FEHILY TIMONEY

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Appendix 9.2

Bat Assessment

BAT SURVEY REPORT TO INFORM THE PROPOSED SHANCLOON WIND FARM, CO. GALWAY

Results of the 2020, 2021, 2023 and 2024 surveys

Report prepared by Woodrow Sustainable Solutions Ltd.

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DOCUMENT CONTROL

Document	Bat Survey Report for the Proposed Shancloon Wind Farm 2020-2021, and 2023 Co. Galway.
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Checked Internally	Frederico Hintze, Jason Guile
Approved by	Jason Guile
Date	15/07/2025

STATEMENT OF AUTHORITY

Bat surveys conducted at Shancloon Wind Farm over 2020, 2021 and 2023 were undertaken by staff from Woodrow Sustainable Solutions Ltd (Woodrow), including: Rachel Irwin, Aoife Moroney, Nicole Fleming, Philip Doddy, Sara Fissolo, Julie Kohlstruck, Patrick Devereux, Ajay Cheruthan, Louise Gannon, Radek Dlugosz, and Oisín O'Sullivan. Manual verification of bat spectrograms, data analysis, and reporting were undertaken by Oisín O'Sullivan, Louise Gannon, Aoife Moroney and Rachel Irwin; with input and supervision from Will Woodrow. The report was compiled by Oisín O'Sullivan and Damien McAndrew and has been reviewed and approved by Frederico Hintze and Jason Guile (Associate Director). Experience for the report are shown below, the remainder are provided in Appendix 1.

Oisín O'Sullivan is a Senior Ecologist with Woodrow. Oisín has completed a B.Sc. in Ecology and Environmental Biology at University College Cork. His final year thesis involved bat surveys of urban habitats in Cork City. His work as a graduate ecologist with Woodrow focused on bat data analysis including bat call identification and bat roost/habitat suitability surveys. Oisín has a high level of proficiency with Kaleidoscope, and BatExplorer, the analysis software used to assess bat calls and activity. Oisín also possesses marine and freshwater habitat survey skills from his time studying at UCC. Since joining Woodrow, Oisín has contributed to the writing of multiple bat activity reports. Oisín is a Qualifying member of CIEEM.

Frederico Hintze is an Ecologist at Woodrow. He holds a B.Sc. in Biology-Geology and an M.Sc. in Ecology from the University of Minho (Portugal), as well as a PhD in Animal Biology from the Federal University of Pernambuco (Brazil). Frederico's passion for bat research and monitoring began during his undergraduate thesis in 2009. For his master's thesis, he focused on assessing the impact of agricultural dams on bat populations in North-eastern Portugal. During his PhD, Frederico utilised bioacoustics and species distribution modelling to enhance our understanding of the distribution of Neotropical bat species. Subsequently, Frederico's post-doctoral work led him to the world's largest iron ore mine in Carajás, Pará, Brazil. Here, he aimed to characterize the vocalizations of Amazonian bats and assess the impacts of mining on bat populations. Throughout his career, Frederico has actively participated in more than 10 Environmental Impact Assessment (EIA) projects in Portugal, covering various topics such as dams, wind farms, roads, and transmission lines. He also served as the coordinator of the Bioacoustics Committee at the Brazilian Bat Research Society. In addition to his academic contributions, Frederico has authored over 15 scientific publications and sampling event datasets, showcasing his expertise in the field. As an ecologist with Woodrow, Frederico's work focuses on bat data analysis, including bat call identification, bat roost/habitat suitability surveys, and report writing and review. He possesses a high level of proficiency and experience with various analysis software used to assess bat calls and activity.

Jason Guile is an Associate Director with Woodrow and has reviewed this report. Jason has over 15 years' experience in ecological assessment and holds a BSc in Marine Biology/Oceanography from the University of Wales, Bangor and a HND in Coastal Conservation with Marine Biology from Blackpool and Fylde College. Jason has a wide range of experience in the preparation of Environmental Impact Assessment Reports, Appropriate Assessment Screening reports and Natura Impact Statements. Jason was the lead ecologist on a range of projects in the UK, including large scale infrastructural schemes. Since moving to Ireland, he has been lead ecologist / author (EIAR, EcIA, AA Screening reports and NIS) for a number of projects including historic landfill remediation works, urban planning applications and commercial regeneration sites.

Rachel Irwin is a Graduate Ecologist at Woodrow and has spent two seasons coordinating the company's bat surveys under the direction of Will Woodrow. Over this time, she has developed considerable experience in PRF surveys for bats, emergence/re-entry roost surveys, activity transects, and deployment of static bat detectors for numerous large wind farms sites in both the Republic of Ireland and Northern Ireland; as well as other developments including quarries and smaller residential projects. Rachel was also developing expertise in conducting roost searches of buildings, bridges, and trees under the supervision of licensed members of Woodrow staff - Róisín NigFhloinn and Will

Woodrow. During her time at Woodrow, Rachel has become accomplished at manually identification of bat sonograms utilising Kaleidoscope and BatExplorer. Towards the end of each active bat season, she was responsible for compiling bat reports. She also assists senior members of staff with reporting for Ecological Impact Assessment (EcIA), Biodiversity Chapters for Environmental Impact Assessment Reports (EIAR) and informs the Appropriate Assessment (AA) process. She is a Qualifying member of the CIEEM.

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Appendices

1 INTRODUCTION

1.1 Protected status of bats in Ireland

Bats are protected by law in the Republic of Ireland under the Wildlife Act 1976 and subsequent amendments (2000, 2010, 2012 and 2023). For the purpose of this report, the Wildlife Act 1976 and amendments will be referred to as "Wildlife Acts". Under the Wildlife Acts, it is an offence to intentionally disturb, injure or kill a bat or disturb its resting place.

NPWS (2021a and 2021b) guidelines outline the further legal protection afforded to species listed on Annex IV of the of the Habitats Directive (92/43/EEC), as required by Articles 12, 13 and 16. The Habitats Directive is transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations, 2011-2021 (Habitats Regulations) and this legislates for requirements in relation to Strict Protection of animals listed on Annex IV of the Habitats Directive, which are set out in Regulation 51, with Regulation 54 pertaining to derogation licences, including Regulation 54 A when the Minister is applying for a derogation.

All species of bat are listed on Annex IV of the EU Habitats Directive (1992). The system of Strict Protection is applied across the entire natural range of Annex IV species, even outside of protected sites. As set out in Regulation 51, carrying out of any work with the potential to capture or kill any specimen of a Strictly Protected species, or to disturb these species, and for which a derogation licence has not been granted, may constitute an offence under Regulation 51 of the Habitats Regulations. Furthermore, any action resulting in damage to, or destruction of, a breeding or resting place of an animal may constitute an offence unless a derogation licence has been granted. This action does not need to be deliberate, and this places onus on demonstrating due diligence. Breeding and resting places are protected even when the animals are not using them, once there is a high probability that they will return. Planning authorities may refuse planning permission solely on grounds of the predicted impact on protected species like bats.

The lesser horseshoe bat (*Rhinolophus hipposideros*), which has a current known range within Counties Cork, Kerry, Limerick, Clare, Mayo and Galway in the Republic of Ireland (NPWS, 2019), is listed on Annex II of the EU Habitats Directive 1992. The level of protection offered to the lesser horseshoe bat (LHS) effectively means that areas important for this species are designated as Special Areas of Conservation (SACs). Among Ireland's obligations under the Habitats Directive, is a requirement to "*maintain favourable conservation status*" of this Annex II-listed species.

Ireland has ratified two international conventions, which afford protection to bats amongst other fauna. These are known as the 'Bern' and 'Bonn' Conventions. The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982) exists to conserve all species and their habitats, including bats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries, which covers certain species of bat.

1.2 Outline of the scope of works

This report has been produced to serve as a technical appendix for the Environmental Impact Assessment Report (EIAR) for the proposed Shancloon Wind Farm development, further referred to as the "proposed development". It provides details of methodologies and survey effort for the suite of bat surveys conducted, including tabulated results, maps and charts, from roost suitability surveys, bat activity surveys and static bat detector surveys. These surveys allow for baseline bat populations and habitat suitability of the wind farm site to be described and to facilitate and inform a robust impact assessment and further assessment of bat activity across all years of assessment.

Pre-planning surveys for bats at proposed wind farm sites aim to identify the species occurring within the Site and provide an understanding of how local bat populations utilise the area in terms of density of use for foraging, roosting (maternity and hibernation) and social interactions. This information allows for the identification and assessment of the potential impacts the proposed development, referred to hereafter as the "Site", is likely to have and for appropriate avoidance and/or mitigation measures to be implemented as part of the design phase of the project, in order to comply with the requirements of the EU Habitats Directive 1992 and the EC Habitats Regulations 2011.

To inform the impact assessment at the Site, a range of bat surveys were undertaken including a desk-based study and field surveys. Refer to Figure 1-1 for the site boundary and turbine locations that have been assessed.

As there were no national guidelines for the collection of baseline data for bats when the project started, the guidelines produced by Scottish Natural Heritage *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation* (SNH *et al*. 2019) were adopted for surveys undertaken in 2020 and 2021. While guidance was produced by the Northern Ireland Environment Agency in 2021, SNH *et al*. (2019) were also updated. Therefore, to maintain consistency, the surveys undertaken in 2023 continued to use SNH *et al*. (2019), now referenced as NatureScot *et al*. (2021). For consistency, this report will refer to both versions of the guidance as NatureScot *et al*. (2021), unless specific sections have changed significantly from the 2019 version, in which case the original 2019 reference will be used.

In summary, bat surveys undertaken are in compliance with SNH *et al*., (2019), NatureScot *et al*. (2021) guidelines. Automated static bat recording equipment was deployed three times over the 2020, 2021, and 2023 active bat season at locations representative of the proposed turbine layout and to provide appropriate representation of the habitats within the Site. The deployments were undertaken in conjunction with continuous monitoring of climatic conditions on the Site to ensure recording windows were inline within compliant weather parameters. There were also at height static surveys carried out during 2023 to determine the activity of species which may be of higher risk of collision, particularly Leisler's bat, who are known for their distinctively high flight patterns.

In addition, informed by an assessment of potential bat roost features within the Site, roost emergence/re-entry surveys and bat activity transects were undertaken. The observations recorded during roost emergence/re-entry surveys and bat activity surveys contextualise how bats utilise the Site.

Figure 1-1 - Proposed turbine layout and 300 m roost characterisation buffer zone

2 METHODOLOGY

Bat surveys were conducted by Woodrow Sustainable Solutions Ltd. at the Site over the 2020, 2021 and 2023 bat activity seasons to ensure compliance with the most recently published guidelines pertaining to surveying, impact assessment, and mitigation for bats at onshore wind turbines (SNH *et al*. 2019). This guidance document supersedes previous guidelines (Collins, 2016 updating Hundt, 2012 & BCI, 2012) and requires a site-by-site approach to survey design, with the only prescriptive element being the positioning, number, and duration of static bat detector deployments, as well as the strongly recommended continual monitoring of site-specific weather data on rainfall, temperature, and wind speeds. SNH (2019) and NatureScot (2021) guidelines require as a minimum three deployments of static detectors aimed at covering spring (April to May), summer (June to mid-August) and autumn (mid-August to October), each with a minimum deployment period of 10 nights (within compliant weather parameters). 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. Compliant weather conditions are defined as: temperatures at ≥ 8°C at dusk, maximum ground-level wind speed of 5 m/s, and no, or only very light, periodic rainfall.

Additional requirements of the SNH *et al*. (2019) guidelines include swarming surveys and winter roost inspections if potential hibernation roosts are identified. Transect and/or vantage point surveys are seen as methods used to complement the static detector surveys, with applicability being discretionary and site-specific.

2.1 Desk study

A desk-based review of habitat availability in the environs of the Site, and available bat data were used to inform the scope to the bat surveys required. As recommended by both BCI (2012) and NatureScot (2021) the area covered by the desk-based review was 10km from the Site. The desk-based study included:

- Reviewing distances from closest Natura 2000 sites designated for bats (only bat SACs in Ireland are for lesser horseshoe bat, *Rhinolophus hipposideros*) - the area of interest (in Co. Galway) is within the current known population range for lesser horseshoe bat in Ireland (NPWS, 2018)
- Examining aerial imagery and 6-inch maps to identify potential bat foraging and roosting habitats
- Following Lundy *et al*. (2011) in order to provide a high-level assessment of potential habitat suitability for different species of bat occurring in Ireland
- Review of data obtained from Bat Conservation Ireland (BCI) within 10 km of the Site
- Biodiversity Maps for the 10km grid square covering the Site [M35 Irish Grid]

2.2 Roost assessment surveys

NatureScot (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 proposed development 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 always conduct roost assessment surveys within 300 m of the potential build area. Features along the access tracks between turbines (within *c*. 30 m). Wide reaching roost and foraging habitat assessment of the Site were undertaken during March 2020, as part of a scoping exercise.

Surveyors utilised the assessment criteria described in Collins (2016) – Page 35, Table 4.1, which provides guidelines for assessing potential suitability of habitat features as bat roosts and for foraging bats. This allows surveyors to assign features a score of 'negligible', 'low', 'moderate' or 'high' status in terms of the presence of Potential Roost Features (PRFs) or quality of habitat for commuting and/or foraging. Based on the features present and the location of trees and/or other structures, the potential use of the feature can also be considered, and classified (as in Hundt, 2012 and BTHK, 2023) Collins (2016) has since been updated (BTHK, 2023), with the assessment outcomes and criteria remaining consistent and valid under current guidelines:

- Maternity (breeding roost);
- Summer / transitional (to include transitional, occasional, satellite, night, and day roosts);
- Hibernation roost.

Surveyors initially employed non-invasive external and internal inspection techniques for any building encountered, and trees were assessed from the ground. All turbine locations were assessed along with a 300 m buffer for bat roost potential (refer to Figure 1-1).

Based on the findings of the roost assessment surveys features classed as having moderate to high suitability for bats and/ or demonstrating likely occupancy, (e.g., bat dropping found, bat fly puparia or an ammonia-type smell indicating bat urine) were targeted for further bat activity surveys, including dusk emergence/dawn re-entry surveys.

Further roost potential assessments of the wider area were carried out in 2024. Two site visits on 17 Jul 2024 and 19 Aug 2024 were undertaken. These focused on areas of Site infrastructure once design elements had been finalised. Features found to be suitable were inspected with an endoscope under licence (DER/BAT 2024-27). For consistency with previous years of survey, Collins *et al.* 2016 (superseded by Collins *et al,* 2023) was used to classify roost features on trees.

2.3 Roost emergence/ re-entry surveys

Dusk bat emergence surveys commenced 30 minutes prior to sunset and concluded 1.5 hours after sunset, whereas dawn re-entry surveys began 1.5 hours before sunrise and concluded 30 minutes after sunrise. Trained observers recorded the occurrence of dusk emergences and dawn re-entries near potential roosting sites. Surveyors took written notes and used hand-held Batlogger M (Elekon) bat detectors, which enabled the collection of geo-referenced records of bat activity. Subsequently, the captured acoustic recordings were subjected to analysis using the BatExplorer software.

A summary of the times, weather conditions, surveyors, and locations for the surveys conducted is provided in Table 2-1.

2.4 Winter roost inspections

NatureScot (2012) recommends that winter roost surveys should also be carried out for any potential hibernation roost within 200 m plus rotor radius of developable area. Based on the results of the roost assessment surveys, eight structures were identified for hibernation potential. The hibernation surveys were conducted on the 25-Feb-2021, within the timeframe in which bats would still be hibernating. Surveys involved searching for and collecting bat faecal samples, and closer examination of roost potential.

2.5 Bat activity surveys – walked/driven transects

Under the NatureScot (2021), the application of transect surveys is discretionary, with survey requirements designed on a site-by-site basis. Transects are complementary to data collected from static bat detectors; and are important for identifying flight lines and for gaining understanding of bat abundance within the survey area. Driven transects can provide useful information on the wider landscape in the vicinity of the Site. If driven transects are undertaken, it is important that appropriate microphones are used and are directed above the vehicle. It is also important to remain at a constant low speed (< 10 km/h). Point counts (of a fixed duration) can be incorporated into transects to survey specific features to provide information on comparative density of use.

Four transects were completed in both 2020 and 2021 with the use of Batlogger M (Elekon) bat detectors. Survey dates and weather conditions for transects conducted in 2020 and 2021 are provided in Table 2-2, Figure 2-1 and Figure 2-2 illustrate the transect routes.

Field records were made of bat species encountered, number of bat passes, activity (where known e.g. foraging, commuting, advertising), travelling direction and approximate height (where known). Temperature and wind speed were measured at intervals throughout the survey. Batlogger M detectors recorded temperature throughout the surveys. Additional walked or driven transects were not undertaken in 2023/2024 as the static detector data collected in these years was considered sufficient to accurately characterise bat activity across the Site. The 2020 and 2021 transect data confirmed the main flight lines and patterns of bat use within the survey area, which remained consistent with the findings from subsequent static monitoring. Therefore, further transects were not deemed necessary under current best practice survey guidelines.

Table 2-1 - Summary of emergence and re-entry survey dates, timing & weather conditions for 2020 and 2021

Date	Start time	End time	Survey type - coverage (surveyors)	Weather Conditions
01-Sep-2020 Sunset 20:25	20:14	21:50	Emergence survey – Conducted at F2. (J. Kohlstruck & A. Cheruthan)	Wind: 3.05 m/s Dry Temp: 14°C Started to rain heavily at 21:40
03-Sep-2020 Sunset: 20:25	21:00	21:55	Emergence survey - Conducted at F2. (J. Kohlstruck & A. Cheruthan)	Wind: 2.77 m/s WSW Dry Temp: 13°C
04-Sep-2020 Sunrise: 6:50	05:30	07:05	Re-entry survey – Conducted at F3. (J. Kohlstruck & A. Cheruthan)	Wind: 3.24 m/s WSW Dry Temp: 12°C
01-Oct-2020 Sunset 19:11	18:55	20:40	Emergence survey – Conducted at F3 (A. Moroney & N. Fleming)	Wind: 4 m/s NNE Overcast Drizzle Temp: 8°C
08-Jun-2021 Sunset 22:01	21:30	23:30	Emergence survey – Conducted at F1 (O. O'Sullivan & R. Dlugosz)	Wind: <1.5 m/s Misty/Light rain Temp: 17°C
30-Jun-2021 Sunset 22:07	21:50	23:37	Emergence survey Conducted at F3 (S. Fissolo & O. O'Sullivan)	Wind: 0 m/s Low mist Temp: 10°C
01-Jul-2021 Sunrise: 05:11	03:45	05:25	Re-entry survey – Conducted at F3 (S. Fissolo & O. O'Sullivan)	Wind: 0 m/s Low mist Temp: 8°C
14-Jul-2021 Sunset: 21:57	21:40	23:40	Emergence survey – Two trees were surveyed at F.7. (L. Gannon & S. Fissolo)	Wind: <1.5 m/s Dry Temp: 18°C
15-Jul-2021 Sunrise: 05:26	04:05	05:41	Re-entry survey – Conducted at F1. (L. Gannon & S. Fissolo)	Wind: 2.8 m/s Dry Temp: 22°C
16-Sept-2021 Sunset 19:49	19:38	20:15	Emergence survey – Due to heavy rain commencing at 20:03 it was deemed **non-compliant**. (S. Fissolo & P. Devereux)	Wind: 6 m/s Dry at start of survey Temp: 18°C Rain began at 20:03 and continued to get heavier.
17-Sept-2021 Sunrise: 07:13	05:45	07:30	Re-entry survey – Conducted at F2. (S. Fissolo & P. Devereux)	Wind: 6 m/s Light showers Temp: 15°C
29-Sept-2021 Sunset 19:11	19:04	20:53	Emergence survey – Conducted at F1. (S. Fissolo & A. Moroney)	Wind: 4 m/s N Light rain Overcast Temp: 11°C

Table 2-2 - Summary of transect survey dates, timing & weather conditions for 2020 and 2021

Date	Start time	End time	Survey type - coverage (surveyors)	Weather Conditions
02-Jul-2020 Sunset 22:03	21:40	00:30	Transect survey - Walked transect covering the western section of the site with a short-walked section covering the southwestern point of the site (R. Irwin & P. Doddy)	Wind: 2.22 m/s NNW Drizzle Temp: 12°C
01-Sep-2020 Sunset: 20.25	21:50	21:52	Transect survey – A transect survey was begun but due to heavy rain commencing at 21:50 it was deemed **non-compliant**. (J. Kohlstruck & A. Cheruthan).	Wind: 3.05 m/s Heavy Rain Temp: 14°C
03-Sep-2020 Sunset: 20:25	21:55	00:58	Transect survey – A walked/driven transect in the eastern section of the site. A point count was then conducted at the farmhouse in the western section of the site, followed by a driven transect to the north of the eastern section of the site. (J. Kohlstruck & A. Cheruthan)	Wind: 2.98 m/s WSW Dry Temp: 12°C
17-Sep-2020 Sunset 19:47	19:30	22:10	Transect survey – Transect of both the eastern and western section of the site. (K. Westman)	Wind: 0.83 m/s ENE Cloud: 4/8 oktas Dry Temp: 13 - 17°C
01-Oct-2020 Sunset 19:11	20:40	00:13	Transect survey – A walked transect in the eastern section of the site with a driven transect to the north of the eastern section and a short waked transect along the western section of the site (A. Moroney & N. Fleming)	Wind: 4 m/s NNE Overcast Drizzle Temp: 8°C
08-Jun-2021 Sunset 22:01	23:30	00:52	Transect survey – First section walked and second section of transect driven. (O. O'Sullivan & R. Dlugosz)	Wind: 0.5 m/s Overcast Dry Temp: 16°C
30-Jun-2021 Sunset 22:07	23:37	00:35	Transect – This transect covered a portion of the eastern section of the site with a point count in the acid grassland commonage. (S. Fissolo & O. O'Sullivan)	Wind: 0 m/s Mist Temp: 10°C
14-Jul-2021 Sunset: 21:57	23:41	00:55	Transect survey – A walked and driven transect in the eastern section of the site was conducted. (L. Gannon & S. Fissolo)	Wind: 2.98 m/s WSW Dry Temp: 1/°C
11-Oct-2021 Sunset: 18:50	18:50	20:55	Transect survey – A transect survey was conducted in the southwest of the eastern section of the site. (O. O'Sullivan & A. Moroney)	Wind: 0 m/s Dry Temp: 12°C

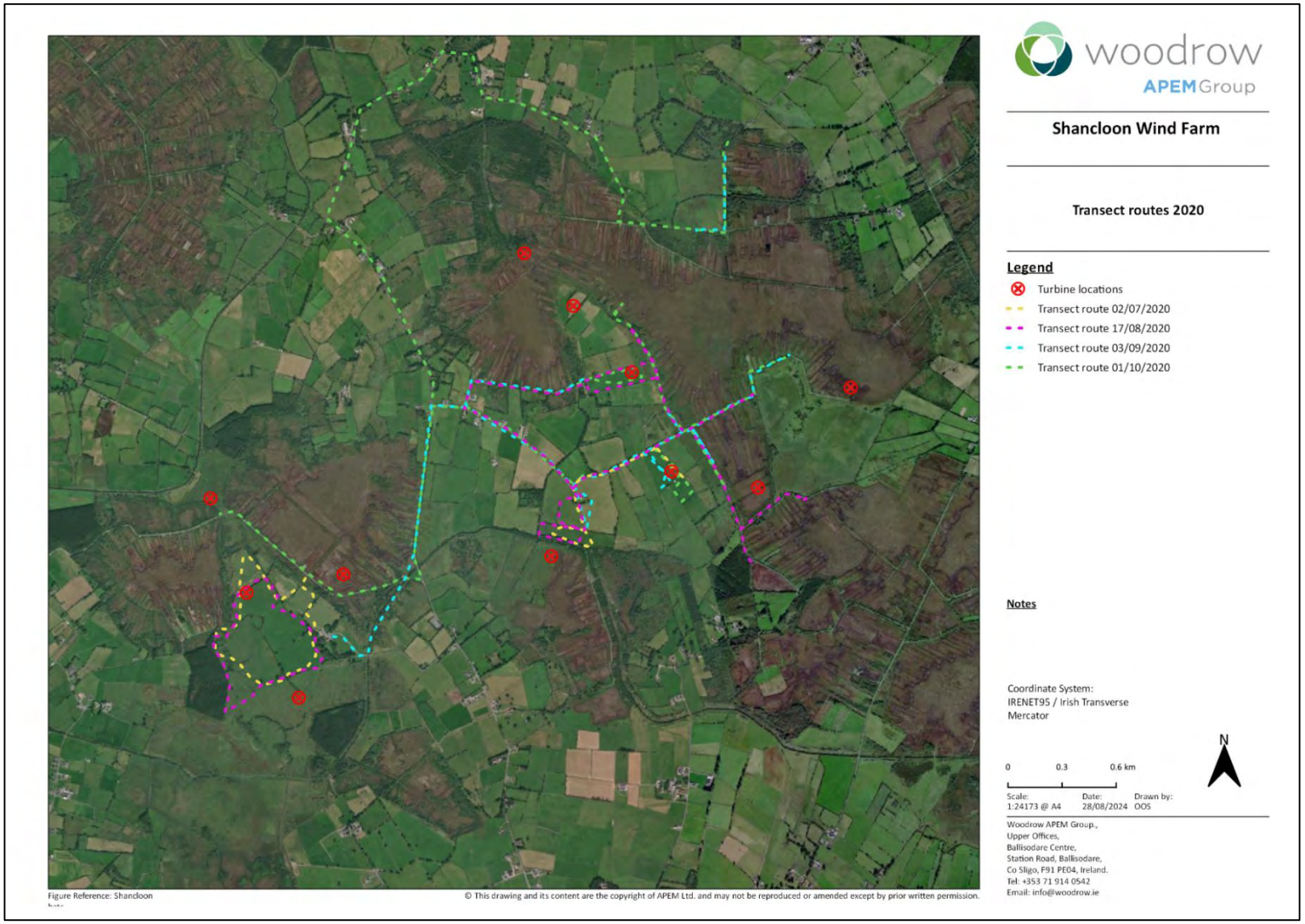

Figure 2-1 - Transect routes 2020

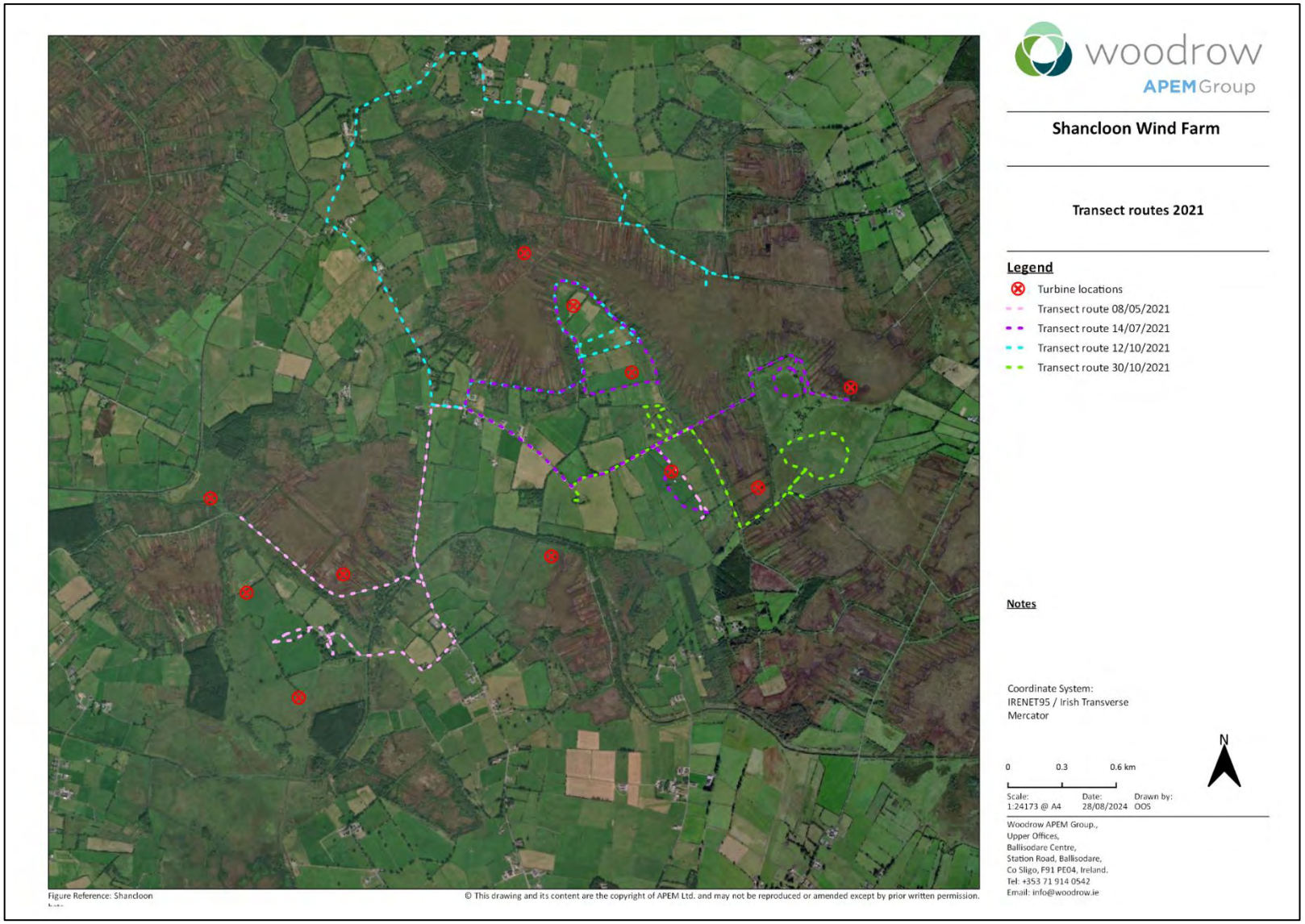

Figure 2-2 - Transect routes 2021

2.6 Static bat detector surveys

Static detector surveys for 2020 were undertaken using Wildlife Acoustics Song Meters (Song Meter 2 Bat Plus (SM2BAT+) using the SMX-U1 microphones and Song Meter 4 Bat-Full Spectrum (SM4BAT-FS) using SMM-U2 microphones) on three occasions covering the spring, summer, and autumn activity seasons. Static detector surveys for 2021 were undertaken again using Wildlife Acoustic Song Meters (SM4BAT-FSs and SM Mini Bat) and were deployed during, spring, summer, and autumn activity seasons with a supplementary deployment between spring and summer for additional contextual data. Static detector surveys for 2023 were undertaken using Wildlife Acoustics Song Meters (SM4Bat-FS and SM Mini Bat) and were deployed during spring, summer and autumn activity seasons.

A 384 kHz sampling rate was set for all detectors, and recording was scheduled from 30 minutes before sunset until 30 minutes after sunrise, for at least 10 weather-compliant nights (see section 2.7 for details on weather compliance). Static bat detectors were deployed to record the bat species present and to provide an overview of how bat activity is distributed over the site and specifically at potential turbine locations. In cases where redeployment in the exact original location was not feasible (due to access, health and safety or similar), the new deployment was ensured to within a 100-meter radius of the original location. The letter "a" was used to indicate the original location, and the letter "b" or “c” was employed to represent the new locations within 100 meters from the original location.

The static detector locations for each year are shown in Figure 2-3, Figure 2-4 and Figure 2-5.A summary of the dates, locations and recording schedules of static detectors are provided in Appendix 2.

2.7 Monitoring climatic of conditions

Monitoring climatic conditions was undertaken through the deployment of an on-site fully automated weather station with 3G connectivity.

The Davis Vantage Vue wireless integrated sensor suite weather station deployed, provided data on a real-time basis. This allows weather station functionality to be checked when needed during the survey season and for action to be taken if a station fails or there are concerns regarding the data. This obviates the need for a second (backup) weather station. The weather station collected the full range of weather data, including temperature, wind speed and rainfall, which allows surveyors to determine whether deployments nights were compliant with the prescribed weather parameters (≥ 8°C at dusk, max. ground level wind speed of 5 m/s and minimal rainfall). The weather station was deployed at 53.529635, -9.025520 in an open area, free of shelter, to give the most the most representative data for the full season.

Deployment periods can then be adjusted to ensure 10 nights of compliant data are captured. In addition, site specific weather data can be useful for investigating the recorded patterns of site usage by bats.

Weather datasets were analysed and visualised through scatter plots with 95% confidence ellipses across each of the deployment seasons.

2.8 Calibration and testing of recording equipment

Calibration and testing of recording equipment is required by all 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 defendable 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 and battery checks, and post- and pre-deployment microphone sensitivity checks.

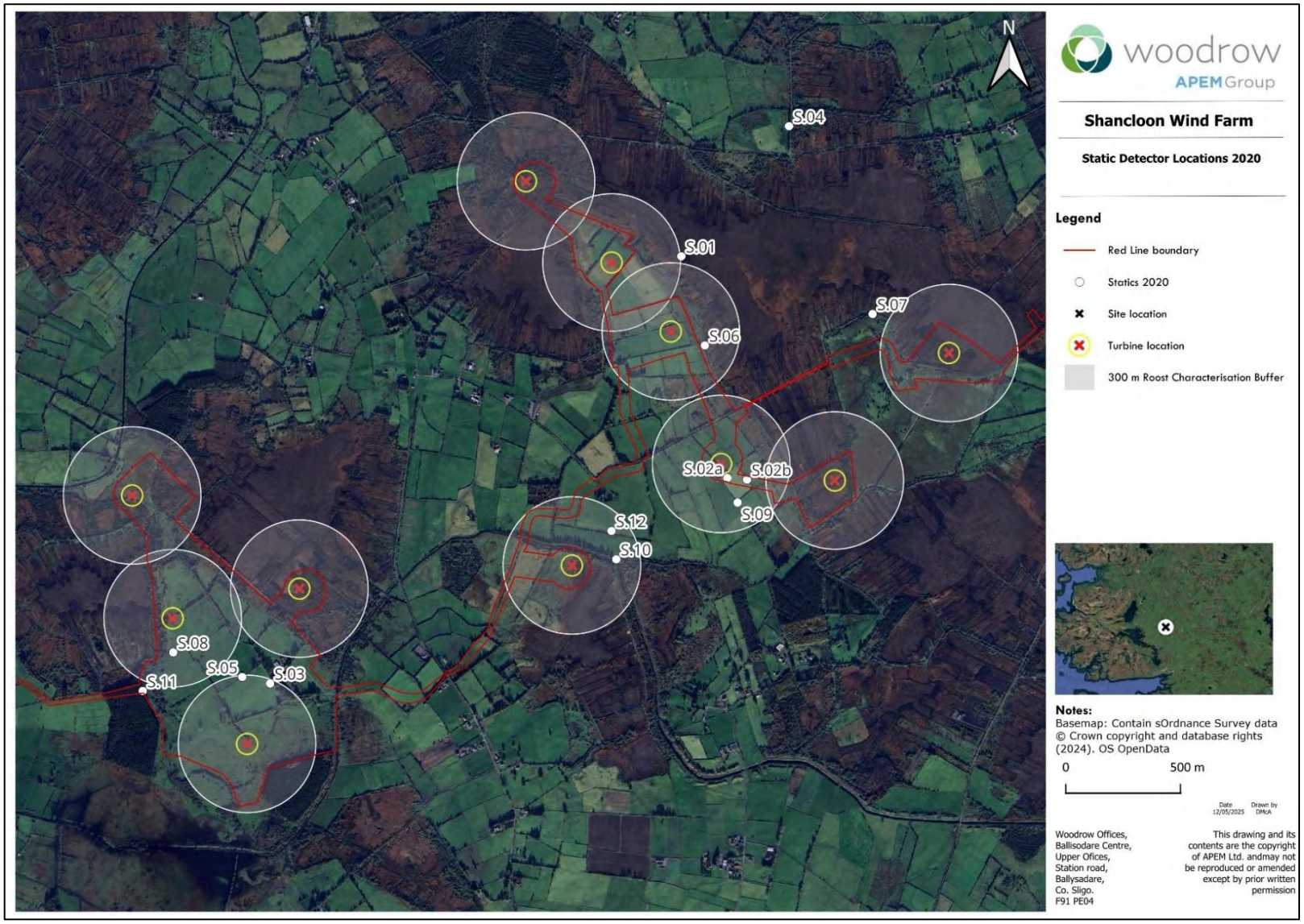

Figure 2-3 - Combined static detector deployment across 2020 monitoring

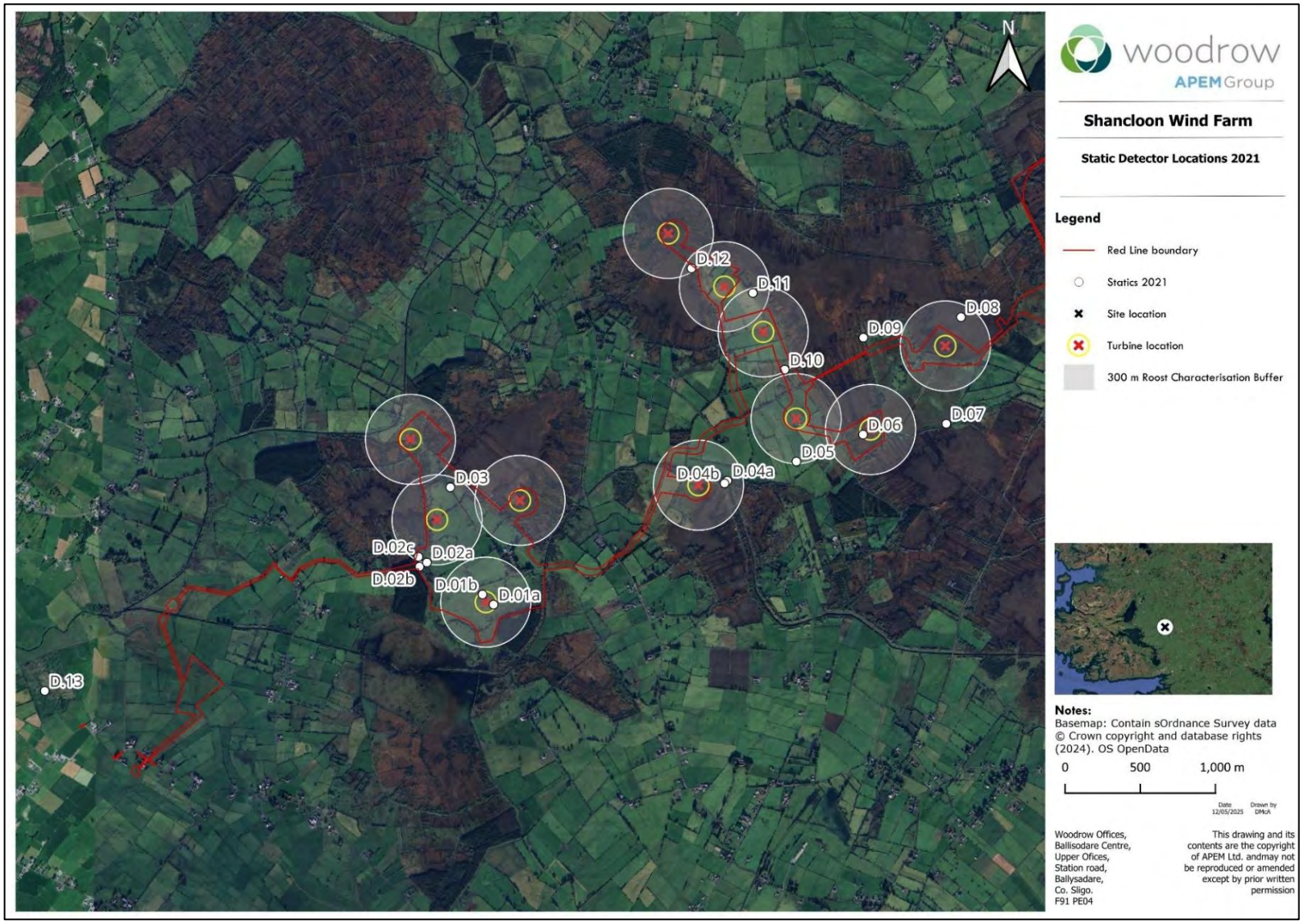

Figure 2-4 - Combined static detector deployment across 2021 monitoring

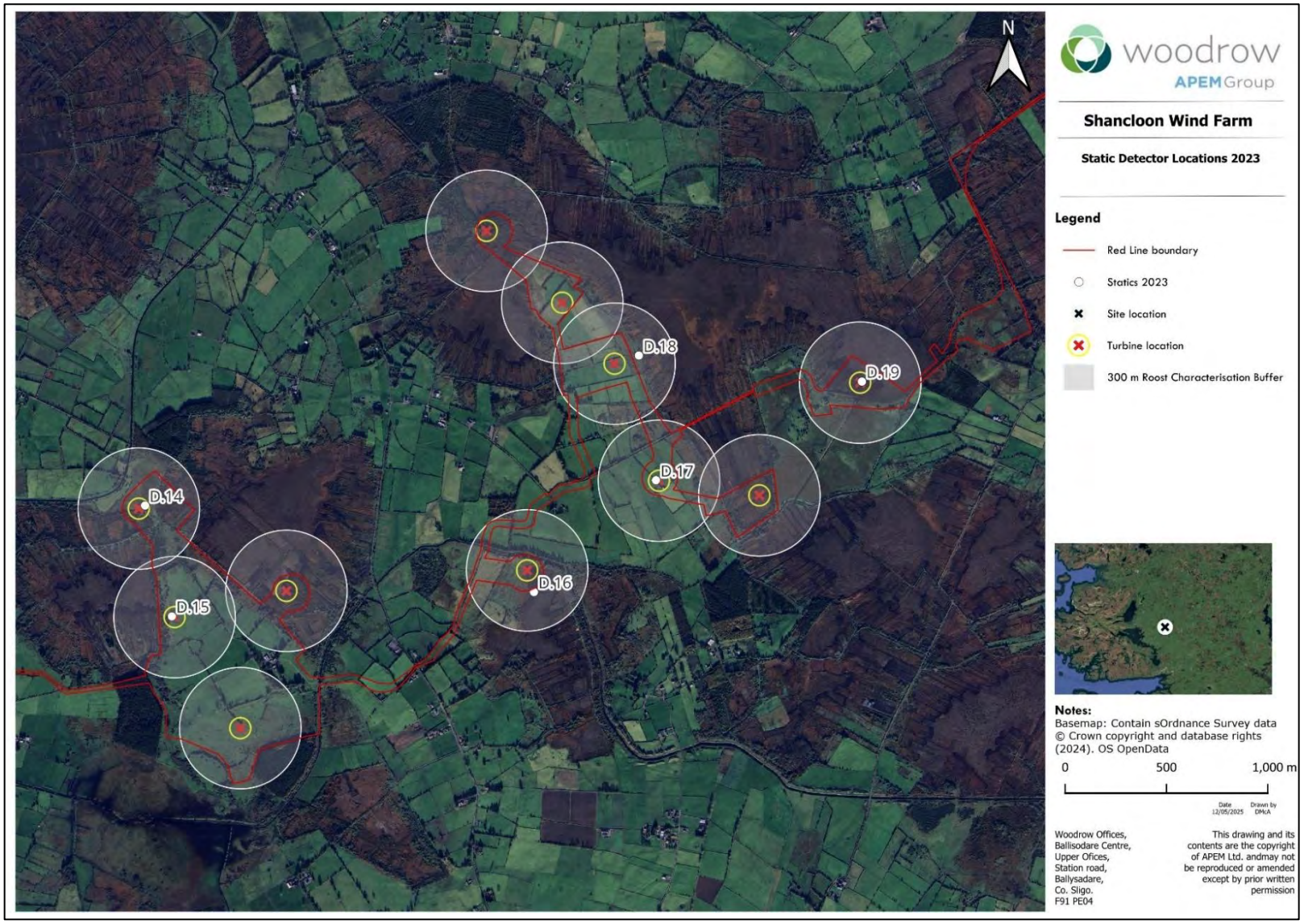

Figure 2-5 - Combined static detector deployment across 2023 monitoring

2.9 Analysis

For data collected using SM2Bat+, SM Mini Bat and SM4BAT-FS, analysis of sound recordings was undertaken using Kaleidoscope software (Version 5.6.3), while BatExplorer software was used for the data collected using the Batlogger M detectors. This analysis aimed to confirm species (or genus for Myotis species) and bat activity (exact number of bat passes) for each deployment and transect survey. All sound files were run through Kaleidoscope Pro's auto-identification (Version 5.6.3), and then manual verification was undertaken by Woodrow operatives. Russ (2012), Middleton *et al*. (2014), and Middleton et al. (2022) were used to aid in the species identification of bat calls during data analysis.

Recordings of common and soprano pipistrelles for which Kaleidoscope determined a match ratio of 100% (meaning every recorded call matched the known species call parameters) were deemed accurate to a degree that did not necessitate manual verification. Nevertheless, all other automatically identified bat species were subjected to manual check, which is above the recommended 10% manual verification outlined in SNH *et al*. (2019) and NatureScot *et al*. (2021).

Recordings automatically identified as noise were determined to fall outside of the recording parameters for the survey and were classified as noise. Any calls showing up as "NoID," in which the software cannot identify any species, were also checked and manually identified.

Bat activity was measured by the number of bat passes recorded. Bat passes are commonly used as a metric for bat activity and determine species presence (Kerbiriou *et al*., 2019). Therefore, we defined a bat pass as the detection of one or more bat calls from a single species within a 15-second sound file. Recordings in which multiple species (or individuals) were recorded were split into separate bat passes. The number of bat passes was considered synonymous with registrations, as defined by commonly accepted practice, which refers to species presence within a 15-second sound file.

Geographical and temporal context for activity levels was then examined through internal comparative analysis. Woodrow have developed an in-house analysis script for data collected. Mean and median bat passes per hour were generated using statistical software R. In order to provide an appropriate test of activity within the Site, Woodrow analysis compares activity levels with other wind farm developments from its own database (at least six) to provide comparative activity levels.

Activity levels are assessed using the criteria applied by Matthews *et al*. (2016). This study examines the risk of European bat species to wind energy developments in the UK. Woodrow have adapted the Matthews *et al*. (2016) scale of activity per night to a scale of bat passes per hour. This adaptation uses an average of 10 hours per night across the active bat season to determine the cut-off of high activity. Error! Reference source not found. shows the adapted activity levels. The output is then converted to show the mean and median activity levels that can then be used to determine a risk assessment in relation to bat activity (It should be noted that presenting mean activity levels can be highly misleading where the data are highly skewed, as is frequently the case with bat activity at wind turbines (Lintott & Mathews, 2018)). A judgement can then be made on which is the most relevant.

The results are presented at both local level (per detector) and site scale to allow assessment of activity across the proposed development (refer to Section 3.6).

Table 2-3 - Activity level classification as per Mathews *et al*. 2016 adapted to hourly activity levels

Classification	Bat passes per hour
Low	<2
Moderate	2 – 4
High	≥5

2.10 Limitations

Prior to the bat surveys, a desktop study is carried out. One limitation of this study is the use of Lundy *et al*. (2011) for the habitat suitability index, given that these results only use records up to 2009 to provide suitability for bats. However, while there are no new roost data available for the metric, there have been no major developments in the area surrounding the Site therefore, the habitat suitability metric is still feasible for the Site.

While detectors S.05, S.07 and S.11 failed to record for the compliant 10 nights during autumn 2020 (refer to Appendix 2), the data collected shows activity as soon as weather conditions were compliant. Therefore, even with the shortage of weather compliant nights, all data (including zero count data) from these detectors are considered to be relevant and have been used in the assessment.

During the 2021 spring deployment, detectors D.01 and D.02 suffered interference from livestock (recording 1 and 7 nights respectively), and D.08 had a faulty memory card resulting in corrupted data. Due to these detector failures, three detectors were re-deployed covering 22 nights between the spring and summer deployments (refer to Appendix 2). The analysis takes into account the date at which the data was collected and groups it with the appropriate season (spring or summer).

In cases where redeployment in the exact original location was not feasible, the new deployment was ensured to be within a 100 m radius of the original location. This approach allowed us to compensate for any potential limitations and gather supplementary data and provided clear identification and distinction between the locations.

During the 2023 spring static deployment, there was a technical issue with D.19, and with D16 during the summer deployment (refer to Appendix 2). However, as the 2023 survey was to show activity levels were still the same around the Site, and there had been no development or indication that activity would have changed during the planning process, the data collected for the duration of deployment was appropriate for the assessment update.

3 SURVEY RESULTS

This section provides the detailed results for bat surveys conducted during the 2020, 2021 and 2023 survey period, as well as additional habitat assessment surveys conducted in March 2021. Deployment locations can be seen in Figure 2-3, Figure 2-4 and Figure 2-5. The weather data during these deployment periods is located in Appendix 3.

3.1 Desk study.

A data request was submitted to BCI on the 6 April 2020 for known roost records in the relevant grid references M 31891 53567 and M 34427 55042. A total of 39 bat records were provided, including 11 roost records, none of which are located within the Site. The closest previously documented bat roost is a brown long-eared, soprano pipistrelle, whiskered bat, and lesser horseshoe bat roost located *c.* 5 km from the site boundary. The results of the BCI request are provided in Appendix 4. The BCI data identifies eight bat species recorded within the 10 km search radius of the grid references. These are:

- Common pipistrelle *Pipistrellus pipistrellus* (PIPPIP)
- Soprano pipistrelle *Pipistrellus pygmaeus* (PIPPYG)
- Leisler's bat *Nyctalus leisleri* (NYCLEI)
- Brown long-eared bat *Plecotus auritus* (PLEAUR)
- Daubenton's bat *Myotis daubentonii* (MYSP)
- Natterer's bat *Myotis nattereri* (MYSP)
- Whiskered bat. *Myotis mystacinus* (MYSP)
- Lesser horseshoer bat *Rhinolophus hipposideros* (RHIHIP)

The only Natura 2000 sites designated for bats in Ireland are for lesser horseshoe bats (LHS). The nearest Special Area of Conservation for LHS is Kildun Souterrain [002320] which is located approximately 13.5 km west of the Site. This lies beyond the foraging range of lesser horseshoe bats of 2.5 km and the estimated maximum range for which they can travel between summer and winter roosts of 10 km (Collins 2016). The position of this SAC relative to the Site, along with identified foraging and commuting ranges is shown in Figure 3-1.

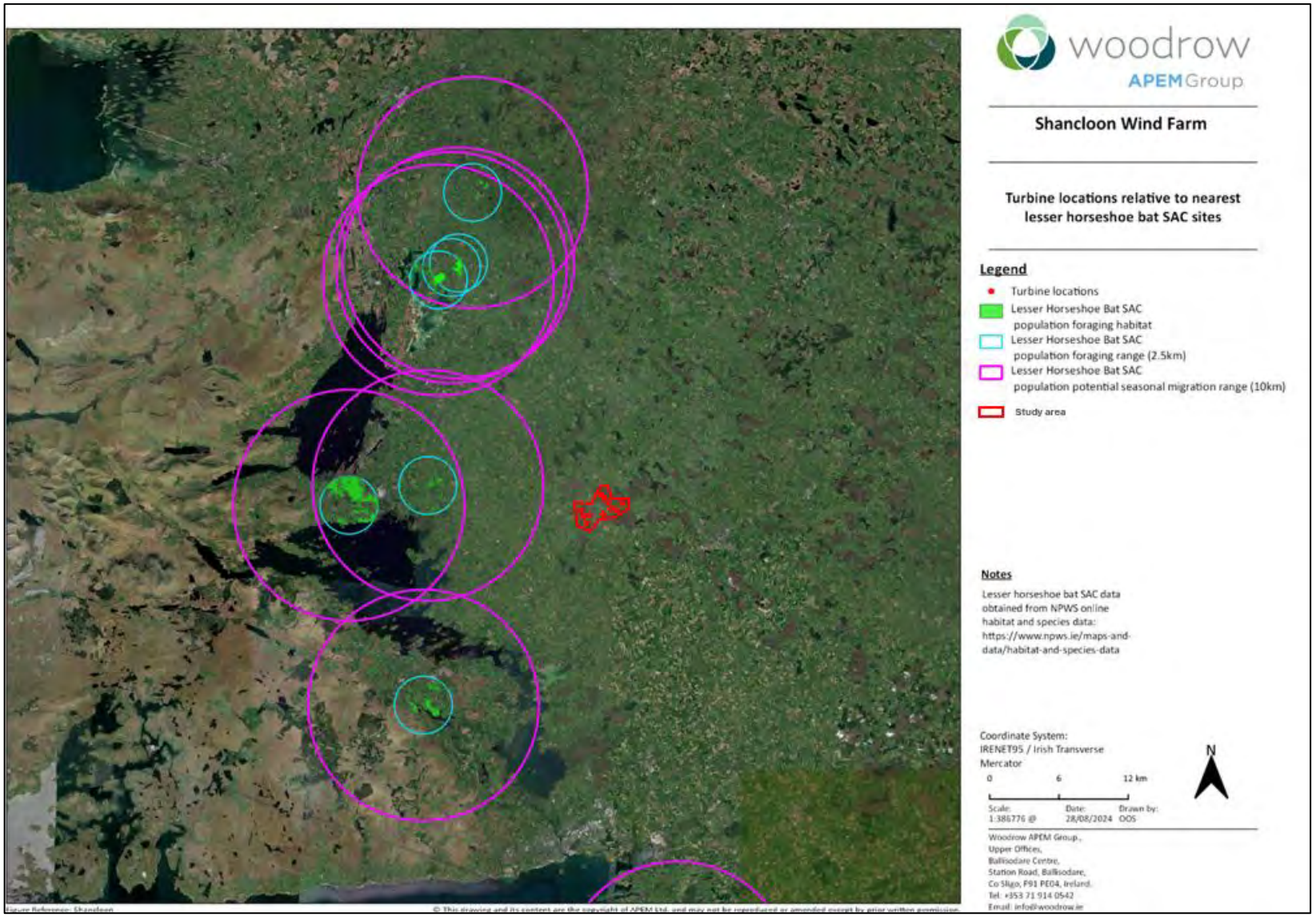

Figure 3-1 - Site relative to the nearest lesser horseshoe bat SAC and their foraging / seasonal migration

3.2 Roost assessment

Based on Lundy *et al.* (2011) the overall suitability for the two 5x5 km squares encompassing the site are scored as having moderate (a portion of the eastern section of the site) and moderate/high (the western section of the site and the other half of the eastern section of the site) habitat suitability for all bat species combined. Individual species habitat suitability is shown and illustrated in Appendix 5.

During a high-level assessment of habitats within the Site, undertaken in 2020 as part of the roost assessment survey, habitats within the Site were identified as comprising of bog, improved grassland, arable crop fields, with some acidic grassland in the eastern section of the site. There are treelines of varied ages along the borders of improved grassland which provide networks of foraging and commuting potential. There is conifer plantation along the western boundary of the western section of the site. There is a river lined on both banks by scrub and treelines running through the southwestern tip of the eastern section of the site, an area of high foraging potential. The habitats surrounding the specific detectors were recorded as part of the deployment survey effort. Results are shown in Appendix 5.

Preliminary surveys for roost features identified several structures of moderate or higher roost potential within the Site. Figure 3-2 shows the location of roost features classed as moderate or higher within the site;

- F1: Derelict house and cattle shed adjacent to occupied farmhouse
- F2: Abandoned cottage which has been boarded up, with entry locations in its eaves
- F3: Concrete derelict two-storey house in a field with multiple empty windows and a large crack through concrete to brickwork on one aspect of the house, with abandoned cattle shed adjacent

The results of the wider area survey in 2024 identified several buildings and trees with negligible and low potential. These are:

- F8: Building of low potential,
- F14: Building of negligible potential
- F9, F10, F11, F12, F,14, F15, and F16: Multiple trees of low potential.
- F13: Tree of moderate potential which had a “ram’s horns” feature running up its length.

F13 could not be inspected completely given the length and nature of the feature, however, a partial inspection was completed and found no roosting bats. The two buildings F8 and F14 were also inspected, and no roosting bats or evidence of roosting bats were found. The roost assessment results are summarised in Table 3-1.

3.3 Roost emergence/ re-entry surveys

The locations of moderate or high roost potential identified in 2020 are shown in Figure 3-2Error! Reference source not found.. The summary of survey times, conditions and roost feature locations for which emergence and re-entry surveys were conducted are shown in Table 2-1, A summary of the roost results are shown in Table 3-1Table 3-1 with a more detailed account and pictures of potential roost locations are located in Appendix 6. Results of the faecal samples are shown in Table 3-2.

Table 3-1 - Summary of all roost survey results

Location Code	Survey dates	Roost type	Evidence	Species	Confirmed Roost
F1 - House	08-Jun-2021, 15-Jul-2021 29-Sept-2021	Hibernation; Night roost (BLE) Night roost (C. pip)	Faecal; feeding remains (BLE) Emergence/re-entry (BLE; C.pip)	Brown long-eared Common pipistrelle	Y
F1 - Shed	29-Sept-2021	Potential Hibernation/ Opportunistic use	Faecal	Natterer's bat	Y
F2	01-Sep-2020 03-Sep-2020 17-Sept-2021	Potential maternity roost	Emergence/ re-entry	Soprano pipistrelle	Y
F3	04-Sep-2020 01-Oct-2020 30-Jun-2021 01-Jul-2021	Transitional (Leisler's) Satellite roost Males/Non-breeding females (S. pip)	Emergence/ re-entry	Leisler's bat Soprano pipistrelle	Y
F4		Re-assessed as negligible	n/a	n/a	
F5		Re-assessed as negligible	n/a	n/a	
F6		Re-assessed as negligible	n/a	n/a	
F7	14-Jul-2021	No confirmed roost	Emergence	n/a	N
F8	14-Jul-2021	No confirmed roost	Emergence	n/a	N

Location Code	Survey dates	Roost type	Evidence	Species	Confirmed Roost
F9	17-Jul-2024	No confirmed roost	Inspected with endoscope	n/a	N
F10	17-Jul-2024	No confirmed roost	Could not be fully inspected	n/a	N
F11	17-Jul-2024	No confirmed roost	Inspected with endoscope	n/a	N
F12	17-Jul-2024	No confirmed roost	Inspected with endoscope	n/a	N
F13	17-Jul-2024	No confirmed roost	Full length of feature could not be inspected. Moderate tree. Subject to pre-construction inspection.	n/a	N
F14	17-Jul-2024	No confirmed roost	Inspected with endoscope	n/a	N
F15	08-Aug-2024	No confirmed roost	Inspected with endoscope	n/a	N
F16	08-Aug-2024	No confirmed roost	Inspected with endoscope		N

Table 3-2 - Genetic analysis results of faecal samples collected during winter inspection

Sample Reference Code	Collection location	Common name	Species name	Grade score (%)
BAT014D	F1 (Derelict house)	Brown long-eared bat	*Plecotus auritus*	99.2%
BAT014F	F1 (Cattle shed)	Natterer's bat	*Myotis nattereri*	100%

3.4 Winter Roost Inspection Surveys

A summary of the winter roost results are shown in Table 3-3. The locations of the features are highlighted in Figure 3-2. Images of these locations are shown in Appendix 6.

Table 3-3 - Summary of winter roost survey results

Location Code	Summary of findings	Confirmed Hibernation Roost
F1	Evidence of feeding bats in the way of moth wings were found along with droppings in a separate room. one faecal sample was found in the house suggesting it was not in current use during the hibernation period, sent for analysis. The presence of moth wings and faecal remains suggests its use as a feeding or maternity roost during the active season The derelict cattle shed had many suitable crevices for roosts though there were many holes in the walls and roof and likely did not maintain temperatures suitable for hibernation. A single faecal sample was also found in the shed and sent for analysis.	N
F2	Internal examination was not possible due to this building been completely sealed shut. Beneath the eaves and window joins were examined for evidence of a bat roost. No roosting evidence was found	N
F3	The second floor of this house was not safe to traverse and therefore attic space could not be assessed. Crevices within the first floor were assessed and no roosting evidence was found	N
F4	Upon re-assessment in the hibernation period this structure was considered to be of negligible roosting potential.	N
F5	Upon re-assessment in the hibernation period this structure was considered to be of negligible roosting potential.	N
F6	Upon re-assessment in the hibernation period this structure was considered to be of negligible roosting potential.	N

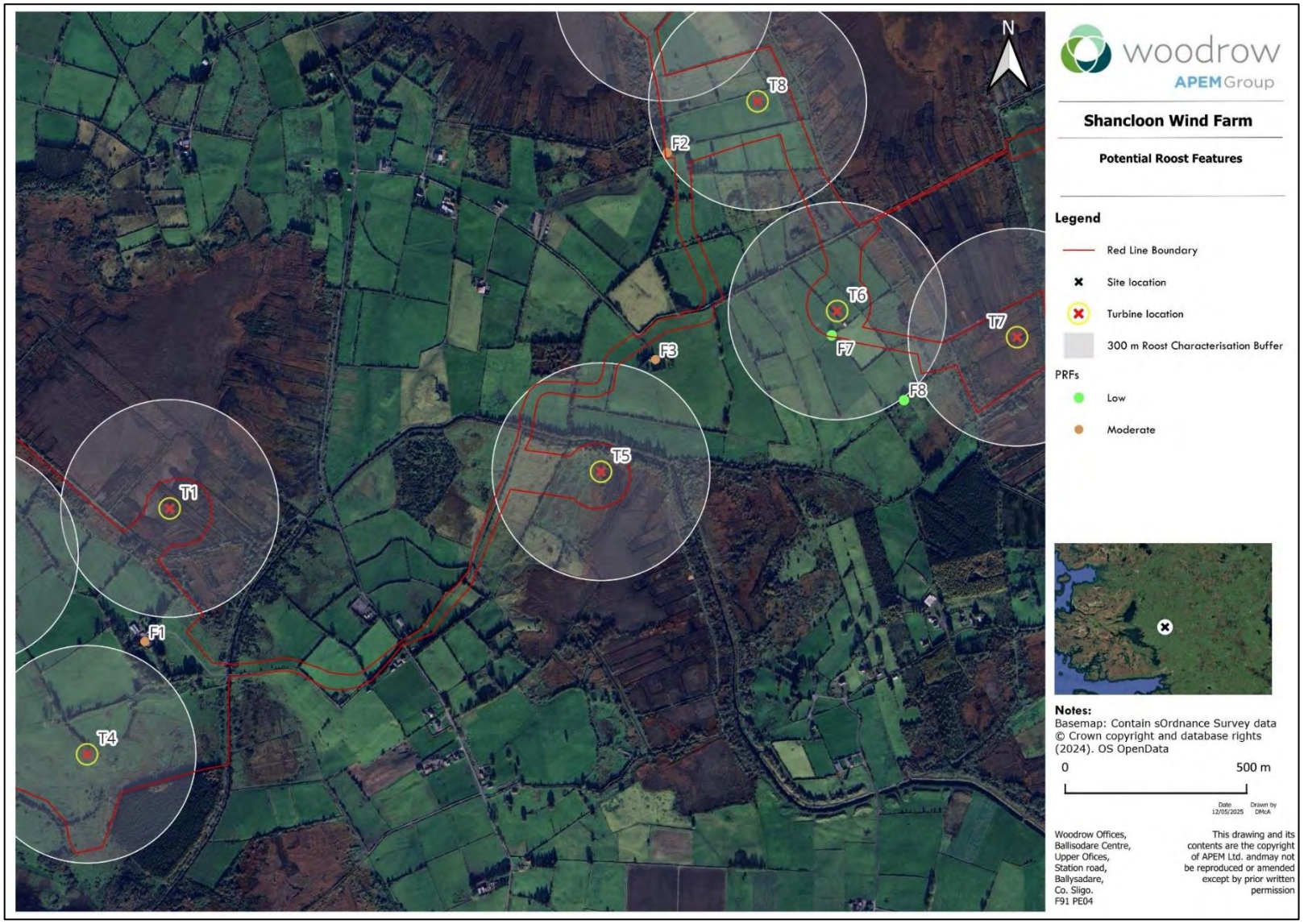

Figure 3-2 - Potential roost feature locations

3.5 Transect surveys

For the 2020 and 2021 bat activity season, eight valid dusk transect surveys were undertaken on the dates outlined in Table 2-2. The transect routes along with distribution of bats recorded are displayed in Appendix 7 The total pass results obtained using Batlogger M (Elekon) bat detectors are presented in Table 3-4. While transect surveys were not undertaken in line with Colins (2016), which states each transect route should be surveyed up to three times (one per spring, summer and autumn). While transect surveys were not repeated three times per route as recommended in Collins (2016), the survey design followed NatureScot (2021), which confirms that the application and frequency of transects should be discretionary and tailored to site-specific conditions. In this case, static detectors were deployed to provide robust coverage throughout the active season, in line with good practice to supplement transect data. This approach ensured that bat activity across key habitat features was sufficiently recorded, in accordance with current guidance. The data collected does show that the linear features walked were active both years.

The linear features within the eastern section of the Site are more active than the western section. The linear features within the eastern section are more active towards the bog (eastern boundary) and between the river (east of T5) and bog. The results also show that soprano pipistrelle account for 76% of all the passes recorded during the surveys and that 03 and 17 September 2020 account for 70% of all the data collected. The routes show that most of the data - three survey dates (03 and 17 September 2020 and 12 October 2021) together account for approximately 78% of all bat passes recorded during the transect surveys collected - are outside the Site to the north and east of the bog (Appendix 7).

Table 3-4 - Total bat passes per transect survey

Transect	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Species	**02-Jul-20**	**03-Sep-20**	**17-Sep-20**	**01-Oct-20**	**08-Jun-21**	**30-Jun-21**	**14-Jul-21**	**12-Oct-21**
Common pipistrelle	2	34	50	3	2	17	5	1
Soprano pipistrelle	12	405	44	41	45	13	0	64
Pipistrelle species	0	5	0	0	0	0	0	0
Nathusius' pipistrelle	0	1	0	0	0	0	0	0
Leisler's bat	6	3	6	0	26	4	2	0
Myotis species	0	7	0	0	0	0	3	0
Brown long-eared bat	0	21	0	0	0	0	1	0
Total passes	**20**	**476**	**100**	**44**	**73**	**34**	**11**	**65**

3.6 Static survey results.

In contrast to the 2020 and 2021 surveys, which were designed to build a general understanding of local bat activity and habitat use, the 2023 static detector locations were chosen specifically to reflect the layout of the proposed infrastructure. This approach ensures that survey data directly informs the placement of infrastructure, helping to minimise potential impacts on important bat habitats.

3.6.1 2020 Static results

3.6.1.1 2020 – Spring

During the spring deployment there were a total of 11,014 passes recorded across 12 detectors (refer to Table 3-5). Common pipistrelle account for 46% of the passes recorded, with 48% of all common pipistrelle calls having been recorded at S.07. Soprano pipistrelle account for the next highest number of recorded passes with 37%, 1/3 of all calls also being recorded at S.07. Leisler's bats account for 15% with 50% of calls being recorded at S.11. The remaining species collectively accounted for only 1% of the passes recorded. S.07 is positioned along a large land drain and lies approximately 380 m from the nearest proposed turbine, indicating that this high-use feature is outside the direct turbine footprint but contributes important commuting or foraging habitat within the wider site context.

Figure 3-3 shows that common and soprano pipistrelle activity peaks around 22:00, decreases until 01:00, and then rises again until 04:00. This pattern aligns with the emergence times shown in Appendix 9. The activity occurring within, immediately after, or later than the expected emergence windows suggests the presence of potential roosts near S.03, S.06, S.10, and S.11; although these are not directly adjacent to the detector locations. Note that none of these detectors are situated near a turbine; instead, they were positioned close to areas of suspected roosting, commuting, or foraging habitat.

While much lower in levels of activity per hour, Leisler's bat show similar peaks between 22:00 to 00:00 with decreasing activity for the rest of the night (refer to Figure 3-3). This again coincides with activity relative to emergence times shown in Appendix 9 for the species. Detector locations S.03, S.05 and S.11 all show a small number of passes within or before the expected emergence window (recognised times which the species are expected to emerge), indicating a potential small roost nearby. None of these detectors were located near turbines; instead, they were strategically placed near areas where roosts were suspected.

For other detectors, while activity was present, it generally occurred after the main emergence window, suggesting foraging or commuting rather than direct roost proximity (refer to Appendix 9).

Table 3-5 - Total number of passes recorded per species per detector for spring

Row Labels	General Location/Habitat Association	MYSP	NYCLEI	PIPPIP	PIPPYG	PIPNAT	PLEAUR	Total
S.01	Along cutover bog near farmland margin	6	135	166	66			**373**
S.02	Scattered trees adjacent to grassland	17	57	17	3		1	**95**
S.03	Drain crossing open bog edge	5	157	65	1016		1	**1244**
S.04	Mature hedgerow with adjacent drain	54	66	399	404		1	**924**
S.05	Hedgerow break near pasture	3	90	49	74			**216**
S.06	Treeline with dense bank vegetation	5	29	427	344		1	**806**
S.07	Large land drain	1	60	2407	1398	1		**3867**
S.09	Drain with hedgerow links	14	63	499	46			**622**
S.10	Treeline near farm buildings	26	113	221	317		2	**679**
S.11	Near roost feature, mature trees and drain	31	842	757	427	1	2	**2060**
S.12	Hedgerow/treeline on site boundary	2	75	27	22		2	**128**
Total		**164**	**1687**	**5034**	**4117**	**2**	**10**	**11014**

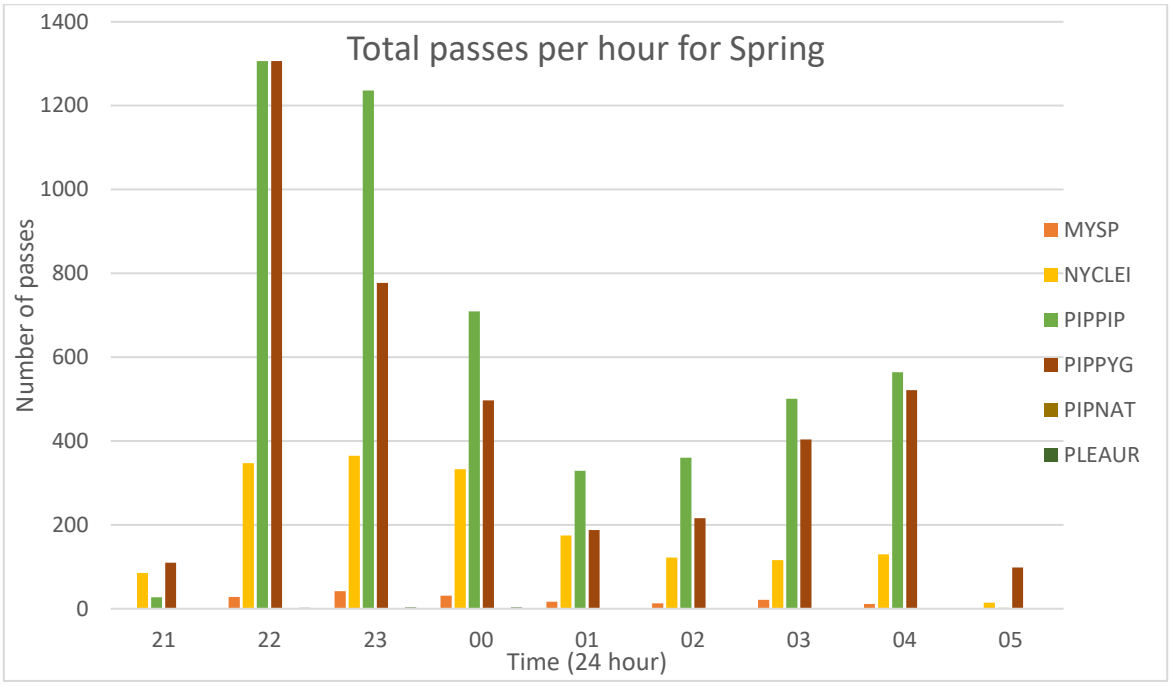

Figure 3-3: Total number of bat passes per hour per species for spring for all detector locations

3.6.1.2 2020 – Summer

A total of 16,659 passes were recorded during the summer period (refer to Table 3.6). Soprano pipistrelle comprised 42% of total summer passes, with 34% of those recorded at S.09. Common pipistrelle accounted for 34% of passes, while Leisler's bats made up 22%. The remaining species collectively accounted for 2% of all passes.

Figure 3-4 shows that Leisler's bat has a peak in activity around 21:00 and 22:00, decreasing in activity throughout the night and then a smaller peak around 04:00. This coincides with the activity relative to emergence times shown in Appendix 9.

S.05 and S.09 show notable levels of activity for this species within and immediately after the emergence window, suggesting the presence of a roost nearby. However, the number of passes recorded may also reflect habitat quality or the use of local flyways, and therefore cannot reliably indicate roost size without dedicated roost surveys, or few individuals using the roost but generating high pass counts due to flight behaviour. F3 is located *c.* 160 m from S.12; this strongly suggests that these passes are associated with bats emerging from F3, which has been confirmed as a transitional roost for Leisler's.

While much greater levels of activity per hour throughout the night peaking around 23:00 for common pipistrelle and 02:00 for soprano pipistrelle, both species show activity at 22:00 (refer to Figure 3-4). This again coincides with activity relative to emergence times shown in Appendix 9 for these species.

Detector locations S.02, S.03, and S.09 show some activity within and immediately after the emergence window, indicating the potential presence of a roost nearby. However, the number of passes may also reflect habitat quality and foraging opportunities; confirmation of roost size or status would require direct roost inspection.

For other detectors, while activity was present, it generally occurred after the main emergence window, suggesting foraging or commuting rather than direct roost proximity (refer to Appendix 9).

