

Bat Pathfinders phase 1: West Cambridgeshire Hundreds (2007-2016)

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West Cambridge Hundreds woodland ride

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1. Summary

The aim of the Bat Pathfinder surveys was to instigate landscape-scale monitoring of woodland linkage projects and use information on bat behaviour to monitor the success of these linkage projects. This report gives the findings of the first phase of the Bat Pathfinder project based in the West Cambridgeshire Hundreds Living Landscape area focusing on Gamlingay Wood and Waresley and Gransden Woods nature reserves. This first phase utilised transect surveys to cover the bulk of the existing woodland and woodland restoration/creation areas. Data was gathered in the field using heterodyne bat detectors and also determined through sonogram analysis of calls recorded by Anabat detectors. Both sets of data have been used to general species lists for each site, as well as looking at location of bat records within each site.

2. Introduction

The woodlands of the West Cambridgeshire Hundreds Living Landscape were chosen for the Bat Pathfinder surveys whose purpose was to instigate landscape-scale monitoring of woodland linkage projects. A secondary aim was to use bat behaviours (e.g. flight paths) as an information source to monitor the success of habitat creation and restoration techniques.

Bats are ideal for this type of study being highly mobile yet dependant on a network of landscape features and the condition of the connectivity within that network. Each night bats can commute several kilometres to their foraging sites, so that their activity is spread over a large area of landscape. This means that the bat populations are not affected solely by the condition of a particular reserve but also its place in the landscape. Features such as hedgerows, pockets of scrub and woodland, and developing woodlands (as part of habitat creation), could greatly influence both the success as well as the presence of certain species.

3. Method

The main method used to gather data was transect walks through the woodlands (Figure 1) pausing for three minutes at set locations, including the start and end points. Bat species were identified by their call parameters through both audible detection in the field using heterodyne bat detector units (various makes and models) and through later sonogram analysis using Anabat (SD1, SD2 and Zaicam) detectors and Analook software. During 2015 static Anabat detectors were left out at two points giving additional data at Gamlingay Wood.

Surveys in Gamlingay Wood and Waresley and Gransden Woods began in 2007 so for most of the transects there is 10 years' worth of field data. Sonogram records are only available from 2014.

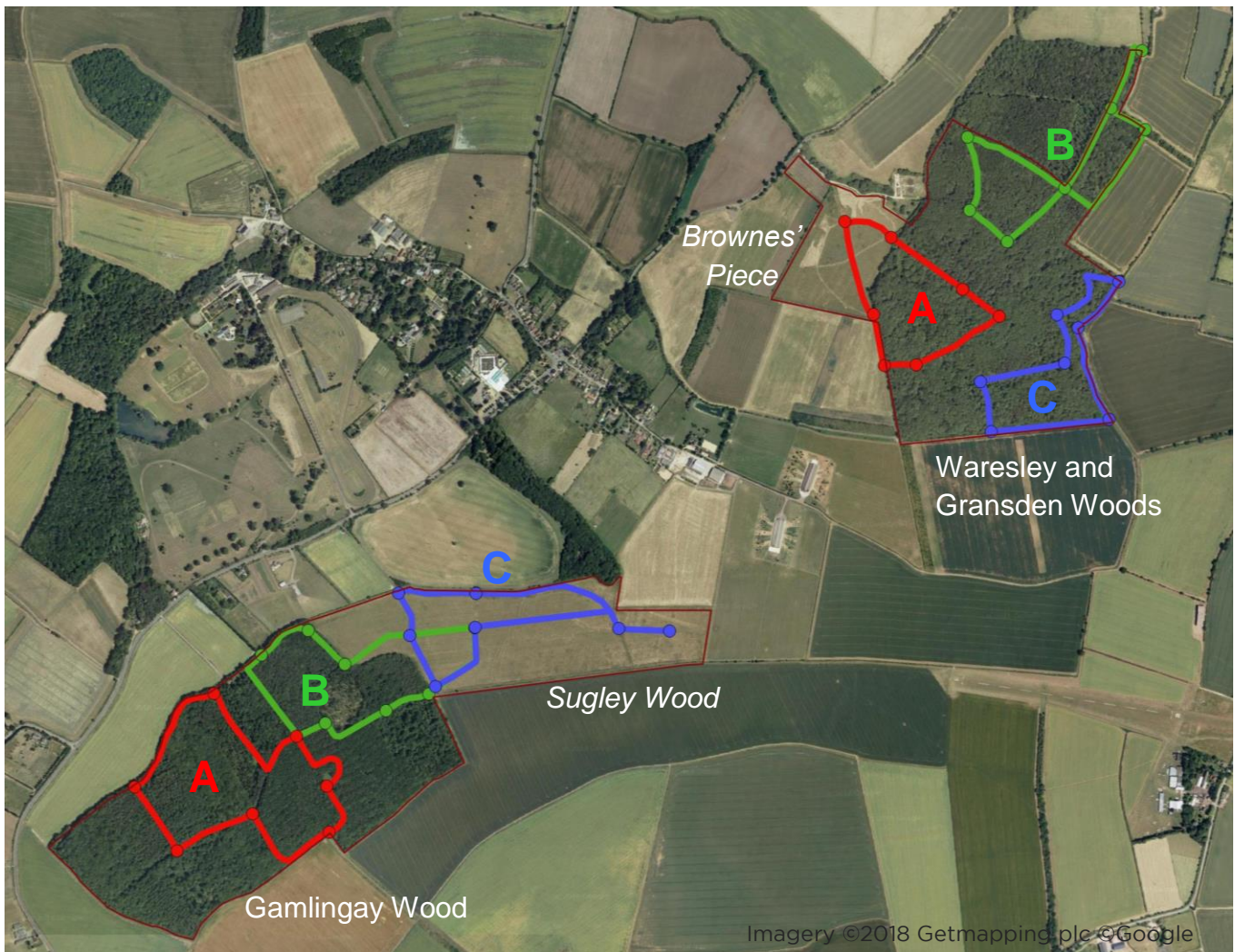


Figure 1 Aerial map showing transects around Gamlingay Wood and Waresley and Gransden Woods (in each wood transect C was slightly different prior to 2014 but covered a similar area)

4. Results

4.1 Species recorded

The data has been split into species records written in the field, identified using heterodyne bat detectors, and species identified from sonograms analysed. The following give the species lists for each reserve (and transects) where they were found.

