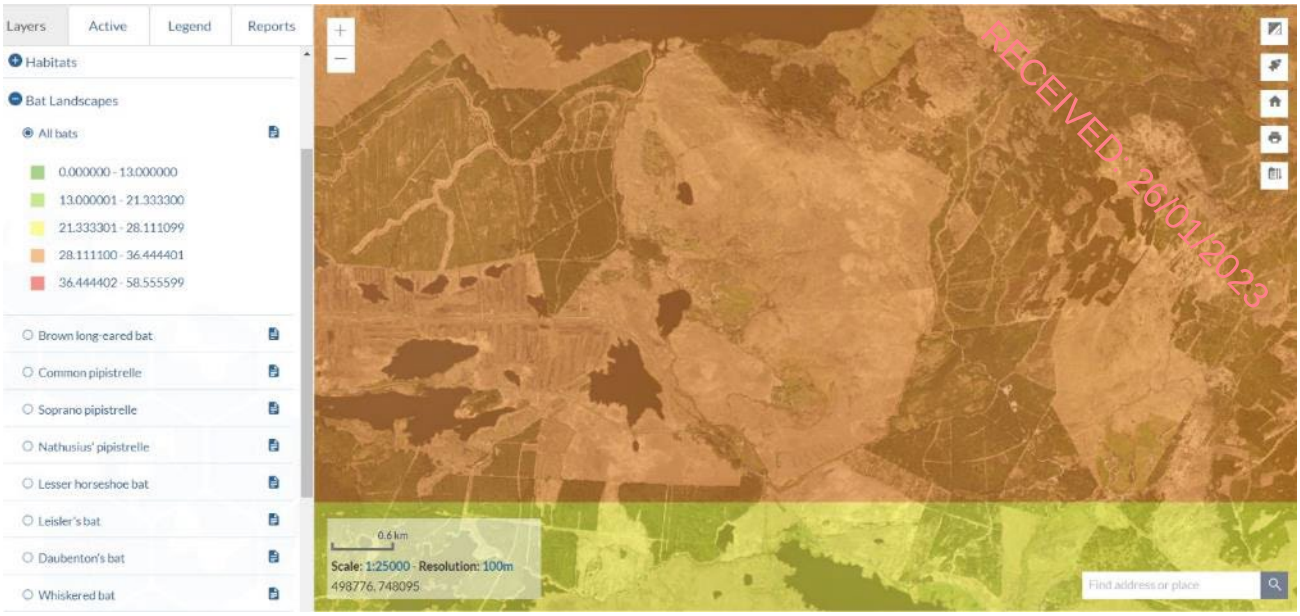


Figure 4-1: NBDC map highlighting the bat landscape for all bats (accessed December 2022)

4.1.2 Designated Sites

European Sites

Table 4-2: European sites within 15km of subject site

Name	Site Code	Distance (km)	Designated for Lesser Horseshoe	Site within designated roost's CSZ
Lough Corrib SAC	001217	1	Yes	No. The designated roost for this SAC is situated in Cong over 12km to the north-east.
Lough Corrib SPA	004042	1	No	-
Maumturk Mountains SAC	000861	1	No	-
Connemara Bog Complex SAC	000866	0.15	No	-
Lough Carra/Mask Complex SAC	000826	9	Yes	No
Lough Mask SPA	004062	10	No	-
Connemara Bog Complex SPA	004181	5	No	-
Kilkieran Bay and Islands SAC	001101	8	No	-
Ballymaglancy Cave, Cong SAC	001051	11	Yes	No
The Twelve Bens/Garraun Complex SAC	002031	13	No	-

Three European sites designated for bats are located within 15km of the proposed wind farm site boundary (see Table 4-2 above).

National Sites

Table 4-3: Nationally designated sites within 10km of subject site

Name	Site Code	Distance (km)	Designated for bats	Site within designated roost's CSZ
Lough Corrib pNHA	000297	1	Lesser Horseshoe	Refers to roost in Cong. Subject site sits outside the CSZ of this roost
Maumturk Mountains pNHA	002008	1.6	No	-
Connemara Bog Complex pNHA	002034	0.75	No	-
Maumtrasna Mountain Complex pNHA	000735	3.65	No	-
Oughterard District Bog NHA	002431	7.2	No	-
Oughterard National School pNHA	002082	8	Leisler's bat	Was the largest known Leisler's roost in Ireland. Site sits outside the CSZ of this roost.
Lough Carra/Mask Complex pNHA	001774	9.1	Lesser Horseshoe	Subject site sits outside the CSZ of this roost
Ballymaglancy Cave, Cong pNHA	000474	9.5	Lesser Horseshoe	No

Four pNHAs within 10 km of the proposed wind farm site boundary refer to bats (see Table 4-3 above).

4.2 Preliminary Roost Surveys 2020

Trees

There are no trees within the study area for the proposed windfarm at Tullaghmore. Trees within the surround area were examined for the potential to host bat roosts. A sycamore with a high potential roost feature (prf) was noted by a derelict ruin within recently cut plantation to the east of the site (53.459389 -9.4497867). This was examined during a night-time emergence survey dated 09/06/2020. No evidence of bat occupancy was noted.

Structures

No buildings or structures suitable for usage by bats can be found within the subject site. Structures outside the site were examined for evidence of roosts. The closest structures examined included a concrete bridge (53.454268 -9.4563424), stone bridge (53.447686 -9.471969), ruined dwelling (53.459389 -9.4497867), located within conifers to the east and an unoccupied house (53.457427 -9.4763865) located to the west.

The concrete bride had no gaps suitable for bat roosts and the stone bridge was gunnetted, again with no bat roosting potential. The two buildings showed moderate roosting potential so were examined using bat detectors during emergence periods.

Ruin (Dwelling 1)

This building refers to a cottage ruin and intact concrete shed located within recently cut conifers located to the east of the site (Plate 4-4). A tree with prf is located adjacent to the shed (Plate 4-5). The shed provides potential roost features though gaps in the stone wall and where the cast concrete roof meets the wall plate. The building has good potential to host bat roosts however a dawn survey conducted on the 09/06/2020 showed no evidence of roosting bats.

Unoccupied house (Dwelling 2)

This building refers to an unoccupied bungalow with slated roof located to the west of the site. The building is set within scrub, providing good bat connective features. Potential access points appear limited to the fascia as windows and doors are intact. A dawn roost survey was conducted on the 29/07/2020. No bats were found roosting here.

Plate 4-1: Concrete Bridge 1 No potential

Plate 4-2: Ruin 1 Dawn survey 09/06/2020

Plate 4-3: Tree with prf by ruin 1. Dawn survey 09/06/2020

Plate 4-4: Non-occupied house. Dawn survey 29/07/2020

Plate 4-5: Bridge has been gunetted – no potential

4.3 Bat Transect and Emergence Surveys 2020

The results of the bat activity (transect and emergence) surveys carried out in 2020 are presented below. Weather conditions for each of the survey dates are presented in Table 4-4.

Overall, five bat species were recorded (Common Pipistrelle, Soprano Pipistrelle, Leisler's bat, Natterer's bat, and Daubenton's bat). In situations where the call could not be identified to species, the identification was determined to the highest level possible.

The most recorded species was Common and Soprano Pipistrelle with low levels of other species, refer to Table 4.5. In upland conifer plantation Common Pipistrelle was most frequently recorded. All other species were most frequently recorded at lower altitudes. Myotis species were recorded mostly within the lowland southern native woodland adjacent to Lough Corrib. Highest activity was recorded on the 28th of August 2020 when surveys were conducted within conifer plantation to the east of the current site and lowland native woodland to the north of the site. Roost emergence / re-entry surveys did not reveal a bat roost.

Table 4-4: Weather Conditions per Survey

Date	Sunset / Sunrise	Start	Finish	Temp (°C)	Wind (Beaufort)	Precipitation
08/06/2020	22:01	21:30	00:31	11.5 - 10	1	Dry
09/06/2020	05:09	03:09	05:10	7.5 - 8	1	Dry
28/07/2020	21:37	21:07	00:07	16.5 - 14.5	0-1	Dry
29/07/2020	05:48	03:28	05:50	12.5 - 12	0-1	Dry
26/08/2020	20:38	20:08	23:45	14 - 12	1-2	Dry
27/08/2020	06:37	04:37	06:37	11 – 12.5	1-2	Dry
21/09/2020	19:36	19:06	00:40	14	0 - 1	Dry

Table 4-5: Transect Survey Results

Species	08/06/2020	09/06/2020	28/07/2020	29/07/2020	26/08/2020	27/08/2020	21/09/2020
CP	1	2	3	3	16	5	11
SP	-	-	8	5	21	-	7
40 kHz Pip	-	-	-	-	-	-	2
LB	-	-	3	2	-	-	-
My	-	-	-	-	-	-	-
Daub	-	-	-	-	2	-	-
Nat	-	-	-	-	5	-	-
Whisk / Daub	-	-	-	-	1	-	3
Total	1	2	14	10	45	5	23

Common Pipistrelle (CP), Soprano Pipistrelle (SP), Leisler's (LB), Myotis spp. (My), Natterer's (Nat), Daubenton's Bat (Daub), Whiskered or Daubenton's (Whisk / Daub)

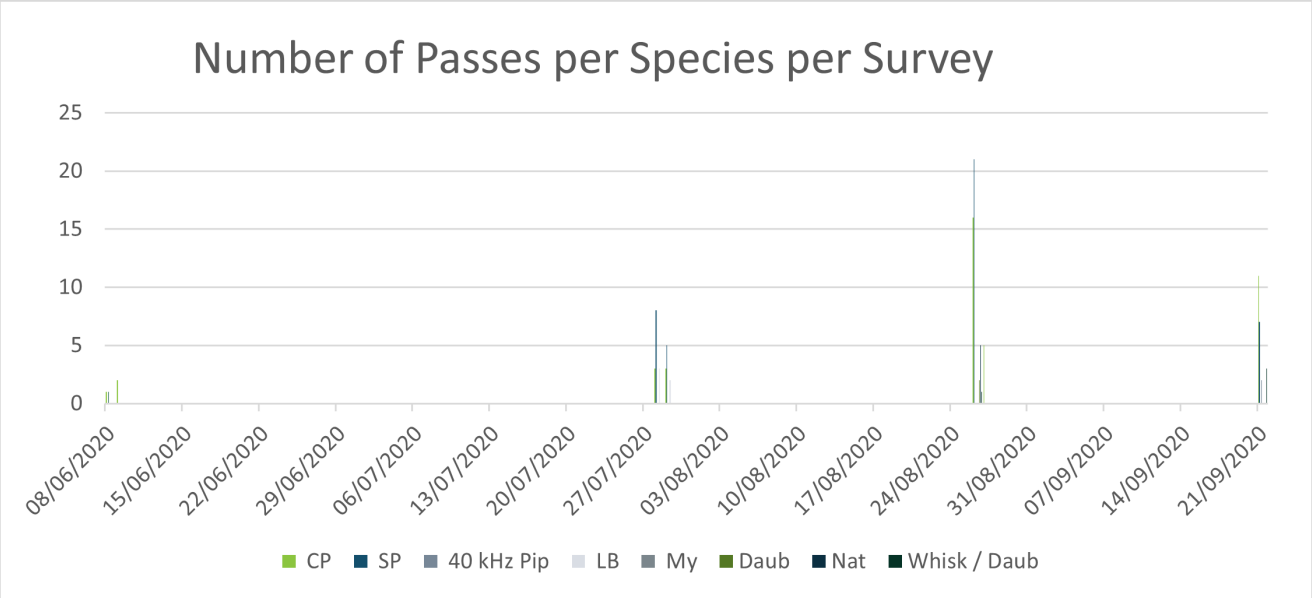


Figure 4-2: 2020 Activity Survey Bat Passes per Species

Bat survey 08th to the 09th of June 2020

Broadleaf sycamores were examined at the start of the survey for prfs. A transect was conducted along a track through conifer plantation to the east of the current site. Low bat activity was found with a single Common Pipistrelle recorded during the dusk survey.

Towards dawn the surveyor was positioned by a derelict dwelling to the east of transect 1. Although two Common Pipistrelle bat registrations were recorded no roosting bats were found.

Table 4-6: Bat Contacts 08th to the 09th of June 2020

Contact number	Time	Species	Details	Lat	Long
1	22:42	Common Pip	Feeding over plantation near edge c.5m high	53.454294	-9.4563734
1	03:49	Common Pip	Close to clearing in conifers	53.457566	-9.4511701
2	04:17	Common Pip	Unseen bat by derelict house	53.464209	-9.4679022

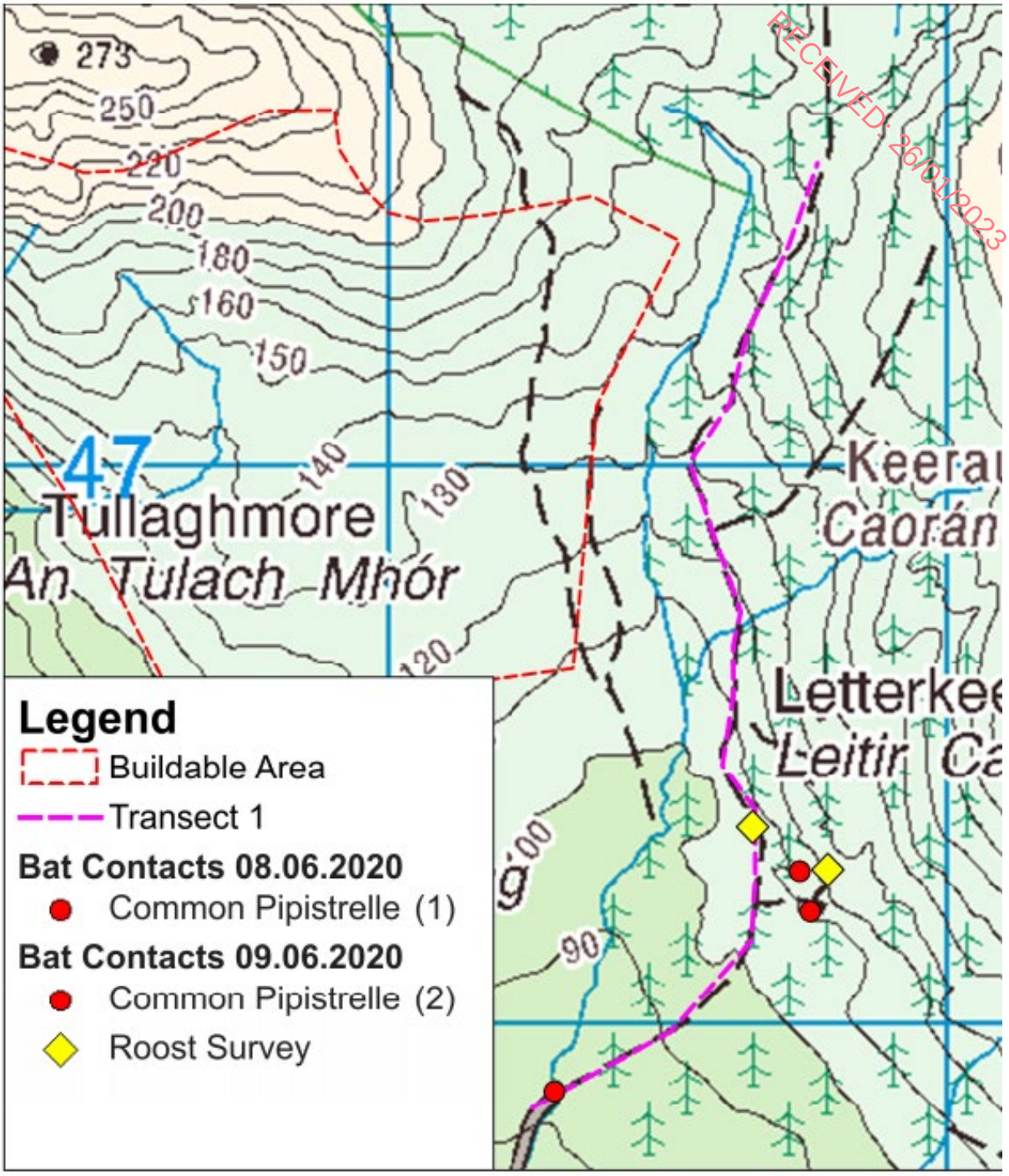


Figure 4-3: Bat Contacts 8th to the 9th of June 2020

Bat survey 28th and 29th of July

Surveys were conducted along the eastern conifers and by Lough Bofin to the south. Common Pipistrelle was recorded within conifers. Soprano Pipistrelle and Leisler's were noted by the lake. A roost survey was conducted towards dawn. Although Soprano Pipistrelle and Leisler's bat were recorded these showed no signs of roosting within the building. The last bat contact was recorded c. 35 minutes before sunrise.

Table 4-7: Bat Contacts 28th to the 29th of July 2020

Contact number	Time	Species	Details	Lat	Long
1	22:14:20	Common Pip	Track within conifers east of bog	53.45477	-9.45483
2	22:14:35	Common Pip		53.45471	-9.45496
3	23:30:57	Soprano Pip	N59 close to L. Bofin	53.44077	-9.45314
4	23:35:06	Leisler's Bat	L. Bofin	53.44031	-9.45571
5	23:35:10	Soprano Pip		53.44058	-9.45558
6	23:35:30	Soprano Pip		53.44049	-9.45563
7	23:36:00	Common Pip		53.44031	-9.45571
8	23:36:38	Soprano Pip		53.44015	-9.45588
9	23:37:12	Leisler's Bat		53.44015	-9.45588
10	23:38:30	Soprano Pip		53.44049	-9.45588
11	23:38:46	Soprano Pip		53.44049	-9.45588
12	23:39:08	Soprano Pip		53.44054	-9.45576
13	23:44:00	Leisler's Bat		53.44365	-9.46646
14	23:54:01	Soprano Pip		53.45713	-9.47641
1	04:15:47	Common Pip	Conifers east of site	53.44954	-9.44099
2	04:16:36	Common Pip		53.44938	-9.44013
3	04:23:06	Soprano Pip	Driven transect on N59 by L. Bofin	53.44062	-9.45624
4	04:23:16	Soprano Pip		53.44083	-9.45734
5	04:23:48	Soprano Pip		53.44206	-9.45998
6	04:24:02	Common Pip		53.44239	-9.46101
7	05:01:43	Soprano Pip	Emergence survey W house	53.45702	-9.47643
8	05:02:17	Soprano Pip		53.45702	-9.47643
9	05:13:48	Leisler's Bat		53.45702	-9.47643
10	05:14:02	Leisler's Bat		53.45702	-9.47643

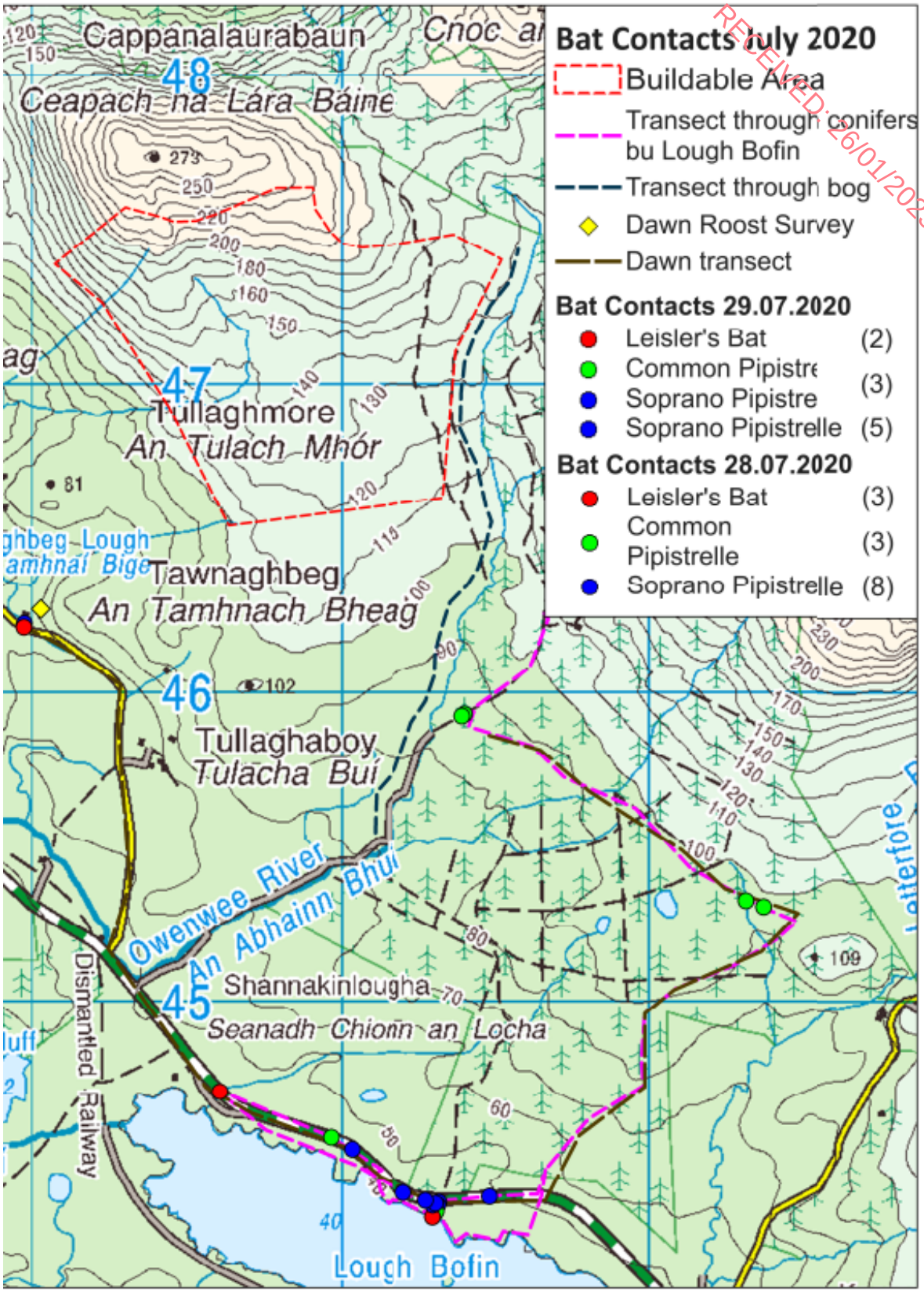


Figure 4-4: Bat Contacts 28th to the 29th of July 2020

Bat transect 26th and 27th of August

Surveys were conducted comparing activity within upland conifer plantation and northern lowland native woodland and edge of Lough Corrib. Daubenton's bat, Natterer's bat and possible Whiskered bat were noted in the lowland section. Higher levels of Soprano Pipistrelle were also recorded in the lower section. In the upland portion of the transect a feeding Common Pipistrelle was noted (4 registrations) in addition to sporadic calls of unseen Common and Soprano Pipistrelle. During the dawn survey low level of Common Pipistrelle was recorded in the upland conifer areas.

Table 4-8: Bat Contacts 26th to the 27th of August 2020

Contact number	Time	Species	Details	Activity	x
1	21:03:09	Soprano Pip	Northern woodlands	53.47838	-9.42099
2	21:07:20	Soprano Pip		53.48122	-9.42093
3	21:08:40	Soprano Pip		53.48134	-9.42057
4	21:10:57	Soprano Pip		53.48162	-9.42154
5	21:11:23	Soprano Pip		53.48176	-9.42196
6	21:11:58	Soprano Pip		53.482	-9.42244
7	21:13:59	Soprano Pip		53.48227	-9.42238
8	21:16:27	Soprano Pip		53.48176	-9.42188
9	21:17:45	Soprano Pip		53.48133	-9.4206
10	21:18:18	Whiskered / Daubenton's Bat		53.48122	-9.41986
11	21:18:33	Natterer's Bat		53.48121	-9.42018
12	21:19:01	Natterer's Bat		53.48122	-9.41986
13	21:22:06	Daubenton's Bat		53.48132	-9.41959
14	21:22:42	Natterer's Bat		53.48132	-9.41959
15	21:25:37	Soprano Pip		53.48132	-9.41959
16	21:54:21	Common Pip	Driven transect through conifer plantation	53.46089	-9.45177
17	21:55:40	Common Pip		53.46037	-9.45176
18	21:56:06	Common Pip		53.45989	-9.45206
19	21:57:45	Common Pip		53.45752	-9.45083
20	22:02:31	Common Pip		53.45061	-9.44207
21	22:22:03	Common Pip		53.45717	-9.44933
22	22:23:51	Soprano Pip		53.45717	-9.44933
23	22:24:13	Soprano Pip	Derelict dwelling within recently cut conifer	53.45724	-9.44924
24	22:24:43	Common Pip		53.45724	-9.44924
25	22:26:04	Common Pip		53.4572	-9.44895

Contact number	Time	Species	Details	Activity	x
26	22:26:20	Common Pip		53.45748	-9.44861
27	22:30:10	Common Pip		53.45777	-9.44887
28	22:31:58	Common Pip		53.4577	-9.44919
29	22:34:33	Common Pip		53.45763	-9.4493
30	22:35:23	Common Pip		53.45742	-9.44957
31	23:15:49	Soprano Pip	Northern native woodlands and L. Corrib	53.48153	-9.42138
32	23:16:17	Soprano Pip		53.4817	-9.42177
33	23:17:59	Soprano Pip		53.48213	-9.42268
34	23:18:18	Daubenton's Bat		53.48222	-9.42273
35	23:18:30	Soprano Pip		53.48231	-9.4228
36	23:18:45	Common Pip		53.48231	-9.4228
37	23:20:09	Soprano Pip		53.48214	-9.42266
38	23:20:40	Natterer's Bat		53.48205	-9.42263
39	23:21:33	Soprano Pip		53.48162	-9.42159
40	23:23:19	Soprano Pip		53.48128	-9.42047
41	23:24:20	Soprano Pip		53.48126	-9.41938
42	23:24:40	Natterer's Bat		53.4812	-9.41967
43	23:25:42	Common Pip		53.48122	-9.42075
44	23:30:05	Soprano Pip		53.48072	-9.42141
45	23:37:52	Common Pip		53.47617	-9.42435
1	05:13:18	Common Pip	Walked transect through conifer plantation	53.46738	-9.45106
2	05:13:07	Common Pip		53.46884	-9.44994
3	05:19:46	Common Pip		53.4647	-9.45311
4	05:33:00	Common Pip		53.46314	-9.45225
5	05:27:03	Common Pip		53.45972	-9.45195

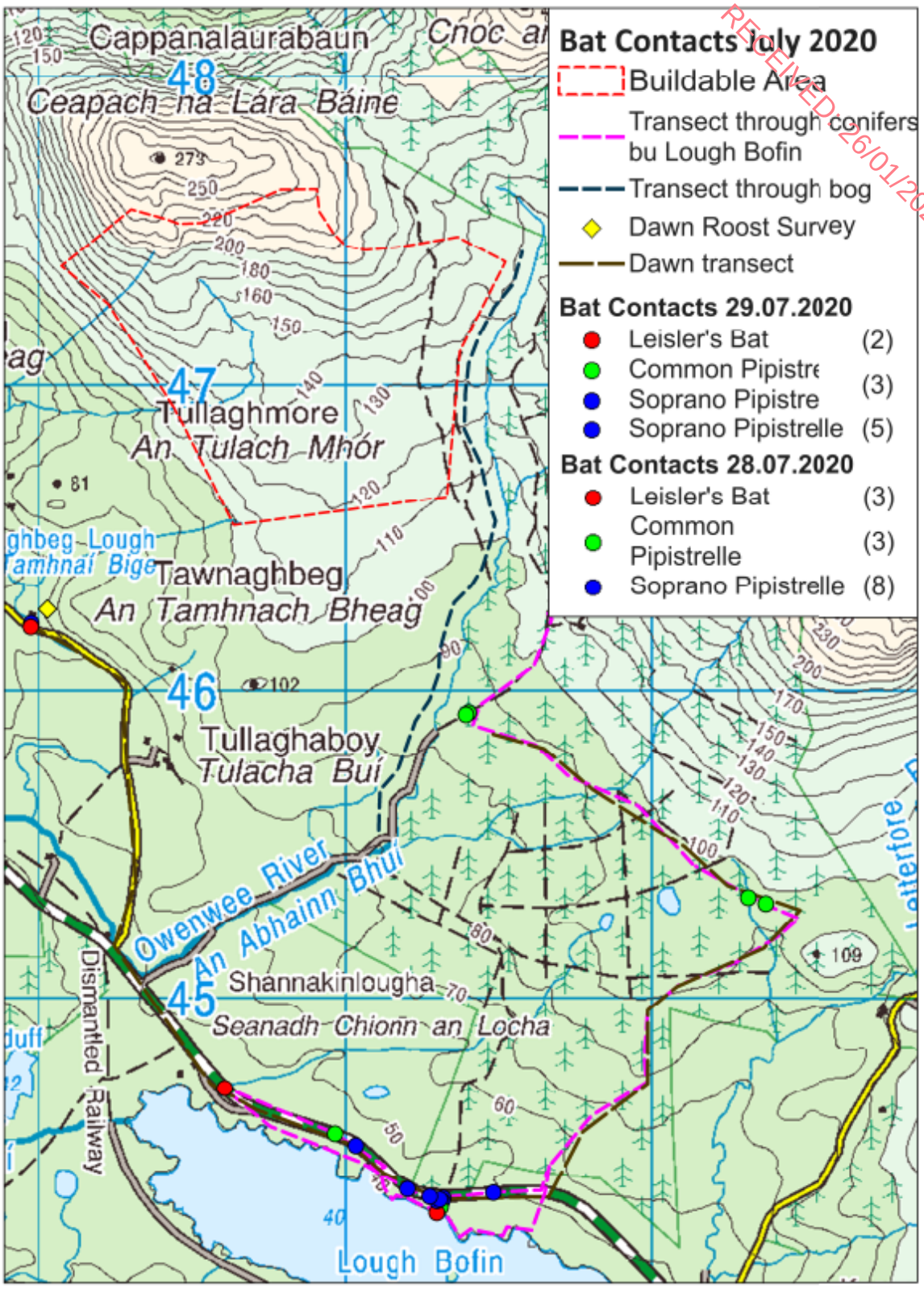


Figure 4-5: Bat Contacts 26th to the 27th of July 2020

Bat transect 21/09/2020

Surveys were conducted through conifer plantation to the east of the site and then through bog over to northwestern lake. Some areas of conifer plantation had feeding Common Pipistrelle alongside calls either Common or Nathusius (peak frequency of 40kHz). In addition, a Whiskered / Daubenton's bat was noted. In comparison the transect through the peatland (final study area) had much lower activity with brief contacts from Soprano Pipistrelle. Towards the lake a Whiskered / Daubenton was noted flying over peatland south away from the water and brief contacts from Soprano and Common Pipistrelle were recorded. No hunting Daubenton's were observed over the lake.

Table 4-9: Bat Contacts 21/09/2020

Contact number	Time	Species	Details	Activity	x
1	19:33:29	Common Pip	Eastern conifer plantation	53.45981	-9.44829
2	19:54:38	Common Pip		53.45762	-9.45091
3	20:05:13	Common Pip		53.45435	-9.45603
4	20:09:04	Common Pip		53.45428	-9.45635
5	20:19:19	40 kHz Pip		53.45753	-9.45107
6	20:28:00	Common Pip		53.45762	-9.451
7	20:36:42	Common Pip		53.45769	-9.458
8	20:39:21	Common Pip		53.45762	-9.451
9	20:41:05	Common Pip		53.45762	-9.451
10	20:44:23	Soprano Pip		53.45762	-9.451
11	20:48:48	Whiskered / Daubenton		53.45762	-9.451
12	20:49:15	Common Pip		53.45762	-9.451
13	20:49:41	40 kHz Pip		53.45762	-9.451
14	20:50:32	Common Pip		53.45762	-9.451
15	21:33:08	Soprano Pip	Peatland	53.46416	-9.46769
16	21:33:23	Soprano Pip		53.46416	-9.46769
17	21:42:24	Soprano Pip		53.46645	-9.47527
18	21:45:35	Soprano Pip		53.46698	-9.47878
19	21:45:42	Soprano Pip		53.46699	-9.47892
20	21:46:30	Whiskered / Daubenton	Peatland close to lake	53.46699	-9.47892
21	21:46:53	Soprano Pip		53.46699	-9.47892
22	21:59:55	Common Pip	By lake	53.46666	-9.48155
23	22:53:56	Whiskered / Daubenton	Eastern conifer plantation	53.46786	-9.45038

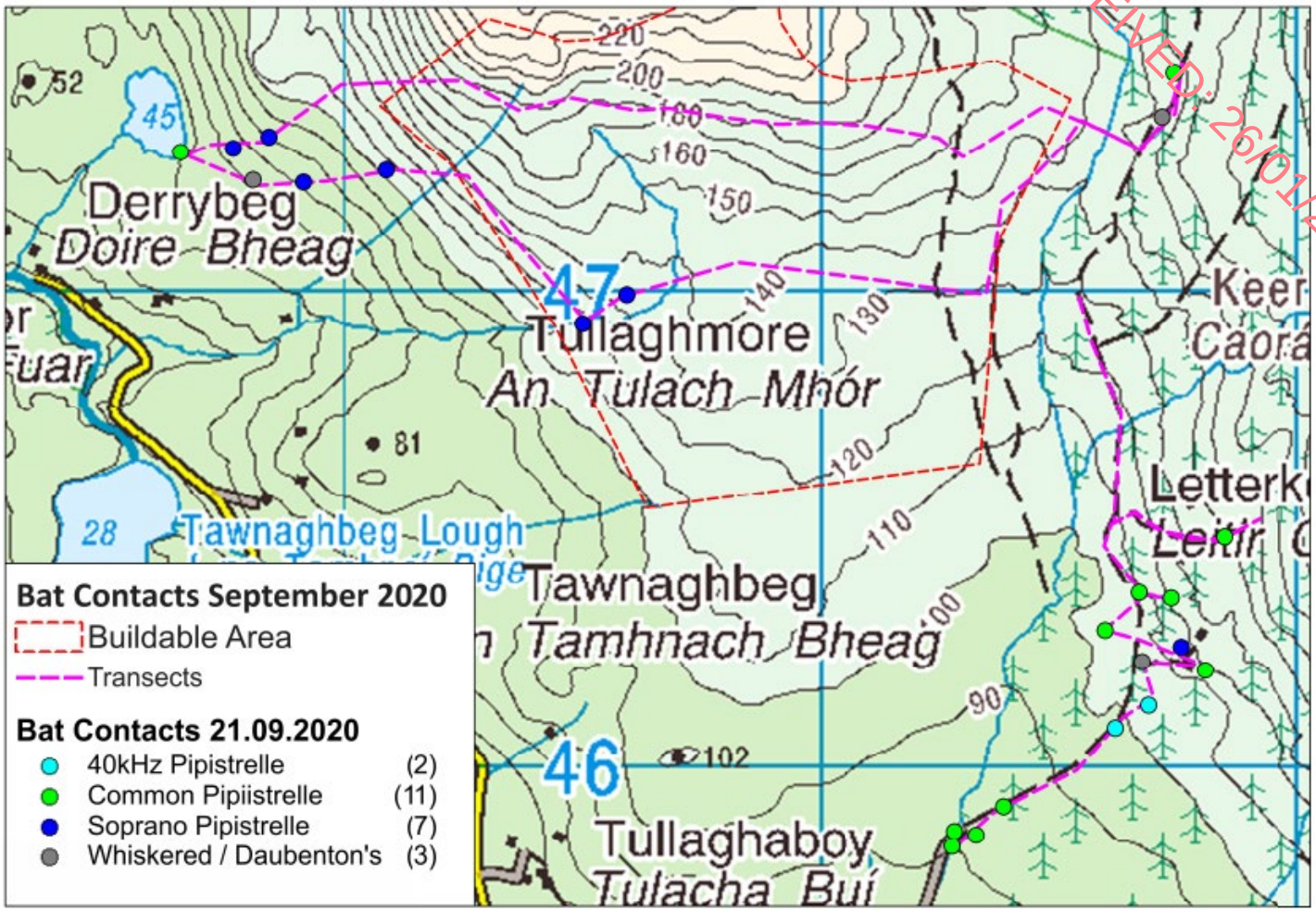


Figure 4-6: Bat Contacts 21st September 2020

4.4 Bat Static Detector Surveys 2020

Table 4-10 below summarises the results, in relation to bat species, recorded on the static detectors deployed in 2020. Detectors of most relevance to the current application (as outlined in Table 3-3) are highlighted in bold. Thirteen static units were deployed during each survey period baring autumn when an additional detector was placed in lowland woodland to the north-east of the site. Overall, seven bat species were recorded (Common Pipistrelle, Soprano Pipistrelle, Nathusius' pipistrelle, Leisler's bat, brown long-eared bat, Natterer's bat and Lesser Horseshoe bat). Where the call could not be identified to species, the identification was determined to genus level. Several registrations were recorded with a peak frequency of 40kHz. These bats will have been either common or Nathusius's Pipistrelle. More detailed results are provided in Appendix B.

The following should be noted:

- D10 failed during the summer period so was redeployed from the 22nd August to 01st Sept. The reduced deployment time has been considered.
- D11 did not record anything after the night of the 3rd /4th of August thus it is assumed batteries failed. The recording period dated 4th/5th to the 13th/14th of August has been deducted from the recorded period

Table 4-10: Summary results of Static Bat Detectors Deployed during Survey Periods 1 to 3. Detectors of highest relevance to current application are highlighted in bold

Detector	Habitats	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius's Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Lesser Horseshoe Bat	Total	Minutes recorded	Bat passes per hour
D1	**PB**[9]	**40**	**22**	**69**	**143**	**0**	**31**	**4**	**13**	**0**	**322**	**22,516**	**0.86**
D2	**PB**	**87**	**31**	**279**	**351**	**0**	**37**	**21**	**15**	**0**	**821**	**22,516**	**2.19**
D3	PB, BL3	91	22	295	455	5	67	6	65	0	1006	22,516	2.68
D4	WD1	54	11	557	122	0	4	42	33	0	823	22,516	2.19
D5	**PB**	**43**	**27**	**82**	**237**	**1**	**21**	**11**	**7**	**0**	**429**	**22,516**	**1.14**
D6	**PB**	**46**	**31**	**46**	**179**	**0**	**32**	**8**	**3**	**0**	**345**	**22,516**	**0.92**
D7	PB, BL3	50	17	69	190	1	30	3	18	0	378	22,516	1.01
D8	WS5	72	126	296	232	2	51	13	16	0	808	22,516	2.15
D9	WD4, ED3	79	22	52	262	0	57	7	3	0	482	22,516	1.28
D10	**FW, WD4, PB**	**100**	**20**	**688**	**332**	**1**	**53**	**17**	**26**	**0**	**1237**	**19,277**	**3.85**
D11	WD4, WS5	367	9	10,053	825	134	44	34	669	0	12135	16,576	43.92
D12	**PB**	**160**	**9**	**84**	**63**	**3**	**29**	**20**	**81**	**0**	**449**	**22,516**	**1.20**
D13	WD4, ED3	68	12	110	171	0	17	27	2	0	407	22,516	1.08
D14	WN, FW	262	0	1	68	0	0	123	1	1	455	7,415	3.68
Total	-	1519	359	12,681	3630	147	473	336	952	1	20097	290,944	4.14

[9] BL3 Tertiary Road, ED3 Recolonised track; FW Stream, PB Peatland, WD4 Conifer plantation, WN Native woodland, WS5 Recently felled conifers

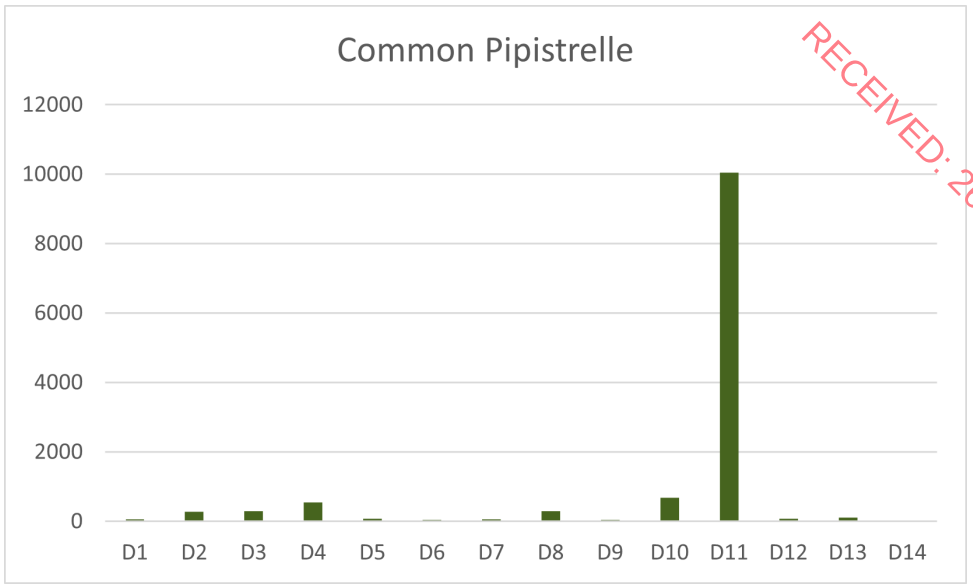


Plate 4-6: **Total number of bat passes recorded for Common Pipistrelles at each of the static detector locations in 2020.**

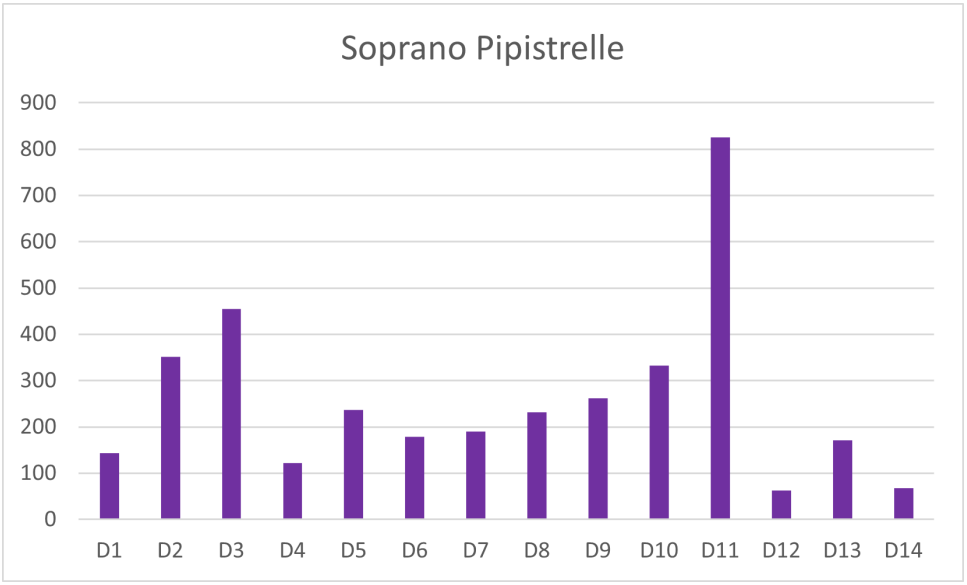


Plate 4-7: **Total number of bat passes recorded for Soprano Pipistrelles at each of the static detector locations in 2020.**

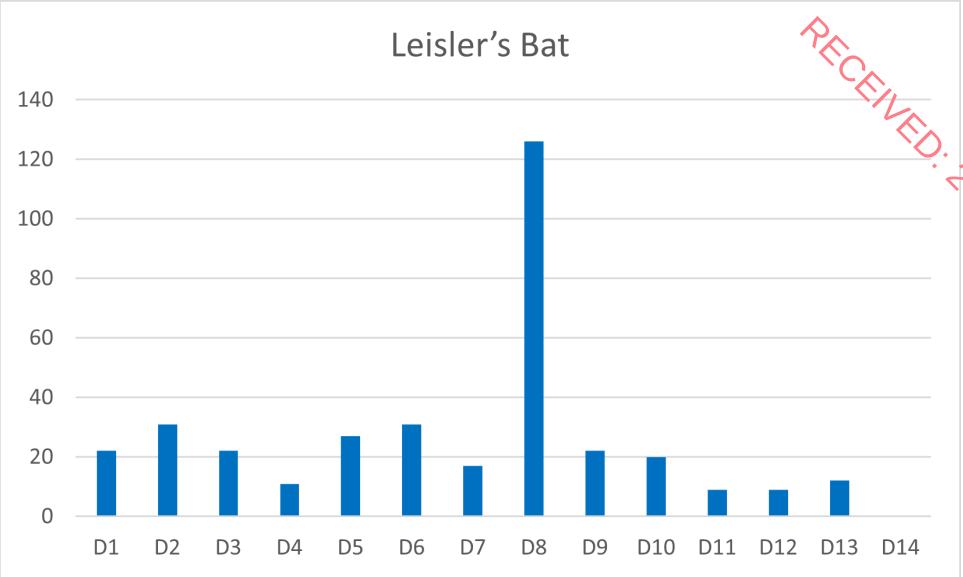


Plate 4-8: **Total number of bat passes recorded for Leisler's bat at each of the static detector locations in 2020.**

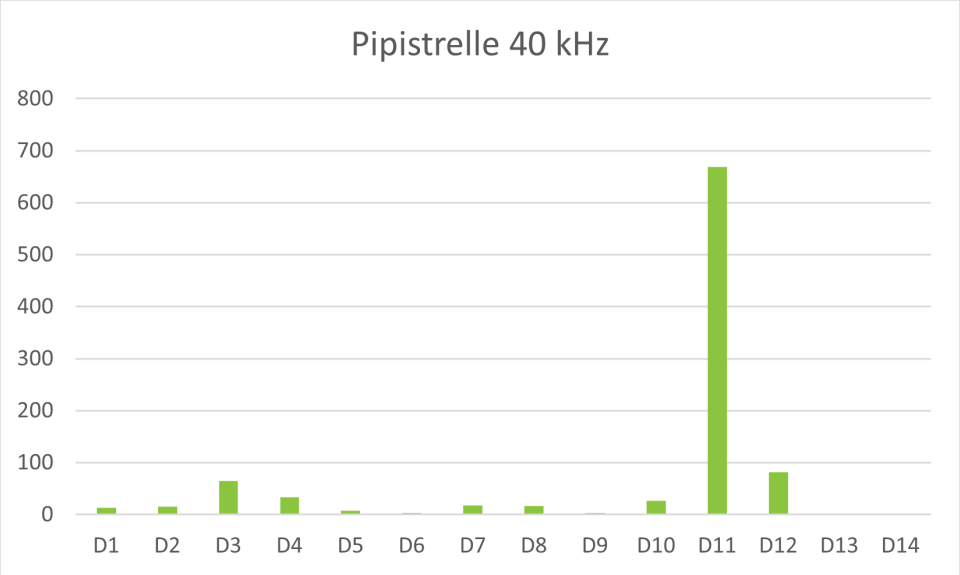


Plate 4-9: **Total number of bat passes recorded for 40kHz Pipistrelle bat at each of the static detector locations in 2020.**

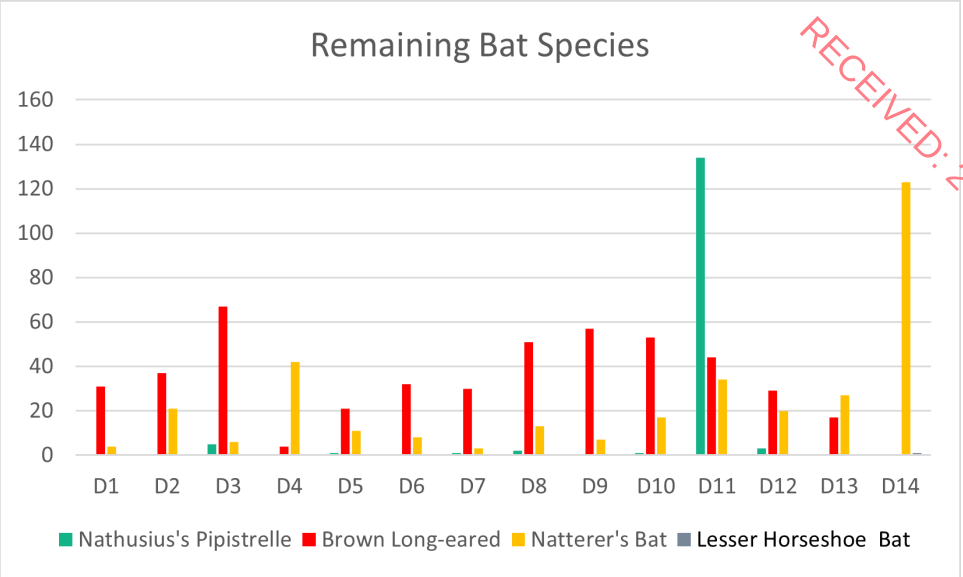


Plate 4-10: Total number of bat passes recorded for remaining bat species at each of the static detector locations in 2020.

