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Members of London Bat Group, Millbank 2014

### **Sharing your bat records with London Bat Group**

To help fill gaps in our knowledge of bat distribution in London, inform bat conservation in the region, and contribute to future editions of the London Bat Atlas, please share your records with London Bat Group.

Full details at: [www.londonbats.org.uk/report-a-bat-sighting.htm](http://www.londonbats.org.uk/report-a-bat-sighting.htm)

## 1. Introduction

- 1.1 Along with many species, bats have experienced considerable declines in their populations in the United Kingdom during the last 50 years. As a result of concerns, the London Bat Group was established to address this. Since its inception, London Bat Group volunteers have been undertaking surveys of bat habitats such as buildings, open spaces, waterways, trees and tunnels to gain a greater understanding of the bat population in the region.
- 1.2 Identification of roosts may prevent them from becoming lost and can result in greater protection for bat species. For example, maternity roosts can be highlighted and saved, which can be of critical importance to the conservation of a bat species and habitat can be conserved where surveys have indicated its importance for foraging or commuting.
- 1.3 The metropolitan area of London covers an area of approximately 1500km<sup>2</sup> with the following statistics relating to the people living and working around London.
  - 33 Boroughs
  - 7.2 million residents (to rise to 8.5 million by 2026), 1.0 million of them under the age of 18
  - 60 people per ha
  - 40% living in the inner boroughs
  - 1 million daily commuters
  - 26 million tourists annually
  - The most affluent and deprived wards in England
- 1.4 Despite all these factors, combined with the adverse effects of light pollution and the worst air quality in England, the ecological value of the region is remarkable and there is a good level of species diversity to be found among the bat community.
- 1.5 Bats are considered a positive indicator of good quality habitat (Jones *et al.* 2009) and many people are surprised to learn that approximately 8690ha of London comprise semi-natural habitat and green-space (Natural England 2008). This includes Richmond Park, Wimbledon Common, Hampstead Heath, Lee Valley Regional Park, Bushy Park, Regents Park, Hyde Park, the smaller local parks, the River Thames and all the private gardens. Together these provide habitat for a variety of bat species. Furthermore, there are extensive opportunities for bats to roost within many of the innumerable buildings and trees within London.
- 1.6 There is a surprising diversity of habitat type in London, of which below is an approximate size of each semi-natural habitat found (NE 2008):
  - woodland 5000ha
  - acid grassland 1500ha,

- chalk grassland 200ha,
- coastal flood plain & grazing marsh 800ha
- heathland 50ha,
- ponds 411ha,
- rivers & streams 600ha,
- reed beds 130ha

1.7 Wetlands are considered to be a key habitat for bats in the United Kingdom (Altringham 2003, Entwistle *et al.* 2001, Walsh and Hains 1996a). London is fortunate to possess key wetland habitats including the Lee Valley Regional Park, Brent reservoir and the Barn Elms London Wetland Centre. Woodland and trees are also an important habitat for bat species such as the noctule (*Nyctalus noctula*) which is primarily a tree roosting species. London has approximately 500,000 street trees (GLA 2010).

1.8 There have been relatively few studies of London's bat population. One seminal piece of work is that undertaken by Mickleburgh (1987) and followed up by Guest *et al.* (2002). Mickleburgh's work was an extensive study carried out over a two year period, giving a 'snap shot' of the bat distribution across the region.

1.9 Mickleburgh's study identified 166 summer roosts in the Greater London area; only 5 winter roost sites were noted in London prior to 1987 and were used by small numbers of bats (Mickleburgh 1987). The main threat to the bat population of London at that time was considered to be pressure from development. It is likely that this has not changed.

1.10 The follow-up work by Guest *et al.* (2002) looked at the decline of bats across the period between Mickleburgh's 1987 study and 1999, when the follow-up surveys were carried out. Guest *et al.* (2002) found that pipistrelles (*Pipistrellus* spp.) were the most common species recorded, followed by noctule/Leisler's bat (*Nyctalus* sp.) (these bats are not always easily distinguishable using the bat detectors) and Daubenton's bat (*Myotis daubentonii*). The serotine (*Eptesicus serotinus*) and the long-eared bats (*Plecotus* spp.) were the least commonly identified bats during the survey period.

1.11 Bats are generally difficult to monitor and survey due to their:

- nocturnal habit
- use of ultrasonic sound for navigation
- flyways through rivers, canals, parks and inaccessible gardens

1.12 Thankfully, we have been able to identify bats more accurately in flight over the last 30 years, through the development of bat detectors, which convert the ultrasonic echolocation made by bats during flight to frequencies that are audible to the human ear.

- 1.13 While great effort has gone into this Atlas to include as much of London as possible and a large data set has been obtained, it is likely that some areas will have been under recorded, while others will have had a disproportionately high number of surveys.

## 2. Legal protection afforded to bats

- 2.1 There are currently two main tiers of legislation that protect bats: the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010.
- 2.2 All of the UK's bat species are protected under Section 9 of the Wildlife and Countryside Act (WCA) 1981 (as amended). The WCA states that '*a person is guilty of an offence if intentionally or recklessly he disturbs [a bat] while it is occupying a structure or place which it uses for shelter or protection; or he obstructs access to any structure or place which [a bat] uses for shelter or protection*'.
- 2.3 Bats are also protected under the Conservation of Habitats and Species Regulations 2010. Bats are listed as European protected species (on Schedule 2) under which it is an offence if:
- *a person deliberately captures, injures or kills any wild animal of a European protected species;*
  - *deliberately disturbs wild animals of any such species;*
  - *damages or destroys a breeding site or resting place of such an animal.*

Disturbances of animals include, in particular, any disturbance which is likely to:

- *impair their ability to survive, breed or reproduce, or to rear or nurture their young;*
  - *in the case of animals of a hibernating or migratory species, impair their ability to hibernate or migrate; or*
  - *affect significantly the local distribution or abundance of the species to which they belong.*
- 2.4 It is within this legal framework that a majority of the requirement for research/survey work on bats is undertaken. Recent precedent was set with amendments to this legislation that effectively removed the defence that a person/organisation could claim that they did not know of the existence of a bat roost that was affected.

## 3. Methodology

### 3.1 Equipment

- 3.1.1 Field surveying for bats is most commonly carried out using various types of bat detectors, which are electronic devices that convert the ultrasonic echolocation calls of bats into frequencies that are audible to the human ear. Heterodyne detectors are the most basic and widely used type; they require a trained and experienced operator to identify bats from the sounds that they hear. The other types include the typically more expensive frequency division, time expansion and direct sampling models. These produce an output that can be recorded and subjected to computerised sound analysis (Russ 1999) to produce sonograms, which can assist the operator to identify the species



and provide a permanent record. However, caution is required in using bat detectors alone as bat calls can be highly variable from individual bats of the same species and there is some cross-over of the frequency range between different species of bat. Whenever possible, sonogram analysis using software should be undertaken to aid identification. Visual clues, such as the size of the bat and shape of its wings, its flight pattern and foraging habitat, can also aid species identification.

### 3.2 Surveys

3.2.1 Data cited in this report were collated by London Bat Group and cover the period 1999 - 2014. Like many recording schemes, the majority of records in the LBG database come from a small number of observers. We would encourage all observers to submit their records at [www.londonbats.org.uk/report-a-bat-sighting.htm](http://www.londonbats.org.uk/report-a-bat-sighting.htm).

3.2.2 The majority of data have been collected by various sources: evening field surveys, Natural England roost visits, surveys for the National Bat Monitoring Programme for the Bat Conservation Trust (BCT), and London Bat Group (and other) bat walks, in addition to consultants' data and bat casualty records. A typical survey would begin half an hour before sunset and continue up to two hours after sunset (but sometimes continue through the night). Walked transect surveys are typical but more novel techniques are sometimes used, such as recording from boats. With new bat detecting systems and models coming on the market, an increasingly wide range of monitoring and recording devices have been used to aid identification. Evening emergence surveys record the numbers and species of bats emerging and re-entering a specific structure. The dawn swarming surveys are much the same except that they normally start up to two hours before sunrise. Harp traps can be used at specific locations with potential for regular commuting/feeding (under strict licence conditions). The value of field surveys has been highlighted by Stebbings *et al.* (2005) who noted that regular transect surveys with a bat detector can:

- Provide an index of relative foraging activity
- Estimate minimum species diversity in the area
- Identify key habitats for commuting and foraging
- Sometimes indicate where roosts are located.

3.2.3 Recording and identification techniques have improved considerably in recent years. This has enabled the separation of some cryptic species that were previously thought to be a single species. Whiskered bat (*Myotis mystacinus*) and Brandt's bat (*M. brandtii*) were identified as separate species in 1970. In the 1990's it was confirmed that the UK's most abundant bat species, the pipistrelle, is in fact two species, common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*P. pygmaeus*). The most recent species addition is Alcaethoe bat (*Myotis alcaethoe*) which was separated from whiskered and Brandt's bats in 2001 and confirmed to be present in the UK in 2010. Although not a newly described species, Nathusius' pipistrelle (*P. nathusii*) was confirmed as a resident UK species in 1997, having previously been classed only as a migrant. At the Greater London scale, there has been an increase in records of species previously considered to be rare in the region, such as Nathusius' pipistrelle and Leisler's bat (*Nyctalus leisleri*)

### 3.3 Mapping

- 3.3.1 Due to the sensitivity of the locations of bat roosts these have not been specified. For the purposes of this atlas, all data are mapped at 1x1 km resolution. For records that cross borough boundaries, the borough that contains the majority of the 1km grid squares is considered as the location for that record.

### 3.4 Data Gap Index and Bat Species Diversity

- 3.4.1 The larger boroughs might be expected to have more records, which may give a false representation of the survey effort. The Data Gap Index is a representation of the relative area of each London Borough that is covered by 1km grid records. This is compared to the average across the whole of London. An index score of 1.0 indicates that the borough is on a par with the London average. The higher the index score above 1.0 then the less favourably the borough compares to the London average. The bat species diversity was simply worked out by counting the number of species recorded (not including vagrants) in each borough.

## 4. Limitations

- 4.1 The data on which the Atlas is based should not be regarded as definitive as they did not all arise from structured surveys and some records are anecdotal. Also the training and skill of the observers varies as well as the survey effort at each site. Gaps occur when few London Bat Group members live near to a site or are unable to negotiate access.
- 4.2 Survey effort increased considerably from the 1980s onwards, when LBG was formed. Prior to that relatively few locations had been surveyed as there were relatively few surveyors. The maps all show where the bats of each species have been encountered to a 1km grid square. Although bat detection equipment has become more sophisticated and software for sound analysis has become more routinely used, bat records can be skewed by differences in sensitivity between different makes and designs of detectors. For example, depending on the type of microphone used, some detectors may be more sensitive at some frequency ranges than others, while analysing recordings from time expansion detectors can enable a more objective identification of species than using a heterodyne detector. However, for some species, time expansion detectors do not always enable identification of a bat any more precisely than heterodyne detectors (Russ 1999, 2000).
- 4.3 Any change in equipment could significantly influence the results of any long term monitoring. Briggs *et al.* (2007) speculated that the introduction of using time expansion as well as heterodyne bat detectors at the London Wetland Centre may have altered the results favouring a differentiation between Leisler's bat, noctule and serotine, and also may have favoured the differentiation of the pipistrelle species.
- 4.4 Skill of the operator is a major factor in the accurate identification of bats in the field. Additionally, the number of capable field surveyors has increased considerably over the last 20 years, particularly with the expansion of effective conservation organisations (*e.g.* the Bat Conservation Trust and regional/local bat groups). And in the ecological sector as a whole there are greater numbers of skilled volunteer and professional ecologists who are capable of



accurate identification of bats in the field and by using sound analysis software. These factors are likely to have increased both the quantity and quality of the LBG bat records in recent years.