Gamlingay Woods

- Common Pipistrelle (ABC)
- Soprano Pipistrelle (ABC)
- Nathusius' Pipistrelle (C)
- Myotis spp. - incl. Daubenton's (ABC)
- Barbastelle (ABC)
- Noctule (ABC)
- Leisler's (A)

Waresley and Gransden Woods

- Common Pipistrelle (ABC)
- Soprano Pipistrelle (ABC)
- Myotis spp. - incl. Daubenton's (ABC)
- Brown Long-Eared (B)
- Barbastelle (ABC)
- Noctule (ABC)
- Leisler's (AB)
- Serotine (A)



At both reserves the most commonly recorded bat species was common pipistelle *Pipistrellus pipistrellus*, closely followed by soprano pipistrelle *P. pygmaeus*. Nathusius' pipistrelle *P. nathusii* was recorded twice at Gamlingay Wood but not at Waresley and Gransden Woods. Barbastelles *Barbastella barbastellus* were picked up in good numbers at both woodland reserves using both methods. As a woodland specialist it was important to detect the presence of this species so on each visit one heterodyne detector was tuned to 33kHz (peak frequency for Barbastelle). Big bat species (Nocule *Nyctalus noctula*, Leisler's *N. leisleri* and Serotine *Eptesicus serotinus*) were under recorded on heterodyne detectors, presumably because they were tuned higher to pick up pipistrelle and Barbastelle bats. *Myotis* bats were also recorded at both reserves with some being recorded as Daubenton's *M. daubentonii*. *Myotis* bat species all have very similar calls which are difficult to accurately separate either by ear or sonogram analysis so it is likely that more species are present in the woodland. Brown long-eared bats *Plecotus auritus* were recorded only once at Waresley and Gransdens Woods although it is probable they are present through the woodlands on both reserves. Brown long-eared bats call very quietly, when they call at all, so are often under recorded on detector surveys.

The transect through the woodland restoration/creation areas at both reserves recorded fewer bat passes than the transects that just went through mature woodland. This is most obvious for Gamlingay's transect C which runs solely through Sugley Wood where the average bat pass on a night is 10.5/9.3 (field records/sonograms) compared to 44.9/50.3 and 30.3/54.7 for transects A and B respectively. At Waresley and Gransdens Woods transect A goes through mature woodland as well as Brownes' Piece but this transect gets an average of 25.2/25.6 bat records per night compared to 38.6/69.0 and 31.4/45.3 for transects B and C respectively.

4.2 Location of records within the reserves

This section looks at the exact location of each record within the woodlands combining both the field survey identification and the sonogram analysis results. In some cases, the time of arrival at each transect stop wasn't recorded so it was impossible to match the time of record to a location, for this reason the counts are lower for the sonogram data than in the previous section. Tables showing the counts for each section are given in the appendix.

Barbastelle bats have been recorded on all the woodland transects at these sites (Figure 2) which is a positive sign given that they are woodland specialists. The majority of records comes from the wider rides (54.9%) rather than the woodland edge (35.9%) or smaller paths (9.2%). Low numbers have also been recorded over Sugley

Wood, an open area of woodland creation in its early stages adjacent to Gamlingay wood (Transect C). So far none have been recorded at Brownes' Piece, another woodland creation area, this time adjacent to Waresley Wood (Transect A, between points 3 and 5).

Myotis bats are difficult to identify to species from their calls so here have been lumped together for analyses. *Myotis* bats have been heard throughout both woodlands (Figure 3) but less frequently than *Barbastelles*. The majority of the *Myotis* records are within the woodland on both wide rides (46.9%) & smaller paths (30.6%) rather than at the edge which ties in with some *Myotis* being woodland specialists. To discover more about the *Myotis* using the woodland trapping surveys would be needed.

A single brown long-eared bat has been recorded (Figure 3) although this species is likely to be common throughout both woods. Brown long-eared bats call very quietly and so are often missed by bat detectors. Again trapping would be a good method to confirm their presence and give some idea of whether many or few are in residence.

The "big bats" (*Nyctalus/Eptesicus* species) were again heard recorded throughout both woodlands (Figure 4a,b) but even less frequently. The majority of big bats were recorded at the woodland edge (48.8%) or along the wider rides (44.1%) with only a few records from the smaller woodland paths. These species forage in more open habitats and often leave their roosts earlier in the evening than other species. Most of the bats identified were noctules but in Waresley Wood in May 2016 Serotine bats were recorded 24 times (Figure 4b).

Unsurprisingly common pipistrelle and soprano pipistrelle were recorded at almost every point throughout both woods, although with fewer records in the woodland creation areas of Sugley Wood and Brownes' Piece (Figure 5a,b). Nearly half of the pipistrelles recorded in the woodlands were along the wider woodland rides (49.0%), and most of the rest (30.8%) were recorded at the woodland edges. Only 20.2% were recorded on the smaller woodland paths highlighting the importance of woodland rides and edges for commuting and foraging bats. The majority of pipistrelle bats identified were common pipistrelles (70.2%) which showed a stronger association with the wider rides (65.1% of records) and only 8.8% were found on the smaller paths. The soprano pipistrelles showed less bias with 46.2% of records from the wider rides, 39.2% from the wood edge and 14.6% from smaller paths. Although the classification of rides here is very approximate with wide rides being identified solely from aerial photos. A more detailed study is currently being carried out by a student.

Interestingly the two records of Nathusius' pipistrelle records are from Sugley Wood (July 2012 field records)(Figure 5b). Nathusius' pipistrelle is a migratory species which is rare in the UK, as no other records have been made of this species it could be that this site is just a stop off on their way elsewhere in the country.

