



Islandmore Wind Farm

Environmental Impact Assessment
Report

Annex 5.6: Bat Surveys

Islandmore Wind Farm Limited

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1.1 INTRODUCTION

Islandmore Wind Farm Limited ('the Developer') has commissioned Galettech Energy Services (GES) to manage the preparation of an Environmental Impact Assessment Report (EIAR) for the proposed Islandmore Wind Farm ('the project') in County Roscommon. APEM Group Woodrow has been commissioned by GES to prepare a technical appendix which presents the baseline data for habitats, to accompany **Chapter 5** (Biodiversity) of the Environmental Impact Assessment Report (EIAR).

1.2 METHODOLOGY

Baseline surveys for bats at the project aimed to identify the species within the project site, and to provide an understanding of how local bat populations utilise the area in terms of density of use for foraging, roosting (maternity and hibernation), social interactions and commuting.

Bat surveys were conducted by APEM Group Woodrow over the 2023 bat activity season to ensure compliance with the most recently published NatureScot *et al.*, 2021 guidance for attaining baseline data for impact assessment of wind farms. This guidance document supersedes aspects of other guidelines (Collins, 2016 updating Hundt, 2012 & Bat Conservation Ireland (BCI, 2012)) and requires a site-by-site approach to survey design.

As a minimum, the latest NatureScot *et al.* (2021) guidelines require three deployments of static detectors aimed at covering spring (April to May), summer (June to mid-August) and autumn (mid-August to October) activity seasons, each with a minimum deployment period of 10 nights. Seasonal deployments of static detectors are set out at all potential turbine locations for proposals comprising ten or less turbines, with a third of any additional locations also covered up to a maximum of 40 detectors.

Additional requirements of the NatureScot *et al.* (2021) guidelines include swarming surveys, and winter roost inspections if potential hibernation roosts are identified. Transect, at height and/or vantage point surveys are seen as methods used to complement the static detector surveys, with applicability being discretionary, based on professional judgement, and on a case-by-case site-specific basis.

1.2.1 DESK STUDY

A comprehensive desk-based review was undertaken to assess habitat suitability for bats within the site and to inform the scope of field surveys required. This review drew on both existing third-party bat data and a spatial analysis of the surrounding environment to evaluate potential bat activity and habitats.

In line with best practice guidance from Bat Conservation Ireland (BCI, 2012) and NatureScot *et al.* (2021), the desk-based review covered a 10km radius from the site. The assessment included an examination of Natura 2000 sites designated for bats, noting that in Ireland, the only Special Areas of Conservation (SACs) designated specifically for bats are for the lesser horseshoe bat. Aerial imagery and historic 6-inch maps were reviewed to identify potential bat foraging and roosting habitats, such as linear features, woodland patches, and built structures.

The review also considered habitat suitability data from Lundy et al. (2011), as displayed on Biodiversity Maps¹, which offers a high-level evaluation of the potential suitability of habitats for various bat species across Ireland. Additionally, data from Bat Conservation Ireland within a 10km radius of a central point in the Site were analysed, along with records from the National Biodiversity Data Centre (NBDC, 2024) for the 10km square covering the site (grid reference G60 and M69). This included records of bat species and known roosting sites. Furthermore, local roosts² were identified and considered for their potential as hibernation roosts for bats.

1.2.2 PRELIMINARY ROOST ASSESSMENT

NatureScot et al., 2021 recommends that:-

"...features that could support maternity roosts and significant hibernation and/or swarming sites (both of which may attract bats from numerous colonies from a large catchment) within 200 m plus rotor radius of the boundary of the project should be subject to further investigation".

Turbine specification, as well as locations are regularly altered during the design phase of projects, and as a precaution Woodrow conduct roost assessment surveys within 300m of the potential build area. Features along the access tracks between turbines (within c. 30m) were also assessed for roost features. Wide reaching roost and foraging habitat assessment of the wind farm site were undertaken by NM Ecology Ltd during March 2020, as part of a scoping exercise. This scoping assessment was ground-truthed by Woodrow in March 2023.

Surveyors utilised the assessment criteria described in Collins (2016) which provides guidelines for assessing potential suitability of habitat features as bat roosts and for foraging bats. This allows surveyors to assign Potential Roost Features (PRFs), as negligible, low, moderate, or high status in terms of their potential for bats, see **All external** inspections of buildings and structures were conducted under a derogation licence, which legally permitted surveyors to search for bats in areas where roosting was considered likely or possible. This licence allowed access and assessment methods that could otherwise constitute a disturbance to bats or their potential roosts. Only non-invasive techniques were employed during these inspections. Trees were assessed separately from the ground (up to 3m in height), which did not require a licence as no direct disturbance was involved.

Based on the findings of the PRA, features classed as having moderate to high suitability for bats and/or demonstrating likely occupancy, (e.g., evidence found to be present) were targeted for further surveys.

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Collins (2023) identified that the categorisation outlined in Error! Reference source not found. does not work well for trees, and that it is best to categorise trees as per the **Table 2..** Note: Collins (2016) has since been superseded by Collins (2023) guidance, although all roost and habitat assessments at the development site were completed

¹ National Biodiversity Data Centre (NBDC) – Biodiversity Maps. Accessed January 2025 from <https://maps.biodiversityireland.ie/Map>

² https://qgiscloud.com/Graham/Irish_Caves_Project Accessed January 2025

prior to the publication of the updated guidelines in October 2023. Notwithstanding this, many elements of the survey methodology used is compliant with the 2023 guidance such as the use of night vision aids during emergence surveys.

All external inspections of buildings and structures were conducted under a derogation licence, which legally permitted surveyors to search for bats in areas where roosting was considered likely or possible. This licence allowed access and assessment methods that could otherwise constitute a disturbance to bats or their potential roosts. Only non-invasive techniques were employed during these inspections. Trees were assessed separately from the ground (up to 3m in height), which did not require a licence as no direct disturbance was involved.

Based on the findings of the PRA, features classed as having moderate to high suitability for bats and/or demonstrating likely occupancy, (e.g., evidence found to be present) were targeted for further surveys.

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Suitability	Description Roosting Habitats	Commuting and Foraging Habitats
None	No habitat features on site likely to be used by any roosting bats at any time of the year (i.e., a complete absence of crevices/suitable shelter at all grounds /underground levels).	No habitat features on site likely to be used by any commuting or foraging bats at any time of the year (i.e., no habitats that provide continuous lines of shade/protection for flight-lines or generate/shelter insect populations available to foraging bats).
Negligible ^A	No obvious habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.	No obvious habitat features on site likely to be used as flightpaths or by foraging bats; however, a small element of uncertainty remains in order to account for non-standard bat behaviour.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions ^B and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e., unlikely to be suitable for maternity and not a classic cool/stable hibernation site but could be used by individual hibernating bats ^C).	Habitat that could be used by small numbers of commuting bats such as a hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by any other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter,	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub

³ Collins 2016 was updated in 2023, released in October 2023. While Collins (2023) guidance now supersedes previous guidelines as laid out in Collins (2016), the surveys and report are still compliant with Collins 2023.

Suitability	Description Roosting Habitats	Commuting and Foraging Habitats
	protection, conditions ^B , and/or surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation – the categorisation described in this table is made irrespective of species conservation status, which is established after presence is confirmed).	or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland, or water.

Table 1: Guidelines for assessing the potential suitability of project sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement (and 2023)

^A For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

^B Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2015). This phenomenon requires some research in the UK, but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments.

^C This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

Suitability	Description
PRF-I	A tree feature only suitable for individual bats or very small numbers of bats either due to size or lack of suitable surrounding habitats.
PRF-M	A tree feature suitable for multiple bats and may therefore be used by a maternity colony.

Table 2: Classification of Tree PRFs (Collins, 2023)

1.2.3 ROOST EMERGENCE/RE-ENTRY SURVEYS

Dusk emergence/dawn re-entry surveys were completed in 2023 to ascertain if PRFs identified during the Preliminary Roost Assessment (PRA) were used by bats. PRFs classified as low or moderate suitability were surveyed twice, at roost emergence or roost re-entry times. Surveys commenced 15-mins before sunset and up to 1.5-hours before sunrise in accordance with Collins *et al.* (2016). Dusk emergence/dawn re-entry surveys were undertaken using Elekon Batlogger M bat detectors to collect geo-referenced records of bat activity, which were then analysed using BatExplorer software. Survey times and roost survey effort are shown in

Date	Start time	End time	Location	Survey type	Weather Conditions
04 Aug 2023 (Sunrise: 05:45)	03:45	06:00	53.93857, - 8.588342	Re-entry Survey derelict building (K. O'Reilly & D. Lavelle)	Wind: 2m/s Temp: 15°C Oktas: 2 Precipitation: Dry Other: full moon
30 Aug 2023 (Sunset 20:30)	20:15	22:00	53.93857, - 8.588342	Emergence Survey - derelict building (K. O'Reilly & F. Hintze)	Wind: 0 m/s Temp: 15°C Oktas: 8 Precipitation: Intermittent light rain

Table 3: Summary of Roost Emergence/Re-entry Survey Effort

below.

Date	Start time	End time	Location	Survey type	Weather Conditions
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30 Aug 2023 (Sunset 20:30)	20:15	22:00	53.93857, - 8.588342	<u>Emergence Survey</u> - derelict building (K. O'Reilly & F. Hintze)	Wind: 0 m/s Temp: 15°C Oktas: 8 Precipitation: Intermittent light rain

Table 3: Summary of Roost Emergence/Re-entry Survey Effort

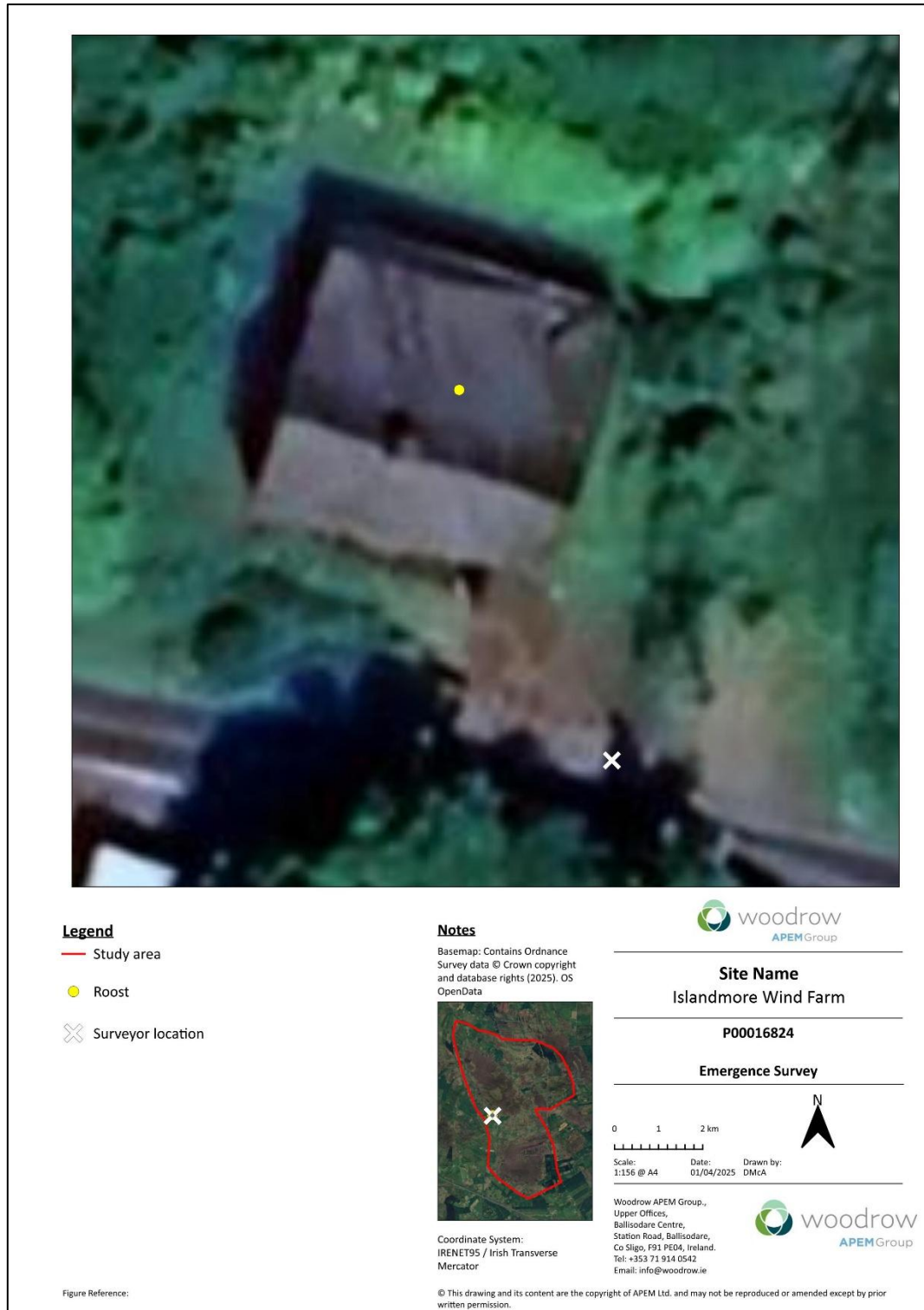


Figure 1: PRA and Emergence Survey Location

1.2.4 BAT ACTIVITY TRANSECT SURVEYS

Bat activity transect surveys, which comprised of a walked transect were conducted over the active season (May-September, 2020). Results of these, and the transect routes walked can be seen in **Appendix 8**.

1.2.5 STATIC BAT DETECTOR SURVEYS

Static detector surveys were undertaken using Wildlife Acoustics Song Meter detectors, Song Meter 4 BAT (SM4BAT), over three deployment periods, covering spring, summer, and autumn in 2023. Detectors were configured to begin recording 30-minutes prior to sunset and end 30-minutes after sunrise. Static bat detectors were deployed to record the bat species present and to provide an overview of how bat activity is broadly distributed over the project site, including at given habitat features and turbine locations. The data then provides context to bat activity, for example, comparing bat activity along habitat features versus open areas away from features, emulating likely post-construction conditions around turbines (following the application of standard buffer distances from turbines to features used by bats).

Table provides dates of the static deployments and shows the survey effort for each detector location. **Figure 2** shows the location of all static detectors for each deployment in 2023.

Season	Deployment date	Collection date
Spring	26-April-2023	11-May-2023
Summer	27-June-2023	14-July-2023
Autumn	30-August-2023	13-September-2023

Table 4: Static Detector Deployment Dates

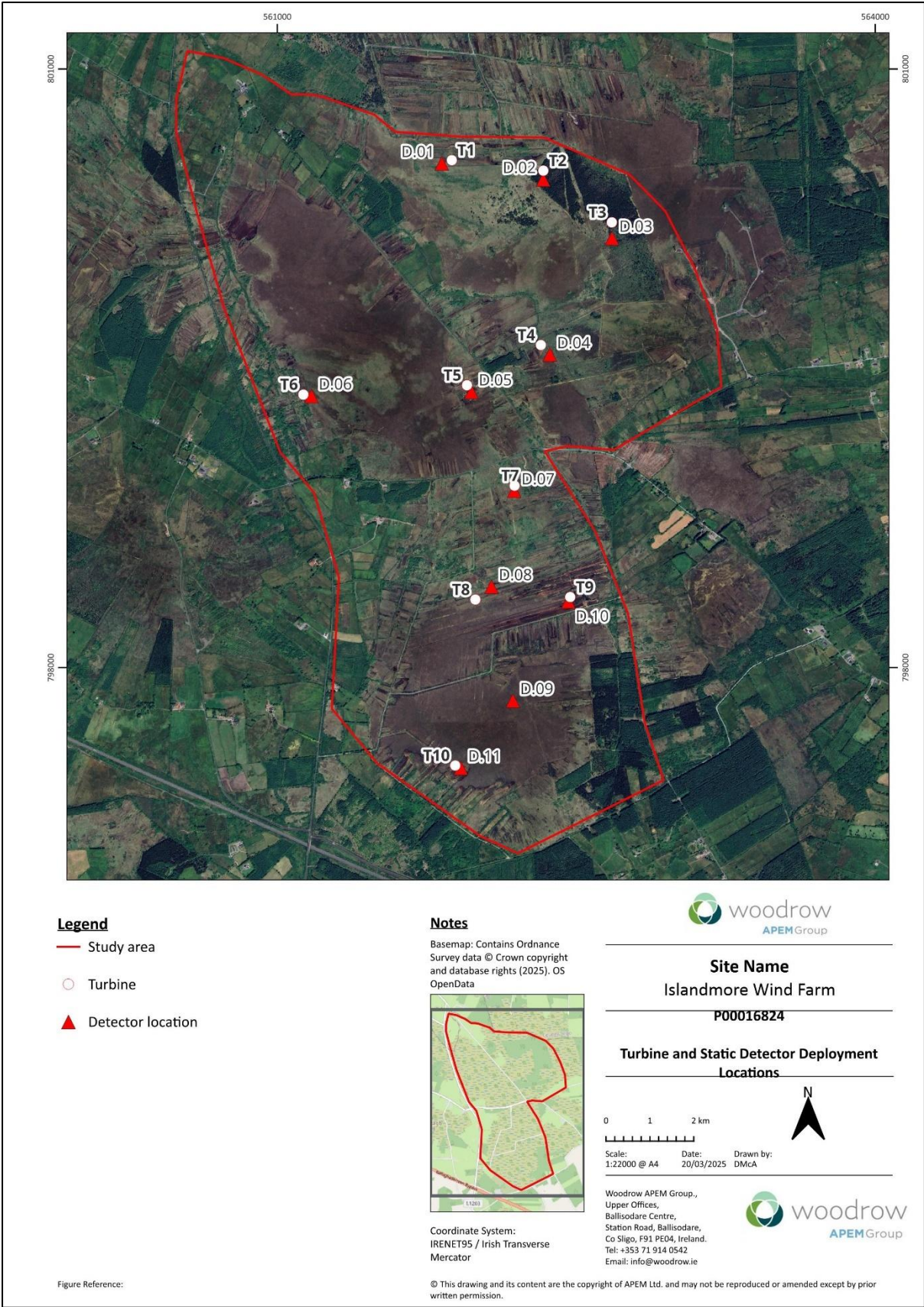


Figure 2: Turbine and Static Detector Deployment Locations 2023

1.2.6 CALIBRATION AND TESTING OF RECORDING EQUIPMENT

Calibration and testing of recording equipment is required by the NatureScot *et al.* (2021) guidelines, and as a standard operating procedure Woodrow have a stringent schedule of testing all bat recording equipment prior to and during deployment in the field. Checks are logged in excel, providing an audit trail to ensure that all data can be relied on and form a robust and traceable data set. Unique numbering of static detectors, SD cards and microphones allows for reverse checking, if any issues arise, e.g., following a microphone failure. Checks undertaken include pre-deployment device setting including battery charge levels and pre-/post-deployment microphone sensitivity tests.

1.2.7 ANALYSIS

For data collected using SM4BAT-FS detectors, analysis of sound recordings was undertaken using Kaleidoscope (Wildlife Acoustics) software to confirm species (or genus for *Myotis* species or *Pipistrelle* species social calls) and exact number of bat passes for each transect survey or deployment. For data collected using Anabat Scout detectors, analysis of sound recordings was undertaken using Anabat Insight and Kaleidoscope software, undertaken by NM Ecology. For data collected using Elekon Batlogger M bat detectors, analysis of sound recordings was undertaken using BatExplorer. Russ (2012) and Middleton *et al.* (2022) were used to aid in identification of bat calls during data analysis.

All sounds files were run through auto-identification and then manual verification was undertaken by APEM Group Woodrow ecologists. Recordings identified as noise were determined to fall outside of the recording parameters for the survey and were manually classified as noise. Common pipistrelle and soprano pipistrelle which Kaleidoscope software determined to be a match ratio of 100% (every pulse recorded matched the species call parameters) were adjudged to be accurate to a level not requiring manual verification. Recordings in which multiple species were recorded were split into separate passes. The number of passes generated were adjudged to be species presence within a 15-second sound file.

1.2.8 ACTIVITY ASSESSMENT

Activity levels were assessed using an adaptation of the criteria applied by Matthews *et al.* 2016 (Table 3Error! Reference source not found.) in a study that examined the risk of European bats to wind energy developments in the UK. Activity levels are classified as prescribed by the study from Matthews *et al.* (2016)., Our bat activity level scale (Error! Reference source not found.) has been adapted to average bat passes per hour. This adaption uses an average value of 10-hours per night across the active bat season to determine the cut-off of 'high' activity.

Geographical and temporal context for activity levels has been examined through the analysis of the data using the software R. Graphs have been created to show the level of activity at each detector in relation to the number of bat passes per hour and in relation to activity levels relative to sunset, see Error! Reference source not found..

	Bat passes per night
Low	<3
Medium	3 - 49
High	≥50

Table 3: Activity Levels as per Matthews *et al.* 2016

Classification	Bat passes per hour
Low	<1.99
Medium	2 - 4
High	≥5

Table 4: Activity Level Classification as per Matthews *et al.* 2016 adapted to hourly activity levels

1.2.9 SURVEY LIMITATIONS

In the case of bat surveys, survey limitations often relate to weather conditions at the time of surveying and equipment failing in the field, for example microphones can be damaged by livestock or can lose sensitivity when exposed to prolonged episodes of heavy rainfall. The following sections provide details for any potential limitations to bat surveys conducted in 2023.

1.2.10 WEATHER

The weather data for the spring deployment period (26 April–11 May 2023) was fully compliant with NatureScot *et al.* (2021) guidance for weather conditions (which requires a minimum of 10 compliant nights per deployment). Out of the 15 nights deployed, five were non-compliant (28 April, 5 May, 6 May, 8 May and 10 May) due to rainfall. This meant that 10 of the deployment nights were compliant with required weather conditions. The weather data for the summer deployment period (27 June–14 July 2023) was fully compliant with the NatureScot *et al.* (2021) guidance for weather conditions, only 7 July was non-compliant due to rainfall. The weather data for the autumn deployment period (30 August–13 September 2023) was compliant with the NatureScot *et al.* (2021) guidance for weather conditions with the only non-compliant nights being on 31 August and 11 September. There was a non-recording of weather data for 12 and 13 September, but this has not impacted on overall results.

1.2.11 SURVEY COVERAGE

Static bat detector coverage of the project site for bat activity in 2023 was in line with the NatureScot *et al.* 2021 guidelines. Due to reasons relating to access and habitat structure, bat equipment could not always be setup at exact proposed turbine locations, e.g., when proposed turbine locations are in dense conifer plantations. This was the case at D.03 where the detector was placed approximately 15 m from the exact turbine location. The detector was placed on the edge of the forestry plantation as opposed to the interior as the interior was inaccessible due to windfallen trees. While this was not considered to limit the robustness of the data set, it is important to acknowledge the deployment locations in relation to the turbines, as this has implications for interpretation of bat activity. For instance, where a proposed turbine location falls within a forestry plantation, deploying a static detector at that location is likely to result in a very limited number of recorded bats, and will not be representative of the conditions during wind farm operation (when forestry will have

been felled). Deploying the static detector at the nearest reasonable, or accessible, location may be on forestry edge, which would be likely to lead to more bats being recorded than would be likely in the operational context. Interpretation of results, taking account of the context of static detector deployment, is therefore extremely important.

Overall, the combined survey approach and coverage over the 2023 survey seasons, provides robust data giving a full insight into the use of the project site by bats. The survey methodologies employed are in line with the recommended guidelines (NatureScot *et al.* 2021), and as such, this information can be appropriately used to assess the potential impacts of the proposed wind farm development on the local bat population.

1.3 RESULTS

1.3.1 DESK STUDY

1.3.1.1 NBDC Records

Following the review of the NBDC bat habitat suitability maps for the 10 km grid square M69, the site has been categorized as low suitability for 'all bats' (Lundy *et al.*, 2011)⁴, see **Figure 5** and **Table 7**. The suitability index refers to areas geographically, as well as suitable roosting habitat. These patterns combined can provide a broad scale geographical area (habitat suitability) for all Irish bats combined and individual Irish species of bats. The suitability index ranges from 0–100 with 0 being least favourable and 100 being the most favourable.

Bat Species	Suitability Index	Suitability Level
All Bats	17	Low
<i>Pipistrellus pygmaeus</i>	32	High
<i>Plecotus auritus</i>	21	Moderate
<i>Pipistrellus pipistrellus</i>	27	Moderate
<i>Rhinolophus hipposideros</i>	0	Nil
<i>Nyctalus leisleri</i>	24	Moderate
<i>Myotis mystacinus</i>	6	Very Low
<i>Myotis daubentonii</i>	23	Moderate
<i>Pipistrellus nathusii</i>	3	Very Low
<i>Myotis nattereri</i>	17	Low

Table 5: NBDC Species Specific Habitat Suitability Index

1.3.1.2 Designated Sites

The closest SACs with lesser horseshoe bat as a qualifying interest (QI) are listed below. These are outside of the current known 2.5km foraging range (Bat Conservation Trust, 2016) of lesser horseshoe bat from their respective roosts. There are no nationally designated sites within 10km of the project site that are designated for the protection of bat species.

⁴ It should be noted that the data used for the study is from 2009. The area within the Site may have changed since the study, including development, and land management, therefore the data provided is not always representative of the current habitat suitability on Site.

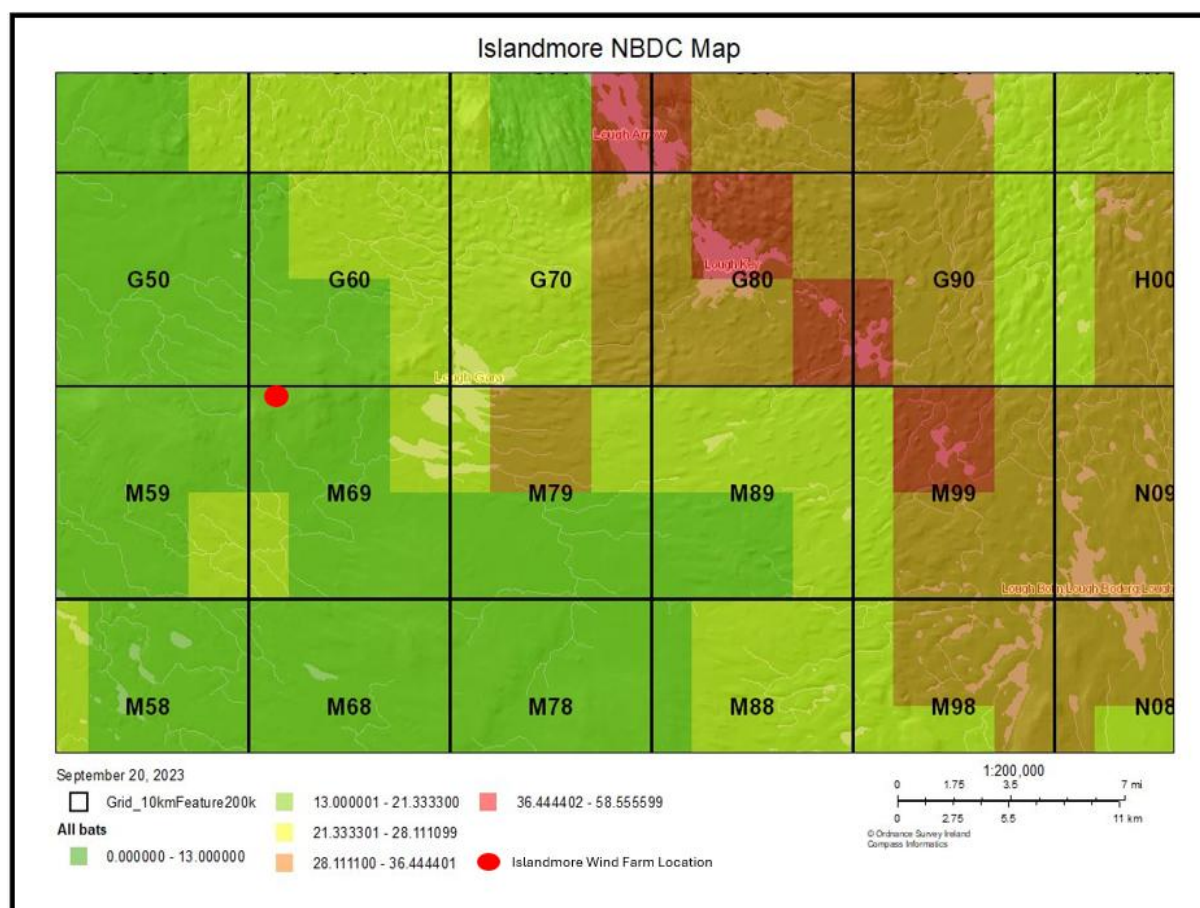


Figure 3: Bat Habitat Suitability (Accessed 2025)

1.3.2 HABITAT AND ROOST SUITABILITY ASSESSMENT

1.3.2.1 Habitat Suitability Assessment

The habitats within the project site have been assessed from aerial photography during a desk study and from habitats recorded during the PRA. The habitat within the project site is comprised of primarily peatland habitat, clear-fell forestry and lodgepole pine (*Pinus contorta*) plantation in the north-eastern section of the site. The dense forestry plantation in the north-east of the site had sections of windfall providing complex habitat for feeding and shelter for foraging. The rest of the site comprises more open habitat including blanket bog, cutover bog, grassland, and scrubland.

In the wider area, the site is surrounded by open peatland habitat and farmland with an existing windfarm on the eastern boundary. Open peatland habitat devoid of linear habitat features or ecological corridors is considered less suitable for commuting and foraging bats. The below **Table 6**, sets out a more detailed habitat assessment for the immediate 100m surrounding each detector location.

Detector Location	Foraging/commuting features at detector locations/provisional turbine buffer (c. 100m)	Roost potential within c. 300m of detectors of moderate or higher suitability
D.01	Located in an open bog area, 30 m from a drain and some scattered scrub vegetation. This is of low commuting or foraging potential.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.

Detector Location	Foraging/commuting features at detector locations/provisional turbine buffer (c. 100m)	Roost potential within c. 300m of detectors of moderate or higher suitability
D.02	Located on a pine tree within dense pine plantation. There is moderate foraging and commuting potential here in this plantation.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.
D.03	Located on a fallen pine tree on the edge of a dense lodgepole pine forest. There is moderate foraging and commuting potential here at this plantation.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.
D.04	Located on clear-felled forestry on peat substrate. There is low foraging and commuting potential here.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.
D.05	Located in open bog near cutover features. There is low suitability foraging or commuting potential.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.
D.06	Located in open bog with some scrubland and small watercourses to the west. There is low foraging and commuting potential here.	The only roost feature in the area is a derelict house which is 400 m south-east of the detector location.
D.07	Located on cutover bog adjacent to some scrub. This is of moderate commuting and foraging potential.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.
D.08	Located on cutover bog adjacent to some scrub. This is of moderate commuting and foraging potential.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.
D.09	Located on open blanket bog. This is of low commuting and foraging potential.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.
D.10	Located on cutaway bog, 5 m to deep bog drain with some water present. This is of moderate commuting and foraging potential.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.
D.11	Located in open bog adjacent to cutover bank. This is of low commuting and foraging potential.	There are no potential roost features classed as moderate or high within 300m of the proposed location associated with this detector.

Table 6: Foraging/Commuting within 100m of the Turbine Locations and Potential Habitat Suitability within the 300m search radius.

1.3.2.2 Roost Suitability Assessment

Preliminary surveys of potential roost features found no potential roosting features within the 300m turbine area of impact consideration for bats. However, one derelict building was identified near the western boundary of the site which had moderate potential for roosting bats. This building was assessed on a precautionary basis as it was the only roost feature in the area. The derelict building is located at: Lat: 53.938392, Long: -8.588325. The building consists of a two-storey derelict dwelling house with slate roof and intact windows. There were some noticeable entry-points

around the fascia, roof tiles, and windows. The building was surrounded by mature vegetation including broadleaf tree species such as sycamore *Acer pseudoplatanus* which was uncharacteristic for the wider landscape. The roost feature was classified as moderate due to the size, number of entry points, and nature of the immediate surrounding habitat. The interior of the building was not accessible for inspection.

Error! Reference source not found. **Error! Reference source not found.** lists the following roost features classed as negligible to high.

Feature ID	Feature Description	Location	PRF suitability (Collins, 2023)
F.1	Derelict house	53.938459, -8.588281	Moderate

Table 9: Potential Roost Features (PRFs) identified within the Project Site.

1.3.2.3 Roost Emergence/Re-entry Surveys

Roost emergence/re-entry surveys were undertaken at the potential roost feature to confirm if it was used by roosting bats during the 2023 season. **Figure 1** shows the location where these surveys were conducted and **Table 9** provides a summary of surveys and results at each of these locations. Images of these locations can be found in **Appendix 2**. Survey results are provided as follows.

Survey 1 – Re-entry survey: 4 August 2023

Derelict house: No bats were seen re-entering the building on this survey. It was noted during this survey that there was an orange streetlight mounted onto the front of the premises which illuminated the roadside portion of the building. A brown long eared bat was recorded at the beginning of the survey foraging in the area. A review of the IR camera footage confirmed this bat did not enter the derelict house. A single soprano pipistrelle and a single common pipistrelle were foraging intermittently around the building but did not enter.