LHS bat have a high number of passes for the species at S.09, outside of the red line boundary of the Site in summer (refer to Figure 3-5), however as there are no passes recorded at S.02, S.10; and one at S.12 for the same deployment period, it is likely the passes are along the hedgerow and movement

by the species was to the south of the proposed development. Figure 2-3 shows S.09, S.10, and S.12 are all outside or at the edge of the red line boundary, with S.02 a and b just inside. Together they cover the same hedgerow corridor extending south/southwest. Roost F3 near S.12 adds context to these locations. The lack of LHS passes at S.02, S.10, and S.12, despite continuous habitat, shows the high activity at S.09 is likely localised foraging or commuting south of the site, not roost emergence within it. Timing data supports this, with passes mostly outside the main emergence window.

Figure 3-6 shows that it is also likely that the passes are individual(s) suggesting that the hedgerow is being used as a commuting or foraging route, rather than indicating a large roost nearby. The presence and size of any roost can only be confirmed through direct survey. Detector locations and habitat association/general location remain constant with Table 3-5.

Table 3-6 - Total number of passes recorded per species per detector for summer

	MYSP	NYCLEI	PIPPIP	PIPPYG	PLEAUR	RHIHIP	Total
S.02	84	54	774	234	7		**1153**
S.03	3	46	1305	244	2		**1600**
S.05	22	1101	108	333	11		**1575**
S.06	3	27	198	360	2		**590**
S.07	15	25	2061	985			**3086**
S.08	13	112	167	86	6		**384**
S.09	5	1236	91	2377	13	44	**3766**
S.10	39	219	690	2087			**3035**
S.11	3	18	40	23	1		**85**
S.12	72	802	254	231	25	1	**1385**
Total	**259**	**3640**	**5688**	**6960**	**67**	**45**	**16659**

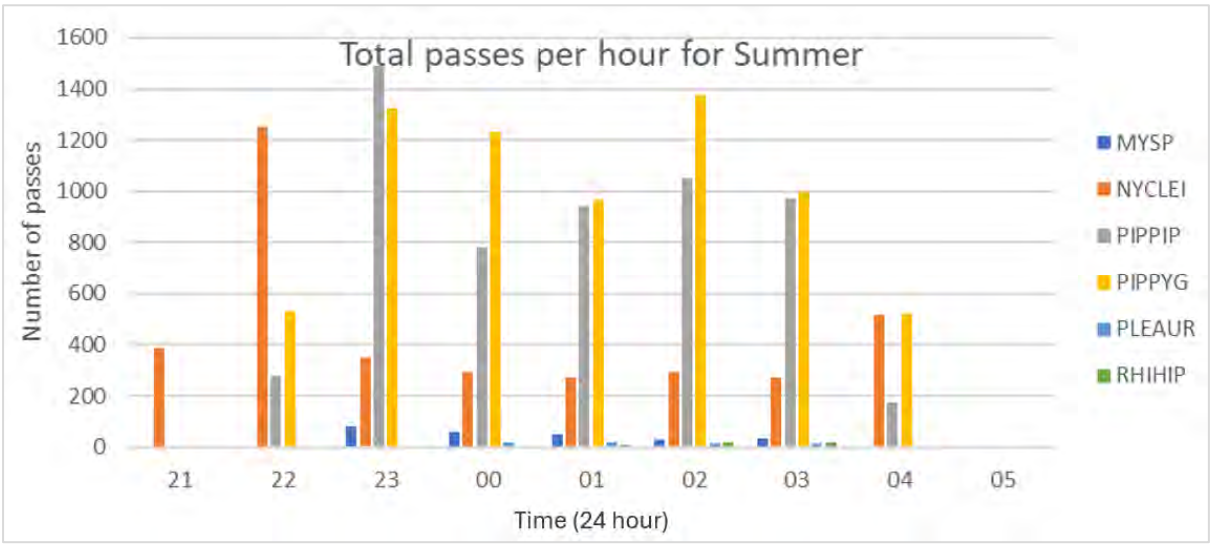

Figure 3-4: Total number of bat passes per hour per species for summer 2020 for all detector locations

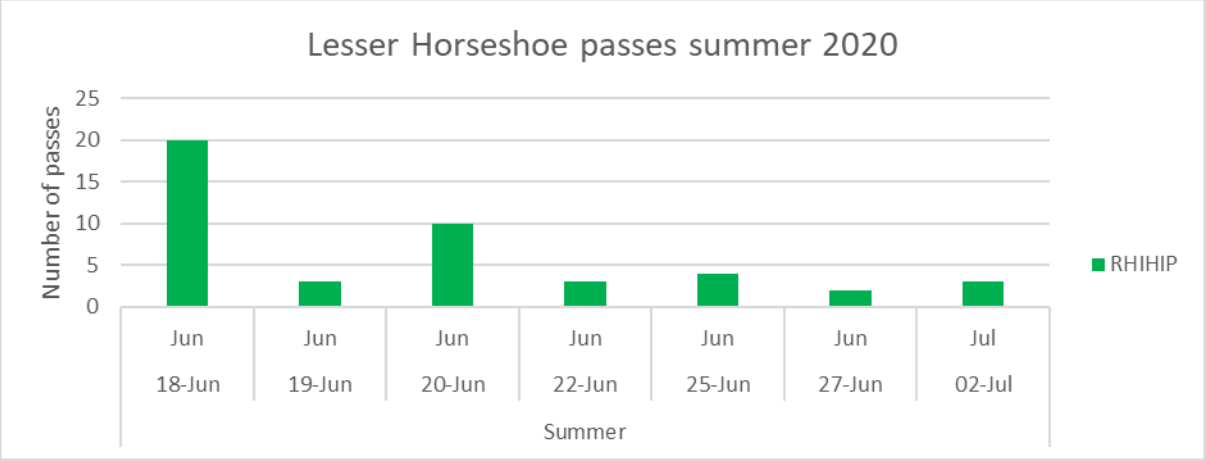

Figure 3-5: Lesser horsehoe passes during the summer deployment of 2020

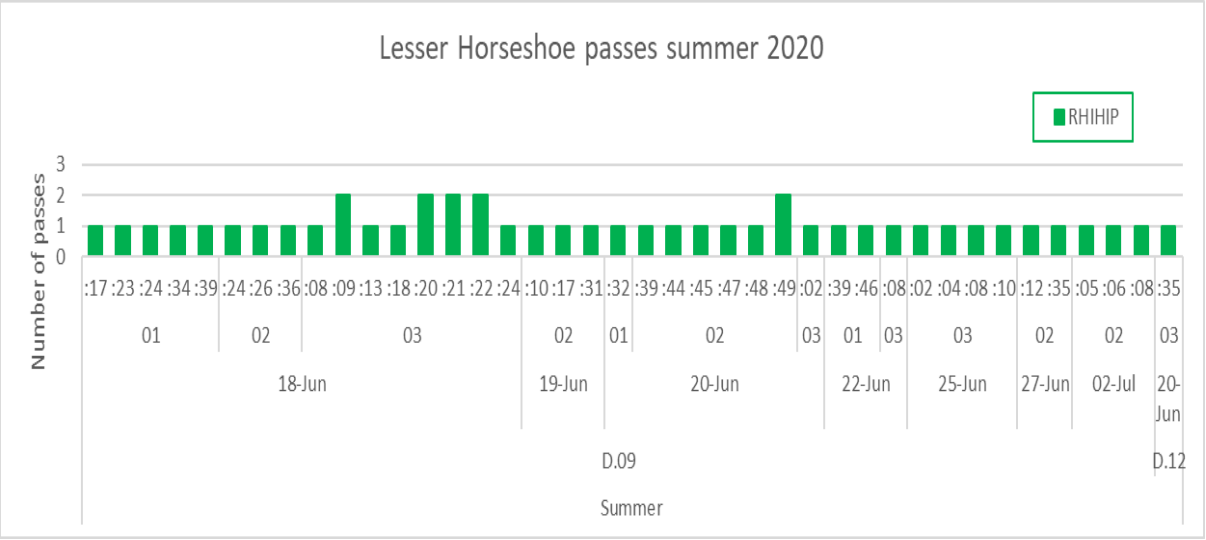

Figure 3-6: Lesser horseshoe passes for detectors S.09 and S.12 shown to detail of passes per minute

3.6.1.3 2020 – Autumn

Autumn activity was almost double that of the other two seasons in 2020, with a total of 33,301 passes (refer to Table 3-7). Soprano pipistrelle represented the majority of passes at 66%, with the greatest numbers recorded at detectors S.04 and S.11. Common pipistrelle followed with 28% of recorded activity, while the remaining species accounted for 6% of the total.

Soprano, common pipistrelle and Leisler's bat activity all peaked between 21:00 and 23:00 throughout autumn, then decreased through the night (refer to Figure 3-7). There is also activity around 20:00 for each species, which coincides with emergence times (Appendix 9). Notably, soprano pipistrelle shows significant levels of activity within and immediately after the emergence window at S.03, S.04, S.10 and

S.11. Common pipistrelle shows lower levels of emergence-window activity at S.04, and Leisler's bat shows low levels at S.10. This pattern indicates the potential for roosts nearby.

However, the detector locations provide useful context: S.03 is close to a known roost; S.10 is positioned on a river corridor, which is a key commuting and foraging feature; S.04 is located nearly 1 km from the Site boundary; and S.11 is within forestry approximately 400 m from the nearest turbine and about 600 m from the known roost.

For other detectors, while activity was present, it generally occurred after the main emergence window, suggesting foraging or commuting rather than direct roost proximity (Appendix 9).

There is much lower LHS activity within the Site in autumn. All eight calls were isolated events on separate nights across different detector locations, including one detector outside the Site boundary, suggesting foraging or commuting use rather than roosting. Detector locations and habitat association/general location remain constant with Table 3-5.

Table 3-7 - Total number of passes recorded per species per detector for autumn

	MYSP	NYCLEI	PIPNAT	PIPPIP	PIPPYG	PIPSP	PLEAUR	RHIHIP	Total
S.01				2	2				**4**
S.02	31	65		1014	425	1	5	1	**1542**
S.03	10	184	1	177	2385	516	31	1	**3305**
S.04	82	146		3773	5586	1	41		**9629**
S.05	4	7		5	46				**62**
S.06	6	114		197	2538	3	3		**2861**
S.07	2	25		229	1446		2		**1704**
S.08	33	107		493	685	2	22		**1342**
S.09	17	69		1934	651	6	13		**2690**
S.10	24	148		562	1687		6	3	**2430**
S.11	44	162	1	782	6550	3	53	3	**7598**
S.12	6	60		15	42	1	10		**134**
Total	**259**	**1087**	**2**	**9183**	**22043**	**533**	**186**	**8**	**33301**

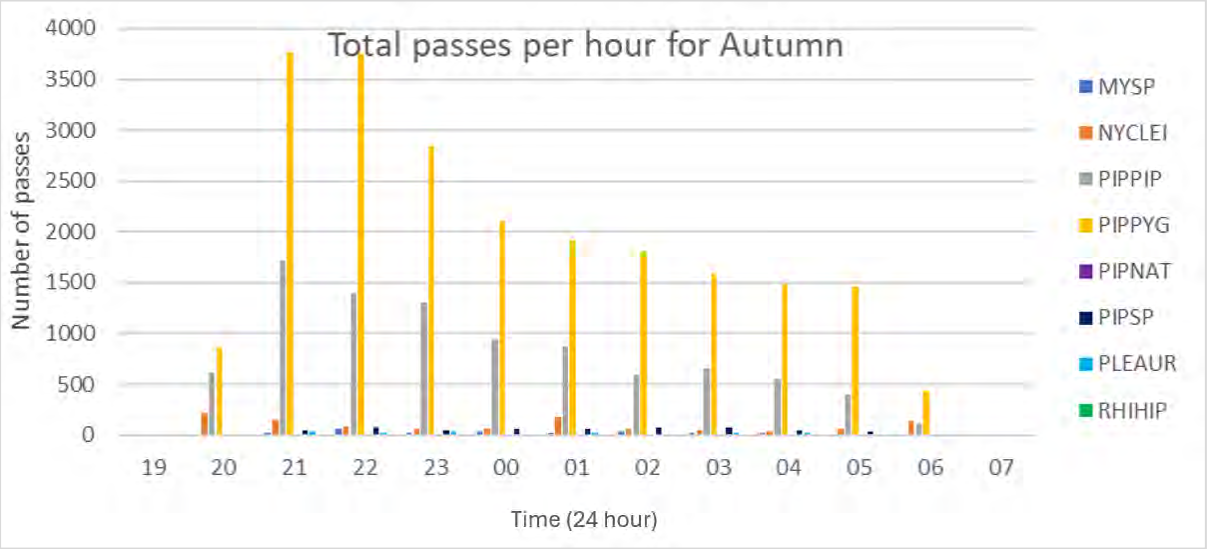

Figure 3-7: Total number of bat passes per hour per species for autumn for all detector locations

3.6.1.4 2020 – All

As indicated in Figure 3-8 the highest level of activity during spring was at S.07 – 377 m northwest of T11 - and during summer at S.07, S.09 and S.10. S.07 was located outside the Site and outside of any 300m turbine buffer, on the end of a linear feature lined with hedgerow and wetland field to the south and bog to the north, all of which lie outside the red line boundary of the Site. The linear feature connects directly with the roost F3. S.09 is located on a hedgerow surrounded by open fields and S.10 on hedgerow as part of the riparian habitat along the river, suggesting movement between the river and the bog habitats also.

Autumn had twice as much activity compared to the other seasons with the majority at S.04 and S.11. Both detector locations are outside the Site, S.04 on the edge of bog with mature scrub and hedgerow to the northeast of the Site and S.11 on a woodland edge west of the Site (refer to Figure 2-3). The detectors with most activity within the Site during autumn are S.09 and S.10. As D.02(a and b) - deployed in 2021 for comparison - has much less activity than the two detectors, it suggests that activity is more focused around the river and that movement between the two is to the south rather than the north along the linear feature connected to F3 as would be the case in the spring and summer (refer to Figure 3-8).

As shown in Figure 3-9 the majority of activity per species was detected at wind speeds of less than 5.5 m/s for all species apart from common and soprano pipistrelle for all seasons in 2020. While activity is above the proposed development cut-in speed of 3 m/s, should mitigation be required, the recommended cut-in speed would be 5.5 m/s (NatureScot 2021 and Whitby *et al.,* 2024), therefore having no expected impact on the local population with regards to the 2020 data. Figure 3-9 also shows that while guidance (Collins 2023) states that species tend not to be active at temperatures below 5°C, species recorded within the Site are active in spring below this. There is no correlation between temperature and activity within the Site.

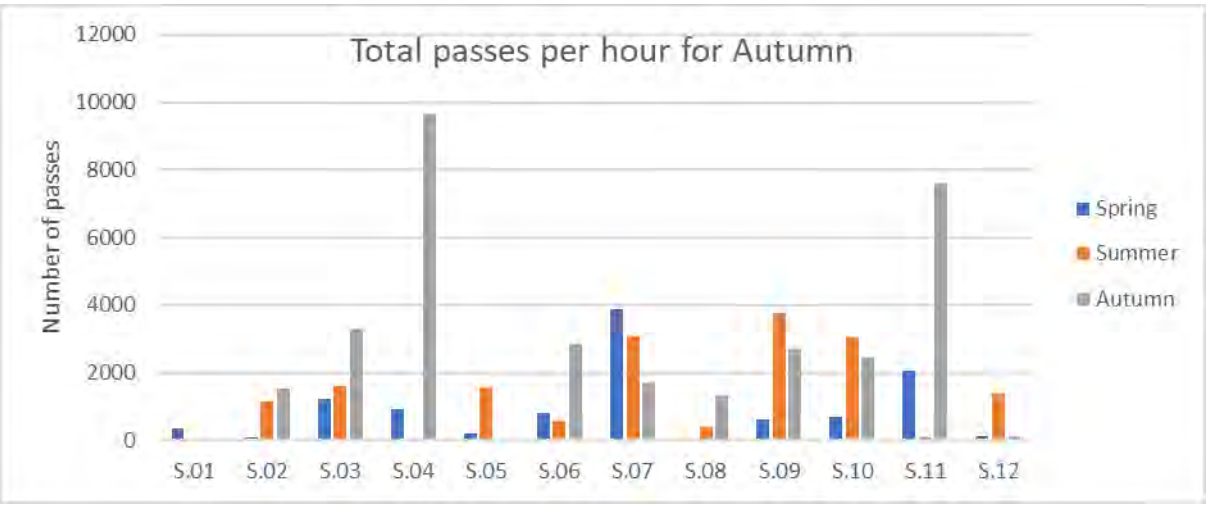

Figure 3-8: Total sum of all species per detector location for all seasons

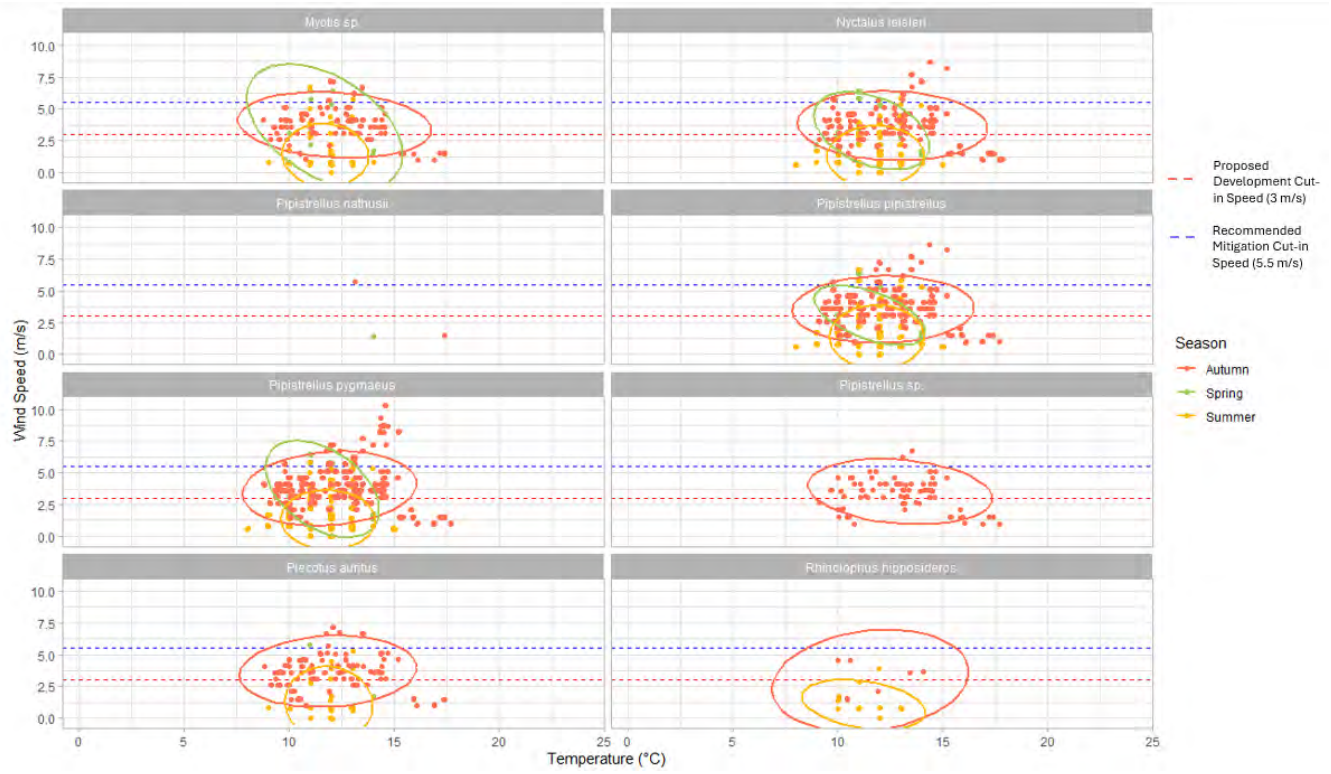

Figure 3-9: Bat passes per species relative to temperature and wind speed in 2020 with 95% confidence ellipses

3.6.2 2021 Static results

3.6.2.1 2021 – Spring

During the spring deployment, a total of 16,531 passes were recorded (refer to Table 3-8). Common pipistrelle was the most active species, making up 68% of all passes, with 26% of those calls recorded at D.07. Soprano pipistrelle accounted for 20%, while Leisler's bats made up 10%. The remaining species accounted for 2%.

Soprano, common pipistrelle and Leisler's bat activity all peaked between 22:00 and 23:00 throughout the spring season, then decreased throughout the night (refer to Figure 3-10). There is also activity around 21:00 for each of the species, that coincides with the activity relative to emergence times shown in Appendix 9. Soprano pipistrelle shows significant levels of activity within and immediately after the emergence window at D.03, D.04, D.10 and D.11. While common pipistrelle shows much higher activity after the emergence windows for most of the detector locations, the activity within and immediately after the emergence window for the species was highest at D.04, D.07, D.10 and D.11. Leisler's bat shows much lower levels of activity within and immediately after the emergence window at D.04. The levels of activity for each of these species indicate the potential for a roost nearby. It is important to note that the detectors showing high activity (D.03, D.04, D.10 and D.11) are located along the river corridor or near significant land drains, which are likely key commuting and foraging routes rather than direct roost sites. D.03 is located close to a known roost, while D.04, D.10 and D.11 are positioned adjacent to watercourses and wetland edges that provide suitable foraging habitat but no confirmed roosts within immediate proximity. D.07, which recorded the highest proportion of common pipistrelle activity, is located about 500 m outside the Site boundary, further suggesting that activity there relates primarily to off-site commuting or foraging.

For other detectors, while activity was present, it generally occurred after the main emergence window, suggesting foraging or commuting rather than direct roost proximity (refer to Appendix 9).

There is much lower LHS activity within the wider study area in spring 2021 compared to 2020. Only one call recorded, suggesting foraging or commuting.

Table 3-8 - Total number of passes recorded per species per detector for spring

	General Location/Habitat Association	MYSP	NYCLEI	PIPPIP	PIPPYG	PIPSP	PLEAUR	RHIHIP	Total
D.01b		4	75	959	59				1097
D.02a	Hedgerow and small stream crossing field margin	1	50	28	10	1	1		91
D.03	Treeline and ditch on edge of improved grassland	4	84	372	247		8		715
D.04a	Mature woodland edge with drain	39	284	1207	463	1	22		2016
D.05	Hedgerow adjacent to pasture	56	71	79	58		4		268
D.06	Small drain running through bog edge	2	121	92	23	1			239
D.07	Large drain with wide vegetated margins	16	437	2739	982		3		4177
D.09	Robust drain near roost features	2	114	1316	86				1518
D.10	Mature treeline with adjacent drain	58	115	2566	382		2		3123
D.11	Drain and scrub habitat near known roost area	72	71	1903	858		6	1	2911
D.12	Hedgerow and drain at site boundary	4	181	130	54		7		376
Total		**258**	**1603**	**11391**	**3222**	**3**	**53**	**1**	**16531**

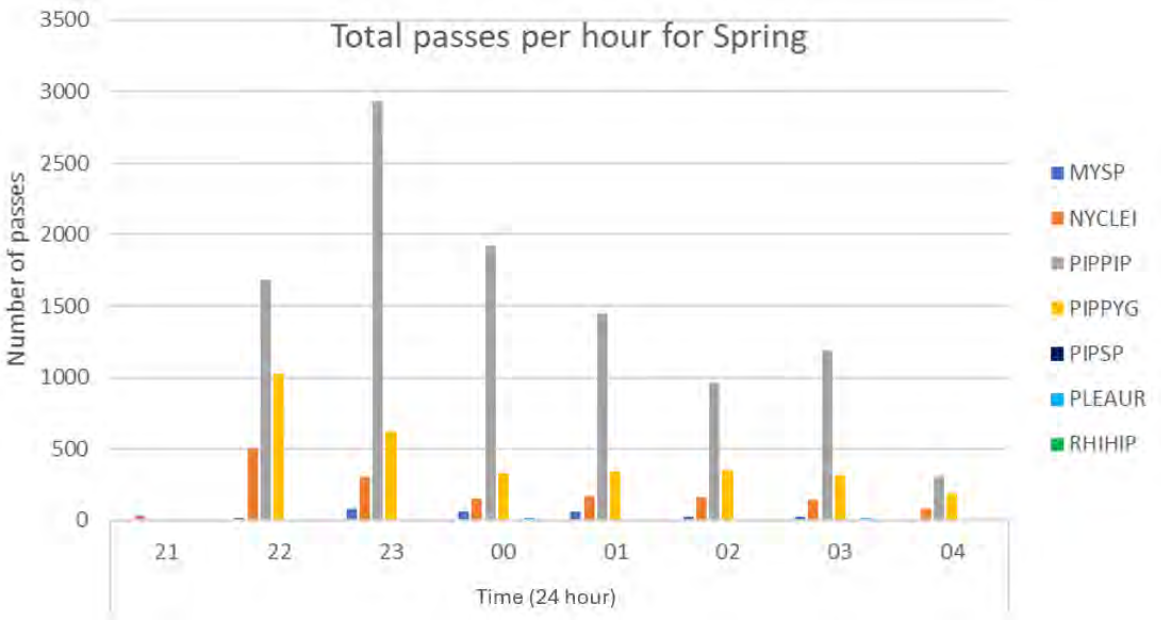

Figure 3-10: Total number of bat passes per hour per species for spring 2021 for all detector locations

3.6.2.2 2021 – Summer

A total of 21,885 passes were recorded over the summer period (refer to

Table 3-9). Common pipistrelle dominated the recordings with 51% of total passes, with the highest concentration of activity recorded at D.07 (37%). Soprano pipistrelle followed with 26%, and Leisler's bats comprised 21%. The remaining species accounted for 2% of activity.

There was no significant correlation between activity levels and time of the night for the summer season for any of the species recorded (refer to Figure 3-11). There are, however, low levels of activity around 22:00 for Soprano, common pipistrelle and Leisler's bat, that coincides with the activity relative to emergence times shown in Appendix 9.

Soprano pipistrelle shows activity within and immediately after the emergence window at D.03, D.04, and D.11. While common pipistrelle shows much higher activity after the emergence windows for most of the detector locations, the activity within and immediately after the emergence window for the species was highest at D.07. Leisler's bat shows much lower levels of activity before, within and immediately after the emergence window at D.04. The levels of activity for each of these species indicate the potential for an undiscovered roost nearby.

For other detectors, while activity was present, it generally occurred after the main emergence window, suggesting foraging or commuting rather than direct roost proximity (refer to Appendix 9).

There is significantly less LHS activity within the study area in summer 2021 compared to 2020. While there are four calls recorded, these are all individual calls on different days at the detector location D.01, suggesting foraging or commuting. This location is on the opposite side of the Site to that of all the activity on 2020 (refer to Figure 2-3 and Figure 2-4). Detector locations and habitat association/general location remain constant with Table 3-8.

Table 3-9 - Total number of passes recorded per species per detector for summer

	General Location/ Habitat Association	MYSP	NYCLEI	PIPNAT	PIPPIP	PIPPYG	PIPSP	PLEAUR	RHIHIP	Total
D.01b		20	377		1548	460	1	23	4	**2433**
D.02b		4	1275		95	68		2		**1444**
D.02c		13	1010		111	91		15		**1240**
D.03		161	129		276	307		24		**897**
D.04b		29	383	1	1669	1229	28	8		**3347**
D.05		23	38		380	175		2		**618**
D.06		3	149		88	30		1		**271**
D.07		27	200		4153	1109	9	10		**5508**
D.08		8	527		63	16		22		**636**
D.09		4	88		956	118	2	2		**1170**
D.10		48	61		265	77				**451**
D.11			21		1407	1407	12	6		**2853**
D.12		5	168		158	223	5	5		**564**
Context	Mature woodland with drains, marshy areas and linked hedgerows forming boundaries	2	91		84	276				**453**
Total		**347**	**4517**	**1**	**11253**	**5586**	**57**	**120**	**4**	**21885**

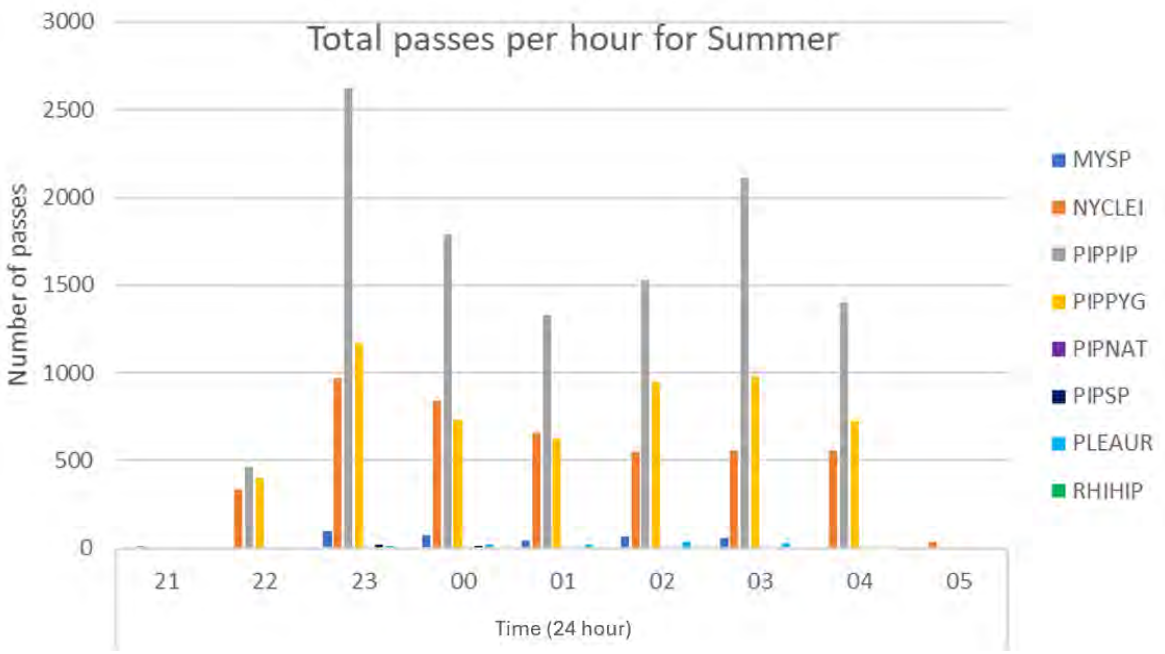

Figure 3-11: Total number of bat passes per hour per species for summer 2021 for all detector locations

3.6.2.3 2021 – Autumn

Autumn monitoring recorded a total of 17,653 passes (refer to Table 3-10). Soprano pipistrelle comprised the majority of passes at 54%, with D.05 (*c*. 200m outside Site footprint) contributing the highest number of calls (28%). Common pipistrelle accounted for 41% of passes. The remaining species (including Leisler's bat) accounted for 5%.

As shown in Figure 3-12 common and soprano pipistrelle activity peaks around 21:00 and decreases for the rest of the night. The trend changes for soprano around 06:00 where activity peaks again. There is activity around 19:00 and 20:00 for Soprano, common pipistrelle and Leisler's bat, that coincides with the activity relative to emergence times shown in Appendix 9. Soprano pipistrelle shows highest activity within and immediately after the emergence window at D.03, close to F1, with much lower levels at D.04, D.07 and D.11. While common pipistrelle shows lower activity after the emergence windows for most of the detector locations, the activity before, within and immediately after the emergence window for the species was highest at D.07. Leisler's bat shows low activity before and just after the emergence window at D.04, which is notable given the confirmed transitional Leisler's roost F3 is nearby. Notably, the 2021 data shows that D.04 and D.07 are positioned along the river corridor, approximately 500 m from the nearest turbine, suggesting the activity here relates to riverine foraging and commuting rather than direct turbine interaction. For other detectors, while activity was present, it generally occurred after the main emergence window, suggesting foraging or commuting rather than direct roost proximity (refer to Appendix 9). Detector locations and habitat association/general location remain constant with Table 3-8.

There is lower LHS activity nearby to the Site in autumn 2021 with only one call recorded, suggesting foraging or commuting.

Table 3-10 - Total number of passes recorded per species per detector for autumn

	MYSP	NYCLEI	PIPNAT	PIPPIP	PIPPYG	PIPSP	PLEAUR	RHIHIP	Total
D.01a	82	32		26	60	1	21		**222**
D.02a	7	13		17	55	2	11		**105**
D.03	18	6		126	800		4		**954**
D.04b	17	214		3446	2837	34	16		**6564**
D.05	57	55		2518	1462	4	8		**4104**
D.06	3	11		21	30	2	5		**72**
D.07	13	12		616	1357	16	2	1	**2017**
D.08		9		20	22		3		**54**
D.09	7	19		324	78		7		**435**
D.10	19	19		19	20		5		**82**
D.11	47	8		116	2621	1			**2793**
D.12	12	34	1	25	37		5		**114**
Context	4	36		20	72		5		**137**
Total	**286**	**468**	**1**	**7294**	**9451**	**60**	**92**	**1**	**17653**

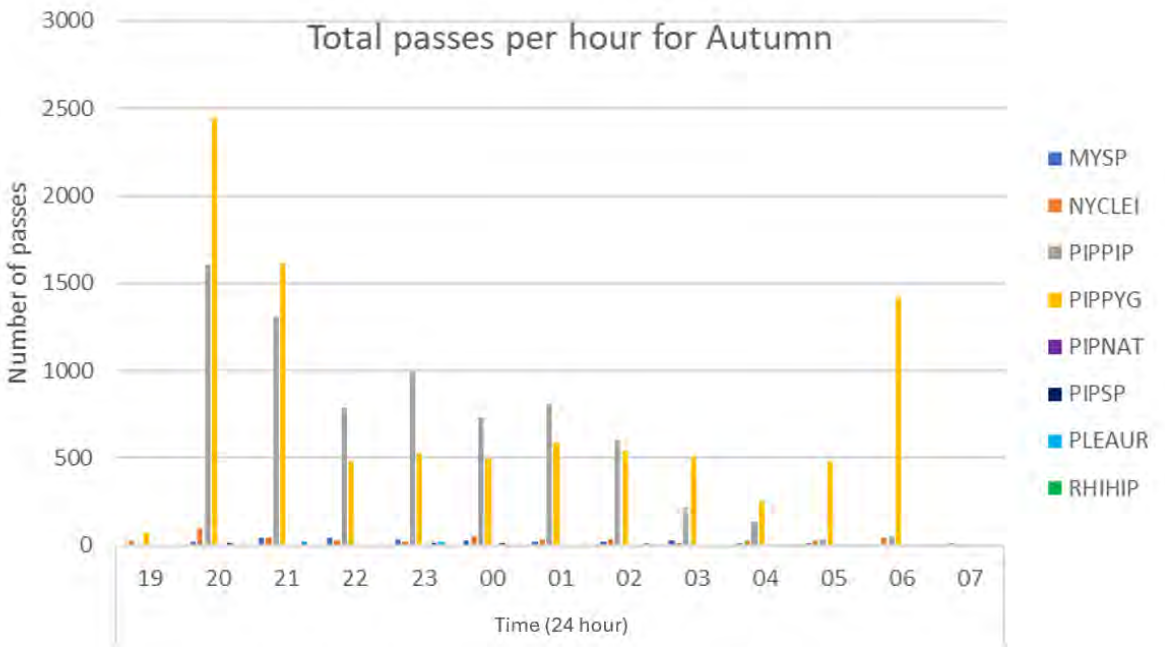

Figure 3-12: Total number of bat passes per hour per species for autumn 2021 for all detector locations

3.6.2.4 2021 – All

As shown in Figure 3-13, the highest levels of bat activity in spring and summer were recorded at detector D.07, which is positioned along a robust hedgerow at the edge of a bog habitat just outside the Site boundary. Similarly, in autumn, the highest activity was recorded at D.04b, located on a hedgerow forming part of the riparian corridor along the river (refer to Figure 2-3). The river corridor itself, as indicated by the elevated activity at D.04a/b, represents a significant foraging and commuting route for bats, facilitating movement between woodland blocks, open fields, and bog habitats. High autumn activity at D.05, situated further south along the same corridor, suggests that bats continue to move between the riparian corridor and bog habitats in this area, a pattern consistent with results from 2020 (refer to Section 3.6.1.4). These key foraging and commuting corridors; the river, its associated hedgerows, and the bog edge are located in proximity to proposed turbine locations and access routes within the wind farm footprint. This highlights the importance of robust linear features in guiding bat movement through the landscape and underscores the potential for interaction with wind farm infrastructure, particularly where turbines or access tracks intersect these features.

Figure 3-14 shows that all activity for 2021 was recorded at wind speeds less that 5m/s with the 95% confidence ellipse below that of the proposed turbine cut-in speed of 3m/s.

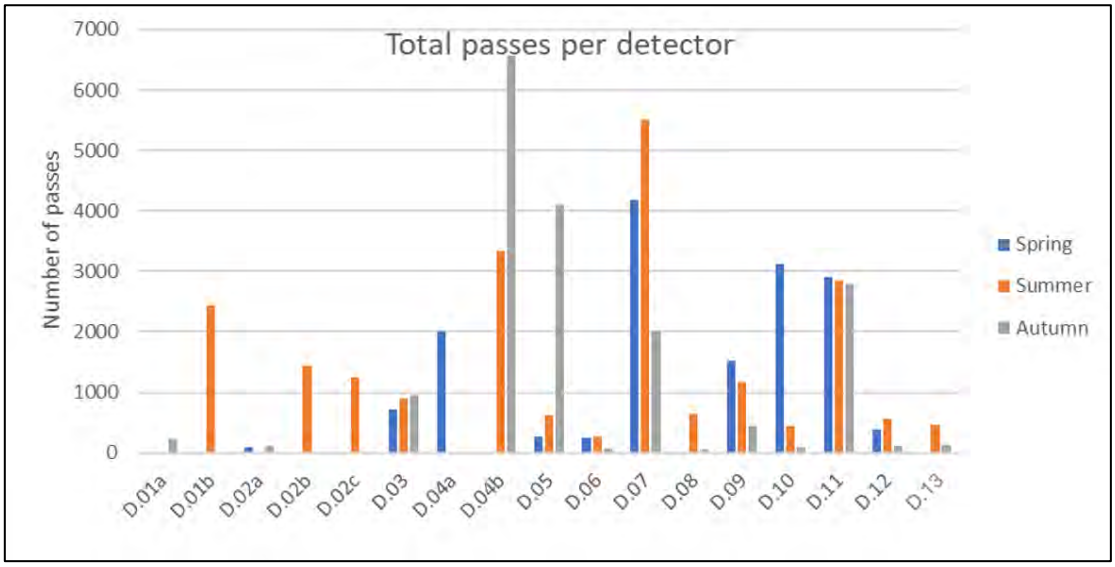

Figure 3-13: Total sum of all species per detector location for all seasons

Figure 3-14 - Bat passes per species relative to temperature and wind speed in 2021 with 95% confidence ellipses

3.6.3 2023 Static results

3.6.3.1 2023 – Spring

A total of 5,723 passes were recorded in spring (refer to Table 3-11). Common pipistrelle was the most frequently recorded species, accounting for 69% of passes, with the majority of calls detected at D.16 (57%). Soprano pipistrelle made up 10%, and Leisler's bats 20%. The remaining species comprised 1% of total activity.

Activity was concentrated around 23:00, with common pipistrelle dominating the early-night period (refer to Figure 3-15). There is also activity around 21:00 and 22:00 for this species and Leisler's bats, that coincides with the activity relative to emergence times shown in Appendix 9.

Common pipistrelle shows significant levels of activity before, within, and immediately after the emergence window at D.17, while Leisler's bat shows lower but notable levels of activity at D.16 and D.18 over the same period. The levels of activity for each species indicate the potential for a roost nearby; this is supported by the fact that this habitat is located approximately 500 to 600 m from two confirmed roosts (F2 and F3), making it likely that the recorded activity relates to bats emerging from these known roosts and using the adjacent habitat for foraging or commuting.

For other detectors, while activity was present, it generally occurred after the main emergence window, suggesting foraging or commuting rather than direct roost proximity (refer to Appendix 9).

It should be noted that while the total number of passes in spring 2023 is much lower than in 2020 or 2021, this is partly due to the reduced number of detectors deployed in 2023 (five, compared to around twelve in previous years; see Table 3-11).

There was much lower lesser horseshoe bat activity recorded within the study area in spring 2023, with only a single call detected. This likely reflects the reduced number of detectors deployed that season, rather than a significant change in site usage. In 2020 and 2021, lesser horseshoe bats were similarly recorded at very low levels and only at detectors positioned along dense linear features, consistent with known habitat use for foraging or commuting. The 2023 record aligns spatially with these same features, suggesting continued occasional use of the site periphery rather than any new roost presence or core habitat within the Site.

Table 3-11 - Total number of passes recorded per species per detector for spring

	General Location/ Habitat Association	MYSP	NYCLEI	PIPPIP	PIPPYG	PIPSP	PLEAUR	RHIHIP	Total
D.14	Along small treeline near farmland margin	2	567	754	86	2	3		**1414**
D.15	Treeline and ditch on edge of improved grassland		111	93	12	1			**217**
D.16	Along cutover bog near farmland margin	11	282	2277	265	10	14		**2859**
D.17	Mature treeline	7	47	223	15		7	1	**300**
D.18	Treeline with dense bank vegetation	7	130	618	177	1			**933**
Total		**27**	**1137**	**3965**	**555**	**14**	**24**	**1**	**5723**

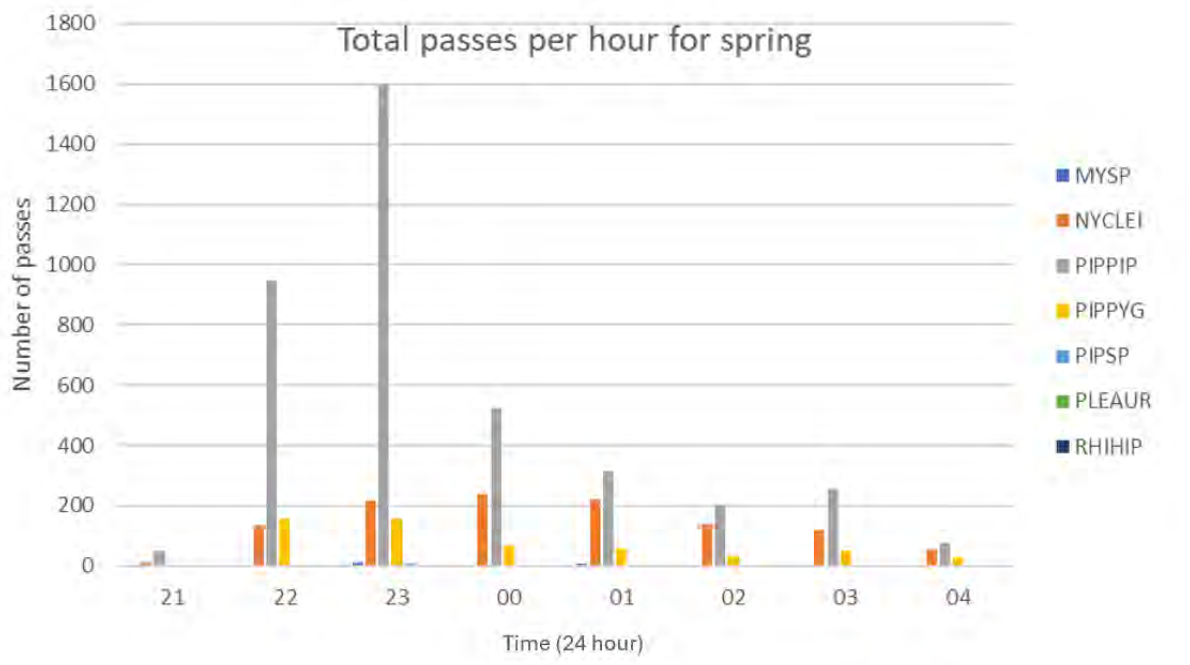

Figure 3-15: Total number of bat passes per hour per species for spring 2023 for all detector locations

3.6.3.2 2023 – Summer

During the summer deployment, 4,625 passes were recorded (refer to Table 3-12). Soprano pipistrelle activity was highest, making up 59% of total passes, with most calls recorded at D.15 (41%), soprano pipistrelle shows notable activity within and shortly after the emergence window at D.15. This is consistent with the presence of a confirmed roost at F1 (Figure 3-2) located approximately 520 m southeast of D.15. While this suggests that activity at this detector may be influenced by commuting to or from this roost, the distance indicates that bats are likely using the surrounding habitat as foraging and commuting corridors.

Common pipistrelle and Leisler's bat activity at D.15 and other detectors occurred mainly after the emergence window, indicating foraging or commuting rather than additional roost presence near other detectors.

Common pipistrelle accounted for 32%, Leisler's bats for 8%. The remaining species accounted for 1%.

Summer activity peaked between at between 22:00 and 23:00, with soprano pipistrelle showing the highest levels, tapering off steadily afterwards (refer to Figure 3-16). While there appears to be no activity within the emergence window for the species during summer, there is activity around 22:00 for common pipistrelle and Leisler's bats that coincides with the activity relative to emergence times shown in Appendix 9. Common pipistrelle shows significant levels of within (although near the end) and immediately after the emergence window at D.17. The levels of activity for this species indicates the potential for a roost nearby. In addition, common pipistrelle activity at D.16 and D.18 may be influenced by confirmed roosts in the surrounding area. F2, an abandoned cottage with access through eaves, lies approximately 410 m southwest of D.18; F3 is a derelict two-storey house and adjacent cattle shed, about 427 m north of D.16. These distances, along with the timing of recorded calls, support the interpretation that these detectors may be picking up commuting or foraging activity linked to these roosts rather than indicating additional roosts immediately adjacent to the detectors.

Leisler's bat, however, does not have enough points within the emergence window to indicate the presence of a roost nearby.

For other detectors, while activity was present, it generally occurred after the main emergence window, suggesting foraging or commuting rather than direct roost proximity (refer to Appendix 9).

There is significantly less LHS activity within the study area in summer 2023 compared to 2020. While there are four calls recorded, these are all individual calls on different days at the detector locations suggesting foraging or commuting (refer to Figure 2-3 and Figure 2-4). Detector locations and habitat association/general location remain constant with Table 3-11.

Table 3-12 - Total number of passes recorded per species per detector for summer

	MYSP	NYCLEI	PIPPIP	PIPPYG	PLEAUR	RHIHIP	Total
D.14	25	108	89	507	10	3	**742**
D.15	3	30	223	1099	3		**1358**
D.17	14	49	600	154	8		**825**
D.18	11	74	479	897	6	1	**1468**
D.19	13	90	76	50	3		**232**
Total	**66**	**351**	**1467**	**2707**	**30**	**4**	**4625**

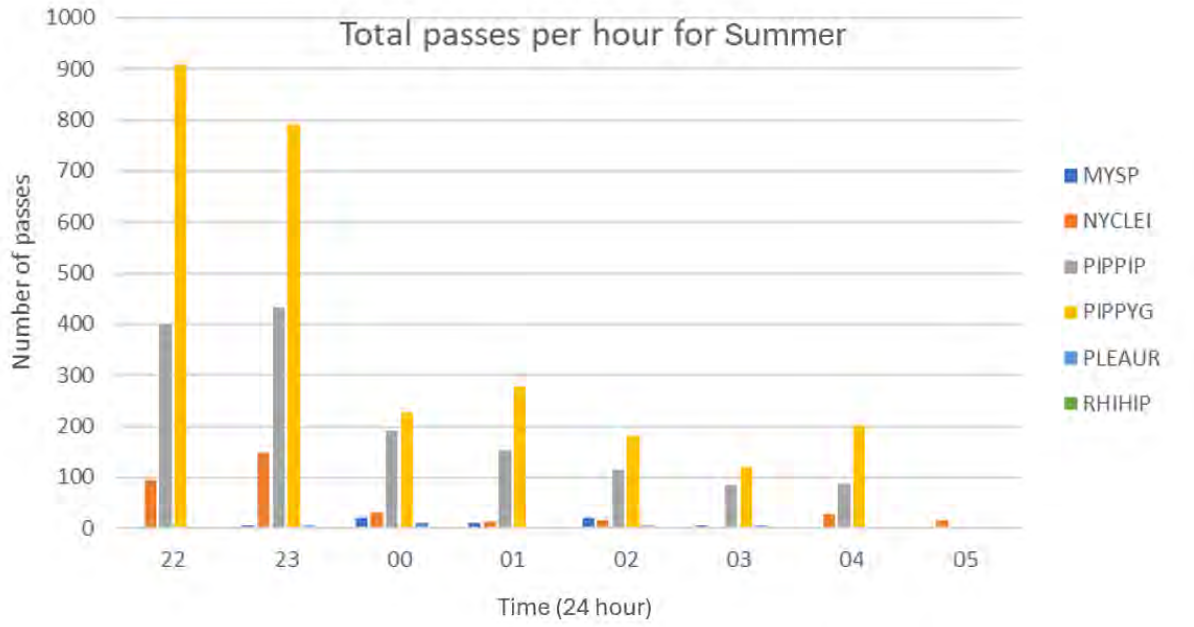

Figure 3-16: Total number of bat passes per hour per species for summer 2023 for all detector locations

3.6.3.3 2023 – Autumn

A total of 2,417 passes were recorded during the autumn period (refer to Table 3-13). Common pipistrelle accounted for the highest activity at 48%, with the highest number of calls recorded at D.19 (60%). Soprano pipistrelle followed with 40%. The remaining species (including Leisler's bats at 5%) made up 12% of the activity.

Autumn 2023 showed the least night-time activity overall, though common pipistrelle activity still peaked around 20:00 and declined steadily through the night, increasing again at 06:00 (refer to Figure 3-17). Appendix 9, while showing activity present, it generally occurred after the main emergence window for all species in autumn, suggesting foraging or commuting rather than direct roost proximity. Detector locations and habitat association/general location remain constant with Table 3-11.

Table 3-13 - Total number of passes recorded per species per detector for autumn

	MYSP	NYCLEI	PIPPIP	PIPPYG	PLEAUR	RHIHIP	Total
D.14	13	10	18	47	3		**91**
D.15	22	22	52	440	3		**539**
D.16	7	42	42	59	25		**175**
D.17	58	24	332	245	8	2	**669**
D.18	10	20	21	68	3		**122**
D.19	7	2	702	109	1		**821**
Total	**117**	**120**	**1167**	**968**	**43**	**2**	**2417**

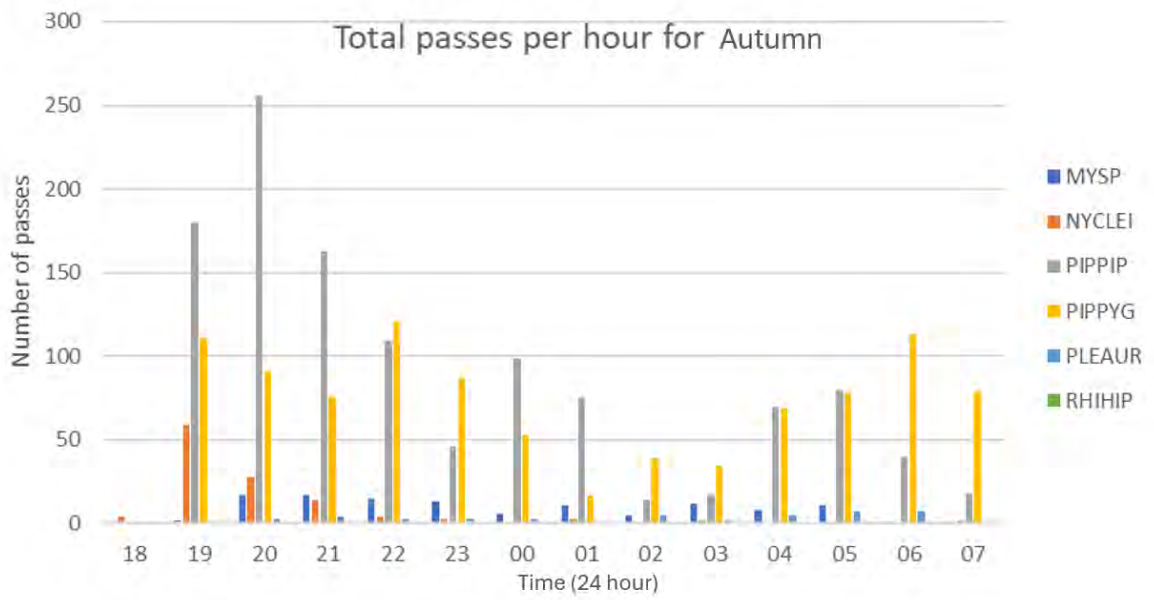

Figure 3-17: Total number of bat passes per hour per species for autumn 2023 for all detector locations

3.6.3.4 2023 – All

As indicated in Figure 3-18 the highest level of activity during spring was at D.16, during summer at D.15 and D.18 and autumn at D.19. D.16 is located south of the river in an area of open bog, but still within detectable distance to activity along the riparian habitat along the river itself. This detector shows similar activity in the spring season to the previous years surveyed (refer to Figure 3-8 and Figure 3-13).

D.15 is located on a hedgerow adjacent to scrub and open bog (west) and open fields (east). The activity is consistent with other locations along linear features within the western section of the Site for previous years (refer to S.03 and S.05 in Figure 3-8 and D.01b and D.03 in Figure 3-13). D.18 is located between a drainage ditch in bog and improved grassland on the western boundary of the Site. The activity recorded is consistent with previous years (refer to D.11 in Figure 3-13) and shows that the drainage ditch along the bog is a commuting corridor. This is also in line with the data collected for the ditch during the transect survey undertaken in July 2021 (refer to Appendix 7).

Autumn while showing no peaks in activity at a particular detector location also has the least amount of activity recorded in 2023. D.19 shows the highest of the activity levels but is still low relative to other locations surveyed in 2023.

As shown in Figure 3-19 the majority of activity per species was detected at wind speeds of less than 5.5m/s for all species for all seasons in 2023. While activity is above the proposed development cut-in speed of 3m/s, should mitigation be required, the recommended cut-in speed would be 5.5m/s (NatureScot 2021 and Whitby *et al.,* 2024), therefore having no expected impact on the local population with regards to the 2023 data. This is in line with previous years. There is no correlation between temperature and activity within the Site.

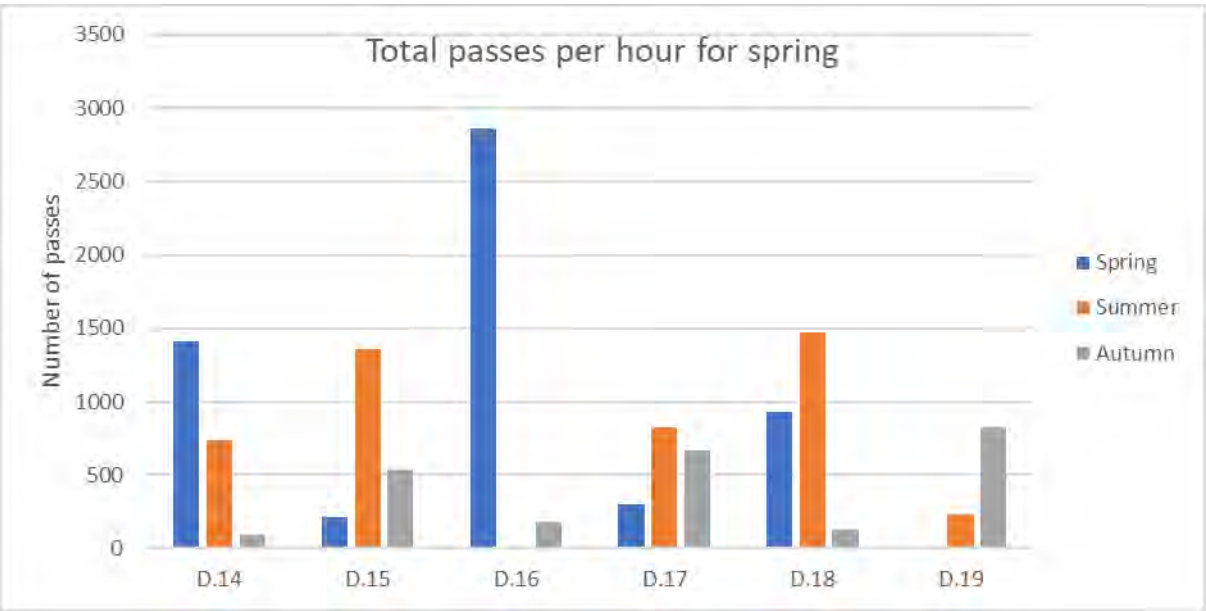

Figure 3-18: Total sum of all species per detector location for all seasons

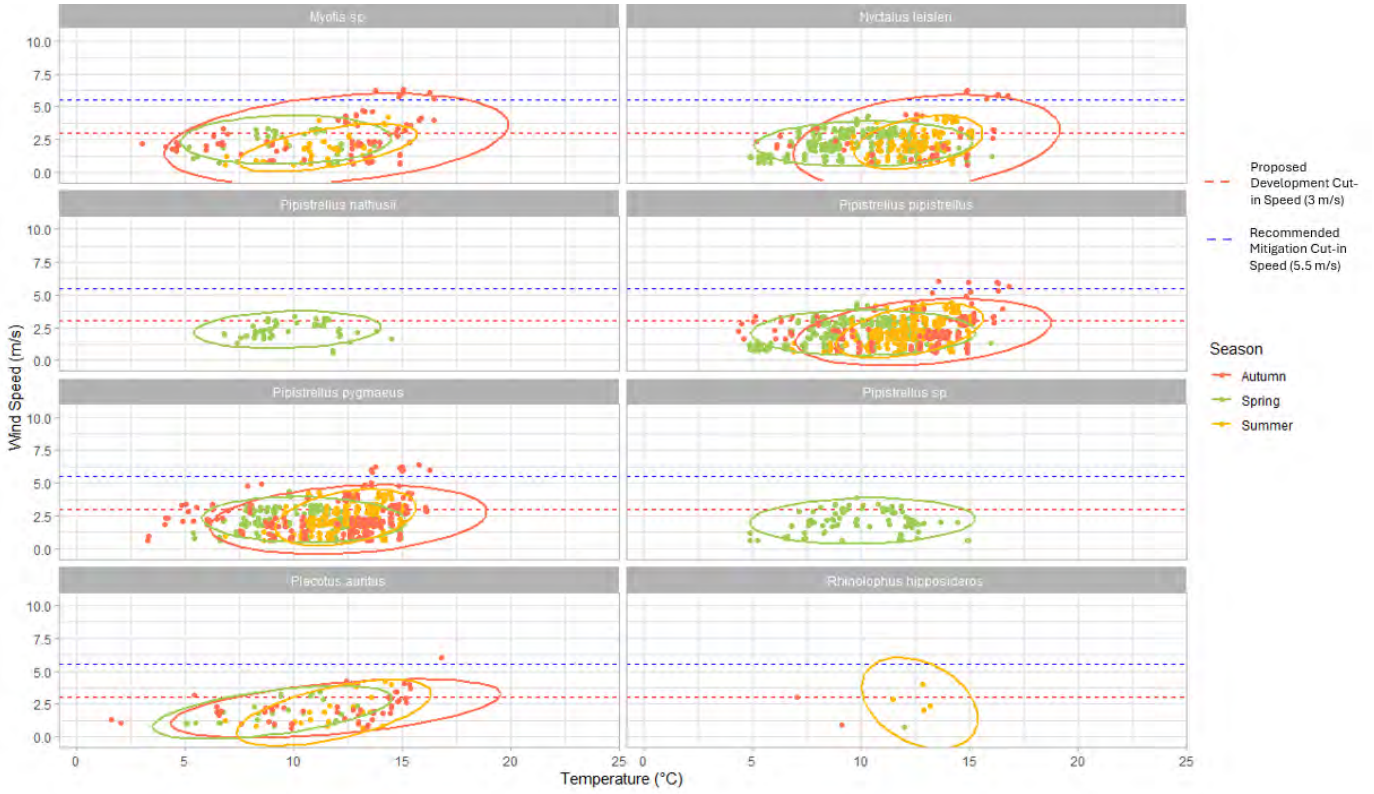

Figure 3-19 - Bat passes per species relative to temperature and wind speed in 2023 with 95% confidence ellipses

3.6.4 Association of bat activity with habitat features

While the static locations for surveys undertaken in 2020 and 2021 were not at proposed turbine locations as per 2023 design, as shown in Figure 2-3 and Figure 2-4, those sighted in 2023 were at or within 100m of proposed turbine locations. The results obtained from the 2020 and 2021 surveys are still in line with NatureScot 2021 as they provide data representing the mosaic of habitats on site and areas of expected high activity. Table 3-14 identifies the proposed turbine location and the detector with assumed activity for that location based on habitat type and location within the Site. It further identifies if the activity level is accurate (static present at exact location of the turbine) or representative (activity levels within similar habitat within the Site) for further NatureScot analysis. This is consistent with NatureScot *et al*. (2021), which advises that, "Where it is not possible to position static detectors at the exact turbine locations, they should be placed in representative habitats that provide the best indication of bat activity levels likely to occur at the turbine locations".

Table 3-14: Turbine locations and associated detectors

Proposed Turbine	Detector Location Accurate (A)	Detector Location Representative (R)	Rationale
1		S.01 D.06 D.08 D.19	While there are no detectors at this turbine location, S.01, D.06, D.08 and D.19 all represent open bog habitat with cut peat areas and drainage ditches within 15 of the detector locations.
2	D.14		D.14 located *c.* 35 m northeast of T2 in a transition area between peatland and forestry, accurate to local habitat.
3	D.15	S.08 D.03	D.15 located *c.* 15 m west of T3 on the same hedgerow, however nearer to the cutover peatland to the east. S.08, D.03 and D.05 are located on similar hedgerow to the SW, NE and SE respectively providing representative data from nearby hedgerows in the dividing fields and grassland/peatland interfaces.
4	D.01a / b	S.02 S.12	D.01a (SE) located in open improved grassland on maturing hawthorn scrub with treeline c. 50 m N and conifer plantation c. 50 m to the S; and D.01b (NW) located on the end of a hawthorn treeline. Both locations are within 50 m of T4. D.01 highlights the difference between a linear feature and open habitat for T4. S.02a and S.12 were both placed in the centre of the field (away from the boundary) and therefore also provide representative data for the location.
5	D.16	S.01 D.06 D.08 D.19	D.16 is located c.100m S of T5 in open bog with a large pool adjacent. S.01, D.06, D.08 and D.19 are also located throughout the Site in open bog habitat with cut peat areas and drainage ditches within 15 of the detector locations. These locations are also representative of open bog areas.
6	D.17	S.02a S.12	D.17 c. 15 m west of T6 on the hedgerow bounding the field in which T6 is located. Due to the size of the field, should the detector have been placed in the centre or on the boundary

Proposed Turbine	Detector Location Accurate (A)	Detector Location Representative (R)	Rationale
			the results would have been the same, therefore the detector data is representative of the turbine location. S.02a and S.12 were both placed in the centre of the field (away from the boundary) and therefore also provide representative data for the location.
7	D.06	S.01 D.06 D.08	D.06 is located c. 60 m SW of T7 on the same linear feature, drainage and hedgerows within peatland, therefore it is representative of T7 habitat. S.01, D.06 and D.08 are also located throughout the Site in open bog habitat with cut peat areas and drainage ditches within 15 of the detector locations. These locations are also representative of open bog areas.
8		S.02 S.12 D.01 D.17	While D.18 and S.06 are the closest detector locations at c. 110 m and 150 m E of the turbine location respectively, they provide data mainly for linear features, hawthorn treeline and drainage ditch along a peatland boundary. As T8 is located in the middle of the field, S.02a, S.12, D.01 and D.02 were all placed in the centre of the field (away from the boundary) and therefore, provide representative data for the location. D.17 is also representative of open field, with boundary data and should be taken into account.
9		S.02 S.12 D.01 D.17	While D.11 c. is the closest detector location at c. 190 m east of T9, it provides data for linear features, mainly hawthorn treeline and drainage ditch along a peatland boundary. It will still be included in the assessment of the location. T9 is located in the middle of a narrow field with linear features close. Therefore, appropriate representation of the location should include both open field data and linear features bounding open field. S.02a, S.12, D.01 and D.02 were all placed in the centre of the field (away from the boundary) and therefore, provide representative data of open field for the location.

Proposed Turbine	Detector Location Accurate (A)	Detector Location Representative (R)	Rationale
			D.01, D.05 and D.17 is also representative of open field with boundary data and should be taken into account.
10		S.01 D.06 D.08 D.19	Open bog habitat with cut peat areas and drainage ditches within 15 of the detector locations.
11	D.19	S.01 D.06 D.08	D.19 is located c. 10 m NE of T11 in open cutover bog. S.01, D.06 and D.08 also provide data for open bog habitat with cut peat areas and drainage ditches within 15 of the detector locations.

3.6.5 Activity Assessment

Statistical analysis was carried out for the data obtained for each of the years 2020, 2021 and 2023 using 'R'. Both mean and median values have been produced (refer to Appendix 8). While the results for the mean show higher levels of activity, in this case, based on the results shown above (refer to Sections, 3.6.1, 3.6.2 and 3.6.3) and in line with NatureScot (2021), the median values will be taken forward for assessment of risk with regards to bats and the proposed development. Refer to Table 3-15, Table 3-16 and Table 3-17 for visualisation of median levels and Appendix 8 for full breakdown of analysis. As per Table 2-3, the colour scheme applies to the following values adapted to hourly activity levels;

Low	<2
Moderate	2 – 4
High	≥5

Table 3-15: Activity per species and detector for 2020
Activity level classification based on median bat passes per hour and classified as per Table 2-3

		MYSP.	'NYCLEI	PIPPIP	PIPPYG	PIPNAT	PIPSP.	PLEAUR	RHIHIP
Spring	S.01								
	S.02								
	S.03								
	S.04								
	S.05								
	S.06								
	S.07								
	S.09								
	S.10								
	S.11								
	S.12								
Summer	S.02								
	S.03								
	S.05								
	S.06								
	S.07								
	S.08								
	S.09								
	S.10								
	S.11								
	S.12								
Autumn	S.01								
	S.02								
	S.03								
	S.04								
	S.05								
	S.06								
	S.07								
	S.08								
	S.09								
	S.10								
	S.11								
	S.12								

Table 3-16: Activity per species and detector for 2021
Activity level classification based on median bat passes per hour and classified as per Table 2-3

		MYSP.	’NYCLEI	PIPPIP	PIPPYG	PIPNAT	PIPSP.	PLEAUR	RHIHIP
Spring	D.02								
	D.03								
	D.04								
	D.05								
	D.06								
	D.07								
	D.09								
	D.10								
	D.11								
	D.12								
Pre-Summer	D.01								
	D.02								
	D.08								
Summer	D.01								
	D.02								
	D.03								
	D.04								
	D.05								
	D.06								
	D.07								
	D.08								
	D.09								
	D.10								
	D.11								
	D.12								
Autumn	D.01								
	D.02								
	D.03								
	D.04								
	D.05								
	D.06								
	D.07								
	D.08								
	D.09								
	D.10								
	D.11								
	D.12								

Table 3-17: Activity per species and detector for 2023
Activity level classification based on median bat passes per hour and classified as per Table 2-3

		MYOSP	NYCLEI	PIPPIP	PIPPYG	PIPNAT	PIPSP	PLEAUR	RHIHIP
Spring	D.14								
	D.15								
	D.16								
	D.17								
	D.18								
Summer	D.14								
	D.15								
	D.17								
	D.18								
	D.19								
Autumn	D.14								
	D.15								
	D.16								
	D.17								
	D.18								
	D.19								

Based on the two-stage approach assessing potential risk to bats (NatureScot 2021), taking into consideration habitat and development-related features (refer to Table 3-18). An overall assessment of risk can then be made by considering the site assessment in relation to the bat activity output from Figure 3-15, Figure 3-16 and Figure 3-17 (refer to Table 3-19) and taking into account the relative vulnerability of each species of bat present, at the population level adapted from Wray *et al.*, 2010 using IWM 134 and Article 17 as a guide (refer to Table 3-20).

The project size is considered large (comprising turbines >100m in height) and a habitat risk of medium, therefore a value of 4 is applied to the proposed development and is multiplied by the Woodrow value for the high-risk species (Leisler's bat, common, soprano and Nathusius' pipistrelle) found within the study area. The results for each year are shown in Table 3-21, Table 3-22 and Table 3-23.

Table 3-18: Stage 1 site risk assessment based on habitat and project size as outlined in NatureScot 2021

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

Table 3-19: Overall risk assessment based on activity categories provided for Woodrow in-house analysis

Site risk level (from Table 3-18)	**Nil**	**Low (1)**	**Low-Moderate (2)**	**Moderate (3)**	**Moderate-High (4)**	**High (5)**
Low (1)	0	1	2	3	4	5
Moderate (3)	0	3	6	9	12	15
High (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 (5-14)	High Overall Risk (15-25)

Table 3-20: Level of potential vulnerability of populations of Irish bat species (Adapted from Wray *et al*., 2010)

	Low collision risk	Medium collision risk	High collision risk
Common species	N/A	N/A	Common pipistrelle Soprano pipistrelle Leisler's bat
Rare species	Brown long-eared bat Daubenton's bat Natterer's bat Lesser horseshoe bat	N/A	Nathusius' pipistrelle
Rarer species	Whiskered bat	N/A	N/A

Table 3-21: Risk assessment for each detector location for the four high risk bat species for 2020

			NYCLEI		PIPPIP		PIPPYG		PIPNAT	
	Detector ID	Site risk value	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)
Spring	S.01	4	3	12	1	4	1.5	6		
	S.02	4	1	4	1	4	1	4		
	S.03	4	1	4	1	4	5	20		
	S.04	4	1	4	1	4	1	4		
	S.05	4	3	12	1	4	3	12		
	S.06	4	1	4	1	4	3	12		
	S.07	4	1	4	5	20	5	20		
	S.09	4	1	4	3	12	1	4		
	S.10	4	1	4	5	20	1	4		
	S.11	4	5	20	5	20	1	4	1	4
	S.12	4	1	4	1	4	1	4		
Summer	S.02	4	1	4	5	20	3	12		
	S.03	4	1	4	5	20	3	12		
	S.05	4	3	12	1	4	1	4		
	S.06	4	1	4	5	20	5	20		
	S.07	4	1	4	5	20	5	20		
	S.08	4	3	12	1	4	1	4		
	S.09	4	3	12	1	4	5	20		
	S.10	4	1	4	3	12	5	20		
	S.11	4	1	4	1	4	1	4		
	S.12	4	5	20	3	12	1	4		
Autumn	S.01	4			1	4	1	4		
	S.02	4	1	4	3	12	1	4		

		NYCLEI		PIPPIP		PIPPYG		PIPNAT	
Detector ID	Site risk value	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)
S.03	4	1	4	1	4	3	12	1	4
S.04	4	1	4	5	20	5	20		
S.05	4	1	4	1	4	2	8		
S.06	4	3	12	1	4	5	20		
S.07	4	1	4	3	12	5	20		
S.08	4	1	4	3	12	3	12		
S.09	4	1	4	5	20	1	4		
S.10	4	1	4	3	12	5	20		
S.11	4	1	4	6	24	5	20	1	4
S.12	4	1	4	1	4	1	4		0

Table 3-22: Risk assessment for each detector location for the four high risk bat species for 2021

			NYCLEI		PIPPIP		PIPPYG		PIPNAT	
	Detector ID	Site risk value	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)
Spring	D.02	4	1	4	1	4	1	4		
	D.03	4	1	4	3	12	3	12		
	D.04	4	3	12	5	20	5	20		
	D.05	4	1	4	1	4	1	4		
	D.06	4	1	4	1	4	1	4		
	D.07	4	3	12	5	20	5	20		
	D.09	4	3	12	5	20	1	4		
	D.10	4	1	4	5	20	3	12		
	D.11	4	1	4	5	20	5	20		
	D.12	4	1	4	1	4	1	4		
Pre-Summer	D.01	4	1	4	3	12	1	4		
	D.02	4	5	20	1	4	1	4		
	D.08	4	1	4	1	4	1	4		
Summer	D.01	4	1	4	1	4	3	12		
	D.02	4	3	12	1	4	1	4		
	D.03	4	1	4	1	4	1	4		
	D.04	4	3	12	5	20	5	20	1	4
	D.05	4	1	4	3	12	3	12		
	D.06	4	3	12	1	4	1	4		
	D.07	4	1	4	5	20	5	20		
	D.08	4	1	4	1	4	1	4		
	D.09	4	1	4	5	20	3	12		
	D.10	4	1	4	3	12	1	4		

			NYCLEI		PIPPIP		PIPPYG		PIPNAT	
	Detector ID	Site risk value	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)
Autumn	D.11	4	1	4	5	20	5	20		
	D.12	4	1	4	1	4	1	4		
	D.01	4	1	4	1	4	1	4		
	D.02	4	1	4	1	4	1	4		
	D.03	4	1	4	1	4	3	12		
	D.04	4	1	4	5	20	5	20		
	D.05	4	1	4	5	20	1	4		
	D.06	4	1	4	1	4	1	4		
	D.07	4	1	4	3	12	5	20		
	D.08	4	1	4	1	4	1	4		
	D.09	4	1	4	1	4	1	4		
	D.10	4	1	4	1	4	1	4		
	D.11	4	1	4	3	12	5	20		
	D.12	4	3	12	1	4	1	4	1	4

Table 3-23: Risk assessment for each detector location for the four high risk bat species for 2023

			NYCLEI		PIPPIP		PIPPYG		PIPNAT	
	Detector ID	Site risk value	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)	Woodrow median category	Detector risk (site risk x median category)
Spring	D.14	4	5	20	3	12	1	4	1	4
	D.15	4	1	4	1	4	1	4	1	4
	D.16	4	3	12	5	20	3	12	1	4
	D.17	4	1	4	1	4	1	4	1	4
	D.18	4	3	12	3	12	1	4	1	4
Summer	D.14	4	1	4	1	4	1	4		
	D.15	4	1	4	1	4	5	20		
	D.17	4	1	4	3	12	1	4		
	D.18	4	1	4	3	12	3	12		
	D.19	4	2	8	1	4	1	4		
Autumn	D.14	4	1	4	1	4	1	4		
	D.15	4	1	4	1	4	3	12		
	D.16	4	1	4	1	4	1	4		
	D.17	4	1	4	1	4	1	4		
	D.18	4	1	4	1	4	1	4		
	D.19	4	1	4	5	20	1	4		

Based on the proposed turbine location and associate detector locations (refer to Table 3-14) and the results of the risk levels for each detector location shown in Table 3-21, Table 3-22 and Table 3-23, an average risk level for each of the high risk species can be drawn for each of the turbine locations. Refer to

Table 3-24 which shows the activity level for each turbine based on all seasons and years.

