Report on bat surveys carried out at the RSPB Farnham Heath Reserve, Tilford, Surrey, by the Surrey Bat Group, 2003-2004

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Introduction

The Surrey Bat Group was invited in summer 2003 to carry out a bat survey at the RSPB's recently acquired Farnham Heath Reserve (SU8543). The long-term aim of the RSPB is to convert much of the reserve back into lowland heath, in the process removing most of the coniferous plantation on the site. Felling was originally scheduled to commence in winter 2003, but appears to have been deferred until winter 2004-5.

Ross Baker and Lynn Whitfield carried out a preliminary survey of the northern part of the reserve, using bat detectors, on the evening of 2 August 2003, concentrating on the areas scheduled for initial felling. Significant levels of bat activity were recorded, and the following species identified:

- Common pipistrelle (*Pipistrellus pipistrellus*)
- Soprano pipistrelle (*P. pygmaeus*)
- Serotine (*Eptesicus serotinus*)
- Noctule (*Nyctalus noctula*)
- *Myotis* sp./brown long-eared bat (*Plecotus auritus*)*

(*It is not possible to separate these species accurately using bat detectors.)

In addition, a bat with a call like that of a serotine, but with a rather atypical call rate and frequency, was recorded. The possibility was raised by Frank Greenaway - one of the UK's leading bat experts - that this could be a northern bat (*Eptesicus nilssonii*), a species only rarely recorded in this country.

In light of these results, it was suggested by the Bat Group that further surveys carried out over a whole season were advisable, in order to assess the extent and timing of the use of the reserve by bats, and hence the potential impact of felling on the bat population. It was subsequently agreed that the Group would carry out a series of detector surveys during 2004,

augmented with trapping by Frank Greenaway to confirm species identities as necessary.

Methods

Bat surveys were again concentrated in the northern part of the reserve (i.e. that scheduled to be cleared first), and the area was divided into three sections initially, designated A, B and C (Figure 1).

Figure 1. Map of Farnham Heath Reserve showing survey transects. Section D comprised transect B3, the dotted line south of and parallel to this (transect D1), and the N-S paths joining them. (Note: as transects 1 and 3 of sections B, C and D were longer than the others, these were divided into two (a and b) for the purposes of comparing numbers of bat passes between transects and sections.) Arrows indicate direction of surveys; red dots indicate position of mist nets/harp traps. R = Rural Life Centre.

Each of these sections is approximately rectangular and delimited by rides and footpaths, which were divided into transects (A1, A2 etc.) of roughly equal length for the purposes of the survey (see Figure 1). On each survey night, bat group members would start from a set point at the start of a transect at sunset, and walk at a steady pace around the section for approximately 1.5 hours. Wherever possible, each survey team had at least two members, with heterodyne bat detectors set at 25 kHz and 50 kHz (optimal frequencies for detecting the larger and smaller bat species respectively). There was at least one Batbox Duet detector per team, the frequency division function of which was used to record bat activity onto minidiscs throughout each survey.

At the end of each transect, surveyors stopped and recorded the activity level of each bat species detected for each transect, using the following scale:

0 No bat passes

1 Few passes (1-5)

2 Many passes (6 or more)

In addition, they noted the approximate position in each transect where bats other than pipistrelles were heard or seen, and any other information of note, such as the direction of flight (where the bat was seen) and feeding activity (detected as feeding "buzzes"). RDB and LW later analysed the minidisc recordings using the Cool Edit software package to produce and analyse sonograms: only a selection of pipistrelle recordings were checked, owing to lack of time, but the identities of all other species were checked in detail. Weather conditions (temperature at start and end of survey, rain, wind, cloud cover) were also recorded.

Detector surveys were carried out on 20 March, 11 April, 2 May, 23 May, 5 June, 25 June, 31 July, 1 August and 14 August 2004, the number of sections surveyed on any night depending on the number of bat group members available. As relatively little activity was found in section C, it was omitted from later surveys. Conversely, as high activity levels were found in section B, an additional set of transects (D) was added within section B later in the season (see Figure 1).

