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LANDSCAPE ARCHITECTS
ECOLOGISTS

Inglewood, Paignton

Bats 2019

A Report on behalf of Deeley Freed Estates

December 2019

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1.0 INTRODUCTION

1.1 An outline planning application (Torbay Council Planning Reference P/2017/1133) for a residential led development of up to 400* dwellings, together with the means of vehicular and pedestrian/cycle access, the principle of a public house, primary school with nursery, internal access roads and the provision of public open space (formal and informal) and strategic mitigation, was submitted in November 2017. *This has now been amended to "up to 373 dwellings".

1.2 The application was supported by bat surveys (which were predominantly undertaken in 2016 and the results reported in Ecological Baseline Report, NPA May 2017). At the time of writing the planning application has yet to be determined. Given the age of the surveys that initially informed the application update bat surveys have been undertaken in 2019.

1.3 The planning application site (hereafter referred to as "Site") is within a sustenance zone for Greater Horseshoe bats (GHS) *Rhinolophus ferrumequinum* associated with the South Hams Special Area of Conservation (SAC), a component of which (Berry Head to Sharkham Point) is 5km south of the Site. As such and for ease of reference a separate report has been prepared in relation to GHS. This report details the methods, results and conclusions in relation to other bat species.

2.0 METHODS

Potential Roosting Features

2.1 An update assessment from the ground of trees on and adjacent to the Site was undertaken to determine if their potential to support roosting bats had changed since the 2016 assessment. This involved a search for suitable features such as cracks, splits, cavities, knotholes and loose bark.

Activity Surveys

2.2 A series of activity surveys for bats were conducted to assess the use of the Site by bats. The surveys consisted of manual activity surveys and deployment of automated bat detectors over a series of nights. These surveys were undertaken in accordance with the Bat Conservation Trust's Bat Surveys for Professional Ecologists (Collins, J, 2016).

2.3 All activity manual surveys were undertaken in suitable weather conditions (no or little rain, no strong wind above Beaufort 4, and moderate temperature, typically not below 10^{0}C). During manual surveys temperature (^{0}C), cloud cover (%), wind (Beaufort) and intensity of rain were recorded at hourly intervals. Deployment of automated detectors was targeted for periods of suitable weather conditions. Whilst the automated detectors recorded temperature, additional weather information was taken from a weather station[1] based in St Mary's Brixham, approximately 4km south east of the Site.

Manual Activity Surveys

2.4 Two surveys were undertaken in each month from April to October 2019 (inclusive). This included a dusk and dawn survey on the 11th and 12th of September.

2.5 The dusk activity surveys consisted of walking three (occasionally 2) transects routes which covered a cross-section of habitats present on Site (See Bat Survey Plan 2019). Each transect began prior to sunset and continued for 2-3 hours after sunset. Each surveyor remained static for the first hour post sunset and then walked the transect route at a steady pace stopping at pre-defined listening points for at least 5 minutes to record bat activity. Incidental records of bats in-between listening points were also made.

2.6 The dawn survey in September started at 2hrs prior to sunrise and lasted until at least sunrise. This was undertaken by 3 surveyors who remained static for the duration of the survey at strategic points within the Site.

2.7 When a bat was encountered the time, species and notes on activity were recorded. Bat echolocation was recorded using full spectrum bat detectors.

Automated Surveys

2.8 Automated bat detectors (AnaBat Express) were also deployed across the Site (See Bat Survey Plan 2019). The detectors were placed approximately 1-1.5m off the ground and left in position for at least five nights (dusk-dawn). They were programmed to come on 15 minutes before sunset and turn off 15 minutes after sunrise.

[1] https://wow.metoffice.gov.uk/observations/details/20170119catkqds6gae6pfybyyguicqpgo

2.9 Recorded echolocation calls were run through filters for both horseshoe bat species within AnaLookW 4.4a to identify likely horseshoe bat calls (see Table 1 below for filter parameters). These were then analysed manually to verify if they were attributable to either Lesser Horseshoe bat *Rhinolophus hipposideros* or Greater Horseshoe bat *Rhinolophus ferrumequinum*.

Table 1: Horseshoe Filter Parameters

	Greater Horseshoe Bat	Lesser Horseshoe Bat
Characteristic Frequency (KHz)	75-90	95-120
Call Duration (ms)	0.2-100	0.2-100

2.10 Identification of other bat species was gained through use of the automated species identification feature within Kaleidoscope 5.1.9.g. Whilst the accuracy of the automated species identification works well for certain species (*e.g.* Pipistrelles) it is less accurate for others (*e.g.* identification to a particular Myotis species). As such species identifications were grouped into the following categories; Pipistrelle species (Nathusius' Pipistrelle *Pipistrellus nathusii*, Common Pipistrelle *Pipistrellus pipistrellus* and Soprano Pipistrelle *Pipistrellus pygmaeus)*, Myotis species, NLS (*i.e.* larger bat species Noctule *Nyctalus noctula*, Leisler's Bat *Nyctalus leisleri* and Serotine *Eptesicus serotinus)* Long-eared (*i.e.* Brown Long-eared bat *Plecotus auritus* and Grey Long-eared bat *Plecotus austriacus*) and Barbastelle *Barbastella barbastellus*.

2.11 Where Kaleidoscope determines a recorded file contains a bat but is unable to confidently attribute it to a particular species, it returns a result of No ID. All No IDs were manually analysed and attributed to a species. In cases where the manual analysis could also not attribute the recording to a species, it was labelled as vesper *i.e.* non horseshoe bat species.

2.12 Due to their rarity any files labelled as Barbastelle were analysed manually for verification.

3.0 RESULTS

Roosting

3.1 The update tree assessment did not alter the conclusions of the 2016 assessment. The manual activity surveys did not record any bats roosting within any of the trees *n.b.* Given that there are no existing buildings or structures within or adjacent to the planning application boundary no roost at all were recorded.

Species Diversity

3.2 The activity surveys recorded at least* eleven species of bat on Site, these being:

- Noctule;
- Leisler's bat;
- Serotine;
- Barbastelle;
- Nathusius' Pipistrelle;
- Common Pipistrelle;
- Soprano Pipistrelle;
- at least one species of Long-eared bat *Plecotus sp*.;
- at least one species of Myotis;
- Greater Horseshoe; and
- Lesser Horseshoe bat.

* a number of *Myotis* species are likely to present on Site, but as the calls of the *Myotis* bats species are very similar, with most of the variation between their calls attributable to the habitat in which they occur (Russ, 1999), the *Myotis* recordings have not been attributed to a particular species.

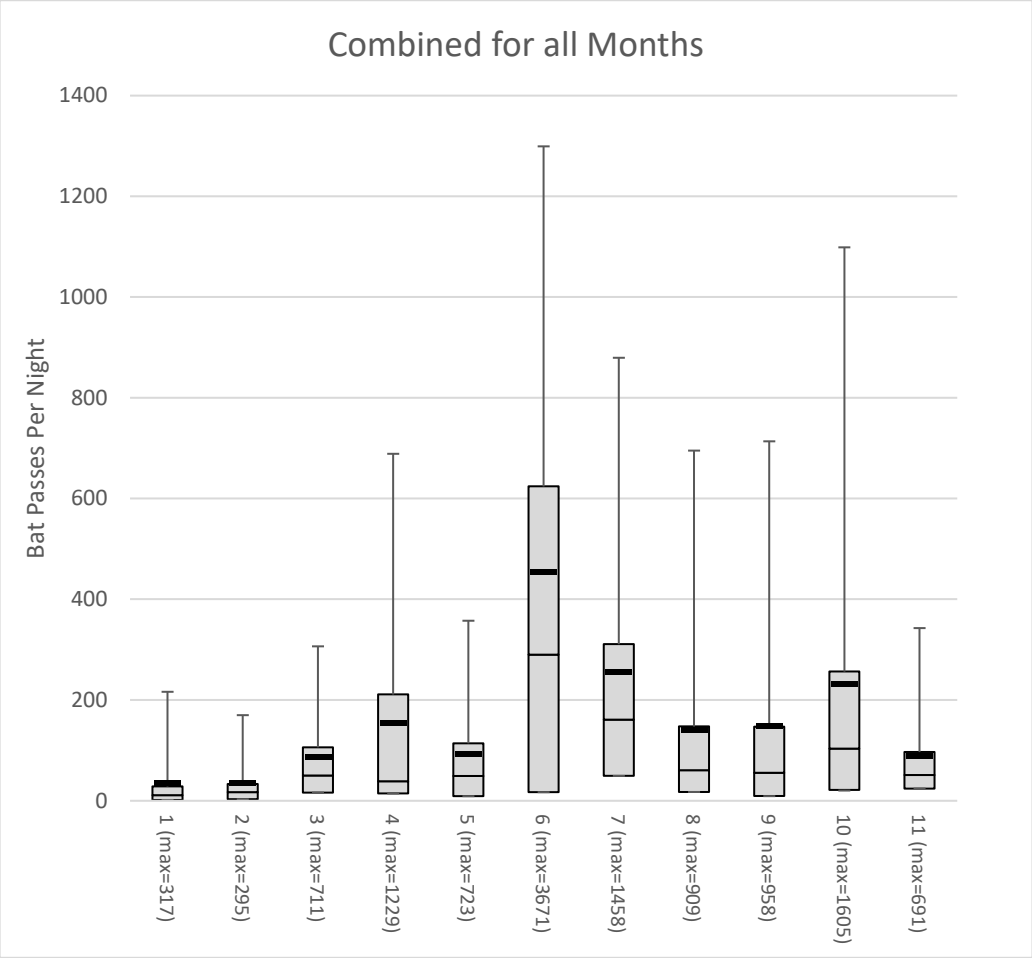
3.3 The activity was dominated by pipistrelle bats with them accounting for almost 90% of bat calls recorded by the automated detectors, as shown in Table 2 below.

Table 2: Percentage of bat activity by species

Species Group	*% of overall activity*
Pip. sp.	*89.53%*
Myo. sp.	*2.93%*
NLS	*2.75%*
LHS	*2.70%*
GHS	*1.75%*
Barbastelle	*0.28%*
Long-eared	*0.05%*
Vesper	*0.00%*
Total	*100.00%*

Activity Location

3.4 The location of activity recorded by the automated detectors is shown on the automated detector activity figures (April-October for Pipistrelle species and other bats), associated pivot tables (Appendix I) and box plots (Appendix II) and the box plots shown below.



Whiskers are 95% and 5% confidence intervals

3.5 Bat activity at location 6 was significantly higher (p=<0.05[2]) than at locations 1, 2, 3, 5, 9 or 11. Bat activity at locations 1 and 2 was significantly lower (p=<0.05) than at locations 4, 6, 7, 8, 9 or 10, with activity at location 1 significantly lower (p=<0.05) than at locations 5 or 11 also. Activity at locations 7, 10 and 4 had the next highest mean levels of activity after location 7.

[2] Shapiro-Wilk test for normality identified the data to be not normally distributed, therefore the non-parametric Kruskal-Wallis analysis with post-hoc testing was utilised to detect differences. All following quoted p values relate to the same method of analysis. See analysis in Appendix III

3.6 The highest level of Lesser Horseshoe bat activity was recorded at location 7. The highest levels of Barbastelle activity were recorded at locations 6, 7 and 9 (see box plots in Appendix II).

3.7 A similar pattern of activity was recorded on the manual activity surveys with bat activity being generally lower on Transect 1, Transect 2 recording higher levels of pipistrelle activity around the streetlamps and tree cover on Brixham Road, and Transect 3 generally recording higher levels of bat activity and a more diverse range of species.

3.8 It was evident during the course of the manual surveys that sheltered areas strongly influenced bat activity levels given that much of the Site is exposed, such that in windier conditions bats preferred areas sheltered by tall/dense hedge banks/woodland and/or the lower lying areas to the south and west of the Site.

Seasonality

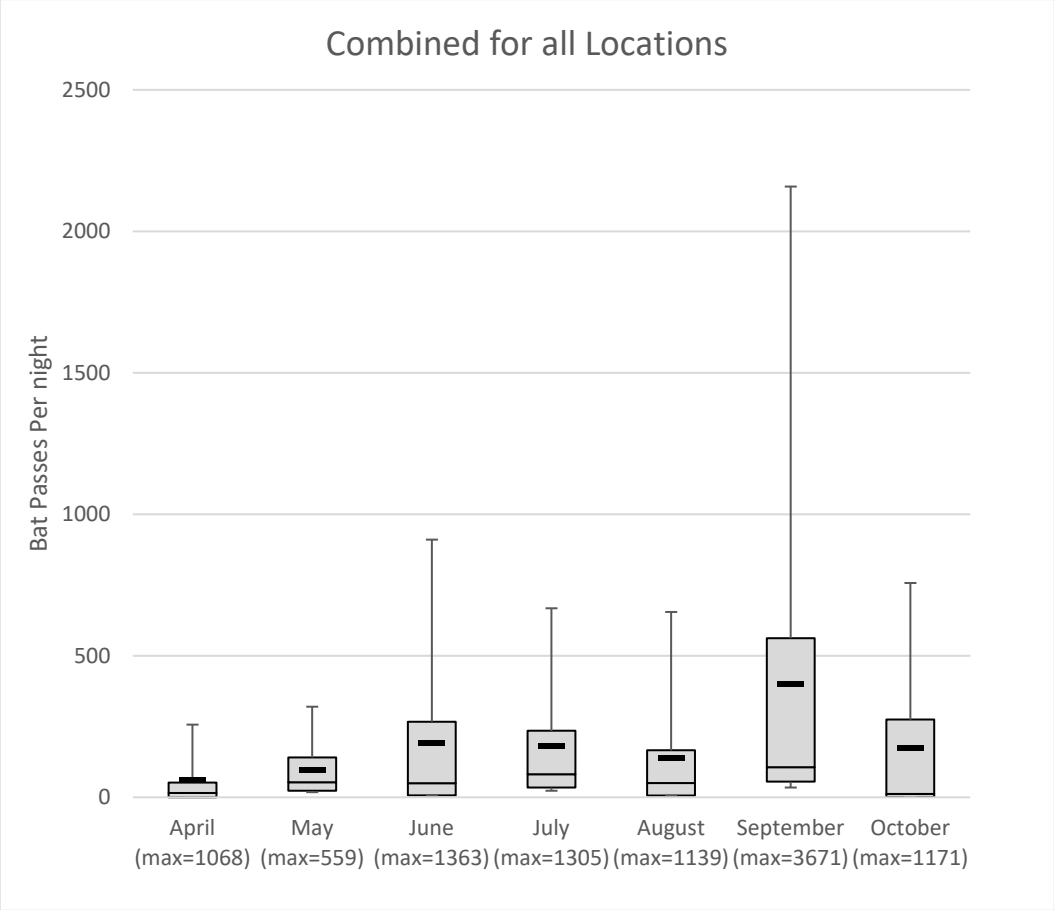
3.9 The months in which the activity was recorded by the automated detectors is shown on the automated detector activity figures (April-October for Pipistrelle species and other bats), associated pivot tables (Appendix I) and box plots (Appendix II) and the box plots shown below.

3.10 The activity recorded in July and September was significantly higher ($p=<0.05$) than in April, June, August or October. With the activity in September also being significantly higher ($p=<0.05$) than in May. The higher activity recorded in July was primarily due to Pipistrelle activity at location 6 and to a lesser extent Myotis activity at location 5 (see activity figures and pivot tables in Appendix I). The higher activity recorded in September was primarily due to Pipistrelle and Myotis activity at location 6.

3.11 Bat activity in April was significantly lower ($p=<0.05$) than in May, June, July, August or September.

3.12 Barbastelle bat activity was higher in July, August and September. There was less seasonal variation in Lesser Horseshoe bat activity, but there does appear to be a reduced activity in the middle of season (July and August).

3.13 The manual activity surveys recorded a similar pattern in that limited activity was recorded in April and higher activity levels were recorded on the second July visit, with Barbastelle's only being recorded from late July onwards and no Lesser Horseshoe bats being recorded in July.