Table 3-24: Average risk level for proposed turbine location

Proposed Turbine	Detector Location Accurate (A)	Detector Location Representative (R)	Average Risk Level			
			NYCLEI	PIPPIP	PIPPYG	PIPNAT
1		S.01 D.06 D.08 D.19				
2	D.14					
3	D.15					
		S.08 D.03				
4	D.01a / b					
		S.02 S.12				
5	D.16					
		S.01 D.06 D.08 D.19				
6	D.17					
		S.02a S.12				
7	D.06					
		S.01 D.06 D.08				
8		S.02 S.12 D.01 D.17				
9		S.02 S.12 D.01 D.17				
10		S.01 D.06 D.08 D.19				
11	D.19					
12		S.01 D.06 D.08				

4 DISCUSSION

Comprehensive bat activity monitoring was undertaken across 2020, 2021, and 2023, using static detectors both within proposed turbine footprints and at key landscape features in the wider local environment. Detectors such as D.04b, D.05, D.11, and D.18 were positioned along high-use linear features, such as treelines, hedgerows, drainage ditches, and riparian corridors to represent the surrounding habitat connectivity. In contrast, detectors including D.06, D.08, D.10, and D.12 were sited within the open bog and improved grassland areas representative of turbine locations.

Analysis of static detector data, supported by transect and roost surveys, demonstrates that bat activity within the study area is strongly associated with linear features such as treelines, hedgerows, and riparian corridors. These features serve as vital commuting and foraging routes, a pattern that is consistent with published studies showing the dependence of many bat species on structured landscape elements for navigation and prey capture (Boughey *et al*., 2011; Finch *et al*., 2020; Collins, 2016).

The highest levels of bat activity were recorded at detectors placed adjacent to such features, namely D.04b, D.05, D.11, and D.18. In particular, D.04b (adjacent to the river corridor) and D.11 (drainage ditch at bog edge) recorded consistently high activity by common and soprano pipistrelle and Leisler's bat, all of which are recognised as high-risk species in relation to wind turbine developments due to their high collision susceptibility and foraging flight height (Wray *et al*., 2010; NatureScot, 2021). Conversely, activity levels within the open areas where turbines are proposed were consistently low across all seasons and years, indicating these habitats do not provide significant foraging or commuting value for bats.

Importantly, the proposed turbine layout has been designed to avoid (where possible) these high-use features. More than 70% of turbines are located within open bog or improved grassland areas where bat activity has consistently been shown to be significantly lower. Detectors such as D.06, D.08, D.10, and D.12 representative of these open habitats, recorded low bat pass rates across all years and seasons. These areas lack the linear features or dense vegetation preferred by most bat species within the Site and do not serve as primary foraging or commuting zones.

Seasonally, bat activity peaked in autumn during each year surveyed. In 2020, autumn records alone exceeded 33,000 passes, with soprano pipistrelle representing 66% of these and common pipistrelle a further 28%. These seasonal peaks were mirrored in 2021 and to a lesser extent in 2023, with detectors such as D.04b, D.05, and D.11 recording the greatest levels of activity during this period. In contrast, activity during spring and summer was more variable and generally lower in total passes, though Leisler's bat showed distinct peaks during early night hours in summer, most notably at D.05 and D.09 in 2020 and at D.07 in 2021.

This strategic turbine placement aligns closely with the precautionary principles outlined in NatureScot *et al*. (2021), which recommend maintaining minimum buffers from high-use linear features and siting turbines in low-activity habitats. Furthermore, the bat activity recorded at the Site occurred overwhelmingly at wind speeds below 5.5 m/s, a threshold widely recommended as a mitigation cut-in speed to reduce bat mortality at turbines (NatureScot, 2021; Whitby *et al*., 2024). Analysis across all years confirms that bat passes are concentrated in the low wind range (Figure 3-9, Figure 3-14 and Figure 3-19), suggesting that any activity occurring near turbines is unlikely to coincide with operational conditions. Should additional mitigation be required based on final licensing or post-construction monitoring, standard seasonal curtailment measures (e.g., 5.5 m/s cut-in) are proven effective.

Although present within the wider 10 km radius, the lesser horseshoe bat was infrequently recorded within the Site and local environs and at low levels. In 2023, the species was detected on only four occasions across the entire monitoring period, and at a maximum of one call per night per detector, placing it firmly within the lowest activity band. These detections occurred at D.14 and D.17, both situated adjacent to wooded or scrubby linear features but with no consistent pattern of use suggesting roost proximity or core foraging behaviour.

This low level of activity is in keeping with the species' ecology. Lesser horseshoe bat typically flies at very low heights (<2 m), primarily within dense vegetation, and avoids open habitats (Bontadina *et al*., 2002; Collins *et al*., 2023. The Site itself lies over 13 km from the nearest designated SAC for lesser horseshoe bat (Kildun Souterrain SAC), well beyond the species' typical foraging range of 2.5 km and outside their known dispersal distance between seasonal roosts (Collins, 2023). Thus, individuals recorded are likely transient or exploratory foragers.

Given the extremely limited and spatially isolated detections, it is reasonable to conclude that the species is not considered at significant risk from the proposed development.

The risk assessment, carried out in accordance with the two-stage approach from NatureScot (2021), integrates habitat type, project scale, and species-specific bat activity. The Site was categorised as "Moderate" habitat risk due to its mosaic of bog, improved grassland, and linear features. Given the development comprises large turbines (>100 m tip height), the combined site risk level is scored as 4.

Using the in-house Woodrow analysis, median bat passes per hour were calculated for each high-risk species (Leisler's bat, common and soprano pipistrelle, and Nathusius' pipistrelle). These were cross-referenced with the Site risk value to produce turbine risk ratings. Turbine locations within or near detectors with high median bat activity (e.g. T4, T5, and T9) received elevated risk scores, while turbines sited in open or low-use areas (e.g. T1, T10, and T11) were consistently scored as Low Risk. The final turbine-level risk ratings are within the Low to Medium range, and no turbine was classified as High Risk.

In summary, the highest bat activity within the study area is clearly associated with linear and edge habitats, with open habitats consistently supporting lower levels of use. The turbine layout reflects these patterns, with most turbines sited in low-risk areas away from key features. Risk assessments confirm that turbine-specific risks remain low to moderate, and that curtailment strategies based on a 5.5 m/s wind speed threshold would be sufficient to prevent impacts to high-risk species. For lesser horseshoe bat, the combination of behavioural ecology, spatial data, and limited detections strongly supports a conclusion of negligible impact. Overall, the proposed development demonstrates compliance with precautionary ecological principles outlined in NatureScot (2021) and aligns with current best practice for minimising bat collision risk while supporting renewable energy generation.

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1 APPENDIX 1: BIOGRAPHYS

Rachel Irwin is a senior ecologist at Woodrow and has spent two seasons coordinating the company's bat surveys under the direction of Will Woodrow. Over this time, she has developed considerable experience in PRF surveys for bats, emergence/re-entry roost surveys, activity transects, and deployment of static bat detectors for numerous large wind farms sites in both the Republic of Ireland and Northern Ireland; as well as other developments including quarries and smaller residential projects. Rachel was also developing expertise in conducting roost searches of buildings, bridges, and trees under the supervision of licensed members of Woodrow staff - Róisín NigFhloinn and Will Woodrow. During her time at Woodrow, Rachel has become accomplished at manually identification of bat sonograms utilising Kaleidoscope and BatExplorer. Towards the end of each active bat season, she was responsible for compiling bat reports. She also assists senior members of staff with reporting for Ecological Impact Assessment (EcIA), Biodiversity Chapters for Environmental Impact Assessment Reports (EIAR) and informs the Appropriate Assessment (AA) process. She is a Qualifying member of the CIEEM.

Oisín O'Sullivan is a senior ecologist with Woodrow. Oisín has completed a B.Sc. in Ecology and Environmental Biology at University College Cork. His final year thesis involved bat surveys of urban habitats in Cork City. His work as a graduate ecologist with Woodrow focuses on bat data analysis including bat call identification and bat roost/habitat suitability surveys. Oisín has developed a high level of proficiency with Kaleidoscope, and BatExplorer, the analysis software used to assess bat calls and activity. Oisín also possesses marine and freshwater habitat survey skills from his time studying at UCC. Since joining Woodrow, Oisín has contributed to the writing of multiple bat activity reports. Oisín is a Qualifying member of CIEEM.

Damien McAndrew is a Bat Ecologist with APEM Group Woodrow. Damien holds a BSc (Hons.) degree in Environmental Science from Atlantic Technological University (ATU) in Sligo, his final year thesis consisted of critically evaluating The Native Woodland Establishment Scheme. Damien has 4 years in consultancy, having previously worked as a Freelance Consultant, Assistant Ecologist and Project Ecologist within other consultancies in Ireland, and has authored multiple bat activity reports, conducted bat activity surveys, delivered toolbox talks, and performed Ecological Clerk of Works (ECoW) on bat-sensitive projects. Damien has undertaken bat surveys including static detector deployment and roost surveys and worked on numerous large-scale developments within the renewables sector. Damien has developed a high level of proficiency with Anabat, as well as working with Kaleidoscope and BatExplorer; the analysis software packages used to assess bat calls and activity. Damien holds a full bat derogation license issued by The Minister for Housing, Local Government & Heritage.

Philip Doddy is a Senior Ecologist who has worked in a variety of terrestrial and aquatic environments. As part of his work with Woodrow, he conducts botanical monitoring and surveys, compiles Ecological Impact Assessments and Natura Impact Statements, carries out mammal surveys and habitat mapping, works with TidyTowns and other community groups on enhancing biodiversity, and writes biodiversity plans for towns and public areas. Philip has a PhD in Aquatic Sciences, a BSc (Hons) in Freshwater & Marine Biology, and a Diploma in Horticulture. He has also completed many other courses, in subjects such as algal taxonomy and identification, newt surveys, cetacean identification and stranding procedures, first aid, and health and safety. He is an associate member of CIEEM. Philip also has a track record as an

ecological researcher and has published several papers on subjects such as lake ecology, environmental monitoring, and ecological succession on limestone pavements. He is also a qualified and experienced horticulturalist, having worked for nine years in this area, and uses this experience when working with TidyTowns groups and community associations on improving public areas and planting displays, and enhancing public areas for biodiversity. Philip also has experience of scientific teaching, having worked as a part-time teacher and lab demonstrator in Galway-Mayo Institute of Technology for three years.

Sara Fissolo was a seasonal field worker with Woodrow and carried out emergence/re-entry surveys, bat activity transect surveys and static deployments and collections. Sara was an enthusiastic and hardworking Ecology and Environmental Biology Graduate. She has strong organisational skills, a passion for conservation ad experience with the environmental services industry. Sara carries out primarily bat-related fieldwork for the company. Her experience lies in carrying out preliminary roost assessments and is competent when undertaking emergence/re-entry bat surveys and activity surveys for bats, and reporting on the same. She also carries out bat call analysis using Kaleidoscope and BatExplorer software.

Julie Kohlstruck is a senior ecologist with Woodrow. She carried out emergence/re-entry surveys, bat activity transect surveys and static deployments and collections. Juliane holds both an MSc and BSc in landscape ecology. Her studies took her from Germany to Istanbul, Patagonia, Central America and finally to Ireland gaining extensive experience in botanical survey methods. She specialises in carrying out floristic surveys. Notwithstanding, she is also skilled in carrying out faunistic surveys including mammals, bats, amphibia, and invertebrates. She is proficient in mapping, spatial and data analysis using ArcGIS, QGIS, Excel, R and SPSS.

Patrick Devereaux was a seasonal field worker for Woodrow and carried out emergence/re-entry surveys, bat activity transect surveys and static deployments and collections is very motivated, always optimistic and willing to learn, fast. As someone who enjoys a challenge, he is accustomed to working under pressure and excels in such situations. With a genuine passion for wildlife and nature he recently completed a BSc in Applied Freshwater and Marine Biology at GMIT.

Ajay Cheruthon joined the Woodrow team in March 2022. Ajay assisted with static deployments. He is an electrical engineer who worked in project coordination with the Government of India. He has a Master's in Environmental Leadership from NUI Galway. Ajay primarily works on the impact of wind energy projects on birds, assisting in data management, field work coordination and geospatial analysis. He manages a team of sub-contracted ornithologists in order to meet the required bird survey needs of the clients.

Louise Gannon is an assistant ecologist with Woodrow and co-authored this report. Louise also carried out emergence/re-entry surveys, bat activity transect surveys and static deployment and collections. Louise has completed a B.Sc. in Environmental Science. Her main experience lies in carrying out protected species surveys for bats (preliminary roost assessments, emergence/re-entry survey and activity transect surveys) as well as the deployment of static bat detectors and reporting on the same. She also carries out bat call analysis using Kaleidoscope and BatExplorer, the analysis software used to assess bat calls and activity. She also has experience in carrying out otter, badger and red squirrel surveys. Louise is a licenced bat surveyor (DER/BAT 2023-25) and a Qualifying member of CIEEM.

2 APPENDIX 2: STATIC DETECTOR EFFORT

Recording failures marked in blue with locations not used for a given deployment marked in grey.

Table 1: Summary of static deployments 2020

Map ID	Latitude	Longitude	Associated feature/habitats	Spring 06 May 2020		Summer 17 June 2020		Autumn 02 September 2020	
				Unit Code	Run time	Unit Code	Run time	Unit Code	Run time
S.01	53.54573	-9.000075	In bog on bank surrounded by cut turf.	WSS006	14 nights (8335 min)	WSS009	No Data	WSS054	16 nights (12146 min)
S.02a	53.53672	-8.995435	On semi mature broadleaf at edge of sheep improved grassland.	WSS007	14 nights (8239 min)	n/a	n/a	n/a	n/a
S.02b	53.5368	-8.994588	In sheep improved grassland field *c.* 70 m from hedgerow.	n/a	n/a	WSS029	15 nights (7601 min)	WSS031	16 nights (12146 min)
S.03	53.52899	-9.026088	Along boundary of small section broadleaf woodland.	WSS008	14 nights (8299 min)	WSS014	15 nights (7601 min)	WSS023	16 nights (12146 min)
S.04	53.55054	-8.992339	On tree within treeline between road and improved grassland.	WSS010	13 nights (7241 min)	WSS033	No Data	WSS036	16 nights (12146 min)
S.05	53.52901	-9.027380	On open fence line between sheep and cattle improved grassland *c.* 100 m from treeline.	WSS012	14 nights (8307 min)	WSS030	15 nights (7601 min)	WSS020	2 nights (2055 min)
S.06	53.54201	-8.997696	On edge of bog between bog and improved grassland.	WSS016	13 nights (7736 min)	WSS011	15 nights (7601 min)	WSS023	11 nights (8446 min)
S.07	53.54338	-8.986811	In hedgerow between horse field and laneway.	WSS017	13 nights (7239 min)	WSS022	15 nights (7601 min)	WSS037	3 nights (2785 min)
S.08	53.5297	-9.032244	On open fence line *c.* 70 m from gorse and *c.* 200 m from plantation	WSS018	No Data	WSS026	15 nights (7601 min)	WSS039	16 nights (12146 min)
S.09	53.53622	-8.995126	In hedgerow running east to west with good connectivity between sheep field.	WSS020	15 nights (8789 min)	WSS032	15 nights (7601 min)	WSS028	16 nights (12146 min)
S.10	53.53375	-9.003293	Between canal and improved grassland on tree.	WSS021	13 nights (7240 min)	WSS024	15 nights (7601 min)	WSS052	16 nights (12146 min)
S.11	53.52805	-9.034123	Along forestry between improved grassland.	WSS022	13 nights (7767 min)	WSS019	15 nights (7601 min)	WSS033	9 nights (6318 min)
S.12	53.53494	-9.003745	On fence line between reseeded ground and cattle improved grassland.	WSS005	14 nights (8264 min)	WSS035	15 nights (7601 min)	WSS003	10 nights (7719 min)

Table 2: Summary of static deployments 2021

Map ID	Latitude	Longitude	Associated feature/habitats	Spring Deployment 20 May 2021		Summer Deployment 30 June 2021		Autumn Deployment 16 September 2021	
				Unit Code	Run time	Unit Code	Run time	Unit Code	Run time
D.01a	53.52594	-9.026027	In open improved grassland on maturing hawthorn scrub. treeline *c.* 50 m N, conifer plantation *c.* 50 m to the S.	WSS054	1 Night (529 min)	n/a	n/a	WSS045	12 Nights (8307 min)
D.01b	53.52642	-9.027304	On a hawthorn treeline in an improved grassland field.	n/a	n/a	WSS032	14 Nights (6886 min)	n/a	n/a
D.02a	53.52815	-9.03239	In improved grassland field with gorse, hawthorn treeline *c.* 40 m west.	WSS032	7 Nights (4151 min)	n/a	n/a	n/a	n/a
D.02c	53.52861	-9.033393	Beside beehives with gorse hedgerow surrounding.	n/a	n/a	WSS025	14 Nights (6886 min)	WSS050	12 Nights (8307 min)
D.03	53.53318	-9.030909	In a hawthorn treeline with gorse and reeds in fields either side.	WSS038	14 Nights (7159 min)	WSS026	14 Nights (6886 min)	WSS031	12 Nights (8307 min)
D.04a	53.53364	-9.002920	On a corner where two rivers meet, adjacent to a large mound and young treeline.	WSS025	14 Nights (7159 min)	n/a	n/a	n/a	n/a
D.04b	53.53346	-9.003425	Adjacent to river, open clearing tall grasses, young beeches along river.	n/a	n/a	WSS047	14 Nights (6886 min)	WSS035	12 Nights (8307 min)
D.05	53.53494	-8.996287	Open improved grassland hawthorn treeline within 3 m ends with field. Open improved grassland beyond. Sheep in field, cows beyond fence.	WSS026	14 Nights (7159 min)	WSS024	14 Nights (6886 min)	WSS055	12 Nights (8307 min)
D.06	53.53653	-8.989583	Open bog, drainage ditch within 15 m.	WSS051	14 Nights (7159 min)	WSS034	14 Nights (6886 min)	WSS036	12 Nights (8307 min)
D.07	53.53739	-8.981063	On small bank thickets of gorse and brambles, stream ditch corner 15 m S, SE and E.	WSS024	14 Nights (7159 min)	WSS038	14 Nights (6886 min)	WSS053	12 Nights (8307 min)
D.08	53.54365	-8.979831	Open sphagnum bog.	WSS047	0 Nights	WSS049	14 Nights (6886 min)	WSS049	12 Nights (8307 min)
D.09	53.54245	-8.989579	On mound near corner pf stream bordering comanage sparse patches of gorse and hawthorn surround.	WSS030	14 Nights (7159 min)	WSS027	14 Nights (6886 min)	WSS026	12 Nights (8307 min)
D.10	53.5407	-8.997378	Hawthorn treeline 20 m south, drainage ditch 40 m east gorse and reed field improved grassland.	WSS034	14 Nights (7159 min)	WSS040	14 Nights (6886 min)	WSS060	12 Nights (8307 min)
D.11	53.54505	-9.001177	Young beech tree along drainage stream and open improved grassland.	WSS040	14 Nights (7159 min)	WSS030	14 Nights (6886 min)	WSS046	12 Nights (8307 min)
D.12	53.54669	-9.007017	Open peatland cutting in progress to the north.	WSS060	14 Nights (7159 min)	WSS060	14 Nights (6886 min)	WSS024	12 Nights (8307 min)

Table 3: Summary of static deployments 2023

Map ID	Latitude	Longitude	Associated feature/habitats	Spring Deployment 16 May 2023		Summer Deployment 11 July 2023		Autumn Deployment 03 October 2023	
				Unit Code	Run time	Unit Code	Run time	Unit Code	Run time
D.14	53.535993	-9.03455	Open, on patch of gorse in improved grassland	WSS005	14 nights (7732min)	WSS041	15 nights (8170min)	WSS045	15 nights (10958min)
D.15	53.531158	-9.032567	On a linear feature of hawthorn hedgerow	WSS003	14 nights (7732min)	WSS065	11 nights (6059min)	WSS048	15 nights (10958min)
D.16	53.532465	-9.005635	In open bog, with a big bog pool nearby	WSS031	15 nights (8226min)	WSS047	15 nights (8170min)	WSS065	15 nights (10958min)
D.17	53.537507	-8.99667	On a hawthorn hedgerow	WSS004	15 nights (8226min)	WSS048	15 nights (8170min)	WSS041	15 nights (10958min)
D.18	53.543028	-8.998073	On a linear feature between a drainage ditch in bog and improved grassland	WSS045	15 nights (8226min)	WSS066	15 nights (8170min)	WSS067	15 nights (10958min)
D.19	53.541994	-8.981378	In open bog	N/A	FAILED	WSS069	15 nights (8170min)	WSS038	15 nights (10958min)

3 APPENDIX 3: WEATHER DATA

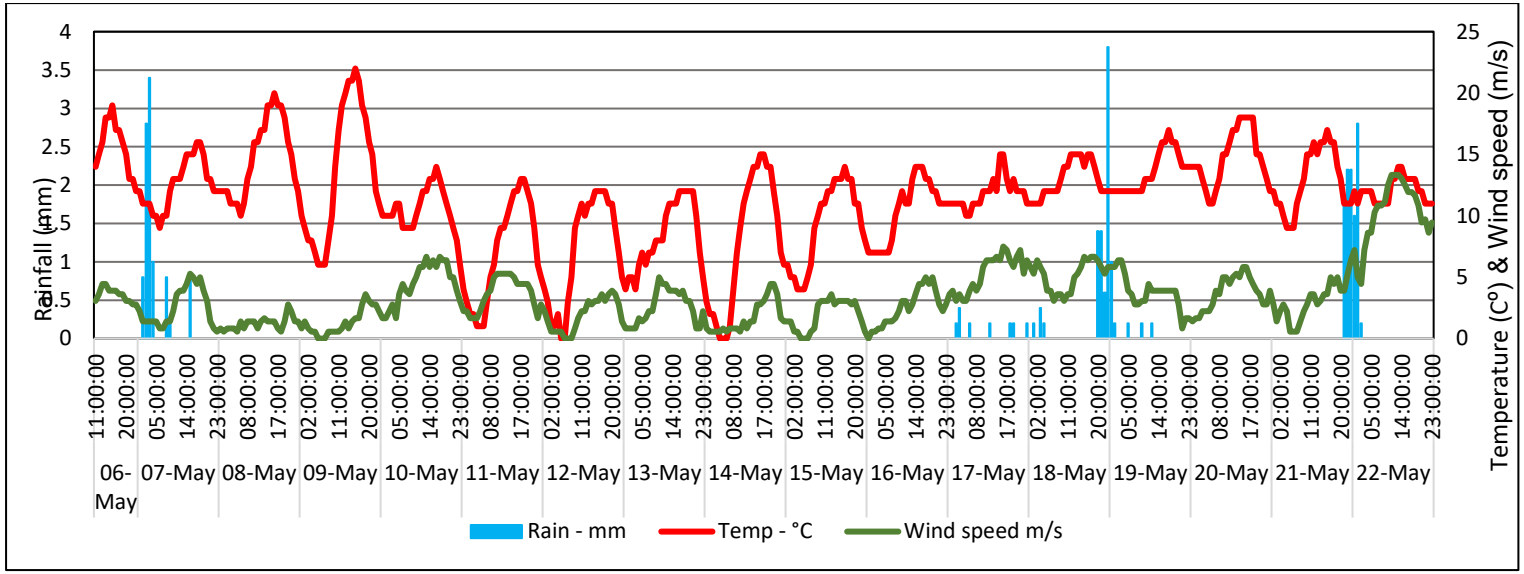


Figure 1: Weather data spring 2020

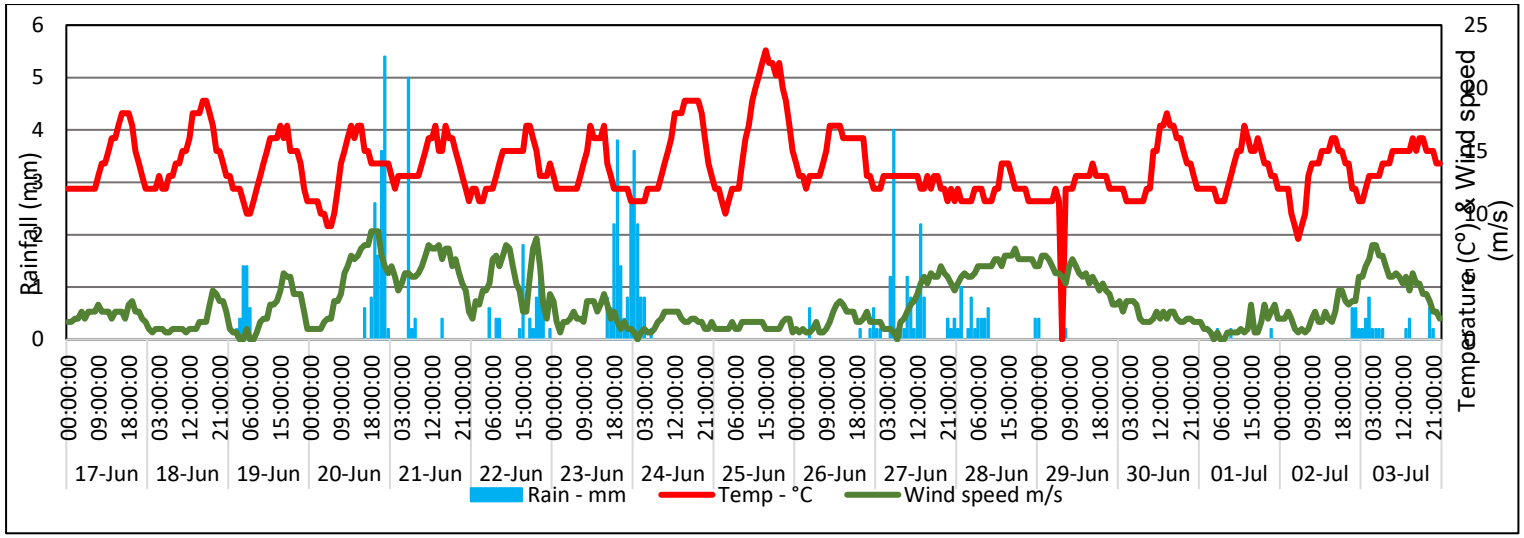


Figure 2: Weather data summer 2020

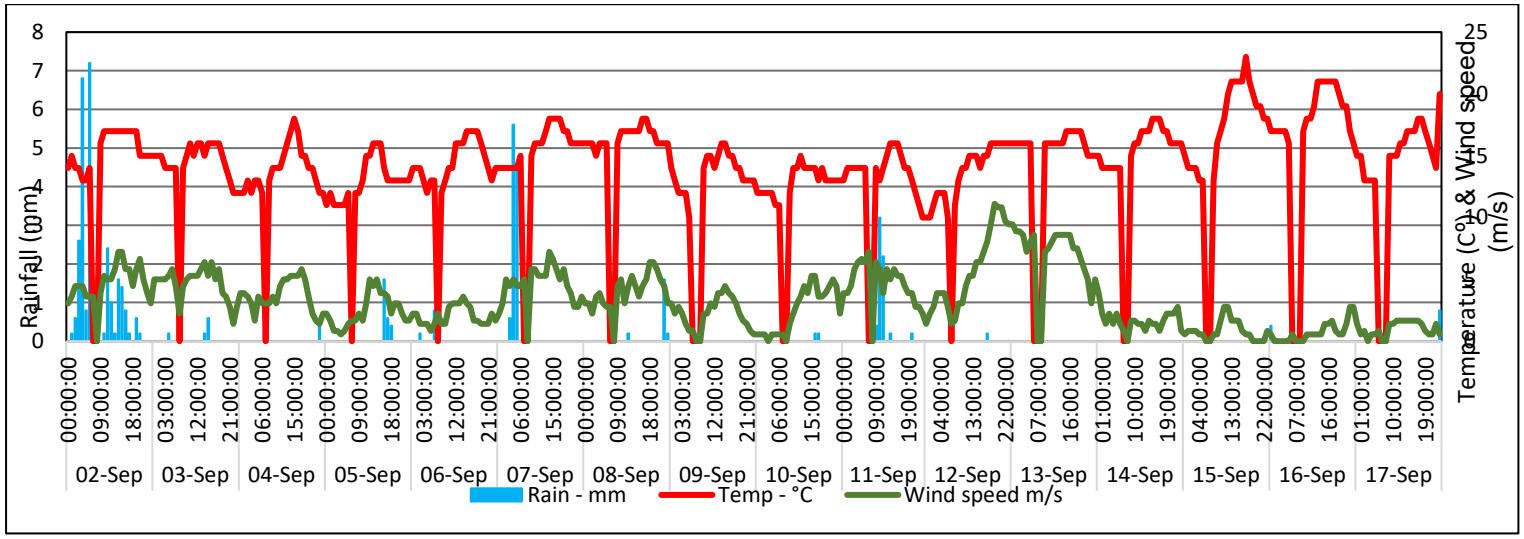


Figure 3: Weather data autumn 2020

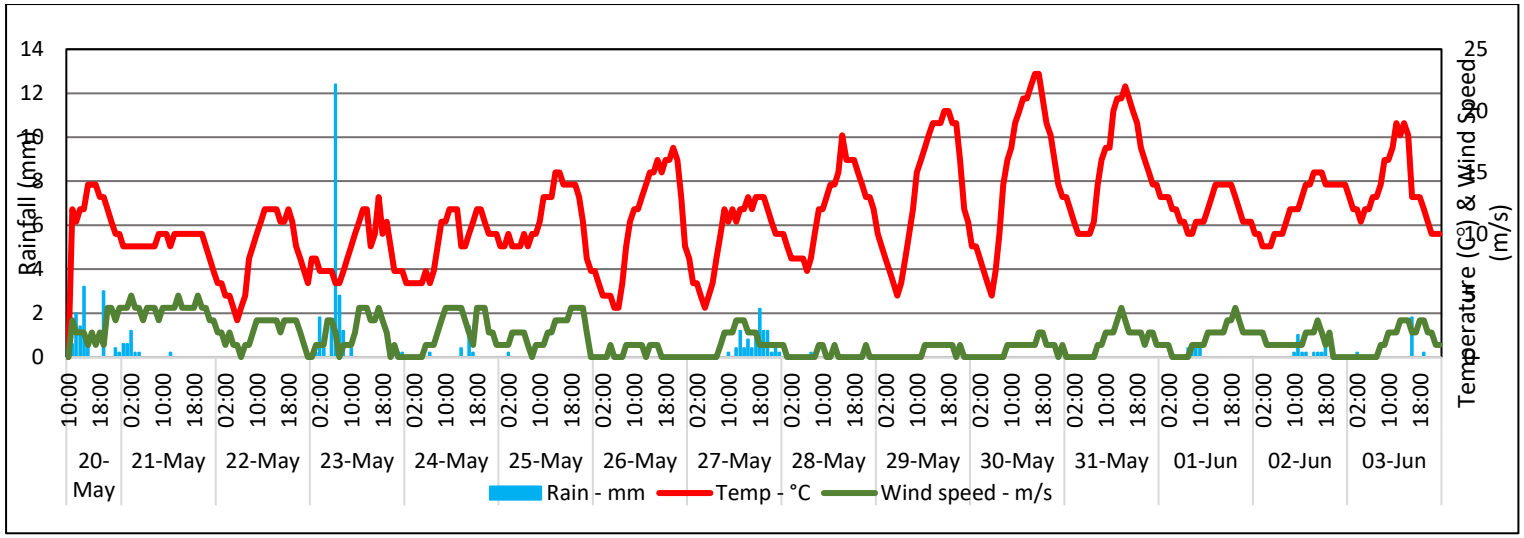


Figure 4- Weather data spring 2021

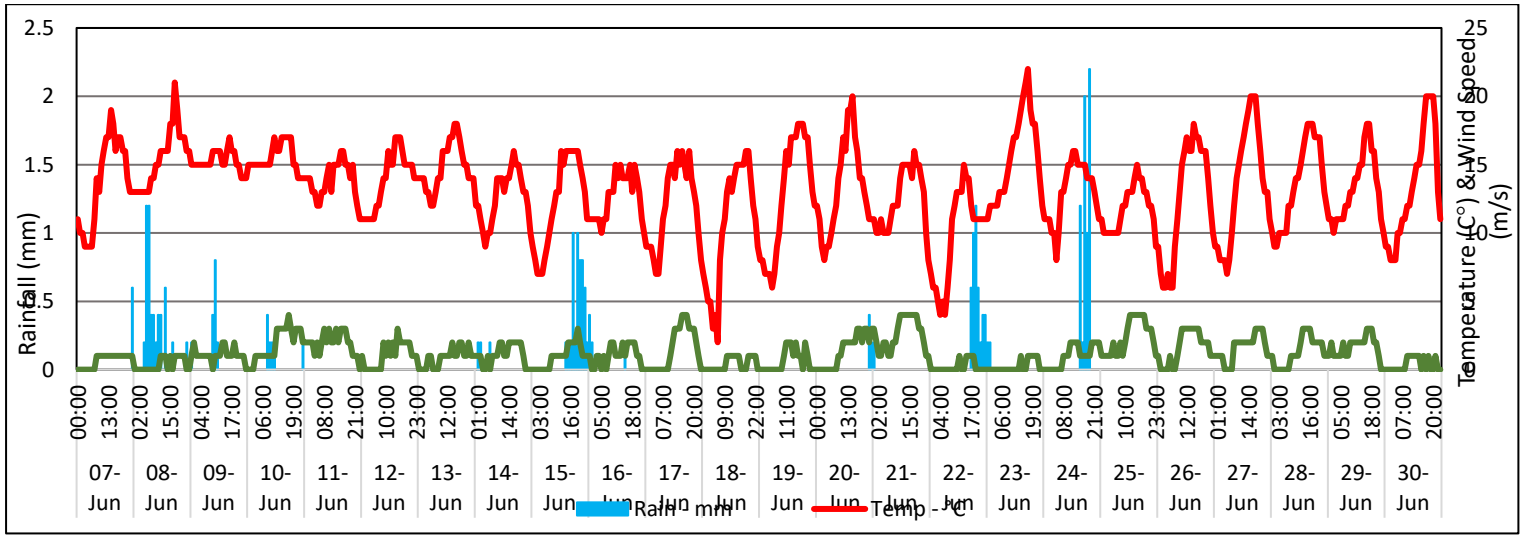


Figure 5Weather data spring (re-deploy) 2021

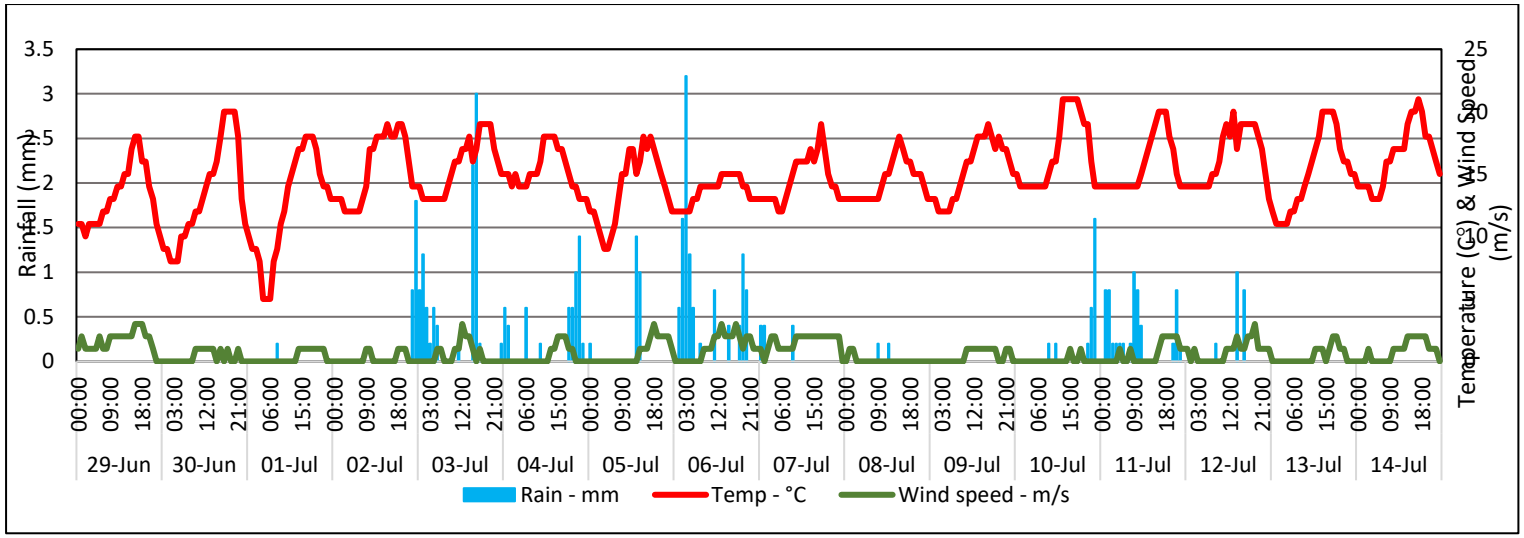


Figure 6- Weather data summer 2021

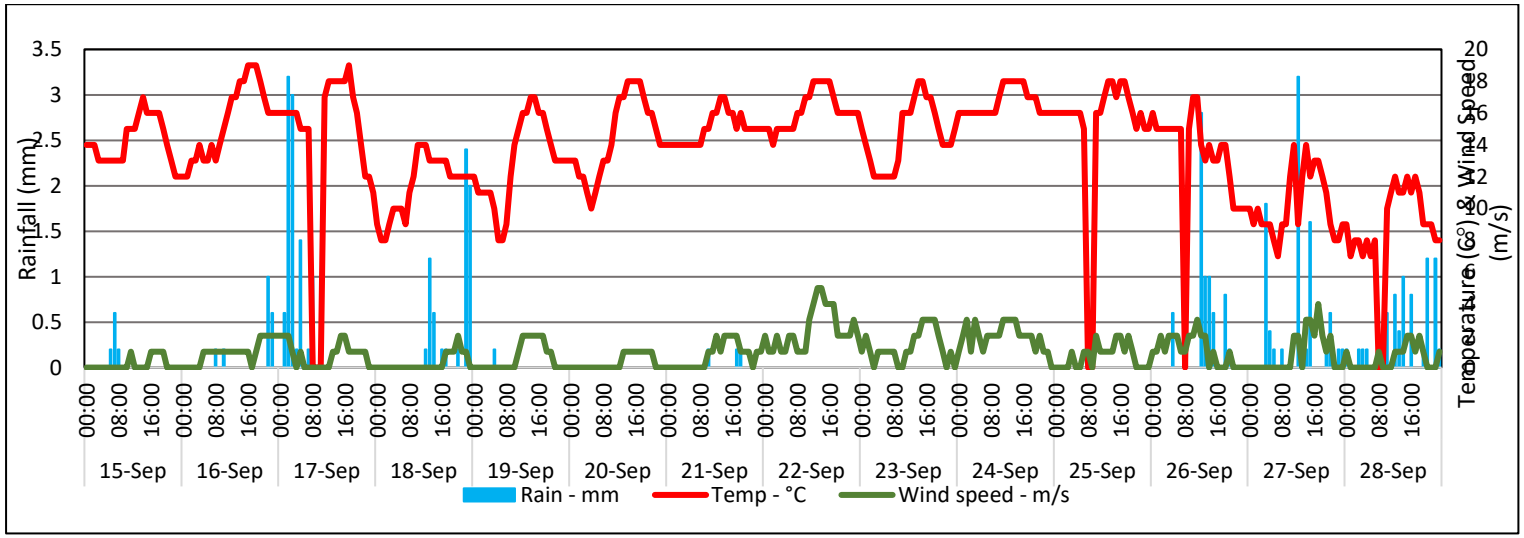


Figure 7: Weather data autumn 2021

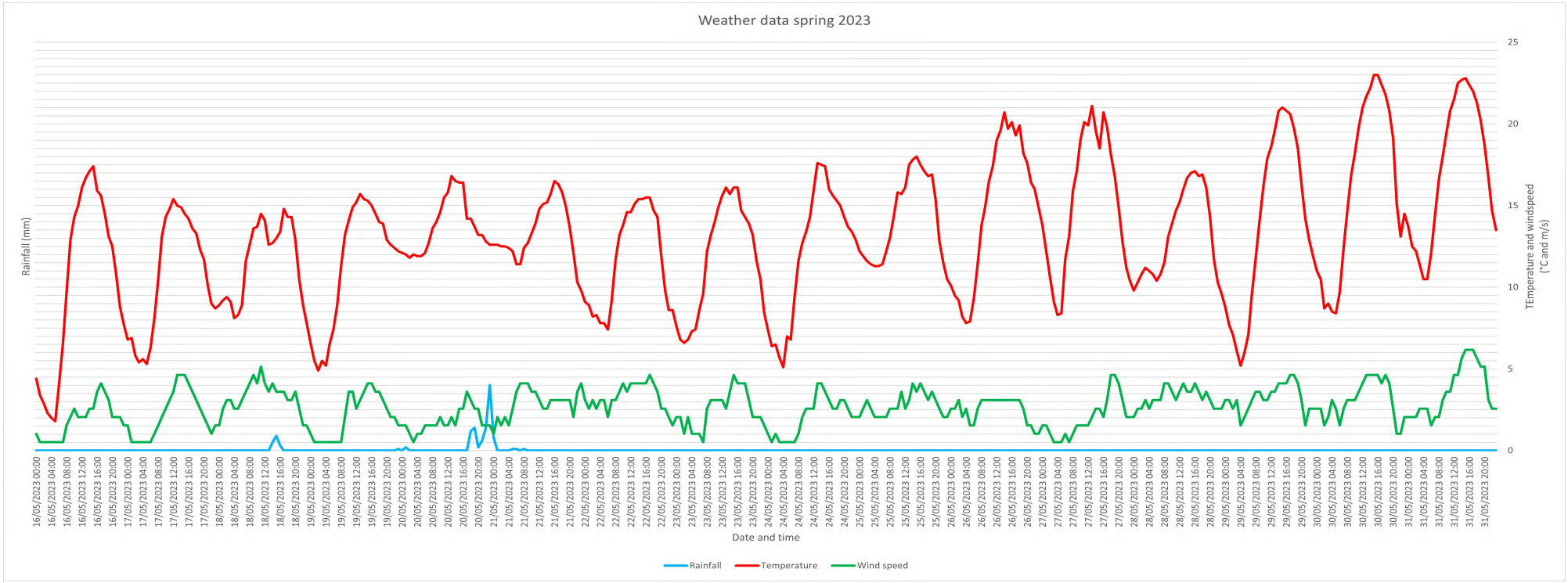


Figure 8: Weather data spring 2023

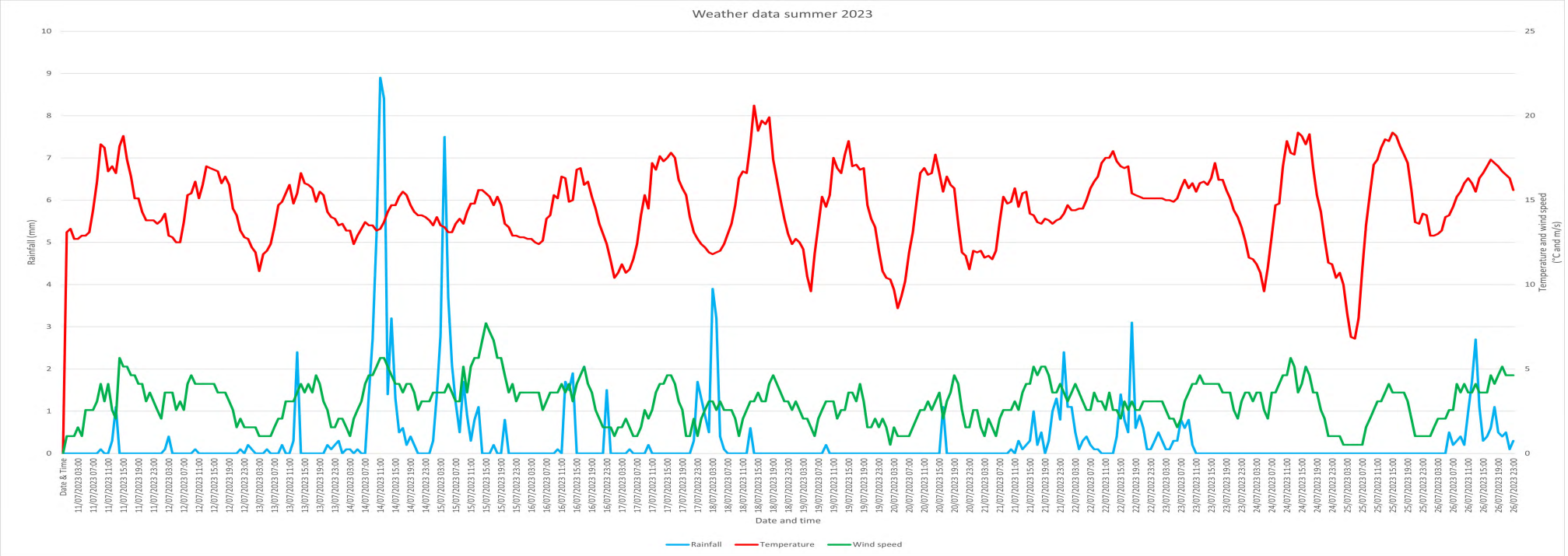


Figure 9: Weather data summer 2023

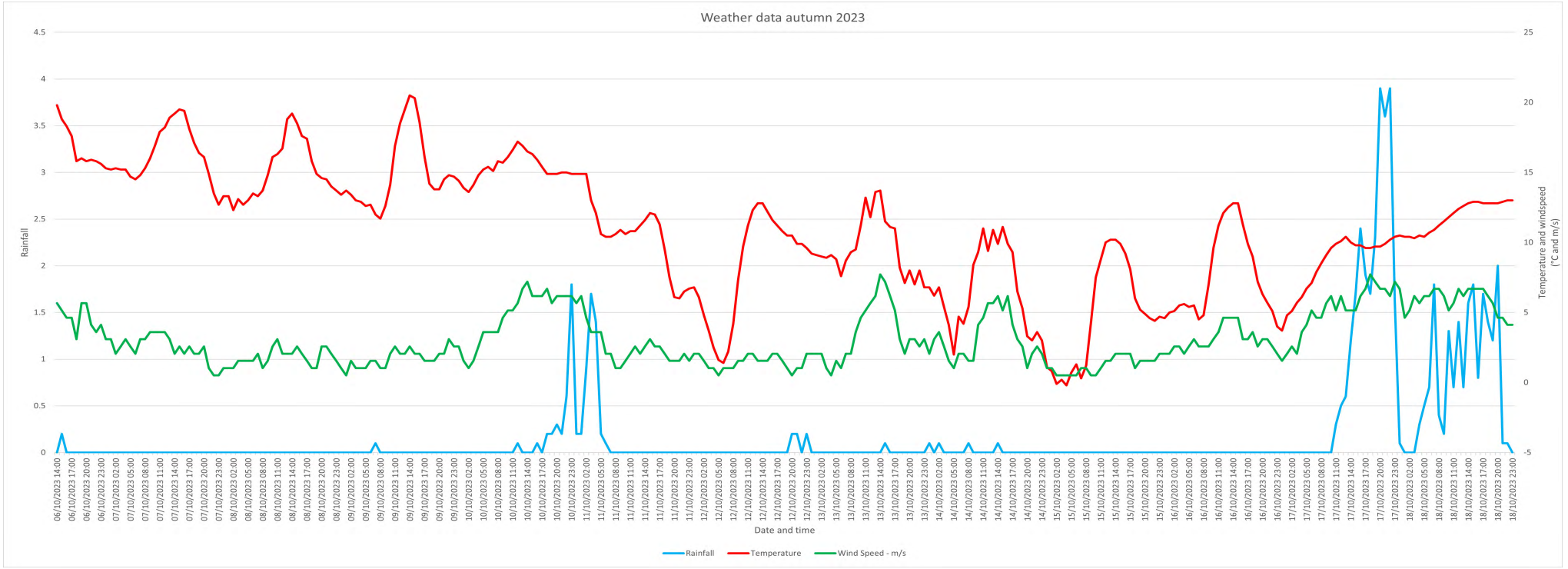


Figure 10: Weather autumn 2023

4 APPENDIX 4: BCI RECORDS

BCI roost data within 10 km of the proposed Shancloon WF Application Site		
Roost Data - Roost Surveys		
Name	***Grid reference***	***Species***
Clare Tuam Bridge 2	Confidential; Not provided here - available on request	Unidentified bat
Clare Tuam Bridge 3		*Myotis nattereri*
Clare Tuam Bridge		*Myotis daubentonii, Myotis nattereri, Rhinolophus hipposideros*
Private		*Myotis mystacinus, Pipistrellus pygmaeus, Plecotus auritus, Rhinolophus hipposideros*
Private		*Rhinolophus hipposideros*
Private		*Rhinolophus hipposideros*
Private		*Plecotus auritus*
Private		*Rhinolophus hipposideros*
Private		*Rhinolophus hipposideros*
Private		*Rhinolophus hipposideros*
Private		*Rhinolophus hipposideros*
Transects		
Name	***Grid reference start***	***Species***
Car transect M24 (10) 2003-	Confidential; Not provided here - available on request	*Nyctalus leisleri, Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz)*
Car transect M24 (11) 2003-		*Myotis spp., Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz),* Unidentified bat
Car transect M24 (12) 2003-		*Nyctalus leisleri, Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz), Plecotus auritus,* Unidentified bat
Car transect M24 (13) 2003-		*Nyctalus leisleri, Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz)*
Car transect M24 (14) 2003-		*Nyctalus leisleri, Pipistrellus pipistrellus , Pipistrellus pygmaeus,* Unidentified bat
Car transect M24 (15) 2003-		*Nyctalus leisleri, Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz)*
Car transect M24 (16) 2003-2008		*Nyctalus leisleri, Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz)*

BCI roost data within 10 km of the proposed Shancloon WF Application Site			
Car transect M24 (17) 2003-2008		*Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz)*	
Car transect M24 (18) 2003-2008		*Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz)*	
Car transect M24 (19) 2003-2008		*Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz)*	
Car transect M24 (20) 2003-2008		*Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz)*	
Car transect M24 (6) 2003-		*Nyctalus leisleri, Pipistrellus pipistrellus , Pipistrellus pygmaeus, Pipistrellus spp. (45kHz/55kHz), Plecotus auritus,* Unidentified bat	
Moyne Bridge		*Myotis daubentonii, Nyctalus leisleri, Pipistrellus pygmaeus,* Unidentified bat	
Ad-hoc observations			
Survey	***Grid reference***	***Species***	***Date***
BATLAS 2010	Confidential; Not provided here - available on request	*Nyctalus leisleri*	29/10/2009
BATLAS 2010		*Nyctalus leisleri, Pipistrellus pygmaeus*	22/05/2009
BATLAS 2010		*Myotis daubentonii, Nyctalus leisleri*	26/08/2009
BATLAS 2010		*Pipistrellus pygmaeus*	24/05/2009
BATLAS 2010		*Pipistrellus pipistrellus , Pipistrellus pygmaeus*	04/08/2009
BATLAS 2010		*Pipistrellus pygmaeus*	18/09/2009
BATLAS 2010		*Myotis spp., Pipistrellus pipistrellus , Pipistrellus pygmaeus*	26/08/2009
BATLAS 2010		*Nyctalus leisleri, Pipistrellus pipistrellus , Pipistrellus pygmaeus*	26/08/2009
BATLAS 2010		*Pipistrellus pipistrellus , Pipistrellus pygmaeus*	22/05/2009
BATLAS 2010		*Nyctalus leisleri, Pipistrellus spp. (45kHz/55kHz)*	30/07/2009
BATLAS 2010		*Nyctalus leisleri, Pipistrellus pygmaeus*	14/10/2009
BATLAS 2010		*Myotis daubentonii, Myotis nattereri, Pipistrellus pygmaeus, Plecotus auritus*	18/09/2009
EIS Surveys		*Myotis daubentonii*	11/05/2002
EIS Surveys		*Myotis daubentonii, Nyctalus leisleri, Pipistrellus pipistrellus , Pipistrellus pygmaeus*	16/06/2005
EIS Surveys		*Myotis daubentonii, Pipistrellus pygmaeus*	23/04/2005

5 APPENDIX 5: HABITAT SUITABILITY MAPS

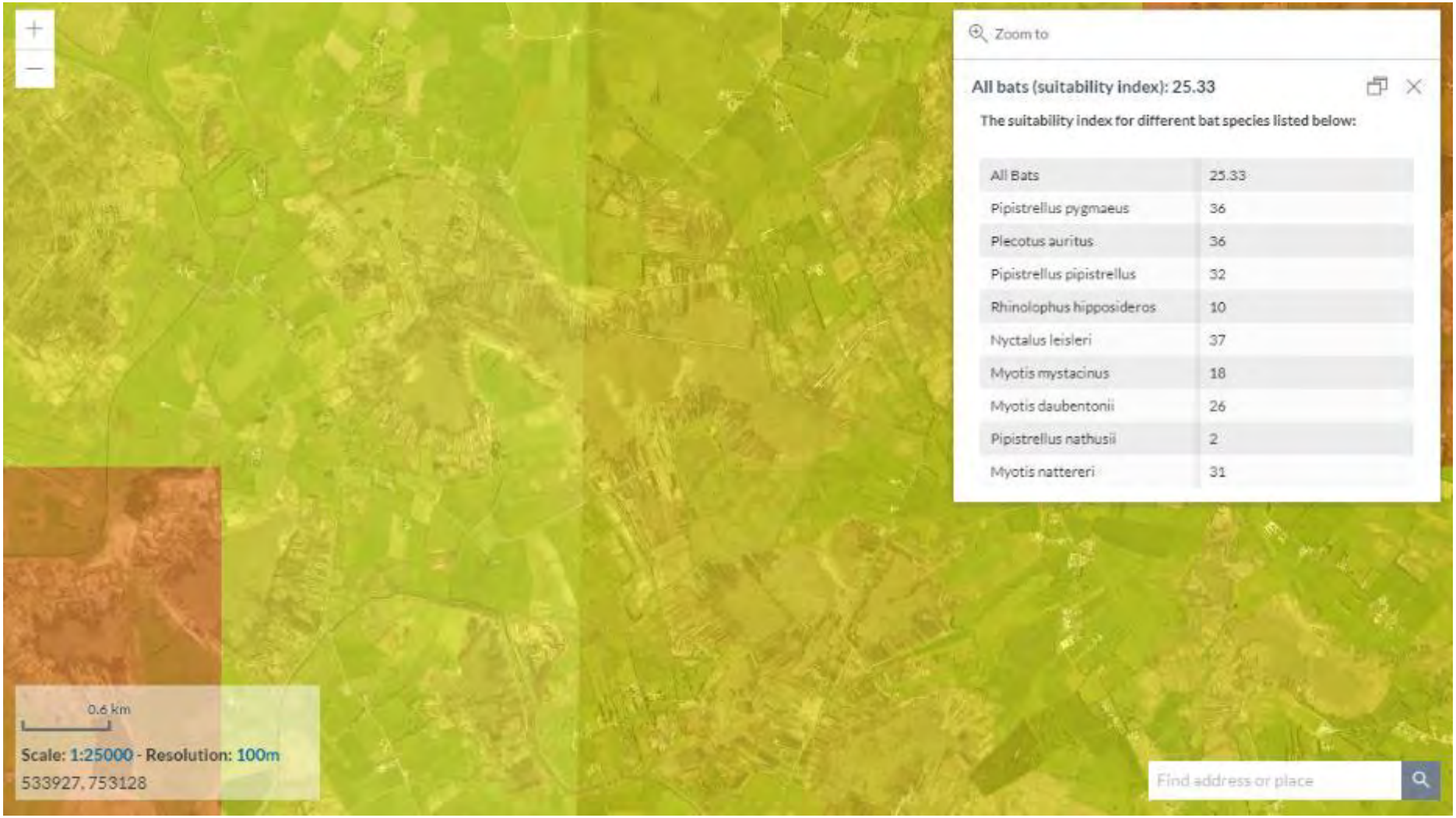


Figure 11: Biodiversity map bat habitat suitability index based on Lundy et al. 2011, eastern section of site (moderate)

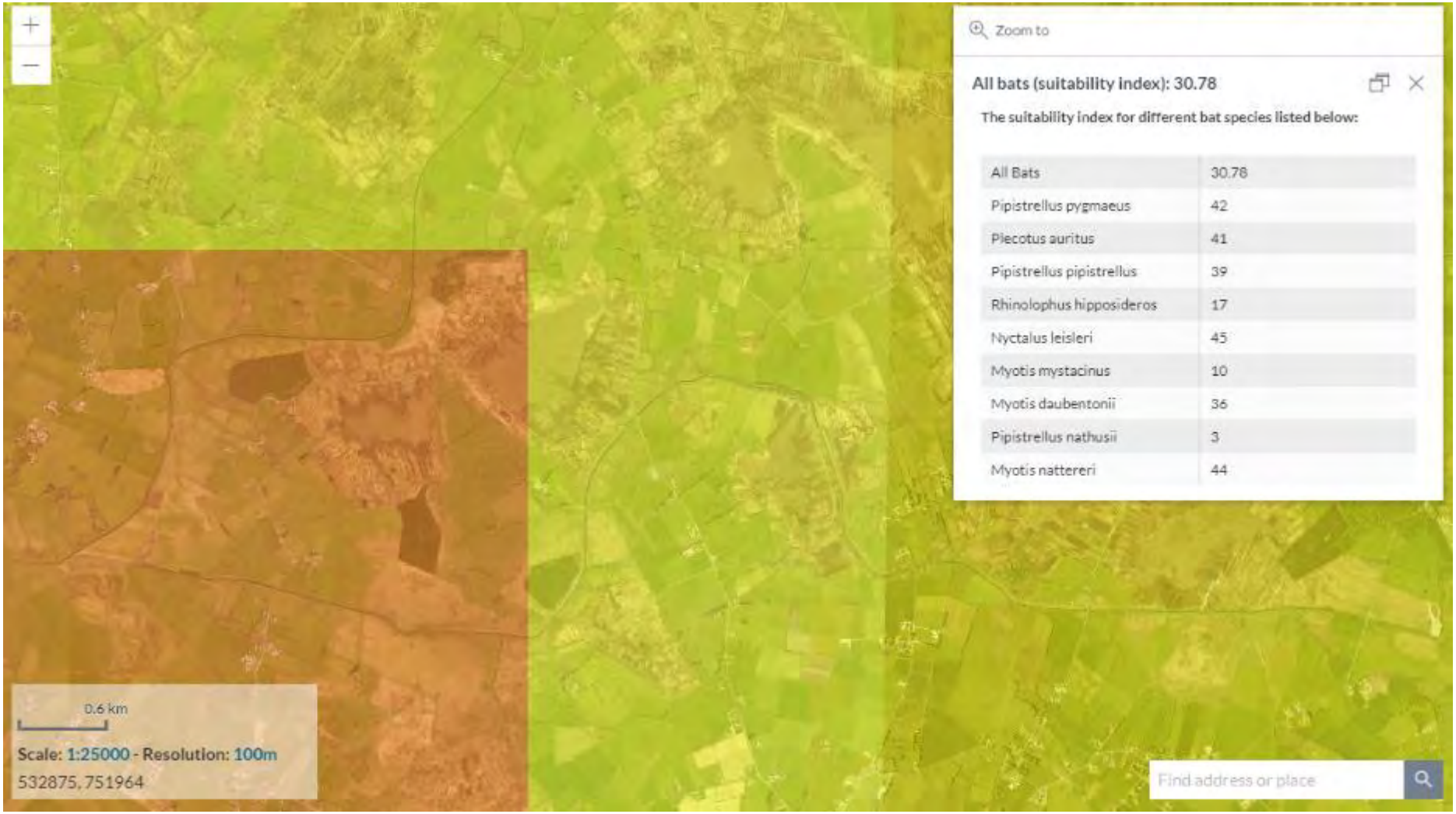


Figure 12: Biodiversity map bat habitat suitability index based on Lundy et al. 2011, western section of site (moderate/high)

6 APPENDIX 6: ROOST SURVEY RESULTS AND LOCATION PICTURES

Emergence survey 1:

Date: 01 September 2020 *Sunset:* 20:25 *Start:* 20:14 *End:* 21:50

A dusk emergence was conducted on the 01 September 2020 at F2.

There was little activity at this location with the total bat passes from both detectors for the emergence survey being 17, and no confirmed emergences being recorded.

Southern gable: There were no bats seen exiting the potential roost features targeted for the survey. Soprano pipistrelles were recorded throughout the survey. The first Soprano heard was noted to be commuting. Common pipistrelles were also heard towards the end of the survey.

Northern gable: The north gable and side of the house were observed for the roost watch survey. The surveyor noted heavy rain began at 21:40. The first bat recorded was a soprano pipistrelle was observed commuting. The surveyor noted the call was very faint and short. A common pipistrelle was commuting and flew over the house. Soprano pipistrelles were recorded again; however, these individuals were not seen. A Leisler's bat was also noted to be commuting. A common pipistrelle and a soprano pipistrelle were observed foraging again at 22:26.

Result: No confirmed roost.

Emergence survey 2:

A dusk roost emergence survey was conducted by two surveyors on the 03 September 2020, each covering separate potential roosting features on F2. One surveyor covered the northern gable of the cottage and the second covered the southern gable.

Date: 03 September2020 *Sunset:* 20:25 *Start:* 20:30 *End:* 22:55

Northern gable: No bats were observed exiting any roosting features in the cottage targeted for the roost watch. A brown long-eared bat was the first bat recorded foraging. A soprano pipistrelle was recorded foraging. Soprano pipistrelles were recorded between 21:45 and 22:03. Commuting soprano pipistrelles were also recorded at 22:01. Soprano pipistrelles were observed foraging again. A common pipistrelle was foraging, and a Leisler's bat was recorded.

Southern gable: No bats were observed exiting any roosting features in the cottage targeted for the roost watch. The first bat recorded was a soprano pipistrelle, who was foraging. The same bat was noted to be continuously flying around. The surveyor noted this bat was continuously foraging up until towards the end of the survey. A common pipistrelle was seen foraging again and a brown long-eared bat was recorded but not seen.

Result: No confirmed roost.

Re-entry survey 1

Date: 04 September 2020 *Sunrise:* 06:50 *Start:* 05:30 *End:* 07:05

A dawn re-entry survey was carried out at F3.

A dawn roost re-entry survey was conducted by two surveyors on the 04 September 2020, each covering separate potential roosting features on F3. One surveyor covered the north and eastern facades of the cottage and the second covered the southern facade.

South side of building: Surveyors covered the south side of the two-storey derelict house. The first bat recorded was a foraging soprano pipistrelle. Two potential soprano pipistrelle re-entries were recorded at 06:57 and 07:08 through a crack connecting running up the wall and chimney. This was followed by a confirmed Leisler's bat re-entry into the roof slates. A soprano pipistrelle was observed to be commuting towards southward.

North and east side of building: Surveyors covered the north and east sides of the two-storey derelict house. There were common pipistrelles, soprano pipistrelles, and brown long-eared bats observed during the survey. A common pipistrelle was recorded commuting. A brown long-eared bat was recorded but not seen and soprano pipistrelles were recorded commuting. No re-entries were recorded on this side of the building.

Result: Confirmed Leisler's bat and soprano pipistrelle roost.

Emergence survey 3:

Date: 01 October 2020 *Sunset:* 19:11 *Start:* 18:55 *End:* 20:40

An emergence survey was carried out on F3.

Eastern side of house: The first bats recorded were two soprano pipistrelles at 19:30 foraging overhead. They were recorded foraging along the treeline adjacent to the house. The surveyor noted the calls were faint and likely from a distant individual. Two soprano pipistrelles were seen and recorded once more, foraging, and circling around the house but not entering it. They then left the area. The surveyor noted the rain getting heavier. Two soprano pipistrelles were recorded again twenty minutes later.

Western side of house: Soprano pipistrelles were recorded foraging around the house for the duration of the emergence survey. There were also common pipistrelles (28 passes) present here. The first bat recorded here was a common pipistrelle at 19:29. There were no bat emergences recorded.

Result: No confirmed roost.

Emergence survey 4:

Date: 08 June 2021 *Sunset:* 22:01 *Start:* 21:30 *End:* 23:30

An emergence survey was carried out on F1. One surveyor covered the south facing side of the building while the other covered the north facing side of the cattle shed.

Cattle shed: This surveyor recorded no bats emerged at this building. The first bat recorded was a Leisler's bat, flying south at a height of *c.* 30 m above the trees. This was not recorded on the Batlogger. At 22:27 a soprano pipistrelle was noted as commuting from south to north. Potentially the same soprano pipistrelle was recorded travelling from the north to south at 22:30. Another soprano pipistrelle was recorded foraging; however, it was not seen. At around 22:54 Leisler's bat was observed was foraging approx. 30 m high above the farmyard. Two soprano pipistrelles were recorded making social calls above the farmyard. A Brown long-eared bat was heard but not seen. One *Myotis* species was also heard but not seen and another *Myotis* species was observed foraging.

Derelict building: The surveyor noted no bat emerging from the derelict building. Soprano pipistrelles, common pipistrelles, Leisler's bats, and brown long-eared bats were recorded foraging above the farmyard during the survey.

Result: No confirmed roost.

Emergence survey 5:

An emergence survey was carried out on F3.

Date: 30 June 2021 *Sunset*: 22:07 *Start:* 21:50 *End:* 23:37

Western side of house: A soprano pipistrelle was noted to potentially have emerged from a window at 22:36. A confirmed soprano pipistrelle emergence from the top right window was recorded at 22:45. Another confirmed soprano pipistrelle emergence was recorded from the top centre window at 22:51. Soprano pipistrelles foraged along the treelines surrounding the building continuously throughout the survey

Eastern side of house: This surveyor covered the northern and eastern sides of the abandoned house. There were 5 windows and a door entrance. However, there were 2 trees obstructing some visibility. The first bat was seen at 22:31 but not recorded on the detector. Two soprano pipistrelles were recorded foraging continuously around the house between 22:40 and 23:37 A Leisler's bat was recorded foraging but was not seen at 23:32.

Result: Confirmed soprano pipistrelle roost.

Re-entry survey 2

A re-entry survey was carried out on F3.

Date: 01-July 2021 *Sunrise:* 05:11 *Start:* 03:45 *End:* 05:25

Western side of house: Three soprano pipistrelles were observed foraging at 03:52. The surveyor noted a possible soprano pipistrelle re-entry through the top centre window. Two separate soprano pipistrelles were then recorded re-entering through the top right windows. The surveyor noted that they turned off the detector at 05:00 and moved as cattle were becoming restless in the field from which they were surveying.

Eastern side of house: No re-entries were noted at the eastern or north-east side of the derelict house. Soprano pipistrelles and Leisler's bats were recorded between 04:03 and 04:16. This surveyor recorded very little activity with a total of 4 passes being recorded. The first bat recorded was a soprano pipistrelle which was heard but not seen. A Leisler's bat was also heard but not seen.

Result: Confirmed soprano pipistrelle roost.

Emergence survey 6

Date: 14 July 2021 *Sunset:* 21:57 *Start:* 21:40 *End:* 23:40

Surveyors surveyed F7 & F8, both of which were trees.

Tree west of lambing shed: Between 22:39 and 23:32 soprano and common pipistrelles were recorded continuously foraging while circling the tree. At any given time between 2 and 5 bats were recorded foraging to a maximum of 3 common or soprano pipistrelles. No emergences were recorded.

Tree south of lambing shed: The second surveyor was located at a treeline approximately 300m south of the other surveyor. The surveyor noted that standing underneath the treeline could affect recordings of bat passes and repositioned into the field east of the tree at 22:47. A common pipistrelle was recorded abruptly at 22:38 but emergence was not confirmed. Soprano pipistrelles, common pipistrelles and an individual Leisler's bat were recorded foraging along the treeline between 22:49 and 23:29. One soprano pipistrelle was recorded foraging low, approx. 1.5m high, along the treeline.

Result: No confirmed roost.

Re-entry survey 3

Date: 15 July 2021 *Sunrise:* 05:26 *Start:* 04:05 *Duration:* 05:41

A re-entry survey was conducted at F1.

Derelict cattle shed: A total of 11 bat passes were recorded at this location. The first bat recorded was a soprano pipistrelle recorded at 04:08 and 04:10. A brown long-eared bat was recorded also at 04:15. A common pipistrelle was recorded commuting into the trees behind the sheds at 04:41. No bats were seen re-entering the shed.

Derelict House: A common pipistrelle was recorded flying into the house but out again through the chimney. A bat was seen inside the house, however there was no call recorded on the Batlogger. The surveyor observed this bat with the use of a headtorch at 04:20. This was likely a brown long-eared bats as they are known to call more infrequently on emergence and re-entry than other bats. A Leisler's bat pass was recorded but was noted as faint, likely produced by a distant individual.

Result: Brown long-eared and common pipistrelle roost in derelict house.

No confirmed roost in cattle shed.

Emergence survey 7:

Date: 16 September 2021 *Sunset:* 19:49 *Start:* 19:38 *End:* 20:15

An emergence survey conducted at F2. This survey was ended abruptly due to non-compliant weather conditions. However, its results are still considered, given the findings.

Northern side of building: The surveyor noted at 20:03 that a light drizzle started, and the wind slowed down however there were still some gusts. A soprano pipistrelle emerged from the roof, but the exact spot it came out from was not seen. It was then recorded foraging in the area surrounding the house. The surveyor noted light rain, which continued to get heavier. The survey stopped at 20:15 due to unsuitable weather conditions.

Southern side of building: The surveyor recorded two soprano pipistrelles emerged from under the fascia of the building at 20:04. The survey stopped at 20:15 due to unsuitable weather conditions.

Result: Confirmed soprano pipistrelle roost.

Re-entry survey 4

Date: 17 September 2021 *Sunrise:* 07:13 *Start:* 05:43 *End:* 07:30

A re-entry survey on F2 to compensate for the poor weather in the previous night's emergence survey. Once again weather fluctuated from compliant to non-compliant, however, the findings remain significant.

Northern side of building: A soprano pipistrelle was recorded foraging around the house and surrounding area while continuously making social calls from 05:50 to 05:56. Another soprano pipistrelle was noted foraging west of the house. The surveyor noted light rain at 06:15. At 06:18 a common pipistrelle was seen flying up to the gable in circles, touching the roof but deciding not to re-enter. The surveyor noted the rain easing and then stopping at 06:28 and 06:35, respectively. No re-entries were observed on this face of the house.

Southern side of building: At the very start of the survey a soprano pipistrelle was recorded foraging and making social calls (likely the same individual recorded by the other surveyor). A soprano pipistrelle was recorded entering the old building at the base of the chimney at 06:22. A further 5 soprano pipistrelles were recorded re-entering the building under the fascia at various locations. A Leisler's bat was recorded foraging above the house at 06:35. Heavy rain started again at 07:00 and continued until the end of the survey at 07:30.

Result: Confirmed soprano pipistrelle roost.

Emergence survey 8

Date: 29 September 2021 *Sunset:* 19:17 *Start:* 19:04 *End:* 20:53

This survey covered the derelict house and cattle shed at F1.

Derelict cattle shed: The first bat recorded was a soprano pipistrelle seen flying east at 19:33. The bat appeared to be struggling to fly due to the wind (4 m/s, which is still considered compliant). Soprano pipistrelles and Leisler's bats were recorded foraging at regular intervals above the farmstead during the survey. No bats were recorded emerging from the cattle shed.

Derelict house: The first bat was recorded at 19:23, which was a soprano pipistrelle. Common and soprano pipistrelles were recorded foraging and making social calls throughout the survey. No bats were recorded emerging from the house.

Result: No confirmed roost.

Re-entry survey 4

Date: 30 September 2021 *Sunrise: 0*7:37 *Start:* 06:08 *End:* 07:53

This re-entry survey covered F1. One surveyor covered the northern side of the house while the second recorded the south-eastern corner.

South-eastern side of house: Soprano pipistrelles and occasional common pipistrelles were recorded foraging and making social calls until some poorer weather was recorded at 07:08. At 06:20 a soprano pipistrelle was recorded entering a between the roof and second floor window; however, it was also recorded re-emerging a minute later from the same point. At 06:44, a soprano pipistrelle was seen flying around the house and chimney, potentially approaching an entrance point on the roof unseen by the surveyor. This occurred a second time at 07:01 with the surveyor remarking that the automatic light on the occupied farmhouse being a potential source of disturbance. At 07:05, a bat was seen inside the house on the ground floor, however there was no call recorded on the Batlogger. It flew into the house and out in front of the surveyor and was seen exiting from the window and flew around the house very low through the farmstead. This was once again likely a brown long-eared bat.

Northern side of house: As was the case with the first surveyor, soprano pipistrelles were recorded foraging and making social calls between 06:14 and 06:54. After the activity had stopped at 07:02, this surveyor noted that it had started raining lightly again which gradually increased along with windspeed until 07:33.

Result: Brown long-eared roost, potential soprano pipistrelle roost.

