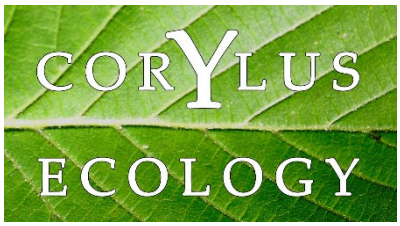

SIZEWELL

RADIO-TRACKING REPORT

For and on behalf of

Arcadis

FEBRUARY 2016

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1.0 Summary

1.1 A scheme involving the construction of the new proposed Sizewell 'C' power station and associated works including access roads and other temporary construction activities and associated developments near Leiston, Suffolk is subject to an Environmental Assessment. This report summarises the radio-tracking study undertaken in 2014.

1.2 The radio-tracking study had the following objectives:

1. to capture barbastelle (*Barbastellus barbastellus*) within the Sizewell Estate later in the bats' active season (see para 2.1.4) to supplement the data gathered earlier in the season in 2010 and 2011 and to determine by radio-tracking the extent of habitat use beyond the boundaries of the Estate.
2. to capture bats beyond the Estate (subject to landowner access) and determine by radio-tracking the extent to which individual barbastelle use areas that are outside *and* within the Sizewell Estate.
3. to identify further roosts through the location of tagged bats during the day.
4. to determine if the activity of adult male barbastelle differs from that of adult females and juveniles
5. to examine any rings found on captured barbastelle to look at persistence in the local area.

1.3 In the licence application, it was also requested that the licence should include radio-tracking Nathusius' pipistrelle, Daubenton's bats and serotine, if trapped. The aim of tracking these species would be to find the maternity roost(s) of these species (thought to be off-site) and determine the extent of their foraging areas within the zone of influence of the proposals.

1.4 A total of 285 bats (including recaptures) were caught during six nights of trapping (9 August 2014 and 11 to 15 August 2014). Trapping locations were in two areas, Minsmere RSPB Reserve as well as the Sizewell Estate.

1.5 A total of 18 barbastelles and one serotine were radio-tagged. The tagged barbastelles used a total of nine confirmed tree roosts (along with six other locations), none of which had been used in the previous 2010 and 2011 surveys. The total number of roosts found over the three radio-tracking periods (June 2010, August 2011 and August 2014) is now 31 plus six approximate roost locations. Of the 18 barbastelles radio-tagged, sufficient data for 15 were collected to allow home range analysis. Four bats were regularly recorded in the Minsmere Levels north and west of Eastbridge and also further west in the area of Theberton House. The objectives for radio-tracking barbastelle were met (although no ringed bats from the 2011 survey were re-caught).

1.6 A single serotine was tagged and tracked. This individual roosted in the grounds of Theberton House (to the west of the Sizewell Estate) where no access was allowed. No further information was available for the

roost site; however, the bat was successfully tracked during the night. No female Daubenton's bats were caught within the Sizewell Estate, and no Nathusius' pipistrelle were trapped in either site. The objective to track these bat species (if caught) was therefore not met.

2.0 Introduction

2.1 Project Background and Purpose

2.1.1 A scheme involving the construction of the new Sizewell 'C' power station and associated works including access roads and other temporary construction activities and associated developments near Leiston, Suffolk is subject to an Environmental Assessment.

2.1.2 A considerable amount of bat survey work has been undertaken by Amec/BSG Ecology (2007-1012), and more recently by Hyder Cresswell (now Arcadis; 2013). This has included transect surveys, static surveys and capture, mist-netting and harp-trapping (the latter activities carried out under previous licences held by Corylus Ecology).

2.1.3 The initial surveys recorded barbastelle at various locations throughout the Sizewell Estate on a regular basis. A session of trapping in May 2009 [under Licence No. 20091142] by Corylus Ecology resulted in a total of 42 bats from five species being caught. Over the three evening trapping sessions (half-night surveys), five barbastelles were caught: four female and a single male. All were caught in harp traps. On the first two evenings, the earliest barbastelles were removed from traps within an hour after sunset (the first, a male, was 50 minutes after sunset and the second c.58 minutes after sunset). The presence of a breeding population of this species was subsequently confirmed through radio-tracking.

2.1.4 A single session of radio-tracking was carried out by Corylus Ecology over a two-week period in June 2010 [under Licence No. 20102328]. A total of eight barbastelle bats were caught and radio-tracked and a further two were released untagged as they were considered to be too heavily pregnant to be radio-tracked. As a result of this work, it was decided that a session of radio-tracking later in the season once juvenile barbastelle bats were flying would be useful to further assess the use of the breeding colony during the key maternity and post-maternity period.

2.1.5 In 2011, a further session of trapping and radio-tracking was licensed [under Licence No. 20112929]. Eighteen barbastelle were caught (eight juveniles, seven breeding females, two non-breeding females and one adult male), of which seventeen were tagged (and sixteen ringed). As a result, a further eleven roosts were identified (ten in trees).

2.1.6 During the 2010 and 2011 radio-tracking surveys, a total of 22 roosts were found, all but two in trees. The main roosting areas recorded in 2011 for adult females and juveniles bats was centred on Ash Wood and the woodland adjacent to Plantation Cottages (to the north), with all breeding females recorded in these areas; tree roosts in Kenton Hills/Leiston Old Abbey Woods were also used. A single breeding female was also recorded roosting to the north (in 2010 only) in Hangman's New Wood, to the west of Minsmere. The

only tagged adult male was recorded briefly roosting in a barn (Hill Farm) a little to the west of the site and on the southern edge of Kenton Hills.

2.1.7 These two radio-tracking studies indicated a core foraging zone used by juveniles and breeding females extending south from the woodland adjacent to Plantation Cottages (to the north) through Black Walks, Ash Wood and into Goose Hill, Kenton Hills and the north-eastern part of the Sizewell Belts. The core foraging zone includes the areas used by juveniles when they become volant (are able to fly) but are incapable of making long commuting flights and are starting to be weaned and learn to hunt for themselves (Greenaway, 2004). There was less overlap of foraging by both breeding female and juvenile barbastelle in peripheral areas such as Sizewell Belts compared to the core foraging area.

2.1.8 Outside the core foraging area, bats were recorded in 2010 and 2011 foraging in parkland around Theberton (north-west), in Greenhouse Plantation (to the west) and to the south.

2.1.9 The radio-tracking work in 2010 and 2011 recorded the maximum distance travelled by a breeding female from a roost tree to a joint bearing at Sizewell was 3.1km; another travelled at least 2.9km into Minsmere; three others ranged over 2km. These distances appeared to be genuine rather than an artefact of the radio-tracking process. By comparison, considerable daily foraging distances (>10km) have been recorded in other projects (including bats tracked in Norfolk by Corylus Ecology). However only a sub-set of the population at Sizewell had been sampled in 2010 and 2011, therefore, further work was required to investigate foraging distances.

2.1.10 In summary, the barbastelles previously tagged (by year, gender and age) are outlined below:

Table A1 - Summary of barbastelles tagged in 2010 and 2011

Year	Adult female breeding	Adult female non-breeding	Adult male	Juvenile female	Juvenile male	Totals
2010	6		(1)			7
(Adult male in 2010 lost tag the day after tagging)						
2011	7	2	1	1	6	17
All barbastelle tracked in 2011 were also ringed with the exception of one male juvenile						
Total	**13**	**2**	**1 (+1)**	**1**	**6**	**24**

2.1.11 Very few males have been captured and tracked, which may either be a realistic representation of the population (fewer males are present to be trapped), or an artefact of the sampling effort (for example, as a result of sex-linked differences in behaviour of bats such as differences in foraging areas causing bias at capture locations. Male bats tend to range over a greater distance and are not as strongly associated with

the core breeding habitat monopolised by the females. The trapping carried out was principally within or in close vicinity to the core breeding habitat.

Other species

2.1.12 Consent was also sought in 2011 to capture and radio-track Nathusius' pipistrelle, Natterer's, brown long-eared and Daubenton's bats.

- At this point, the bat activity surveys undertaken by Amec/BSG (HyderCresswell, 2015, in prep.) had recorded Nathusius' pipistrelle activity throughout the summer breeding period. Currently little is known about Nathusius' pipistrelle maternity roosts in England and it was considered important to try to determine if there is a breeding roost in the vicinity of the proposals.
- The previous radio-tracking/trapping recorded good numbers of Natterer's bats and it was confirmed there was a breeding colony within the survey area. The aim of radio-tracking this species in 2011 was to try to find significant foraging areas and any key roosting areas.
- Based on trapping results and static bat detector surveys, brown long-eared bats are widespread and relatively common, and at least two maternity roosts are present.
- Only a single Daubenton's bat (a male) was caught in 2010 (traps were not set in areas specifically to catch this species). However, the activity surveys recorded this species foraging over the Sizewell Belts.

2.1.13 Four Natterer's bats and one brown long-eared bat were radio-tagged in 2011. No Daubenton's bats or Nathusius's pipistrelle were trapped, so could not be radio-tracked.

2.1.14 Nine serotine were trapped in 2011 (an unusually high number for this site) but not tagged/tracked as they were not included on the 2011 licence.

2.2 Objectives

2.2.1 During ecology workshops held with stakeholders in October 2013 and February 2014, it was agreed that carrying out additional radio-tracking in 2014 would be of benefit to the overall understanding of the Sizewell Estate and wider area by bats, particularly barbastelle. The study has the following objectives:

- to capture barbastelles within the Estate later in the bats' active season to determine by radio-tracking the extent of habitat use beyond the boundaries of the Estate;
- to capture bats beyond the Estate (subject to landowner access) and determine by radio-tracking the extent to which individual barbastelles use areas that are outside *and* within the Sizewell Estate. The RSPB allowed access to land to the north of the Sizewell Estate within their Minsmere Reserve;
- to identify further roosts through the location of tagged bats during the day;
- to determine if the activity of adult male barbastelles differs from that of adult females and juveniles;

- to examine any rings found on captured barbastelles to look at persistence (the small numbers previously ringed may give an indication of population size, but not an accurate estimate).

2.2.2 In addition to the surveys of barbastelle, serotine were also targeted for radio-tracking along with Daubenton's bat and Nathusius' pipistrelle. This choice of these species was based on: the results of the previous transect/activity surveys; the 2011 radio-tracking surveys (which tracked Natterer's and brown long-eared bats); and the potential impacts of the proposals; with the objective of determining if breeding females were present and the locations of their roosts, if any, and to determine the extent of their foraging areas within the zone of influence.

3.0 Methodology

3.1 Harp-trapping and mist-netting, with additional hand-netting from tree roosts, was undertaken between 9 and 15 August with radio-tracking commencing on 12 and continuing until the 22 August.

3.2 Acoustic lures (Sussex Autobat) were used during the trapping exercise. The lures played either a synthesised barbastelle or Nathusius' pipistrelle social call and were used near to harp traps on a number of evenings specifically to attract those subject bats.

3.3 Bats were tracked throughout the night until they were lost by surveyors, and then tracked by surveyors during the day who attempted to find their roosting locations. At emergence times, surveyors also attempted to catch bats from roost trees using static hand-nets where placement was possible. This was only undertaken on the one occasion on 15 August. Two of the main tree roosts were considered impossible to climb and mist-nets were put as close to the roosts as was considered safe to catch bats emerging from these trees.

3.4 A licence for the trapping and radio-tracking project was granted to Helen Lucking of Corylus Ecology by Natural England (licence number 2014-1934-Sci-Sci) with ringing to be undertaken by Helen Lucking, Geoff Billington of Greena Ecological Consultancy or Dr Stephanie Murphy of Arbeco Ecological Services Ltd. The main accredited agents used were: Paul Spencer of Corylus Ecology; Alison Johnston, Stephanie Murphy of Arbeco Ltd; and Geoff Billington of Greena Ecology. A number of other surveyors employed by Corylus Ecology were used as accredited agents during the trapping and for radio-tracking. All radio-trackers were experienced in such work.

3.5 Biometric data were recorded from all bats caught including gender, forearm length and weight. Every bat was also examined to ascertain its breeding status, where possible. Only bats which were in healthy condition and of suitable weight were considered for tracking/ringing. Bats were tagged with radio-transmitters provided by Biotrack. Tags weighed 0.47g, 0.35g or 0.28g, and the licence granted from Natural England allowed tags to be used on bats up to a maximum of 5% body weight. Eighteen barbastelles were tagged ranging in weight from 7.4g (a male) to 10.8g. A single serotine was the only species to be tagged with a 0.47g tag which was approximately 1.8% body weight. The bats being tracked were fur-clipped and the transmitters glued between the shoulder blades using Salts Latex Adhesive Solution 833005[1] adhesive. The 0.47g and 0.35g transmitters used were designed with a battery life of at least eight days with the 0.28g tags set for five days. Care was taken to ensure that tag frequencies would not overlap. Time was allowed for the bats and transmitters to settle and for receivers to be set to the optimum frequency of each transmitter

[1] Current guidance from the Bat Conservation Trust suggests that the new formulation of SkinBond adhesive may not be safe for use with bats. The adhesive used during surveys at Sizewell was a latex-based formula which has been used successfully by the RSPCA and other UK consultants.

before releasing the bats close to where they had been caught. Each tracked bat was assigned a consecutive number to allow them to be distinguished easily during tracking.

3.6 Bats were radio-tracked using Australis and Sika radio-tracking scanning receivers with Yagi rigid directional aerials to track bats on foot. Whip omni-directional antennas were employed when searching for bats by vehicle. Hand-held sighting compasses were used to take bearings and both detailed maps and handheld GPS units were used to provide locations for both surveyors and bats. Between two and nine surveyors were used to radio-track the bats, using both close-tracking and synchronised triangulation techniques to produce joint bearings. Surveyors used long-range MITEK radio-sets and mobile phones to allow contact to be maintained while synchronised joint bearings were taken.

3.7 The key night-time radio-tracking surveyors used were experienced in multi-bat tracking projects for development and road schemes, each having a minimum of seven years' experience of similar, sustained trapping and tracking survey. Experienced day-time surveyors were used to track bats back to day roosts.

3.8 A series of safe observation points for the radio-tracking surveyors were pre-planned to allow for safe working and to provide the best receiver locations for joint bearings to be taken. However, since the 2011 surveys, access to private land around the village of Eastbridge had become more restricted and many of the pre-planned monitoring points could not be used. Surveyors were therefore positioned largely within the Sizewell Estate and Minsmere, or in (limited) additional areas where access had been approved. If a bat moved further to the west (around the village of Eastbridge and neighbouring farmland) such that the surveyors were unable to move to get a joint bearing, tracking was suspended until the bat moved closer to the survey area.

3.9 If a bat was recorded, then attempts were made to take synchronised, also referred to as 'joint', bearings, with another surveyor. This meant that surveyors frequently had to change locations in order to get joint bearings. It is recognised that gathering regular, accurate and triangulated fixes for foraging bats is difficult. This is because bats forage in flight and at speed, continually twisting and turning, causing fluctuations in transmitter pulse amplitude which can impede interpretation of distance and direction (Mackie & Racey, 2007). In addition, the barbastelle is a wide-ranging, fast-flying species which switches roosts frequently. Care also had to be taken to ensure that the surveyors were positioned away from overhead cables and electric fences to avoid disturbance to the compasses and radio-signals

3.10 The high number of experienced radio-trackers meant that a wide area was covered for radio-tracking, not just the Sizewell Estate. All surveyors were mobile, with each surveyor able to drive to new locations and were in contact with each other with long-range radios. In previous projects, if no tagged bats were in the area of the proposals, surveyors would search for bats in the wider area, although priority would always be given to those in closer proximity to the scheme. For this project, the aim was not just to record data from within the area of the proposals but to record the extent of bat foraging across the landscape. Due to access arrangements with private landowners, not all areas of the landscape could be fully surveyed. Surveyors were allowed access to land within the Sizewell and Minsmere Estates and at the National Trust at Dunwich. Vantage points (VPs) for taking bearings were also possible from public land such as formal road laybys or on private land where access was granted. Access was restricted around Eastbridge for the 2014 surveys (there had been no such restriction on this area during the 2010 or 2011 surveys). As a result, varying numbers of triangulation points were taken for each bat, and not all bats were followed as closely as others. However, omni-directional aerials on cars allowed the presence of bats in certain areas to be determined even if there were no public road laybys to allow a bearing to be taken (although it should be noted that vehicles did not drive between Eastbridge and the B1122 on any route during the main tracking period). Vantage points within the Minsmere Reserve and Dunwich Heath in elevated positions were used in 2014 which allowed bats in the Eastbridge area to be tracked.

3.11 Collecting tracking data on female bats was prioritised over data collection from male bats when male bats were not present within the areas where most bats were being recorded. The majority of the barbastelle population caught at Sizewell comprised females; data from previous years indicated that the females were more faithful to the habitats present within the Sizewell Estate, with male bats using areas away from this area. The receivers used allowed easy scrolling between the frequencies of the different tags/bats and the surveyors were constantly checking for the presence of all bats including the male tagged bats. As well as recording bats that were within range, surveyors also noted which bats were not recorded.

3.12 The local bat group representatives were contacted, in this case the local Suffolk Wildlife Trust team, to inform them of the work and to check whether any other radio-tracking was being undertaken by other surveyors who should also have contacted the same bat group representatives. No concurrent studies were reported.

Analysis

3.13 For each tagged bat, the triangulation points obtained have allowed habitat areas to be identified. Detailed statistical analysis relating to variation in home ranges (an area over which an animal or group of animals regularly travels in search of food or mates, and which may overlap with those of neighbouring animals or groups of the same species) or core areas (the area where the animal spends the majority of its time) has not been undertaken as the same level of survey effort was not carried out for each bat. Wherever sufficient information has been gathered, analysis of home ranges has been undertaken.

3.14 The data presented in this report are based on all available triangulation points. In addition, where a bat was known to be present in a given location at a given time, a data point was also generated. Where a bat was closely radio-tracked (for example, a bat foraging for a sustained period within a specific area), a triangulation point was generated for the approximate centre of the foraging area. The aim was to obtain a fix for at least every ten-minute interval. However, in real terms, this may have not been possible for every radio-tracked bat. This is because barbastelles have a tendency to move through the landscape quickly, resulting in the transmitter not being detected by the receiver. Therefore, once a radio-tagged barbastelle had been re-located it was imperative to obtain as much data as possible to establish a pattern of range use. If during the night time active tracking a number of similar fixes were achieved within a short period time, i.e. 10 minutes, then multiple fixes were discarded to correct for autocorrelation. Millspaugh and Marzluff (2001) conclude that for home range analysis adequate sampling of animal locations throughout the duration of the study is more important than determining a time interval between sampling that is statistically independent. It is important therefore that the study incorporates biological traits of the animal into the sampling schedule: for example, studying nocturnal animals in both day and night locations to prevent bias towards a particular behaviour or activity. The data was checked to make sure there were no duplicates/clumping of fixes at the roosts during the night-time tracking to eliminate overestimate of habitat use around roosts due to swarming. Selection of a sampling interval less than that required for "time to independence" (TTI – the time at which autocorrelation is non-existent in successive observations) will not invalidate kernel or MCP analysis, provided that the time frame of the study is adequate (Swihart and Slade 1997; Millspaugh and Marzluff, 2001).

3.15 Bat fixes were transferred to digital geo-referenced maps using AutoCAD and coordinates for triangulation points were determined; the extent of bat activity for each bat was plotted independently and the data were carefully scrutinised and any obviously false bearings were discarded. The coordinates of the plotted triangulation points were then transferred into Ranges 7 software (Anatrack) and analysed to produce minimum convex polygons[2] (MCPs), neighbour linkage[3] (or clusters) and kernel contours[4]. These are all methods of showing home ranges. Where roosts were found, the roost sites were included within the home ranges. The analysis was carried out using 95% of the locations closest to the home range centre (for polygons produced by MCP analysis) or the 95% nearest to each other for the contour analysis (the cluster and kernel contours).

[2] The MCP enables the creation of a boundary around all fixes using the smallest possible convex polygon. This is commonly used but may overestimate the size of home ranges.

[3] A type of multivariate analysis that uses records or measurements of a number of characteristics or features to group individuals into clusters or classes, so that individuals within each cluster/class are as alike each other as possible and as unlike individuals in other clusters/classes as possible.

[4] Kernel methods quantitatively determine areas which are intensively used by animals by converting position coordinates into lines or areas with varying probabilities of use and present these graphically.

3.16 Within each data set, the trapping locations were specified as the focal sites and all coordinates from the night-time tracking and roost locations were inputted as location qualifying variables (LQVs) within Ranges (LQV's are time, activity, habitat, values associated with the *x*,*y* coordinates). The activities of the bats were assigned a numerical value for their activity, either roosting, flying or night-roosting for analysis within Ranges. Typically a focal site might consist of a static, repeatedly-used location such as a den or nest, but in the case of bats where roosts change regularly, the trapping location is the most appropriate focal point to use.

Emergence surveys of barbastelle roost trees

3.17 During the 2010 and 2011 radio-tracking surveys, a total of 22 barbastelle roosts were located. Of these, two were barns used by single male bats and another was within an area of inaccessible woodland at Grimseys where two female barbastelles roosted in 2010. It was impossible to tell if more than one roost location was used in Grimseys. The other 19 roosts were all in trees which could be accessed. During the 2014 study, a further nine barbastelle tree roosts were located with a further six unspecified roost areas identified bringing the total known to 36. During 2014, emergence surveys were undertaken on six trees, including two tree roosts identified in 2011.