Whiskers are 95% and 5% confidence intervals

4.0 CONCLUSIONS

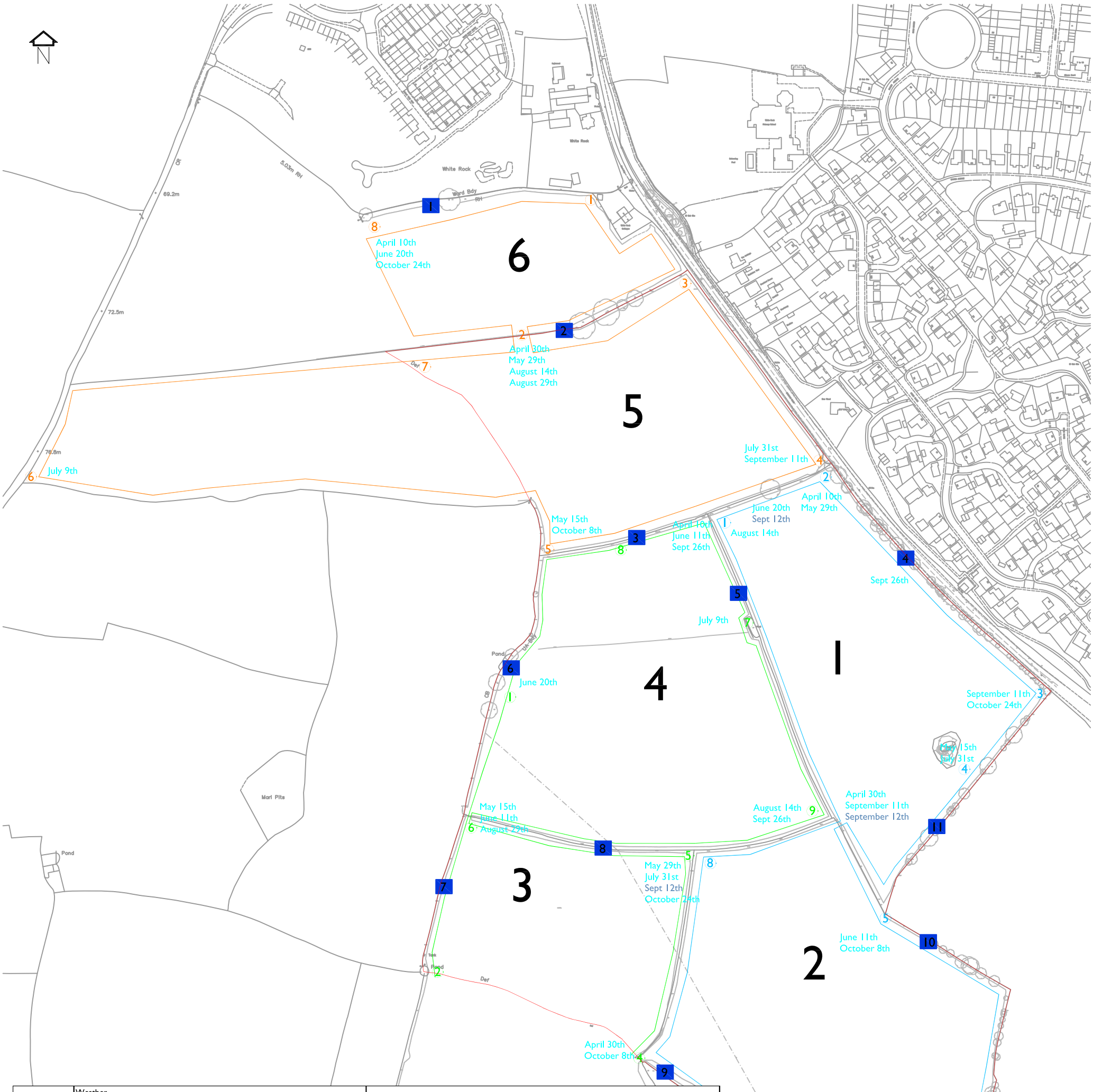
4.1 As in 2016, no bat roosts were recorded on Site, but a diverse range (at least 11 species in 2019) were recorded on Site, with activity dominated by Pipistrelle species.

4.2 Bat activity at location 6 on the western boundary of the Site was significantly higher than at most other locations (1, 2, 3, 5, 9 or 11). Locations 4, 10 and 7 recorded the next highest levels of activity. Activity at location 4 was largely Pipistrelle species feeding around the streetlamps and tree cover on Brixham Road.

4.3 It was evident during the course of the manual surveys that sheltered areas strongly influenced bat activity levels given that much of the Site is exposed, such that in windier conditions bats preferred areas sheltered by tall/dense hedge banks/woodland and/or the lower lying areas to the south and west of the Site. This in part might explain why higher activity levels were recorded at locations 6, 7 (both lower lying with hedge banks) and 10 (hedge with tall trees).

4.4 The activity recorded in July and September was higher than in April, June, August or October. With the activity in September also being significantly higher than in May also. Bat activity in April was lower than in May, June, July, August or September.

4.5 It is considered that the 2019 survey results do not significantly alter the status of the Site for bats and that the conclusions in the ecology chapter of the Environmental Statement (Stride Treglown, November 2017) that supported the application remain valid *i.e.* that the provision of a robust mitigation package, which a coherent network of hedgerows connected to the wider landscape and habitat enhancement measures around the south and west of the proposed built development, would avoid residual negative impact to bats during construction and would result in a significant positive impact in the long term.



Date	Weather				Notes/Constraints
	Temp (°C)	Cloud Cover (%)	Wind (Beaufort Scale)	Rain	
April 10th	10	20	1	Dry	Transect 2 started @ 21:00 due to detecotr issue. Did not cover Field 3 due to presence of bull.
April 30th	14	90	1	Dry	
May 15th	14	15	1	Dry	
May 29th	15	80	3	Dry	
June 11th	11	100	2-3	Dry	
June 20th	13	0	1	Dry	
July 9th	18	5	0	Dry	2 surveyors used. Transect 1 + Field 1; Transect 2 + Field 2
July 31st	16	60	0-1	Dry	
August 14th	16	100	1-2	Dry	
August 29th	16	5	1-2	Dry	2 surveyors used. Transect 1 + Field 1; Transect 2 + Field 2
September 11th	17	100	2-3	Intermittent light	
September 12th	16	100	2-3	Intermittent light	
September 26th	16	60	2-3	Dry	
October 8th	14	25	3	Dry	
October 24th	11	30	1	Showers between 19:15-30	

Planning application boundary

5 Field Reference

5 AnaBat Location

June 20th Activity start point

Sept 12th Dawn static

Transect 1

Transect 2

Transect 3

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Bat Survey Plan 2019

November 2019

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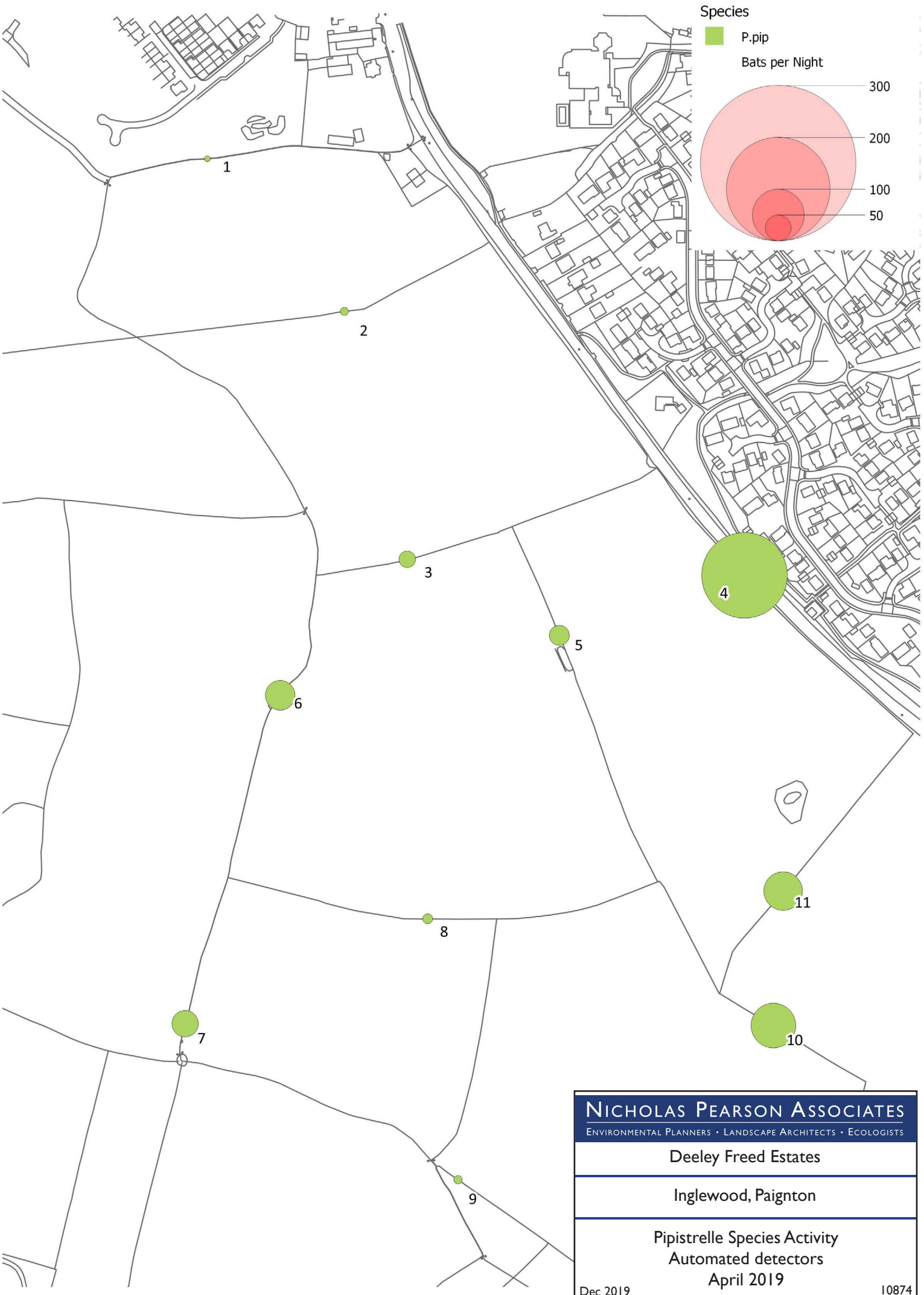
Pipistrelle Species Activity
Automated detectors
April-October 2019 Combined

Dec 2019 10874



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April 2019

Dec 2019

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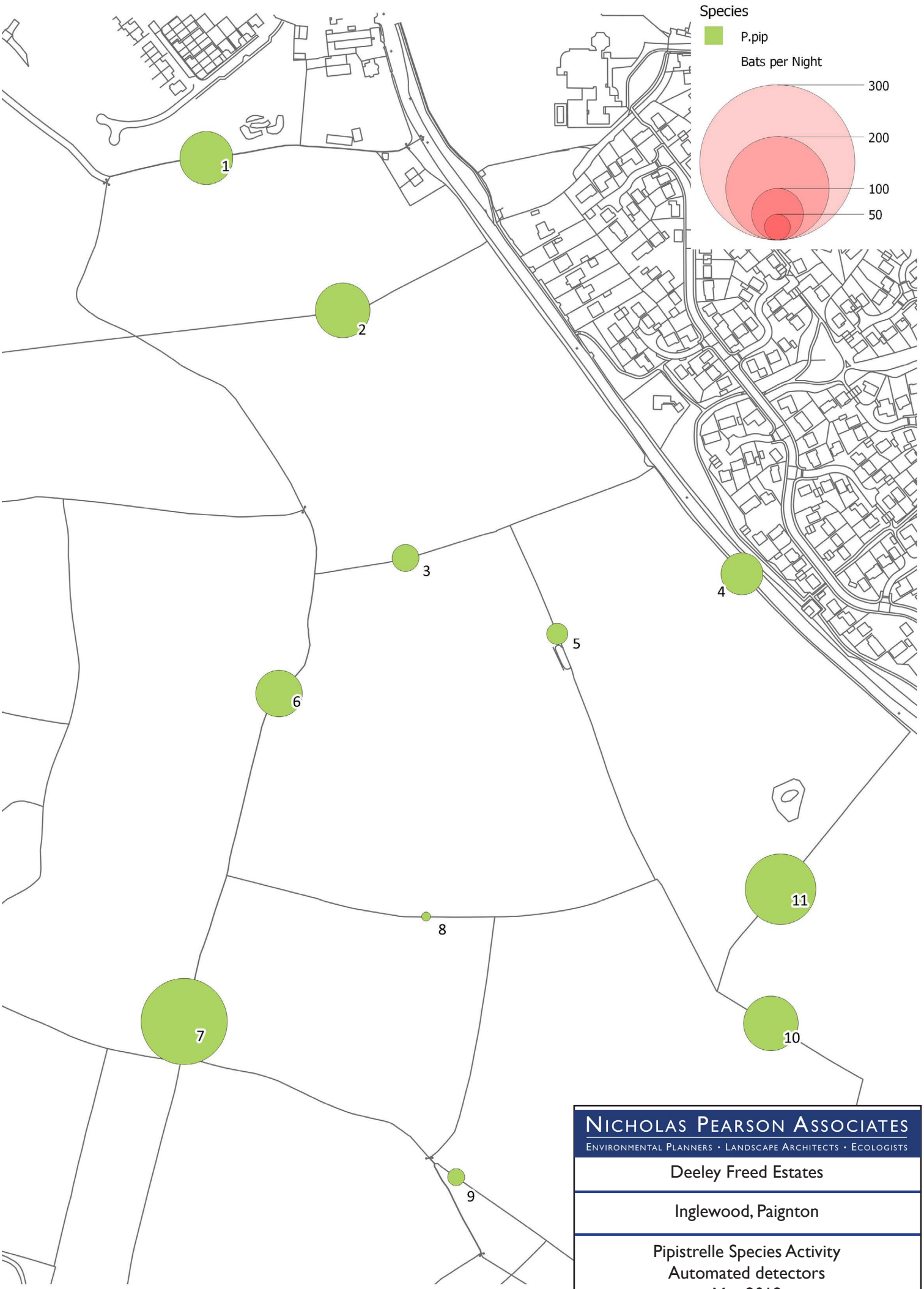

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Dec 2019

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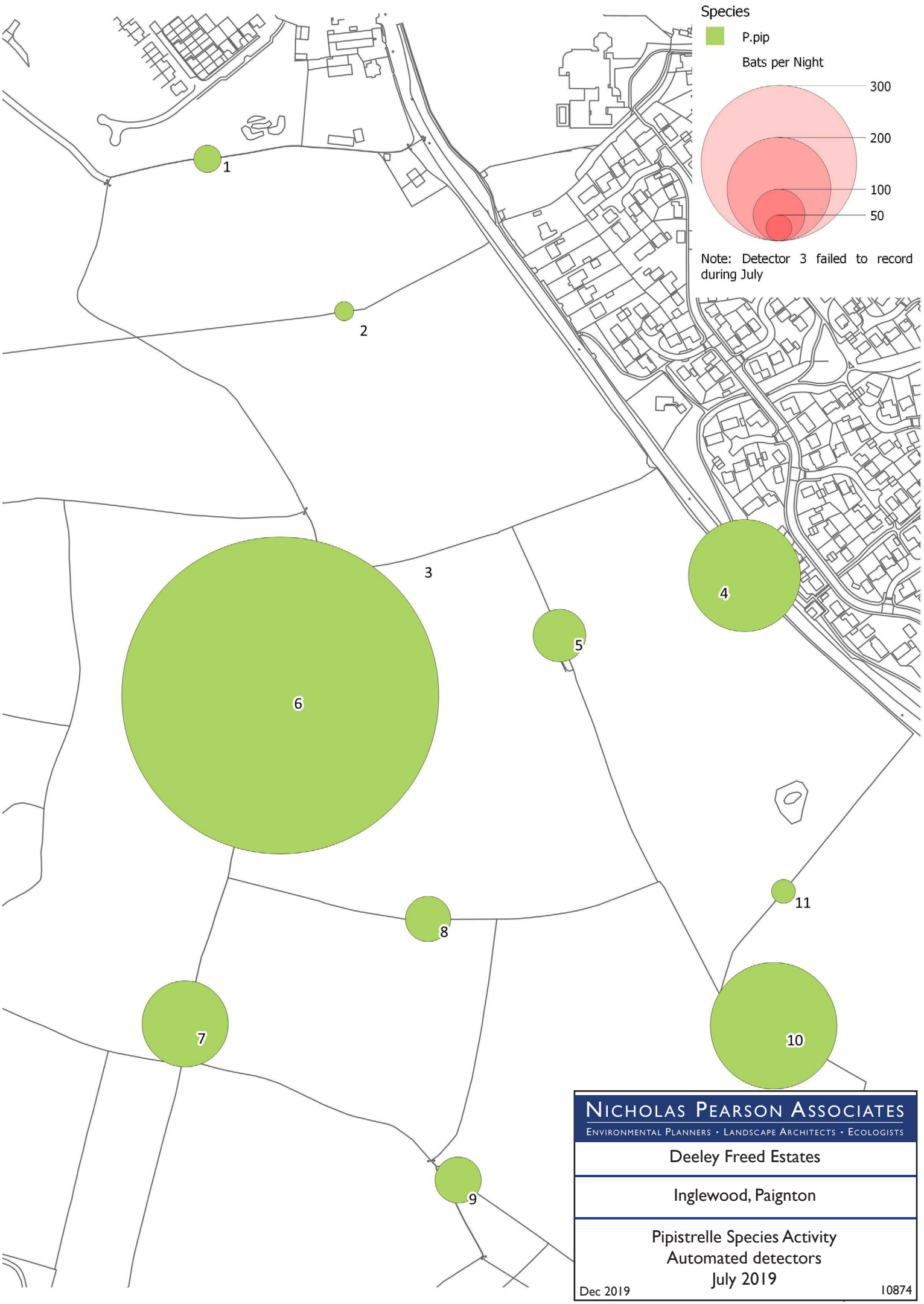