Figure 13: F1 Derelict building in farmstead (West)

Figure 14: F1 Derelict cattle shed (Western section)

Figure 15: F2 Abandoned cottage

Figure 16: F2 Entry points recorded in use on the abandoned cottage

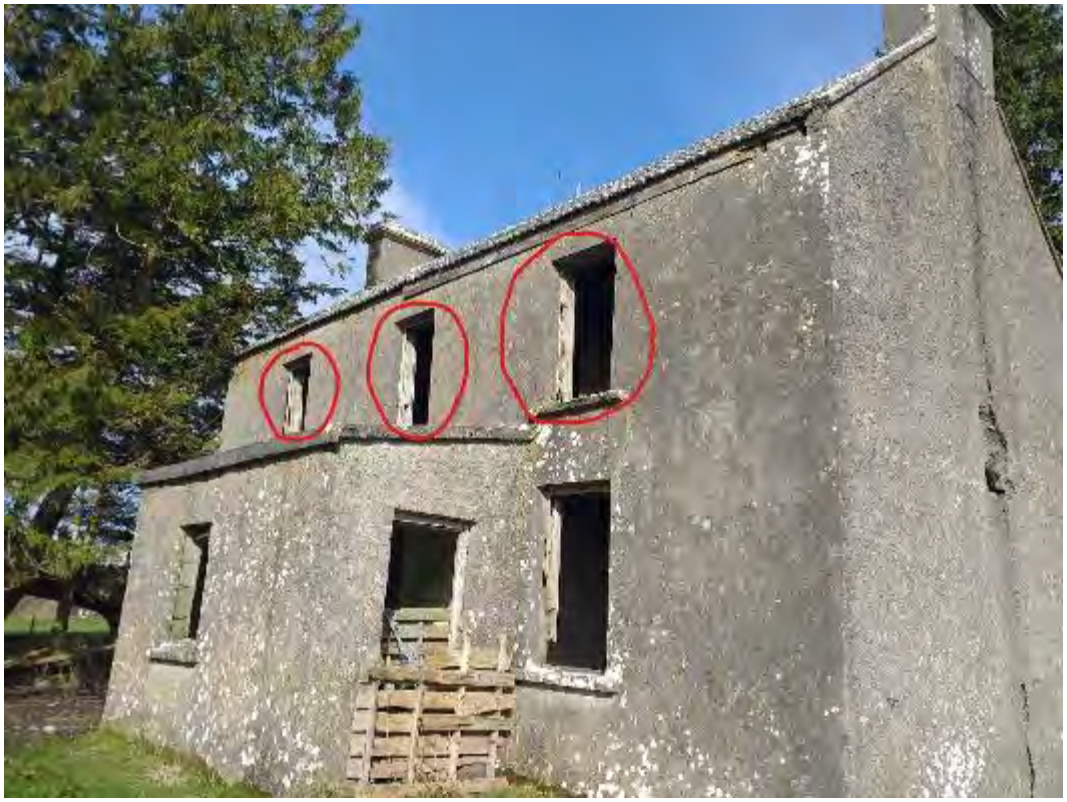


Figure 17: F3 Derelict house in field with emergence/re-entry points marked (Eastern section)

Figure 18: F7 Mature tree west of lambing shed with fluting and pruning cut

Figure 19: Treeline with features assessed during roost survey (and lesser horseshoe activity)

Figure 20: F8 Example of canker/knot hole surveyed

Figure 21: F4 Lambing shed

Figure 22: F5 Corrugate shed (interior)

Figure 23: F6 Concrete stable

7 APPENDIX 7: TRANSECT ROUTES

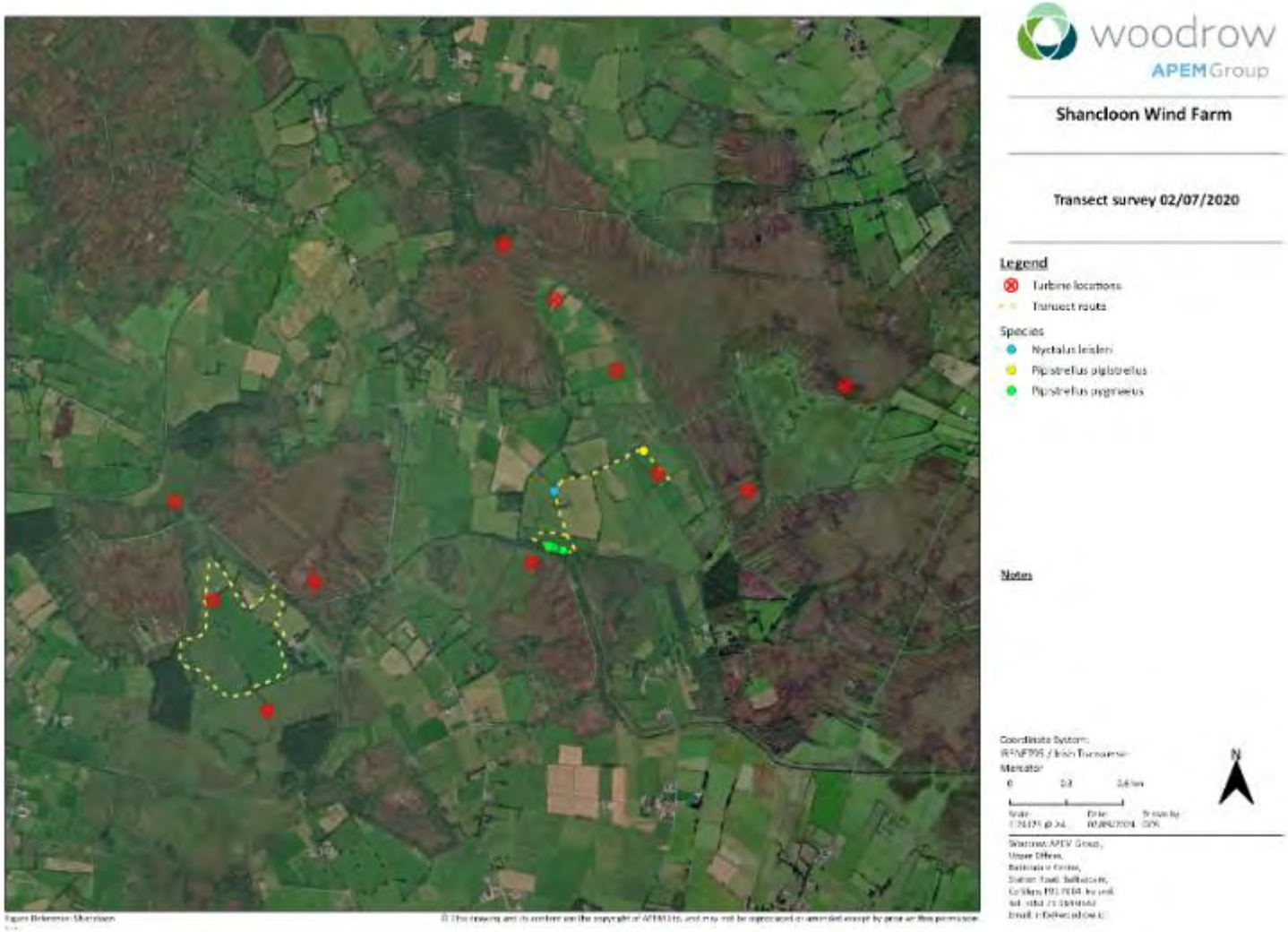


Figure 24: Transect results 02 July 2020

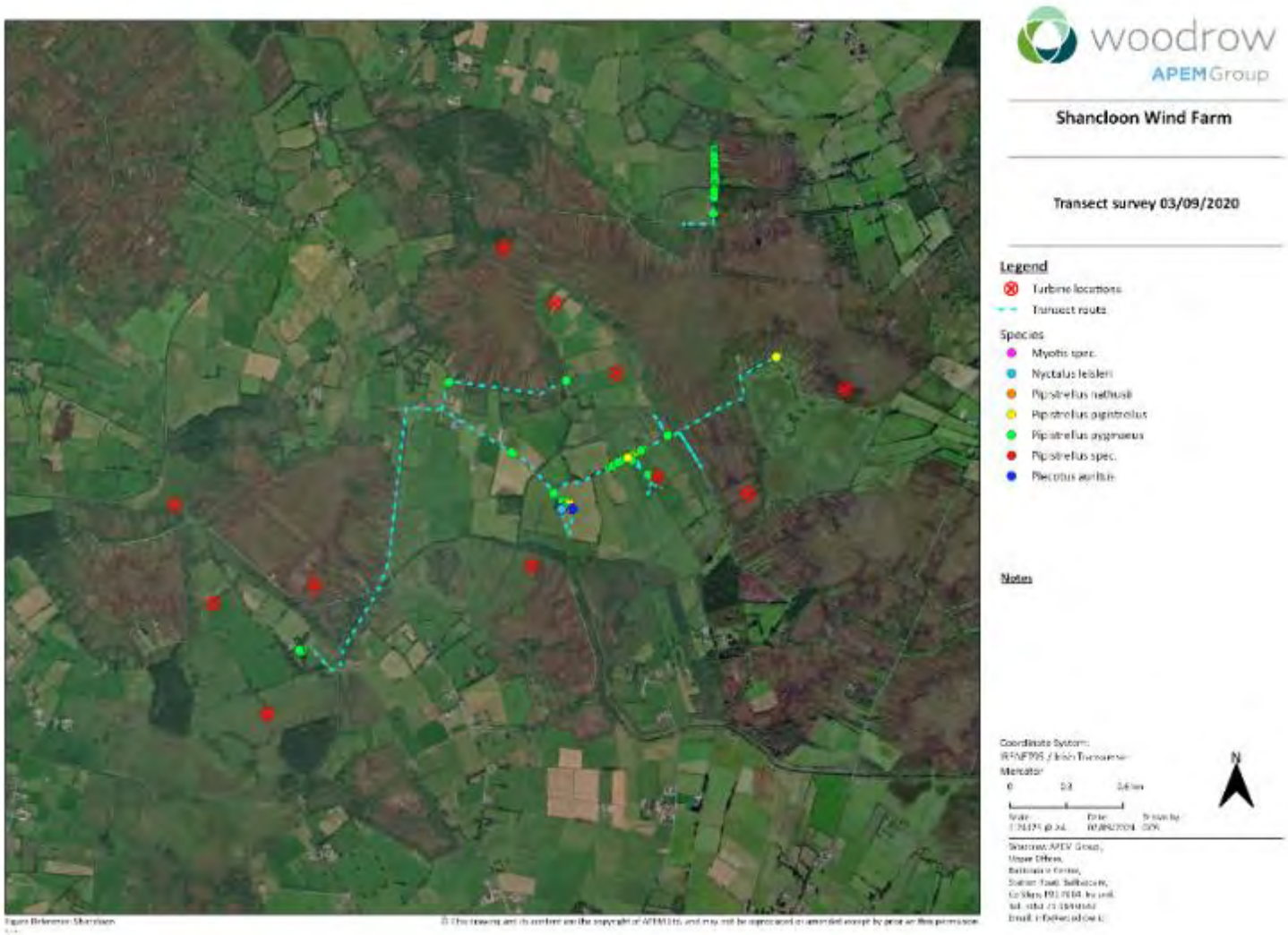


Figure 25: Transect results 03 September 2020, Myotis sp. passes obscured by pipistrelle foraging passes around the house surveyed for a roost.

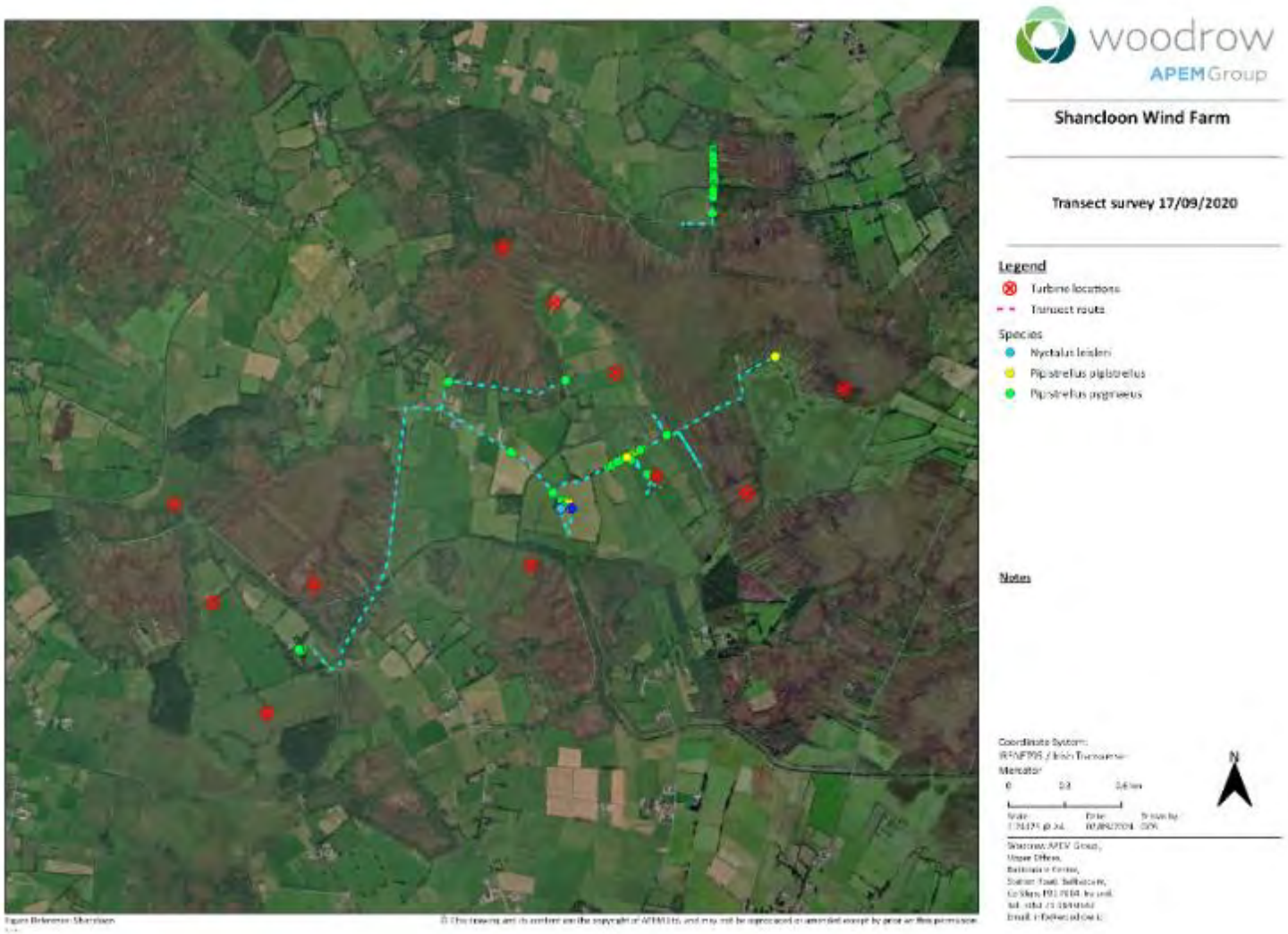


Figure 26: Transect results 17 September 2020

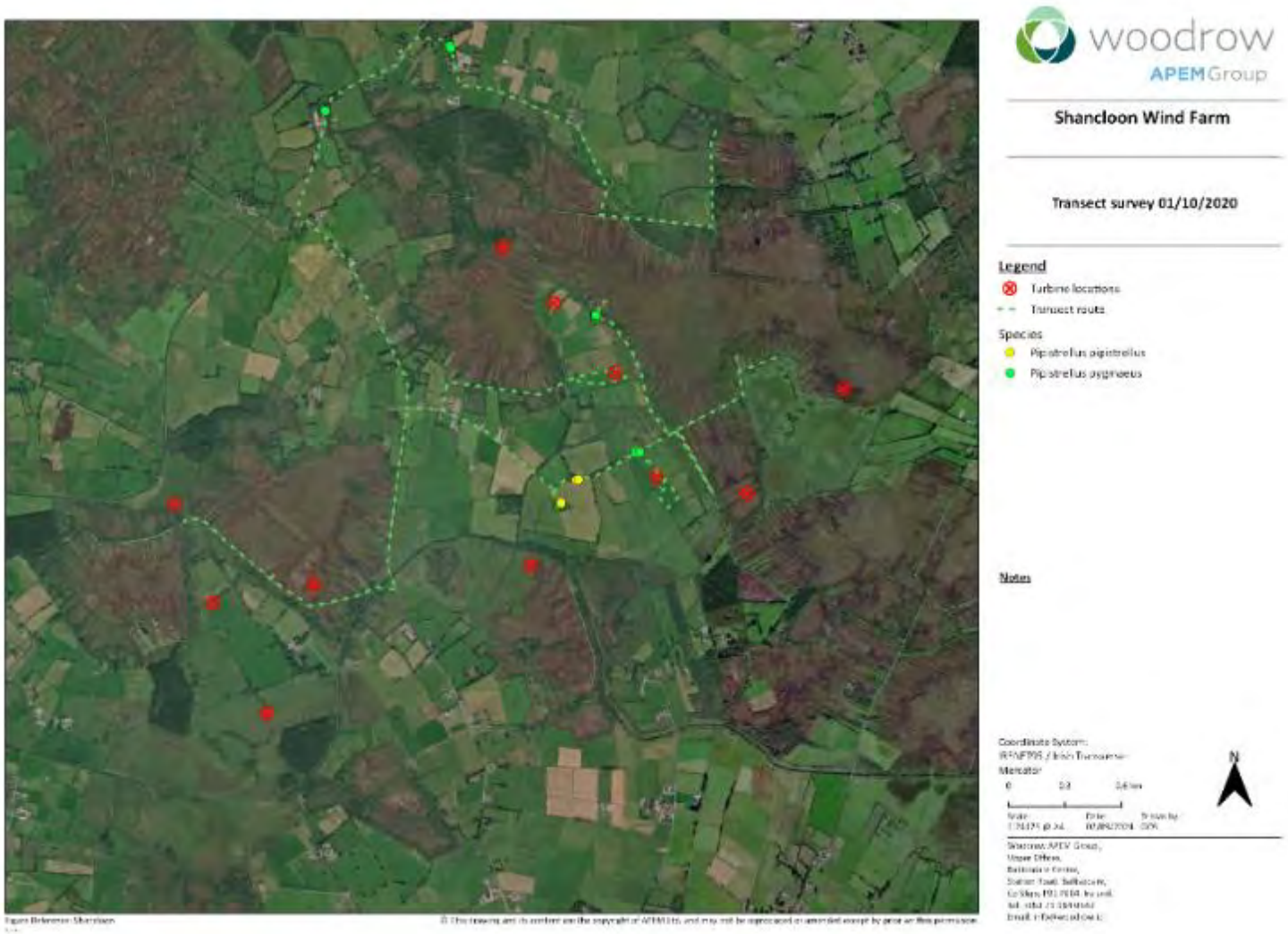


Figure 27: Transect results 01 October 2020

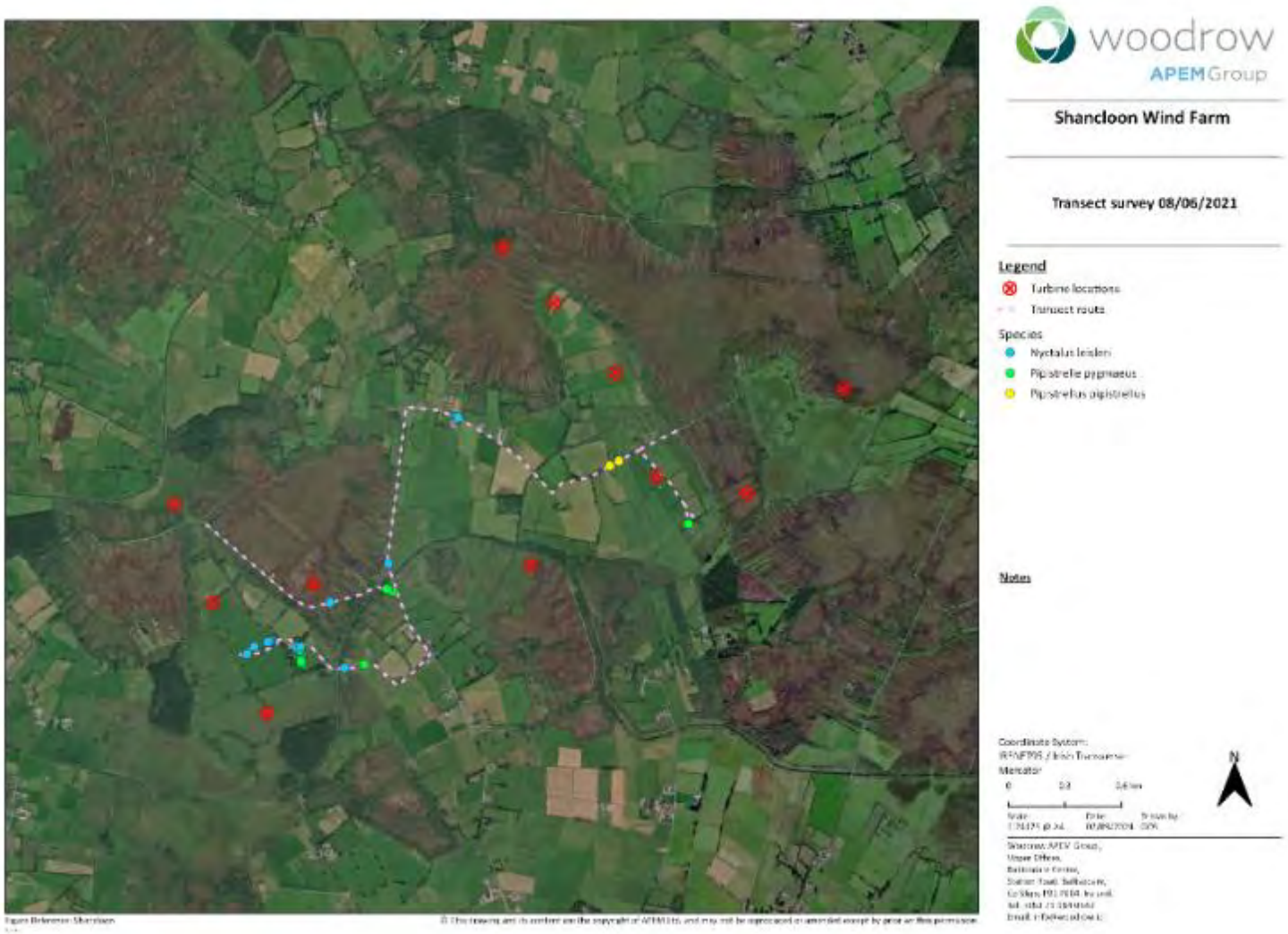


Figure 28: Transect results 08 June 2021

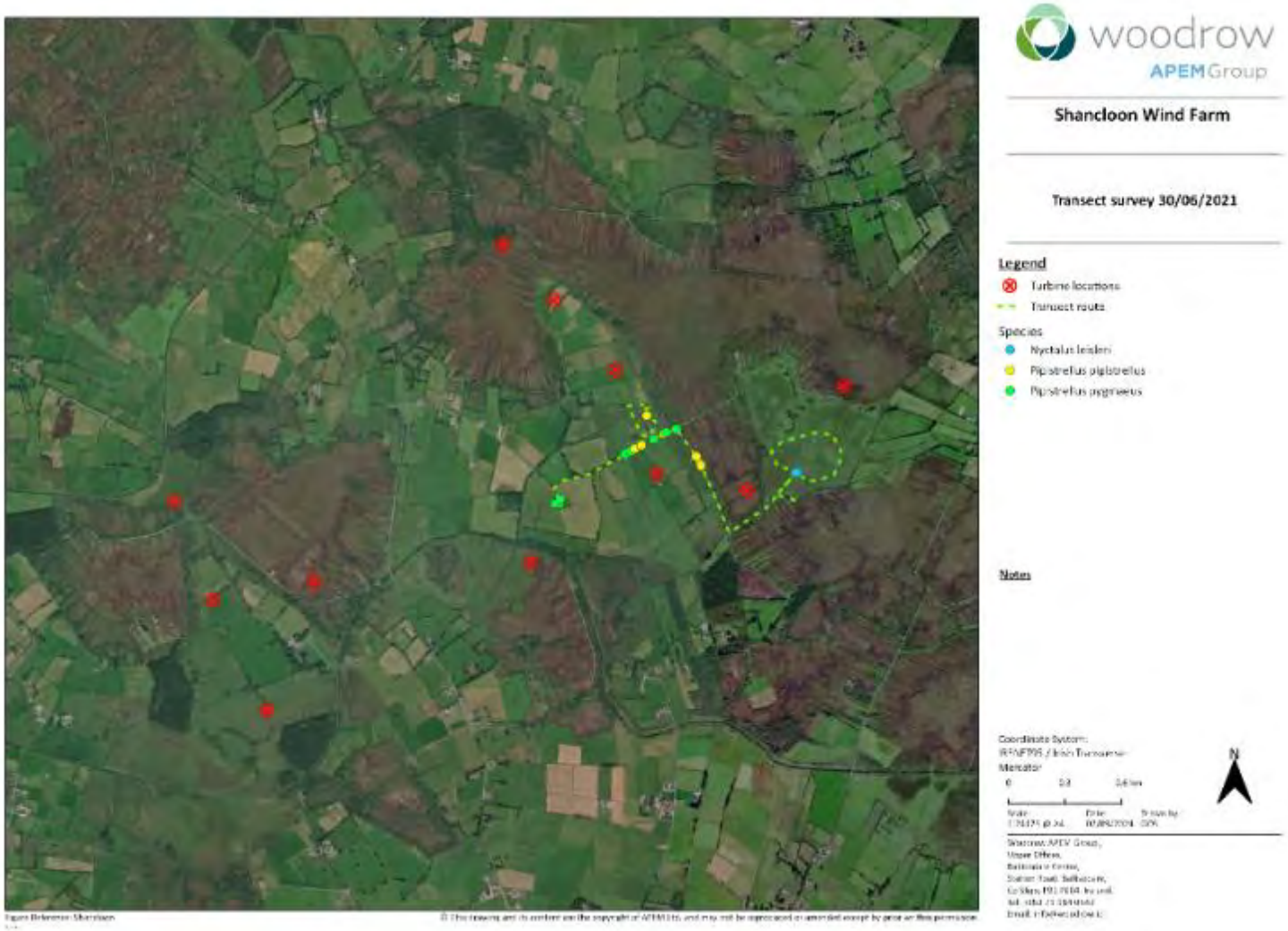


Figure 29: Transect results 30 June 2021

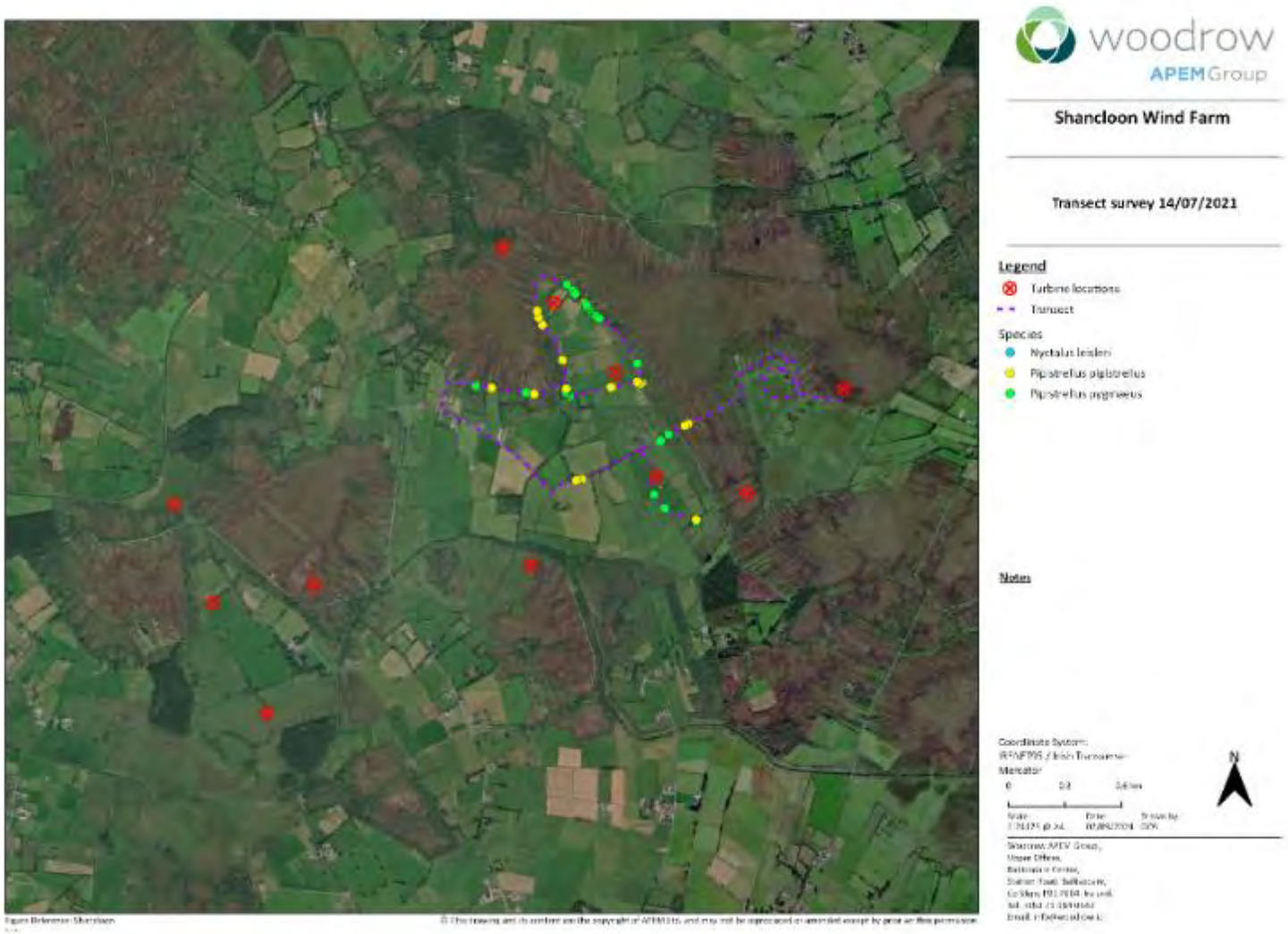


Figure 30: Transect results 14 July 2021

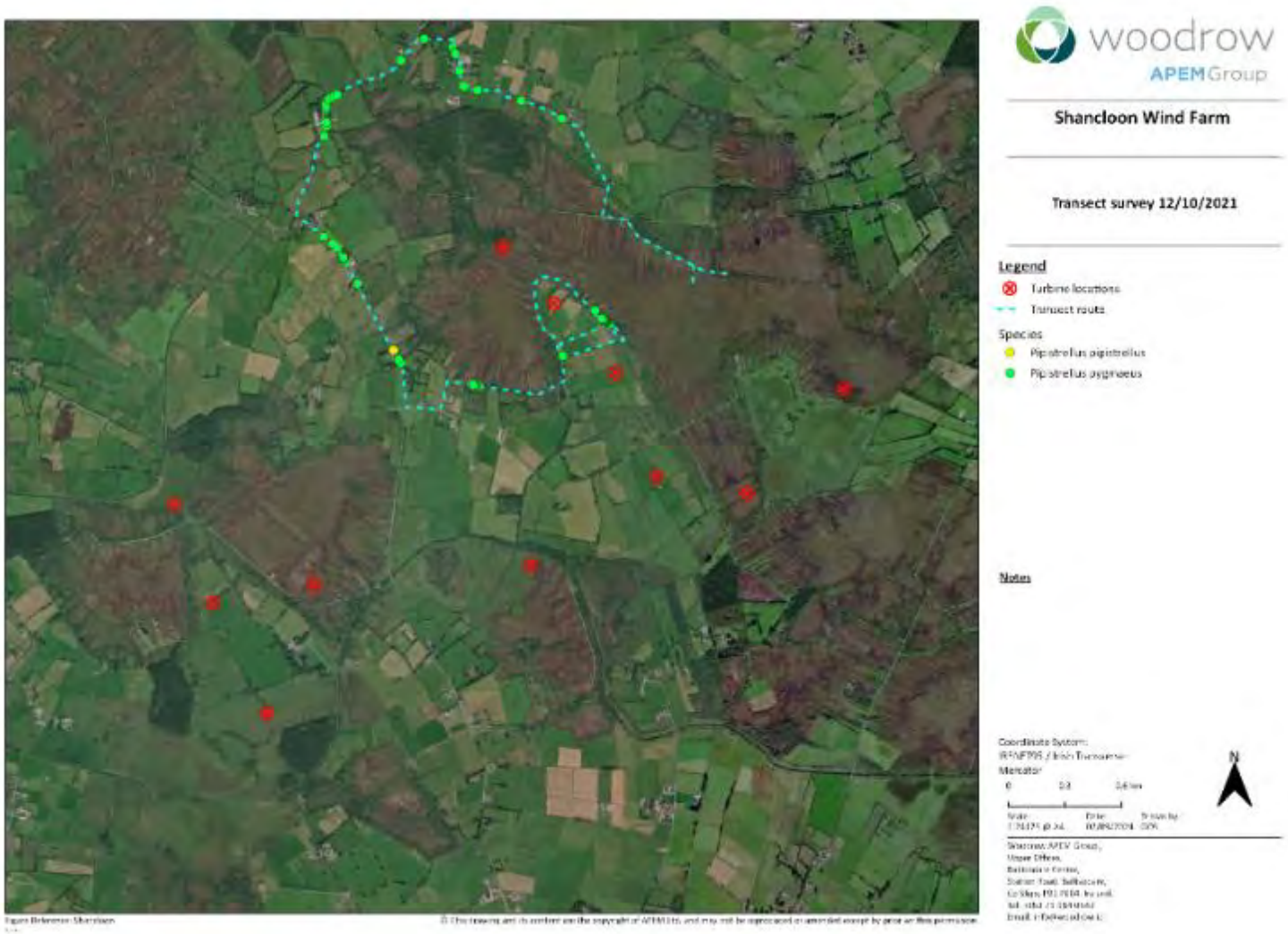


Figure 31: Transect results 12 October-2021

8 APPENDIX 8: STATSTICAL ANALYSIS USING R

Table 4: Activity per species and detector for 2020

Activity level classification based on mean bat passes per hour: < 2 bp/h = **Low**, 2 to < 5 bp/h = **Moderate**, ≥ 5 bp/h = **High**

		MYSP.	'NYCLEI	PIPPIP	PIPPYG	PIPNAT	PIPSP.	PLEAUR	RHIHIP
Spring	S.01		4.2	3.083333333	2.375				
	S.02	1.2	3.076923077	1.4	1				
	S.03	1	1.5	1	23.43243243				
	S.04		3	1.4	2				
	S.05	1	2.5	1.444444444	3.714285714				
	S.06	1	2	9.6	8.375				
	S.07		3.666666667	31	9.8				
	S.09	1	3.076923077	6.666666667	1.833333333				
	S.10	1	2.714285714	6.1	9.909090909				
	S.11	1	12.92307692	12.15384615	4.307692308	1		1	
	S.12	1	2.125	1.428571429	1.5			1	
Summer	S.02	2.185185185	2.041666667	10.68181818	4.714285714			1	
	S.03	1	2.933333333	17.59090909	4.891304348			1	
	S.05	1.454545455	18.25	2.657142857	5.1			1.222222222	
	S.06		2.222222222	5.892857143	9.852941176			1	
	S.07	1.4	1.428571429	33.78431373	19				
	S.08	1.4	2.90625	2.86	2.027777778			1.2	
	S.09	1	18.83636364	2.090909091	30.47457627			1.166666667	3.666666667
	S.10	1.80952381	4.465116279	9.866666667	28.03174603				
	S.11	1	1.166666667	1.35	1.230769231			1	
	S.12	4.461538462	13.97727273	4.844444444	4.441860465			2.125	1
Autumn	S.01			1	1				
	S.02	1.333333333	1.848484848	9.38	3.362745098		1	1	1
	S.03	1	3.536585366	4.882352941	19.6	1	6.414285714	1.333333333	1
	S.04	1.944444444	3.487179487	32.66019417	37.46616541		1	1.576923077	
	S.05	1.333333333	2.333333333	1.25	2.466666667				
	S.06	1	5.285714286	6.225806452	25.07526882		1	1.5	
	S.07	1	2.857142857	10.28571429	42.40625			1	
	S.08	1.476190476	3.607142857	6.097222222	6.323529412		1	1.222222222	
	S.09	1.363636364	2.172413793	17.2	5.820224719		1.2	1.083333333	
	S.10	1.105263158	2.321428571	6.357142857	13.18333333			1	1
	S.11	2.3125	7.619047619	10.88709677	67.65060241	1	1	1.548387097	1
	S.12	1.2	2.416666667	1.076923077	1.266666667			1.111111111	

Table 5: Activity per species and detector for 2020

Activity level classification based on median bat passes per hour: < 2 bp/h = **Low**, 2 to < 5 bp/h = **Moderate**, ≥ 5 bp/h = **High**

		MYSP.			’NYCLEI			PIPPIP			PIPPYG			PIPNAT			PIPSP.			PLEAUR			RHIHIP		
		median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR
Spring	S.01				4	1	2.5	2	1	1.25	1.5	1	1												
	S.02	1	1	0	2	1	5	1	1	1	1	1	0												
	S.03	1	1	0	1.5	1	1	1	1	0	6														
	S.04				1	1	3	1	1	1	1.5	1	1.75												
	S.05	1	1	0	3	1	1	1	1	1	3	1	2												
	S.06	1	1	0	2	1	1	2	1	12	3.5	1	5.25												
	S.07				1	1	4	12.5	1	61.5	6	1	6												
	S.09	1	1	0	2	1	3	3	1	6.75	1.5	1	1												
	S.10	1	1	0	2	1	2	6	1	5.75	2	1	10												
	S.11	1	1	0	12	1	10	7	1	11	2	1	4	1	1	0				1	1	0			
	S.12	1	1	0	2	1	2	1	1	0.5	1	1	0.75							1	1	0			
	S.02	2	1	1.5	1	1	1.25	6	1	11.75	3	1	3.75							1	1	0			
	S.03	1	1	0	2	1	1	6	1	15.75	3	1	3.75							1	1	0			
	S.05	1	1	1	3	1	11.5	1	1	2	2	1	5.75							1	1	0			
	S.06				2	1	2	5.5	1	5	5	1	8.5							1	1	0			
Summer	S.07	1	1	0	1	1	0.75	30	1	25.5	11	1	18												
	S.08	1	1	1	2.5	1	2.25	2	1	3	1	1	2							1	1	0			
	S.09	1	1	0	3	1	14.5	2	1	2	16	1	36							1	1	0	3	1	2.5
	S.10	1	1	1	2	1	3.5	4	1	7.25	7	1	22												
	S.11	1	1	0	1	1	0	1	1	0	1	1	0							1	1	0			
	S.12	2	1	2	9.5	1	13	3	1	5	2	1	2.5							1.5	1	2	1	1	0
	S.01							1	1	0	1	1	0												
	S.02	1	1	0	1	1	1	3	1	6.5	2	1	3				1	1	0	1	1	0	1	1	0
	S.03	1	1	0	2	1	3	1	1	1	4	1	15.5	1	1	0	5.5	1	6.75	1	1	0	1	1	0
	S.04	1	1	1	2	1	2	9	1	28	22	1	43				1	1	0	1	1	1			
	S.05	1	1	0.5	2	1	1.5	1	1	0.25	2	1	3												
Autumn	S.06	1	1	0	3	1	6	1	1	2	15	1	34				1	1	0	1.5	1	0.5			
	S.07	1	1	0	2	1	1	3	1	5	14	1	52.5							1	1	0			
	S.08	1	1	0	2	1	3	4	1	4	4	1	6				1	1	0	1	1	0			
	S.09	1	1	0.5	2	1	2	5	1	15.5	2	1	5				1	1	0	1	1	0			
	S.10	1	1	0	1	1	1.25	3	1	5	6	1	11							1	1	0	1	1	0
	S.11	1	1	2.25	1	1	4	6	1	15.25	41	1	119.5	1	1	0	1	1	0	1	1	1	1	1	0
	S.12	1	1	0	1.5	1	1	1	1	0	1	1	0.75							1	1	0			

Table 6: Activity per species and detector for 2021

Activity level classification based on mean bat passes per hour: < 2 bp/h = **Low**, 2 to < 5 bp/h = **Moderate**, ≥ 5 bp/h = **High**

		MYSP.	'NYCLEI	PIPPIP	PIPPYG	PIPNAT	PIPSP.	PLEAUR	RHIHIP
Spring	D.02		2.470588235	1.470588235	1.142857143		1	1	
	D.03	1	2.322580645	6.97826087	7			1.166666667	
	D.04	1.565217391	6.166666667	15.50847458	8.595744681		1	1.461538462	
	D.05	1.68	2.133333333	2.03125	1.888888889			1	
	D.06	1	3.5625	2.28125	1.428571429		1		
	D.07	1.166666667	8.446808511	37.48275862	18.38297872			1	
	D.09	1	2.888888889	24.15909091	2.92				
	D.10	2.047619048	3.275862069	47.5	10.9375			1	
	D.11	2.434782609	2.206896552	31.8	14.22641509			1.25	1
	D.12	1	4	2.785714286	2.095238095			1	
Pre-Summer	D.01	1	2.659574468	13.08988764	2.694117647			1	1
	D.02	2	12.23529412	1.5	1.529411765			1	
	D.08	1	5.287671233	1.45	1.25			1.333333333	
Summer	D.01	1	2.980769231	3.283018868	6.196969697		1	1.4	1
	D.02	1	14.57446809	2.774193548	2.09375			1.181818182	
	D.03	4.740740741	2.658536585	5.104166667	4.75			1.176470588	
	D.04	1.2	6.228070175	23.06557377	19.92727273	1	1.769230769	1.333333333	
	D.05	1.666666667	1.52	7.145833333	3.659090909			1	
	D.06	1	3.56097561	2.653846154	1.444444444			1	
	D.07	1.470588235	4.162790698	53.1969697	19.01923077		1	1.5	
	D.08	1	2.923076923	1.277777778	1			1.714285714	
	D.09	1	2.793103448	18.5952381	4.363636364		2	1	
	D.10	1.947368421	2.230769231	5.58974359	2.714285714				
	D.11		1.909090909	22.5	25.47826087		1.5	1	
	D.12	1	3.488372093	4.285714286	5.268292683		1.666666667	1	
Autumn	D.01	1.825	1.911764706	1.586206897	2.228070175			1.15	
	D.02	1	1.571428571	1	1.416666667		2	1.111111111	
	D.03	2	1.5	3.088235294	8.986842105			1	
	D.04	1.071428571	4.311111111	46.76190476	27.6875		2.5	1.333333333	
	D.05	2.04	1.894736842	44.52941176	21.46268657		1	1.142857143	
	D.06	1	1.333333333	1.307692308	1.238095238		1	1	
	D.07	1.111111111	2	15.13157895	18.80882353		1.555555556	1	1
	D.08		2	1.357142857	1.428571429			1	
	D.09	1.166666667	3	9.516129032	3.181818182			1.2	
	D.10	1.416666667	1.8	1.6	1.25			1	
	D.11	1.84	1	6.277777778	36.97014925		1		
	D.12	1	3	1.923076923	1.761904762	1		1.333333333	

Table 7: Activity per species and detector for 2021

Activity level classification based on median bat passes per hour: < 2 bp/h = **Low**, 2 to < 5 bp/h = **Moderate**, ≥ 5 bp/h = **High**

		MYSP.			'NYCLEI			PIPPIP			PIPPYG			PIPNAT			PIPSP.			PLEAUR			RHIHIP		
		median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR
Spring	D.02				1	1	1	1	1	1	1	1	0				1	1	0	1	1	0			
	D.03	1	1	0	1	1	2.5	3	1	5.75	2.5	1	6							1	1	0			
	D.04	1	1	1	4	1	6	8	1	13.5	5	1	9.5				1	1	0	1	1	0			
	D.05	2	1	1	2	1	2	2	1	2	1	1	1.5							1	1	0			
	D.06	1	1	0	2	1	2.25	1	1	1.25	1	1	1				1	1	0						
	D.07	1	1	0	3	1	8.5	20	1	60.25	10	1	19							1	1	0			
	D.09	1	1	0	2.5	1	2.25	10.5	1	20	2	1	1												
	D.10	2	1	2	2	1	3	11	1	66	3	1	13.5							1	1	0			
	D.11	2	1	2	1	1	2	11	1	50.25	10	1	11							1	1	0.25	1	1	0
	D.12	1	1	0	2	1	4	2	1	3	1	1	2							1	1	0			
Pre-Summer	D.01	1	1	0	2	1	2	3	1	9	2	1	2							1	1	0	1	1	0
	D.02	2	1	0	5	1	13.5	1	1	0.75	1	1	1							1	1	0			
	D.08	1	1	0	2	1	4	1	1	1	1	1	0.25							1	1	0.75			
	D.01	1	1	0	2	1	2.25	2	1	2	3.5	1	7				1	1	0	1	1	1	1	1	0
	D.02	1	1	0	4	1	10.5	2	1	2.5	2	1	1.25							1	1	0			
	D.03	4	1	7	2	1	3	2	1	4.25	2	1	3							1	1	0			
	D.04	1	1	0	4	1	7	11	1	30	8	1	31.5	1	1	0	2	1	1	1	1	0.75			
	D.05	2	1	1	1	1	1	3.5	1	7	3	1	3							1	1	0			
Summer	D.06	1	1	0	3	1	3	1	1	2	1	1	0.75							1	1	0			
	D.07	1	1	1	1	1	3.5	15.5	1	102.25	8.5	1	24.5				1	1	0	1	1	0.75			
	D.08	1	1	0	2	1	2	1	1	0	1	1	0							1	1	1.5			
	D.09	1	1	0	2	1	3	7.5	1	23.25	2.5	1	5.5				2	1	0	1	1	0			
	D.10	2	1	1.5	2	1	1.75	3	1	5	2	1	2												
	D.11				1	1	1	8.5	1	18.25	11	1	16.75				1	1	0.75	1	1	0			
	D.12	1	1	0	2	1	3	2	1	4	2	1	6				2	1	0.5	1	1	0			
Autumn	D.01	1	1	1	1	1	1	1	1	1	2	1	2							1	1	0			
	D.02	1	1	0	2	1	1	1	1	0	1	1	1				2	1	0	1	1	0			
	D.03	2	1	1	1	1	0.5	2	1	2.75	3	1	5							1	1	0			
	D.04	1	1	0	2	1	4	14	1	92	7	1	39				1	1	0.75	1	1	1			
	D.05	1	1	1	1	1	1	28	1	61	2	1	22				1	1	0	1	1	0			
	D.06	1	1	0	1	1	0.75	1	1	1	1	1	0				1	1	0	1	1	0			
	D.07	1	1	0	2	1	1	4.5	1	17.5	7	1	24.25				1	1	1	1	1	0	1	1	0
	D.08				1	1	1.5	1	1	0	1	1	0.75							1	1	0			
	D.09	1	1	0	1	1	0	2	1	6.5	2	1	3.75							1	1	0			
	D.10	1	1	0.25	1	1	1.75	1	1	1	1	1	0.25							1	1	0			
	D.11	2	1	2	1	1	0	2.5	1	4	34	1	36.5				1	1	0						
	D.12	1	1	0	2.5	1	2	1	1	2	1	1	1	1	1	0				1	1	0.5			

Table 8: Activity per species and detector for 2023

Activity level classification based on mean bat passes per hour: < 2 bp/h = **Low**, 2 to < 5 bp/h = **Moderate**, ≥ 5 bp/h = **High**

		MYSP.	'NYCLEI	PIPPIP	PIPPYG	PIPNAT	PIPSP.	PLEAUR	RHIHIP
Spring	D.14	1	8.333333333	12.62	2.097560976	1.545454545	1.466666667	1	
	D.15		2.543859649	1.766666667	1.222222222	1	1.083333333		
	D.16	1.1875	5.02739726	19.84931507	4.833333333	1.588235294	1.862068966	1.166666667	
	D.17	1	1.5	2.444444444	1.222222222	1.2	1.111111111	1	1
	D.18	1	3.5	6.014925373	3.211538462	1.1	1.347826087	1.5	
Summer	D.14	1.25	2.766666667	2.866666667	11.27906977			1	1
	D.15	1	2	4.454545455	19.32692308			1	
	D.17	1.166666667	2.043478261	7.328767123	2.979166667			1.333333333	
	D.18	1.111111111	2.52173913	6.706896552	15.13207547			1.25	1
	D.19	1.285714286	2.741935484	2.3	2.529411765			1	
Autumn	D.14	1.181818182	2	1.125	1.451612903			1	
	D.15	1.75	3.142857143	3.333333333	5.742424242			1	
	D.16	1	2.210526316	2.277777778	1.962962963			1.15	
	D.17	1.5	4	5.642857143	5.684210526			1.6	1
	D.18	1	4	1.583333333	1.638888889			1	
	D.19	1.333333333	1	22.48148148	4.16			1	

Table 9: Activity per species and detector for 2023

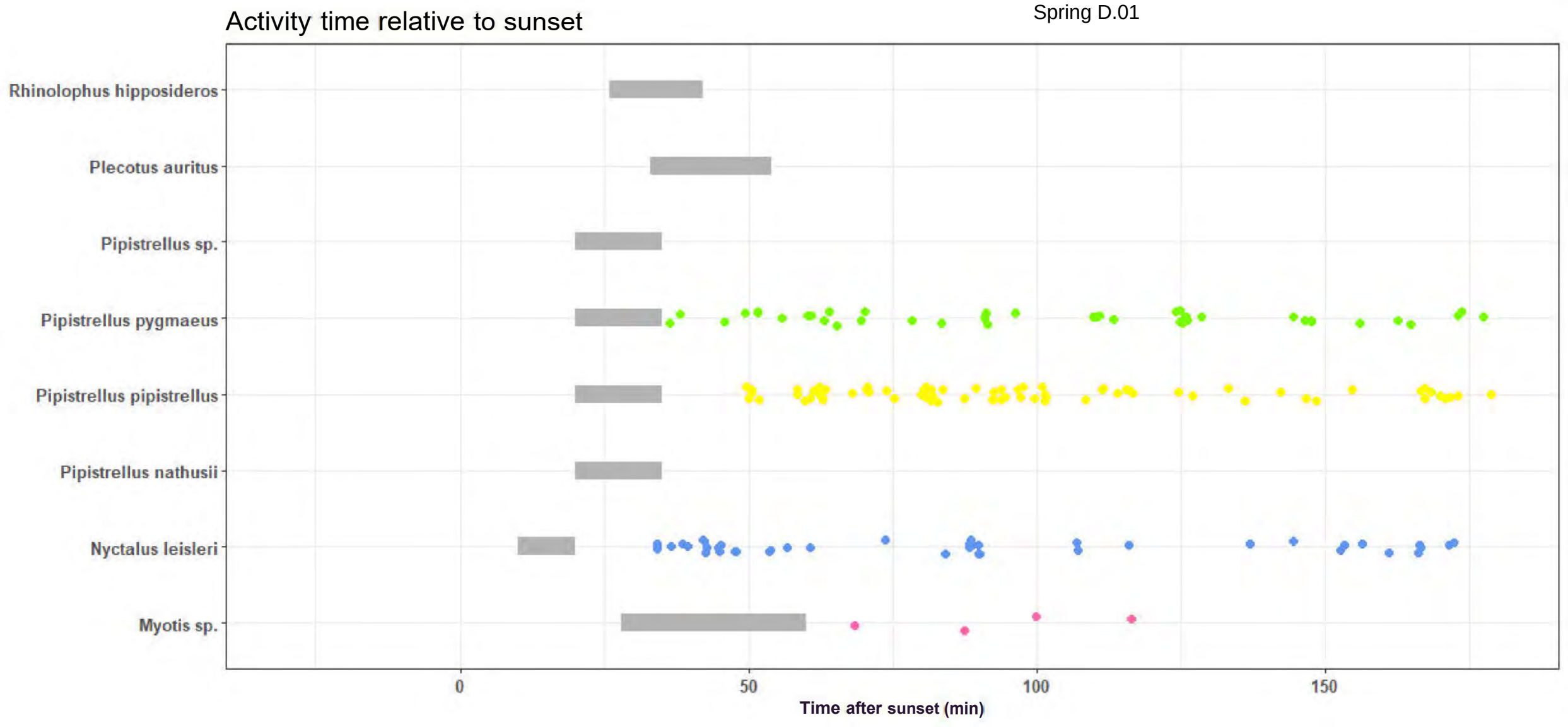
Activity level classification based on median bat passes per hour: < 2 bp/h = **Low**, 2 to < 5 bp/h = **Moderate**, ≥ 5 bp/h = **High**

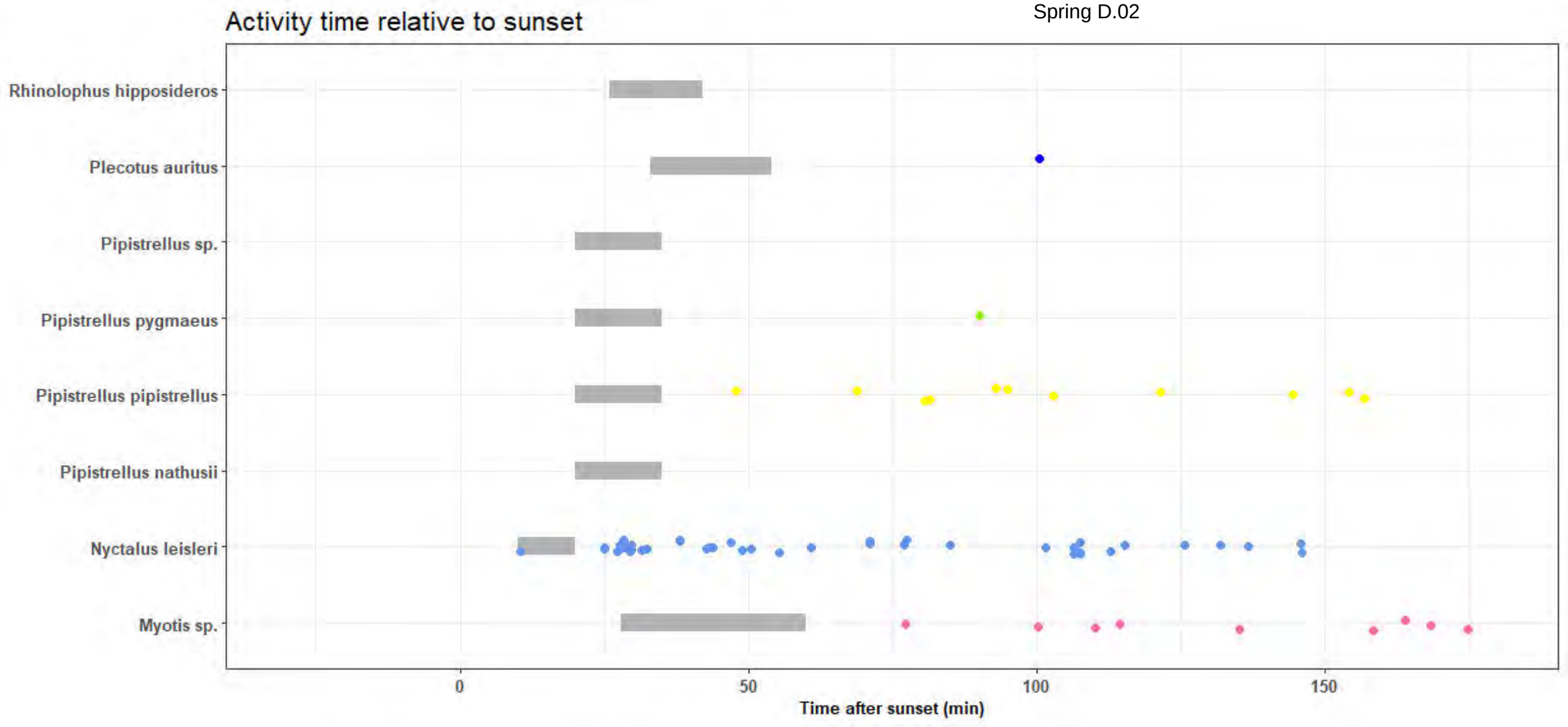
		MYSP.			'NYCLEI			PIPPIP			PIPPYG			PIPNAT			PIPSP.			PLEAUR			RHIHIP		
		median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR	median	std_dev	IQR
Spring	D.14	1	1	0	6	1	10.5	3	1	3	2	1	2	1	1	1	1	1	1	1	1	0			
	D.15				2	1	3	1	1	1	1	1	0	1	1	0	1	1	0						
	D.16	1	1	0	4	1	7	8	1	19	3	1	6	1	1	1	2	1	2	1	1	0			
	D.17	1	1	0	1	1	1	2	1	2	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0
	D.18	1	1	0	3	1	3.25	4	1	7	2	1	3.25	1	1	0	1	1	0	1.5	1	0.5			
Summer	D.14	1	1	0	2	1	2	2	1	2	2	1	5.5							1	1	0	1	1	0
	D.15	1	1	0	1	1	1	2	1	3.25	7	1	27.25							1	1	0			
	D.17	1	1	0	2	1	1.5	4	1	5	1	1	3							1	1	0.5			
	D.18	1	1	0	1	1	2.5	4	1	8	4	1	17							1	1	0.25	1	1	0
	D.19	1	1	0.5	2	1	2	1	1	1.75	1	1	2							1	1	0			
Autumn	D.14	1	1	0	1	1	1	1	1	0	1	1	0							1	1	0			
	D.15	1	1	1.25	2	1	2.5	1	1	1	4	1	5							1	1	0			
	D.16	1	1	0	2	1	1.5	1	1	0.75	1	1	1.5							1	1	0			
	D.17	1	1	0	2.5	1	1.75	2	1	4	1	1	1							1	1	0	1	1	0
	D.18	1	1	0	2	1	1	1	1	1	1	1	1							1	1	0			
	D.19	1	1	0.5	1	1	0	14	1	34	2	1	4							1	1	0			

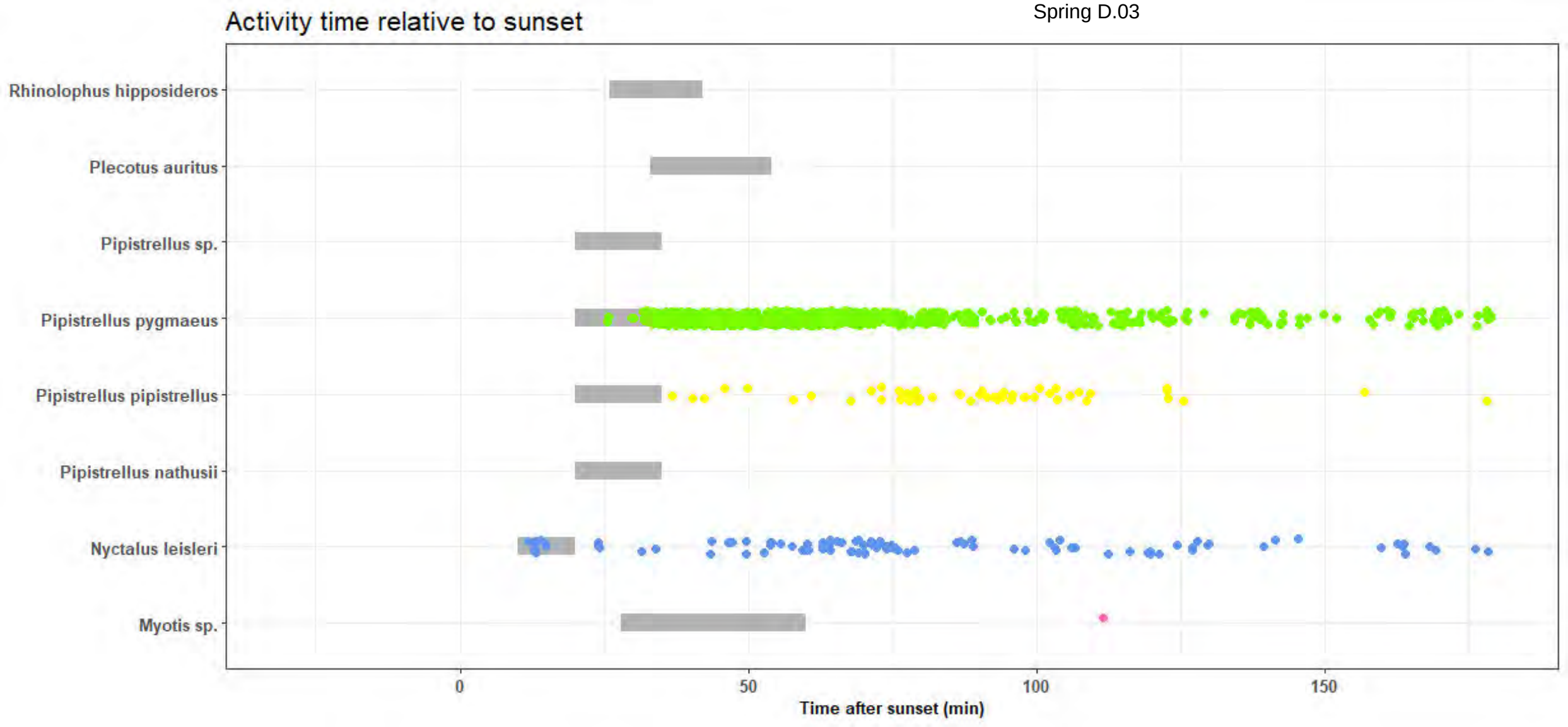
9 APPENDIX 9: BAT ACTIVITY RELATIVE TO SUNSET AND EMERGENCE WINDOWS

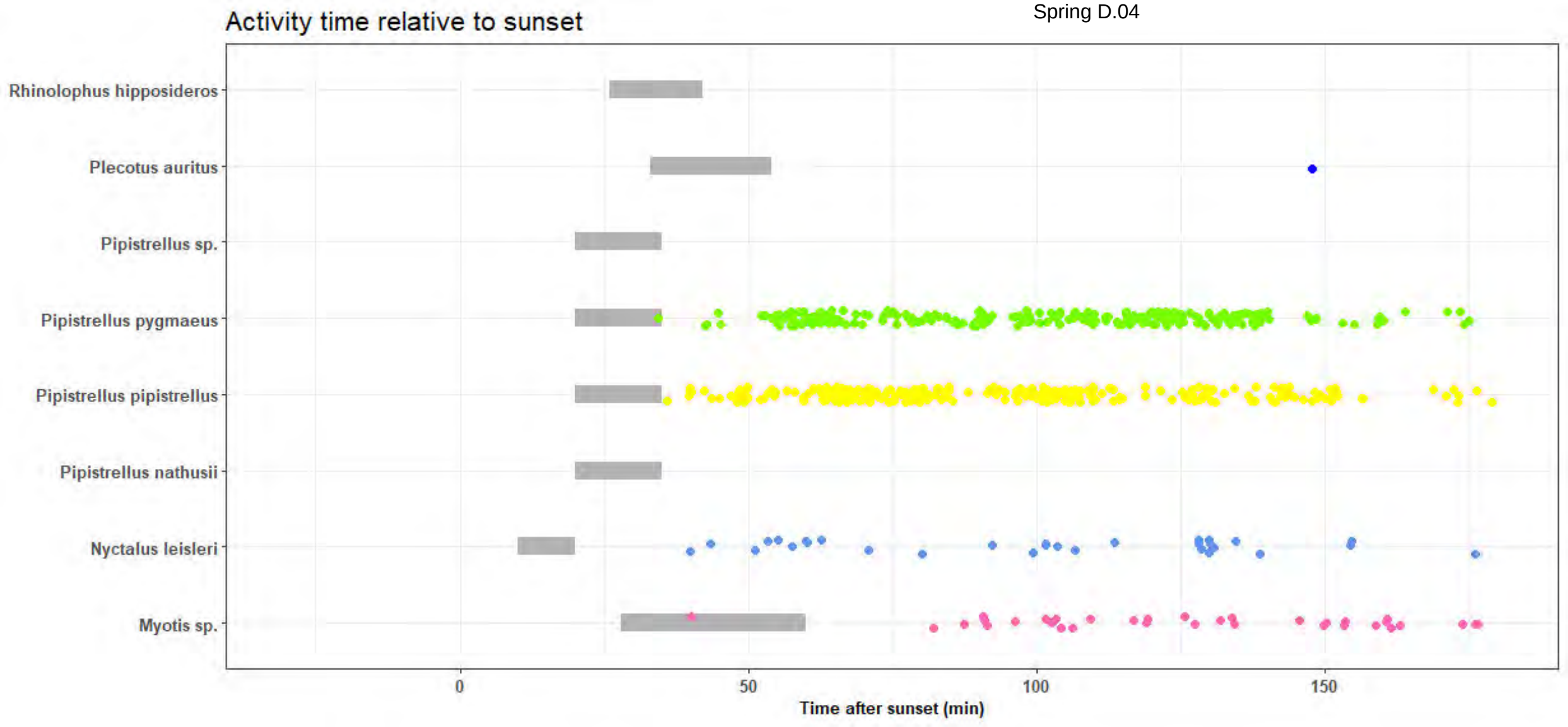
Species specific bat activity relative to sunset and emergence windows (grey box) for each detector location.

