

**THE MAMMAL FAUNA OF THE RIVER
LIFFEY AT FINGAL, INCLUDING
ADJOINING DEMESNES AND FARMLAND**



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For Fingal County Council Parks Department
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INTRODUCTION

The following study was undertaken at the request of Mr. Hans Visser, Biodiversity Officer with Fingal County Council. This assessment looks at the importance of the River Liffey and the surrounding townlands for the mammal fauna of Fingal. This river is the most significant river examined in this series of assessments on behalf of the Parks Department, Fingal County Council. The Liffey rises in County Kildare and enters the Irish Sea in Dublin Bay. It is most closely associated with Dublin City but clearly it has its greatest mammalian biodiversity in suburban and rural areas rather than in the built-up section from Chapelizod along the Dublin quays and out into sea water.

In this study, the enclosed private estates between Lucan and Knockmaroon on the Fingal boundary are examined to determine whether the accelerated changes seen along the east coast in the vicinity of Dublin City has removed the mammal diversity that would be expected in a rural/suburban setting along a major river such as this.

Many of the large tracts of land in this area are contained within private estates that themselves are undergoing major changes in use, in housing density and in their survival as a single entity. A switch from unsustainable (that is, economically) farming towards the establishment of gated housing and the enormous financial benefits of housing will further reduce the rural nature of these demesnes. This can be seen at the Somerton (Summerton) estate where already a hotel and golf course has been built and houses are under construction, at Luttrellstown where more golf holes have been constructed, a golf house and housing will follow. The possibility of such a change to the lands of the surrounding demesnes must be high given the desirability of a site close to Dublin but as yet not densely populated.

SUMMARY OF FINDINGS ALONG THE RIVER LIFFEY

Species of mammal along the River Liffey

Daubenton's bat	<i>Myotis daubentoni</i>
Brown long-eared bat	<i>Plecotus auritus</i>
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Common pipistrelle	<i>P. pipistrellus</i>
Leisler's bat	<i>Nyctalus leisleri</i>
Natterer's bat	<i>Myotis nattereri</i>
Whiskered/ Brandt's bat	<i>M. mystacinus/ brandti</i>
Badger	<i>Meles meles</i>
Stoat	<i>Mustela erminea hibernica</i>
American mink	<i>Mustela vison</i>
Otter	<i>Lutra lutra</i>
Fox	<i>Vulpes vulpes</i>
Rabbit	<i>Oryctolagus cuniculus</i>
Irish hare	<i>Lepus timidus hibernicus</i>
Grey squirrel	<i>Sciurus carolinensis</i>
Brown rat	<i>Rattus norvegicus</i>
House mouse	<i>Mus musculus</i>
Wood mouse	<i>Apodemus sylvaticus</i>
Fallow Deer	<i>Cervus (Dama) dama</i>
Hedgehog	<i>Erinaceus europaeus</i>

The demesnes within the Liffey Valley offer refuge and feeding opportunities for a wide range of mammal species including seven species of bat, four species of mustelid, including the otter, an Annex II species under the Habitats Directive and the Wildlife (Amendment) Act 2000. The presence of Natterer's, whiskered/ Brandt's and Daubenton's bat in one area is uncommon in the Dublin region and this is itself significant in terms of the mammal fauna of Fingal.

Red squirrels were not in evidence within any of the sites examined in this area. The author last noted red squirrel in the Phoenix Park close to the study area in November/ December 1987 and this species is absent here since this date. Grey squirrels are numerous throughout the Liffey Valley.

Badgers appear to be dependent upon areas such as Luttrellstown and Knockmaroon for much of their foraging and the protection of setts. Further along the valley, badgers were noted within St. Catherine's Park. With continued housing pressures, these sites will become even more important for badgers.

In all of the studies of the Fingal area to date, the bat fauna of the Luttrellstown – Beech Park House and probably Somerton (from available data) must feature as of high importance. The survival of features that allow their continued survival in Fingal such as mature trees, unpolluted water courses, hedgerow, old farm buildings and darkness are all vital to sustain future populations.

Continued changes to the area including the development of housing such as Laraghcon, Luttrellstown View, within Somerton as well as Castleknock Hotel and Golf Course, housing in Luttrellstown and the change of use of farmland to golf courses (although this is still less damaging than housing) have a cumulative impact that if improperly approached would prevent movement of mammals into and out of these sites and lead to a dwindling or isolated population.