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July 2019

Dec 2019

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Pipistrelle Species Activity
Automated detectors
August 2019

Dec 2019

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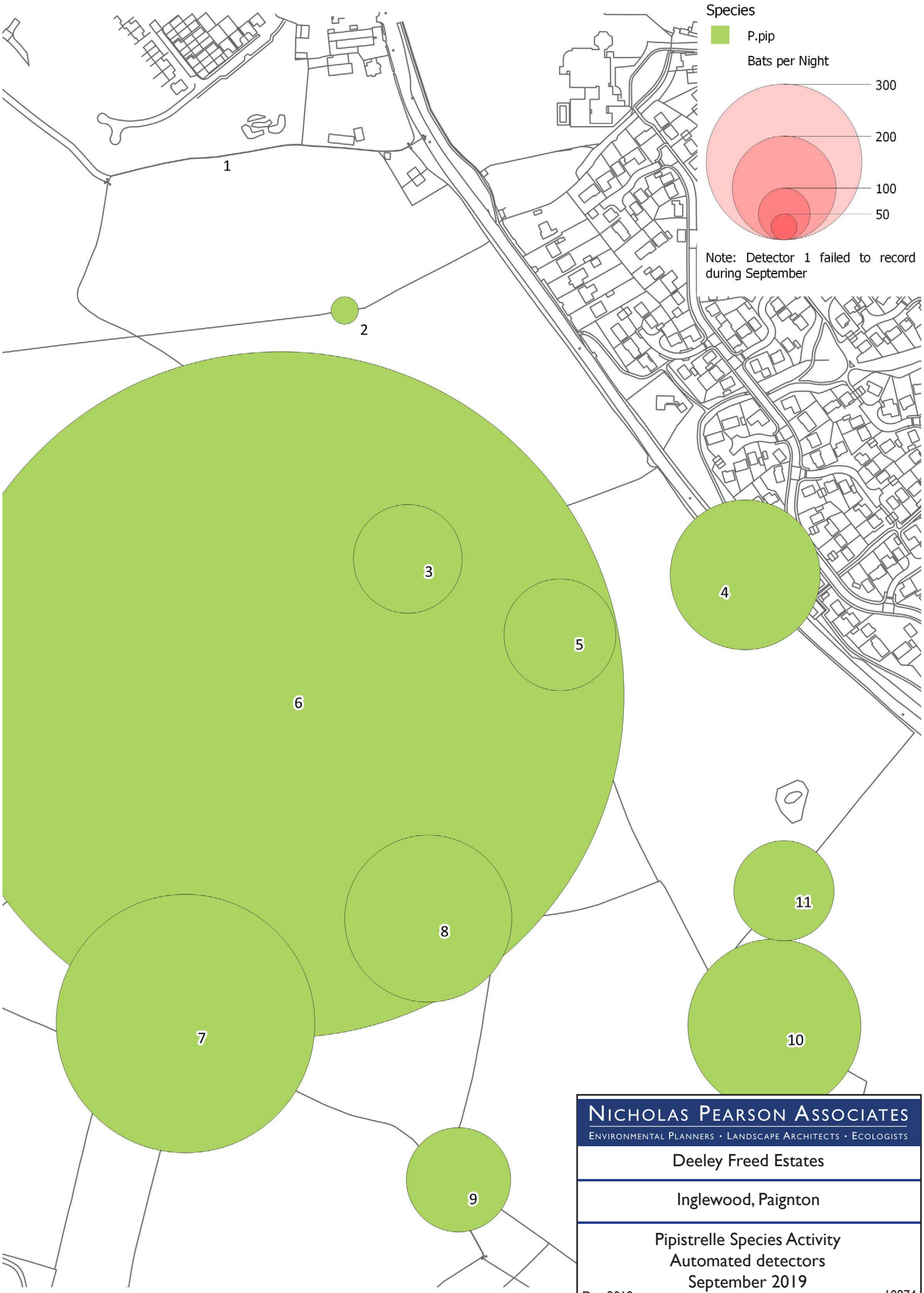

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Dec 2019

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Automated detectors
October 2019

Dec 2019

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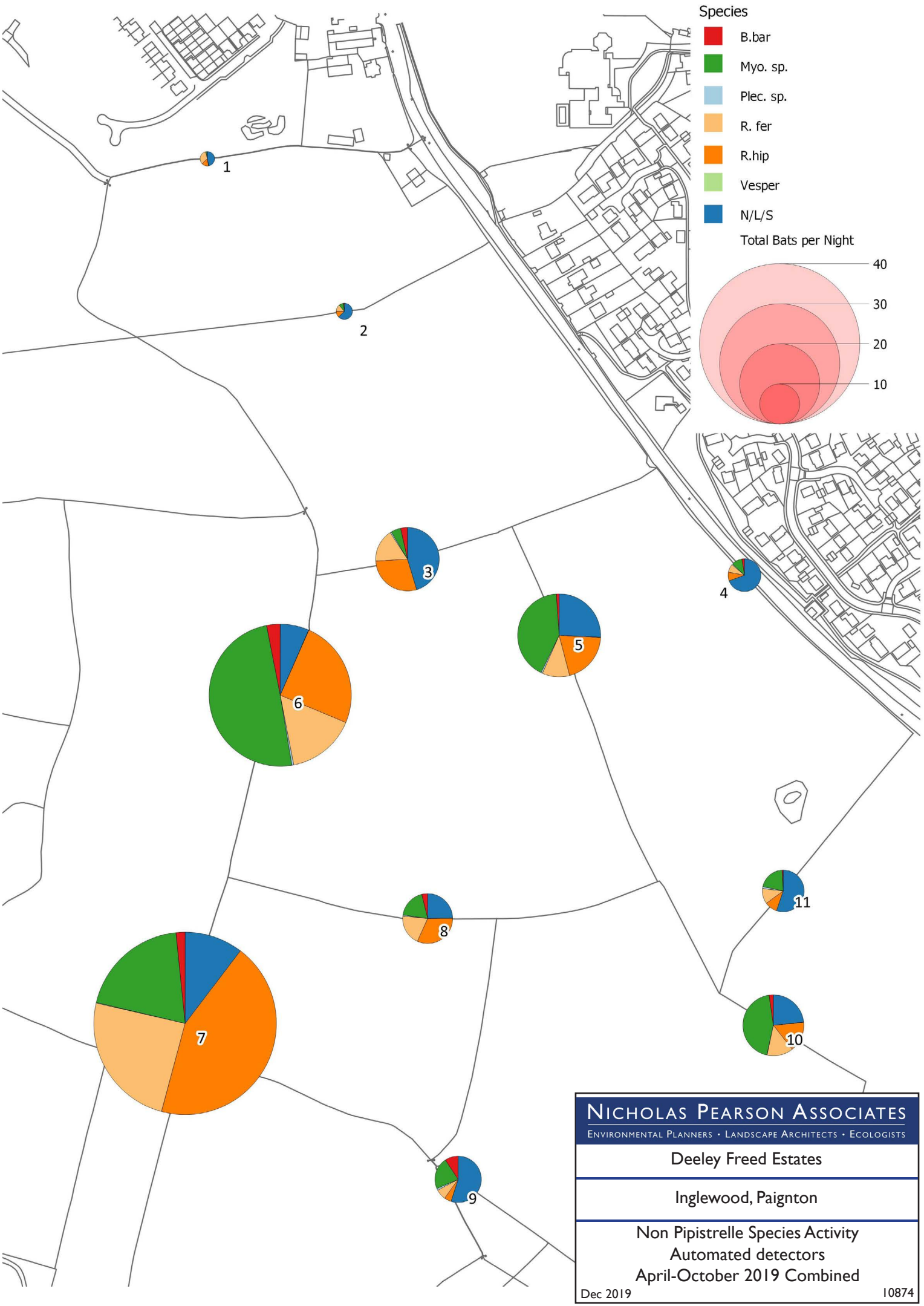

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Non Pipistrelle Species Activity
Automated detectors
April-October 2019 Combined

Dec 2019

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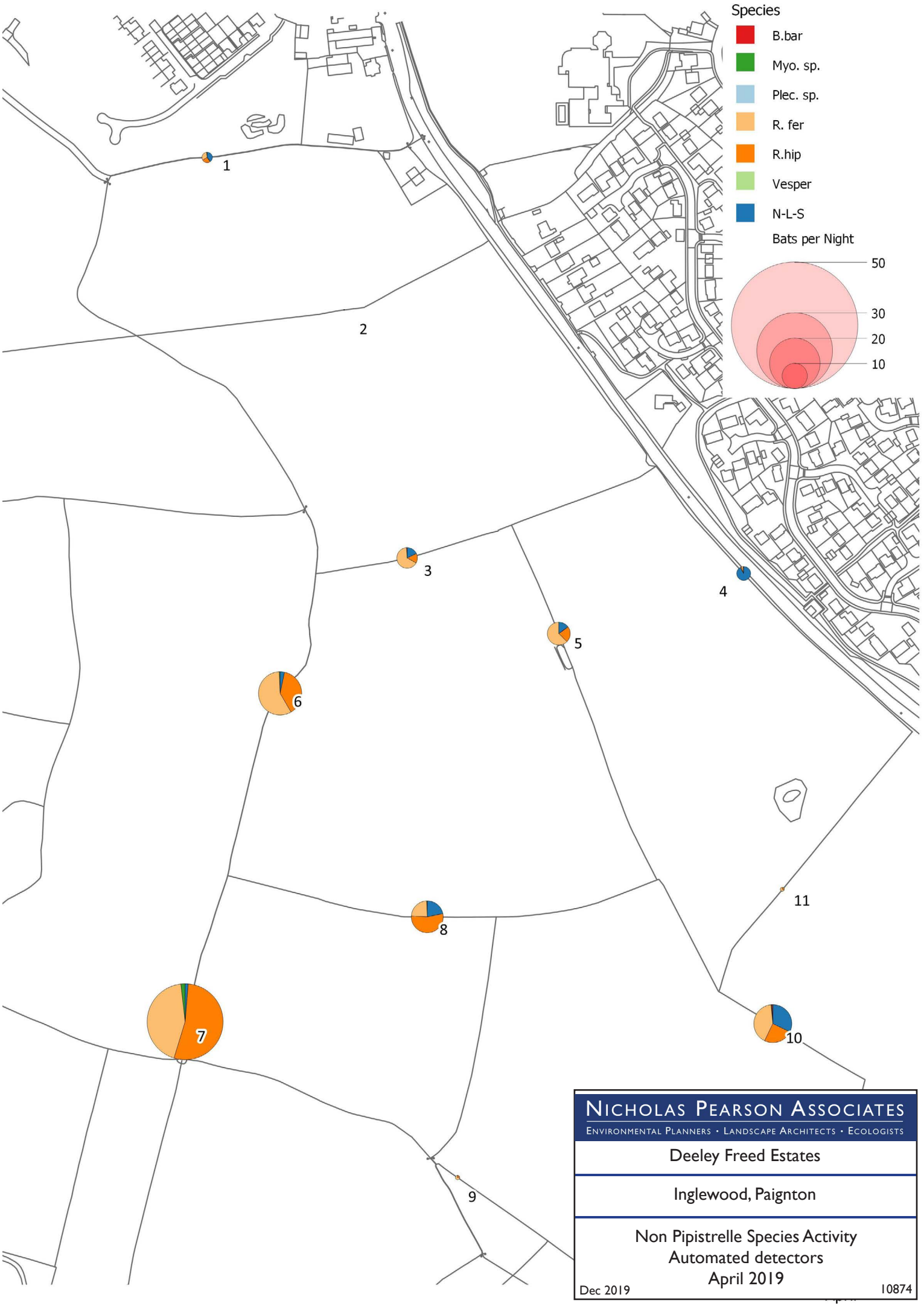

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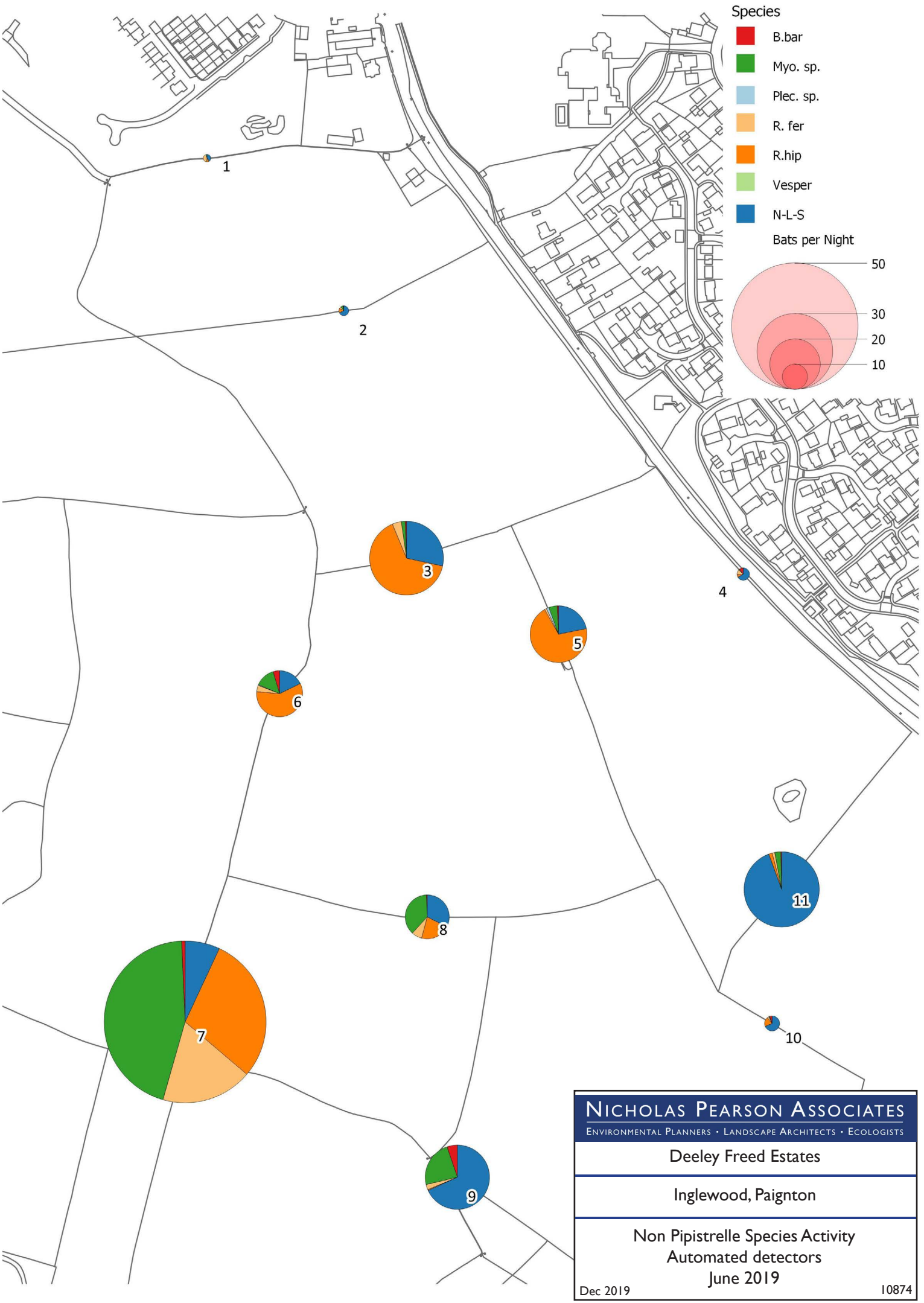