Survey limitations

Trapping and radio-tracking

3.18 During the radio-tracking session, the weather was unsettled after a relatively long period of warm and settled weather. One evening of trapping was cancelled due to high wind and rain when ex-hurricane Bertha passed over the UK on 10 August. Following this storm, there was an unusually long period of strong winds that restricted trapping to harp traps only and in more sheltered locations. On 14 August, a heavy sea mist came in at around 00.45hrs. Toward the end of the project, night-time temperatures were also unusually low, dropping down to 5^{o}C on 19 and 20 August which resulted in ending the tracking at around 1am as the majority of bats had either returned to their roost or could not be found.

3.19 Weather data was provided by the RSPB's Minsmere Reserve following the installation but subsequent internal battery failure of a Tinytag temperature datalogger. The data provided is included in Appendix 1. The data is for daytime conditions only.

3.20 As was found during 2010 and 2011, the landscape of the area made joint bearings difficult to take in places. Much of the area is flat and there were few good vantage points from which to take bearings over the wider landscape. Although there is slightly higher ground in Nursery Covert and Goose Hill, these areas are not particularly elevated and have undulating ground. As a result the signal from tagged bats would rapidly appear and disappear as they moved below and over ridges in the woodland, and surveyors frequently had to move location to be able to take bearings. However, one location at the Coastguard Cottages on the

coast at Minsmere was used on every night as this was a high point with most bats being tracked from that location.

3.21 A significant area around Eastbridge was excluded for access for all surveyors even by car to avoid issues with local landowners who had revoked any access. This was during both day- and night-tracking. This "No-go" area is shown on Figure A1. As with the 2011 radio-tracking surveys, there was electrical interference in the Fiscal Policy area which affected the receivers in this area and into Kenton Hills and Lover's Lane area. As a result the strength of the signals from the tags were much reduced.

3.22 Another constraint was the loss and failure of tags. The tag on Bat 4 appeared to be faulty as it was first detected on 16 August in the Nursery Covert area four days after it was fixed on the bat. The tag on Bat 12 was not recorded after it had been released and so no bearings were possible for this bat. Bat 10 was caught on 13 August just after midnight and its roost was found for three days before the tag appeared to fail.

3.23 Only three adult male bats were caught and therefore tagged. These bats were not radio-tracked to the full extent of their home range particularly those that roosted a considerable distance from the Sizewell area near Saxmundham.

4.0 Radio-tracking results

4.1 Trapping results

4.1.1 Full details of all bats caught are provided in **Table A2.** None of the bats caught had previously been ringed. A summary of the species and the breeding status of caught bats are provided in **Tables A3** and **A4** for Sizewell and Minsmere respectively. Twenty-six barbastelles were caught and 18 were tagged, a summary of the barbastelle bats caught is shown in **Table A5.** Vantage points for taking bearings are shown in **Figure A1.** The trapping and roost locations are shown in **Figure A2**. **Figure A3** shows locations of areas described within the report.

Table A3 - Summary of species and breeding status of bats caught within Sizewell Estate

Species	Female			Male		Unknown	Grand Total
	Adult breeding	Adult non-breeding	Juvenile	Adult	Juvenile		
Barbastelle	7	1		3	5	1	17
Brown long-eared	2	1		6			9
Daubenton's				1	1		2
Natterer's	5		1	11			17
Common pipistrelle	4	8	5	17	2	1	37
Soprano pipistrelle	2		2	12	1		17
Serotine		1					1
Grand Total	**20**	**11**	**8**	**50**	**9**	**2**	**100**

Chart 1 – Numbers of male and female bats caught per species within Sizewell Estate

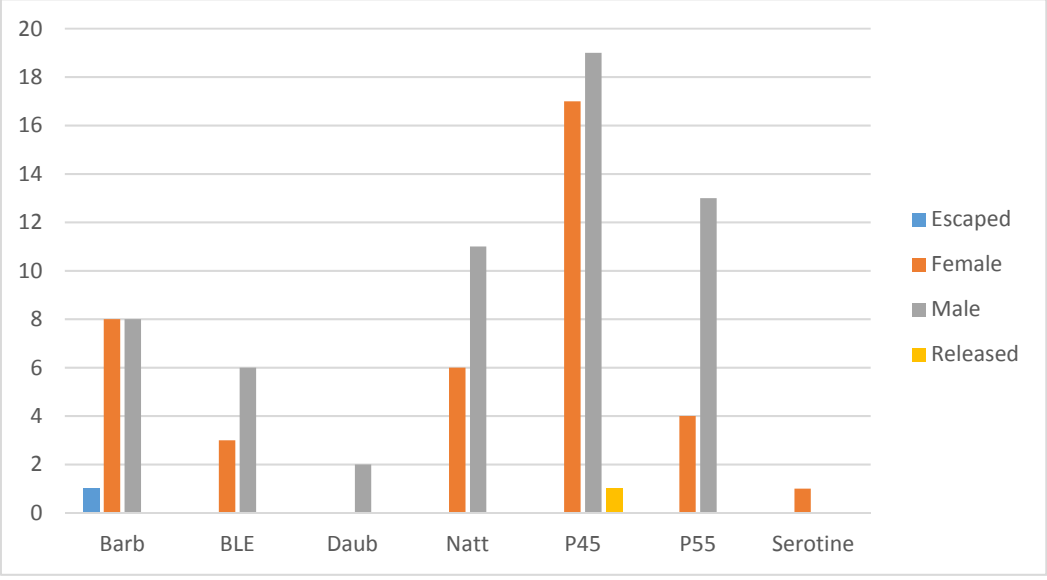
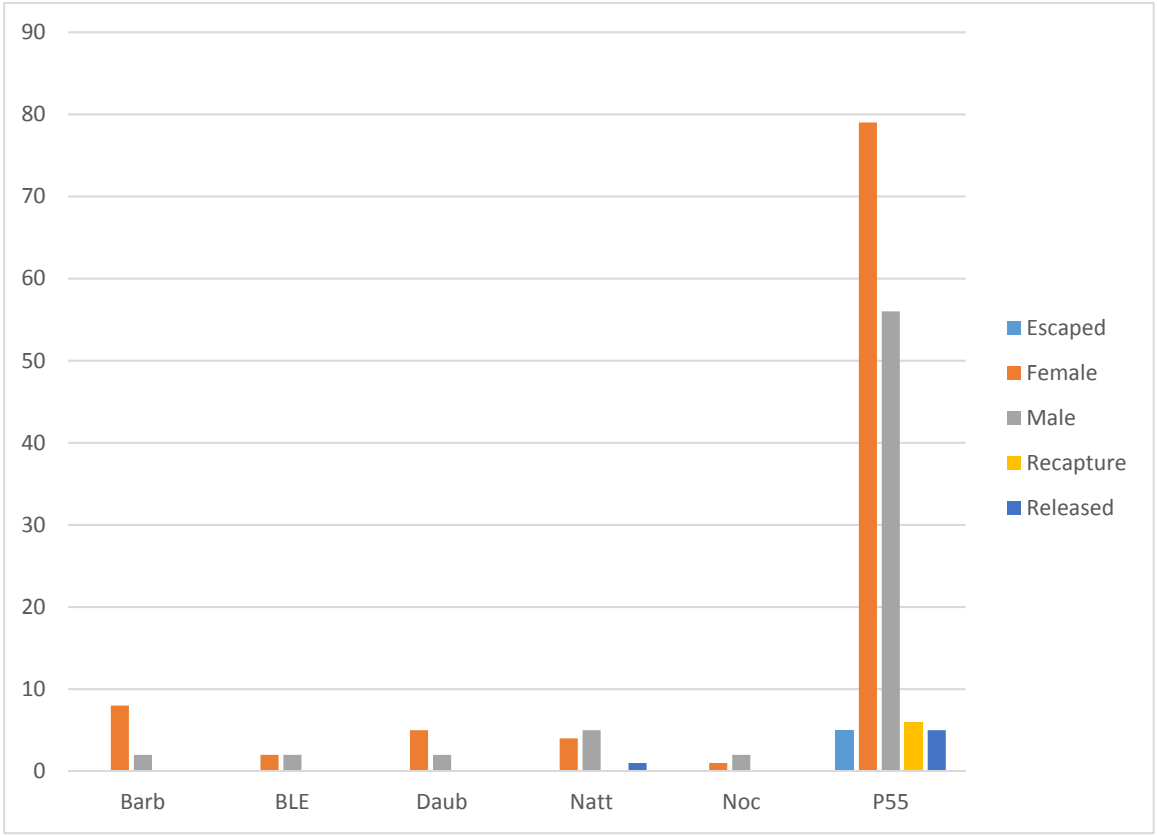


Table A4 - Summary of species and breeding status of bats caught within Minsmere

Species	Female			Male		Unknown	Grand Total
	Adult breeding	Adult non-breeding	Juvenile	Adult	Juvenile		
Barbastelle	5	2			2	1	10
Brown long-eared	1		1	1	1		4
Daubenton's		1	4		2		7
Natterer's	1	1	2	3	2	1	10
Noctule	1			2			3
Soprano pipistrelle	3	4	72	21	35	16	151
Grand Total	**11**	**8**	**79**	**27**	**42**	**18**	**185**

Chart 2 – Numbers of male and female bats caught per species within Minsmere (note different scale to previous chart)



4.2 Trapping Overview

4.2.1 In total 285 bats were caught during the trapping exercise. This includes six bats that escaped from the nets, seven that were recaptures and seven that were caught too close to sunrise to be able to take any biometric data and were released straight away. Seven species were caught within the Sizewell Estate and

six within Minsmere; a total of eight across both areas. Serotine and common pipistrelle were caught at Sizewell but not at Minsmere whilst noctule was caught at Minsmere but not Sizewell. There were a total of seven trapping sites. Four of these trapping sites were within the Sizewell Estate: at Fiscal Policy; in the northern section of Nursery Covert; along Abbey Lane; and the southern side of Nursery Covert. There were three sites within the Minsmere Reserve: at Southwalk Belt to the south-west of the Visitor Centre; at the centre of the track leading north from Hangman's Wood; and north of Sheepwash Lane in Scottshall Covert. In addition, two trees were climbed: R26 in Ash Wood and R27 in Nursery Covert (both within the Sizewell Estate). Bats were only caught and tagged from one of these trees. A third tree was due to be climbed, but it was determined that the area of the likely roost would be too difficult to safely access and instead two mist-nets were installed near the tree.

9 August 2014

Fiscal Policy (T1)

4.2.2 A single male juvenile barbastelle weighing 7.8g was caught during the first trapping night at Fiscal Policy (T1). The bat was ringed (ring number T8832) but as it was a juvenile bat it was not radio-tracked. A further 20 bats were caught: eight common pipistrelle, six soprano pipistrelle, four Natterer's bat; a single juvenile male Daubenton's bat; and a single brown long-eared bat.

4.2.3 Following a night of no trapping on the 10 August due to bad weather, two trapping sites were used: Nursery Covert (Sizewell) and Southwalk Belt (Minsmere).

11 August 2014

Sizewell Estate - Northern side of Nursery Covert (T2)

4.2.4 A total of 27 bats were caught including eight barbastelle (four post-lactating females, two adult males and a juvenile male). One barbastelle escaped from the mist-net before it was extracted. The seven processed bats weighed between 8.1g and 10.7g but only six were tagged (Bat 1 through Bat 6). The seventh, a juvenile male was considered to be too stressed and was not weighed. It was quickly ringed (ring number T8827) and subsequently released. Bat 1 was a post-lactating female (ring number T8831); Bat 2 was a post-lactating female (T8828); Bat 3 a breeding male (T8829); Bat 4 was a post-lactating female (T8830); Bat 5 was a non-breeding male (T8981); and Bat 6 a post-lactating female (T9000). In addition four common pipistrelles, six soprano pipistrelles, five Natterer's bats and four brown long-eared were caught.

Minsmere - Southwalk Belt (T12)

4.2.5 At the second trapping site, a total of 69 bats were caught and 56 of these (81%) were soprano pipistrelle. A single juvenile male barbastelle was caught weighing 8.2g but was not tagged (ring number H5944). Other species caught comprised three Natterer's bats, seven Daubenton's bats (one adult non-breeding female and 6 juvenile) and two brown long-eared bats.

12 August 2014

Sizewell Estate - Abbey Lane (T3)

4.2.6 Two trapping sites were again chosen for this night. The first located on Abbey Lane in Sizewell caught 33 bats including one post-lactating female barbastelle weighing 9.7g, tagged as Bat 12 (ring number T8954). A female adult serotine was also caught (25.1g) and tagged (Bat 9). In total, 21 common pipistrelles were caught, as well as a single soprano pipistrelle, a single adult male Daubenton's bat, six Natterer's bats and two brown long-eared bats.

Minsmere - Lane leading north from Hangman's Wood (T10)

4.2.7 A total of 96 bats were caught at this location, the most caught at any trapping site. Of these 83 were soprano pipistrelles and seven of these were recaptures. Of the six barbastelle caught, five were adults and were subsequently tagged (Bat 7, Bat 8, Bat 10, Bat 11 and Bat 13. A sixth bat was a juvenile and was not tagged (ring number H6098). Bat 7 was a post lactating female weighing 8.5g (H6100); Bat 8 was a non-breeding female weighing 9g (H6099); Bat 10 was a post-lactating female weighing 9.9g (H6097); Bat 11 was a post-lactating female weighing 10g (H6096); and Bat 13 was a post-lactating female weighing 10.8g (H6095). Other species caught comprised three Natterer's bats, one noctule and two brown long-eared bats.

13 August 2014

Minsmere - ScottsHall Covert north of Sheepwash Lane (T13)

4.2.8 Again two trapping sites were chosen on this night. The first at land off Sheepwash Lane in the Minsmere Lane caught a total of 18 bats. No barbastelle were caught; however, two male noctule, four Natterer's bats and 12 soprano pipistrelles were caught.

Sizewell Estate - Nursery Covert Southern track (T11)

4.2.9 A total of 16 bats were caught at this location including four barbastelle. All four bats were adults and were tagged. Bat 14 was male weighing 7.4g (ring number T8963), Bat 15 was a non-breeding female weighing 8.4g (T8964); Bat 16 was a post-lactating female weighing 10.6g (T8982); Bat 17 was a post-lactating female weighing 9.8g (T8999). Other bats recorded comprised four common pipistrelles, four soprano pipistrelles, two Natterer's bats and two brown long-eared bats.

14 August

Minsmere – Tree Roost R25

4.2.10 Tree roost R25 located in Minsmere was discovered during day-time tracking. It was not possible to safely reach the likely roost area by climbing; instead two mist-nets were installed near the tree with concealed surveyors watching for bats to enter the net to ensure they could be extracted immediately. Two adult

female barbastelle bats were caught. Bat 18 was a post-lactating female weighing 10g (H6094) and Bat 19 was a non-breeding female weighing 8.5g (H6093).

Tree Roost R26 Ash Wood

4.2.11 Tree roost R26 was found during day-time tracking. A single surveyor climbed the tree but, although bats were seen emerging from the tree, none were caught.

15 August

Sizewell Estate – Nursery Covert Tree Roost R27

4.2.12 The roost was found during day-time tracking and was found to be a tree frequently used by tagged bats. An emergence survey was undertaken to try to determine more accurately where the bats were roosting and emerging. The same surveyor climbed the tree the following evening to attempt to catch bats from it. A total of three barbastelles were caught: all were juvenile male bats and were therefore ringed but not tagged (ring nos T8978, T8979 and T8980). Two of these bats were under 7g in weight; however, one was a very mature juvenile bat weighing 7.9g.

4.3 Movement of Tagged Barbastelles (see Figures B1-B19)

Bat 1

4.3.1 This bat, a post-lactating female, was caught at Nursery Covert (T2) on 11 August at 20:50. The bat was recorded roosting in four tree roosts: R23 in The Grove on 12 and 14 August before moving to R26 in Ash Wood for one night. It was not found on 15 August before moving to R27 in Nursery Covert until 21 August when it moved to R32 (the unspecified tree(s) near Lower Abbey Farm). All roosts were within the Sizewell Estate.

4.3.2 A total of 57 joint bearings were achieved with a further 14 single bearings. It was initially recorded foraging in The Grove and Nursery Covert but in the early days of night tracking it was rapidly lost flying north in Minsmere Levels. It was recorded using night roosts, including R27, on 14 August between 02:45 and 04:25 but by the time the day-time search was undertaken it was found in R26 in Ash Wood.

4.3.3 It was tracked further north on 14 August in Scottshall Covert before it moved back south to the Sizewell Estate. After this point during the night-tracking surveys it was regularly recorded foraging with the Warren and Scottshall Covert in the Minsmere Reserve, moving south over Minsmere Levels back to the Sizewell Estate.

4.3.4 The bat was recorded returning to its roost relatively early on several nights. On 14 and 15 it was recorded returning to R27 at around 03:00 and 22 August at R 32 from 03:40 (sunrise being around 05:40 during the period of the tracking). On 20 August when conditions were cold, it was recorded in R27 at 22:58; before

this on that evening, its range was restricted as it was not recorded north of the Minsmere Levels. Bearings taken later in the night recorded that it remained in the south.

Bat 2

4.3.5 This bat, a post-lactating female, was caught at Nursery Covert/Turf Pits (T2) on 11 August at 20:50. It was not found in a day roost on 12 August but on 13 August it was recorded in tree roost R24 in Scottshall Covert in Minsmere. The following day, tracking recorded it in R27 in Nursery Covert (Sizewell), and it was recorded in the same location on 16 and 17 August. On 18 August, its day roost was not found; however, on 19 August it was located in an area where no access was allowed to the north of Lower Abbey Farm in the same general area as Bat 1 where it was recorded thereafter (R32 area).

4.3.6 A total of 66 joint bearings were achieved with a further 48 single bearings. The bat was not recorded on August 12 by the radio-trackers who were largely in the Sizewell Estate area. Similarly it was not recorded the following night until 03:20 when it was recorded static within Ash Wood until at least 03:47. The bat had moved locations after this, as it was found during the day-time checks in R27 in Nursery Covert.

4.3.7 The bat appeared to move rapidly from its roosting area to the main foraging area which was found to be the woodland to the south and east of the RSPB visitor centre at Minsmere, north into The Warren and Dunwich Heath and west into Scottshall Covert. On 20 August, as an example, it was in the Warren at 21:07. It was recorded occasionally returning south towards the Sizewell Estate but the majority of time when it was active was spent in this northern foraging area. On 19 August, after foraging in the Warren area, the bat moved back to the Sizewell Estate and was recorded roosting within Ash Wood at 03:00 (presumed R26) but during the day-time tracking it was found to have moved to R32. On 20 August, which was a particularly cold night, during the night-tracking it was recorded in an unspecified roost at Ash Wood at 22.33, and on 22 August it was recorded flying in Ash Wood and possibly static in the roost, but was in R32 near Lower Abbey Farm in the morning.

Bat 3

4.3.8 This bat, an adult male, was caught at Nursery Covert/Turf Pits (T2) on 11 August. The day roost(s) used by this bat were not identified except for a general area location. Bearings putting it in the area of Grimseys Wood were taken on 13, 14, 16 and 17 August, whilst on 21 August, it was in the northern section of Grimseys Wood. The area is impenetrable and no access was possible at the time of the radio-tracking.

4.3.11 A total of 17 joint bearings were achieved for this bat. The bat was found foraging south of Lovers Lane and apparently using the railway line as a foraging or commuting route. It was recorded here on several nights including 13, 14, 17 and 22 August. It was also recorded to the south of Sandy Lane. It was often recorded moving through the Sizewell Estate including Fiscal Policy, Nursery Covert, Goose Hill and Dunwich Forest

up to Ash Wood. Single bearings and close tracking were achieved which resulted in 78 location points being plotted. It was recorded just to the north of Eastbridge on the Minsmere Levels by a single joint bearing.

Bat 4

4.3.12 This bat, a post-lactating female, was caught at Nursery Covert/Turf Pits (T2) on 12 August shortly after midnight. The tag either malfunctioned or the bat dispersed from the study area. No day roosts could be found for this bat, and none of the surveyors recorded this bat after the night it was tagged and released until the night of 16 August. A total of 20 joint bearings were possible on this bat during that night. The bat was recorded to the north at the northern end of The Grove, in the Goose Hill and Kenton Hills area and to the south around the Platform Location near Sizewell.

Bat 5

4.3.13 This bat, an adult male, was caught at Nursery Covert/Turf Pits (T2) on 12 August shortly before dawn at 03:50. On 12 August, it was recorded roosting in the Grimseys Woodland area. After this time it moved between two roosts near Saxmundham; R33 at Redhouse Farm Saxmundham and R34 New Plantation at Saxmundham.

4.3.14 A total of 14 joint bearings were obtained and a further 25 single bearings. This recorded the bat in the Rookyard Woods area, south of the power station on night of 12 and 16 August. It appeared to use the area under the overhead power cables as a foraging area. Joint bearings recorded it as far south as The Walks, to the east of Leiston. Single bearings also recorded it just west of the power station and also north over the Minsmere Levels near Eastbridge. The bat was recorded in these locations on multiple nights.

Bat 6

4.3.15 This bat, a post-lactating female, was caught at Nursery Covert/Turf Pits (T2) on 12 August at 04.33. As with Bat 5, it flew and roosted in the Grimseys Woodland on 12 August before moving to R26, an oak tree in Ash Wood on 13 August and 14 August. A count of the tree on 14 August recorded at least 10 bats emerging from the tree. The bat was not found on 15 August but the day-tracking was curtailed due to access problems. At 03:20 on the 15 August, the bat was recorded static within Ash Wood and the first bearing achieved the following evening positioned the bat at The Grove at 21.06. On 16 August it could not be located; however, between 18 and 21 August, it was in the area to the north of Lower Abbey (R32 – approximate location) where again no access was permitted.