Static location D11 had the highest number of passes for Myotis bats, Common, Soprano, Nathusius's and 40kHz Pipistrelle bats. The median number of Common Pipistrelle registrations per night was 297.

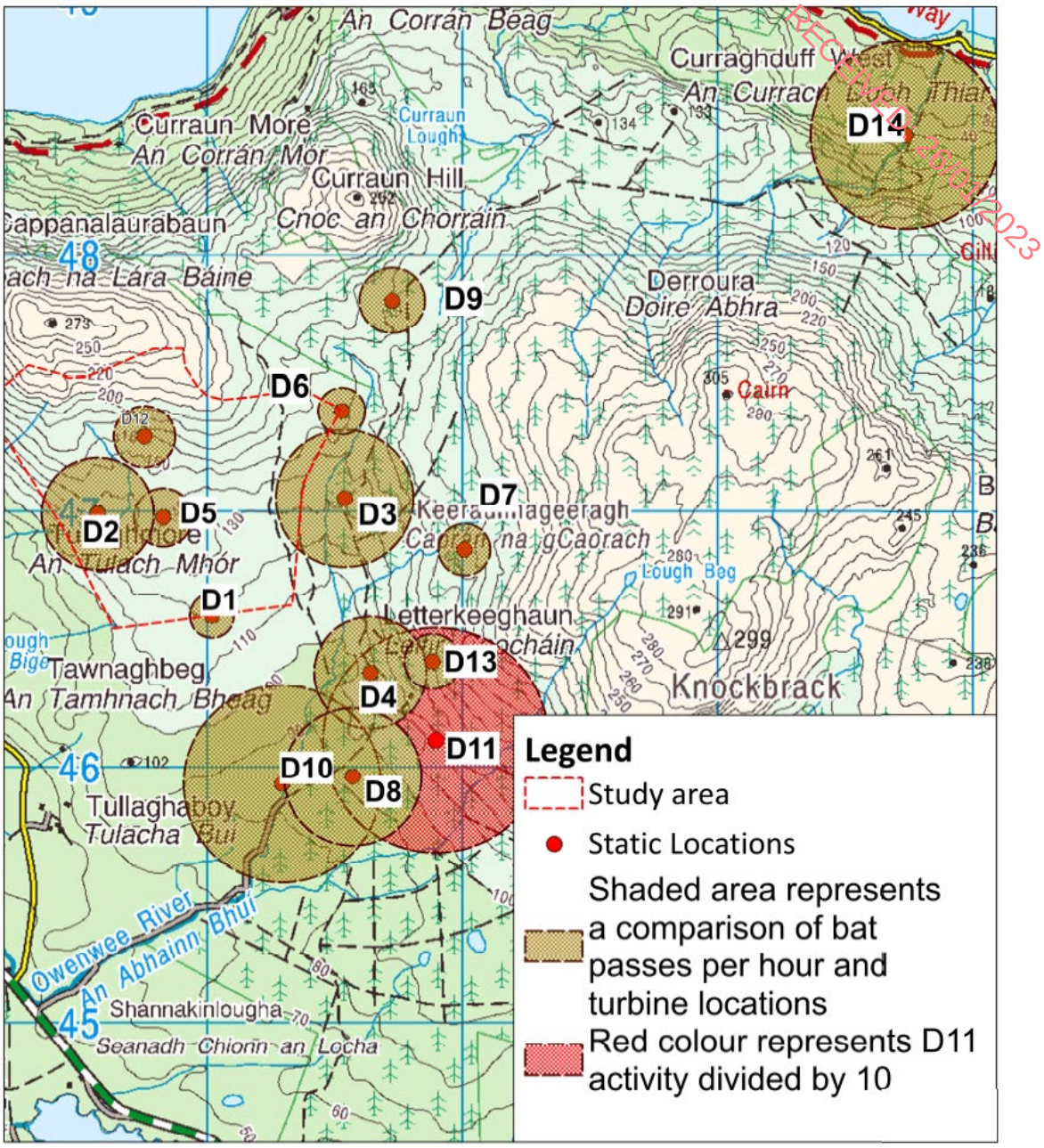


Figure 4-7: Static locations with proportion of activity based on bat passes per hour.

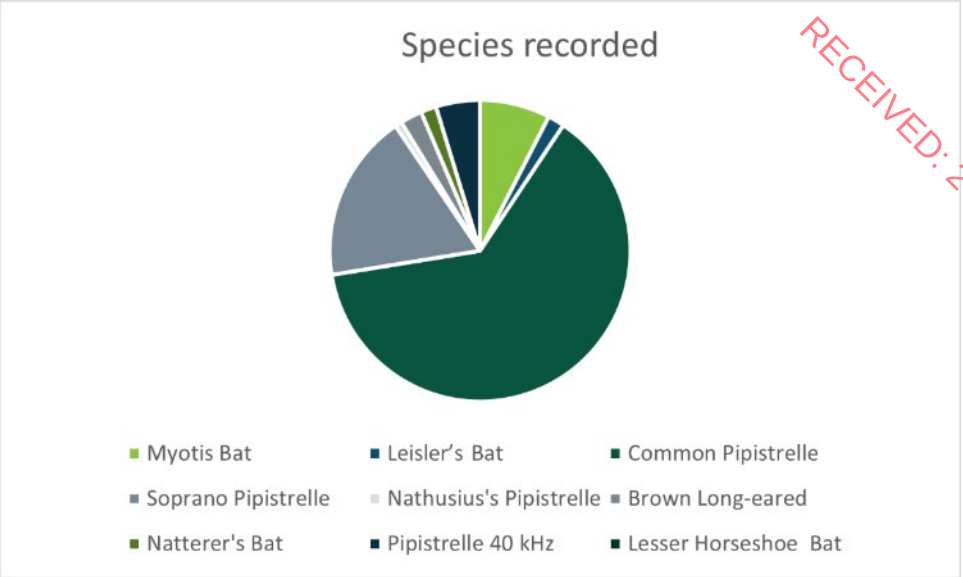


Plate 4-11: Species recorded during all static surveys

4.5 Ecobat

Although all data was analysed using the ECOBAT tool, only those detectors of relevance to the current application are displayed below. Analysis from all detectors can be found in Appendix C and D. Analysis was undertaken for each survey period separately. Where groups of detectors were deployed for different dates within a survey period, those that were deployed for the same dates were analysed together (details are provided for each survey period below). The reference range datasets were stratified to include:

- Only records from within 30 days of the survey date.
- Only records from within 100 km^2 of the survey location.
- Records using any make of bat detector.

The Ecobat tool provides a series of summary tables to enable analysis of the bat activity level at each static location.

4.5.1 Ecobat results for detectors most relevant to current proposal

Table 4-11 and 4-12 below provides a summary of bat activity from those turbines most relevant to the current proposal (based on Table 3-3). None of these detector locations showed high activity.

Table 4-11: Summary showing the number of nights recorded bat activity fell into each activity band for each species at the static locations relevant to the proposed project and bat activity category based on median percentile – all periods

Location	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	Median Percentile	Bat Activity Category
L1	*Myotis*	0	0	6	3	28	0	Low
L1	*Myotis nattereri*	0	0	0	0	37	0	Low
L1	*Nyctalus leisleri*	0	0	3	3	31	0	Low
L1	*Pipistrellus nathusii*	0	0	2	2	33	0	Low
L1	*Pipistrellus*	0	3	5	1	28	0	Low
L1	*Pipistrellus pygmaeus*	2	6	2	2	25	16	Low
L1	*Plecotus auritus*	0	2	1	2	32	0	Low
L2	*Myotis*	0	5	6	4	22	8	Low
L2	*Myotis nattereri*	0	0	4	1	32	0	Low
L2	*Nyctalus leisleri*	0	0	3	6	28	0	Low
L2	*Pipistrellus nathusii*	0	2	0	0	35	0	Low
L2	*Pipistrellus*	3	6	7	5	16	36	Low to Moderate
L2	*Pipistrellus pygmaeus*	6	4	7	4	16	34	Low to Moderate
L2	*Plecotus auritus*	0	1	2	6	28	0	Low
L5	*Myotis*	0	0	9	6	22	0	Low
L5	*Myotis nattereri*	0	0	0	3	34	0	Low
L5	*Nyctalus leisleri*	0	0	5	1	31	0	Low
L5	*Pipistrellus nathusii*	0	0	0	1	36	0	Low
L5	*Pipistrellus*	1	1	7	3	25	8	Low
L5	*Pipistrellus pygmaeus*	5	4	6	5	17	34	Low to Moderate
L5	*Plecotus auritus*	0	0	1	4	32	0	Low
L6	*Myotis*	0	1	9	5	22	0	Low
L6	*Myotis nattereri*	0	0	0	3	34	0	Low
L6	*Nyctalus leisleri*	0	0	4	6	27	0	Low
L6	*Pipistrellus nathusii*	0	0	0	0	37	0	Low
L6	*Pipistrellus*	0	2	4	6	25	0	Low
L6	*Pipistrellus pygmaeus*	3	6	4	4	20	18	Low
L6	*Plecotus auritus*	0	0	3	4	30	0	Low
L10	*Myotis*	0	7	9	5	9	45	Moderate

Location	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	Median Percentile	Bat Activity Category
L10	*Myotis nattereri*	0	0	2	1	27	0	Low
L10	*Nyctalus leisleri*	0	0	2	0	28	0	Low
L10	*Pipistrellus nathusii*	0	0	3	2	25	0	Low
L10	*Pipistrellus*	5	8	5	3	9	53	Moderate
L10	*Pipistrellus pygmaeus*	3	6	7	3	11	43	Moderate
L10	*Plecotus auritus*	0	1	7	4	18	17	Low
L12	*Myotis*	2	7	7	3	18	26	Low to Moderate
L12	*Myotis nattereri*	0	0	3	2	32	0	Low
L12	*Nyctalus leisleri*	0	0	1	1	35	0	Low
L12	*Pipistrellus nathusii*	1	0	4	0	32	0	Low
L12	*Pipistrellus*	1	1	4	5	26	0	Low
L12	*Pipistrellus pygmaeus*	0	3	5	5	24	0	Low
L12	*Plecotus auritus*	0	0	4	3	30	0	Low

Table 4-12: Summary showing the number of nights recorded bat activity fell into each activity band for each species across the detectors relevant to the current application for all survey periods combined

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	Median Percentile	Bat Activity Category
Myotis	2	20	46	26	121	4	Low
Myotis nattereri	0	0	9	10	196	0	Low
Nyctalus leisleri	0	0	18	17	180	0	Low
Pipistrellus nathusii	1	2	9	5	198	0	Low
Pipistrellus	10	21	32	23	129	4	Low
Pipistrellus pygmaeus	19	29	31	23	113	26	Low to Moderate
Plecotus auritus	0	4	18	23	170	0	Low

5. ECOLOGICAL EVALUATION

5.1 Bat species recorded and Sensitivity

Eight species of bat were recorded during the 2020 bat surveys at Tullaghmore. The table below provides an ecological valuation of each bat species and the collision risk factor in relation to wind farms. Four of the bat species recorded are considered to be High risk.

Table 5-1: Ecological evaluation of the bat species recorded during the bat survey (CIEEM Guidelines, 2021) and "Bat Risk" in relation to Wind Turbines (SNH, 2019), (Commission, 2020)

Ecological Value	Geographical Scale of Importance	Bat Risk
International	Leisler's bat Lesser Horseshoe Bat	High Low
Regional	Brown long-eared bat Natterer's bat Nathusius' pipistrelle	Low Low High
County		
Local	Soprano Pipistrelle Common Pipistrelle Daubenton's bat	High High Low
Negligible		

Site Risk Assessment & Impact Assessment (Aughney, 2019):

According to (SNH, 2021) wind farms can affect bats in the following ways:

1. Collision mortality, barotrauma [10] and other injuries (although it is important to consider these in the context of other forms of anthropogenic mortality)
2. 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);
3. Loss of, or damage to, roosts;
4. Displacement of individuals or populations (due to wind farm construction or because bats avoid the wind farm area).

(10) *It should also be noted that although mortality of bats at wind farms include barotrauma (that results from exposure to the pressure variations caused by rotating turbine blades) as first presented by Baerwald et al. (2008) a number of studies since, including NREL (2012). *Reducing Bat Fatalities From Interactions with Operating Wind Turbines* and Lawson et al. (2020). *An investigation into the potential for wind turbines to cause barotrauma in bats*, dispute the hypothesis that barotrauma is responsible for a significant number of wind-turbine-related bat fatalities. However, the more recent studies have been undertaken on several mammal species (representative of bat species) as there is no data available on pressure change levels that cause barotrauma in bats.

According to the (SNH, 2021), to ensure that bats are protected by minimising the risk of collision, an assessment of impact at a site requires an 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.
- The effect on the species' population status if predicted impacts are not mitigated.

In addition, it is recommended to consider the relevant factors in the assessment process:

- Is the bat species at the edge of its range
- Cumulative effects
- Presence of protected sites
- Proximity of maternity roosts
- Key foraging areas
- Key flight lines
- Possible migration routes.

Using the SNH guidelines outlined in Table 5-2 the following risk assessment for the individual turbines in relation to each bat species recorded was completed using the following values:

- Project Size = Large (turbine height is higher than 100m)
- Habitat Risk = Low

Table 5-2: Stage 1 - Initial site risk assessment extracted from SNH (2019) guidance document

Site Risk Level (1-5)*	Project Size			
		Small	Medium	Large
Habitat Risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5

Key: Green (1-2) - low/lowest site risk; Amber (3) - medium site risk; Red (4-5) - high/highest site risk.

* Some sites could conceivably be assessed as being of no (0) risk to bats. This assessment is only likely to be valid in more extreme environments, such as above the known altitudinal range of bats, or outside the known geographical distribution of any resident British species.

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

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

Therefore, a value of 3 is applied to the proposed wind farm site and this is multiplied by the Ecobat value for the four most common bat species recorded which are also High Risk species (i.e. Leisler's bat, Common Pipistrelle, Nathuius' pipistrelle and Soprano Pipistrelle) for two separate value categories.

The overall value of the site (Table 5-8) is based on the summary tables for these species yielded from Ecobat analysis (Table 5-3 to Table 5-6).

- Highest Ecobat activity category recorded;
- Most frequent activity category (i.e., median value).

It should be noted that the Impact Assessment is based on the median values to determine overall risk to population.

Table 5-3: Risk Assessment Matrix

	Ecobat activity category					
Site Risk	**Nil (0)**	**Low (1)**	**Low – Moderate (2)**	**Moderate (3)**	**Moderate – High (4)**	**High (5)**
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Medium (3)	0	3	6	9	12	15
High (4)	0	4	8	12	15	18
Highest (5)	0	5	10	15	20	25

Overall assessment value (i.e., Turbine Risk value) is then compared to the ranges below:

Low Overall Risk (0-4)	Medium Overall Risk (5-12)	High Overall Risk (13-25)

With regards to the Ecobat Maximum Percentile for Leisler's bat, all relevant locations have a medium risk factor.

With regards to the Ecobat median, all locations had a low risk. This is presented in Table 5-4:

Table 5-4: Risk assessment for relevant detector locations - Leisler's bat

Bat detector ID No.	Site risk value	Ecobat Maximum Percentile	Risk (site risk x Ecobat Maximum Percentile)	Ecobat median percentile	Risk (site risk x Ecobat median category)
D1	3	3	**9**	1	**3**
D2	3	3	**9**	1	**3**
D5	3	3	**9**	1	**3**
D6	3	3	**9**	1	**3**
D10	3	3	**9**	1	**3**
D12	3	3	**9**	1	**3**

With regards to the Ecobat Maximum Percentile for Nathusius's pipistrelle, locations D12 has a High Risk Factor, while locations D10, 5, 2 and 1 have a Medium Risk Factor and D6 has a Low risk. With regards to the Ecobat median, all locations had a low risk. This is presented in Table 5-5.

Table 5-5: Risk assessment from detector locations – Nathusius's pipistrelle

Bat detector ID No.	Site risk value	Ecobat Maximum Percentile	Risk (site risk x Ecobat Maximum Percentile)	Ecobat median percentile	Risk (site risk x Ecobat median category)
D1	3	3	**9**	1	**3**
D2	3	4	**12**	1	**3**
D5	3	2	**6**	1	**3**
D6	3	1	**3**	1	**3**
D10	3	3	**9**	1	**3**
D12	3	5	**15**	1	**3**

With regards to the Ecobat Maximum Percentile for Common Pipistrelle, locations D2, 5, 10 and 12 have a High Risk Factor, while locations D1 and D6 have a Medium Risk Factor. With regards to the Ecobat median, location D2 and D10 have a Medium Risk Factor, while locations D1, 5, 6 and 12 have a Low Risk Factor. This is presented in Table 5-6.

Table 5-6: Risk assessment from detector locations – Common Pipistrelle

Bat detector ID No.	Site risk value	Ecobat Maximum Percentile	Risk (site risk x Ecobat Maximum Percentile)	Ecobat median percentile	Risk (site risk x Ecobat median category)
D1	3	4	**12**	1	**3**
D2	3	5	**15**	2	**6**
D5	3	5	**15**	1	**3**
D6	3	4	**12**	1	**3**
D10	3	5	**15**	3	**9**
D12	3	5	**15**	1	**3**

With regards to the Ecobat Maximum Percentile for Soprano Pipistrelle, all the locations baring D12 (which has a Medium Risk factor) have a High Risk factor. With regards to the Ecobat median, locations D2, 5 and 10 have a Medium Risk factor, while locations D1, 6 and 12 have a Low Risk Factor. This is presented in Table 5-7

Table 5-7: Risk assessment from detector locations – Soprano Pipistrelle

Bat detector ID No.	Site risk value	Ecobat Maximum Percentile	Risk (site risk x Ecobat Maximum Percentile)	Ecobat median percentile	Risk (site risk x Ecobat median category)
D1	3	5	**15**	1	**3**
D2	3	5	**15**	2	**6**
D5	3	5	**15**	2	**6**
D6	3	5	**15**	1	**3**
D10	3	5	**15**	3	**9**
D12	3	4	**12**	1	**3**

5.2 Habitat Assessment

The habitat assessment determines the value of the habitat to bat species with regards to potential roosting, commuting or foraging value as indicated by current guidelines and literature including (but not limited to) Collins 2016, Denzinger 2013, Kirkpatrick 2016 and Finch 2020.

5.2.1 Within Study Area

Peatland

The subject site consists of uniform open heath. The site rises to the north-west. This habitat lacks any roosting potential nor contains any landscape features suitable for commuting and foraging bats thus this area is considered as *Low Ecological value* for bats.

5.2.2 Habitats Surveyed in 2020 Outside the Study Area

Plantation woodland

A study by Kirkpatrick (2016) identified that, although bat associations with plantation habitat features are separated into two broad guilds (those using more complex habitats such as soprano pipistrelle and Myotis spp., and open space foragers such as noctule and to some extent common pipistrelle), all species preferentially used stand edges. Plantation edges may also allow both clutter tolerant and clutter sensitive bats access to navigate both within and around stands of plantation. The study further concluded that a possible reason for the higher activity levels found at forestry edges may be due to providing protection from the wind for weak flying prey or acting as windbreaks collecting airborne insects blown in from adjacent open or felled areas and also providing protection from predators.

The edge ecology is considered as *High Ecological value for bats*, while the dense woodland stands (internal ecology) are of *Low Ecological value* for bats at the Site.

5.3 Summary of Assessments

Table 5-8: Summary of bat survey data relevant to current project and assessment

Static Detector ID	Risk Assessment Leisler's bat		Risk Assessment Common Pipistrelle		Risk Assessment Soprano Pipistrelle		Risk Assessment Nathusius' pipistrelle		Clarifying comment	Bat Habitat within 200m of turbine	If no mitigation is applied, what is the potential impact level?
	Ecobat Maximum Percentile	Ecobat Median Percentile	Ecobat Maximum Percentile	Ecobat Median Percentile	Ecobat Maximum Percentile	Ecobat Median Percentile	Ecobat Maximum Percentile	Ecobat Median Percentile	Is location of static at turbine location Yes/No		Taking into consideration the clarifying comment.
1	9	3	12	3	15	3	9	3	No		
10	9	3	15	9	15	9	9	3	No	Yes	Low
Combined	9	3	13	5	15	5	9	3	No		
6	9	3	12	3	15	3	3	3	No	Yes	Low
6	9	3	12	3	15	3	3	3	No		
12	9	3	15	3	12	3	15	3	No	Yes	Low
Combined	9	3	13.5	3	13.5	3	9	3	No		
5	9	3	15	3	15	6	6	3			
2	9	3	15	6	15	6	12	3	No	No	Low
Combined	9	3	15	4.5	15	6	9	3			
2	9	3	15	6	15	6	12	3	Yes	No	Low
1	9	3	12	3	15	3	9	3	No	No	Low

6. DISCUSSION

The methodology for the 2020 bat surveys at Tullaghmore wind farm adhered to SNH (2019) and (SNH, 2021) guidance for assessing the impact of proposed wind farm developments on local bat species. Roost assessment, emergence surveys and activity surveys were undertaken between June and September 2020. Three rounds of static detectors were also deployed, for a minimum of 10 nights per round per detector.

During activity surveys, a total of five species of bats were recorded: Common Pipistrelle, Soprano Pipistrelle, Leisler's bat, Natterer's bat, and Daubenton's bat. Where the call could not be identified to species, the identification was determined to the highest possible level. The most commonly recorded species was common and Soprano Pipistrelle, with low levels of Leisler's and myotis species.

The deployment locations for statics D1, D2, D5, D6, D10 and D12 are representative of the current study area. All other statics were placed within conifer plantation habitats located to the east of the site. Habitats here have higher potential for bat activity and data from these detectors are not relevant to the current planning application except to demonstrate how bats prefer utilising landscape features such as paths and woodland edges than the open heath found within the proposed site.

A study by Kirkpatrick (2016) identified that, although bat associations with plantation habitat features are separated into two broad guilds (those using more complex habitats such as Soprano Pipistrelle and Myotis spp., and open space foragers such as noctule and to some extent Common Pipistrelle), all species preferentially used stand edges. Plantation edges may also allow both clutter tolerant and clutter sensitive bats access to navigate both within and around stands of plantation. The study further concluded that a possible reason for the higher activity levels found at forestry edges may be due to providing protection from the wind for weak flying prey or acting as windbreaks collecting airborne insects blown in from adjacent open or felled areas and also providing protection from predators. As such, static location D10 is also indicative of expected activity levels along edges of plantation woodland. With regards to open areas within woodland, Kirkpatrick (2016) identified open space and felled woodland stands are used by both open and edge-space foragers. As such, static location D8 and D11 are indicative of activity levels in open spaces within plantation woodland.

During the Autumn period, a static D14 was placed to the south of the site within lowland native woodland with connectivity to the conifer plantation located to the west of the site. This was the only detector where Lesser Horseshoe bat was recorded.

During static detector surveys a total of seven species of bat were recorded. In addition to the five species identified during activity surveys, Nathusius' pipistrelle and (a single) Lesser Horseshoe bat registrations were also recorded. Common Pipistrelle was the most frequently recorded species across all static locations while Soprano Pipistrelle had marginally higher registrations when solely examining statics relevant to the current application. Low levels of

The Ecobat analysis showed all 13 of the static detector locations recorded at least one night of high bat activity during period two (summer) and period three (autumn), while only 4 of the 13 static detector locations recorded at least one night of high bat activity during period one (spring). All of these 4 detectors were placed within conifer plantation habitats now not included within the redefined site boundary. D11 based within mature conifers showed a marked higher level of bat activity than all others. This occurred throughout each recording period. This detector is not located within the current proposed final study area.

All bats recorded are classified as 'Least Concern' on the Irish Red List (2019) and protected under the EU Habitats Directive Annex IV and Wildlife Acts.

Due to the levels of nightly bat activity (with regard to median values as determined by Ecobat analysis) at each of the static locations, locations 1 and 5 have a medium risk for Common and Soprano Pipistrelle while location 4 is a medium risk for Soprano Pipistrelle.

Each of the relevant detectors shows overall low levels of activity for each of the high risk bat species however as the Maximum percentile figures demonstrate, sporadic nights of high activity can occur at all locations.

6.1 Potential Impacts

As outlined by Scottish Natural Heritage (2021), wind farms can affect bats in the following ways:

- Collision mortality, barotrauma and other injuries
- Loss or damage to commuting and foraging habitat
- Loss of, or damage to roosts
- Displacement of individuals or populations.

Furthermore, as indicated in Richardson et al (2021) Common Pipistrelle bats may be attracted to wind turbines. The study showed Common Pipistrelle activity was 37% higher at turbines than at control locations. The study further discussed, the observed higher levels of activity could be because there are more bats around turbines, or because animals spend more time in these locations relative to controls, even if the number of individual bats remains the same. We cannot distinguish between these possibilities using acoustic data. However, either way, higher levels of activity around turbines is likely to increase fatality risks and help to explain why fatality rates are often not predicted by acoustic surveys for bat activity conducted prior to facility construction.

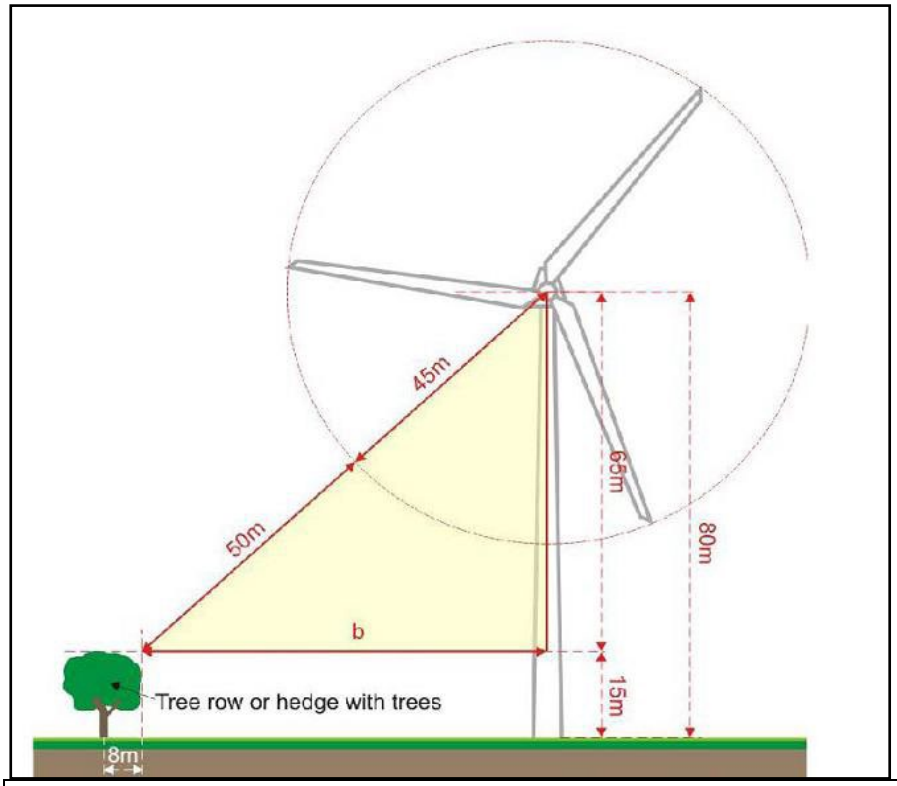
6.2 Mitigation Measures

6.2.1 Mitigation during Construction Phase

Buffer Zone

Bats typically use woodland edge habitats for commuting and feeding purposes. Areas of conifer plantation should be felled in order to discourage bat species from flying close to turbines. Various publications provide guidelines on buffer zones surrounding turbines to reduce the favourability of the site for bat activity. Eurobats 'Guidelines for consideration of bats in wind farm projects' (Rodrigues, et al., 2015) recommend buffer zones of 200m from turbine base to high potential features whilst Natural England Bats (England, 2014) recommend 50m buffers from blade tip to tree. (NIEA, 2021) recommends a minimum buffer of 100m between the turbines at the edge of commercial forestry where wind farms are proposed to be key-holed.

The following formula will be used to calculate the required felling buffer for turbines for each turbine (taking into account the height of surrounding woodland/plantations at each turbine location):



$$b = \sqrt{\{(50 + bl)^2 - (hh - fh)^2\}}$$

where: b = the distance on the ground
between the edge of the canopy and the turbine (m)
bl = blade length (m)
hh = hub height (m)
fh = feature height (m)

$$b = \sqrt{\{(50 + 81.1)^2 - (105 - 25)^2\}}$$
$$b = 104m$$

All turbines are positioned outside the recommended 104m buffer zone.

Construction operations within the wind farm site will take place during the hours of daylight where possible to minimise disturbances to faunal species at night. Some works along the cable route and wind farm site may occur at night but the project ecologist/ECoW shall limit night-time works to sections of the route / site which avoid sensitive features (e.g., mature treelines).

In addition, the following specific mitigation measures for bats are also now recommended:

Retention of trees

Any trees and treelines along approach roads and planned site access tracks will be retained unless felling is unavoidable. Retained trees should be protected from root damage by an exclusion zone of at least 7 metres or equivalent to canopy height. Such protected trees will be fenced off by adequate temporary fencing prior to other works commencing.

Compensation for loss of commuting routes

Linear features such as hedgerows and treelines serve as commuting corridors for bats (and other wildlife). Measures are recommended to compensate for the loss of features that are used by bats as commuting routes. These measures will also compensate for habitat loss and provide continuity in the landscape.

An example will be to reconnected hedgerows with saplings to compensate for the loss of hedgerows currently used by bats. Native species of Irish provenance should be used as they support more insect life than non-native varieties.

Habitat retention, replacement and landscaping

Habitat replacement and landscaping could compensate for or add to the wildlife value of the area and also provide areas of aesthetic as well as wildlife interest. In general, best practice design should aim to retain the quality of the landscape and ensure its protection within the landscaping programme. Existing hedgerows and semi-natural scrub or semi-natural grasslands within the study area outside of the footprint of the development will be retained and incorporated into the landscaping. Disturbed areas will be allowed to recolonise naturally. Bat boxes will be installed at appropriate locations identified during landscaping design and further determined by the ECoW while on site.

Lighting restrictions

In general, artificial light creates a barrier to bats so lighting should be avoided where possible. Construction operations within the wind farm site will take place during the hours of daylight where possible to minimise disturbances to faunal species at night. Some works along the cable route and wind farm site may occur at night but the project ecologist/ECoW shall limit night-time works to sections of the route / site which avoid sensitive features (e.g., mature treelines). Where lighting is required, directional lighting (i.e., lighting which only shines on work areas and not nearby countryside) will be used to prevent overspill.

This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only.

Pre-construction Surveys

If three years lapse from between planning-stage surveys and installation of the wind turbines, it will be necessary to repeat one season of surveys during the activity period (EUROBATS, 2014). Future survey work will be completed according to best practice guidelines available (Hundt, 2012; Collins, 2016; SNH, 2019; 2021) and includes static detector, activity and roost inspection surveys.

6.2.2 Mitigation during Operational Phase

Feathering of Blades

Turbines should operate in a manner which restricts the rotation of the blades as far as is practicably possible below the manufacturer's specified cut-in speed. This is usually achieved by feathering the blades during low wind speeds; the angle of the blades is rotated to present the slimmest profile possible towards the wind, ensuring they do not rotate or 'idle' when not generating power.

Turbine blades spinning in low wind can kill bats, however bats cannot be killed by feathered blades which are not spinning (Horn *et al*., 2008). The feathering of turbine blades combined with increased cut-in speeds have been shown to reduce bat fatalities from 30% to 90% (NIEA, 2021), (SNH, 2021), (Wellig S.D., 2018), (Rydell J., 2010), (Arnett, 2011) and (Baerwald, 2009).

As such, the feathering of blades to prevent 'idling' during low wind speeds is recommended for all turbines.

Cut-in Speeds/Curtailment

Increasing the cut-in speed above that set by the manufacturer can reduce the potential for bat/turbine collisions. A study by Arnett *et al*., (2011) showed a 50% decrease in bat fatality can be achieved by increasing the cut-in speed by 1.5 m/s.

Species with elevated risk of collision (Leisler's bat, Soprano, Common and Nathusius' Pipistrelle) in particular would benefit from increasing the cut-in speed of turbines, as dictated on a case-by case basis depending on the activity levels recorded at each turbine.

Due to the higher levels of activity identified at locations closest to edge ecology, increased cut-in speeds will be implemented from commencement of operation for turbines T2, T4 and T6 (closest turbine locations to edge ecology). Cut-in speeds will be increased during the bat activity season (April-October) and/or where weather conditions are optimal for bat activity (see below) from 30 minutes prior to sunset and to 30 minutes after sunrise at all turbines.

Cut-in speeds restrictions will be operated according to specific weather conditions:

1. When the air temperature is above approximately 10 to 11°C at nacelle height.
2. Generally, bat activity peaks at a wind speed range of 5.0 to 6.5m/s (at nacelle height).

Due to the considerable unnecessary down time resulting from the proposed curtailment (above) and the advances in smart curtailment a focused curtailment regime is further proposed from the year two of operation.

This will focus on times and dates, corresponding with periods when the highest level of bat activity occur within the Site. This includes the use of the SCADA (Supervisory Control and Data Acquisitions) operating system (or equivalent) to only pause/feather the blades below a specified wind speed and above a specified temperature within specified time periods.

Post-constructions surveys will be undertaken for the first three years of operation to confirm if the curtailment restrictions can be amended in line with post-construction activity levels.

The post construction surveys will be used to update the current curtailment regime designed around the values for the key weather parameters and other factors that are known to influence collision risk. This will include all of the following:

- Wind speed in m/s (measured at nacelle height)
- Time after sunset
- Month of the year
- Temperature (ºC)
- Precipitation (mm/hr)

Post Construction surveys

Monitoring will take place for at least 3 years after construction, providing sufficient data to detect any significant change in bat activity relative to pre-construction levels. It will assess changes in bat activity patterns and the efficacy of mitigation to inform any changes to curtailment.

During years one to three of operation bat activity will be measured continuously between April and mid-October at each turbine location, in combination with carcass surveys. In addition, wind speed and temperature data will be continuously recorded at the nacelle height of each turbine.

Modern remotely operated wind turbines as proposed here allow cut-in speeds to be controlled centrally/automatically, facilitating an operation regime designed to minimise harmful impacts to bats.

The feathering of turbine blades combined with increased cut-in speeds have been shown to reduce bat fatalities from 30% to 90% (Adams et al., 2021, Arnett et al., 2008, 2011, 2013; Baerwald et al., 2009). The most recent of studies showed a 63% decrease in fatalities (Adams et al., 2021).

Monitoring Curtailment

If, following the initial 3 years of post-construction surveys, bat activity increases above the baseline and/or remains consistently high and carcass searches indicate fatalities are occurring (refer below), increased cut-in speeds will continue. This will subsequently be monitored in years 5, 7, 10, 15, 20, 25 and 30 with further review after each monitoring period.

Alternatively, if it is found that the results of bat activity surveys and fatality searches confirm that the level of bat activity at turbine locations is low then consent will be sought from Galway County Council (in consultation with NPWS) for the cessation in the requirement for these cut-in speeds / curtailment measures, or a reduction on the timing restrictions for these measures.

Where post construction acoustic surveys are undertaken, they will utilise full spectrum automatic detectors deployed, as a minimum, for one complete bat activity season.

Acoustic monitoring will be supplemented with thermal imaging cameras etc. to provide more detailed information on bat activity in the vicinity of turbines.

An assessment of static data gathered during operational surveillance will be completed using the online analysis tool Ecobat as recommended by SNH (2021) as a minimum, or other equivalent guidance as dictated by up-to date standards and practices.

Buffer zones

The vegetation-free buffer zones (refer to section 6.2.1 above) around the identified turbines will be managed and maintained during the operational life of the development.

Due to mitigation by design, turbines are proposed to be sited at a suitable separation distance from trees and trees or vegetation are to be removed to ensure a woodland-free buffer zone.

The immediate surroundings of individual turbines should be managed and maintained so that they do not attract insects (i.e., the concentration of insects in the wind turbine vicinity should be reduced as much as possible, but not such that insect abundancies affected elsewhere on the site). This should be achieved through physical management of habitats without the use of toxic substances.

Monitoring of mitigation measures

The success of the implemented mitigation measures for bats on the project should be monitored for a period of three years after construction and appropriate measures taken to enhance these if and where required. A recommended schedule for monitoring is given in Table 6-1 below.

Bat fatality monitoring

Whilst no significant residual impacts on bats are predicted, the proposed development could provide an opportunity to gain baseline data on bat/turbine interaction and it is recommended that the scheme be monitored for bat fatalities for the first three years of operation (post construction surveys) and subsequently in years 5, 7, 10, 15, 20, 25 and 30 as part of the additional curtailment monitoring schedule. A comprehensive onsite fatality monitoring programme is to be undertaken following published best practice (e.g., SNH 2021 or equivalent at the time of operation).

The primary components of the bird mortality programme are outlined below, and an assessment of bat mortality would essentially follow the same methodology:

a) Carcass removal trials to establish levels of predator removal of possible fatalities. This should be done following best recommended practice and with due cognisance of published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results.

b) Turbine searches for fatalities should be undertaken following best practice in terms of search area (minimum radius hub height) and at intervals selected to effectively sample fatality rates as determined by carcass removal trials in (a) above.

c) A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/ randomly selected spiral transects/ dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality impact (if any).

d) Recorded fatalities should be calibrated against known predator removal rates to provide an estimate of overall fatality rates.

Table 6-1: Monitoring schedule recommended for bat mitigation measures

Mitigation measure	Monitoring required	Description	Duration
Bat boxes and tubes	Monitor bat use	Bat boxes, rocket boxes and tubes to be placed at locations removed from wind farm as determined by project ecologist/ECoW at least 1 season before construction start. These shall be examined by a licensed bat specialist according to NPWS recommendations. Records should be submitted to *Bat Conservation Ireland* for inclusion in its bat distribution database. If the boxes / tubes are not used within the first three years of deployment re-site if necessary. Annual cleaning required if well used by bats or if used by birds. Replacement if damaged/lost.	From mounting to 3 years post construction.
Mortality study	Fatality monitoring	Corpse searches beneath turbines to assess the impact of operation on bats.	From initial operation conducted during years 1, 2, 3, 5, 7, 10, 15, 20 and 25 post construction.

7. CONCLUSION

Following extensive surveys within and surrounding the site, it is the authors opinion the landscape in which the proposed wind farm is situated is of moderate suitability for Common Pipistrelle and Soprano Pipistrelle, low suitability for brown long-eared bat, Leisler's bat, Daubenton's bat and natterer's bat, and low for whiskered bat, lesser horseshoe bat and Nathusius' Pipistrelle.

Six species of bats have been recorded as present from detectors relevant to the proposed wind farm site while an additional two were recorded in the surrounds during the 2020 bat surveys. All are listed as 'Least Concern' on the Irish Red List (2019), and Annex IV of the EU Habitats Directive.

The report identifies that the deployment locations for statics D1, D2, D5, D6, D10 and D12 are representative of the final turbine locations. All other locations for statics represent habitat types with higher suitable (upland conifer plantations and associated habitats with bat landscape features such as woodland edge). These detectors were placed for a larger proposed windfarm encompassing lands to the east of the current application.

Static location D14 was placed to examine activity in a lowland native woodland. This showed higher Myotis activity and the only (single) recorded registration of Lesser Horseshoe bat. Given the lack of Lesser Horseshoe activity within the current site it is the surveyors opinion that the proposed windfarm will have no impact on this species

With the implementation of the mitigation outlined above (section 6.2) potential risk of fatality from collision and/or barotrauma events to foraging and/or commuting high risk species such as pipistrelle and Leisler have been significantly reduced (Behr, O. et al., 2017).

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FEHILY TIMONEY

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APPENDIX A

Description of Irish Bat Species

Ireland has ten known bat species from two distinct families. Each is briefly described below. For a more comprehensive overview see Roche *et al* (2014). The conservation status of each species is derived from NPWS (2013).

Vespertilionidae:

Common Pipistrelle (*Pipistrellus pipistrellus*)
This species was only recently separated from its sibling, the soprano or brown pipistrelle *P. pygmaeus*, which is detailed below (Barratt et al, 1997). The Common Pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland. The conservation status of this species is Favourable.

Soprano Pipistrelle (*Pipistrellus pygmaeus*)
The Soprano Pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the Common Pipistrelle on detector. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings but tree holes and heavy ivy are also used. Roost numbers can exceed 1,500 animals in mid-summer. The conservation status of this species is Favourable.

Nathusius' pipistrelle (*Pipistrellus nathusii*)
Nathusius' pipistrelle is a recent addition to the Irish fauna and has mainly been recorded from the north-east of the island in Counties Antrim and Down (Richardson, 2000) and also in Fermanagh, Longford and Cavan. It has also been recorded in Counties Cork and Kerry (Kelleher, 2005). However, the known resident population is enhanced in the autumn months by an influx of animals from Scandinavian countries. The conservation status of this species is Favourable.

Leisler's bat (*Nyctalus leisleri*)
This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddis-flies and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. The conservation status of this species is Favourable.

Brown long-eared bat (*Plecotus auritus*)
This species of bat is a 'gleaner', hunting amongst the foliage of trees and shrubs, and hovering briefly to pick a moth or spider off a leaf, which it then takes to a sheltered perch to consume. They often land on the ground to capture their prey. Using its nose to emit its echolocation, the long-eared bat 'whispers' its calls so that the insects, upon which it preys, cannot hear its approach (and hence, it needs oversize ears to hear the returning echoes). As this is a whispering species, it is extremely difficult to monitor in the field as it is seldom heard on a bat detector. Furthermore, keeping within the foliage, as it does, it is easily overlooked. It prefers to roost in old buildings. The conservation status of this species is Favourable.

Natterer's bat (*Myotis nattereri*)
This species has a slow to medium flight, usually over trees but sometimes over water. It usually follows hedges and treelines to its feeding sites, consuming flies, moths, caddis-flies and spiders. Known roosts are usually in old stone buildings but they have been found in trees and bat boxes. The Natterer's bat is one of our least studied species and further work is required to establish its status in Ireland. The conservation status of this species is Favourable.

Daubenton's bat (*Myotis daubentonii*)
This bat species prefers feeding close to the surface of smooth water, either over rivers, canals, ponds, lakes or reservoirs but it can also be found foraging in woodlands. Flying at 15 kilometres per hour, it gaffs insects with its over-sized feet as they emerge from the surface of the water - feeding on caddis flies, moths, mosquitoes, midges etc. It is often found roosting beneath bridges or in tunnels and also makes use of hollows in trees. The conservation status of this species is Favourable.

Whiskered bat (*Myotis mystacinus*)
This species, although widely distributed, has been rarely recorded in Ireland. It is often found in woodland, frequently near water. Flying high, near the canopy, it maintains a steady beat and sometimes glides as it hunts. It also gleans spiders from the foliage of trees. Whiskered bats prefer to roost in buildings, under slates, lead flashing or exposed beneath the ridge beam within attics. However, they also use cracks and holes in trees and sometimes bat boxes. The whiskered bat is one of our least studied species and further work is required to establish its status in Ireland.

Brandt's bat (*Myotis brandtii*)
According to NPWS (2013), whiskered and Brandt's bats are cryptic species and can only be told apart using DNA techniques. Brand't bat has been confirmed only once from Ireland; a single specimen found in 2003 in Wicklow (Mullen, 2006). Following this discovery, an intensive re-survey, involving DNA testing, was undertaken of all known whiskered bat roosts in Ireland, by the Centre for Irish Bat Research. Woodland mist-netting was also conducted for the species. Despite the extensive survey-work, no further Brandt's bats were identified. The most recent Red Data List for Irish Mammals (Marnell *et al*. 2009) lists Brandt's bat as data deficient. There is no evidence of any roosts for this species in the country and at present the single record for the species is considered an anomaly. Boston et al (2010) concluded that "*M. brandtii* …. cannot currently be considered a resident species. This species is now considered a vagrant to the country and consequently, a detailed assessment has not been carried out.

<u>Rhinolophidae:</u>
Lesser horseshoe bat (*Rhinolophus hipposideros*)
This species is the only representative of the Rhinolophidae or horseshoe bat family in Ireland. It differs from our other species in both habits and looks, having a unique nose leaf with which it projects its echolocation calls. It is also quite small and, at rest, wraps its wings around its body. Lesser horseshoe bats feed close to the ground, gleaning their prey from branches and stones. It often carries its prey to a perch to consume, leaving the remains beneath as an indication of its presence. The echolocation call of this species is of constant frequency and, on a heterodyne bat detector, sounds like a melodious warble. The species is confined to six counties along the Atlantic seaboard: Mayo, Galway, Clare, Limerick, Kerry and Cork. The current Irish national population is estimated at 12,500 animals. This species is listed on Annex II of the EC Habitats Directive and 41 Special Areas of Conservation have been designated in Ireland for its protection. Where it occurs, it is often found roosting within farm buildings. The conservation status of this species is Favourable.