Recommendations for Liffey Valley

Retention of hedgerow/ Re-enforcement of hedgerow through planting

Farmland around the demesnes would be of greater benefit to mammals if there were hedgerows traversing the fields. This is clearly outside the immediate control of Fingal County Council as most of this area is in private ownership. The presence of stud farms for horse breeding and of farms principally geared towards cereal crop production is very often associated with a programme of denudation of hedgerow and cover. At sites such as Barberstown, Coldblow and around Westmanstown, cover is less abundant and this in turn reduces the value of the site for most mammal species.

Where Fingal County Council may have some role in land management is in encouraging the retention of existing hedgerow and the encouragement of land owners to create cover to compensate for lost cover. The provision of a double hedge would be of much greater value as it thus creates an internal shelter and a corridor of movement that is less susceptible to disruption through lighting and human contact.

Retention of tree root systems of riverside trees where trees must be felled

If it is necessary for trees along the riverbank to be felled (for ESB works, drainage programmes, construction, creation of viewing sites), they should be removed with a chainsaw and the root system retained *in situ* to allow the possible use of such roots by otters as a holt site. As the roots pose no risk to buildings etc. from falling, this would create no difficulties and would be a benefit in terms of dead wood habitat as well as a shelter for mammals.

Lighting restrictions

Lighting such as that outside Castleknock Hotel and Golf Course is intrusive to mammals. The overspill from this site is likely to interfere with the movement of species such as the whiskered/ Brandt's bat, a species which would appear to be present within Somerton. The level of light intensity and control of the direction of lighting must be considered during any planning for this area to minimise light pollution.

Bat boxes

Bat boxes serve a number of functions besides the provision of roost sites for bats. This in itself is enough of a benefit to justify their usage. However, they also allow a means of monitoring the bat fauna of a site. If the boxes are checked on a regular basis, they will allow for the possibility of assessing the presence of bat species, the occurrence of new or uncommon bat species and if carried out regularly and systematically may allow the identification of trends in the population (only where a large number of bat boxes are erected and other roosting options are known).

As bat roosts in old buildings and trees are clearly lost as a consequence of development, the provision of bat boxes may serve as a means of compensating for roost loss especially where any construction neglects to consider bats or is too small to trigger an Environmental Impact Assessment.

Bat boxes on the supports of the M50 bridge would be ideally located to receive solar heating, have easy accessibility for bats and be easy to re-check at a later stage. A number of boxes could be erected here of differing designs including Schwegler bat boxes, timber boxes including large maternity roost boxes.

Insistence upon a full mammal assessment for any development within the Liffey Valley Area

Fingal County Council has the capacity and the responsibility to insist that developments within this area include a full and proper evaluation of the mammal fauna of the site. This includes bats which make up ten of the species of mammal in Ireland. This has been undertaken in relation to Luttrellstown where a request for Further (or Additional) Information ensured that a bat assessment of this demesne was carried out.

MAMMALS OF LUTTRELLSTOWN CASTLE AND DEMESNE, FINGAL, DUBLIN



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Method of assessment of Luttrellstown Castle for mammals

The Luttrellstown demesne was assessed during two separate visits for the presence of all mammals.

Bats

The bat survey involved an examination of structures during daytime for evidence of occupation or of historical presence as well as a nighttime bat detector and visual survey of roost sites and feeding areas.

The bat detector assessment was undertaken on September 9th and 10th 2005 and involved the use of two bat detectors, a Pettersson D240X ultrasonic heterodyne and time expansion bat detector and a QMC Mini 3 heterodyne bat detector.

This allowed the identification of all bats encountered to species level with the confirmation of identification in enclosed areas by visual observation of the bat concerned at close quarters or where bats were in the open, visual cues such as height and mode of flight allowed identification.

Photographic corroboration was possible for a number of individuals and this is included in this report.

Buildings, tunnels, bridges and any other accessible structures were also examined subsequently during November 2005 for the identification of hibernation sites, if present. Bat fauna on the east coast were rarely reported after 31st October 2005 and hibernation may have commenced for many bats by mid November when this assessment took place (November 12th).

The information collated during a bat survey in 2002 was also available to the author and experience of the estate during this survey assisted in pinpointing areas of special interest for roosting and feeding bats.

Other mammals

All mammal signs were sought during a visit to the estate on November 12th 2005. This involved following all paths around the estate, crossing through all woodland and forestry and following any mammal tracks that were encountered.

All animal burrows were examined to establish the identity of resident species. All footprints, tracks, faeces were examined to species level. Visual observations of mammals during the bat survey or during this daytime survey were noted. Discussions with staff such as Mr. Paddy Smith, gamekeeper for several decades on the estate, and with local ecologist Mr. Terry Flanagan, provided data on mammal observations over a considerable period and provided indicators of trends in populations as well as explanations of the distribution of mammals on the estate.