## 5. Species distribution maps

### 5.1 All species

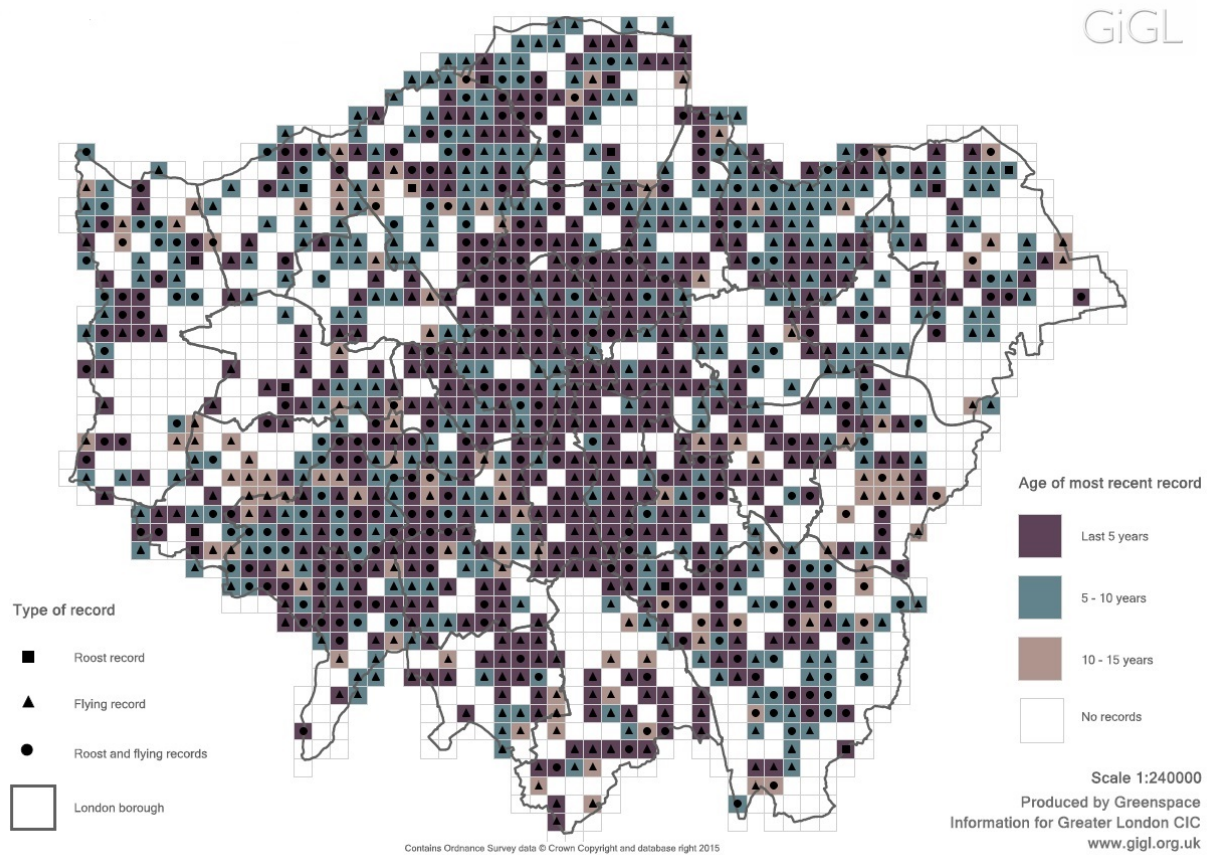


Figure 1 – Distribution of records of all bat species across London (each point representing a 1km grid square)

5.1.1 Figure 1 shows the coverage of bat records in 1km grid squares across the whole of London. It highlights that bats are widespread, although gaps appear in the records in many parts of London. This is an important consideration when it comes to development as there can often be an assumption about bats not being present in the more urbanised and industrialised locations in London. The distribution map of records in 1km grid squares above clearly shows this to be inaccurate.

## 5.2 Common pipistrelle (*Pipistrellus pipistrellus sensu stricto*)

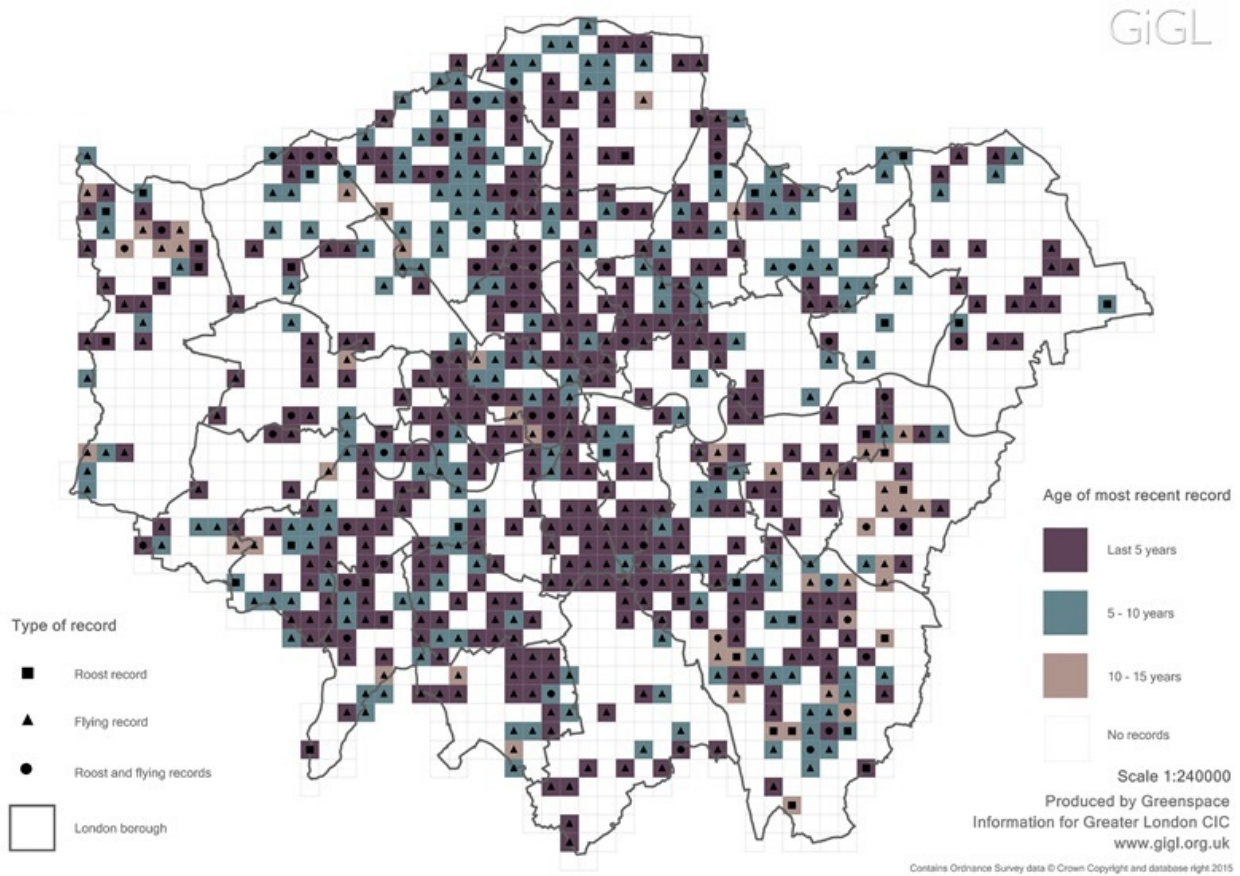


Figure 2 - Distribution of records of common pipistrelle (*Pipistrellus pipistrellus*. Schreber, 1774)

- 5.2.1 Common pipistrelle is the most cosmopolitan of London's bat species, being distributed fairly evenly across London. There are several obvious gaps in the distribution, such as in the westernmost boroughs (Hillingdon, Harrow, Brent, Ealing and Hounslow) but also Croydon, Newham, Barking & Dagenham, and Havering. However, it is likely that this species occurs London-wide. Given the widespread distribution of this species, it is likely that the gaps are more representative of an absence of survey data rather than an absence of the species.
- 5.2.2 Common pipistrelles are very flexible in their choices of summer roost locations and are often in crevices and voids in both new and old buildings, behind panelling, barge and fascia boards, shutters, beneath roof tiles, hanging tiles, cavity walls, eaves and flat roofs. They are also found in bat boxes and trees. The common pipistrelle tends to forage in a wide range of habitats whereas the soprano pipistrelle tends to prefer lakes, rivers and water courses (Vaughan *et al.* 1997). Pipistrelles are the most urban dwelling bat species in the UK, which explains to some degree the level of success this bat genus has had in the United Kingdom, with the increasing urbanisation of the landscape.

### 5.3 Soprano pipistrelle (*Pipistrellus pygmaeus*)

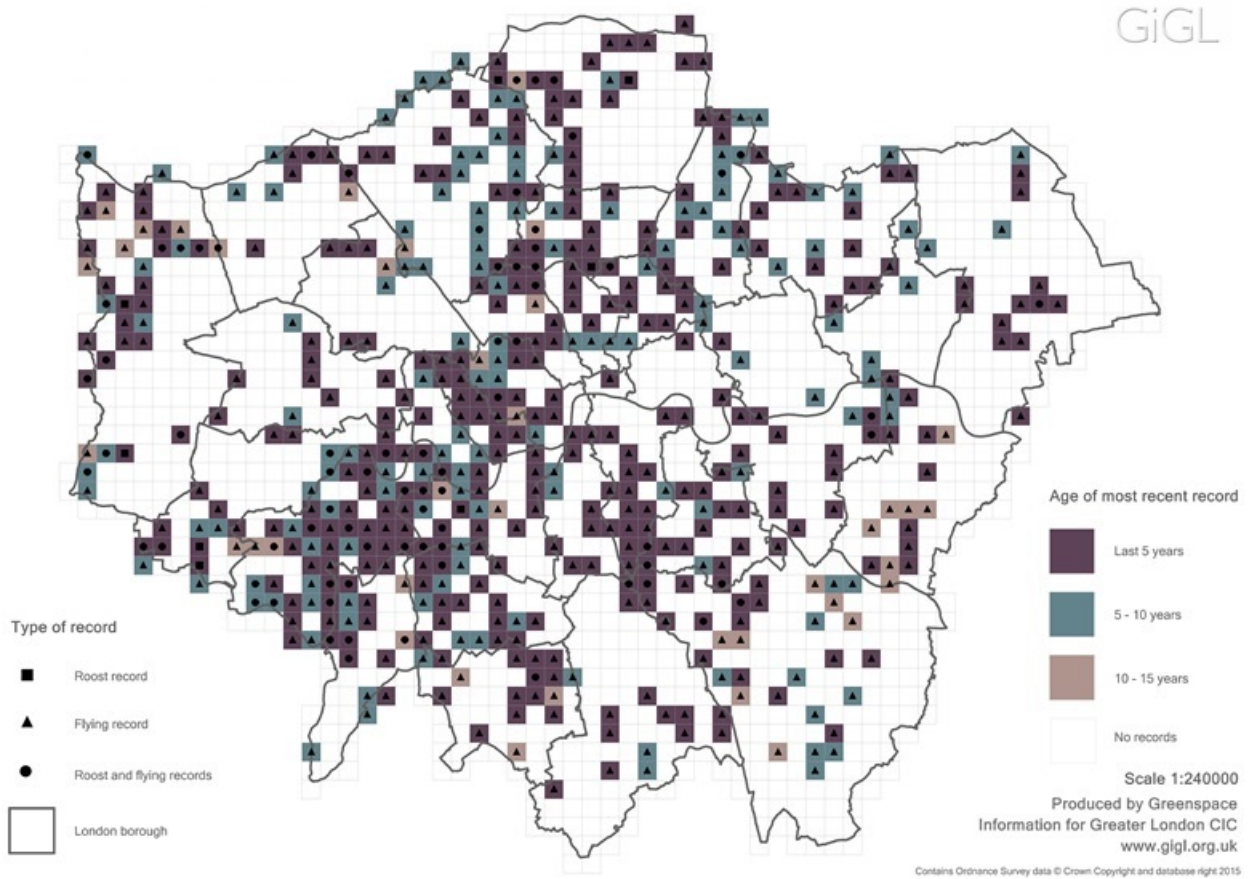


Figure 3 – Distribution of records of soprano pipistrelle (*Pipistrellus pygmaeus*. Leach, 1825)

- 5.3.1 Soprano pipistrelle distribution is similar to that of the common pipistrelle, with a few notable differences. Again, there are obvious gaps in the records in the westernmost boroughs but also a much patchier distribution of records in the eastern half of the region. There is a concentration of records following a south westerly direction across London, perhaps reflecting the number of water-bodies in that area, and the soprano pipistrelle's preference for aquatic insects. There are gaps in distribution in some other areas with apparently highly suitable habitat which is likely to be due to a lack of records rather than this species' absence, for example the large reservoirs along the eastern boundary of Enfield. All boroughs have various smaller waterbodies or waterways with the potential to yield further soprano pipistrelle records where these sites have yet to be surveyed (or the records shared with London Bat Group), not to mention parks and woodlands which are also known to be utilised by this species.