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APPENDIX B

Passes (per species) recorded at each static detector over the three surveillance periods

Table 8-1 Static Detector 1

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Total
19th/20th May	0	6	0	0	1	1	2	10
20th/21st May	1	0	1	0	0	0	0	2
21st/22nd May	0	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0	0
23rd/24th May	0	0	0	0	0	0	0	0
24th/25th May	0	0	0	0	0	0	0	0
25th/26th May	0	0	0	0	0	0	0	0
26th/27th May	0	0	0	0	0	0	0	0
27th/28th May	0	0	0	0	0	0	0	0
28th/29th May	0	0	0	0	0	0	0	0
28th/29th July	0	1	1	1	1	0	0	4
29th/30th July	0	0	0	0	0	0	0	0
30th/31st July	0	0	0	1	0	0	0	1
31st July/1st August	1	0	2	0	2	0	0	5
1st/2nd August	0	0	0	0	0	0	0	0
2nd/3rd August	0	0	1	1	1	0	0	3
3rd/4th August	0	0	0	0	0	0	0	0
4th/5th August	1	0	0	1	0	0	0	2
5th/6th August	1	2	3	1	0	0	0	7
6th/7th August	4	0	1	1	0	0	0	6
7th/8th August	6	2	0	6	1	0	0	15
8th/9th August	0	4	3	20	1	0	0	28
9th/10th August	6	1	0	28	8	0	0	43
10th/11th August	4	2	0	12	1	1	0	20
11th/12th August	5	3	5	15	7	1	0	36
12th/13th August	1	1	1	7	1	0	0	11
13th/14th August	0	0	1	2	0	0	0	3
10th/11th Sept	1	0	0	0	0	0	0	1
11th/12th Sept	3	0	0	0	0	0	0	3
12th/13th Sept	0	0	0	0	0	0	0	0
13th/14th Sept	0	0	0	0	1	0	1	2
14th/15th Sept	2	0	17	19	3	0	4	45
15th/16th Sept	1	0	3	10	0	0	0	14
16th/17th Sept	1	0	18	12	0	1	2	34
17th/18th Sept	0	0	9	3	0	0	4	16
18th/19th Sept	0	0	3	2	1	0	0	6
19th/20th Sept	2	0	0	1	2	0	0	5

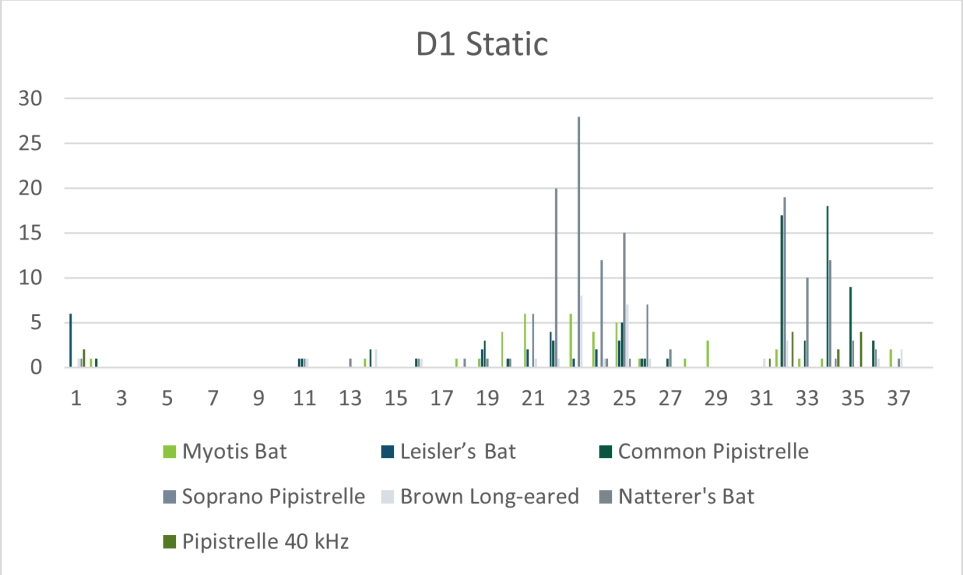


Table 8-2 Static Detector 2

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared	Natterer's bat	40kHz Pipistrelle	Total
10th/ 11th Sept	0	0	2	0	0	0	0	2
11th/12th Sept	2	0	8	18	1	0	0	29
12th/13th Sept	0	0	0	0	0	0	0	0
13th/14th Sept	5	0	41	13	0	1	1	61
14th/15th Sept	1	1	47	54	8	0	6	117
15th/16th Sept	2	0	58	58	2	3	1	124
16th/17th Sept	1	1	16	35	2	0	6	61
17th/ 18th Sept	2	\	1	1	2	0	0	6
18th/19th Sept	0	0	1	5	0	0	0	6
19th/20th Sept	1	0	2	4	1	0	0	8
19th/20th May	0	3	9	2	0	0	0	14
20th/21st May	0	0	0	0	0	0	0	0
21st/22nd May	0	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0	0
23rd/24th May	0	0	0	0	0	0	0	0
24th/25th May	0	2	4	3	0	0	0	9
25th/26th May	0	0	3	0	1	0	0	4
26th/27th May	0	1	3	2	0	0	0	6
27th/28th May	1	2	24	6	1	1	0	35
28th/29th May	1	0	4	1	0	0	0	6
28th/29th July	2	0	1	2	0	0	0	5
29th/30th July	0	0	0	0	0	0	0	0
30th/31st July	1	0	0	0	1	0	0	2

31st July/1st August	6	2	2	0	2	3	0	15
1st/2nd August	2	0	0	1	1	0	0	4
2nd/3rd August	4	2	1	3	1	0	0	11
3rd/4th August	0	0	0	0	0	0	0	0
4th/5th August	0	0	0	0	0	0	0	0
5th/6th August	8	0	3	8	0	0	0	19
6th/7th August	2	2	5	6	1	0	0	16
7th/8th August	10	1	1	4	1	1	0	18
8th/9th August	15	3	6	34	2	4	0	64
9th/10th August	4	1	9	53	4	1	0	72
10th/11th August	4	4	14	9	0	1	1	33
11th/12th August	11	6	9	24	2	3	0	55
12th/13th August	1	0	1	1	0	1	0	4
13th/14th August	1	0	4	4	4	2	0	15

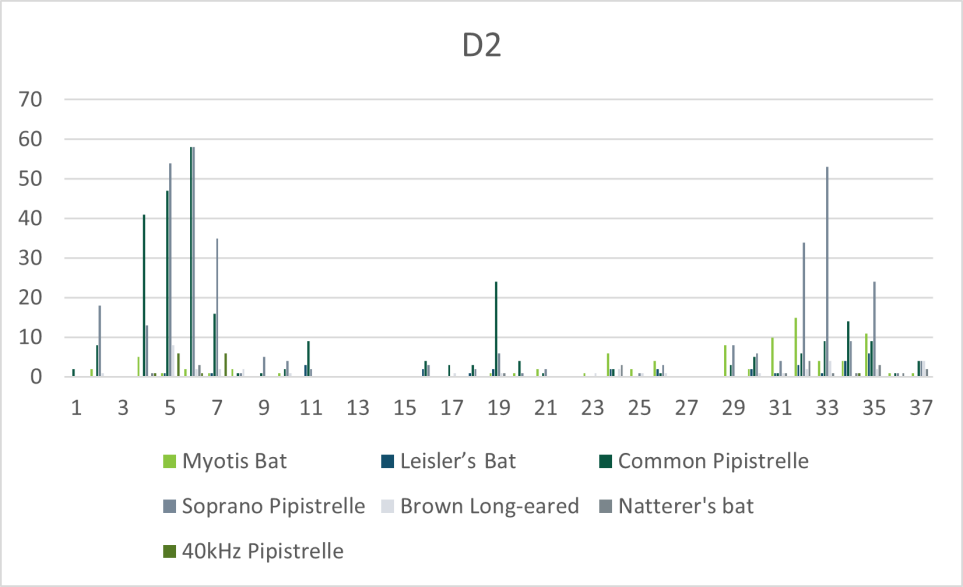


Table 8-3 Static Detector 3

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nauthusius' Pipistrelle	Brown Long-eared	40 kHz Pipistrelle	Natterer's Bat	Total
19th/20th May	5	0	50	64	1	1	28	0	149
20th/21st May	0	0	37	15	0	1	32	0	85
21st/22nd May	0	0	0	0	0	0	0	0	0
22nd/23rd May	2	0	0	0	0	0	0	0	2
23rd/24th May	3	0	7	0	0	1	1	0	12
24th/25th May	1	0	20	24	0	1	1	0	47
25th/26th May	0	0	6	1	0	0	0	0	7
26th/27th May	10	0	13	15	0	1	0	0	39
27th/28th May	4	2	59	26	0	8	1	0	100

28th/29th May	2	2	30	26	0	1	1	0	62
28th/29th July	2	0	1	0	0	5	0	0	8
29th/30th July	0	0	0	0	0	0	0	0	0
30th/31st July	0	0	2	0	0	0	0	0	2
31st July/1st August	0	0	3	2	0	3	0	0	8
1st/2nd August	0	0	0	0	0	0	0	0	0
2nd/3rd August	2	0	2	10	0	0	0	0	14
3rd/4th August	0	0	0	0	0	0	0	0	0
4th/5th August	0	0	2	1	0	0	0	0	3
5th/6th August	2	3	8	19	0	5	0	0	37
6th/7th August	1	2	4	4	0	0	0	0	11
7th/8th August	1	1	1	9	0	3	0	0	15
8th/9th August	1	6	7	38	0	4	0	3	59
9th/10th August	6	1	4	46	0	6	0	0	63
10th/11th August	6	4	6	40	0	1	0	1	58
11th/12th August	7	1	3	32	0	7	0	0	50
12th/13th August	0	0	1	21	0	0	0	0	22
13th/14th August	6	0	1	11	0	4	0	1	23
10th/ 11th Sept	6	0	4	3	0	1	0	0	14
11th/12th Sept	4	0	3	1	0	4	0	0	12
12th/13th Sept	0	0	0	0	0	0	0	0	0
13th/14th Sept	3	0	3	0	0	1	1	0	8
14th/15th Sept	2	0	6	10	0	5	0	0	23
15th/16th Sept	4	0	7	19	1	1	0	0	32
16th/17th Sept	7	0	1	8	0	0	0	1	17
17th/ 18th Sept	1	0	1	4	2	2	0	0	10
18th/19th Sept	2	0	1	3	0	1	0	0	7
19th/20th Sept	1	0	2	3	1	0	0	0	7

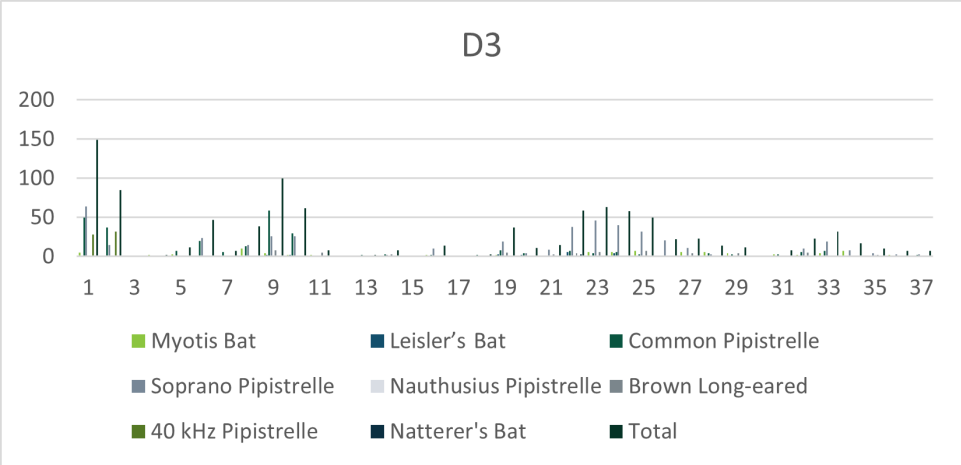


Table 8-4 Static Detector 4

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Natterer's Bat	Brown Long-eared	40 kHz Pipistrelle	Total
19th/20th May	0	0	8	1	0	0	5	14
20th/21st May	3	0	19	9	0	0	6	37
21st/22nd May	0	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0	0
23rd/24th May	0	0	9	0	0	0	1	10
24th/25th May	1	1	17	2	0	0	3	24
25th/26th May	0	1	0	0	0	0	0	1
26th/27th May	13	0	22	6	0	0	3	44
27th/28th May	4	0	5	3	0	1	2	15
28th/29th May	2	1	7	16	0	0	1	27
28th/29th July	4	0	5	0	1	0	0	10
29th/30th July	0	0	0	0	0	0	0	0
30th/31st July	12	1	2	0	6	0	0	21
31st July/1st August	0	0	0	1	1	0	0	2
1st/2nd August	0	0	0	0	4	0	0	4
2nd/3rd August	1	0	2	0	5	0	1	9
3rd/4th August	0	0	0	0	4	0	0	4
4th/5th August	0	0	8	0	13	0	0	21
5th/6th August	1	0	5	1	1	0	0	8
6th/7th August	0	0	8	4	3	0	0	15
7th/8th August	0	0	3	1	1	1	0	6
8th/9th August	1	1	10	11	0	0	2	25
9th/10th August	0	0	37	12	0	0	2	51
10th/11th August	1	2	44	7	2	0	3	59
11th/12th August	0	0	7	6	1	0	0	14
12th/13th August	1	0	9	4	0	0	1	15
13th/14th August	0	0	0	0	0	0	0	0
10th/ 11th Sept	0	0	6	1	0	0	0	7
11th/12th Sept	0	0	56	1	0	0	0	57
12th/13th Sept	0	0	0	0	0	0	0	0
13th/14th Sept	0	0	75	11	0	0	0	86
14th/15th Sept	0	4	135	10	0	0	3	152
15th/16th Sept	3	0	28	8	0	1	0	40
16th/17th Sept	3	0	1	3	0	1	0	8
17th/ 18th Sept	2	0	4	2	0	0	0	8
18th/19th Sept	2	0	7	2	0	0	0	11
19th/20th Sept	0	0	18	0	0	0	0	18

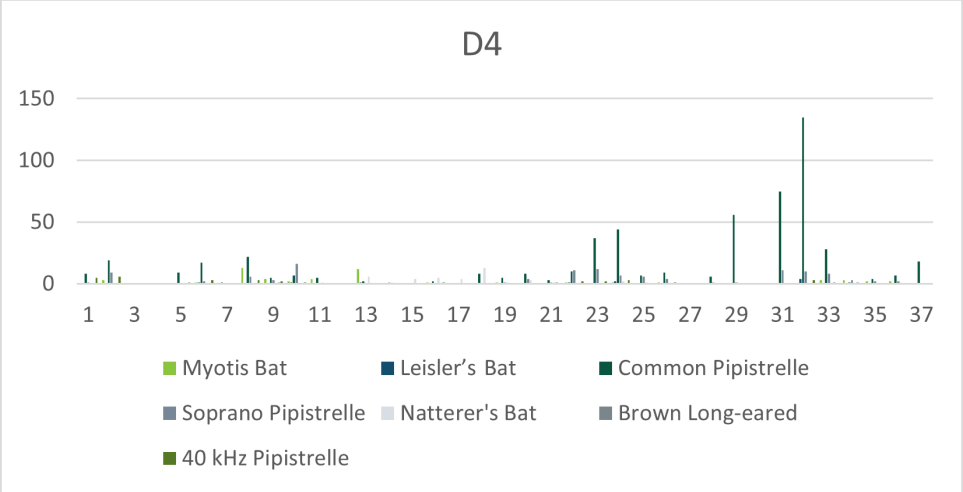


Table 8-5 Static Detector 5

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared	Nauthusius Pipistrelle	Natterer's Bat	40 kHz Pipistrelle	Total
19th/20th May	0	0	1	2	0	0	0	0	3
20th/21st May	0	0	1	1	0	0	0	0	2
21st/22nd May	0	0	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0	0	0
23rd/24th May	0	0	0	0	0	0	0	0	0
24th/25th May	0	0	0	0	0	0	0	0	0
25th/26th May	0	0	3	1	0	0	0	2	6
26th/27th May	1	0	1	0	0	0	0	0	2
27th/28th May	0	1	8	14	3	0	2	0	28
28th/29th May	2	1	1	5	0	0	0	0	9
28th/29th July	1	0	1	2	0	0	0	0	4
29th/30th July	0	0	0	0	0	0	0	0	0
30th/31st July	0	2	0	0	1	0	0	0	3
31st July/1st August	0	0	1	5	1	0	0	0	7
1st/2nd August	1	0	0	0	0	0	1	0	2
2nd/3rd August	1	0	1	4	0	0	2	0	8
3rd/4th August	0	0	0	0	0	0	0	0	0
4th/5th August	0	0	1	0	0	0	0	0	1
5th/6th August	4	4	3	9	0	0	0	0	20
6th/7th August	4	0	2	4	1	0	2	0	13
7th/8th August	0	1	0	5	2	0	1	0	9
8th/9th August	5	4	0	24	1	0	1	0	35
9th/10th August	6	4	5	38	0	0	0	0	53
10th/11th August	2	3	3	17	0	0	1	0	26
11th/12th August	2	6	2	25	3	0	0	0	38
12th/13th August	0	0	1	1	1	0	0	0	3
13th/14th August	0	0	0	0	1	0	0	0	1
10th/ 11th Sept	0	0	0	1	0	0	0	0	1
11th/12th Sept	0	0	5	2	1	0	0	0	8
12th/13th Sept	0	0	0	0	0	0	0	0	0
13th/14th Sept	0	0	0	1	0	0	0	0	1
14th/15th Sept	0	1	7	7	1	1	0	0	17

15th/16th Sept	2	0	5	22	2	0	0	0	31
16th/17th Sept	4	0	27	38	2	0	0	5	76
17th/ 18th Sept	2	0	0	2	1	0	1	0	6
18th/19th Sept	4	0	0	2	0	0	0	0	6
19th/20th Sept	2	0	3	5	0	0	0	0	10

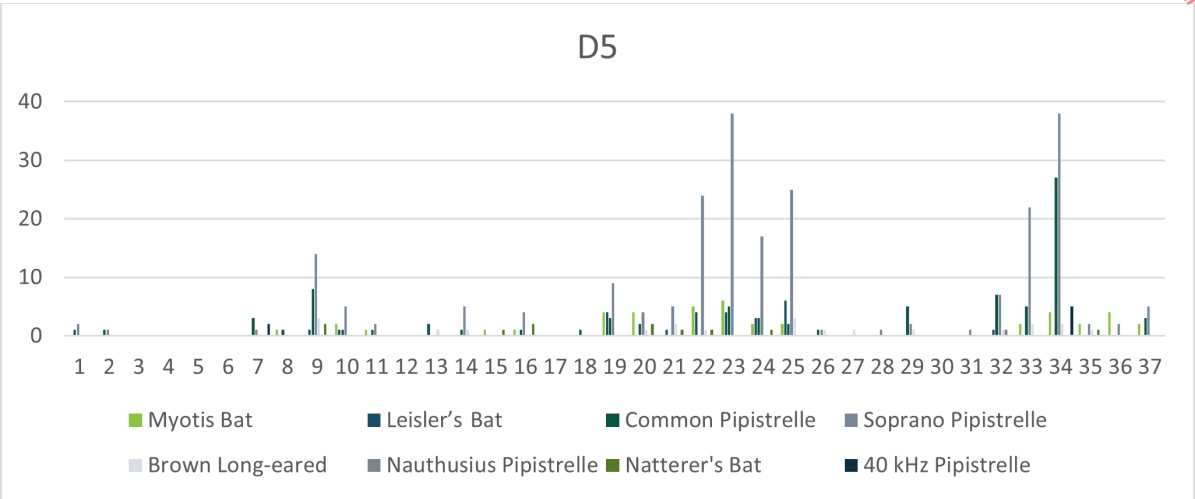


Table 8-6 Static Detector 6

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Natterers	Brown Long-eared	Pipistrelle 45 kHz	Total
19th/20th May	0	1	2	0	0	0	1	4
20th/21st May	0	0	0	0	0	2	0	2
21st/22nd May	0	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0	0
23rd/24th May	0	0	0	0	0	0	0	0
24th/25th May	0	2	1	3	0	1	0	7
25th/26th May	0	0	0	0	0	0	0	0
26th/27th May	0	2	5	2	0	0	0	9
27th/28th May	1	1	10	10	0	4	0	26
28th/29th May	2	1	3	3	0	2	1	12
28th/29th	0	2	0	0	0	0	0	2
29th/30th July	0	0	0	0	0	0	0	0
30th/31st July	0	2	0	0	0	1	0	3
31st July/1st August	0	1	2	0	0	1	0	4
1st/2nd August	0	0	0	0	0	0	0	0
2nd/3rd August	0	0	1	4	0	0	0	5
3rd/4thAugust	0	0	0	0	0	0	0	0
4th/5th August	0	0	0	0	0	0	0	0
5th/6th August	0	1	0	6	0	0	0	7
6th/7th August	0	2	0	1	0	0	1	4
7th/8th August	4	2	0	7	0	4	0	17
8th/9th August	6	3	2	38	0	0	0	49
9th/10th August	6	5	3	23	0	0	0	37
10th/11th August	2	0	3	5	0	2	0	12
11th/12th August	2	3	7	23	0	1	0	36
12th/13th August	2	3	0	16	0	1	0	22

13th/14th August	0	0	0	0	0	0	0	0
10th/ 11th Sept	3	0	0	1	0	1	0	5
11th/12th Sept	0	0	0	0	2	1	0	3
12th/13th Sept	0	0	0	0	0	0	0	0
13th/14th Sept	0	0	3	0	1	1	0	5
14th/15th Sept	2	0	2	13	1	1	0	19
15th/16th Sept	5	0	2	8	2	1	0	18
16th/17th Sept	3	0	0	10	0	1	0	14
17th/ 18th Sept	4	0	0	3	0	0	0	7
18th/19th Sept	1	0	0	1	2	5	0	9
19th/20th Sept	3	0	0	2	0	2	0	7

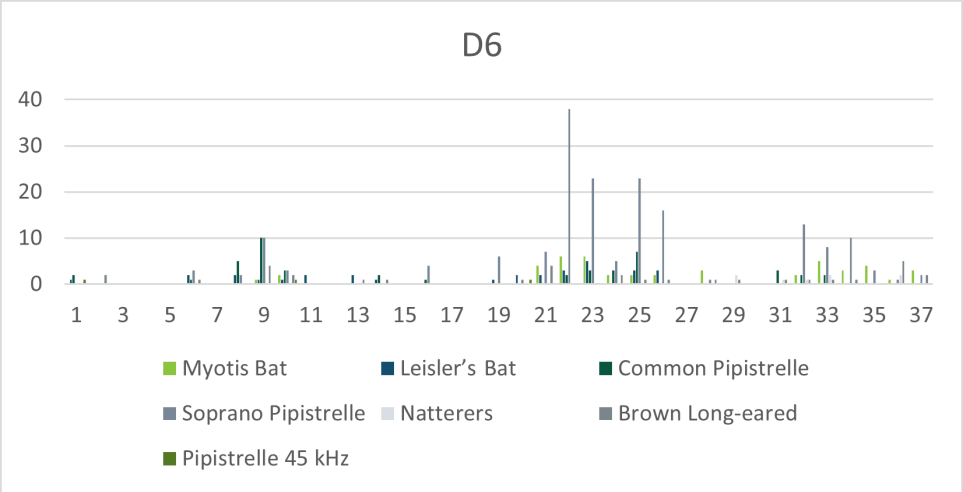


Table 8-7 Static Detector 7

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nauthusius Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Total
19th/20th May	1	0	2	0	0	1	0	6	10
20th/21st May	0	4	0	0	0	1	0	4	9
21st/22nd May	0	0	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0	0	0
23rd/24th May	0	0	0	0	0	0	0	0	0
24th/25th May	1	0	3	0	0	1	0	1	6
25th/26th May	0	0	0	0	0	0	0	0	0
26th/27th May	5	0	9	4	0	1	0	2	21
27th/28th May	6	1	3	8	0	5	0	0	23
28th/29th May	0	5	7	3	0	2	0	4	21
28th/29th July	2	0	0	1	0	0	0	0	3
29th/30th July	0	0	0	0	0	0	0	0	0
30th/31st July	2	0	0	1	0	0	0	0	3
31st July/1st August	3	0	2	0	0	0	0	0	5
1st/2nd August	0	0	0	0	0	1	0	0	1
2nd/3rd August	0	1	1	4	0	0	0	0	6
3rd/4th August	0	0	1	0	0	0	0	0	1
4th/5th August	0	0	0	0	0	0	0	0	0

5th/6th August	0	0	5	1	0	0	0	1	7
6th/7th August	3	0	2	9	0	0	0	0	14
7th/8th August	1	0	1	2	0	2	0	0	6
8th/9th August	4	1	6	27	0	3	0	0	41
9th/10th August	4	0	7	45	0	1	0	0	57
10th/11th August	3	1	8	14	0	1	0	0	27
11th/12th August	5	1	2	23	0	0	0	0	31
12th/13th August	0	1	3	10	0	1	1	0	16
13th/14th August	0	1	2	3	0	0	0	0	6
10th/ 11th Sept	0	0	0	0	0	0	0	0	0
11th/12th Sept	0	0	0	0	0	0	0	0	0
12th/13th Sept	0	0	0	0	0	0	0	0	0
13th/14th Sept	0	0	0	1	0	0	0	0	1
14th/15th Sept	4	0	1	12	0	2	0	0	19
15th/16th Sept	1	0	1	6	0	1	0	0	9
16th/17th Sept	3	0	0	10	0	1	0	0	14
17th/ 18th Sept	2	1	1	3	1	1	1	0	10
18th/19th Sept	0	0	1	2	0	4	0	0	7
19th/20th Sept	0	0	1	1	0	1	1	0	4

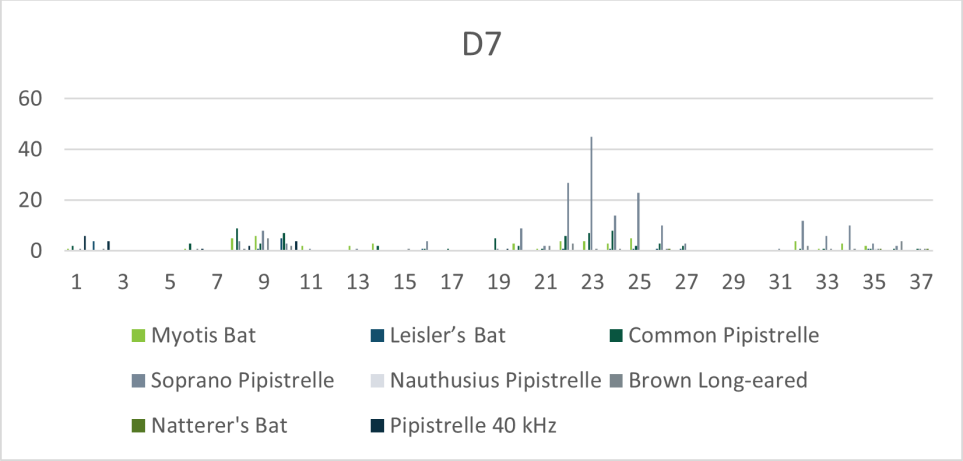


Table 8-8 Static Detector 8

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nauthusius Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Total
19th/20th May	3	0	4	10	0	0	0	1	18
20th/21st May	0	0	0	0	0	1	0	0	1
21st/22nd May	0	0	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0	0	0
23rd/24th May	1	0	0	0	0	0	0	0	1
24th/25th May	0	2	11	6	0	0	0	1	20
25th/26th May	0	0	0	0	0	0	0	0	0
26th/27th May	0	1	7	5	0	2	0	2	17
27th/28th May	13	4	14	6	1	2	0	1	41
28th/29th May	1	88	32	6	0	4	0	8	139
28th/29th July	4	0	13	3	0	0	3	0	23
29th/30th July	1	0	1	0	0	0	1	0	3

30th/31st July	1	0	15	1	0	1	1	0	19
31st July/1st August	0	0	19	1	0	0	0	0	20
1st/2nd August	0	0	0	0	0	0	0	0	0
2nd/3rd August	2	1	15	1	0	0	0	0	19
3rd/4th August	0	0	1	3	0	0	0	0	4
4th/5th August	0	0	2	0	0	0	0	0	2
5th/6th August	0	1	9	6	0	0	0	0	16
6th/7th August	1	4	14	9	0	0	0	0	28
7th/8th August	0	6	9	5	0	0	1	0	21
8th/9th August	5	7	19	22	0	1	0	0	54
9th/10th August	2	4	14	28	0	1	0	0	49
10th/11th August	7	4	12	16	0	2	1	1	43
11th/12th August	3	1	17	21	0	1	0	0	43
12th/13th August	3	1	7	9	0	0	0	0	20
13th/14th August	5	1	7	23	0	1	0	1	38
10th/ 11th Sept	1	0	0	0	0	2	1	0	4
11th/12th Sept	1	0	3	1	0	4	0	0	9
12th/13th Sept	0	0	0	0	0	0	0	0	0
13th/14th Sept	2	1	5	1	0	1	1	0	11
14th/15th Sept	2	0	26	15	0	3	1	1	48
15th/16th Sept	3	0	5	6	0	11	0	0	25
16th/17th Sept	2	0	8	12	0	2	1	0	25
17th/ 18th Sept	4	0	0	7	0	6	0	0	17
18th/19th Sept	1	0	2	7	0	2	1	0	13
19th/20th Sept	4	0	5	2	1	4	1	0	17

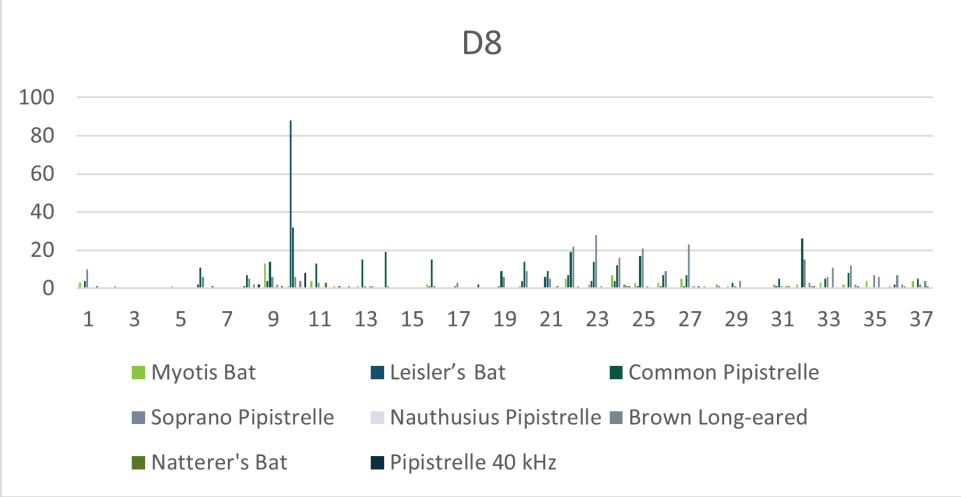


Table 8-9 Static Detector 9

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Total
19th/20th May	1	0	1	4	3	0	2	11
20th/21st May	0	0	1	1	0	0	0	2
21st/22nd May	0	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0	0

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Total
23rd/24th May	0	0	0	0	0	0	0	0
24th/25th May	1	0	1	1	0	0	1	4
25th/26th May	0	0	0	2	0	0	0	2
26th/27th May	15	0	2	17	1	0	0	35
27th/28th May	12	0	17	53	2	0	0	84
28th/29th May	7	0	5	5	5	0	0	22
28th/29th July	1	0	0	1	3	1	0	6
29th/30th July	0	0	0	0	0	0	0	0
30th/31st July	0	0	0	1	1	0	0	2
31st July/1st August	1	0	3	2	2	1	0	9
1st/2nd August	0	1	0	0	0	0	0	1
2nd/3rd August	1	1	1	4	0	0	0	7
3rd/4th August	0	0	0	0	0	0	0	0
4th/5th August	0	0	0	0	0	0	0	0
5th/6th August	5	2	2	7	4	1	0	21
6th/7th August	1	0	0	10	0	0	0	11
7th/8th August	4	0	0	13	1	0	0	18
8th/9th August	8	4	4	43	3	1	0	63
9th/10th August	3	0	1	16	2	1	0	23
10th/11th August	3	3	2	18	3	2	0	31
11th/12th August	4	3	5	18	4	0	0	34
12th/13th August	0	1	0	9	1	0	0	11
13th/14th August	1	3	2	10	0	0	0	16
10th/ 11th Sept	0	0	0	0	0	0	0	0
11th/12th Sept	1	0	0	1	1	0	0	3
12th/13th Sept	0	0	0	0	0	0	0	0
13th/14th Sept	1	0	2	1	0	0	0	4
14th/15th Sept	2	1	2	11	6	0	0	22
15th/16th Sept	1	3	0	7	6	0	0	17
16th/17th Sept	3	0	0	3	4	0	0	10
17th/ 18th Sept	1	0	0	1	3	0	0	5
18th/19th Sept	2	0	0	2	1	0	0	5
19th/20th Sept	0	0	1	1	1	0	0	3

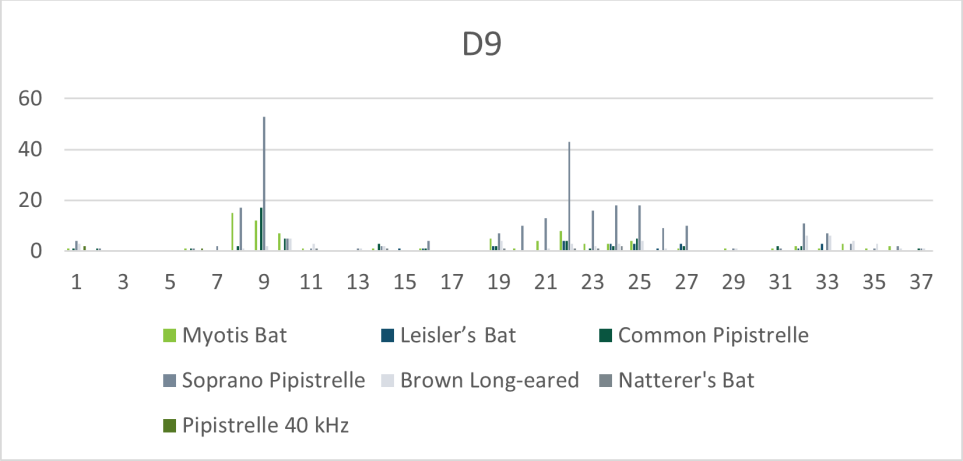


Table 8-10 Static Detector 10

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nauthusius Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Total
19th/20th May	4	0	10	4	0	1	0	2	21
20th/21st May	1	0	3	5	0	1	0	4	14
21st/22nd May	0	9	0	0	0	0	0	0	9
22nd/23rd May	0	0	0	0	0	0	0	0	0
23rd/24th May	0	0	0	0	0	0	0	0	0
24th/25th May	3	0	10	3	1	0	0	4	21
25th/26th May	2	0	4	4	0	0	0	9	19
26th/27th May	1	1	9	7	0	0	0	0	18
27th/28th May	12	0	10	18	0	0	0	1	41
28th/29th May	8	4	15	20	0	0	0	0	47
22nd / 23rd August	4	0	1	1	0	2	0	0	8
23rd /24th August	5	1	2	0	0	4	2	0	14
24th - 25th August	0	0	0	0	0	0	0	0	0
25th - 26th August	6	0	27	0	0	1	1	1	36
26th - 27th August	0	0	1	1	0	1	0	0	3
27th - 28th August	4	0	2	2	0	3	1	0	12
28th - 29th August	2	0	0	0	0	2	0	0	4
29th - 30th August	3	0	3	4	0	5	1	0	16
30th August 01st Sept	4	1	1	16	0	3	1	1	27
31st - 31st August	1	0	4	2	0	1	0	0	8
10th/ 11th Sept	1	0	13	5	0	2	1	0	22
11th/12th Sept	3	0	6	133	0	4	3	0	149
12th/13th Sept	0	0	0	0	0	0	0	0	0
13th/14th Sept	6	0	238	6	0	1	3	1	255
14th/15th Sept	6	1	49	31	0	5	0	2	94
15th/16th Sept	3	1	13	18	0	9	0	1	45
16th/17th Sept	4	1	144	30	0	1	1	0	181
17th/ 18th Sept	13	0	106	16	0	4	1	0	140
18th/19th Sept	3	0	4	5	0	1	1	0	14
19th/20th Sept	1	1	13	1	0	2	1	0	19

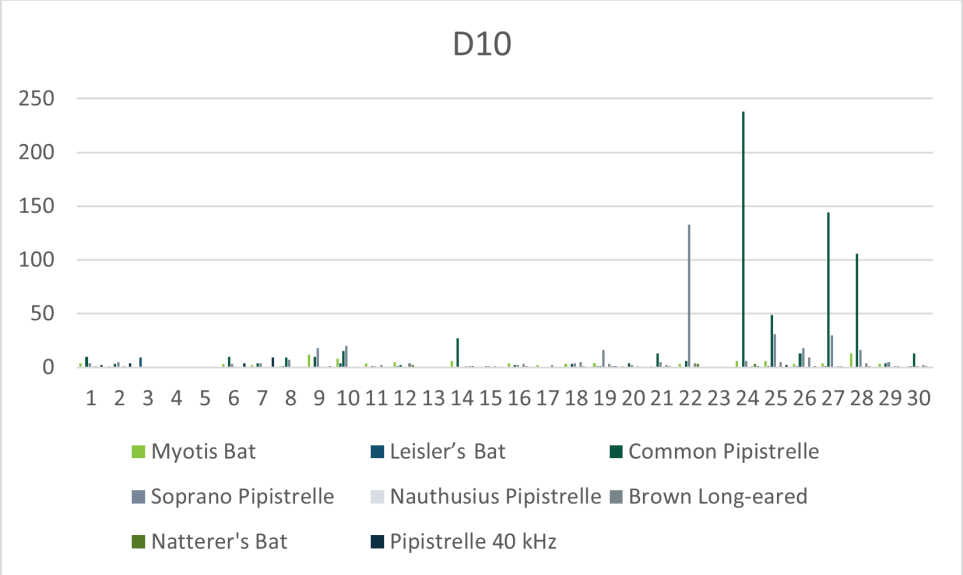


Table 8-11 Static Detector 11

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nauthusius Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Total
19th/20th May	35	0	102	52	5	2	0	43	239
20th/21st May	55	0	595	94	14	0	0	63	821
21st/22nd May	4	0	666	0	4	1	0	12	687
22nd/23rd May	3	0	0	0	0	0	0	0	3
23rd/24th May	1	1	88	16	0	0	0	12	118
24th/25th May	25	0	418	114	25	0	0	70	652
25th/26th May	97	1	657	62	17	2	0	103	939
26th/27th May	22	1	528	76	18	3	0	37	685
27th/28th May	8	2	297	65	23	3	0	70	468
28th/29th May	5	1	347	62	27	3	0	220	665
28th/29th July	5	0	780	61	1	0	0	5	852
29th/30th July	2	0	64	0	0	0	0	0	66
30th/31st July	12	0	1324	7	0	0	12	6	1361
31st July/1st August	2	0	159	6	0	1	0	3	171
1st/2nd August	5	0	93	0	0	0	0	1	99
2nd/3rd August	7	0	257	11	0	0	3	6	284
3rd/4th August	1	0	124	4	0	0	2	0	131
10th/ 11th Sept	11	0	418	7	0	1	0	3	440
11th/12th Sept	7	0	431	7	0	1	3	2	451
12th/13th Sept	5	0	266	1	0	1	5	1	279
13th/14th Sept	13	0	1515	18	0	0	1	5	1552
14th/15th Sept	10	1	323	64	0	7	0	1	406
15th/16th Sept	4	0	317	22	0	7	1	4	355
16th/17th Sept	9	0	64	30	0	3	3	0	109
17th/ 18th Sept	7	0	28	9	0	6	2	0	52
18th/19th Sept	5	2	42	23	0	1	1	0	74
19th/20th Sept	7	0	150	14	0	2	1	2	176

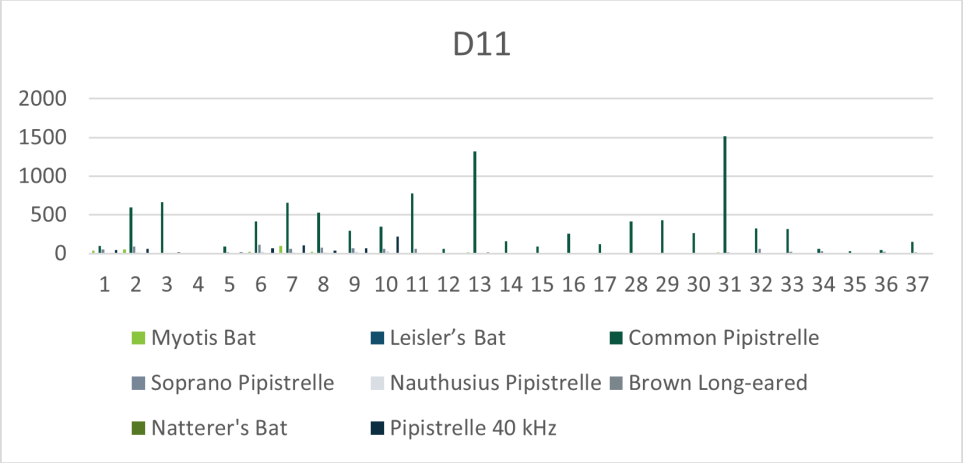


Table 8-12 Static Detector 12

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nauthusius Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Total
19th/20th May	0	0	1	0	0	0	0	0	1
20th/21st May	0	0	0	0	0	0	0	0	0
21st/22nd May	0	0	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0	0	0
23rd/24th May	0	0	0	0	0	0	0	0	0
24th/25th May	0	0	1	0	0	1	0	0	2
25th/26th May	2	0	5	0	0	2	0	1	10
26th/27th May	3	0	2	0	0	1	0	0	6
27th/28th May	1	0	2	0	0	2	0	0	5
28th/29th May	5	1	3	1	0	0	0	0	10
28th/29th July	7	0	1	0	0	0	3	0	11
29th/30th July	0	0	0	0	0	0	0	0	0
30th/31st July	0	0	0	0	0	0	0	0	0
31st July/1st August	8	0	0	0	0	1	0	0	9
1st/2nd August	0	0	0	0	0	0	0	0	0
2nd/3rd August	26	0	0	2	0	1	4	0	33
3rd/4th August	0	0	0	0	0	0	0	0	0
4th/5th August	0	0	0	0	0	0	0	0	0
5th/6th August	7	3	2	2	0	0	1	0	15
6th/7th August	3	0	2	1	0	1	1	0	8
7th/8th August	31	0	0	2	0	0	2	0	35
8th/9th August	15	2	5	8	0	2	3	0	35
9th/10th August	12	0	1	14	0	5	2	0	34
10th/11th August	8	0	4	4	0	1	0	0	17
11th/12th August	6	1	0	5	0	3	0	0	15
12th/13th August	10	0	0	6	0	1	0	0	17
13th/14th August	5	0	0	4	0	0	1	0	10
10th/ 11th Sept	0	0	0	0	0	0	0	0	0
11th/12th Sept	2	0	0	0	0	0	1	0	3
12th/13th Sept	0	0	0	0	0	0	0	0	0
13th/14th Sept	2	0	41	1	3	1	0	80	128
14th/15th Sept	0	1	6	2	0	0	1	0	10

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nauthusius Pipistrelle	Brown Long-eared	Natterer's Bat	Pipistrelle 40 kHz	Total
15th/16th Sept	3	1	5	6	0	3	0	0	18
16th/17th Sept	0	0	1	0	0	4	0	0	5
17th/ 18th Sept	0	0	1	0	0	0	0	0	1
18th/19th Sept	0	0	1	2	0	0	0	0	3
19th/20th Sept	4	0	0	3	0	0	1	0	8

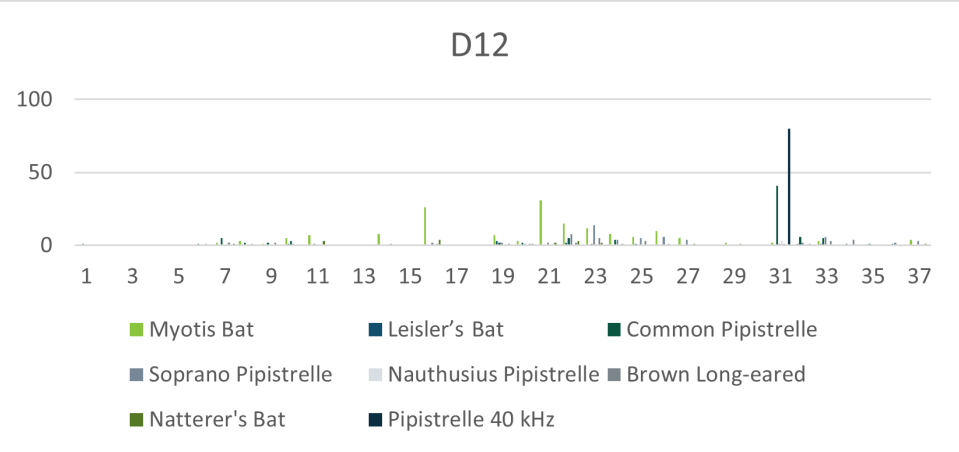


Table 8-13 Static Detector 13

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared	Natterer's Bat	Total
19th/20th May	5	1	10	0	0	0	16
20th/21st May	1	0	2	0	4	0	7
21st/22nd May	0	0	0	0	0	0	0
22nd/23rd May	0	0	0	0	0	0	0
23rd/24th May	0	0	2	0	0	0	2
24th/25th May	0	0	7	3	0	0	10
25th/26th May	0	0	5	0	0	0	5
26th/27th May	9	0	7	3	0	0	19
27th/28th May	9	0	2	5	1	0	17
28th/29th May	6	1	4	3	0	0	14
28th/29th July	4	0	2	0	0	2	8
29th/30th July	0	0	0	0	0	0	0
30th/31st July	1	0	0	0	0	3	4
31st July/1st August	0	0	1	2	0	1	4
1st/2nd August	0	0	0	0	0	0	0
2nd/3rd August	1	0	1	2	0	0	4
3rd/4th August	0	0	0	0	0	0	0
4th/5th August	0	0	2	0	0	0	2
5th/6th August	0	0	9	14	0	3	26
6th/7th August	5	0	0	9	0	2	16
7th/8th August	3	0	2	2	1	4	12
8th/9th August	4	1	11	20	1	3	40
9th/10th August	5	1	5	37	2	1	51
10th/11th August	0	2	4	17	0	2	25

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Brown Long-eared	Natterer's Bat	Total
11th/12th August	3	1	2	11	5	4	26
12th/13th August	2	0	2	8	0	1	13
13th/14th August	1	0	0	1	0	0	2
10th/ 11th Sept	1	0	0	0	0	0	1
11th/12th Sept	1	0	11	3	0	0	15
12th/13th Sept	0	0	0	0	0	0	0
13th/14th Sept	0	0	5	2	0	0	7
14th/15th Sept	1	2	8	9	1	1	22
15th/16th Sept	1	3	1	8	0	0	13
16th/17th Sept	0	0	2	6	1	0	9
17th/ 18th Sept	1	0	1	1	0	0	3
18th/19th Sept	2	0	2	3	1	0	8
19th/20th Sept	2	0	0	2	0	0	4

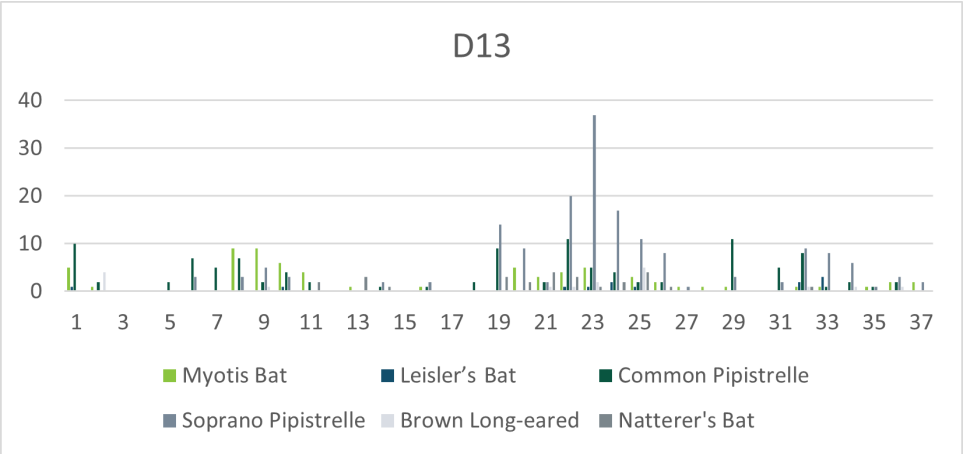
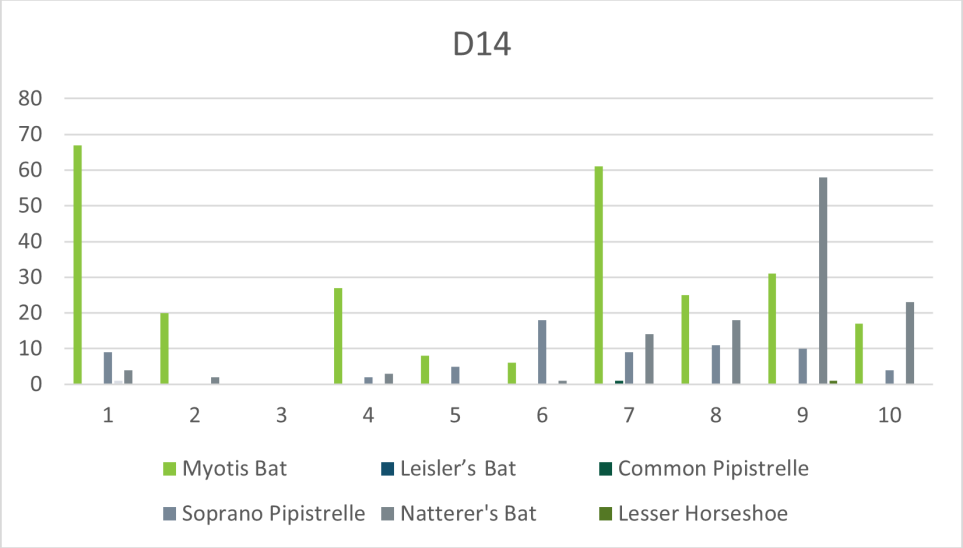


Table 8-14 Static Detector 14

Date	Myotis Bat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Natterer's Bat	Lesser Horseshoe	Total
10th/ 11th Sept	67	0	0	9	4	0	80
11th/12th Sept	20	0	0	0	2	0	22
12th/13th Sept	0	0	0	0	0	0	0
13th/14th Sept	27	0	0	2	3	0	32
14th/15th Sept	8	0	0	5	0	0	13
15th/16th Sept	6	0	0	18	1	0	25
16th/17th Sept	61	0	1	9	14	0	85
17th/ 18th Sept	25	0	0	11	18	0	54
18th/19th Sept	31	0	0	10	58	1	100
19th/20th Sept	17	0	0	4	23	0	44



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APPENDIX C

Ecobat Summary for Periods 1 – 3

8.1.1 Survey Period 1

Bat surveys were conducted for 10 nights between 19/05/2020 and 28/05/2020, using Wildlife Acoustics static bat detectors. All species reference range were above 200 thus these activity levels can be viewed as accurate.