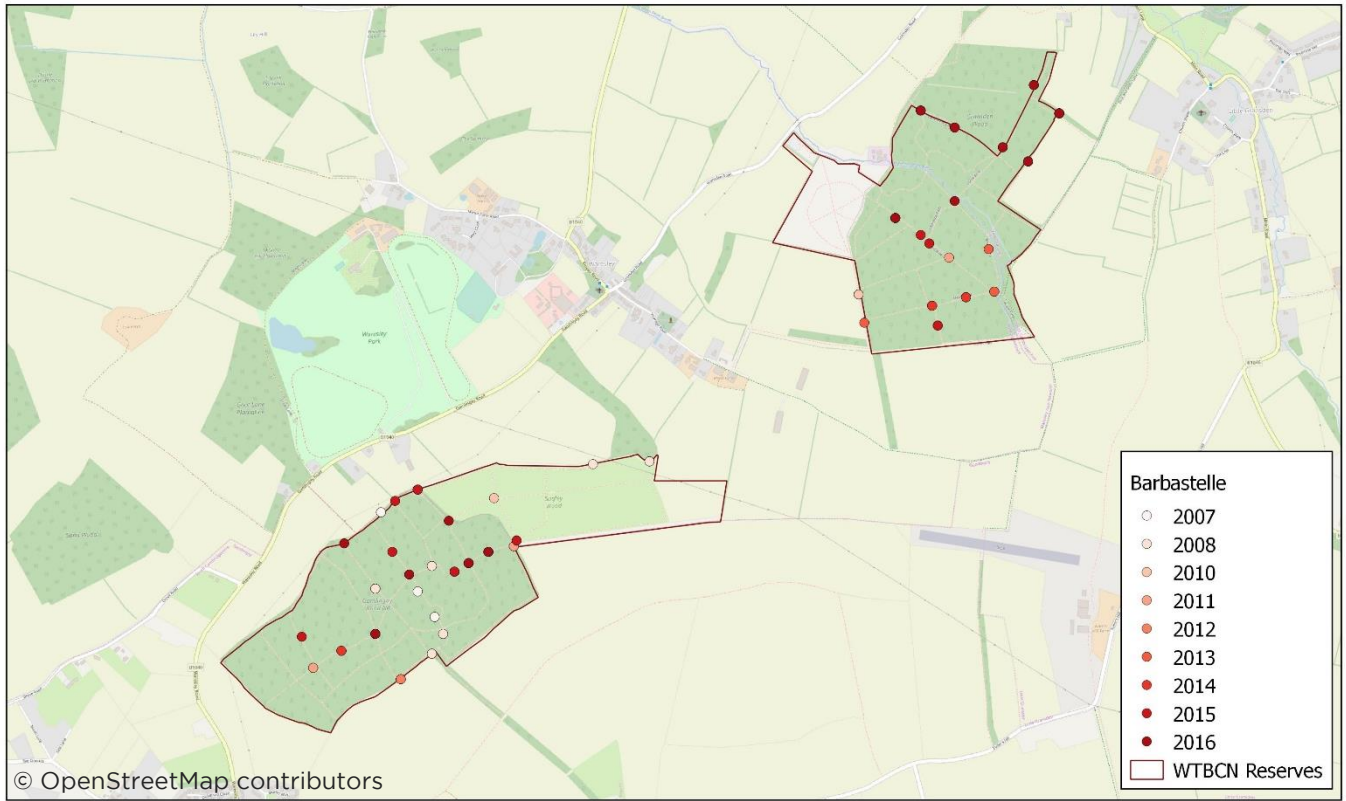


Figure 2 Barbastelle bat records (combined methods) by year

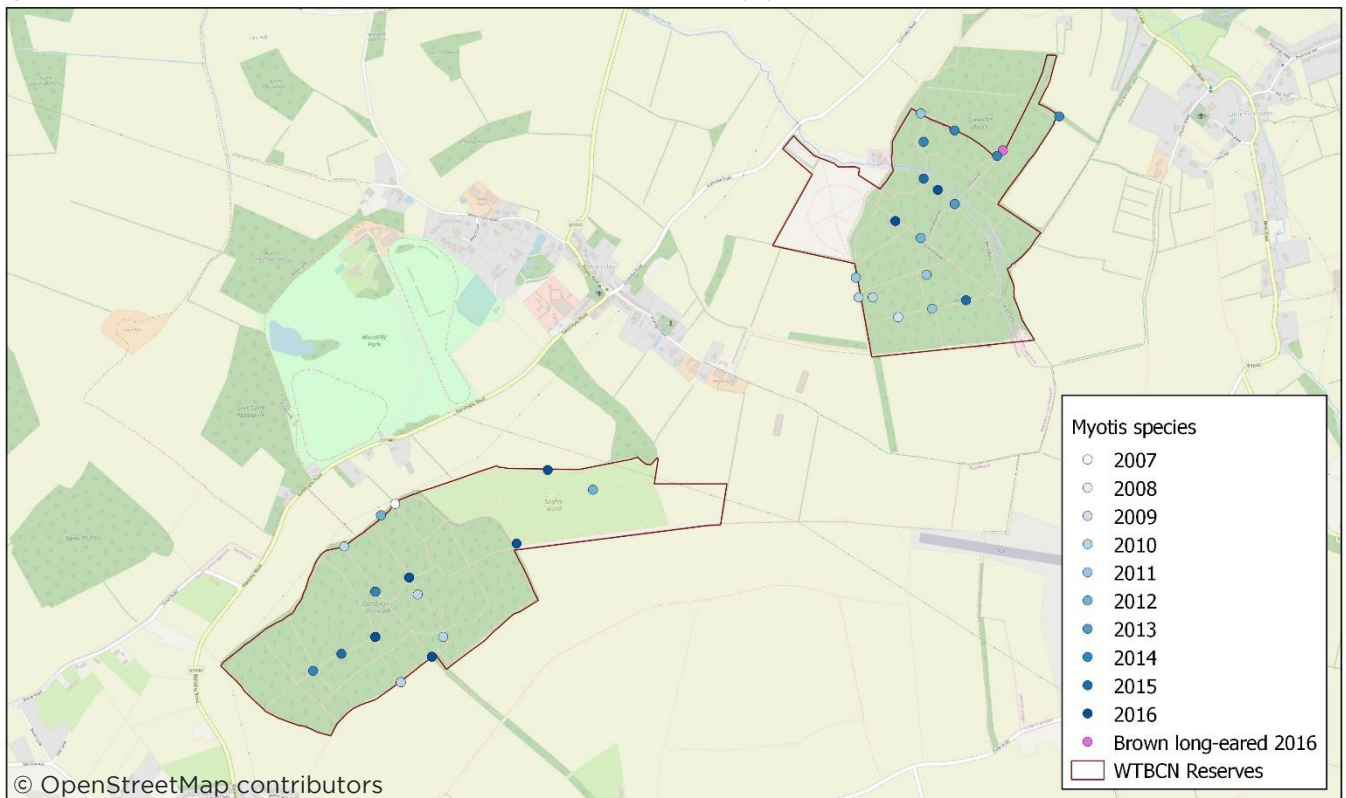


Figure 3 *Myotis* bat records (combined methods) by year and single brown long-eared bat record (2016 sonogram)