4.3.16 Fifty-nine joint bearings were taken over a period of nine nights, with a further 23 single-bearing estimates plotted from monitoring and close tracking. This bat flew quite widely, with joint bearings recording it north in Scottshall Coverts and the Warren, over Minsmere Levels and south into Grimseys and towards Sizewell

Belts. It was also recorded further west just south of Theberton. The bat was recorded regularly returning to an unspecified night roost in Ash Wood. The exact roost was not determined as it was considered if a surveyor approached a night roost tree it would likely disturb the bat and cause them to fly. On each evening between 13 and 16 August, and 20 to 22 August (inclusive), the bat was recorded static in Ash Wood from around 01:00 or from 03.50. The bat was recorded in R26 in Ash Wood on 13 and 14 August but on 16, 20, 21 and 22 it moved location by the time of the day-time tracking.

Bat 7

4.3.17 This bat, a post-lactating female, was caught at the northern section of New Hangman's Wood (T10) on 12 August at 21:25. It was re-caught in the same general trapping area at midnight. It was recorded roosting in R27, the dead Scot's pine tree in Nursery Covert, every day it was found. It was not recorded in a day roost on 15 August when day-time tracking was curtailed due to access issues; however, it had been recorded static at 03:20 in R27 on the 15 August.

4.3.18 This bat was recorded most regularly around the Black Walks, Lower Abbey and Minsmere Levels area; however, it was also recorded north-west of Westleton and west around Middleton. Access for taking bearings was restricted both by access restrictions and landscape and it is thought that this bat foraged in this western area more regularly than the joint bearings suggest. The bat was caught in the north on the track north of Hangman's Wood and was recorded foraging in this area and over the grassland habitats to the east of the track. It was also recorded within Scottshall Coverts and east of the Minsmere Visitor Centre. It was considered likely to be foraging south of this area in the Minsmere Levels through a single-bearing recording but no joint bearings were achieved. No joint bearings were achieved in Nursery Covert as the bat appeared to move north very rapidly after emerging and was regularly recorded in the Black Walks area early in the night (for example, just after 21:00).

4.3.19 This bat was faithful to the same roost for the duration of the radio-tracking. It was recorded back in the roost tree relatively early on two nights. On 14 August it was found back in the roost at 02.33hrs and again on 18 August it was in its roost by 03:30. No other night roosts were found, but it is possible that roosts in the inaccessible western area were used, as the 2011 radio-tracking survey recorded night roosts in the area north-west of Eastbridge.

Bat 8

4.3.20 This bat, a non-breeding female, was caught at the northern section of Hangman's Wood on 12 August at 22:10. A total of 40 joint bearings were achieved with a further five single bearings. No roost was found for this bat despite extensive searches. It is considered most likely that it was roosting somewhere in the area around Eastbridge and Theberton where access was restricted.

4.3.21 The bat was recorded foraging around the Eastbridge area south to Greenhouse Plantation and Theberton House and north into the Minsmere Reserve including the area where it had been caught and north into Westleton Walks. It is considered likely to have foraged in the area to the north-west of Eastbridge although due to access restrictions it was not possible to get many bearings of it here.

Bat 10

4.3.22 This bat, a post-lactating female was caught shortly after midnight on 13 August at Minsmere at T10 along the lane north of Hangman's Wood.

4.3.23 Only three joint bearings were successful with this bat. The tag appeared to fail after three nights. It was found roosting in R25 for two days after it was tagged (13 and 14 August) and R28 on 15 August. A record was also made some days later on 19 August again at R25 at 03:30 but no other recordings were made.

4.3.24 The three joint bearings taken were all after midnight on 15 August and all three located the bat in the woodland and open habitats to the west of Hangman's New Wood. Single bearings taken over two nights (14 and 15 August) recorded the bat within Scottshall Plantation, over the Minsmere Levels, to the west of Eastbridge and north towards Westleton Walks. It was not recorded by any of the surveyors to the south in the Sizewell Estate.

Bat 11

4.3.25 This bat, a post-lactating female was caught at Minsmere at T10 along the lane north of Hangman's Wood at 01:00 on 13 August. A total of 57 joint bearings were achieved with a further 27 single bearings. The bat used four roost trees. On 13 August it was found in roost R25 in Scottshall Covert. The following four days, it was recorded in R28 before moving to R24 for the next four days. On the final day it was recorded in another new roost, R31, all these roosts being within Scottshall Covert.

4.3.26 The bat was recorded ranging quite widely. Joint bearings found it ranging north as far as Dunwich and south as far as Black Walks on the Sizewell Estate. It was also recorded some distance out to the west between Eastbridge and Theberton, near Westleton and north of Westleton Walks. The majority of joint triangulation points recorded the bat in the woodlands to the north of Scottshall Plantation and Dunwich Heath. It was also recorded foraging over the floodplain on 13 August but, due to access restrictions, joint bearings into this area were very difficult.

4.3.27 It was recorded in roosts relatively early during three of the night-tracking sessions. On 19 August, it was recorded in R28 at approximately 03:20 before moving to R25 at 03:27 and was recorded in R24 during the daytime tracking that day. On 20 at 01:02 it was recorded static in R25, whilst on the 21 August it was recorded static, possibly in R24, at 00:41 before being recorded flying again at 00:58.

Bat 12

4.3.28 This bat, a post-lactating female, was caught at 01:35 on 12 August along Abbey Lane (T3). The tag appeared to fail or the bat dispersed from the study area as it was not recorded after being released although a very weak signal was possibly recorded on 13 August at 22:36 in a westerly direction from Kenton Hills by one tracker. None of the other trackers recorded this bat at this time or at any other time.

Bat 13

4.3.29 This bat, a post-lactating female barbastelle, was caught at Minsmere at trapping point T10 along the lane north of Hangman's Wood at 01:30 on 13 August. A total of 76 joint bearings were achieved with a further three single bearings. No roosting location was found despite extensive searching. Two bearings were possible from locations within the Minsmere Estate which located the bat somewhere in the Eastbridge/Middleton area where access was severely restricted. For the purposes of plotting the data and the home range analysis, an approximate location has been plotted for R37. The bearings taken from Minsmere cross at a point near to Reckford Bridge; however, no signal could be found from near this area during the tracking.

4.3.30 This bat was recorded over a very wide range especially in relation to the other post-lactating female bats tracked. It was recorded as far west as Middleton and north into Westleton Walks and Grimstons Covert in Minsmere. It was recorded regularly near to where it was caught and the heath and woodland habitats around Hangman's New Wood and also further east in Scottshall Coverts. The bat was also recorded to the south in the Sizewell Estate, specifically around Black Walks and Lower Abbey and further south down Abbey Lane. It was also recorded south of Sizewell in The Walks which is south-east of Leiston and south of Thorpeness. It was recorded in this general area on two consecutive nights at approximately the same time (23:22) and it remained in this area for several hours before moving back north.

Bat 14

4.3.31 This bat, an adult male, was caught at the southern edge of Nursery Covert (T11) on 13 August at 21:30. A total of 68 joint bearings were achieved. It was first recorded roosting in R26 in Ash Wood on 14 August but then no roost was found on 15 August when daytime tracking was curtailed. It was then recorded in R27 for the rest of the period.

3.3.32 As with the other male bats, it was recorded widely over the landscape. It was recorded as far south as Lovers Lane, as far west as Westleton Walks and north to the area just south of Dunwich around the caravan park. The majority of joint bearings were made between Goose Hill and Minsmere Levels and in Minsmere around Scottshall Coverts and North Walks.

4.3.33 There were fairly extended periods when the bat was not recorded by the surveyors and it is likely that the bat was foraging more widely than the tracking suggests.

Bat 15

4.3.34 This bat, a non-breeding female, was caught at the southern edge of Nursery Covert (T11) on 13 August. It was only recorded using roost R27 for the duration of the survey. It was not recorded on 15 August when daytime tracking was curtailed, or on 22 August when it was not possible to complete the day tracking, On 23 August it was not recorded in R27 but it was considered most likely the tag had ceased working by this point.

4.3.35 A total of 47 joint bearings were made of this bat. It was a wide-ranging bat, being recorded west and south of Theberton and in the north foraging within the woodland and heathland either side of the track extending north from Hangman's New Wood. The most numerous joint bearings located the bat around Eastbridge down to the grounds of Theberton House. It was also recorded north in Minsmere, over the Levels and around Scottshall Covert. It was also recorded to the east of Goose Hill and within Ash Wood in the Sizewell Estate.

Bat 16

4.3.36 This bat, a post-lactating female, was caught at Nursery Covert (T11) on 13 August just before midnight at the same time as Bat 17. A total of 30 joint bearings were achieved with a further 26 single bearings. It was first recorded roosting in R26 in Ash Wood on 14 August. It was not recorded in a day roost on 15 August when daytime tracking was curtailed due to access issues; however, it had been recorded at 03:20 on the 15 August as static at R26 in Ash Wood. It was then recorded in R27 for the rest of the period.

4.3.37 The bat was recorded foraging in both the Minsmere and Sizewell Estates. In Minsmere, the bat was recorded in Scottshall Coverts and into Westleton Walks and to the west around Hangman's New Wood and the surrounding woodland, heathland and grassland habitats. In Sizewell it was regularly recorded around the Black Walks and Lower Abbey area and down into Ash Wood. Night roosts were also used. On 18 August it was recorded static in Ash Wood (likely R26) at 22:55 but by 23:12 it had gone from this location. On 21 August at 01:22 the bat was again recorded static in Ash Wood (likely R26 in 2011).

Bat 17

4.3.38 This bat, a post-lactating female, was caught at Nursery Covert (T11) on 13 August just before midnight at the same time as Bat 16. A total of 67 joint bearings was achieved, with a further 23 single-point estimates. It was first recorded roosting in R26 in Ash Wood on 14 August but then no roost was found on either 15 or 16 August. It was then recorded in R27 for the rest of the period.

4.3.39 The bat was recorded foraging around the main areas of the Sizewell Estate which had been recorded as foraging habitat in previous surveys namely: Kenton Hills; Goose Hill; the Grove; Ash Wood and Black Walks; and Lower Abbey Farm.

Bat 18

4.3.40 This bat, a post-lactating female bat, was caught from tree roost R25 on 14 August. It was confirmed using tree roost R28 from 15 August through 23 August. A total of 25 joint bearings were achieved. A further 40 single-point estimates were plotted in areas where few joint bearings had been achieved. The single-point data has been analysed and the information from this added into the text below. The bat was recorded widely between Scottshall Coverts and Westleton Walks and north to Dunwich. It was not recorded to the south of Minsmere by any of the surveyors and its main foraging areas were not found initially as it was lost in a general northwards direction on 17 and 18 August relatively soon after emerging from the roost. It was targeted on 20 August and recorded foraging within Dunwich Heath, the Warren and Scottshall Coverts after it had emerged usually sometime between 20:39 and 20:50 for roughly half an hour before moving further north. The bat was tracked down to Dunwich and appeared to be foraging in the area to the east of Dunwich in Greyfriars Wood, using the foreshore. It was also recorded in Dunwich Forest and near Broom Hill to the west of Dunwich although, due to the landscape and the bat moving rapidly between this area to the west and back to the south and east of Dunwich, no joint bearings were successfully achieved in the area to the west. Once the bat had been tracked to this area, single surveyors periodically drove to the area and took single bearings on this bat. The bat would move between the Dunwich area and the Minsmere area through the night. It was not recorded flying south of Scottshall Covert at all during the tracking.

Bat 19

4.3.41 This bat, a non-breeding adult female, was caught in a mist-net near to tree roost R25 on 14 August. Fifty-one joint bearings were achieved with a further 36 single-point estimates. It was confirmed using tree roosts R29, R30, R24 and R31 which are all within Scottshall Coverts from 15 August through 23 August.

4.3.42 During the first nights of night-time tracking, the bat was recorded moving north after emerging and was lost shortly afterwards. On 16 August, it was tracked down to the north and north-east of Westleton in Dunwich Forest and Westleton Heath. Its area extended to farmland to the north and north-west of Westleton. Once the bat had been tracked to this area, single surveyors periodically drove to the area and took single bearings on this bat. It spent time moving between Scottshall Covert and Dunwich Forest during the night. It was not recorded flying south of Scottshall Covert regularly but one joint bearing recorded the bat flying in the wetland area of the Minsmere Reserve

4.3.43 It was recorded returning to its roost relatively early (around 03.15) on two nights (sunrise being around 05.40 during the radio-tracking period). On morning of 19 August, the bat returned to roost R25 at 03.15

before then moving to roost R24 at 03.20 where it remained. On 21 August, the bat returned to its roost early, shortly after midnight (this was the night when temperatures fell considerably).

4.4 Other species

Bat 9 – Serotine

4.4.1 This bat, a non-breeding female serotine, was caught at 22:35 on 12 August at Abbey Lane in the Sizewell Estate. The exact location of its roost was not determined due to restricted access and limited stopping points on roads in the area around Theberton and Eastbridge. However, it was determined that it was roosting within the grounds of Theberton House, and there is a known maternity roost within a building at Theberton House. It is considered likely that the tag failed some time on 21 August.

4.4.2 During the radio-tracking, the bat was regularly recorded static in the roost area. On 20 August it remained static from 21:54 (approximately 90 minutes after sunset) until at least midnight; similarly on 19 August, it was recorded flying early in the evening but from 22:08 it was recorded static again in the roost area.

4.4.3 The bat otherwise covered a fairly wide range over the Minsmere Levels, down to Dunwich Forest within the Sizewell Estate and up into Minsmere.

4.5 Roost Information

4.5.1 Tree roosts were found in both the Minsmere Reserve and the Sizewell Estate. A total of nine confirmed tree roosts and six other unconfirmed locations (likely trees) were used during the radio-tracking survey. None of the roosts found in 2010 or 2011 were re-used in 2014; however, Grimseys could not be safely accessed in 2014 and bat roosts were confirmed in this area in previous years. The roost numbers given to the 2014 tree roosts follow on consecutively from those found in the earlier ratio-tracking surveys which for 2014 means roosts R23 through to R37. Access to six of these (R32 through to R37) were restricted so the exact roost was not identified.

4.5.2 A combined list of the tree roosts and their descriptions is provided in **Table A6,** whilst information regarding which tree roost was used per day by each bat is given in **Table A7 (**at the end of the document). In total, there are now 28 confirmed trees known to have been used as roosts and two buildings used by single male bats in 2010 and 2011. In addition, there are four roosts not confirmed due to access restrictions but all are in areas of woodland and therefore classified as 'likely tree roosts'. Another two roosts could not be confirmed as either tree or building roosts.

Table A6 – Tree roosts and descriptions

Roost number	Bat number 2014	Area/Location	Grid Reference	Tree Species	Diameter at Breast Height (cm)	Height of feature	Description of roost feature
R23	1	Sizewell: The Grove - eastern side northern end	TM46438, 65519	Dead alder (*Alnus glutinosa)*	85	6-7m	Large expanses of lifted bark with few holes on north-east and north-west side.
R24	2, 11, 19	Minsmere: Scottshall Covert. East of main ride	TM46785, 67324	Pedunculate Oak (*Quercus robur*)	40	Huge split down entire length of main stem	Large split down entire south face plus loose bark signal strongest and mid-point at 6m.
R25	10, 11	Minsmere: Scottshall Covert. West of main ride	TM46625, 67490	Pedunculate Oak (*Quercus robur*)	96-100	20+	Large standard; 3 main central limbs. The middle limb has loose bark on west and SW-face signal strong here near a dead pole; (snapped) loose bark.
R26	1, 6, 14, 16, 17	Sizewell: Ash wood. South-east corner next just north of Ash Wood Cottage	TM46032, 65041	Pedunculate Oak (*Quercus robur*)	60	6m	Woodpecker hole and loose bark on north-west face; feature runs 2m in length.
R27	1 ,2, 7, 14, 15, 16, 17	Sizewell: Nursery Covert. North-west corner at the edge of track near bend of woodland ride	TM46404, 64411	Dead Scots pine pole (*Pinus sylvestris*)	110	15m	Dead pole, decay holes, missing loose bark. Roost holes on NNW face.
R28	10, 11, 18	Minsmere: Located on the western edge of Scottshall Covert wood.	TM46447, 67427	Pedunculate Oak (*Quercus robur*)	40	6-8m	The tree is approximately 10m high, single stem and intact; there are multiple areas of lifted bark on the north face of the stem between 6m and 8m; signal strongest at this point.
R29	19	Minsmere: Located on the northern edge on Scottshall Covert towards the eastern side, right on edge of woodland with open grassland to the north.	TM46899, 67439	Pedunculate Oak (*Quercus robur*)	50	6m	The top of the tree at approximately 8m high has snapped off completely; there is lifted bark from 4m high on the stem to the top on the southern face of the tree, facing the woodland. The signal was strongest from the lifted bark at approx. 6m high
R30	19	Scottshall Covert – north-west corner	TM46522, 67465	Pedunculate Oak (*Quercus robur*)	60	9m	Feature is a large split that runs the entire length of the stem, caused by possible lightning strike. Tag signal was strongest approximately 9m high on main stem and on the northern face.
R31	11,19	Scottshall Covert. West of main ride near Sheepwash Lane	TM46645, 67292	Pedunculate Oak (*Quercus robur*)	80	12-14M	At the top of the tree, 12m, within a large branch that extends to the north: this limb has split with raised bark
R32	1, 2, 6, 16	Sizewell: Area north of Lower Abbey - exact location not known	Restricted Access	Likely tree roost	-	-	Restricted Access
R33	5	Redhouse Farm Saxmundham - exact location not known	Restricted Access	Unknown	-	-	Restricted Access

Roost number	Bat number 2014	Area/Location	Grid Reference	Tree Species	Diameter at Breast Height (cm)	Height of feature	Description of roost feature
R34	5	New Plantation - Saxmundham - exact location not known	Restricted Access	Likely tree roost	-	-	Restricted Access
R35	5	Sizewell: Grimseys	Restricted Access	Likely tree roost	-	-	Restricted Access
R36	3 , 6	Sizewell: North Grimseys - exact location not known	Restricted Access	Likely tree roost	-	-	Restricted Access
R37	13	Close to Reckford Bridge/Eastbridge Marshes and East of Middleton	Restricted Access	Unknown			Restricted Access

Sizewell Estate Roosts

4.5.3 The tracking surveys recorded a new tree roost in Ash Wood taking the total number of known roosts here to five. Within Nursery Covert, a single additional roost was found. At least two tree roosts were used in Grimseys (although access was restricted in this area, it could be determined that bats were in different locations within the wood). In addition, another tree roost (R23) was confirmed in the northern end of the The Grove taking the total number in this woodland to four recorded during the three sessions of radio-tracking.

4.5.4 Within the Sizewell Estate, Ash Wood and the woodland adjacent to Plantation Cottages are relatively isolated, whilst Leiston Old Abbey Woodland links directly to Fiscal Policy and into Kenton Hills. The Grove is a thin strip of woodland connected to coniferous plantation on its southern side, and used infrequently by tagged barbastelles in 2010 and 2014 but not in 2011. In 2014, a single bat roosted in R23 in The Grove on a single night immediately after being caught.

Minsmere Roosts

4.5.5 Within Minsmere, six roost trees were used in 2014. All were within oak trees and all were within one area of woodland, Scottshall Covert (R24, R25, R28, R29, R30 and R31). One bat was recorded static for a short period in Southwalk Belt in Minsmere although the exact location was not found. The area of woodland where it was recorded has a number of large oak trees with features suitable for bats (including raised bark which is favoured by barbastelles). Previously only a single tree roost had been found within the Minsmere Reserve during the 2010 and 2011 surveys (used by a single tagged bat). That single tree was in New Hangman's Wood in the western part of the RSPB Reserve.

Locations of Roosting Features

4.5.6 Of the nine tree roosts that were confirmed in 2014, eight were behind loose/lifted or flaking bark with only R30 confirmed in a large spilt on the main stem. The apparent preference shown towards roosting behind

raised bark is similar to findings of other radio-tracking projects on this species (Russo 2004, Greenaway and Hill, 2004) as well as the previous radio-tracking surveys at Sizewell.

4.5.7 None of the confirmed roosting positions were below 6m above ground level (agl). Of nine features, six were between 6m and 10m (see **Table A8)** and three were above 10m.

Table A8 - Distance from the nearest woodland edge of known roost trees used in 2014; height of roost (agl)

Tree roost no.	Distance from nearest edge (m)	Height of roost area (agl)
R23	10	6-7m
R24	18	Large split down entire south side of tree
R25	20	20+
R26	33	6m
R27	100	15m
R28	28	6-8m
R29	16	6m
R30	52	9m
R31	25	12-14m
R32	Unknown	Unknown
R33	Unknown	Unknown
R34	Unknown	Unknown
R35	Unknown	Unknown
R36	Unknown	Unknown
R37	Unknown	Unknown

Use of tree roosts and movement between roosts

4.5.8 Tree roost R27 was used by the highest number of tagged bats, with both males and females recorded here. This is a large dead pine pole located in Nursery Covert with a peak of seven tagged bats on the 17 August with at least six bats recorded on five consecutive days from 14 August (five bats on the 21 August). Commonly recorded in this roost were Bats 1, 2, 7, 15, 16 and 17 (all breeding females) and Bat 14 (male) which was recorded here on most days. Trapping at this tree roost caught three bats (all juvenile which were therefore not tagged). The tree with the next highest number of recorded bats was R26, with five on the 14 August. This tree was not used by radio-tagged bats again after the 15 August. Roost R32 was used by four radio-tagged bats with a peak of four radio-tagged bats on the 21 August.