Statics 3, 8, 9 and 11 had at least one night of High Activity during the survey period.

Detector 11 was deemed the only detector to have a High Bat Activity (for Common, Soprano and Nathusius's Pipistrelle) based on the Percentile Median value

Table 8-16 shows the number of nights recorded bat activity fell into each activity band for each species across all of the detectors. None of the species showed high bat activity (per median percentile) across all detectors for period 1.

Table 8-15: Bat activity within each activity band for each species – Survey period 1

Location	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	Median Percentile	Bat Activity Category
T1	*Myotis*	0	0	0	0	10	0	Low
T1	*Myotis nattereri*	0	0	0	0	10	0	Low
T1	*Nyctalus leisleri*	0	0	1	0	9	0	Low
T1	*Pipistrellus nathusii*	0	0	0	1	9	0	Low
T1	*Pipistrellus pipistrellus*	0	0	0	0	10	0	Low
T1	*Pipistrellus pygmaeus*	0	0	0	0	10	0	Low
T1	*Plecotus auritus*	0	0	0	0	10	0	Low
T2	*Myotis*	0	0	0	1	9	0	Low
T2	*Myotis nattereri*	0	0	0	0	10	0	Low
T2	*Nyctalus leisleri*	0	0	0	3	7	0	Low
T2	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T2	*Pipistrellus pipistrellus*	0	1	3	2	4	36	Low to Moderate
T2	*Pipistrellus pygmaeus*	0	0	1	3	6	4	Low
T2	*Plecotus auritus*	0	0	0	0	10	0	Low
T3	*Myotis*	0	1	2	3	4	26	Low to Moderate
T3	*Myotis nattereri*	0	0	0	0	10	0	Low
T3	*Nyctalus leisleri*	0	0	0	2	8	0	Low

Location	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	Median Percentile	Bat Activity Category
T3	*Pipistrellus nathusii*	0	2	0	0	8	8	Low
T3	*Pipistrellus pipistrellus*	3	3	2	0	2	70	Moderate to High
T3	*Pipistrellus pygmaeus*	1	5	0	0	4	69	Moderate to High
T3	*Plecotus auritus*	0	0	1	0	9	8	Low
T4	*Myotis*	0	1	1	2	6	4	Low
T4	*Myotis nattereri*	0	0	0	0	10	0	Low
T4	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T4	*Pipistrellus nathusii*	0	0	2	3	5	17	Low
T4	*Pipistrellus pipistrellus*	0	3	4	0	3	57	Moderate
T4	*Pipistrellus pygmaeus*	0	1	2	2	5	17	Low
T4	*Plecotus auritus*	0	0	0	0	10	0	Low
T5	*Myotis*	0	0	0	2	8	0	Low
T5	*Myotis nattereri*	0	0	0	1	9	0	Low
T5	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T5	*Pipistrellus nathusii*	0	0	0	1	9	0	Low
T5	*Pipistrellus pipistrellus*	0	0	1	1	8	8	Low
T5	*Pipistrellus pygmaeus*	0	1	1	1	7	4	Low
T5	*Plecotus auritus*	0	0	0	1	9	0	Low
T6	*Myotis*	0	0	0	1	9	0	Low
T6	*Myotis nattereri*	0	0	0	0	10	0	Low
T6	*Nyctalus leisleri*	0	0	0	2	8	4	Low
T6	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T6	*Pipistrellus pipistrellus*	0	1	1	2	6	4	Low
T6	*Pipistrellus pygmaeus*	0	1	0	3	6	0	Low
T6	*Plecotus auritus*	0	0	1	2	7	0	Low
T7	*Myotis*	0	0	2	0	8	0	Low
T7	*Myotis nattereri*	0	0	0	0	10	0	Low

Location	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	Median Percentile	Bat Activity Category
T7	*Nyctalus leisleri*	0	0	2	0	8	0	Low
T7	*Pipistrellus nathusii*	0	0	3	1	6	4	Low
T7	*Pipistrellus pipistrellus*	0	0	2	3	5	13	Low
T7	*Pipistrellus pygmaeus*	0	0	2	1	7	0	Low
T7	*Plecotus auritus*	0	0	1	1	8	8	Low
T8	*Myotis*	0	1	0	1	8	0	Low
T8	*Myotis nattereri*	0	0	0	0	10	0	Low
T8	*Nyctalus leisleri*	1	0	1	1	7	0	Low
T8	*Pipistrellus nathusii*	0	0	1	2	7	4	Low
T8	*Pipistrellus pipistrellus*	0	3	2	0	5	22	Low to Moderate
T8	*Pipistrellus pygmaeus*	0	1	4	0	5	24	Low to Moderate
T8	*Plecotus auritus*	0	0	1	2	7	0	Low
T9	*Myotis*	0	2	1	0	7	4	Low
T9	*Myotis nattereri*	0	0	0	0	10	0	Low
T9	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T9	*Pipistrellus nathusii*	0	0	0	1	9	0	Low
T9	*Pipistrellus pipistrellus*	0	1	1	1	7	8	Low
T9	*Pipistrellus pygmaeus*	1	1	2	1	5	17	Low
T9	*Plecotus auritus*	0	0	1	2	7	0	Low
T10	*Myotis*	0	1	2	2	5	17	Low
T10	*Myotis nattereri*	0	0	0	0	10	0	Low
T10	*Nyctalus leisleri*	0	0	2	0	8	0	Low
T10	*Pipistrellus nathusii*	0	0	3	1	6	4	Low
T10	*Pipistrellus pipistrellus*	0	4	2	1	3	52	Moderate
T10	*Pipistrellus pygmaeus*	0	2	4	1	3	43	Moderate
T10	*Plecotus auritus*	0	0	0	0	10	0	Low

Location	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	Median Percentile	Bat Activity Category
T11	*Myotis*	3	2	3	1	1	67	Moderate to High
T11	*Myotis nattereri*	0	0	0	0	10	0	Low
T11	*Nyctalus leisleri*	0	0	0	1	9	4	Low
T11	*Pipistrellus nathusii*	7	2	0	0	1	87	High
T11	*Pipistrellus pipistrellus*	9	0	0	0	1	97	High
T11	*Pipistrellus pygmaeus*	7	1	0	0	2	86	High
T11	*Plecotus auritus*	0	0	0	5	5	17	Low
T12	*Myotis*	0	0	1	2	7	0	Low
T12	*Myotis nattereri*	0	0	0	0	10	0	Low
T12	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T12	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T12	*Pipistrellus pipistrellus*	0	0	1	3	6	8	Low
T12	*Pipistrellus pygmaeus*	0	0	0	0	10	0	Low
T12	*Plecotus auritus*	0	0	0	2	8	0	Low
T13	*Myotis*	0	0	4	0	6	4	Low
T13	*Myotis nattereri*	0	0	0	0	10	0	Low
T13	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T13	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T13	*Pipistrellus pipistrellus*	0	1	4	3	2	35	Low to Moderate
T13	*Pipistrellus pygmaeus*	0	0	1	3	6	0	Low
T13	*Plecotus auritus*	0	0	1	0	9	0	Low

Table 8-16: Summary showing the number of nights recorded bat activity fell into each activity band for each species across all of the detectors – Survey period 1

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	Median Percentile	Bat Activity Category
Myotis	3	8	16	15	88	0	Low
Myotis nattereri	0	0	0	1	129	0	Low
Nyctalus leisleri	1	0	6	9	114	0	Low
Pipistrellus nathusii	7	4	9	10	100	0	Low
Pipistrellus pipistrellus	12	17	23	16	62	22	Low to Moderate
Pipistrellus pygmaeus	9	13	17	15	76	4	Low
Plecotus auritus	0	0	6	15	109	0	Low

8.1.2 Survey Period 2

All species reference range were above 200 thus these activity levels can be viewed as accurate.

Bat surveys were conducted for 17 nights between 28/07/2020 and 13/08/2020 using Wildlife Acoustics static bat detectors. Detector 11 did not record from the 4th of August onwards. It is likely batteries failed beyond this point rather than no bats flying. In addition, detector 10 malfunctioned thus was reset to record from the 22/08/2020 to the 31/08/2020.

All of the six static locations had at least one night of High Activity during the survey period.

Based on the Percentile Median value no detector location was deemed to have a High Bat Activity (for specific bat species) level.

Table 8-17: Bat activity within each activity band for each species – Survey period 2

Location	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	Median Percentile	Bat Activity Category
T1	*Myotis*	0	0	5	0	12	16	Low
T1	*Myotis nattereri*	0	0	0	0	17	0	Low
T1	*Nyctalus leisleri*	0	0	2	3	12	0	Low
T1	*Pipistrellus nathusii*	0	0	0	0	17	0	Low
T1	*Pipistrellus pipistrellus*	0	0	3	1	13	16	Low
T1	*Pipistrellus pygmaeus*	1	4	1	1	10	16	Low
T1	*Plecotus auritus*	0	2	0	1	14	16	Low

Location	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	Median Percentile	Bat Activity Category
T2	*Myotis*	0	4	5	1	7	44	Moderate
T2	*Myotis nattereri*	0	0	3	1	13	0	Low
T2	*Nyctalus leisleri*	0	0	3	3	11	0	Low
T2	*Pipistrellus nathusii*	0	0	0	0	17	0	Low
T2	*Pipistrellus pipistrellus*	0	3	4	1	9	16	Low
T2	*Pipistrellus pygmaeus*	3	2	4	1	7	44	Moderate
T2	*Plecotus auritus*	0	0	2	3	12	16	Low
T3	*Myotis*	0	3	2	3	9	16	Low
T3	*Myotis nattereri*	0	0	1	0	16	0	Low
T3	*Nyctalus leisleri*	0	0	3	1	13	0	Low
T3	*Pipistrellus nathusii*	0	0	0	0	17	0	Low
T3	*Pipistrellus pipistrellus*	0	2	5	3	7	34	Low to Moderate
T3	*Pipistrellus pygmaeus*	4	5	1	1	6	67	Moderate to High
T3	*Plecotus auritus*	0	1	7	0	9	16	Low
T4	*Myotis*	0	2	6	1	8	34	Low to Moderate
T4	*Myotis nattereri*	0	1	5	1	10	16	Low
T4	*Nyctalus leisleri*	0	0	0	1	16	0	Low
T4	*Pipistrellus nathusii*	0	0	1	2	14	0	Low
T4	*Pipistrellus pipistrellus*	2	5	3	2	5	56	Moderate
T4	*Pipistrellus pygmaeus*	0	3	3	0	11	16	Low
T4	*Plecotus auritus*	0	0	0	0	17	0	Low
T5	*Myotis*	0	0	6	2	9	16	Low
T5	*Myotis nattereri*	0	0	0	2	15	0	Low
T5	*Nyctalus leisleri*	0	0	5	1	11	0	Low
T5	*Pipistrellus nathusii*	0	0	0	0	17	0	Low
T5	*Pipistrellus pipistrellus*	0	0	3	2	12	16	Low
T5	*Pipistrellus pygmaeus*	3	2	4	1	7	51	Moderate
T5	*Plecotus auritus*	0	0	1	1	15	0	Low
T6	*Myotis*	0	0	3	3	11	0	Low
T6	*Myotis nattereri*	0	0	0	0	17	0	Low
T6	*Nyctalus leisleri*	0	0	4	4	9	16	Low
T6	*Pipistrellus nathusii*	0	0	0	0	17	0	Low
T6	*Pipistrellus pipistrellus*	0	1	2	2	12	0	Low

Location	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	Median Percentile	Bat Activity Category
T6	*Pipistrellus pygmaeus*	3	2	3	0	9	16	Low
T6	*Plecotus auritus*	0	0	1	1	15	0	Low
T7	*Myotis*	0	0	6	2	9	16	Low
T7	*Myotis nattereri*	0	0	0	0	17	0	Low
T7	*Nyctalus leisleri*	0	0	0	0	17	0	Low
T7	*Pipistrellus nathusii*	0	0	0	0	17	0	Low
T7	*Pipistrellus pipistrellus*	0	2	3	4	8	34	Low to Moderate
T7	*Pipistrellus pygmaeus*	3	3	2	1	8	34	Low to Moderate
T7	*Plecotus auritus*	0	0	1	1	15	0	Low
T8	*Myotis*	0	2	4	4	7	34	Low to Moderate
T8	*Myotis nattereri*	0	0	1	0	16	0	Low
T8	*Nyctalus leisleri*	0	1	4	0	12	16	Low
T8	*Pipistrellus nathusii*	0	0	0	0	17	0	Low
T8	*Pipistrellus pipistrellus*	0	13	0	1	3	72	Moderate to High
T8	*Pipistrellus pygmaeus*	2	5	4	0	6	56	Moderate
T8	*Plecotus auritus*	0	0	0	1	16	0	Low
T9	*Myotis*	0	1	5	2	9	16	Low
T9	*Myotis nattereri*	0	0	0	1	16	0	Low
T9	*Nyctalus leisleri*	0	0	4	1	12	0	Low
T9	*Pipistrellus nathusii*	0	0	0	0	17	0	Low
T9	*Pipistrellus pipistrellus*	0	0	3	3	11	0	Low
T9	*Pipistrellus pygmaeus*	1	8	1	1	6	63	Moderate to High
T9	*Plecotus auritus*	0	0	5	2	10	16	Low
T10	*Myotis*	0	2	4	1	3	51	Moderate
T10	*Myotis nattereri*	0	0	0	1	9	8	Low
T10	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T10	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T10	*Pipistrellus pipistrellus*	1	0	2	2	5	25	Low to Moderate
T10	*Pipistrellus pygmaeus*	0	1	1	2	6	16	Low
T10	*Plecotus auritus*	0	0	4	2	4	34	Low to Moderate

Location	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	Median Percentile	Bat Activity Category
T11	*Myotis*	1	1	3	2	10	0	Low
T11	*Myotis nattereri*	0	1	1	1	14	0	Low
T11	*Nyctalus leisleri*	0	0	0	0	17	0	Low
T11	*Pipistrellus nathusii*	0	0	4	0	13	0	Low
T11	*Pipistrellus pipistrellus*	7	0	0	0	10	0	Low
T11	*Pipistrellus pygmaeus*	1	2	2	0	12	0	Low
T11	*Plecotus auritus*	0	0	0	0	17	0	Low
T12	*Myotis*	2	7	3	0	5	65	Moderate to High
T12	*Myotis nattereri*	0	0	3	2	12	0	Low
T12	*Nyctalus leisleri*	0	0	1	1	15	0	Low
T12	*Pipistrellus nathusii*	0	0	4	0	13	0	Low
T12	*Pipistrellus pipistrellus*	0	0	2	2	13	0	Low
T12	*Pipistrellus pygmaeus*	0	2	4	3	8	34	Low to Moderate
T12	*Plecotus auritus*	0	0	2	1	14	0	Low
T13	*Myotis*	0	4	5	1	7	44	Moderate
T13	*Myotis nattereri*	0	0	5	3	9	16	Low
T13	*Nyctalus leisleri*	0	0	0	1	16	0	Low
T13	*Pipistrellus nathusii*	0	0	0	0	17	0	Low
T13	*Pipistrellus pipistrellus*	0	2	2	5	8	34	Low to Moderate
T13	*Pipistrellus pygmaeus*	1	6	0	3	7	34	Low to Moderate
T13	*Plecotus auritus*	0	0	1	1	15	0	Low

Table 8-18: Summary showing the number of nights recorded bat activity fell into each activity band for each species across all of the detectors – Survey period 2

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	Median Percentile	Bat Activity Category
Myotis	3	26	57	22	106	16	Low
Myotis nattereri	0	2	19	12	181	0	Low
Nyctalus leisleri	0	1	26	16	171	0	Low
Pipistrellus nathusii	0	0	9	2	203	0	Low

Pipistrellus pipistrellus	10	28	32	28	116	16	Low
Pipistrellus pygmaeus	22	45	30	14	103	34	Low to Moderate
Plecotus auritus	0	3	24	14	173	0	Low

8.1.3 Survey Period 3

A summary showing the number of nights recorded bat activity within each activity band for each species is presented below in Table 8-19.

Bat surveys were conducted for 10 nights between 10/09/2020 and 19/09/2020 for static locations 1 to 13 and an additional detector set within lowland woodland set outside the site to the south for comparison.

All of the static locations had at least one night of High Activity during the survey period.

The following Static locations are deemed to have a High Bat Activity (for specific bat species) level based on the Percentile Median value:

- D11 Common Pipistrelle
- D14 (outside the site) for Myotis bats

Table 8-19: Summary showing the number of nights recorded bat activity fell into each activity band for each species at each static location and bat activity category based on median percentile – Survey period 3

Location	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	Median Percentile	Bat Activity Category
T1	*Myotis*	0	0	1	3	6	18	Low
T1	*Myotis nattereri*	0	0	0	0	10	0	Low
T1	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T1	*Pipistrellus nathusii*	0	0	2	1	7	0	Low
T1	*Pipistrellus pipistrellus*	0	3	2	0	5	24	Low to Moderate
T1	*Pipistrellus pygmaeus*	1	2	1	1	5	28	Low to Moderate
T1	*Plecotus auritus*	0	0	1	1	8	0	Low
T2	*Myotis*	0	1	1	2	6	18	Low
T2	*Myotis nattereri*	0	0	1	0	9	0	Low
T2	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T2	*Pipistrellus nathusii*	0	2	0	0	8	0	Low
T2	*Pipistrellus pipistrellus*	3	2	0	2	3	53	Moderate
T2	*Pipistrellus pygmaeus*	3	2	2	0	3	67	Moderate to High
T2	*Plecotus auritus*	0	1	0	3	6	18	Low

Location	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	Median Percentile	Bat Activity Category
T3	*Myotis*	0	2	3	2	3	43	Moderate
T3	*Myotis nattereri*	0	0	0	0	10	0	Low
T3	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T3	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T3	*Pipistrellus pipistrellus*	0	2	3	1	4	43	Moderate
T3	*Pipistrellus pygmaeus*	1	2	4	0	3	47	Moderate
T3	*Plecotus auritus*	0	0	2	1	7	18	Low
T4	*Myotis*	0	0	2	2	6	0	Low
T4	*Myotis nattereri*	0	0	0	0	10	0	Low
T4	*Nyctalus leisleri*	0	0	1	0	9	0	Low
T4	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T4	*Pipistrellus pipistrellus*	4	3	1	0	2	73	Moderate to High
T4	*Pipistrellus pygmaeus*	0	3	1	2	4	38	Low to Moderate
T4	*Plecotus auritus*	0	0	0	0	10	0	Low
T5	*Myotis*	0	0	3	2	5	19	Low
T5	*Myotis nattereri*	0	0	0	0	10	0	Low
T5	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T5	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T5	*Pipistrellus pipistrellus*	1	1	3	0	5	24	Low to Moderate
T5	*Pipistrellus pygmaeus*	2	1	1	3	3	38	Low to Moderate
T5	*Plecotus auritus*	0	0	0	2	8	9	Low
T6	*Myotis*	0	1	6	1	2	47	Moderate
T6	*Myotis nattereri*	0	0	0	3	7	9	Low
T6	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T6	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T6	*Pipistrellus pipistrellus*	0	0	1	2	7	0	Low
T6	*Pipistrellus pygmaeus*	0	3	1	1	5	28	Low to Moderate
T6	*Plecotus auritus*	0	0	1	1	8	18	Low
T7	*Myotis*	0	0	3	0	7	9	Low
T7	*Myotis nattereri*	0	0	0	0	10	0	Low
T7	*Nyctalus leisleri*	0	0	0	0	10	0	Low

Location	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	Median Percentile	Bat Activity Category
T7	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T7	*Pipistrellus pipistrellus*	0	0	0	0	10	9	Low
T7	*Pipistrellus pygmaeus*	0	3	1	1	5	28	Low to Moderate
T7	*Plecotus auritus*	0	0	1	1	8	18	Low
T8	*Myotis*	0	0	6	2	2	47	Moderate
T8	*Myotis nattereri*	0	0	0	0	10	18	Low
T8	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T8	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T8	*Pipistrellus pipistrellus*	1	1	4	1	3	53	Moderate
T8	*Pipistrellus pygmaeus*	0	5	0	1	4	51	Moderate
T8	*Plecotus auritus*	0	2	3	3	2	43	Moderate
T9	*Myotis*	0	0	1	2	7	18	Low
T9	*Myotis nattereri*	0	0	0	0	10	0	Low
T9	*Nyctalus leisleri*	0	0	1	0	9	0	Low
T9	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T9	*Pipistrellus pipistrellus*	0	0	0	2	8	0	Low
T9	*Pipistrellus pygmaeus*	0	2	1	1	6	18	Low
T9	*Plecotus auritus*	0	2	2	0	6	18	Low
T10	*Myotis*	0	4	3	2	1	57	Moderate
T10	*Myotis nattereri*	0	0	2	0	8	18	Low
T10	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T10	*Pipistrellus nathusii*	0	0	0	1	9	0	Low
T10	*Pipistrellus pipistrellus*	4	4	1	0	1	75	Moderate to High
T10	*Pipistrellus pygmaeus*	3	3	2	0	2	71	Moderate to High
T10	*Plecotus auritus*	0	1	3	2	4	38	Low to Moderate
T11	*Myotis*	0	9	1	0	0	71	Moderate to High
T11	*Myotis nattereri*	0	0	3	1	6	18	Low
T11	*Nyctalus leisleri*	0	0	0	1	9	0	Low
T11	*Pipistrellus nathusii*	0	0	3	2	5	28	Low to Moderate

Location	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	Median Percentile	Bat Activity Category
T11	*Pipistrellus pipistrellus*	10	0	0	0	0	97	High
T11	*Pipistrellus pygmaeus*	4	5	0	0	1	79	Moderate to High
T11	*Plecotus auritus*	0	3	1	1	5	28	Low to Moderate
T12	*Myotis*	0	0	3	1	6	9	Low
T12	*Myotis nattereri*	0	0	0	0	10	0	Low
T12	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T12	*Pipistrellus nathusii*	1	0	0	0	9	0	Low
T12	*Pipistrellus pipistrellus*	1	1	1	0	7	18	Low
T12	*Pipistrellus pygmaeus*	0	1	1	2	6	9	Low
T12	*Plecotus auritus*	0	0	2	0	8	0	Low
T13	*Myotis*	0	0	0	3	7	18	Low
T13	*Myotis nattereri*	0	0	0	0	10	0	Low
T13	*Nyctalus leisleri*	0	0	1	1	8	0	Low
T13	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T13	*Pipistrellus pipistrellus*	0	2	1	2	5	28	Low to Moderate
T13	*Pipistrellus pygmaeus*	0	3	2	2	3	43	Moderate
T13	*Plecotus auritus*	0	0	0	0	10	0	Low
T14	*Myotis*	7	2	0	0	1	86	High
T14	*Myotis nattereri*	2	2	2	1	3	51	Moderate
T14	*Nyctalus leisleri*	0	0	0	0	10	0	Low
T14	*Pipistrellus nathusii*	0	0	0	0	10	0	Low
T14	*Pipistrellus pipistrellus*	0	0	0	0	10	0	Low
T14	*Pipistrellus pygmaeus*	0	5	2	1	2	65	Moderate to High
T14	*Plecotus auritus*	0	0	0	0	10	0	Low
T14	*Rhinolophus hipposideros*	0	0	0	0	10	0	Low

Table 8-20: Summary showing the number of nights recorded bat activity fell into each activity band for each species across all of the detectors – Survey period 3

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	Median Percentile	Bat Activity Category
Myotis	7	19	33	22	59	18.5	Low
Myotis nattereri	2	2	8	5	123	0	Low
Nyctalus leisleri	0	0	3	2	135	0	Low
Pipistrellus nathusii	1	2	5	4	128	0	Low
Pipistrellus pipistrellus	24	19	17	10	70	26	Low to Moderate
Pipistrellus pygmaeus	14	40	19	15	52	40.5	Low to Moderate
Plecotus auritus	0	9	16	15	100	18	Low
Rhinolophus hipposideros	0	0	0	0	10	0	Low

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APPENDIX D

Ecobat Full Reports for Periods
1 – 3

Ecobat Bat Activity Analysis

Site Name: Tullaghmore Spring

John Curtin

23/11/2021

8.1.4 Summary

Bat surveys were conducted at T1, T10, T11, T12, T13, T2, T3, T4, T5, T6, T7, T8, T9, for 10 nights between 2020-05-19 and 2020-05-28, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 666 passes, and 7 species were recorded.

The reference range dataset was stratified to include:

- Only records from within 30 days of the survey date.
- Only records from within 100km^2 of the survey location.
- Records using any make of bat detector.

8.1.4.1 Table 1

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

Location	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
T1	*Myotis*	0	0	0	0	10
T1	*Myotis nattereri*	0	0	0	0	10
T1	*Nyctalus leisleri*	0	0	1	0	9
T1	*Pipistrellus nathusii*	0	0	0	1	9
T1	*Pipistrellus pipistrellus*	0	0	0	0	10
T1	*Pipistrellus pygmaeus*	0	0	0	0	10
T1	*Plecotus auritus*	0	0	0	0	10
T10	*Myotis*	0	1	2	2	5
T10	*Myotis nattereri*	0	0	0	0	10
T10	*Nyctalus leisleri*	0	0	2	0	8
T10	*Pipistrellus nathusii*	0	0	3	1	6

T10	*Pipistrellus pipistrellus*	0	4	2	1	3
T10	*Pipistrellus pygmaeus*	0	2	4	1	3
T10	*Plecotus auritus*	0	0	0	0	10
T11	*Myotis*	3	2	3	1	1
T11	*Myotis nattereri*	0	0	0	0	10
T11	*Nyctalus leisleri*	0	0	0	1	9
T11	*Pipistrellus nathusii*	7	2	0	0	1
T11	*Pipistrellus pipistrellus*	9	0	0	0	1
T11	*Pipistrellus pygmaeus*	7	1	0	0	2
T11	*Plecotus auritus*	0	0	0	5	5
T12	*Myotis*	0	0	1	2	7
T12	*Myotis nattereri*	0	0	0	0	10
T12	*Nyctalus leisleri*	0	0	0	0	10
T12	*Pipistrellus nathusii*	0	0	0	0	10
T12	*Pipistrellus pipistrellus*	0	0	1	3	6
T12	*Pipistrellus pygmaeus*	0	0	0	0	10
T12	*Plecotus auritus*	0	0	0	2	8
T13	*Myotis*	0	0	4	0	6
T13	*Myotis nattereri*	0	0	0	0	10
T13	*Nyctalus leisleri*	0	0	0	0	10
T13	*Pipistrellus nathusii*	0	0	0	0	10
T13	*Pipistrellus pipistrellus*	0	1	4	3	2
T13	*Pipistrellus pygmaeus*	0	0	1	3	6
T13	*Plecotus auritus*	0	0	1	0	9
T2	*Myotis*	0	0	0	1	9
T2	*Myotis nattereri*	0	0	0	0	10
T2	*Nyctalus leisleri*	0	0	0	3	7
T2	*Pipistrellus nathusii*	0	0	0	0	10

T2	*Pipistrellus pipistrellus*	0	1	3	2	4
T2	*Pipistrellus pygmaeus*	0	0	1	3	6
T2	*Plecotus auritus*	0	0	0	0	10
T3	*Myotis*	0	1	2	3	4
T3	*Myotis nattereri*	0	0	0	0	10
T3	*Nyctalus leisleri*	0	0	0	2	8
T3	*Pipistrellus nathusii*	0	2	0	0	8
T3	*Pipistrellus pipistrellus*	3	3	2	0	2
T3	*Pipistrellus pygmaeus*	1	5	0	0	4
T3	*Plecotus auritus*	0	0	1	0	9
T4	*Myotis*	0	1	1	2	6
T4	*Myotis nattereri*	0	0	0	0	10
T4	*Nyctalus leisleri*	0	0	0	0	10
T4	*Pipistrellus nathusii*	0	0	2	3	5
T4	*Pipistrellus pipistrellus*	0	3	4	0	3
T4	*Pipistrellus pygmaeus*	0	1	2	2	5
T4	*Plecotus auritus*	0	0	0	0	10
T5	*Myotis*	0	0	0	2	8
T5	*Myotis nattereri*	0	0	0	1	9
T5	*Nyctalus leisleri*	0	0	0	0	10
T5	*Pipistrellus nathusii*	0	0	0	1	9
T5	*Pipistrellus pipistrellus*	0	0	1	1	8
T5	*Pipistrellus pygmaeus*	0	1	1	1	7
T5	*Plecotus auritus*	0	0	0	1	9
T6	*Myotis*	0	0	0	1	9
T6	*Myotis nattereri*	0	0	0	0	10
T6	*Nyctalus leisleri*	0	0	0	2	8
T6	*Pipistrellus nathusii*	0	0	0	0	10

T6	*Pipistrellus pipistrellus*	0	1	1	2	6
T6	*Pipistrellus pygmaeus*	0	1	0	3	6
T6	*Plecotus auritus*	0	0	1	2	7
T7	*Myotis*	0	0	2	0	8
T7	*Myotis nattereri*	0	0	0	0	10
T7	*Nyctalus leisleri*	0	0	2	0	8
T7	*Pipistrellus nathusii*	0	0	3	1	6
T7	*Pipistrellus pipistrellus*	0	0	2	3	5
T7	*Pipistrellus pygmaeus*	0	0	2	1	7
T7	*Plecotus auritus*	0	0	1	1	8
T8	*Myotis*	0	1	0	1	8
T8	*Myotis nattereri*	0	0	0	0	10
T8	*Nyctalus leisleri*	1	0	1	1	7
T8	*Pipistrellus nathusii*	0	0	1	2	7
T8	*Pipistrellus pipistrellus*	0	3	2	0	5
T8	*Pipistrellus pygmaeus*	0	1	4	0	5
T8	*Plecotus auritus*	0	0	1	2	7
T9	*Myotis*	0	2	1	0	7
T9	*Myotis nattereri*	0	0	0	0	10
T9	*Nyctalus leisleri*	0	0	0	0	10
T9	*Pipistrellus nathusii*	0	0	0	1	9
T9	*Pipistrellus pipistrellus*	0	1	1	1	7
T9	*Pipistrellus pygmaeus*	1	1	2	1	5
T9	*Plecotus auritus*	0	0	1	2	7

8.1.4.2 Table 2

Summary table showing key metrics for each species recorded.

Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
T1	*Myotis*	0	0 - 0	8	10	1092
T1	*Myotis nattereri*	0	0 - 0	8	10	150
T1	*Nyctalus leisleri*	0	0 - 0	52	10	1494
T1	*Pipistrellus nathusii*	0	0 - 0	26	10	245
T1	*Pipistrellus pipistrellus*	0	0 - 0	8	10	1681
T1	*Pipistrellus pygmaeus*	0	0 - 0	0	10	1646
T1	*Plecotus auritus*	0	0 - 0	8	10	573
T10	*Myotis*	17	17 - 54.5	66	10	1092
T10	*Myotis nattereri*	0	0 - 0	0	10	150
T10	*Nyctalus leisleri*	0	8 - 60	60	10	1494
T10	*Pipistrellus nathusii*	4	25.5 - 51.5	60	10	245
T10	*Pipistrellus pipistrellus*	52	39.5 - 65.5	69	10	1681
T10	*Pipistrellus pygmaeus*	43	39.5 - 72.5	73	10	1646
T10	*Plecotus auritus*	0	0 - 0	8	10	573
T11	*Myotis*	67	41.5 - 80.5	90	10	1092
T11	*Myotis nattereri*	0	0 - 0	0	10	150
T11	*Nyctalus leisleri*	4	8 - 8	26	10	1494
T11	*Pipistrellus nathusii*	87	77 - 91	95	10	245
T11	*Pipistrellus pipistrellus*	97	92.5 - 98	98	10	1681
T11	*Pipistrellus pygmaeus*	86	78 - 89.5	91	10	1646
T11	*Plecotus auritus*	17	22 - 36	36	10	573
T12	*Myotis*	0	8 - 48	48	10	1092
T12	*Myotis nattereri*	0	0 - 0	0	10	150
T12	*Nyctalus leisleri*	0	0 - 0	8	10	1494

T12	*Pipistrellus nathusii*	0	0 - 0	8	10	245
T12	*Pipistrellus pipistrellus*	8	8 - 37	48	10	1681
T12	*Pipistrellus pygmaeus*	0	0 - 0	8	10	1646
T12	*Plecotus auritus*	0	8 - 26	26	10	573
T13	*Myotis*	4	30 - 60	60	10	1092
T13	*Myotis nattereri*	0	0 - 0	0	10	150
T13	*Nyctalus leisleri*	0	0 - 0	8	10	1494
T13	*Pipistrellus nathusii*	0	0 - 0	8	10	245
T13	*Pipistrellus pipistrellus*	35	26 - 55	62	10	1681
T13	*Pipistrellus pygmaeus*	0	36 - 36	48	10	1646
T13	*Plecotus auritus*	0	25.5 - 25.5	43	10	573
T2	*Myotis*	0	17 - 17	26	10	1092
T2	*Myotis nattereri*	0	0 - 0	8	10	150
T2	*Nyctalus leisleri*	0	17 - 31	36	10	1494
T2	*Pipistrellus nathusii*	0	0 - 0	0	10	245
T2	*Pipistrellus pipistrellus*	36	36 - 60	76	10	1681
T2	*Pipistrellus pygmaeus*	4	8 - 52	52	10	1646
T2	*Plecotus auritus*	0	0 - 0	8	10	573
T3	*Myotis*	26	17 - 55	62	10	1092
T3	*Myotis nattereri*	0	0 - 0	0	10	150
T3	*Nyctalus leisleri*	0	0 - 0	26	10	1494
T3	*Pipistrellus nathusii*	8	8 - 43.5	79	10	245
T3	*Pipistrellus pipistrellus*	70	59.5 - 83.5	86	10	1681
T3	*Pipistrellus pygmaeus*	69	38.5 - 81.5	86	10	1646
T3	*Plecotus auritus*	8	8 - 8	58	10	573
T4	*Myotis*	4	22 - 51.5	67	10	1092
T4	*Myotis nattereri*	0	0 - 0	0	10	150

T4	*Nyctalus leisleri*	0	0 - 0	8	10	1494
T4	*Pipistrellus nathusii*	17	17 - 44	52	10	245
T4	*Pipistrellus pipistrellus*	57	51.5 - 74	75	10	1681
T4	*Pipistrellus pygmaeus*	17	22 - 61	70	10	1646
T4	*Plecotus auritus*	0	0 - 0	8	10	573
T5	*Myotis*	0	26 - 26	26	10	1092
T5	*Myotis nattereri*	0	0 - 0	26	10	150
T5	*Nyctalus leisleri*	0	0 - 0	8	10	1494
T5	*Pipistrellus nathusii*	0	0 - 0	26	10	245
T5	*Pipistrellus pipistrellus*	8	8 - 33	58	10	1681
T5	*Pipistrellus pygmaeus*	4	8 - 48	68	10	1646
T5	*Plecotus auritus*	0	0 - 0	36	10	573
T6	*Myotis*	0	17 - 17	26	10	1092
T6	*Myotis nattereri*	0	0 - 0	0	10	150
T6	*Nyctalus leisleri*	4	8 - 17	26	10	1494
T6	*Pipistrellus nathusii*	0	0 - 0	8	10	245
T6	*Pipistrellus pipistrellus*	4	22 - 49	62	10	1681
T6	*Pipistrellus pygmaeus*	0	31 - 49	62	10	1646
T6	*Plecotus auritus*	0	17 - 34.5	43	10	573
T7	*Myotis*	0	8 - 48	52	10	1092
T7	*Myotis nattereri*	0	0 - 0	0	10	150
T7	*Nyctalus leisleri*	0	8 - 48	48	10	1494
T7	*Pipistrellus nathusii*	4	8 - 52	52	10	245
T7	*Pipistrellus pipistrellus*	13	26 - 60	60	10	1681
T7	*Pipistrellus pygmaeus*	0	36 - 58	58	10	1646
T7	*Plecotus auritus*	8	8 - 26	48	10	573
T8	*Myotis*	0	8 - 37.5	67	10	1092

T8	*Myotis nattereri*	0	0 - 0	0	10	150
T8	*Nyctalus leisleri*	0	8 - 89	89	10	1494
T8	*Pipistrellus nathusii*	4	8 - 42	58	10	245
T8	*Pipistrellus pipistrellus*	22	53.5 - 71.5	79	10	1681
T8	*Pipistrellus pygmaeus*	24	50 - 57	62	10	1646
T8	*Plecotus auritus*	0	17 - 34.5	43	10	573
T9	*Myotis*	4	8 - 66	69	10	1092
T9	*Myotis nattereri*	0	0 - 0	0	10	150
T9	*Nyctalus leisleri*	0	0 - 0	0	10	1494
T9	*Pipistrellus nathusii*	0	17 - 17	26	10	245
T9	*Pipistrellus pipistrellus*	8	8 - 48	71	10	1681
T9	*Pipistrellus pygmaeus*	17	17 - 66.5	85	10	1646
T9	*Plecotus auritus*	0	8 - 48	48	10	573