2020

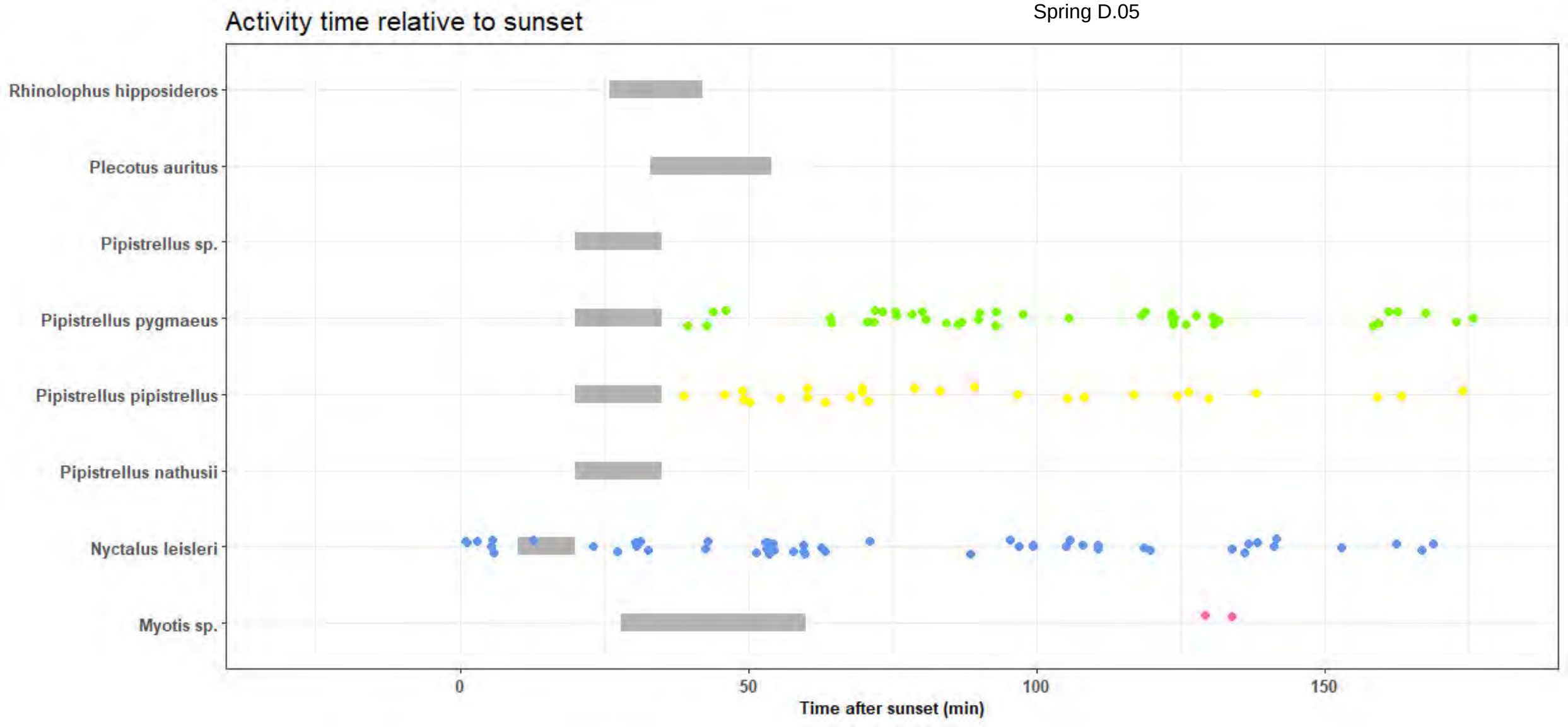

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

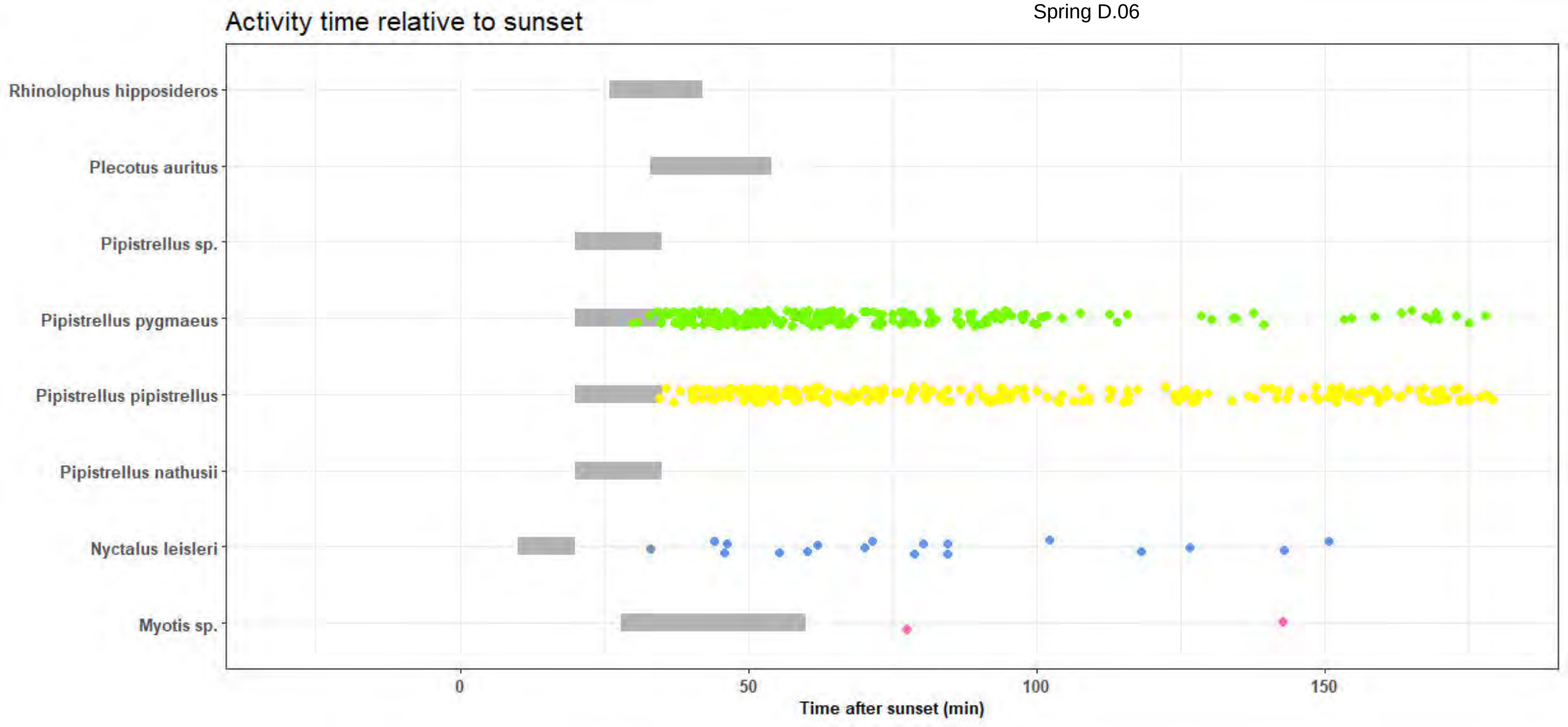

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

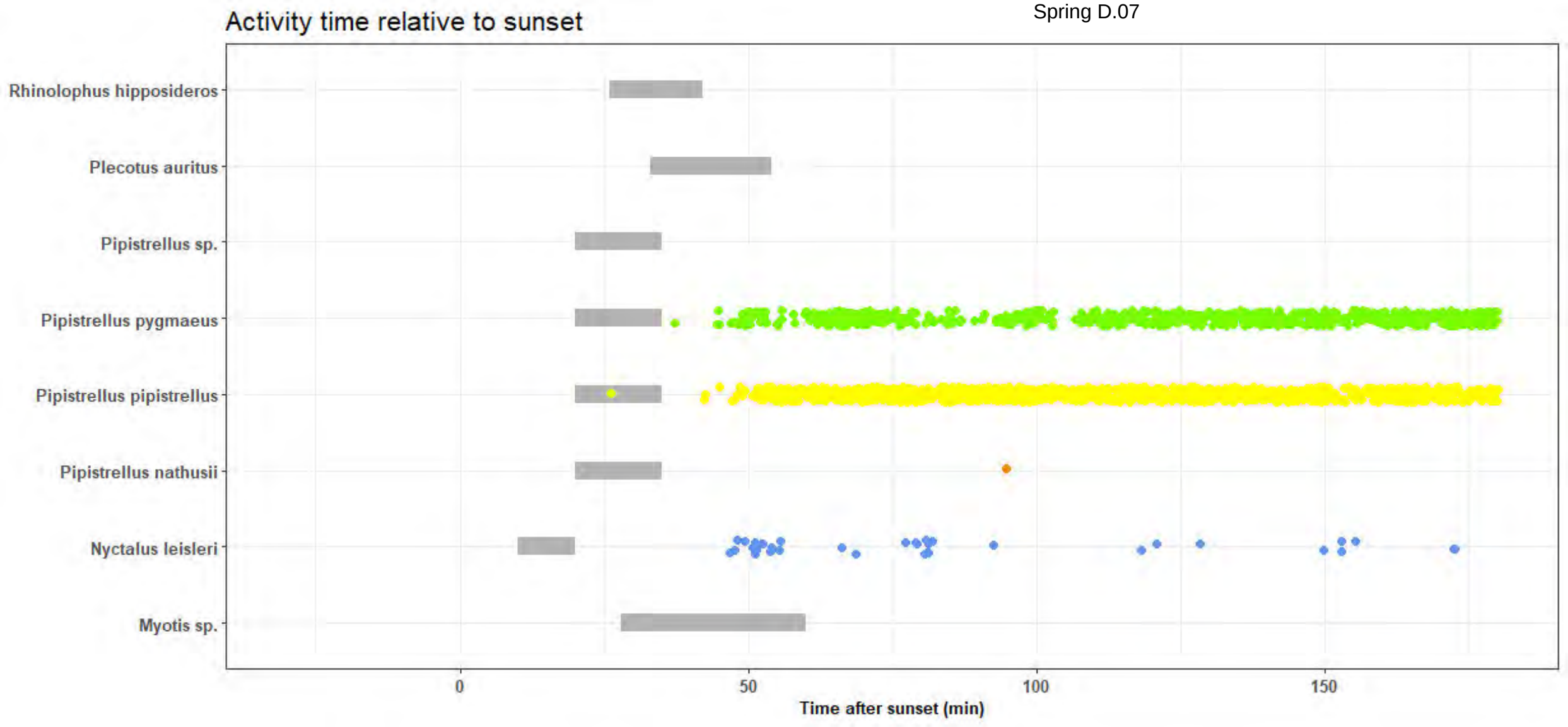

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

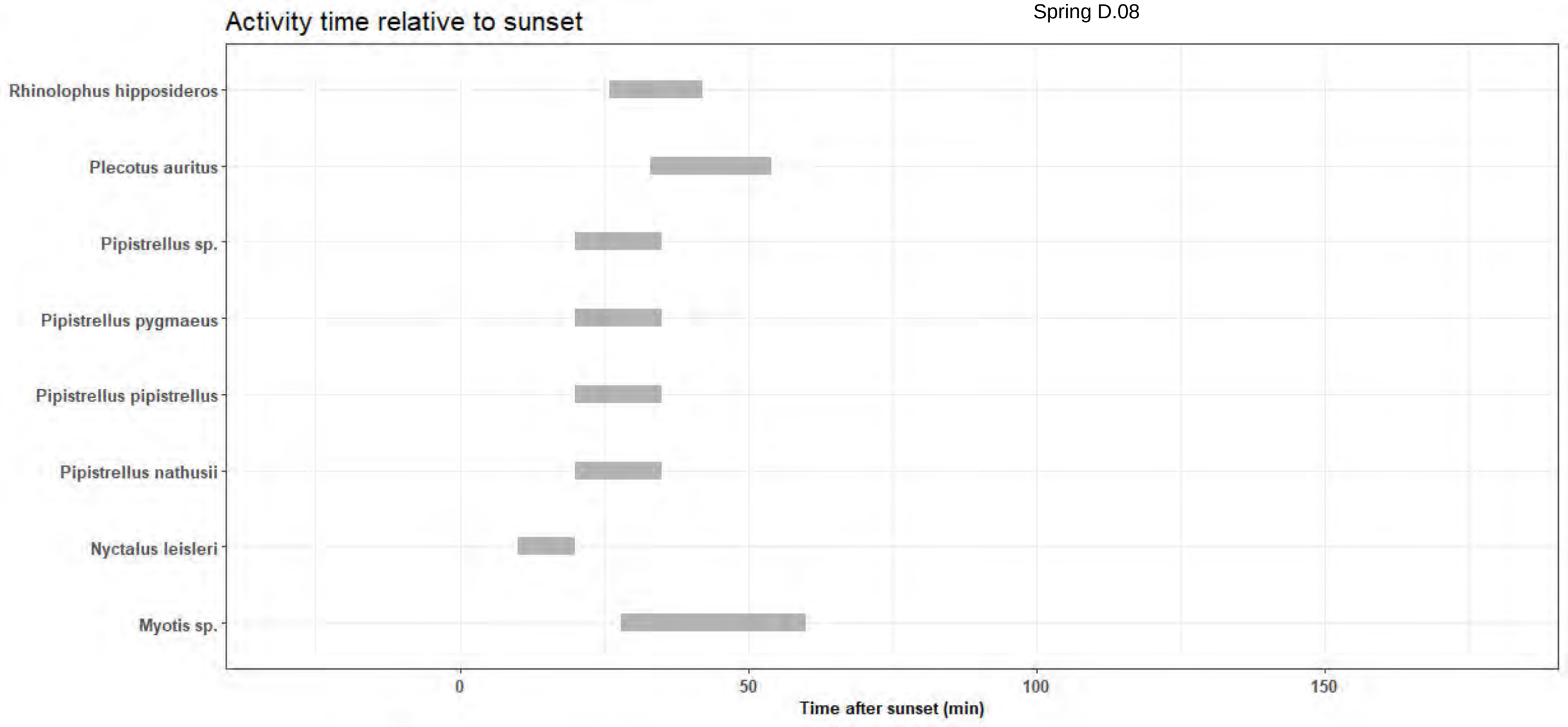

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

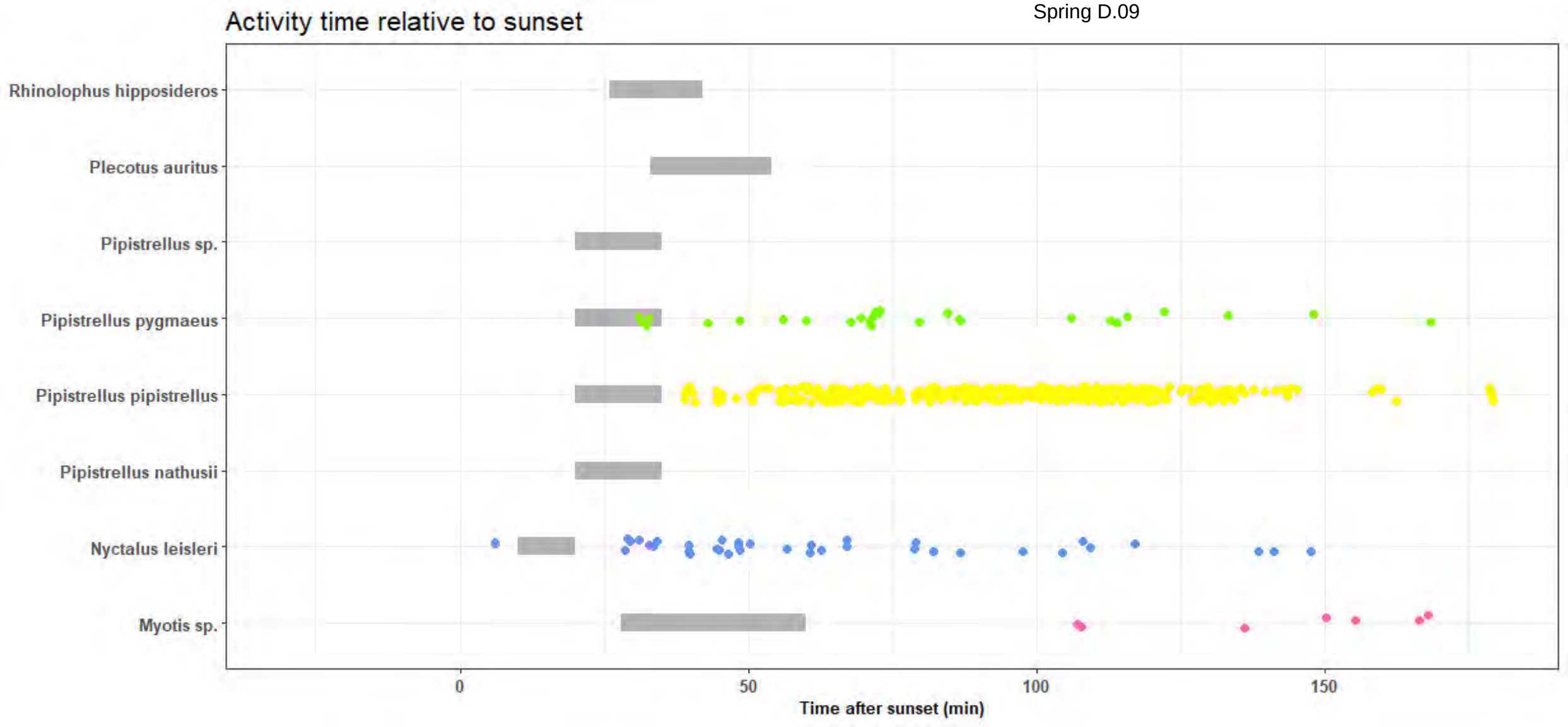
Spring D.05

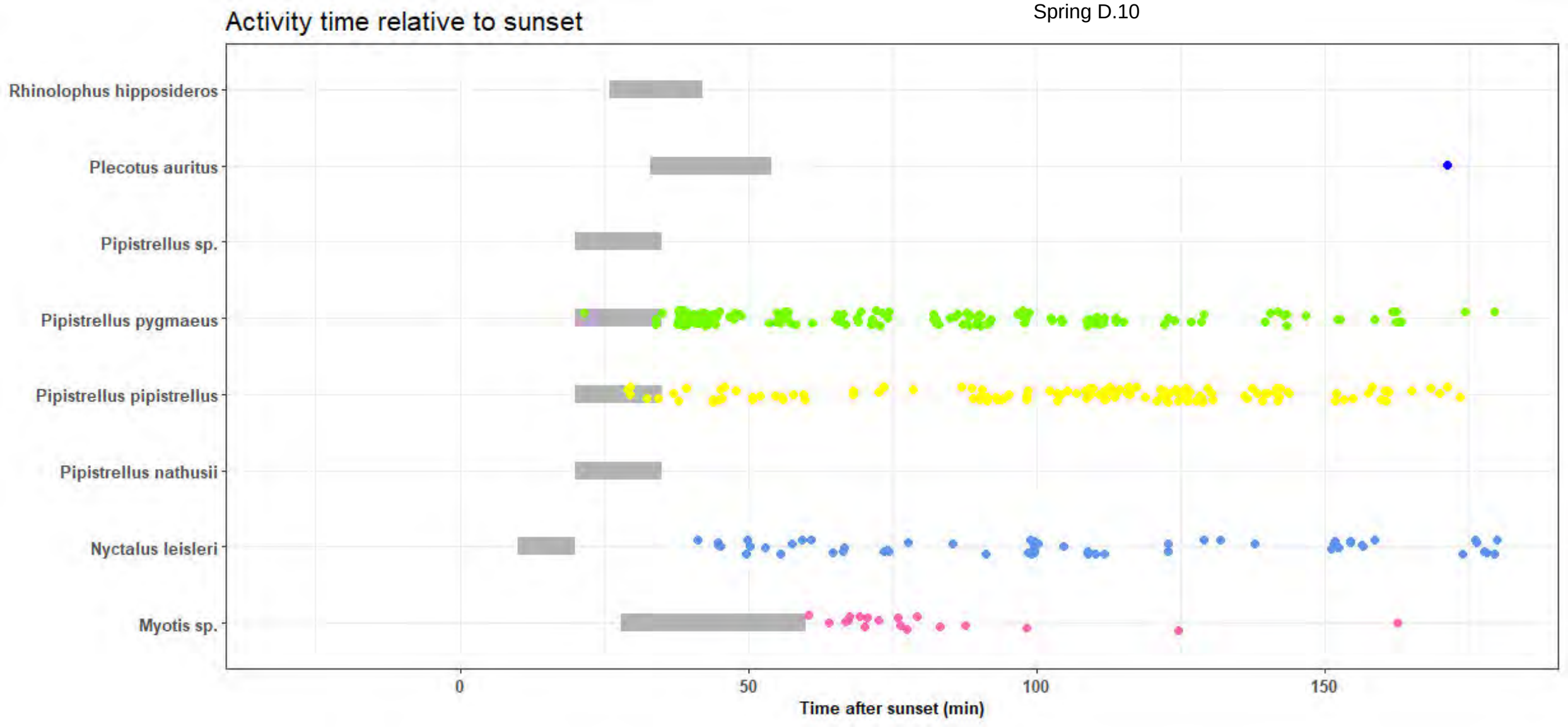

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

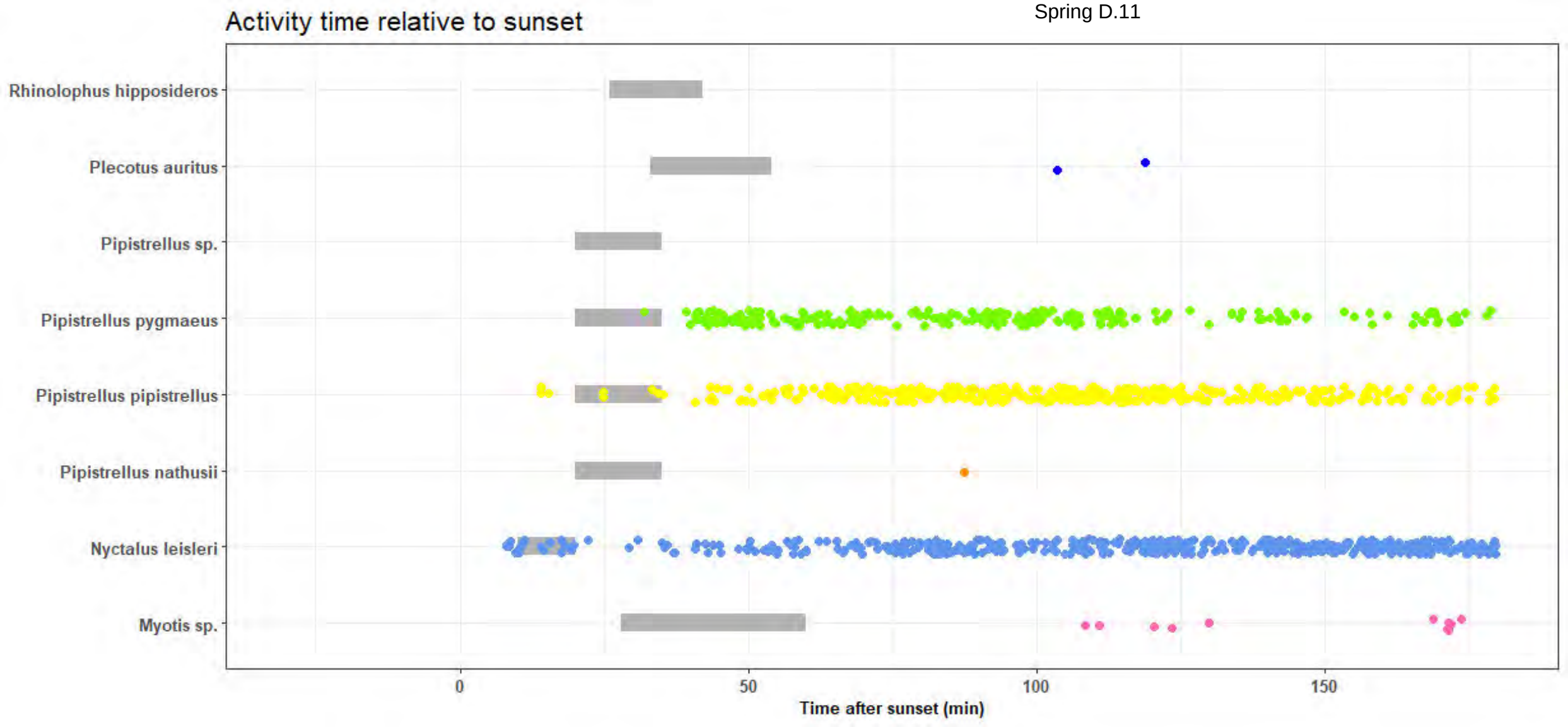

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

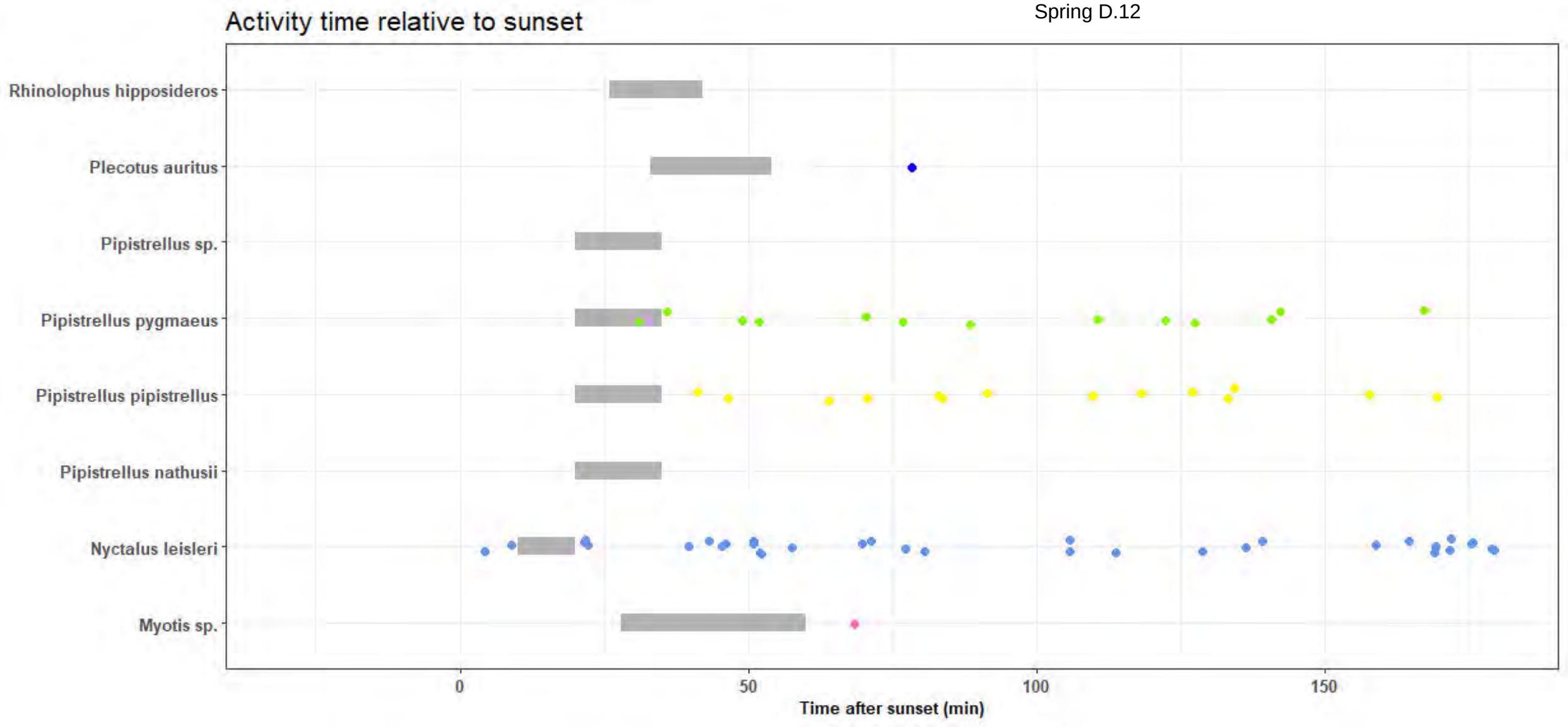

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

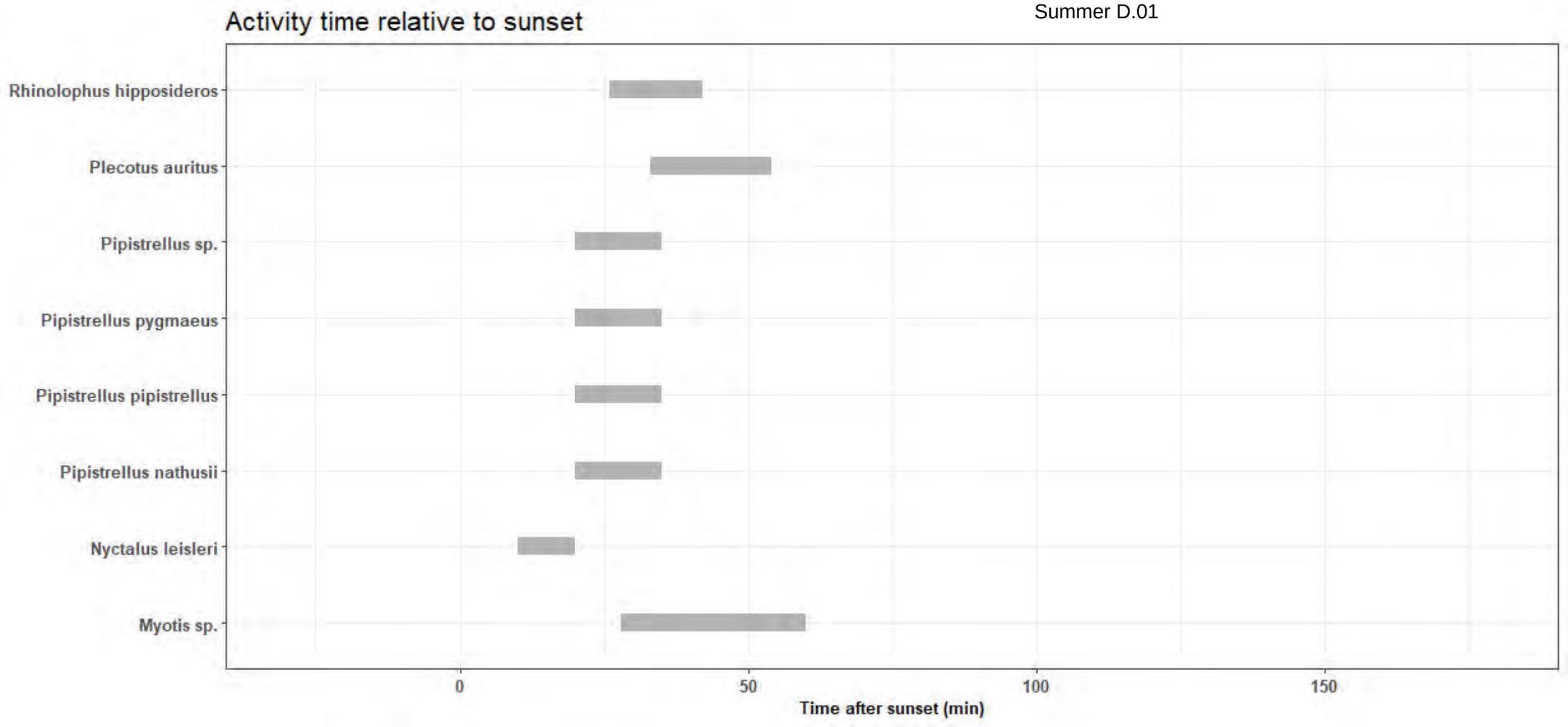

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

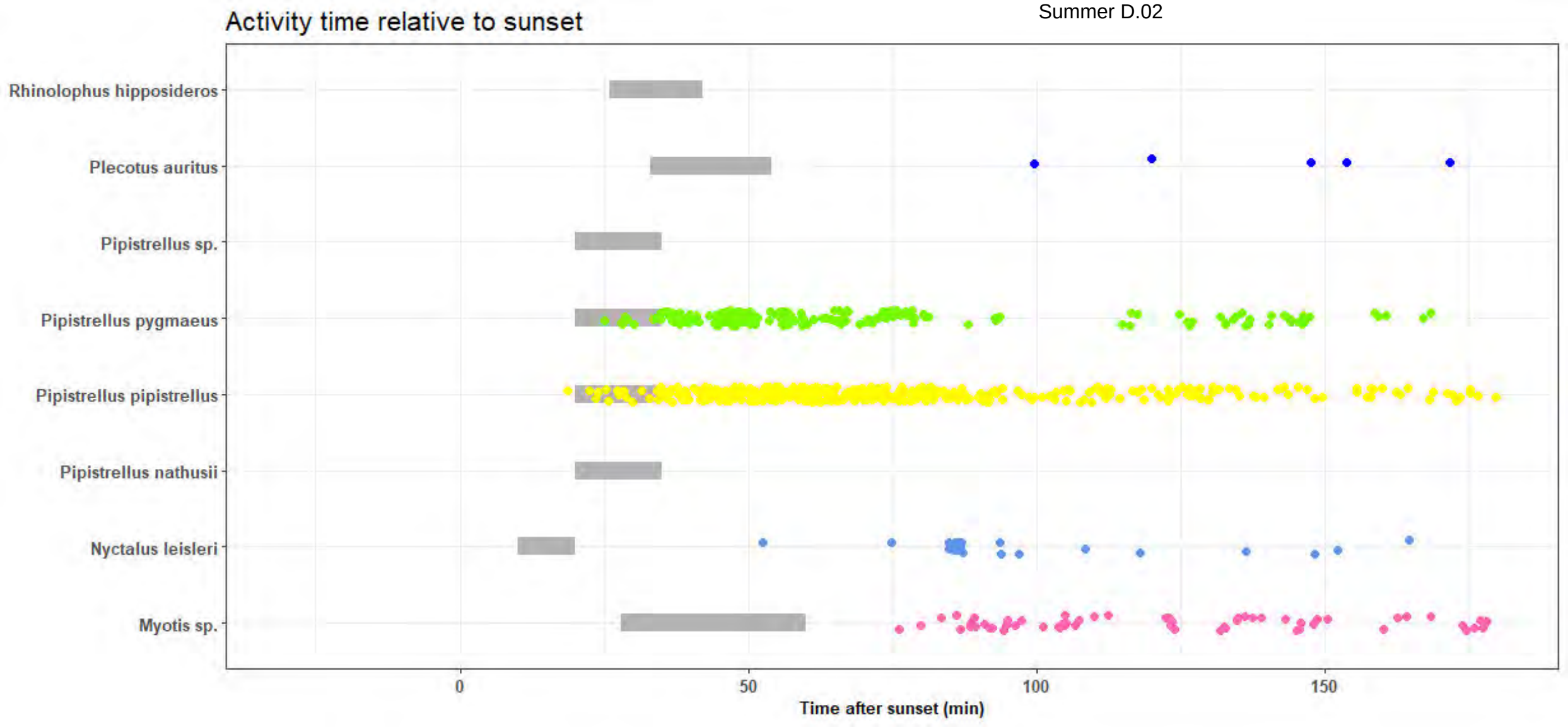

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

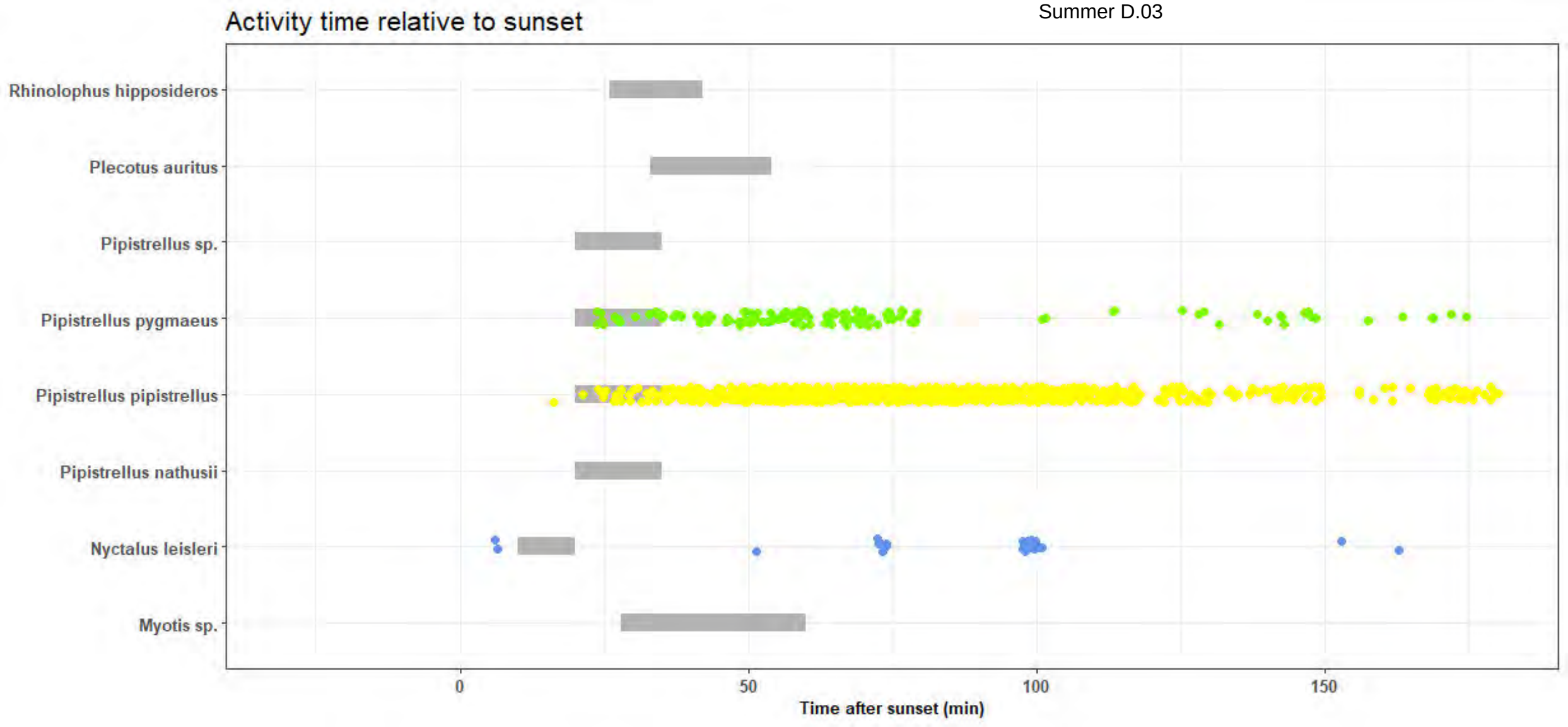
Summer D.01


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

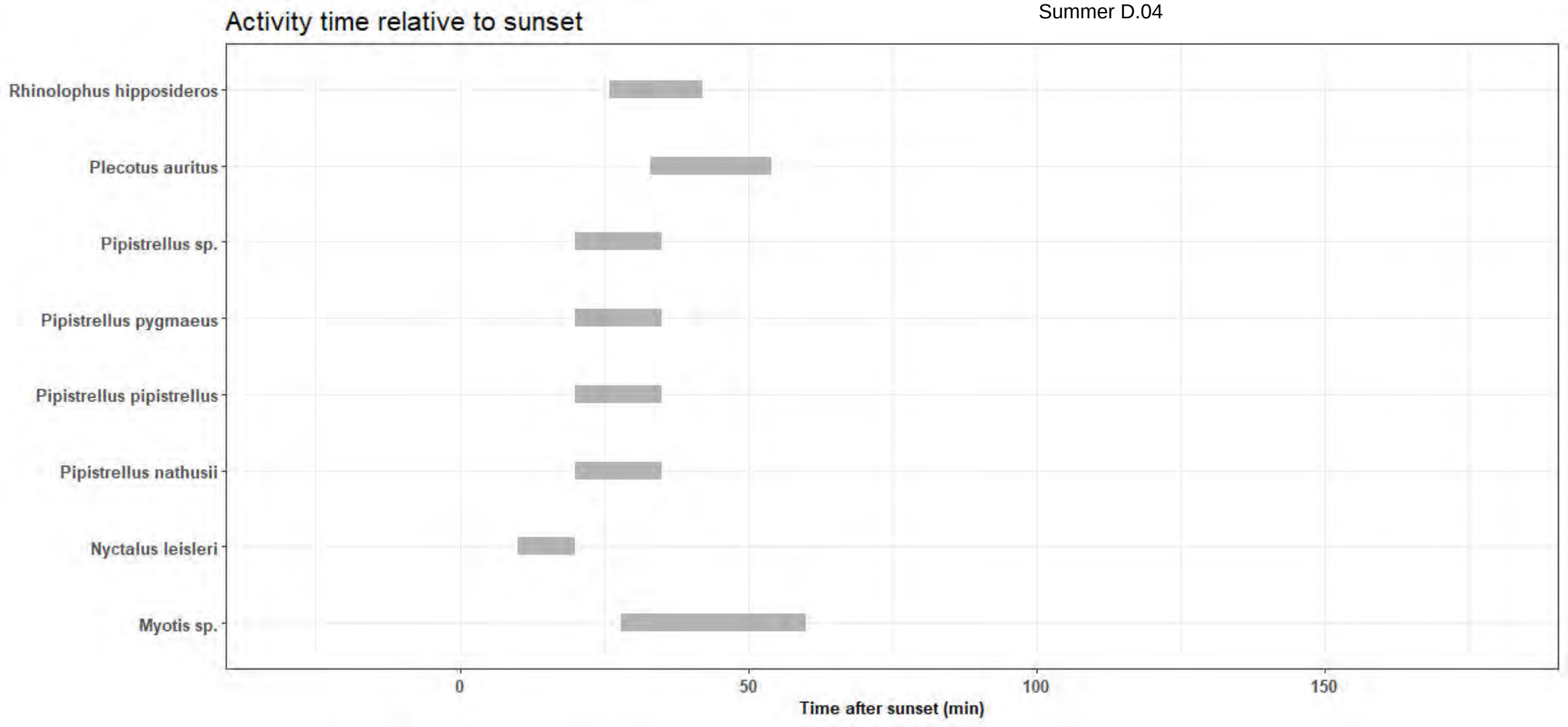
Summer D.02


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

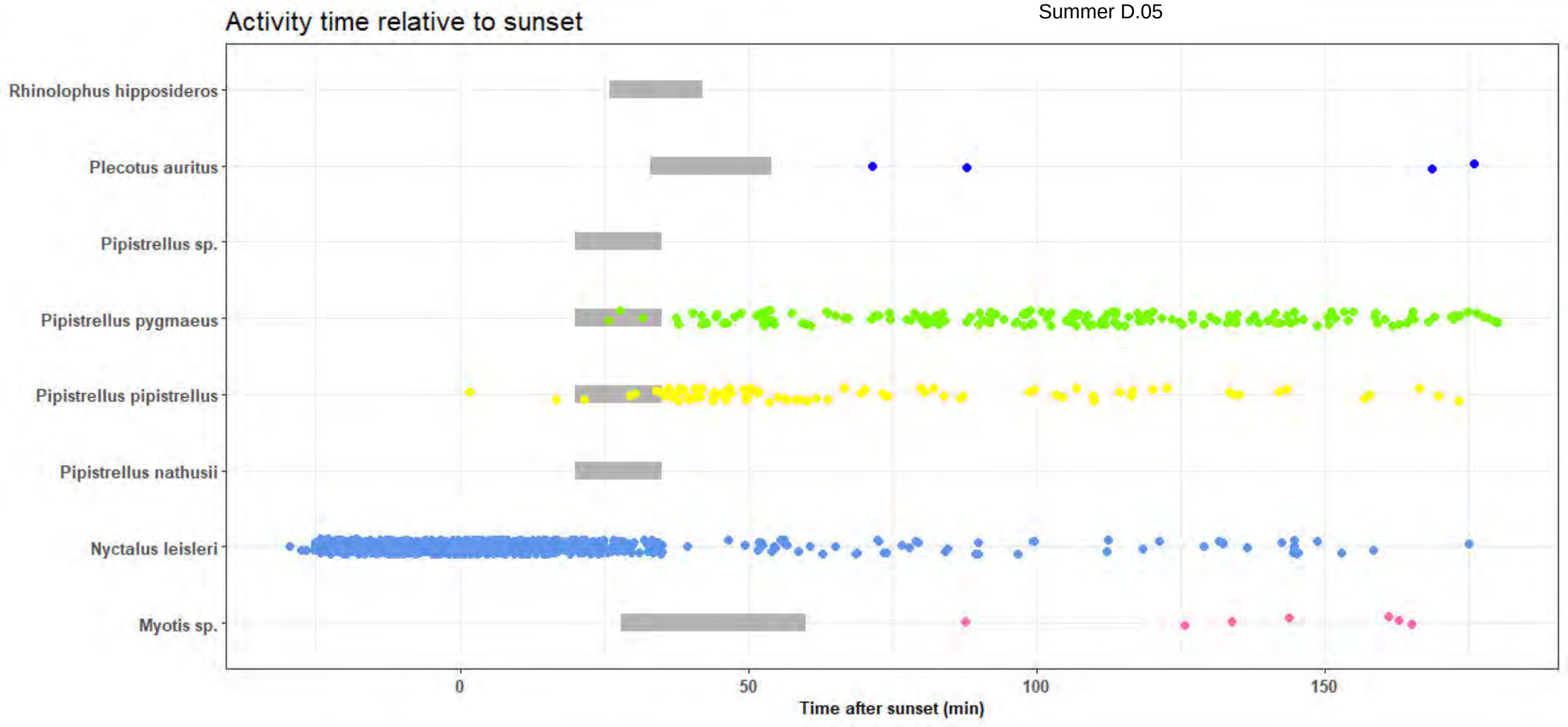
Summer D.03


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

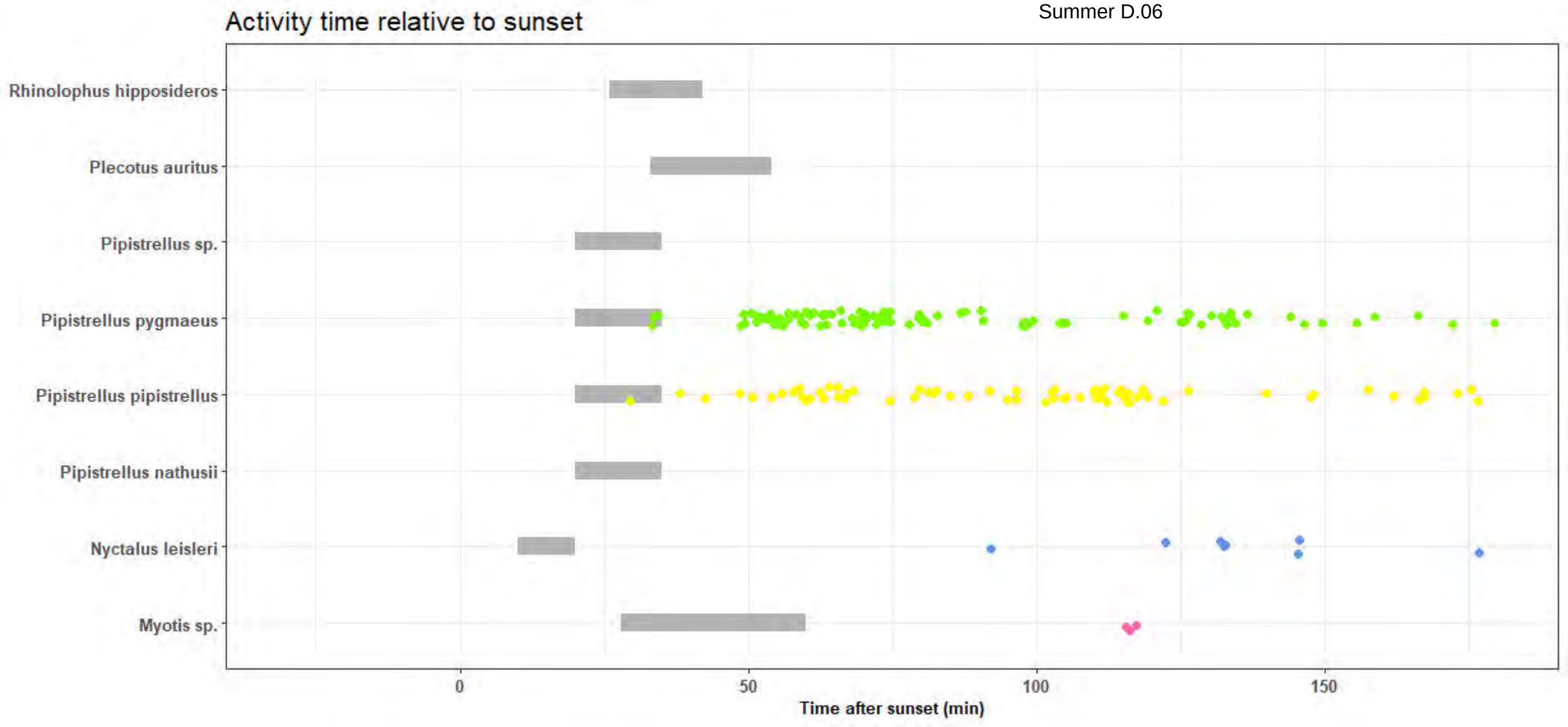
Summer D.04


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

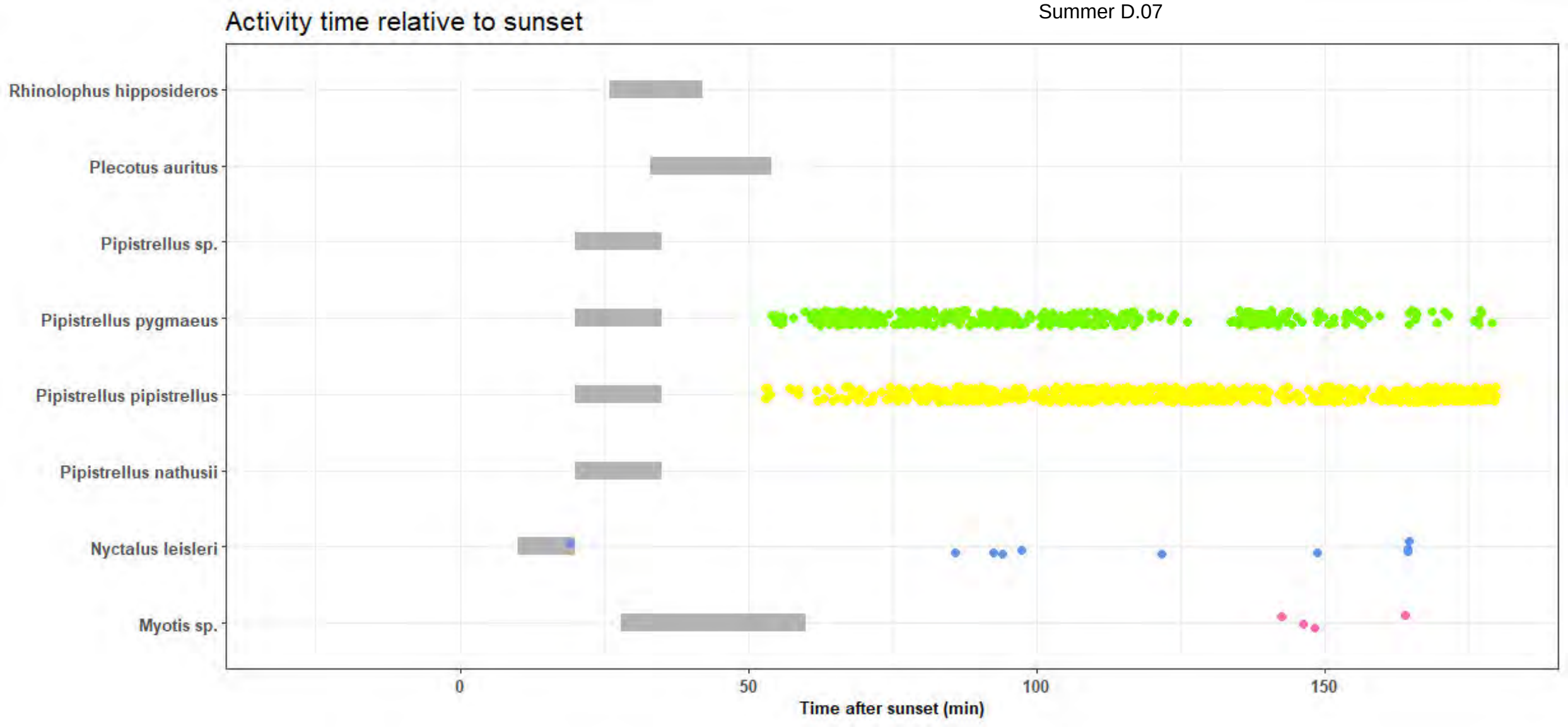
Summer D.05


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

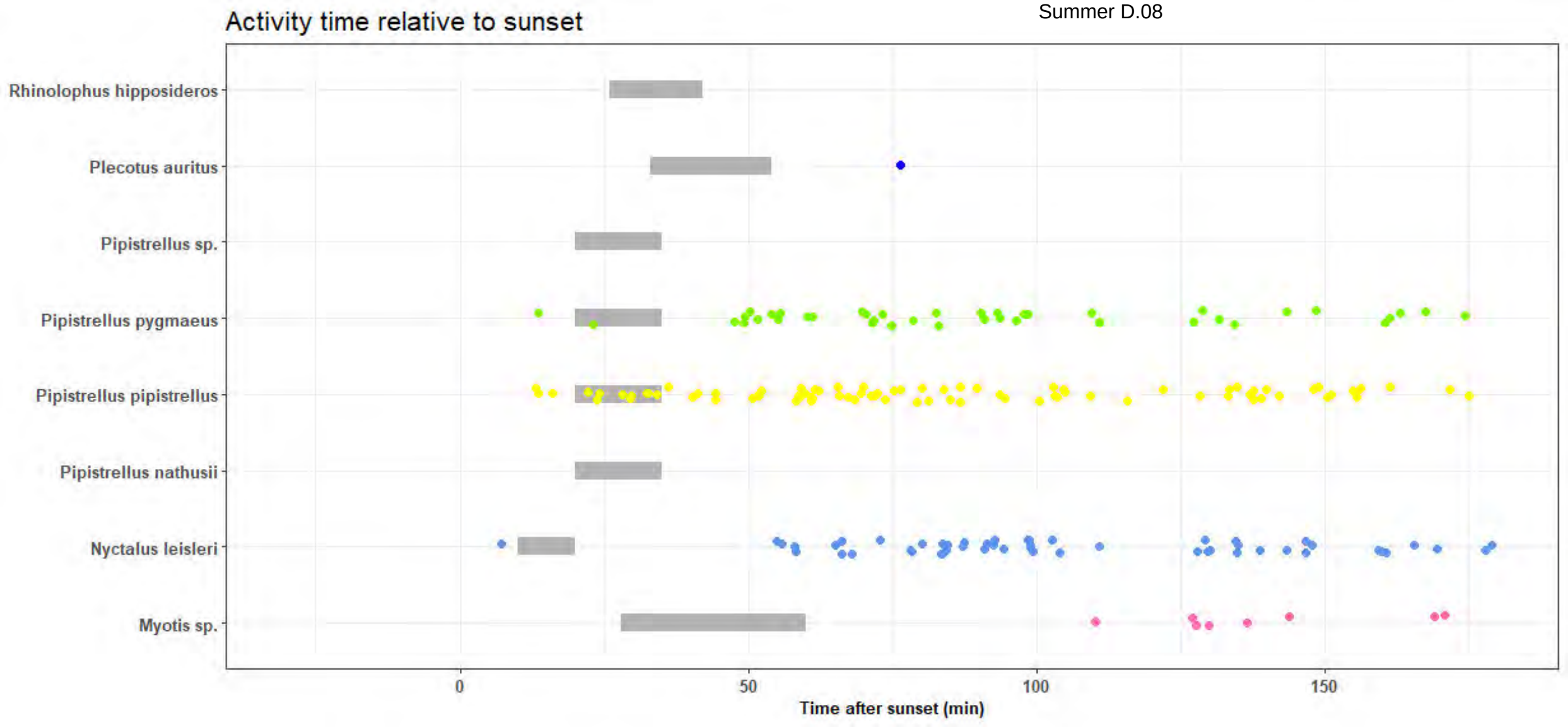
Summer D.06


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

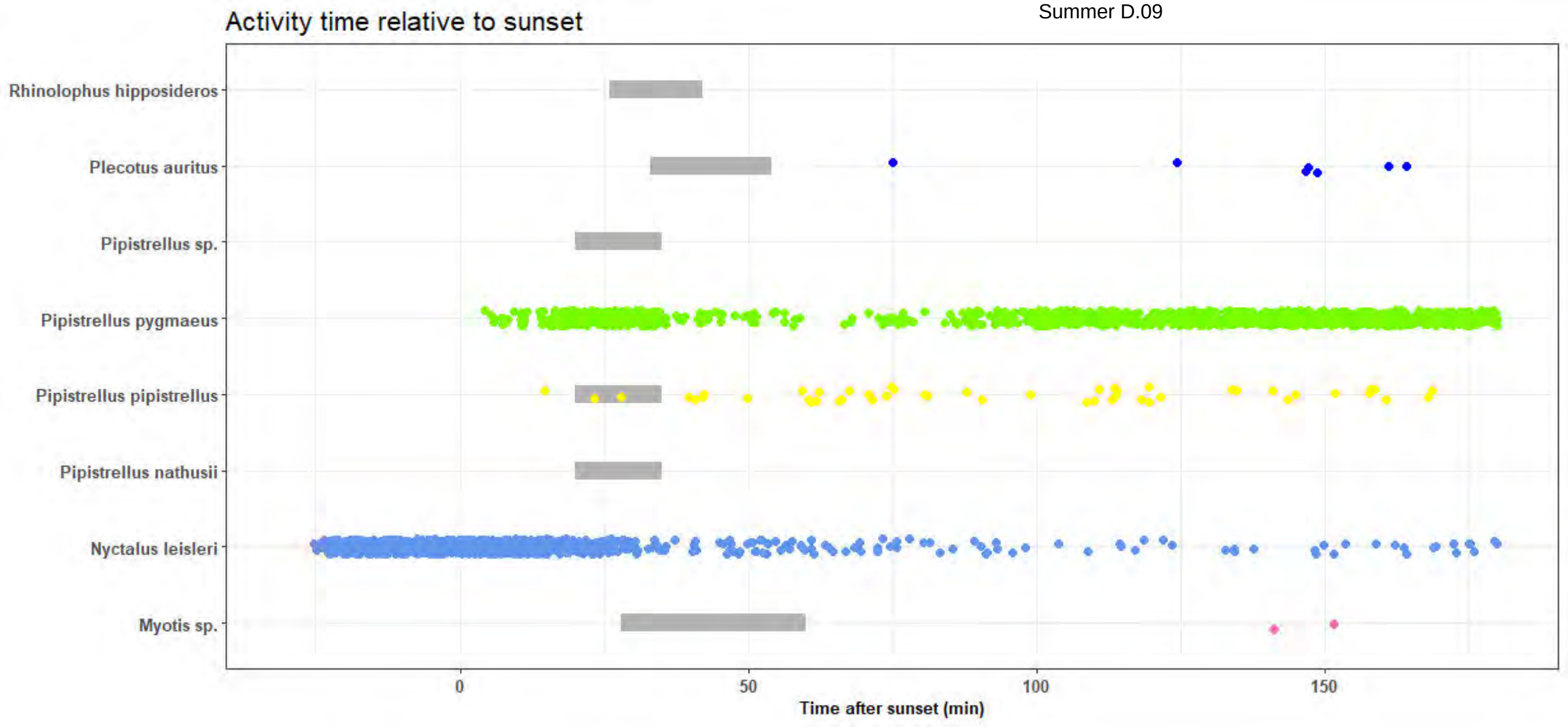
Summer D.07


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

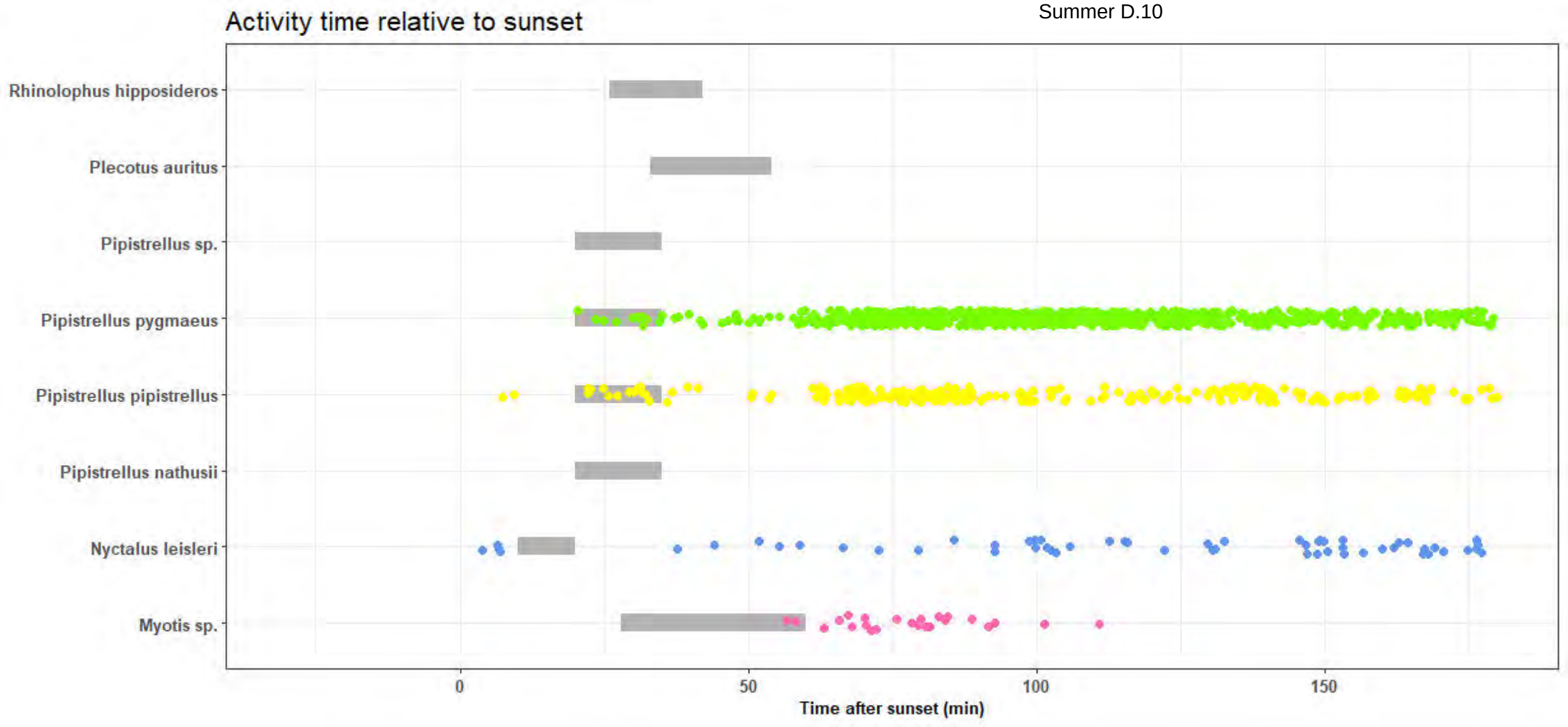
Summer D.08


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

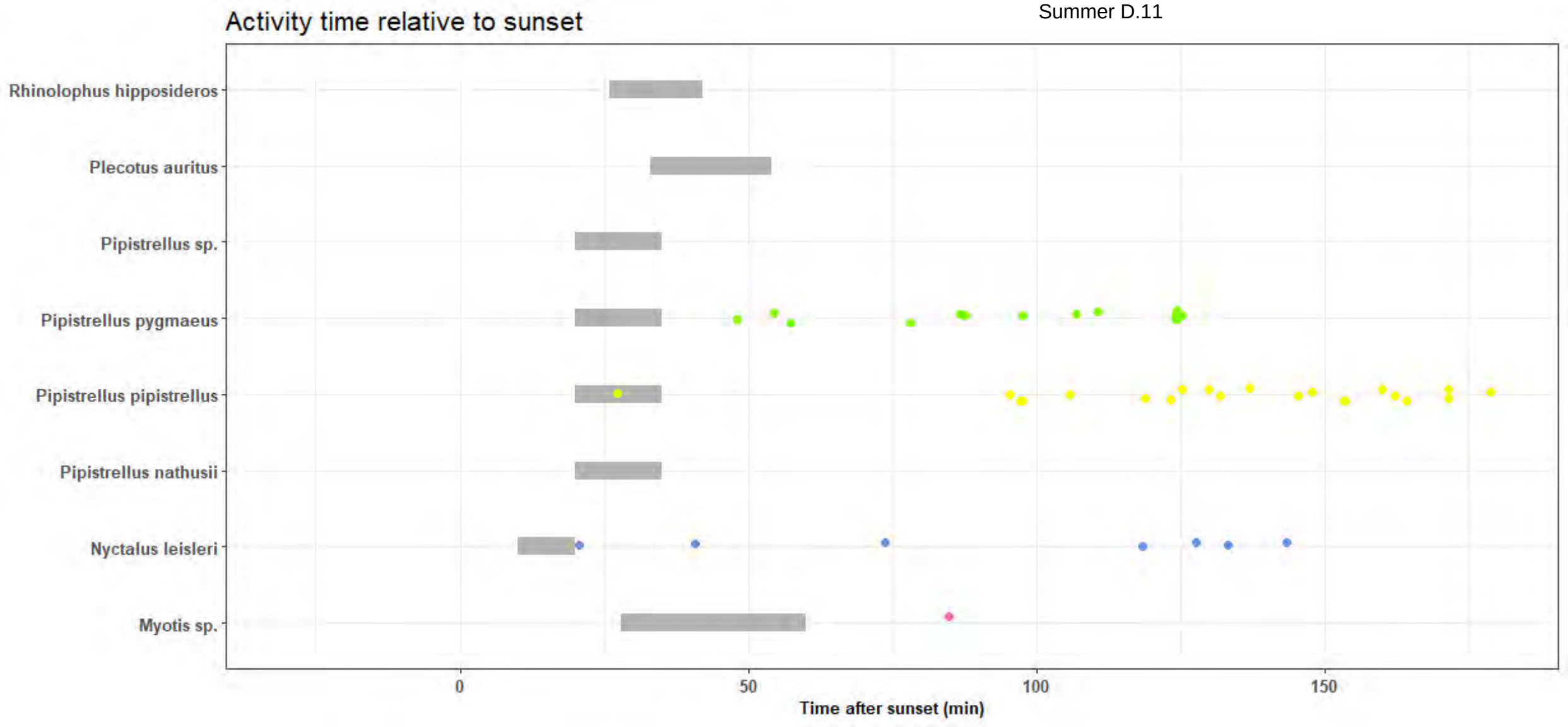
Summer D.09


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

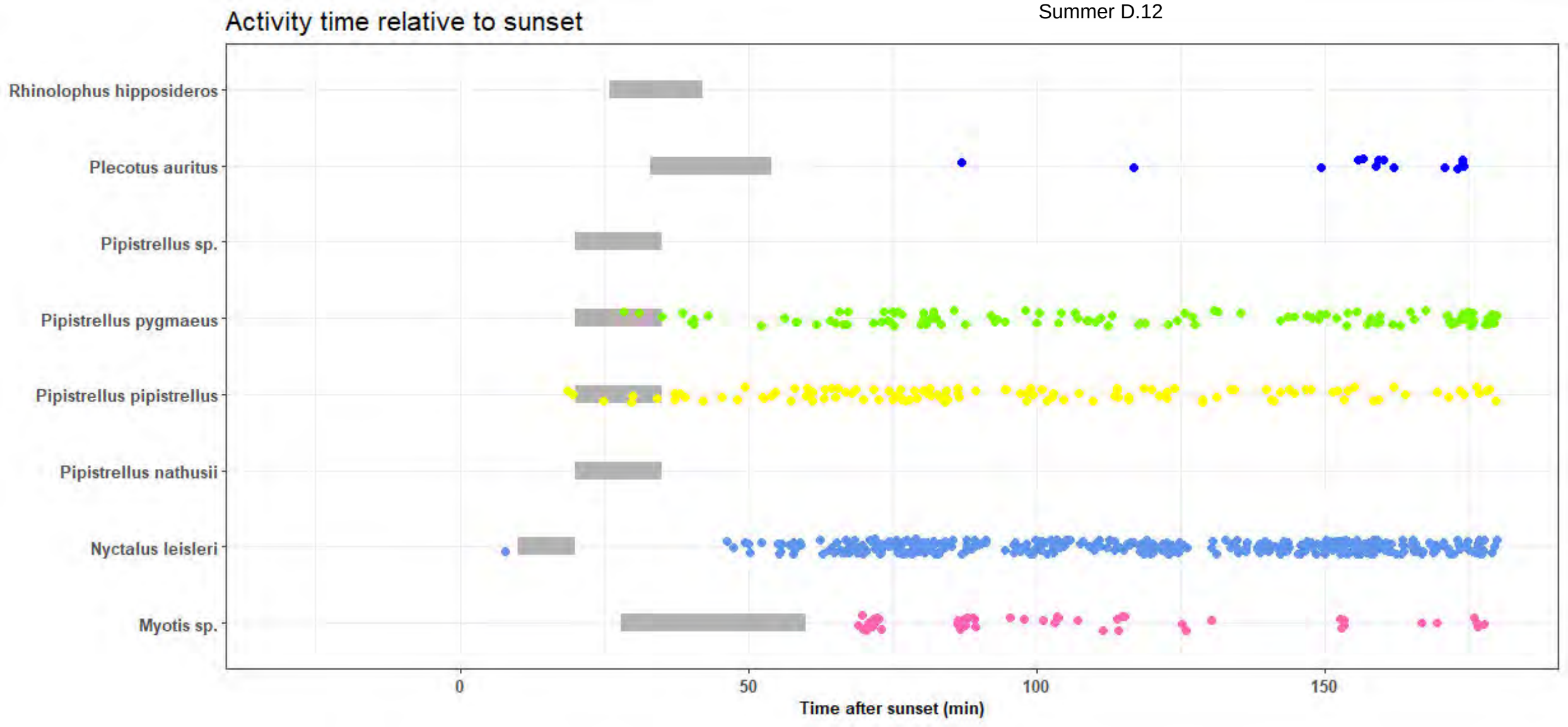
Summer D.10


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

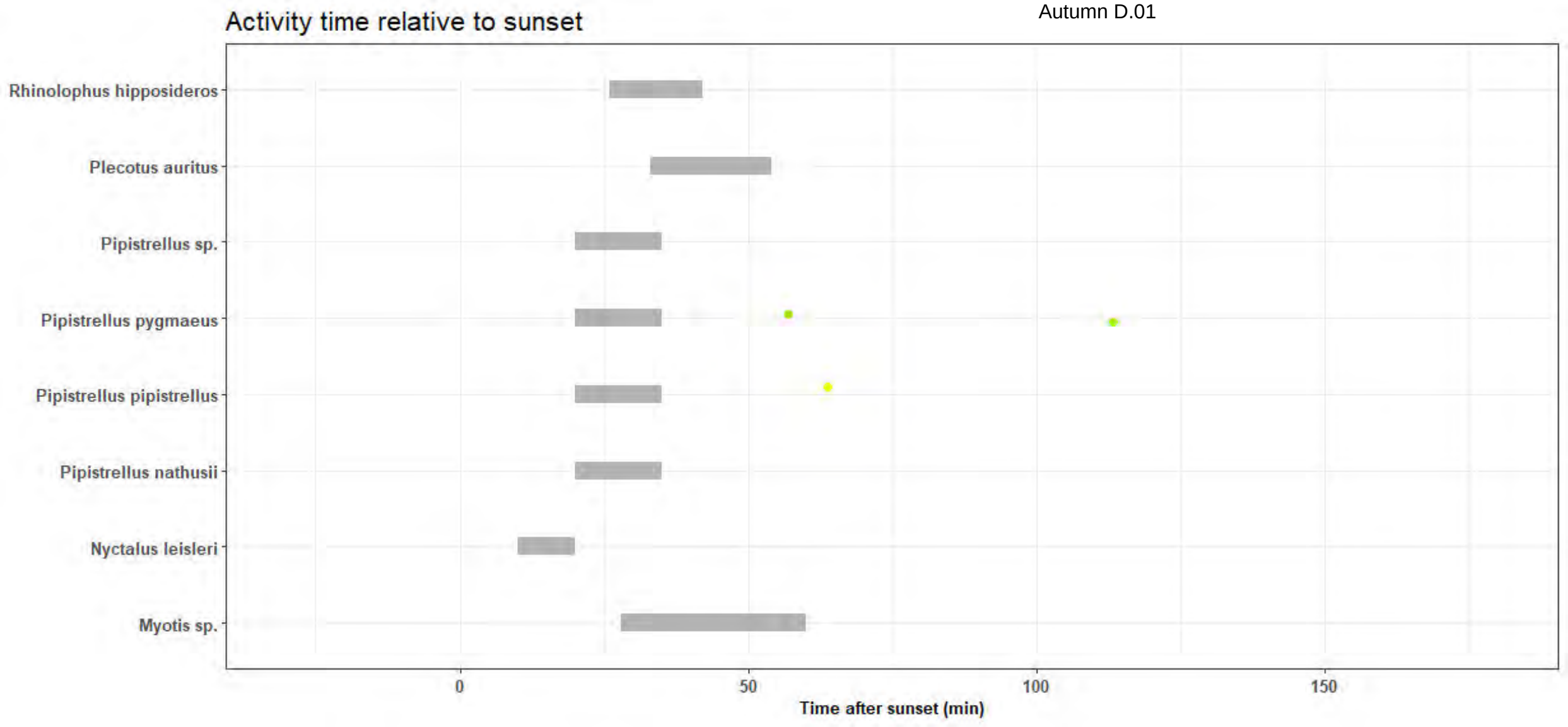
Summer D.11

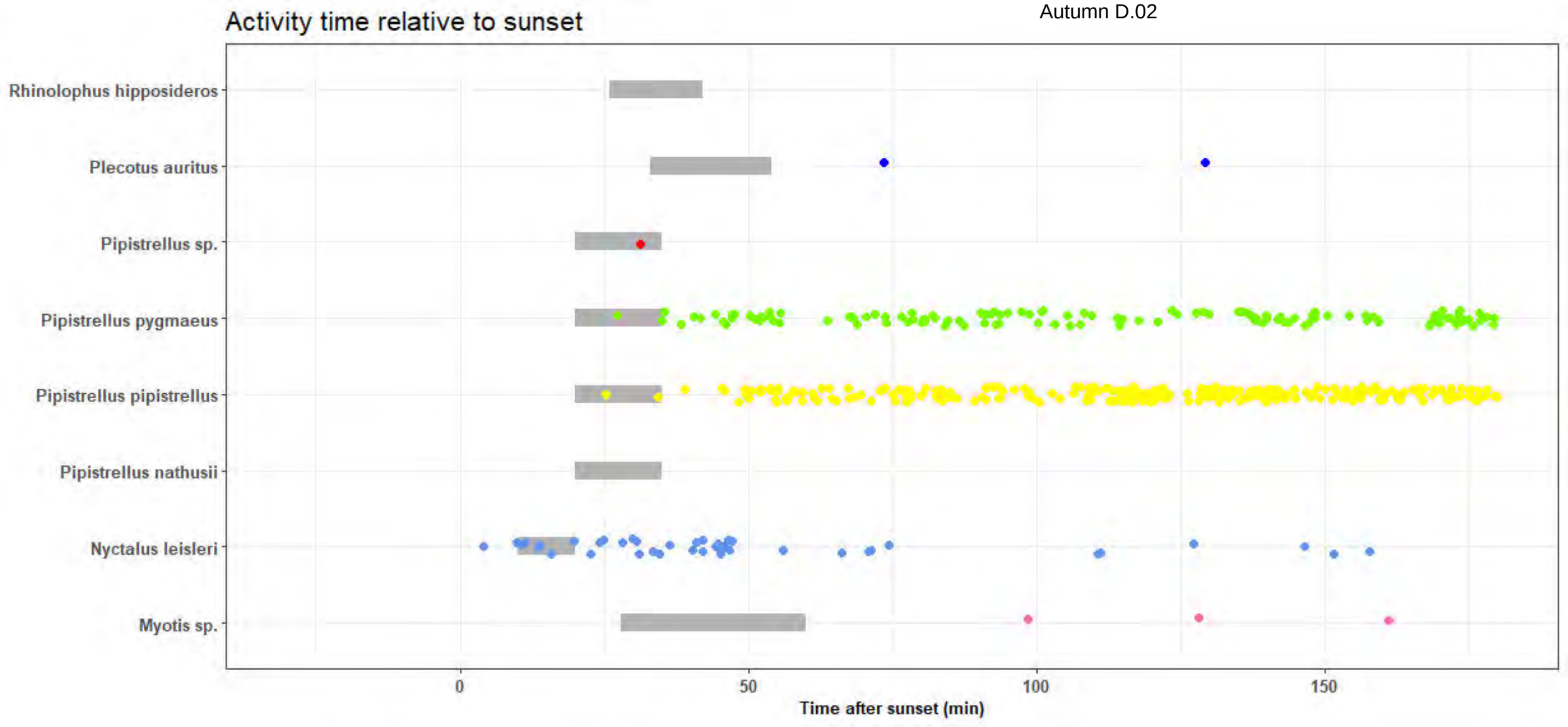

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