4.5.9 Barbastelles are known to move roost regularly, and one key aim of this study was to establish if there was interaction between bats in Minsmere with bats in the Sizewell Estate. Bat 2, a female bat caught in Nursery Covert on 11 August, was the only bat that roosted in both areas. On the 13 August, it was confirmed as roosting in R24 in Scottshall Covert in Minsmere. Between 14 and 17 August, Bat 2 was found roosting in R27 located in Nursery Covert in the Sizewell Estate (it was not found on 15 August). Between 19 and 21 August, Bat 2 was then recorded roosting in R32 in between Minsmere and Sizewell in a small strip of woodland extending north of Black Walks and Plantation Cottages near Lower Abbey Farm. The distance between R24 and R27 where Bat 2 recorded on successive nights is approximately 2.92km and is the longest distance between two confirmed roosts used by breeding female bats within the study area.

4.5.10 The smallest distance between roost switches of breeding females in 2014 was 175m (between Roosts 25 and 28 in Scottshall Covert). Other than the distance flown by Bat 2, the next largest distance recorded by a breeding female bat was 1.7km, between Roost 27 and R32. The average distance between roost switches of breeding females was 1079m.

4.5.11 Bat 5 was a male barbastelle caught in Nursery Covert on 11 August and was recorded the following day roosting in Grimsey's. The following day it was recorded in R34, 6.74km to the west near to Saxmundham but never returned to roost within the Site.

4.5.12 The straight line distances between roost switches between consecutive days was measured. For example, Bat 1, a breeding female, roosted in R23 on 13 August but on 14 August it had moved to R26. The straight line distance between these two trees is 632m. The distances between each tree roost switch recorded are given in **Table A9**. There are significant clusters of trees with potential for supporting barbastelles in these woodland blocks with Ash Wood supporting the greatest number of potential trees within the Sizewell Estate. Scottshall Covert similarly has a high number of mature oak trees with potential for barbastelles.

Table A9 – Distances between barbastelle roost switches between consecutive days in 2014

Roosts	Distance	Location of Trees	Status
R23 - R26	632	The Grove to Ash Wood	Breeding Female
R26 - R27	714	Ash Wood to Nursery Covert	Breeding Female
R24 - R27	2920	Minsmere Scottshall Covert to Nursery Covert	Breeding Female
R27 - R32	1678	Nursery Covert to N of Plantation Cottages	Breeding Female
R28 - R24	353	Within Scottshall Covert	Breeding Female
R25 - R28	175	Within Scottshall Covert	Breeding Female
R25 - R29	290	Within Scottshall Covert	Non-breeding Female
R29 - R30	378	Within Scottshall Covert	Non-breeding Female
R30 - R24	304	Within Scottshall Covert	Non-breeding Female

Distances travelled

4.5.13 The distances travelled from roosts are presented in Table 10. The distances measured are straight-line distances between the furthest recorded location and the roost used during the daytime beforehand. The maximum distance recorded from a roost in this study was by a breeding female (Bat 13), travelling 9.1km. The mean maximum distance for breeding females was 4.4km (excluding Bat 4), similar to that of non-breeding females (though the sample size is small). The mean maximum distance for the male bats in 2014 was 5.2km (range 4.0 to 7.2km).

Table A10 - Distance travelled from roost

Bat No	Date	Distance in km	Roost	Joint Bearing number
Breeding Females				
Bat 1	18/08/2014	3.7	R27	1.29
Bat 2	17/08/2014	4.4	R36	2.17
Bat 6	17/08/2014	4.8	R37	6.33
Bat 7	17/08/2014	5.1	R27	7.20
Bat 10	15/08/2014	2.6	R25	10.14
Bat 11	18/08/2014	3.2	R33	11.9
Bat 13	15/08/2014	9.1	R37	13.10
Bat 16	20/08/2014	3.6	R27	16.30
Bat 17	18/08/2014	3.9	R27	17.22
Bat 18	22/08/2014	3.5	R28	18.19
Mean distance		**4.4**		
Non-breeding female				
Bat 15	18/08/2014	4.1	R27	15.18
Bat 19	16/09/2014	4.3	R29	19.7
Mean distance		**4.2**		
Male				
Bat 3	15/08/2014	4.0	R36	3.5
Bat 5	14/08/2014	7.2	R37	5.8
Bat 14	22/08/2014	4.4	R27	14.66
Mean distance		**5.2**		

4.6 Foraging areas and home ranges of barbastelle bats

4.6.1 Bats were recorded using a wide variety of habitats during the radio-tracking surveys. The areas used are summarised in **Figures B1** to **B19** which illustrate triangulation points, extent of ranges and the MCP, neighbourhood linkage (clusters) and kernels for each bat radio-tracked. The total number of bearings achieved (including night and day roosts used) have also been shown. These data are set out in **Table A11** below.

Table A11 - 95% Home Range Analysis (areas in ha)

Breeding females				
Bat number	No. bearings achieved	MCP	Cluster	Kernel
1	81	480	246	349
2	123	508	173	614
4	28	117	117	153
6	89	509	434	516
7	78	601	373	617
10	17	232	37	433
11	94	820	284	720
13	78	2020	819	1275
16	68	472	105	309
17	98	685	235	549
18	56	330	154	293
Mean	-	616	270	530
Mean of breeding females without Bat 4				
Mean	-	*666*	*286*	*567*

Non breeding females				
Bat number	No. bearings achieved	MCP	Cluster	Kernel
8	45	415	284	502
15	53	951	680	1049
19	97	744	231	665
Mean	-	703	398	739

Males				
Bat number	No. bearings achieved	MCP	Cluster	Kernel
3	80	610	400	715
5	47	1782	115	1875
14	96	631	425	615
Mean	-	1008	313	1068

4.6.2 The 2014 data for female bats with full data sets (i.e. excluding Bats 4 and 10) was run through the software BIOTAS which calculates areas at various points through the tracking period. The results were then plotted as graphs (see Graphs 1 – 13) to see if the data reached an asymptote: i.e. the point at which the addition of further locational data would not significantly alter the results. As per Kenward (2001), the asymptote of range size has been carried out on each tracked animal as opposed to cohorts. For example, the asymptote was reached at 28 joint bearings for Bat 6 (Graph 3) which had 59 joint bearings and a further 11 single bearings. The graphs for Bats 1, 7 and 18 are less clear. For Bat 1 a total of 57 joint bearings and a further 14 single bearings were achieved. Its location was regularly checked between 11 August and 20 August, and found to be continually using the same areas. It can be determined from reviewing the data collected against Graph 1 that the asymptote was reached at around 30 fixes. Bat 7 in comparison shows an asymptote may not have been reached. This bat was recorded flying north-west between Eastbridge and Middleton where access for surveyors was restricted, and only a small number of fixes were achieved. The bat regularly moved into this area after midnight; activity before this being within the Sizewell and Minsmere Estates. The extent of where it flew in this area between Eastbridge and Middleton could not be recorded. It was not, however, recorded further afield; for example, north of Middleton or near Westleton where other bats were recorded and where surveyors regularly checked. Bat 18 was radio-tracked between 13 and 23

August (10 nights). It was recorded foraging in Dunwich Heath and Westleton Walks on most nights but it took several nights to track it to where it went to at around midnight. It was finally tracked around Dunwich village and was recorded flying to this area each night thereafter. Although the graph shows a large step in the size of the area, it is considered that this is due to the late find of the foraging area to the north at Dunwich. There may be additional areas used which is considered quite typical of bat behaviour (i.e. they occasionally make excursions from their most regularly used foraging areas) which could have resulted in a slight increase at the end of the tracking period. Some individuals may increase their foraging range, especially in August as individuals start to make more excursions and therefore may have not reached asymptote but the general trend was that, for 86% of tagged bats, an asymptote was reached and it is considered that the home ranges have been well-recorded during the period of the survey.

4.6.3 Subsequently the data from the 2010 and 2011 radio-tracking surveys were run through the same software. The 2010 data (Graphs 14 to 17) similarly shows those bats with full data sets reached an asymptote. Bats 3 and 4 had incomplete data sets with only eight and ten bearings achieved respectively. An asymptote appears to have been reached with Bat 1 which had 32 bearings, whilst Bat 2 appears to have just reached an asymptote with 33 bearings achieved. Bats 5 and 6 have significantly larger data sets with 83 and 65 bearings, and an asymptote has clearly been reached. Of the six breeding female bats tracked in 2011, 67% had more than 30 bearings and 33% had more than 40 bearings taken. For the 2011 surveys, of the seven breeding female barbastelles tracked, 86% had more than 30 bearings and 43% had more than 40 bearings. Only one of the bats had fewer than 30 bearings (29 were achieved for Bat 8). The analysis (Graphs 18 to 23 excluding Bat 8) shows that an asymptote was reached in most instances, with the exception of Bat 20 which had limited data collection (the tag was lost after three nights of tracking).

4.6.4 Whilst the radio-tracking undertaken followed the bats for only a relatively short period of time, the data collected shows some patterns to barbastelle behaviour in the site.

4.6.5 Only a single bat was recorded roosting in both Minsmere and Sizewell (Bat 2, a breeding female). This bat also foraged in both areas, although its main foraging area appeared to be in The Warren area of Minsmere north of the Visitor Centre.

4.6.6 Less activity was recorded around the Sizewell Belts area south of Kenton Hills than during the previous two radio-tracking studies. This may have been influenced in part by windy conditions which meant that trapping was not possible in the more exposed areas around Goose Hill and Sandlings Walks using mist-nets or the triple-high sky net. These locations had been trapped at in 2010 and 2011. This may have reduced the likelihood of catching bats whose foraging area were centred over the Sizewell Belts. However, on reviewing the trapping locations of those bats radio-tracked in the Sizewell Belts and to the east of Goose Hill in 2011, only one of six bats recorded foraging regularly in these areas was caught in Goose Hill. The

rest were caught in Ash Wood (from a tree roost), in Nursery Covert which was successfully trapped at in 2014 and along Abbey Lane, also successfully trapped at in 2014. It is therefore unclear whether the windy conditions made foraging in the Sizewell Belts less favourable for foraging during the 2014 tracking or whether there was a shift in activity away from the Sizewell Belts in late summer, compared to the 2011 surveys.

4.6.7 Millspaugh and Marzluff (ed 2001) suggests that more than 100 fixes are required to obtain reliable estimates of home range size using MCP analysis, while the kernel analysis is useful when a smaller sample size is obtained and, along with cluster analysis, are useful at identifying multiple centres of activity, particularly in heterogeneous environments. A 95% MCP analysis was carried out instead of a 100% MCP as this eliminates outliers. **Figure C1** shows the MCPs for adult breeding female barbastelles. The sample size was good for the 75% of tagged breeding female bats: this includes single as well as joint bearings, roosts and night roosts. Of the 25% where the sample size was poor, Bats 4, 10, and 12 had issues with the tags. Only 28 and 17 bearings were achieved with Bats 4 and 10 respectively and the tag failed or the bat left the survey area permanently shortly after Bat 12 was released so no bearings were obtained. The remaining bats all had over 60 locations, with Bat 16 recording fewest points (68). Four bats (33% of all breeding female barbastelles tagged) had over 90 locations recorded: Bat 2 with 123 locations plotted.

4.6.8 The MCP areas for Bats 4 and 10 (measuring 117ha and 232ha) do not represent the full home range of these bats. The average MCP area for the remaining 10 breeding females (i.e. excluding Bats 4 and 10) was 714ha. The greatest MCP area was generated by Bat 13 with a home range of 2020ha. Bat 13 was recorded foraging extensively in the Minsmere area north of the Visitor Centre into Westleton Walks and in the areas of woodland, heathland and either side of the lane north of New Hangman's Wood; also some distance east of Middleton and around the Eastbridge area and Minsmere Levels. It was also recorded further south around The Walks to the south-east of Leiston and south to Thorpeness.

4.6.9 Three non-breeding female adult bats were tracked; Bats 8, 15 and 19. The average MCP area recorded for the non-breeding female bats was 703ha ranging from 414ha to 951ha. Bat 19 was caught near tree roost R25 in Minsmere and was not recorded south of Minsmere during the tracking. Bat 15 was caught on the lane north of New Hangman's Wood but was consistently recorded roosting in R27 in Nursery Covert whilst Bat 8 was not tracked to a roost (considered likely to be in an area of restricted access) but was caught on the lane north of New Hangman's Wood and recorded in Minsmere, Black Walks and south of Eastbridge. The 95% MCP of Bat 19 was recorded as 744ha and was recorded for part of the foraging time in similar areas to Bat 18 (a breeding female) particularly in Scottshall Coverts, Dunwich Heath and Westleton Walks. The amount of overlap of the MCP of Bat 18 by Bat 19 was 47%. The non-breeding female (Bat 19) ranged more widely around Westleton using hedgerows around arable fields and into Dunwich Forest west of Dunwich.

4.6.10 The male bats, Bats 3, 5 and 14, were not radio-tracked to the full extent of their home range particularly those that roosted a considerable distance from the Sizewell area near Saxmundham. However, they were tracked when they came close to or within the site. In addition, surveyors drove around the wider area to try to locate any distinct foraging areas that may be used. Where areas for foraging by the male bats were located away from the main Sizewell and Minsmere areas, these were periodically visited to check that they were present on most nights. Minimum home range sizes for the male bats were as follows: 610ha, 1782ha and 631ha. Bat 3 was caught in Nursery Coverts and roosted within the Grimseys area of woodland; a total of 80 points were recorded. It was regularly located within the Sizewell Estate, but also as far north as the Minsmere Levels and south of Leiston near Aldringham, and to the south of the Sizewell Estates in an area called The Walks. Bat 5, also caught in Nursery Covert, was found regularly foraging to the south of the Sizewell Estates in The Walks whilst it roosted towards Saxmundham. It was recorded in The Walks on three nights, foraging for extended periods of time; in contrast, it was located in the north on the edge of the Minsmere Levels only very briefly on three separate occasions. A total of 47 points were achieved for this bat. There were, however, periods when this bat was not found within the Sizewell and Minsmere Estates or in the areas which were searched such as The Walks, around Leiston and Lovers Lane or to the north. On occasion, a night-time surveyor moved further west towards Saxmundham but no tagged bats were recorded here. The third male bat, Bat 14, was recorded roosting within the Sizewell Estate. A total of 96 points were achieved, the majority within the Sizewell and Minsmere Estates but also further afield south of Lover's Lane, north west towards Westleton and north-east along the coast.

4.6.11 The 95% kernel analysis (see **Figure C3**) recorded home range sizes of the breeding female bats of between 153ha and 1275ha with a mean of 530ha. The kernel analysis extends the home ranges of those bats that were foraging close to the sea wall as being out at sea; the size of the kernel home ranges has not been adjusted for this. The non-breeding female bats resulted in kernel home range sizes from 502ha to 1049ha with a mean of 739ha.

4.6.12 The 95% kernel analysis of the adult male barbastelle bats recorded home ranges between 615ha and 1875ha and a mean of 1068ha.

4.6.13 The core area size (based on a 95% cluster analysis) of the breeding female barbastelles ranged from 37ha to 819ha, with the number of core areas per bat ranging from 1 to 7. Whilst a number of these cluster core areas overlap, there may be some partitioning of foraging habitat which can be seen on **Figure C2**. However, it should be noted that only a subset of the population of barbastelle bats is tracked at any given time and it is not known how many other non-tagged bats may have been foraging in these areas. During the 2014 survey two key roosting areas were found, Scottshall Covert (Minsmere) and Ash Wood/Nursery Covert (Sizewell Estate). The main areas identified for foraging were:

1) The Minsmere area of Scottshall Covert extending up into Westleton Walks and Dunwich Heath;
2) Kenton Hills, Nursery Covert and Ash Wood (Sizewell);
3) Around Plantation Covert and Black Walks (just to the north of Sizewell);
4) The area of the levels north-west of Eastbridge; and
5) Parts of the Minsmere Levels between Sizewell and Minsmere.

4.6.14 During the 2011 radio-tracking surveys, the main roosting areas were identified within Ash Wood, Nursery Covert, Black Walks and Leiston Abbey. The trapping during that survey session was restricted to the Sizewell Estate and was undertaken slightly earlier in the season when juvenile bats were less well developed, both of which are likely to have strongly influenced the roosting areas found.

Habitat use

4.6.15 At Sizewell, barbastelles have been recorded using a wide variety of habitats for foraging and commuting. The core foraging zone consists of woodland blocks, adjacent scrubby habitats and the sheltered grazing marsh such as that enclosed by Grimseys and Goose Hill/Nursery Covert. The area of Black Walks which is part of the core foraging zone supports a sheep-grazed field with patchy areas of scrub and bracken, whilst east of Ash Wood, the habitat is of young plantation giving a scrubby appearance. To the south, Sizewell Belts is grazed pasture with a ditch network and tree lines and areas of scrub sheltered by the adjacent woodland habitats and the power station.

4.6.16 Within the Minsmere area, the areas being used for foraging were over the mixed woodland, heath and unimproved grassland habitats to the north as well as the Minsmere Levels between Minsmere and the Sizewell Estate which is more open grazing marsh habitat with reedbeds and with a ditch network and open wetland pools.

4.7 Interchange between Sizewell and Minsmere

4.7.1 During the 2014 surveys, a single bat was recorded roosting in both the Sizewell Estate and the Minsmere Reserve. Bat 2, which was caught in Nursery Covert in Sizewell, was recorded roosting in R24 in Scottshall Covert on a single day; otherwise she was roosting either in R27 (Nursery Covert) or in the area of R32 (area north of Plantation Cottages).

4.7.2 A number of bats were recorded moving between Sizewell and Minsmere during the night-time tracking, as summarised in **Table A12**.

Table A12 – Interchange between tracked barbastelle bats between Sizewell and Minsmere

Minsmere caught female bats	**Roosting**	**Foraging**
Bat 7	Sizewell Estate	Minsmere and Sizewell
Bat 8	Unknown roost	Minsmere and Sizewell
Bat 10	Minsmere	Minsmere
Bat 11	Minsmere	Minsmere and Sizewell
Bat 13	Unknown roost	Minsmere and Sizewell
Bat 18	Minsmere	Minsmere and northwards only
Bat 19	Minsmere	Minsmere and northwards only
Sizewell caught female bats	**Roosting**	**Foraging**
Bat 1	Sizewell Estate	Minsmere and Sizewell
Bat 2	Minsmere and Sizewell	Minsmere and Sizewell
Bat 4	Unknown	Sizewell (limited data)
Bat 6	Sizewell (plus unknown location to west towards Middleton)	Minsmere and Sizewell
Bat 15	Sizewell Estate	Minsmere and Sizewell
Bat 16	Sizewell Estate	Minsmere and Sizewell
Bat 17	Sizewell Estate	Minsmere and Sizewell
Sizewell caught male bats	**Roosting**	**Foraging**
Bat 3	Sizewell Estate	Sizewell and Minsmere Levels
Bat 5	Saxmundham	Sizewell and Minsmere Levels
Bat 14	Sizewell Estate	Minsmere and Sizewell

4.8 Emergence surveys of barbastelle roost trees

4.8.1 A series of emergence surveys were undertaken on a number of the trees including tree roosts recorded during the earlier radio-tracking studies to determine whether it would be worth catching from these tree roosts. No simultaneous combined emergence survey of all trees was undertaken as the emphasis was on the radio-tracking to ascertain habitat use. The emergence surveys assisted with determining where bats were roosting for trapping purposes.

Table A13 – Emergence Survey Results

Date of Emergence Survey	**Roost Number**	**Results**
12th August 2014	R3	0
	R13	0
	R14	Single common pipistrelle emerged from top of tree
	R17	0

Date of Emergence Survey	Roost Number	Results
13th August 2014	R19	0
14th August 2014	R26	At least 10 barbastelle emerged
18th August 2014	R26	0
	R27	17 barbastelle emerged. First at 20:38, 23 minutes after sunset, a further two at 20:38 all from relatively high in the tree. The following 14 bats emerged from approximately 6 m agl on the west face from under a loose plate of bark.
	R28	At least four bats emerged from this tree roost. The first bat emerged at 20:20 with Bat 18 emerging at 20:44

4.9 Breeding status

4.9.1 The bats during the 2014 survey were tracked in the post-lactation period. Of the 15 female barbastelle captured, 12 (80%) had bred in 2014. Juvenile barbastelle bats that were caught appeared to be well-developed. Early breeding had been recorded in bats due to the good conditions in early summer and it was observed that juvenile bats caught were a good weight and in many the fusing of the finger joints was advanced.

4.9.2 In previous years, too few barbastelle were caught in 2009 or 2010 to look at breeding ratios (though all eight females caught in 2010 were pregnant). In 2011, of the 9 female barbastelle caught, 7 (78%) were post-lactating (again, samples are too small to be other than indicative). Four of the female bats were caught from trapping locations in the woodlands, along with one juvenile; a further five adult female and seven juvenile bats were caught from tree roosts.

4.10 Serotine

4.10.1 The serotine caught and radio-tagged was a non-breeding female bat caught on 12 August 2014 along Abbey Lane. The bat was tracked back to the Theberton House area (where no access was allowed, and so no further information was available). It has been confirmed by the Suffolk bat group that there is a known serotine maternity roost at this property.