Soprano Pipistrelle (Alison Fure)

#### 5.4 Nathusius' pipistrelle (*Pipistrellus nathusii*)

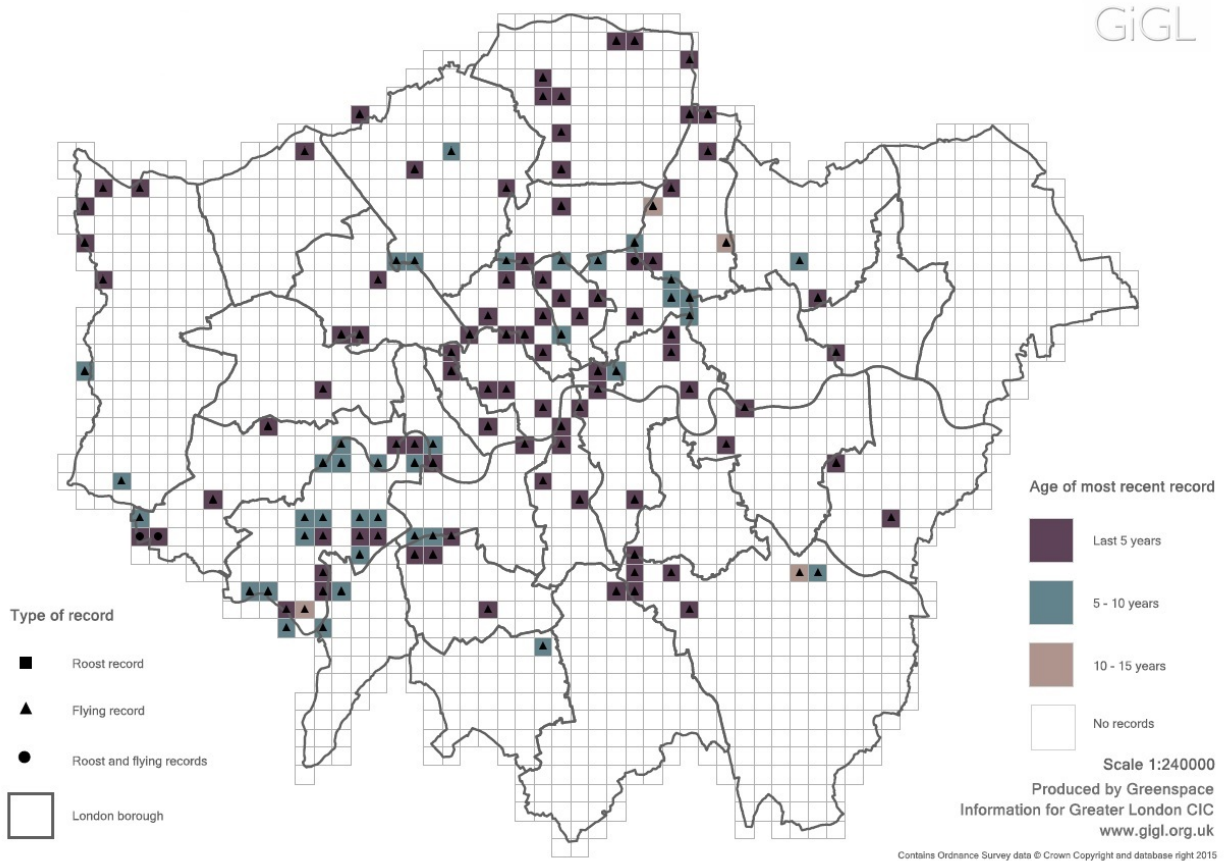


Figure 4 – Distribution of records of Nathusius' pipistrelle (*Pipistrellus nathusii*. Keyserling & Blasius, 1839).

5.4.1 Nathusius' pipistrelle is thought to roost primarily in tree holes, crevices and bat boxes, and sometimes in tall modern buildings. It may share a nursery roost with other species, notably other pipistrelles. When commuting, it tends to fly between 4 - 15m above the ground (Russ 1999). This species has a strong association with large waterbodies and waterways but also forages in woodland. It is migratory with a peak in records in the UK during its late summer/autumn passage when it moves from its main breeding range in Eastern Europe to central Western Europe.



At this time of year migrating individuals supplement a smaller, more sedentary population thought to be resident in the UK (Russ 2001). At some sites in London, such as the WWT London Wetland Centre, it is recorded all year around, including occasional records of winter activity.

- 5.4.2 As with soprano pipistrelle, there is a concentration of records following a south westerly direction across London, perhaps partially reflecting the two species' similar habitat preferences. There is an almost complete absence of records along the eastern and southern edges of London with Havering the only borough containing no records. To the west there is a large gap in records centred on the boundaries of Harrow, Hillington and Ealing. It is worth remembering that Nathusius' pipistrelle is a relatively recent addition to the London bat species list, which might account for the limited number of records. However, results from the first five years of BCT's UK-wide Nathusius' pipistrelle survey suggests that London is something of a hot-spot for this species, with 83% of lakes surveyed in the region as part of this survey having confirmed Nathusius' pipistrelle records.<sup>1</sup>



Nathusius' pipistrelle (left) and soprano pipistrelle (right) demonstrating size difference

Photo: Daniel Hargreaves

<sup>1</sup> [http://www.bats.org.uk/pages/nath\\_pip\\_survey\\_results.html](http://www.bats.org.uk/pages/nath_pip_survey_results.html), accessed March 2015

## 5.5 Noctule (*Nyctalus noctula*)

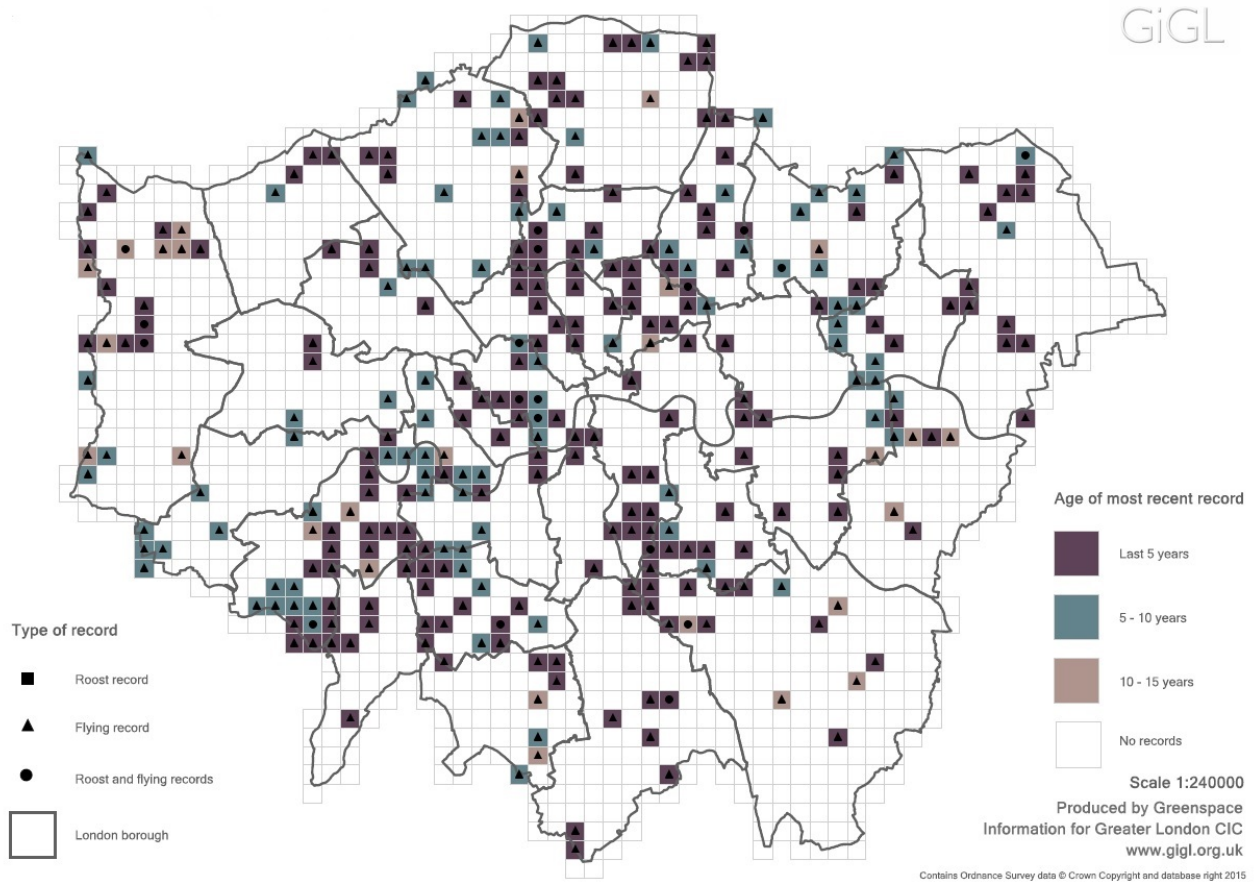


Figure 5 – Distribution of records of noctule (*Nyctalus noctula*. Schreber, 1774)

- 5.5.1 Predominately a tree-dwelling species and therefore likely to occur in locations that contain trees that are of a suitable size, for example, in the Royal Parks, on common land and larger areas of woodland (Highgate Wood is an excellent example of a location that is particularly known for noctules (*pers comm* Cindy Blaney). Noctules can be found in woodpecker holes and natural cavities in mature deciduous trees, particularly beech (Racey 1991), oak and ash. They may be largely dependent on the presence of woodpeckers to create an abundance of preferable roosting locations (Boonman 2000) and tend to make good use of bat boxes compared to other bat species.
- 5.5.2 Noctules are not agile fliers so tend to be seen over open habitats. They fly fast and high and may travel some distance from their roost. They are our loudest bat, echolocating at 130 decibels, so their calls can typically be picked up from further away than those of other species. They are considered as an uncommon bat in the more urbanised metropolitan areas (across the UK) and are more often found in lowland areas with mature woodland, rivers and marshland. The largest known roost in London is in Hillingdon, in an oak (*Quercus* sp.) tree.

5.5.3 The noctule is found throughout Britain except Northern Ireland where Leisler's bat occupies this niche. There were many historical records in the London area pre-1960. Hooper (1981) noted *Nyctalus* sp at 70 sites, although Leisler's bat and noctule were not differentiated. The noctule has a fairly widespread distribution across London. The distribution of records is notably similar to soprano pipistrelle though at a somewhat lower density. This may be linked to some overlap in habitat preferences, since noctules too are often attracted to waterbodies and riparian habitat. However, distribution of records may also be linked to recorder effort as many of the gaps on the map coincide with boroughs that have a relatively high score on the data gap index charts (Figs 18 and 19), for example Ealing, Croydon and Havering. The higher density of records following a south-westerly direction across London coincides with boroughs that score quite low on the data gap index charts (this may also account for the higher density of records for other species including soprano pipistrelle and Nathusius' pipistrelle). However, there are also boroughs with a low data gap index score which have big gaps in distribution of noctule records, such as Bromley and Hounslow.