Survey 2 – Emergence survey: 30 August 2023

Derelict house: Two bats were recorded emerging from the building on this survey. They emerged from the same entry point to the rear of the building under the soffit of the roof. One bat was confirmed to be a soprano pipistrelle. The other bat did not echolocate on exit, but a common pipistrelle was recorded foraging nearby shortly thereafter, so the second emergence was presumed to be a common pipistrelle. The two bats were tandem flying, foraging, and social calling around the roost feature throughout the survey.



Figure 1: Confirmed Roost Identified (Note: project footprint is as per March 2025)

1.3.3 STATIC DETECTOR SURVEYS

The following sections detail the results from static detector surveys for each of the deployments: spring, summer, and autumn.

Table Identifies the survey effort for each season and total number of passes per species.

then shows the mean activity (assessed using the adaptation criteria applied by Matthews *et al.* 2016). Full detail of mean activity is detailed in **Error! Reference source not found.** Our bat activity level scale is shown in Error! Reference source not found..

Error! Reference source not found., Error! Reference source not found., and Error! Reference source not found. below also identify the standard deviation, showing how dispersed the data is from the mean. A low standard deviation shows how the data is clustered around the mean. A high standard deviation shows how the data is more spread out from the mean. The interquartile range indicates the data that lies within the middle half of the data set.

		Spring	Summer	Autumn
Nights recorded		16	18	15
Minutes recorded		9,436	8,966	10,531
Passes	Common pipistrelle	1,969	3,079	139
	Soprano pipistrelle	1,264	192	908
	Leisler's bat	249	232	4
	Myotis sp.	2	133	64
	Brown long-eared	3	15	13
Total passes		3,471	3,652	1,727

Table 10: Summary of Mean Bat Activity recorded at each Static Detector

Detector															
		Common pipistrelle	Soprano pipistrelle	Leisler's	Other		Common pipistrelle	Soprano pipistrelle	Leisler's	Other		Common pipistrelle	Soprano pipistrelle	Leisler's	Other
D.01	Spring					Summer					Autumn				
D.02															
D.03															
D.04															
D.05															
D.06															
D.07															
D.08															
D.09															
D.10															
D.11															

Table 11: Summary of Mean Bat Activity

	High
	Medium
	Low
	Nil

1.3.3.1 Association of Bat Activity with Habitat Features

In the 2023 survey season, detectors D.02 and D.03 were placed along the edges of coniferous forestry plantations. These locations recorded more activity from species present compared to the other detectors located in less favourable habitats for species, especially in the spring season.

These were also the detectors which recorded the greatest levels of activity, particularly that of Leisler's bat during the summer deployment. These detectors were all placed at proposed turbine locations which are near foraging and commuting habitat features which have been assessed as having moderate to low foraging potential within the 300m buffers.

D.10 and D.11 also recorded moderate levels of activity for common pipistrelle and soprano pipistrelle respectively, likely due to the presence of a watercourse in the form of a drainage ditch which provides a source of invertebrate prey and shelter.

Analysis of activity levels and weather conditions show that detectors placed near habitat features, such as D.03, recorded higher activity levels during periods of inclement weather (see **Appendix 4**). This shows that habitat features such as forestry can provide shelter for bats thereby allowing them to continue to forage in otherwise suboptimal conditions.

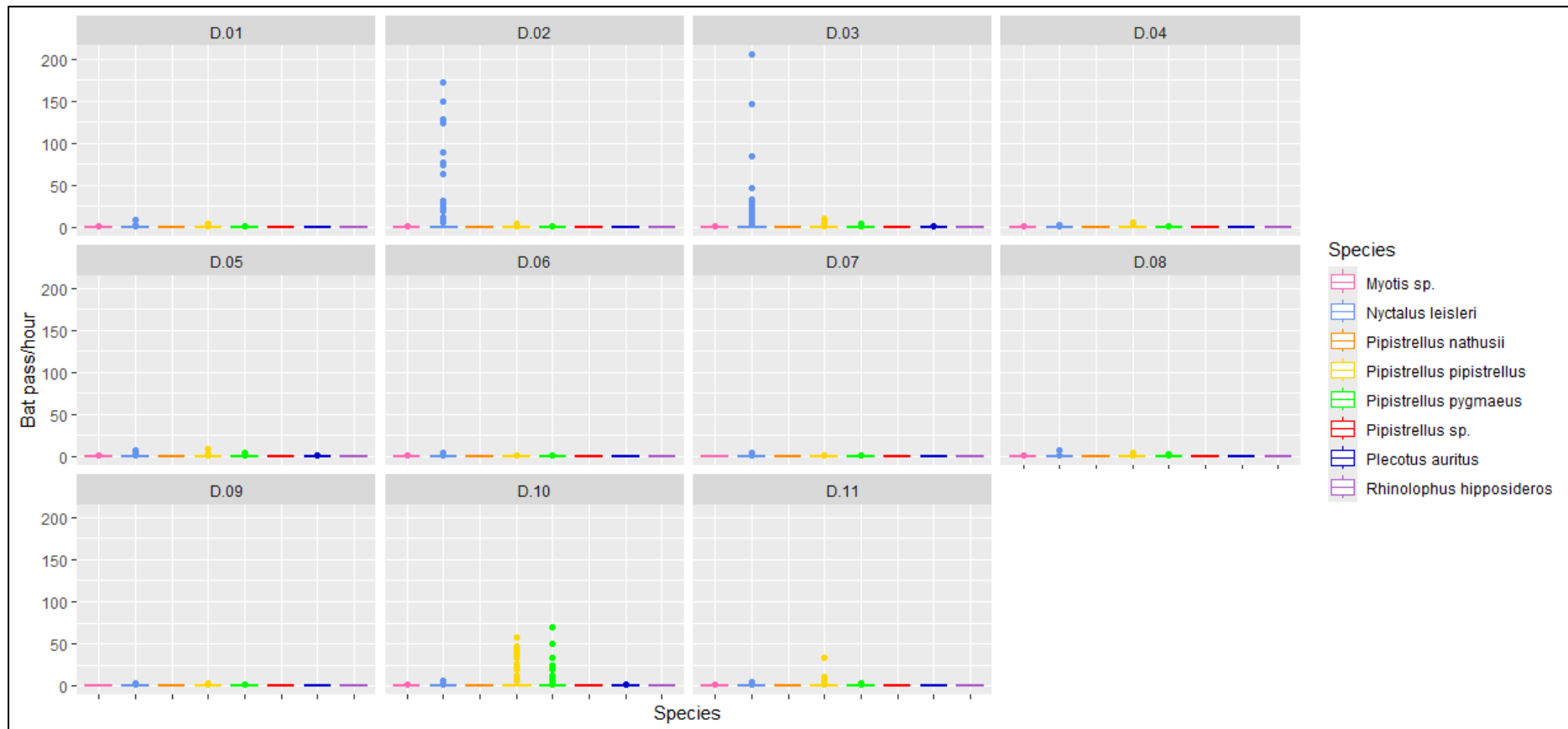


Figure 2: Mean Passes of each Species at Detector Locations – Spring

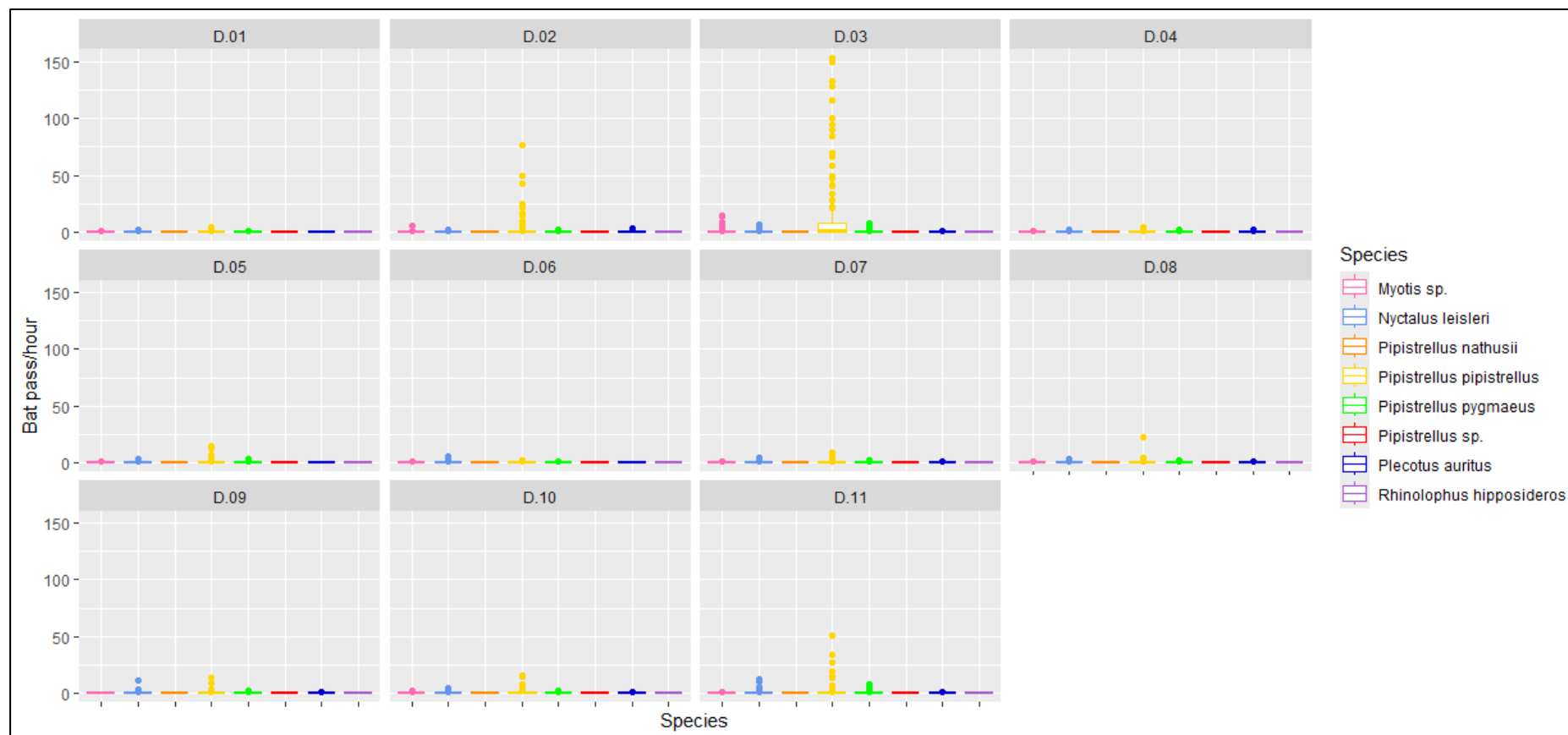


Figure 3: Mean Passes of each Species at Detector Locations – Summer

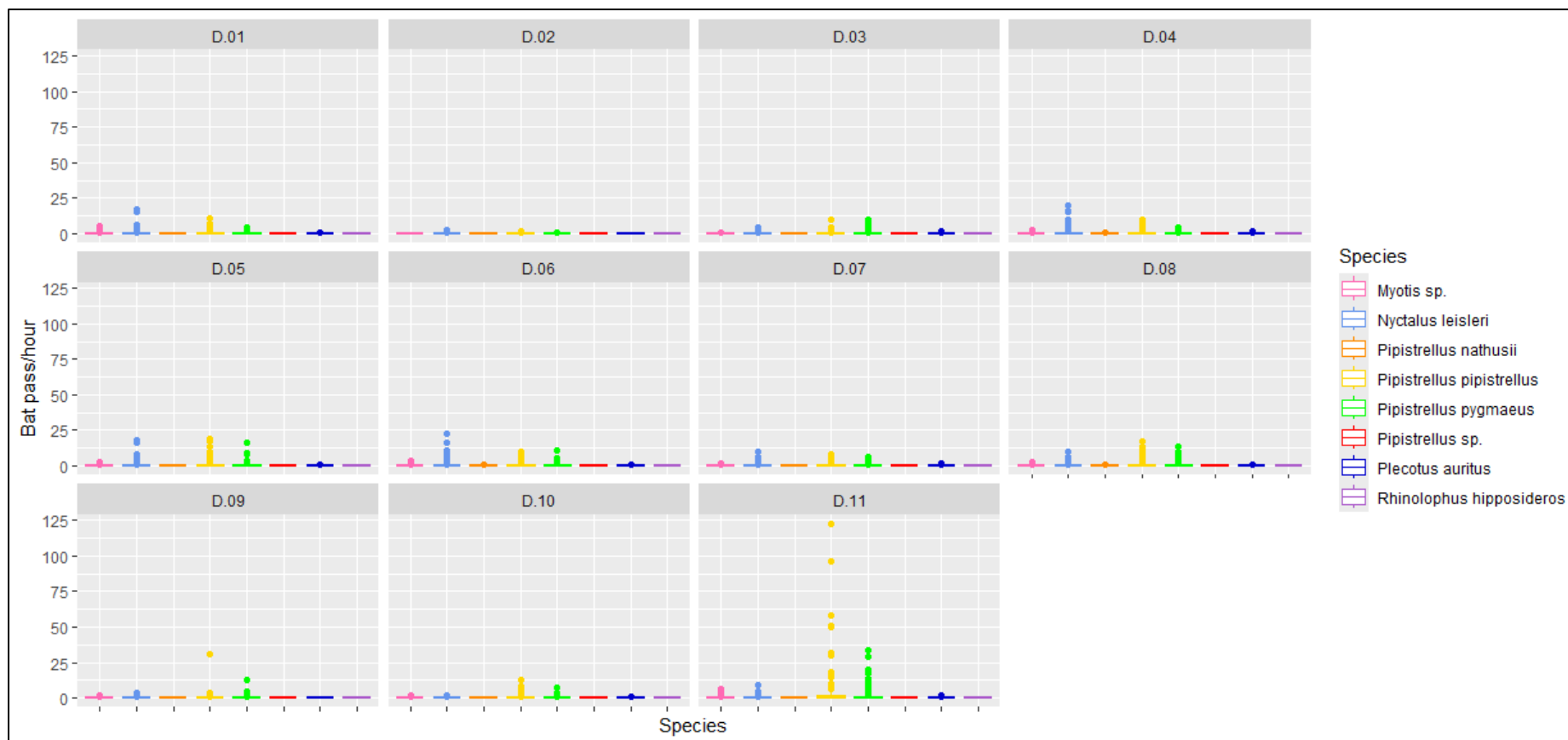


Figure 7: Mean Passes of each Species at Detector Locations – Autumn

1.3.4 BAT ACTIVITY SURVEY SUMMARY

Below is a summary of activity by species on the project site.

1.3.4.1 Common Pipistrelle

The data shows that common pipistrelle were the most commonly recorded species within the project site with 5,187 passes detected throughout the three deployments for this species, which accounts for 58.6% of bat passes recorded. Data analysis shows that common pipistrelle mean activity levels ranged from Low to High across all deployments relative to this species (

). Error! Reference source not found. shows the results from the closest detectors.

Data analysis shows that common pipistrelle was recorded to have mostly low median activity levels across all deployments. They had medium median activity recorded at the following locations and seasons:-

- Spring: D.10;
- Summer: D.03; and,
- Autumn: D.11.

1.3.4.2 Soprano Pipistrelle

The data shows that soprano pipistrelle was the second most active species at the project site with a total of 1,459 calls recorded throughout the three deployments, which accounts for 16.5% of passes recorded. Data analysis shows that common pipistrelle mean activity levels ranged from Low to High across all deployments relative to this species (

). Error! Reference source not found. shows the results from the closest detectors.

Data analysis shows that soprano pipistrelle was recorded to have mostly low median activity levels across all deployments. They had medium median activity recorded at the following locations and seasons:-

- Spring: D.10;
- Summer: D.03; and,
- Autumn: D.11.

1.3.4.3 Leisler's bat

Leisler's bat was classed as having low median activity during all deployments with the exception of spring at D.02 and D.03, which locations recorded medium activity.

Leisler's bat will frequently fly at heights greater than other species and are also less reliant on the use of linear features, generally increasing their risk of turbine collision. D.03 recorded the greatest Leisler's bat activity throughout the deployments with a total of 936 passes detected. There was a total of 3,306 calls recorded throughout all of the deployments. Leisler's bat had medium median activity recorded at the following detector locations:-

- Summer: D.02, D.03.

1.3.4.4 Other

During the survey period, a total of 481 calls were recorded for *Myotis* sp. across the total three deployment periods. These species exhibited nil to low activity levels across the site. The highest recorded mean activity for this group of species was recorded at D.03. These species have a weak association with the areas of the site where there is forestry or scrub vegetation.

It is acknowledged that accurately monitoring brown long-eared bat activity can prove quite difficult as this species is known to make low amplitude calls and frequently forage using their eyes or ears rather than echolocation (Collins, 2016 and Russ, 2012). As a result, brown long-eared bats are frequently underrepresented in surveys which rely solely on the use of bat detectors.

A total of 83 passes were recorded for brown long-eared bat across all seasons. Activity for this species was nil to low across all seasons in each static detector location.

1.4 DISCUSSION

The bat surveys conducted in 2023 adhered to the best practice guidelines as set out in NatureScot et al. (2021). These guidelines ensure a comprehensive and standardised assessment of baseline bat activity to inform the assessment of the potential impacts of the proposed wind farm. They provide a robust framework for data collection and analysis, enabling a thorough evaluation of bat activity, habitat suitability, roosting bats, and roost potential within the site.

Common pipistrelle and soprano pipistrelle were identified as the most active species, accounting for a significant majority of recorded passes.

A confirmed bat roost was identified within the derelict house, used by one soprano pipistrelle and one additional common pipistrelle. This roost feature (**Figure 4**) is

located approximately 400m south of turbine T6. No further conclusions regarding habitat use or significance are made within this technical appendix.

Although activity across the site was generally nil or low, the moderate levels of bat activity were recorded near bat habitat features such as watercourses and forestry. The forestry located on the site is coniferous commercial forestry, however, it provides a foraging resource for certain species of bat such as Leisler's bat and common pipistrelle, particularly in the spring and summer. This is likely due to the absence of other bat habitat features in the rest of the site. This activity may also correspond with inclement weather conditions which shows that bat species use the forestry edge as shelter to forage during inclement weather. Detectors placed in more open areas of the project site recorded considerably less activity which reflects the expected activity levels if bat vegetation buffers are implemented at D.02 and D.03.

1.5 CONCLUSION

A confirmed bat roost was recorded at the derelict house (F.1), which is to be excluded from any development activities to prevent disturbance. Although overall bat activity across the site was low or nil, elevated activity levels were recorded at key habitat features, including forestry edges and watercourses. Detectors D.02 and D.03 recorded high levels of Leisler's bat activity during the summer period, while D.10 and D.11 recorded moderate activity levels for common and soprano pipistrelles.

Key foraging features will be retained, and a 86m bat buffer will be maintained around all turbines. Retaining these foraging habitats will prevent habitat degradation, while the turbine buffer will minimise disturbance to bats. Turbine placement and access routes will avoid areas of high bat activity to reduce collision risk and habitat fragmentation. Pre-construction surveys and post-construction monitoring are required to validate baseline assumptions, inform any turbine micro-siting decisions, and assess the effectiveness of mitigation measures.

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APPENDIX 1: STATIC DETECTOR SURVEY EFFORT AND LOCATION

Map ID	Associated feature	Spring Deployment		Summer Deployment		Autumn Deployment	
		Unit	Run time	Unit	Run time	Unit	Run time
D.01	In open field	WSS037	16 nights 9,436min	WSS030	18 nights 8,966min	WSS075	15 nights 10,531min
D.02	In open field	WSS075	16 nights 9,436min	WSS083	18 nights 8,966min	WSS052	2 nights 1,351min
D.03	On a strip of alder divide, with a drainage ditch to the east and spruce forestry to the west	WSS076	16 nights 9,436min	WSS074	18 nights 8,966min	WSS064	11 nights 8,351min
D.04	Within plantation gap with boggy ground	WSS070	16 nights 9,436min	WSS040	18 nights 8,966min	WSS034	15 nights 10,531min
D.05	Placed in bog with scrub	WSS061	16 nights 9,436min	WSS059	18 nights 8,966min	WSS037	15 nights 10,531min
D.06	Mixed woodland edge with improved grassland	WSS079	16 nights 9,436min	WSS078	18 nights 8,966min	WSS024	15 nights 10,531min
D.07	In open field	WSS030	16 nights 9,436min	WSS031	18 nights 8,966min	WSS082	15 nights 10,531min
D.08	On tree beside forestry and drain	WSS033	16 nights 9,436min	WSS077	18 nights 8,966min	WSS072	15 nights 10,531min
D.09	On forestry edge	WSS072	16 nights 9,436min	WSS072	18 nights 8,966min	WSS075	15 nights 10,531min
D.10	On bog with scrub	WSS038	16 nights 9,436min	WSS082	18 nights 8,966min	WSS052	15 nights 10,531min
D.11	On elder tree beside forest and open pasture	WSS059	16 nights 9,436min	WSS080	18 nights 8,966min	WSS029	15 nights 10,531min

APPENDIX 2 - PHOTOGRAPHS OF ROOST SURVEY LOCATIONS



Plate 1: F.1 watched during emergence survey.

APPENDIX 3 - WEATHER DATA FOR EACH STATIC DEPLOYMENT PERIOD



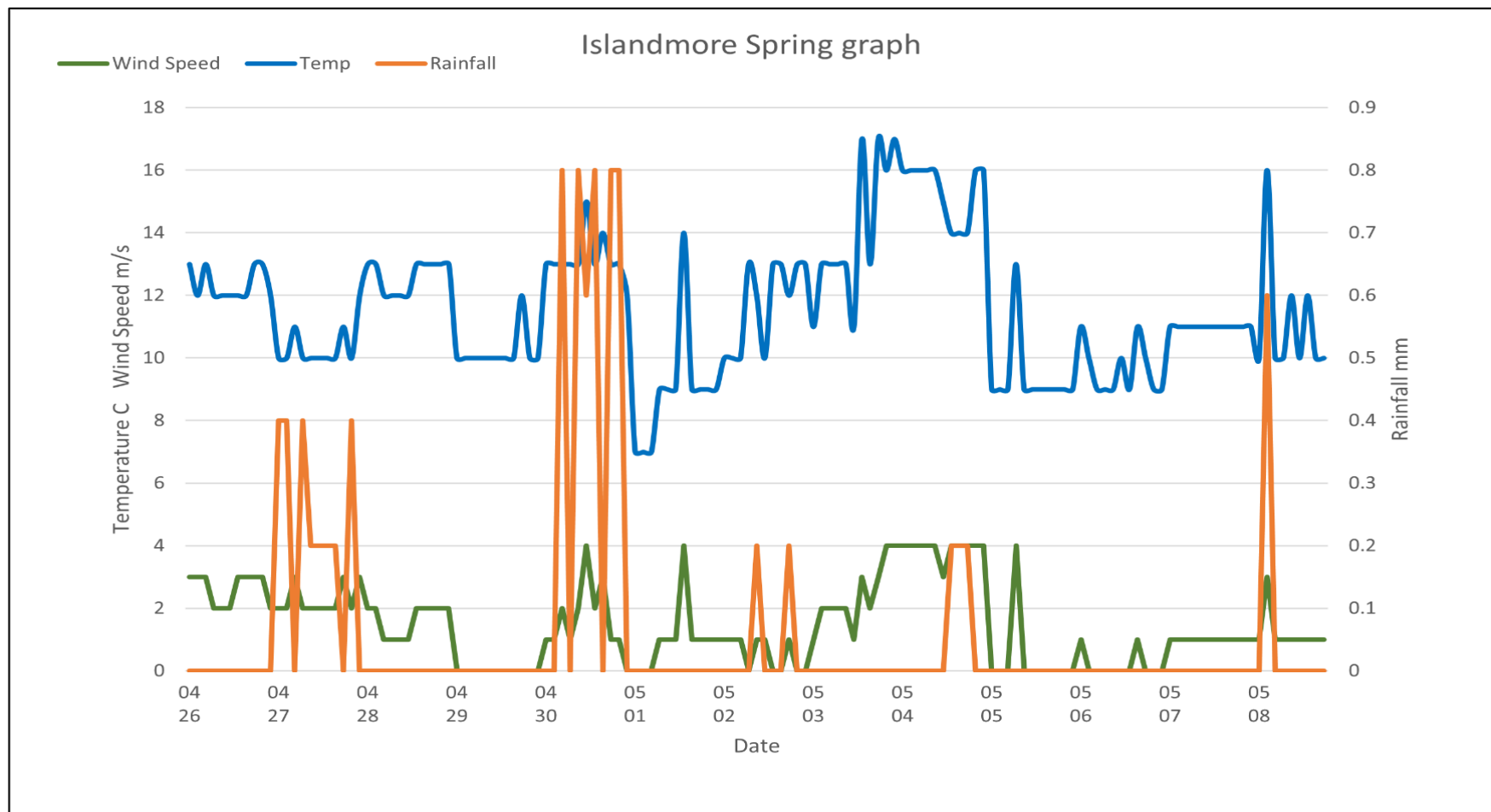


Figure A2.1 - Mean hourly weather conditions for the duration of the 2023 Spring deployment

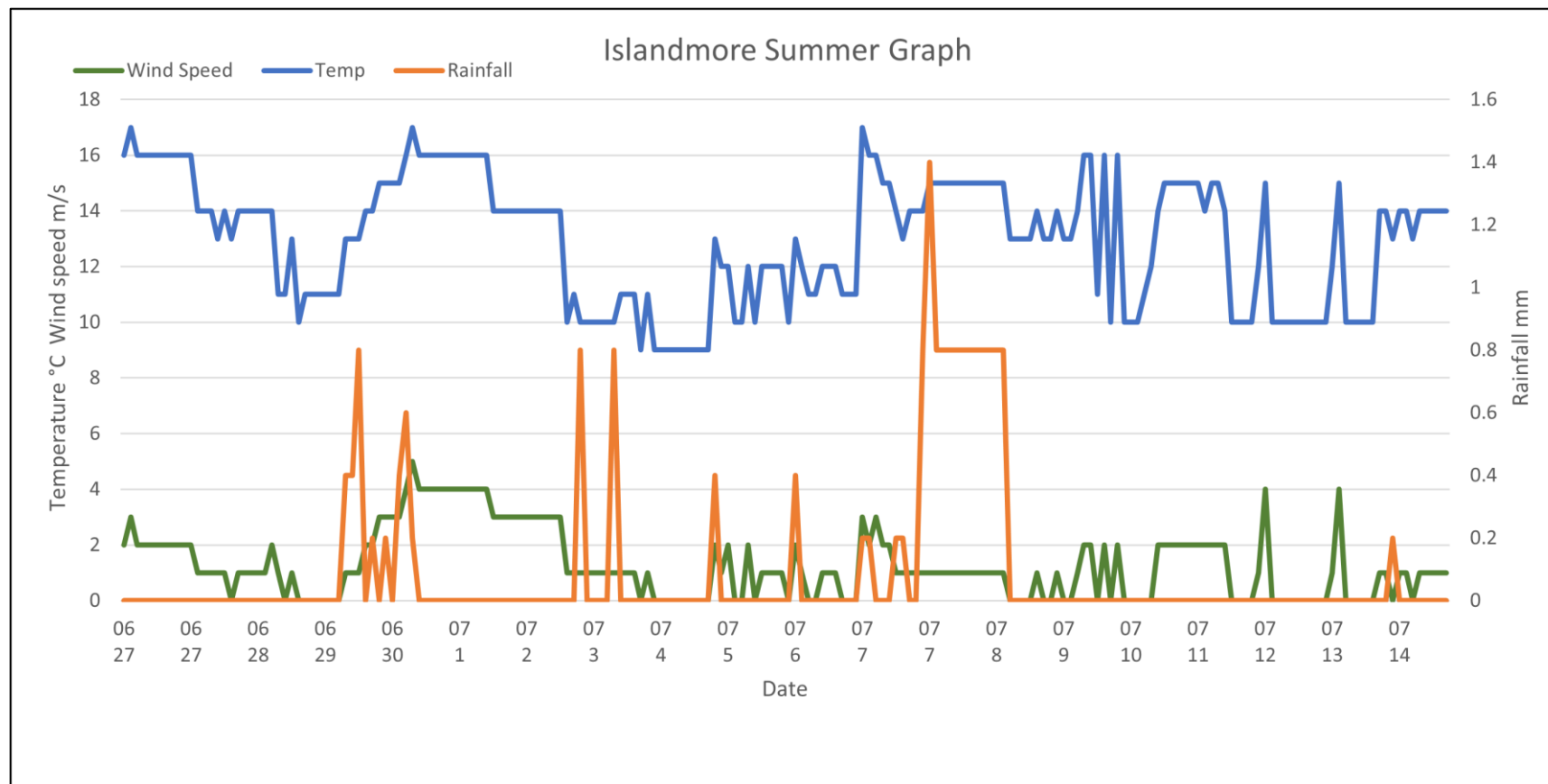


Figure A2.2 – Mean hourly weather conditions for the duration of the 2023 Summer Deployment

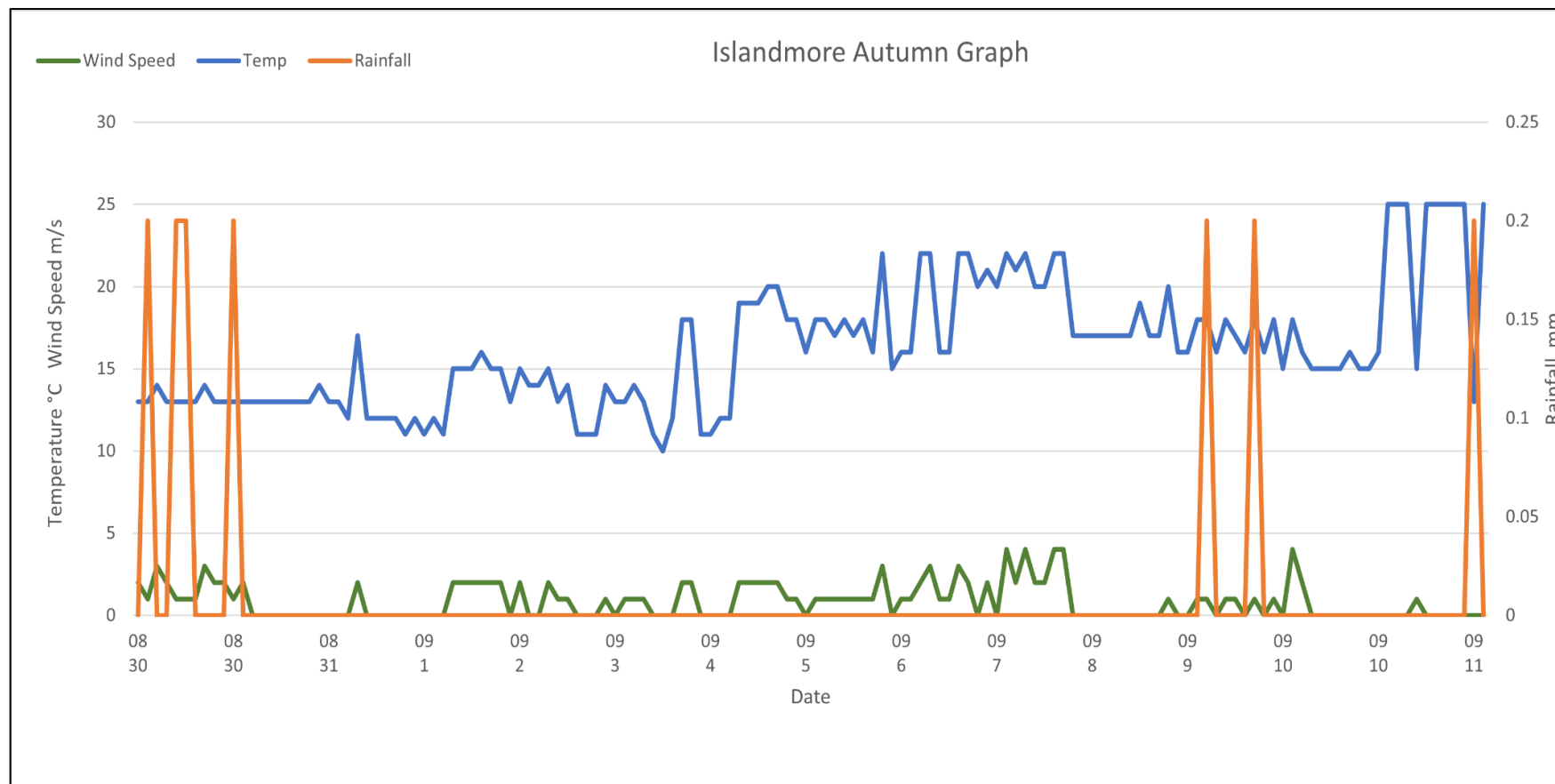


Figure A2.3 – Mean hourly weather conditions for the duration of the 2023 Autumn Deployment