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June 2019

Dec 2019

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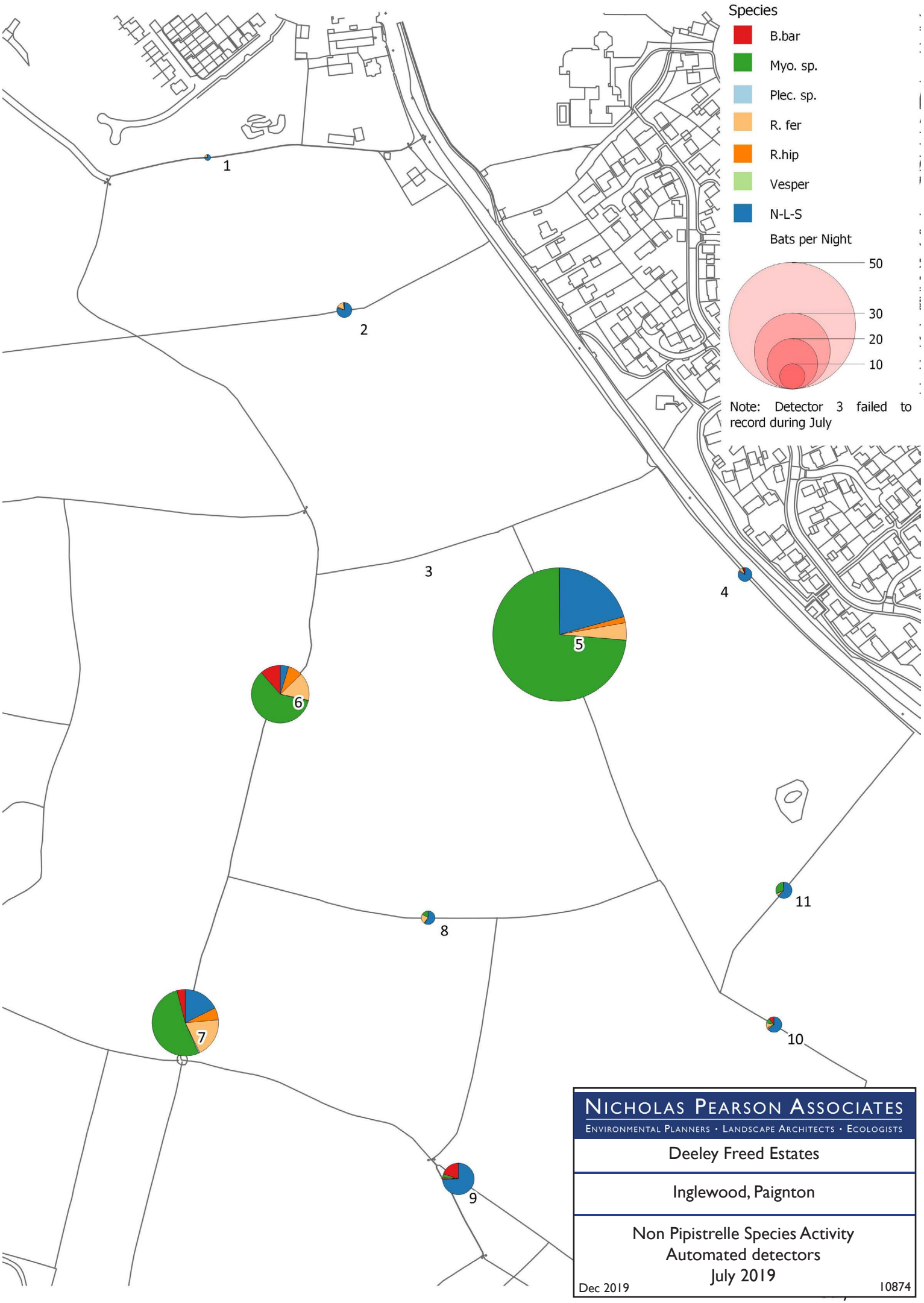

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Non Pipistrelle Species Activity
Automated detectors
July 2019

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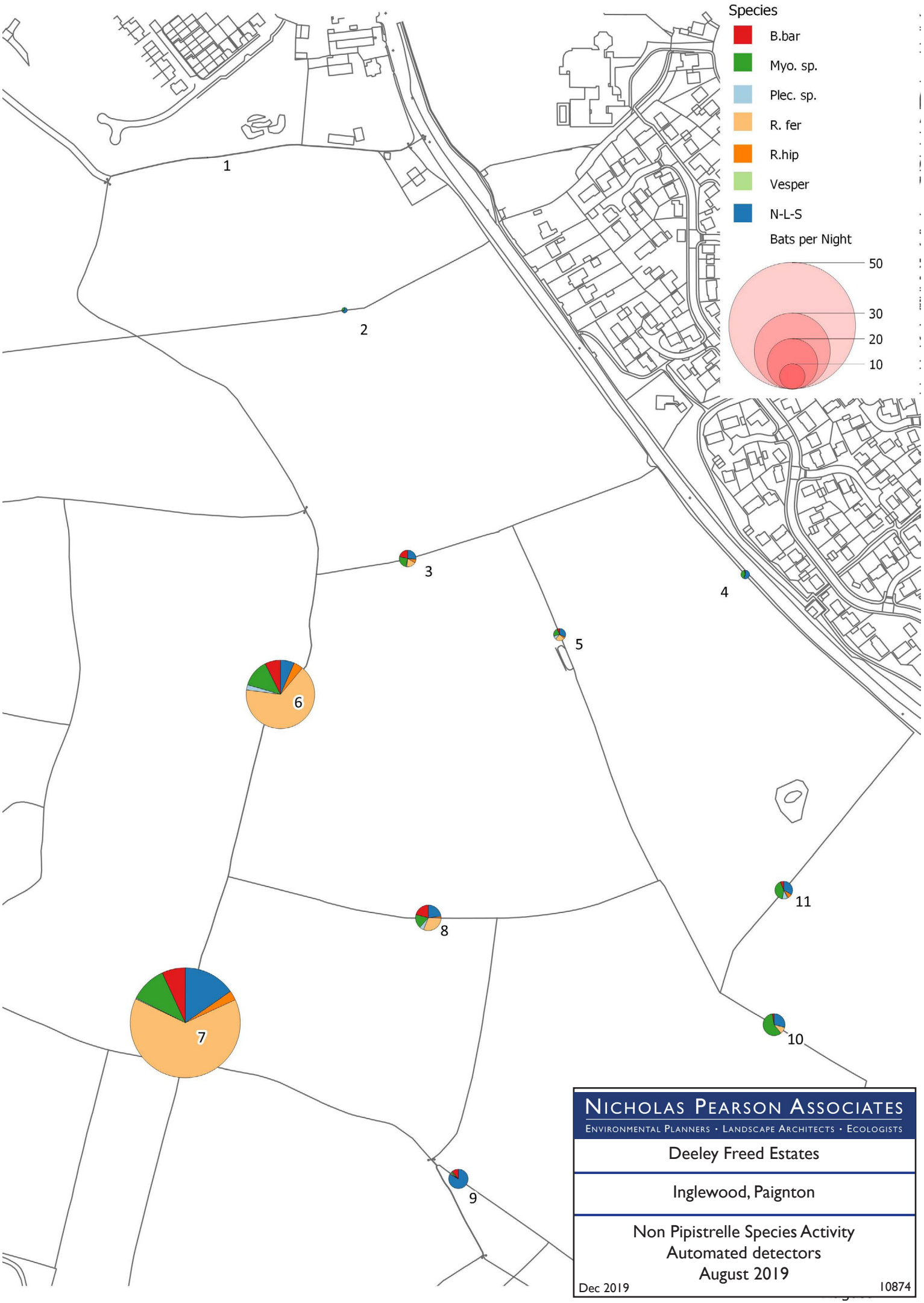

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Non Pipistrelle Species Activity
Automated detectors
August 2019

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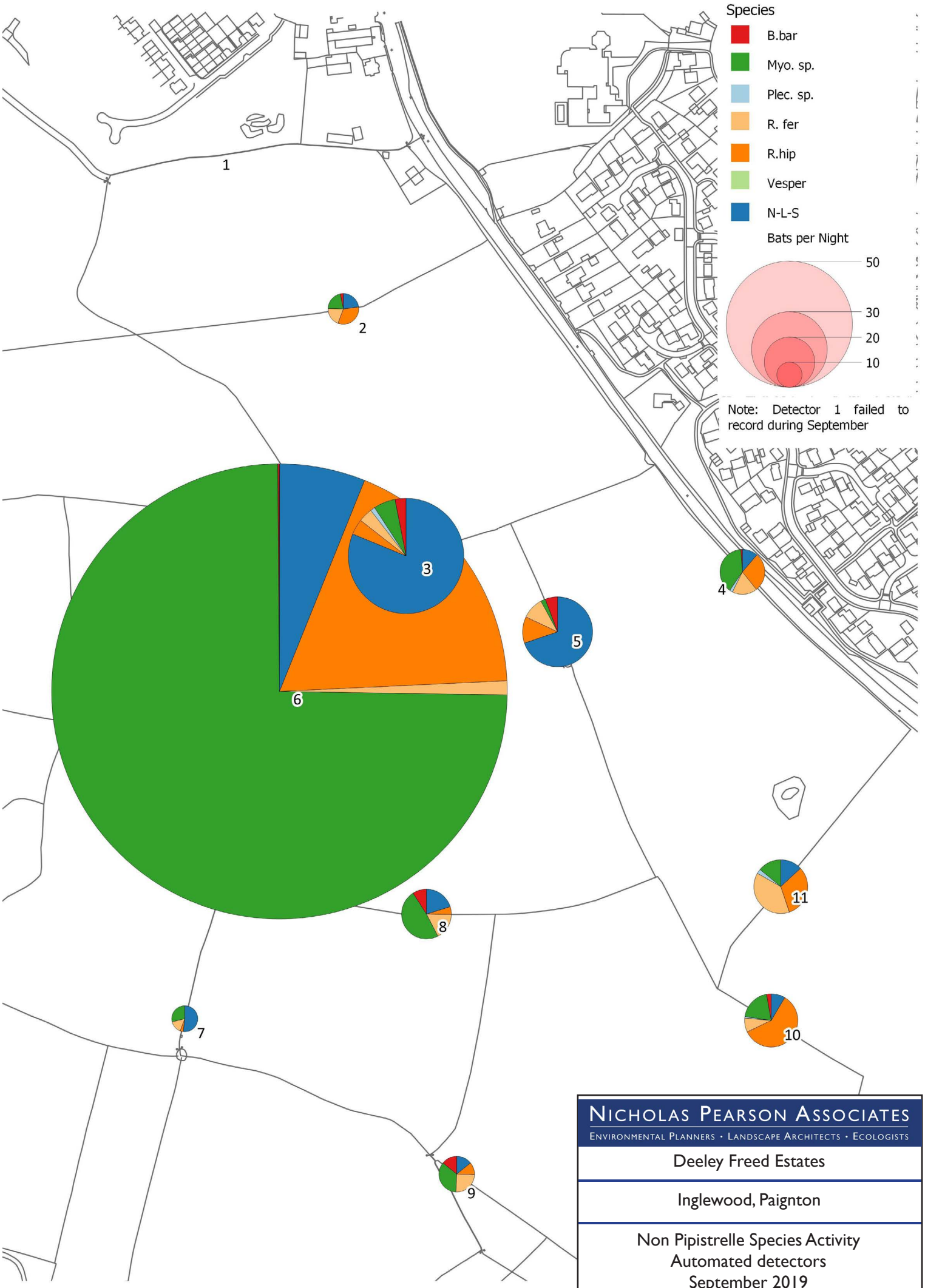

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Non Pipistrelle Species Activity
Automated detectors
September 2019

Dec 2019

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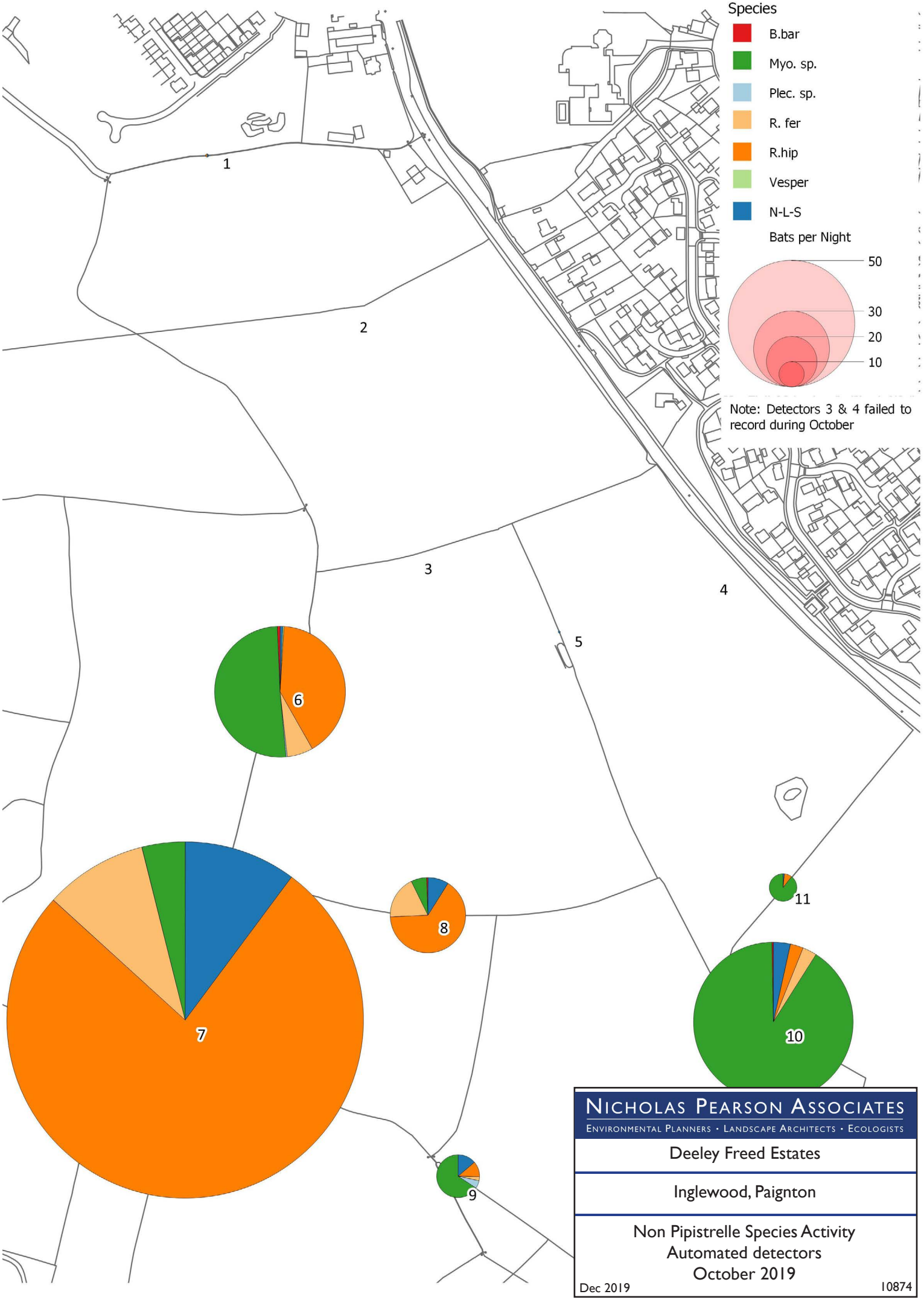

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Non Pipistrelle Species Activity
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October 2019