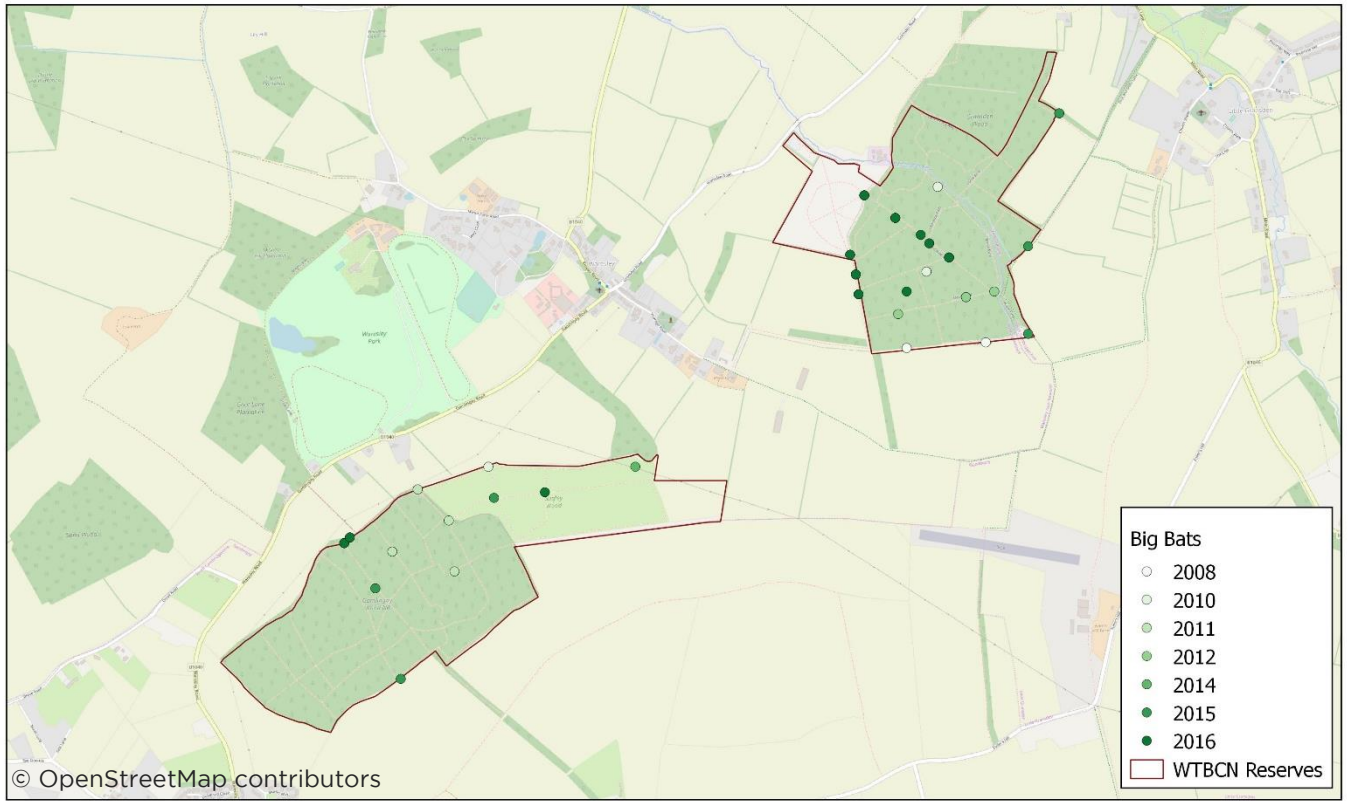


Figure 4a *Nyctalus/Eptesicus* bat records (combined methods) by year

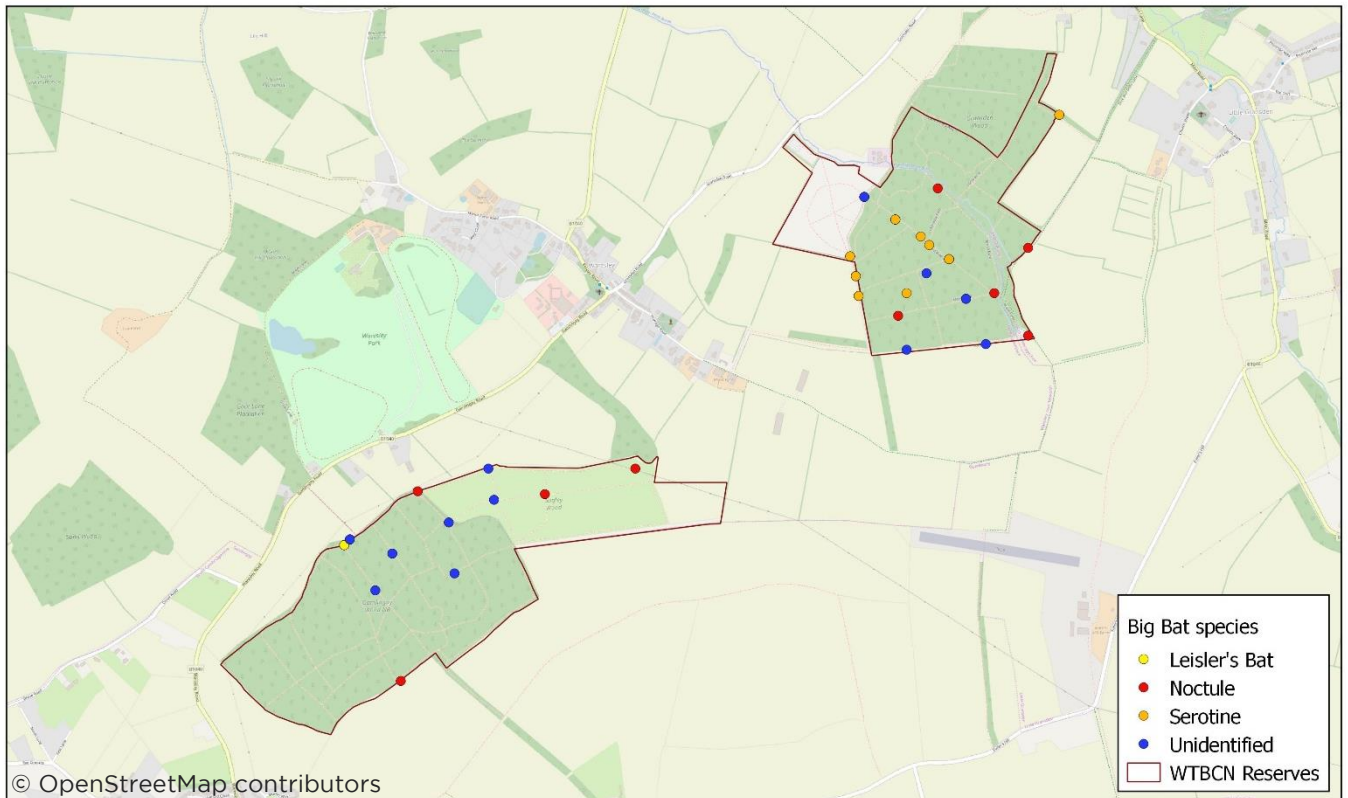


Figure 4b *Nyctalus/Eptesicus* bat records (combined methods) from all years (2008-16) shown by species