APPENDIX 4 - MEAN BAT PASSES PER HOUR (BP/H) VALUES

Seas on	Locati on	Species	mean	std_d ev	IQ R	Activity level	Seas on	Species	mean	std_dev	IQ R	Activity level	Seas on	Species	mean	std_d ev	IQ R	Activity level
Spring	D.01	Common pipistrelle	0.15	0.54	0	Low	Summer	Common pipistrelle	0.15	0.58	0	Low	Autumn	Common pipistrelle	0.60	1.46	1	Low
		Soprano pipistrelle	0.08	0.36	0	Low		Soprano pipistrelle	0.03	0.17	0	Low		Soprano pipistrelle	0.46	0.74	1	Low
		Nathusius' pipistrelle	0	0	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil
		Pipistrellus sp.	0	0	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil
		Leisler's bat	0.27	0.93	0	Low		Leisler's bat	0.05	0.25	0	Low		Leisler's bat	0.55	1.97	0	Low
		Myotis sp.	0.01	0.08	0	Low		Myotis sp.	0.02	0.15	0	Low		Myotis sp.	0.34	0.73	0	Low
		Brown long eared bat	0	0	0	Nil		Brown long eared bat	0.00	0.00	0	Nil		Brown long eared bat	0.05	0.23	0	Low
		Lesser horseshoe bat	0	0	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil
	D.02	Common pipistrelle	0.11	0.50	0	Low		Common pipistrelle	2.60	9.34	0	Low		Common pipistrelle	0.18	0.50	0	Low
		Soprano pipistrelle	0.02	0.18	0	Low		Soprano pipistrelle	0.06	0.27	0	Low		Soprano pipistrelle	0.05	0.21	0	Low
		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil
		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil
		Leisler's bat	7.75	26.20	2	Medium		Leisler's bat	0.04	0.27	0	Low		Leisler's bat	0.18	0.66	0	Low
		Myotis sp.	0.03	0.24	0	Low		Myotis sp.	0.04	0.44	0	Low		Myotis sp.	0.00	0.00	0	Nil
		Brown long eared bat	0.00	0.00	0	Nil		Brown long eared bat	0.02	0.26	0	Low		Brown long eared bat	0.00	0.00	0	Nil
		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil
	D.03	Common pipistrelle	0.57	1.52	0	Low		Common pipistrelle	14.89	31.59	8.25	Medium		Common pipistrelle	0.22	1.05	0	Low
		Soprano pipistrelle	0.15	0.54	0	Low		Soprano pipistrelle	0.30	0.98	0	Low		Soprano pipistrelle	0.34	1.35	0	Low
		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil
		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil
		Leisler's bat	5.90	22.41	1	Medium		Leisler's bat	0.21	0.82	0	Low		Leisler's bat	0.16	0.70	0	Low
		Myotis sp.	0.02	0.18	0	Low		Myotis sp.	0.72	2.14	0	Low		Myotis sp.	0.06	0.24	0	Low
		Brown long eared bat	0.01	0.08	0	Low		Brown long eared bat	0.01	0.12	0	Low		Brown long eared bat	0.08	0.30	0	Low
		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil
	D.04	Common pipistrelle	0.57	1.19	1	Low		Common pipistrelle	0.31	0.73	0	Low		Common pipistrelle	0.68	1.43	1	Low
		Soprano pipistrelle	0.03	0.18	0	Low		Soprano pipistrelle	0.16	0.44	0	Low		Soprano pipistrelle	0.33	0.72	0	Low
		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.01	0.11	0	Low
		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil
		Leisler's bat	0.22	0.66	0	Low		Leisler's bat	0.06	0.29	0	Low		Leisler's bat	0.95	2.69	1	Low
		Myotis sp.	0.01	0.12	0	Low		Myotis sp.	0.01	0.12	0	Low		Myotis sp.	0.17	0.50	0	Low
		Brown long eared bat	0.00	0.00	0	Nil		Brown long eared bat	0.03	0.21	0	Low		Brown long eared bat	0.09	0.30	0	Low
		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil
	D.05	Common pipistrelle	0.31	0.97	0	Low		Common pipistrelle	0.58	2.02	0	Low		Common pipistrelle	1.10	2.82	1	Low
		Soprano pipistrelle	0.05	0.35	0	Low		Soprano pipistrelle	0.14	0.47	0	Low		Soprano pipistrelle	0.66	1.72	1	Low
		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil
		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil
		Leisler's bat	0.30	0.99	0	Low		Leisler's bat	0.07	0.36	0	Low		Leisler's bat	0.76	2.26	0.25	Low

Seas on	Locati on	Species	mean	std_d ev	IQ R	Activity level	Seas on	Species	mean	std_dev	IQ R	Activity level	Seas on	Species	mean	std_d ev	IQ R	Activity level
Low	D.06	<i>Myotis sp.</i>	0.03	0.16	0	Low	Low	<i>Myotis sp.</i>	0.03	0.17	0	Low	Low	<i>Myotis sp.</i>	0.30	0.66	0	Low
		<i>Brown long eared bat</i>	0.01	0.08	0	Low		<i>Brown long eared bat</i>	0.00	0.00	0	Nil		<i>Brown long eared bat</i>	0.02	0.15	0	Low
		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil
	D.06	<i>Common pipistrelle</i>	0.09	0.31	0	Low		<i>Common pipistrelle</i>	0.10	0.34	0	Low		<i>Common pipistrelle</i>	0.62	1.46	1	Low
		<i>Soprano pipistrelle</i>	0.03	0.16	0	Low		<i>Soprano pipistrelle</i>	0.04	0.21	0	Low		<i>Soprano pipistrelle</i>	0.46	1.16	1	Low
		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil		<i>Nathusius' pipistrelle</i>	0.01	0.08	0	Low
		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil
		<i>Leisler's bat</i>	0.10	0.49	0	Low		<i>Leisler's bat</i>	0.20	0.79	0	Low		<i>Leisler's bat</i>	0.80	2.59	0	Low
		<i>Myotis sp.</i>	0.01	0.08	0	Low		<i>Myotis sp.</i>	0.01	0.12	0	Low		<i>Myotis sp.</i>	0.20	0.52	0	Low
		<i>Brown long eared bat</i>	0.00	0.00	0	Nil		<i>Brown long eared bat</i>	0.00	0.00	0	Nil		<i>Brown long eared bat</i>	0.07	0.25	0	Low
		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil
	D.07	<i>Common pipistrelle</i>	0.13	0.35	0	Low		<i>Common pipistrelle</i>	0.49	1.28	0	Low		<i>Common pipistrelle</i>	0.72	1.55	1	Low
		<i>Soprano pipistrelle</i>	0.03	0.18	0	Low		<i>Soprano pipistrelle</i>	0.07	0.28	0	Low		<i>Soprano pipistrelle</i>	0.41	1.00	0	Low
		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil
		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil
		<i>Leisler's bat</i>	0.13	0.56	0	Low		<i>Leisler's bat</i>	0.14	0.53	0	Low		<i>Leisler's bat</i>	0.39	1.18	0	Low
		<i>Myotis sp.</i>	0.00	0.00	0	Nil		<i>Myotis sp.</i>	0.02	0.15	0	Low		<i>Myotis sp.</i>	0.20	0.47	0	Low
		<i>Brown long eared bat</i>	0.00	0.00	0	Nil		<i>Brown long eared bat</i>	0.01	0.09	0	Low		<i>Brown long eared bat</i>	0.04	0.23	0	Low
		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil
	D.08	<i>Common pipistrelle</i>	0.35	0.77	0	Low		<i>Common pipistrelle</i>	0.50	2.09	0	Low		<i>Common pipistrelle</i>	1.41	2.91	1	Low
		<i>Soprano pipistrelle</i>	0.09	0.37	0	Low		<i>Soprano pipistrelle</i>	0.12	0.37	0	Low		<i>Soprano pipistrelle</i>	0.92	1.79	1	Low
		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil		<i>Nathusius' pipistrelle</i>	0.01	0.08	0	Low
		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil
		<i>Leisler's bat</i>	0.19	0.69	0	Low		<i>Leisler's bat</i>	0.13	0.51	0	Low		<i>Leisler's bat</i>	0.39	1.21	0	Low
		<i>Myotis sp.</i>	0.03	0.16	0	Low		<i>Myotis sp.</i>	0.03	0.17	0	Low		<i>Myotis sp.</i>	0.29	0.61	0	Low
		<i>Brown long eared bat</i>	0.00	0.00	0	Nil		<i>Brown long eared bat</i>	0.01	0.12	0	Low		<i>Brown long eared bat</i>	0.02	0.13	0	Low
		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil		<i>Lesser horseshoe bat</i>	0.00	0.00	0	Nil
	D.09	<i>Common pipistrelle</i>	0.12	0.43	0	Low		<i>Common pipistrelle</i>	0.35	1.53	0	Low		<i>Common pipistrelle</i>	0.30	2.46	0	Low
		<i>Soprano pipistrelle</i>	0.05	0.21	0	Low		<i>Soprano pipistrelle</i>	0.13	0.42	0	Low		<i>Soprano pipistrelle</i>	0.18	1.13	0	Low
		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil		<i>Nathusius' pipistrelle</i>	0.00	0.00	0	Nil
		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil		<i>Pipistrellus sp.</i>	0.00	0.00	0	Nil
		<i>Leisler's bat</i>	0.14	0.46	0	Low		<i>Leisler's bat</i>	0.23	1.07	0	Low		<i>Leisler's bat</i>	0.07	0.39	0	Low
		<i>Myotis sp.</i>	0.00	0.00	0	Nil		<i>Myotis sp.</i>	0.00	0.00	0	Nil		<i>Myotis sp.</i>	0.04	0.22	0	Low

Seas on	Locati on	Species	mean	std_d ev	IQ R	Activity level	Seas on	Species	mean	std_dev	IQ R	Activity level	Seas on	Species	mean	std_d ev	IQ R	Activity level
		Brown long eared bat	0.00	0.00	0	Nil		Brown long eared bat	0.01	0.09	0	Low		Brown long eared bat	0.00	0.00	0	Nil
		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil
	D.10	Common pipistrelle	4.31	10.90	2	Medium		Common pipistrelle	0.85	2.57	1	Low		Common pipistrelle	0.54	1.63	0	Low
		Soprano pipistrelle	1.81	7.93	0	Low		Soprano pipistrelle	0.09	0.33	0	Low		Soprano pipistrelle	0.23	0.85	0	Low
		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil
		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil
		Leisler's bat	0.35	0.94	0	Low		Leisler's bat	0.18	0.69	0	Low		Leisler's bat	0.09	0.32	0	Low
		Myotis sp.	0.01	0.12	0	Low		Myotis sp.	0.04	0.22	0	Low		Myotis sp.	0.08	0.31	0	Low
		Brown long eared bat	0.01	0.08	0	Low		Brown long eared bat	0.01	0.09	0	Low		Brown long eared bat	0.01	0.08	0	Low
		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil
		D.11	Common pipistrelle	0.83	3.14	0		Low	Common pipistrelle	1.84	6.29	0.25		Low	Common pipistrelle	4.15	14.57	2
	Soprano pipistrelle		0.23	0.61	0	Low		Soprano pipistrelle	0.27	1.03	0	Low		Soprano pipistrelle	2.01	5.01	1	Low
	Nathusius' pipistrelle		0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil		Nathusius' pipistrelle	0.00	0.00	0	Nil
	Pipistrellus sp.		0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil		Pipistrellus sp.	0.00	0.00	0	Nil
	Leisler's bat		0.18	0.59	0	Low		Leisler's bat	0.38	1.54	0	Low		Leisler's bat	0.32	1.00	0	Low
	Myotis sp.		0.01	0.16	0	Low		Myotis sp.	0.04	0.21	0	Low		Myotis sp.	0.32	0.82	0	Low
	Brown long eared bat		0.00	0.00	0	Nil		Brown long eared bat	0.01	0.09	0	Low		Brown long eared bat	0.04	0.22	0	Low
	Lesser horseshoe bat		0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil		Lesser horseshoe bat	0.00	0.00	0	Nil