Noctule (Huma Pearce)



## 5.6 Leisler's bat (*Nyctalus leisleri*)

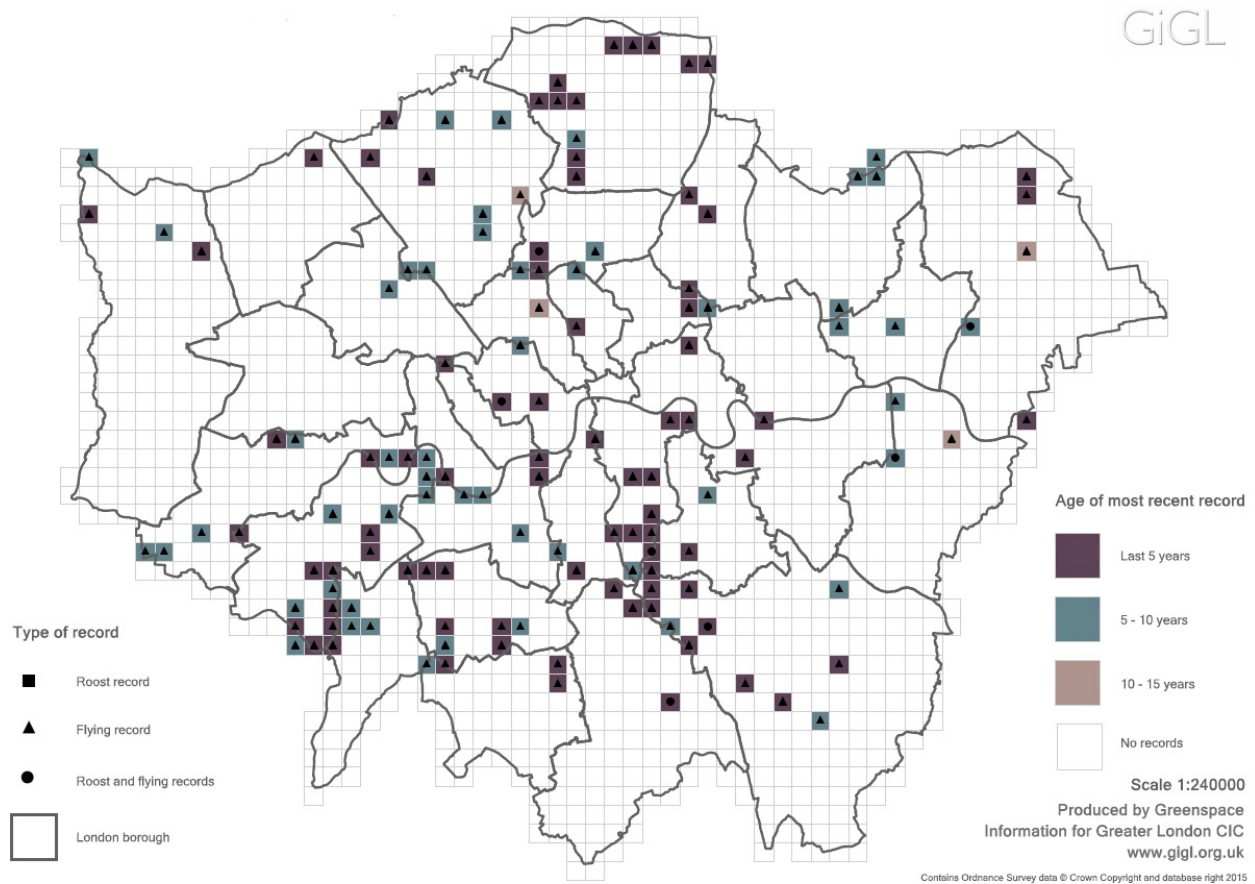


Figure 6 – Distribution of records of Leisler's Bat (*Nyctalus leisleri*. Kuhl, 1817)

- 5.6.1 The distribution of Leisler's bat records across London is far more sporadic than that of its close cousin the noctule. There is a concentration along the Richmond/Kingston border (particularly north of Richmond) and the borders of Bromley, Lewisham, Southwark and Croydon. Most of Hillingdon, northern Hounslow, Ealing, Harrow and Brent lack any records of Leisler's bat. Also there is an absence of records in The City, Newham and Ealing.
- 5.6.2 Leisler's bats emerge early, normally 18 minutes after sunset (Jones & Rydell, 1994) and prefer open habitats, rivers or lakes (Vaughan *et al.* 1997). The flight of the Leisler's bat is high and fast, usually between 10 – 70m above ground level (Russ, 1999). This species has a wide but patchy distribution across the UK though may simply be under-recorded in some parts of its range and potentially misidentified as noctule. The London area has historically provided a significant number of records (Mickleburgh 1987).



Leisler's bat (Huma Pearce)

5.7 Serotine (*Eptesicus serotinus*)

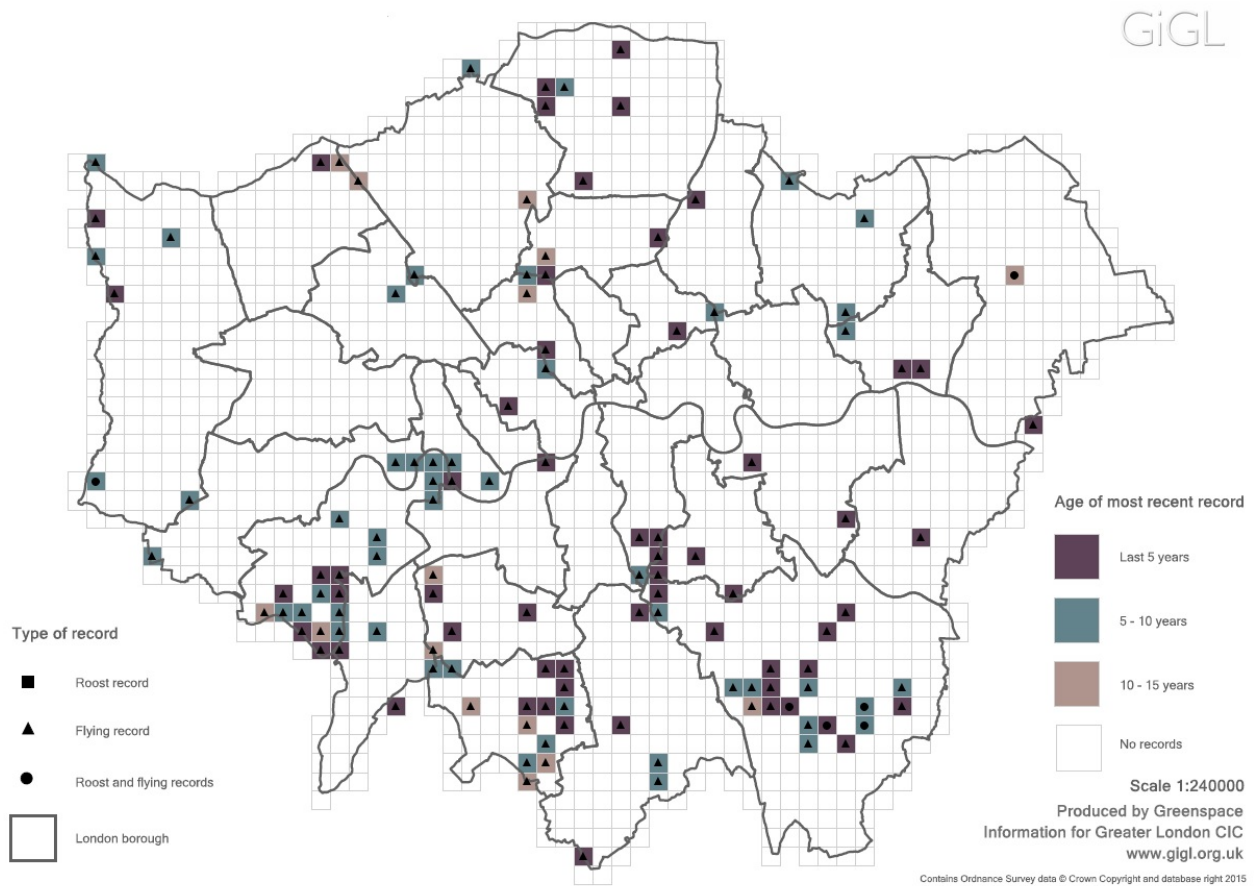


Figure 7 – Distribution of records of serotine (*Eptesicus serotinus*. Schreber, 1774)

5.7.1 The distribution of serotine tends to follow a similar pattern to the Leisler's bat, with records widely but sporadically spread across London. There are records south of the river, particularly throughout Bromley including the north western borders with Lewisham, Southwark and Croydon. Sutton has a good distribution of records and there is a concentration of records in Richmond. Some sporadic records are known across the rest of London, with an absence from Ealing, the City, Kensington & Chelsea, Islington, Newham, Tower Hamlets and Lambeth.

5.7.2 Serotines are commonly associated with roosting within buildings. Winter roosts generally consist of cavity walls, chimneys and under the floors of old buildings, sometimes sharing roosts with pipistrelle and long eared bats. The serotine tends to fly slowly and leisurely up to 30m above ground level (Hutson, 1991), mainly at tree top height.

### 5.8 Long-eared bats (*Plecotus* spp.)

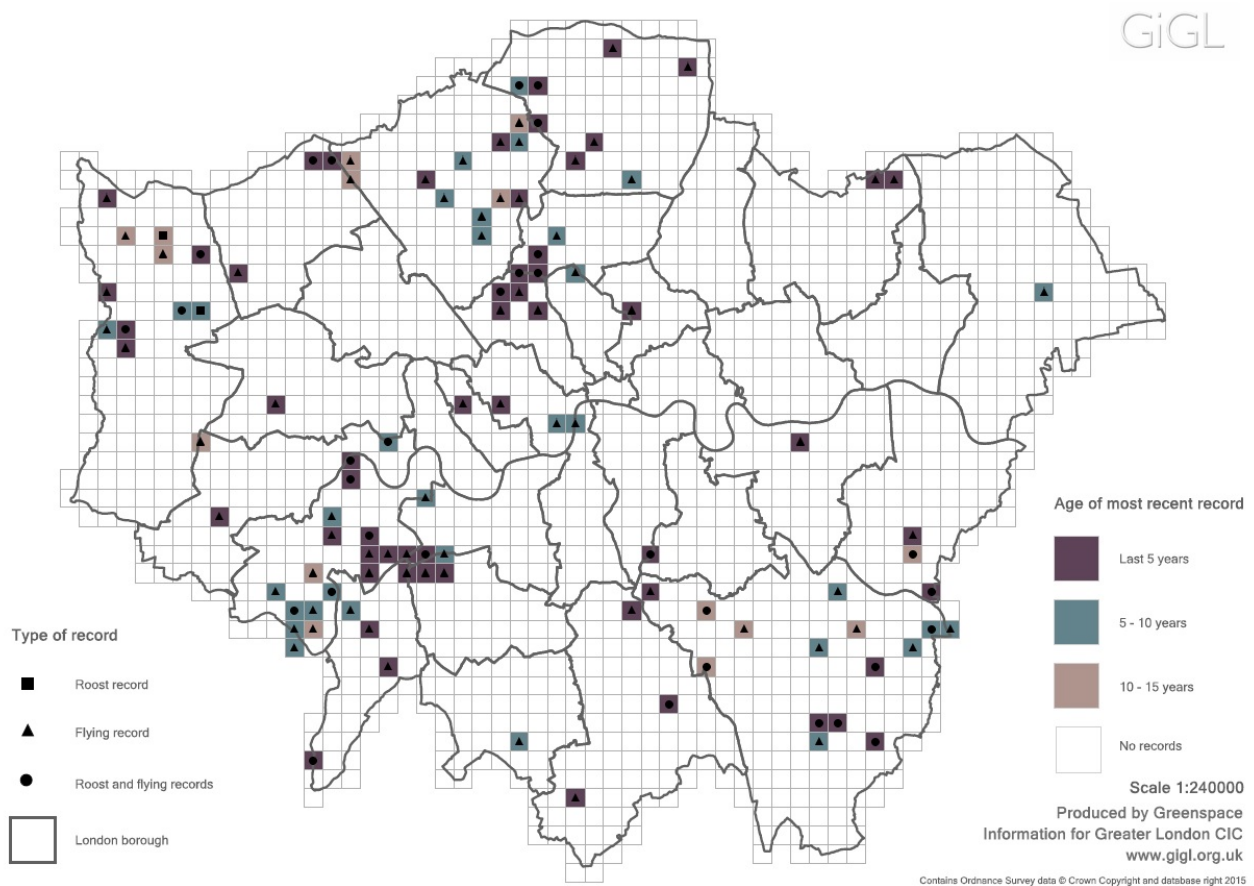


Figure 8 – Distribution of records of long-eared bats (*Plecotus* species. Linnaeus, 1758).