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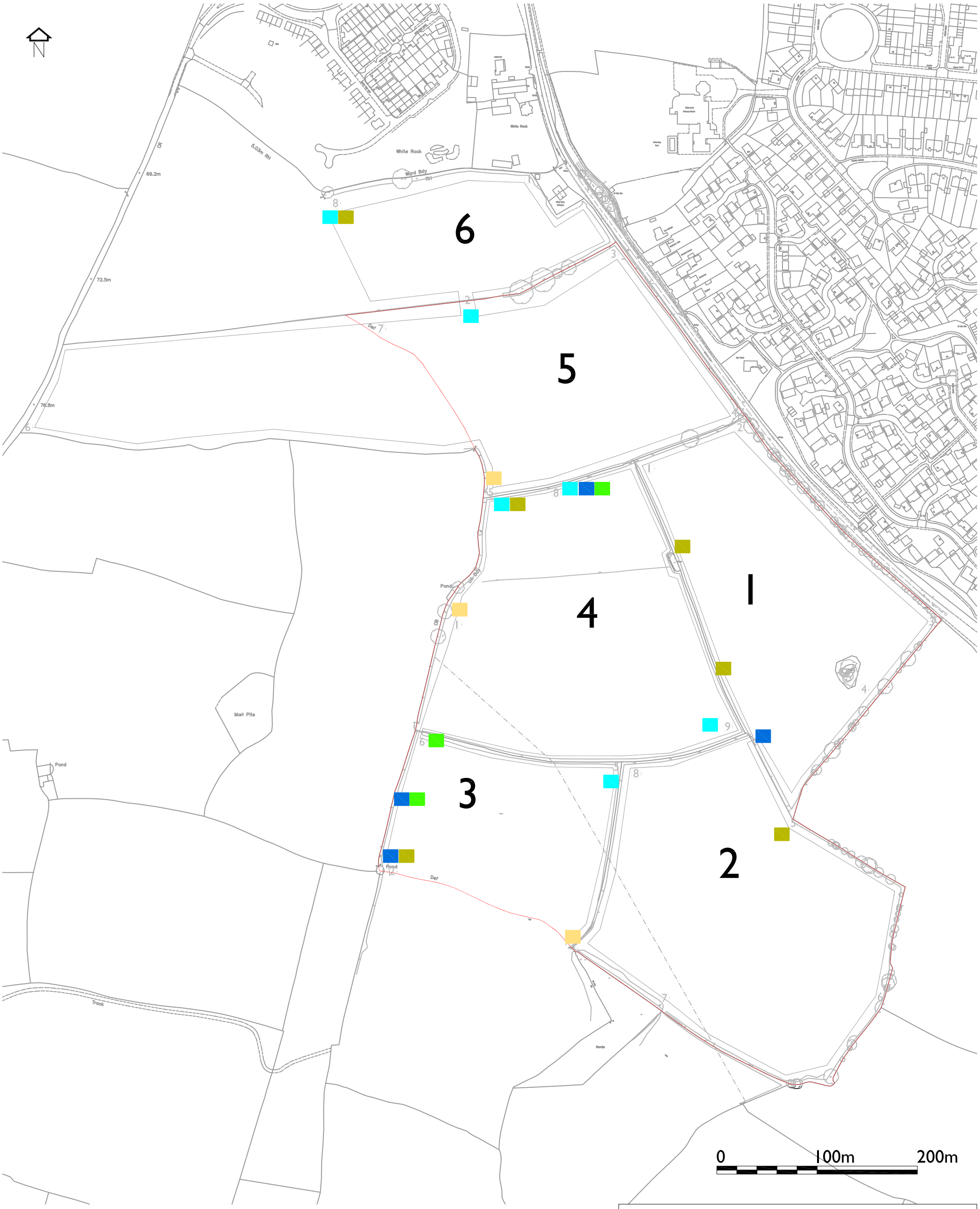

Planning application boundary

5 Field Reference

April

May

June

August

October

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Lesser Horseshoe Bats
Manual Records 2019

November 2019

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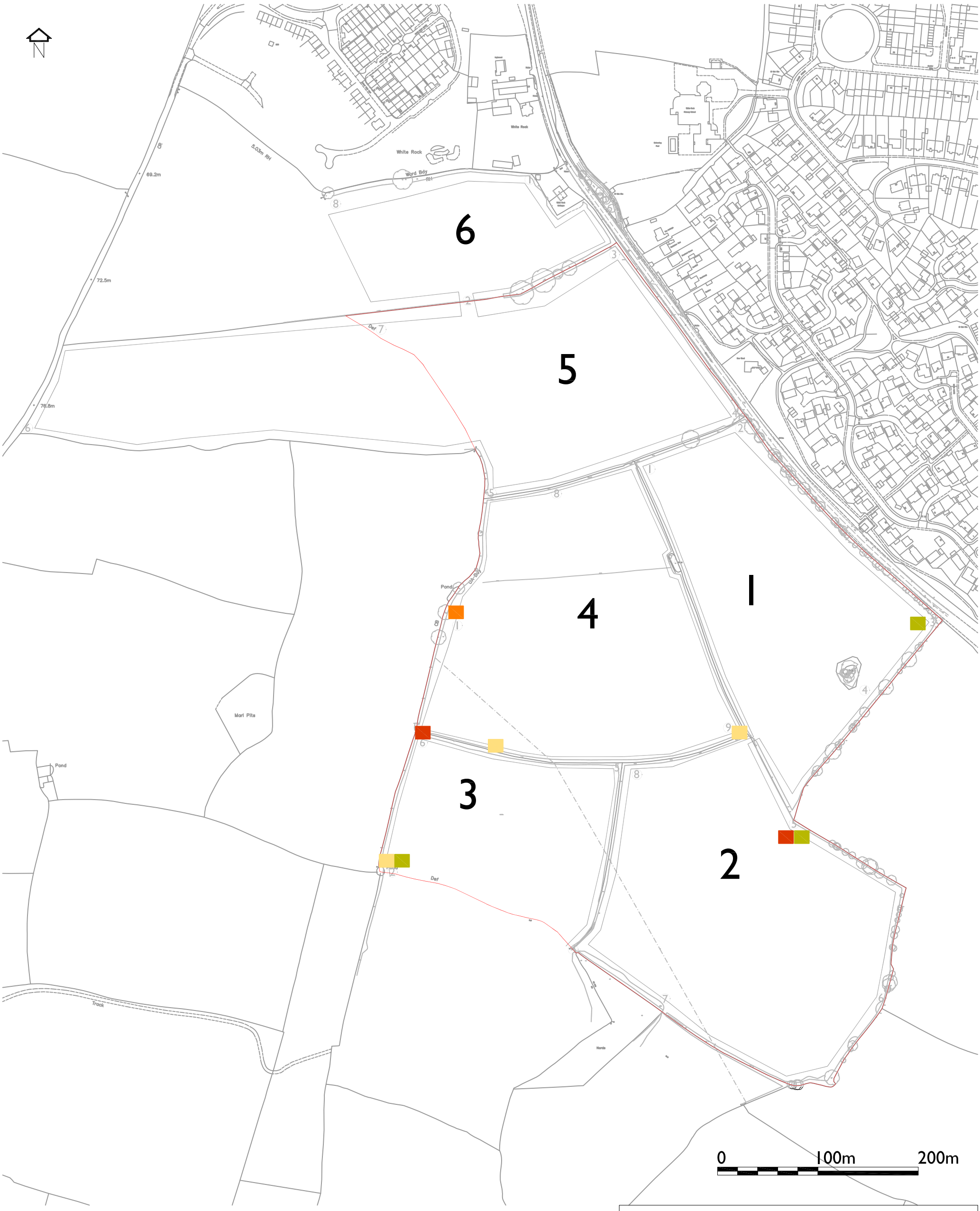

Planning application boundary

5 Field Reference

July

August

September

October

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Barbastelle Bats
Manual Records 2019

November 2019

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APPENDIX 1: Automated Records 2019 – Pivot Tables

Total Bats Per night (all months)

Location	No. Deployment Nights	*B.bar*	Myo. sp.	N-L-S	Pip. sp.	Plec. sp.	*R. fer*	*R.hip*	Vesper	Total
1	61	0.05	0.10	1.70	31.18	0.00	1.20	0.56	0.02	34.80
2	66	0.08	0.38	2.52	30.76	0.00	0.56	0.52	0.00	34.80
3	40	0.55	0.80	7.18	72.78	0.10	2.65	4.55	0.00	88.60
4	57	0.21	0.86	5.68	149.58	0.07	0.67	0.70	0.00	157.77
5	66	0.23	8.65	5.33	72.70	0.12	2.21	4.18	0.02	93.44
6	62	1.10	17.60	2.32	425.10	0.15	5.56	8.77	0.02	460.61
7	63	0.73	8.98	4.71	214.10	0.05	11.13	19.98	0.00	259.68
8	63	0.48	2.37	3.10	129.83	0.08	2.48	3.98	0.00	142.30
9	63	1.05	2.51	6.19	139.54	0.14	0.83	0.56	0.00	150.81
10	63	0.35	6.76	3.56	219.68	0.02	2.13	2.44	0.02	234.95
11	63	0.10	2.16	5.76	79.56	0.16	1.24	1.02	0.00	89.98
Total		4.91	51.16	48.05	1564.78	0.88	30.64	47.26	0.06	1747.76
% of overall activity		*0.28%*	*2.93%*	*2.75%*	*89.53%*	*0.05%*	*1.75%*	*2.70%*	*0.00%*	*100.00%*

Bats per Night: April

Location	No. Deployment Nights	*B.bar*	*Myo.* sp.	N-L-S	*Pip.* sp.	*Plec.* sp.	*R. fer*	*R.hip*	Vesper	Total
1	13(11th- 23rd)	0.00	0.08	1.62	11.31	0.00	1.31	1.08	0.08	15.46
2	13(11th- 23rd)	0.00	0.00	0.15	16.00	0.00	0.23	0.08	0.00	16.46
3	13(11th- 23rd)	0.08	0.00	1.46	32.15	0.00	5.38	1.23	0.00	40.31
4	13(11th- 23rd)	0.08	0.00	5.15	165.62	0.00	0.23	0.15	0.00	171.23
5	13(11th- 23rd)	0.00	0.00	1.31	39.08	0.00	5.69	2.00	0.08	48.15
6	13(11th- 19th)	0.00	0.11	0.56	57.44	0.00	9.89	6.56	0.00	74.56
7	13(11th- 23rd)	0.00	0.54	0.38	51.15	0.00	13.08	16.08	0.00	81.23
8	13(11th- 23rd)	0.00	0.08	2.77	19.46	0.00	3.00	6.85	0.00	32.15
9	13(11th- 23rd)	0.00	0.00	0.00	16.38	0.00	1.38	0.38	0.00	18.15
10	13(11th- 23rd)	0.15	0.08	4.85	86.77	0.00	6.23	3.77	0.00	101.85
11	13(11th- 23rd)	0.00	0.00	0.00	74.62	0.00	1.15	0.54	0.00	76.31
Total:		0.31	0.88	18.25	569.98	0.00	47.58	38.71	0.15	675.86
% of overall activity:		*0.05%*	*0.13%*	*2.70%*	*84.33%*	*0.00%*	*7.04%*	*5.73%*	*0.02%*	*100.00%*

Bats per Night: May										
Location	No. Deployment Nights	*B.bar*	*Myo.* sp.	N-L-S	*Pip.* sp.	*Plec.* sp.	*R. fer*	*R.hip*	Vesper	Total
1	7 (15th – 21st)	0.43	0.29	5.29	102.57	0.00	4.43	1.71	0.00	114.71
2	7 (15th – 21st)	0.14	0.14	5.14	106.00	0.00	0.71	0.57	0.00	112.71
3	7 (15th – 21st)	0.00	0.00	2.29	52.43	0.00	1.29	5.29	0.00	61.29
4	7 (15th – 21st)	0.14	0.00	19.29	81.43	0.00	1.00	1.14	0.00	103.00
5	7 (15th – 21st)	0.14	0.14	1.00	41.29	0.00	1.86	4.43	0.00	48.86
6	7 (15th – 21st)	0.00	0.43	1.71	90.43	0.00	0.86	4.00	0.00	97.43
7	7 (15th – 21st)	0.00	2.29	2.00	167.29	0.00	2.43	28.29	0.00	202.29
8	7 (15th – 21st)	0.00	0.00	0.86	17.43	0.00	1.43	0.43	0.00	20.14
9	7 (15th – 21st)	0.14	0.57	2.86	33.57	0.00	1.00	0.86	0.00	39.00
10	7 (15th – 21st)	0.14	0.57	3.14	106.14	0.00	2.00	2.57	0.14	114.71
11	7 (15th – 21st)	0.00	0.29	2.43	136.86	0.00	2.00	1.00	0.00	142.57
Total:		1.14	4.71	46.00	935.43	0.00	19.00	50.29	0.14	1056.71
% of overall activity:		*0.11%*	*0.45%*	*4.35%*	*88.52%*	*0.00%*	*1.80%*	*4.76%*	*0.01%*	*100.00%*

Bats per Night: June										
Location	No. Deployment Nights	*B.bar*	*Myo.* sp.	N-L-S	*Pip.* sp.	*Plec.* sp.	*R. fer*	*R.hip*	Vesper	Total
1	12 (12th- 23rd)	0.00	0.17	1.25	18.25	0.00	1.33	0.33	0.00	21.33
2	12 (12th- 23rd)	0.08	0.33	2.67	15.42	0.00	0.25	0.58	0.00	19.33
3	6 (12th- 17th)	0.17	0.50	8.33	133.17	0.00	1.17	19.17	0.00	162.50
4	9 (12th- 20th)	0.56	0.11	3.33	25.11	0.00	0.67	0.33	0.00	30.11
5	12 (12th- 23rd)	0.17	1.08	4.92	47.33	0.33	0.25	15.75	0.00	69.83
6	12 (12th- 23rd)	0.83	2.58	3.25	493.42	0.08	0.83	10.75	0.00	511.75
7	9 (12th- 20th)	0.44	28.78	4.44	545.33	0.00	11.67	18.78	0.00	609.44
8	9 (12th- 20th)	0.11	6.56	5.67	383.44	0.00	1.33	3.78	0.00	400.89
9	9 (12th- 20th)	1.33	6.00	17.44	362.89	0.00	0.67	0.11	0.00	388.44
10	9 (12th- 20th)	0.33	0.11	4.11	64.78	0.00	0.22	1.22	0.00	70.78
11	9 (12th- 20th)	0.11	0.78	28.22	49.56	0.00	0.33	0.44	0.00	79.44
Total:		4.14	47.00	83.64	2138.69	0.42	18.72	71.25	0.00	2363.86
% of overall activity:		*0.18%*	*1.99%*	*3.54%*	*90.47%*	*0.02%*	*0.79%*	*3.01%*	*0.00%*	*100.00%*