Trapping was carried out by Frank Greenaway, assisted by RDB and LW, on 26 August 2004 between 20.30 and 22.45. A harp trap and a mist net were positioned in transects D1a and B1a respectively, with another mist net near the top of the path leading south from the car park at the start of transect B1 (the overhanging vegetation within the transects themselves being too high to make captures likely otherwise) (see Figure 1). Sonic lures (devices producing electronically synthesised bat social calls) were positioned next to the first two traps.

Results

The level of bat activity recorded in each transect at each survey, as well as sunset and weather data, are given in Appendix 1. Mean activity levels for each section are summarised in Figure 2. By far the most common species were pipistrelles (Figure 3) but significant numbers of serotine passes were also recorded, particularly in section B (Figure 4). Feeding activity by these species was also frequently noted. Occasional passes by noctules and by *Myotis* sp./brown long-eared bats were also recorded (Appendix 1).

Note that it was generally possible to complete at least three circuits of each section (two of the larger section C) during each survey: the mean for each section therefore generally includes three periods after sunset, with little bat activity immediately after sunset and activity beginning to tail off in the third period (see Figure 5). In spite of the generally low level of activity in the early evening, however, pipistrelle passes were frequently noted not far from the car park area shortly after sunset (see Appendix 1).

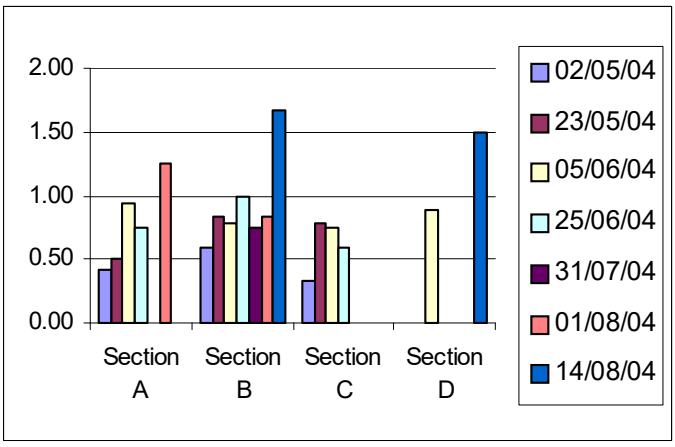

Figure 2. Mean activity level per transect: all bats.

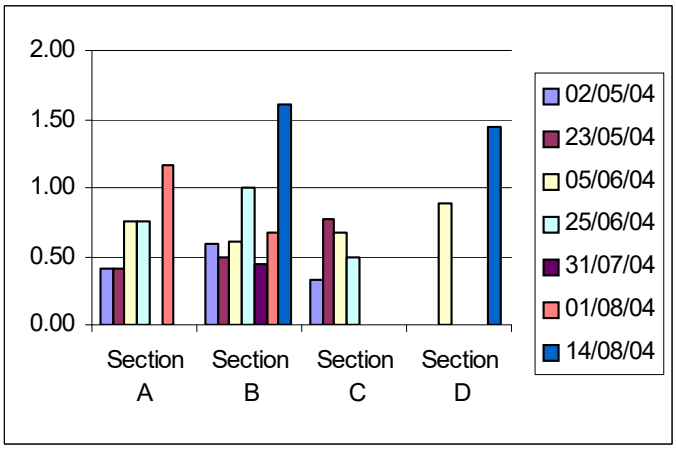

Figure 3. Mean activity level per transect: pipistrelles.

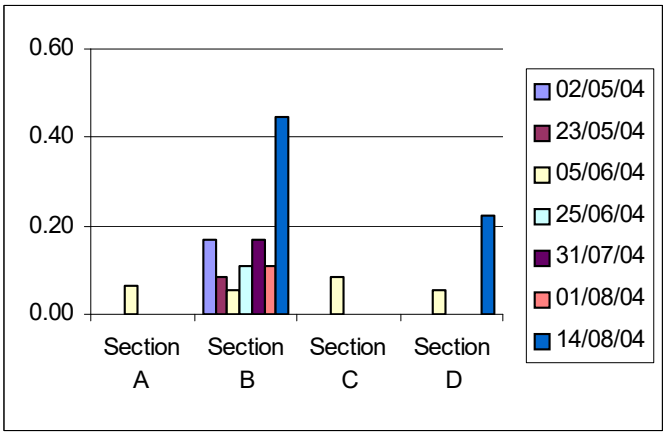

Figure 4. Mean activity level per transect: serotines.