5.8.1 The genus *Plecotus* includes two species known to occur in the UK, the brown long-eared bat (*Plecotus auritus*) and grey long-eared bat (*P. austriacus*). The latter species is mainly recorded along the south coast and in the South West of England and is not known to occur in London. However, due to the difficulty of separating the two species without close examination in the hand, records from this genus are here referred to as long-eared bat or *Plecotus* sp. In London, historic records of long-eared bats were mostly confined to winter hibernation sites. Despite being a

common species throughout England, there were few records highlighted in the Mickleburgh study (1987). Two roosts were discovered in the G.L.C area.

5.8.2 Long-eared bats will select roosting sites in accordance to the availability of suitable buildings. There is a preference for older buildings with partitioned roofs that are situated within 0.5 km of woodland and water, with a preference for warmer houses for summer roosts (Entwistle *et al.* 1997). Due to the quietness of their echolocation calls, long-eared bats (known as the whispering bats) are notoriously difficult to survey for using bat detection equipment. They are also difficult to spot as they tend to emerge well after sunset, normally 55 minutes after (Jones & Rydell, 1994).

5.8.3 Where there are records of *Plecotus*, they appear to be concentrated in specific locations. Aside from a few isolated records there is an absence of *Plecotus* records across the north east of London. Apart from concentrations in Richmond/Kingston/Merton, and Camden/Haringey, and several records in Hillingdon, Barnet, Enfield and Bromley, the distribution of records is extremely sporadic, with the other boroughs having records of this species in only one or two of the 1km grid squares and several boroughs with no records at all.



Brown long eared bat (Alison Fure)

## 5.9 Daubenton's bat (*Myotis daubentonii*)

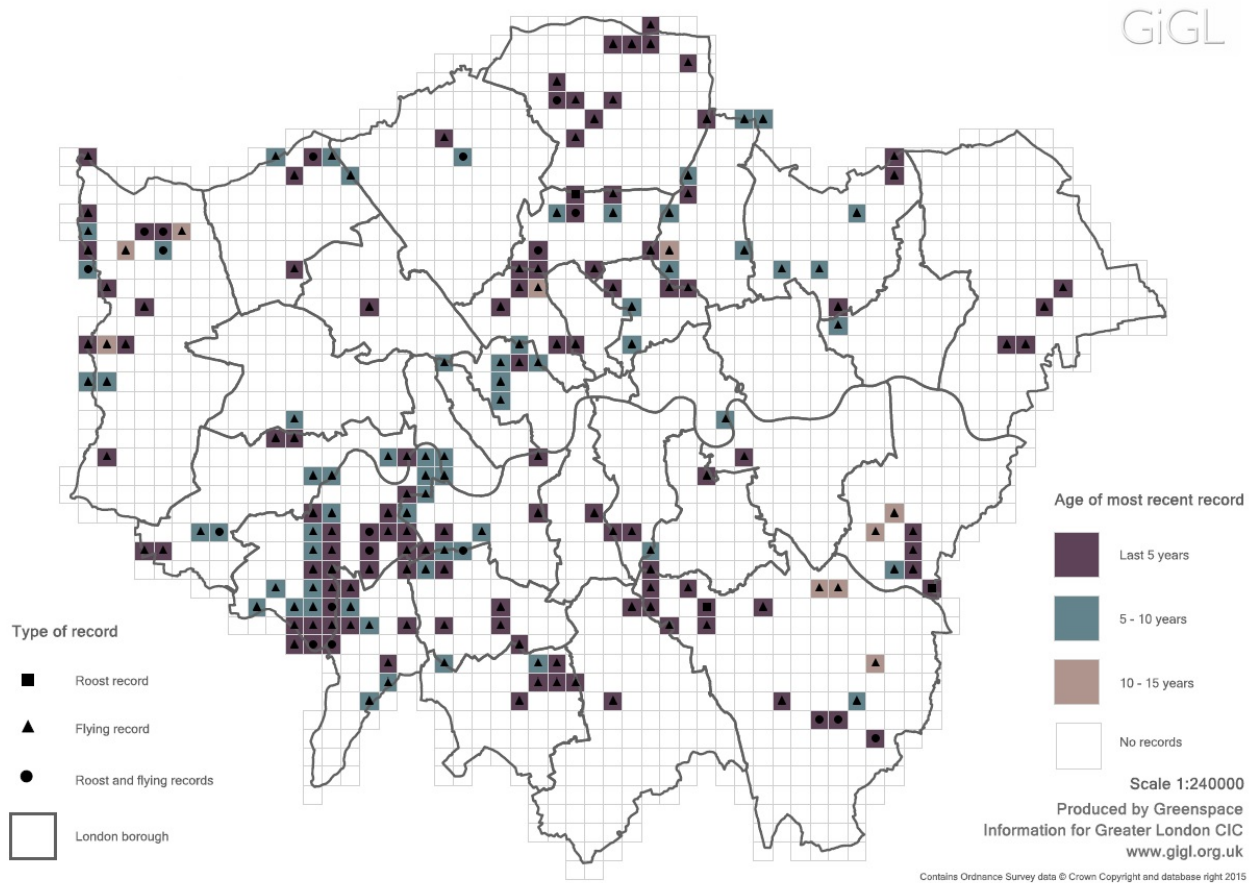


Figure 9 – Distribution of records of Daubenton's bat (*Myotis daubentonii*. Kuhl, 1817).

- 5.9.1 There are many historic records of Daubenton's bat, most notably in winter hibernation sites. Fitter (1949) noted records at Blackfriars bridge, the Serpentine, St James' Park, Regents Canal, Putney, Hendon and Brent Reservoir. Mickleburgh (1987) noted two summer roosts, one of which in Ickenham was sealed in 1977.
- 5.9.2 Daubenton's bat is by far the most commonly recorded *Myotis* species in London and has the widest known distribution. The distribution of records is likely to be linked to the presence of waterbodies and waterways where it can be readily identified with a high degree of confidence by its characteristic habit of foraging low over water, often taking prey from the surface. There is a distinct concentration of Daubenton's bats in the south west of London, particularly in Kingston (Fure 2004) and Richmond. London Bat Group has many records that relate to *Myotis* species of which the vast majority probably relate to Daubenton's bat but have been excluded from the map.
- 5.9.3 Other than this concentration, there are other patches in Bromley and Bexley. In the north there is a notable distribution of records in a south westerly direction in a strip from Westminster, Islington and Camden leading up through Hackney, Haringey, Waltham Forest, and Enfield. There is an absence of records of this species from Newham, Hammersmith & Fulham, Kensington & Chelsea, and The City.





Daubenton's Bat hibernating in the Barge Tunnel at Seething Wells, 2013 (Alison Fure)

5.10 Natterer's bat (*Myotis nattereri*)

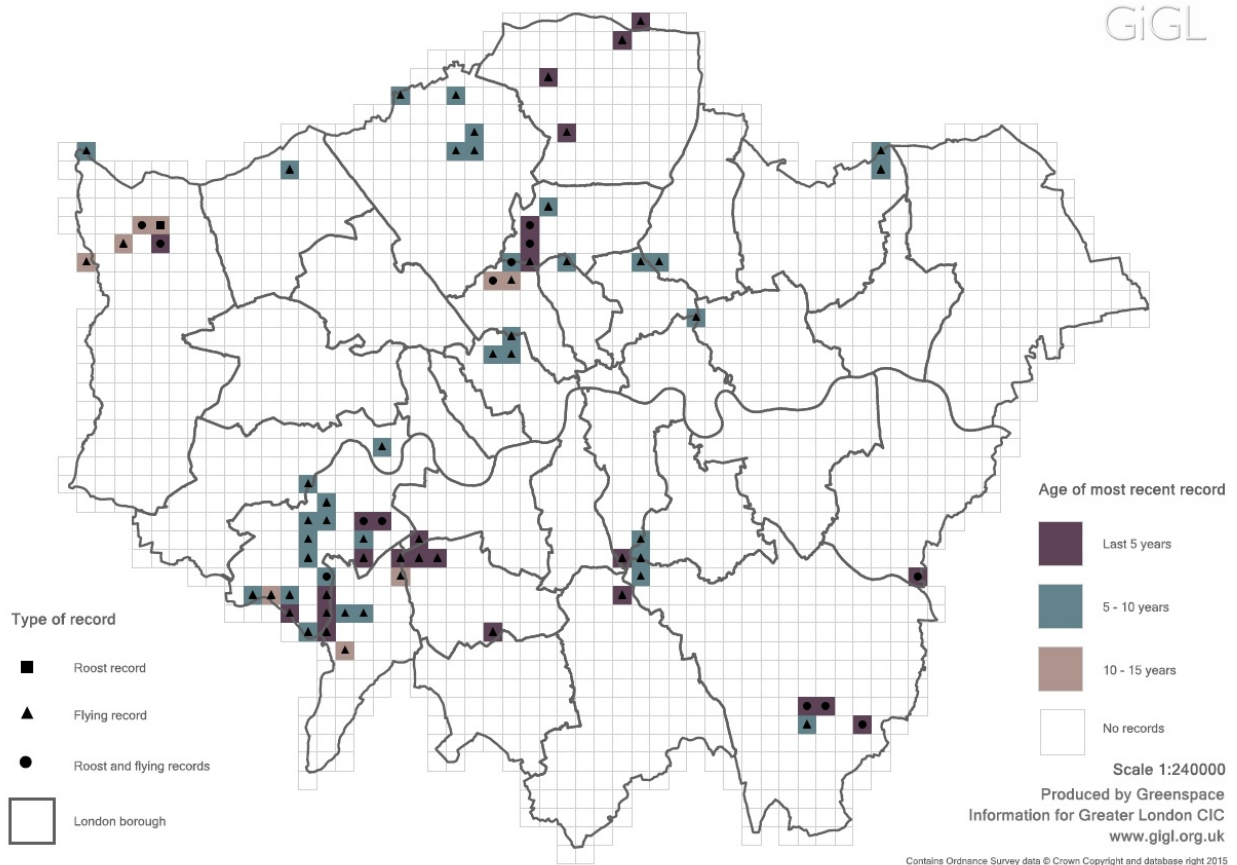


Figure 10 – Distribution of records of Natterer's bat (*Myotis nattereri*. Kuhl, 1817)

5.10.1 Natterer's bats tend to prefer open woodland and parks and water, including tree lined rivers and ponds (Smith & Racey, 2002). Their flight is low and slow, but they are agile flyers and can hover for short periods of time, enabling

gleaning behaviour. They forage throughout the night, often low over water, but higher than Daubenton's bats, spending time extremely close to vegetation and sometimes gleaning prey.

5.10.2 This species is widespread in the British Isles but Fitter (1949) found no records for Natterer's bats in London although noted that they had been 'fairly common' in the suburbs in 1917 and 'common' in Hampstead. A dead Natterer's bat was found in Highgate wood in December 1985 (Mickleburgh 1987). All of the other of Mickleburgh's records came from hibernation sites, 72% of the known hibernation sites across London containing Natterer's bats.

5.10.3 Natterer's bat records are poorly distributed across London. There is a notable concentration of records in Richmond, where this species is known to breed, with a spread of records covering most of the north London boroughs. There is an absence of records from Barking & Dagenham, Brent, the City, Ealing, Hammersmith & Fulham, Havering, Kensington & Chelsea, Greenwich, Lambeth, and Wandsworth.