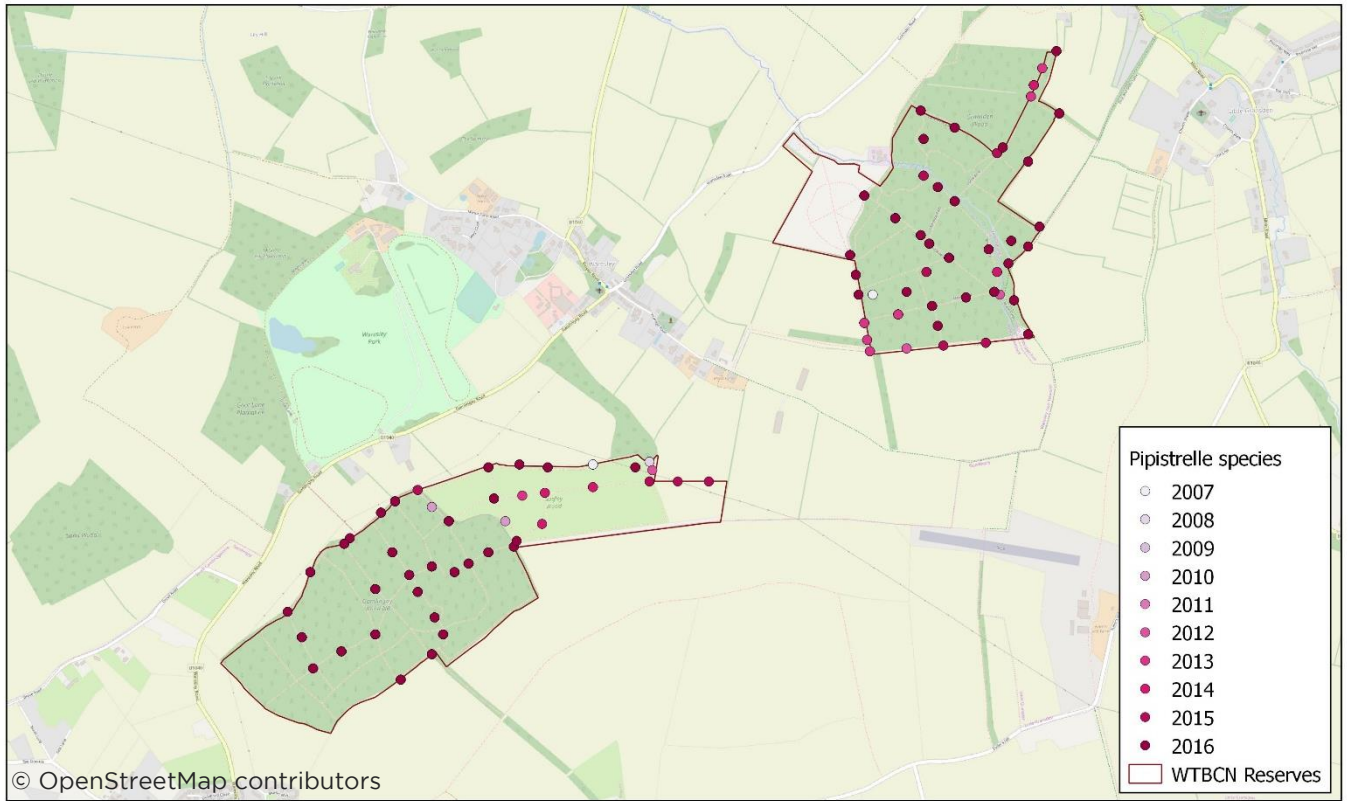


Figure 5a Pipistrelle bat records (combined methods) by year

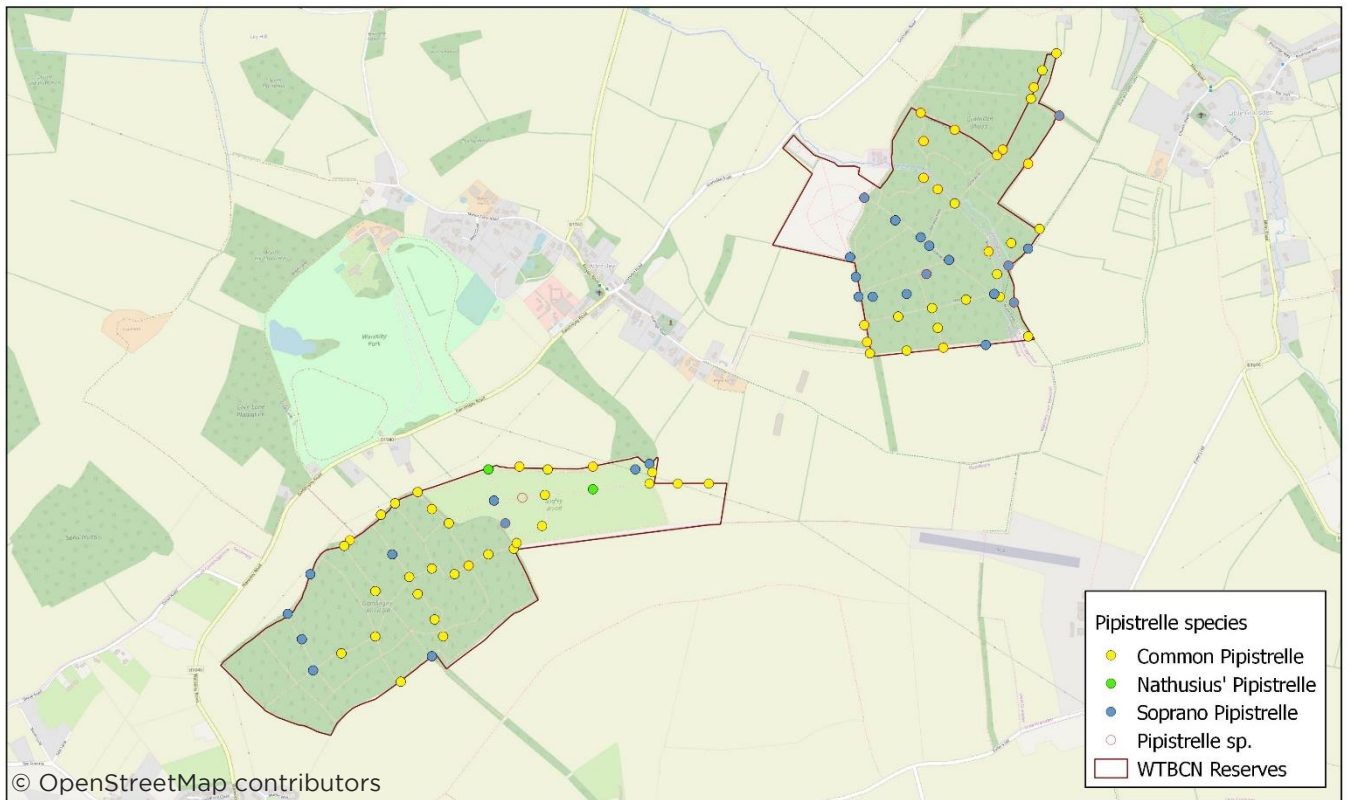


Figure 5b Pipistrelle bat records (combined methods) from all years (2007-16) shown by species

5. Future work

Further analysis of this data could involve assessing trends in numbers/species in relation to any habitat or management changes.

Current surveying effort is looking at the hedgerow linkages between these and other local woodlands. Surveyors are staking out each hedgerow connecting our woods for an hour after sunset and recording flight paths where possible (Figure 6). The aim is to identify which hedges are most important in linking the landscape for bats and also to identify potential hedgerow restoration projects where gaps occur.



Figure 6 Aerial map showing survey points to monitor hedgerow linkages between woodlands (blue and orange points currently unsuitable for various reasons including access)

A Wildlife Trust BCN project licence is being applied for to catch bats using harp traps and mist nets which will allow us to:

- Identify cryptic *Myotis* species using our reserves.
- More accurately record the presence and distribution of brown long-eared bats.
- Determine breeding condition and age of the bats present on site, this could lead to the identification of key breeding areas.