4.10.2 The bat was recorded foraging widely into the Minsmere Reserve, Minsmere Levels and around Goose Hill, The Grove and Ash Wood, with bearings putting it along the coastal edge. The bat was recorded static within the general roost area, returning after short stints of foraging. The bat was 26.1g which is a good weight for the species. Dietz *et al*. (2009) record the normal weight range for serotine as being 18-25g. It is therefore considered likely that the bat did not need to spend long periods foraging and restricted its activity to the early periods of the evening when foraging is most productive.

4.11 Other species trapping information

4.11.1 In addition to the 27 barbastelles caught, 37 common pipistrelles, 168 soprano pipistrelles, nine Daubenton's bats, 27 Natterer's bats, 13 brown long-eared bats, three noctule and one serotine were caught. One hundred of the bats were caught within the Sizewell Estate; the remaining 185 bats were caught within the Minsmere Reserve and, of these, 139 were soprano pipistrelle bats caught at two locations.

4.11.2 For both common and soprano pipistrelles, roughly equal numbers of males and females were caught (as illustrated in Section 4.1, Charts 1 and 2). However, of the 168 soprano pipistrelle bats caught (excluding those escaped and recaptured), only five post-lactating female and four non-breeding female bats were recorded compared to 110 juvenile bats. The majority of these were recorded within the Minsmere Reserve, with 64 juvenile bats caught on the lane north of Hangman's Wood and 37 at Southwalk Belts. A pipistrelle roost was reported by a walker in one of the cottages at the southern end of Hangman's Wood which probably accounts for the high number of juvenile bats caught here. Of the 36 common pipistrelle bats caught, only seven were juvenile bats.

4.11.3 The 2014 trapping sessions caught Daubenton's bats. Only a single male Daubenton's had been caught previously at Sandy Lane (T7) in 2011. Of the nine Daubenton's bats caught in 2014, only two were caught within the Sizewell Estate, one each in Fiscal Policy and Abbey Lane. Both of these were male bats, one adult and one juvenile and were not radio-tagged for this reason. The remaining seven caught in Minsmere consisted of one adult breeding female, four juvenile female and two juvenile male bats.

4.11.4 Thirteen brown long-eared bats were caught; five males and eight females, (three post-lactating females). Only two juvenile brown long-eared bats were caught. Nine adult bats were caught within Sizewell Estate, the remaining four bats caught at Minsmere.

4.11.5 It was noted that, on the first night of trapping at Fiscal Policy, which was undertaken following an extended period of very good weather conditions, of the 21 bats caught only two adult female bats were caught, both common pipistrelle and only one of these was a breeding bat. All other bats were either juvenile or adult male bats, all with large testes. Breeding female bats have been recorded in the past at Fiscal Policy in 2009, 2010 and 2011.

5.0 EVALUATION

5.1 Barbastelle

5.1.1 The Sizewell Estate has been used by breeding barbastelle throughout the three periods of radio-tracking: in the pre-breeding period in 2010, early August in 2011 and mid to late August 2014. The radio-tracking undertaken in 2014 has confirmed that the RSPB Minsmere Reserve supports breeding barbastelle bats. The tracking has also confirmed the interchange of bats between the two areas both for foraging and roosting.

Habitat use

5.1.2 At Sizewell, barbastelles have been recorded using a wide variety of habitats for foraging and commuting. During June 2010, the tracking of seven adult female bats resulted in the discovery of pre-maternity roost areas with several trees found at Kenton Hills, Ash Wood and the Grove with additional roosts recorded near Greenhouse Plantation, Nursery Covert and Hangman's Wood. Two bats were also recorded day roosting in Grimseys Wood, but the individual trees were not located, as the area could not be safely accessed. It is possible that several trees were used in this area. The females were recording switching between trees regularly although the distances between the roosts was greater than other published available data for the pre-lactating period. Key foraging areas were identified through the radio-tracking, with bats recorded regularly flying from Ash Wood/The Grove in the north through Dunwich Forest to the sheltered eastern section of Sizewell Belts north of Grimseys. This area was used regularly for early foraging before bats moved to other foraging areas. Periods of sustained foraging were recorded elsewhere with frequent visits back to the roost areas of Ash Wood and the Grove.

5.1.3 The core foraging zone identified in 2011 consisted of woodland blocks, adjacent scrubby habitats and the sheltered grazing marsh (such as that enclosed by Grimseys and Goose Hill/Nursery Covert). Black Walks (also part of the core foraging zone) supports a sheep-grazed field with patchy areas of scrub and bracken, whilst east of Ash Wood the habitat is of young plantation giving a scrubby appearance. The foraging areas of breeding females and juveniles were centered on Ash Wood and the woodland adjacent to Plantation Cottages at Lower Abbey Farm with the juvenile bats foraging consistently in these areas before extending their foraging areas further afield. The breeding female bats were all recorded in these areas, with tree roosts in Kenton Hills also being used; the majority of bats moved roosts from Ash Wood to the woodland adjacent to Plantation Cottages before moving to Leiston Old Abbey woods and there was a good deal of movement between the roost in Leiston Old Abbey woods and those at Plantation Cottages.

5.1.4 The main foraging areas for the breeding females at the end of the breeding season in 2014 appeared to be centered at a number of locations: around Kenton Hills and Goose Hill towards Ash Wood; around Lower Abbey Farm and Black Walks; to the north of Eastbridge; and in Minsmere around Scottshall Covert and north into Dunwich Heath. A number of more wide-ranging bats provided clusters of activity north around Dunwich into Dunwich Forest and south around The Walks south-east of Leiston. The woodlands are mixed

with some broad-leaved and some coniferous plantations. Unlike 2011, there was limited movement in 2014 in the Leiston Old Abbey area.

5.1.5 The more-open grazing marsh habitats have also been well used. During the 2010 and 2011 surveys, the areas to the east of Goose Hill and The Grove and around the Sizewell Belts were used by many of the bats. The area north-east of Eastbridge also appeared to be significantly used for foraging by the breeding females and the juveniles in 2011 as they extended their range from the core foraging zone to have multiple centres of activity. In 2014, the area of the Minsmere Levels both to the north-west and to the east of Eastbridge was used more widely and frequently than previously recorded. Even when considering only those bats caught within the Sizewell Estate (with the exception of Bat 4 where there was limited data), all six female bats caught in the Sizewell Estate were recorded using Minsmere Levels during the 2014 surveys. The Minsmere Levels comprises more-open grazing marsh habitat with a ditch network and open wetland pools.

5.1.6 The preference for foraging in wetland habitat by barbastelle has been recorded at other locations. Zeale *et al.* (2012) recorded a strong preference to forage in riparian vegetation and deciduous woodland at two sites (Hampshire and Devon). Barbastelle were found to forage predominantly in vegetation on the periphery of water bodies rather than over open water bodies; it was considered that this was due to riparian and deciduous woodland habitats typically supporting high moth abundance. Unimproved grassland was also preferentially used for foraging at one of Zeale's study areas. At the second, improved grassland was often used for foraging, though bats were thought to be using the adjacent hedgerows with the field margins and woodland edge habitat supporting relatively high densities of moths. It is likely that where arable and improved grassland were used at Sizewell that the hedgerows with field margins were the target area.

5.1.7 Within the coniferous plantation, the rides and edges were well used by barbastelle bats. The areas of heathland, broad-leaved woodland and grassland habitat (particularly that set aside for stone curlew) within the Minsmere Reserve (and beyond the Levels) were extensively used, along with the heathland areas south near Leiston around The Walks south-east of Leiston (see Figure A3).

Roost selection

5.1.8 All of the confirmed barbastelle roost trees located in 2014 were pedunculate oak except for a single pine tree (R27) which appeared to be one of the main breeding roost trees within Nursery Covert. It appears to have been subject to extensive tree surgery in the past. This preference for oak trees is similar to the results of the 2010 and 2011 surveys. During the 2011 surveys, eight tree roosts were located and all were pedunculate oak except for a single sweet chestnut tree (R17) and a pine tree (R14 used by a female on a single day after being tagged and not considered to be a regularly used breeding roost). In 2010, the 13 tree roosts found were all pedunculate oak trees except a single dead elm (R11) and an unidentified dead

tree (R6). Eight of the trees found in 2014 had raised bark. This brings the total number of tree roosts comprising raised/loose bark to 20 across the 2010, 2011 and 2014 surveys. Two of the 2011 roosts were in vertical splits in the main stems of large trees (R13 and R21); a further similar roost was found in 2014 (R30 in Scottshall Covert). The apparent preference shown towards roosting behind raised bark is similar to that found in other radio-tracking research of this species in Italy (Russo *et al.* 2004), Germany (Kerth & Melber, 2009), and England (Billington, 2002; Greenaway 2008; Greenaway & Hill, 2004) where barbastelle nursery roosts tended to be within splits in trees or under loose bark. Russo *et al* 2004 found 20 out of 27 tree roosts of breeding female bats were under raised bark.

5.1.9 Other research has found that breeding roosts are found in quiet locations well away from the woodland edges and surrounded by dense cover (Russo *et al* 2004; Greenaway 2008) but this was not found to be the case in the radio-tracking surveys undertaken at Sizewell/Minsmere to date. In 2014, seven of the nine tree roosts were found within approximately 30m of a woodland edge; two were recorded beyond this. R30 in Scottshall Covert is approximately 50m from a woodland edge, this roost supporting only a single tagged non-breeding female during the tracking. R27 the main roost tree in Nursery Covert is approximately 100m from a woodland edge; however, it was located immediately adjacent to a relatively open ride. In 2010, of the 11 tree roosts found, three were on the northern edge of woodland blocks and seven were within 30m of woodland edge. In 2011, two of the 2010 tree roosts were re-used by tagged barbastelle bats: R9 and R13 which were both within 20m of the edge of the woodland edge of Ash Wood and both on the northern side of the woodland. Of the eight additional tree roosts found in 2011, two were on the edge of woodland, whilst two were approximately 11m from the woodland edge. Two were 35m and 39m from woodland edge habitat respectively. The roosts were all in high canopy woodland which is similar to that found in the Mens SAC (Greenaway, 2008). As with the 2010 and 2011 surveys, it was noted that in the majority of cases there was dense ground cover of bracken or bramble.

5.1.10 The height of the roosting positions were generally high (above 6m) with three between 12 and 20m high. This was similar to the roost trees found in 2010 and 2011. In 2011 the roosting positions were also generally above 6m with three up to 13m high. No particularly low roosts were found during 2014 (at R27 bats were recorded emerging from some 6m agl as well as higher up in the tree). In 2011, a single roost tree some 4m agl was found.

5.1.11 The weather conditions during the radio-tracking were generally varied following a long period of calm, warm and dry weather during the summer. The tail of Hurricane Bertha affected trapping at the beginning of the survey period and, following this, the weather was unsettled with night temperatures dropping on a number of nights. During the cooler conditions, it was noted that the bats returned to roost areas earlier in the night and were often within the roost trees well before dawn.

5.1.12 Breeding female bats need to remain homeothermic, i.e. in a state maintaining a high body temperature rather than going into torpor and allowing it to fall, as non-breeding bats do to save energy. This is in order to allow foetal development and later lactation, and it has been suggested that breeding barbastelle bats select warmer areas for roosting to limit the costs of homeothermy (Russo *et al*., 2004). In spring 2010, although the majority of roosts with breeding females were on the southern side of trees, several were on the northern and eastern sides of the trees. Although all tree roost sites benefited from woodland cover at least on one aspect, all were close to a woodland edge and some, for example, Roosts R1 and R2 were on the extreme northern edge. During the tracking in 2011, which was timed to be shortly after breeding had taken place in early August 2011, there did not appear to be any pattern to the direction in which the roost feature was facing. For example, the loose bark on R14 (used by five of the 2011 tagged bats) was on the south side of the tree, whilst on R17 the raised bark extended mainly around the east and north of the tree. The vertical split on R21 was on the northern side, whilst the snapped limb on R18 was on the south-west side. During the later summer tracking in 2014, there did not appear to be any pattern to the direction in which the roost feature was facing. Loose bark was recorded on both north and south sides of trees. The orientations and locations of tree roosts found at Sizewell during the three tracking surveys do not appear to show any clear correlation with those in Russo's study.

Movements between roosts

5.1.13 Barbastelle are known to move roosts regularly even during the period when their young cannot fly (Russo *et al*., 2004). The mean distance moved between trees by female bats in central Italy ranged between 31m and 626m, with distances contracting during the main lactating period (Russo *et al*., 2004). This suggests that female barbastelles, in order to continue to move roosts regularly, need a large number of suitable roost trees relatively close to each other during the whole breeding season, but particularly during the main lactating period. Russo *et al.* also found that barbastelle roosts were most frequently found within unmanaged woodland where the dead trees occurred most frequently, in comparison with managed woodland and pasture woodland, and where clusters of larger trees occurred. Greenaway and Hill (2004) found that the roosts tended to be located within a distinct area which they refer to as a "loyalty area". Loyalty areas will gradually change over time as woodlands develop, and Greenaway and Hill (2004) suggest that management plans for nursery roosting sites should include areas of five to ten times the area that bats are presently using.

5.1.14 The distances between roost-switches (movements between roosts located in Sizewell and/or Minsmere) in 2014 are given in **Table A9**. The distances between roost-switches in all three years of tracking are summarised in **Table A14** below.

Table A14 – Summary of distances between roost-switches by breeding females over 3 years

Year	Minimum (m)	Maximum (m)	Mean (m)	Number of switches
2010	488	2006	1203	13
2011	264	1741	915	13
2014	175	2920	1079	6

5.1.15 Russo *et al.* (2005) found during the late lactation/post lactation phase that the range for distances between roost switches was between 0 (sic) and 352m with a mean of 89m. In both 2011 and 2014, three of the combinations of roost switches (in 2014, all within Scottshall Plantation) fell within the distance range found by Russo *et al.* (2004) and 14 of the switches were greater. Tracked barbastelles at Sizewell and Minsmere therefore switched roosts on a regular basis as found in other studies, but over larger distances than reported in some. However, a study in Germany found that female barbastelles could cover much large distances (up to 9.0km between consecutive day roost locations: Kerth & Melber, 2009), and it seems likely that there is a great deal of variation between colonies, probably reflecting the relative availability of roost sites.

5.1.16 Only a single bat (2014 Bat 2) was recorded roosting in both the Sizewell Estate and Minsmere during 2014. This confirms that at least one breeding female was able to roost in either area in late summer. In 2010 (early June), a single female barbastelle was recorded in a tree roost in the Minsmere Reserve (R12) for a single day. This bat (Bat 5 2010) had been caught from R3 within Ash Wood and on all other days was recorded roosting in trees within the Sizewell Estate. This suggests that the behaviour is not restricted to one season.

Colony structure and size

5.1.17 Barbastelle maternity colony sizes are difficult to estimate (as discussed in Greenaway, 2008), largely due to the numerous roost changes. Although simultaneous emergence surveys of all known tree roosts were not undertaken in 2014, emergence surveys carried out in 2014 recorded a peak of 10 bats emerging from a roost in Scottshall Covert (R26) and 17 from roost R27 in Nursery Covert (on different days). A simultaneous emergence survey on 18 August of both R27 and R28 was carried out, the combined count of these two trees (17 and four bats emerged respectively) plus the known tagged bats in the other trees equates to 27 bats including known male bats. This is a little lower than the highest emergence count to date (2011) which recorded 31 barbastelle bats, and included some juvenile bats. However, on the days during which the majority of bats were tracked to a day roost in 2014 (14 to 21 August), at least four, and up to seven, different day roosts were being used on any one day. All of these counts are therefore likely to have represented only a proportion of the population in the wider Sizewell/Minsmere area. None of the bats caught in 2014 were those ringed in 2011.

5.1.18 Russo *et al. (*2004) found the number of bats in a maternity colony over seven different counts throughout July and August was 16.7 bats ± 4.2 (range 12-23 bats). Billington (pers. comm.) counted 26 bats within a single tree roost in Somerset. Greenaway (2008) studied two maternity colonies in Sussex, and estimated counts of at least 64 breeding females in one maternity colony and at least 80 breeding females in the other. These colonies were further divided into sub-groups of 16-25 breeding females (Greenaway, 2008, Greenaway & Hill, 2004). Bats have been recorded changing sub-groups between different years, but never changing nursery colonies (Greenaway, 2004; Greenaway, 2008; Greenaway & Hill, 2004). It is not known whether the Sizewell colony supports the sub-group theory; those papers discussing sub-groups generally are of high-quality habitats covering larger areas such as the Ahringsbachtal Special Area of Conservation (SAC) in Germany and the Mens and Ebernoe Common SACs in England.

5.1.19 During the 2011 radio-tracking surveys, non-breeding female bats were recorded within the maternity roost trees and appeared to move with other breeding female bats and juvenile bats into different tree roosts. During the 2014 surveys, three non-breeding female barbastelles were tracked, for one (Bat 8) no roost was found (thought likely to be in area of no access around Eastbridge); Bat 15 remained in R27 for the duration of the tracking along with other breeding female bats; and Bat 19 moved between roosts within Scottshall Covert but did not appear to move with any of the other tagged bats that were roosting in this area. However, it is not possible to know the movements of untagged bats. Non-breeding females have been recorded roosting within maternity colonies (Greenaway, 2008), but have also been recorded roosting with small groups of males (Parsons *et al*., 2003).

5.1.20 The trapping and radio-tracking studies provide very useful data, but on an unknown proportion of the population caught from a small number of trapping locations. Barbastelle bats are notoriously adept at evading traps/nets and therefore difficult to catch (Billington, pers comm.). There are a limited number of ideal trapping locations on the Sizewell Estate on flightlines that are used regularly and where bats find it difficult to evade capture, i.e. on rides where there is dense vegetation both above and to the sides. The use of a Sky-net in the coniferous plantation woodland increased trapping success in 2011; however, in 2014 (due to the windy weather) the use of mist-nets was restricted. It is likely that the available trapping locations are not used by all of the barbastelles and therefore only a proportion of the total barbastelle population has been sampled by trapping.

Foraging areas and home ranges

Foraging areas

5.1.21 As described above, the main foraging areas for the breeding females in 2014 appeared to be centered at a number of locations: around Kenton Hills and Goose Hill towards Ash Wood; around Plantation Cottages and Black Walks; to the north of Eastbridge; and in Minsmere around Scottshall Covert and north into Dunwich Heath. A number of more wide-ranging bats provided clusters of activity north around Dunwich

and south around The Walks south-east of Leiston. As the barbastelle bats caught in 2010 were not ringed it is not possible to determine whether any of the same bats have been radio-tracked during the two latter tracking periods. None of the bats ringed during 2011 were re-caught in 2014 so it is known that none of the bats tracked in 2011 were tracked in 2014.

5.1.22 Only very limited movement of bats into the Minsmere area had been recorded during the previous radio-tracking surveys. Access into and through Minsmere and Dunwich Heath was permitted during both the 2010 and 2011 tracking surveys; however, no VP sites to the north were plotted as no bats were recorded when surveyors searched in these areas. During the 2010 radio-tracking surveys, a pregnant female (2010 Bat 5) was the only bat recorded flying to the north. It was recorded roosting in Hangman's Wood and foraging over the Minsmere Levels at the bridge at Eastbridge. During the 2011 radio-tracking, a breeding female (2011 Bat 8) regularly moved away from the main site and was not tracked down. It was recorded to the north in Minsmere towards Westleton Walks on one occasion but further tracking was not achieved and it returned to the Sizewell Estate shortly afterwards. Bat 13 from 2011 was recorded during the first four nights of tracking within the Sizewell Estate but from the fifth night onwards the bat appeared to move to the north west of Eastbridge over the Minsmere Levels West where it remained for large parts of the nights whilst roosting in Leiston Old Abbey Woods. Occasional forays into Hangman's Wood were also recorded. This reason for this shift in foraging area is not known.

5.1.23 The 2014 surveys confirmed regular interchange between Minsmere and the Sizewell Estate. This increased evidence of interchange may be due to the fact that during 2014 trapping was carried out in Minsmere for the first time but it may also be a real effect arising from seasonal changes in foraging strategy. At least one breeding female in 2014 (2014 Bat 13) foraged much more widely than previously recorded: she spent the first nights she was tracked foraging around the Sizewell Estate, with occasional forays towards Minsmere Levels and northwest of Eastbridge before moving to fly more regularly around the Minsmere Old River to the north-west of Eastbridge and north into Hangmans New Wood within the Minsmere Reserve.

Home ranges: breeding females MCP and kernel analyses

5.1.24 Home Range Analysis was undertaken for all bats where sufficient bearings were collected. A comparison of the data from 2010, 2011 and 2014 is given below (Table A15). These can be compared with data from other radio-tracking studies. The other studies typically used 100% MCPs, rather than (as here) 95% MCPs to eliminate outliers. The data for 2010 and 2011 are at the lower end of the ranges recorded for adult female barbastelles in the Mens (range 260-2,928ha; mean: 1,236ha); and are similar to the mean recorded in Germany (222ha; Kerth & Melber, 2009). The 2014 results (range 329 – 2020ha; mean 714ha) are

similar to that recorded at Ebernoe Common (range: 45 - 2,521ha; mean: 779.5ha; [5]Greenaway, 2008).. The results for all years at Sizewell are much higher than that recorded in Switzerland (mean: 8.8ha); Sierro & Arlettaz, 1997).

Table A15 – Mean Home Ranges for breeding females recorded in 2010, 2011 and 2014. All areas in ha.