Weighing bats at Sydenham Hill Wood (London Bat Group)



## 5.11 Whiskered/Brandt's/Alcathoe bat (*Myotis mystacinus/brandtii/alcathoe*)

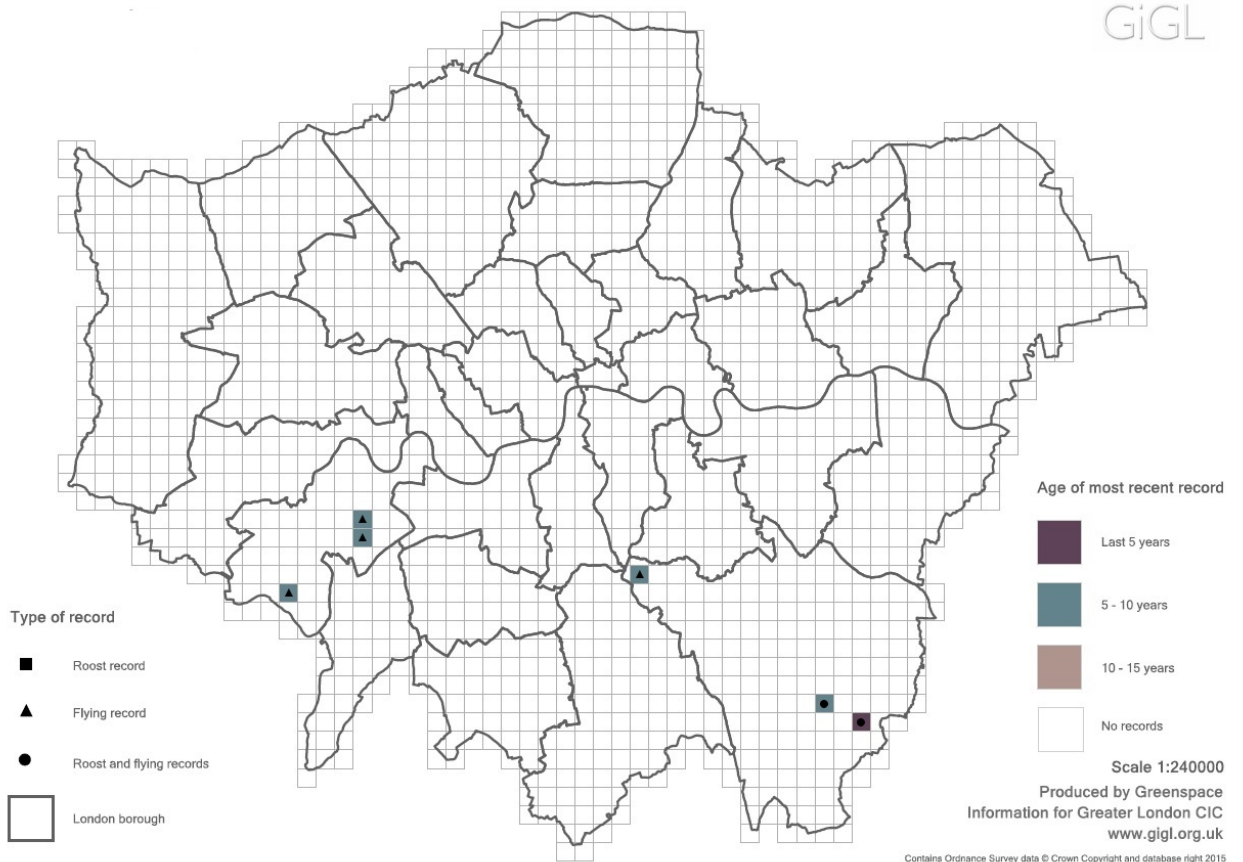


Figure 11 – Distribution of records of whiskered/Brandt's/Alcathoe bat (*Myotis mystacinus*. Kuhl, 1817/*M. brandtii*. Eversmann, 1845/*M. alcathoe*. Helversen & Heller, 2001)

5.11.1 Whiskered/Brandt's/Alcathoe (W/B/A) bats are a difficult group to differentiate. They form part of the genus *Myotis*, along with Daubenton's, Natterer's, Bechstein's (*Myotis bechsteini*) and greater mouse eared bats (*M. myotis*), the latter two not being recorded in London. W/B/A have been recorded in very few 1km grid squares in London. Bromley and Richmond each contain three 1km grid squares in which W/B/A have been recorded.

5.11.2 Fitter (1949) noted that whiskered bats (Brandt's bat and Alcathoe bat only being recognised as a separate species in 1970 and 2001 respectively) were widespread in London's suburbs and beyond. One of the most important elements of this species habitat is the presence of forest and water (Dietz *et al.* 2007). This species is more strongly associated with forest than whiskered bat (Taake 1984). Alcathoe bat was only confirmed as being present in the UK in 2010, though it has probably long been resident. Its status in the Greater London area is as yet unknown.

## 5.12 Kuhl's pipistrelle (*Pipistrellus kuhlii*)

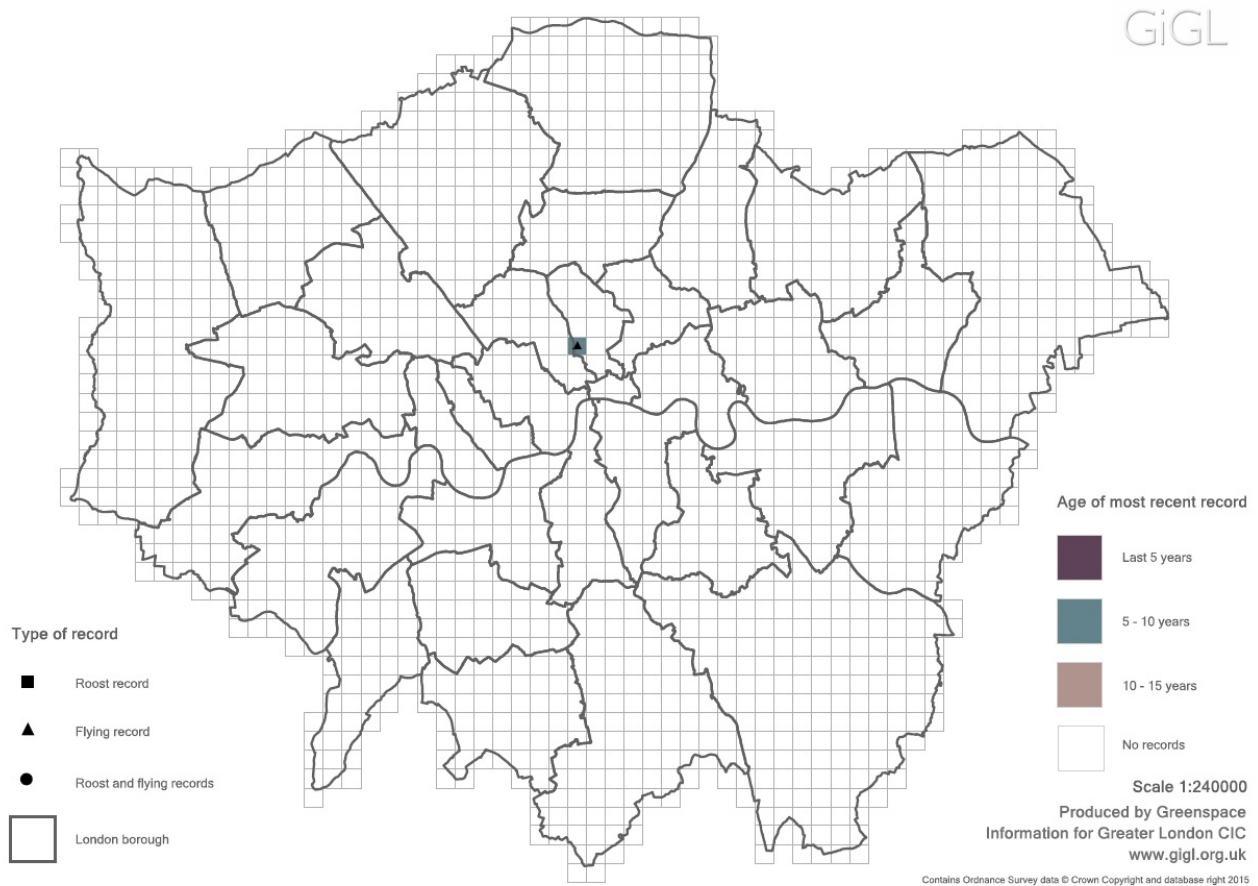


Figure 12 – Distribution of records of Kuhl's pipistrelle (*Pipistrellus kuhlii*, Kuhl, 1817)

5.12.1 Kuhl's pipistrelle (*Pipistrellus kuhlii*) has been recorded in only one 1km grid square, a grounded individual found in Islington. This species is considered a vagrant in the United Kingdom, although numerous on the continent; it might have flown across or been transported on ferries or cargo vessels that ply their trade between continental and East Coast or Thames ports.

### 5.13 Parti-coloured bat (*Vespertilio murinus*)

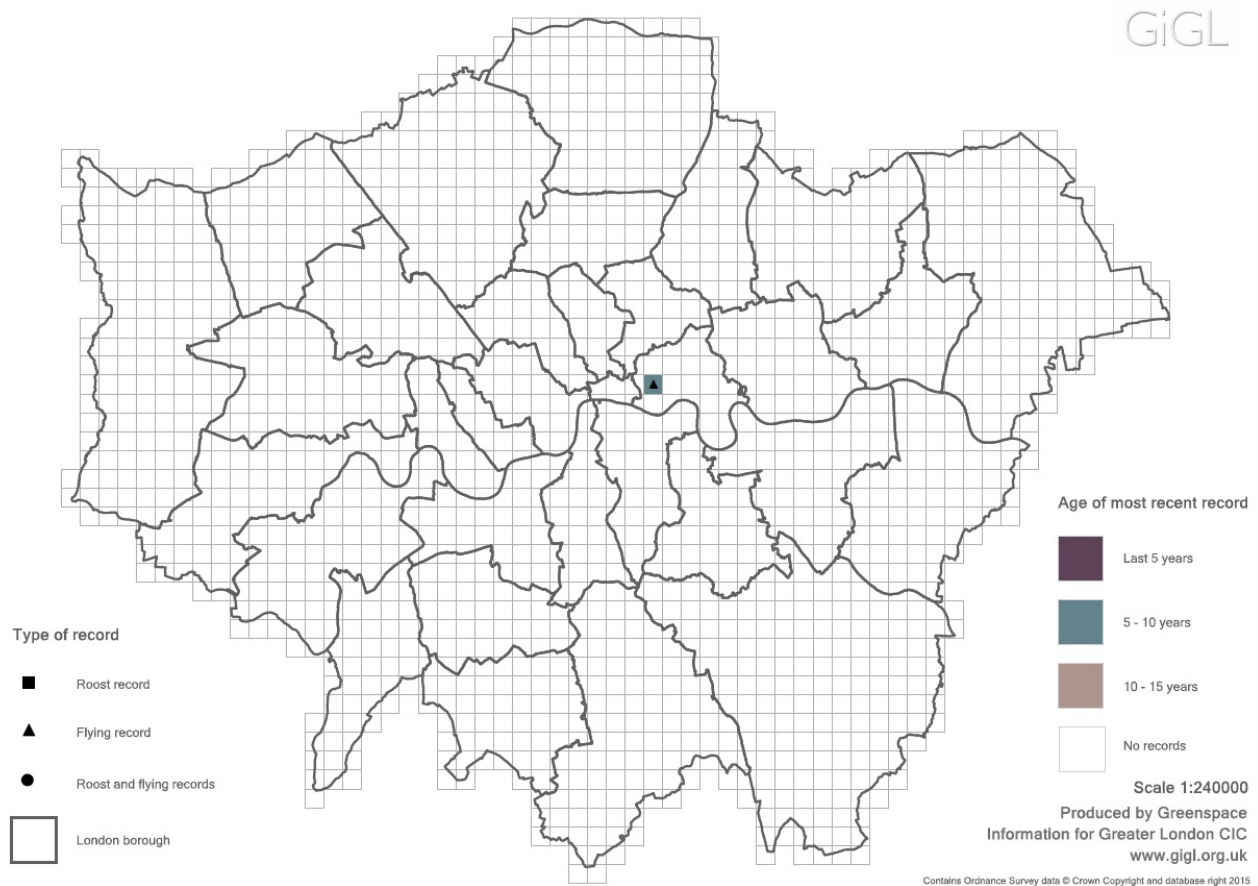


Figure 13 – Distribution of records of parti-coloured bat (*Vespertilio murinus*. Linnaeus, 1758)

5.13.1 Parti-coloured bat (*Vespertilio murinus*) has been recorded in only one 1km grid square in London since 1999. There was also an earlier record in 1994. Both were grounded individuals, the first occurring in Havering and the more recent record in Tower Hamlets. Like Kuhl's pipistrelle (see above) it is considered a vagrant in the United Kingdom.