8.1.5 Figures

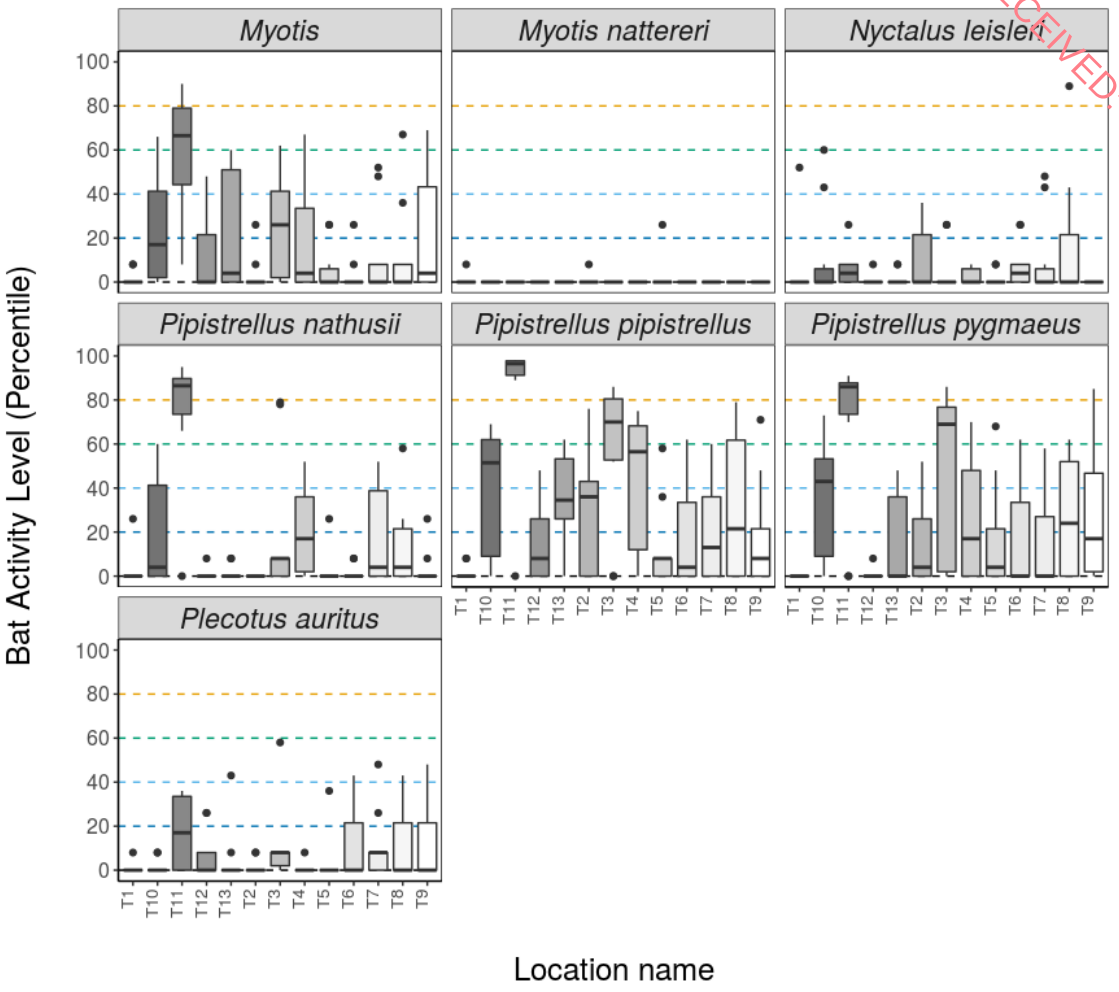
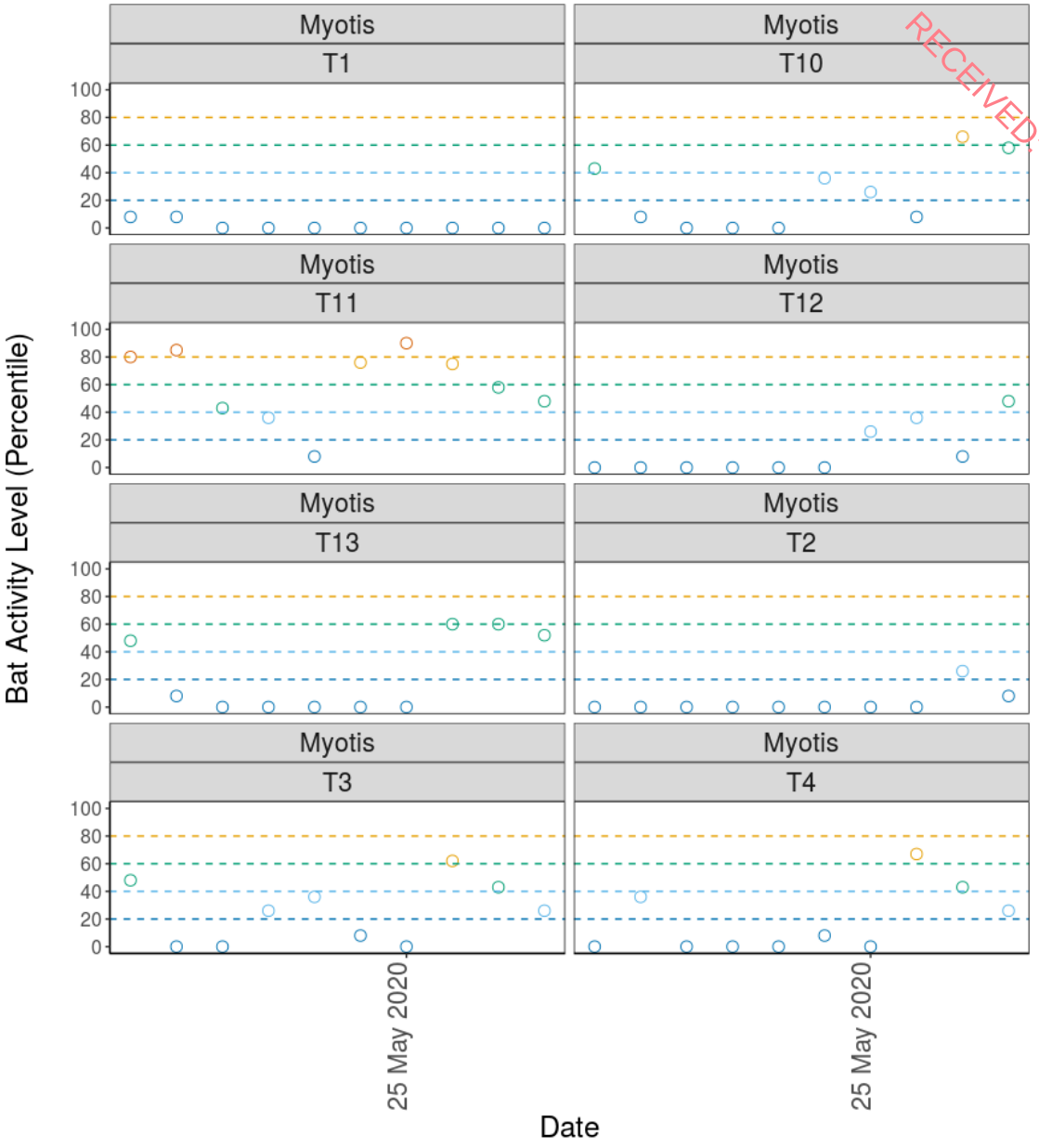
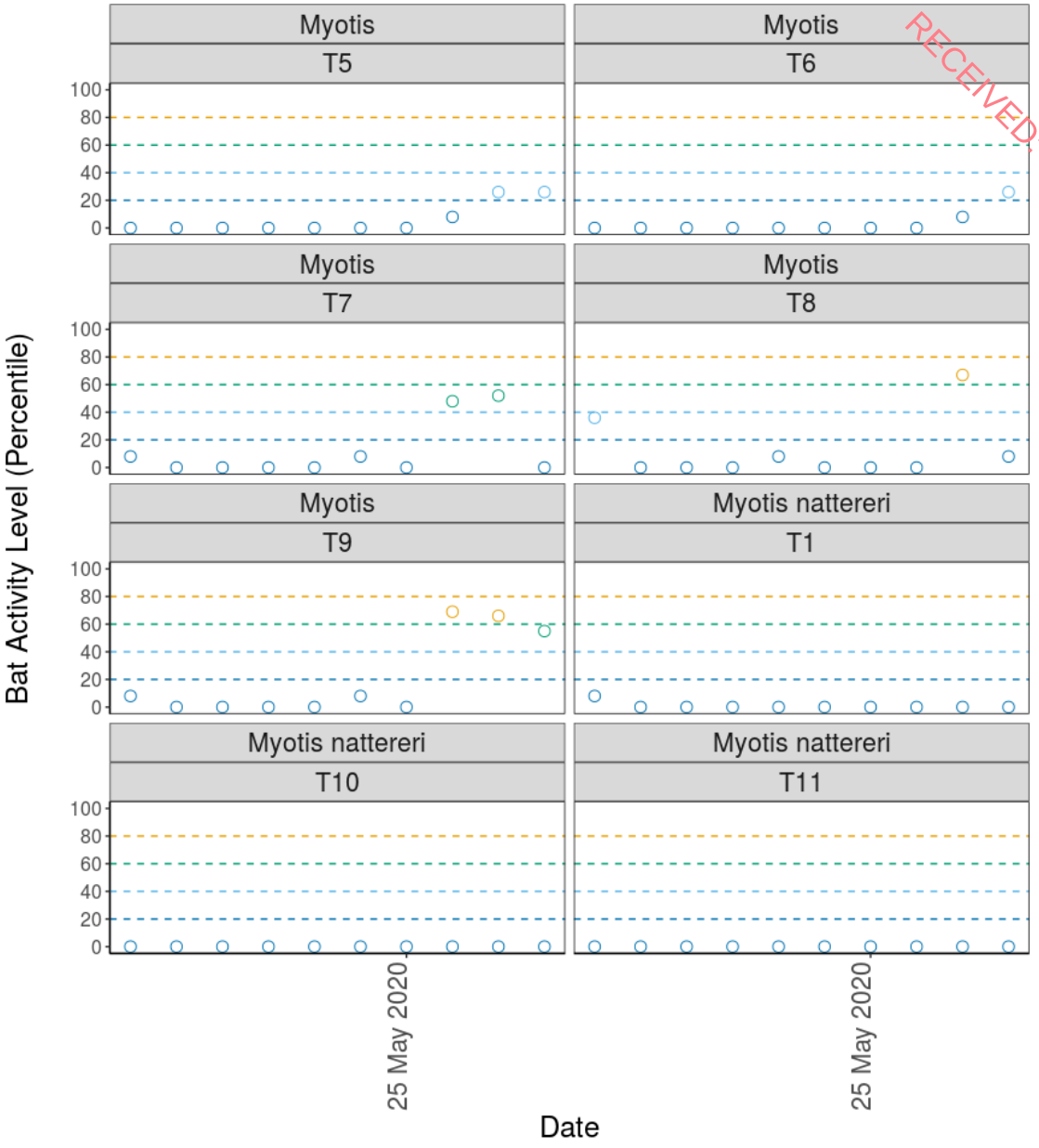
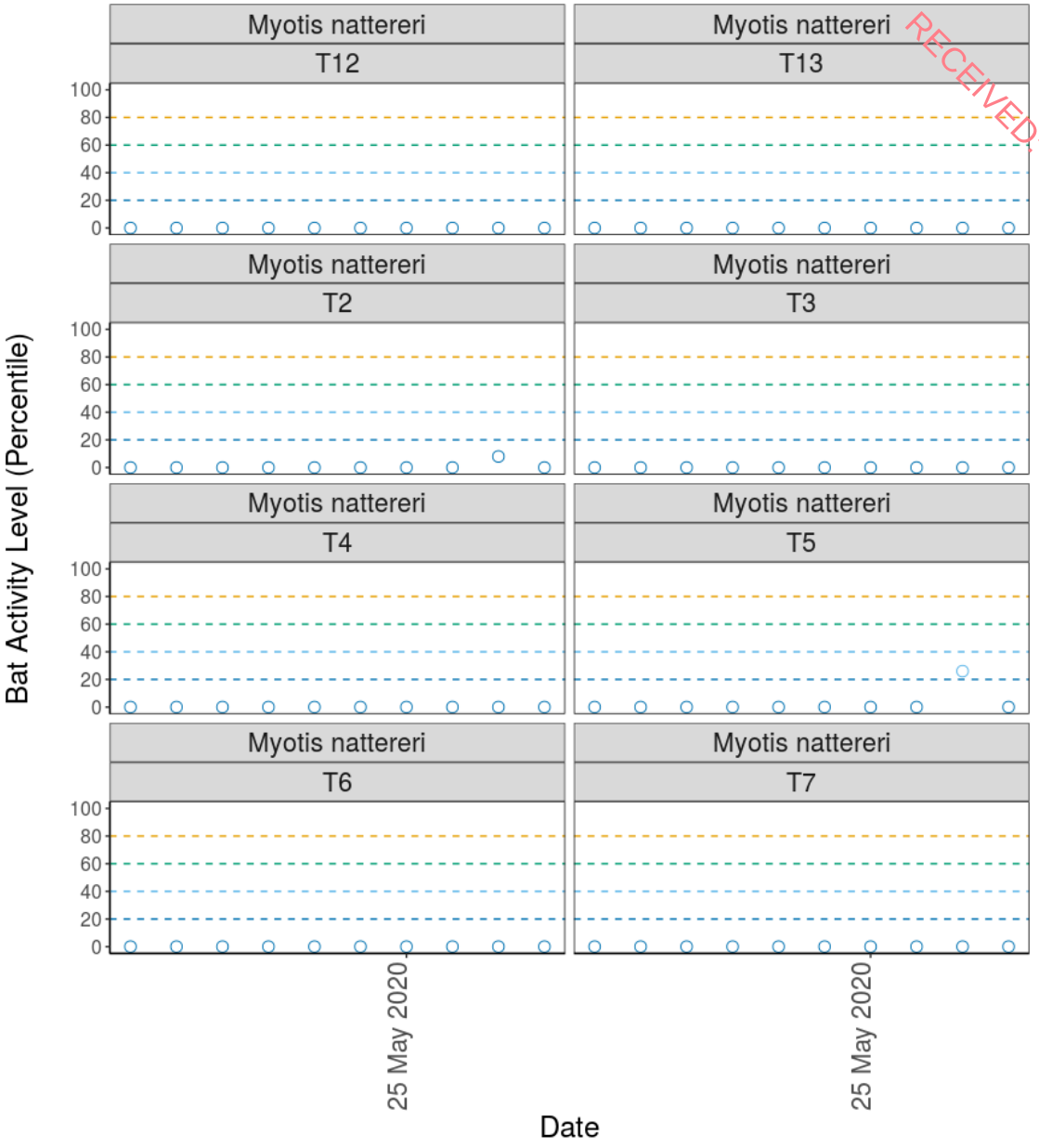
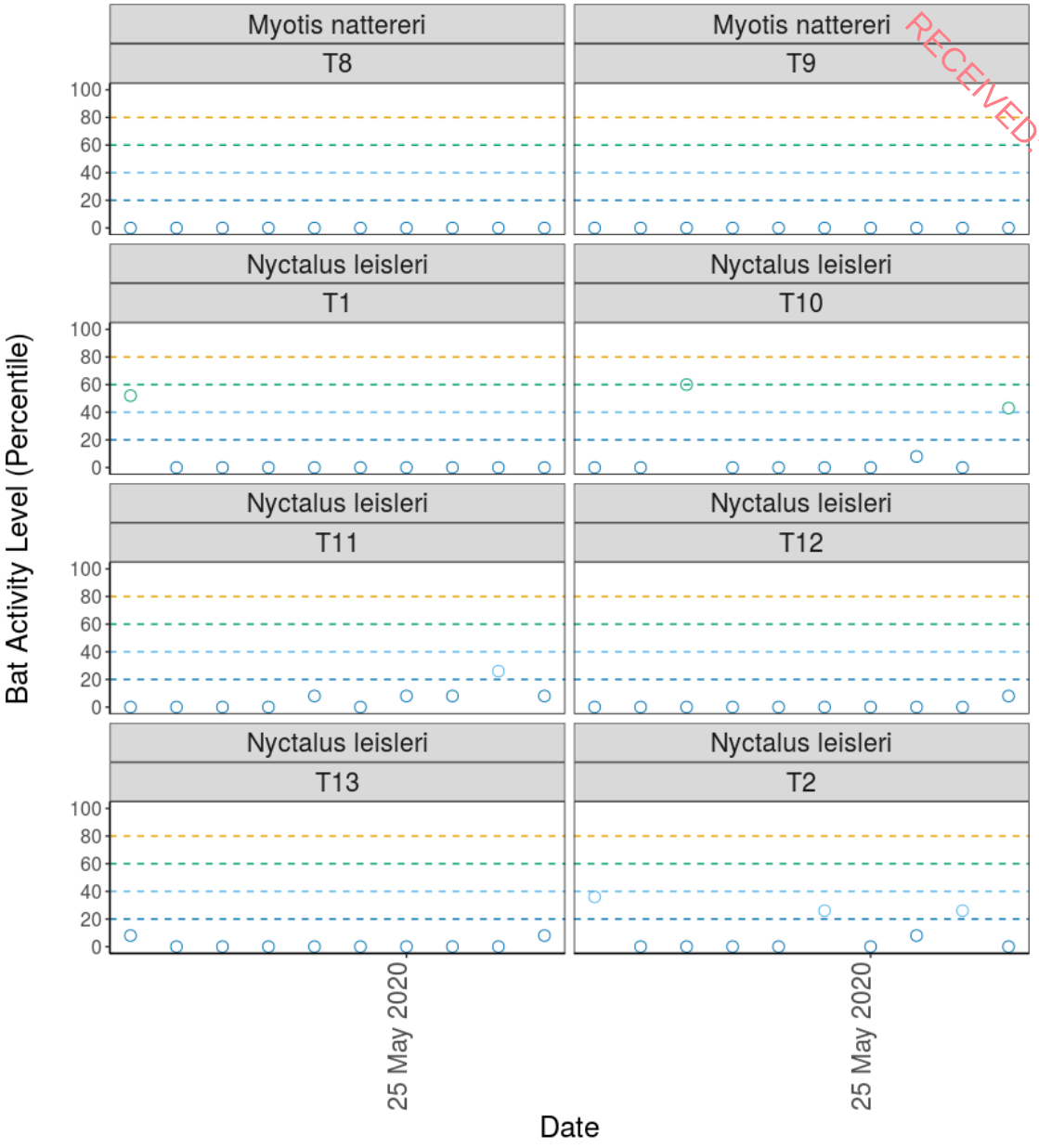


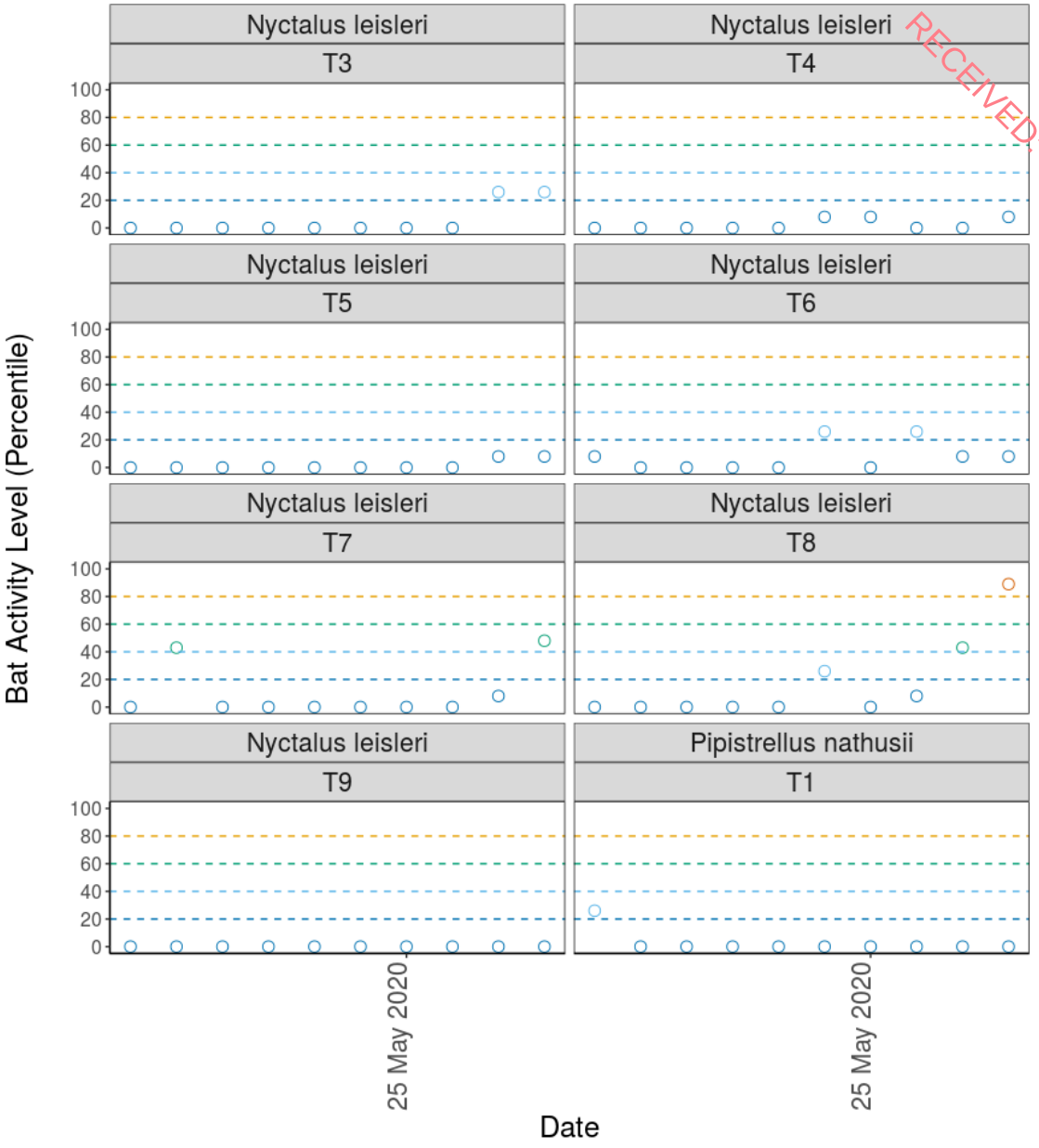
Figure 1. Differences in activity between static detector locations, split by species and location. The center line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)

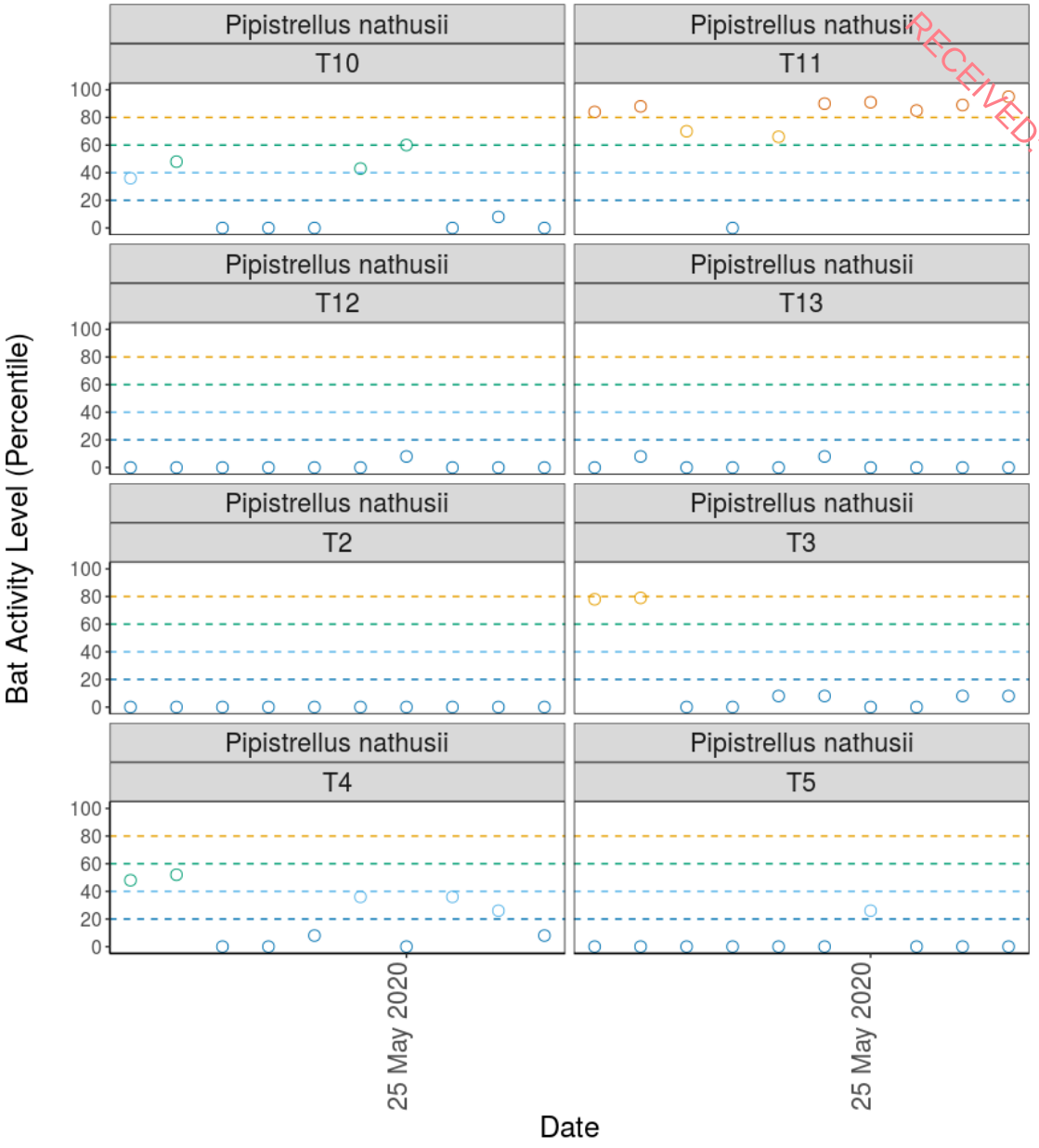


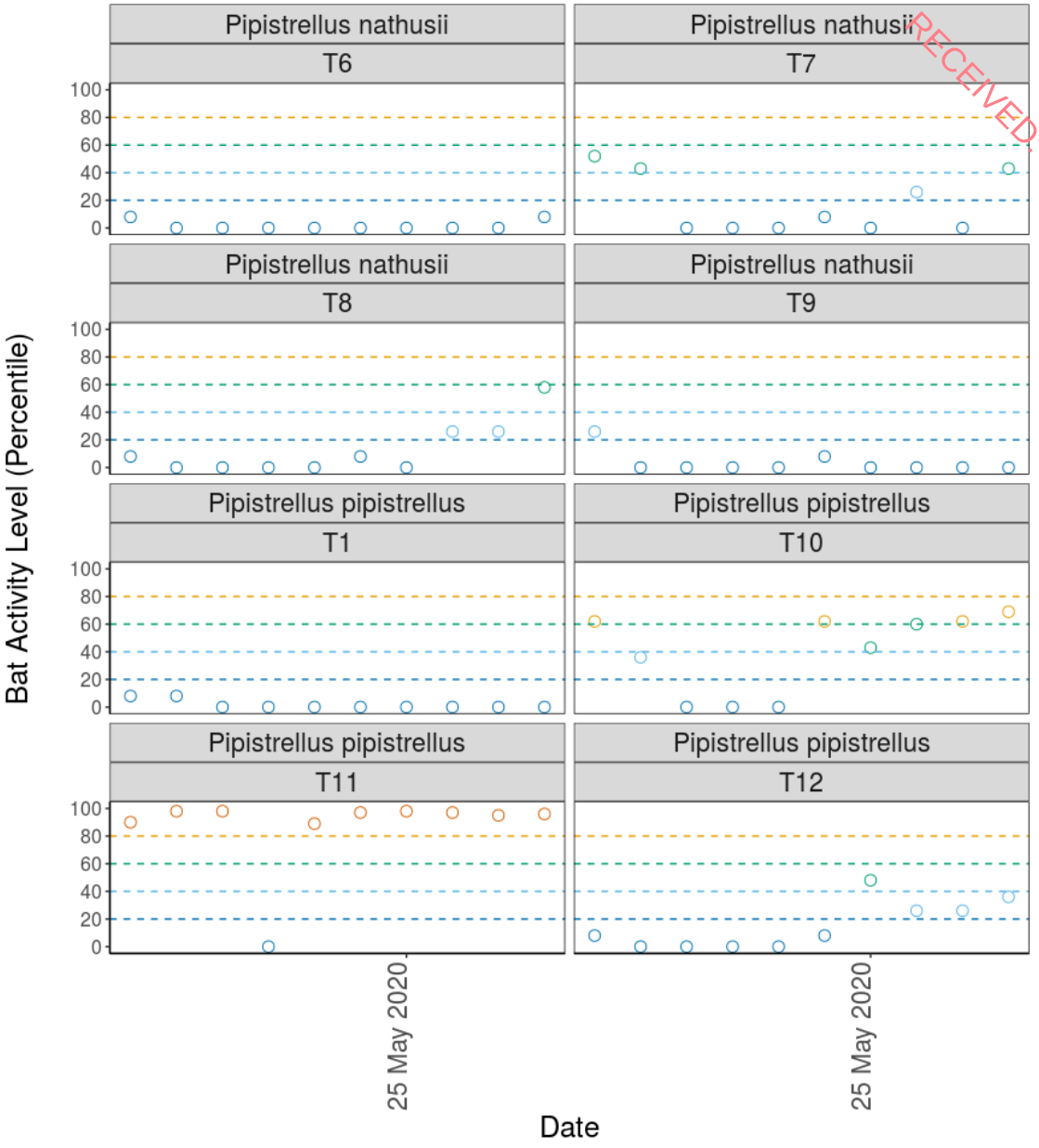


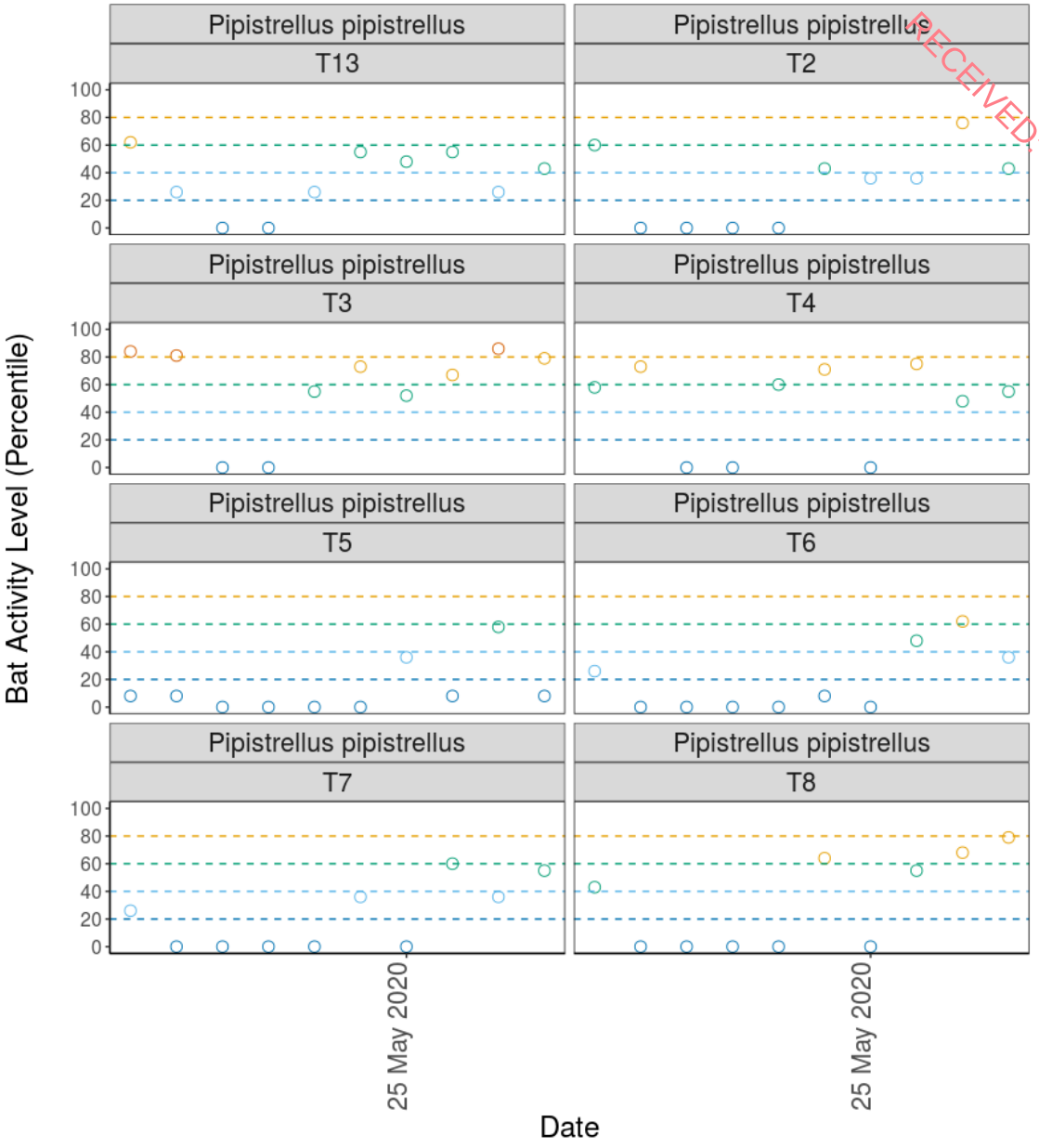


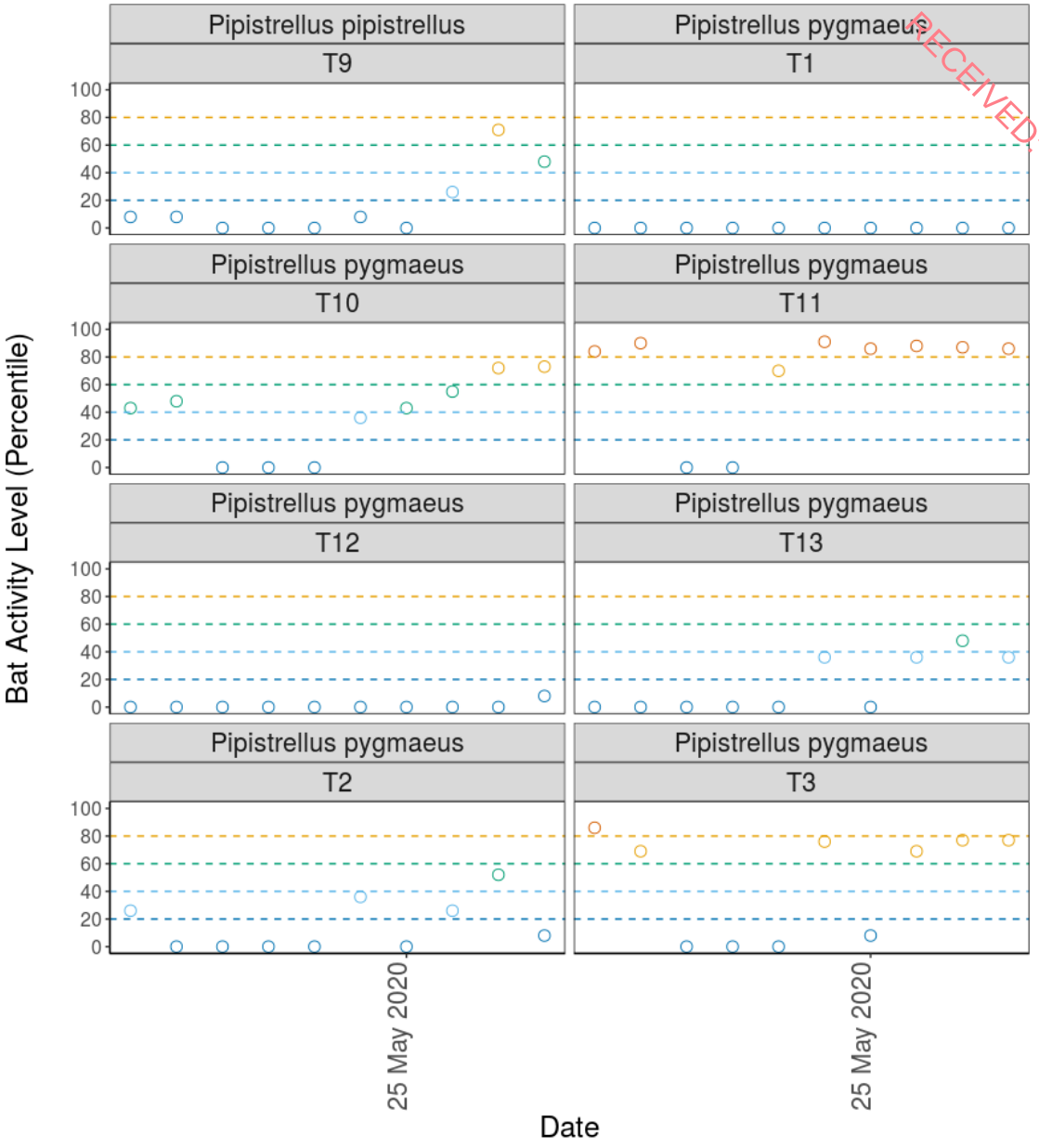


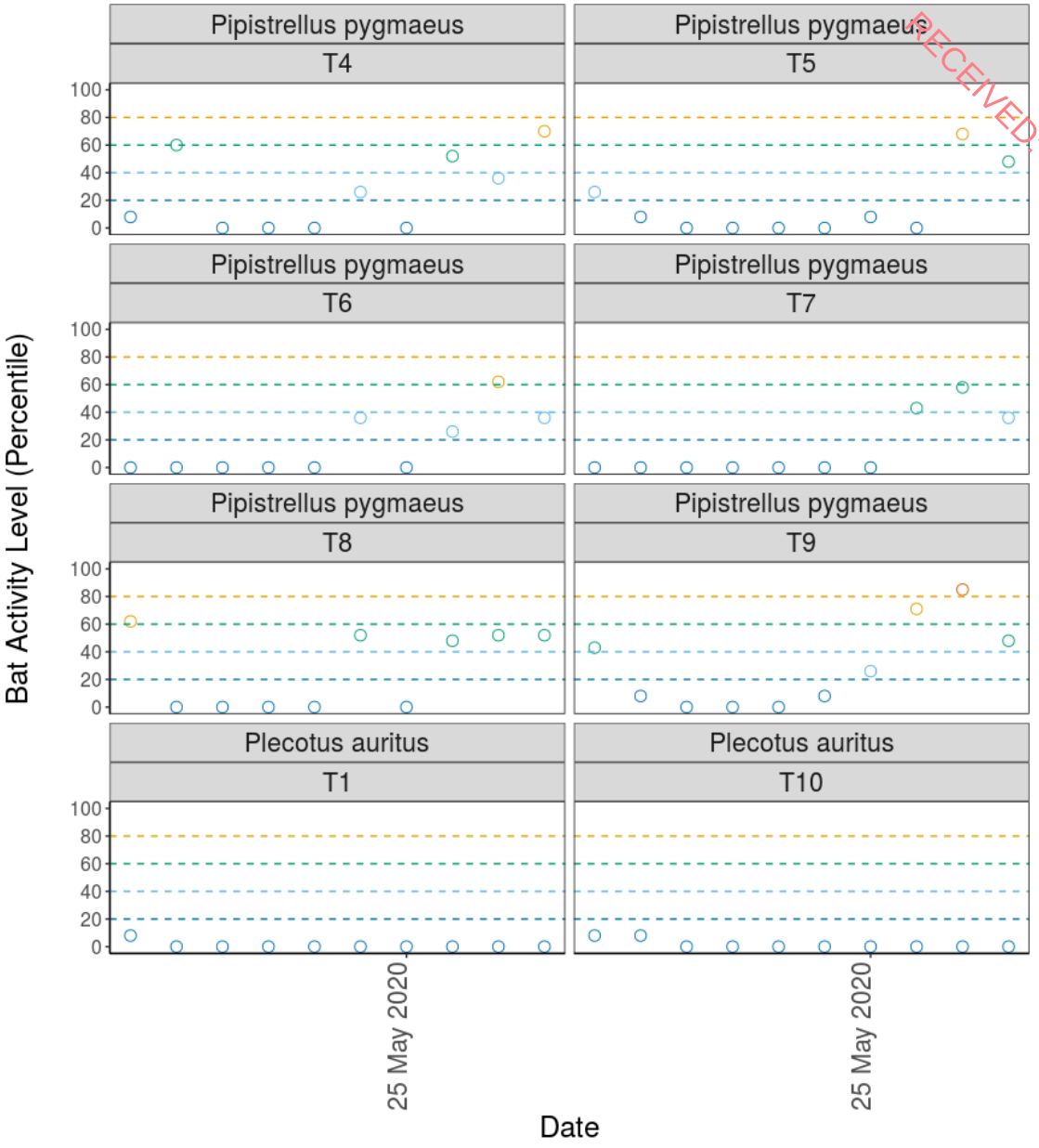


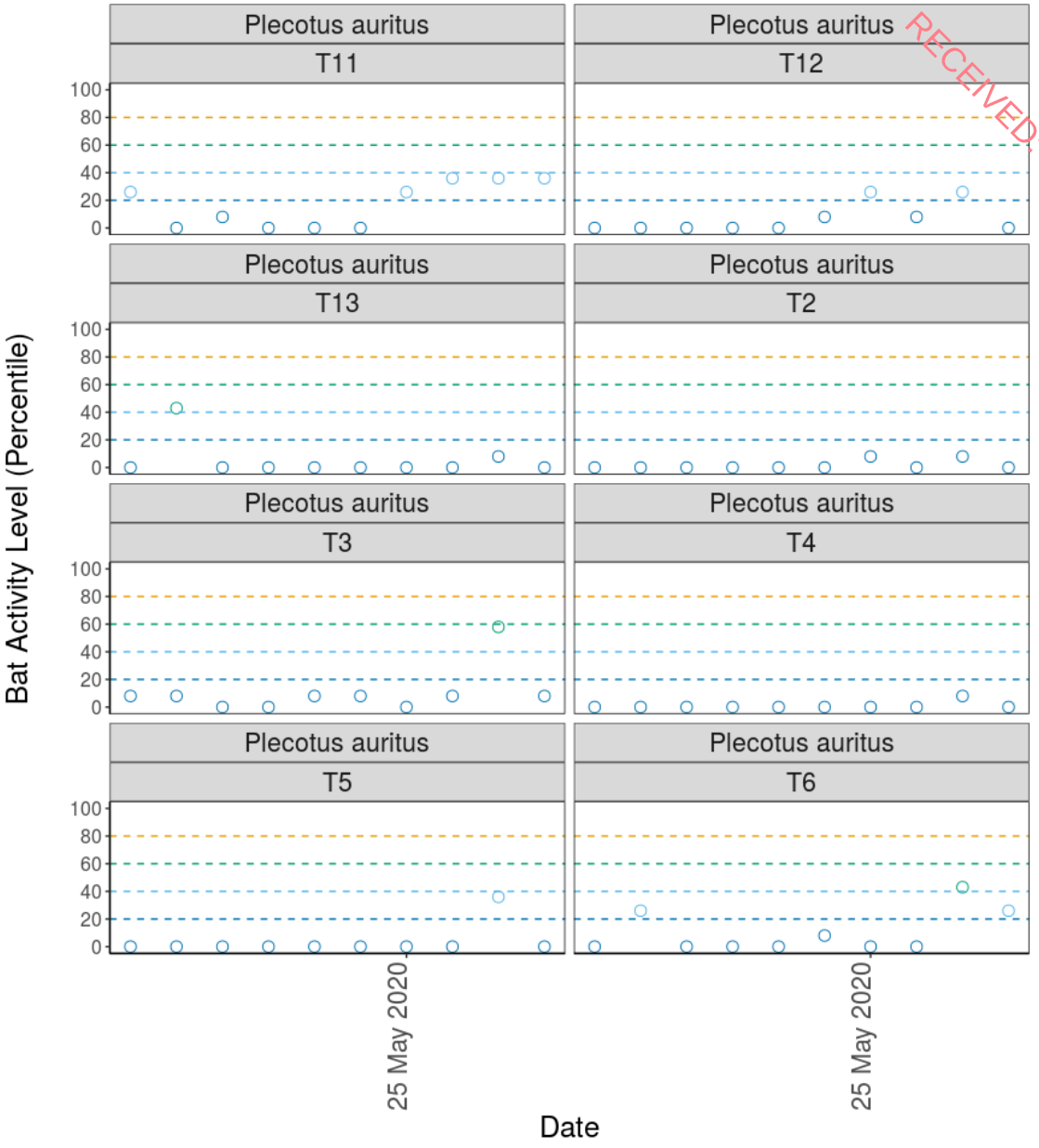












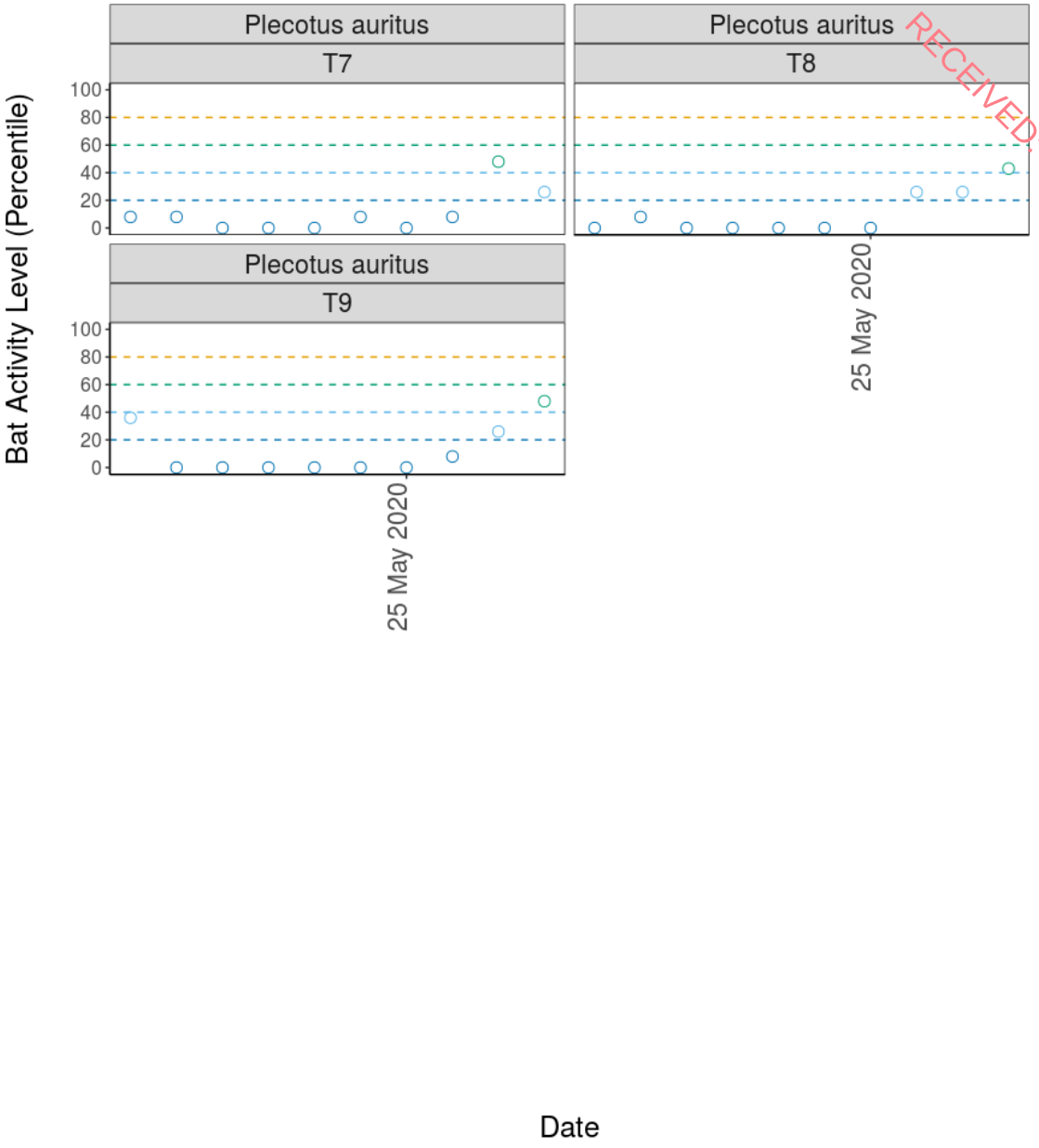


Figure 2. The activity level (percentile) of bats recorded across each night of the bat survey, split by location and species.

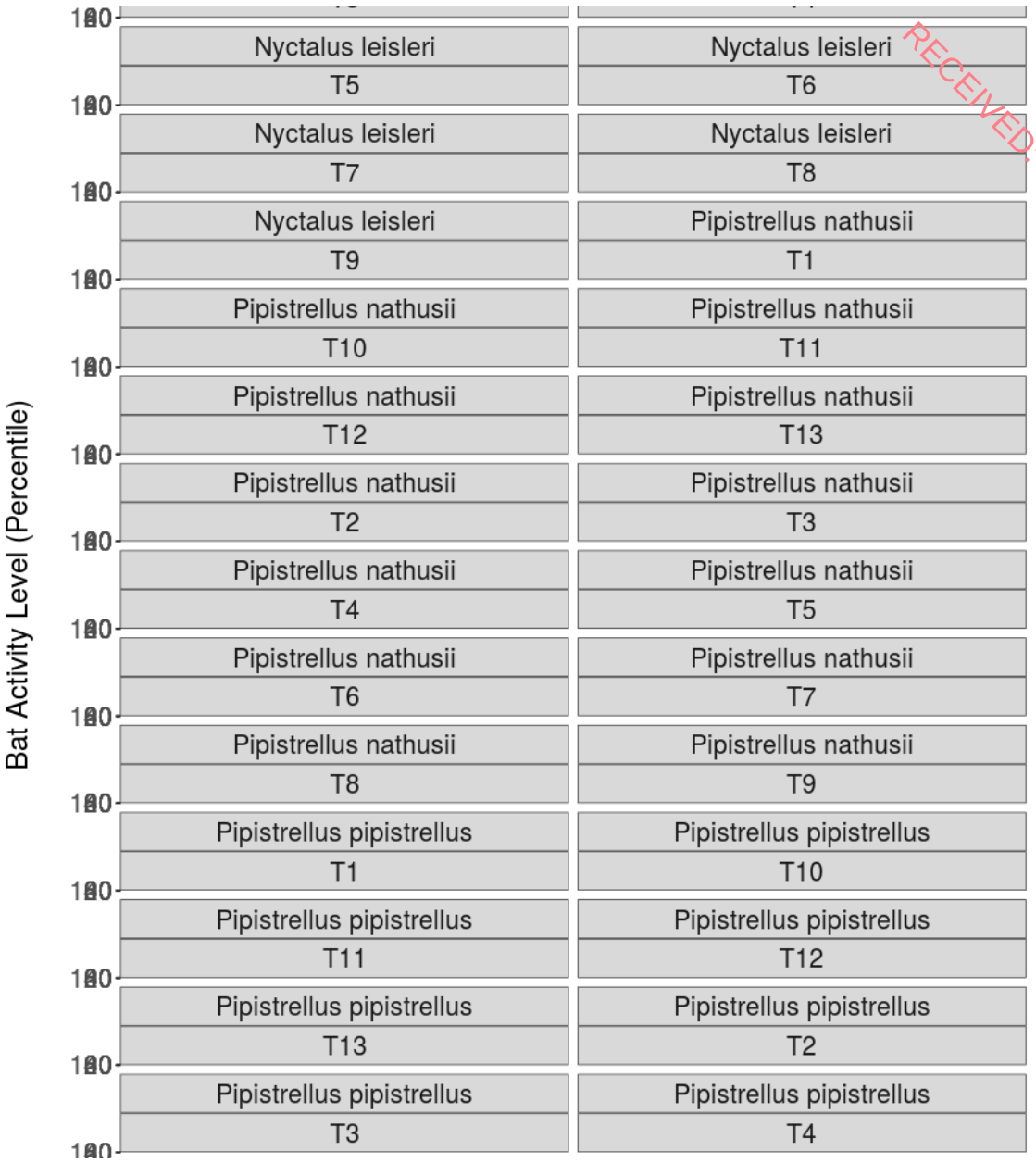


Figure 3. The relationship between recorded bat activity (percentile) and the temperature at sunset, split by species and location.

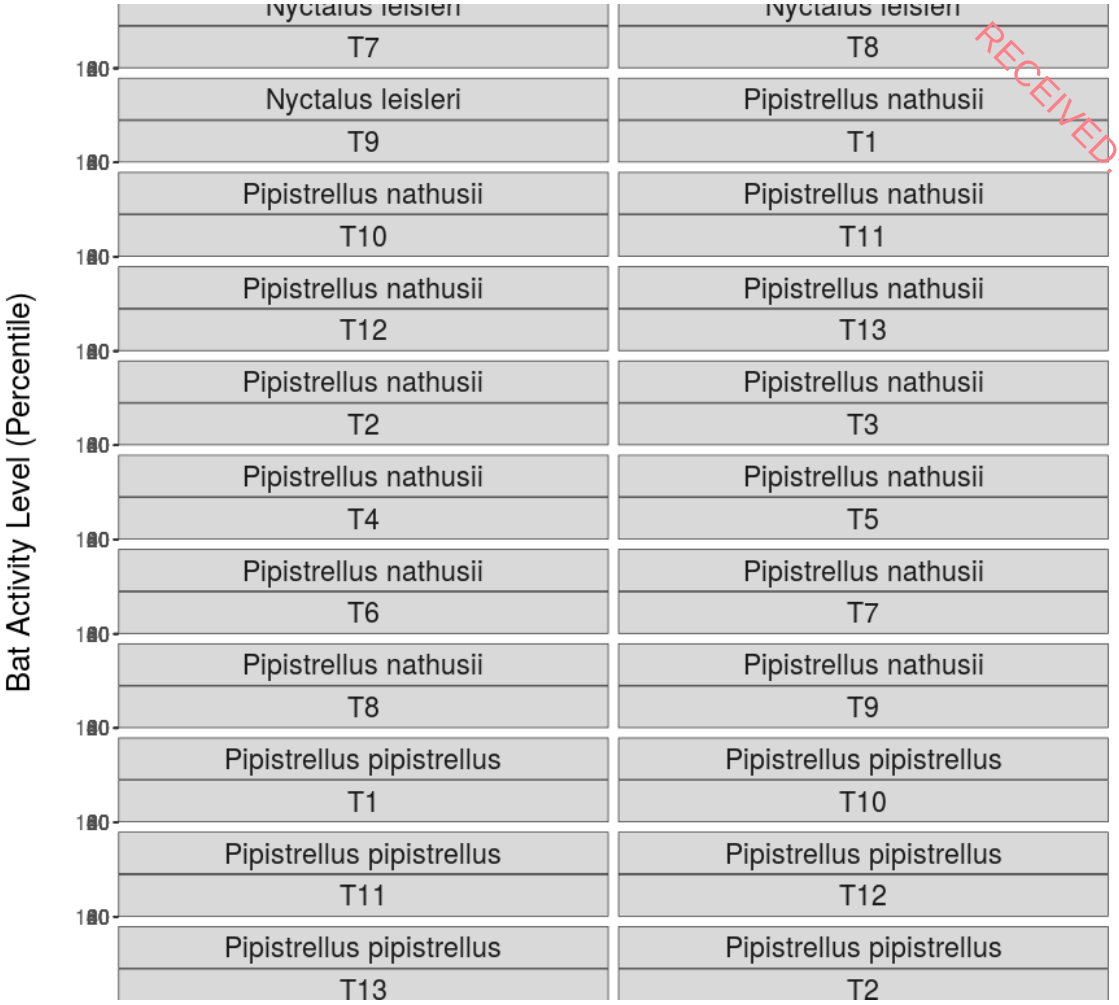


Figure 4. The relationship between recorded bat activity (percentile) and the temperature at sunset, split by location and species.

Ecobat Bat Activity Analysis

Site Name: Tullaghmore Summer

John Curtin

22/11/2021

8.1.6 Summary

Bat surveys were conducted at T1, T11, T12, T13, T2, T3, T4, T5, T6, T7, T8, T9, T10, for 27 nights between 2020-07-28 and 2020-08-31, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 1324 passes, and 7 species were recorded.

The reference range dataset was stratified to include:

- Only records from within 30 days of the survey date.
- Only records from within 100km^2 of the survey location.
- Records using any make of bat detector.