Status	Year	2010	2011	2014
Breeding females (excl. Bats 4 and 10 in 2014)	95% MCP Mean (range)	221 (76-388)	272 (128-547)	714 (329-2020)
	95% Kernel Mean (range)	256 (101 – 410)	336 (203-508)	582 (309-1275)
	95% Cluster mean (range) No. of nuclei/cluster	68 (4 – 175) 1 - 4	128 (20 – 227) 1 - 6	313 (105 -819) 1 - 7

Home Ranges recorded in other studies						
Status	**Analysis Type**	**Mens**	**Ebernoe**	**Hillen *et al.***	**Kerth *et al.***	**Norwich NDR**
Breeding females	100% MCP Mean (range)	1,236 (260 – 2928)	779.5 (45 – 2521)	-	222	904 (393 - 1637) 95% MCP
	95% Kernel Mean (range)			403 (125 – 2551)	108.6 (90% Kernel)	884 (460 - 2119)

5.1.25 The 2011 and 2014 home range kernel analysis results are similar to the home ranges recorded for 12 female barbastelle bats at the site in Germany, although a wider range of values were recorded (kernel 95%: range: 125-2551ha; median: 403ha; Hillen *et al*., 2009). Another site in Germany recorded a smaller mean home range (90% kernel mean: 108.6ha) (Kerth & Melber, 2009)

Core areas defined through kernel analyses

5.1.26 Core areas are those where an animal spends the majority of its time. Hillen's radio-tracking study of barbastelle (Hillen *et al*., 2009) looked at core areas used within each bat's home range. In that study, the core area was defined as 50% and home range was defined as 95% of the kernel density estimate. On that basis, the median number of core areas per bat was two with a range of one to five core areas per bat

[5] Note the MCP% analysis is not given in Greenaway 2008 or Sierro and Arlettaz 1997 but given as 100% MCP in Kerth and Melber 2009)

tracked per year. The core area size ranged from 5ha to 285ha. They found that all the home ranges of radio-tracked females (breeding and non-breeding) overlapped with at least one other home range but that only 41% of the core areas overlapped with another female's core area, suggesting a degree of partitioning. Although the sample size for the study was small (19 data sets from 12 female bats), Hillen *et al.* 2009 determined that female barbastelles partition foraging areas and keep individual hunting areas constant over time. The same analysis was undertaken of the 2014 Sizewell data , using the 50% kernel area of nine breeding female barbastelle bats. This resulted in 61% of core areas having no overlap and therefore 39% being overlapped by at least one other core area, a very similar result to the Hillen study. Figure C8 shows the 50% kernel areas of the breeding female barbastelle bats.

5.1.27 It should be noted that for both studies it is not known how many untagged bats were foraging in these core areas. Therefore it is possible that there is a greater degree of overlap in individual foraging areas than is otherwise indicated by the data presented here. The Hillen and Sizewell studies differ because at Sizewell the bats were radio-tracked over the same time period with multiple surveyors allowing the bats to be tracked simultaneously, whilst the Hillen study tracked either single bats or pairs of bats at any one time. The Hillen study did, however, track the same bat over different years with one bat tracked in each of the four years of the study, one during three of the four years and three during two of the four years. The researchers concluded that fidelity between years appeared to be more important in determining home range than intraspecific competition. None of the bats at Sizewell have been knowingly caught and tracked over different years as ringing did not take place during the 2010 capture/tracking session.

Cluster analyses: breeding females

5.1.28 Cluster analysis creates a number of nuclei or clusters for each bat. The cluster area size defined by a 95% cluster analysis of breeding female barbastelle ranged from 105 to 819ha with the number of nuclei ranging from 1 to 7 (as shown on **Figure C2)**. Although there is overlap between the nuclei of individual bats, there does appear to be some partitioning of foraging habitat away from the main roosting areas. By way of comparison, during 2011, the 95% cluster analysis of breeding females resulted in between 1 to 6 nuclei with the total areas ranging from 20ha to 227ha. Again, there appeared to be some partitioning of foraging habitat away from the main roosting area. During the 2010 pre-lactation radio-tracking period (based on results of bats with functioning tags), the 95% cluster analysis of all breeding females resulted in between 1 to 4 nuclei with total areas ranging from 4ha to 175ha. There was some east-west partitioning of foraging habitat in the belts area north of Grimseys, Leiston Old Abbey woodland and around Eastbridge Road, Theberton House and the fields north of Leiston Abbey. Areas of overlap occurred around Ash Wood and the field system north of Kenton Hills and around Abbey Farm Track in 2010. Areas of overlap in 2011 were similar but extended out to Goose Hill more than in 2010. In 2014, the areas of overlap occurred around Kenton Hills and Goose Hill towards Ash Wood, around Lower Abbey Farm and Black Walks, to the north of Eastbridge and in Minsmere around Scottshall Covert and north into Dunwich Heath.

Non-breeding female barbastelles (MCP, Kernel and Cluster analysis)

5.1.29 Three non-breeding female bats were radio-tracked in 2014: Bats 8, 15 and 19. These had 95% MCP home ranges averaging 703 ha, comparable with the breeding female bats. The 95% cluster analysis resulted in larger average cluster size of 398ha compared to the mean size for breeding females of 313ha (excluding Bats 4 and 10 with the limited tracking data). The kernel analysis similarly recorded a larger area 739ha compared to 582 for the breeding females. Greenaway (2008) found that there was greater variability in MCP size for non-breeding barbastelles (both male and female). The lower metabolic demands of non-breeding bats mean that they do not require such large foraging areas; conversely a tendency to 'wander' in the late summer to find mating opportunities means they can also have quite large ranges as defined by MCP. For example, it was determined that non-lactating female noctules used more marginal and less preferred habitats significantly more than lactating bats (Mackie & Racey, 2007), although there was little difference in timing of foraging activity or distances travelled.

Male barbastelles (MCP)

5.1.30 The male bats at Sizewell in 2014 had 95% MCPs ranging between 558ha and 1782ha (mean 990ha). This is typically larger than those of the female bats tracked in 2014 (mean 714ha breeding female and 703ha non-breeding female). Male bats tend to range over much greater distance and tend not to be associated with the core breeding habitat monopolised by the females. Greenaway (2004) proposed that the foraging areas used by the male may more frequently be in sub-optimal habitats when compared to those used by the females; however, in this instance and as with the 2011 tracking, there appears to be a greater degree of overlap at this site than occurs in the Sussex sites. During the 2014 surveys, only three adult male barbastelles were caught, most likely due to the trapping being principally in or in close vicinity to the core breeding habitat. The male barbastelles were recorded flying in the areas of habitat used by the female tracked bats: male Bat 3, for example, roosted in the Grimseys Wood area and was recorded regularly in Fiscal Policy, Goose Hill and Ash Wood. Male Bat 5 was recorded around Sizewell Belts, to the east of Eastbridge and also regularly to the south in The Walks (south-east of Leiston) where Bat 13 a breeding female was also recorded. Bat 14 spent most days roosting in tree R27 and was recorded regularly in Goose Hill, Minsmere Levels and Scottshall Coverts in Minsmere as well as south to Lovers Lane and west to Westleton Walks. However, all three were also recorded some distance away from the Sizewell and Minsmere Estates. Bat 3 was recorded south of Leiston near Aldringham whilst Bat 14 was recorded towards Westleton to the north west and north east along the coast near Dunwich. Bat 5 roosted near Saxmundham and, due to the distance from the Sizewell Estate, this bat was not tracked from its roost. As a result there were periods when the bat could not be located either within the Sizewell Estate or in the more distant locations such as The Walks where it was regularly recorded. Bat 14 roosted regularly in tree R27. Given that up to five of the breeding female bats and one non-breeding female roosted within R27 at the same time as Bat 14, it is possible that this was a mating roost, although the bat was not noted as having swollen testes when it was caught. It is interesting that juvenile male bats were also caught out of this tree.

Distances travelled

5.1.31 Barbastelle bats radio-tracked from The Mens Woodland SAC ranged widely (range: 2.64-11.98km; mean: 7.1km), as did those from Ebernoe Common SAC (range: 1.17-10.46; mean: 5.1) (Greenaway, 2008). The average flight distances for pregnant or lactating females at the same locations were 7.67km and 5.09km respectively (Greenaway, 2008). From Paston Barn near Cromer (Norfolk), female barbastelles flew a maximum of 2.75km to their foraging site, while males were tracked 4.75km (Parsons *et al*., undated). At two sites in southern England, the home ranges varied considerably with bats travelling between 1 and 20km to reach foraging areas with the average range span being 6.8km (Zeale *et al.,* 2012). In Norfolk, the maximum distance travelled by a breeding female bat was 9.4km (average 5.84km), whilst for a male it was 13km (BSG 2010). In comparison, at Sizewell/Minsmere, the maximum distance recorded from a roost area was 9.1km for Bat 13, whilst the mean maximum distance for breeding females was 4.4km (excluding Bat 4). In 2011 (earlier in the breeding season), the furthest flight distance recorded by a breeding female was 3.1km, with a mean distance of 2.3km. The mean maximum distance for the male bats in 2014 was 4.2km. The 2011 distances recorded were considerably smaller than the mean recorded at the Mens and Ebernoe (based on 20 bats tracked in small batches between May and September 2008). The results of the 2014 survey are consistent with the results of previous studies (Greenaway, 2004; 2008 and Zeale *et al.*, 2012). The habitats at Ebernoe and the Mens are more extensive and less fragmented than at Sizewell, and it is considered from the data available that the colonies at these two sites are larger. In addition, the 2011 survey at Sizewell was undertaken when juvenile bats were recently volant and still dependent on their mothers. Therefore the data is for a set time period and at a time when it would be expected that the breeding female bats would not forage as far afield.

5.1.32 Research in Sussex suggested that breeding females dispersed from the roost area along established flight lines to foraging areas often several kilometres away; the female repeatedly using the same flight line, and juveniles following the mothers out along the flight lines to become familiarised with the routes and foraging zones (Greenaway 2004). Whilst the flight lines may be shared, they were generally found to end in a section used by a single bat to access the most distant foraging area (Greenaway 2004). The radio-tracking surveys at Sizewell to date have not found this, with bats flying widely within the landscape: that is, the tracked barbastelle did not tend to follow linear features and did not seem to follow predetermined routes. They appeared to be less reliant on linear features to commute to foraging areas than has been suggested for other studies. As stated above, the habitats at Ebernoe and the Mens are more extensive and less isolated than at Sizewell. It is therefore considered more likely that the quality of the available habitat limits the need for the bats to use specific flightlines at Sizewell/Minsmere. There is limited high-quality foraging habitat available away from these areas meaning they do not commute to more distant foraging areas. At Sizewell and in Norfolk (BSG, 2010), foraging over less high-quality foraging habitat has been recorded, with foraging over arable land being recorded in both instances. The occurrence of the arable habitat within

the Sizewell Estate within the core area does not restrict the movement of the bats, and they do not appear to use specific linear corridors to move between the areas of higher quality habitat which are all situated relatively close to each other.

5.1.33 During the summer season, Greenaway (2004) records that male barbastelle tend to be active for fairly short periods of the night, and appeared to forage entirely in woodlands within 1km of their roost site. In the present study, although the male bats were not continuously followed, they were regularly recorded throughout the night, and were clearly foraging further from their roost than the Greenaway study. Bat 5, which roosted towards Saxmundham, was recorded at least 7km from its roost whilst Bats 3 and 14, which roosted within the Sizewell Estate, were both recorded 4km from their roost areas, and in all cases appeared to be spending considerable periods of time foraging in areas within or close to Sizewell/Minemere. Bats 3 and 5 were both recorded to the south in The Walks whilst Bat 14 was regularly recorded to the north in Minsmere. In comparison, the single adult male bat caught and tracked in early August 2011 travelled a maximum distance of 2.77km. The level of activity recorded varied for that bat: it was sometimes recorded throughout the night, and at other times, it returned to the roost early and made occasional flights from the roost later. It is likely that there are a number of factors affecting the distances the male bats move. It is possible, given the later time-frame for the 2014 survey, that the male bats were starting to mate (Bat 3 was noted as having swollen testes). During this period, it seems reasonable to assume they will travel further and visit the core area more regularly.

Home range overlap and partitioning

5.1.34 The 95% MCP home ranges for the breeding female barbastelles have been overlaid and the areas of overlapping has been measured. (**Table A16** – see **Figure C7**).

Table A16 - Areas of overlapping ranges of breeding female MCPs

No of bats overlapping	Area ha 95% MCP
2	1271
3	842
4	678
5	520
6	364
7	217
8	58
9	0.6

5.1.35 Excluding the data from Bats 4 and 10, the area where the MCPs for the remaining nine breeding female bats caught in both Minsmere and Sizewell overlapped covers an area of just <1 ha in Minsmere to the south of Scottshall Covert. The area where the MCPs for eight breeding female bats overlapped covers an area of 58ha, covering an area extending from Lower Abbey Farm to Scottshall Covert (this lies outside the

proposed SZC construction boundary). The area increases quite substantially where seven breeding female bats are overlapping to 217ha. This area extends south to include Ash Wood and Goose Hill. The difference between at least 6 bats overlapping and 7 bats overlapping is relatively small. The area of overlap between at least six breeding female bats extends to the northern end of Nursery Covert, Goose Hill, Ash Wood, through Black Walks into Minsmere Levels and north to Minsmere to Scottshall Covert, The Warren and North Walks.

5.1.36 The 50% kernels of the 2014 breeding females when overlaid show two distinct core areas, one to the north at Minsmere and one to the south within the Sizewell Estate (**Figure C8**). The sizes of these core areas and the % overlap by at least two bats has been calculated.

Table A17 - % overlap of 50% kernel core areas of breeding female barbastelles in 2014

	Total Area (Ha)	Area of overlap by at least 2 bats (Ha)	% core area overlapped
Sizewell	325.3	214.27	65%
Minsmere	264.5	143.78	54.4%

5.1.37 The core area in the south covers a relatively wide area extending from Eastbridge to Nursery Covert and Goose Hill. In the north the core area is focussed on Scottshall Covert, towards Dunwich Heath and The Warren.

5.1.38 The same analysis of the 2011 data has been carried out. The 50% kernels of breeding females (**Figure C9** and **Table A18**) in 2011 found three core areas. One towards Leiston Old Abbey, one to the north over Ash Wood and Black Walks and the third to the east over Goose Hill and the grazing marsh to the east.

Table A18 - % overlap of 50% kernel core areas of breeding female barbastelles in 2011

	Total Area (Ha)	Area of overlap by at least 2 bats (Ha)	% core area overlapped
Leiston Old Abbey	75	52	69%
Ash Wood/Black Walks	127	106	83%
Goose Hill	78	39	50%

5.1.39 The 2011 radio-tracking found a core foraging zone used by juvenile and breeding female bats that extends south from the woodland adjacent to Plantation Cottages through Black Walks, Ash Wood and into Goose Hill and Kenton Hills. It was considered during that survey that this area was the critical productive foraging zone providing the juvenile and shared breeding female foraging areas as described by Greenaway (2004). The radio-tracking in 2014 confirmed the importance of this area for breeding barbastelle, although the overall area of foraging habitat regularly used by the bats in 2014 extended further north into Minsmere and into the area north west of Eastbridge than previously recorded.

5.1.40 The 2011 surveys concluded that, whilst there appeared to be some partitioning of the foraging resource, there was also a higher degree of overlapping than is suggested from research at other sites. Key areas of overlap included Ash Wood, Upper Abbey and Leiston Old Abbey, Dunwich Forest/Goose Hill and the Kenton Hills area. Some partitioning was considered likely, with some distinct areas used in the north-east around Eastbridge, over Sizewell Belts, and to the west and south-west towards the sewage works and Greenhouse Plantation. The 2011 surveys concluded that the majority of activity was concentrated on the area to the south of the Lower Abbey Farm roosting areas with less activity to the north over the Minsmere Levels and north-west of Eastbridge. However, it was considered likely that there could be some seasonal variations to habitat use for foraging due to temperature/food availability and this supposition was based on the apparent movement of foraging female bats from the Belts area to the Eastbridge area in the latter part of the 2011 radio-tracking. The 2014 radio-tracking surveys seem to confirm this, with a higher level of foraging occurring over the Minsmere Levels than previously recorded. The area of overlap is high given that data from only radio-tracked bats can be measured (i.e. excluding non-tracked bats from the colony). The overlaps recorded are 65% at Sizewell and more than 54% at Minsmere. Given this data has been produced from only a sub-set of the colony there is likely to be a higher level of overlap if non-tracked bats are considered. This would suggest that there is a low level of resource partitioning and a high demand on the habitat available in this landscape.

5.1.41 Seasonal diet changes in barbastelle have been researched and it has been found that they selectively predate larger moth species even during periods when smaller moth species are more abundant (Andreas *et al.,* 2012). It was found that, whilst there was generally no abrupt seasonal changes in their diet within season, the exception is in autumn, when the larger moths are replaced by smaller moths. It is considered that this is due to prey availability as most moth species cease to fly and only the smaller species are still flying during this time. Larger moths are still present but display limited flying activities. This autumn period is reported as being into November in the study area within the Czech Republic. Whilst the radio-tracking of barbastelles at Sizewell/Minsmere has not extended later into the Autumn period, it is likely that there will be seasonal and weather-related changes to key foraging areas throughout the year.

Foraging areas and home ranges in relation to the site boundary

5.1.42 An analysis was undertaken of the percentage of each bat's core area(s) that was overlapped by the proposed SZC construction site footprint (Figures C8 (2014),C9 (2011) and C10 (2010)). [Core areas here are defined using 50% kernel analysis; it is important to note that the home ranges can be considerably larger.]

5.1.43 In 2010 when tracking took place before the bats had given birth, the percentage overlap of core areas (as defined above) with the construction footprint ranged from 3ha to 91ha (six bats included in analysis) Bats 3 (17ha) and 4 (3ha) had a restricted number of fixes achieved (8 and 10 respectively).

5.1.44 In 2011, when tracking took place later in the year (females had given birth and juvenile bats were flying but fairly recently flying), the percentage overlap of core areas (as defined above) with the construction footprint ranged from 28ha to 88ha (seven bats included in analysis).

5.1.45 In 2014, when tracking took place later in the year (when young bats are (or largely are) independent), the percentage of overlap of core areas (as defined above) with the construction footprint ranged from 0ha to 87ha (nine bats included in analysis). Four of the five bats whose core areas showed no or minimal overlap with the construction site footprint were caught in Minsmere; one was caught in Sizewell. The four bats with at least 17ha overlap of their core areas with the construction footprint were caught in Sizewell.

Table A19 – Area in ha of 50% kernel core areas of adult breeding female barbastelle with proposed SZC construction site footprint

2014 50% Core Overlap (in order of greatest overlap)		
Bat Number	**Total Area ha**	**Overlap Area ha**
Bat 6	177	87
Bat 17	159	55
Bat 16	79	16
Bat 1	110	17
Bat 7	127	1
Bat 2	90	0
Bat 10	209	0
Bat 13	128	0
Bat 18	94	0
2011 50% Core Overlap (in order of greatest overlap)		
Bat Number	**Total Area ha**	**Overlap Area ha**
Bat 11	113	88
Bat 17	128	71
Bat 13	163	63
Bat 9	108	46
Bat 6	67	30
Bat 8	79	29
Bat 20	77	28
2010 50% Core Overlap (in order of greatest overlap)		
Bat 6	137	91
Bat 5	145	85
Bat 2	37	36
Bat 1	58	28
Bat 3	18	17
Bat 4	8	3

5.2 Serotine

5.2.1 The serotine bat caught was a non-breeding female and appeared to return to its roost relatively early each evening during the tracking. The home range analysis has been undertaken based on 31 points including an estimated location for its roost. Suffolk Bat Group has confirmed there is a known maternity roost at Theberton House.

Table A20 – Serotine home range sizes

MCP	Kernel	Cluster
570.3ha	820.4	421 (2 nuclei)

5.2.2 Research indicates that serotine usually hunt within 4.5km of the roost (occasionally up to 12km, Dietz *et al.,* 2009*)*. Individual home ranges of this species (MCP) have varied from 0.16 to 47.58km2 (4758ha) (Robinson and Stebbings, 1997). The home range recorded at Sizewell was 570ha; however, the bat was recorded returning early to its roost on a number of nights and was often within the area where no access was allowed. It is likely that home range has been underestimated. Distances recorded between roost sites and foraging areas in one study were 8km with a maximum distance of over 41km with up to 10 feeding sites being visited each night (Robinson and Stebbings 1997) whilst Catto *et al.* (1996) found that feeding sites were all within 4km of the day roost. The furthest distance from the roost site visited by Bat 9 was only 3.5km; however, the bat was recorded foraging widely into the Minsmere reserve, Minsmere Levels and around Goose Hill, The Grove and Ash Wood with bearings putting it along the coastal edge. Successful joint bearings within the coastal area were difficult to achieve due to the limited number of locations where surveyors could stand to get bearings in this areas.

5.2.3 The bat also spent considerable time flying in the grounds of Theberton House. Studies at a site in Brighton East Sussex (Catto *et al.,* 1996) recorded that bats used the breeding roost for night roosting interspersed with short repeated flights of between 1 and 20 minutes close to the resting place. This study also found that temperature had a significant effect on the total time spent away from the roost and time spent in continuous flight. The Sussex research found that mean times away from the roost site varied between the two study sites, with the Brighton bats spending a mean time of 189.5 minutes / night away from the roost with resting periods spent away from the day roost,; bats from the Lewes study site spent 59.4 minutes/night away from the roost but returned to the day roost to rest. The findings at Sizewell appear to display the same general behaviour, with very limited time flying away from the roost on cooler nights such as 19 and 20 August. The bat was recorded more widely in the Minsmere Levels and coastal areas on 15, 16 August and south towards Goose Hill on 17 August, before moving rapidly north to Minsmere before returning to the Theberton House area some 20 minutes later at 21.47hrs (approximately 1 ½ hrs after sunset).