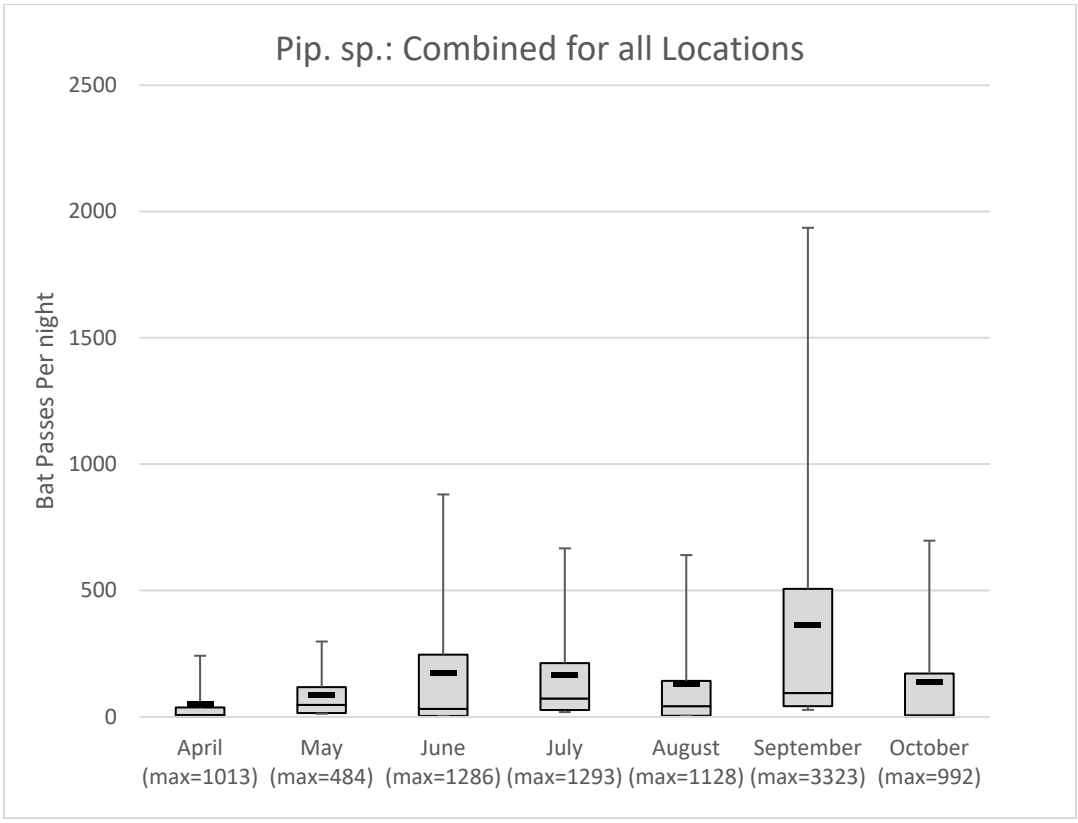
Bats per Night: July										
Location	No. Deployment Nights	*B.bar*	*Myo.* sp.	N-L-S	*Pip.* sp.	*Plec.* sp.	*R. fer*	*R.hip*	Vesper	Total
1	14 (9th- 22nd)	0.00	0.07	1.86	52.79	0.00	0.50	0.00	0.00	55.21
2	14 (9th- 22nd)	0.07	0.07	4.86	37.50	0.00	0.93	0.14	0.00	43.57
3	0	-	-	-	-	-	-	-	-	-
4	14 (9th- 22nd)	0.21	0.07	4.64	216.64	0.07	0.43	0.14	0.00	222.21
5	14 (9th- 22nd)	0.07	38.86	10.93	101.86	0.00	2.21	0.79	0.00	154.71
6	14 (9th- 22nd)	2.64	13.71	1.07	611.93	0.07	3.57	1.86	0.00	634.86
7	14 (9th- 22nd)	1.07	13.86	4.64	166.71	0.14	5.07	1.57	0.00	193.07
8	14 (9th- 22nd)	0.00	0.93	3.21	87.43	0.00	1.21	0.07	0.00	92.86
9	14 (9th- 22nd)	2.50	0.43	9.36	89.57	0.14	0.00	0.14	0.00	102.14
10	14 (9th- 22nd)	0.71	0.64	4.07	244.43	0.00	0.64	0.21	0.00	250.71
11	14 (9th- 22nd)	0.07	1.93	4.00	46.07	0.07	0.29	0.07	0.00	52.50
Total:		7.36	70.57	48.64	1654.93	0.50	14.86	5.00	0.00	1801.86
% of overall activity:		*0.41%*	*3.92%*	*2.70%*	*91.85%*	*0.03%*	*0.82%*	*0.28%*	*0.00%*	*100.00%*

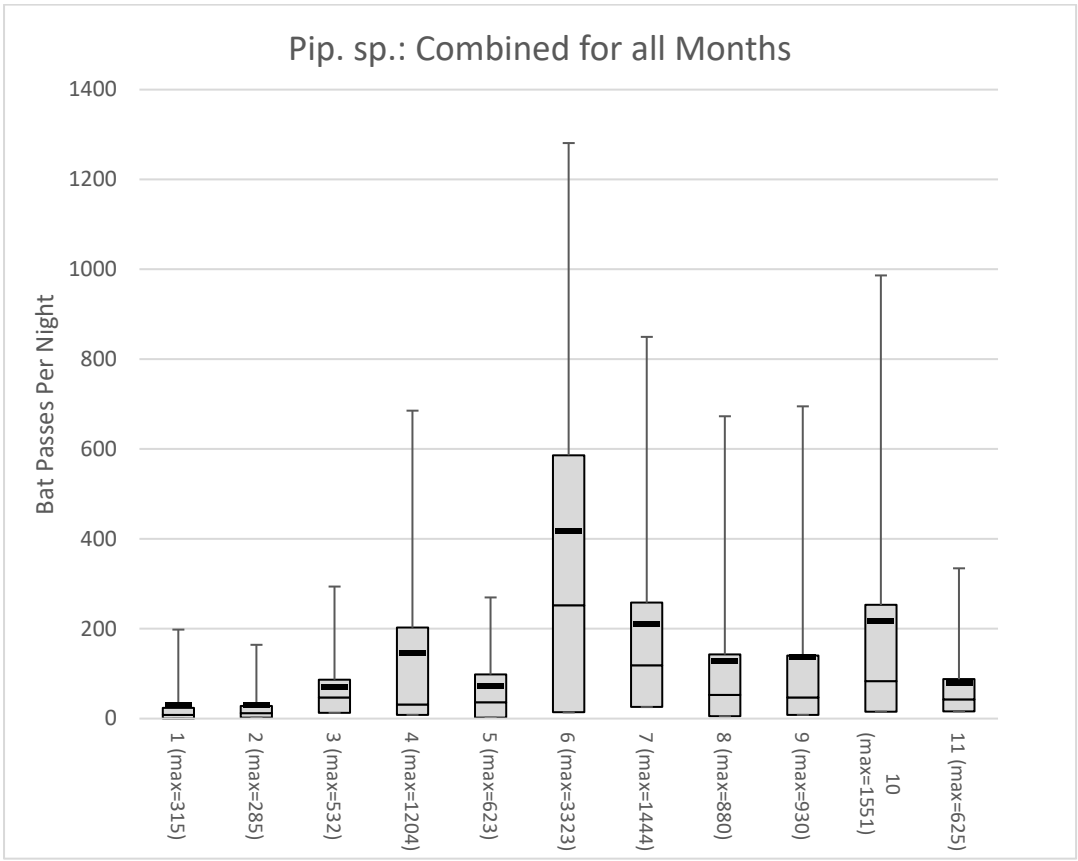
Bats per Night: August										
Location	No. Deployment Nights	*B.bar*	*Myo.* sp.	N-L-S	*Pip.* sp.	*Plec.* sp.	*R. fer*	*R.hip*	Vesper	Total
1	9 (5th- 13th)	0.00	0.00	0.11	6.00	0.00	0.22	0.00	0.00	6.33
2	9 (5th- 13th)	0.00	0.67	1.44	8.89	0.00	0.11	0.00	0.00	11.11
3	9 (5th- 13th)	1.44	1.67	1.78	31.00	0.11	1.22	0.44	0.00	37.67
4	9 (5th- 13th)	0.11	1.33	1.89	122.11	0.11	0.00	0.00	0.00	125.56
5	9 (5th- 13th)	0.33	1.11	1.56	100.89	0.44	1.22	0.22	0.00	105.78
6	9 (5th- 13th)	2.00	3.56	1.78	374.22	0.67	17.89	1.22	0.00	401.33
7	9 (5th- 13th)	3.00	4.67	6.67	85.22	0.11	27.89	1.22	0.00	128.78
8	9 (5th- 13th)	2.11	1.78	2.33	126.44	0.56	3.11	0.22	0.00	136.56
9	9 (5th- 13th)	0.89	0.22	6.44	63.89	0.11	0.00	0.11	0.00	71.67
10	9 (5th- 13th)	0.22	5.11	2.56	455.44	0.00	0.89	0.00	0.00	464.22
11	9 (5th- 13th)	0.44	2.89	2.33	43.44	0.67	0.11	0.56	0.00	50.44
Total:		10.56	23.00	28.89	1417.56	2.78	52.67	4.00	0.00	1539.44
% of overall activity:		*0.69%*	*1.49%*	*1.88%*	*92.08%*	*0.18%*	*3.42%*	*0.26%*	*0.00%*	*100.00%*

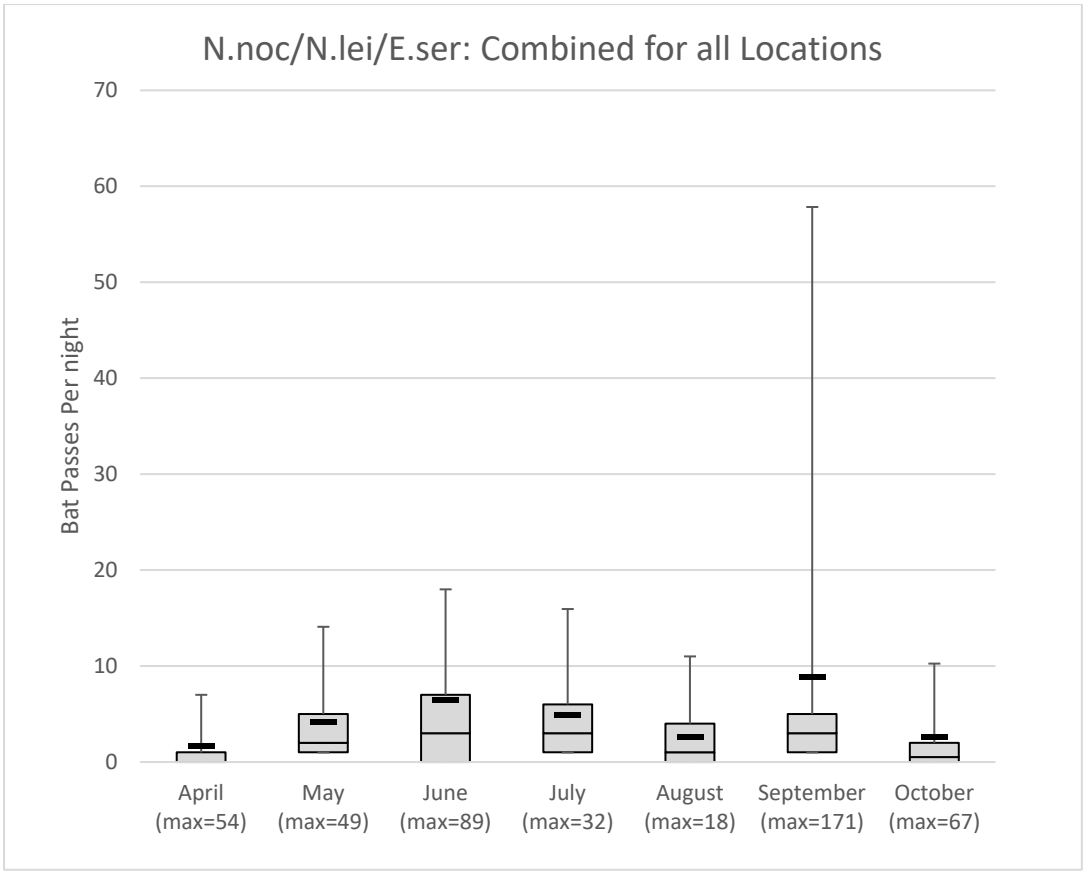
Bats per Night: September										
Location	No. Deployment Nights	*B.bar*	*Myo.* sp.	N-L-S	*Pip.* sp.	*Plec.* sp.	*R. fer*	*R.hip*	Vesper	Total
1	0	-	-	-	-	-	-	-	-	-
2	5 (12th - 16th)	0.40	2.60	2.80	53.00	0.00	2.40	4.00	0.00	65.20
3	5 (12th - 16th)	1.40	2.80	37.20	209.60	0.60	1.80	2.00	0.00	255.40
4	5 (12th - 16th)	0.20	7.00	2.00	289.00	0.40	3.20	5.00	0.00	306.80
5	5 (12th - 16th)	1.60	0.60	19.40	216.00	0.00	2.80	3.40	0.00	243.80
6	5 (12th - 16th)	0.20	134.80	11.00	1322.80	0.00	1.80	32.80	0.00	1503.40
7	5 (12th - 16th)	0.00	3.00	5.40	498.60	0.00	1.60	0.40	0.00	509.00
8	5 (12th - 16th)	1.80	9.60	4.00	322.00	0.00	3.40	1.00	0.00	341.80
9	5 (12th - 16th)	2.00	5.00	2.00	201.40	0.00	3.60	1.60	0.00	215.60
10	5 (12th - 16th)	0.60	4.20	1.80	333.20	0.20	1.80	12.60	0.00	354.40
11	5 (12th - 16th)	0.00	3.00	2.80	193.60	0.60	8.20	6.80	0.00	215.00
Total:		8.20	172.60	88.40	3639.20	1.80	30.60	69.60	0.00	4010.40
% of overall activity:		*0.20%*	*4.30%*	*2.20%*	*90.74%*	*0.04%*	*0.76%*	*1.74%*	*0.00%*	*100.00%*

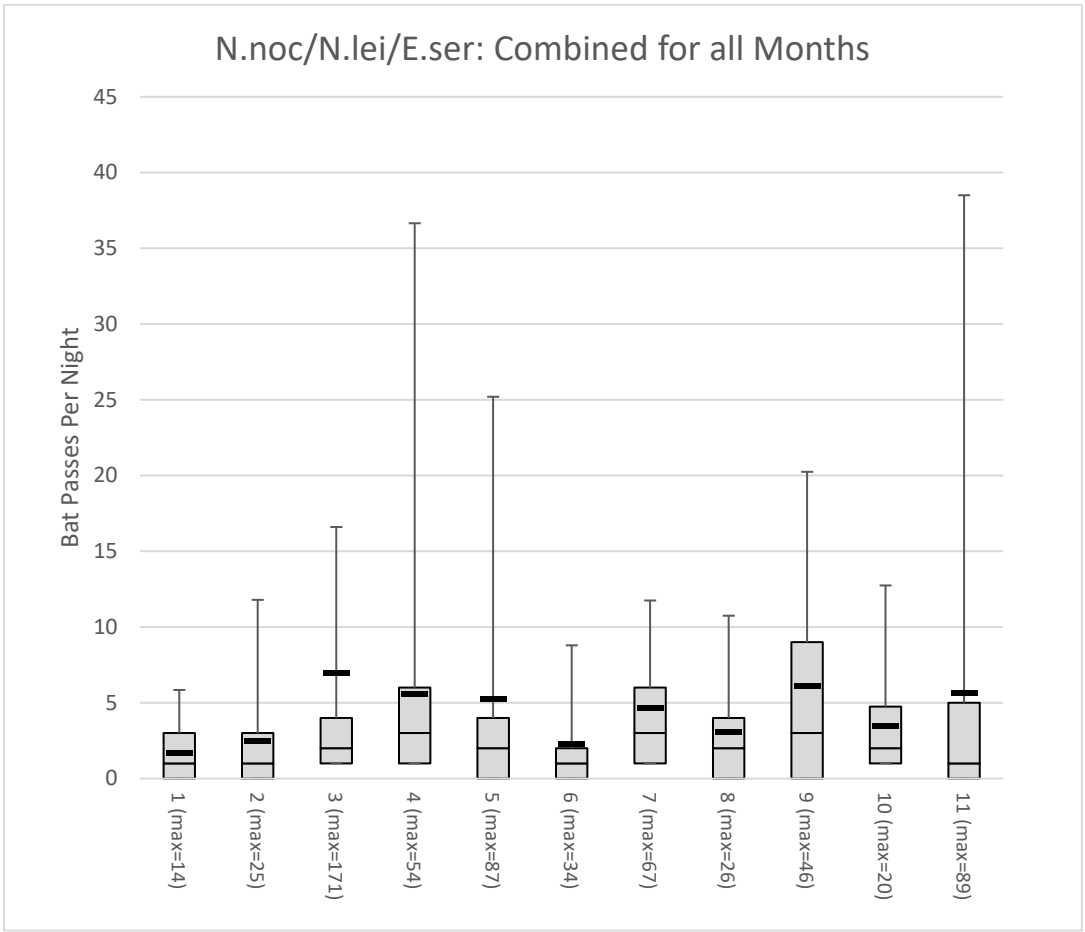
Bats per Night: October										
Location	No. Deployment Nights	*B.bar*	*Myo.* sp.	N-L-S	*Pip.* sp.	*Plec.* sp.	*R. fer*	*R.hip*	Vesper	Total
1	6 (8th - 13th)	0.00	0.00	0.67	4.17	0.00	0.00	0.67	0.00	5.50
2	6 (8th - 13th)	0.00	0.00	0.17	4.17	0.00	0.00	0.00	0.00	4.33
3	0	-	-	-	-	-	-	-	-	-
4	0	-	-	-	-	-	-	-	-	-
5	6 (8th - 13th)	0.00	0.00	0.83	3.17	0.00	0.00	0.00	0.00	4.00
6	6 (8th - 13th)	0.33	26.33	0.33	122.67	0.17	3.33	21.17	0.17	174.50
7	6 (8th - 13th)	0.00	5.50	14.33	191.67	0.00	13.17	108.00	0.00	332.67
8	6 (8th - 13th)	0.17	2.00	2.67	63.50	0.00	5.50	19.50	0.00	93.33
9	6 (8th - 13th)	0.00	11.17	2.33	373.50	1.00	0.50	2.00	0.00	390.50
10	6 (8th - 13th)	0.17	57.33	2.17	366.50	0.00	1.83	1.67	0.00	429.67
11	6 (8th - 13th)	0.00	9.83	0.17	105.67	0.00	0.00	1.00	0.00	116.67
Total:		0.67	112.17	23.67	1235.00	1.17	24.33	154.00	0.17	1551.17
% of overall activity:		*0.04%*	*7.23%*	*1.53%*	*79.62%*	*0.08%*	*1.57%*	*9.93%*	*0.01%*	*100.00%*