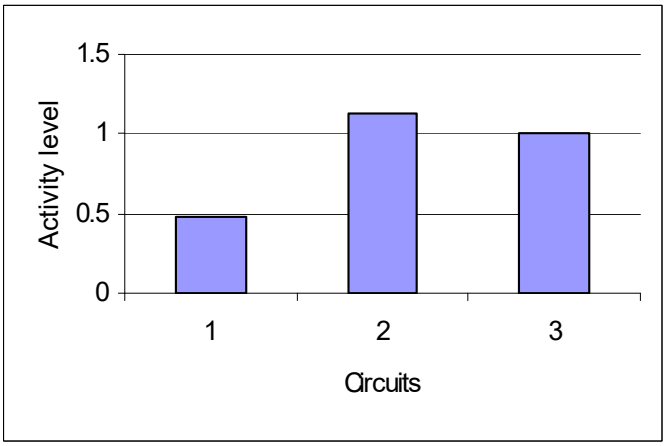

Figure 5. Change in mean bat activity level per transect during a survey (sections A and B, all dates).

Analysis of records in sections B (and D, the additional circuit within B) shows that serotine activity was particularly high on 14 August, and was concentrated in the southern part of the section. Mist-netting and harp-trapping on 26 August confirmed that a large number of serotines was present in the area, with seven of this species (five male, two female) caught

Figure 6. One of the serotines captured during mist-netting at the Farnham Heath Reserve.

in the mist net just south of the car park (Figure 6), and further serotines also detected frequently near all three traps, although they managed to avoid capture in the other two. In addition, a Natterer's bat (*Myotis nattereri*) and nine brown long-eared bats were captured. (Frequent pipistrelle passes were detected but they seemed to be able to avoid the traps.)

Discussion and recommendations

The surveys carried out by the Surrey Bat Group during 2003-2004 have confirmed that large numbers of bats are using the Farnham Heath reserve. Those apparently present in the greatest numbers are the two pipistrelle species, serotines and brown long-eared bats. Note that the latter species has an extremely quiet echolocation call and is therefore very difficult to record on a bat detector, so the small number of "*Myotis*/BLE" passes recorded, compared with the number trapped, is unsurprising. The presence of larger numbers of *Myotis* bats, such as the Natterer's, than indicated by this study cannot be ruled out, however, as these species (as well as the brown long-eared) specialise in foraging deep among the foliage (Altringham 2003), and our surveys were carried out (for practical and safety reasons) along the rides between blocks of trees.

Population sizes of all British bats are estimated to have undergone dramatic decreases during the last century, with numbers of even the relatively common pipistrelles estimated to have fallen by 70% between 1978 and 1993 (Stebbings 1995). For this reason, all British bat species are afforded protection under the Wildlife and Countryside Act 1981 through inclusion on schedule 5, and additionally under the Conservation (Natural Habitats &c.) Regulations 1994 (which were issued under the European Communities Act 1972), through inclusion on annex IV. These make it illegal to kill, injure, capture or disturb bats; or to obstruct access to, damage or destroy bat roosts. The UK is also a party to the Agreement on the Conservation of Bats in Europe, set up under the Bonn Convention; article 3 of the agreement requires protection of all bats and their habitats, including the identification and protection from damage or disturbance of important feeding areas.

While pipistrelles and brown long-eared bats are still considered to be relatively common and widespread in the UK, the serotine occurs only in southern England, with an estimated population size of only 15,000 individuals, and is believed to be in decline (Altringham 2003). Anecdotal reports suggest that this is true particularly in the eastern part of its UK range, and in a survey of 23 sites in the Greater London area, the number of serotines detected fell from seven in 1985-87 to zero in 1999 (Guest et al. 2002). Indeed, Table 1 shows that estimated serotine numbers are now lower than those of the lesser horseshoe bat - one of the four UK species considered to be so under threat that they are listed in Annex II of the EC Habitats Directive. (The presence of an Annex II species at a site qualifies it for designation as a Special Area of Conservation (SAC).)