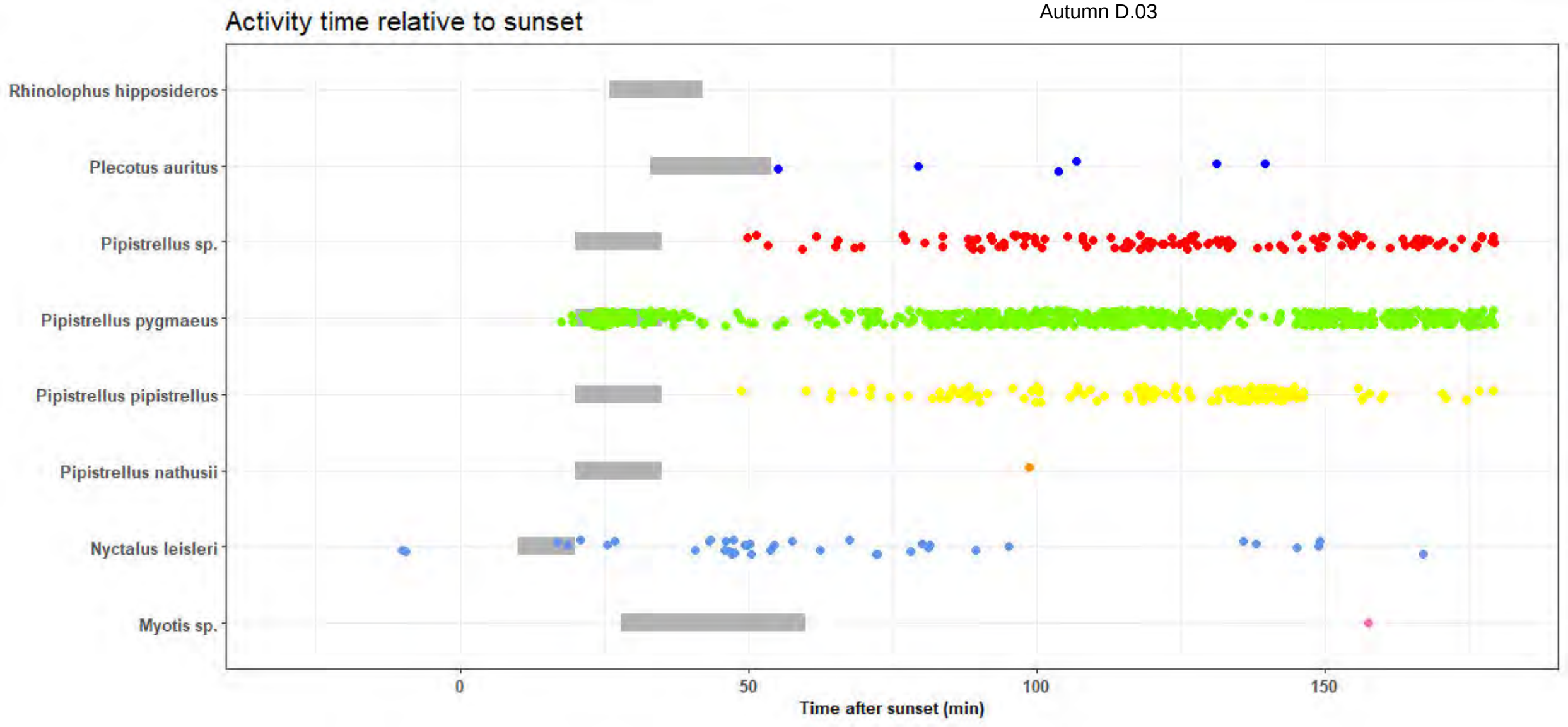
Summer D.12


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

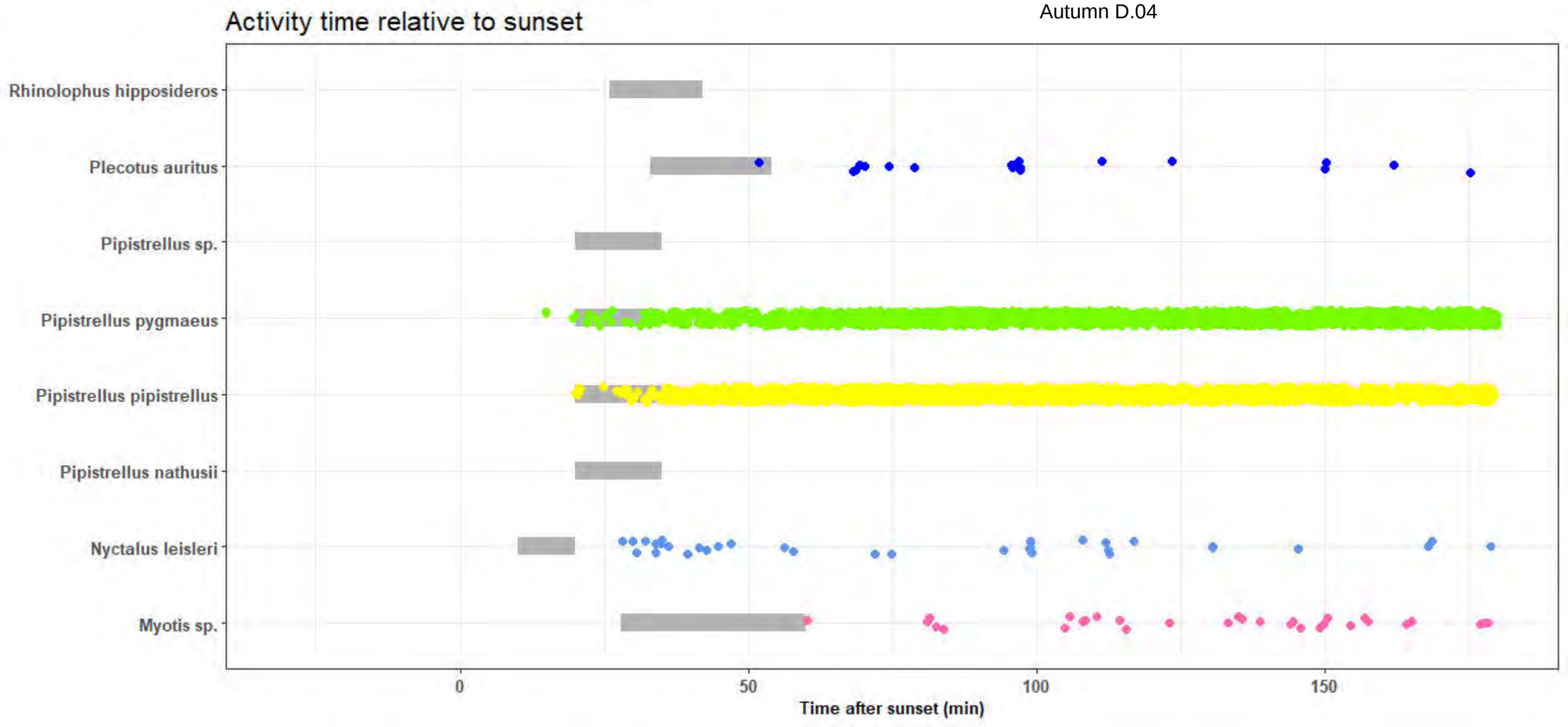
Autumn D.01


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

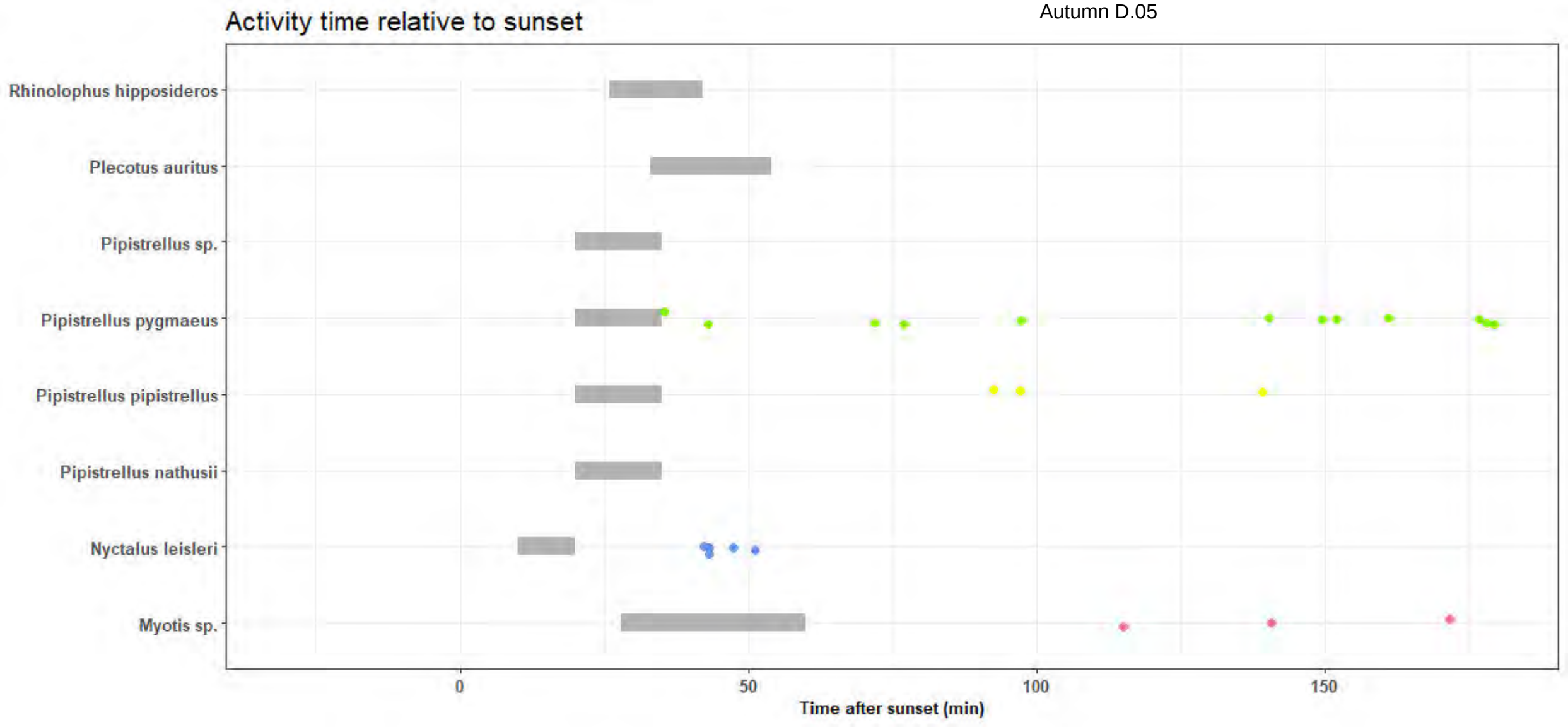

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

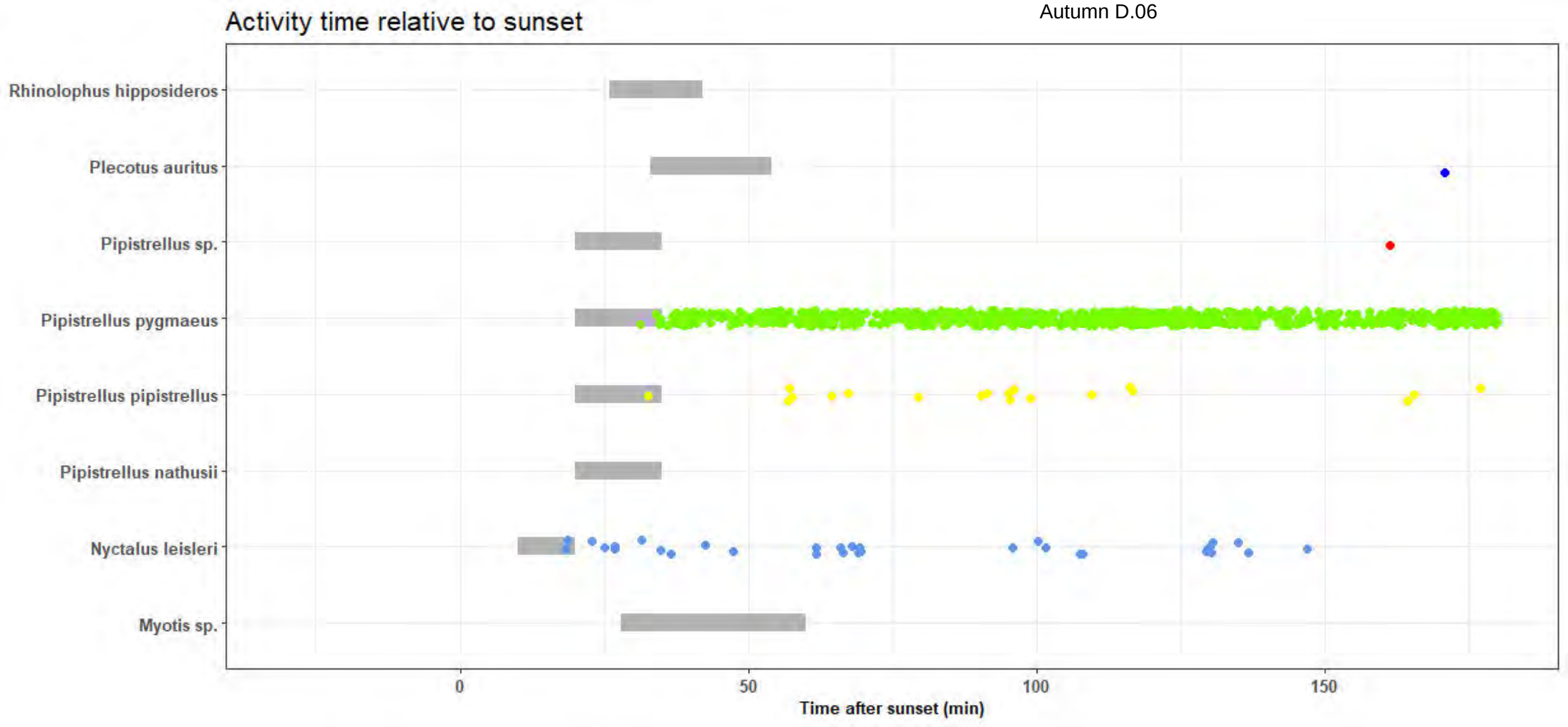
Autumn D.04


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

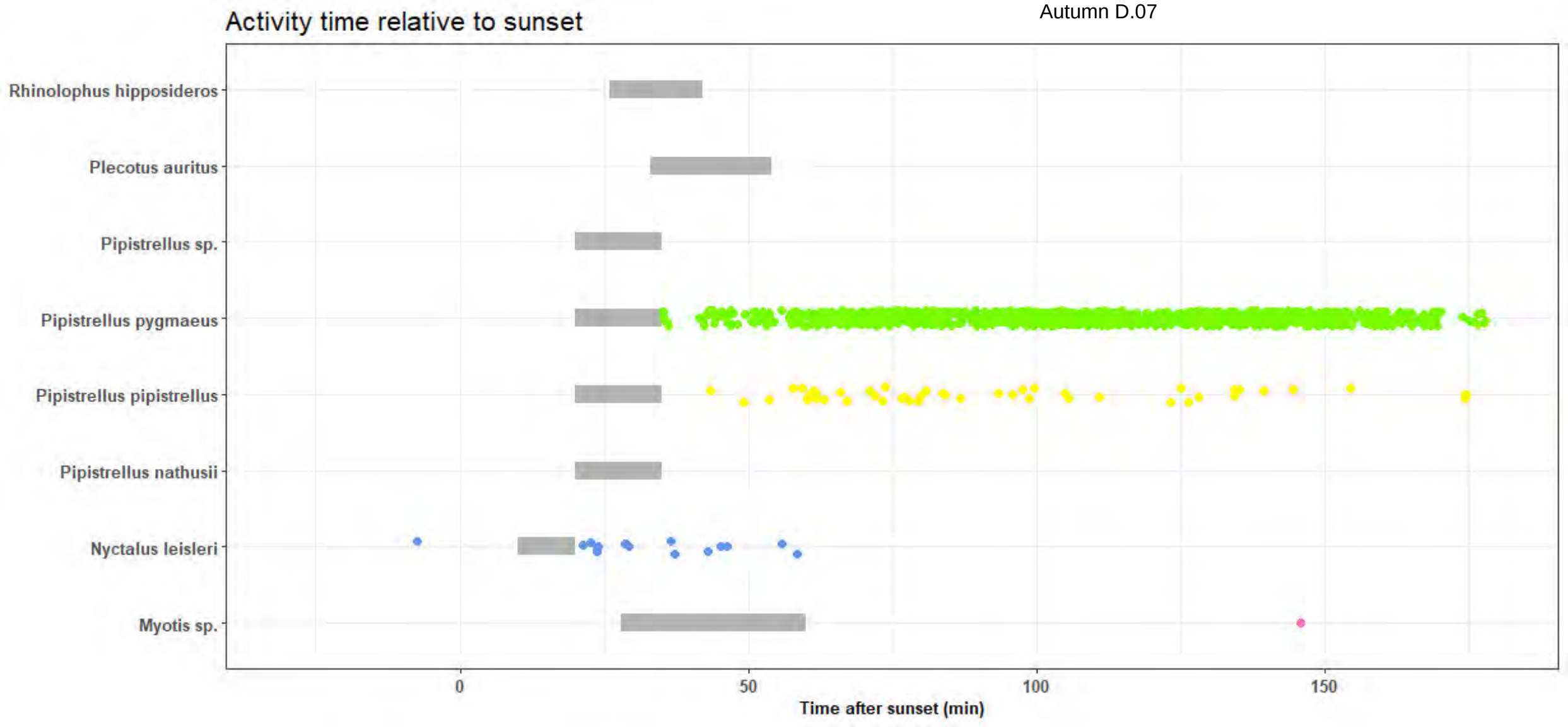
Autumn D.05

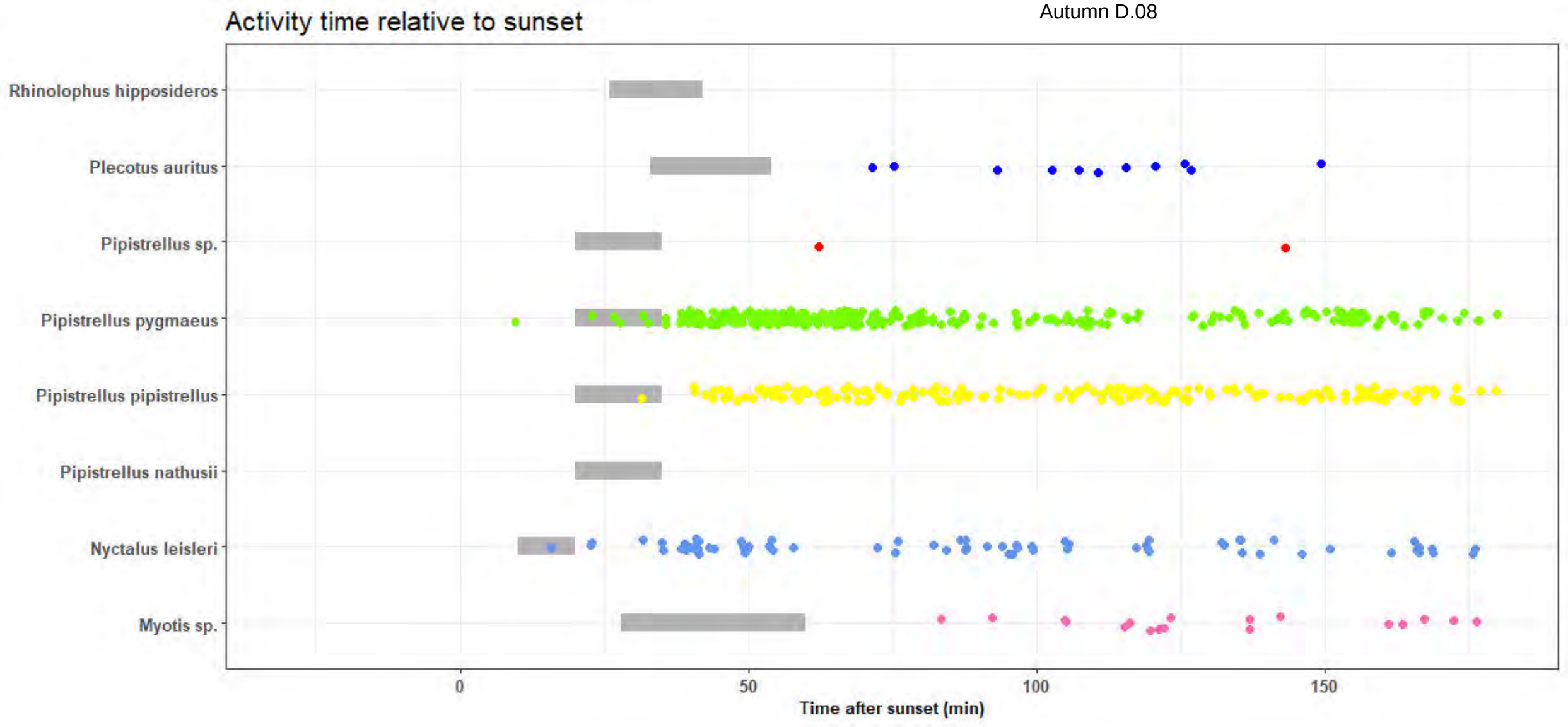

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

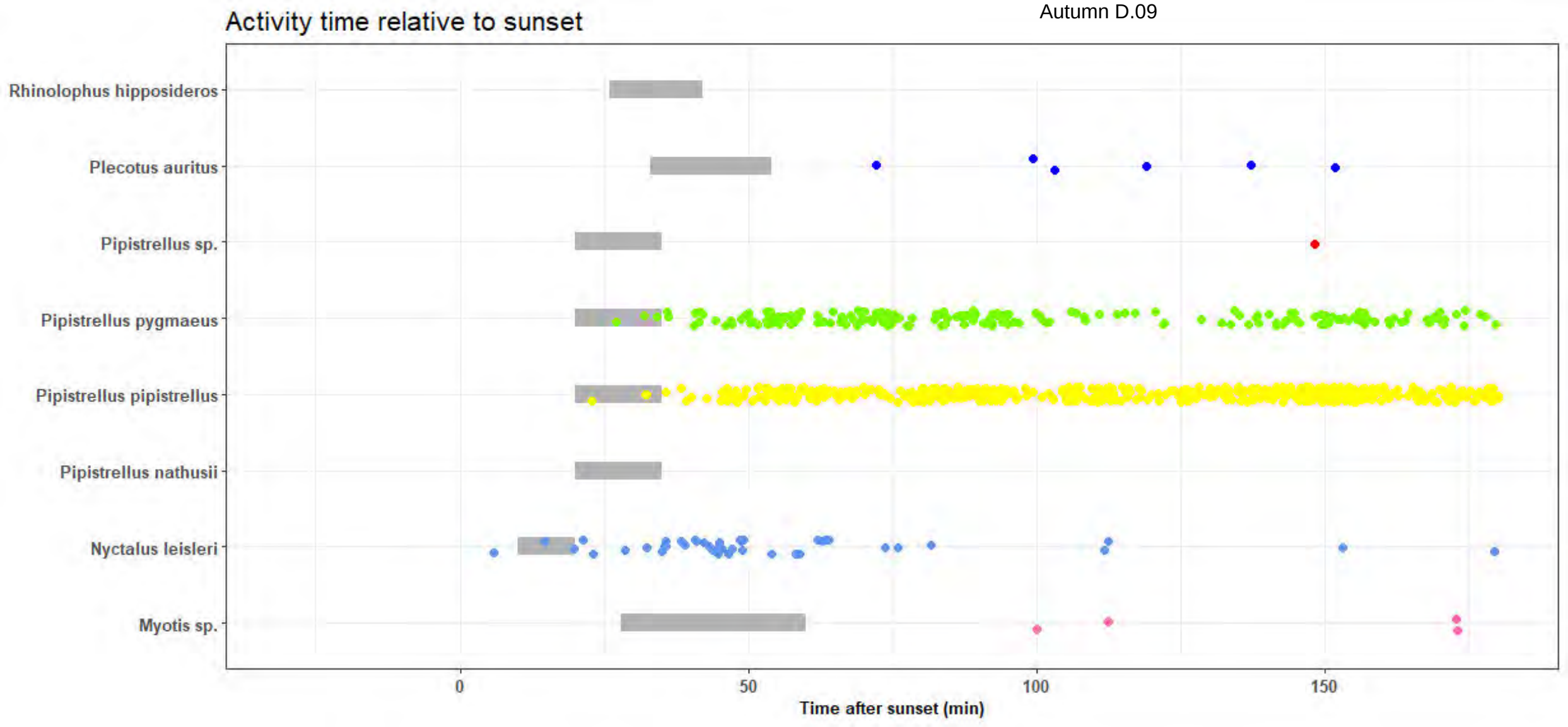
Autumn D.06

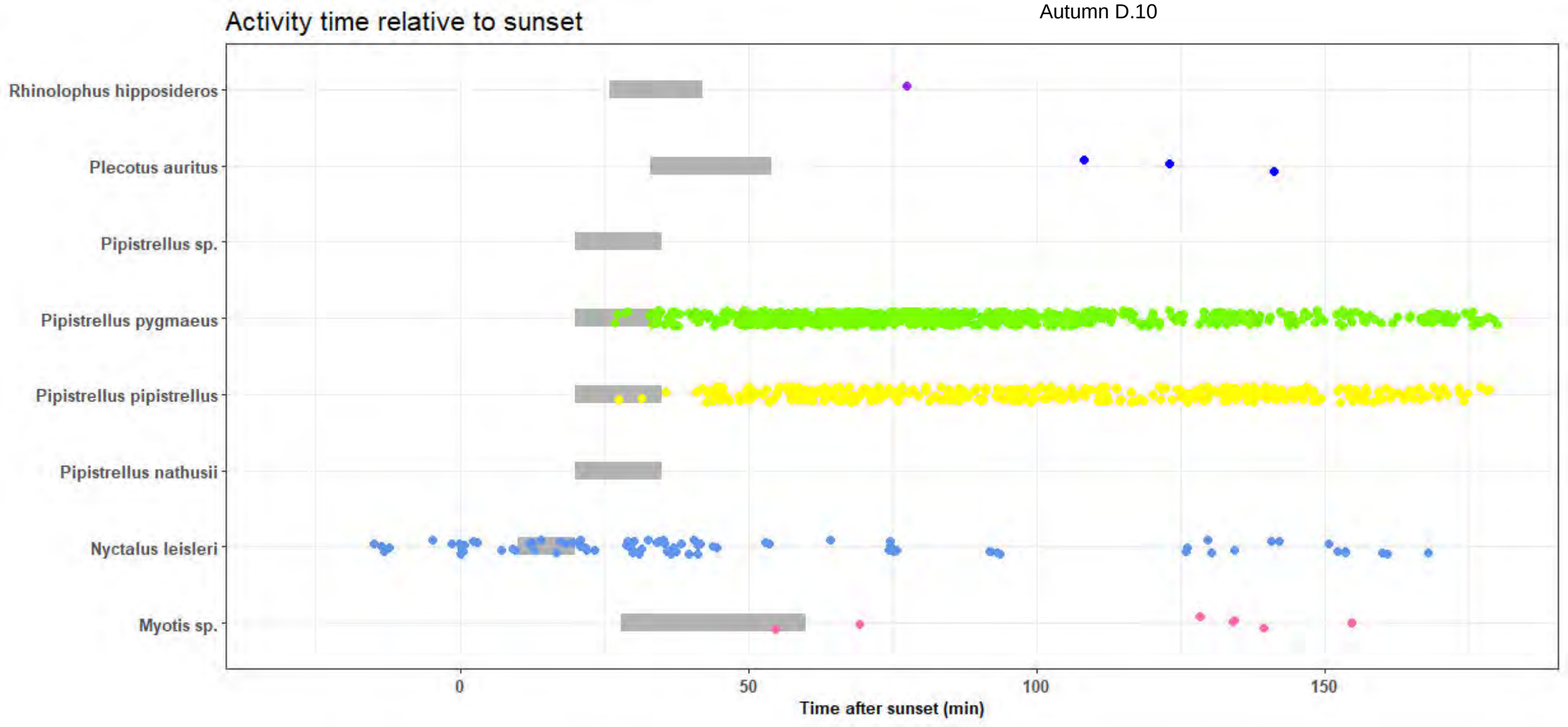

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

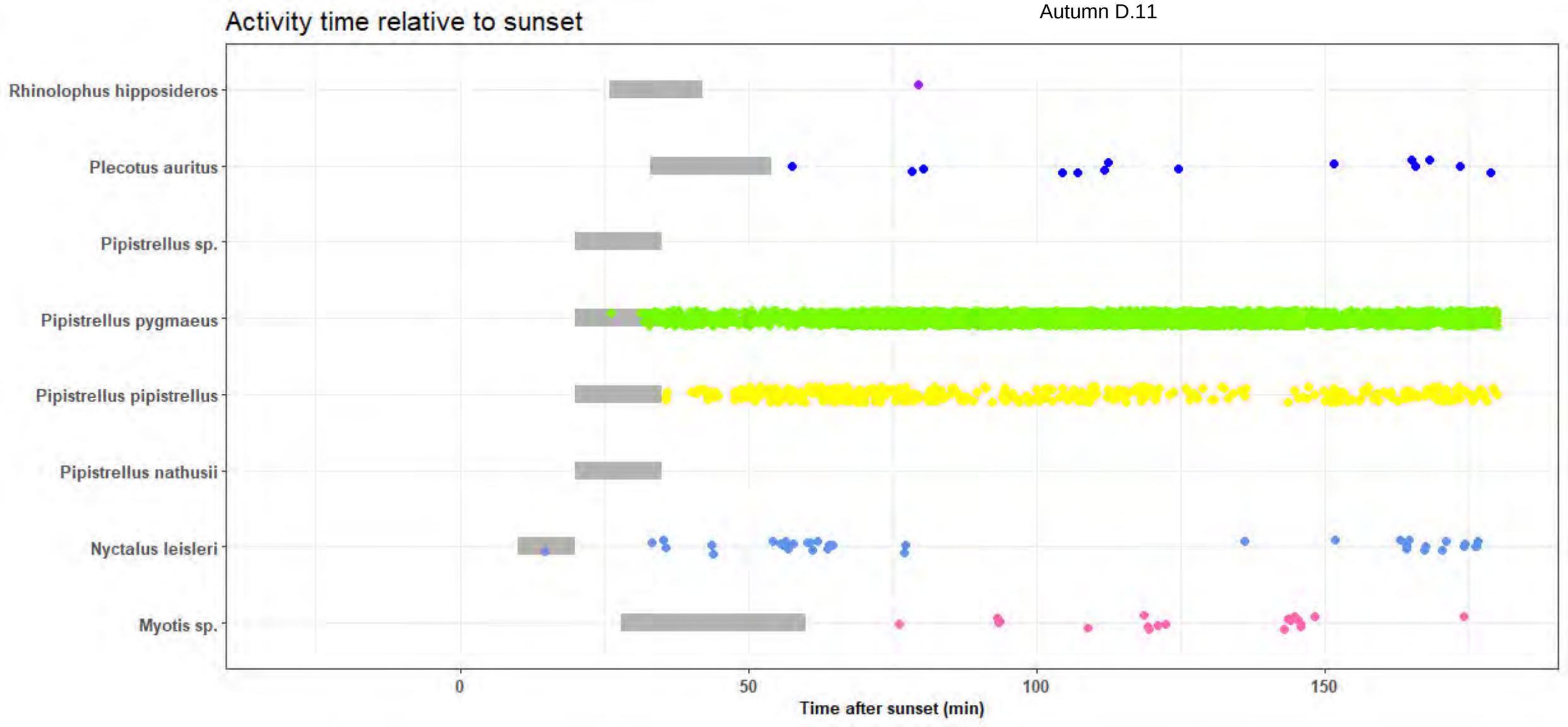
Autumn D.07

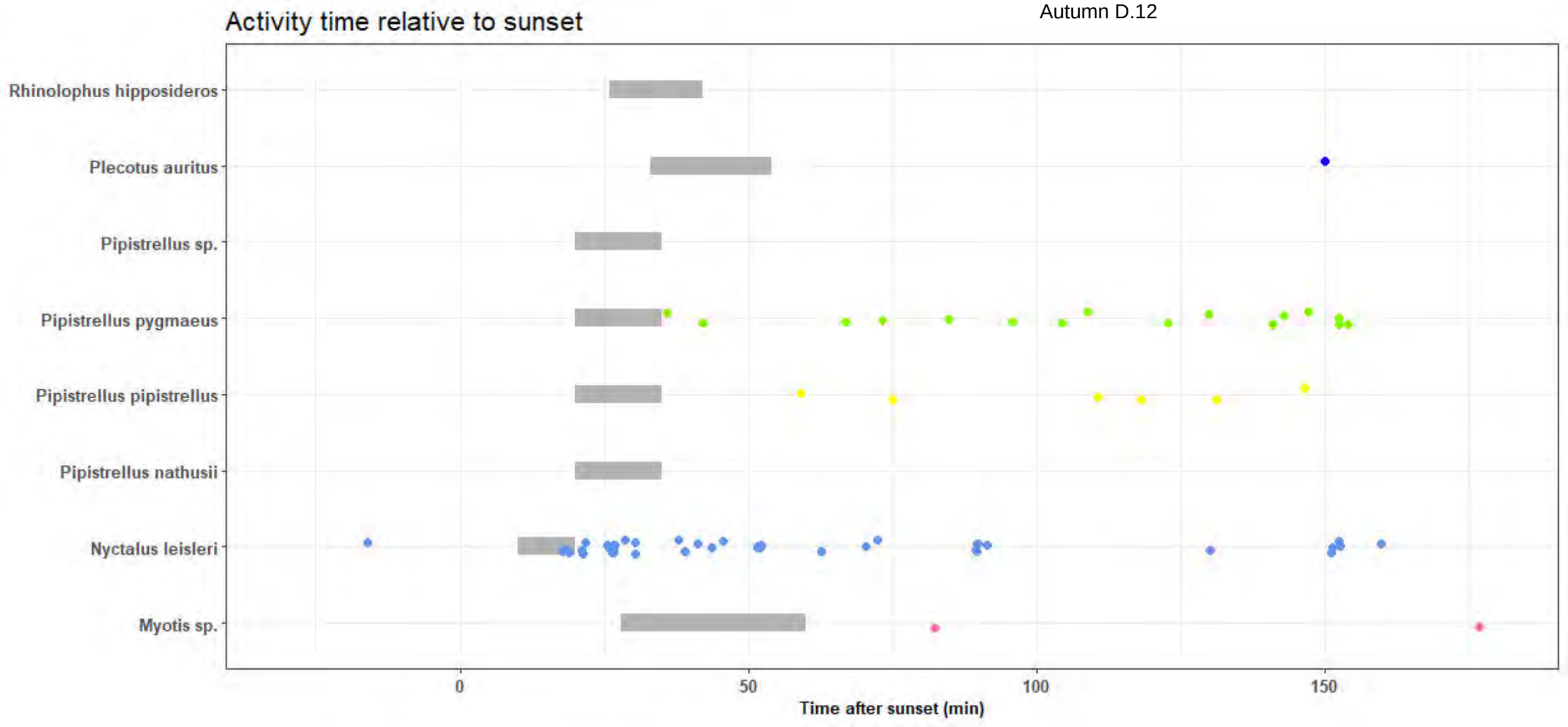

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

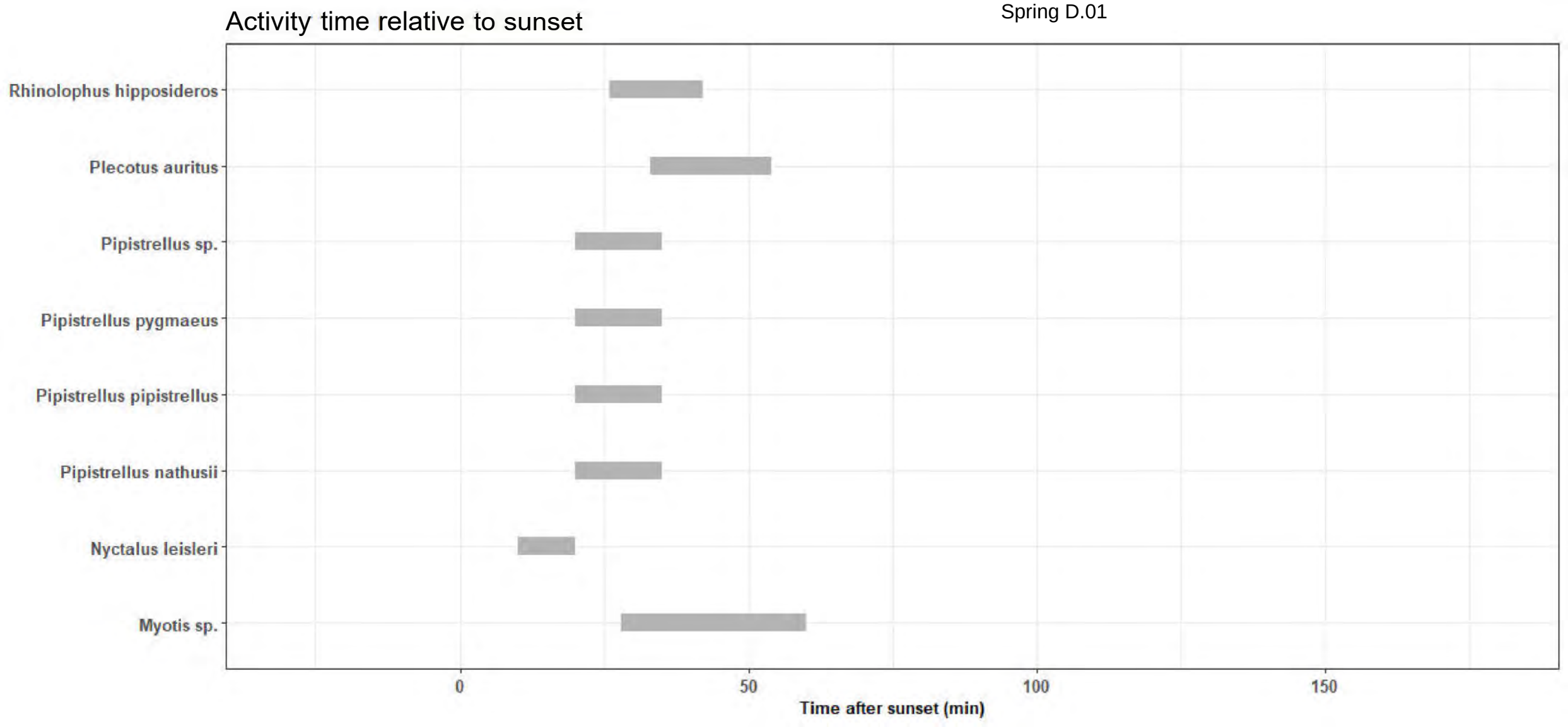

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

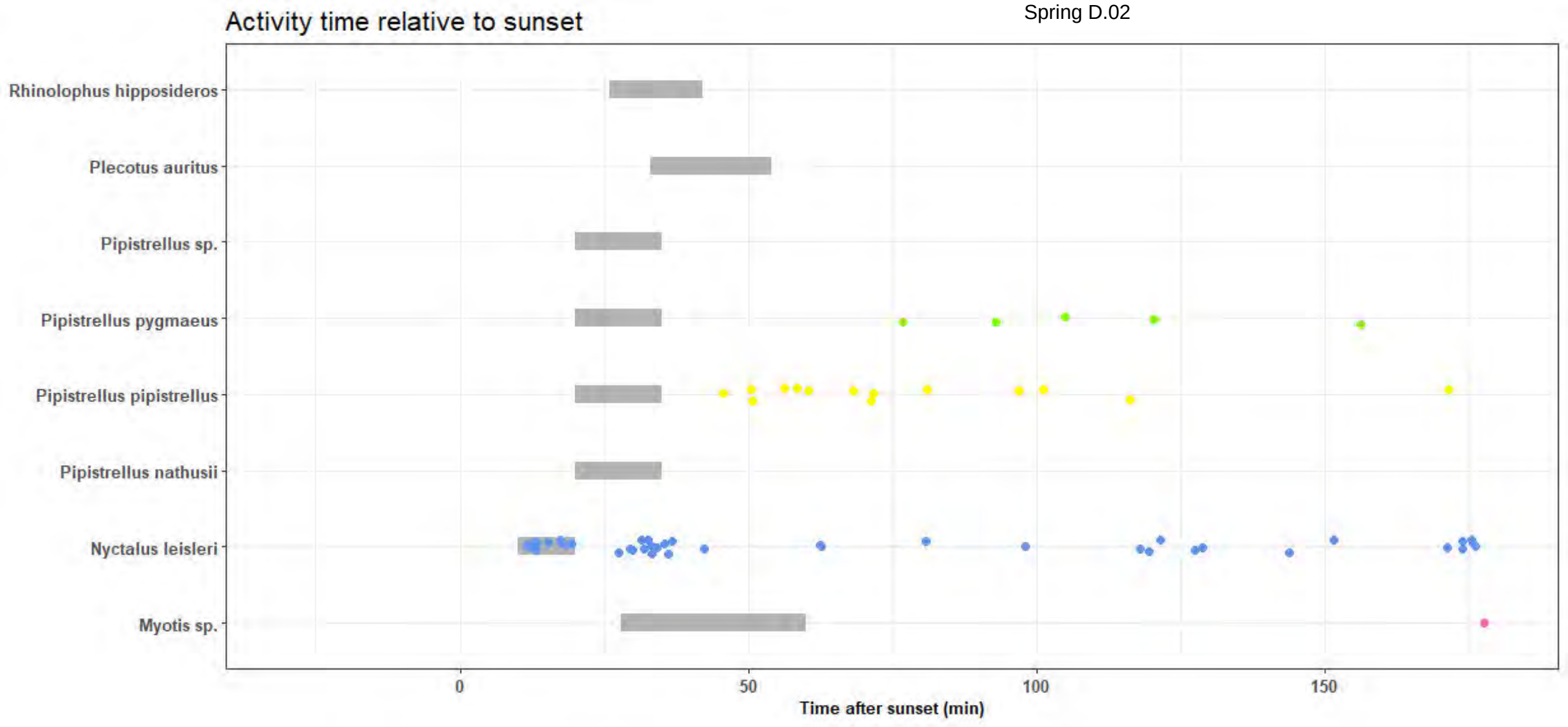

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

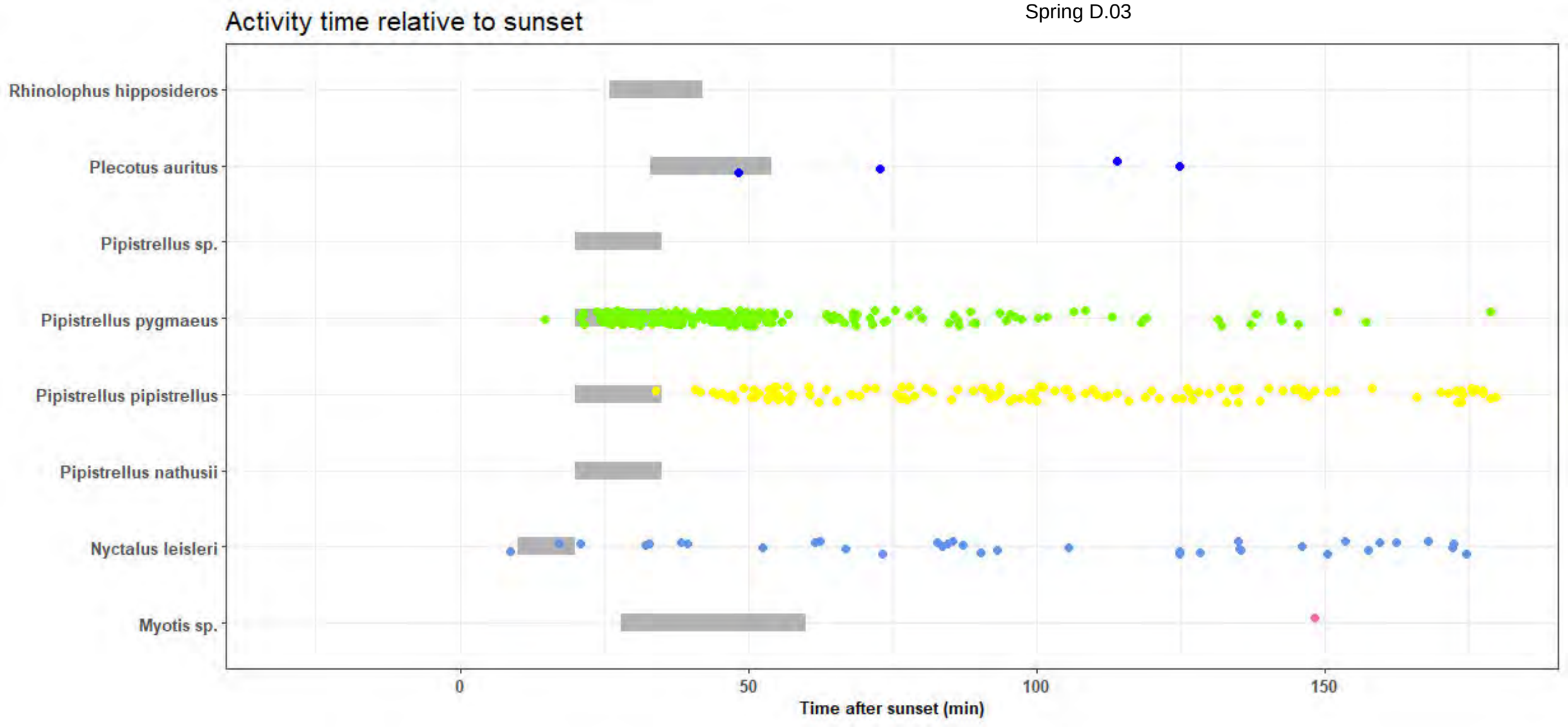

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

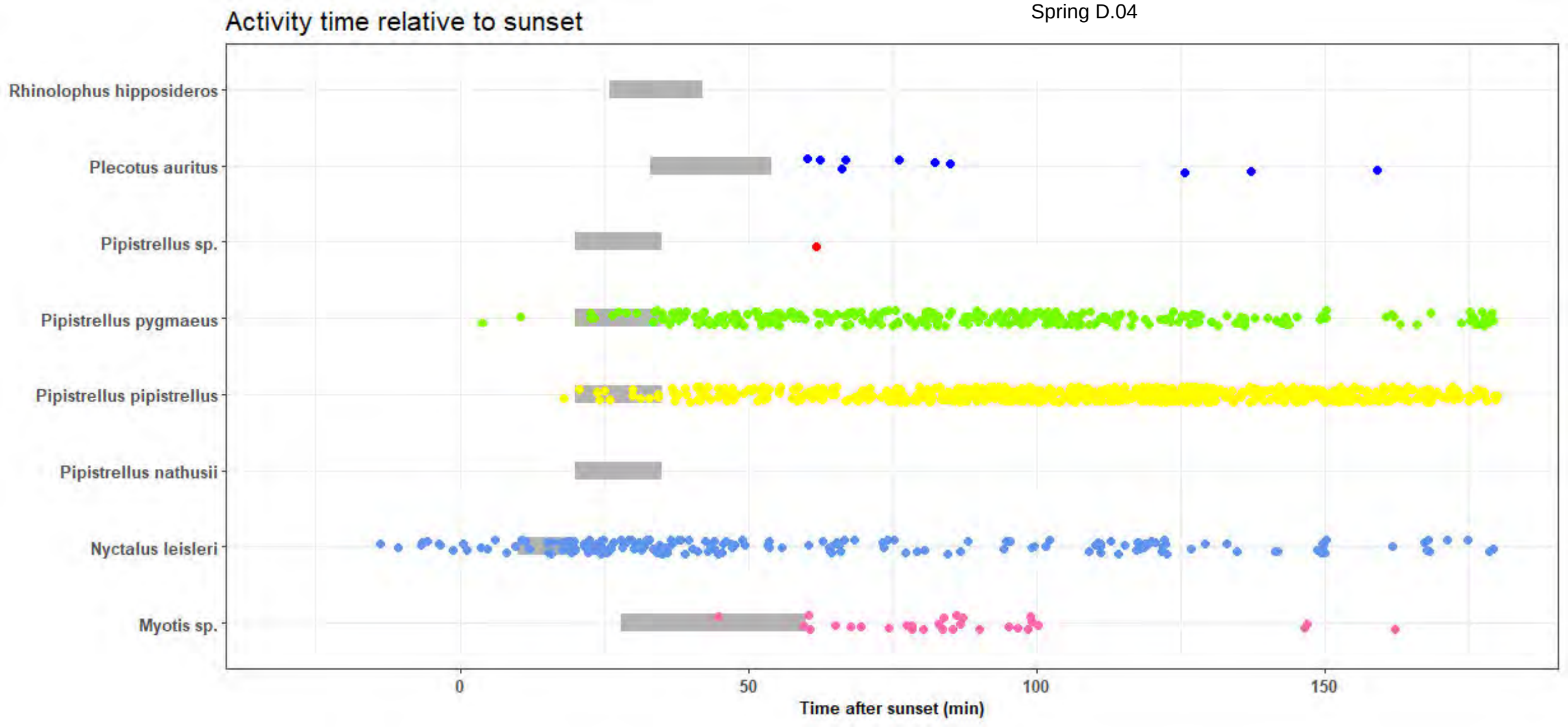
2021

Spring D.01

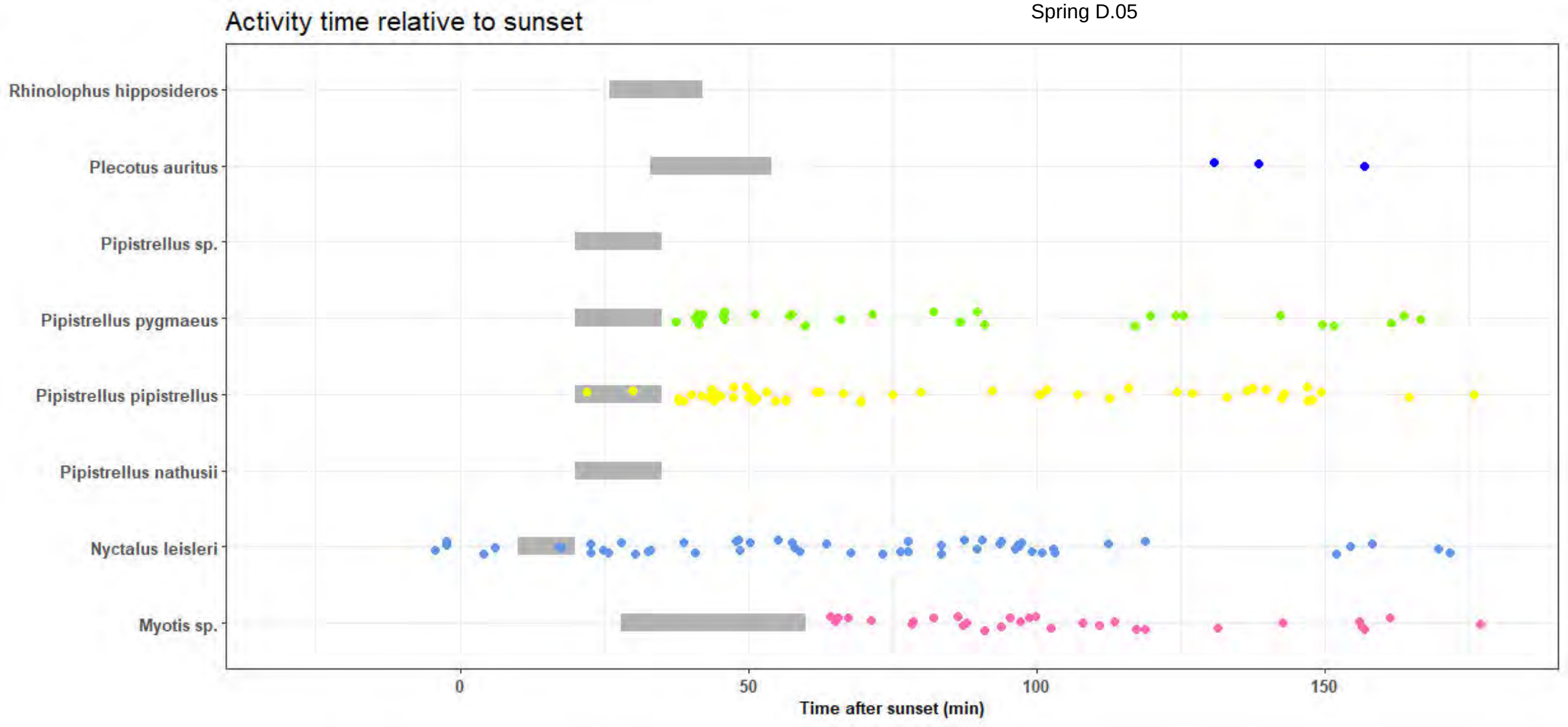

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

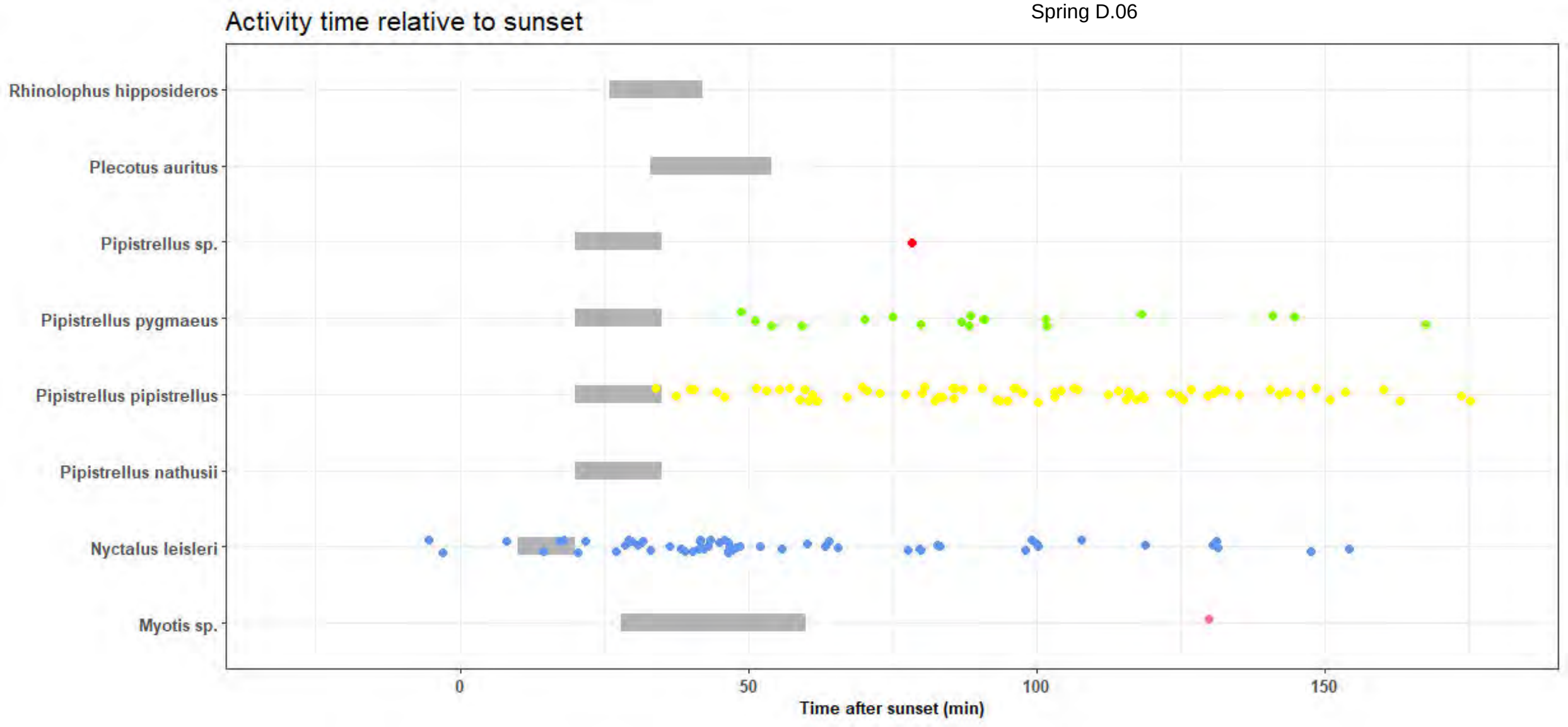

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

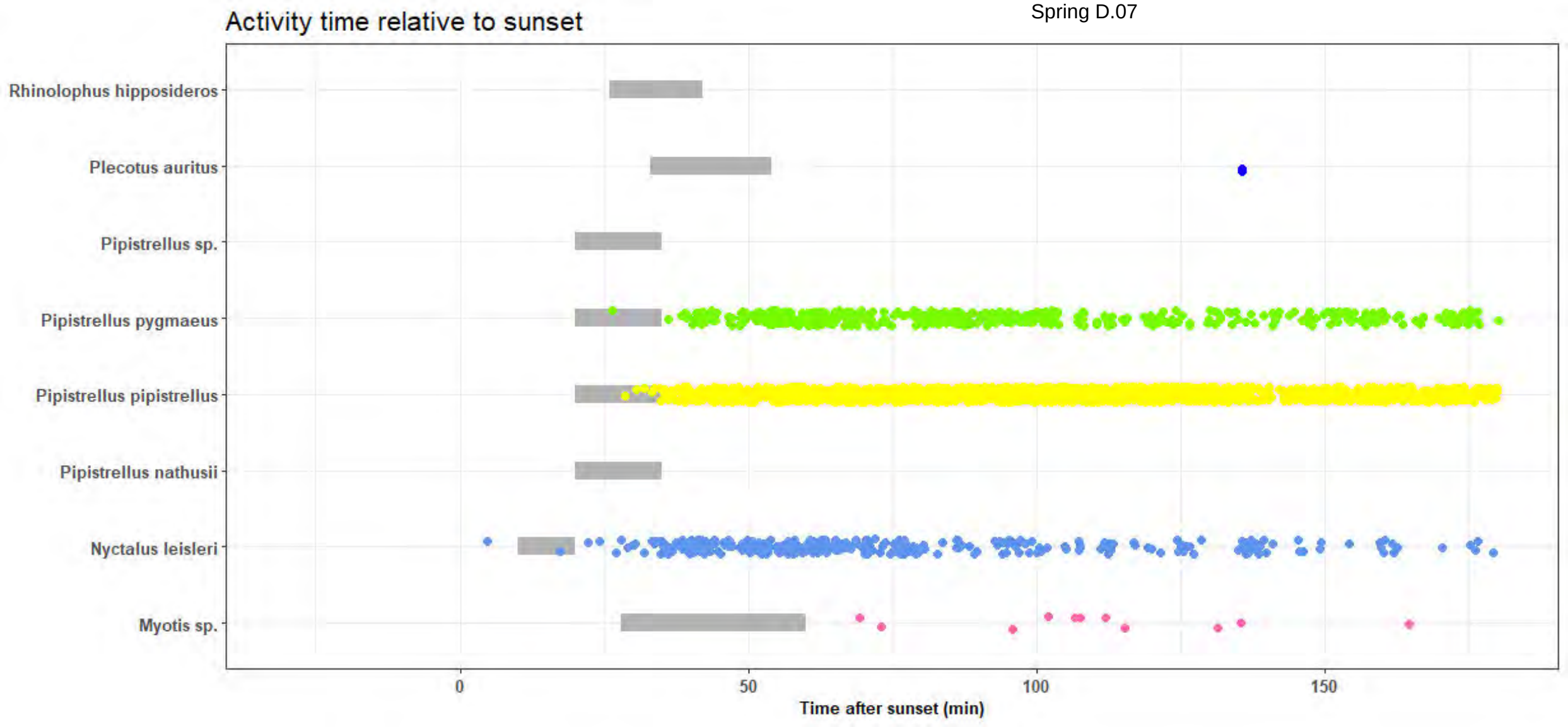

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

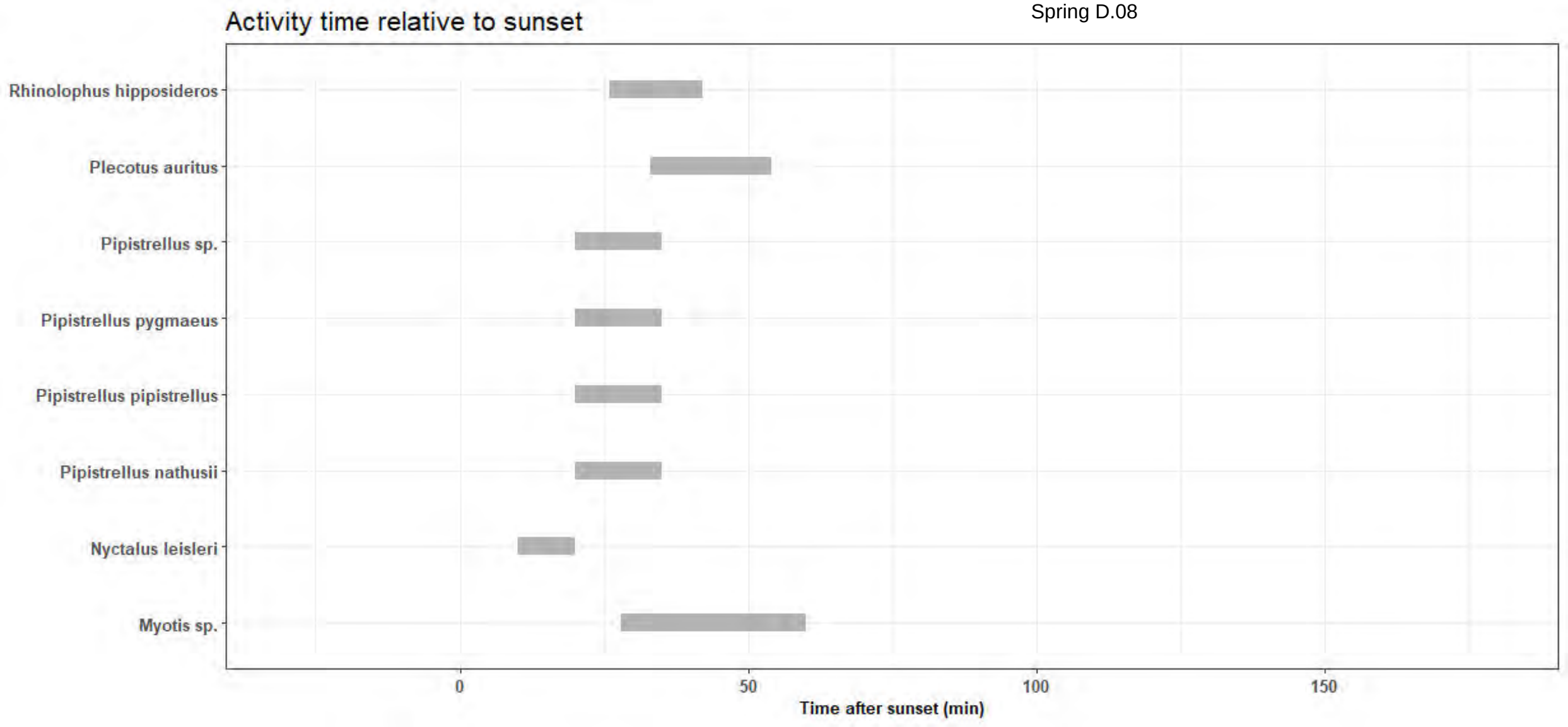
Spring D.05

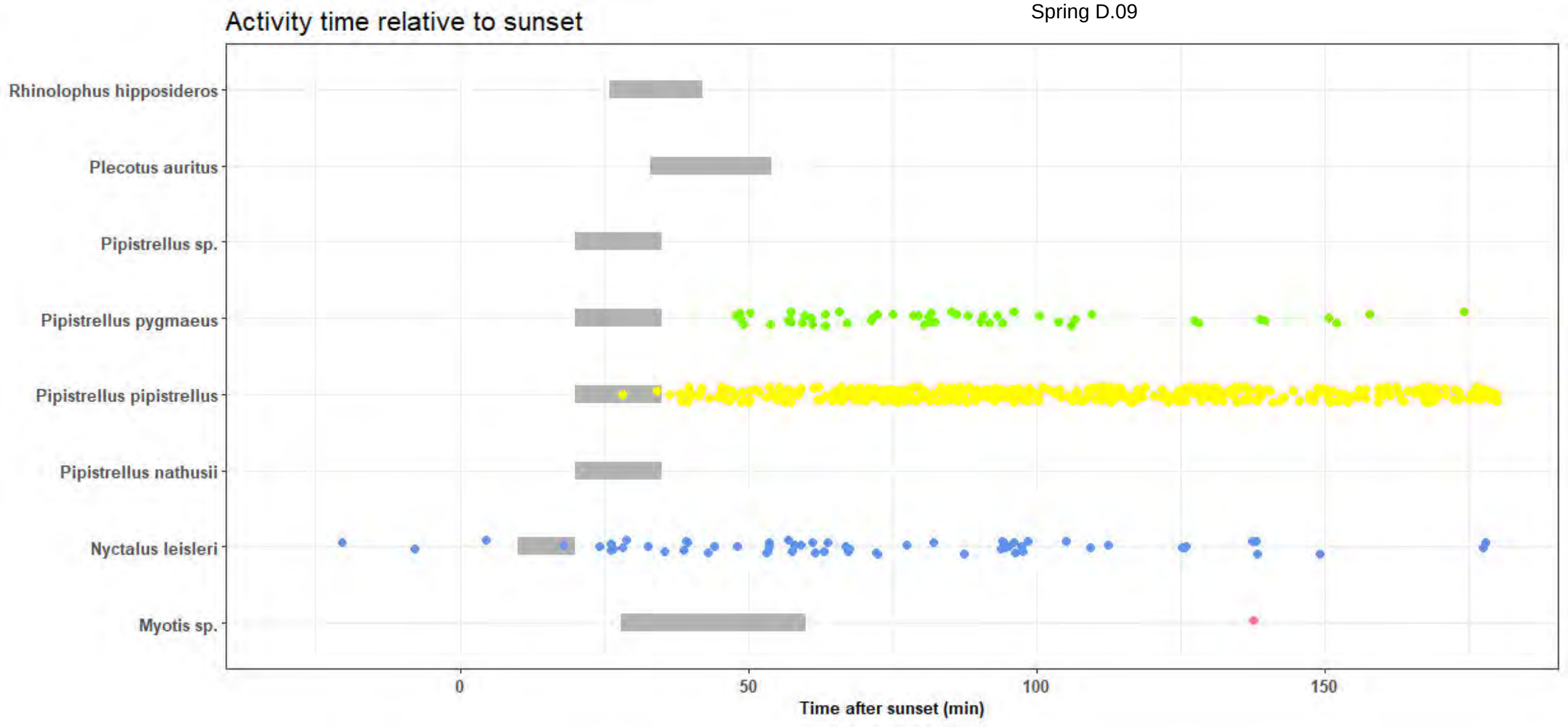

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

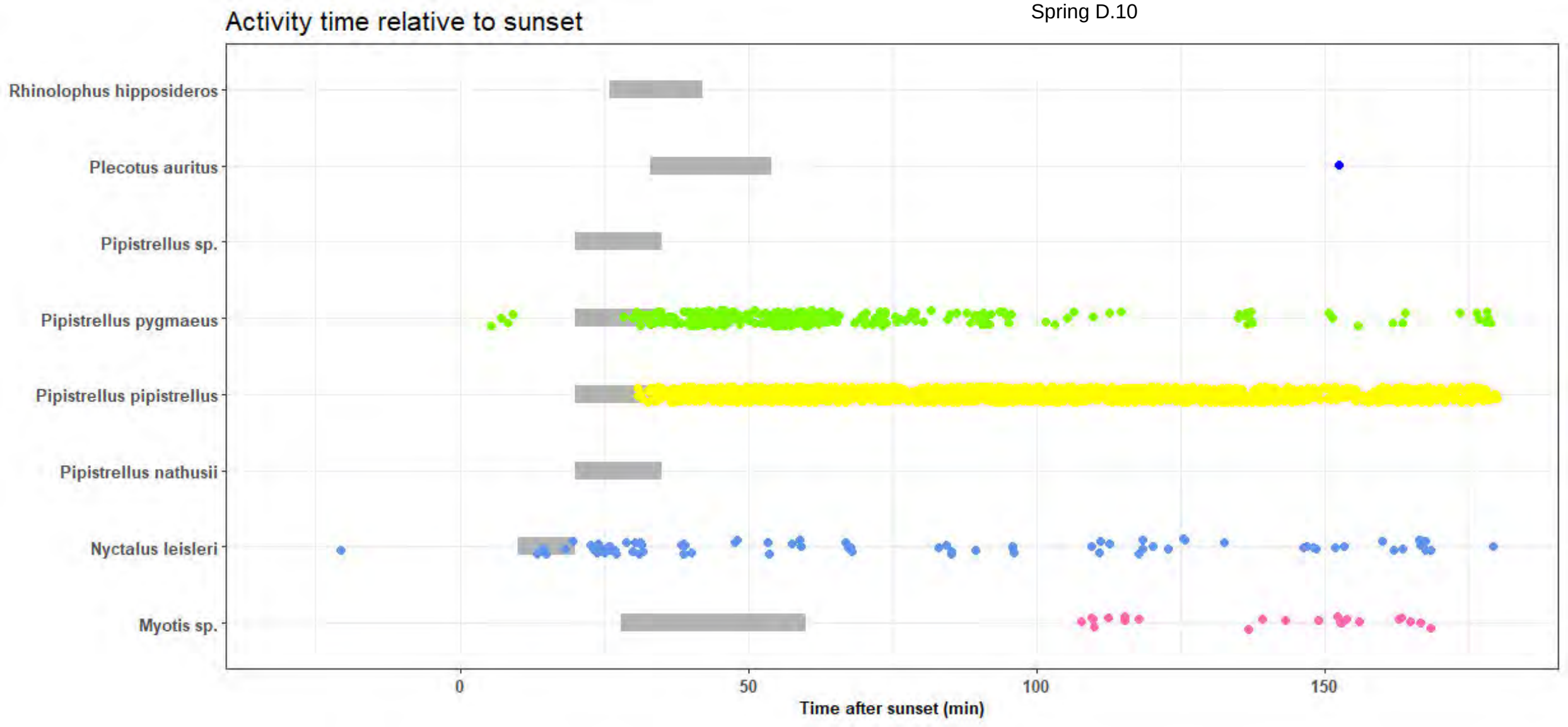

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

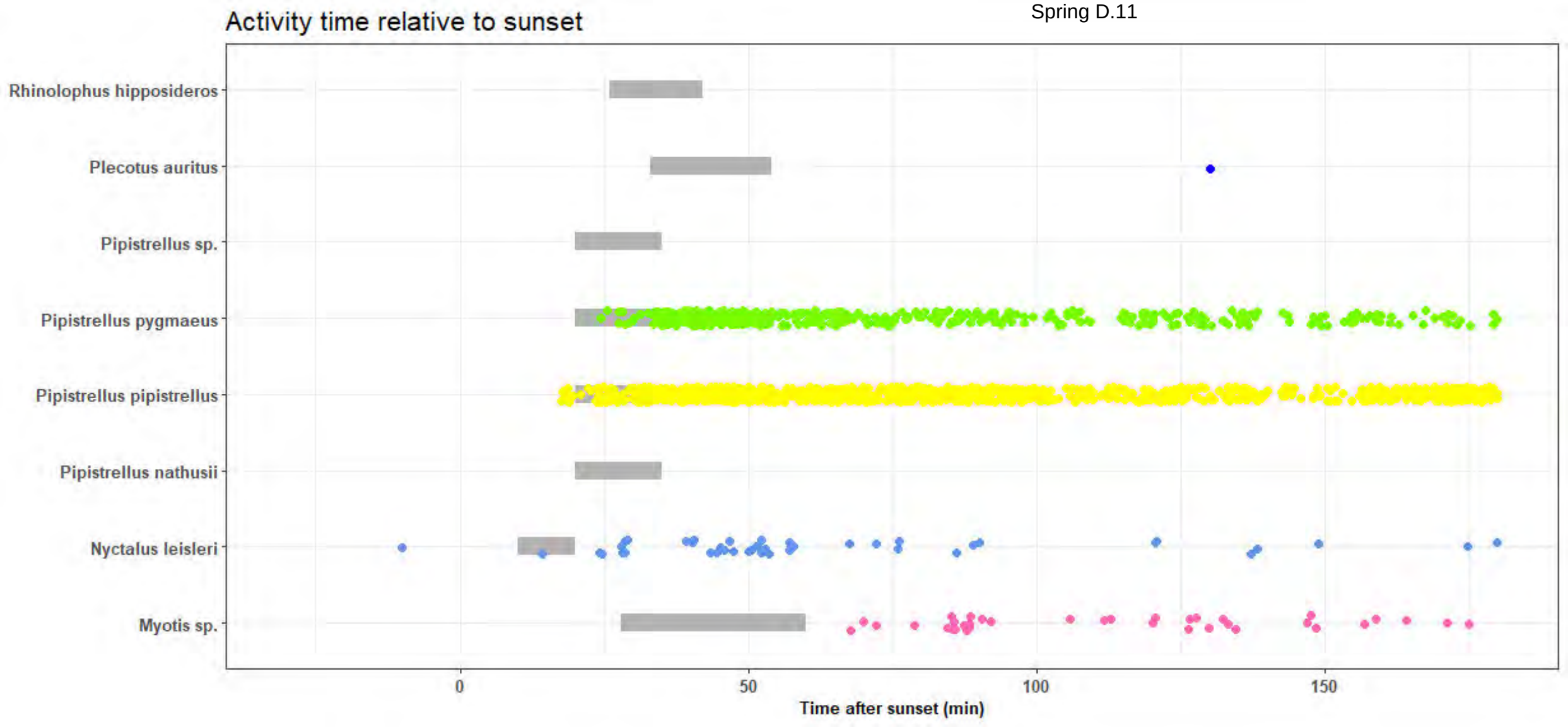
Spring D.07

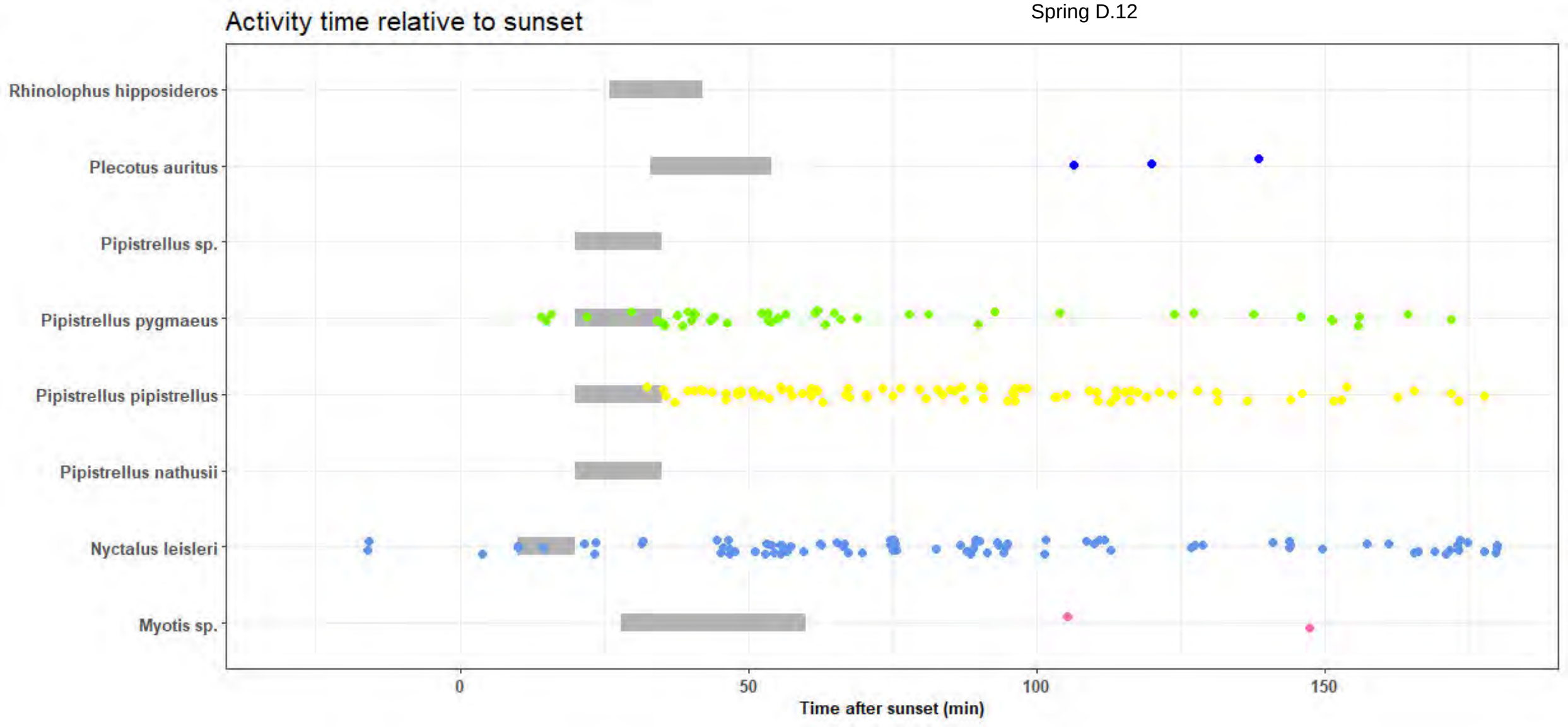

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

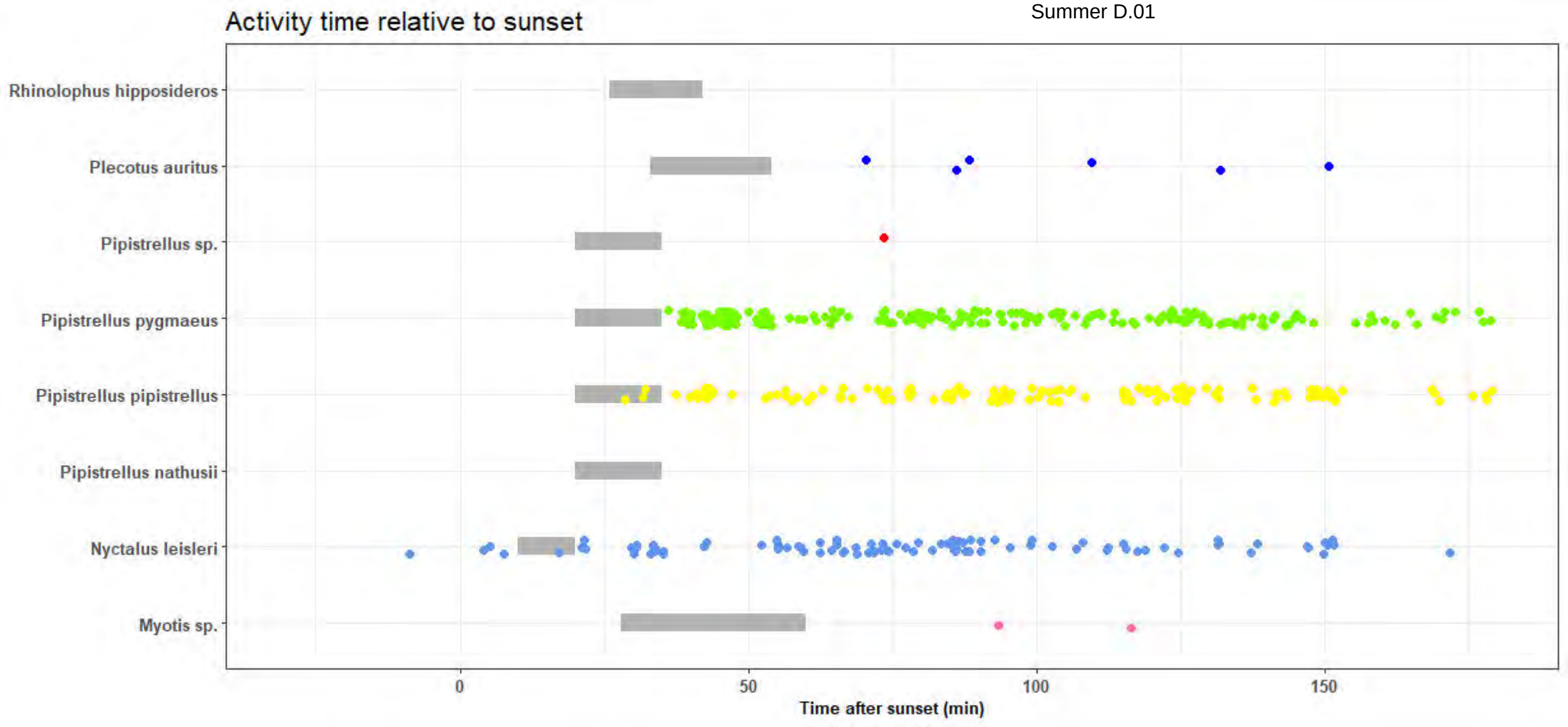

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

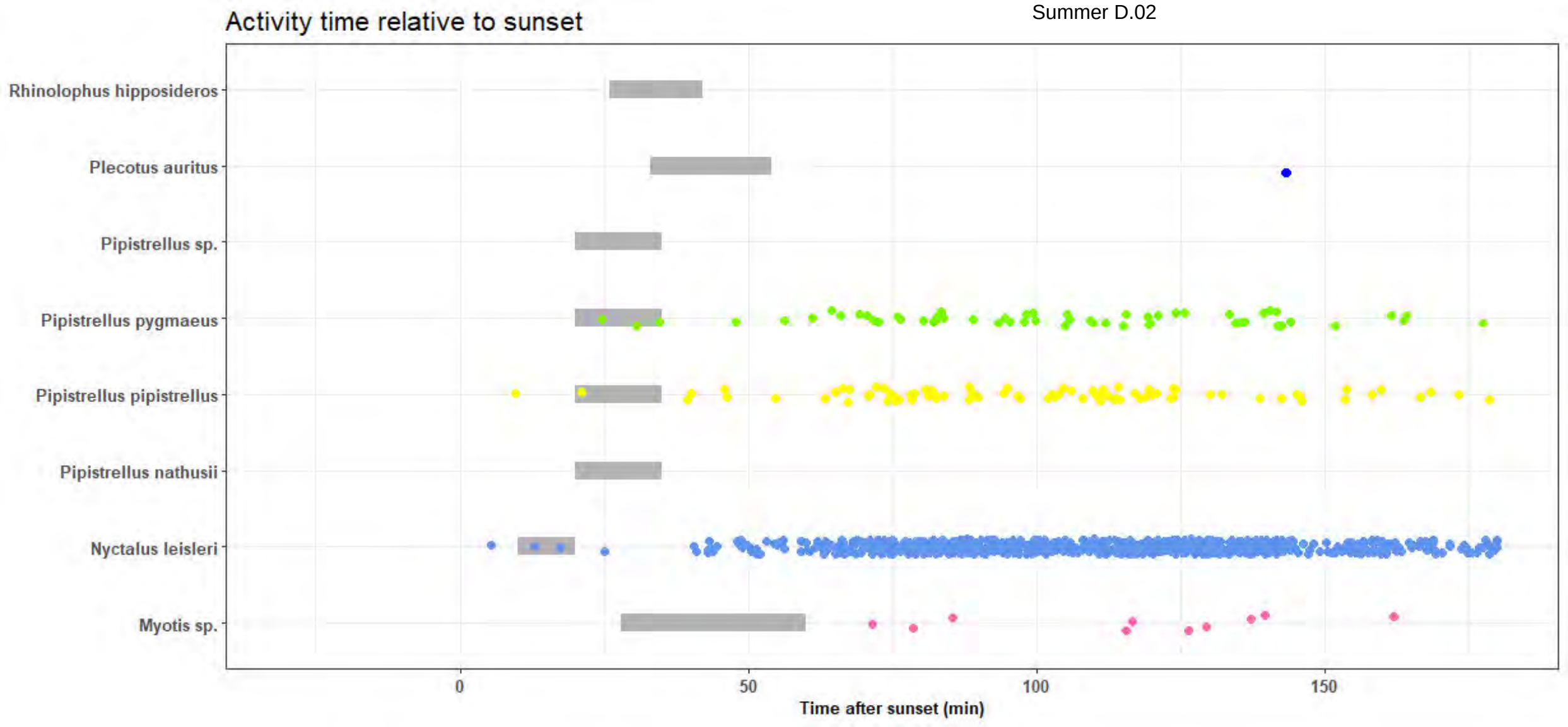

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

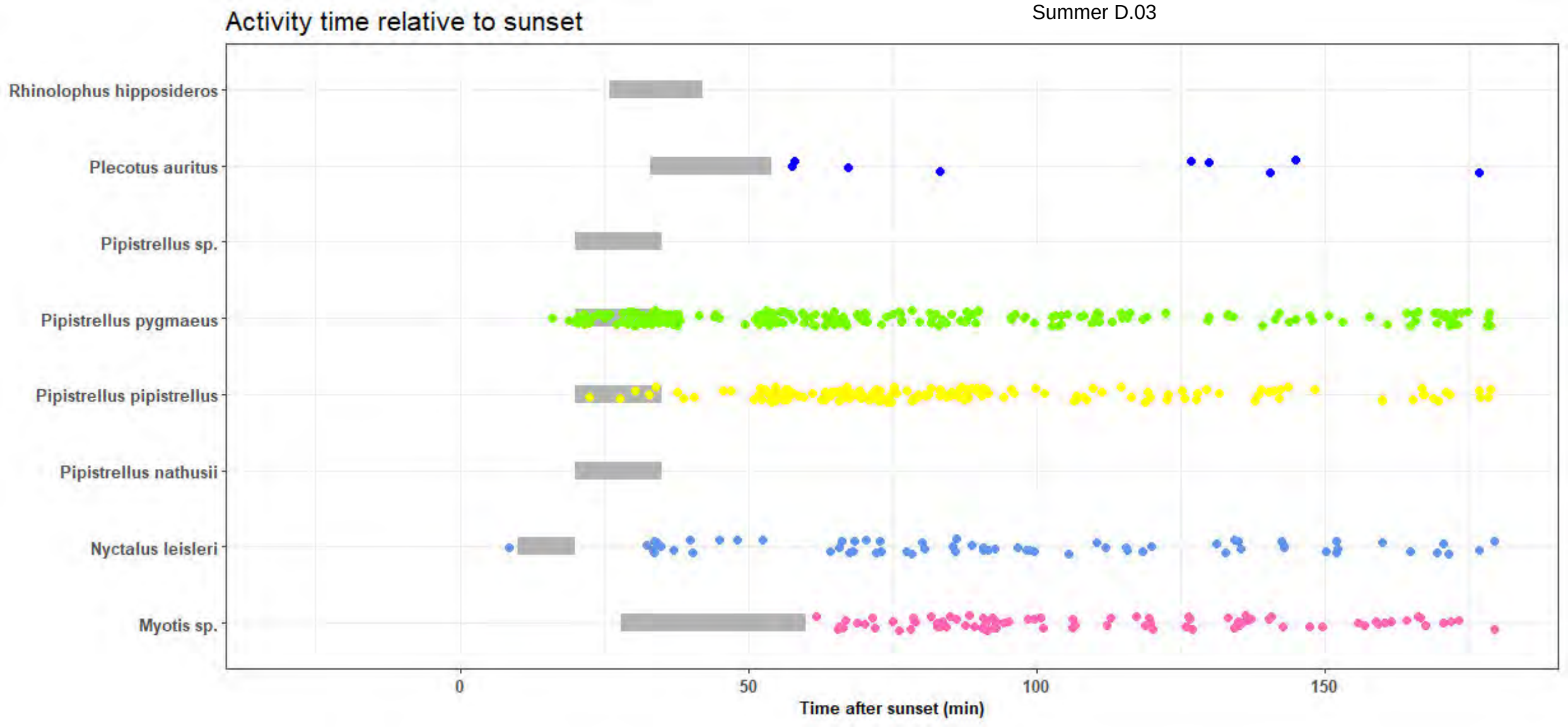
Summer D.01