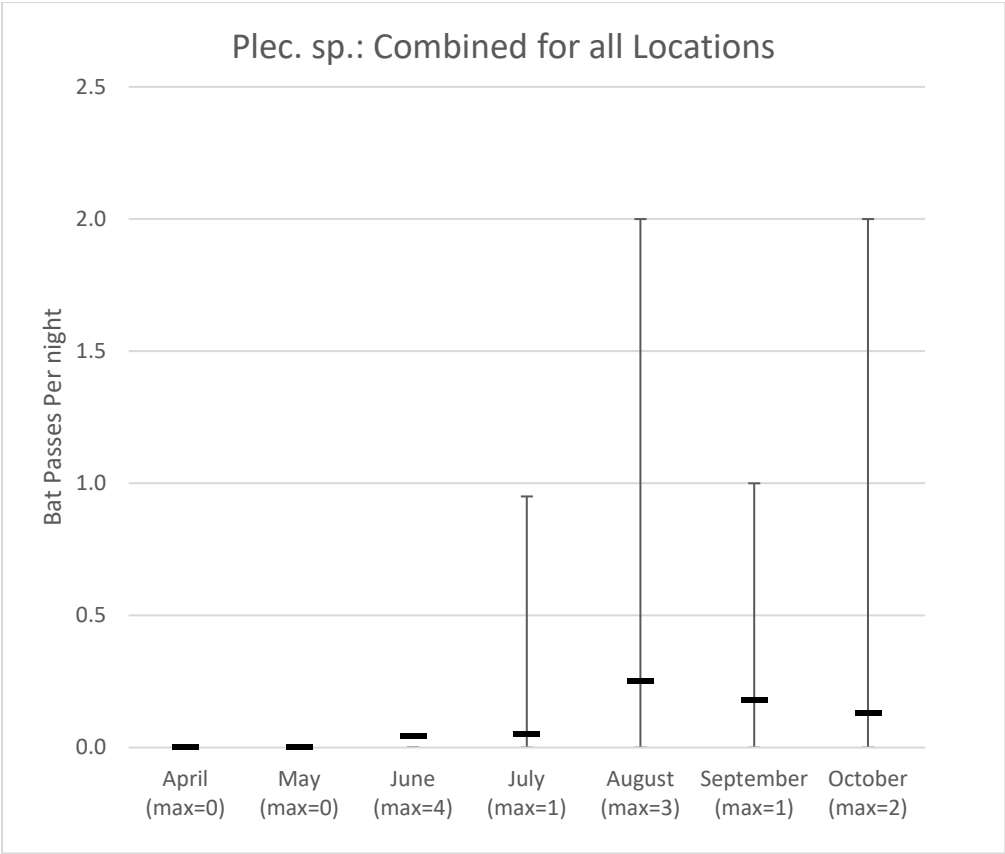
APPENDIX II: Automated Records 2019 – Box Plots for each Species

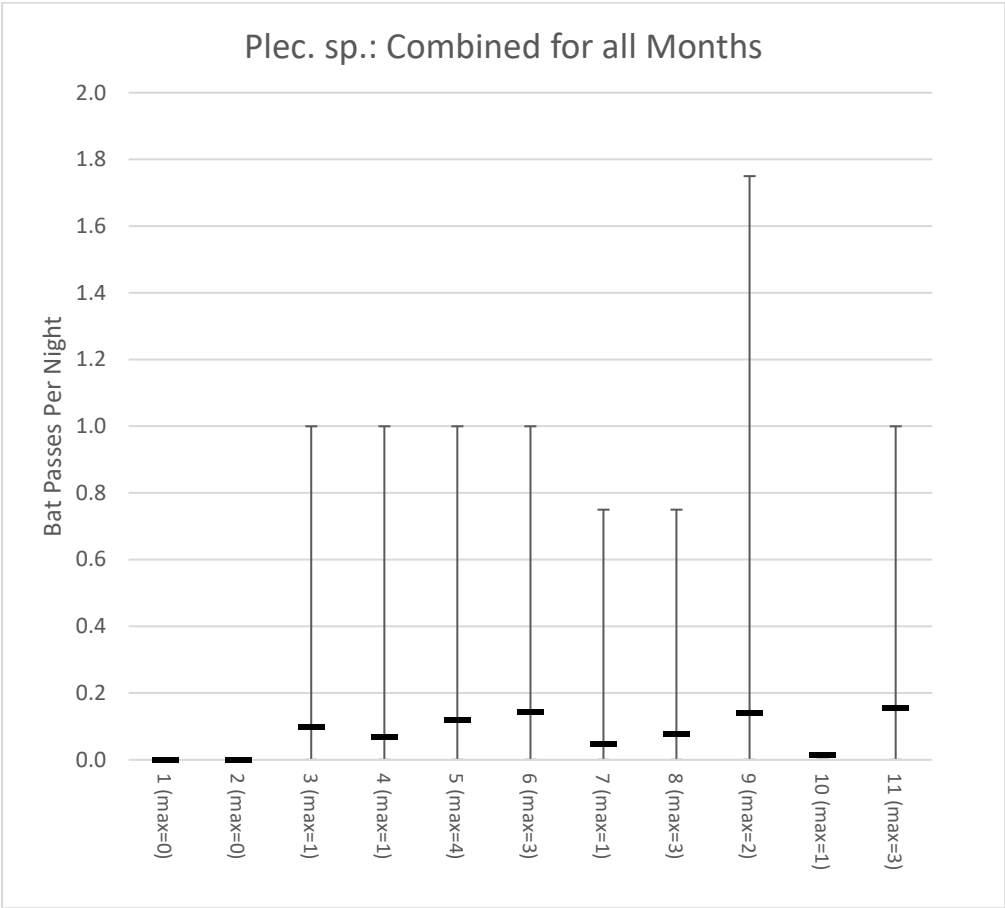

Pip. sp.: Combined for all Locations
Bat Passes Per night
2500
2000
1500
1000
500
0
April (max=1013)
May (max=484)
June (max=1286)
July (max=1293)
August (max=1128)
September (max=3323)
October (max=992)

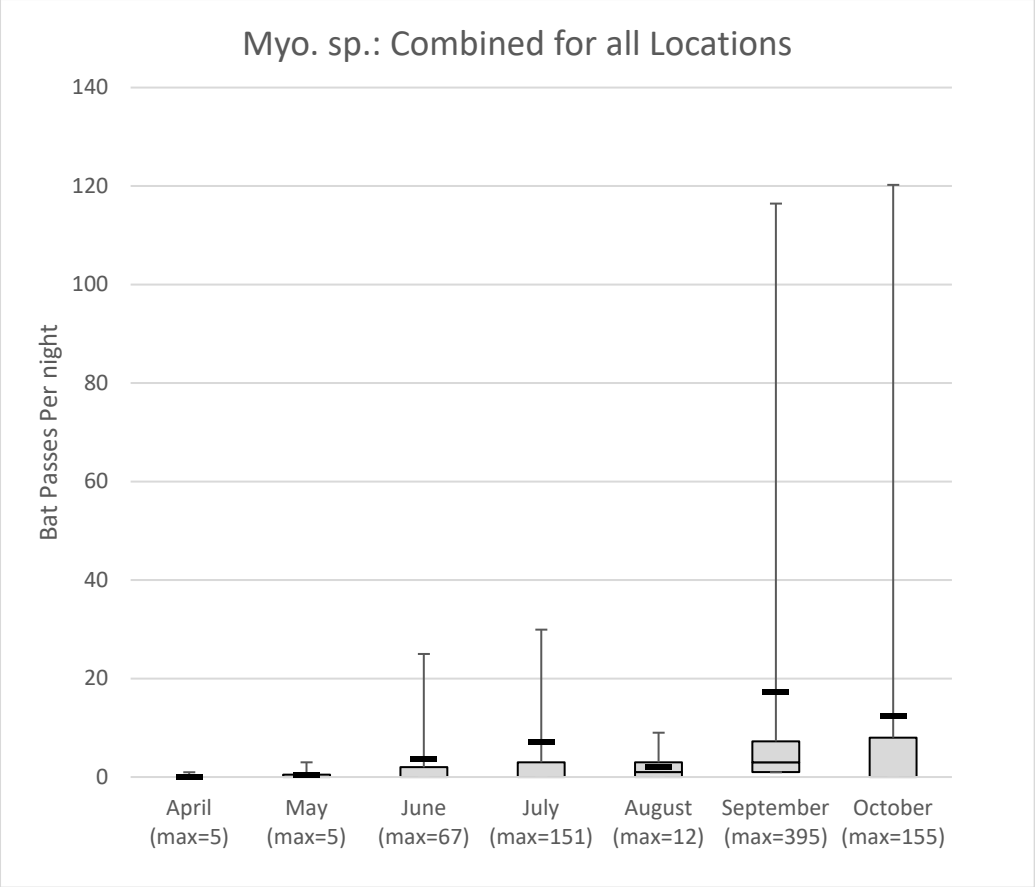

Pip. sp.: Combined for all Months
Bat Passes Per Night
1400
1200
1000
800
600
400
200
0
1 (max=315)
2 (max=285)
3 (max=532)
4 (max=1204)
5 (max=623)
6 (max=3323)
7 (max=1444)
8 (max=880)
9 (max=930)
10 (max=1551)
11 (max=625)

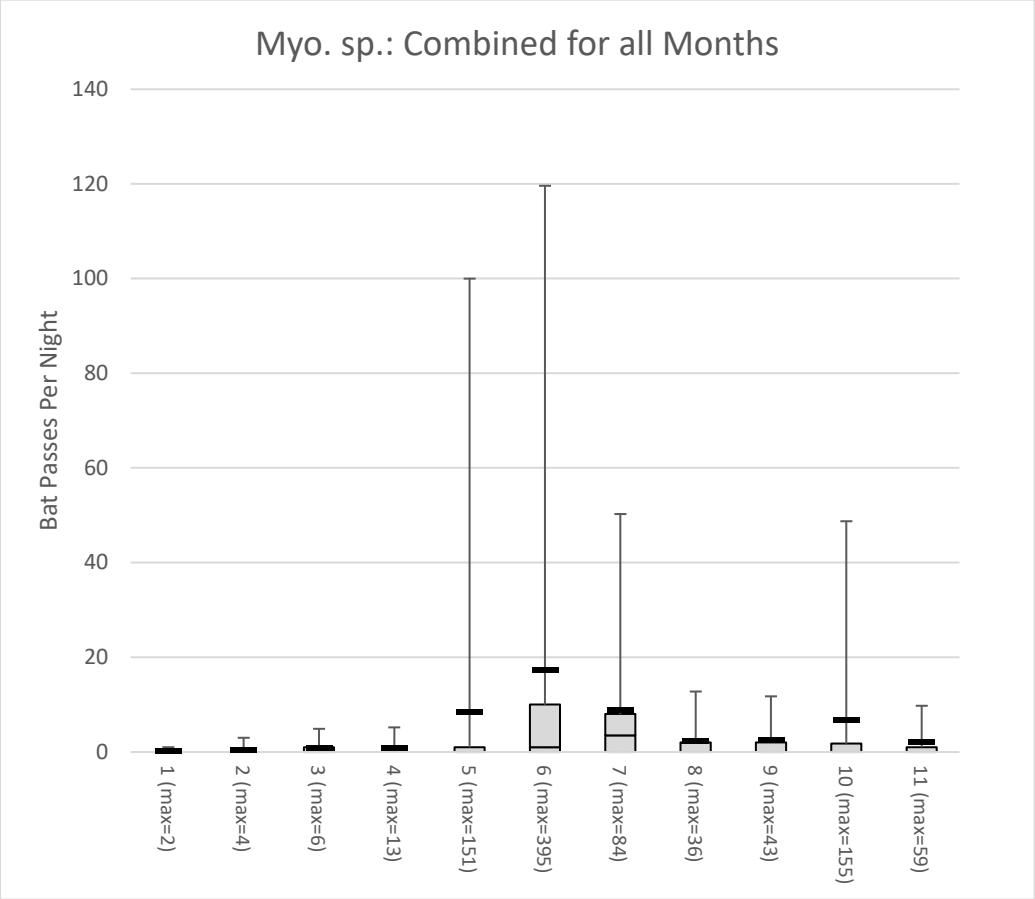

N.noc/N.lei/E.ser: Combined for all Locations
Bat Passes Per night
70
60
50
40
30
20
10
0
April (max=54)
May (max=49)
June (max=89)
July (max=32)
August (max=18)
September (max=171)
October (max=67)

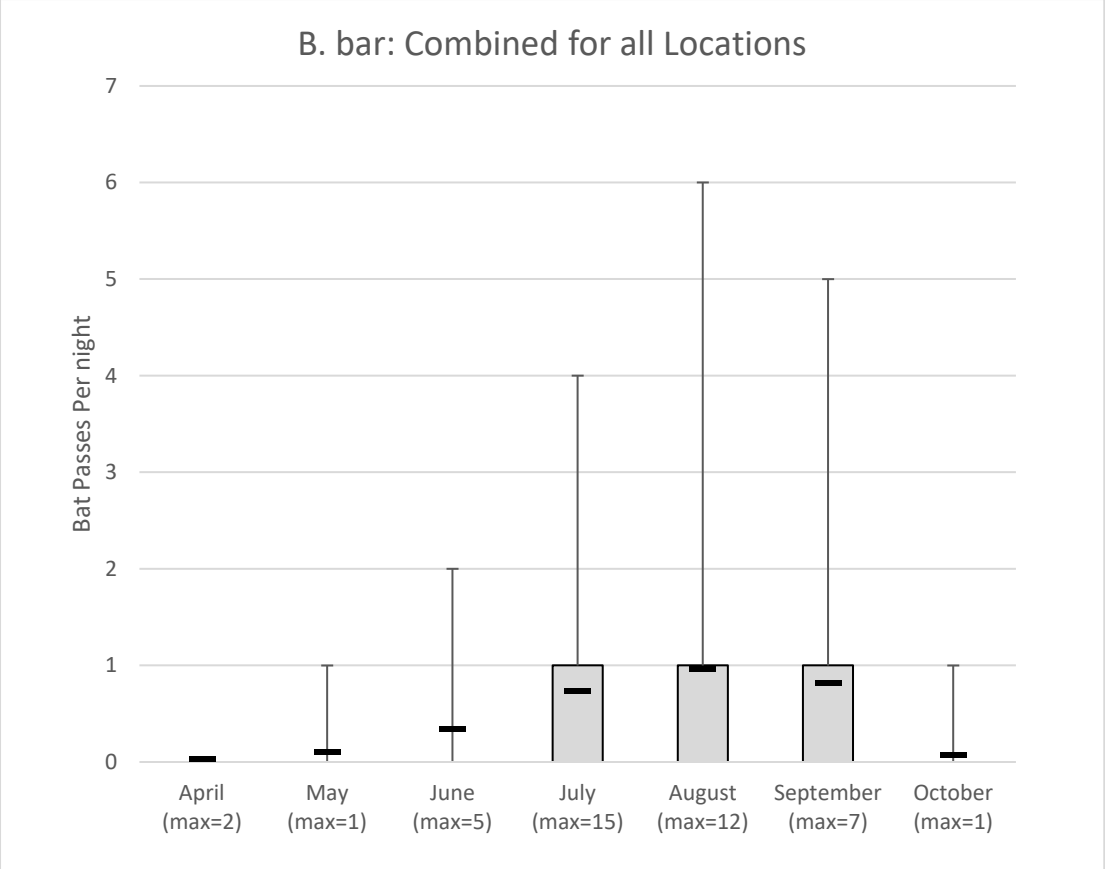

N.noc/N.lei/E.ser: Combined for all Months
Bat Passes Per Night
45
40
35
30
25
20
15
10
5
0
1 (max=14)
2 (max=25)
3 (max=171)
4 (max=54)
5 (max=87)
6 (max=34)
7 (max=67)
8 (max=26)
9 (max=46)
10 (max=20)
11 (max=89)