Appendix I: Bat species records by year

Table 1 Bat species at Gamlingay Wood - field records

Gamlingay A		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CP	Common Pipistrelle	6	52	4	26	8	22	4	31	24	31
NP	Nathusius' Pipistrelle	0	0	0	0	0	0	0	0	0	0
SP	Soprano Pipistrelle	1	11	0	12	8	15	5	10	8	9
UP	unidentified <i>Pipistrelle</i> spp.	0	14	5	25	12	5	18	0	4	0
D	Daubenton's	0	0	0	0	0	0	0	0	0	0
M	<i>Myotis</i> spp.	1	2	1	10	0	0	0	1	5	3
BLE	Brown Long-Eared	0	0	0	0	0	0	0	0	0	0
B	Barbastelle	3	4	0	0	1	1	0	2	0	5
N	Noctule	0	0	0	0	0	0	0	0	0	0
L	Leisler's	0	0	0	0	0	0	0	0	0	0
S	Serotine	0	0	0	0	0	0	0	0	0	0
UN	unidentified <i>Nyctalus</i> spp.	0	0	0	0	0	0	0	0	1	0
UB	unidentified bat	2	14	0	4	0	4	8	3	3	1
TOTAL COUNT		13	97	10	77	29	47	35	47	45	49
NUMBER OF SPECIES		4	4	2	3	3	3	2	4	4	4
Gamlingay B		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CP	Common Pipistrelle	1	12	2	13	21	13	20	19	32	20
NP	Nathusius' Pipistrelle	0	0	0	0	0	0	0	0	0	0
SP	Soprano Pipistrelle	1	3	3	1	9	3	5	3	3	2
UP	unidentified <i>Pipistrelle</i> spp.	4	10	0	4	5	1	6	3	5	5
D	Daubenton's	0	0	0	0	0	0	0	0	0	0
M	<i>Myotis</i> spp.	3	0	0	0	0	2	0	0	0	0
BLE	Brown Long-Eared	0	0	0	0	0	0	0	0	0	0
B	Barbastelle	3	2	0	4	1	0	0	0	5	2
N	Noctule	0	0	0	0	1	0	0	0	0	0
L	Leisler's	0	0	0	0	0	0	0	0	0	0
S	Serotine	0	0	0	0	0	0	0	0	0	0
UN	unidentified <i>Nyctalus</i> spp.	0	0	0	0	4	0	0	0	0	0
UB	unidentified bat	7	4	1	6	1	2	5	8	6	5
TOTAL COUNT		19	31	6	28	42	21	36	33	51	34
NUMBER OF SPECIES		4	3	2	3	4	3	2	2	3	3
Gamlingay C		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CP	Common Pipistrelle	3	5	6	2	0	2	0	8	12	5
NP	Nathusius' Pipistrelle	0	0	0	0	0	2	0	0	0	0
SP	Soprano Pipistrelle	2	4	0	3	0	0	0	1	2	2
UP	unidentified <i>Pipistrelle</i> spp.	3	3	1	3	0	1	0	0	0	1
D	Daubenton's	0	0	0	0	0	0	0	0	0	0
M	<i>Myotis</i> spp.	0	1	0	0	0	1	0	0	0	1
BLE	Brown Long-Eared	0	0	0	0	0	0	0	0	0	0
B	Barbastelle	1	9	0	3	0	0	0	0	1	0
N	Noctule	0	0	0	0	0	0	0	1	0	1
L	Leisler's	0	0	0	0	0	0	0	0	0	0
S	Serotine	0	0	0	0	0	0	0	0	0	0
UN	unidentified <i>Nyctalus</i> spp.	0	0	0	1	0	0	0	0	0	0
UB	unidentified bat	5	2	0	2	2	2	1	0	0	0
TOTAL COUNT		14	24	7	14	2	8	1	10	15	10
NUMBER OF SPECIES		3	4	1	4	1	3	1	3	3	4

Table 2 Bat species recorded at Waresley and Gransden Woods - field records

<u>Waresley A</u>											
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CP	Common Pipistrelle	4	3	1	14	0	14	7	3	7	4
NP	Nathusius' Pipistrelle	0	0	0	0	0	0	0	0	0	0
SP	Soprano Pipistrelle	4	7	0	11	1	12	0	4	10	22
UP	unidentified <i>Pipistrelle</i> spp.	0	3	4	19	17	5	7	5	5	4
D	Daubenton's	0	0	0	0	0	0	0	0	0	0
M	<i>Myotis</i> spp.	0	1	0	2	0	1	0	0	0	1
BLE	Brown Long-Eared	0	0	0	0	0	0	0	0	0	0
B	Barbastelle	0	2	0	2	1	0	0	0	3	2
N	Noctule	0	0	0	0	0	0	0	0	0	0
L	Leisler's	0	0	0	0	0	0	0	0	0	0
S	Serotine	0	0	0	0	0	0	0	0	0	0
UN	unidentified <i>Nyctalus</i> spp.	0	0	0	1	0	0	0	0	0	0
UB	unidentified bat	0	0	1	6	8	7	1	7	8	1
	TOTAL COUNT	8	16	6	55	27	39	15	19	33	34
	NUMBER OF SPECIES	2	4	1	5	2	3	1	2	3	4
<u>Waresley B</u>											
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CP	Common Pipistrelle		13	13	25	16	27	13	11	11	4
NP	Nathusius' Pipistrelle		0	0	0	0	0	0	0	0	0
SP	Soprano Pipistrelle		10	5	8	0	2	0	0	6	0
UP	unidentified <i>Pipistrelle</i> spp.		0	5	10	18	17	6	4	9	36
D	Daubenton's		0	0	0	0	0	0	0	0	0
M	<i>Myotis</i> spp.		0	1	0	1	0	2	2	0	0
BLE	Brown Long-Eared		0	0	0	0	0	0	0	0	0
B	Barbastelle		2	0	0	0	0	0	0	2	12
N	Noctule		0	0	1	0	0	0	0	0	0
L	Leisler's		0	0	0	0	0	0	0	0	0
S	Serotine		0	0	0	0	0	0	0	0	0
UN	unidentified <i>Nyctalus</i> spp.		0	0	0	0	0	0	0	0	0
UB	unidentified bat		9	3	11	12	8	1	3	7	1
	TOTAL COUNT		34	27	55	47	54	22	20	35	53
	NUMBER OF SPECIES		3	3	3	2	2	2	2	3	2
<u>Waresley C</u>											
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CP	Common Pipistrelle		11	6	11	12	27	20	9	4	18
NP	Nathusius' Pipistrelle		0	0	0	0	0	0	0	0	0
SP	Soprano Pipistrelle		3	0	6	2	6	1	8	14	10
UP	unidentified <i>Pipistrelle</i> spp.		2	10	4	0	7	4	11	4	10
D	Daubenton's		0	0	0	0	0	0	0	0	0
M	<i>Myotis</i> spp.		0	1	0	1	0	0	0	1	0
BLE	Brown Long-Eared		0	0	0	0	0	0	0	0	0
B	Barbastelle		0	0	0	0	0	4	3	0	0
N	Noctule		0	0	0	0	2	0	0	1	0
L	Leisler's		0	0	0	0	0	0	0	0	0
S	Serotine		0	0	0	0	0	0	0	0	0
UN	unidentified <i>Nyctalus</i> spp.		4	0	0	0	1	0	0	0	0
UB	unidentified bat		3	7	4	10	6	1	2	1	11
	TOTAL COUNT		23	24	25	25	49	30	33	25	49
	NUMBER OF SPECIES		3	2	2	3	3	3	3	4	2