APPENDIX 5 - R GRAPHS OF ACTIVITY TIME IN RELATION TO SUNSET

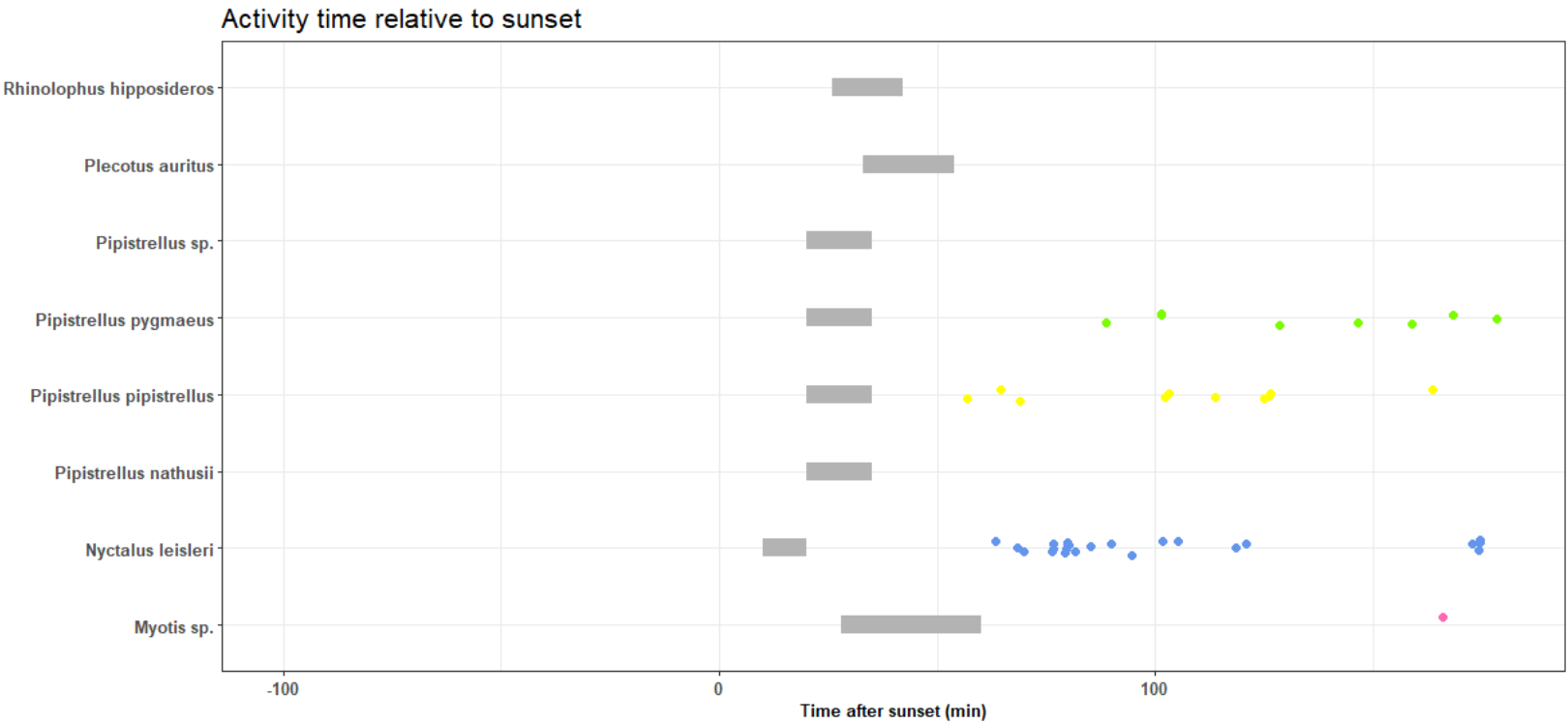


Figure A3.1: D.01 Spring activity time relative to sunset

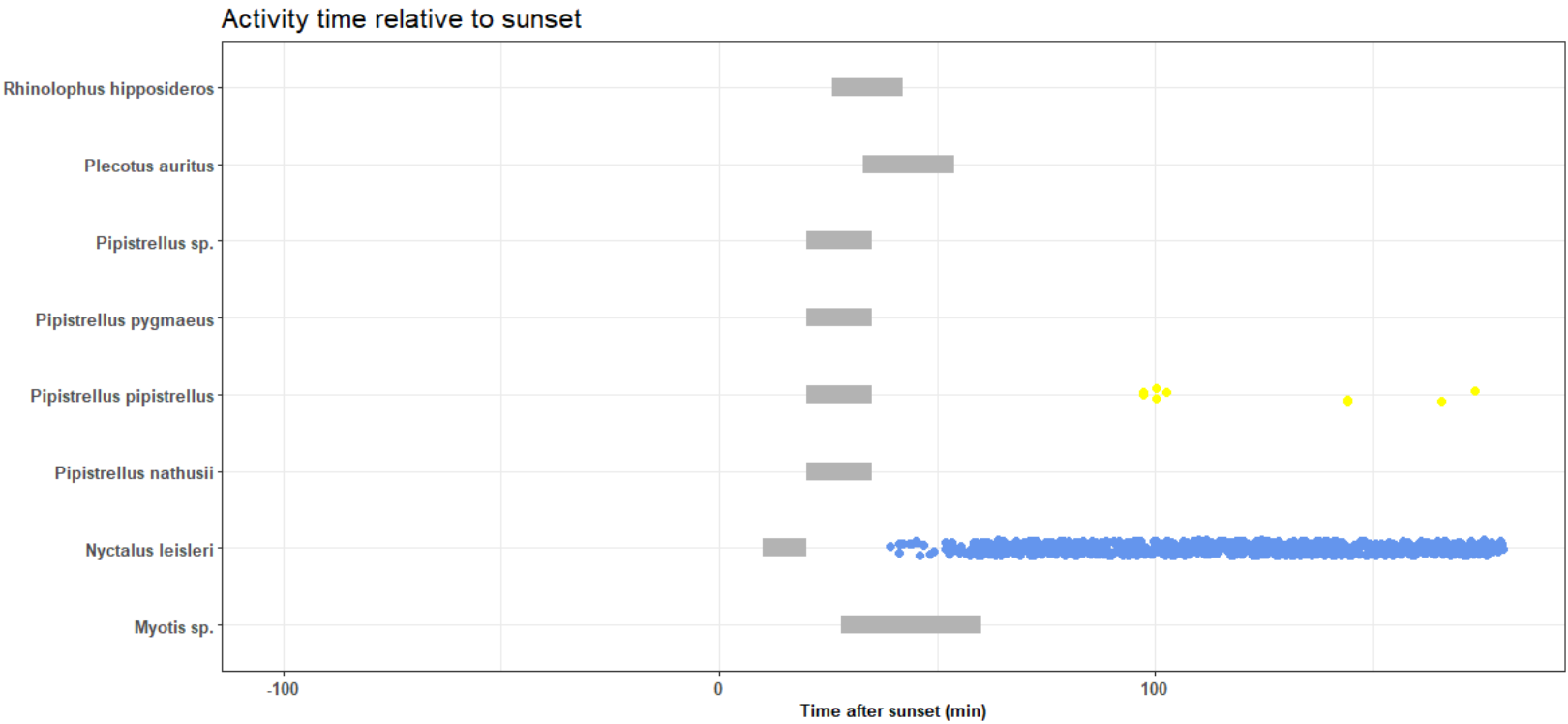


Figure A3.2: D.02 Spring activity time relative to sunset

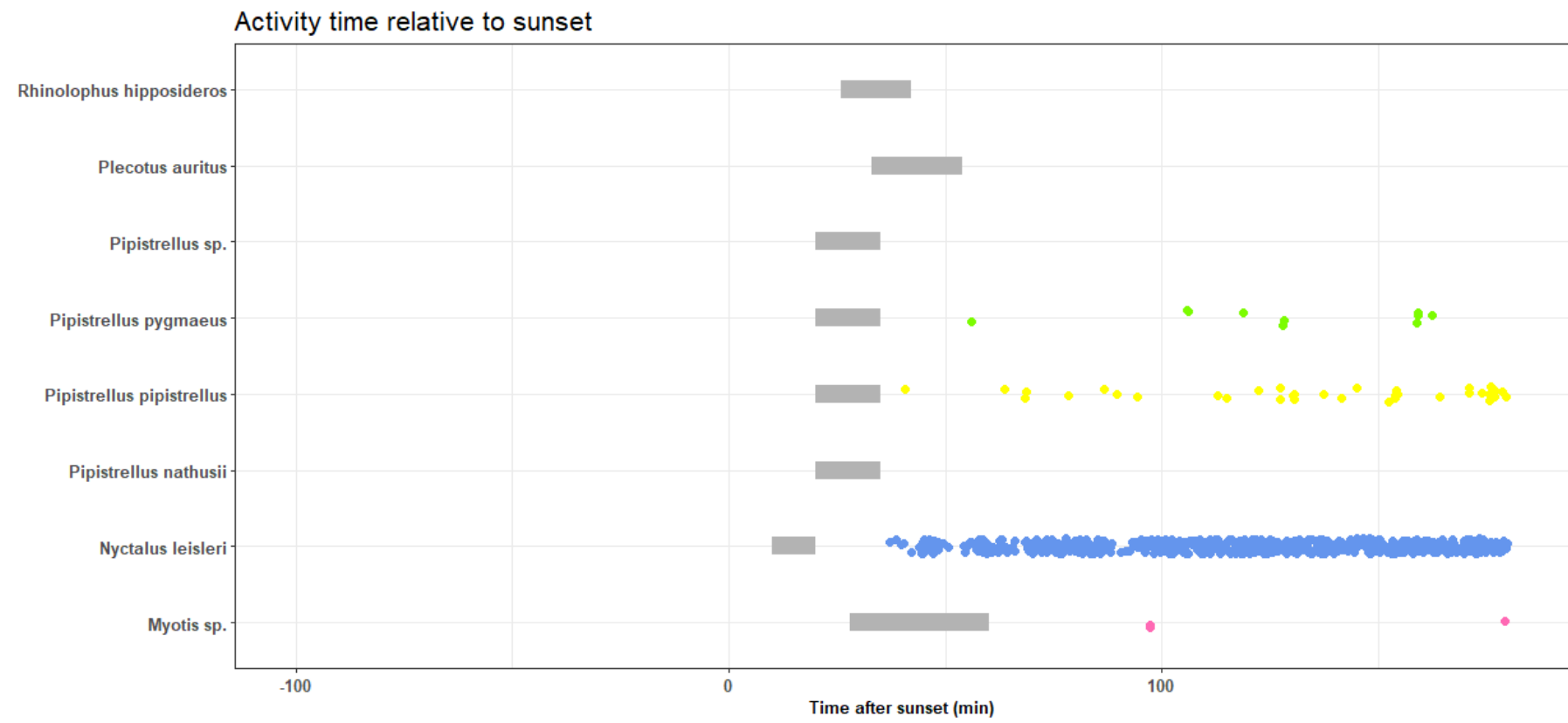


Figure A3.3: D.03 Spring activity time relative to sunset

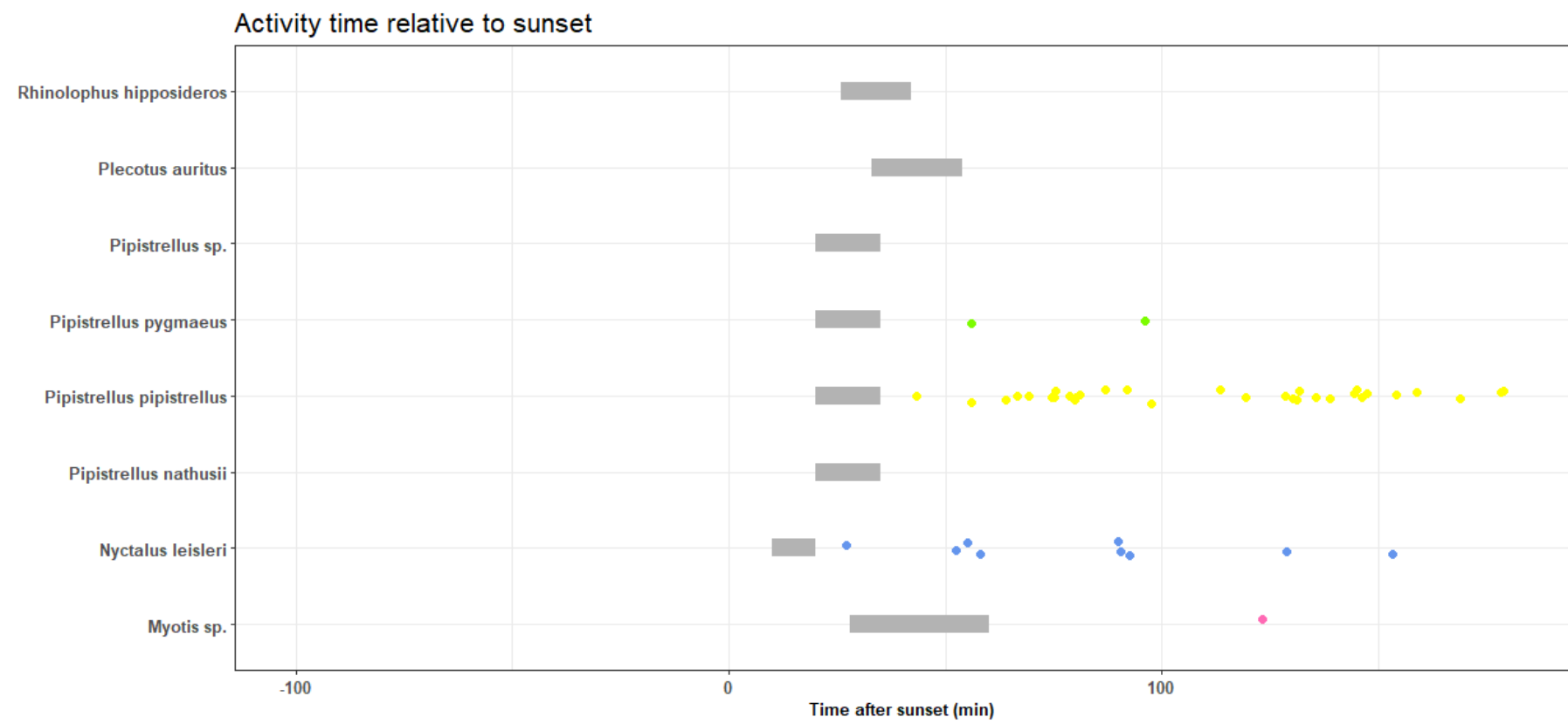


Figure A3.4: D.04 Spring activity time relative to sunset

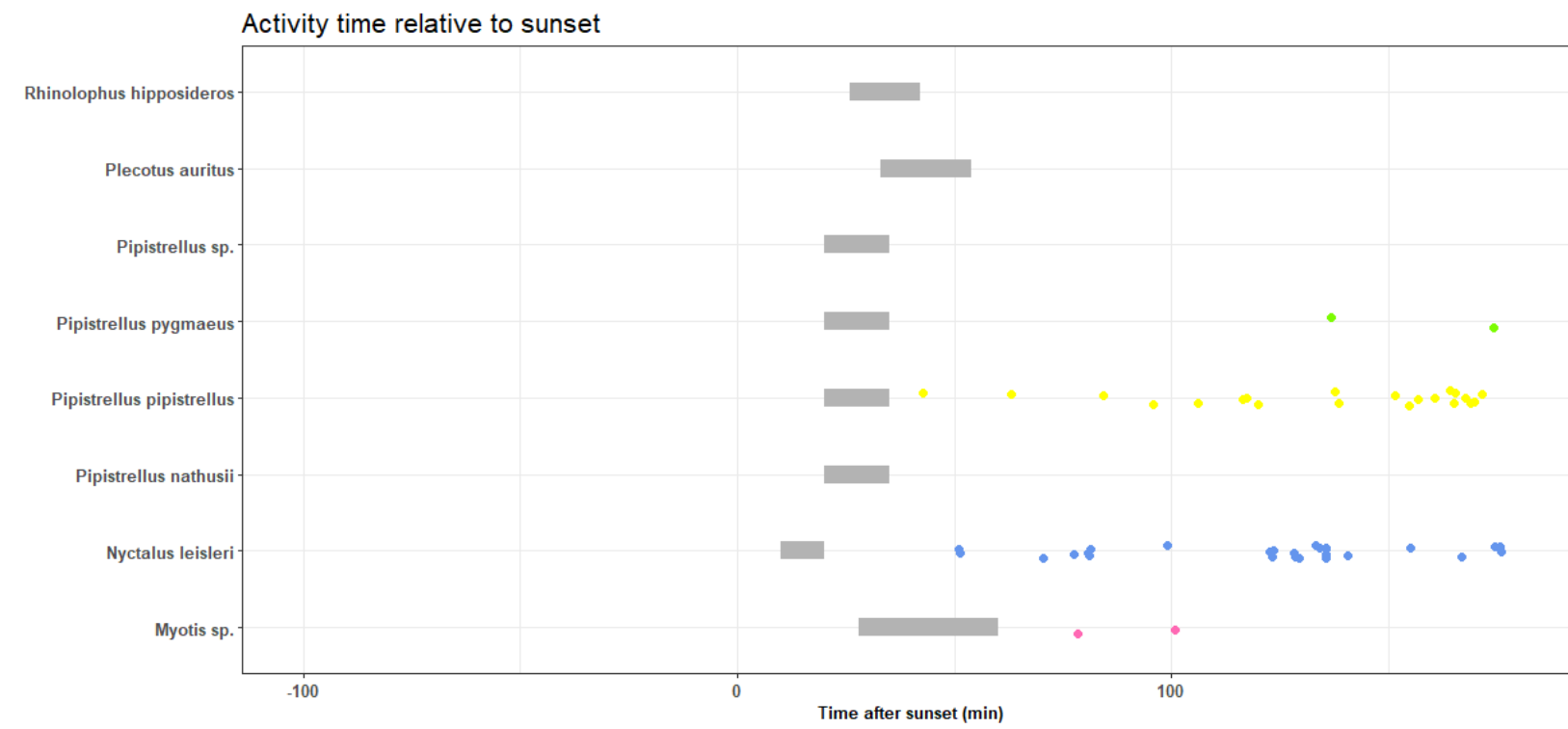


Figure A3.5: D.05 Spring activity time relative to sunset

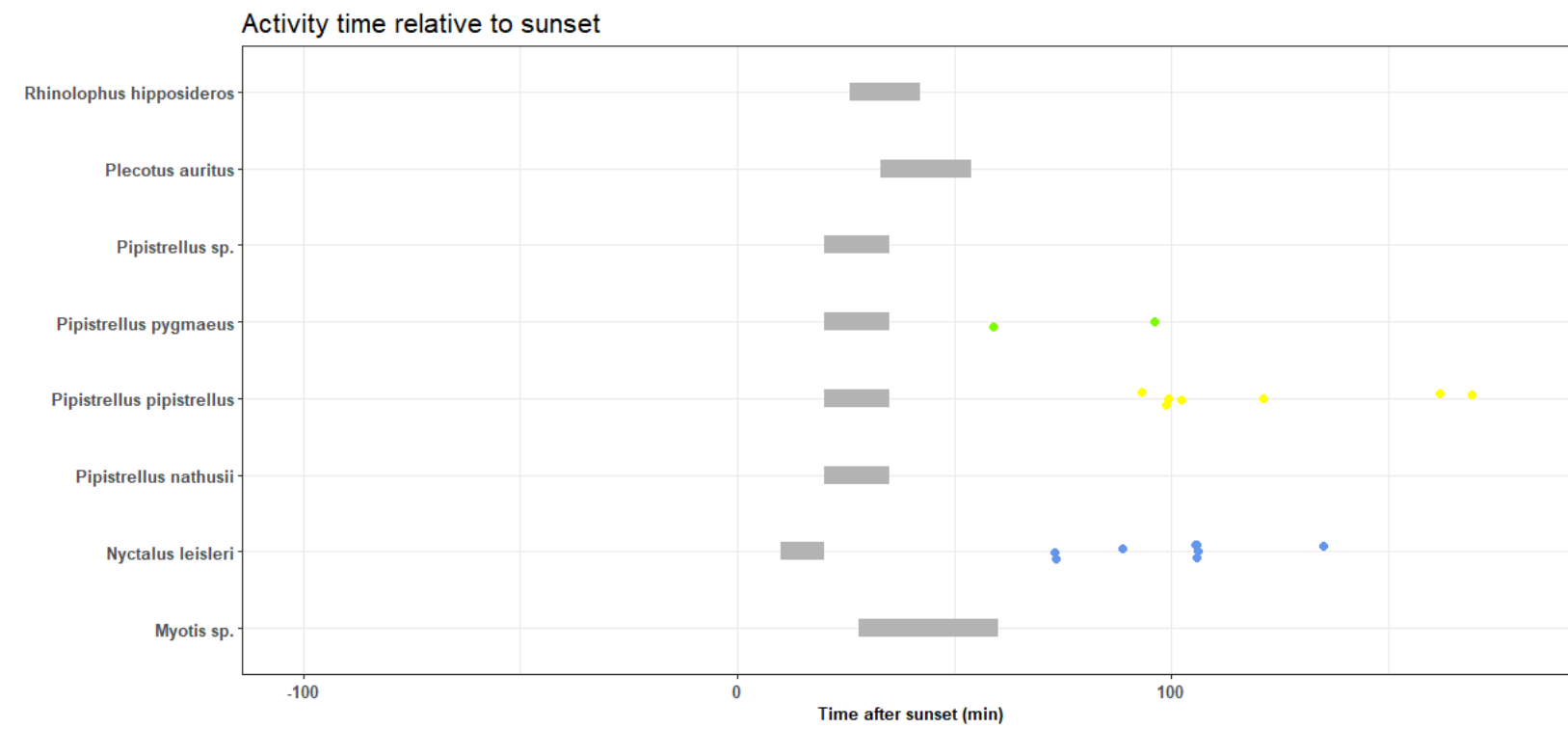


Figure A3.6: D.06 Spring activity time relative to sunset

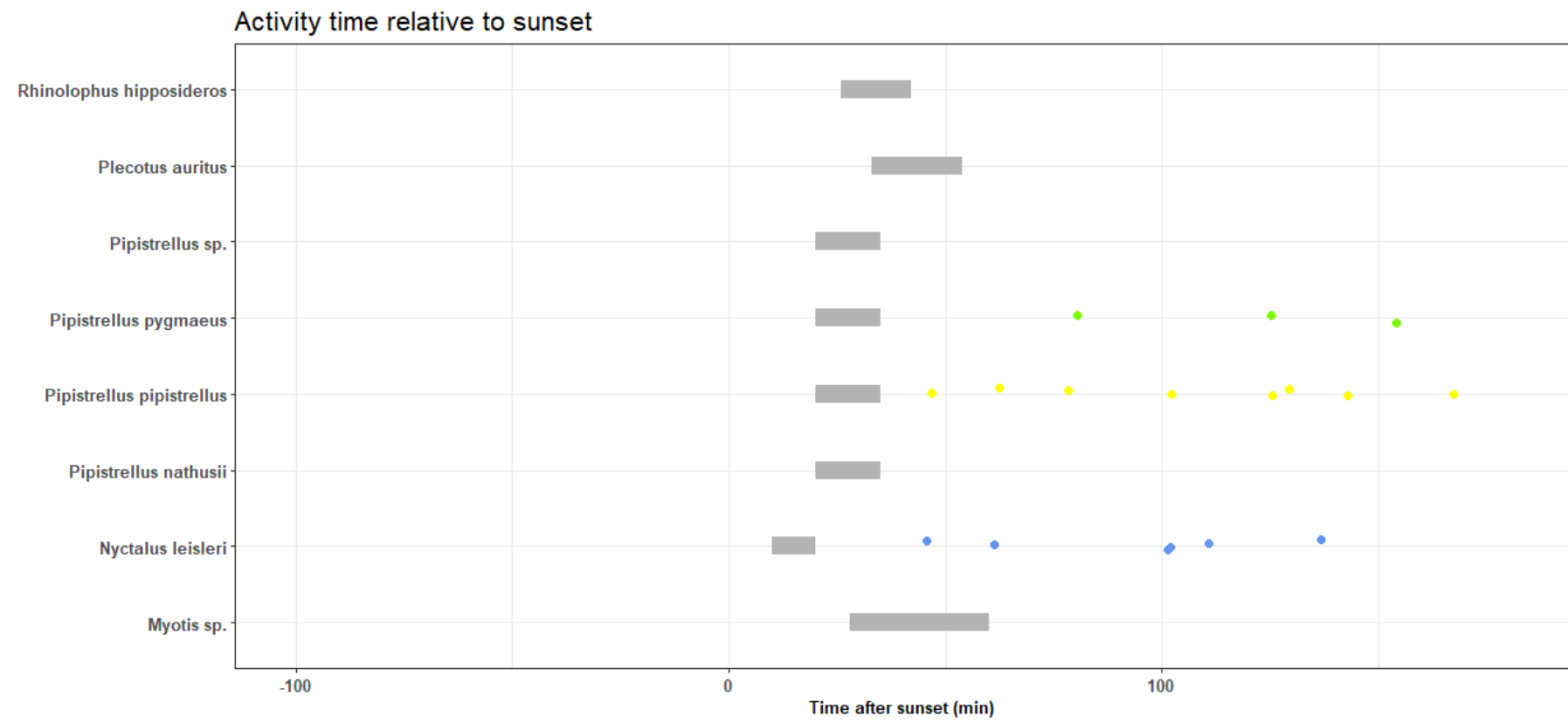


Figure A3.7: D.07 Spring activity time relative to sunset

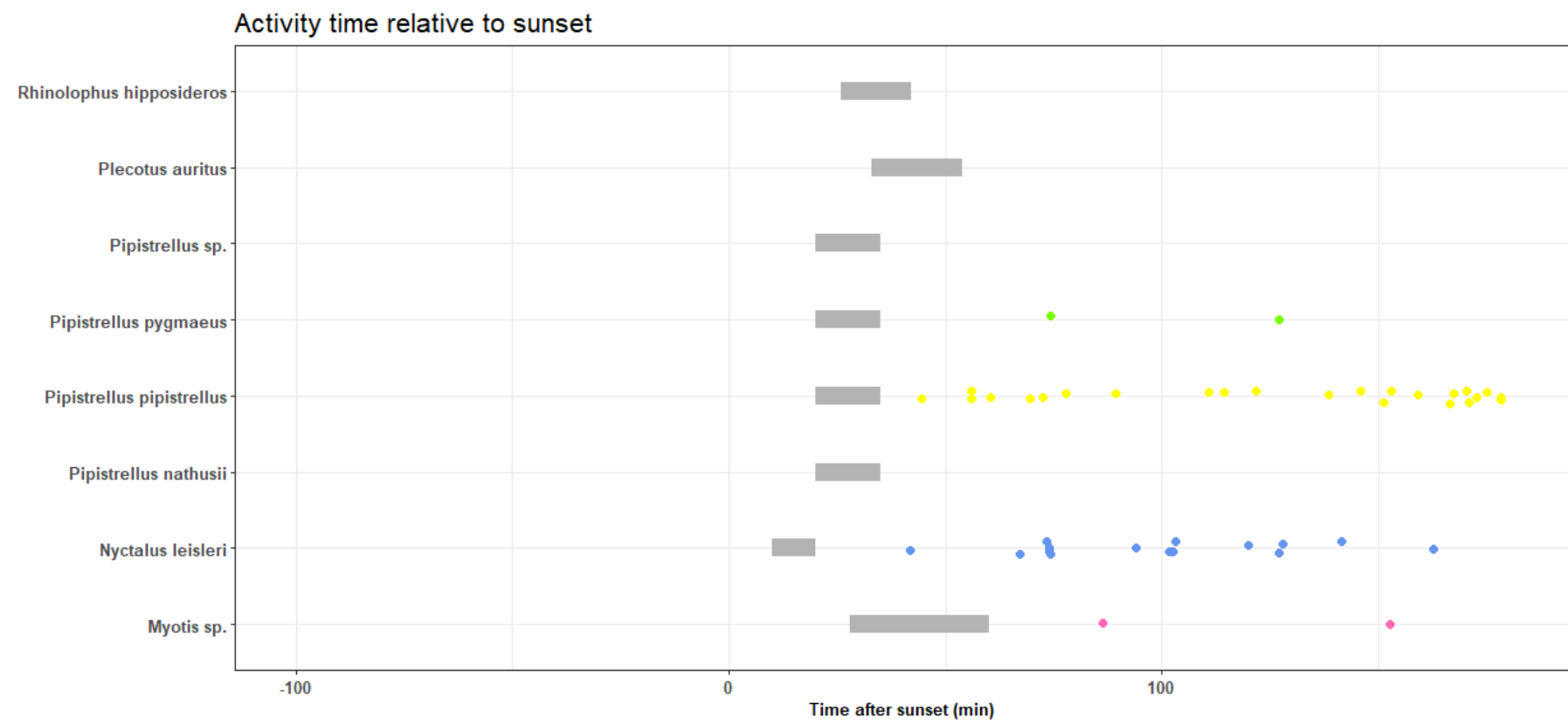


Figure A3.8: D.08 Spring activity time relative to sunset

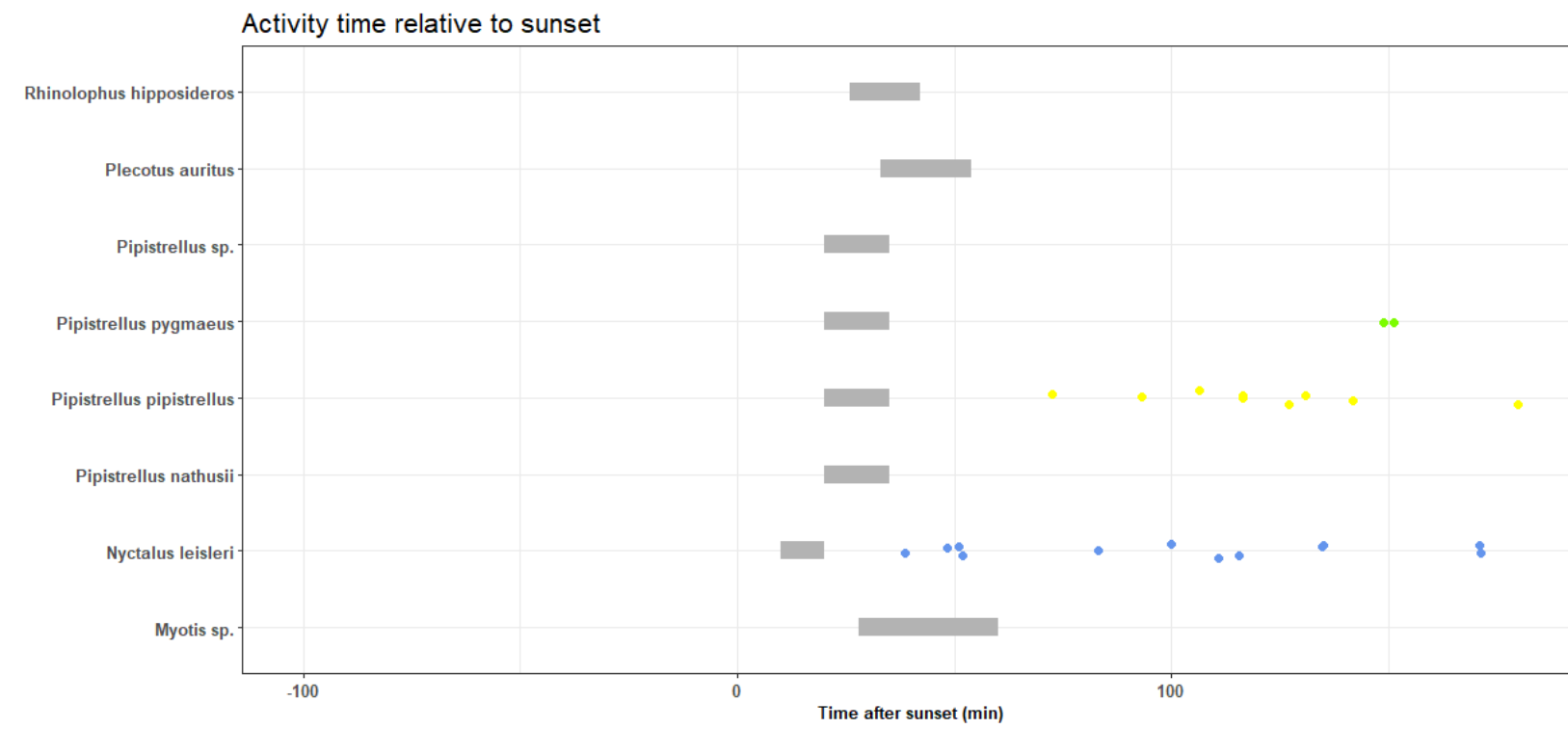


Figure A3.9: D.09 Spring activity time relative to sunset

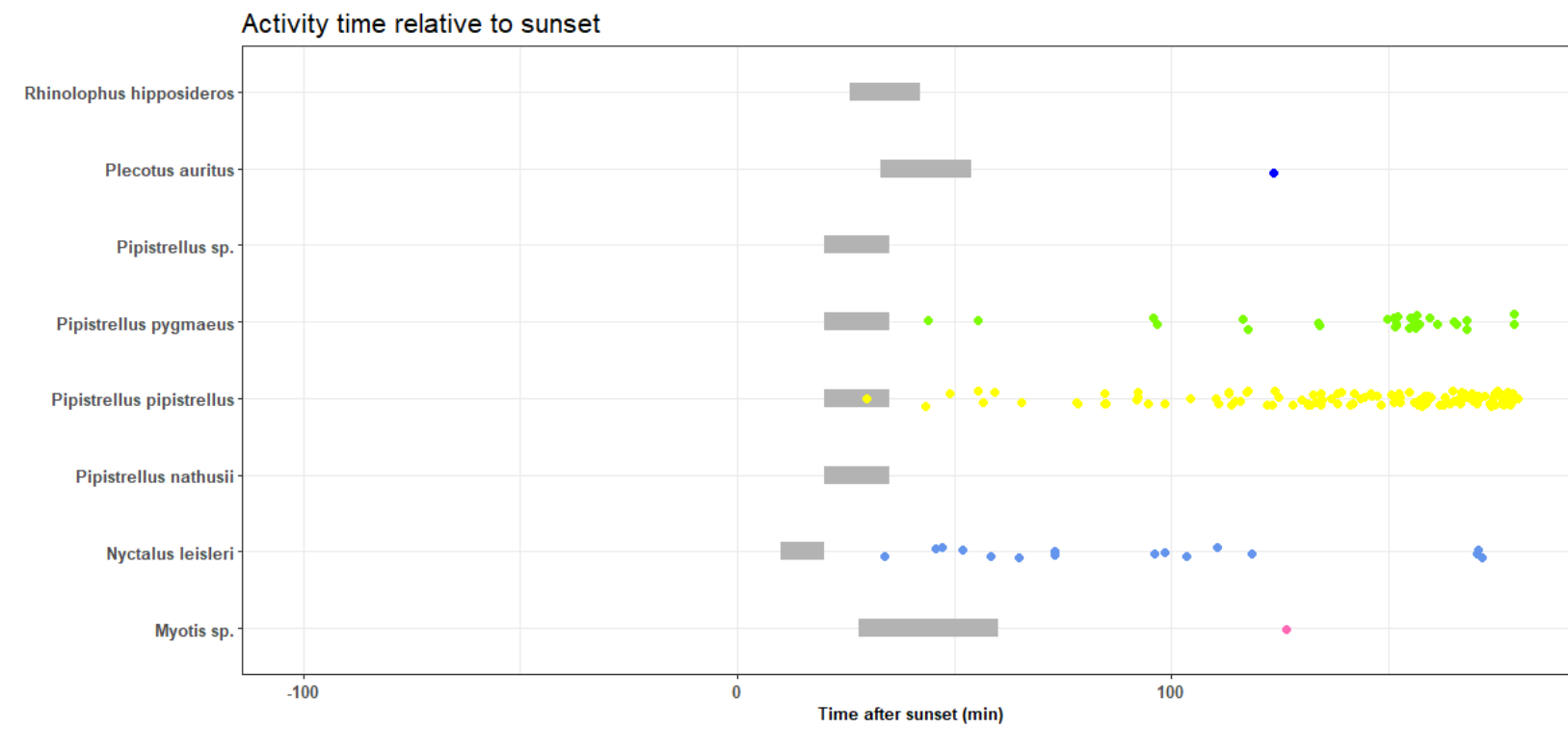


Figure A3.10: D.10 Spring activity time relative to sunset

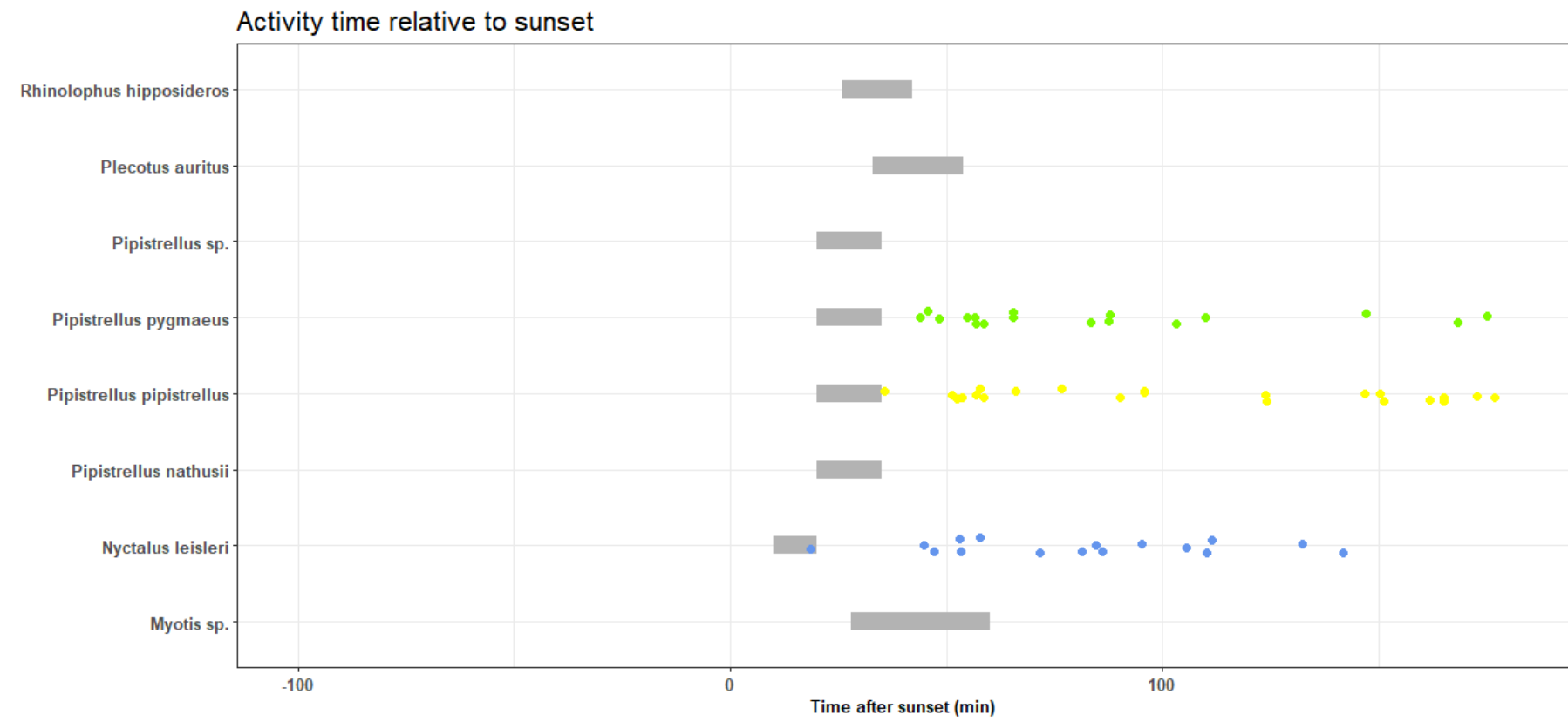


Figure A3.11: D.11 Spring activity time relative to sunset

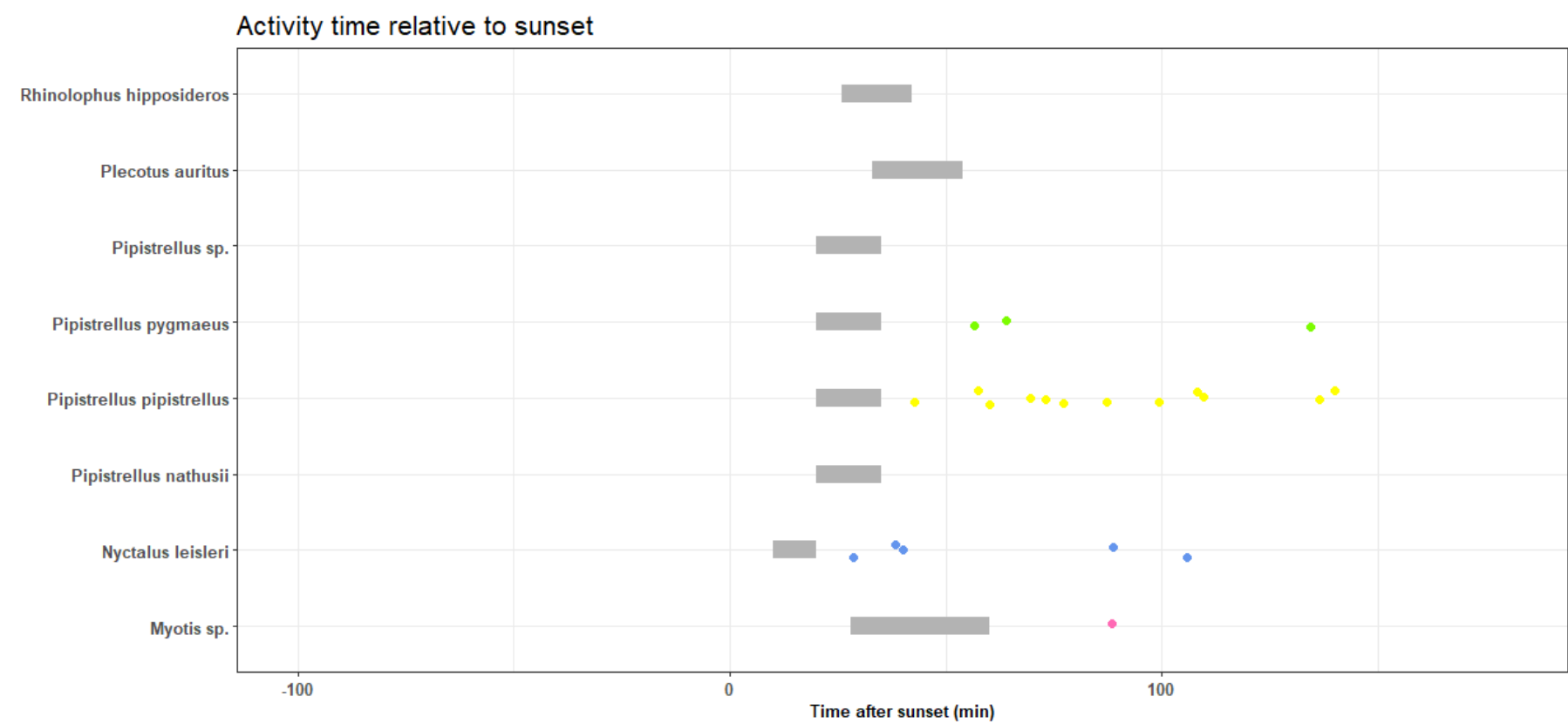


Figure A3.12: D.01 Summer activity time relative to sunset

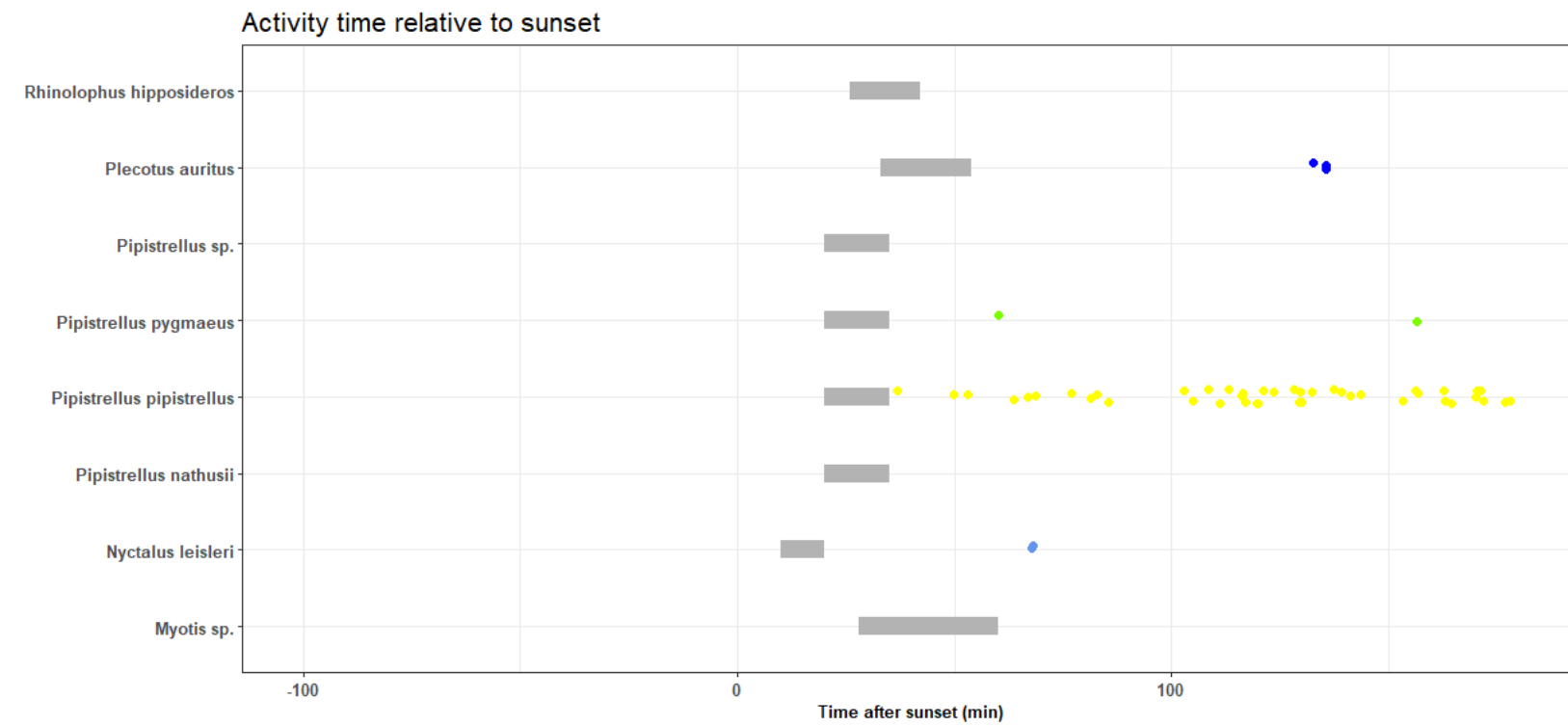


Figure A3.13: D.02 Summer activity time relative to sunset

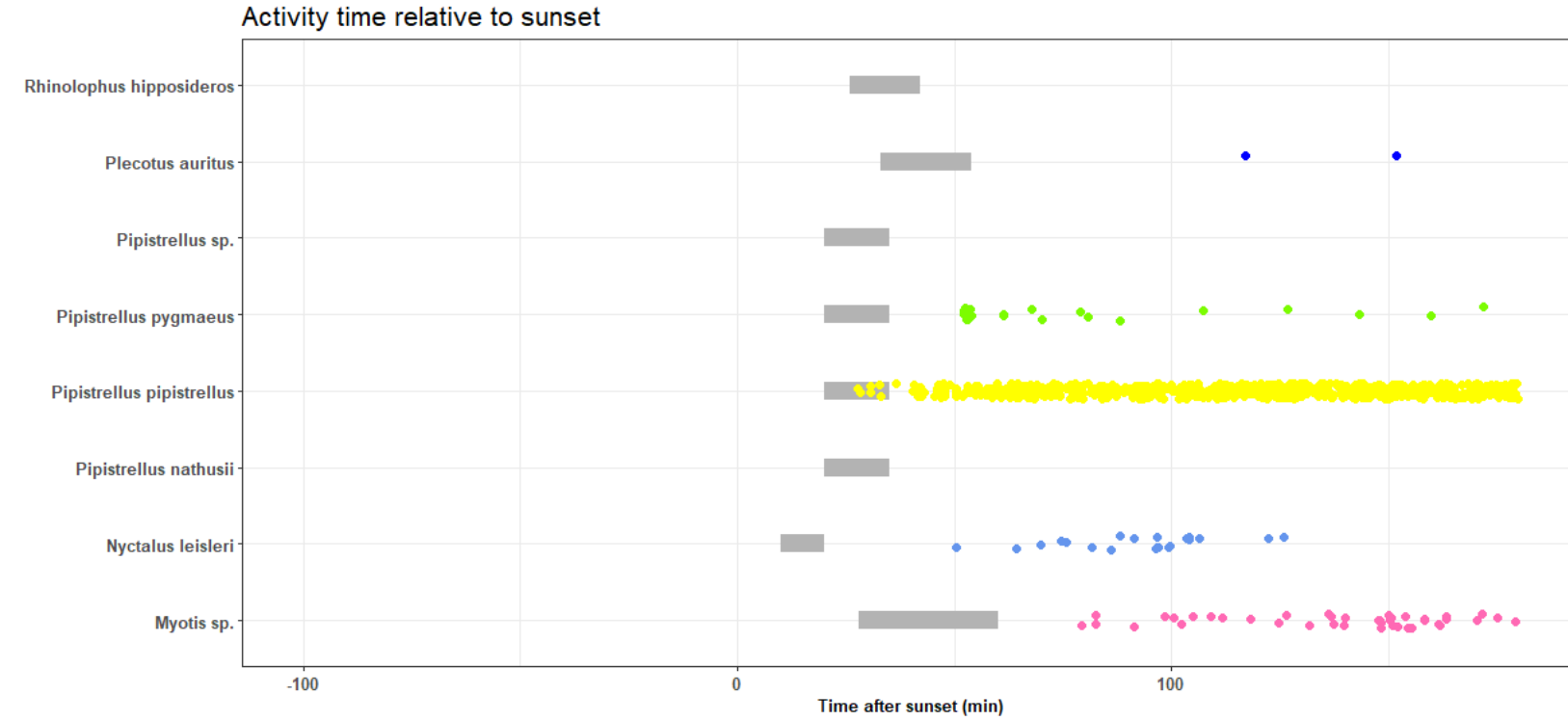


Figure A3.14: D.03 Summer activity time relative to sunset

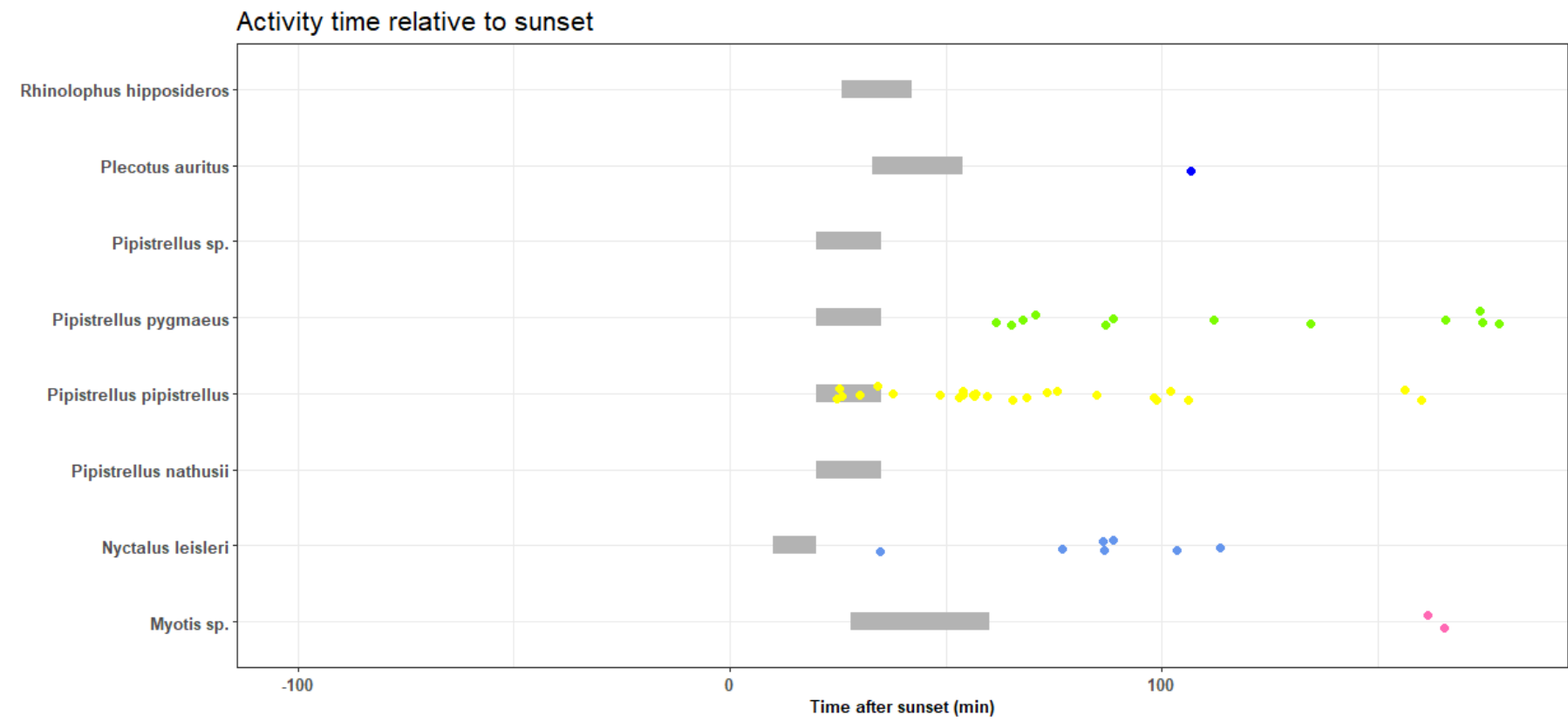


Figure A3.15: D.04 Summer activity time relative to sunset

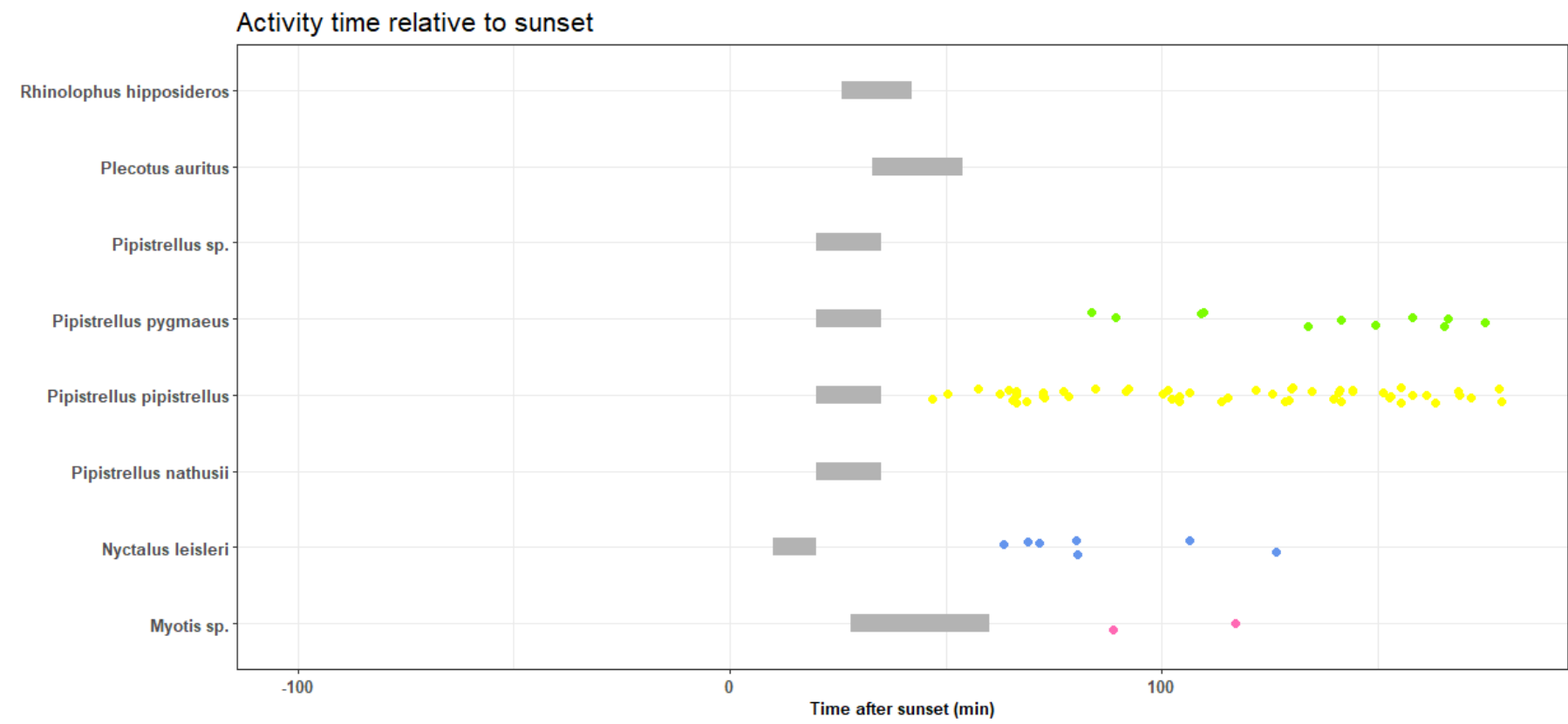


Figure A3.16: D.05 Summer activity time relative to sunset

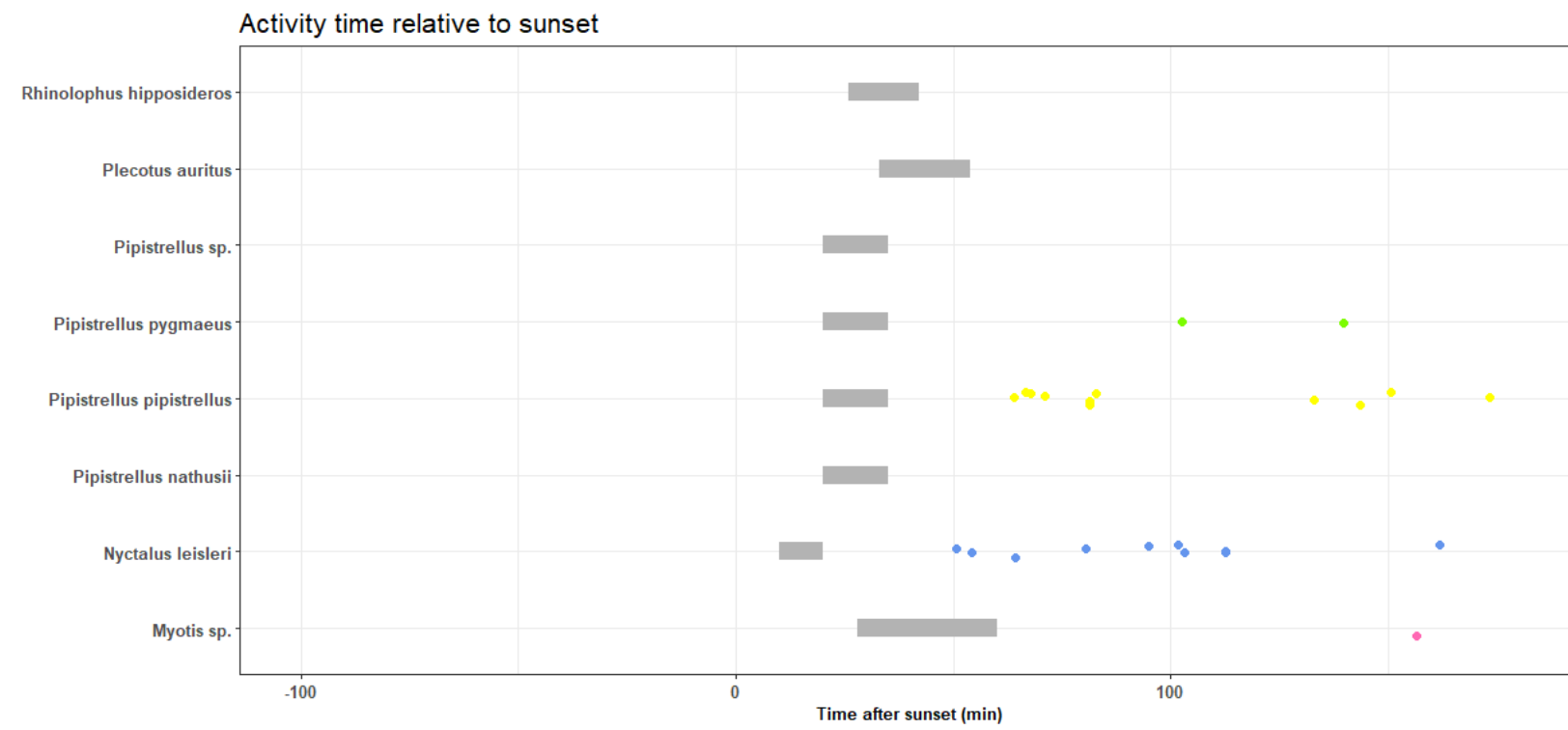


Figure A3.17: D.06 Summer activity time relative to sunset

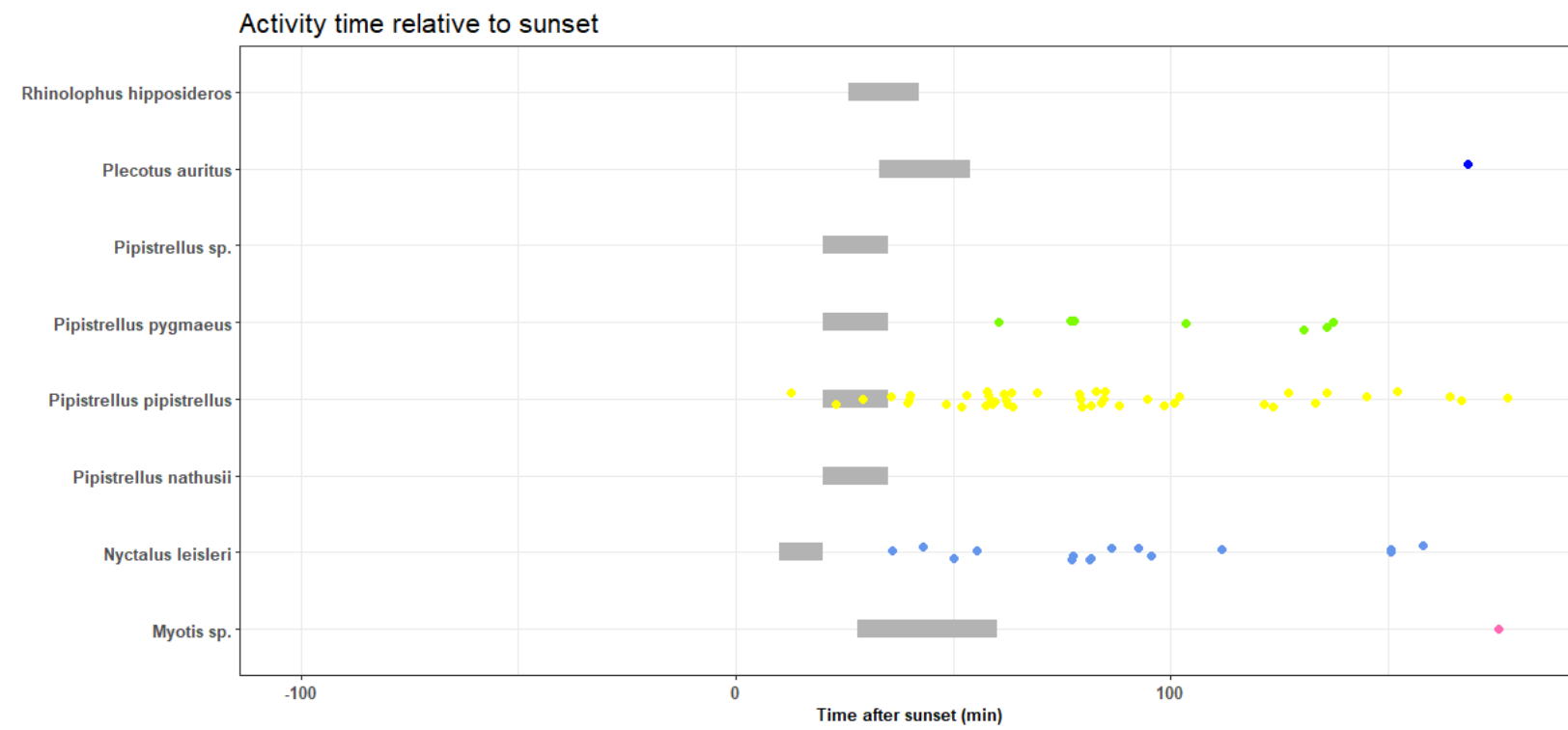


Figure A3.18: D.07 Summer activity time relative to sunset

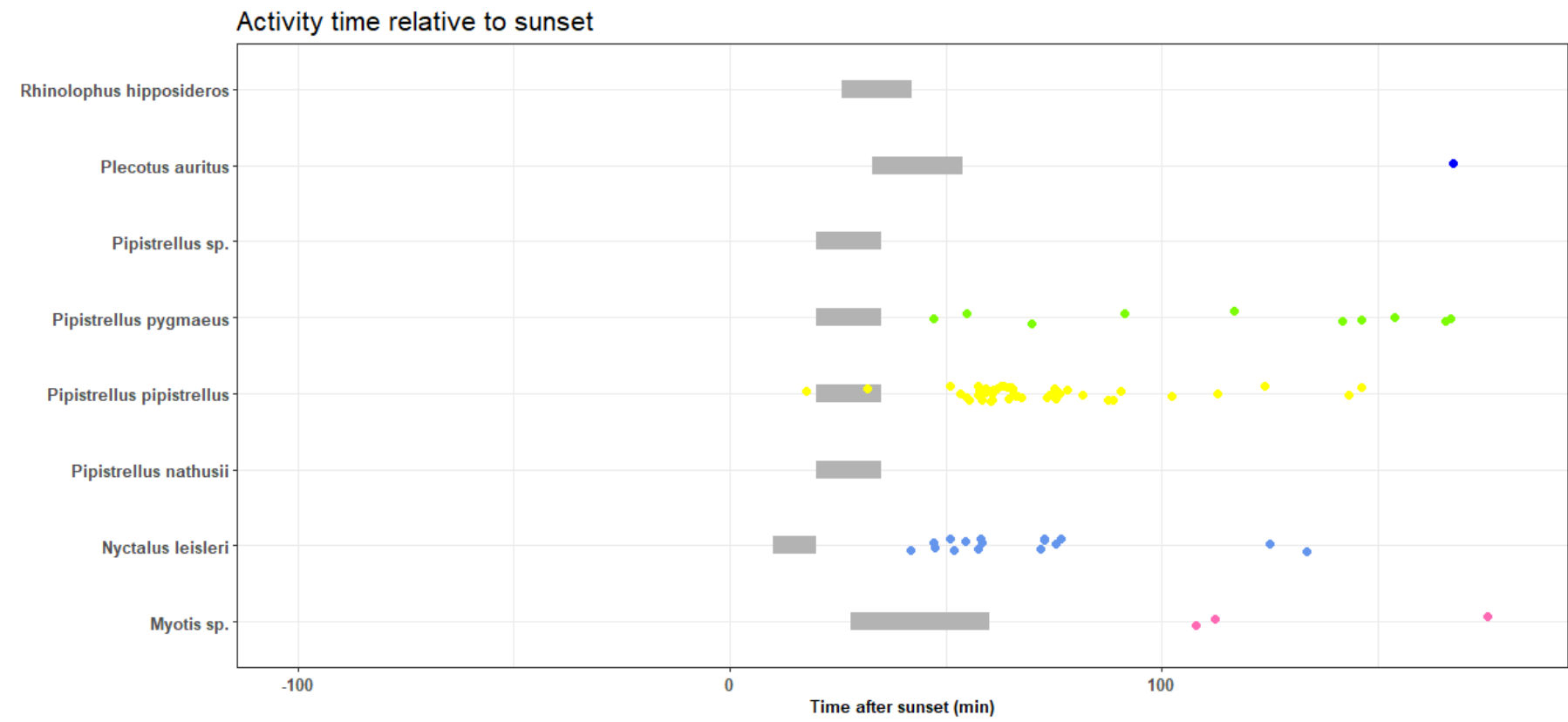


Figure A3.19: D.08 Summer activity time relative to sunset

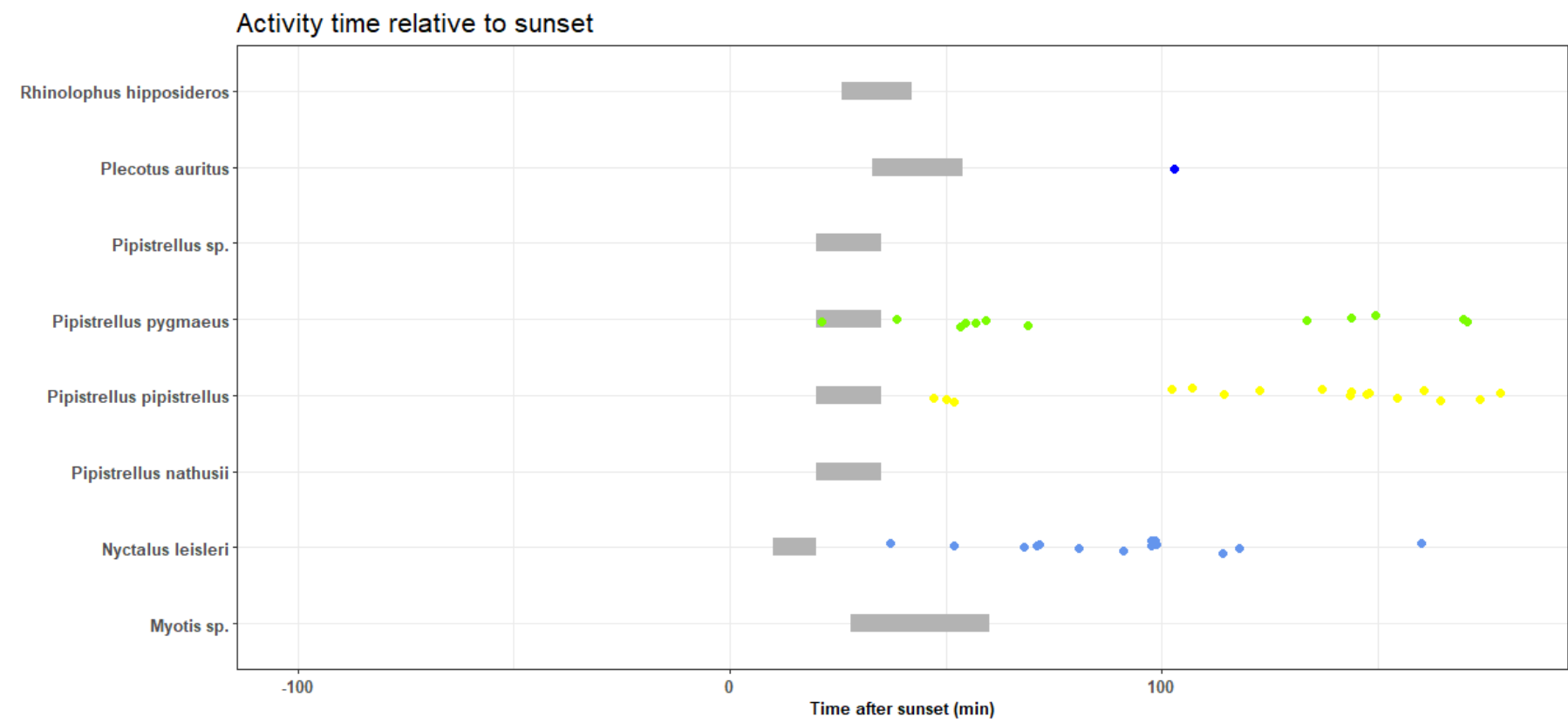


Figure A3.20: D.09 Summer activity time relative to sunset

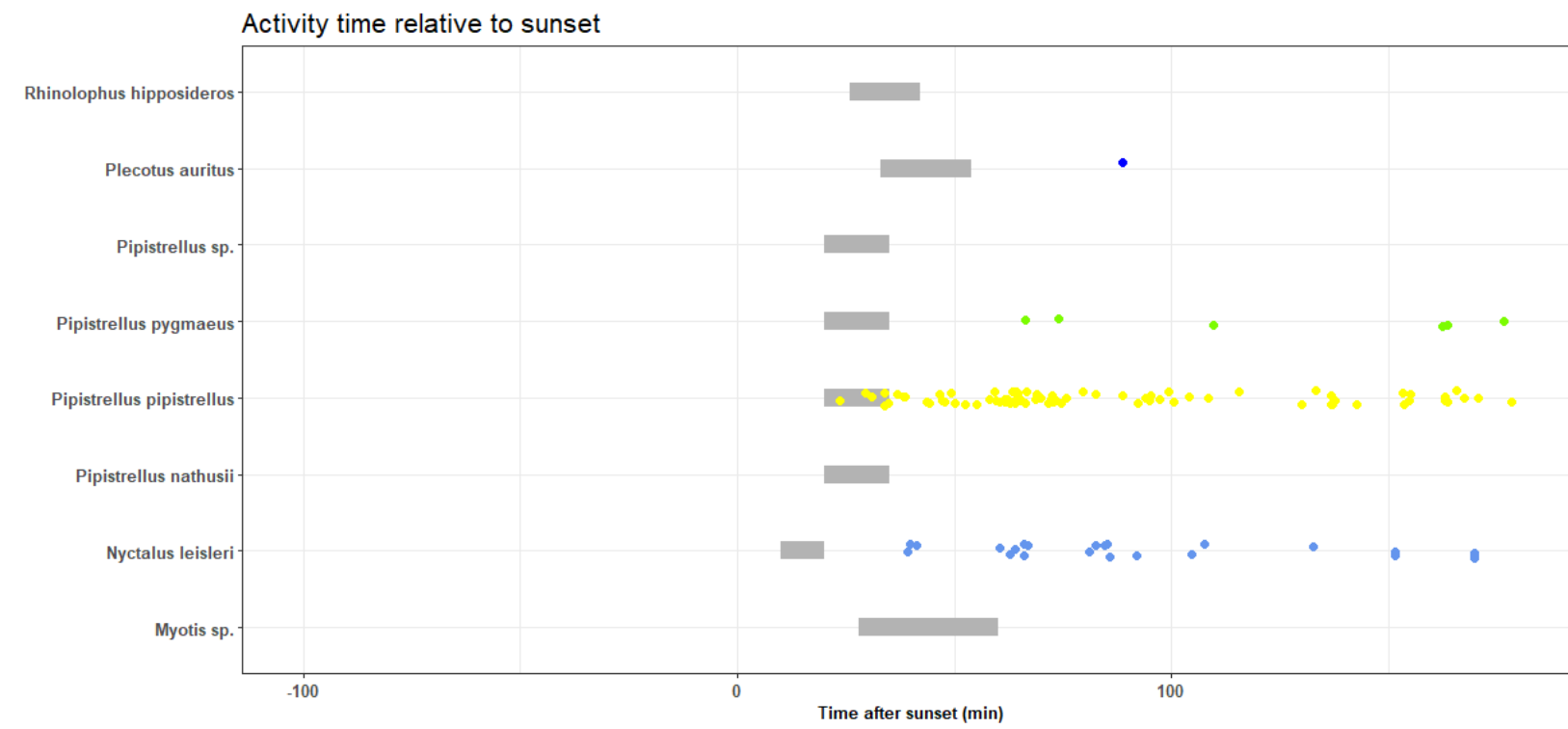


Figure A3.21: D.10 Summer activity time relative to sunset

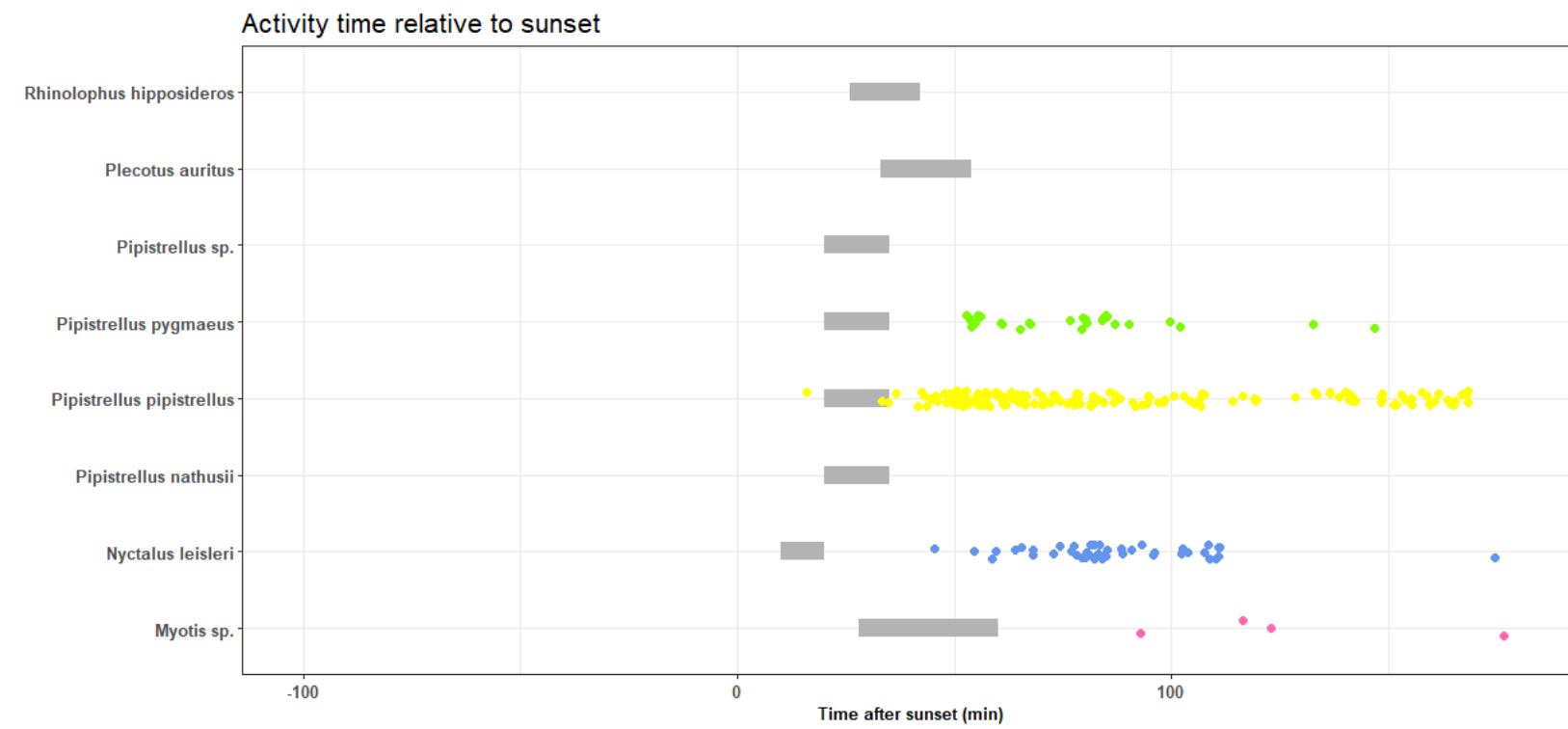


Figure A3.22: D.11 Summer activity time relative to sunset

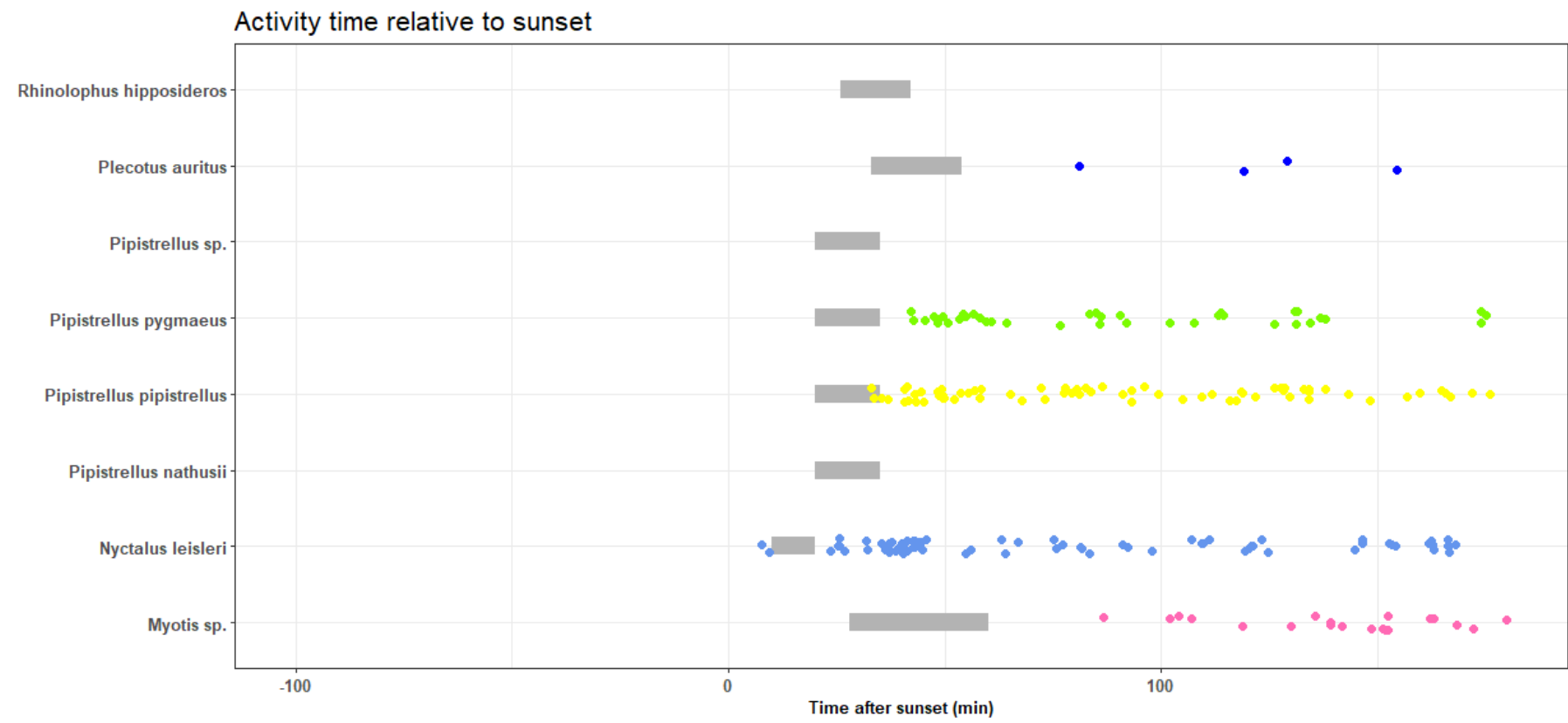


Figure A3.23: D.01 Autumn activity time relative to sunset

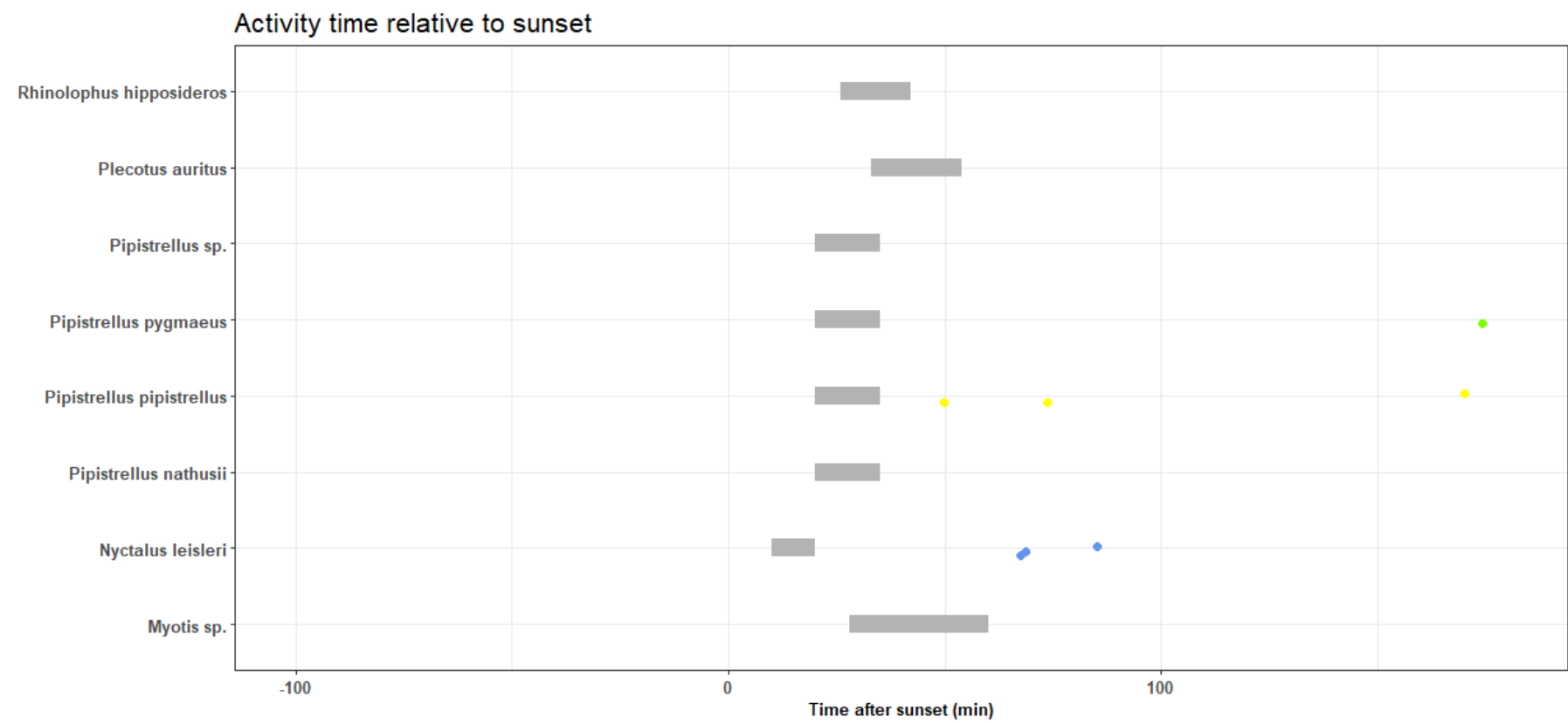