### 5.14 Other Rare Species

5.14.1 The following species are all currently thought to be absent from the London area (up to the border of Greater London). Although they have been previously documented in London, they are considered as locally extinct. A number of reasons can be hypothesised for the general absence of these species, although lack of suitable foraging habitat could be considered as a significant factor. It is worth noting that these species are uncommon throughout the United Kingdom and not just London.

5.14.2 The barbastelle (*Barbastella barbastellus*) is primarily a tree roosting species in the summer, particularly under bark and in the cracks of storm-damaged trunks and tree holes, although it also inhabits roof spaces. Barbastelles have been shown to prefer tree roosts in unmanaged forests and avoid open woodland and pasture (Russo *et al.* 2004). These rare bats occur across southern Britain albeit records are rare. The last record for the Greater London/Surrey

area was at Painshill Park, Surrey in 1968. Chislehurst caves figured as an important site for this species as a roosting site in 1837, 1859 and 1874. However, these bats are long since absent.

5.14.3 Horseshoe bats are represented by two species in the UK: the greater horseshoe (*Rhinolophus ferrumequinum*) and the lesser horseshoe (*Rhinolophus hipposideros*) bat. Both are considered extinct within the London area. Greater horseshoe bats are largely restricted to the south western extreme of England and Wales. They forage in deciduous woodland and pastures rich in larger insect species. The two main threats affecting greater horseshoe bats are the loss of roosting sites and foraging areas (Duverge & Jones, 2003). Lesser horseshoe bats are also mostly confined to south west Britain, the last authentic record in the London area being located at Abbey Wood, Woolwich 1952 – 53 (Rigden 1955); although six were reintroduced to Regents Park in the 1950's, these have not been recorded since.

5.14.4 Two additional species of bat are native to the United Kingdom but there are no records from London. The grey long-eared bat (*Plecotus austriacus*) is mainly restricted to the southern-most counties of England from Devon to Sussex, while Bechstein's bats are limited to mature woodland areas and rarely found in urban environments.



Bechstein's Bat (Alison Fure)



Lesser Horseshoe bats in a cave (Alison Fure)

## 6. Boat survey encounters, roost sites, casualty records and hibernation sites

6.1 The information contained in this section is based on analysis carried out on data available at the start of this project in 2011.

6.2 The boat survey method is a relatively recent addition to bat surveys in London. It focuses on the riparian habitats along the River Thames and London's canals. Pipistrelles are well represented, being the dominant genus recorded (on the canals but not on the Thames). The *Myotis* species represent approximately a quarter of all encounters, with Daubenton's bat (*M. daubentonii*) being the most frequently encountered of these species. Leisler's bat (*Nyctalus leisleri*) is also a fairly commonly encountered bat on these surveys.

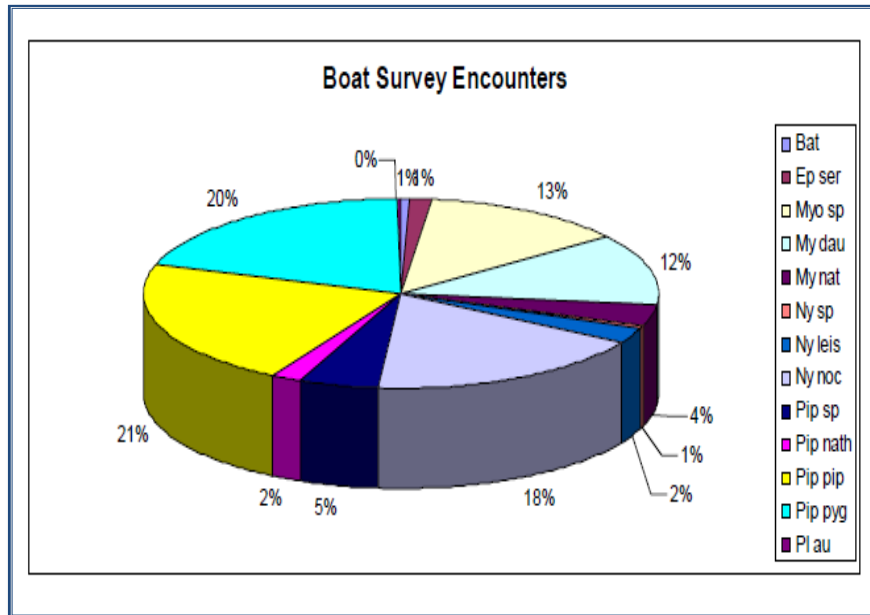


Figure 14 – Boat survey encounters

6.2 The *Pipistrellus* species occupy well over half of the known roost sites across London. On a par with the serotine, there are relatively few records of flying long-eared bats. However, long eared bats are more favourably represented in the roost sites. Species in the *Myotis* genus are all poorly represented in London roost records which may indicate the importance of known roosts. *Nyctalus* bats are the second most common genus in the London area, but occupy a small percentage of known roosting sites.

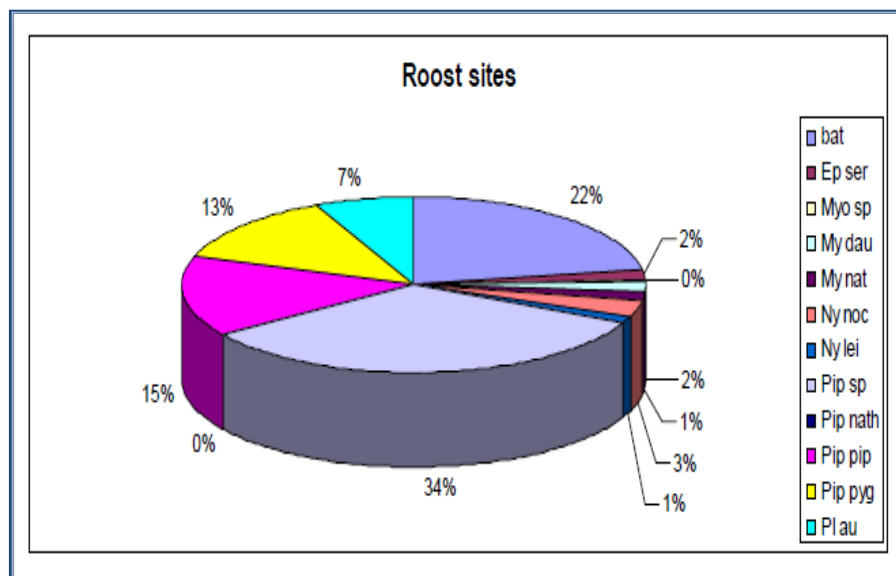


Figure 15 – Roost sites

- 6.3 There are some key habitats in London, some very close to the centre. Of particular note is the WWT London Wetland Centre in Barnes, Richmond upon Thames. This expanse of wetland habitat provides excellent foraging habitat for a number of bat species and is likely to be of regional if not national importance in terms of soprano pipistrelle foraging activity (Briggs *et al.* 2007).
- 6.4 Pipistrelles dominate the casualty records; 47% of casualties are common pipistrelle and 24% are soprano pipistrelle. With the addition of Nathusius' pipistrelle and pipistrelle spp. (totalling a further 10%), the genus *Pipistrellus* accounts for 81% of all casualties recorded by London Bat Group. Long-eared bats account for 5% of casualty records, followed by all other species comprising 14% of casualty records.

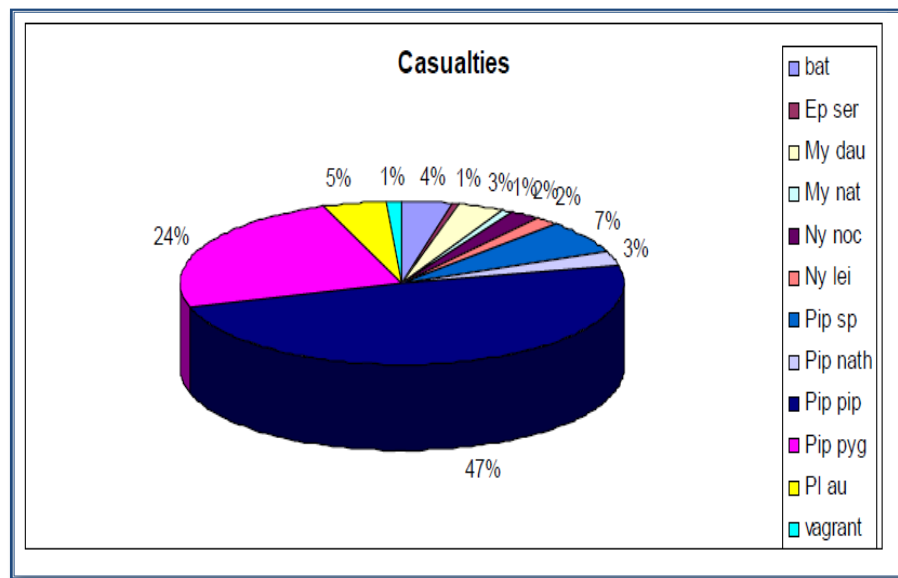


Figure 16 – Casualty records across London

- 6.5 An interesting feature of the data in Figure 17 showing records from hibernation sites is that Natterer's, Daubenton's and long-eared bats are very well represented. Contrary to the data available on distribution across London, pipistrelle bats are poorly represented at hibernation sites. There is almost a total absence of soprano pipistrelle records in the hibernation data. This may be a result of the tendency of pipistrelles to avoid hibernating in large structures that are easily accessible to surveyors.

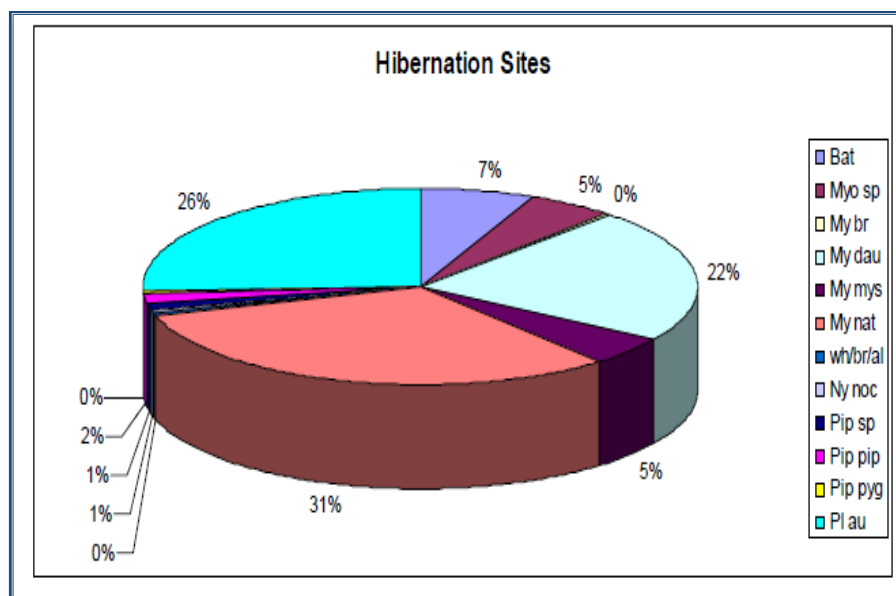


Figure 17 – Hibernation records across London

## 7. Data gap index

- 7.1 The data gap index represents the observed variation in data from borough to borough. It is based on the survey coverage for each London borough in relation to the overall survey effort across the whole of London (*i.e.* the total of 2km grid squares represented for all species), 1.0 being on a par with the average survey effort for London. Higher than this figure means there are fewer 2km grid squares for that borough in comparison. The lower the figure the more 1km grid squares have species records compared to the London average.
- 7.2 NB The data gap index charts were produced at the start of this project in 2011 and use 2km squares since they were based on the original draft maps which presented the records at 2km resolution. Using 2km squares may produce a better index since being a bigger area they would suffer less from vagaries of reporting. Targeted surveys have since begun to fill some of the gaps in coverage. The initial results of these surveys, along with other new records, are represented in the maps included in this atlas. A significant increase in recording effort in one borough is noted in the text that follows but apart from this the charts are likely to still give a reasonably accurate picture of the relative levels of recording effort between each borough.
- 7.2 In North London, Newham comes out least favourably, with a data gap index of 2.7. Ealing is also lacking in survey coverage along with Havering, Harrow and Tower Hamlets. The City comes out most favourably at 0.43, followed by Westminster (0.54) and Islington (0.55). However, the City is very small in size even when compared to the next smallest borough, Kensington & Chelsea (12.13km<sup>2</sup>). There is only room for one 2km grid square in the City with only a small number of surveys required to provide a more comprehensive effort.