5.2.3 No breeding serotine bats were caught during the 2014 trapping sessions, and no serotine bats were caught at all in the Minsmere area. When higher numbers of serotine bats were caught in 2011, they were nearly all caught in a triple-high sky-net in the Goose Hill area. Serotine bats have regularly been recorded flying high often 10 – 15m above the ground when commuting and the inability to use these higher nets in 2014, and thus the trapping sites in Goose Hill, would have reduced the success of catching the species. In addition, the Sussex research found that when winds were of medium strength (4/5 on the Beaufort scale), serotines foraged closer to the roost and reduced their foraging time, which also would have reduced the likelihood of being trapped.

6.0 CONCLUSION

Barbastelle Bats

6.1 The radio-tracking undertaken in 2014 largely achieved the five objectives set out in para 1.2. A total of 27 barbastelle bats were caught; none of these bats were ringed and it can be deduced from this that none of the bats radio-tracked in 2014 were radio-tracked in 2011. Three adult male, 12 breeding female and three non-breeding female bats were tagged. The remaining eight untagged bats were seven juvenile male barbastelle and a single bat which escaped before biometrics could be taken.

6.2 The trapping and tracking has determined that Minsmere supports breeding barbastelle bats both in terms of roosts and foraging habitat. The tracking has also confirmed the interchange of bats between the two areas, Sizewell and Minsmere. Over the three periods of radio-tracking in the pre-breeding period in 2010, early August in 2011 and mid to late August 2014, it has been found that the Sizewell Estate is used throughout by breeding barbastelle bats. The 2011 radio-tracking found there is a core foraging zone used by the juvenile and breeding female bats that extends south from the woodland adjacent to Plantation Cottages (near Lower Abbey Farm) through Black Walks, Ash Wood and into Goose Hill and Kenton Hills. Outside this core foraging zone, there is a degree of overlap of foraging by both breeding female and juvenile barbastelles into the Sizewell Belts area.

6.3 The areas in which foraging bats were recorded was wider in 2014 than in 2011 with more foraging occurring over the Minsmere Levels and the Eastbridge area than had previously been recorded. Whilst there does appear to be some partitioning of the foraging resource, there appears to be a higher degree of overlapping of habitat in the open grazing meadows than is suggested in previously published research. In 2011, the majority of activity was concentrated on the area to the south of the Lower Abbey area with lesser amounts of activity in the north towards Eastbridge. However, it was considered that there could be some seasonal variations to habitat use for foraging due to temperature. The 2010 and 2011 surveys have confirmed the fidelity of the colony to the Sizewell Estate and their use of the Estate to establish nurseries. The 2014 confirmed the importance of both the Sizewell Estate and the RSPB Minsmere Reserve and determined that there was interchange between the two areas. In addition to the discovery of tree roosts within Minsmere, the 2014 surveys found additional tree roosts in the key roost areas found previously in the Sizewell Estate particularly in Ash Wood, Lower Abbey and Nursery Covert. The reliance of the colony on the Estate is indicated strongly by the number of roost trees used by the colony within it and by the majority of bats foraging for significant periods within it.

6.4 The three male bats were all caught within the Sizewell Estate: two from the northern side of Nursery Covert and the third from the southern edge of the same block of woodland. Two of the male bats were found roosting within the Sizewell Estate, one within Grimseys and one within roost R27. The third was recorded

roosting further away near Saxmundham. The male bats had generally larger home ranges than the female bats, flying more widely within the wider landscape.

6.5 The value of the site should be considered as a whole to the relevant population. The precise evaluation of this resource is difficult for some key reasons:

- The reference population size (i.e. Suffolk or UK) is unclear as there is no published estimate for the Suffolk population, and UK population estimates are based on very limited data.
- The size of the population at Sizewell is not known, although the minimum size of the maternity colony recorded from emergence counts is 31 counted in 2011 (which includes juvenile as well as adult female bats). Ringing of all barbastelle bats caught commenced in 2011 and during the 2014 surveys no previously ringed bats were caught.
- It is not known whether there are any hibernation roosts for barbastelle within the Sizewell Estate although, given that this species frequently roosts in trees during the hibernation period where suitable roost trees are available, it is likely that at least a proportion of the summer population also hibernate on the site.

Serotine bat

6.6 A single non-breeding female serotine bat was caught and tracked. No other serotine bats were caught. The bat roosted for the duration of the tracking within the grounds of Theberton Farm. No access was permitted in this area although there is a known serotine maternity roost at this property. The bat was recorded foraging widely into the Minsmere Reserve, Minsmere Levels and around Goose Hill, The Grove and Ash Wood with bearings putting it along the coastal edge.

Other bat species caught

6.7 Over six nights of trapping, 285 bats of eight species caught. This is considered to be a high number of bats trapped particularly given the weather conditions experienced. Of these, 139 were soprano pipistrelle bats caught at two locations within the Minsmere Reserve. Only male Daubenton's bats were caught in the Sizewell Estate, whilst a single non-breeding adult female was caught in the Minsmere Reserve along with six further juvenile Daubenton's bats. Prior to the 2014 surveys only a single male Daubenton's had been caught to the south of the Sizewell Estate along Sandy Lane. No Nathusius' pipistrelle were trapped in either site. The objective to track these bat species if caught was therefore not met.

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LARGE TABLES FOLLOW

Table A2 – Bat trapping data (Key: SZC – Sizewell; Mm – Minsmere; PL – post-lactation; NB – non-breeding, T1 - testes not swollen, T2 – testes intermediate, T3 – testes swollen)

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
09/08/2014	SZC - Fiscal Policy	1	20:50	P55	Male	Adult	T3	30.5	4.6			
09/08/2014	SZC - Fiscal Policy	2	20:50	P45	Female	Adult	NB	31.9	2.1			
09/08/2014	SZC - Fiscal Policy	3	21:00	P55	Male	Adult	T3	32.8	4.9			
09/08/2014	SZC - Fiscal Policy	4	21:00	P55	Male	Adult	T3	30.8	5.2			
09/08/2014	SZC - Fiscal Policy	5	21:00	P45	Female	Adult	PL	32.2	5.2			
09/08/2014	SZC - Fiscal Policy	6	21:00	P45	Female	Juvenile	NB	32.2	5.1			
09/08/2014	SZC - Fiscal Policy	7	21:00	Natt	Male	Adult	T3	39.3	8.1			
09/08/2014	SZC - Fiscal Policy	8	21:00	Barb	Male	Juvenile	T2	38.4	7.8	-	T8832	Very small ear discs
09/08/2014	SZC - Fiscal Policy	9	21:00	BLE	Male	Adult	T3	39.6	8.1			
09/08/2014	SZC - Fiscal Policy	10	21:00	Daub	Male	Juvenile	T3	37.9	6.7			
09/08/2014	SZC - Fiscal Policy	11	21:20	P55	Female	Juvenile	NB	32.5	5.1			
09/08/2014	SZC - Fiscal Policy	12	21:50	Natt	Female	Juvenile	NB	40.2	7.6			Mature juvenile
09/08/2014	SZC - Fiscal Policy	13	22:00	P55	Female	Juvenile	NB	31.0	4.4			
09/08/2014	SZC - Fiscal Policy	14	22:00	Natt	Male	Adult	T3	37.4	6.3			
09/08/2014	SZC - Fiscal Policy	15	22:00	P45	Male	Adult	T3	29.9	5.3			
09/08/2014	SZC - Fiscal Policy	16	22:20	P45	Female	Juvenile	NB	32.3	5.4			
09/08/2014	SZC - Fiscal Policy	17	22:20	P45	Female	Juvenile	NB	31.9	5.0			
09/08/2014	SZC - Fiscal Policy	18	22:50	P45	Male	Adult	T3	31.0	5.1			
09/08/2014	SZC - Fiscal Policy	19	22:50	Natt	Male	Adult	T3	40.0	8.3			
10/08/2014	SZC - Fiscal Policy	20	00:40	P55	Male	Adult	T3	30.2	4.8			
10/08/2014	SZC - Fiscal Policy	21	02:00	P45	Released	Released	Released					Released as taking down traps due to rain.
11/08/2014	SZC - Nursery Covert North	22	20:50	Barb	Female	Adult	PL	39.7	9.8	1	T8831	Ear discs
11/08/2014	SZC - Nursery Covert North	23	20:50	Barb	Female	Adult	PL	38.9	9.7	2	T8828	
11/08/2014	SZC - Nursery Covert North	24	20:50	Barb	Escaped	Escaped	Escaped					Escaped from mist net
11/08/2014	SZC - Nursery Covert North	25	20:50	Barb	Male	Juvenile	T1	38.4			T8827	Very stressed so not weighed
11/08/2014	SZC - Nursery Covert North	26	21:30	Barb	Male	Adult	T3	38.3	8.1	3	T8829	
11/08/2014	SZC - Nursery Covert North	27	21:30	P55	Male	Juvenile	T1	31.8	5.0			
11/08/2014	SZC - Nursery Covert North	28	22:25	Natt	Male	Adult	T1	40.2	9.1			
11/08/2014	SZC - Nursery Covert North	29	22:45	P45	Female	Juvenile	NB	33.5	4.8			
11/08/2014	SZC - Nursery Covert North	30	22:55	P45	Female	Adult	NB	32.5	5.6			
11/08/2014	SZC - Nursery Covert North	31	22:55	P45	Female	Adult	NB	31.5	5.0			

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
11/08/2014	SZC - Nursery Covert North	32	23:15	Natt	Female	Adult	PL	39.4	8.2			
11/08/2014	SZC - Nursery Covert North	33	23:30	P45	Female	Adult	NB	32.2	5.5			
11/08/2014	SZC - Nursery Covert North	34	23:45	BLE	Male	Adult	T1	40.6	7.3			
12/08/2014	SZC - Nursery Covert North	35	00:15	P55	Male	Adult	T1	31.8	4.8			
12/08/2014	SZC - Nursery Covert North	36	00:15	P55	Male	Adult	T1	29.1	4.3			
12/08/2014	SZC - Nursery Covert North	37	00:53	Barb	Female	Adult	PL	38.8	9.4	4	T8830	
12/08/2014	SZC - Nursery Covert North	38	01:20	Natt	Male	Adult	T1	38.3	7.6			
12/08/2014	SZC - Nursery Covert North	39	01:20	P55	Male	Adult	T3	31.4	5.0			
12/08/2014	SZC - Nursery Covert North	40	01:20	P55	Male	Adult	T3	30.7	4.9			
12/08/2014	SZC - Nursery Covert North	41	01:30	BLE	Female	Adult	PL	37.6	8.2			
12/08/2014	SZC - Nursery Covert North	42	01:30	Natt	Female	Adult	PL	40.0	8.9			
12/08/2014	SZC - Nursery Covert North	43	01:30	BLE	Male	Adult	T1	38.6	7.1			
12/08/2014	SZC - Nursery Covert North	44	01:45	BLE	Male	Adult	T1	37.9	6.4			
12/08/2014	SZC - Nursery Covert North	45	01:50	Natt	Female	Adult	PL	39.1	9.0			
12/08/2014	SZC - Nursery Covert North	46	01:50	P55	Male	Adult	T1	32.7	5.0			Swollen glands
12/08/2014	SZC - Nursery Covert North	47	03:50	Barb	Male	Adult	T1	39.0	9.6	5	T8981	
12/08/2014	SZC - Nursery Covert North	48	04:33	Barb	Female	Adult	PL	38.6	10.7	6	T9000	
11/08/2014	Mm - RSPB Southwalk Belt	49	21:00	Barb	Male	Juvenile	T1	37.2	8.2		H5944	No ear discs
11/08/2014	Mm - RSPB Southwalk Belt	50	21:00	Daub	Female	Juvenile	NB	37.0	6.5			
11/08/2014	Mm - RSPB Southwalk Belt	51	21:00	Daub	Female	Juvenile	NB	36.2	7.0			
11/08/2014	Mm - RSPB Southwalk Belt	52	21:00	P55	Female	Juvenile	NB	32.7	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	53	21:00	P55	Female	Juvenile	NB	31.2	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	54	21:40	BLE	Female	Juvenile	NB	39.2	7.0			
11/08/2014	Mm - RSPB Southwalk Belt	55	21:50	P55	Female	Juvenile	NB	32.4	5.5			
11/08/2014	Mm - RSPB Southwalk Belt	56	21:50	P55	Female	Juvenile	NB	32.1	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	57	22:00	P55	Female	Juvenile	NB	30.1	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	58	22:00	P55	Female	Juvenile	NB	31.4	6.1			
11/08/2014	Mm - RSPB Southwalk Belt	59	22:10	P55	Female	Juvenile	NB	31.4	5.1			
11/08/2014	Mm - RSPB Southwalk Belt	60	22:10	P55	Male	Juvenile	T1	31.0	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	61	22:15	P55	Male	Juvenile	T1	30.0	4.1			
11/08/2014	Mm - RSPB Southwalk Belt	62	22:15	P55	Female	Juvenile	NB	31.4	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	63	22:15	P55	Female	Juvenile	NB	31.6	5.5			
11/08/2014	Mm - RSPB Southwalk Belt	64	22:15	P55	Female	Juvenile	NB	30.5	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	65	22:15	P55	Male	Juvenile	T1	31.0	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	66	22:40	P55	Female	Juvenile	NB	31.3	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	67	22:40	P55	Female	Juvenile	NB	30.5	5.5			

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
11/08/2014	Mm - RSPB Southwalk Belt	68	22:40	P55	Male	Adult	T2	32.9	4.0			
11/08/2014	Mm - RSPB Southwalk Belt	69	22:40	P55	Male	Juvenile	T1	30.3	5.5			
11/08/2014	Mm - RSPB Southwalk Belt	70	22:40	P55	Female	Juvenile	NB	31.0	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	71	22:40	P55	Escaped	Escaped	Escaped					Escaped
11/08/2014	Mm - RSPB Southwalk Belt	72	22:40	P55	Female	Juvenile	NB	31.1	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	73	22:40	Daub	Female	Adult	NB	37.4	9.5			
11/08/2014	Mm - RSPB Southwalk Belt	74	22:40	P55	Female	Juvenile	NB	31.1	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	75	23:00	P55	Female	Adult	NB	37.4	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	76	23:00	Daub	Female	Juvenile	NB	31.1	9.5			
11/08/2014	Mm - RSPB Southwalk Belt	77	23:00	P55	Male	Juvenile	T1	31.8	4.5			
11/08/2014	Mm - RSPB Southwalk Belt	78	23:30	Daub	Male	Juvenile	T1	37.2	8.0			
11/08/2014	Mm - RSPB Southwalk Belt	79	23:40	P55	Male	Juvenile	T1	29.5	4.9			
11/08/2014	Mm - RSPB Southwalk Belt	80	23:40	P55	Female	Juvenile	NB	30.5	5.0			
11/08/2014	Mm - RSPB Southwalk Belt	81	23:40	P55	Male	Adult	T3	30.5	6.0			
11/08/2014	Mm - RSPB Southwalk Belt	82	23:40	P55	Male	Adult	T3	29.4	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	83	00:08	P55	Female	Juvenile	NB	31.3	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	84	00:08	BLE	Female	Adult	PL	39.3	9.0			
12/08/2014	Mm - RSPB Southwalk Belt	85	00:08	P55	Female	Juvenile	NB	30.6	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	86	00:10	P55	Male	Adult	T2	31.2	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	87	00:40	P55	Male	Adult	T2	30.5	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	88	00:40	Natt	Female	Juvenile	NB	37.9	7.8			
12/08/2014	Mm - RSPB Southwalk Belt	89	01:05	P55	Male	Adult	T2	29.8	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	90	01:10	Daub	Female	Juvenile	NB	39.1	9.0			
12/08/2014	Mm - RSPB Southwalk Belt	91	01:50	P55	Male	Juvenile	T1	29.7	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	92	02:20	P55	Male	Adult	T2	30.8	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	93	02:40	P55	Male	Adult	T2	29.4	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	94	02:40	P55	Female	Juvenile	NB	32.0	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	95	03:00	P55	Male	Adult	T1	30.6	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	96	03:30	P55	Female	Adult	NB	31.2	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	97	03:30	Natt	Male	Juvenile	T1	40.4	8.3			
12/08/2014	Mm - RSPB Southwalk Belt	98	04:00	P55	Female	Adult	NB	30.8	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	99	04:00	P55	Female	Juvenile	NB	30.5	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	100	04:00	P55	Male	Adult	T1	30.8	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	101	04:20	P55	Male	Juvenile	T1	30.7	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	102	04:20	Daub	Male	Juvenile	T1	36.0	8.0			
12/08/2014	Mm - RSPB Southwalk Belt	103	04:30	Natt	Male	Juvenile	T1	39.4	8.0			

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
12/08/2014	Mm - RSPB Southwalk Belt	104	04:30	P55	Male	Juvenile	T1	29.5	4.7			
12/08/2014	Mm - RSPB Southwalk Belt	105	04:30	P55	Female	Adult	PL	31.0	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	106	04:45	P55	Female	Juvenile	NB	31.2	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	107	04:45	P55	Male	Juvenile	T1	29.0	5.3			
12/08/2014	Mm - RSPB Southwalk Belt	108	04:50	P55	Female	Juvenile	NB	31.1	5.0			
12/08/2014	Mm - RSPB Southwalk Belt	109	04:50	P55	Male	Juvenile	T1	31.0	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	110	04:50	P55	Female	Juvenile	NB	33.0	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	111	04:50	P55	Female	Juvenile	NB	31.9	4.0			
12/08/2014	Mm - RSPB Southwalk Belt	112	04:50	P55	Female	Juvenile	NB	32.1	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	113	04:50	P55	Female	Juvenile	NB	31.4	5.5			
12/08/2014	Mm - RSPB Southwalk Belt	114	04:50	P55	Female	Juvenile	NB	31.7	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	115	04:55	P55	Male	Adult	T2	31.1	4.8			
12/08/2014	Mm - RSPB Southwalk Belt	116	04:55	P55	Male	Adult	T1	29.0	4.5			
12/08/2014	Mm - RSPB Southwalk Belt	117	05:20	P55	Male	Adult	T1					Released as caught late
12/08/2014	SZC - Abbey Lane	118	21:00	Natt	Male	Adult	T3	38.4	7.8			
12/08/2014	SZC - Abbey Lane	119	21:00	P45	Female	Adult	PL	32.1	5.0			swollen glands
12/08/2014	SZC - Abbey Lane	120	21:00	P45	Male	Adult	T3	31.0	4.6			swollen glands
12/08/2014	SZC - Abbey Lane	121	21:00	P45	Male	Adult	T3	30.7	4.9			
12/08/2014	SZC - Abbey Lane	122	21:00	P45	Male	Adult	T3	30.9	5.0			
12/08/2014	SZC - Abbey Lane	123	21:00	P45	Male	Adult	T3	32.4	4.6			
12/08/2014	SZC - Abbey Lane	124	21:00	P45	Female	Adult	PL	31.1	5.0			
12/08/2014	SZC - Abbey Lane	125	21:00	P45	Male	Juvenile	T1	29.8	4.1			
12/08/2014	SZC - Abbey Lane	126	21:00	P45	Male	Adult	T3	29.0	4.3			Swollen glands
12/08/2014	SZC - Abbey Lane	127	21:00	P45	Male	Adult	T3	31.9	4.5			Swollen glands
12/08/2014	SZC - Abbey Lane	128	21:00	BLE	Male	Adult	T3	37.0	6.7			
12/08/2014	SZC - Abbey Lane	129	21:00	P45	Female	Juvenile	NB	31.0	5.1			
12/08/2014	SZC - Abbey Lane	130	21:45	P45	Male	Adult	T3	31.2	5.4			
12/08/2014	SZC - Abbey Lane	131	21:45	Natt	Male	Adult	T1	39.7	7.4			
12/08/2014	SZC - Abbey Lane	132	21:45	P45	Female	Adult	NB	33.6	6.9			
12/08/2014	SZC - Abbey Lane	133	21:45	Natt	Male	Adult	T3	39.1	6.9			
12/08/2014	SZC - Abbey Lane	134	21:45	Natt	Male	Adult	T3	38.3	7.5			
12/08/2014	SZC - Abbey Lane	135	22:15	P55	Male	Adult	T3	30.3	5.0			
12/08/2014	SZC - Abbey Lane	136	22:35	Serotine	Female	Adult	NB	55.5	26.1	9		
12/08/2014	SZC - Abbey Lane	137	23:15	P45	Male	Adult	T3	32.1	4.8			Swollen glands
12/08/2014	SZC - Abbey Lane	138	23:15	Natt	Male	Adult	T1	38.6	7.2			
12/08/2014	SZC - Abbey Lane	139	23:15	P45	Male	Adult	T1	32.1	4.7			