Figure A3.24: D.02 Autumn activity time relative to sunset

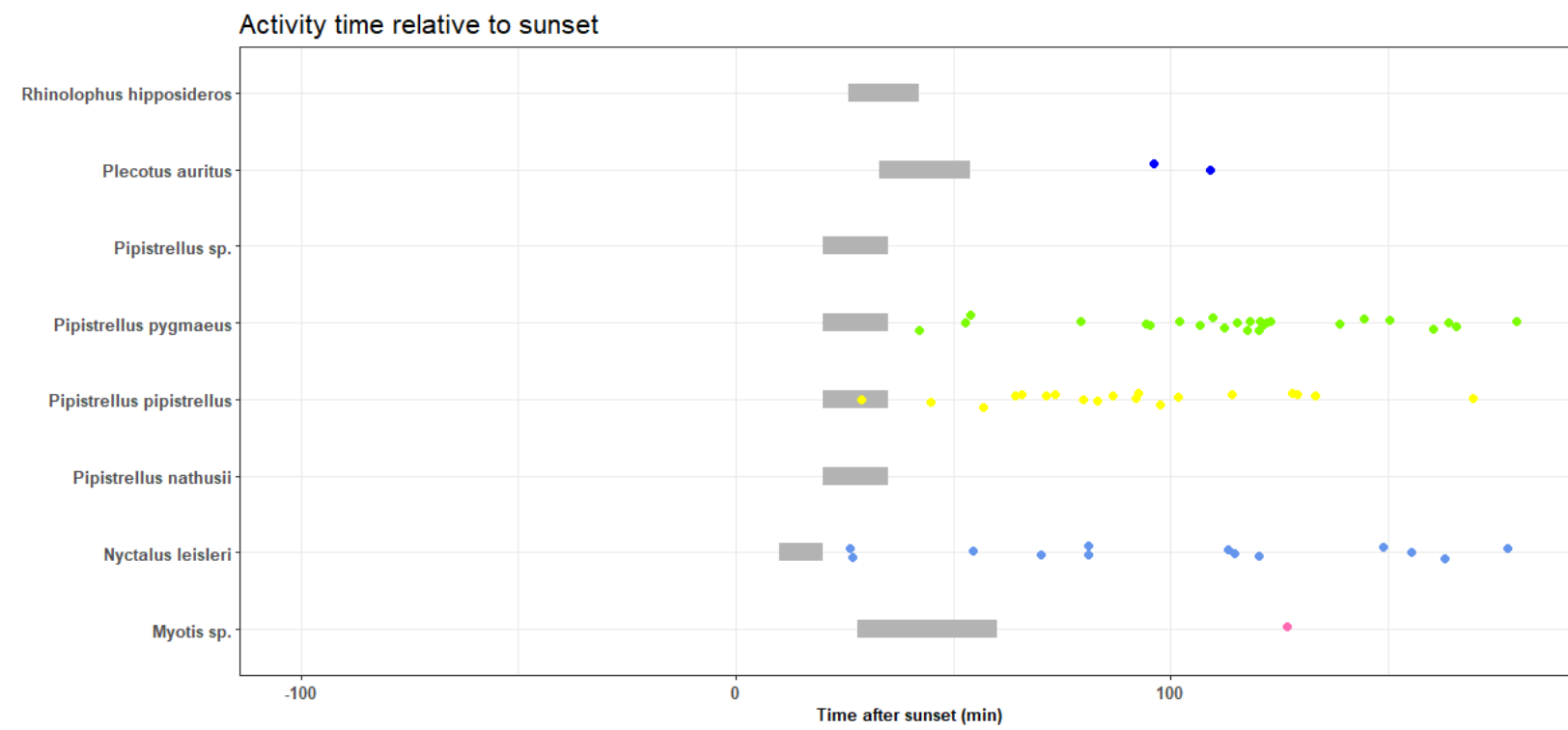


Figure A3.25: D.03 Autumn activity time relative to sunset

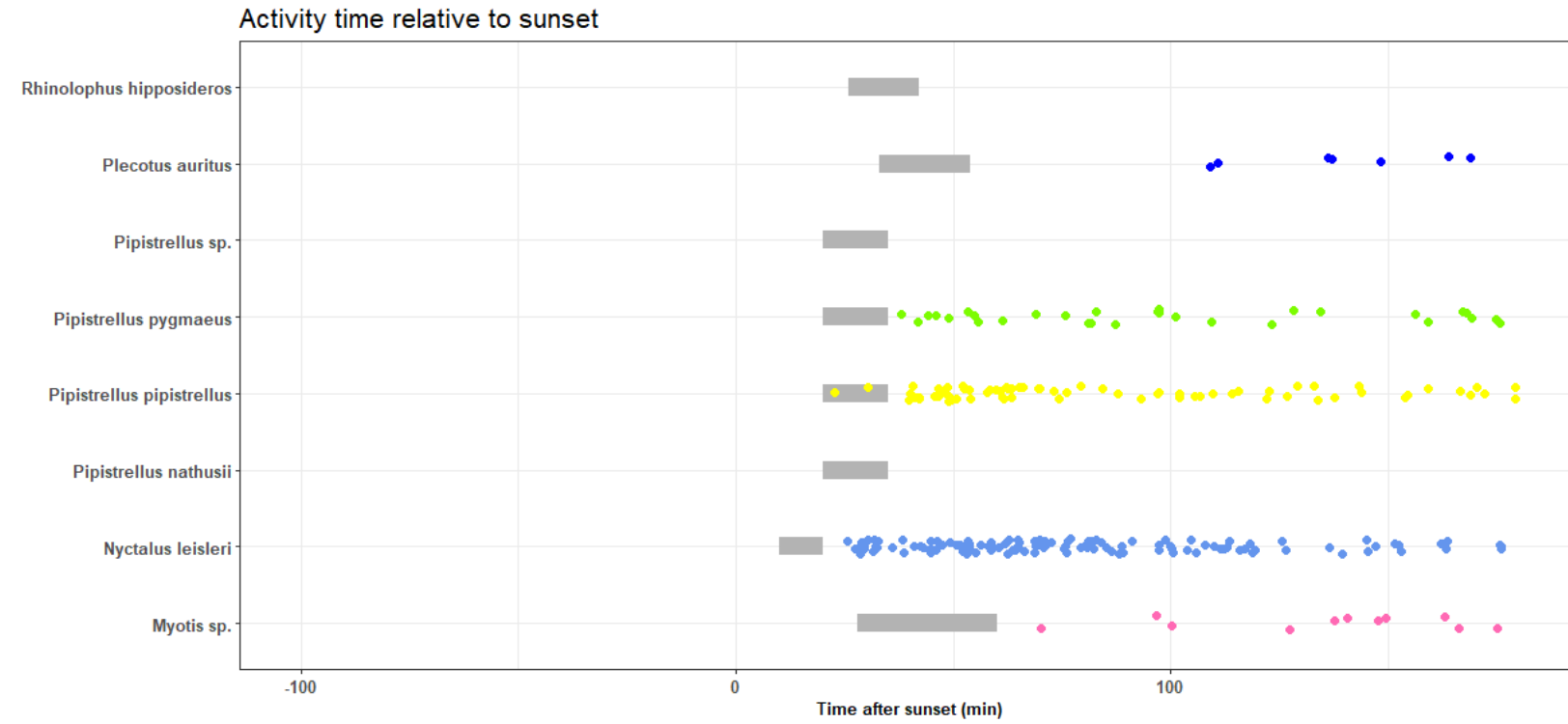


Figure A3.26: D.04 Autumn activity time relative to sunset

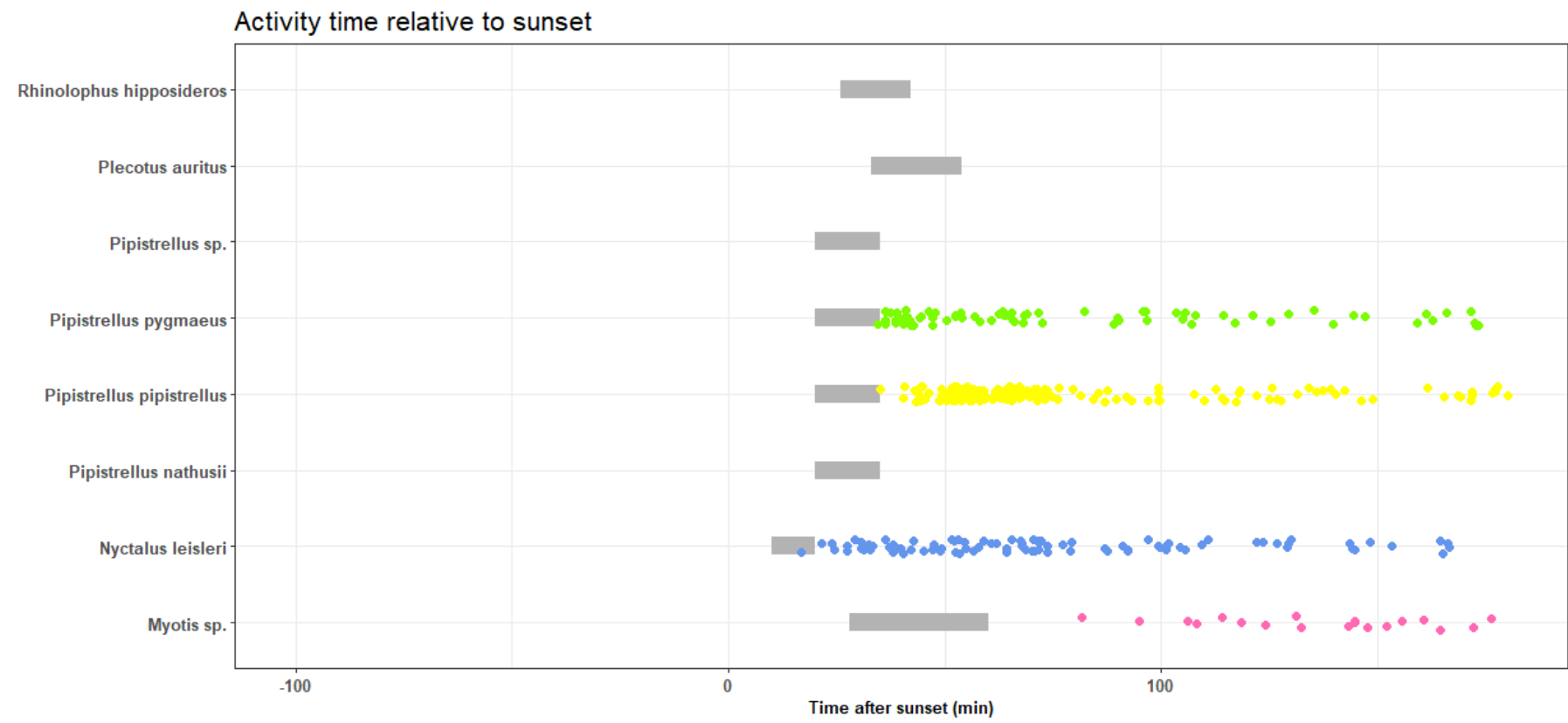


Figure A3.27: D.05 Autumn activity time relative to sunset

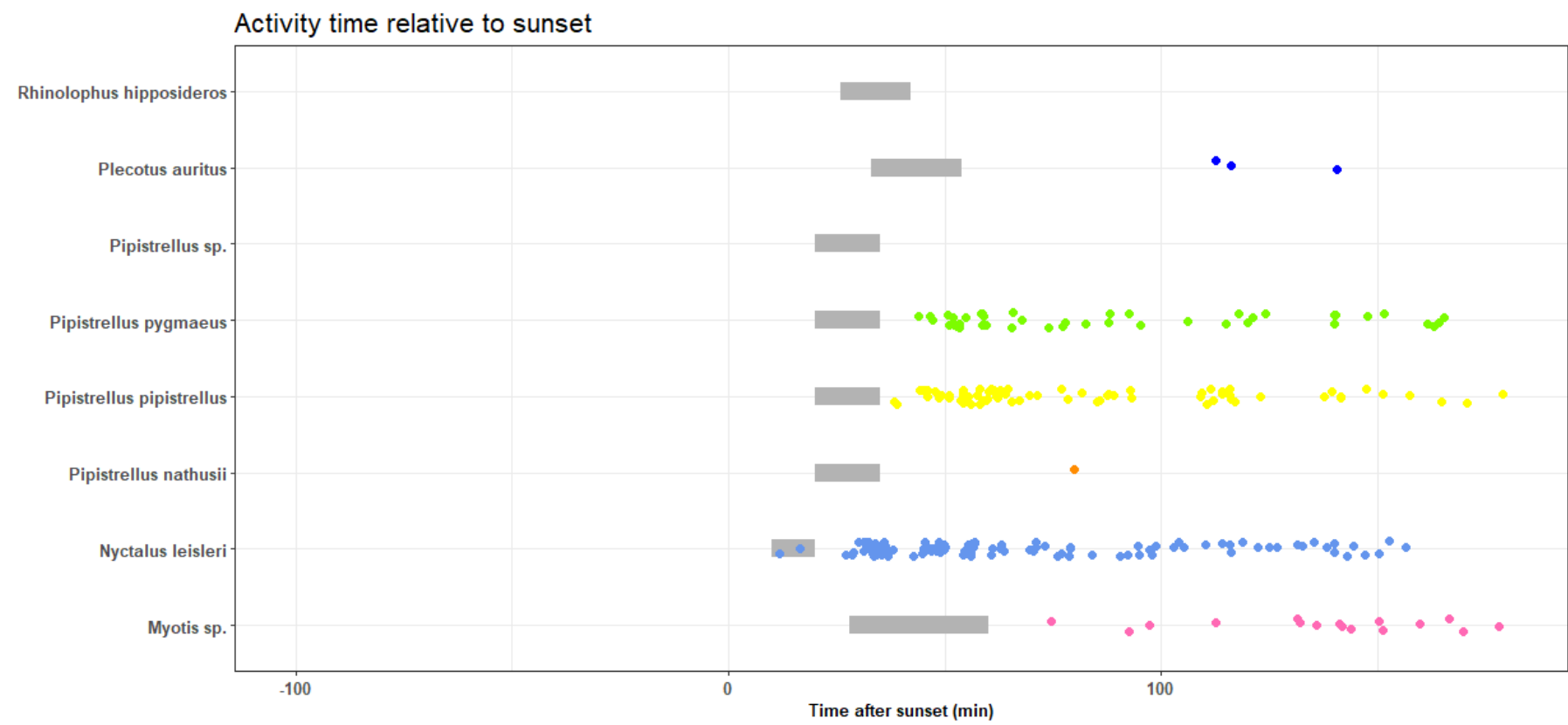


Figure A3.28: D.06 Autumn activity time relative to sunset

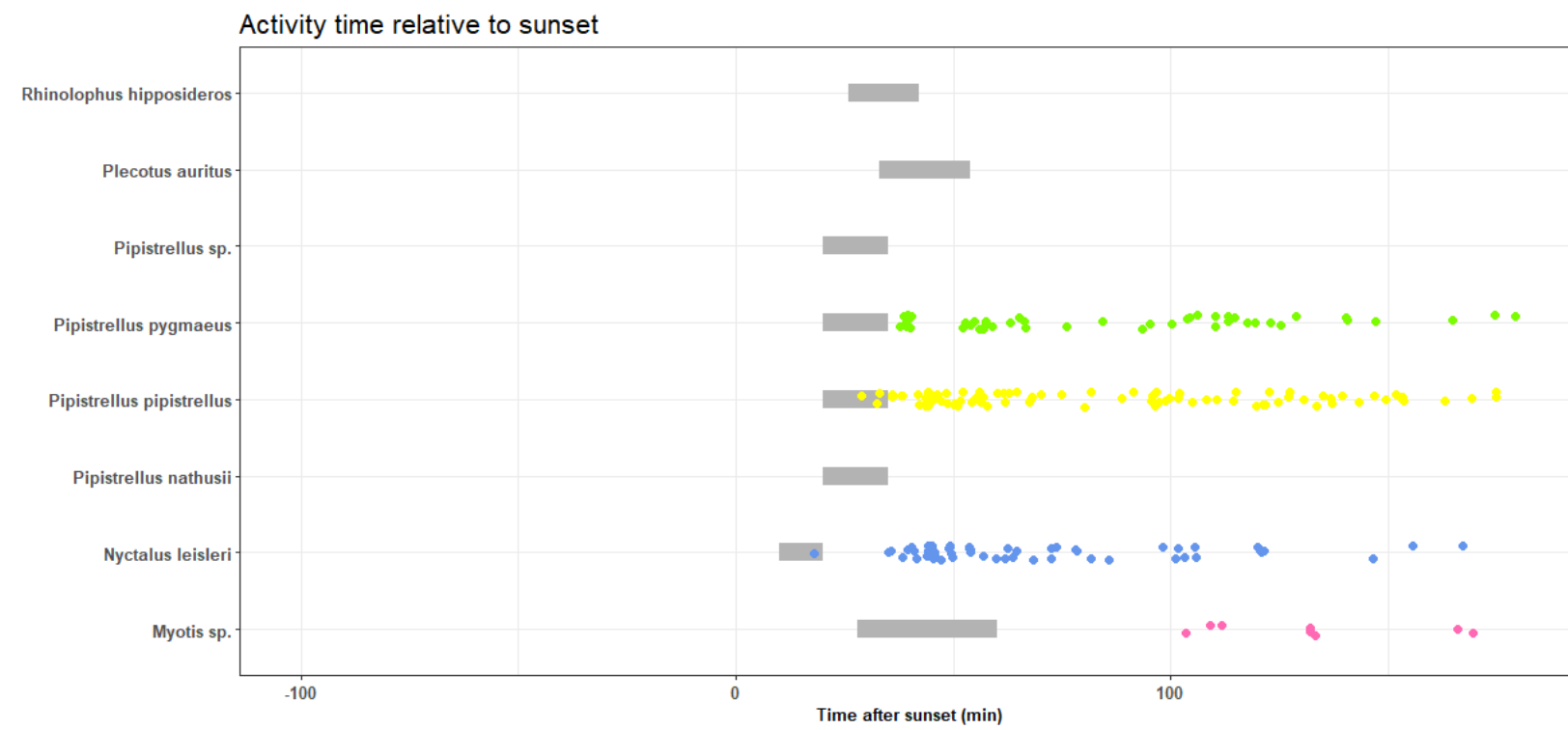


Figure A3.29: D.07 Autumn activity time relative to sunset

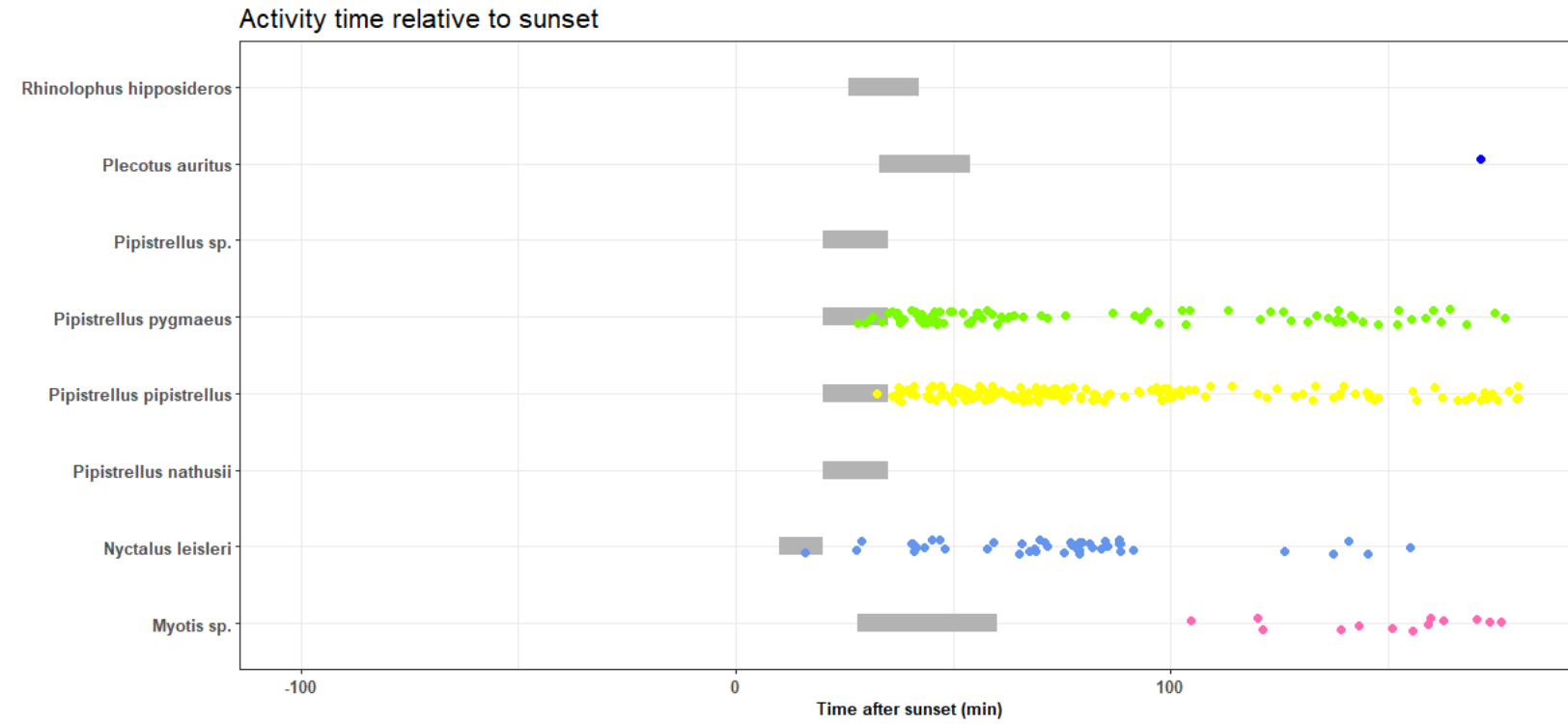


Figure A3.30: D.08 Autumn activity time relative to sunset

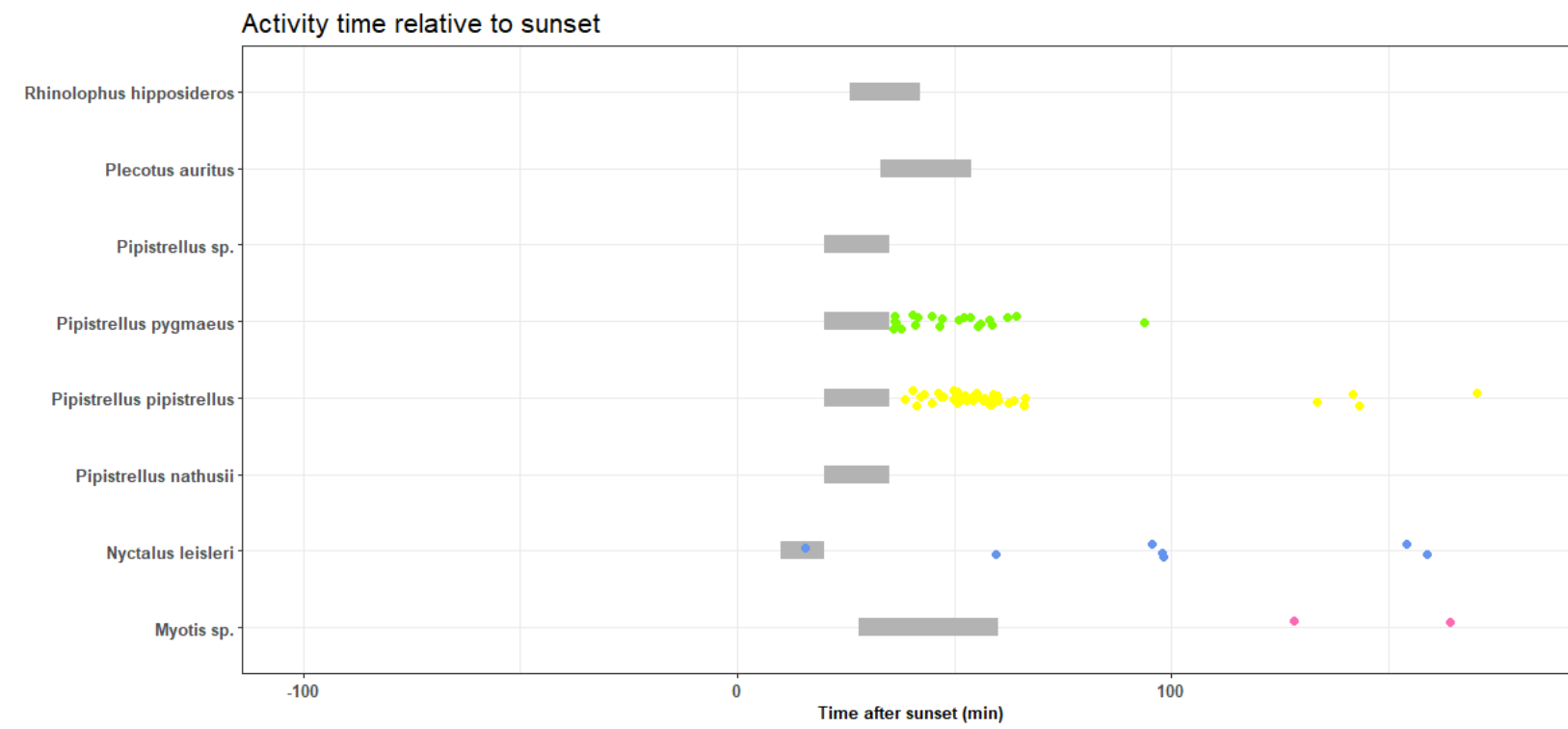


Figure A3.31: D.09 Autumn activity time relative to sunset

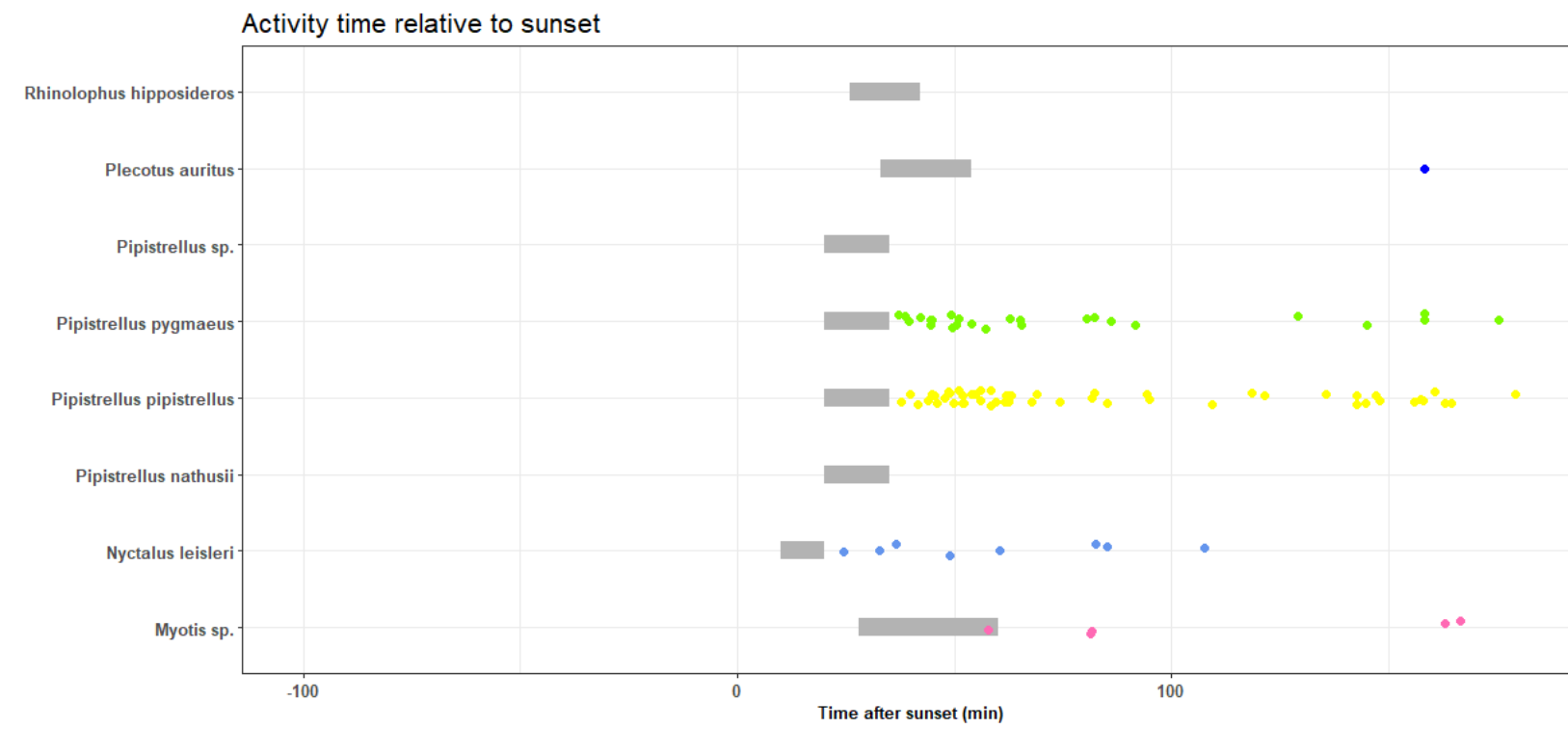


Figure A3.32: D.10 Autumn activity time relative to sunset

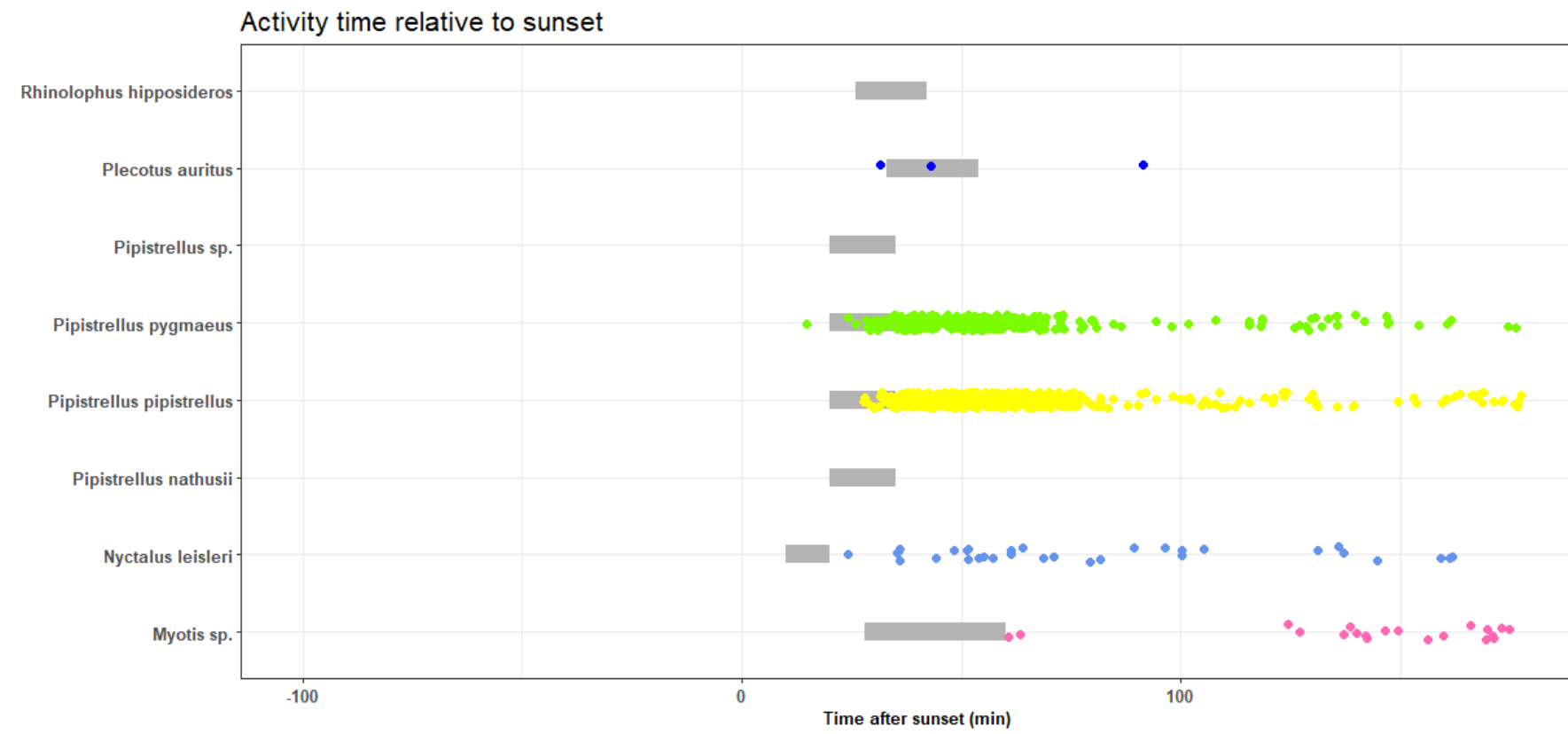


Figure A3.33: D.11 Autumn activity time relative to sunset

APPENDIX 6 - ACTIVITY PLOTS RELATIVE TO WIND SPEED AND TEMPERATURE



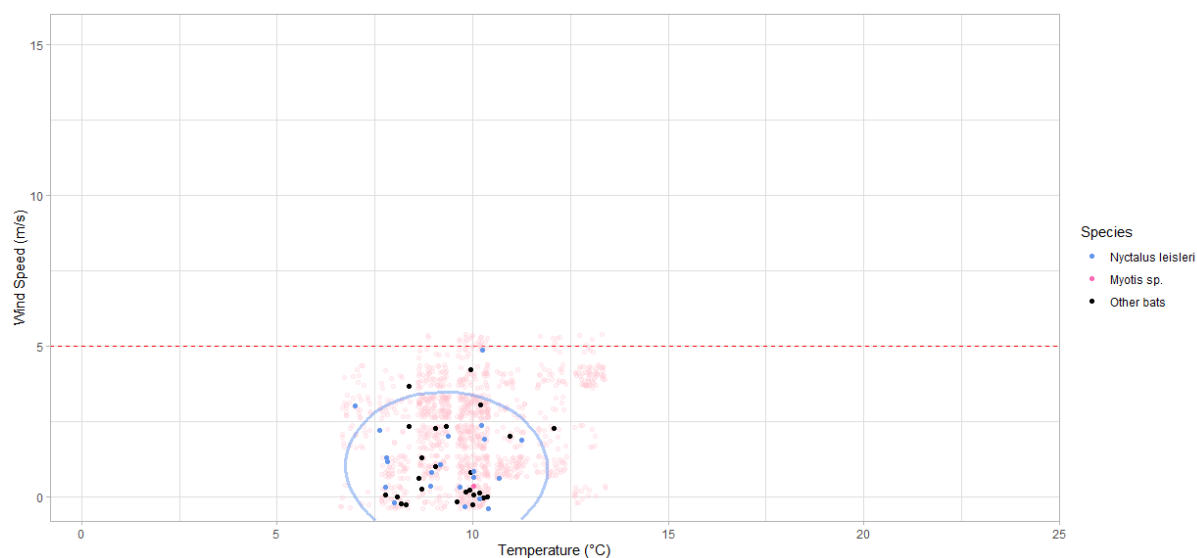


Figure A4.1: Spring D.01

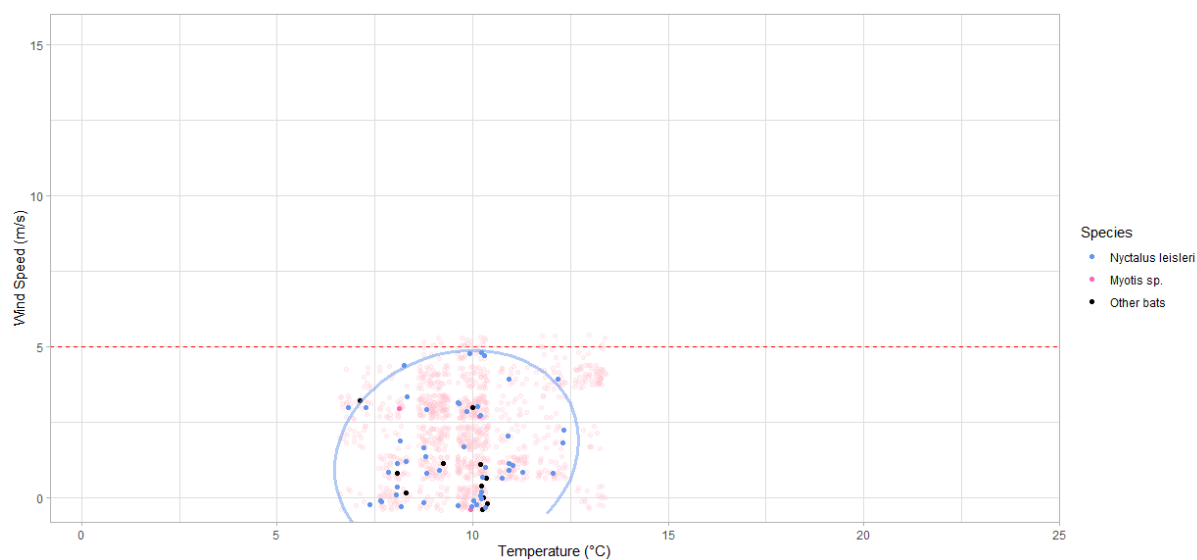


Figure A4.2: Spring D.02

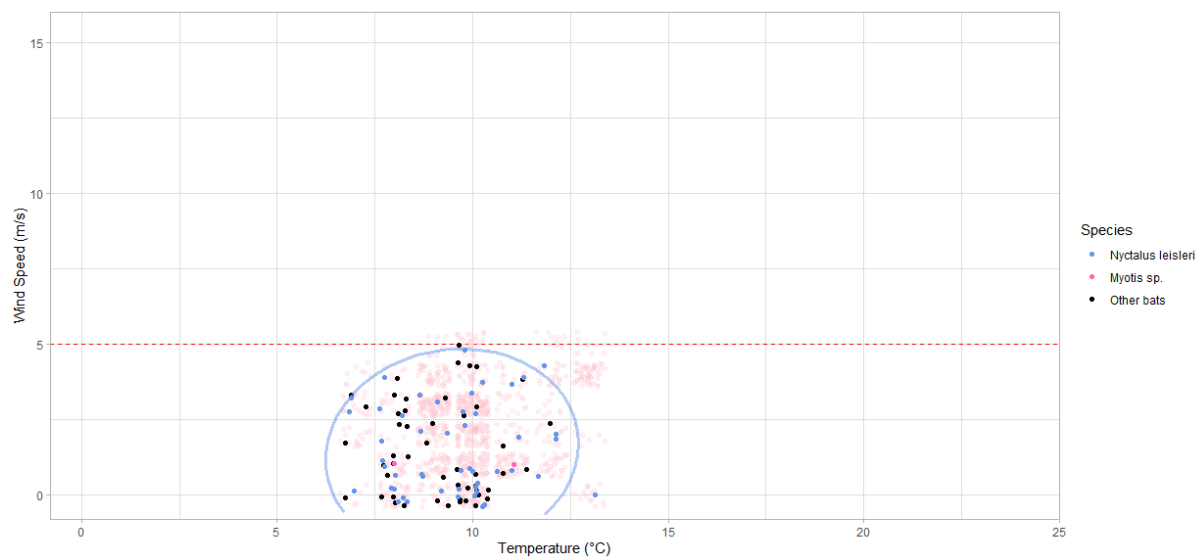


Figure A4.3: Spring D.03

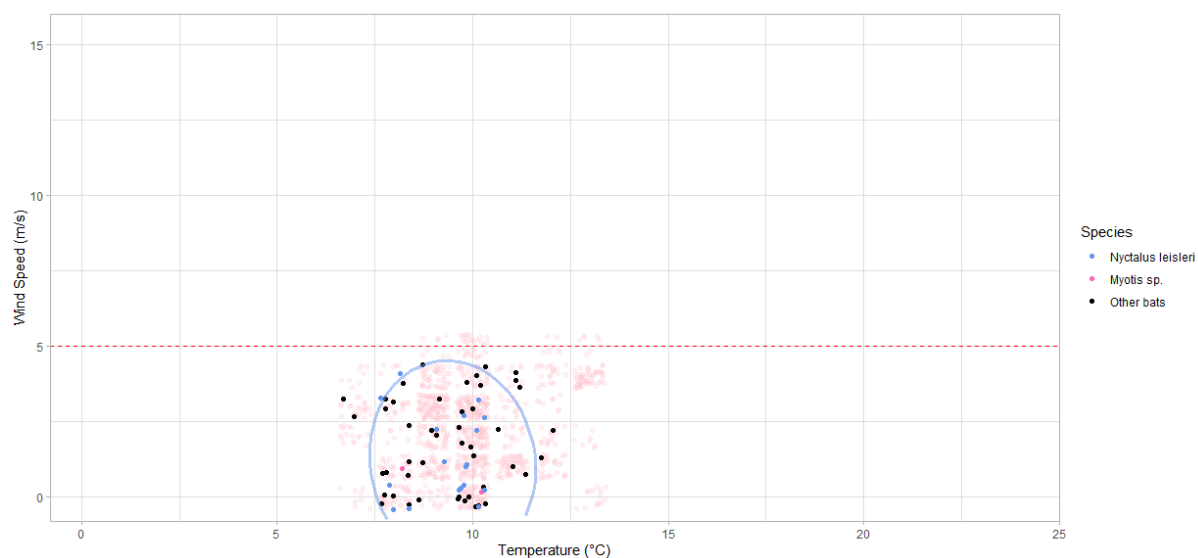


Figure A4.4: Spring D.04

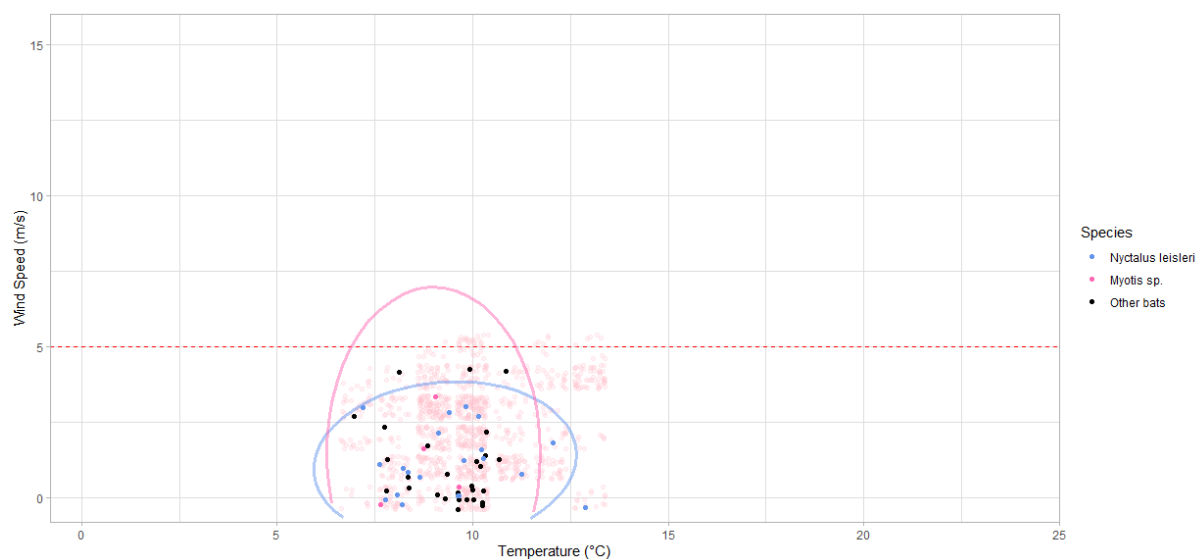


Figure A4.5: Spring D.05

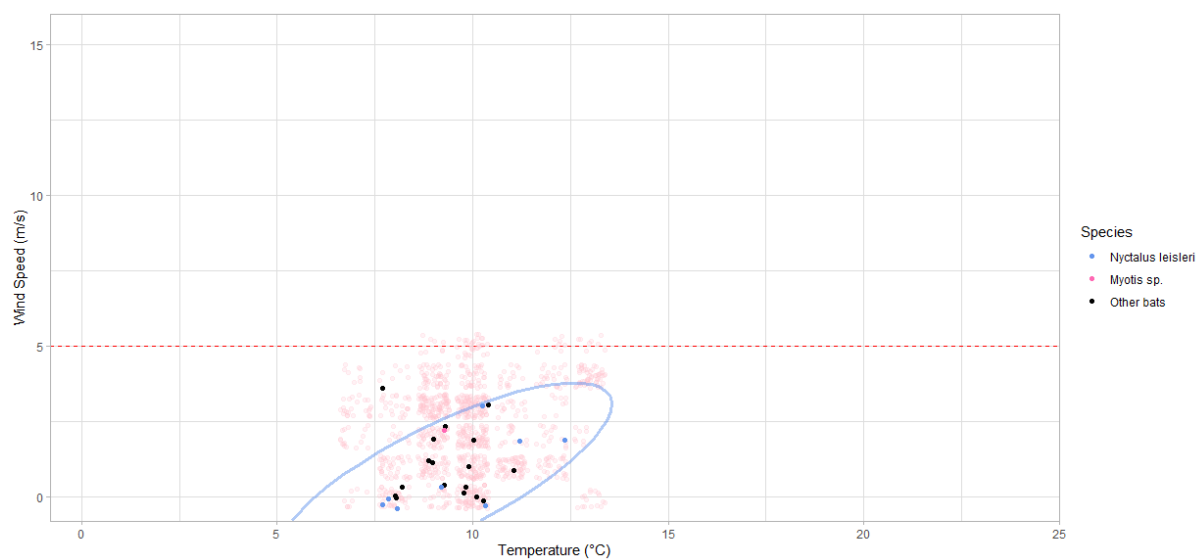


Figure A4.6: Spring D.06

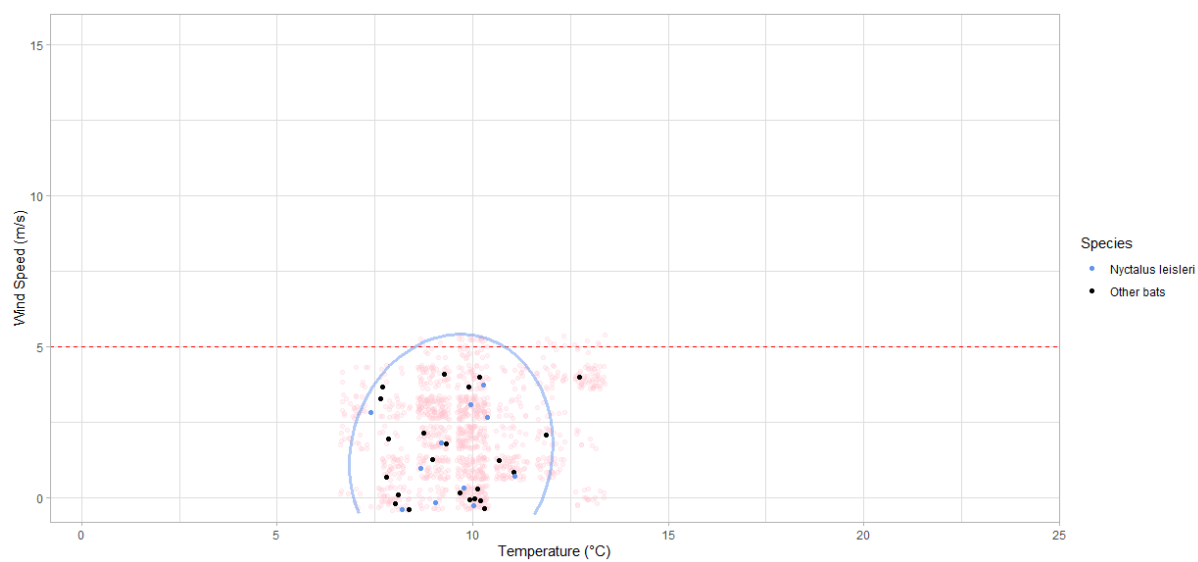


Figure A4.7: Spring D.07

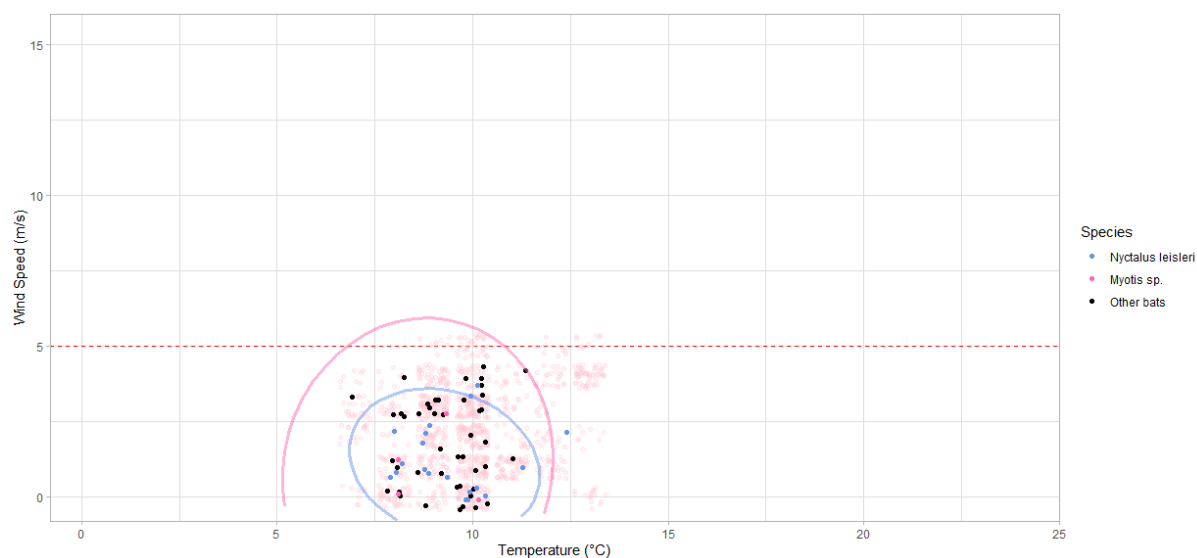


Figure A4.8: Spring D.08

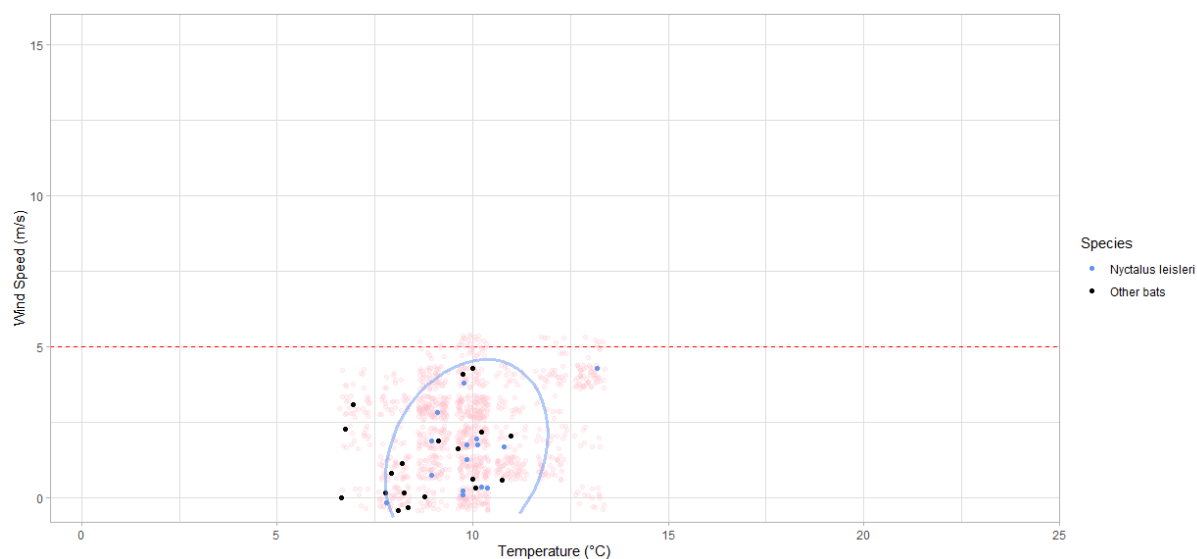


Figure A4.9: Spring D.09

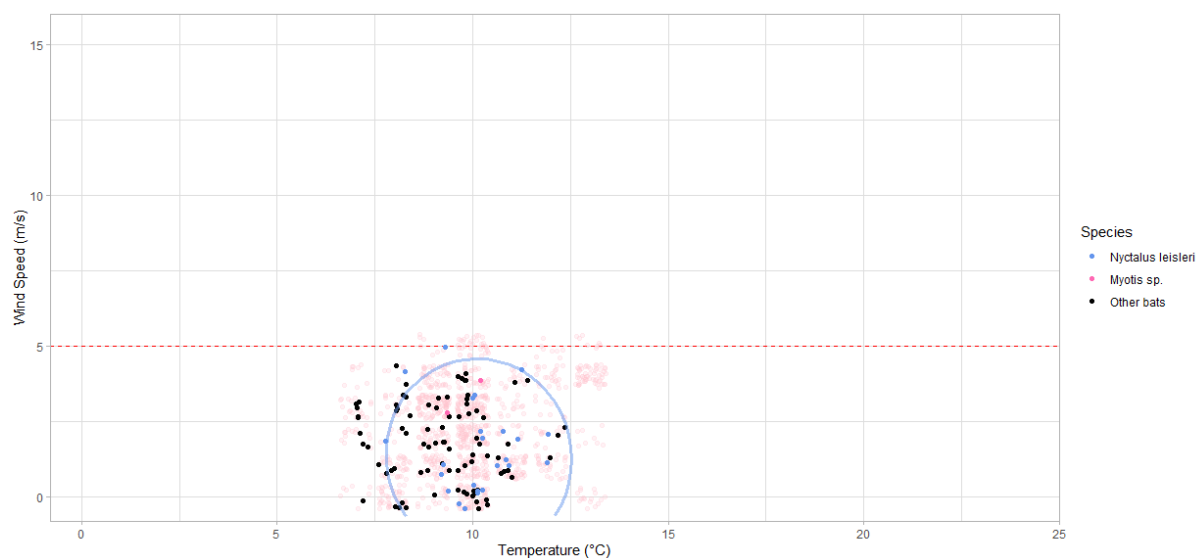


Figure A4.10: Spring D.10

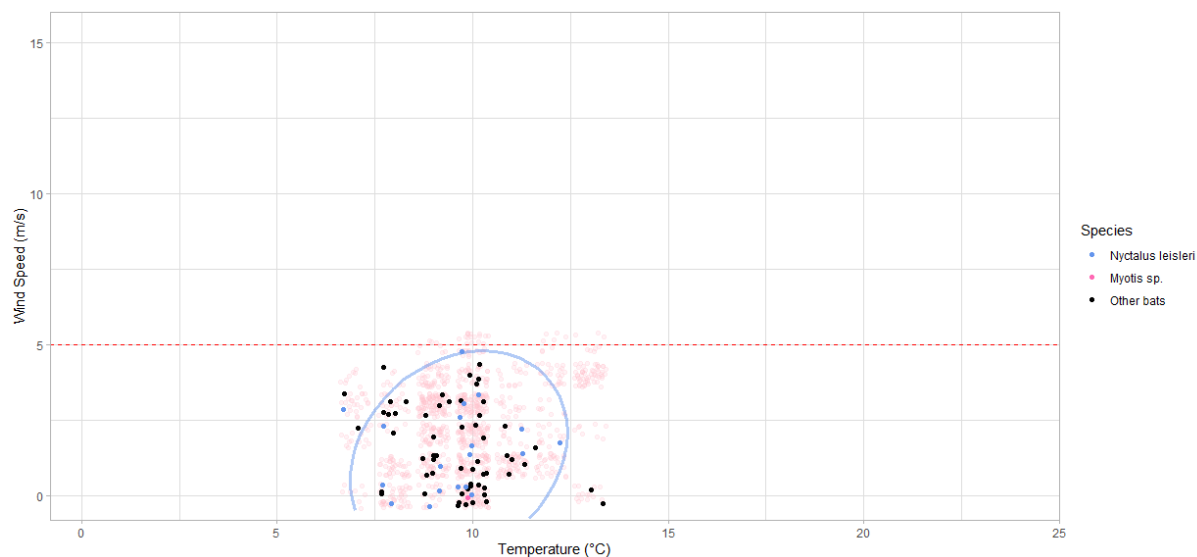


Figure A4.11: Spring D.11

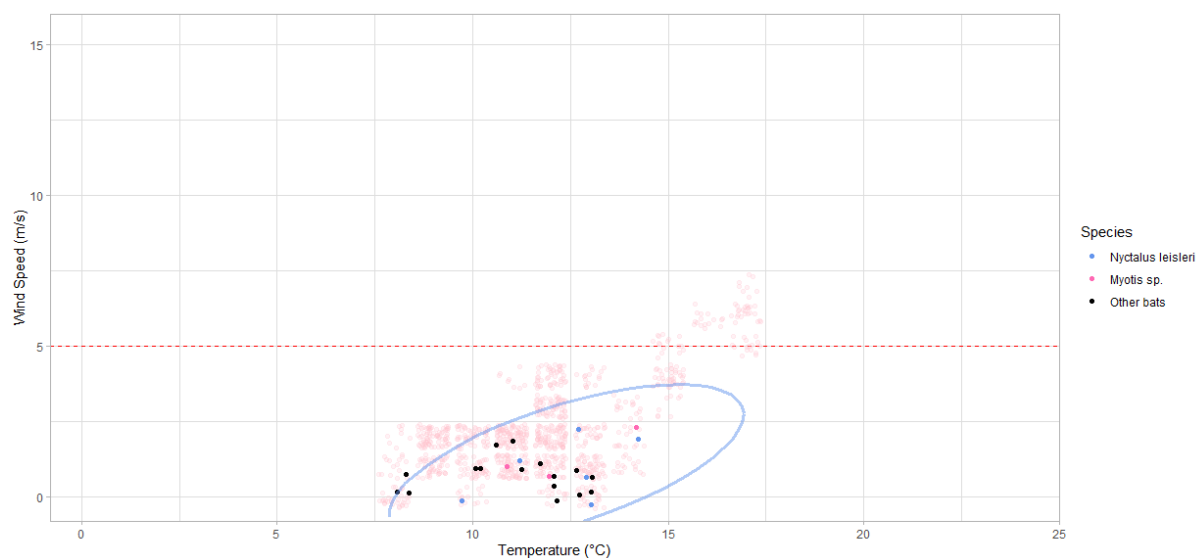


Figure A4.12: Summer D.01

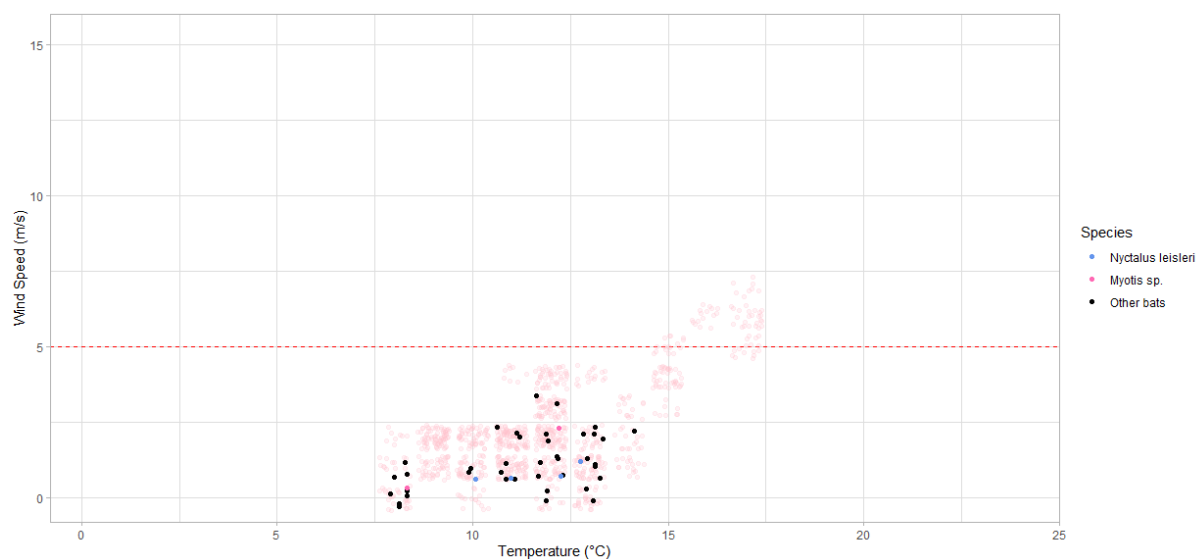


Figure A4.13: Summer D.02

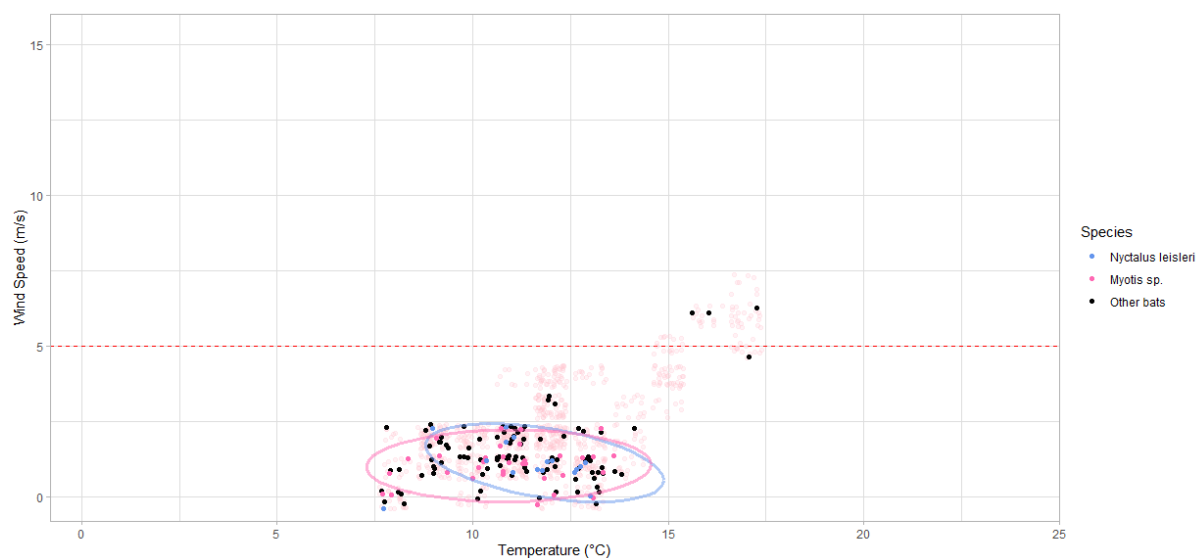


Figure A4.14: Summer D.03

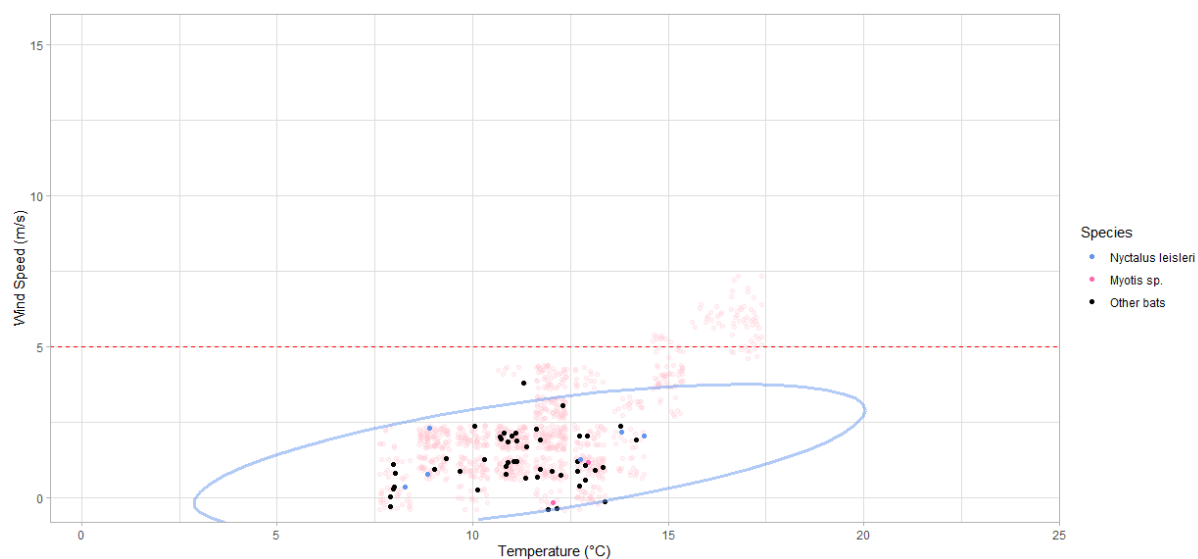


Figure A4.15: Summer D.04

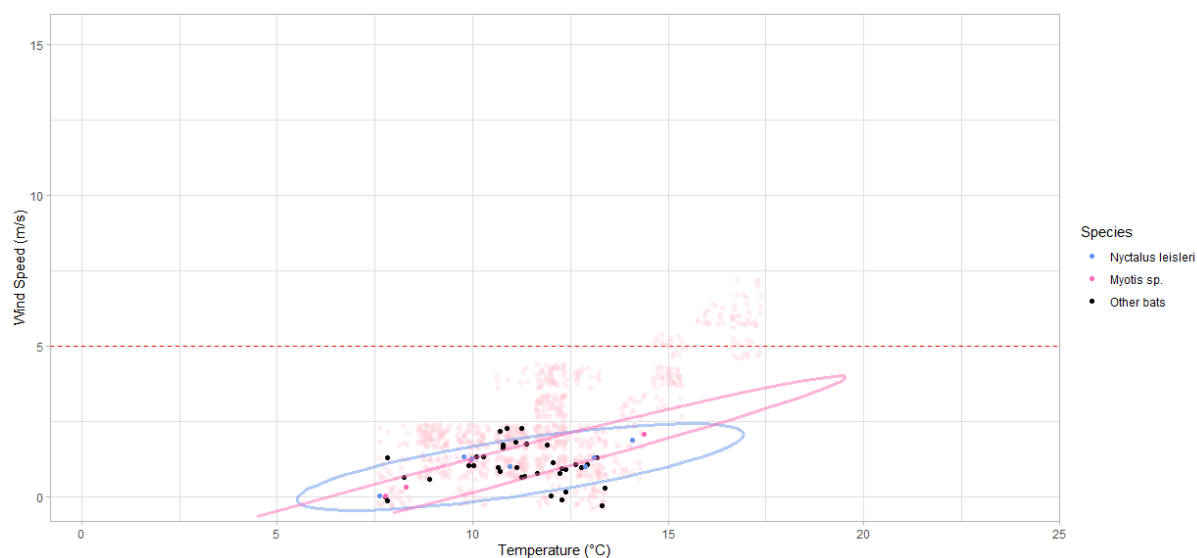


Figure A4.16: Summer D.05

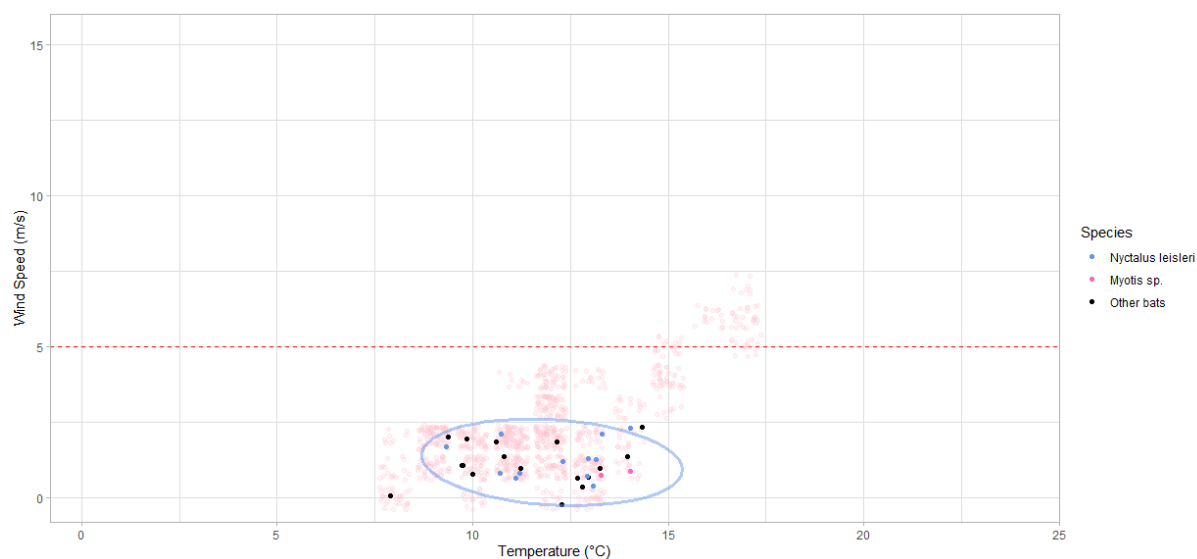


Figure A4.17: Summer D.06

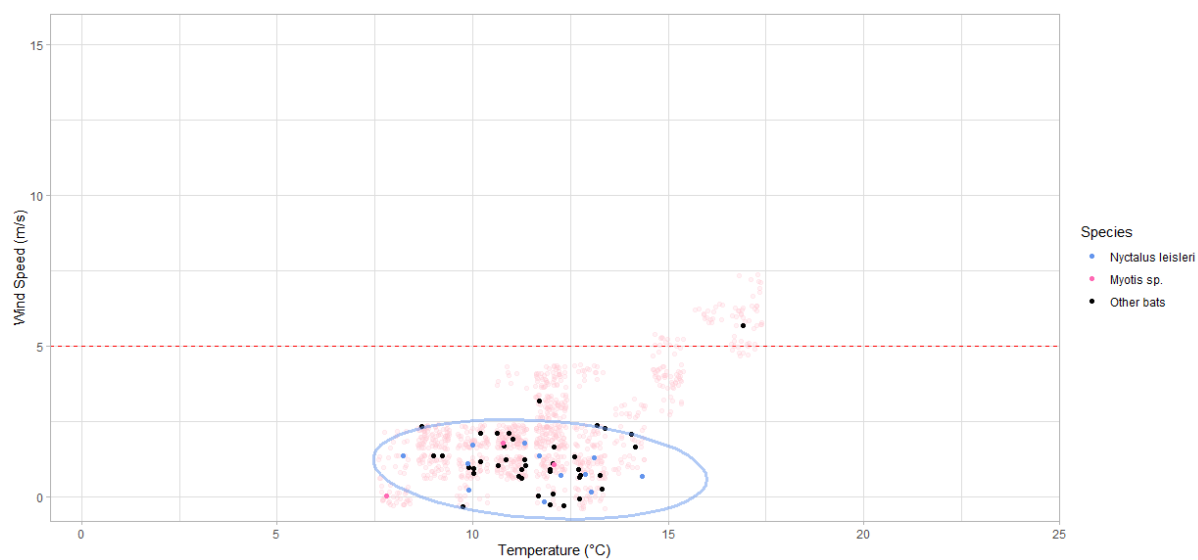


Figure A4.18: Summer D.07

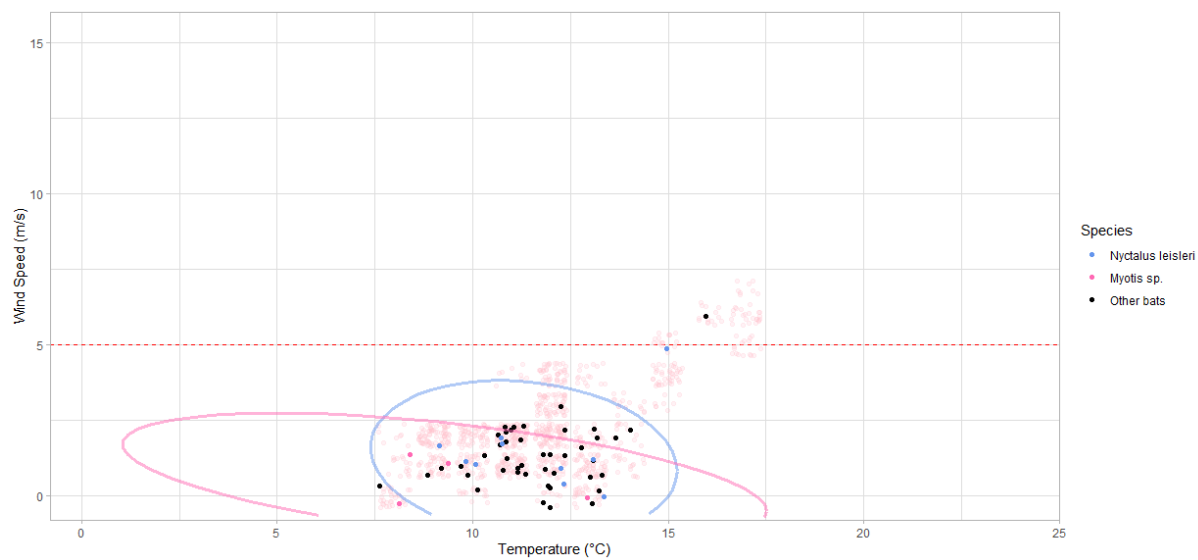


Figure A4.19: Summer D.08

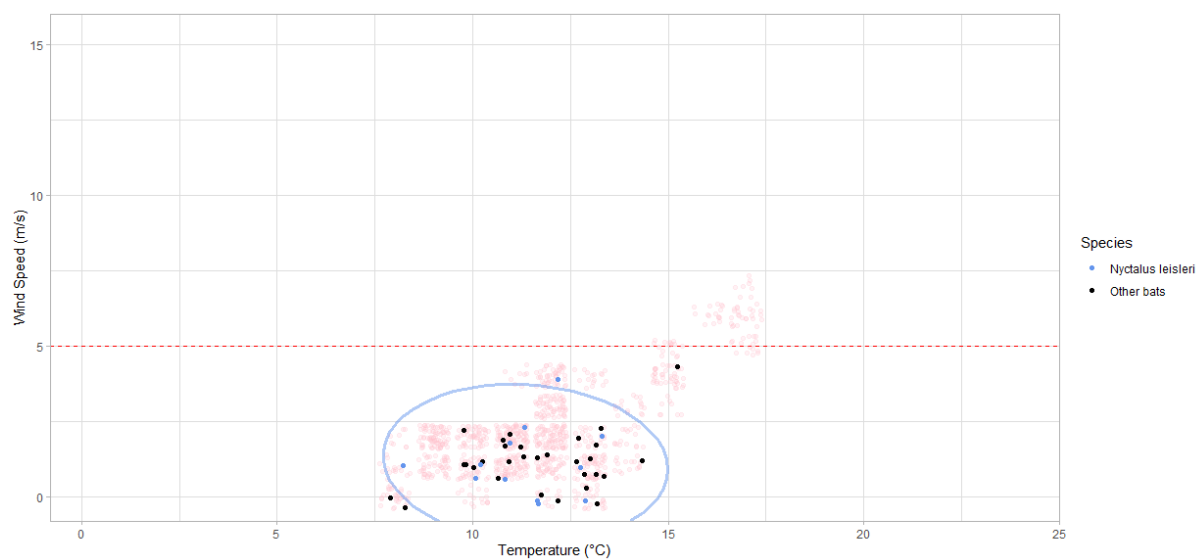


Figure A4.20: Summer D.09