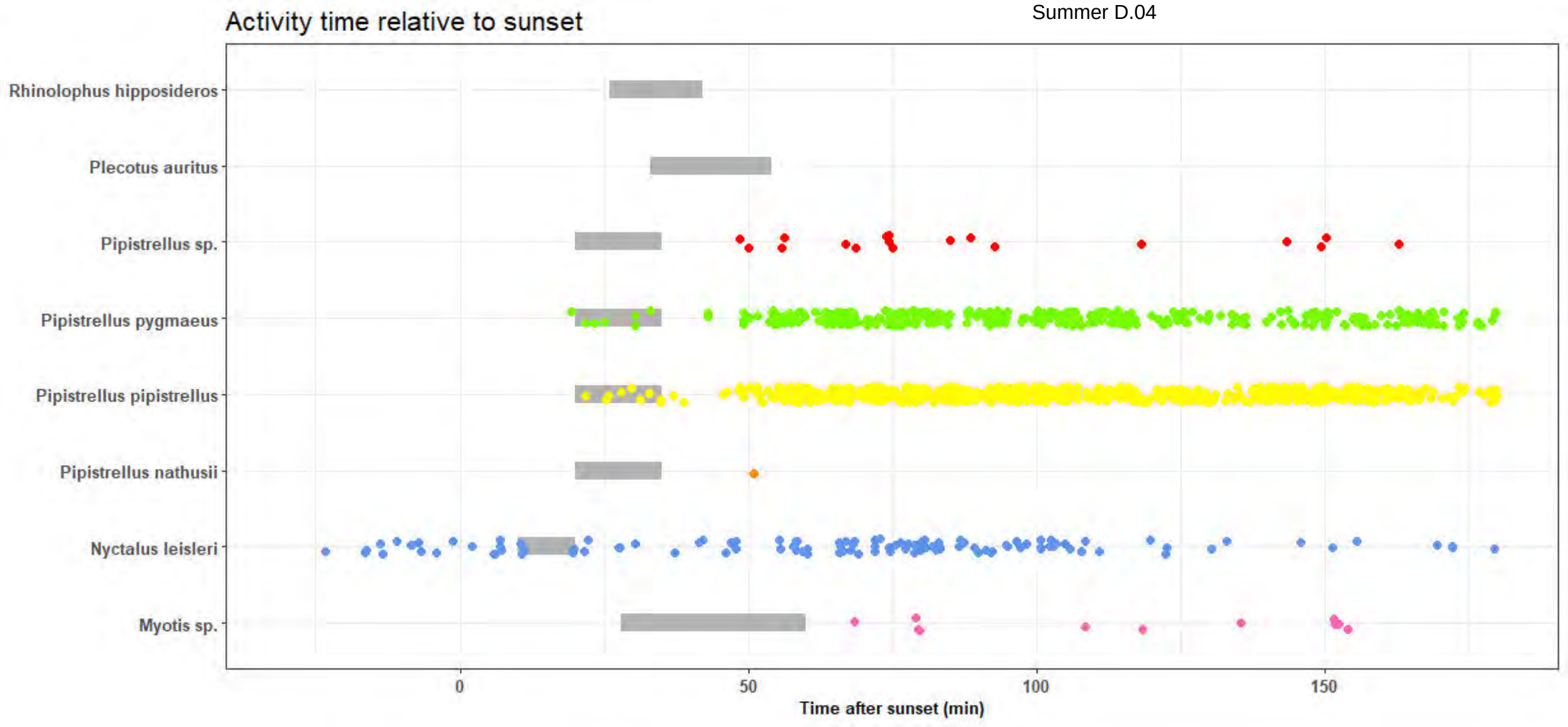

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

Summer D.02

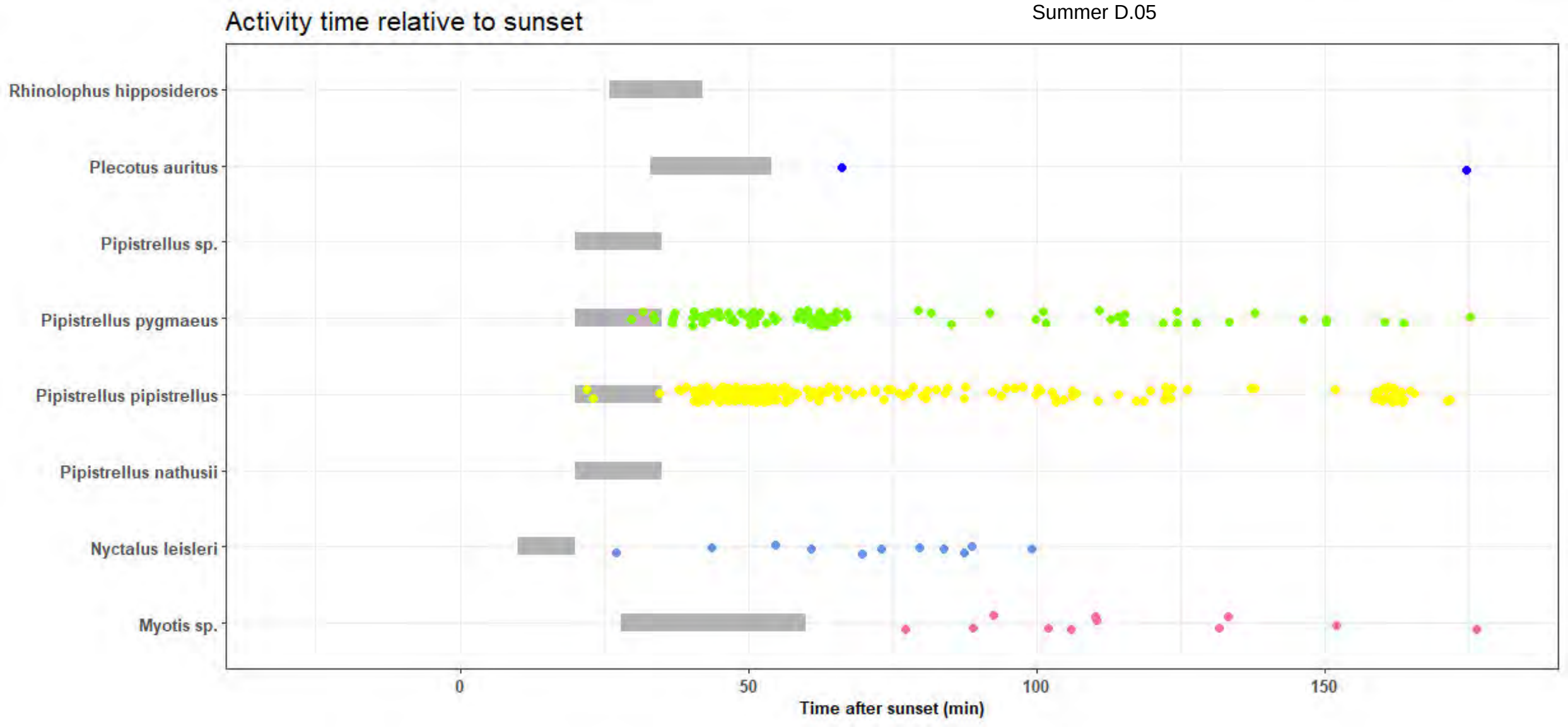

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

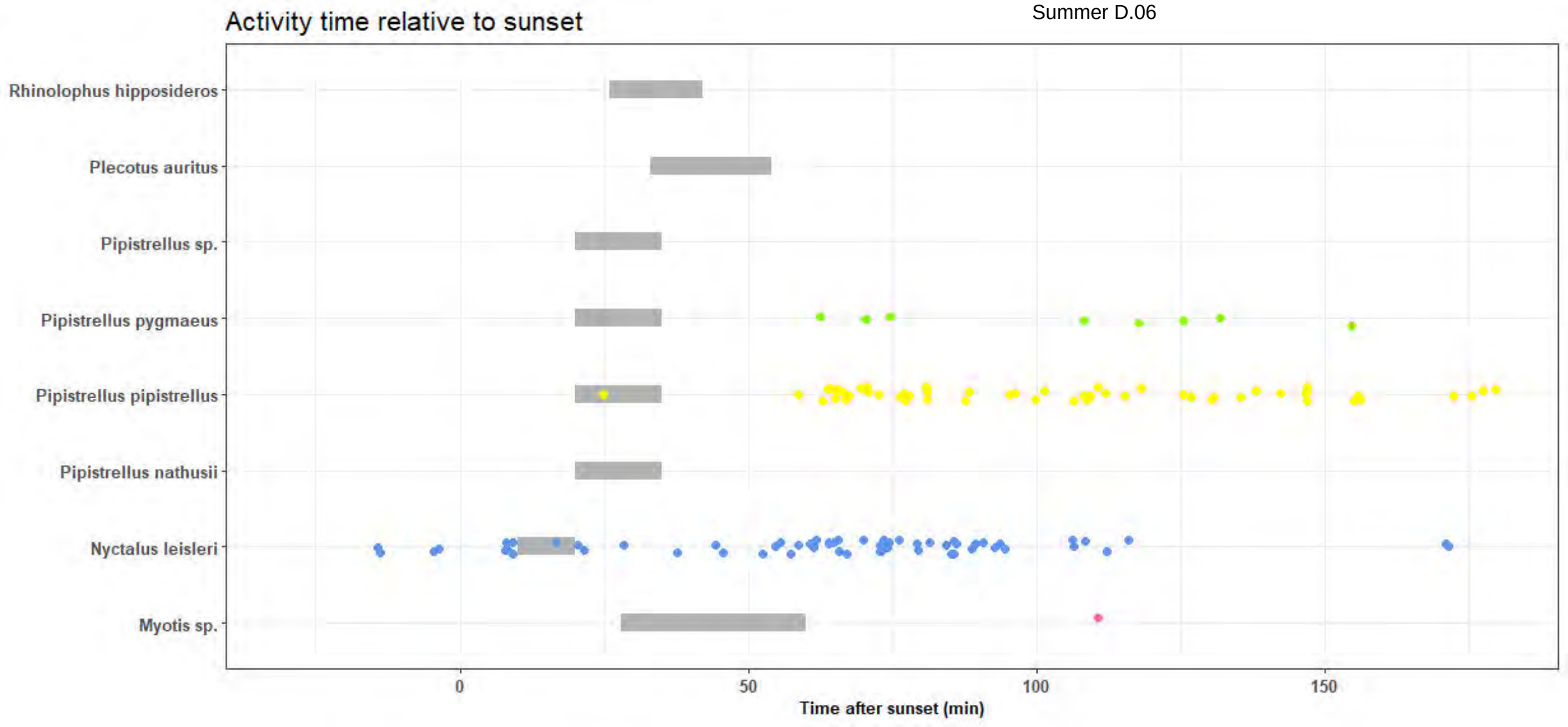
Summer D.03


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

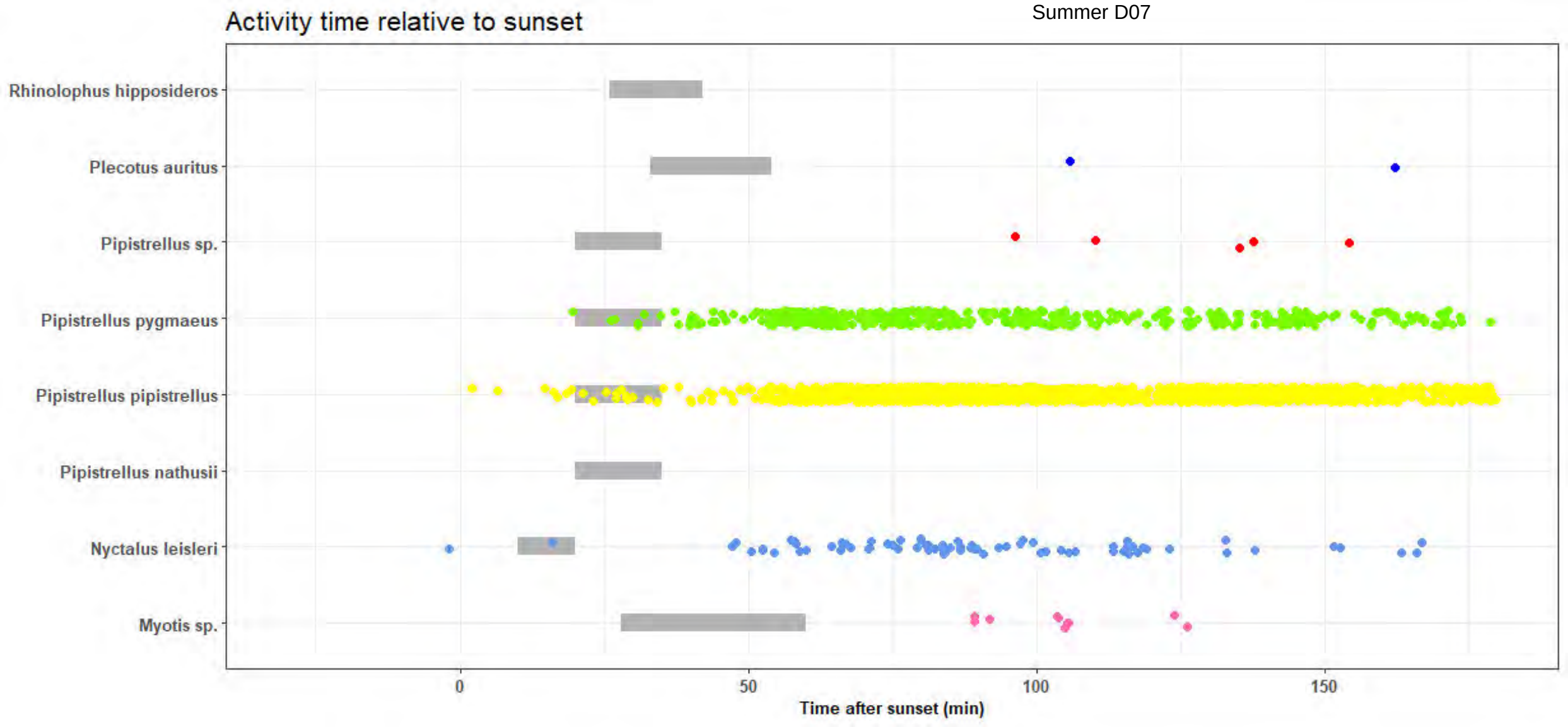

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

Summer D.05

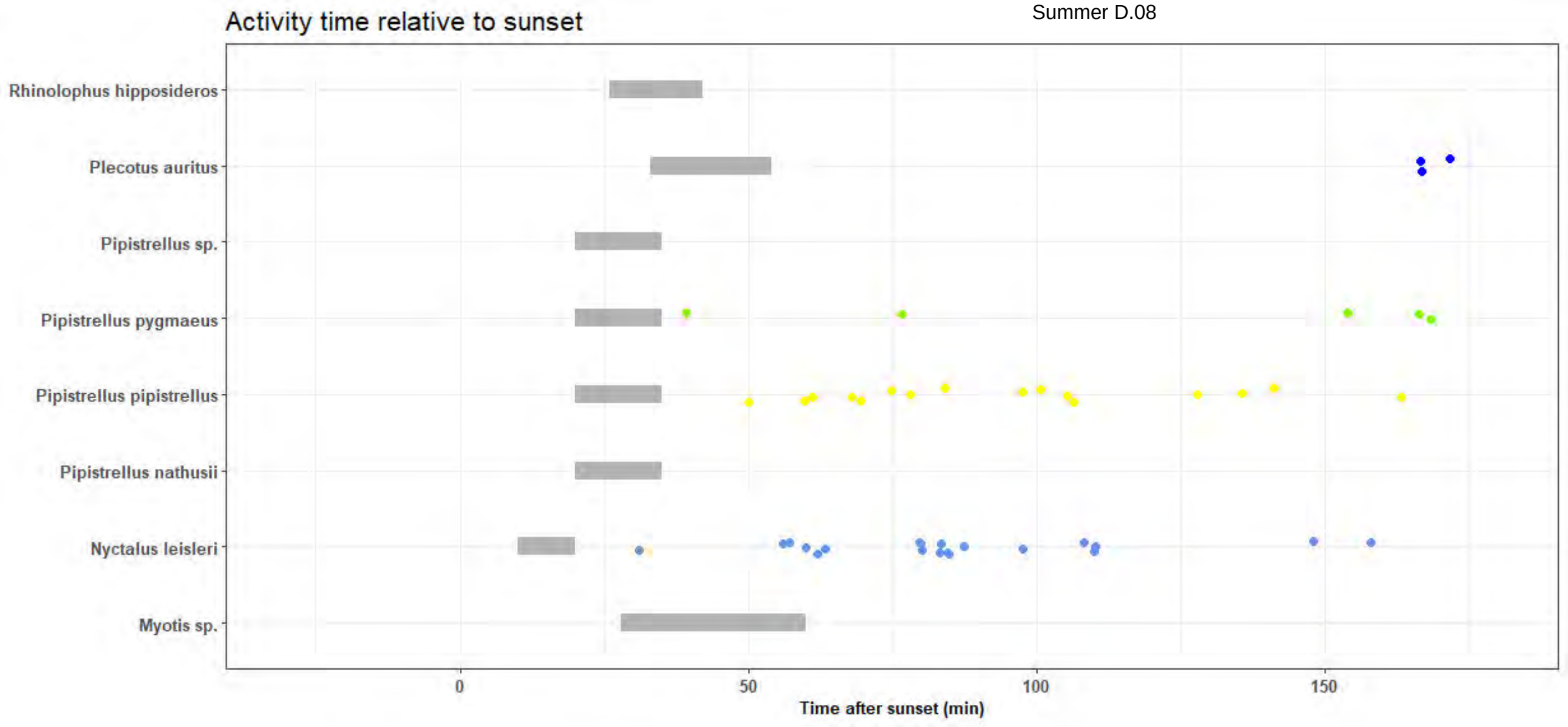

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

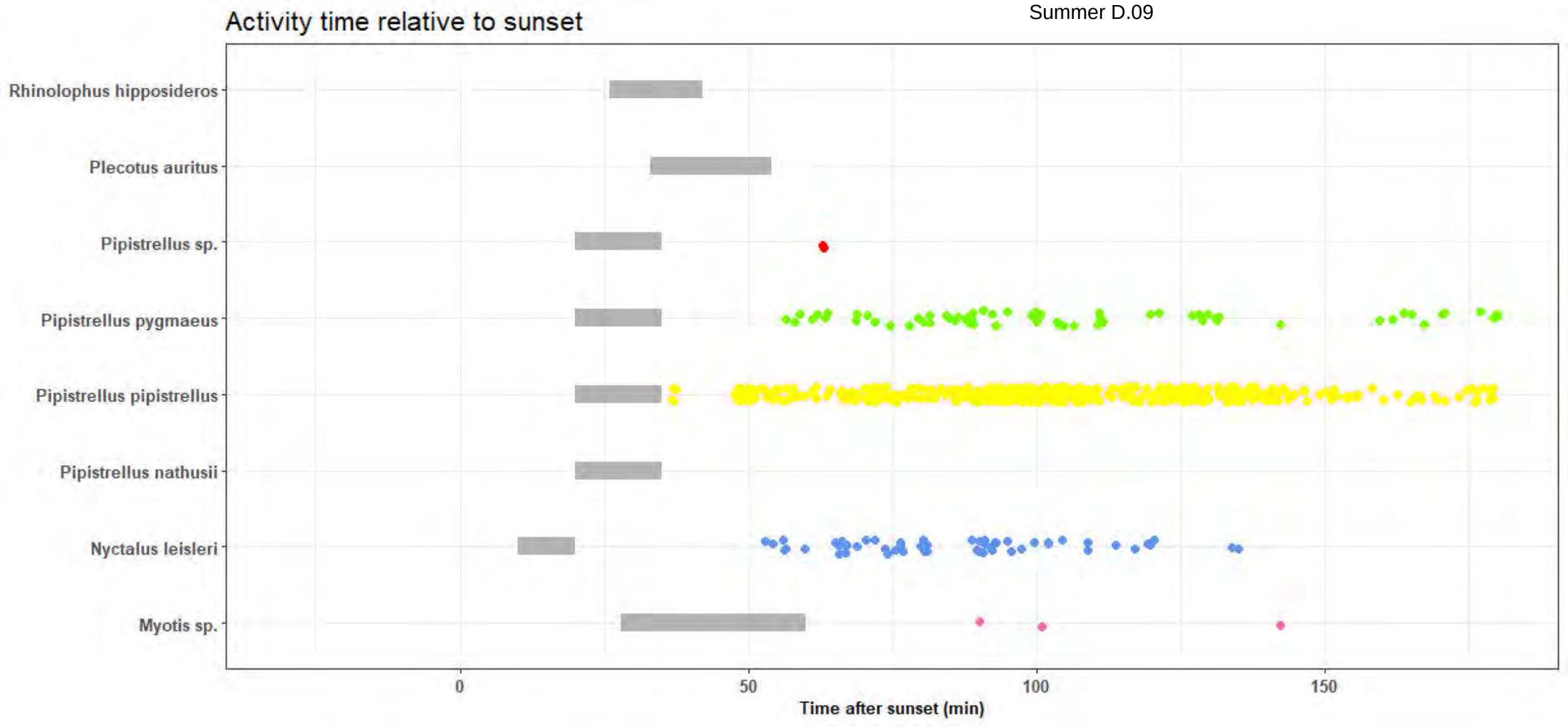
Summer D07


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

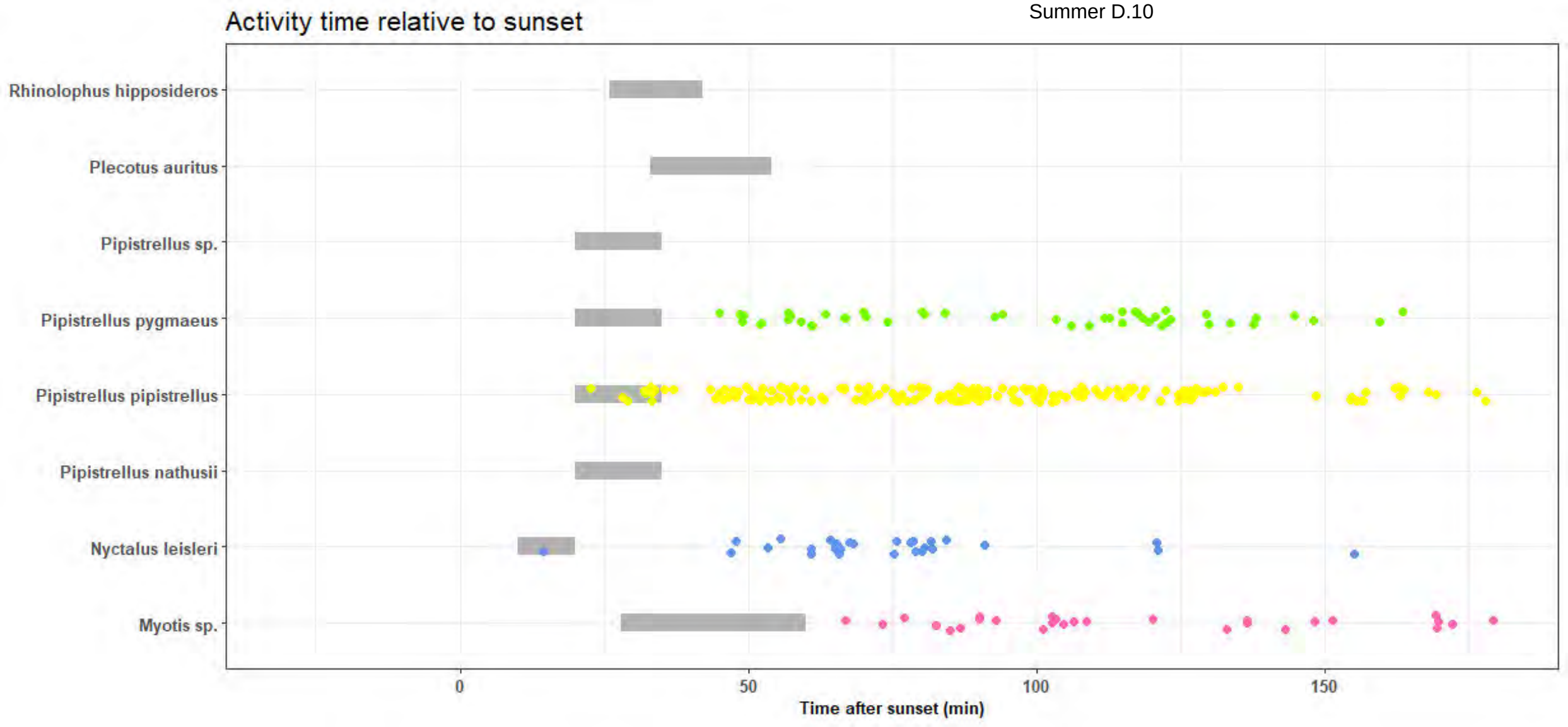
Summer D.08


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

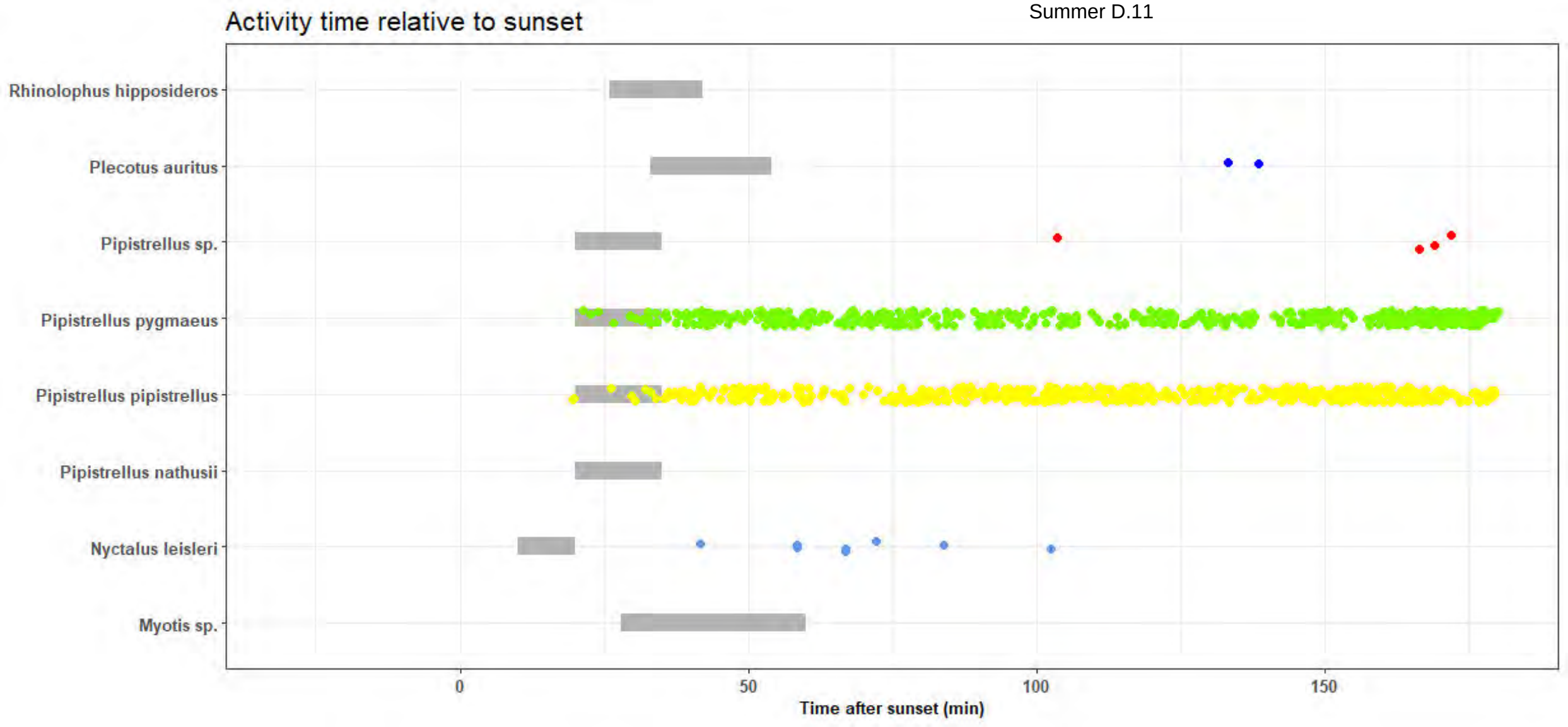
Summer D.09


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

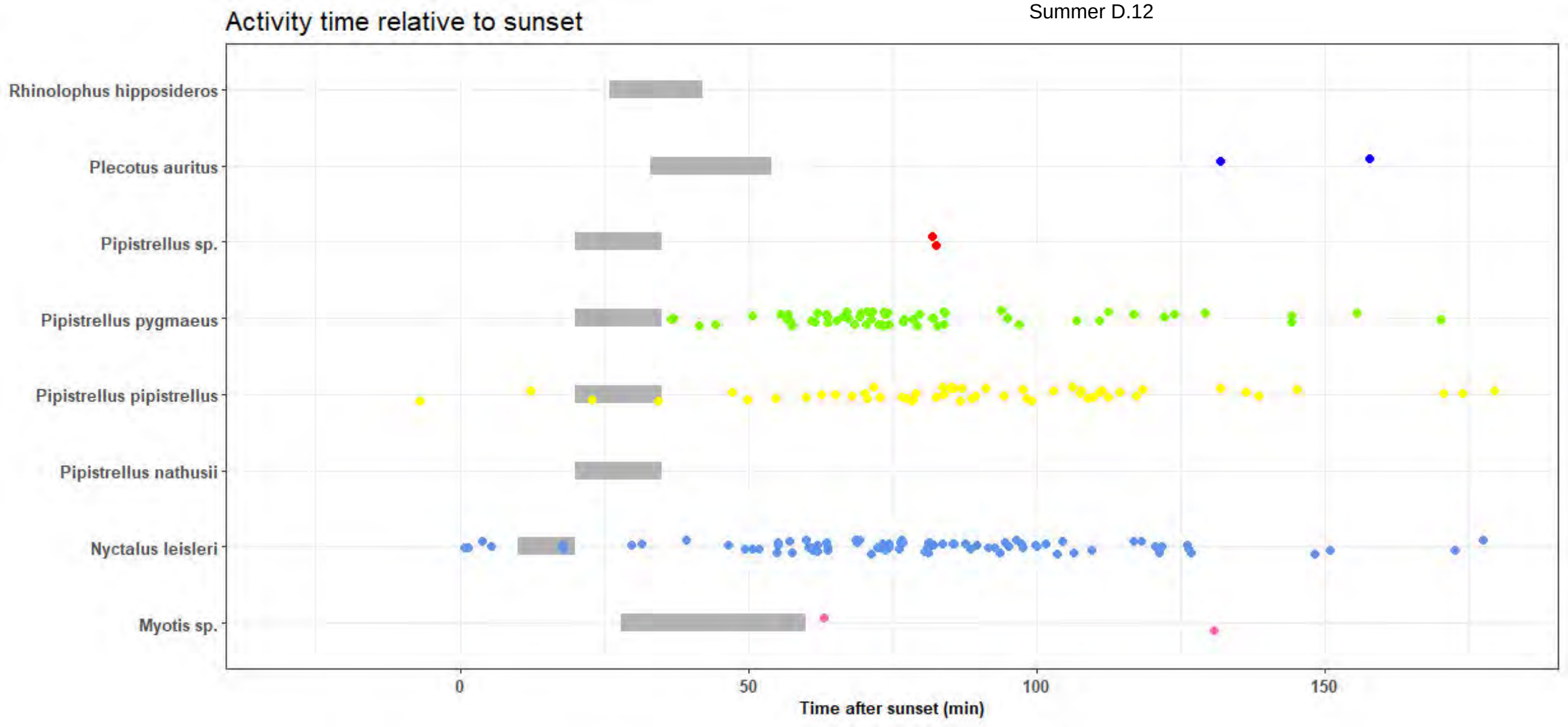
Summer D.10

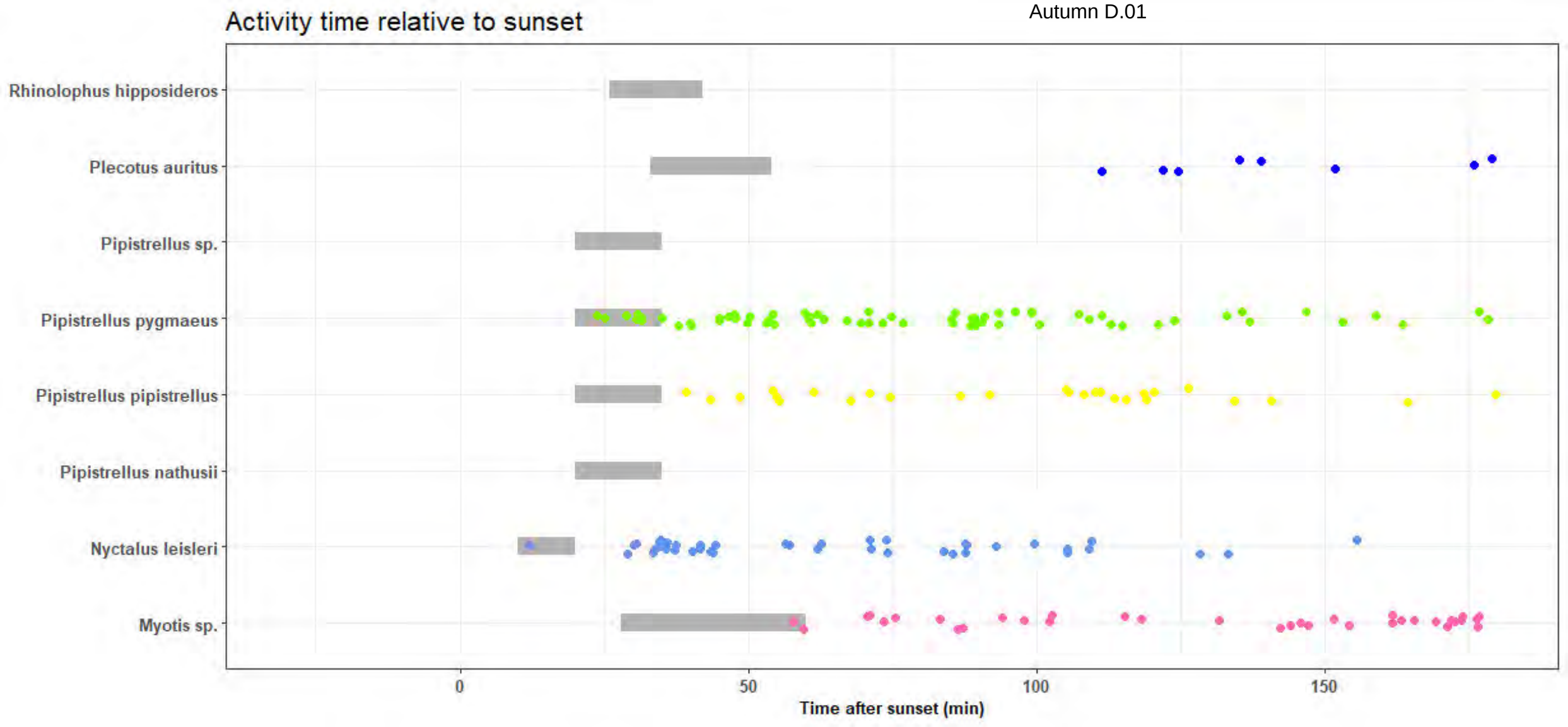

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

Summer D.11

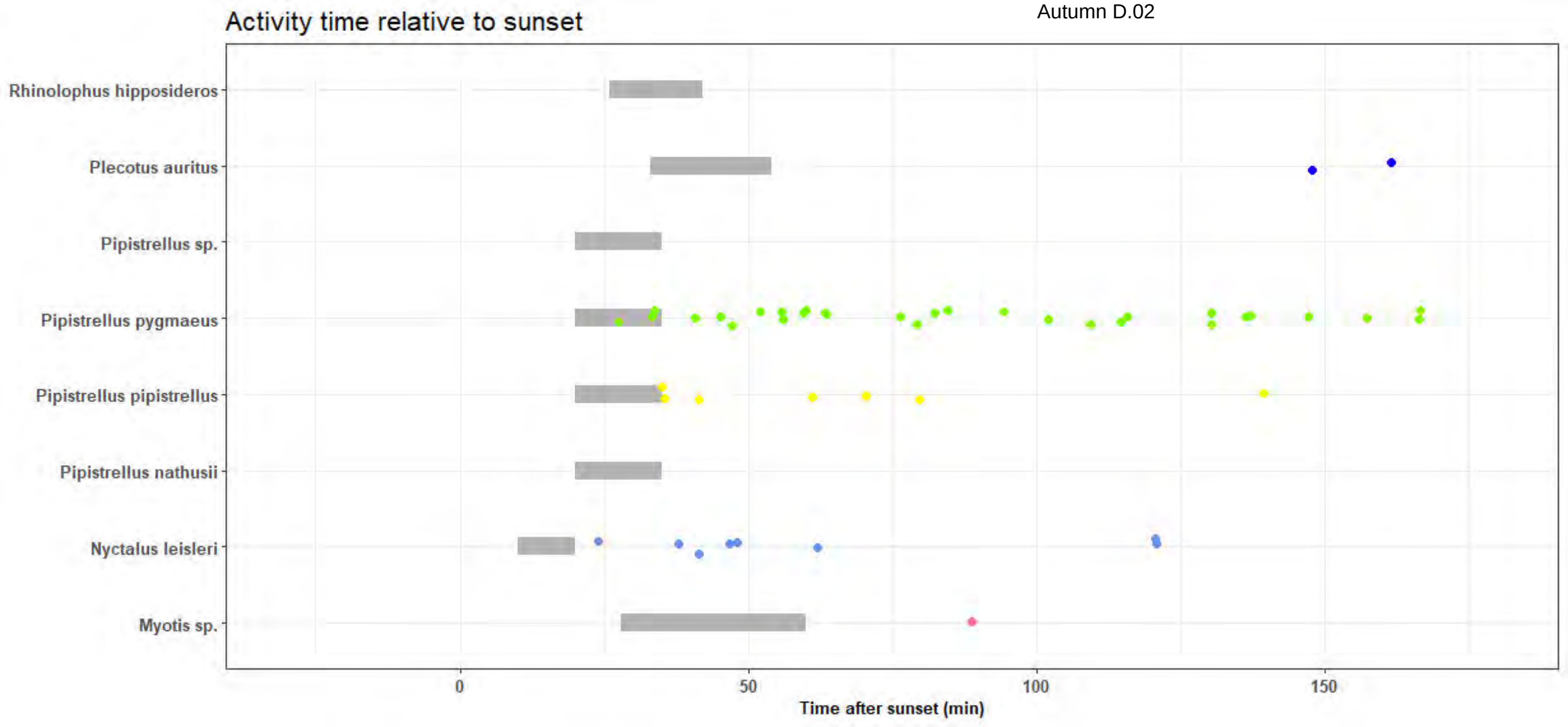

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

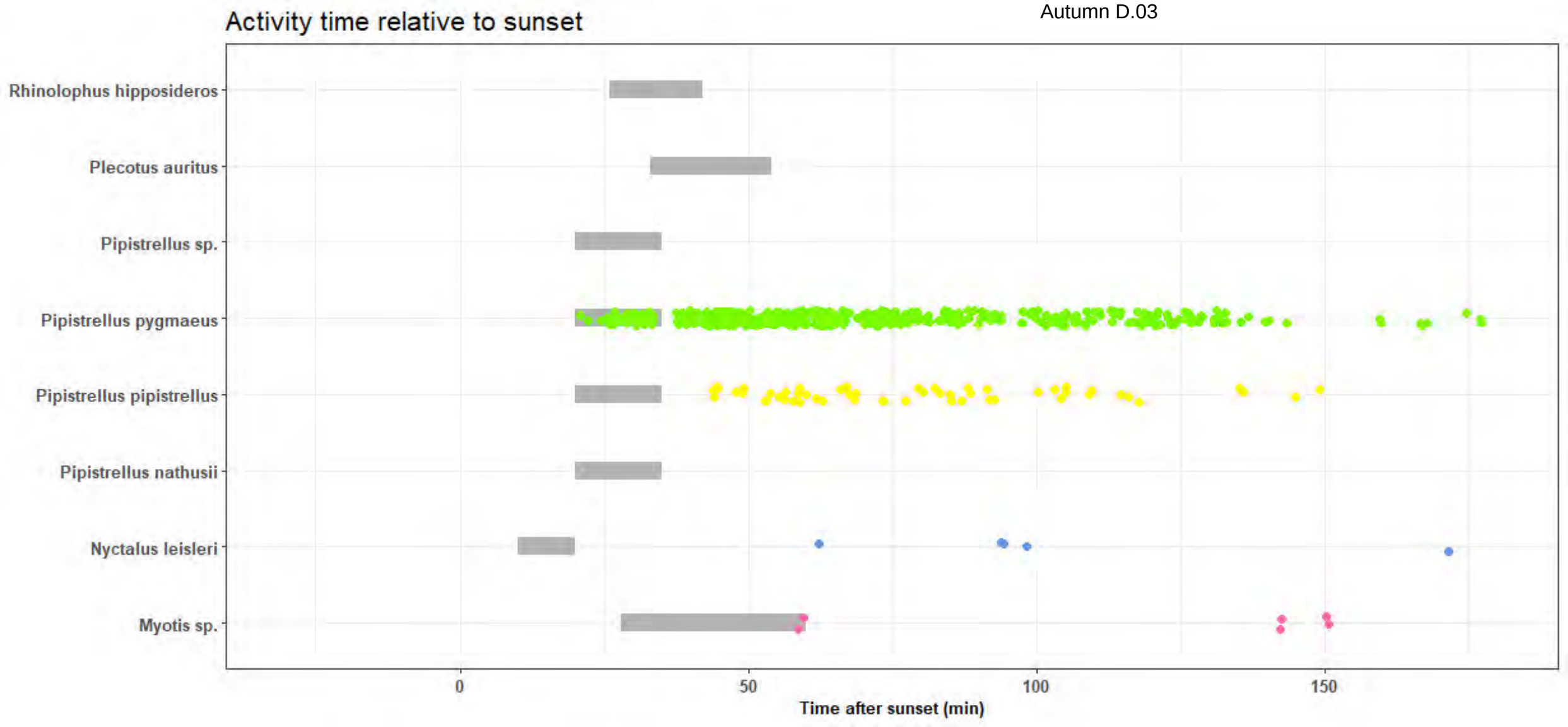
Summer D.12


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

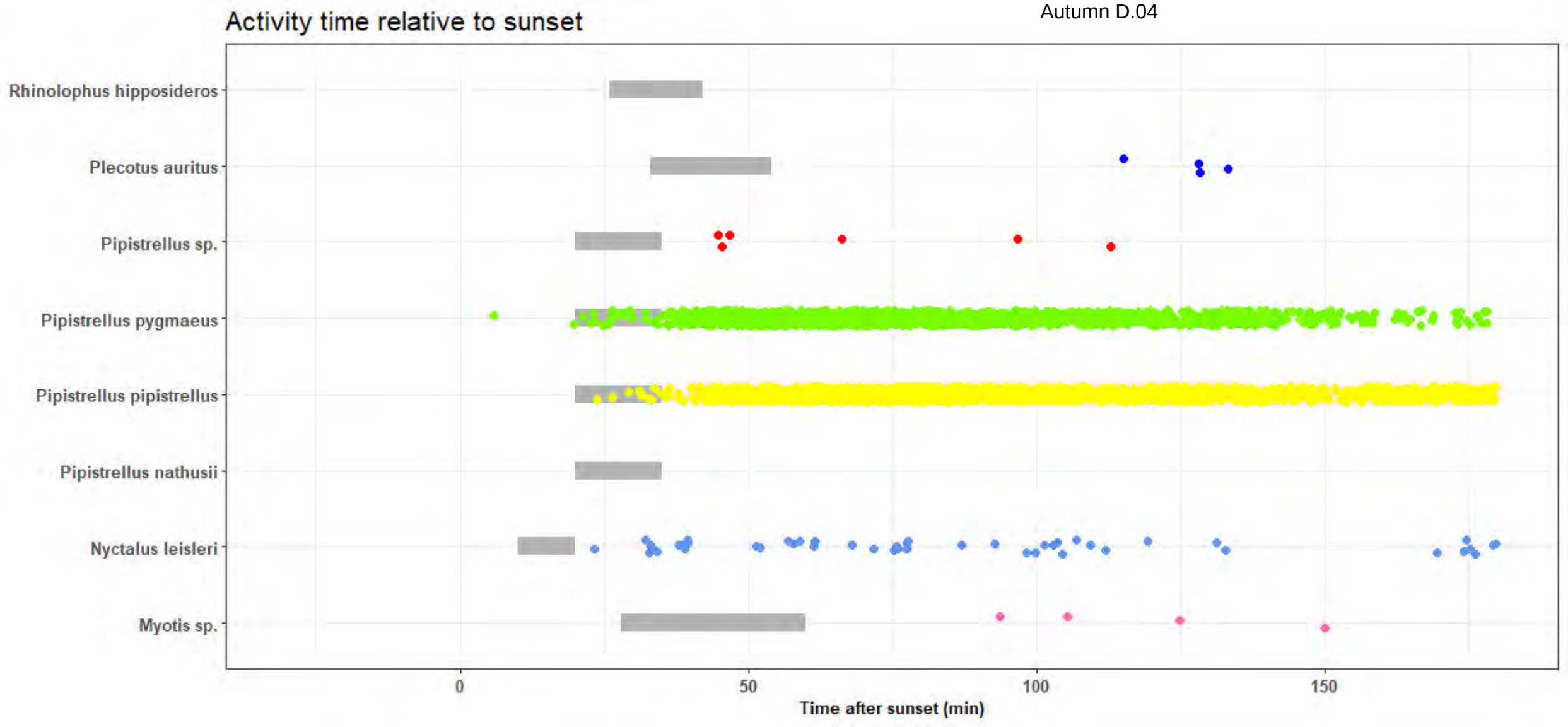

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

Autumn D.02

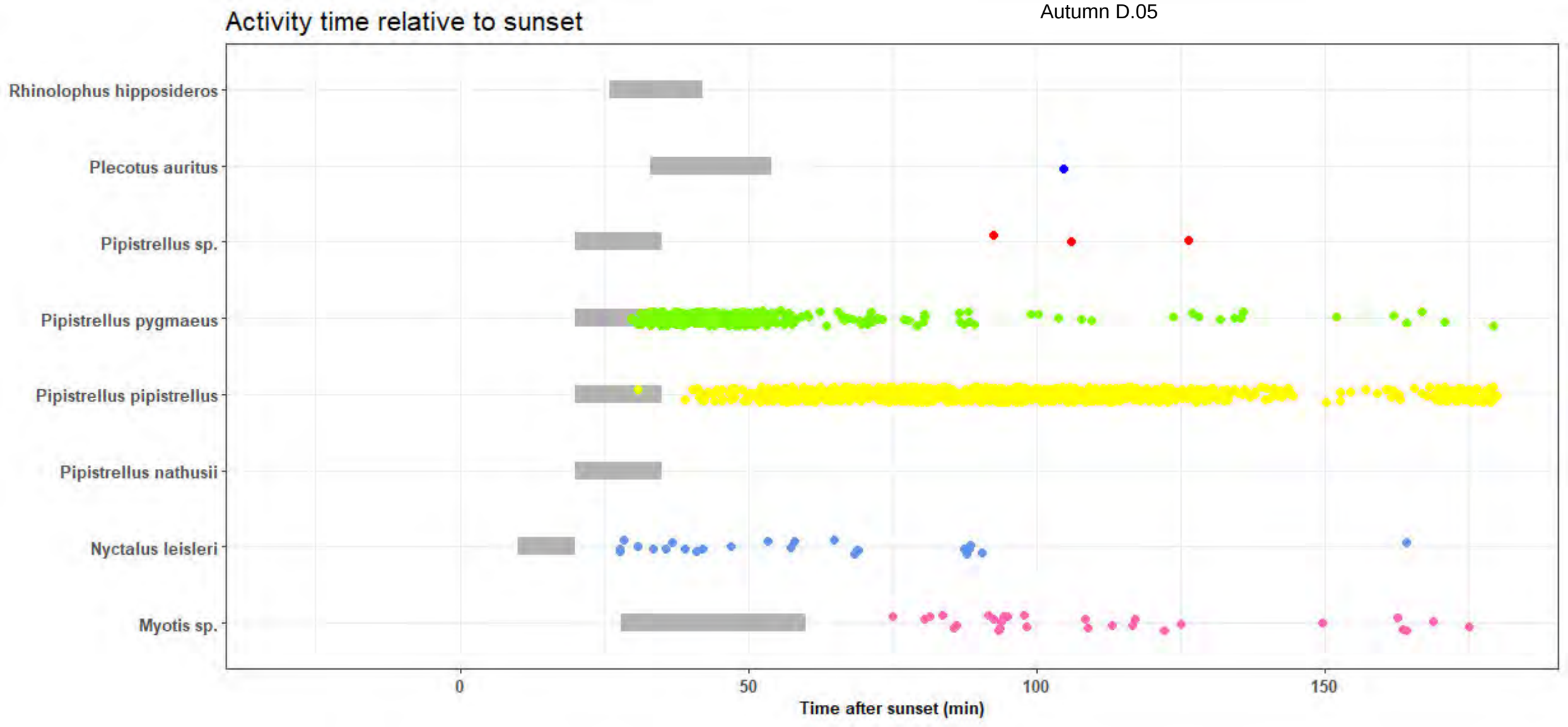

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

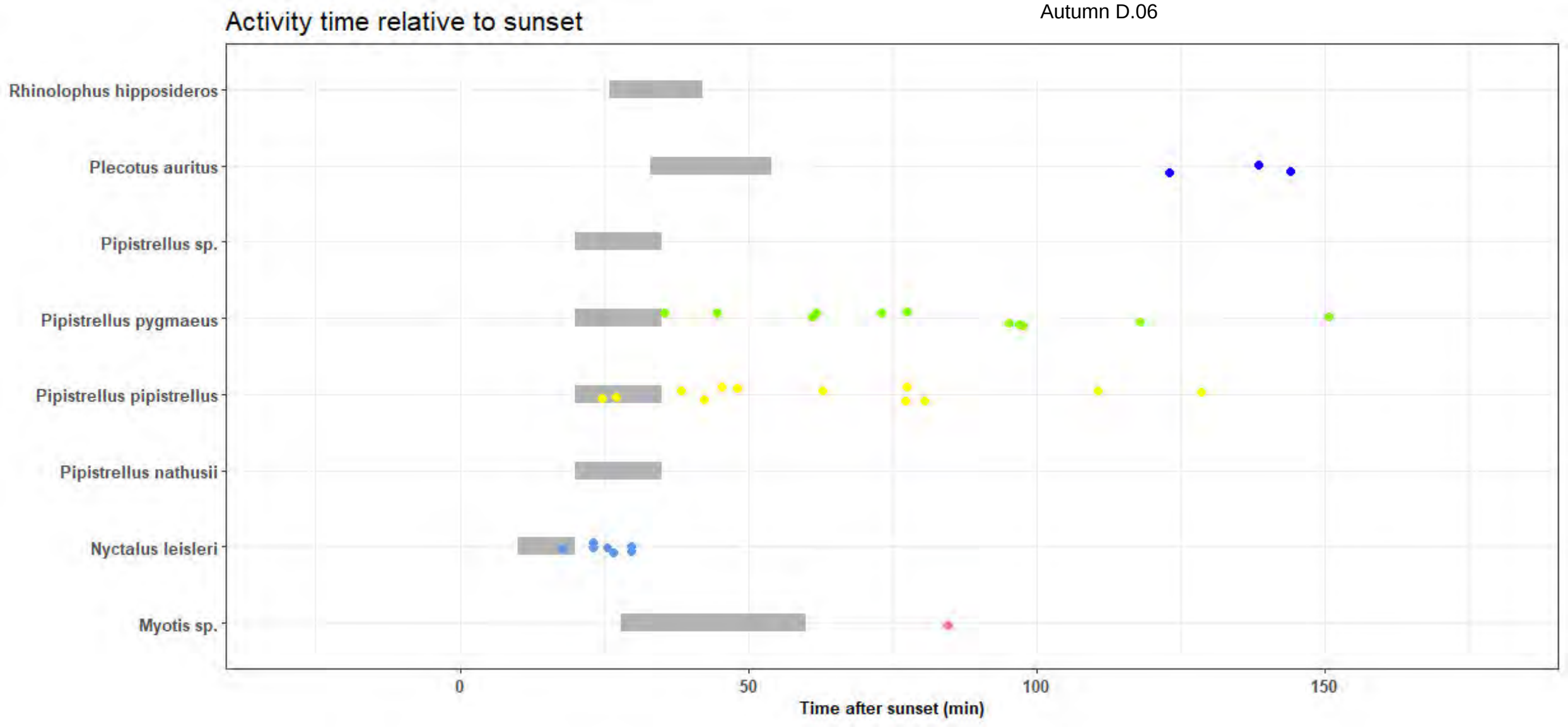

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

Autumn D.04

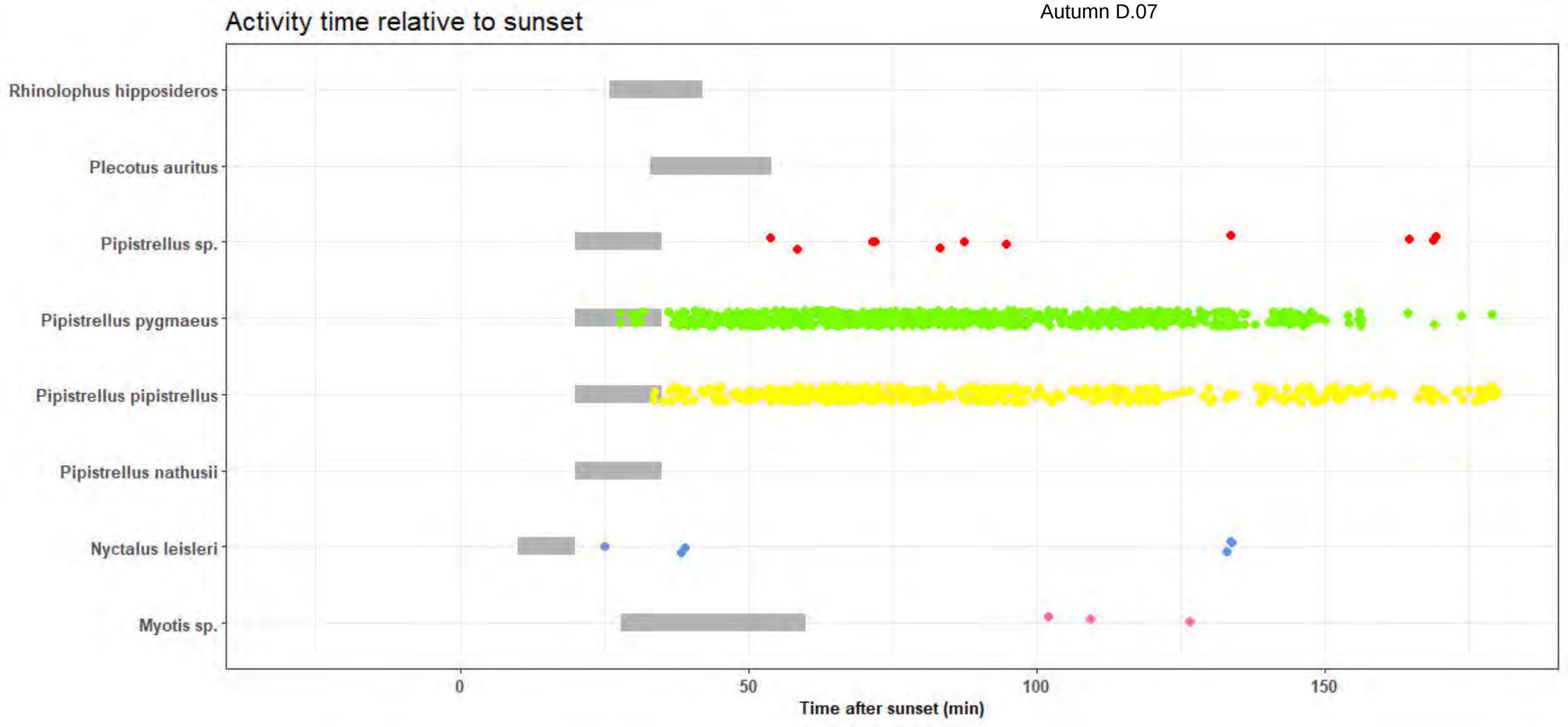

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

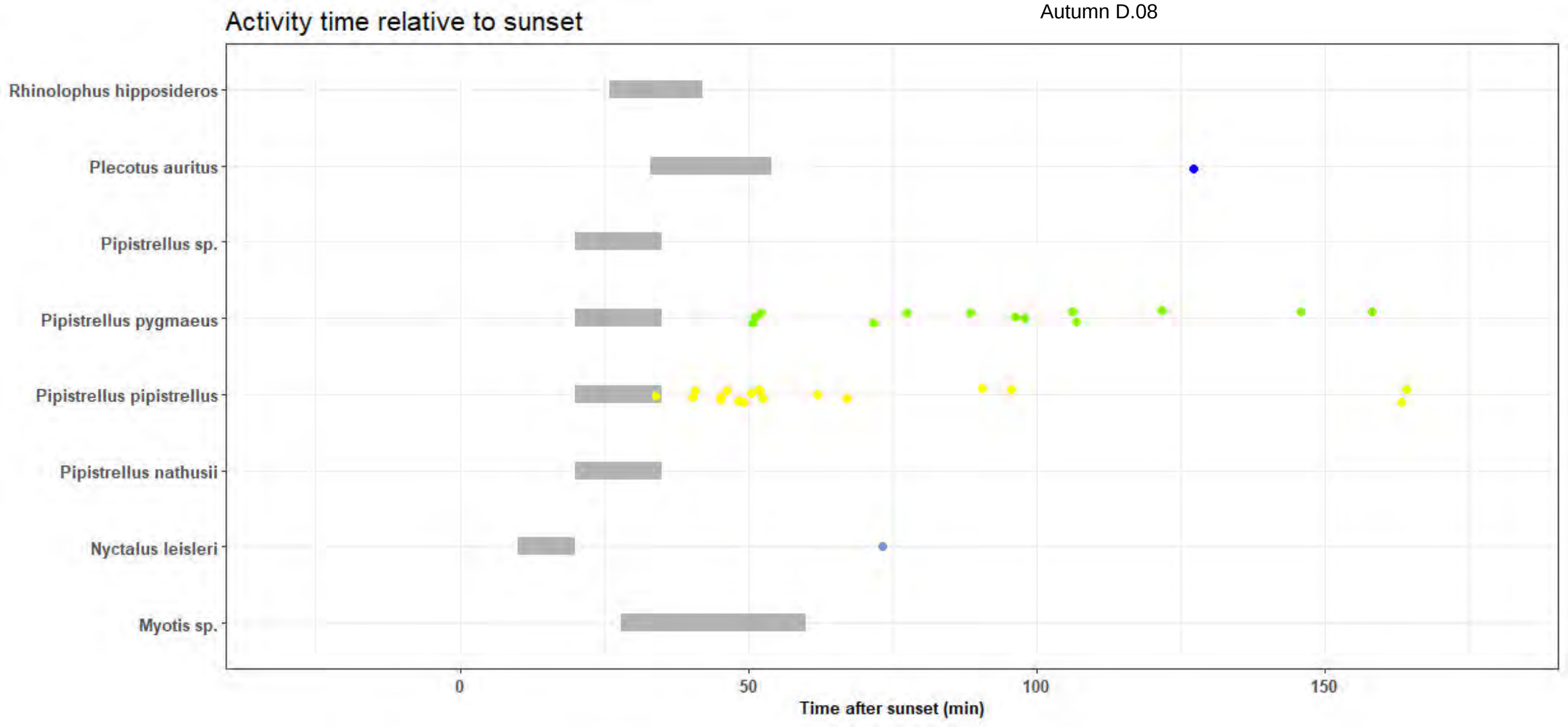
Autumn D.05

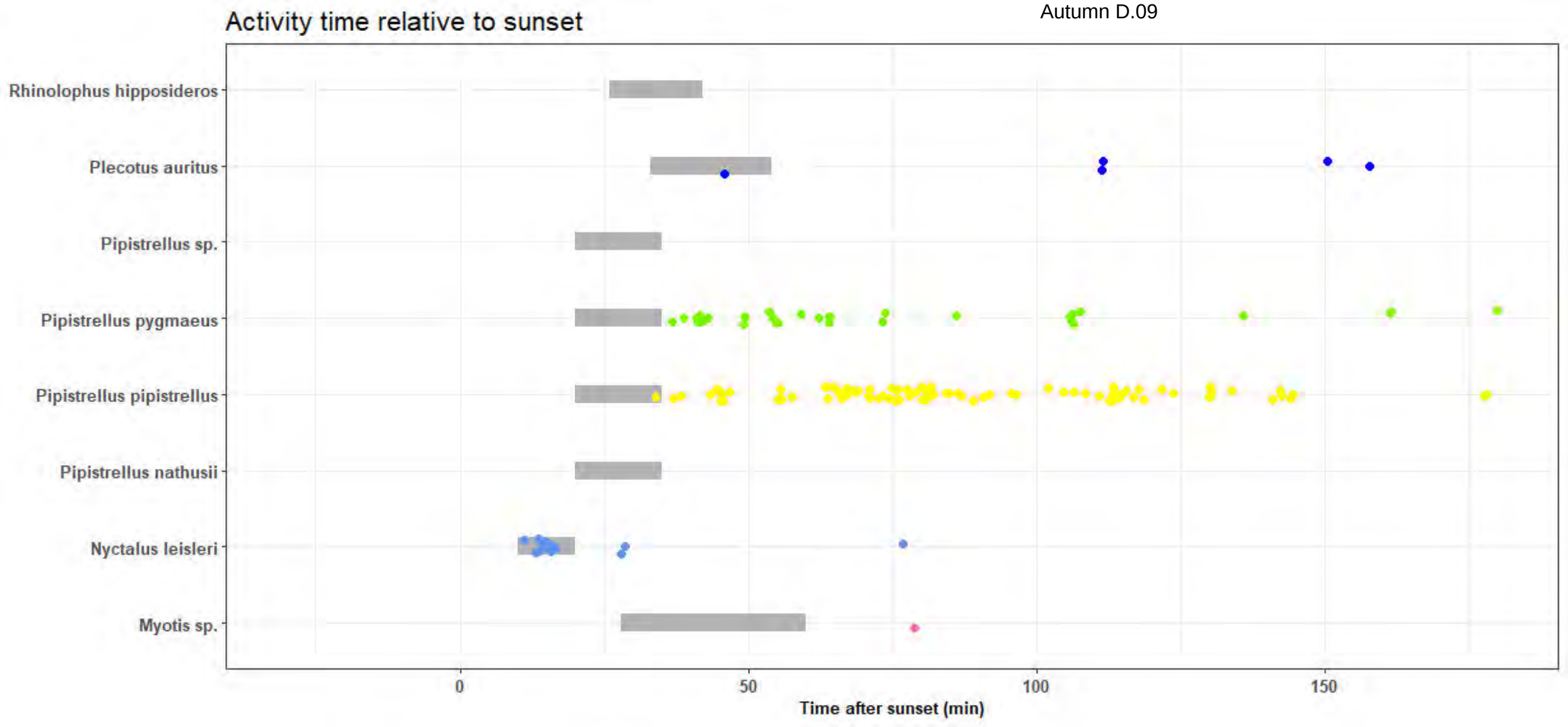

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

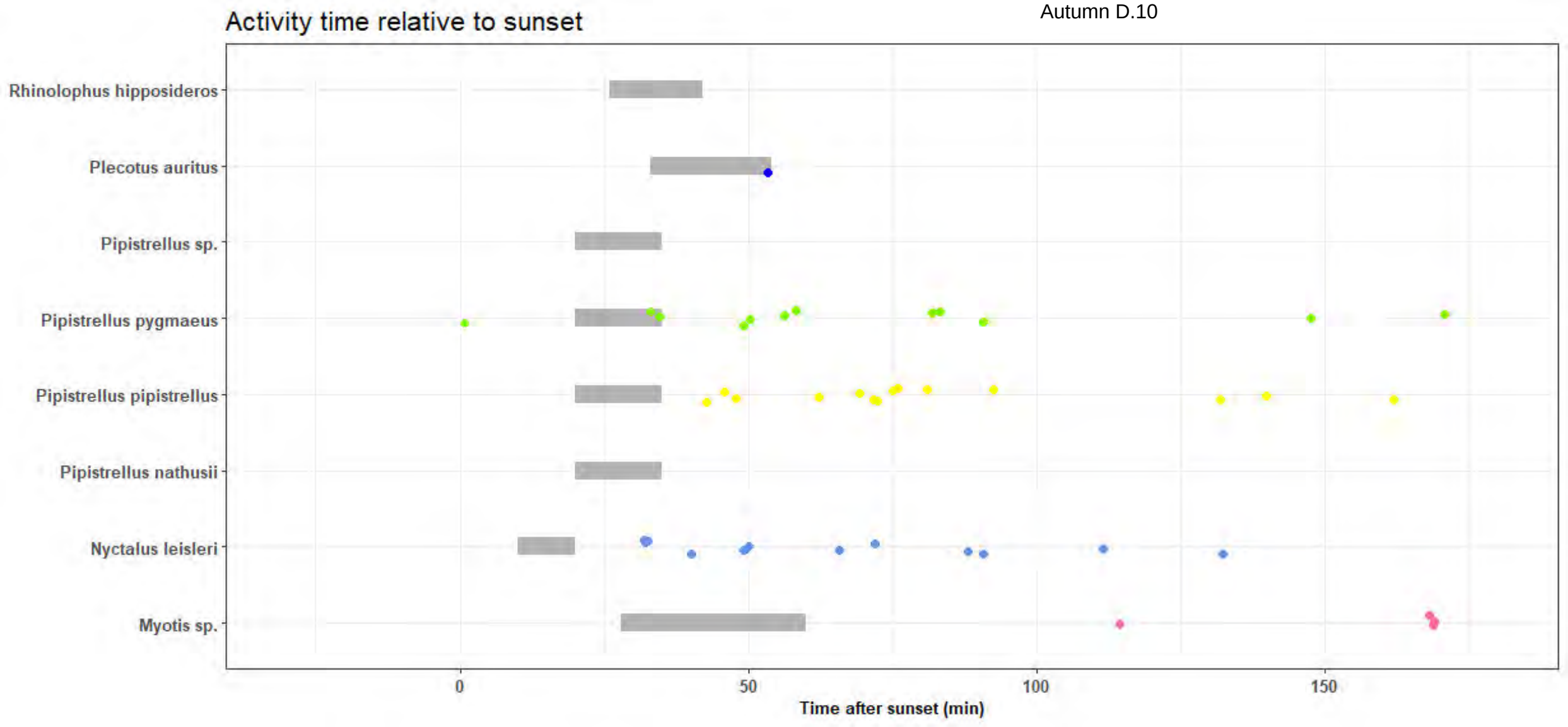

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

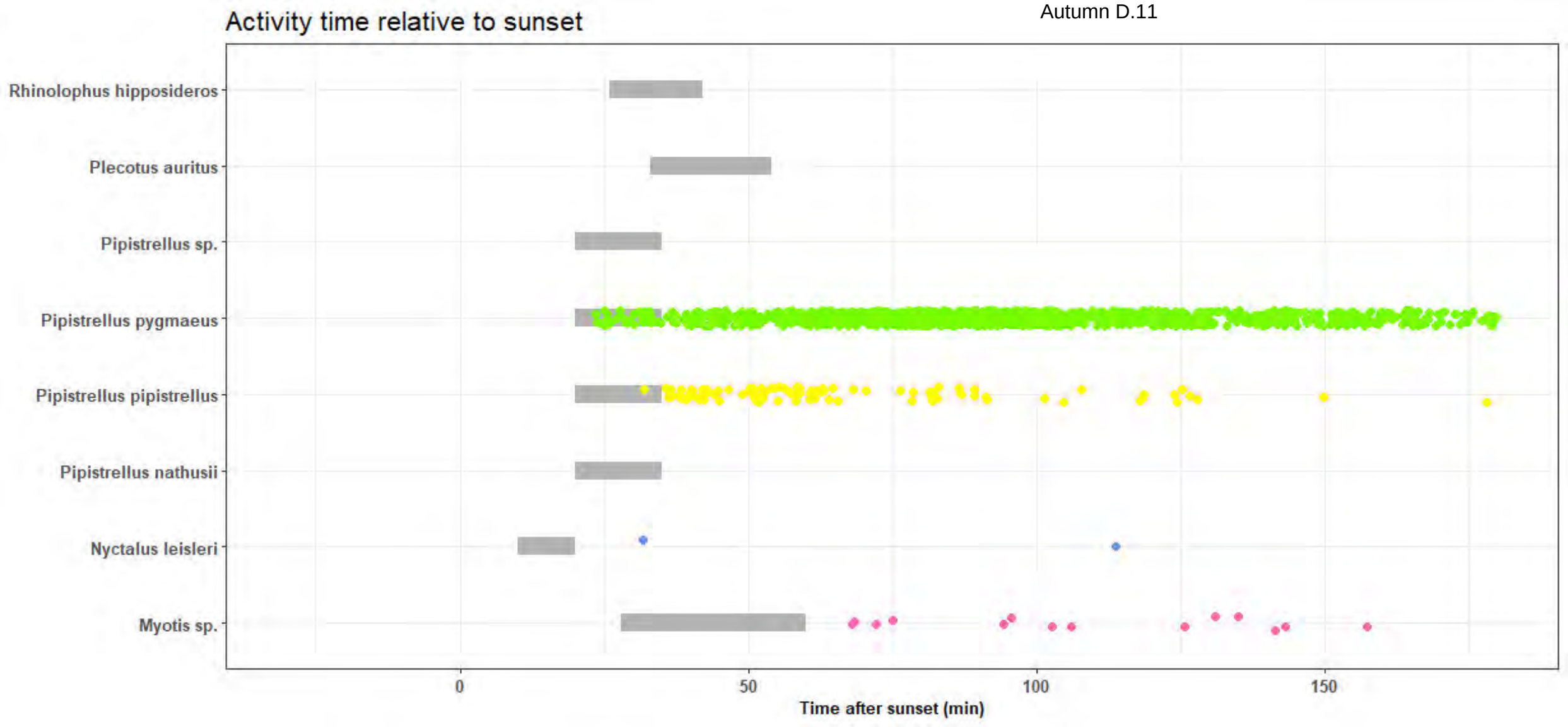
Autumn D.07

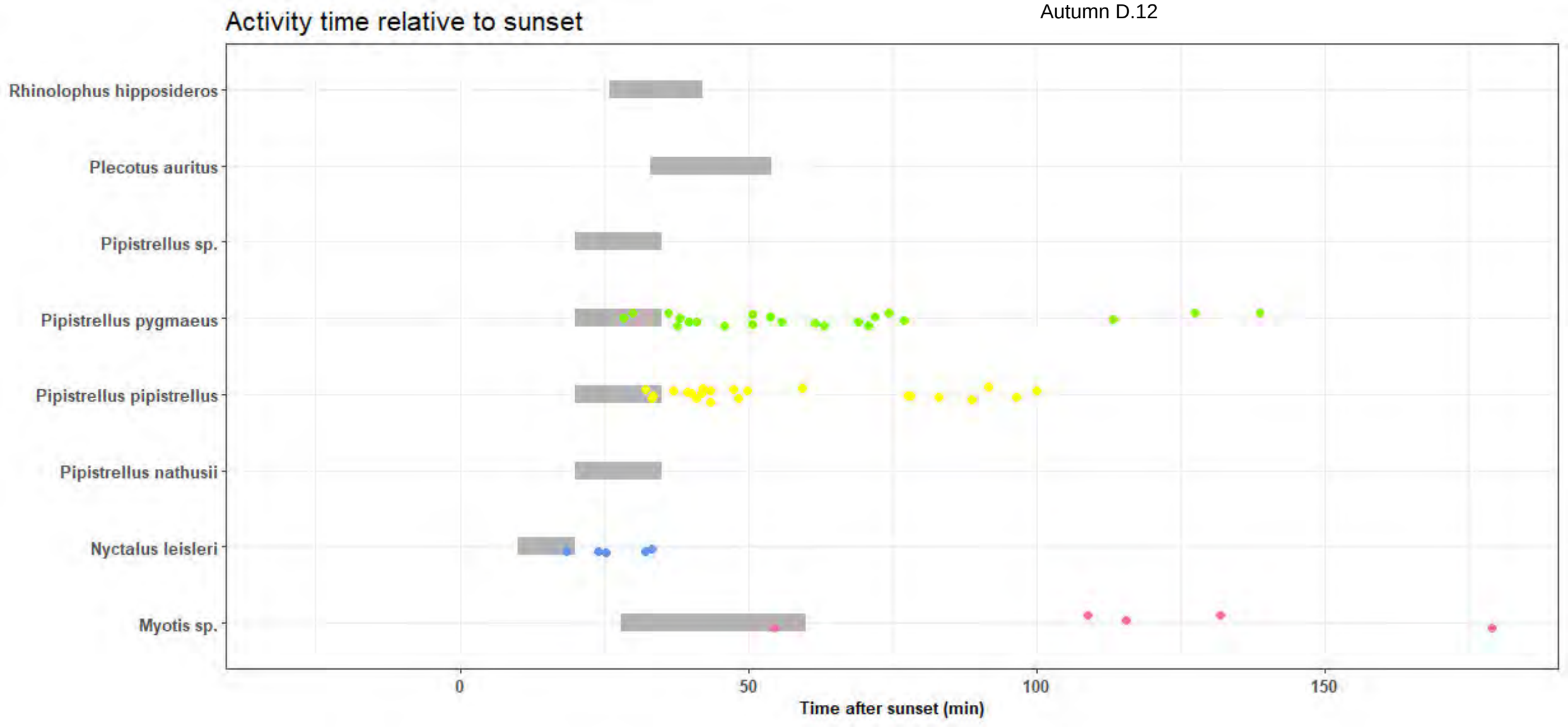

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

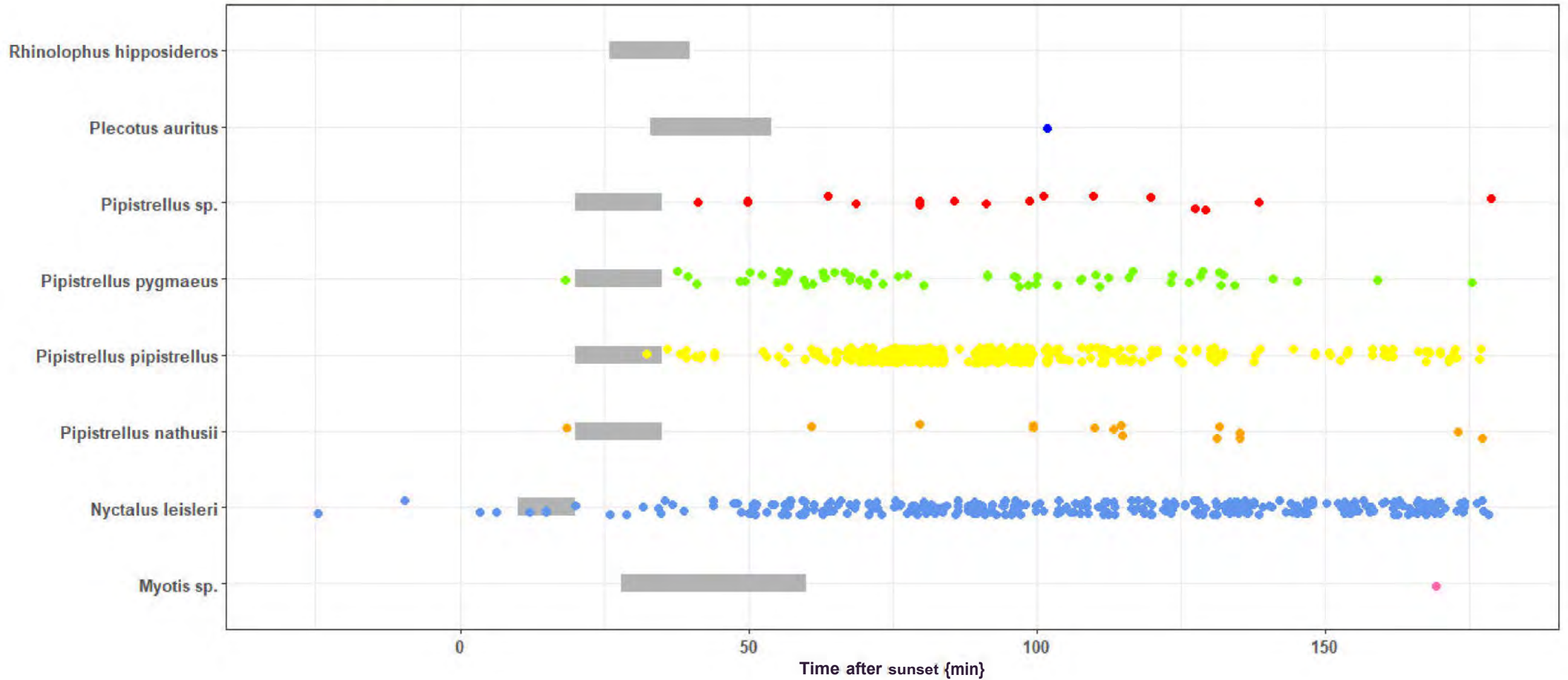

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

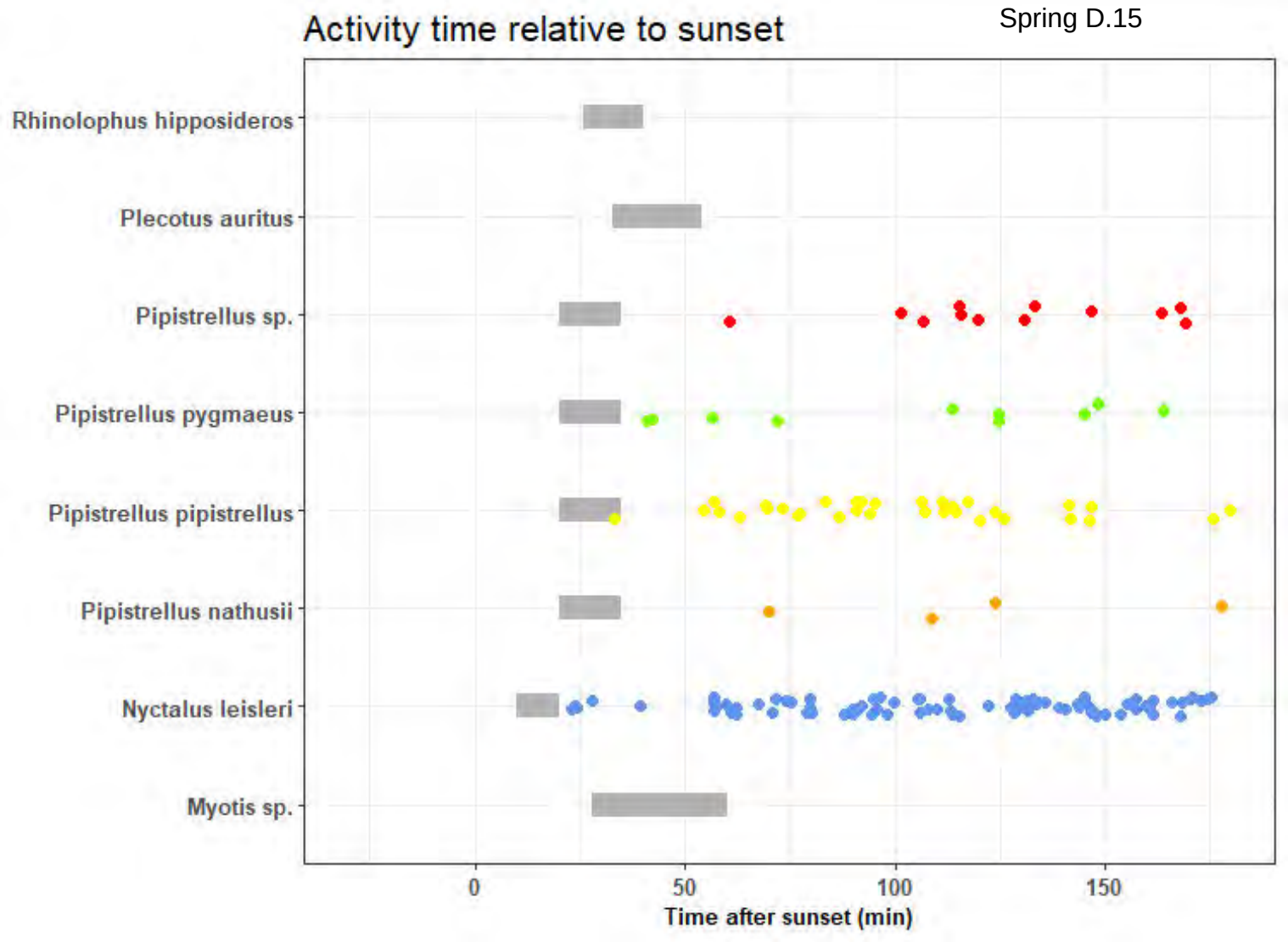
2023