8.1.6.1 Table 1

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

Location	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
T1	*Myotis*	0	0	5	0	12
T1	*Myotis nattereri*	0	0	0	0	17
T1	*Nyctalus leisleri*	0	0	2	3	12
T1	*Pipistrellus nathusii*	0	0	0	0	17
T1	*Pipistrellus pipistrellus*	0	0	3	1	13
T1	*Pipistrellus pygmaeus*	1	4	1	1	10
T1	*Plecotus auritus*	0	2	0	1	14
T10	*Myotis*	0	2	4	1	3
T10	*Myotis nattereri*	0	0	0	1	9
T10	*Nyctalus leisleri*	0	0	0	0	10
T10	*Pipistrellus nathusii*	0	0	0	0	10

T10	*Pipistrellus pipistrellus*	1	0	2	2	5
T10	*Pipistrellus pygmaeus*	0	1	1	2	6
T10	*Plecotus auritus*	0	0	4	2	4
T11	*Myotis*	1	1	3	2	10
T11	*Myotis nattereri*	0	1	1	1	14
T11	*Nyctalus leisleri*	0	0	0	0	17
T11	*Pipistrellus nathusii*	0	0	4	0	13
T11	*Pipistrellus pipistrellus*	7	0	0	0	10
T11	*Pipistrellus pygmaeus*	1	2	2	0	12
T11	*Plecotus auritus*	0	0	0	0	17
T12	*Myotis*	2	7	3	0	5
T12	*Myotis nattereri*	0	0	3	2	12
T12	*Nyctalus leisleri*	0	0	1	1	15
T12	*Pipistrellus nathusii*	0	0	4	0	13
T12	*Pipistrellus pipistrellus*	0	0	2	2	13
T12	*Pipistrellus pygmaeus*	0	2	4	3	8
T12	*Plecotus auritus*	0	0	2	1	14
T13	*Myotis*	0	4	5	1	7
T13	*Myotis nattereri*	0	0	5	3	9
T13	*Nyctalus leisleri*	0	0	0	1	16
T13	*Pipistrellus nathusii*	0	0	0	0	17
T13	*Pipistrellus pipistrellus*	0	2	2	5	8
T13	*Pipistrellus pygmaeus*	1	6	0	3	7
T13	*Plecotus auritus*	0	0	1	1	15
T2	*Myotis*	0	4	5	1	7
T2	*Myotis nattereri*	0	0	3	1	13
T2	*Nyctalus leisleri*	0	0	3	3	11
T2	*Pipistrellus nathusii*	0	0	0	0	17

T2	*Pipistrellus pipistrellus*	0	3	4	1	9
T2	*Pipistrellus pygmaeus*	3	2	4	1	7
T2	*Plecotus auritus*	0	0	2	3	12
T3	*Myotis*	0	3	2	3	9
T3	*Myotis nattereri*	0	0	1	0	16
T3	*Nyctalus leisleri*	0	0	3	1	13
T3	*Pipistrellus nathusii*	0	0	0	0	17
T3	*Pipistrellus pipistrellus*	0	2	5	3	7
T3	*Pipistrellus pygmaeus*	4	5	1	1	6
T3	*Plecotus auritus*	0	1	7	0	9
T4	*Myotis*	0	2	6	1	8
T4	*Myotis nattereri*	0	1	5	1	10
T4	*Nyctalus leisleri*	0	0	0	1	16
T4	*Pipistrellus nathusii*	0	0	1	2	14
T4	*Pipistrellus pipistrellus*	2	5	3	2	5
T4	*Pipistrellus pygmaeus*	0	3	3	0	11
T4	*Plecotus auritus*	0	0	0	0	17
T5	*Myotis*	0	0	6	2	9
T5	*Myotis nattereri*	0	0	0	2	15
T5	*Nyctalus leisleri*	0	0	5	1	11
T5	*Pipistrellus nathusii*	0	0	0	0	17
T5	*Pipistrellus pipistrellus*	0	0	3	2	12
T5	*Pipistrellus pygmaeus*	3	2	4	1	7
T5	*Plecotus auritus*	0	0	1	1	15
T6	*Myotis*	0	0	3	3	11
T6	*Myotis nattereri*	0	0	0	0	17
T6	*Nyctalus leisleri*	0	0	4	4	9
T6	*Pipistrellus nathusii*	0	0	0	0	17

T6	*Pipistrellus pipistrellus*	0	1	2	2	12
T6	*Pipistrellus pygmaeus*	3	2	3	0	9
T6	*Plecotus auritus*	0	0	1	1	15
T7	*Myotis*	0	0	6	2	9
T7	*Myotis nattereri*	0	0	0	0	17
T7	*Nyctalus leisleri*	0	0	0	0	17
T7	*Pipistrellus nathusii*	0	0	0	0	17
T7	*Pipistrellus pipistrellus*	0	2	3	4	8
T7	*Pipistrellus pygmaeus*	3	3	2	1	8
T7	*Plecotus auritus*	0	0	1	1	15
T8	*Myotis*	0	2	4	4	7
T8	*Myotis nattereri*	0	0	1	0	16
T8	*Nyctalus leisleri*	0	1	4	0	12
T8	*Pipistrellus nathusii*	0	0	0	0	17
T8	*Pipistrellus pipistrellus*	0	13	0	1	3
T8	*Pipistrellus pygmaeus*	2	5	4	0	6
T8	*Plecotus auritus*	0	0	0	1	16
T9	*Myotis*	0	1	5	2	9
T9	*Myotis nattereri*	0	0	0	1	16
T9	*Nyctalus leisleri*	0	0	4	1	12
T9	*Pipistrellus nathusii*	0	0	0	0	17
T9	*Pipistrellus pipistrellus*	0	0	3	3	11
T9	*Pipistrellus pygmaeus*	1	8	1	1	6
T9	*Plecotus auritus*	0	0	5	2	10

8.1.6.2 Table 2

Summary table showing key metrics for each species recorded.

Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
T1	*Myotis*	16	16 - 55.5	60	17	1928
T1	*Myotis nattereri*	0	0 - 0	0	17	487
T1	*Nyctalus leisleri*	0	16 - 42.5	51	17	1989
T1	*Pipistrellus nathusii*	0	0 - 0	16	17	570
T1	*Pipistrellus pipistrellus*	16	16 - 39	56	17	2605
T1	*Pipistrellus pygmaeus*	16	16 - 66	82	17	2709
T1	*Plecotus auritus*	16	16 - 39.5	65	17	1382
T10	*Myotis*	51	33.5 - 59.5	63	10	1928
T10	*Myotis nattereri*	8	16 - 16	34	10	487
T10	*Nyctalus leisleri*	0	0 - 0	16	10	1989
T10	*Pipistrellus nathusii*	0	0 - 0	16	10	570
T10	*Pipistrellus pipistrellus*	25	16 - 51	82	10	2605
T10	*Pipistrellus pygmaeus*	16	16 - 55	76	10	2709
T10	*Plecotus auritus*	34	16 - 47.5	56	10	1382
T11	*Myotis*	0	39 - 68.5	81	17	1928
T11	*Myotis nattereri*	0	34 - 72	72	17	487
T11	*Nyctalus leisleri*	0	0 - 0	0	17	1989
T11	*Pipistrellus nathusii*	0	38 - 60	60	17	570
T11	*Pipistrellus pipistrellus*	0	90.5 - 99.5	100	17	2605
T11	*Pipistrellus pygmaeus*	0	57 - 76	89	17	2709
T11	*Plecotus auritus*	0	0 - 0	16	17	1382

T12	*Myotis*	65	62.5 - 74.5	84	17	1928
T12	*Myotis nattereri*	0	16 - 44	51	17	487
T12	*Nyctalus leisleri*	0	16 - 44	44	17	1989
T12	*Pipistrellus nathusii*	0	38 - 60	60	17	570
T12	*Pipistrellus pipistrellus*	0	16 - 51	56	17	2605
T12	*Pipistrellus pygmaeus*	34	34 - 62.5	74	17	2709
T12	*Plecotus auritus*	0	16 - 36	56	17	1382
T13	*Myotis*	44	33.5 - 61.5	63	17	1928
T13	*Myotis nattereri*	16	25 - 44	51	17	487
T13	*Nyctalus leisleri*	0	16 - 16	34	17	1989
T13	*Pipistrellus nathusii*	0	0 - 0	0	17	570
T13	*Pipistrellus pipistrellus*	34	25 - 52.5	71	17	2605
T13	*Pipistrellus pygmaeus*	34	40.5 - 75.5	85	17	2709
T13	*Plecotus auritus*	0	16 - 36	56	17	1382
T2	*Myotis*	44	44 - 68	80	17	1928
T2	*Myotis nattereri*	0	16 - 44	51	17	487
T2	*Nyctalus leisleri*	0	25 - 51	60	17	1989
T2	*Pipistrellus nathusii*	0	0 - 0	16	17	570
T2	*Pipistrellus pipistrellus*	16	25 - 60	74	17	2605
T2	*Pipistrellus pygmaeus*	44	38 - 72	88	17	2709
T2	*Plecotus auritus*	16	16 - 34	51	17	1382
T3	*Myotis*	16	25 - 61.5	63	17	1928
T3	*Myotis nattereri*	0	16 - 16	44	17	487
T3	*Nyctalus leisleri*	0	16 - 47	60	17	1989
T3	*Pipistrellus nathusii*	0	0 - 0	0	17	570
T3	*Pipistrellus pipistrellus*	34	25 - 51	65	17	2605

T3	*Pipistrellus pygmaeus*	67	51 - 82	87	17	2709
T3	*Plecotus auritus*	16	36 - 58	63	17	1382
T4	*Myotis*	34	30 - 55.5	78	17	1928
T4	*Myotis nattereri*	16	16 - 53.5	73	17	487
T4	*Nyctalus leisleri*	0	16 - 16	34	17	1989
T4	*Pipistrellus nathusii*	0	16 - 39	44	17	570
T4	*Pipistrellus pipistrellus*	56	49.5 - 71.5	87	17	2605
T4	*Pipistrellus pygmaeus*	16	16 - 66	72	17	2709
T4	*Plecotus auritus*	0	0 - 0	16	17	1382
T5	*Myotis*	16	30 - 55.5	60	17	1928
T5	*Myotis nattereri*	0	16 - 25	34	17	487
T5	*Nyctalus leisleri*	0	25 - 55.5	60	17	1989
T5	*Pipistrellus nathusii*	0	0 - 0	0	17	570
T5	*Pipistrellus pipistrellus*	16	16 - 39	56	17	2605
T5	*Pipistrellus pygmaeus*	51	45 - 76	85	17	2709
T5	*Plecotus auritus*	0	16 - 25	44	17	1382
T6	*Myotis*	0	34 - 55.5	60	17	1928
T6	*Myotis nattereri*	0	0 - 0	0	17	487
T6	*Nyctalus leisleri*	16	25 - 45	56	17	1989
T6	*Pipistrellus nathusii*	0	0 - 0	16	17	570
T6	*Pipistrellus pipistrellus*	0	25 - 53.5	63	17	2605
T6	*Pipistrellus pygmaeus*	16	46 - 80	85	17	2709
T6	*Plecotus auritus*	0	16 - 33.5	51	17	1382
T7	*Myotis*	16	30 - 50	56	17	1928
T7	*Myotis nattereri*	0	0 - 0	16	17	487

T7	*Nyctalus leisleri*	0	0 - 0	16	17	1989
T7	*Pipistrellus nathusii*	0	0 - 0	16	17	570
T7	*Pipistrellus pipistrellus*	34	25 - 50	65	17	2605
T7	*Pipistrellus pygmaeus*	34	33.5 - 74.5	87	17	2709
T7	*Plecotus auritus*	0	16 - 30	44	17	1382
T8	*Myotis*	34	30 - 53.5	65	17	1928
T8	*Myotis nattereri*	0	16 - 16	44	17	487
T8	*Nyctalus leisleri*	16	16 - 51	63	17	1989
T8	*Pipistrellus nathusii*	0	0 - 0	16	17	570
T8	*Pipistrellus pipistrellus*	72	47 - 74.5	78	17	2605
T8	*Pipistrellus pygmaeus*	56	41.5 - 73.5	82	17	2709
T8	*Plecotus auritus*	0	16 - 16	34	17	1382
T9	*Myotis*	16	25 - 55.5	67	17	1928
T9	*Myotis nattereri*	0	16 - 16	34	17	487
T9	*Nyctalus leisleri*	0	16 - 44	51	17	1989
T9	*Pipistrellus nathusii*	0	0 - 0	0	17	570
T9	*Pipistrellus pipistrellus*	0	25 - 50	56	17	2605
T9	*Pipistrellus pygmaeus*	63	42.5 - 74.5	86	17	2709
T9	*Plecotus auritus*	16	25 - 47.5	51	17	1382

8.1.7 Figures

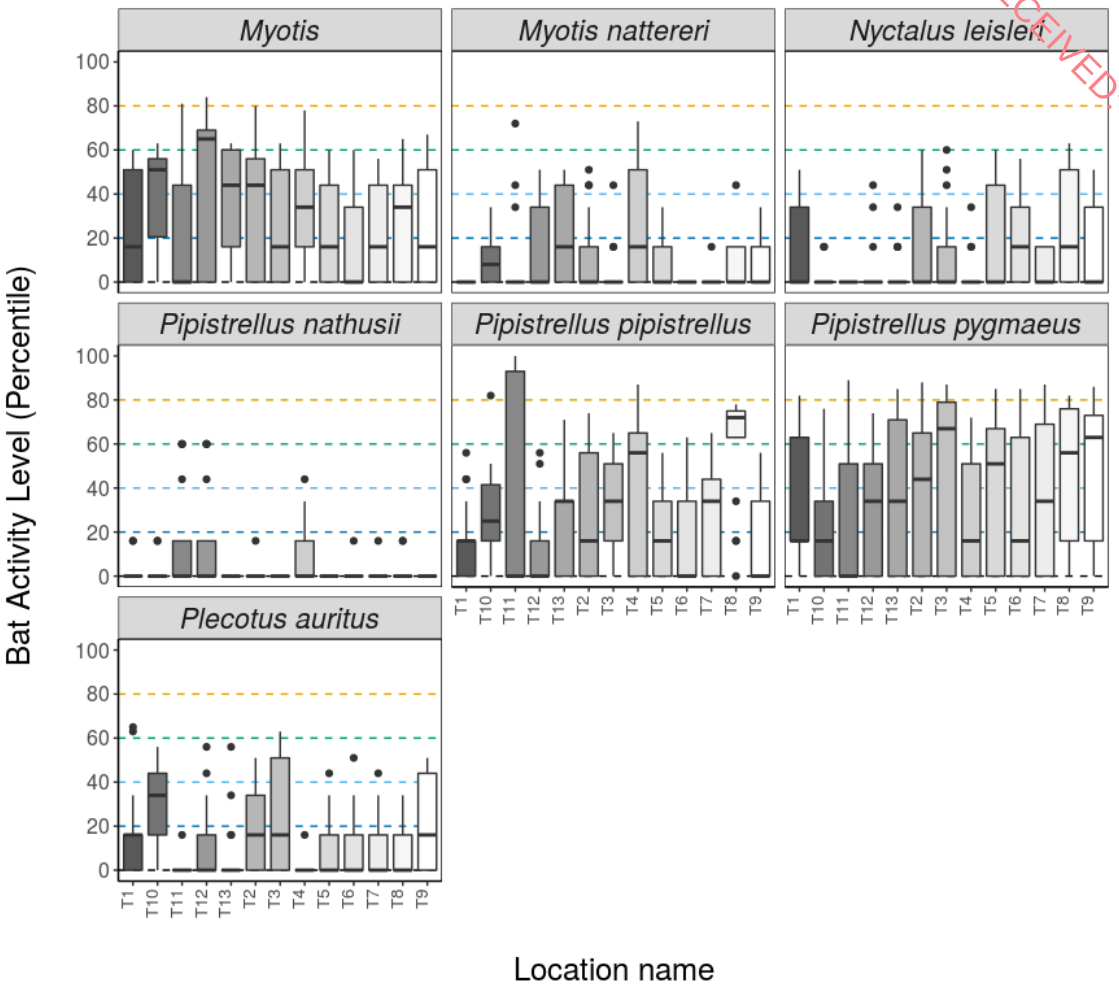
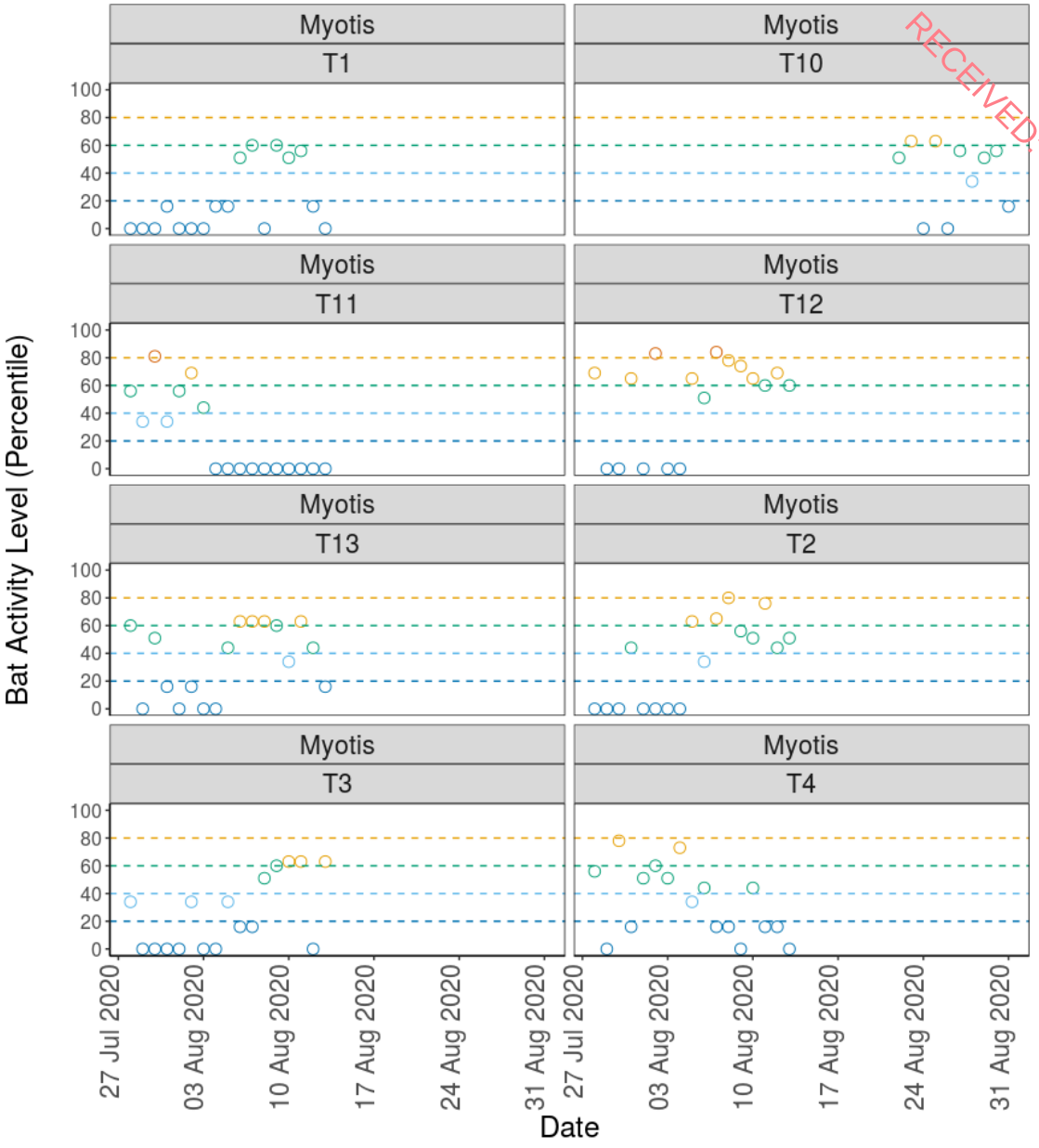
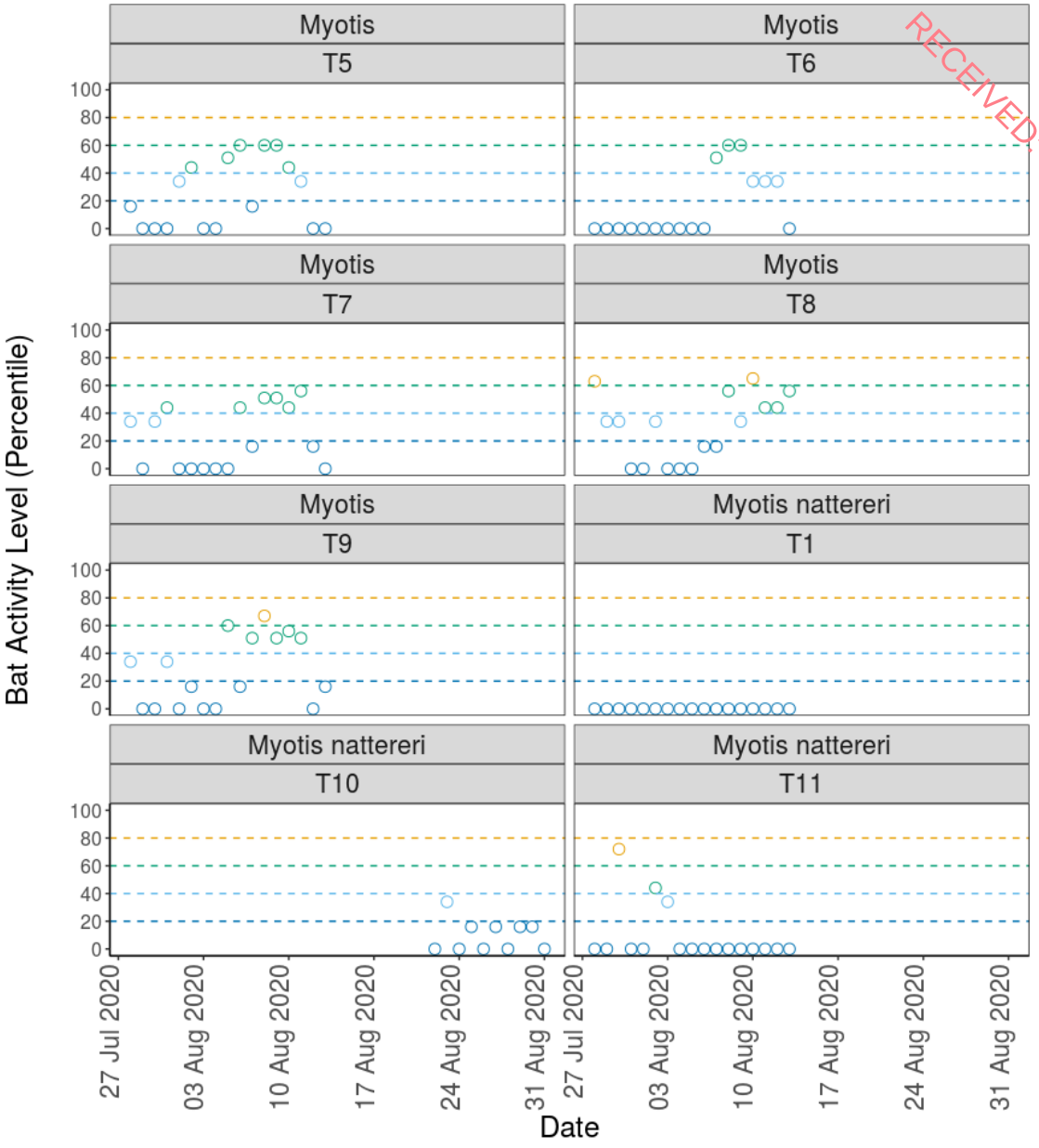
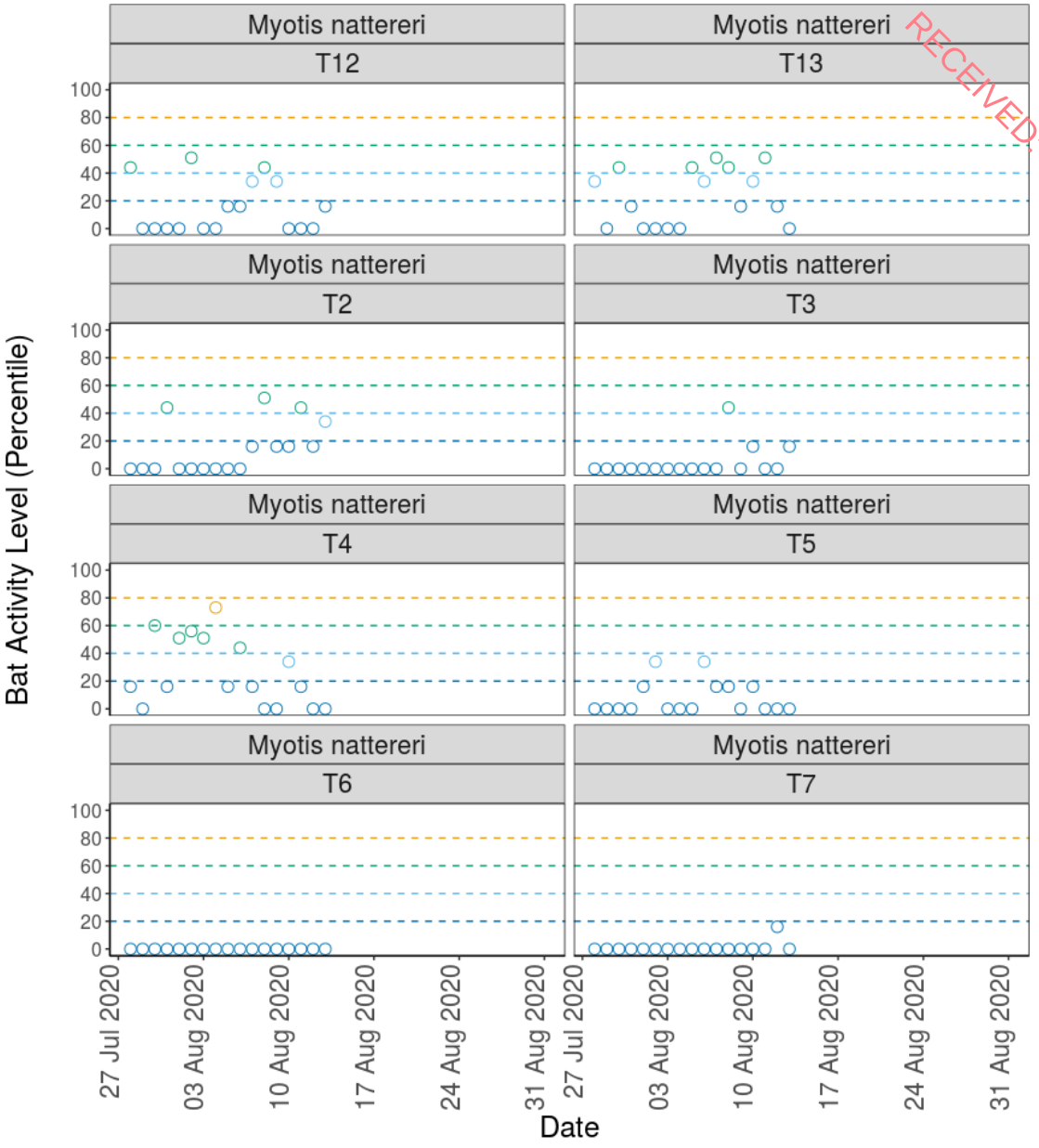
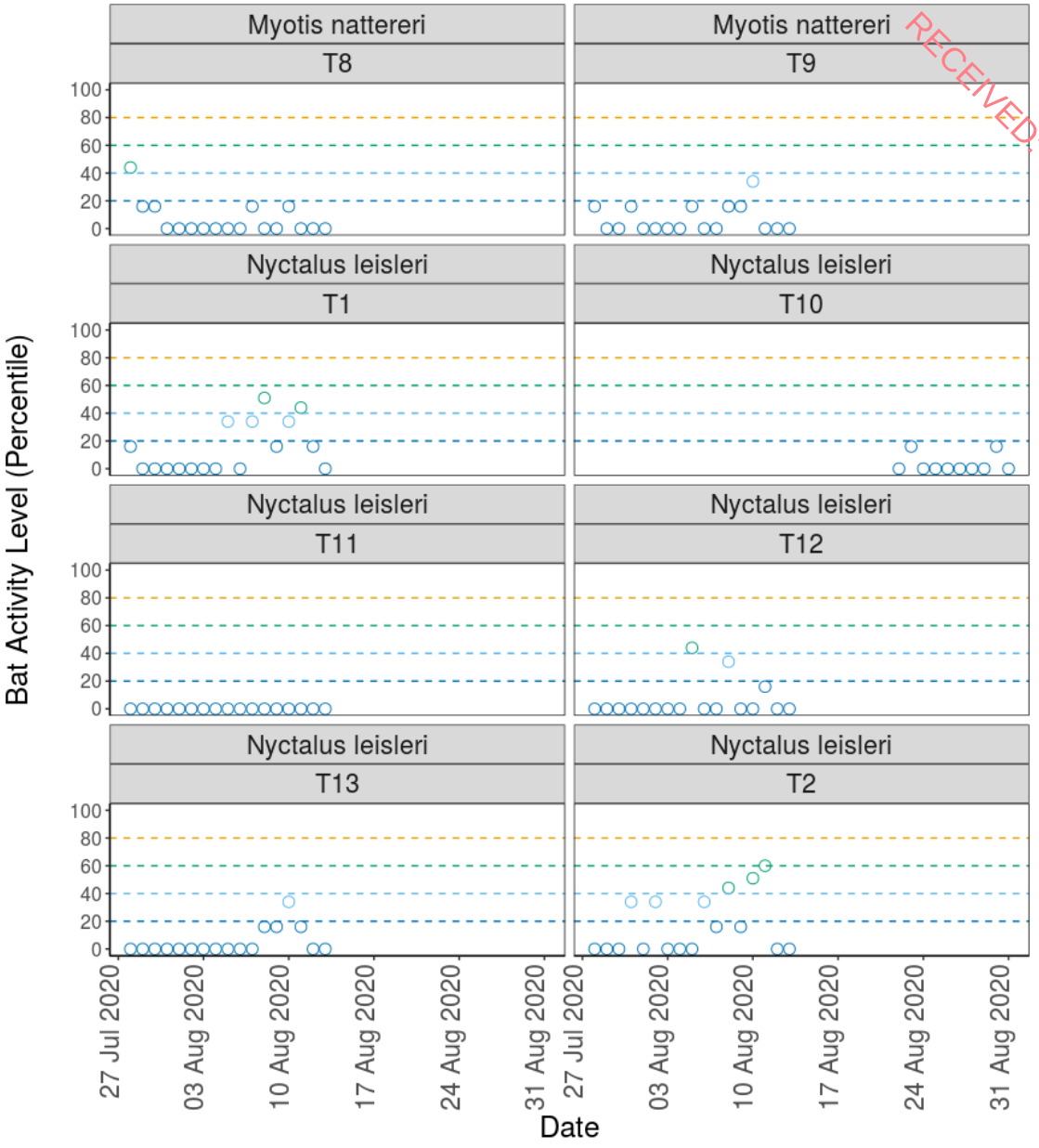


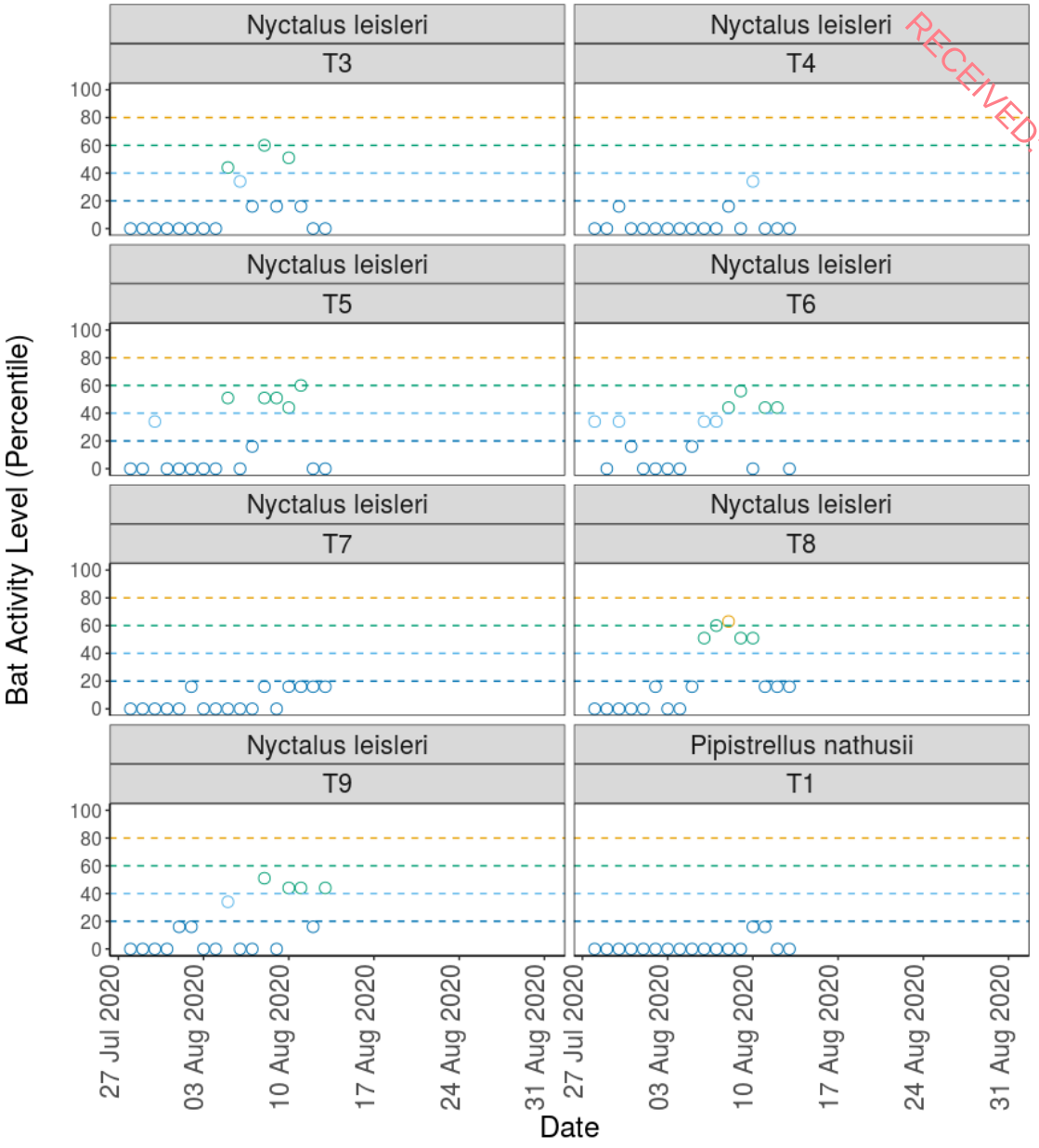
Figure 1. Differences in activity between static detector locations, split by species and location. The center line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)