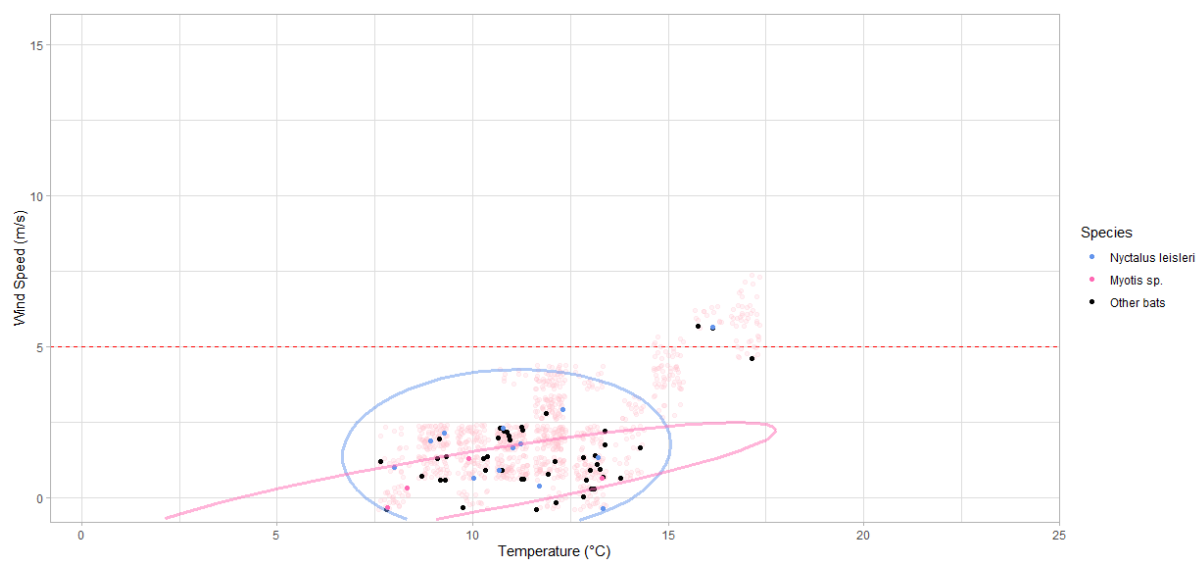
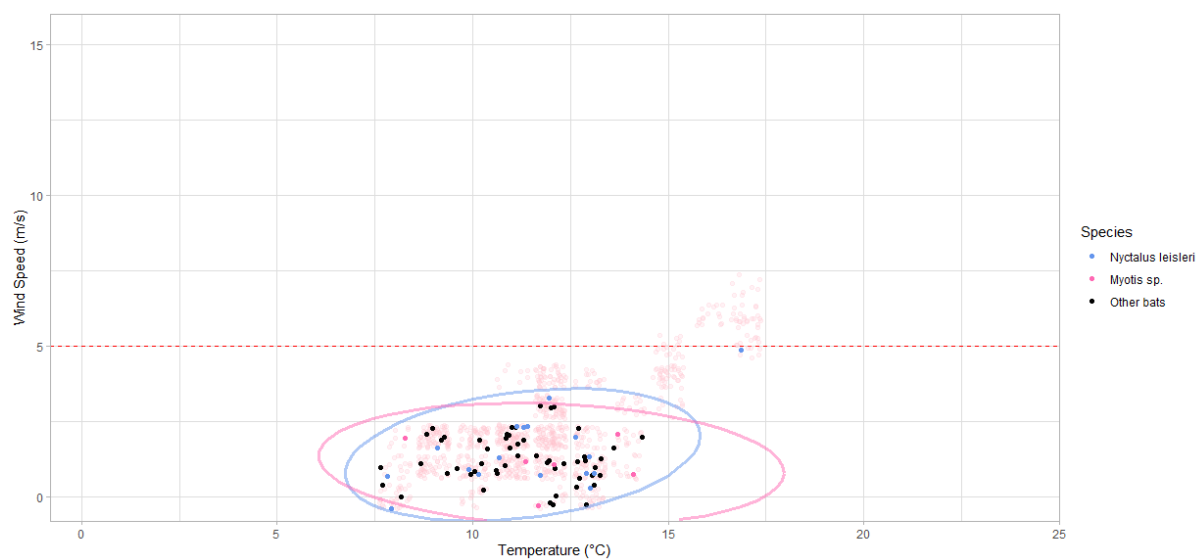


Figure A4.21: Summer D.10



APPENDIX 7 - BCI ROOST RESULTS



Roosts			
Name	Distance from Centre of Site	Species Observed	
Private	7.3km	<i>Pipistrellus</i> spp., <i>Plecotus auritus</i>	
Private	15km	<i>Myotis nattereri</i>	
Private	7.3km	<i>Pipistrellus</i> spp.	
Old Lung Bridge	5.3km	<i>Myotis daubentonii</i> d	
Private	5.8km	<i>Myotis mystacinus</i>	
Transects			
Name	Distance from Centre of Site	Species Observed	
Bridge u/s Lough Gara Transect	2.6km	<i>Myotis daubentonii</i> , Unidentified bat	
Bridge u/s Lough Gara Transect	2.6km	<i>Myotis daubentonii</i> , Unidentified bat	
Bridge u/s Lough Gara Transect	2.9km	<i>Myotis daubentonii</i>	
Bridge u/s Lough Gara Transect	2.7km	<i>Myotis daubentonii</i>	
Bridge u/s Lough Gara Transect	2.8km	<i>Myotis daubentonii</i> , Unidentified bat	
Bridge u/s Lough Gara Transect	2.8km	<i>Myotis daubentonii</i> , Unidentified bat	
Bridge u/s Lough Gara Transect	2.7km	<i>Myotis daubentonii</i>	
Bridge u/s Lough Gara Transect	2.7km	<i>Myotis daubentonii</i>	
Bridge u/s Lough Gara Transect	2.8km	<i>Myotis daubentonii</i> , Unidentified bat	
Bridge u/s Lough Gara Transect	2.8km	<i>Myotis daubentonii</i>	
Bridge u/s Lough Gara Transect	2.9km	<i>Myotis daubentonii</i>	
Ad-Hoc Observations			
Name	Distance from Centre of Site	Date	Species Observed
Consultancy Surveys	8.8km	22/06/2015	<i>Pipistrellus pipistrellus</i> , <i>Nyctalus leisleri</i> , <i>Myotis nattereri</i>
Consultancy Surveys	6.9km	22/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	8.1 km	23/06/2015	<i>Myotis daubentonii</i>
Consultancy Surveys	12km	23/06/2015	<i>Pipistrellus pygmaeus</i> , <i>Myotis</i> spp
Consultancy Surveys	12km	23/06/2015	<i>Pipistrellus pygmaeus</i>
Consultancy Surveys	11km	23/06/2015	<i>Pipistrellus pygmaeus</i>
Consultancy Surveys	7.5km	23/06/2015	<i>Pipistrellus pipistrellus</i> , <i>Nyctalus leisleri</i>
Consultancy Surveys	7.1km	23/06/2015	<i>Pipistrellus pipistrellus</i>

Consultancy Surveys	7.2km	23/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	6.8km	23/06/2015	<i>Pipistrellus pipistrellus</i> , <i>Plecotus auritus</i> , <i>Myotis</i> <i>spp.</i> , <i>Nyctalus leisleri</i>
Consultancy Surveys	6.5km	23/06/2015	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i>
Consultancy Surveys	6.5km	23/06/2015	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Myotis spp</i>
Consultancy Surveys	6.9km	23/06/2015	<i>Pipistrellus pygmaeus</i>