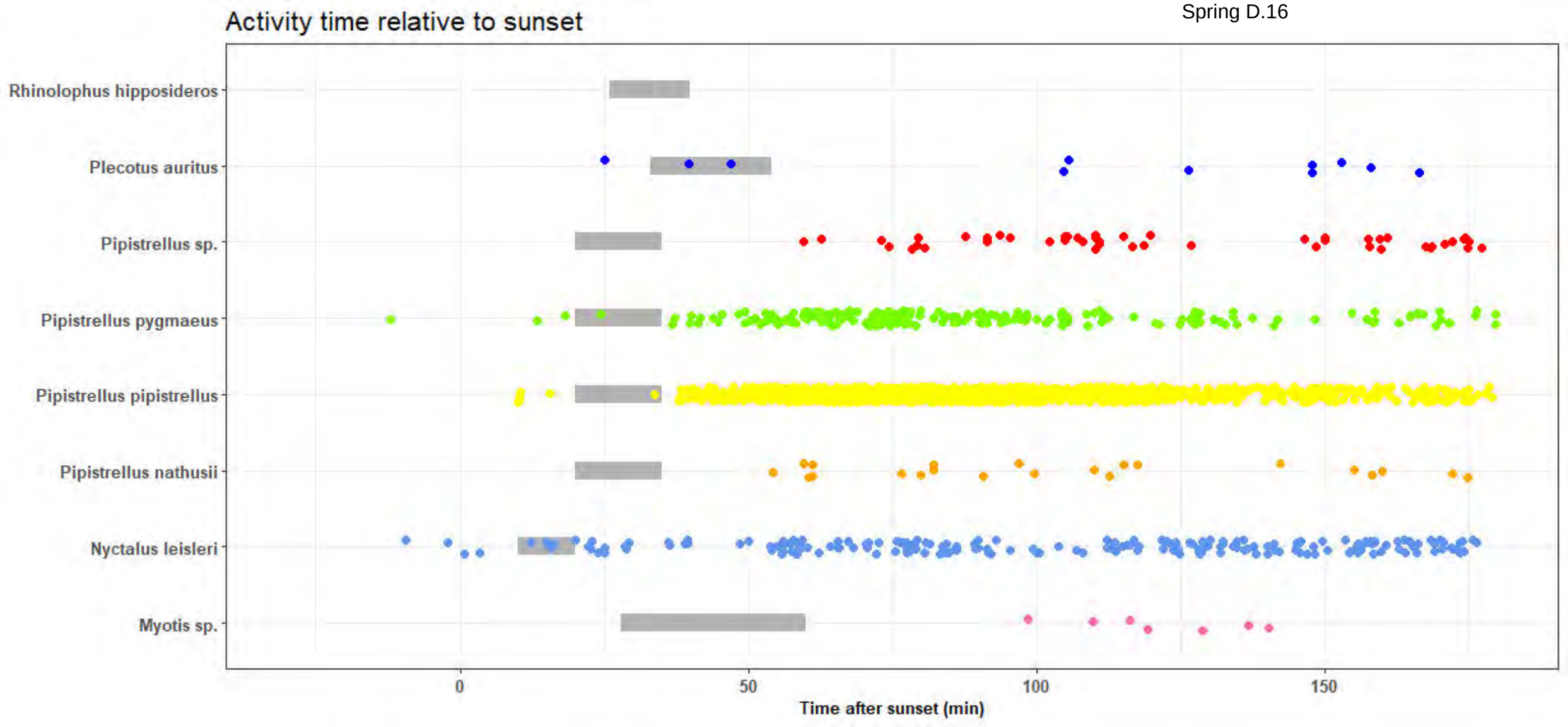
Activity time relative to sunset

Spring D.14

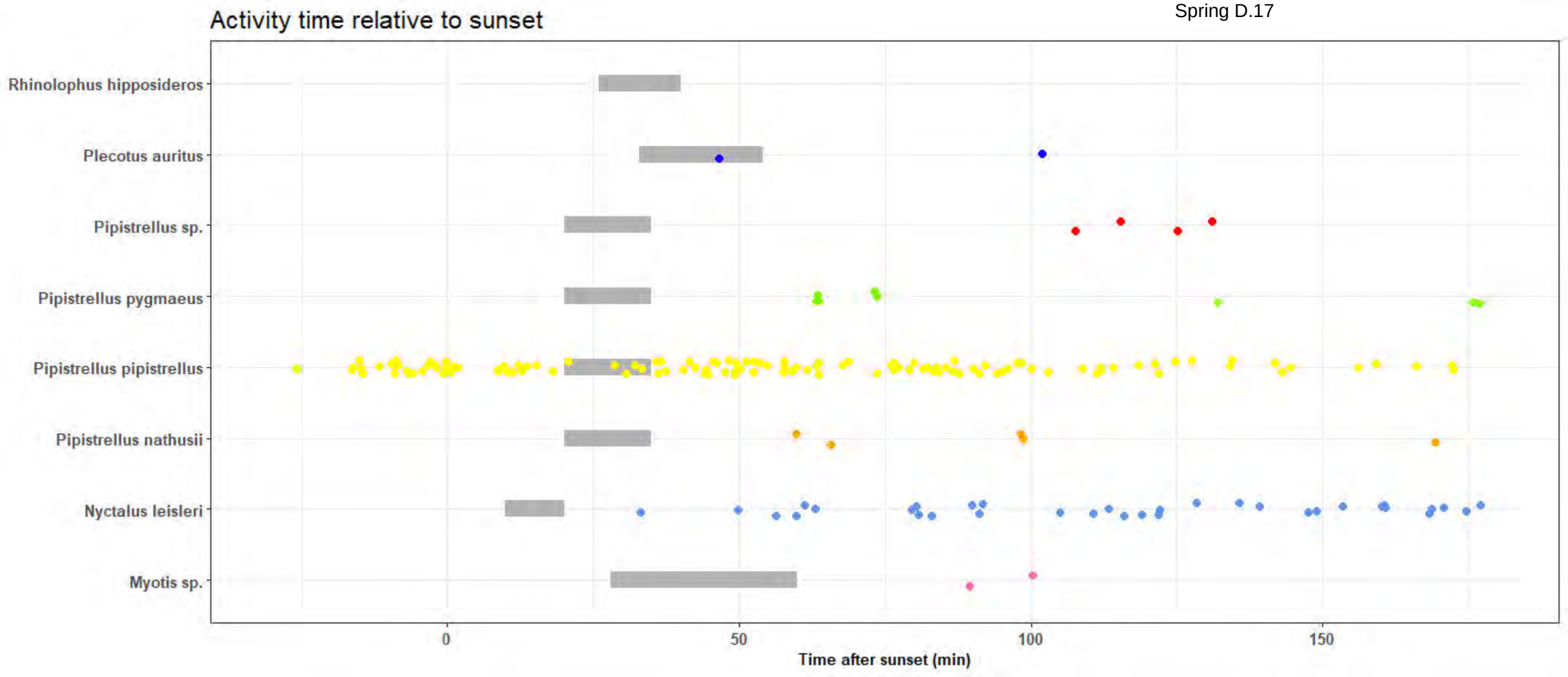


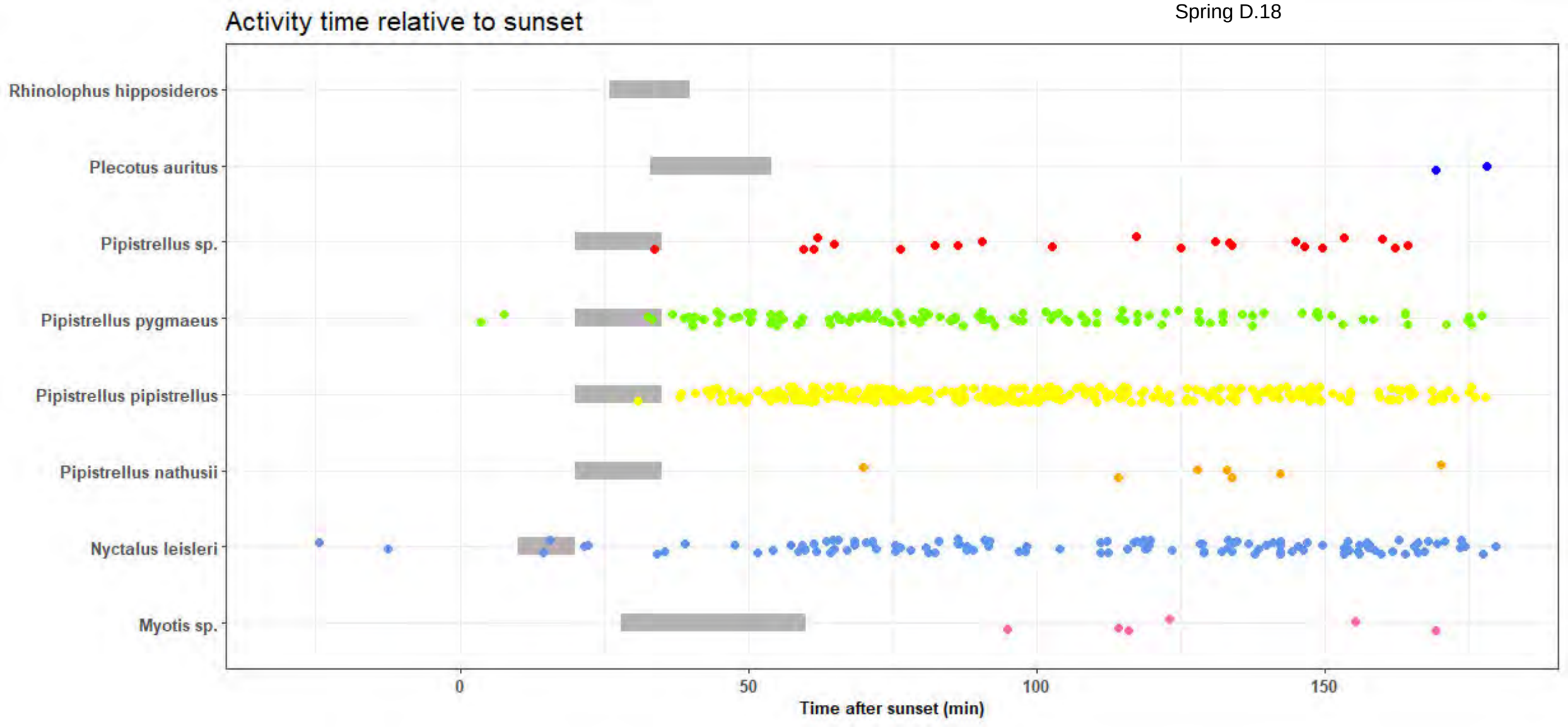
Spring D.15

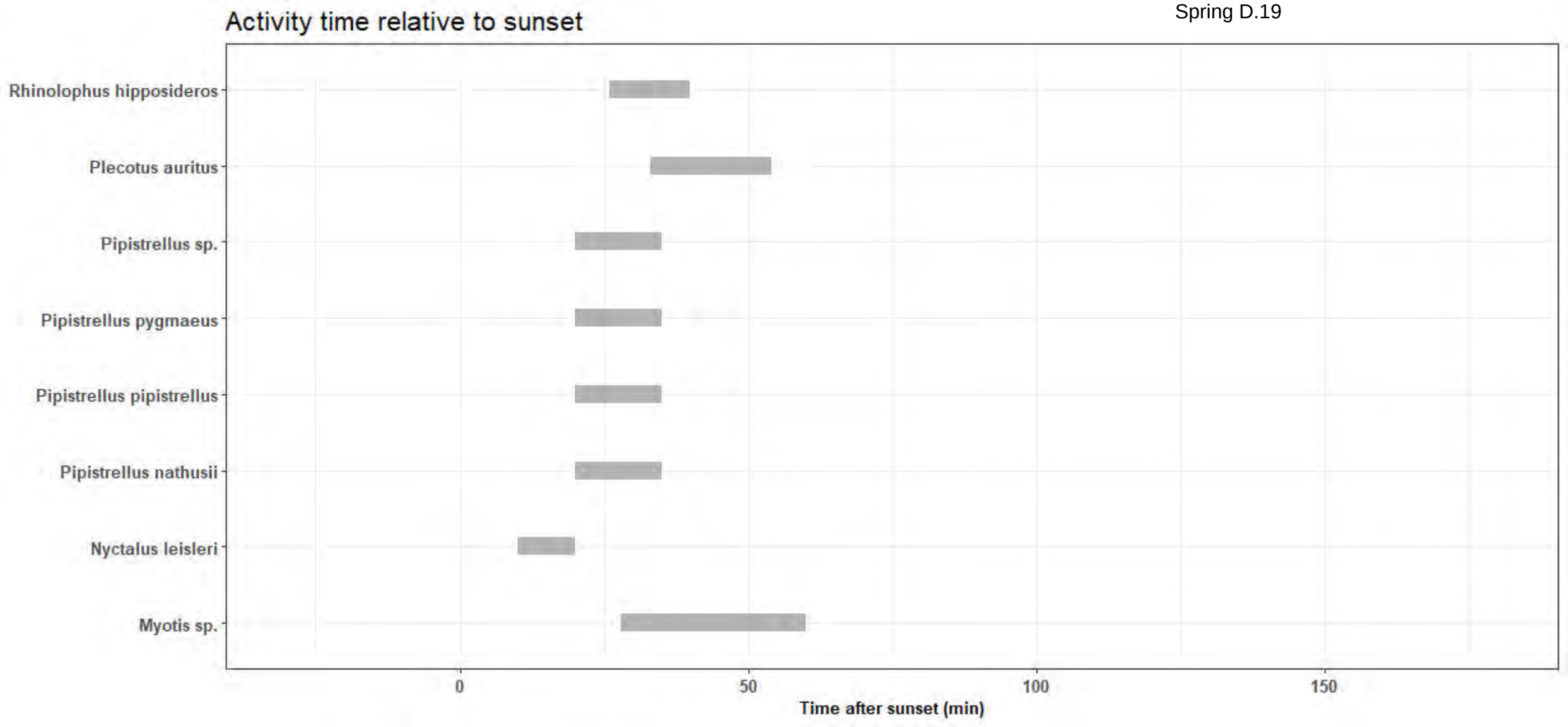

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

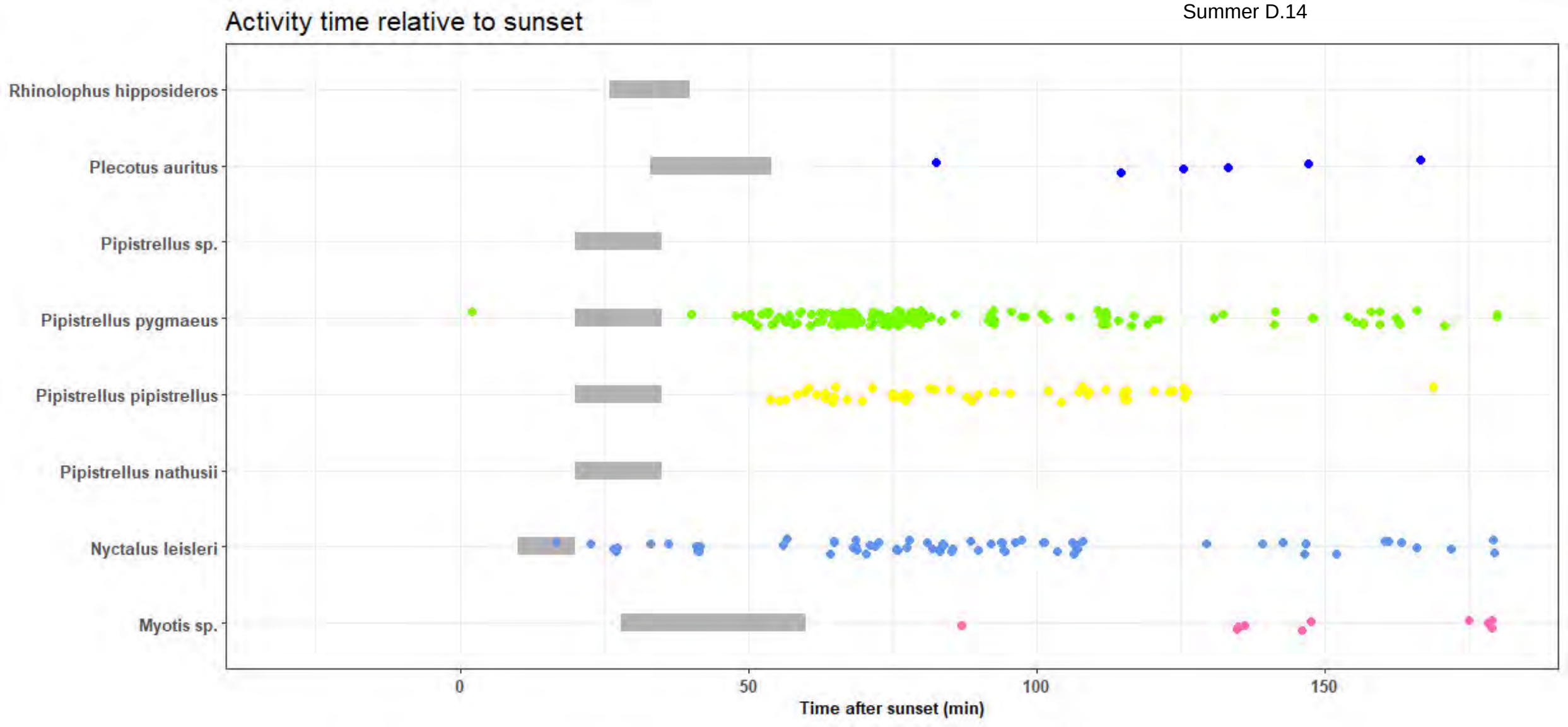
Spring D.17


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

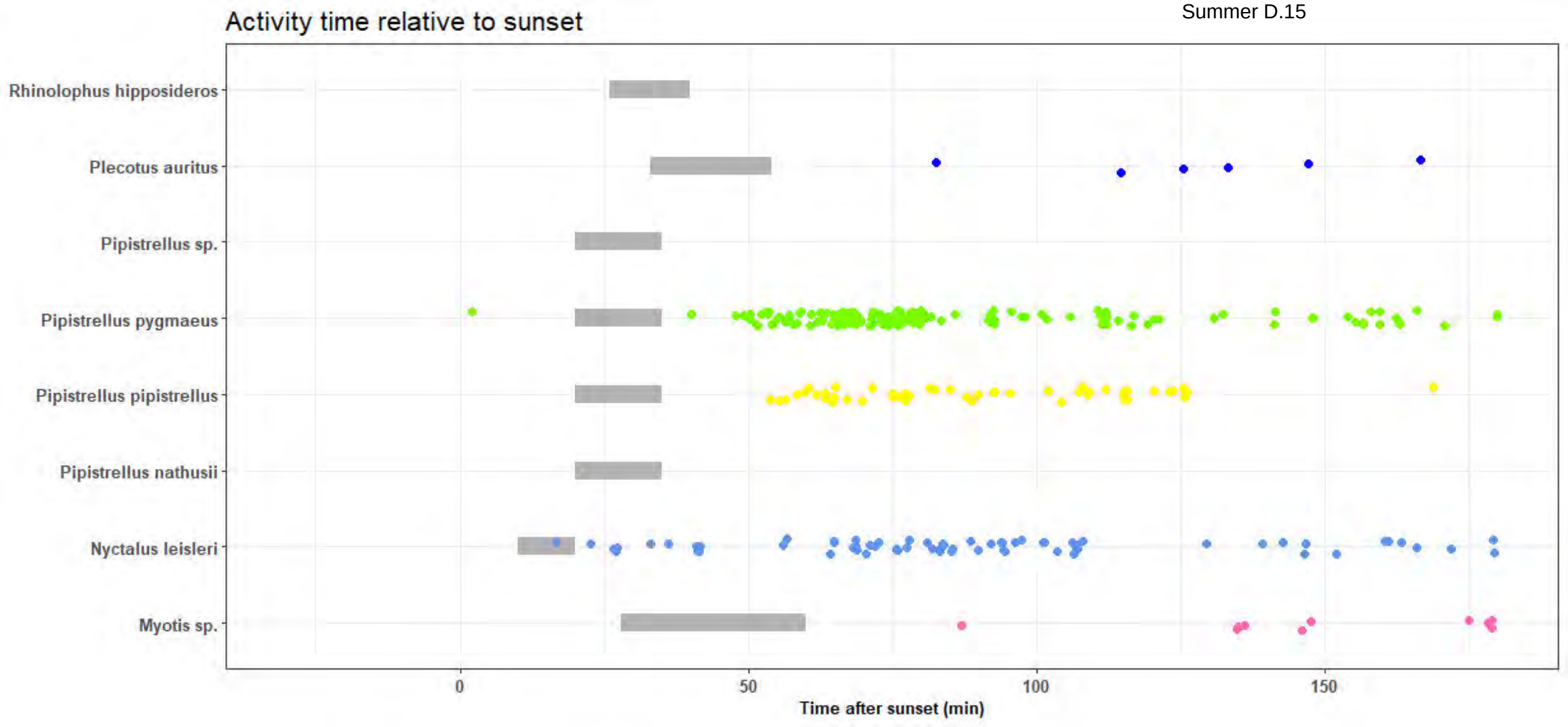

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

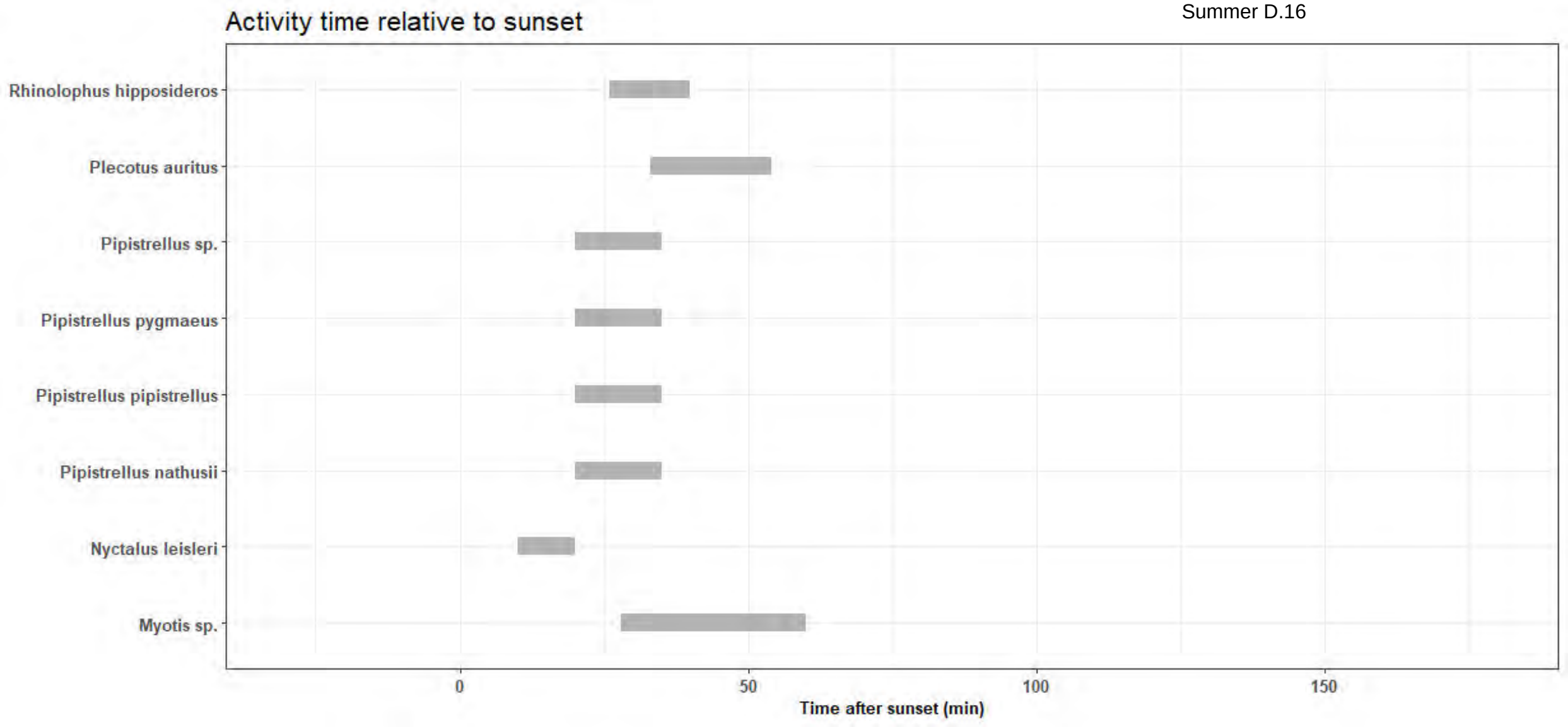

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

Summer D.14

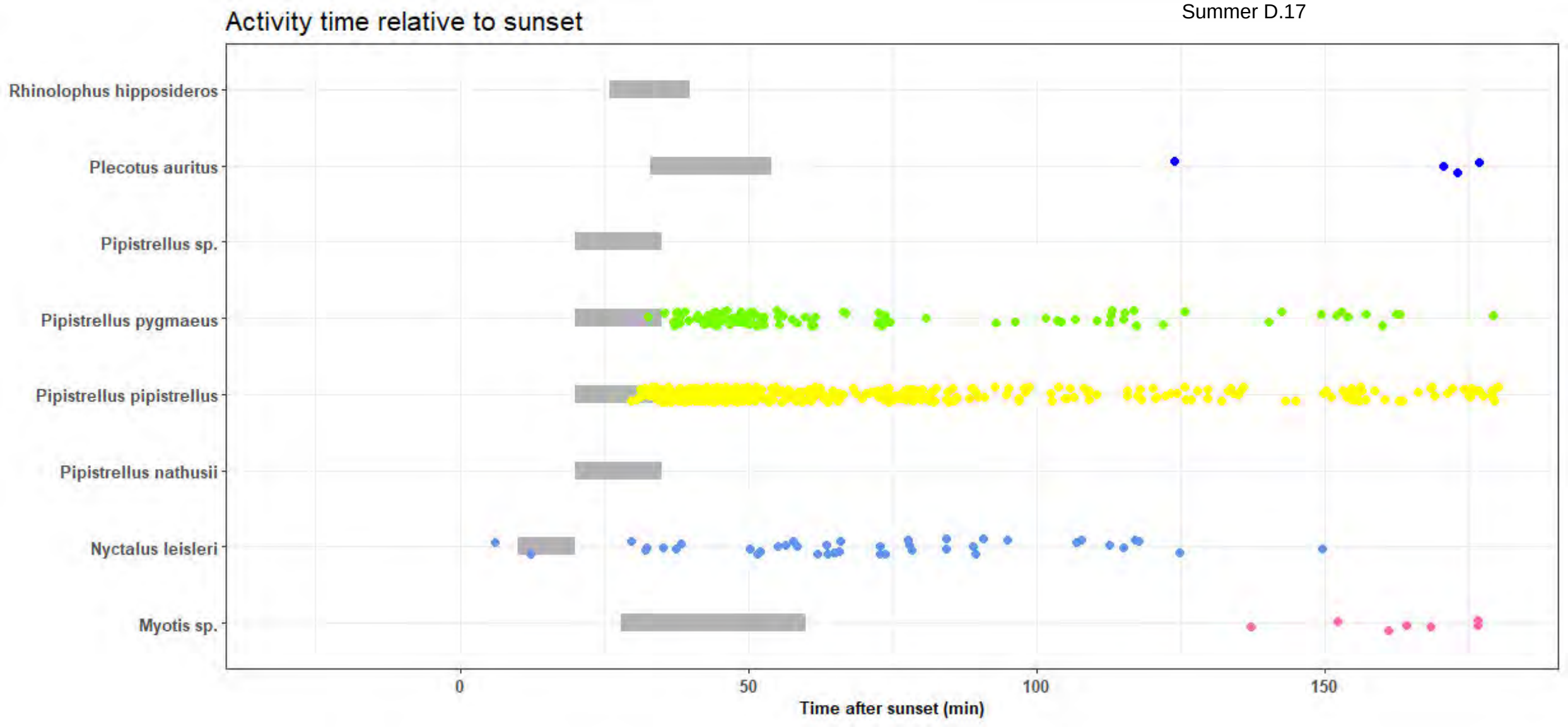

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

Summer D.15

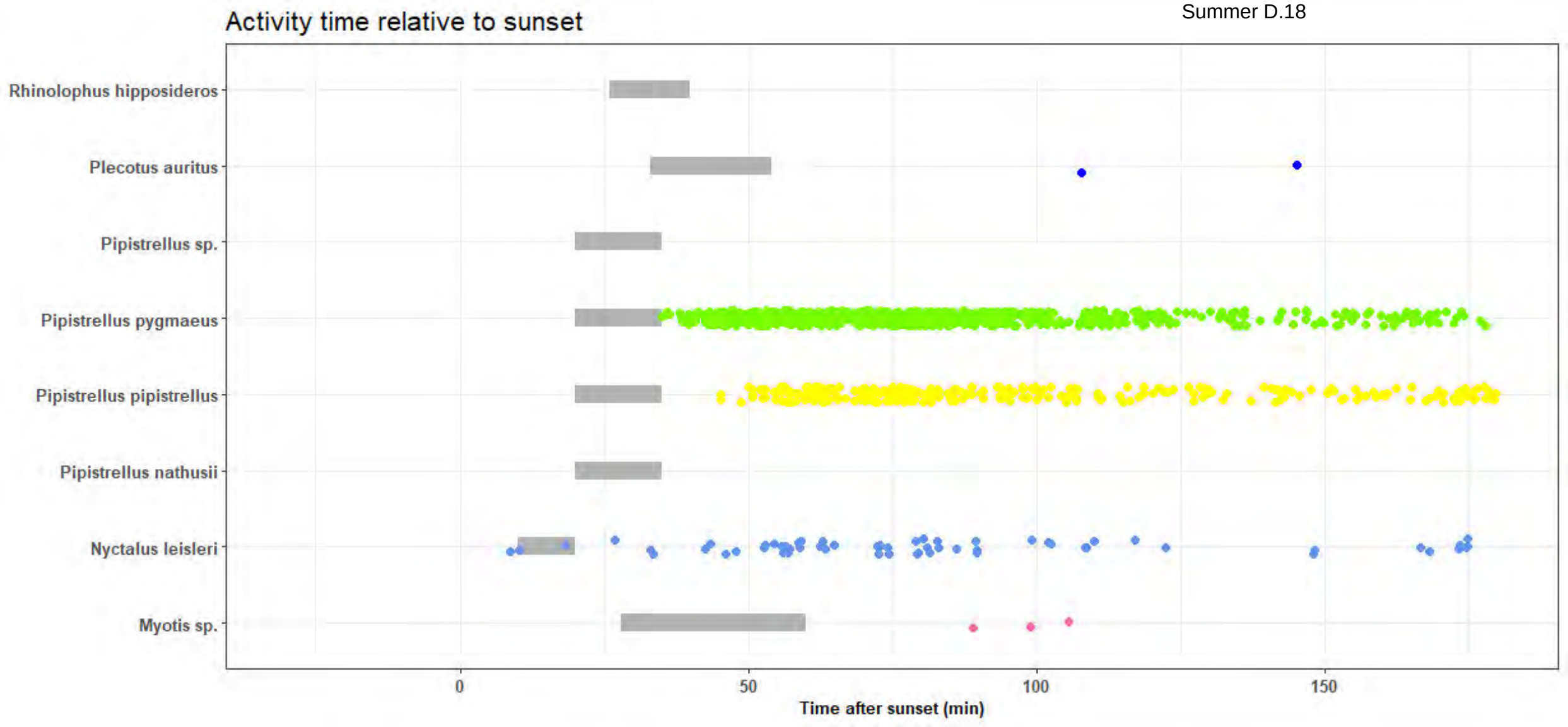

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

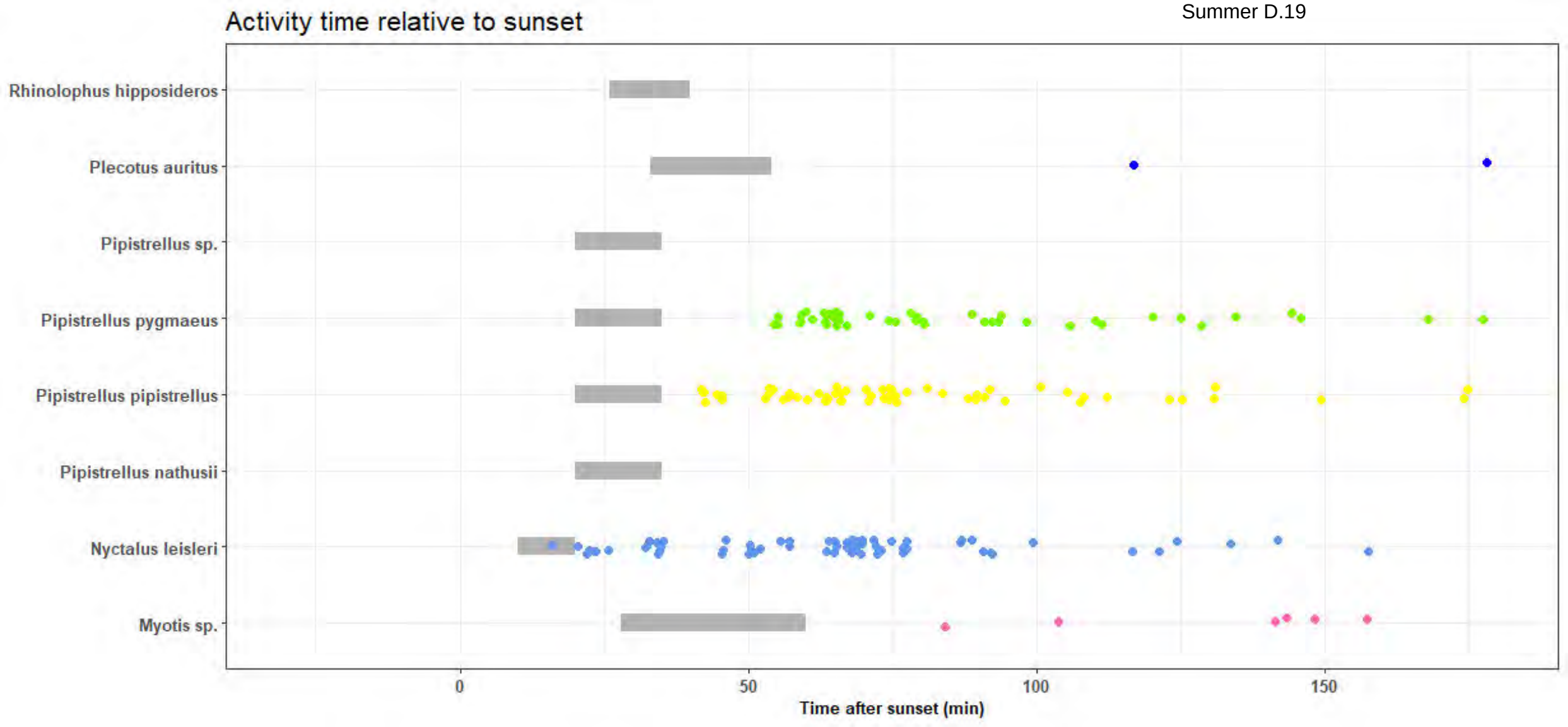
Summer D.17

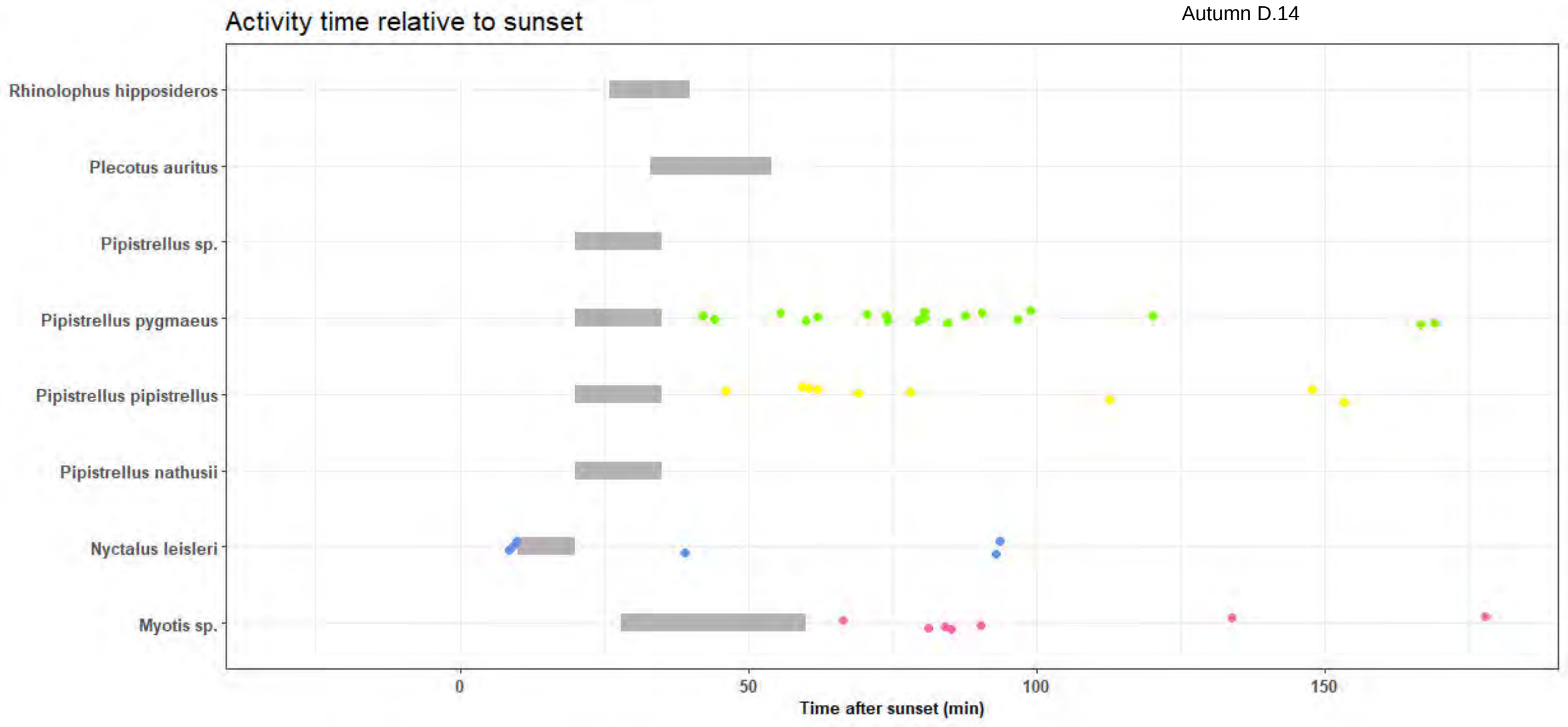

Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

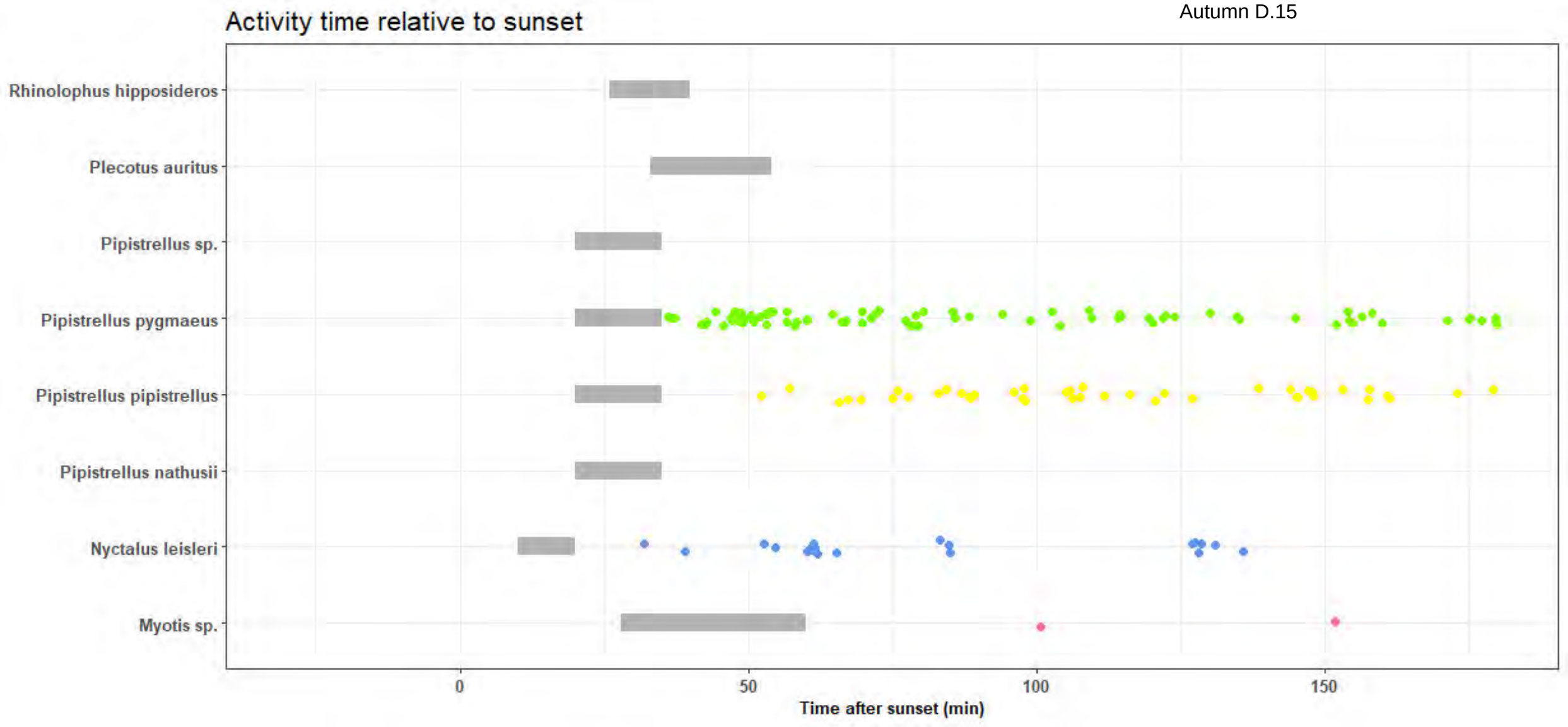
Summer D.18


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)

Summer D.19


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
0
50
100
150
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
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Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
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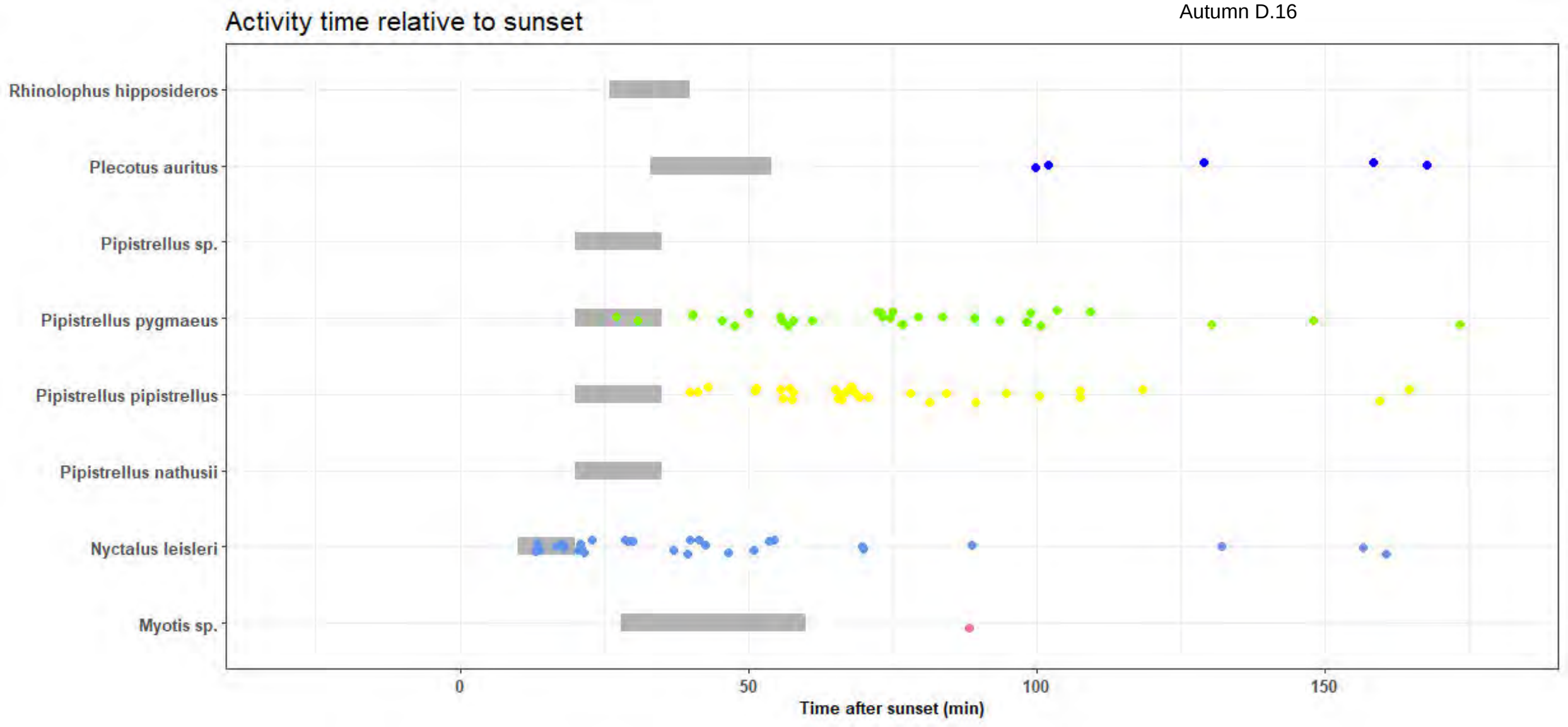
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
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100
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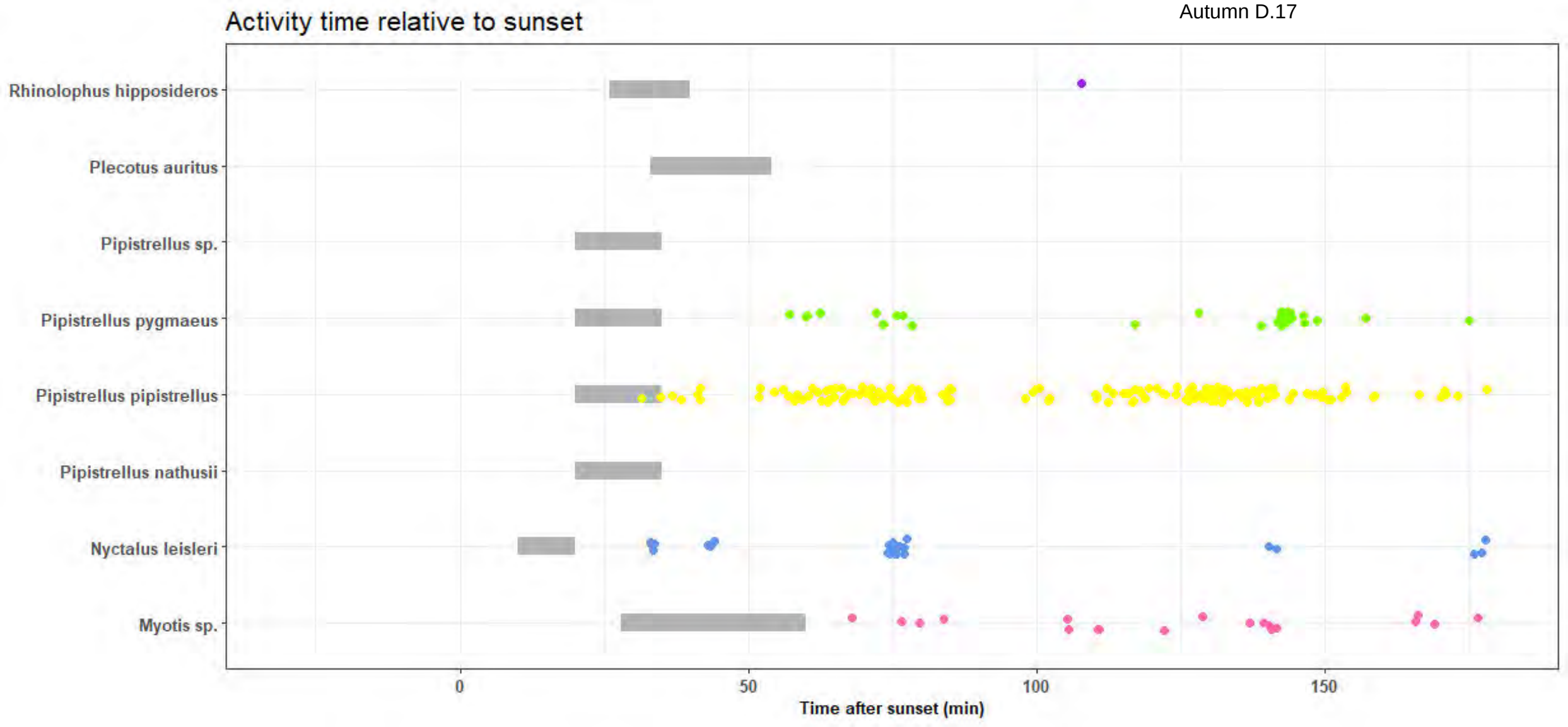
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
Plecotus auritus
Pipistrellus sp.
Pipistrellus pygmaeus
Pipistrellus pipistrellus
Pipistrellus nathusii
Nyctalus leisleri
Myotis sp.
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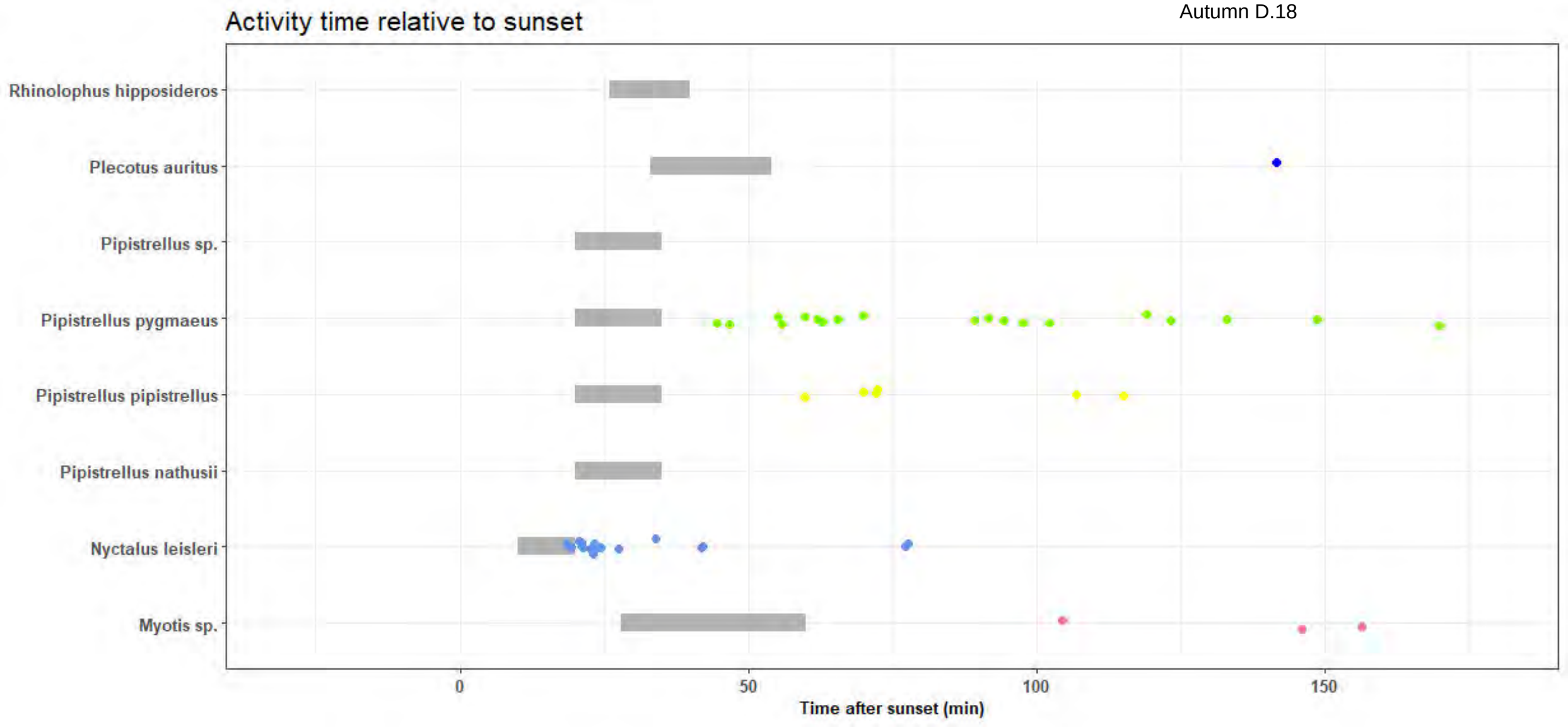
Time after sunset (min)


Activity time relative to sunset
Rhinolophus hipposideros
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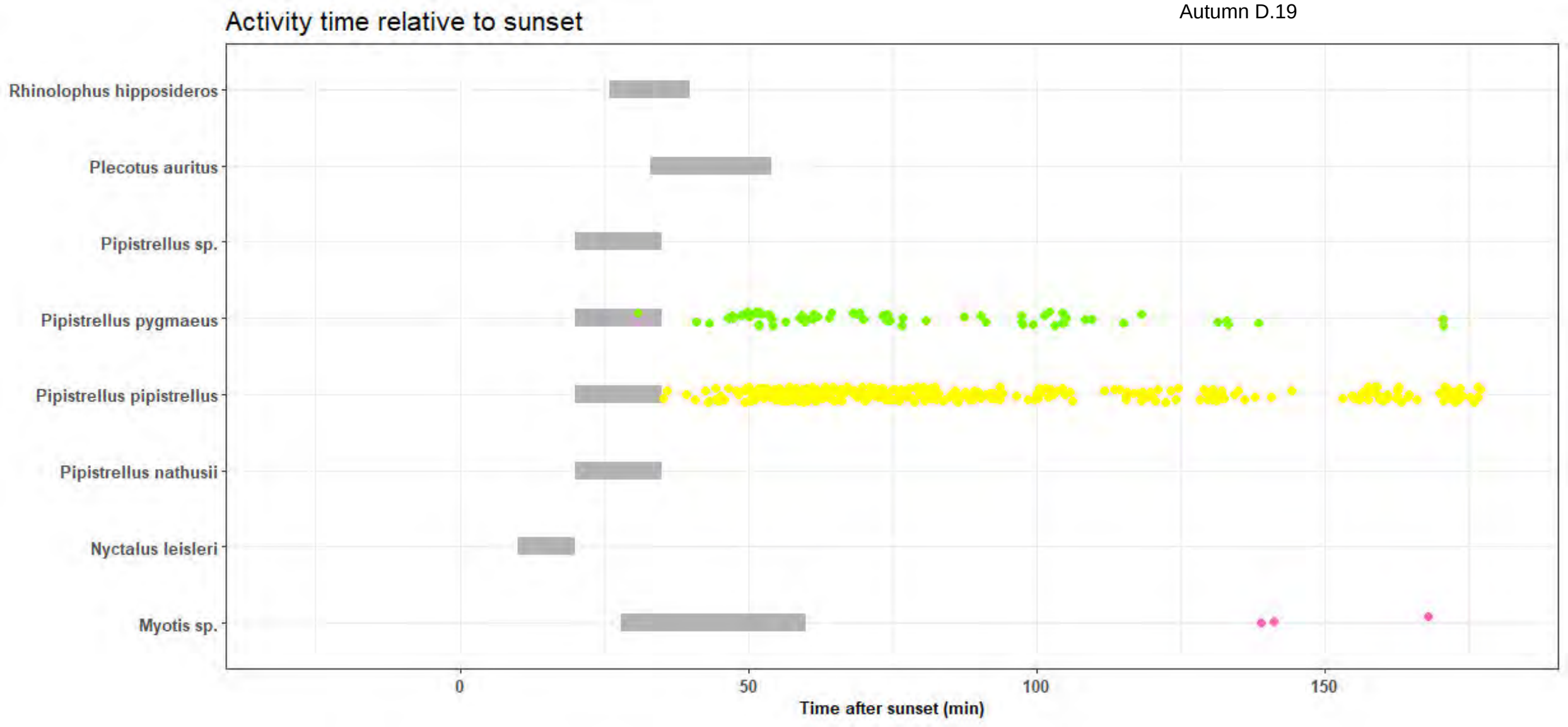
Activity time relative to sunset
Rhinolophus hipposideros
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