Studies have shown that although serotines feed mainly on large beetles, such a cockchafers and dung beetles, they will eat a wide range of prey depending on seasonal availability (Catto et al. 1994, 1996). Serotines are able to fly long distances (>40 km) each night to feed (Catto et al. 1995, Robinson & Stebbings 1997); the large numbers of these bats at the Farnham Heath reserve (cf. the major study by Robinson and Stebbings 1997, in which

Table 1. Estimated British mainland bat populations (Altringham 2003).

Species	Population size
Pipistrelle (common + soprano)	2 million
Brown long-eared bat	200,000
Daubenton's bat	150,000
Natterer's bat	100,000
Noctule	50,000
Whiskered bat	40,000
Brandt's bat	30,000
Lesser horseshoe bat*	17,000
Serotine	15,000
Leisler's bat	10,000
Barbastelle*	?5000
Greater horseshoe bat*	4000
Bechstein's bat*	1500
Grey long-eared bat	1000
Nathusius' pipistrelle	?

* Species listed in EU Habitats Directive Annex II.

the maximum density of serotines recorded foraging together in pasture or woodland was five bats per hectare) could therefore indicate that it is an important foraging site for them, particularly in late summer when serotine activity appeared to increase sharply. Removal of large areas of trees could therefore adversely affect the population in a number of ways:

1. The insects upon which the bats are feeding may be associated with the pines, so that large-scale felling could remove an important food source. Although their breadth of diet and large foraging range means that these bats could probably find alternative food sources over time, they may not be able to do so quickly enough to compensate for sudden removal of a habitual feeding area. (Note, incidentally, that in this study no serotine activity was recorded in transect A1, which is the only one adjacent to existing heathland.)

2. Serotines feeding far from their day roosts are known to use nighttime roosts between feeding bouts, rather than flying continuously, to conserve energy (Catto et al. 1996). Unlike day roosts, the night roosts in the latter

study were in the open, the bats hanging from any convenient surface: they may therefore be using the trees at the reserve as temporary roosts.

3. There is evidence that serotine foraging activity is negatively correlated with wind speed (Verboom and Huitema 1997): although these bats commonly feed in open parkland, therefore, the narrow rides of the reserve may provide a sheltered feeding area during windy weather.

4. Serotines, like other bats, are known to use tree lines for navigation between roosting and feeding sites (Robinson & Stebbings 1997).

It is also worth noting that all of the major studies on serotines to date have focused on maternity roosts: little is known about the roosting or foraging requirements of male bats, or about serotine breeding behaviour. However, all British bat species mate in the autumn and winter, and in some species this involves "swarming" behaviour in which large numbers of males gather at very specific and repeatedly used sites. The fact that the majority of the bats caught at Farnham Heath were males could therefore mean that this site is an important one for serotine breeding. However, more research would be needed to establish whether this was the case.

It is recommended, therefore, that in order to minimise any negative impacts on the bat populations using the reserve, felling is:

1. Kept to the minimum that is compatible with the heathland restoration scheme for which the reserve was intended, if possible retaining most of the woodland and rides in section B;

2. Carried out a small area at a time;

3. Planned so as to maintain islands of trees connected by tree lines linking the woodland from one side of the reserve to another;

4. Planned so as to retain any mature, particularly deciduous trees that could provide bat roosts. (The appearance of pipistrelles very early in the evening strongly suggests the presence of day roosts nearby.)

It is appreciated that the RSPB is already taking many of these ideas into account as part of its felling scheme. The Surrey Bat Group hopes to be able to continue bat surveys at the reserve in future years, in order to monitor changes in the bat populations as work proceeds and to provide more specific advice as required.

Note

The opinions expressed in this report are those of the authors, and not necessarily those of other members of the Surrey Bat Group.

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