Consultancy Surveys	6.1km	23/06/2015	<i>Pipistrellus spp.</i> , <i>Pipistrellus</i> <i>pipistrellus</i>
Consultancy Surveys	6.5km	23/06/2015	<i>Pipistrellus pygmaeus</i> , <i>Plecotus auritus</i>
Consultancy Surveys	6.4km	23/06/2015	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i>
Consultancy Surveys	6.3km	23/06/2015	<i>Pipistrellus spp.</i>
Consultancy Surveys	6.5km	23/06/2015	<i>Pipistrellus pygmaeus</i>
Consultancy Surveys	6.6km	23/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	6.3km	23/06/2015	<i>Nyctalus leisleri</i> , <i>Pipistrellus</i> <i>pipistrellus</i>
Consultancy Surveys	5.9km	23/06/2015	<i>Nyctalus leisleri</i> , <i>Pipistrellus</i> <i>pipistrellus</i> , <i>Myotis spp.</i>
Consultancy Surveys	6.6km	23/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	6.1km	23/06/2015	<i>Nyctalus leisleri</i>
Consultancy Surveys	7.1km	23/06/2015	<i>Pipistrellus pygmaeus</i>
Consultancy Surveys	7.1km	23/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	6.8km	23/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	6.7km	23/06/2015	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Myotis nattereri</i>
Consultancy Surveys	5.6km	24/06/2015	<i>Pipistrellus pygmaeus</i>
Consultancy Surveys	6.2km	24/06/2015	<i>Pipistrellus pipistrellus</i> , <i>Nyctalus leisleri</i>
Consultancy Surveys	7.4km	24/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	7.3km	24/06/2015	<i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i> , <i>Myotis spp.</i>
Consultancy Surveys	7.3km	24/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	7.3km	24/06/2015	<i>Pipistrellus pipistrellus</i>

Consultancy Surveys	7.4km	24/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	7km	24/06/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	5.7km	24/06/2015	<i>Pipistrellus pipistrellus</i> <i>Pipistrellus pygmaeus</i>
Consultancy Surveys	6km	25/05/2015	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Myotis nattereri</i> , <i>Nyctalus leisleri</i>
Consultancy Surveys	5.8km	26/05/2015	<i>Myotis daubentonii</i>
Consultancy Surveys	8.2km	26/05/2015	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Plecotus auritus</i>
Consultancy Surveys	8.8km	26/05/2015	<i>Myotis</i> spp.
Consultancy Surveys	5.8km	26/05/2015	<i>Nyctalus leisleri</i>
Consultancy Surveys	6.3km	26/05/2015	<i>Pipistrellus pygmaeus</i>
Consultancy Surveys	6.7km	26/05/2015	<i>Nyctalus leisleri</i>
Consultancy Surveys	7.5km	26/05/2015	<i>Pipistrellus pygmaeus</i>