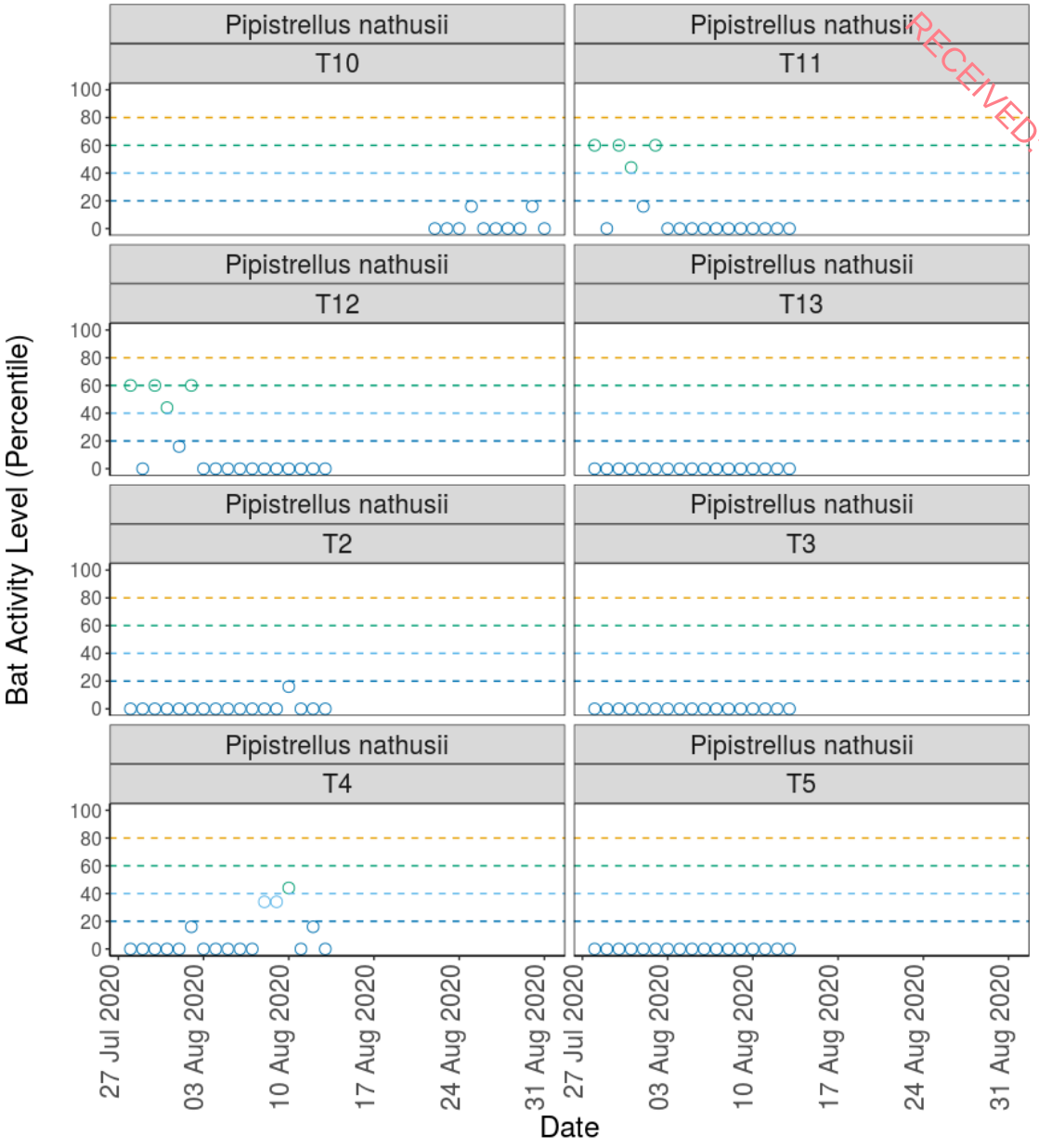


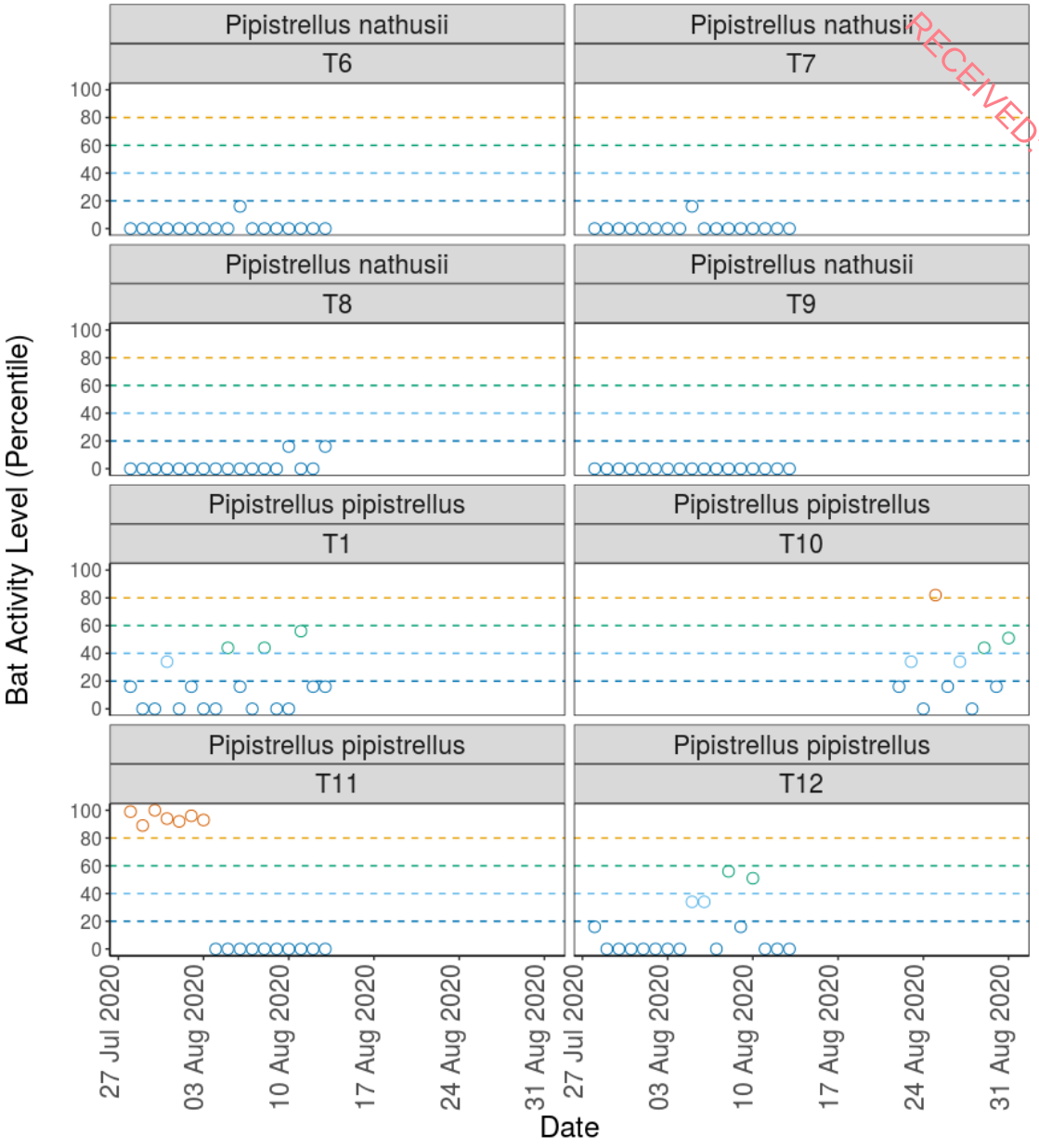


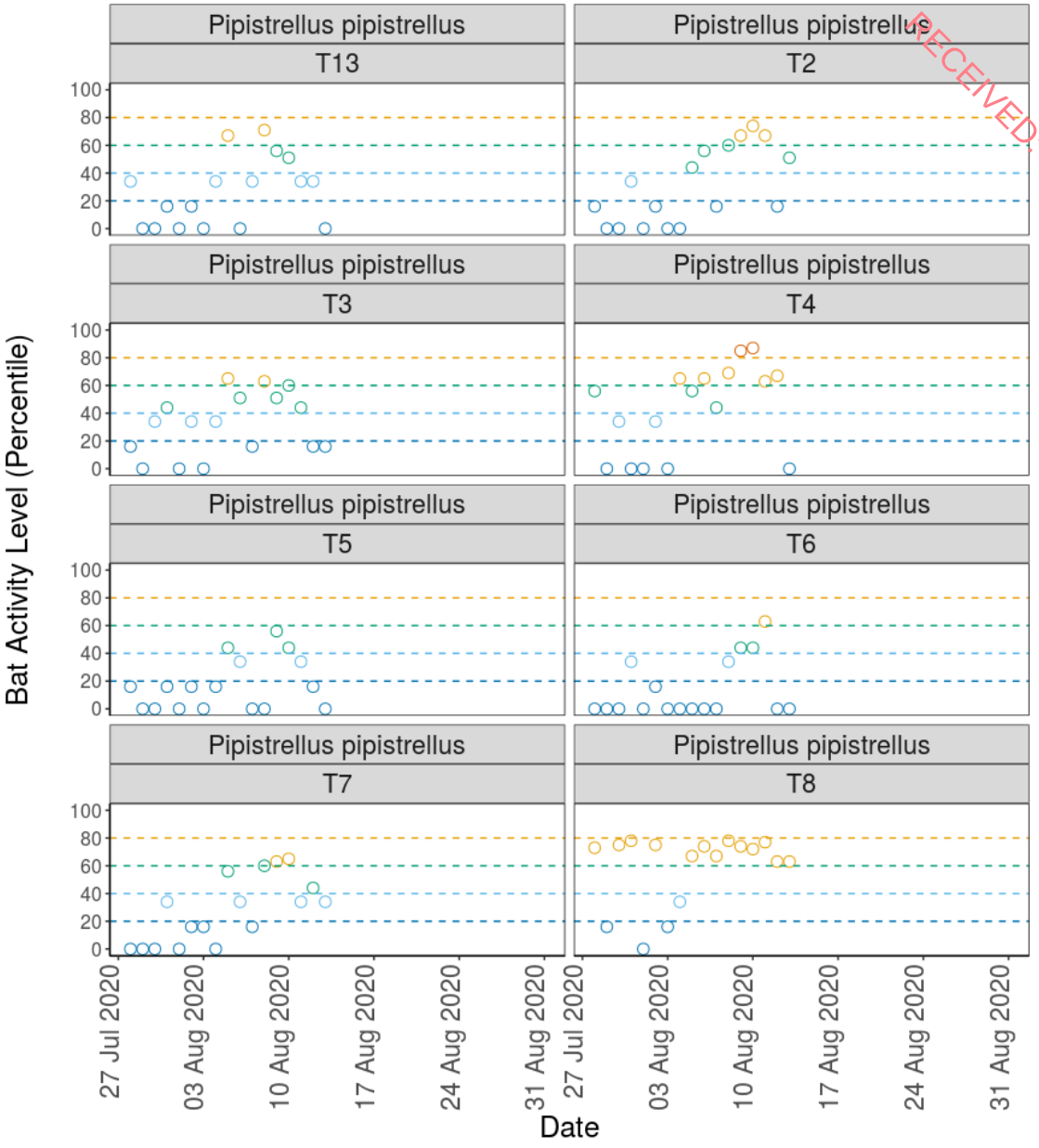


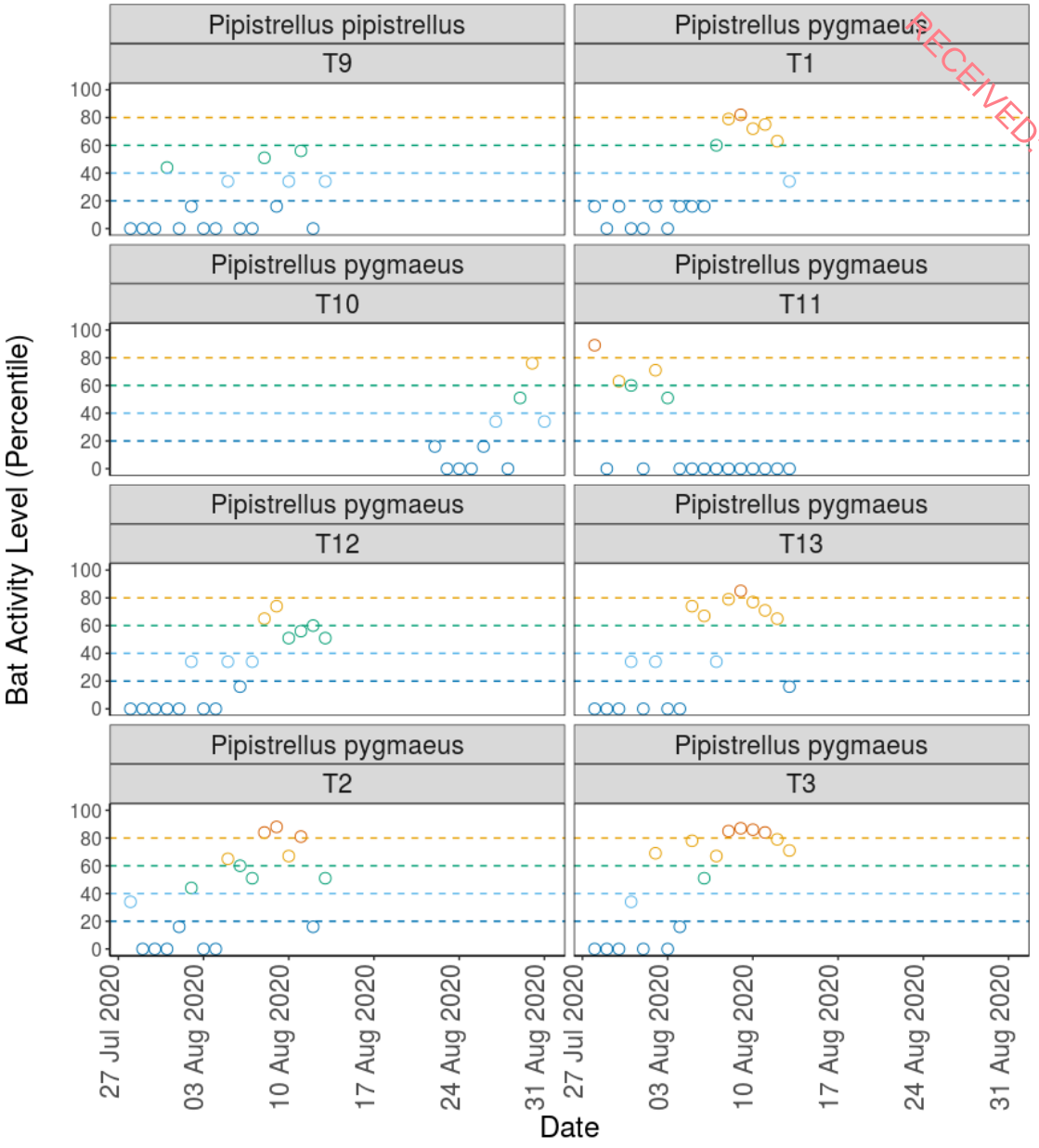


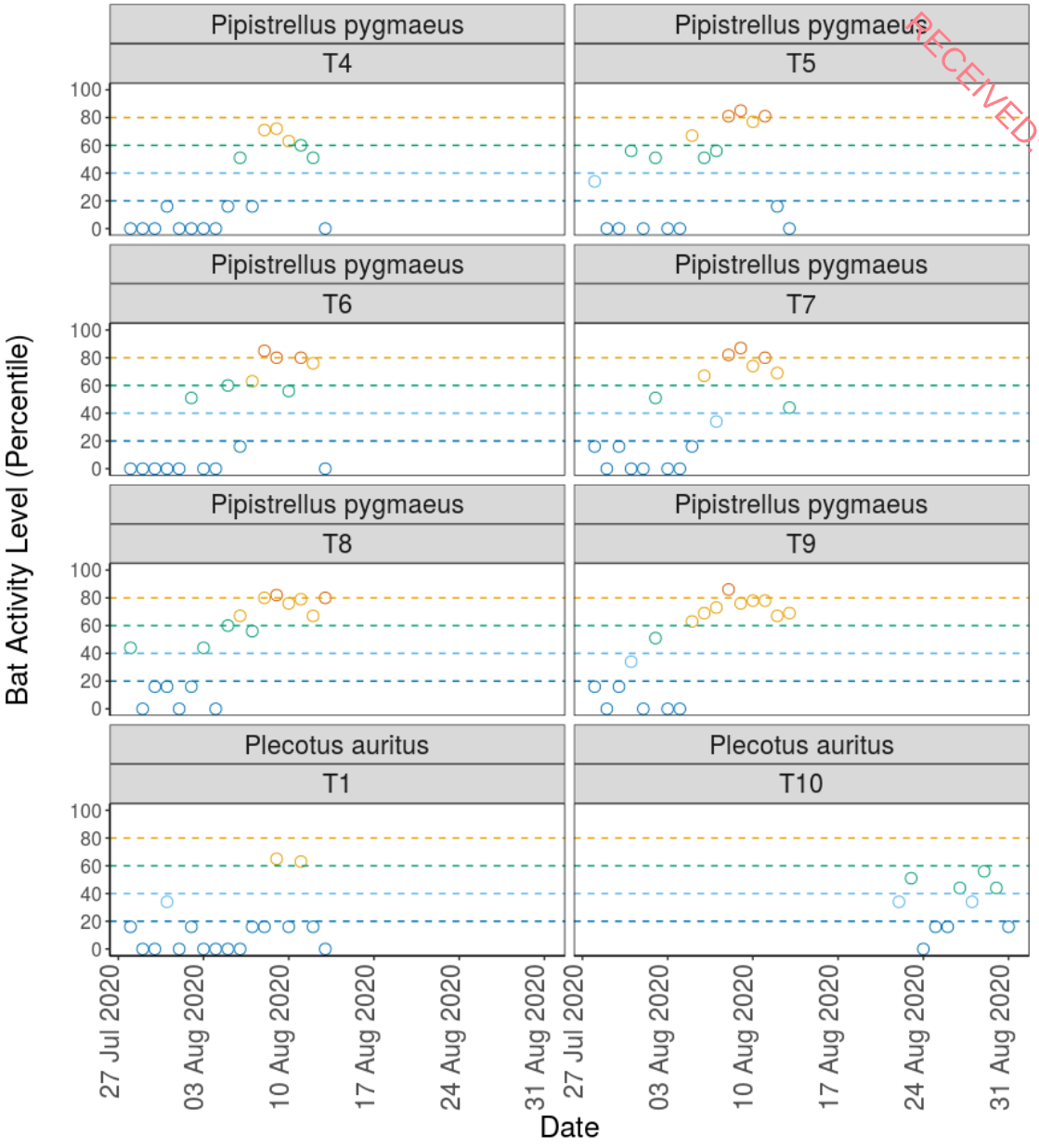


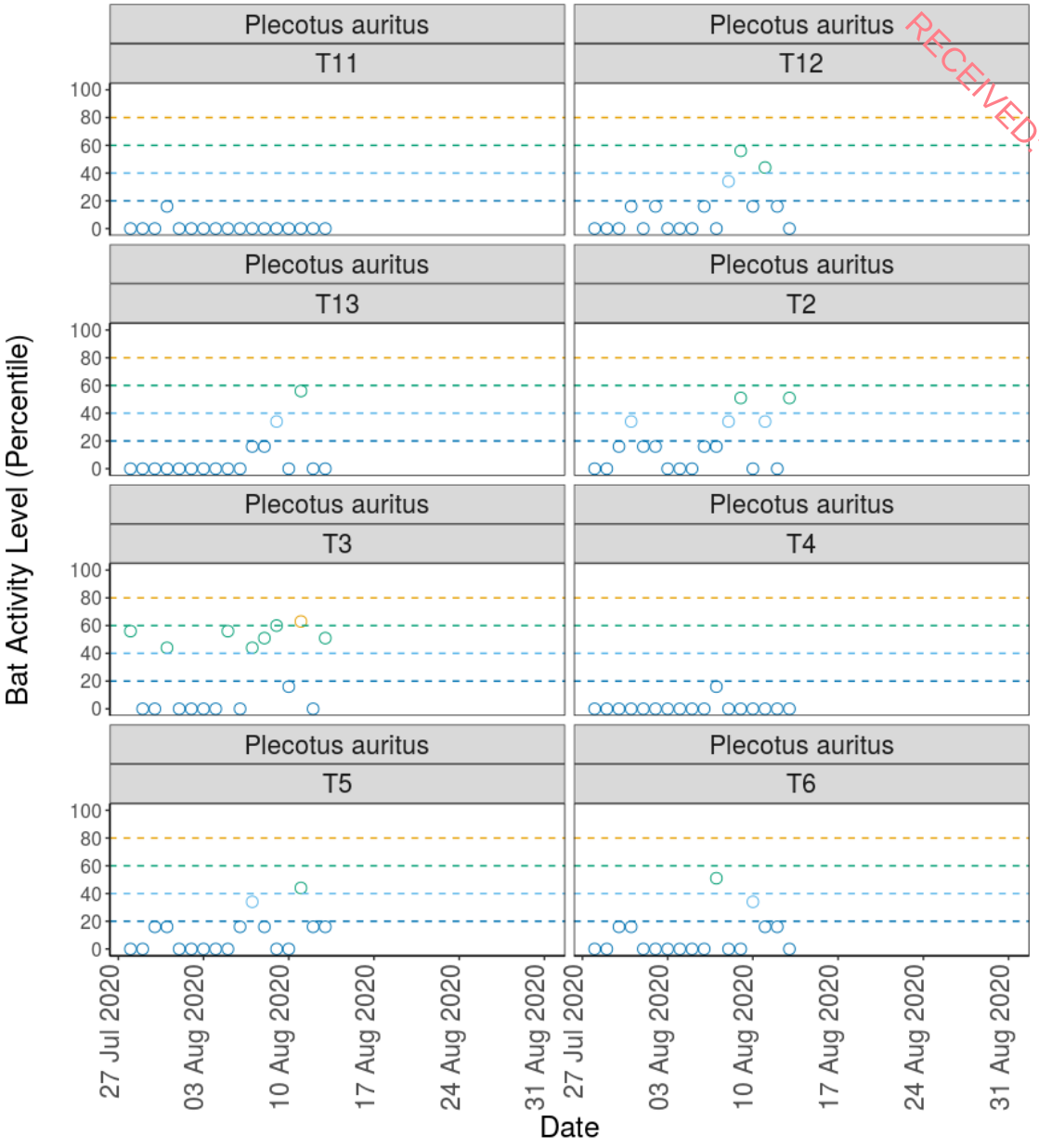












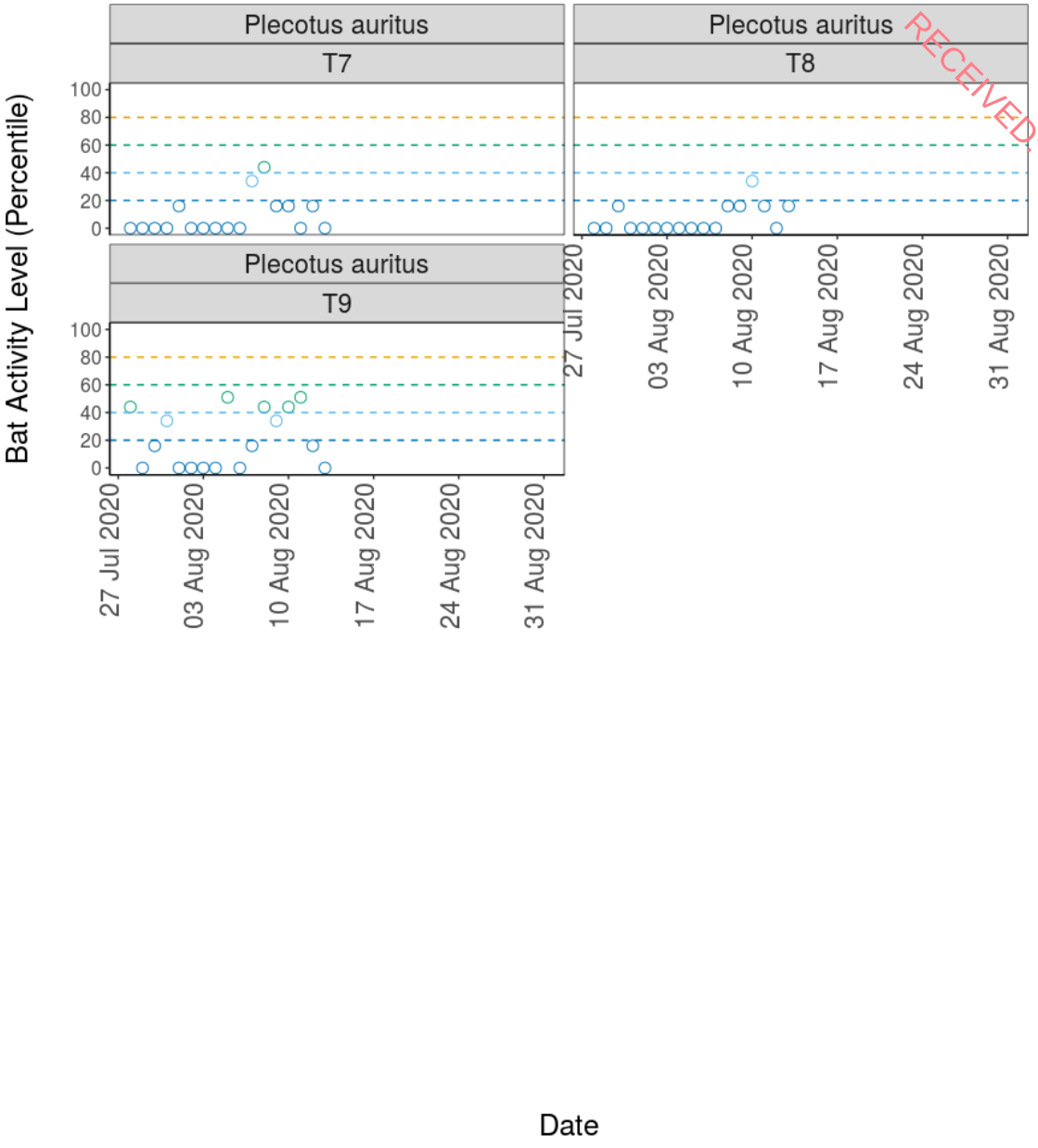


Figure 2. The activity level (percentile) of bats recorded across each night of the bat survey, split by location and species.

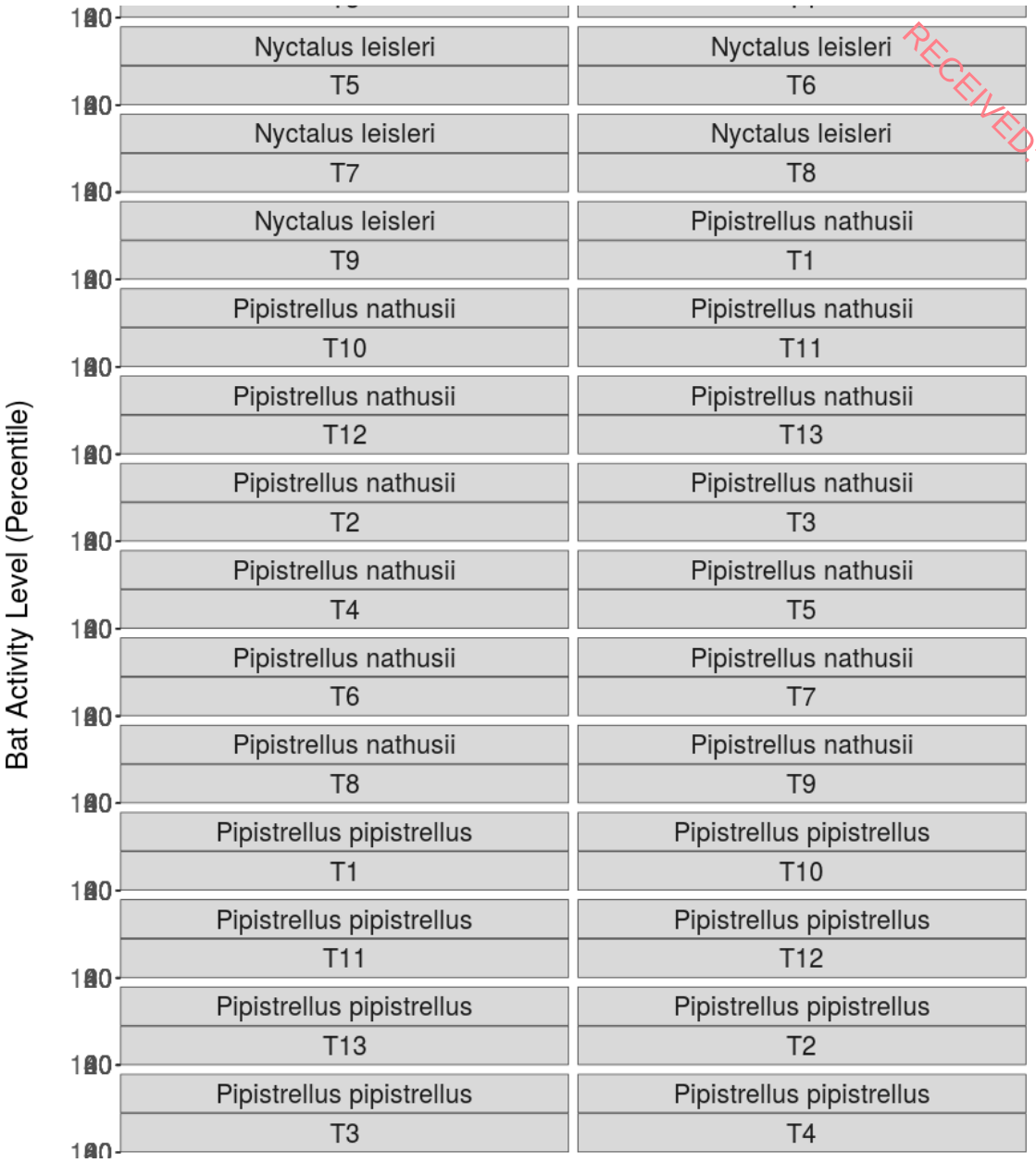


Figure 3. The relationship between recorded bat activity (percentile) and the temperature at sunset, split by species and location.

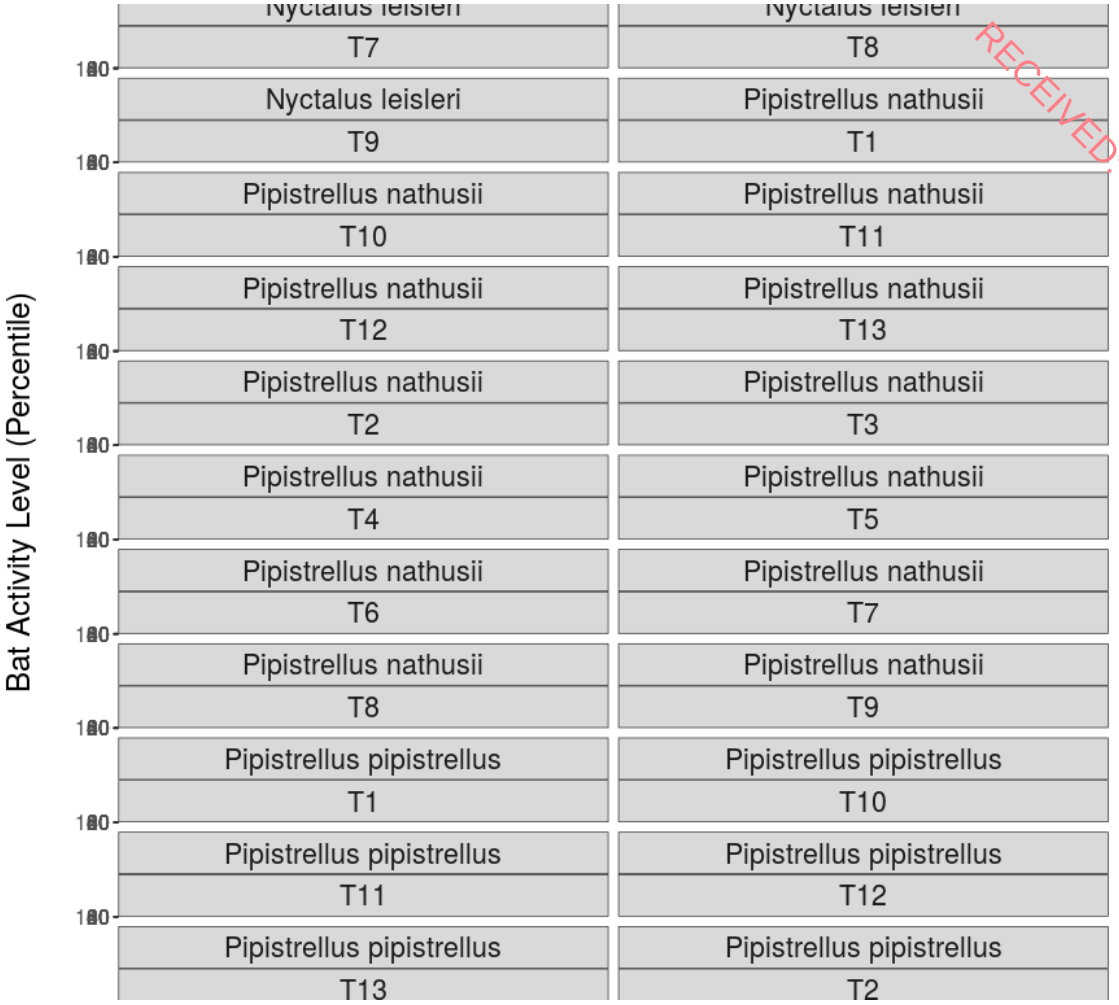


Figure 4. The relationship between recorded bat activity (percentile) and the temperature at sunset, split by location and species.

Ecobat Bat Activity Analysis

Site Name: Tullaghmore Autumn

John Curtin

23/11/2021

8.1.8 Summary

Bat surveys were conducted at T1, T10, T11, T12, T13, T14, T2, T3, T4, T5, T6, T7, T8, T9, for 10 nights between 2020-09-10 and 2020-09-19, using Wildlife Acoustics static bat detectors. The maximum of passes recorded in a single night was 1515 passes, and 8 species were recorded.

The reference range dataset was stratified to include:

- Only records from within 30 days of the survey date.
- Only records from within 100km^2 of the survey location.
- Records using any make of bat detector.

8.1.8.1 Table 1

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

Location	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
T1	*Myotis*	0	0	1	3	6
T1	*Myotis nattereri*	0	0	0	0	10
T1	*Nyctalus leisleri*	0	0	0	0	10
T1	*Pipistrellus nathusii*	0	0	2	1	7
T1	*Pipistrellus pipistrellus*	0	3	2	0	5
T1	*Pipistrellus pygmaeus*	1	2	1	1	5
T1	*Plecotus auritus*	0	0	1	1	8
T10	*Myotis*	0	4	3	2	1
T10	*Myotis nattereri*	0	0	2	0	8
T10	*Nyctalus leisleri*	0	0	0	0	10
T10	*Pipistrellus nathusii*	0	0	0	1	9

T10	*Pipistrellus pipistrellus*	4	4	1	0	1
T10	*Pipistrellus pygmaeus*	3	3	2	0	2
T10	*Plecotus auritus*	0	1	3	2	4
T11	*Myotis*	0	9	1	0	0
T11	*Myotis nattereri*	0	0	3	1	6
T11	*Nyctalus leisleri*	0	0	0	1	9
T11	*Pipistrellus nathusii*	0	0	3	2	5
T11	*Pipistrellus pipistrellus*	10	0	0	0	0
T11	*Pipistrellus pygmaeus*	4	5	0	0	1
T11	*Plecotus auritus*	0	3	1	1	5
T12	*Myotis*	0	0	3	1	6
T12	*Myotis nattereri*	0	0	0	0	10
T12	*Nyctalus leisleri*	0	0	0	0	10
T12	*Pipistrellus nathusii*	1	0	0	0	9
T12	*Pipistrellus pipistrellus*	1	1	1	0	7
T12	*Pipistrellus pygmaeus*	0	1	1	2	6
T12	*Plecotus auritus*	0	0	2	0	8
T13	*Myotis*	0	0	0	3	7
T13	*Myotis nattereri*	0	0	0	0	10
T13	*Nyctalus leisleri*	0	0	1	1	8
T13	*Pipistrellus nathusii*	0	0	0	0	10
T13	*Pipistrellus pipistrellus*	0	2	1	2	5
T13	*Pipistrellus pygmaeus*	0	3	2	2	3
T13	*Plecotus auritus*	0	0	0	0	10
T14	*Myotis*	7	2	0	0	1
T14	*Myotis nattereri*	2	2	2	1	3
T14	*Nyctalus leisleri*	0	0	0	0	10
T14	*Pipistrellus nathusii*	0	0	0	0	10

T14	*Pipistrellus pipistrellus*	0	0	0	0	10
T14	*Pipistrellus pygmaeus*	0	5	2	1	2
T14	*Plecotus auritus*	0	0	0	0	10
T14	*Rhinolophus hipposideros*	0	0	0	0	10
T2	*Myotis*	0	1	1	2	6
T2	*Myotis nattereri*	0	0	1	0	9
T2	*Nyctalus leisleri*	0	0	0	0	10
T2	*Pipistrellus nathusii*	0	2	0	0	8
T2	*Pipistrellus pipistrellus*	3	2	0	2	3
T2	*Pipistrellus pygmaeus*	3	2	2	0	3
T2	*Plecotus auritus*	0	1	0	3	6
T3	*Myotis*	0	2	3	2	3
T3	*Myotis nattereri*	0	0	0	0	10
T3	*Nyctalus leisleri*	0	0	0	0	10
T3	*Pipistrellus nathusii*	0	0	0	0	10
T3	*Pipistrellus pipistrellus*	0	2	3	1	4
T3	*Pipistrellus pygmaeus*	1	2	4	0	3
T3	*Plecotus auritus*	0	0	2	1	7
T4	*Myotis*	0	0	2	2	6
T4	*Myotis nattereri*	0	0	0	0	10
T4	*Nyctalus leisleri*	0	0	1	0	9
T4	*Pipistrellus nathusii*	0	0	0	0	10
T4	*Pipistrellus pipistrellus*	4	3	1	0	2
T4	*Pipistrellus pygmaeus*	0	3	1	2	4
T4	*Plecotus auritus*	0	0	0	0	10
T5	*Myotis*	0	0	3	2	5
T5	*Myotis nattereri*	0	0	0	0	10
T5	*Nyctalus leisleri*	0	0	0	0	10

T5	*Pipistrellus nathusii*	0	0	0	0	10
T5	*Pipistrellus pipistrellus*	1	1	3	0	5
T5	*Pipistrellus pygmaeus*	2	1	1	3	3
T5	*Plecotus auritus*	0	0	0	2	8
T6	*Myotis*	0	1	6	1	2
T6	*Myotis nattereri*	0	0	0	3	7
T6	*Nyctalus leisleri*	0	0	0	0	10
T6	*Pipistrellus nathusii*	0	0	0	0	10
T6	*Pipistrellus pipistrellus*	0	0	1	2	7
T6	*Pipistrellus pygmaeus*	0	3	1	1	5
T6	*Plecotus auritus*	0	0	1	1	8
T7	*Myotis*	0	0	3	0	7
T7	*Myotis nattereri*	0	0	0	0	10
T7	*Nyctalus leisleri*	0	0	0	0	10
T7	*Pipistrellus nathusii*	0	0	0	0	10
T7	*Pipistrellus pipistrellus*	0	0	0	0	10
T7	*Pipistrellus pygmaeus*	0	3	1	1	5
T7	*Plecotus auritus*	0	0	1	1	8
T8	*Myotis*	0	0	6	2	2
T8	*Myotis nattereri*	0	0	0	0	10
T8	*Nyctalus leisleri*	0	0	0	0	10
T8	*Pipistrellus nathusii*	0	0	0	0	10
T8	*Pipistrellus pipistrellus*	1	1	4	1	3
T8	*Pipistrellus pygmaeus*	0	5	0	1	4
T8	*Plecotus auritus*	0	2	3	3	2
T9	*Myotis*	0	0	1	2	7
T9	*Myotis nattereri*	0	0	0	0	10
T9	*Nyctalus leisleri*	0	0	1	0	9

T9	*Pipistrellus nathusii*	0	0	0	0	10
T9	*Pipistrellus pipistrellus*	0	0	0	2	8
T9	*Pipistrellus pygmaeus*	0	2	1	1	6
T9	*Plecotus auritus*	0	2	2	0	6

8.1.8.2 Table 2

Summary table showing key metrics for each species recorded.

Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
T1	*Myotis*	18	18 - 42.5	47	10	1447
T1	*Myotis nattereri*	0	0 - 0	18	10	320
T1	*Nyctalus leisleri*	0	0 - 0	0	10	1295
T1	*Pipistrellus nathusii*	0	36 - 54	54	10	405
T1	*Pipistrellus pipistrellus*	24	47 - 79	80	10	1765
T1	*Pipistrellus pygmaeus*	28	32.5 - 76	81	10	1833
T1	*Plecotus auritus*	0	18 - 38	47	10	1053
T10	*Myotis*	57	46 - 68	77	10	1447
T10	*Myotis nattereri*	18	18 - 32.5	47	10	320
T10	*Nyctalus leisleri*	0	0 - 0	18	10	1295
T10	*Pipistrellus nathusii*	0	18 - 18	38	10	405
T10	*Pipistrellus pipistrellus*	75	64.5 - 93	96	10	1765
T10	*Pipistrellus pygmaeus*	71	49 - 85	94	10	1833
T10	*Plecotus auritus*	38	18 - 56.5	70	10	1053
T11	*Myotis*	71	65 - 73.5	77	10	1447

T11	*Myotis nattereri*	18	18 - 47	59	10	320
T11	*Nyctalus leisleri*	0	28 - 28	38	10	1295
T11	*Pipistrellus nathusii*	28	28 - 53	59	10	405
T11	*Pipistrellus pipistrellus*	97	90.5 - 98	100	10	1765
T11	*Pipistrellus pygmaeus*	79	50 - 83.5	90	10	1833
T11	*Plecotus auritus*	28	18 - 55	66	10	1053
T12	*Myotis*	9	18 - 59	59	10	1447
T12	*Myotis nattereri*	0	0 - 0	18	10	320
T12	*Nyctalus leisleri*	0	0 - 0	18	10	1295
T12	*Pipistrellus nathusii*	0	0 - 0	92	10	405
T12	*Pipistrellus pipistrellus*	18	18 - 63	87	10	1765
T12	*Pipistrellus pygmaeus*	9	18 - 63	63	10	1833
T12	*Plecotus auritus*	0	18 - 54	54	10	1053
T13	*Myotis*	18	18 - 28	38	10	1447
T13	*Myotis nattereri*	0	0 - 0	18	10	320
T13	*Nyctalus leisleri*	0	42.5 - 42.5	47	10	1295
T13	*Pipistrellus nathusii*	0	0 - 0	0	10	405
T13	*Pipistrellus pipistrellus*	28	28 - 66	73	10	1765
T13	*Pipistrellus pygmaeus*	43	32.5 - 66.5	70	10	1833
T13	*Plecotus auritus*	0	0 - 0	18	10	1053
T14	*Myotis*	86	75.5 - 91	92	10	1447
T14	*Myotis nattereri*	51	36 - 83.5	90	10	320
T14	*Nyctalus leisleri*	0	0 - 0	0	10	1295
T14	*Pipistrellus nathusii*	0	0 - 0	0	10	405

T14	*Pipistrellus pipistrellus*	0	0 - 0	18	10	1765
T14	*Pipistrellus pygmaeus*	65	54 - 75	80	10	1833
T14	*Plecotus auritus*	0	0 - 0	0	10	1053
T14	*Rhinolophus hipposideros*	0	0 - 0	18	10	111
T2	*Myotis*	18	18 - 50.5	63	10	1447
T2	*Myotis nattereri*	0	32.5 - 32.5	47	10	320
T2	*Nyctalus leisleri*	0	0 - 0	18	10	1295
T2	*Pipistrellus nathusii*	0	18 - 63	63	10	405
T2	*Pipistrellus pipistrellus*	53	28 - 87	90	10	1765
T2	*Pipistrellus pygmaeus*	67	46.5 - 88	90	10	1833
T2	*Plecotus auritus*	18	18 - 53	68	10	1053
T3	*Myotis*	43	28 - 58.5	68	10	1447
T3	*Myotis nattereri*	0	0 - 0	18	10	320
T3	*Nyctalus leisleri*	0	0 - 0	0	10	1295
T3	*Pipistrellus nathusii*	0	0 - 0	18	10	405
T3	*Pipistrellus pipistrellus*	43	18 - 56.5	66	10	1765
T3	*Pipistrellus pygmaeus*	47	32.5 - 71	81	10	1833
T3	*Plecotus auritus*	18	18 - 38.5	59	10	1053
T4	*Myotis*	0	38 - 47	47	10	1447
T4	*Myotis nattereri*	0	0 - 0	0	10	320
T4	*Nyctalus leisleri*	0	0 - 0	54	10	1295
T4	*Pipistrellus nathusii*	0	0 - 0	0	10	405
T4	*Pipistrellus pipistrellus*	73	51 - 89	94	10	1765
T4	*Pipistrellus pygmaeus*	38	28 - 70.5	73	10	1833
T4	*Plecotus auritus*	0	0 - 0	18	10	1053

T5	*Myotis*	19	38 - 54	54	10	1447
T5	*Myotis nattereri*	0	0 - 0	18	10	320
T5	*Nyctalus leisleri*	0	0 - 0	18	10	1295
T5	*Pipistrellus nathusii*	0	0 - 0	18	10	405
T5	*Pipistrellus pipistrellus*	24	47 - 84	84	10	1765
T5	*Pipistrellus pygmaeus*	38	28 - 73	87	10	1833
T5	*Plecotus auritus*	9	18 - 28	38	10	1053
T6	*Myotis*	47	32.5 - 56.5	66	10	1447
T6	*Myotis nattereri*	9	28 - 38	38	10	320
T6	*Nyctalus leisleri*	0	0 - 0	0	10	1295
T6	*Pipistrellus nathusii*	0	0 - 0	0	10	405
T6	*Pipistrellus pipistrellus*	0	38 - 38	47	10	1765
T6	*Pipistrellus pygmaeus*	28	28 - 71	75	10	1833
T6	*Plecotus auritus*	18	18 - 28	59	10	1053
T7	*Myotis*	9	18 - 50.5	54	10	1447
T7	*Myotis nattereri*	0	0 - 0	18	10	320
T7	*Nyctalus leisleri*	0	0 - 0	18	10	1295
T7	*Pipistrellus nathusii*	0	0 - 0	18	10	405
T7	*Pipistrellus pipistrellus*	9	9 - 9	18	10	1765
T7	*Pipistrellus pygmaeus*	28	28 - 68.5	74	10	1833
T7	*Plecotus auritus*	18	18 - 36	54	10	1053
T8	*Myotis*	47	32.5 - 53	59	10	1447
T8	*Myotis nattereri*	18	18 - 18	18	10	320
T8	*Nyctalus leisleri*	0	0 - 0	18	10	1295
T8	*Pipistrellus nathusii*	0	0 - 0	18	10	405

T8	*Pipistrellus pipistrellus*	53	42.5 - 75.5	83	10	1765
T8	*Pipistrellus pygmaeus*	51	28 - 71.5	77	10	1833
T8	*Plecotus auritus*	43	36 - 60	73	10	1053
T9	*Myotis*	18	18 - 32.5	47	10	1447
T9	*Myotis nattereri*	0	0 - 0	0	10	320
T9	*Nyctalus leisleri*	0	32.5 - 32.5	47	10	1295
T9	*Pipistrellus nathusii*	0	0 - 0	18	10	405
T9	*Pipistrellus pipistrellus*	0	38 - 38	38	10	1765
T9	*Pipistrellus pygmaeus*	18	18 - 45.5	73	10	1833
T9	*Plecotus auritus*	18	18 - 58.5	63	10	1053

8.1.9 Figures

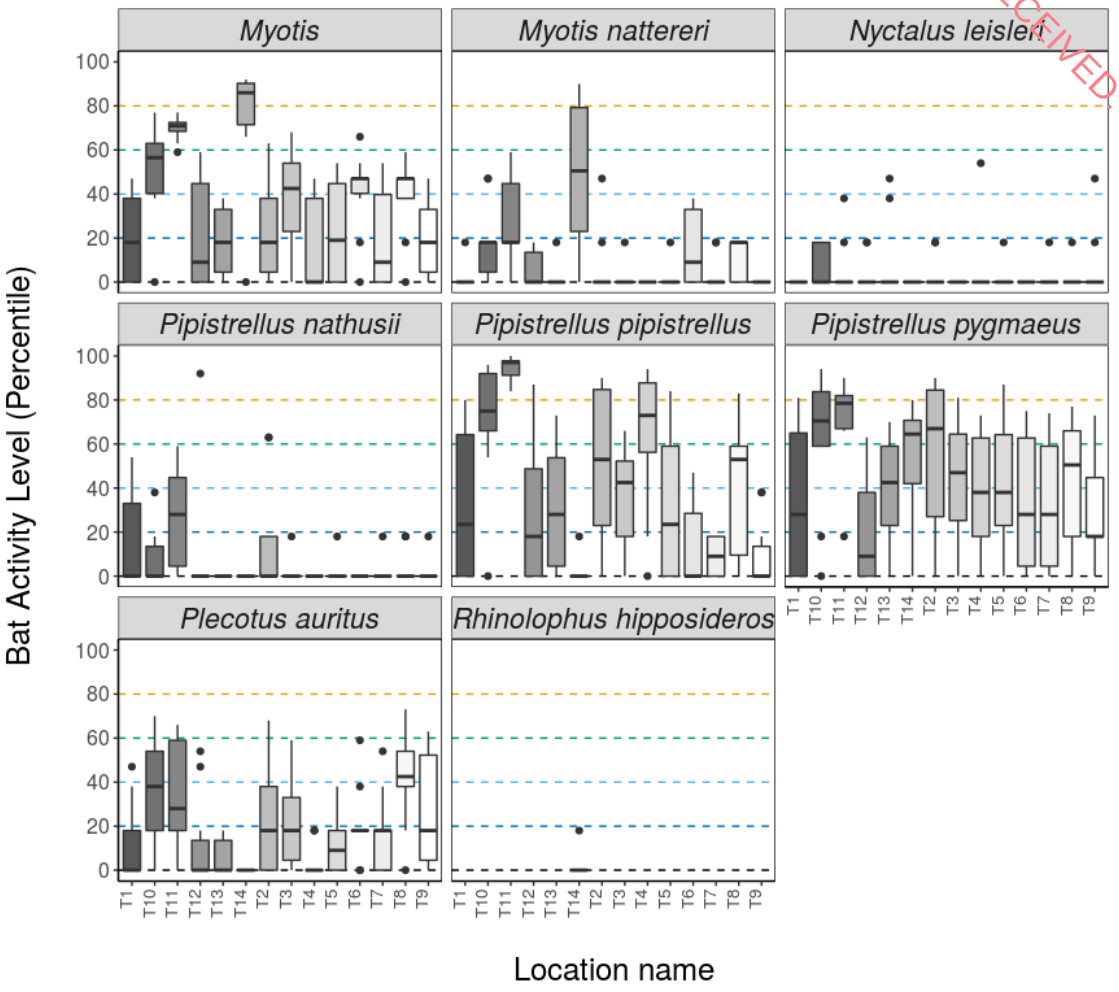
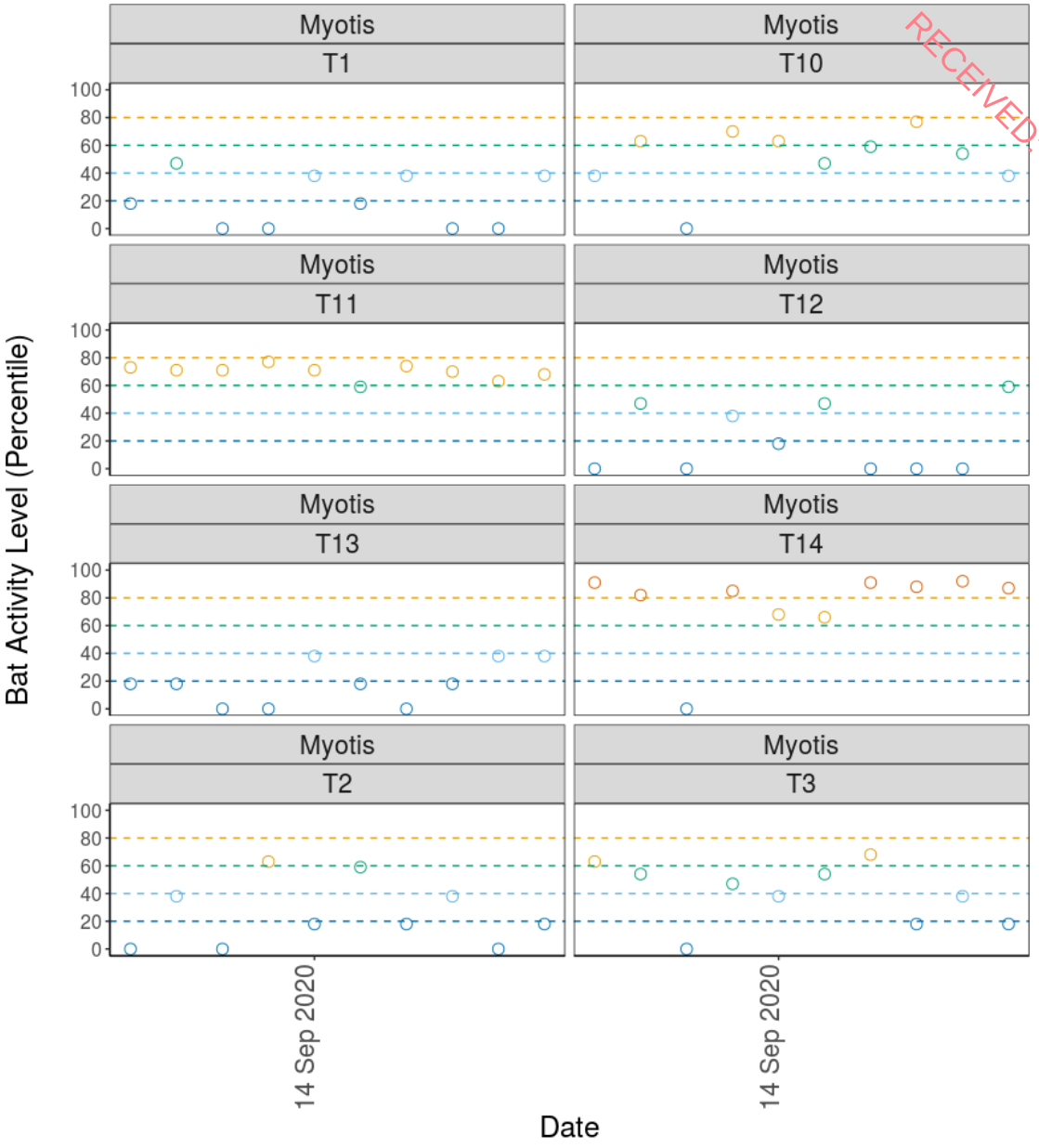
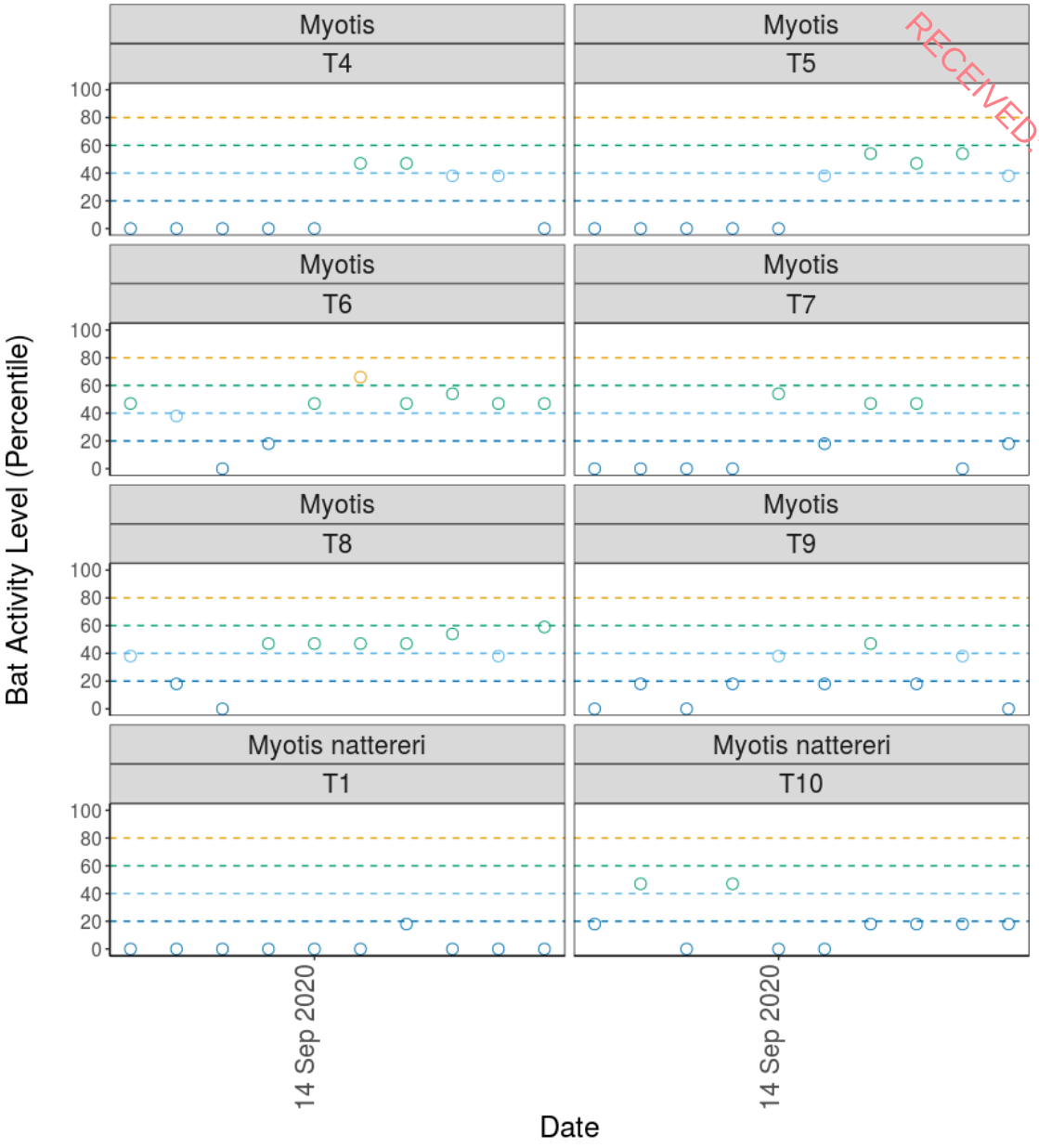
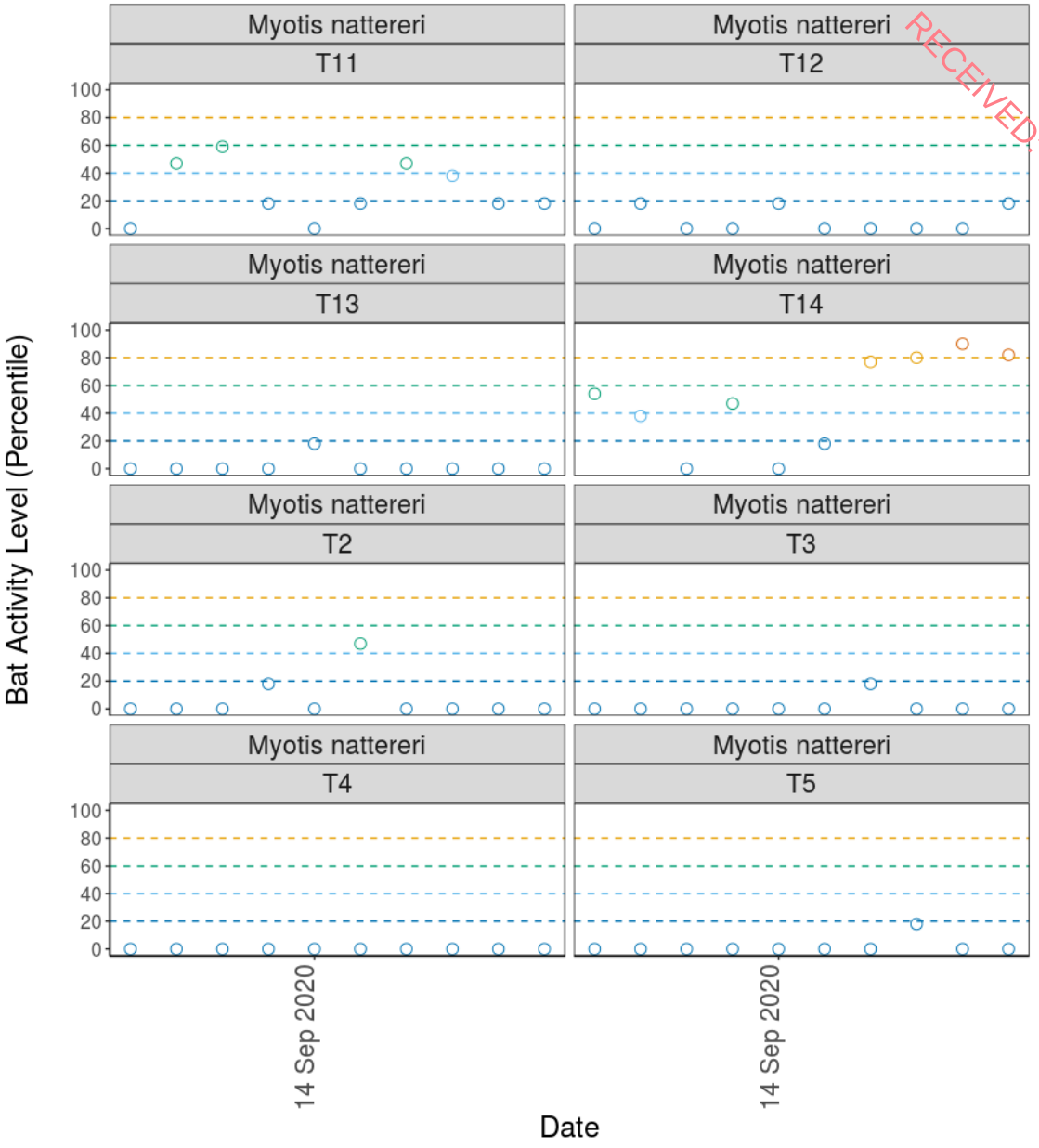
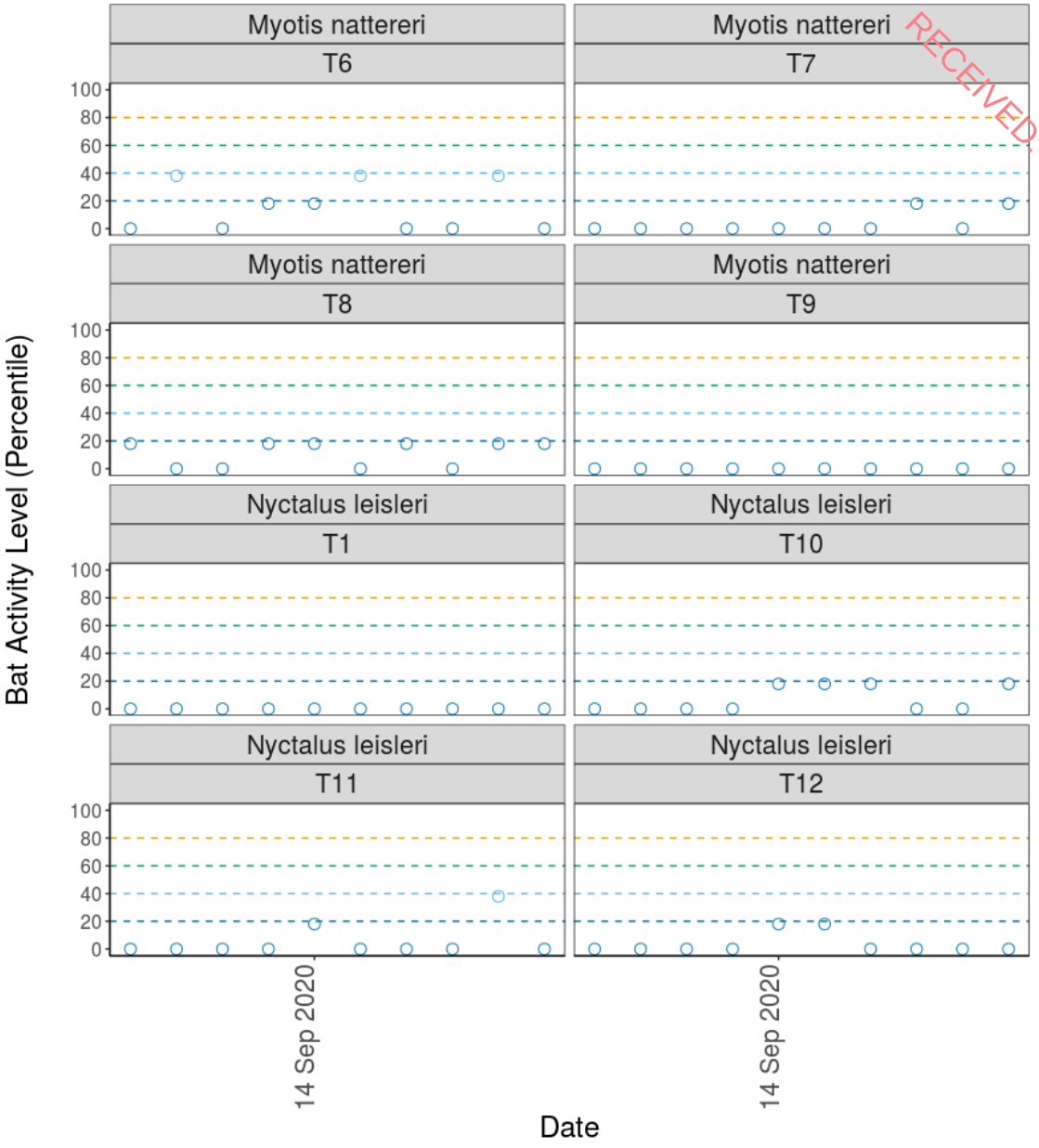