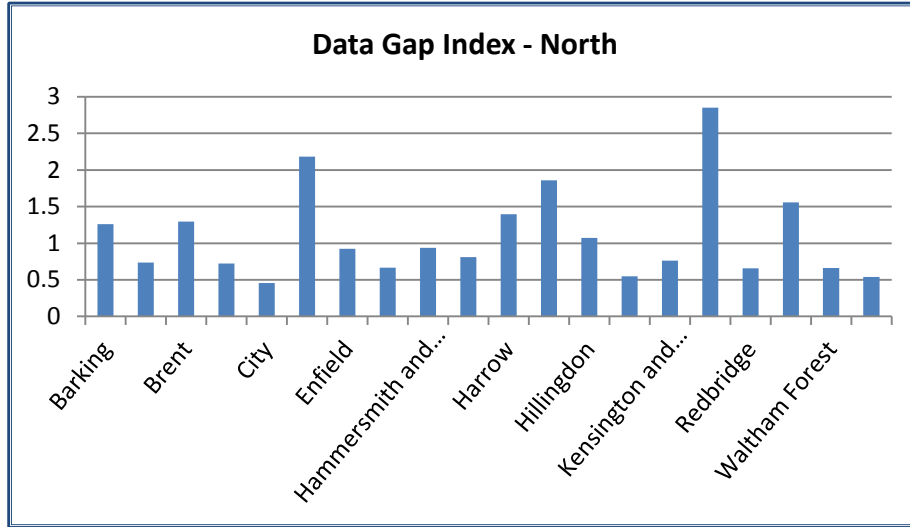


Figure 18 – Data Gap Index for North London Boroughs

7.3 Like the data gap index for the north London boroughs, the same comparison with the overall mean of survey for the number of 2km grid squares with records across the whole of London applies. A figure of 1.0 represents that the borough is on a par with the London mean. Figures that are lower represent a greater number of 2km grid squares with species records in the borough compared to the London mean. Four boroughs that have fewer 2km grid squares with records than the mean are Bexley (by far the least covered with an index score of 2.15), then Southwark with 1.58, and Croydon (1.45) respectively. All the other south London boroughs are generally below the London mean. Particularly well covered for surveys are Kingston (0.51) and Richmond (0.40). Lambeth has also been targeted for further surveys since the above charts were produced and is now among the best represented boroughs.

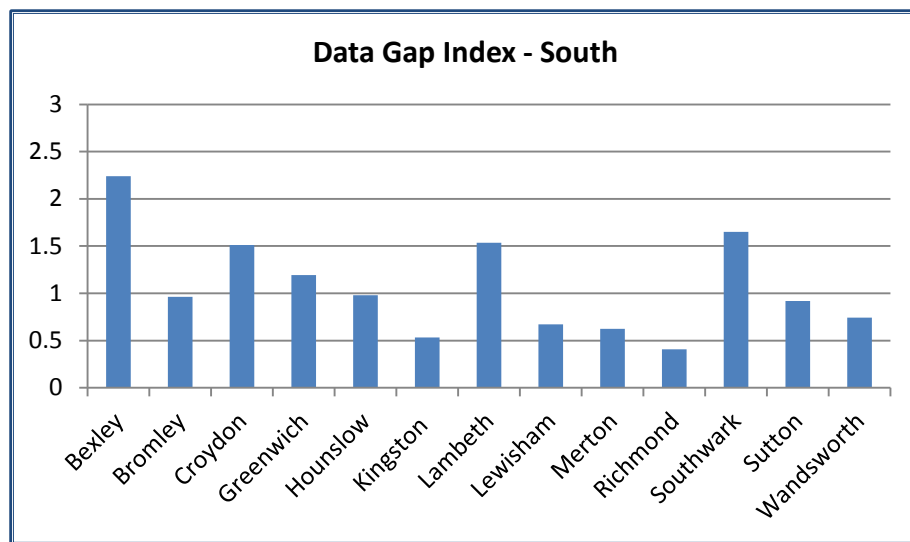


Figure 19 – Data Gap Index for South London Boroughs

7.4 Figure 20 shows the bat species diversity of each north London borough. Fairly low species diversity is found in the City, Hammersmith & Fulham, Kensington & Chelsea, Newham, Tower Hamlets and Barking. Hillingdon has had 10 species of bat recorded with the rest of the boroughs having between six and eight.

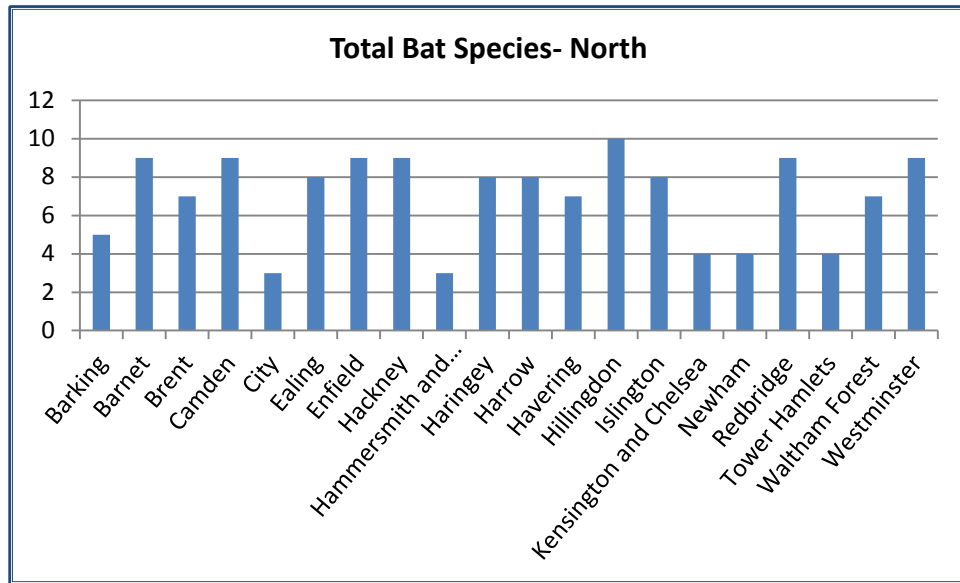


Figure 20 – Bat Species Diversity for North London Boroughs

7.5 Comparing the species diversity with the data gap index highlights that while some boroughs have reasonable or high species diversity, the relative coverage of data is low. Ealing, for example, has eight bat species yet the proportion of the borough surveyed is low. Both Havering and Harrow have a good representation of bat species diversity but again the relative area of these boroughs surveyed is low.

7.6 Newham shows a low overall survey coverage and has a low species diversity compared to Hillingdon, which has both a high survey coverage and a high species diversity.

7.7 The south London boroughs have greater species diversity than the north London boroughs. There are five species recorded in Greenwich, Southwark and Lambeth. Richmond and Bromley have the highest bat species diversity (ten bat species recorded each). Croydon, Sutton and Kingston record nine species while Wandsworth, Merton, Lewisham, Hounslow and Bexley have eight. Bexley has a reasonable number of species recorded when compared to the boroughs with higher survey coverage. Croydon also has relatively low survey coverage yet reasonably good species diversity.

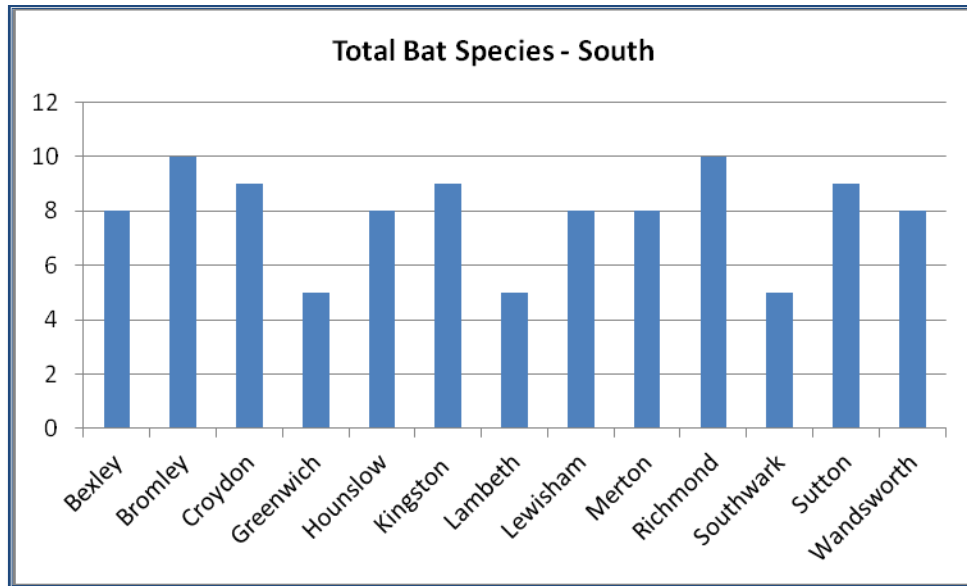


Figure 21 – Bat Species Diversity for South London Boroughs (Southwark has increased to nine since this was produced).

## 8. Observations on data collection

- 8.1 There is a clear disparity in survey effort within each London borough and future surveys could target the deficiency of these areas, particularly the London Boroughs of Newham, Ealing, Bexley and Havering.
- 8.2 It is far easier to find volunteers to survey bats in a nice location such as Richmond Park and not so easy to find surveyors to volunteer on street corners at night in areas of inner London. Additionally, explaining a bat survey to the police can be quite time consuming particularly in areas that suffer from a high crime rate.
- 8.3 By far the London Borough with the largest number of 1km grid records is Richmond, with 89. There are three London Boroughs with the least number of records, all on a tie at eight. These are Hammersmith & Fulham, Newham and Tower Hamlets. The City has four records, but is small being only slightly over 2.5km<sup>2</sup> in size.
- 8.4 The distribution maps have a tendency to favour the larger London boroughs over the smaller ones. The City, located in the middle of London and significantly smaller than either Richmond or Bromley, is likely to contain fewer bat records than a larger borough. It would be logical to expect the boroughs on the edge of London, particularly the larger ones, to show a greater number of records. This was to some extent compensated for by using the data gap index, but this technique was by no means comprehensive.
- 8.5 Maps are based on records in the London Bat Group database at the end of 2014, which includes data from BCT's National Bat Monitoring Programme up to the 2012/13 winter as well as data from a reciprocal exchange with GiGL.
- 8.6 We would like to thank Julie Cox at Greenspace Information for Greater London (GiGL) for kindly producing the excellent maps for this atlas.

## 9. Acknowledgements

- 9.1 Firstly, I would like to thank the Vodafone World of a Difference Programme that provided the funding for this project. This project would never have gone ahead had Alison Fure not conceived it in the first place and her support, advice and assistance were gratefully received. The initial data, charts and draft maps were all compiled and provided by Jackie Wedd. The final maps were produced by GIGL based on data compiled by Derek Coleman who also proof-read the final draft. Roger Havard carried out an extensive review of an earlier draft. John Tovey also provided some useful insight into the dynamics of the bat population across London and has given his time to help formulate the bat atlas. Philip Briggs was instrumental in the final editing and review of this document, providing invaluable advice and knowledge.
- 9.2 I would like to thank London Bat Group as a whole, and all their volunteers and surveyors, whose hours of effort, often at horrendously unsociable hours of the evening and early morning, have slowly begun to increase our understanding of the distribution and population of bats across London. Without those missed meals, bedtimes, TV episodes and social events there simply would not be any credible information on bats so this is also for all those bat workers out there.



London Bat Group at Westerham Mines, 2013 (London Bat Group)

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