Consultancy Surveys	9.4km	26/05/2015	<i>Pipistrellus pygmaeus</i>
Consultancy Surveys	10km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	9.9km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	9.7km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	9.7km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	9.2km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	9km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	8.7km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	7.9km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	7.9km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	8.3km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	8.4km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	8.1km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	7.2km	26/05/2015	<i>Plecotus auritus</i>

Consultancy Surveys	11km	26/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	10km	27/05/2015	<i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i>
Consultancy Surveys	10.1km	27/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	11km	27/05/2015	<i>Pipistrellus pipistrellus</i>
Consultancy Surveys	8.1km	27/05/2015	<i>Pipistrellus pipistrellus</i>
BATLAS2010	10km	19/09/2009	<i>Myotis daubentonii</i>
BATLAS2010	1.2km	18/10/2000	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i> , <i>Myotis daubentonii</i>
BATLAS2010	4.5km	18/10/2009	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i>
BATLAS2010	11km	18/10/2009	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Myotis daubentonii</i>
BATLAS2020	5.7km	01/06/2018	<i>Pipistrellus pipistrellus</i> , <i>Nyctalus leisleri</i> , <i>Myotis spp</i>
BATLAS2020	10km	01/06/2018	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Myotis daubentonii</i>
BATLAS2020	3.5km	31/05/2018	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Nyctalus leisleri</i> , <i>Myotis daubentonii</i>
BATLAS2020	6.3km	01/06/2018	<i>Pipistrellus pipistrellus</i> , <i>Pipistrellus pygmaeus</i> , <i>Myotis spp.</i> , <i>Pipistrellus spp</i>
BATLAS2020	6.3km	01/06/2018	<i>Pipistrellus pipistrellus</i>

APPENDIX 8 - PREVIOUS CONSULTANT REPORTS



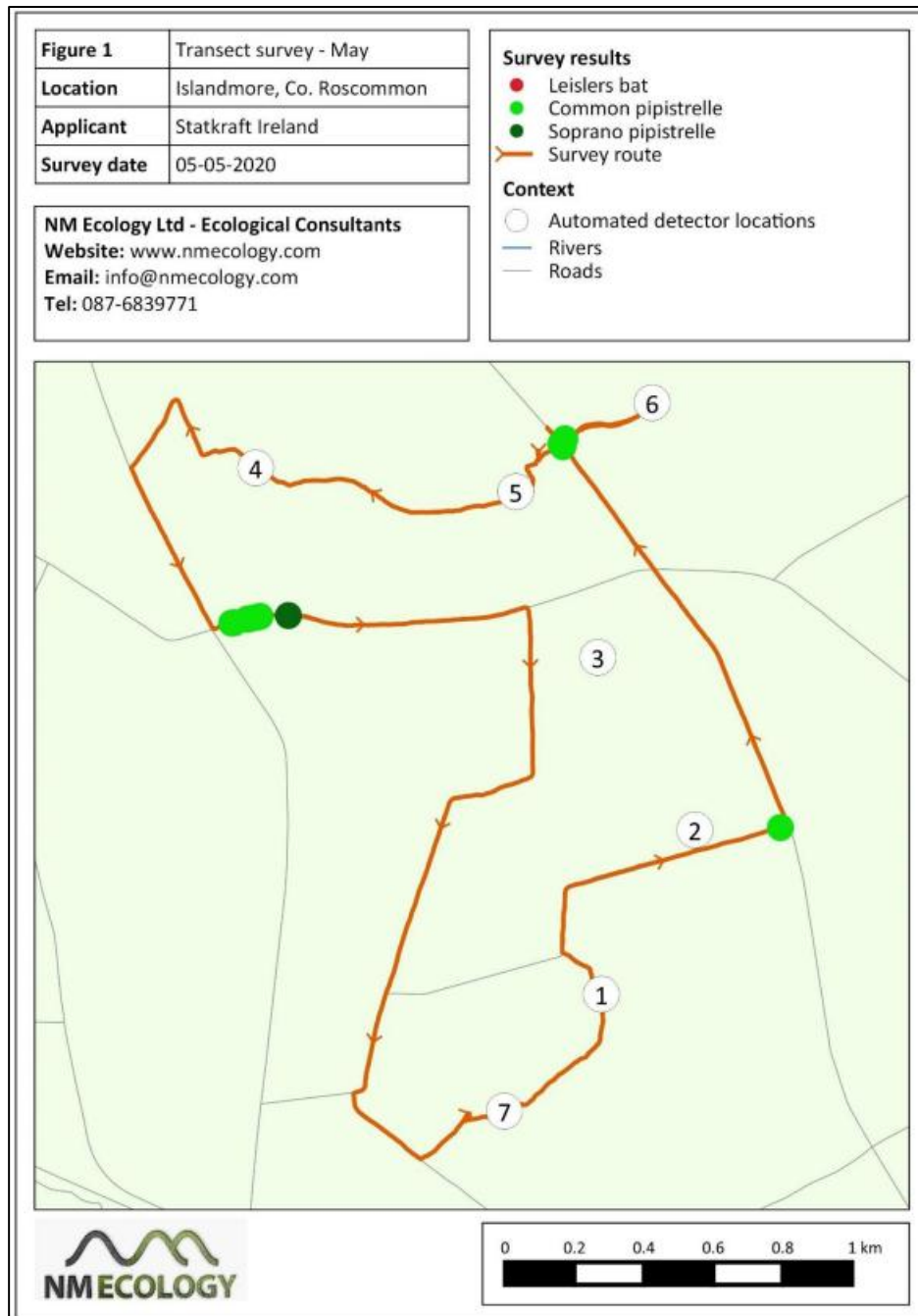


Figure A8.1: Transect Survey, May 2020

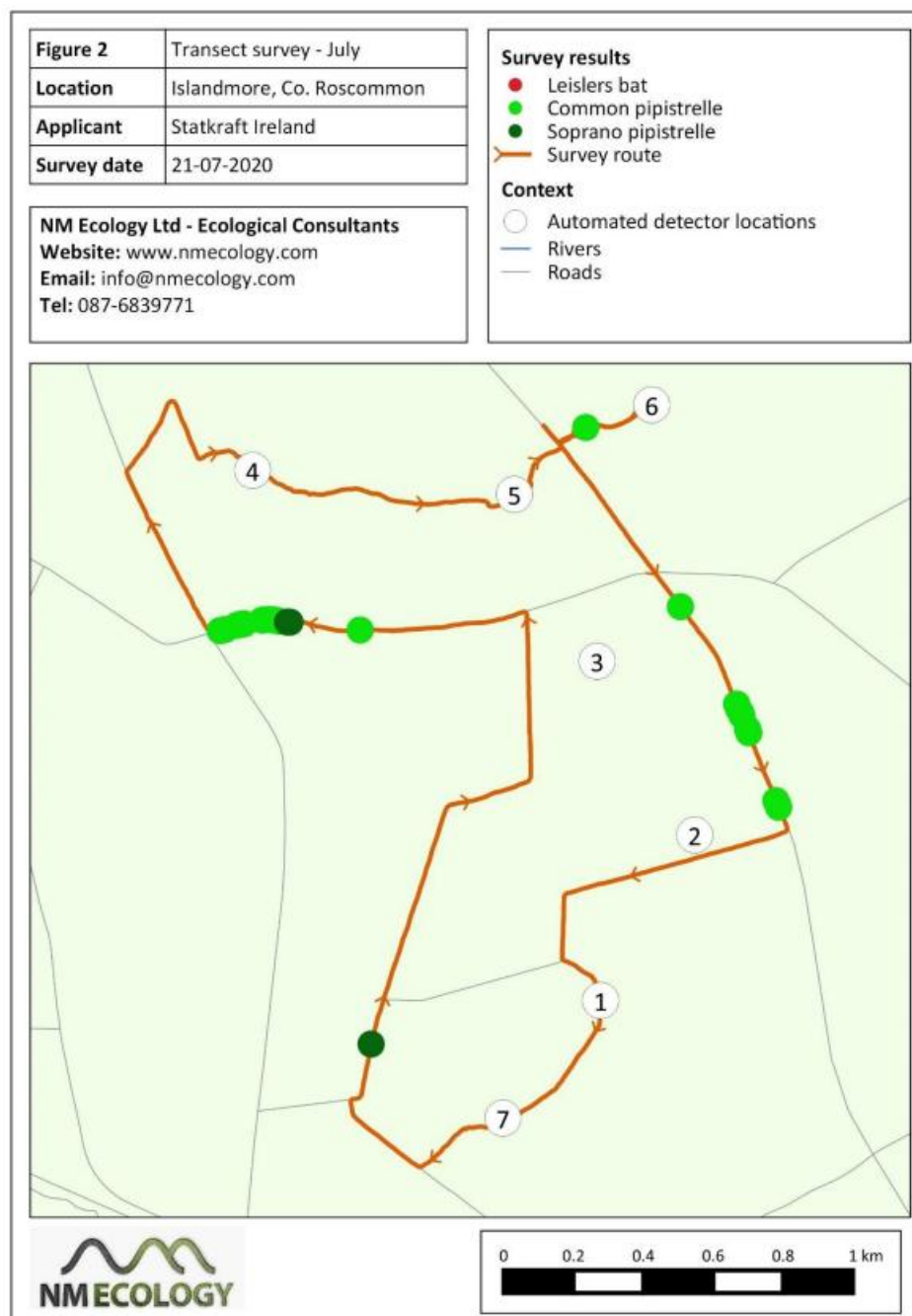


Figure A8.2: Transect Survey, July 2020

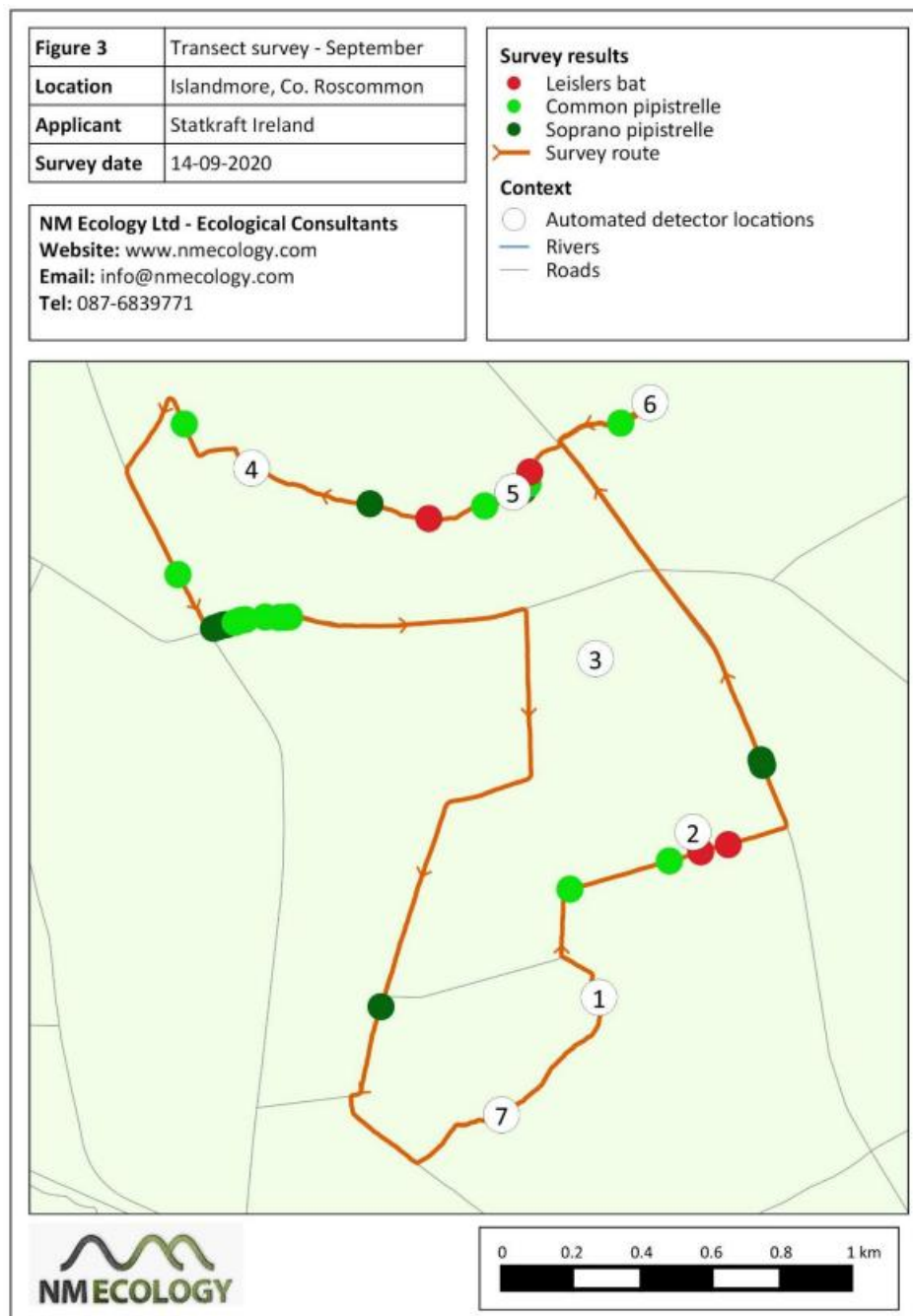


Figure A8.3: Transect Survey, September 2020



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