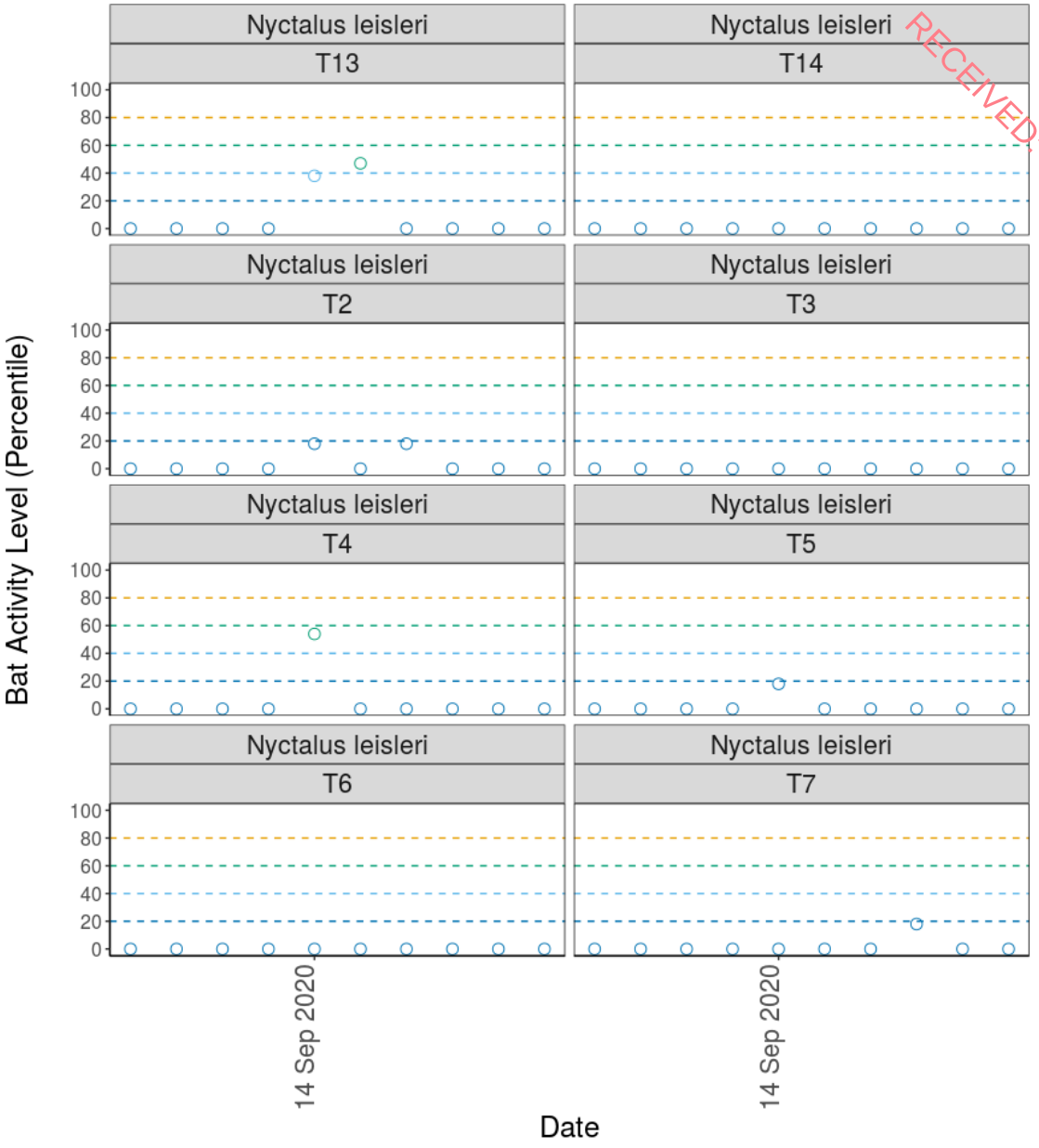
Figure 1. Differences in activity between static detector locations, split by species and location. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)

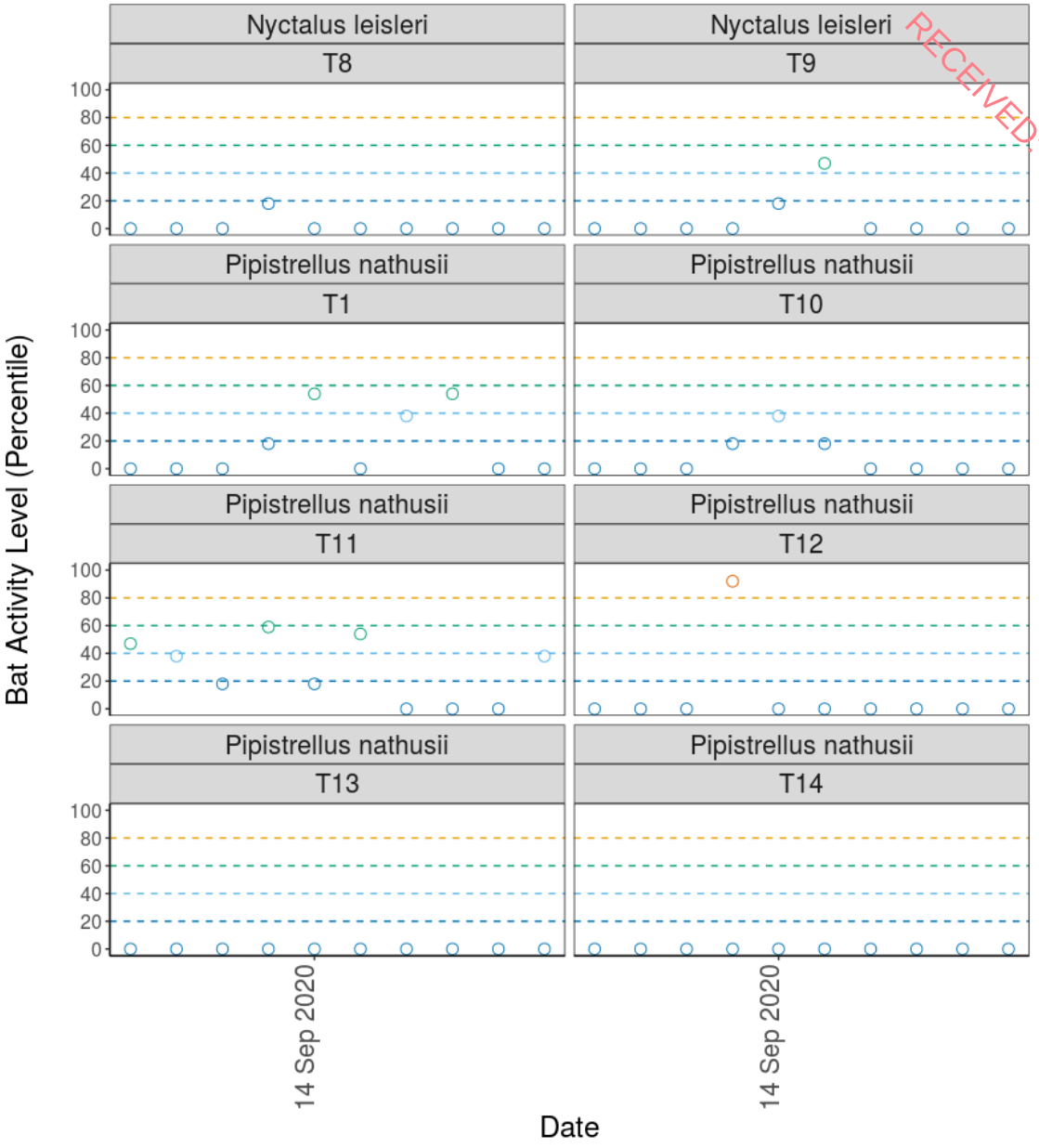


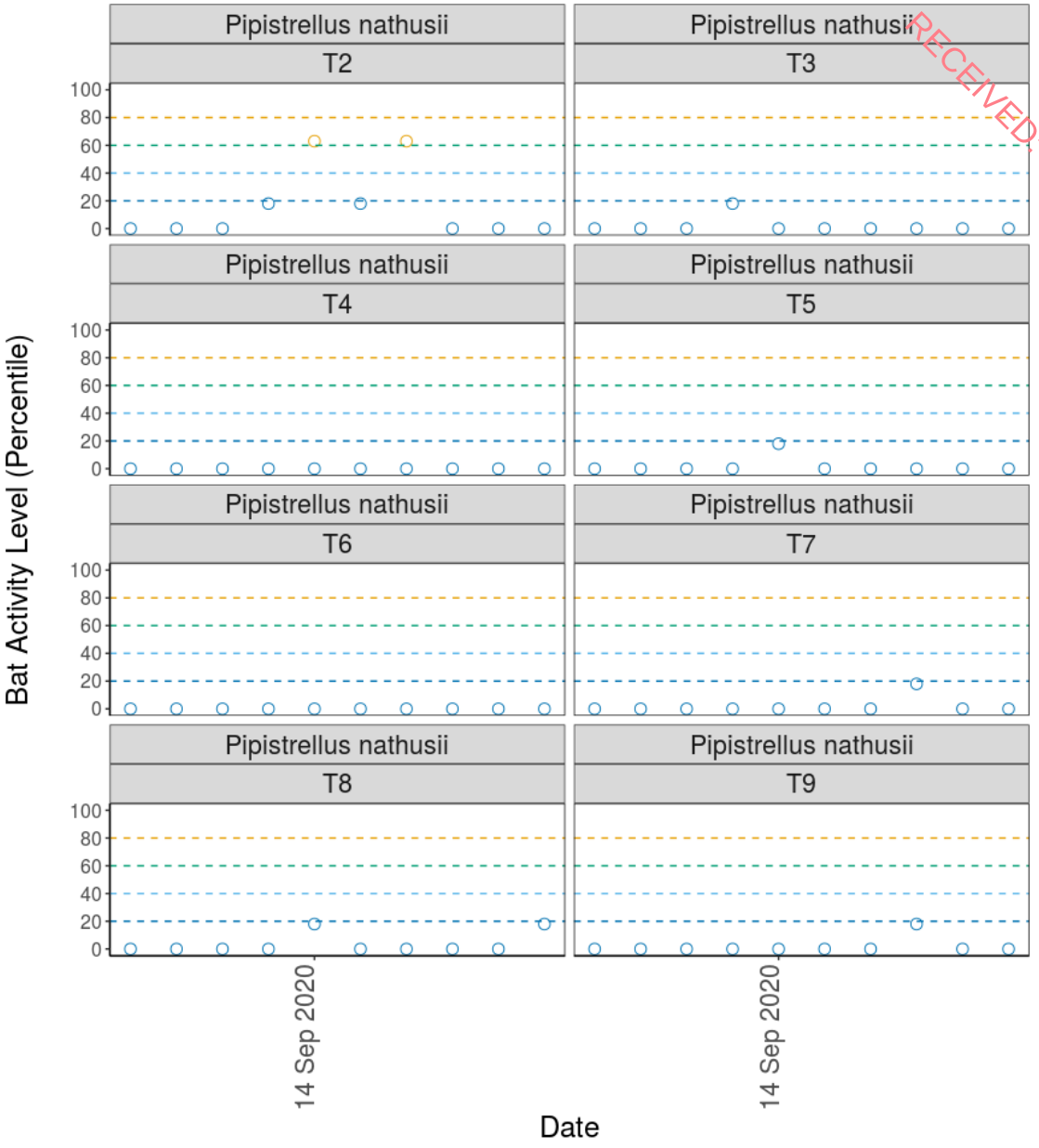


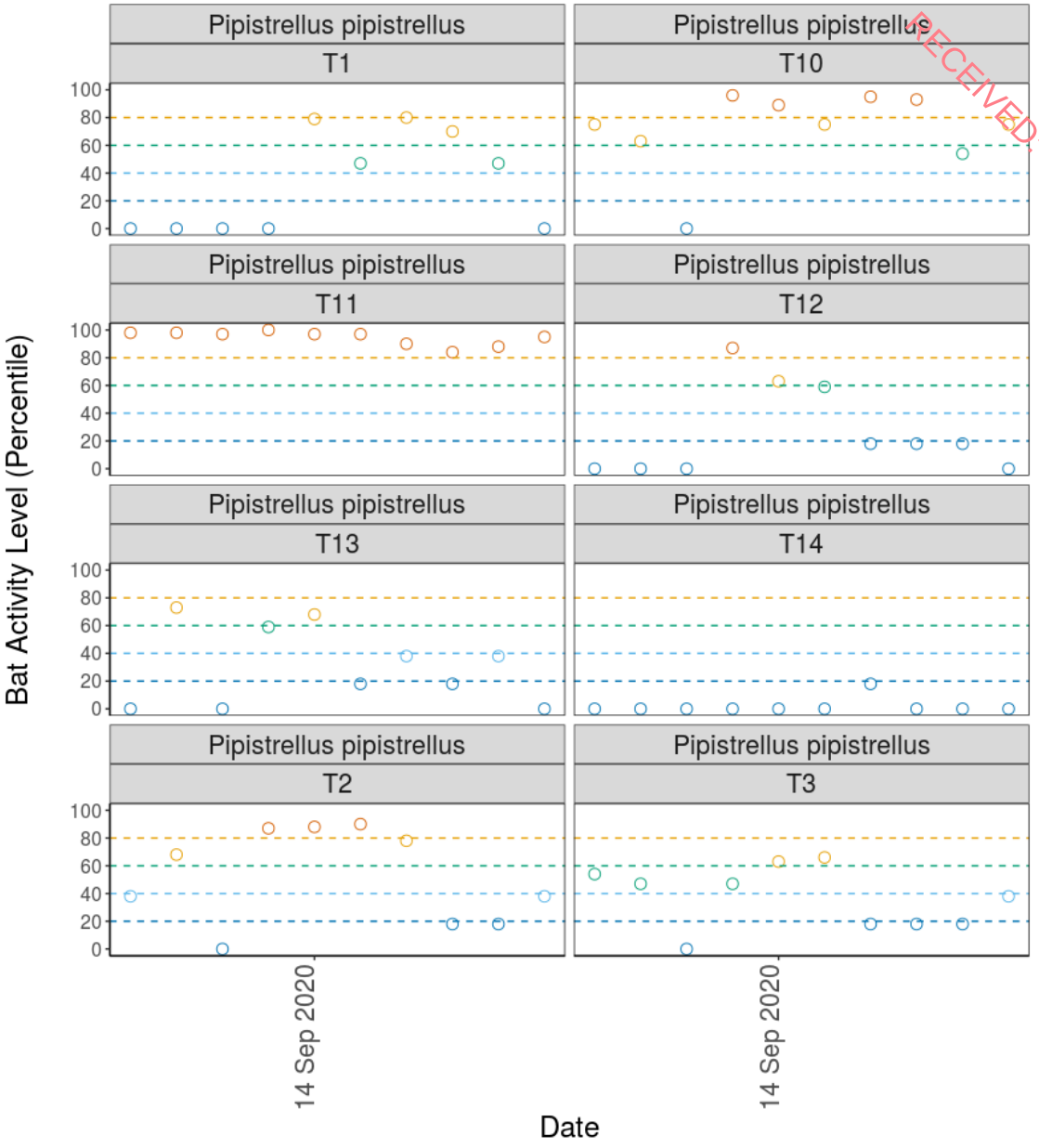


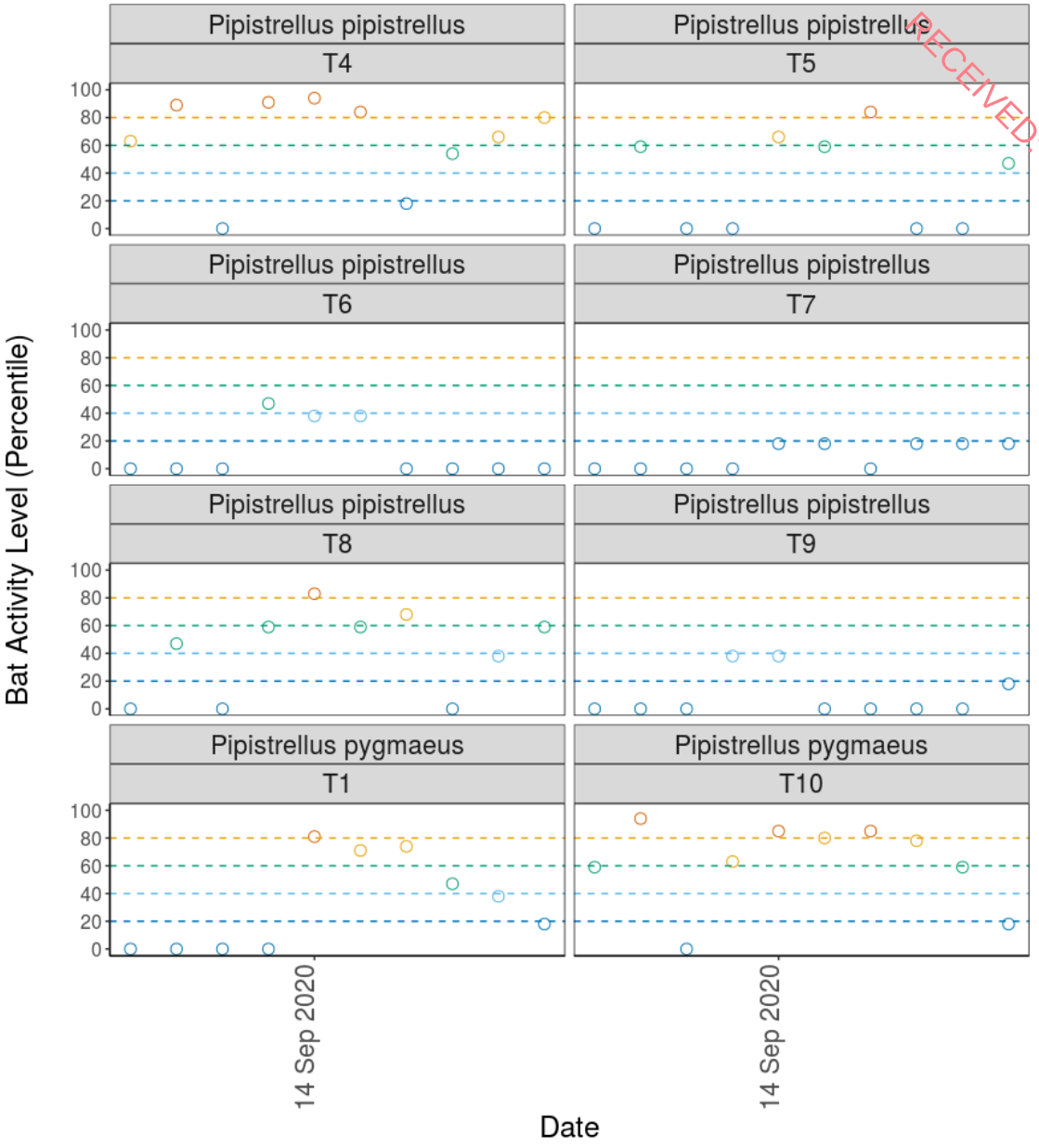


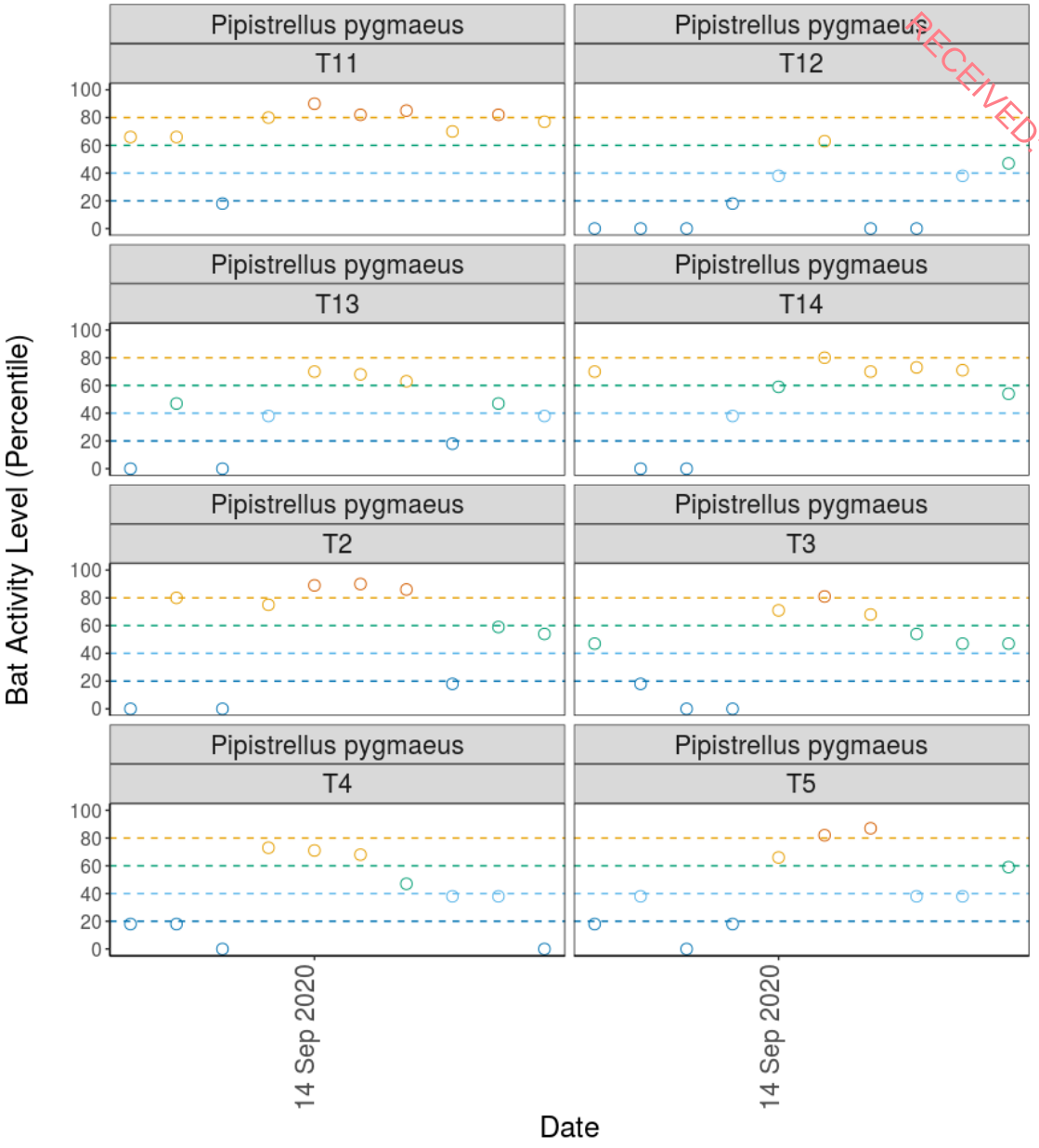


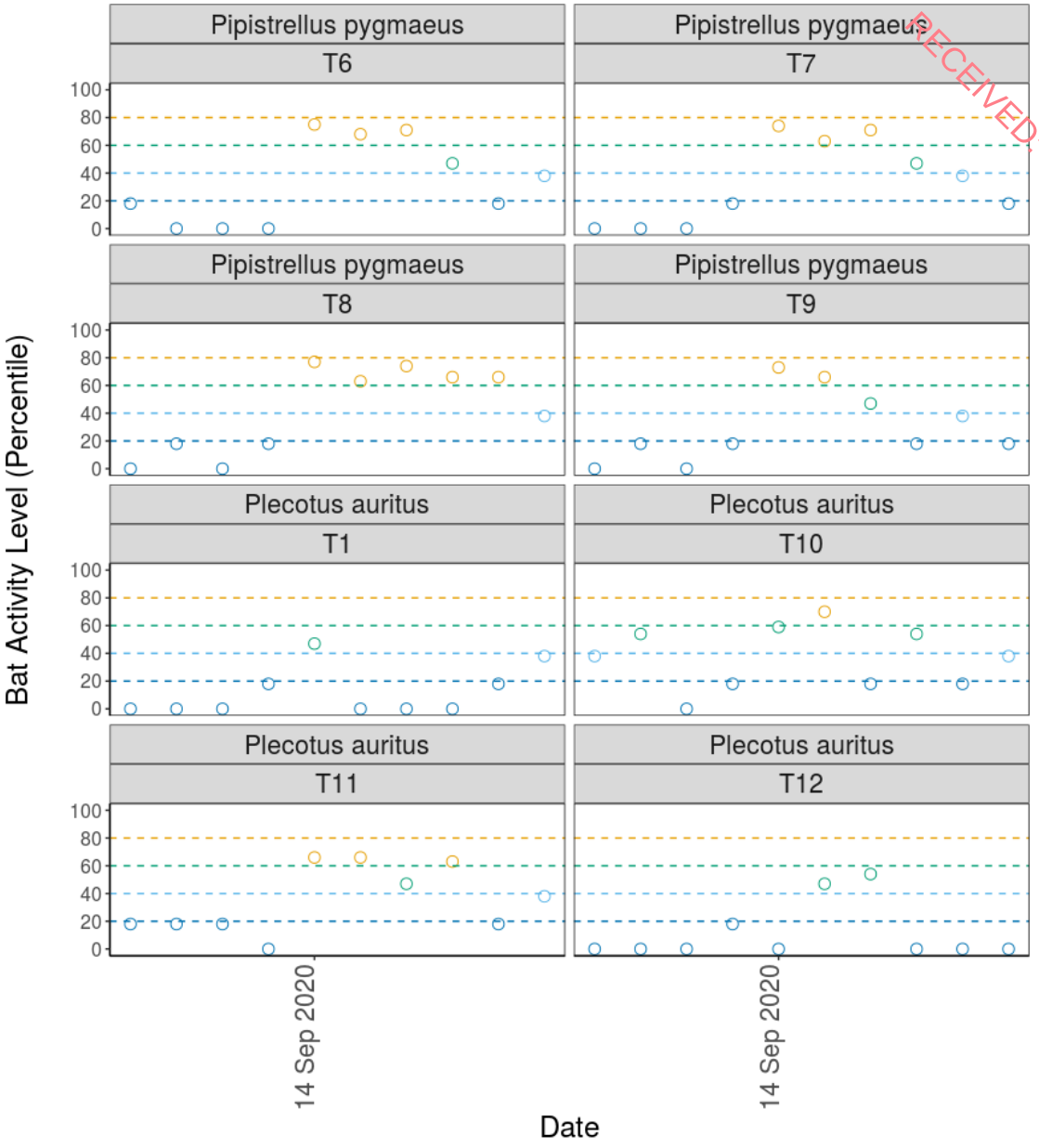


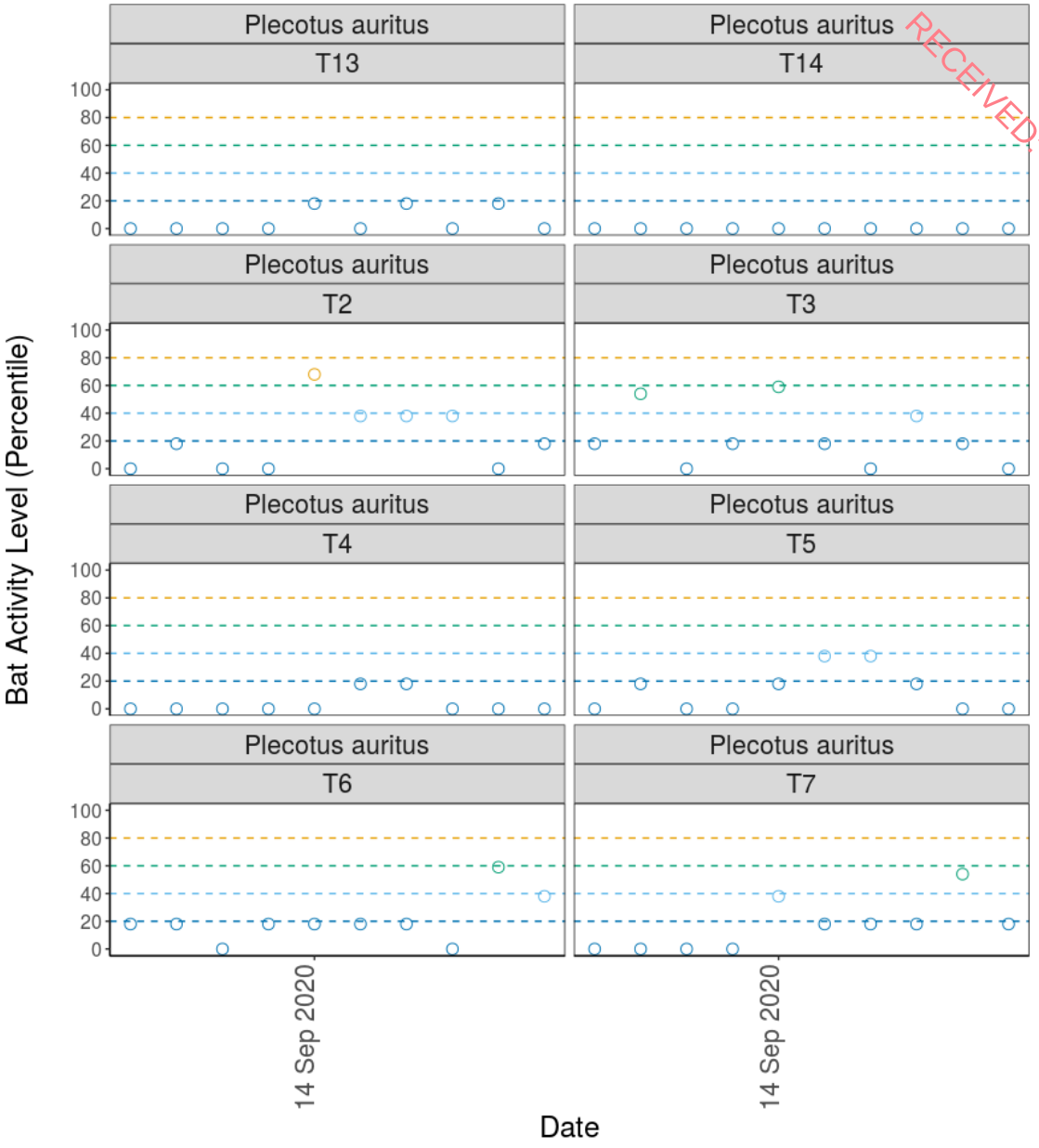












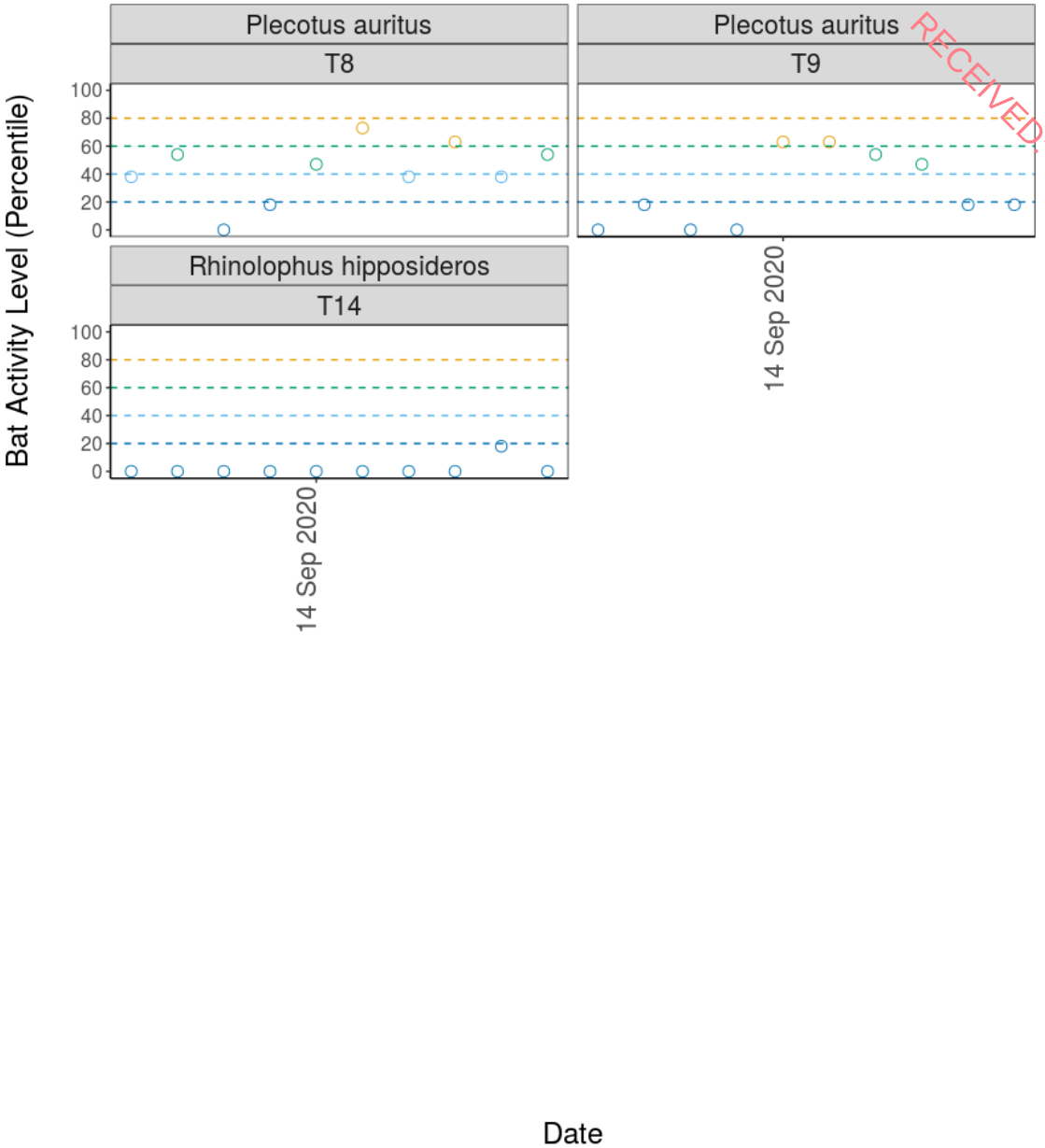


Figure 2. The activity level (percentile) of bats recorded across each night of the bat survey, split by location and species.

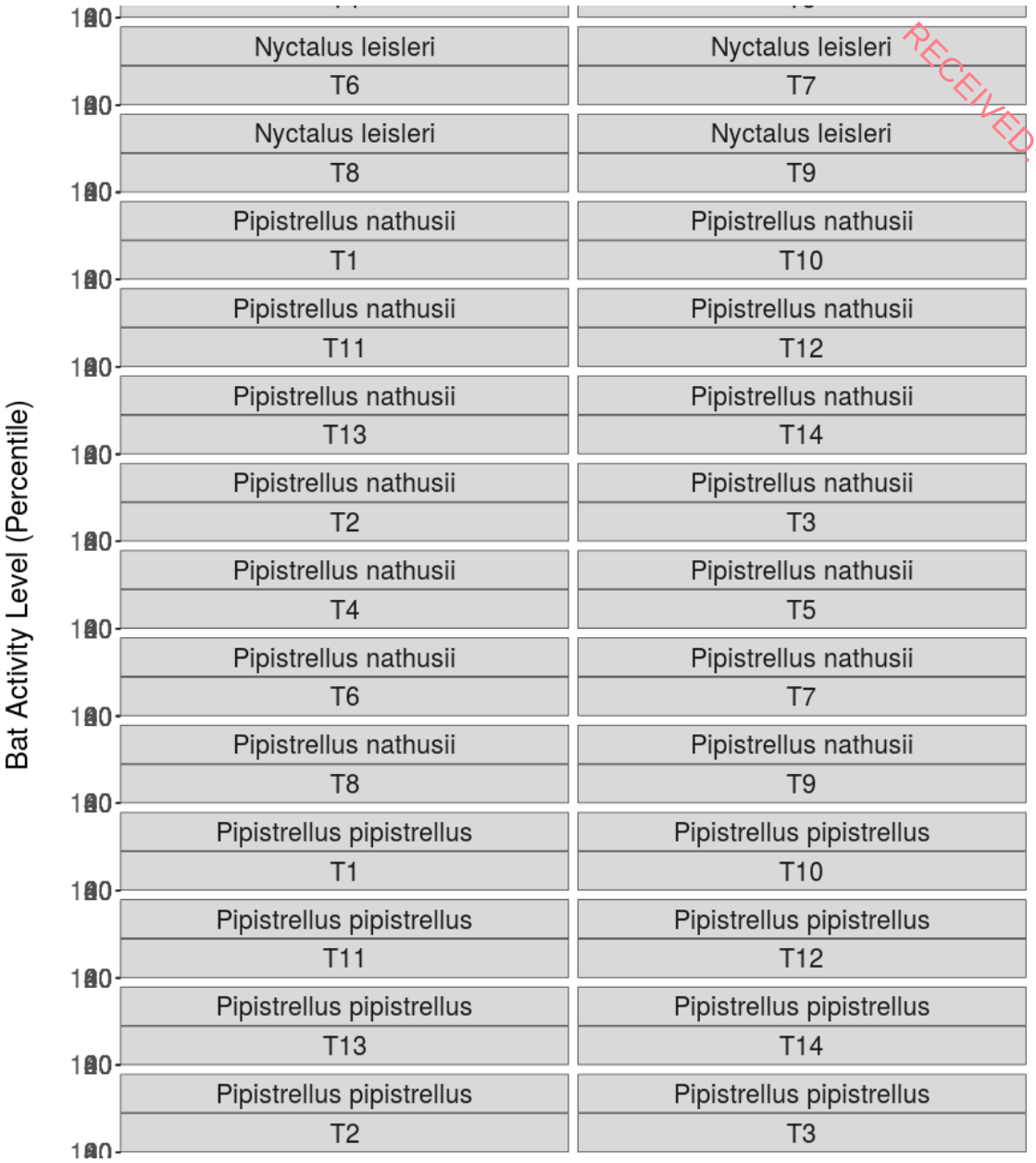


Figure 3. The relationship between recorded bat activity (percentile) and the temperature at sunset, split by species and location.

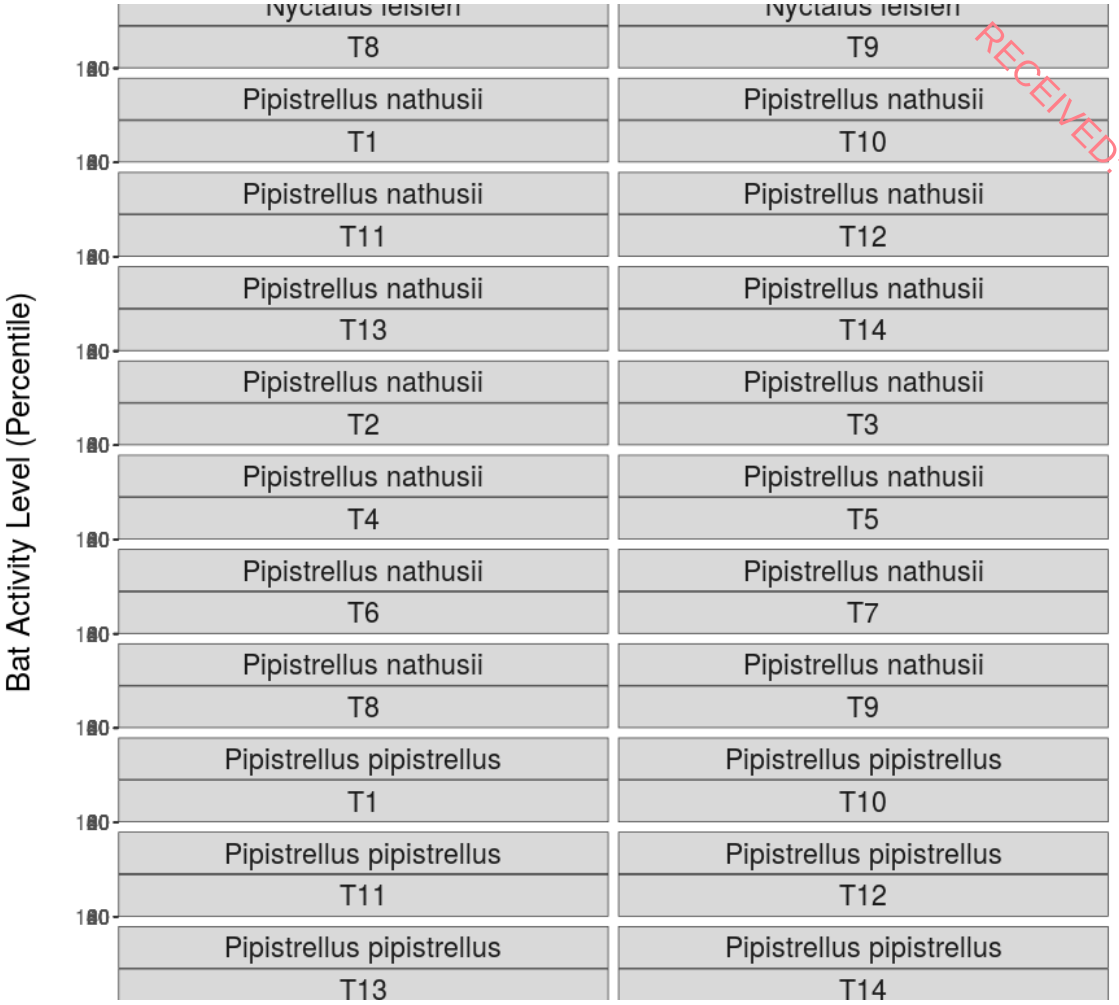


Figure 4. The relationship between recorded bat activity (percentile) and the temperature at sunset, split by location and species.

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