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
12/08/2014	SZC - Abbey Lane	140	23:15	P45	Male	Adult	T2	32.6	5.1			Swollen glands
12/08/2014	SZC - Abbey Lane	141	23:55	P45	Male	Adult	T2	29.6	4.3			
12/08/2014	SZC - Abbey Lane	142	23:55	Daub	Male	Adult	T1	37.3	10.1			
13/08/2014	SZC - Abbey Lane	143	00:15	P45	Male	Adult	T2	30.1	4.3			Swollen glands
13/08/2014	SZC - Abbey Lane	144	01:00	P45	Female	Adult	NB	31.2	4.8			Swollen glands
13/08/2014	SZC - Abbey Lane	145	01:35	Barb	Female	Adult	PL	38.5	9.7	12	T8954	
13/08/2014	SZC - Abbey Lane	146	01:45	P45	Male	Juvenile	T1	32.3	4.5			
13/08/2014	SZC - Abbey Lane	147	02:15	P45	Male	Adult	T3	31.6	4.7			Swollen glands
13/08/2014	SZC - Abbey Lane	148	03:28	BLE	Female	Adult	NB	39.4	7.3			Bred before, not 2014
13/08/2014	SZC - Abbey Lane	149	04:10	P45	Male	Adult	T3	32.6	5.2			Swollen glands
13/08/2014	SZC - Abbey Lane	150	04:21	Natt	Male	Adult	T1	41.0	8.6			
12/08/2014	Mm - North of Hangmans Wood	151	20:30	P55	Female	Juvenile	NB	31.2	4.5			
12/08/2014	Mm - North of Hangmans Wood	152	21:00	P55	Male	Juvenile	T1	32.1	3.0			
12/08/2014	Mm - North of Hangmans Wood	153	21:00	P55	Male	Juvenile	T2	30.5				
12/08/2014	Mm - North of Hangmans Wood	154	21:00	P55	Female	Juvenile	NB	31.4	5.0			
12/08/2014	Mm - North of Hangmans Wood	155	21:00	P55	Female	Juvenile	NB	31.3	5.0			Signs of breeding
12/08/2014	Mm - North of Hangmans Wood	156	21:10	P55	Female	Juvenile	NB	31.3	5.0			
12/08/2014	Mm - North of Hangmans Wood	157	21:25	Barb	Female	Adult	PL	39.6	8.5	7	H6100	Small ear tags
12/08/2014	Mm - North of Hangmans Wood	158	21:25	P55	Female	Juvenile	NB	32.1	5.0			
12/08/2014	Mm - North of Hangmans Wood	159	21:36	P55	Female	Juvenile	NB	30.2	5.0			
12/08/2014	Mm - North of Hangmans Wood	160	21:36	P55	Female	Juvenile	NB	32.0	5.5			
12/08/2014	Mm - North of Hangmans Wood	161	21:36	P55	Male	Juvenile	T1	30.1	4.0			
12/08/2014	Mm - North of Hangmans Wood	162	21:36	P55	Female	Adult	PL	31.0	6.0			
12/08/2014	Mm - North of Hangmans Wood	163	21:36	P55	Female	Juvenile	NB	32.0	6.0			
12/08/2014	Mm - North of Hangmans Wood	164	21:36	P55	Female	Juvenile	NB	30.5	5.0			
12/08/2014	Mm - North of Hangmans Wood	165	22:00	P55	Male	Adult	T1	31.9	5.5			
12/08/2014	Mm - North of Hangmans Wood	166	22:00	P55	Female	Juvenile	NB	31.9	5.0			
12/08/2014	Mm - North of Hangmans Wood	167	22:00	P55	Male	Juvenile	T2	29.4	4.8			
12/08/2014	Mm - North of Hangmans Wood	168	22:00	P55	Male	Adult	T2	29.3	5.0			
12/08/2014	Mm - North of Hangmans Wood	169	22:00	P55	Male	Juvenile	T1	31.6	5.0			
12/08/2014	Mm - North of Hangmans Wood	170	22:00	P55	Male	Juvenile	T1	30.2	4.0			
12/08/2014	Mm - North of Hangmans Wood	171	22:00	P55	Female	Juvenile	NB	31.6	5.0			
12/08/2014	Mm - North of Hangmans Wood	172	22:00	P55	Female	Juvenile	NB	31.3	5.0			
12/08/2014	Mm - North of Hangmans Wood	173	22:00	Noc	Female	Adult	PL	53.9	26.0			
12/08/2014	Mm - North of Hangmans Wood	174	22:10	P55	Female	Adult	PL	31.9	5.0			
12/08/2014	Mm - North of Hangmans Wood	175	22:10	P55	Female	Juvenile	NB	32.1	5.5			Fur trimmed

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
12/08/2014	Mm - North of Hangmans Wood	176	22:10	P55	Female	Juvenile	NB	30.6	3.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	177	22:10	P55	Female	Juvenile	NB	28.9	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	178	22:10	Barb	Female	Adult	NB	38.7	9.0	8	H6099	
12/08/2014	Mm - North of Hangmans Wood	179	22:30	P55	Male	Juvenile	T1	31.0	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	180	22:30	P55	Female	Juvenile	NB	31.2	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	181	22:30	P55	Male	Juvenile	T1	31.4	4.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	182	22:30	P55	Male	Juvenile	T1	31.0	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	183	22:30	P55	Female	Juvenile	NB	31.7	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	184	22:30	P55	Female	Juvenile	NB	30.9	5.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	185	22:30	P55	Escaped	Escaped	Escaped					Escaped
12/08/2014	Mm - North of Hangmans Wood	186	22:30	P55	Female	Juvenile	NB	31.5	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	187	22:30	P55	Male	Juvenile	T1	31.4	4.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	188	22:30	P55	Female	Adult	NB	32.4	4.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	189	23:00	P55	Male	Juvenile	T1	31.3	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	190	23:00	Natt	Male	Adult	T2	41.2	7.0			
12/08/2014	Mm - North of Hangmans Wood	191	23:00	P55	Female	Juvenile	NB	31.2	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	192	23:00	P55	Female	Juvenile	NB	31.1	5.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	193	23:00	P55	Female	Juvenile	NB	30.7	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	194	23:00	P55	Female	Juvenile	NB	32.5	6.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	195	23:10	P55	Male	Juvenile	T1	30.0	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	196	23:10	P55	Escaped	Escaped	Escaped					Escaped
12/08/2014	Mm - North of Hangmans Wood	197	23:10	P55	Escaped	Escaped	Escaped					Escaped
12/08/2014	Mm - North of Hangmans Wood	198	23:10	P55	Escaped	Escaped	Escaped					Escaped
12/08/2014	Mm - North of Hangmans Wood	199	23:40	P55	Female	Juvenile	NB	31.9	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	200	23:40	P55	Female	Juvenile	NB	31.5	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	201	23:40	P55	Female	Juvenile	NB	31.0	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	202	23:40	P55	Female	Juvenile	NB	32.7	5.0			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	203	23:40	Natt	Female	Juvenile	NB	38.4	7.5			
12/08/2014	Mm - North of Hangmans Wood	204	23:40	P55	Female	Juvenile	NB	31.2	5.5			Recapture
12/08/2014	Mm - North of Hangmans Wood	205	23:40	P55	Female	Juvenile	NB	31.5	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	206	23:55	Barb	Male	Juvenile	T1	38.3	8.0		H6098	small ear tags
12/08/2014	Mm - North of Hangmans Wood	207	23:55	P55	Male	Juvenile	T1	32.0	4.5			Fur trimmed
12/08/2014	Mm - North of Hangmans Wood	208	23:55	P55	Female	Juvenile	NB	31.9	5.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	209	00:00	Barb	Female	Recapture	Recapture			7		Recapture
13/08/2014	Mm - North of Hangmans Wood	210	00:00	BLE	Male	Juvenile	T1	38.8	7.0			
13/08/2014	Mm - North of Hangmans Wood	211	00:10	P55	Female	Juvenile	NB	31.7	5.0			Fur trimmed

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
13/08/2014	Mm - North of Hangmans Wood	212	00:45	P55	Male	Juvenile	T1	30.1	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	213	00:45	P55	Female	Juvenile	NB	22.1	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	214	00:47	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	215	00:47	P55	Female	Juvenile	NB	31.9	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	216	00:47	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	217	00:47	Barb	Female	Adult	PL	38.7	9.9	10	H6097	Small ear tags & brown colouring
13/08/2014	Mm - North of Hangmans Wood	218	01:00	Natt	Male	Adult	T1	39.8	7.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	219	01:00	P55	Male	Juvenile	T1	30.5	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	220	01:00	Barb	Female	Adult	PL	39.6	10.0	11	H6096	Moderate ear tags & brown colouring
13/08/2014	Mm - North of Hangmans Wood	221	01:20	P55	Female	Juvenile	NB	30.9	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	222	01:20	P55	Female	Juvenile	NB	31.2	5.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	223	01:30	P55	Female	Juvenile	NB	31.8	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	224	01:30	P55	Male	Juvenile	T1	31.4	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	225	01:30	Barb	Female	Adult	PL	40.6	10.8	13	H6095	Small growth, not even a tag & brown colouring
13/08/2014	Mm - North of Hangmans Wood	226	01:30	P55	Male	Juvenile	T1	30.0	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	227	02:10	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	228	02:10	P55	Male	Juvenile	T1	31.4	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	229	02:10	P55	Female	Juvenile	NB	33.0	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	230	02:10	P55	Male	Adult	T2	30.8	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	231	02:10	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	232	02:10	P55	Female	Juvenile	NB	31.8	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	233	02:40	P55	Female	Juvenile	NB	31.9	6.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	234	02:45	P55	Male	Juvenile	T1	30.9	4.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	235	02:45	P55	Male	Juvenile	T1	31.6	4.8			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	236	04:20	P55	Female	Juvenile	NB	32.2	5.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	237	04:20	P55	Recapture	Recapture	Recapture					Recapture
13/08/2014	Mm - North of Hangmans Wood	238	04:30	P55	Male	Juvenile	T1	31.7	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	239	04:30	P55	Female	Juvenile	NB	32.4	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	240	04:30	P55	Female	Juvenile	NB	31.1	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	241	04:30	P55	Male	Juvenile	T1	31.7	5.0			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	242	04:30	P55	Female	Juvenile	NB	31.7	5.5			Fur trimmed
13/08/2014	Mm - North of Hangmans Wood	243	04:30	BLE	Male	Adult	T1	38.7	8.0			
13/08/2014	Mm - North of Hangmans Wood	244	05:00	P55	Released	Released	Released					released as caught late
13/08/2014	Mm - North of Hangmans Wood	245	05:00	P55	Released	Released	Released					released as caught late

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
13/08/2014	Mm - North of Hangmans Wood	246	05:00	P55	Released	Released	Released					released as caught late
13/08/2014	Mm - North of Sheepwash Lane	247	21:30	P55	Male	Adult	T2	30.1	4.5			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	248	21:30	P55	Male	Adult	T2	30.0	4.5			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	249	22:50	Natt	Male	Adult	T1	39.6	7.5			
13/08/2014	Mm - North of Sheepwash Lane	250	22:50	P55	Male	Juvenile	T1	33.1	4.5			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	251	22:50	P55	Male	Adult	T2	31.5	4.6			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	252	23:15	P55	Male	Juvenile	T1	29.7	5.0			Fur trimmed
13/08/2014	Mm - North of Sheepwash Lane	253	23:47	Natt	Female	Adult	PL	40.1	8.5			
13/08/2014	Mm - North of Sheepwash Lane	254	23:47	Natt	Female	Adult	NB	41.3	8.5			
14/08/2014	Mm - North of Sheepwash Lane	255	00:00	P55	Male	Adult	T2	30.0	5.0			Fur trimmed
14/08/2014	Mm - North of Sheepwash Lane	256	00:00	P55	Male	Adult	T1	31.1	4.0			Fur trimmed
14/08/2014	Mm - North of Sheepwash Lane	257	00:43	P55	Recapture	Recapture	Recapture					
14/08/2014	Mm - North of Sheepwash Lane	258	01:05	Noc	Male	Adult	T2	52.5	26.5			
14/08/2014	Mm - North of Sheepwash Lane	259	01:10	Noc	Male	Adult	T2	52.9	28.5			
14/08/2014	Mm - North of Sheepwash Lane	260	01:45	P55	Female	Juvenile	NB	31.8	5.5			Fur trimmed
14/08/2014	Mm - North of Sheepwash Lane	261	01:45	P55	Female	Juvenile	NB	30.9	5.0			Fur trimmed
14/08/2014	Mm - North of Sheepwash Lane	262	04:30	Natt	Released	Released	Released					Released as captured late
14/08/2014	Mm - North of Sheepwash Lane	263	04:30	P55	Released	Released	Released					Released as captured late
14/08/2014	Mm - North of Sheepwash Lane	264	04:30	P55	Released	Released	Released					Released as captured late
13/08/2014	SZC - Nursery Covert South	265	21:30	Barb	Male	Adult	T1	37.2	7.4	14	T8963	
13/08/2014	SZC - Nursery Covert South	266	22:40	Natt	Female	Adult	PL	39.5	8.4			
13/08/2014	SZC - Nursery Covert South	267	23:14	Barb	Female	Adult	NB	39.3	8.4	15	T8964	
13/08/2014	SZC - Nursery Covert South	268	23:35	P45	Female	Adult	NB	33.7	5.3			
13/08/2014	SZC - Nursery Covert South	269	23:35	P45	Female	Adult	NB	31.4	5.7			
14/08/2014	SZC - Nursery Covert South	270	00:00	Barb	Female	Adult	PL	39.6	10.6	16	T8982	
14/08/2014	SZC - Nursery Covert South	271	00:00	Barb	Female	Adult	PL	39.1	9.8	17	T8999	
14/08/2014	SZC - Nursery Covert South	272	00:38	P55	Male	Adult	T1	31.8	5.3			
14/08/2014	SZC - Nursery Covert South	273	00:38	P45	Female	Adult	PL	31.4	4.9			
14/08/2014	SZC - Nursery Covert South	274	01:10	Natt	Female	Adult	PL	40.6	8.3			
14/08/2014	SZC - Nursery Covert South	275	01:10	BLE	Male	Adult	T1	39.1	7.4			
14/08/2014	SZC - Nursery Covert South	276	01:20	P55	Female	Adult	PL	32.8	6.1			
14/08/2014	SZC - Nursery Covert South	277	02:15	P55	Male	Adult	T3	30.4	4.6			Swollen glands
14/08/2014	SZC - Nursery Covert South	278	02:45	P45	Male	Adult	T3	32.1	4.6			Swollen glands
14/08/2014	SZC - Nursery Covert South	279	02:45	P55	Female	Adult	PL	32.1	5.5			Swollen glands
14/08/2014	SZC - Nursery Covert South	280	02:45	BLE	Female	Adult	PL	38.5	10.9			
14/08/2014	Mm - Roost 25	281	21:00	Barb	Female	Adult	PL	39.6	10.0	18	H6094	Small ear tags

Date	Trapping Location	No.	Time Caught	Species	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring number	Comments
14/08/2014	Mm - Roost 25	282	21:10	Barb	Female	Adult	NB	39.5	8.5	19	H6093	Small ear tags
15/08/2014	SZC - Roost R27	283	21:00	Barb	Male	Juvenile	NB	38.7	7.9		T8980	Very mature juvenile
15/08/2014	SZC - Roost R27	284	21:00	Barb	Male	Juvenile	NB	37.8	6.3		T8979	
15/08/2014	SZC - Roost R27	285	21:00	Barb	Male	Juvenile	NB	37.6	6.8		T8978	

Table A5 - Summary of barbastelle bats caught (Key: SZC – Sizewell; Mm – Minsmere; PL – post-lactation; NB – non-breeding, T1 - testes not swollen, T2 – testes intermediate, T3 – testes swollen)

Date	Trapping Location	Time Caught	Sex	Age	Breeding status	Forearm (mm)	Weight (g)	Bat tag no	Ring no	Comments
09/08/2014	SZC - Fiscal Policy	21:00	Male	Juvenile	T2	38.4	7.8	-	T8832	Very small ear discs
11/08/2014	MM - RSPB	21:00	Male	juvenile	T1	37.2	8.2	-	H5944	No ear discs
11/08/2014	SZC - Nursery Covert North	20:50	Female	Adult	PL	39.7	9.8	1	T8831	Ear discs
11/08/2014	SZC - Nursery Covert North	20:50	Female	Adult	PL	38.9	9.7	2	T8828	
11/08/2014	SZC - Nursery Covert North	20:50	Escaped	Escaped	Escaped			-		Escaped from mist net
11/08/2014	SZC - Nursery Covert North	20:50	Male	Juvenile	T1	38.4		-	T8827	Very stressed so not weighed
11/08/2014	SZC - Nursery Covert North	21:30	Male	Adult	T3	38.3	8.1	3	T8829	
12/08/2014	SZC - Nursery Covert North	00:53	Female	Adult	PL	38.8	9.4	4	T8830	
12/08/2014	SZC - Nursery Covert North	03:50	Male	Adult	T1	39.0	9.6	5	T8981	
12/08/2014	SZC - Nursery Covert North	04:33	Female	Adult	PL	38.6	10.7	6	T9000	
12/08/2014	Mm - North of Hangmans Wood	21:25	Female	Adult		39.6	8.5	7	H6100	Small ear tags
12/08/2014	Mm - North of Hangmans Wood	22:10	Female	Adult	NB	38.7	9.0	8	H6099	
12/08/2014	Mm - North of Hangmans Wood	23:55	Male	Juvenile	T1	38.3	8.0	-	H6098	small ear tags
13/08/2014	Mm - North of Hangmans Wood	00:00	Recapture	Recapture	Recapture			7		Recapture
13/08/2014	Mm - North of Hangmans Wood	00:47	Female	Adult	PL	38.7	9.9	10	H6097	Small ear tags & brown colouring
13/08/2014	Mm - North of Hangmans Wood	01:00	Female	Adult	PL	39.6	10.0	11	H6096	Moderate ear tags & brown colouring
13/08/2014	Mm - North of Hangmans Wood	01:30	Female	Adult	PL	40.6	10.8	13	H6095	Small growth, not even a tag & brown colouring
13/08/2014	SZC - Abbey Lane	01:35	Female	Adult	PL	38.5	9.7	12	T8954	
13/08/2014	SZC - Nursery Covert South	21:30	Male	Adult	T1	37.2	7.4	14	T8963	
13/08/2014	SZC - Nursery Covert South	23:14	Female	Adult	NB	39.3	8.4	15	T8964	
14/08/2014	SZC - Nursery Covert South	00:00	Female	Adult	PL	39.6	10.6	16	T8982	
14/08/2014	SZC - Nursery Covert South	00:00	Female	Adult	PL	39.1	9.8	17	T8999	
14/08/2014	Mm - Roost 25	21:00	Female	Adult	PL	39.6	10.0	18	H6094	Small ear tags
14/08/2014	Mm - Roost 25	21:10	Female	Adult	NB	39.5	8.5	19	H6093	Small ear tags
15/08/2014	SZC - Roost R27	21:00	Male	Juvenile	NB	38.7	7.9	-	T8980	Very mature juvenile
15/08/2014	SZC - Roost R27	21:00	Male	Juvenile	NB	37.8	6.3	-	T8979	
15/08/2014	SZC - Roost R27	21:00	Male	Juvenile	NB	37.6	6.8	-	T8978	

Table A7 - Roosts by day

Bat no	Sp		Breeding or Non-breeding	11/08/2014	12/08/2014	13/08/2014	14/08/2014	15/08/2014	16/08/2014	17/08/2014	18/08/2014	19/08/2014	20/08/2014	21/08/2014	22/08/2014	23/08/2014
1	Barb	F	PL	Caught SZC Nursery Covert	R23	R23	R26	R27 (at 3.20)	R27	R27	R27	R27	R27	R32		
2	Barb	F	PL	Caught SZC Nursery Covert	-	R24	R27		R27	R27		R32	R32	R32		
3	Barb	M		Caught SZC Nursery Covert	-	R36	R36		R36	R36	R36	R36	-	R36		
4	Barb	F	PL	Caught SZC Nursery Covert	-	-	-	-	-	-	-	-	-	-		
5	Barb	M		Caught SZC Nursery Covert	R35	-	R34	R34	R34	-	R33	R33		R34		
6	Barb	F	PL	Caught SZC Nursery Covert	Grimseys area	R26	R26	R26 (at 3.20)	-	R32	R32	R32	R32	R32		
7	Barb	F	PL		Mm track N of Hangman's Wood	R27	R27	R27 (at 3.20)	R27	R27	R27	R27	R27	R27		R27
8	Barb	F	NB		Mm track N of Hangman's Wood	-	-	-	-	-	-	-	-	-		
9	Sero	F	NB		Caught Abbey Lane	In restricted land(browns plantation)	In restricted land(browns plantation)		In restricted area	In restricted area	In restricted area	In restricted area	In restricted area	poss failed tag		
10	Barb	F	PL		Mm track N of Hangman's Wood	R25	R25	R28	-	-	-	-	-	-		
11	Barb	F	PL		Mm track N of Hangman's Wood	R25	R28	R28	R28	R28	R24	R24	R24	R24		R31
12	Barb	F	PL		Caught Abbey Lane	-	-		-	-	-	-	-	-		
13	Barb	F	PL		Mm track N of Hangman's Wood	-	-		-	Towards eastbridge marshes R37	-	-	-	-		
14	Barb	M				Caught SZC Nursery Covert South	R26	R27 (at 3.20)	R27	R27	R27	R27	R27	R27		R27
15	Barb	F	NB			Caught SZC Nursery Covert South	R27	R27 (at 3.20)	R27	R27	R27	R27	R27	R27		
16	Barb	F	PL			Caught SZC Nursery Covert South	R26	R26 (at 3.20)	R27	R27	R27	R27	R27	R32		
17	Barb	F	PL			Caught SZC Nursery Covert South	R26		-	R27	R27	R27	R27	R27		R27
18	Barb	F	PL				Caught from R25	R28	R28	R28	R28	R28	R28	R28	R28	R28
19	Barb	F	NB				Caught from R25	R29	R30	R30	R24	R24	R24	R24		R31
Minimum number of roosts known to be used on any night							6	5	5 (6)	5 (6)	6 (7)	6(1)	4 (5)	5	1	3

NB. No daytime tracking was possible on 22/8/14