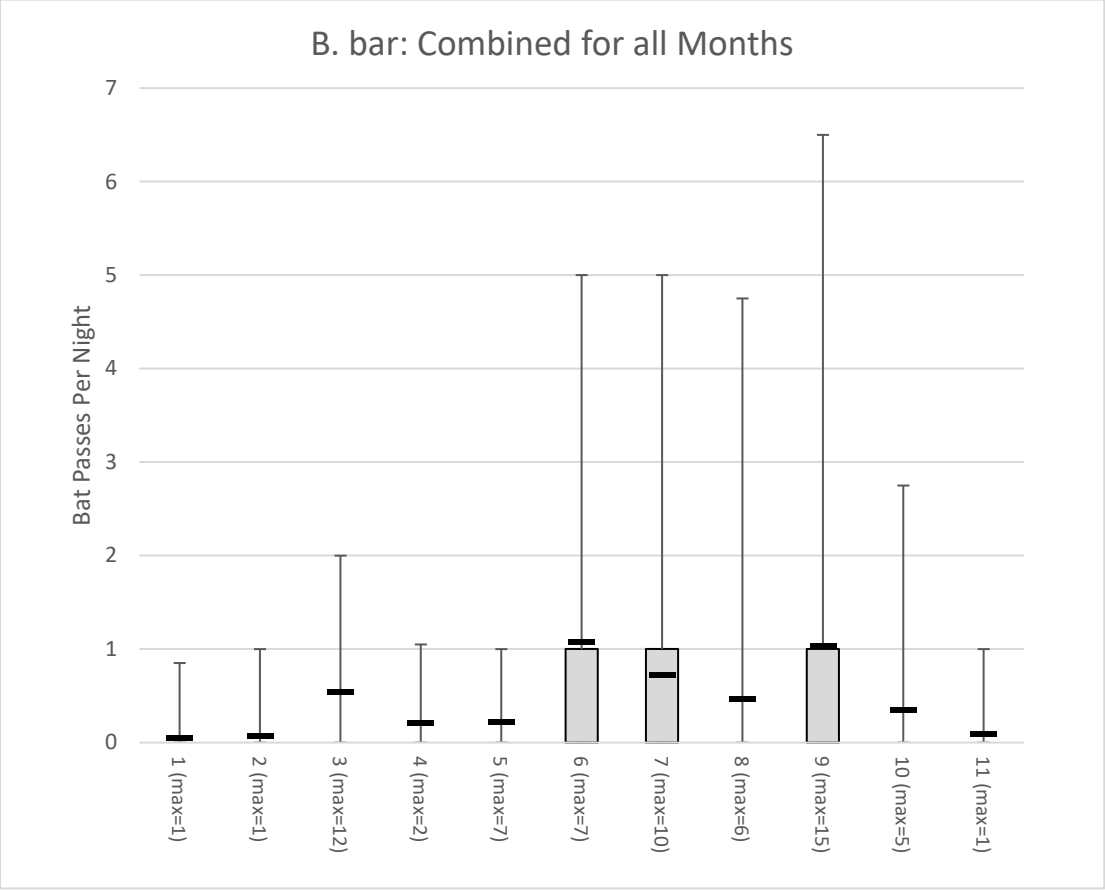

Plec. sp.: Combined for all Locations
Bat Passes Per night
2.5
2.0
1.5
1.0
0.5
0.0
April (max=0)
May (max=0)
June (max=4)
July (max=1)
August (max=3)
September (max=1)
October (max=2)

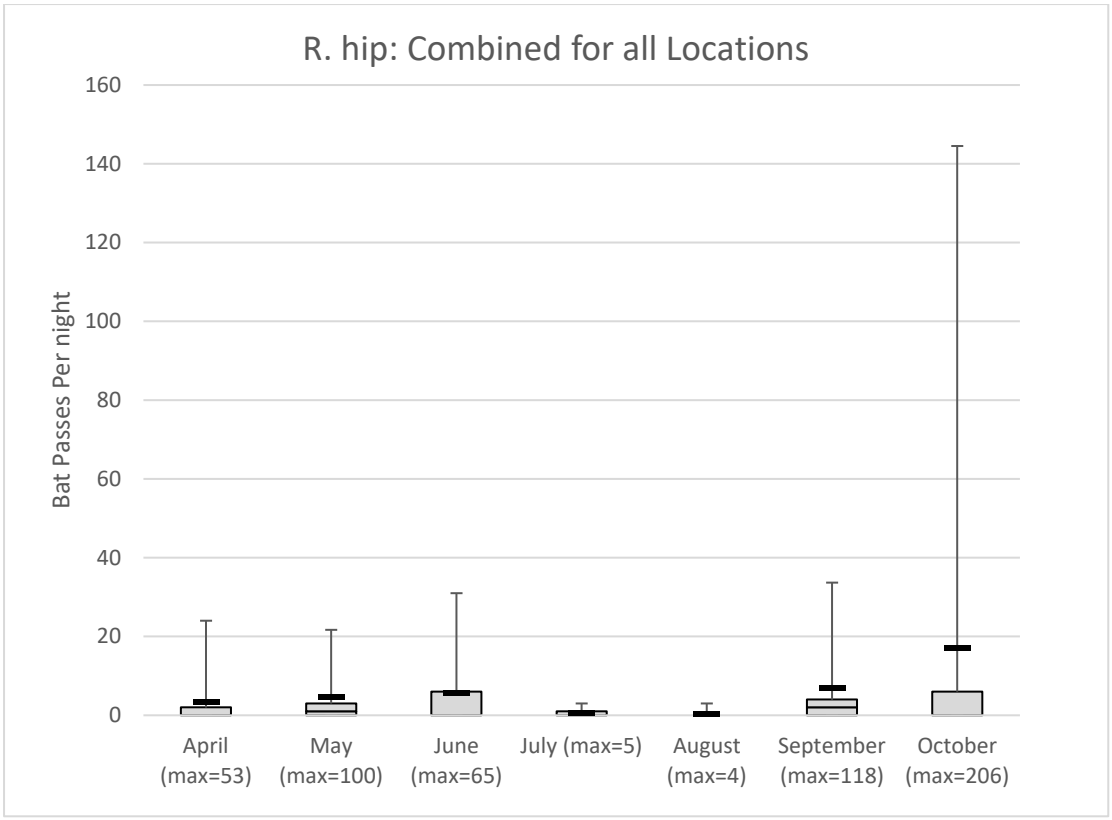

Plec. sp.: Combined for all Months
Bat Passes Per Night
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1 (max=0)
2 (max=0)
3 (max=1)
4 (max=1)
5 (max=4)
6 (max=3)
7 (max=1)
8 (max=3)
9 (max=2)
10 (max=1)
11 (max=3)

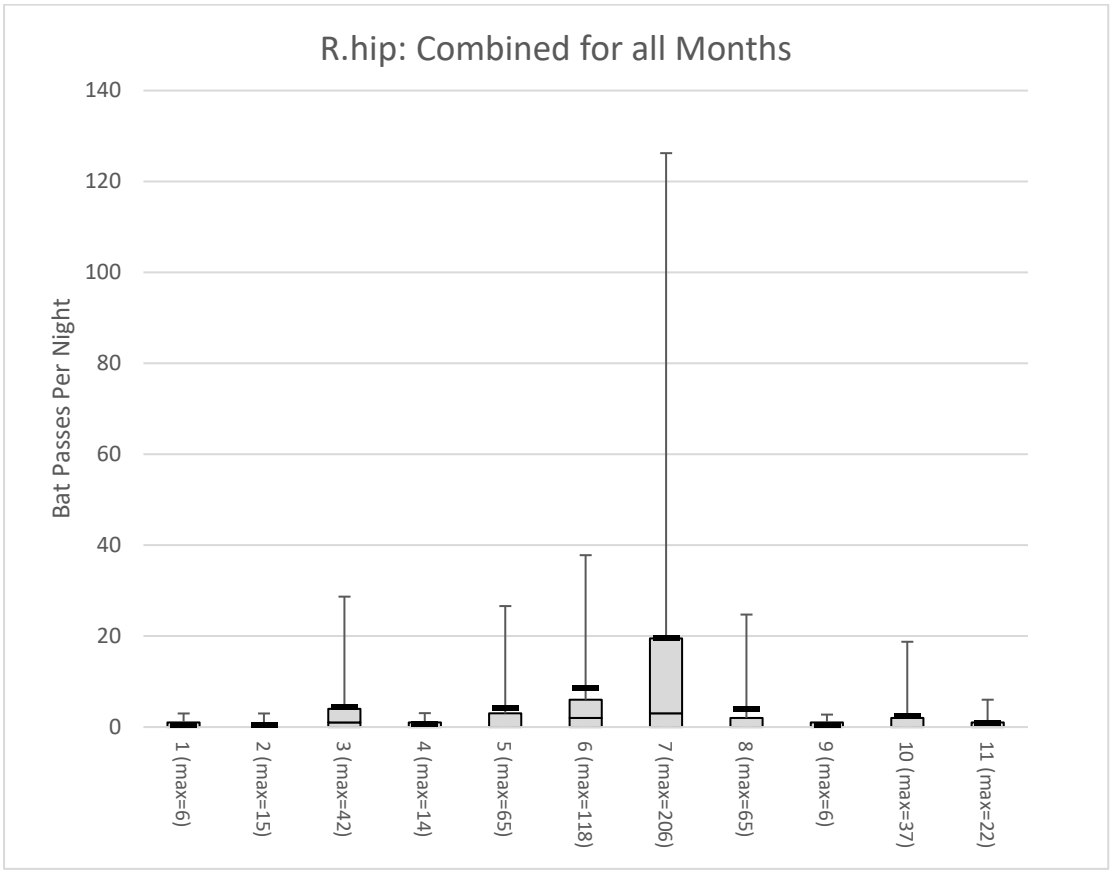

Myo. sp.: Combined for all Locations
Bat Passes Per night
140
120
100
80
60
40
20
0
April (max=5)
May (max=5)
June (max=67)
July (max=151)
August (max=12)
September (max=395)
October (max=155)


Myo. sp.: Combined for all Months
Bat Passes Per Night
140
120
100
80
60
40
20
0
1 (max=2)
2 (max=4)
3 (max=6)
4 (max=13)
5 (max=151)
6 (max=395)
7 (max=84)
8 (max=36)
9 (max=43)
10 (max=155)
11 (max=59)


B. bar: Combined for all Locations
Bat Passes Per night
0
1
2
3
4
5
6
7
April (max=2)
May (max=1)
June (max=5)
July (max=15)
August (max=12)
September (max=7)
October (max=1)


B. bar: Combined for all Months
Bat Passes Per Night
0
1
2
3
4
5
6
7
1 (max=1)
2 (max=1)
3 (max=12)
4 (max=2)
5 (max=7)
6 (max=7)
7 (max=10)
8 (max=6)
9 (max=15)
10 (max=5)
11 (max=1)


R. hip: Combined for all Locations
Bat Passes Per night
160
140
120
100
80
60
40
20
0
April (max=53)
May (max=100)
June (max=65)
July (max=5)
August (max=4)
September (max=118)
October (max=206)


R.hip: Combined for all Months
Bat Passes Per Night
140
120
100
80
60
40
20
0
1 (max=6)
2 (max=15)
3 (max=42)
4 (max=14)
5 (max=65)
6 (max=118)
7 (max=206)
8 (max=65)
9 (max=6)
10 (max=37)
11 (max=22)

APPENDIX III: Statistical Analysis

Differences between locations

```
> kruskalmc(Bats~Location, data=AllBatData)
Multiple comparison test after Kruskal-Wallis
p.value: 0.05
Comparisons
         obs.dif critical.dif difference
1-2    20.997472     114.4982      FALSE
1-3   126.827105     130.7880      FALSE
1-4   142.938543     118.6910       TRUE
1-5   120.422845     114.4982       TRUE
1-6   257.543907     116.2320       TRUE
1-7   240.117692     115.7808       TRUE
1-8   159.773942     115.7808       TRUE
1-9   140.875504     115.7808       TRUE
1-10  204.117692     115.7808       TRUE
1-11  128.703629     115.7808       TRUE
2-3   105.829632     128.8307      FALSE
2-4   121.941071     116.5308       TRUE
2-5    99.425373     112.2573      FALSE
2-6   236.546434     114.0252       TRUE
2-7   219.120219     113.5652       TRUE
2-8   138.776469     113.5652       TRUE
2-9   119.878032     113.5652       TRUE
2-10  183.120219     113.5652       TRUE
2-11  107.706157     113.5652      FALSE
3-4    16.111438     132.5710      FALSE
3-5     6.404259     128.8307      FALSE
3-6   130.716802     130.3741       TRUE
3-7   113.290587     129.9720      FALSE
3-8    32.946837     129.9720      FALSE
3-9    14.048399     129.9720      FALSE
3-10   77.290587     129.9720      FALSE
3-11    1.876524     129.9720      FALSE
4-5    22.515697     116.5308      FALSE
4-6   114.605364     118.2348      FALSE
4-7    97.179149     117.7912      FALSE
4-8    16.835399     117.7912      FALSE
4-9     2.063039     117.7912      FALSE
4-10   61.179149     117.7912      FALSE
4-11   14.234914     117.7912      FALSE
5-6   137.121061     114.0252       TRUE
5-7   119.694846     113.5652       TRUE
5-8    39.351096     113.5652      FALSE
5-9    20.452659     113.5652      FALSE
5-10   83.694846     113.5652      FALSE
5-11    8.280784     113.5652      FALSE
6-7    17.426215     115.3131      FALSE
6-8    97.769965     115.3131      FALSE
6-9   116.668403     115.3131       TRUE
6-10   53.426215     115.3131      FALSE
6-11  128.840278     115.3131       TRUE
7-8    80.343750     114.8582      FALSE
7-9    99.242188     114.8582      FALSE
7-10   36.000000     114.8582      FALSE
7-11  111.414062     114.8582      FALSE
8-9    18.898438     114.8582      FALSE
8-10   44.343750     114.8582      FALSE
8-11   31.070312     114.8582      FALSE
9-10   63.242188     114.8582      FALSE
9-11   12.171875     114.8582      FALSE
10-11  75.414062     114.8582      FALSE
```

Differences between Months

```
kruskalmc(Bats~Month, data=AllBatData)
Multiple comparison test after Kruskal-Wallis
p.value: 0.05
Comparisons
        obs.dif critical.dif difference
4-5  117.921284     84.53404       TRUE
4-6  101.457953     74.31671       TRUE
4-7  176.093037     71.25054       TRUE
4-8   93.318109     78.25660       TRUE
4-9  227.435180     98.12869       TRUE
4-10  51.043698     95.41834      FALSE
5-6   16.463331     87.02954      FALSE
5-7   58.171753     84.42635      FALSE
5-8   24.603175     90.41716      FALSE
5-9  109.513896    108.07593       TRUE
5-10  66.877585    105.62115      FALSE
6-7   74.635084     74.19419       TRUE
6-8    8.139844     80.94587      FALSE
6-9  125.977227    100.28648       TRUE
6-10  50.414255     97.63605      FALSE
7-8   82.774928     78.14026       TRUE
7-9   51.342143     98.03593      FALSE
7-10 125.049339     95.32295       TRUE
8-9  134.117071    103.24001       TRUE
8-10  42.274411    100.66737      FALSE
9-10 176.391481    116.78641       TRUE
```

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DOCUMENT CONTROL

Document Title: Bats 2019

Project No: 10874

This document: Original ✓ Revision ☐ Rev Letter: ☐

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REVISION RECORD

Rev Letter	Date Prepared	Prepared by	Checker/ Approver	Description of changes