Table 3 Bat species recorded at Gamlingay and Waresley Woods – sonogram data

Gamlingay A				
		2014	2015	2016
CP	Common Pipistrelle	29	39	18
NP	Nathusius' Pipistrelle	0	0	0
SP	Soprano Pipistrelle	4	6	9
UP	unidentified <i>Pipistrelle spp.</i>	0	0	2
D	Daubenton's	3	0	0
M	<i>Myotis spp.</i>	0	3	0
BLE	Brown Long-Eared	0	0	0
B	Barbastelle	5	15	2
N	Noctule	1	1	0
L	Leisler's	0	0	5
S	Serotine	0	0	0
UN	unidentified <i>Nyctalus spp.</i>	0	0	6
UB	unidentified bat	2	0	1
	TOTAL COUNT	44	64	43
	NUMBER OF SPECIES	5	5	4
Gamlingay B				
		2014	2015	2016
CP	Common Pipistrelle	11	40	57
NP	Nathusius' Pipistrelle	0	0	0
SP	Soprano Pipistrelle	3	15	10
UP	unidentified <i>Pipistrelle spp.</i>	0	0	0
D	Daubenton's	0	0	0
M	<i>Myotis spp.</i>	0	0	0
BLE	Brown Long-Eared	0	0	0
B	Barbastelle	0	14	12
N	Noctule	0	0	0
L	Leisler's	0	0	0
S	Serotine	0	0	0
UN	unidentified <i>Nyctalus spp.</i>	0	1	1
UB	unidentified bat	0	0	0
	TOTAL COUNT	14	70	80
	NUMBER OF SPECIES	2	4	4
Gamlingay C				
		2014	2015	2016
CP	Common Pipistrelle	3	3	6
NP	Nathusius' Pipistrelle	0	0	0
SP	Soprano Pipistrelle	3	3	3
UP	unidentified <i>Pipistrelle spp.</i>	0	0	0
D	Daubenton's	0	0	1
M	<i>Myotis spp.</i>	0	0	0
BLE	Brown Long-Eared	0	0	0
B	Barbastelle	0	2	3
N	Noctule	1	0	0
L	Leisler's	0	0	0
S	Serotine	0	0	0
UN	unidentified <i>Nyctalus spp.</i>	0	0	0
UB	unidentified bat	0	0	0
	TOTAL COUNT	7	8	13
	NUMBER OF SPECIES	3	3	4
Waresley A				
		2014	2015	2016
CP	Common Pipistrelle	12	11	6
NP	Nathusius' Pipistrelle	0	0	0
SP	Soprano Pipistrelle	2	10	6
UP	unidentified <i>Pipistrelle spp.</i>	1	0	0
D	Daubenton's	3	0	0
M	<i>Myotis spp.</i>	0	0	0
BLE	Brown Long-Eared	0	0	0
B	Barbastelle	0	1	0
N	Noctule	3	0	0
L	Leisler's	0	0	1
S	Serotine	0	0	16
UN	unidentified <i>Nyctalus spp.</i>	0	0	4
UB	unidentified bat	0	0	1
	TOTAL COUNT	21	22	34
	NUMBER OF SPECIES	4	3	4
Waresley B				
		2014	2015	2016
CP	Common Pipistrelle	37	29	39
NP	Nathusius' Pipistrelle	0	0	0
SP	Soprano Pipistrelle	15	18	25
UP	unidentified <i>Pipistrelle spp.</i>	2	1	1
D	Daubenton's	0	1	0
M	<i>Myotis spp.</i>	2	2	2
BLE	Brown Long-Eared	0	0	1
B	Barbastelle	0	5	11
N	Noctule	1	0	0
L	Leisler's	0	1	0
S	Serotine	0	0	0
UN	unidentified <i>Nyctalus spp.</i>	0	0	0
UB	unidentified bat	8	0	6
	TOTAL COUNT	65	57	85
	NUMBER OF SPECIES	4	5	5
Waresley C				
		2014	2015	2016
CP	Common Pipistrelle	10	13	26
NP	Nathusius' Pipistrelle	0	0	0
SP	Soprano Pipistrelle	8	24	29
UP	unidentified <i>Pipistrelle spp.</i>	1	0	7
D	Daubenton's	0	0	0
M	<i>Myotis spp.</i>	0	0	1
BLE	Brown Long-Eared	0	0	0
B	Barbastelle	0	8	5
N	Noctule	1	1	0
L	Leisler's	0	0	0
S	Serotine	0	0	0
UN	unidentified <i>Nyctalus spp.</i>	0	0	0
UB	unidentified bat	1	0	1
	TOTAL COUNT	21	46	69
	NUMBER OF SPECIES	3	4	4

Table 4a Single year transects at Gamlingay Wood - field records

a) 2007 Gamlingay transects		
	Transect 1	Transect 2
Common Pipistrelle	3	0
Nathusius' Pipistrelle	0	0
Soprano Pipistrelle	2	2
unidentified <i>Pipistrelle</i> spp.	1	3
Daubenton's	0	0
<i>Myotis</i> spp. (Natterer's, Whiskered etc.)	0	0
Brown Long-Eared	0	0
Barbastelle	2	7
Noctule	0	0
Leisler's	0	0
Serotine	0	0
unidentified <i>Nyctalus</i> spp.	0	0
unidentified bat	0	1
TOTAL COUNT	8	13
NUMBER OF SPECIES	3	2

Table 4b Single year fix point Anabat detectors at Gamlingay Wood - sonograms

Gamlingay fixed point - 2015 only		
	1	2 (Sugley)
Common Pipistrelle	7	5
Nathusius' Pipistrelle	0	0
Soprano Pipistrelle	1	2
unidentified <i>Pipistrelle</i> spp.	0	0
Daubenton's	1	0
<i>Myotis</i> spp.	1	6
Brown Long-Eared	0	0
Barbastelle	0	1
Noctule	1	0
Leisler's	0	0
Serotine	0	0
unidentified <i>Nyctalus</i> spp.	1	0
unidentified bat	0	1
TOTAL COUNT	12	15
NUMBER OF SPECIES	4	4

Appendix II: Bat location data tables

Table A: Locations of bat species within Gamlingay Woods from field records

	Barbastelle	Common Pipistrelle	Myotis spp.	Nathusius' Pipistrelle	Noctule	Soprano Pipistrelle	unidentified bat	unidentified Nyctalus spp.	unidentified Pipistrelle spp.	Grand Total
Gamlingay Wood	43	217	31	2	3	126	92	6	137	837
A	16	28	23			79	39	1	83	449
1	1	14	1			2	4		4	26
1-2		5				6			6	17
2		3				2	1		1	7
2-3		6				1	1			8
3	1	8				6	1		10	26
3-4	1	16				13	4		11	45
4	4	21	6			3			6	40
4-5	1	23	3			12	7		5	51
5	1	7	3			6	3		6	26
5-6	1	8	1			6	5		4	25
6	2	11	1			2	3		5	24
6-7		1								1
7	1	18	3			4	5		10	41
7-1	1	24	1			5	1		6	38
7-8 (poss. 1?)		2								2
8 (poss. 1?)	2	41	4			11	4	1	9	72
B	13	146	5		1	33	39	4	42	283
1	1	28				3	2		6	40
1-2	1	5				1	1	1	4	13
2	3	10				3	4		3	23
2-3	1	9				6	2		6	24
3	1	4				1	4		2	12
3-4		1					1		1	3
4-5		8				1			2	11
5		8				1	5	1	4	19
5-6		1				1	1		1	4
6	4	5			1	1	5		1	17
6-7		10	3			6	8		1	28
7	2	12	2			3	3		2	24
7-1		45				6	3	2	9	65
C (2007-2013)	9	15	1	2		9	13	1	11	61
1	3	1				2	3		1	10
2		1								1
2-3			1	1						2
3		1					1			2
3-4		1								1
4	3	1				2	3		3	12
4-5	2	3				2	1		4	12
5		1				2	1			4
5-6		5					2		1	8
6		1		1				1	1	4
7	1						1			2
7-1						1	1		1	3
Fix point (2008)	4	3	1				1			9
C (2014-2016)	1	25	1		2	5			1	35
1		2								2
2-1		1								1
2		1				1				2
2-3		2								2
3		2			1					3
4	1	5	1							7
6		3				1				4
6-7		3							1	4
7		3				1				4
7-1						1				1
7-2		3			1	1				5

Table B: Locations of bat species within Waresley and Gransden Woods from field records

	Barbastelle	Common Pipistrelle	Myotis spp.	Noctule	Soprano Pipistrelle	unidentified bat	unidentified Nyctalus spp.	unidentified Pipistrelle spp.	Grand Total
Waresley Wood	33	307	14	4	153	138	6	220	875
A	10	58	5		73	40	1	70	257
1	1	12			12	3		13	41
1-2	1	2			5	2		7	17
2	1	5	2		8	9		12	37
2-3	4	16	1		19	7		9	56
3		4			7	2		4	17
3-4					1				1
4					2				2
4-5								1	1
5		6			8	3		8	25
5-6		6			3	5		2	16
6	3	3	1		4	4		6	21
6-7		2	1		1	1			5
7		1			1	3		1	6
7-1		1			2	1	1	4	9
8 (poss. 1?)								3	3
B	16	133	6	1	31	55		105	347
1	5	26	2		6	5		10	54
1-2	1	23	1		5	4		10	44
2		4	1			3		3	11
2-3	2	7			1	1		11	22
3	4	13			9	8		9	43
3-4	1	4			1	8		7	21
4		12				6		17	35
4-5		4				5			9
5		2				3		1	6
5-6	2	9				3		5	19
6	1	10	2		3	2		7	25
6-7		4			2			4	10
7		3			1	1		8	13
6-1		1		1					2
7-1		5			3	2		10	20
5-2						1			1
2-6		3				3		3	9
4-6		3							3
C (2009-2013)	4	87	2	2	18	31	5	27	176
1	1	1			2				4
1-2						1			1
2	1	12		1	1	4		3	22
2-3		10			3	1	3	2	19
3	1	12	1		1			2	17
3-4		18	1	1	8	6		2	36
4	1	5			1	3		5	15
4-5		3				1		1	5
5		10				2		4	16
5-6		2				1	1	3	7
6		3				4			7
6-7		4			2	1	1		8
7		6				6		3	15
7-1		1				1			2
7-2								2	2
C (2014-2016)	3	29	1	1	31	12		18	95
1		1				2		3	6
1-2		1							1
2		7			9	1			17
2-3	2	4	1		5	2		1	15
3	1	4			2	3		2	12
3-4		1			2				3
4-5					3				3
5		1			3	1		1	6
5-6					1			3	4
6					1	2		3	6
6-7		4		1	3			3	11
7		6			2	1		2	11

Table C: Locations of bat species within Gamlingay Wood from sonogram records

	Barbastelle	Serotine	Daubenton's	Leisler's	Noctule	Common Pipistrelle	Soprano Pipistrelle	unidentified bat	unidentified Myotis spp.	unidentified Nyctalus spp.	unidentified Pipistrellus spp.	Grand Total
Gamlingay Wood	65		2	13	1	410	52	3	3	12	2	563
A	31		1	13	1	187	20	3	3	11	2	272
1						3	5					8
1.5						1	4					5
2						3						3
2.5	1					9	1					11
3	2		1			2		1				6
3.5	5					7	4		1			17
4	15					3			1			19
4.5	2				1	2	1					6
5	2					2	1					5
5.5	2											2
6						1	1					2
6.5						36		1				37
7	1					21						22
7.5	1					91	3		1		1	97
8				5		5				6		16
8.5				8		1		1		5	1	16
B	33					221	31			1		286
1	1					62	12					75
1.5	6					6						12
2	7					9	2					18
2.5	8					12	5					25
3	3						1					4
4.5						18	4			1		23
5	1					24	3					28
5.5						1						1
6	5					3						8
6.5	1					9	2					12
7						9						9
7.5	1					36	2					39
8						25						25
8.5						7						7
C	1		1			2	1					5
4	1											1
6						1						1
7			1									1
7.5						1	1					2

Table D: Locations of bat species within Waresley and Gransden Woods from sonogram records

	Barbastelle	Serotine	Daubenton's	Leisler's	Noctule	Common Pipistrelle	Soprano Pipistrelle	unidentified bat	unidentified Myotis spp.	unidentified Nyctalus spp.	unidentified Pipistrellus spp.	Grand Total
Waresley Wood	33	25	1	1	1	291	204	18	4	5	6	589
A	1	24		1		24	25	1		5		81
1		4				2	1					7
1.5		4					1					5
2		3					3					6
2.5	1	2		1		5	1					10
3										4		4
4						8						8
4.5						4						4
5		2				1	9					12
5.5		4				2	7	1		1		15
6		3				1	3					7
7		1										1
8		1				1						2
B	23	1	1		1	240	115	16	4		5	406
1	4					30	14				1	49
1.5	2					31	11	2				46
2.5	5					17	18	2				42
3	10	1			1	21	34	1	1			69
3.5	2					7	3	2				14
4						32	3	3				38
4.5						16						16
5.5						19	8	2				29
6						16	6	1	1			24
6.5						10	3		1			14
7			1			8	6	1			2	18
7.5						25	4	2	1			32
8						8	5				2	15
C	9					27	64	1			1	102
1.5							2					2
2	1					8	37	1				47
2.5	4					4	2					10
3	1						5					6
3.5	3						7					10
4.5						1	6					7
5						2	2					4
6							1					1
6.5						1						1
7						6	2					8
7.5						5					1	6