Streams, lakes, bridges, waterside rocks were all checked for evidence of otters (and mink) and all accessible banks were examined for holts.

Species of bat present

Brown long-eared bat	<i>Plecotus auritus</i>
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Common pipistrelle	<i>P. pipistrellus</i>
Leisler's bat	<i>Nyctalus leisleri</i>
Daubenton's bat	<i>Myotis daubentoni</i>
Natterer's bat	<i>Myotis nattereri</i> (2005 only)
 Whiskered/ Brandt's bat	 <i>M. mystacinus/ brandti</i> (2002 only)

Other mammals

Badger	<i>Meles meles</i>
Stoat	<i>Mustela erminea hibernica</i>
American mink	<i>Mustela vison</i>
Otter	<i>Lutra lutra</i>
Fox	<i>Vulpes vulpes</i>
Rabbit	<i>Oryctolagus cuniculus</i>
Irish hare	<i>Lepus timidus hibernicus</i>
Grey squirrel	<i>Sciurus carolinensis</i>
Brown rat	<i>Rattus norvegicus</i>
House mouse	<i>Mus musculus</i>
Wood mouse	<i>Apodemus sylvaticus</i>
Fallow Deer	<i>Cervus (Dama) dama</i>
Hedgehog	<i>Erinaceus europaeus</i>

Luttrellstown offers a variety of feeding and roosting opportunities for bats. The estate itself covers a considerable area and provides an array of habitats and vegetation cover from golf course, to grassland and parkland with mature oak to broadleaf and coniferous cover, hedgerow, lakes and streams. Buildings on site range from farm buildings, terraced housing/farmyard (near-derelect), gate lodges, farm houses and finally the castle itself. In addition to this, there is “The Folly” and a small tunnel associated with a former industrial operation on site (according to a farmer with responsibility for restoration of the farmland).

This summary is enough to explain why the bat fauna is diverse on the estate.

Bat roosts were noted in the 2002 EIS survey and additional roosts have been identified in the current study.

Brown long-eared bat droppings were noted within the attic of the Castle in 2002 (see Figure 2).

A second brown long-eared bat roost was discovered in the farm buildings proposed for renovation and change of use as part of development on the estate.

Bats were perching on the timbers of the ceiling of the ground floor while some were entering into a hole in the wall (see Figure 3). Brown long-eared bats were noted flying around within the adjoining stables of this building.

A brown long-eared bat roost was found in “The Folly” within the glen in 2002. This is still occupied (see Figure 4(a) and (b)). Bats were first seen in the road arch of “The Folly” at 10.05 pm. Late into the night’s assessment, three Natterer’s bats were roosting upon the wall of the room leading to the brown long-eared bat roost all to one side of “The Folly”.

A Daubenton’s bat was noted to rest in this building during the 2002 assessment. None entered in 2005 but one and later two Daubenton’s bats were observed in the tunnel close to “The Folly” (see Figures 4(c) and 5).

Pipistrelles were noted in and around the Castle and farm buildings. Both soprano and common pipistrelles are present within the estate. If Nathusius’ pipistrelle is an expanding bat species in Ireland, Luttrellstown would provide many of the desired features for this species including several buildings including large stone walls such as at walled gardens and stable yards, lakes, parkland and mature trees.

Male Leisler's bats were noted in mature oak trees on the estate emitting social calls to attract females (see Figure 6). Oak trees provide ample roosting options for bats when mature as they may form extensive cavities for bats to use.

Daubenton's bats were noted in "The Folly" in Luttrellstown in 2002 and feeding on one of the lakes. In this assessment, one (at 10.23 pm) and subsequently two (12.30 am) Daubenton's bats entered the tunnel close to "The Folly" and slept here during the night. An examination of this tunnel in November for hibernating bats yielded no evidence that bats were present. Daubenton's bat activity was noted on the lake to the east of the main avenue.

Natterer's bats were present in the room, roosting upon the wall within which the brown long-eared bat roost was found in "The Folly" (see earlier) at 1.00 am. This species is uncommon in the Dublin area and their presence on this estate is quite an important find.

Whiskered bats were noted within the farm buildings and feeding along the edge of forestry in 2002. This species was not in evidence in 2005 on the estate. However, the species was noted across in the Beech Park House and around the perimeter of the Somerton estate to the east of here and it is likely that the species is still present occasionally or seasonally.

(It cannot be ruled out that the species referred to here as whiskered bat is in fact Brandt's bat, but it is clear that whiskered is the more commonly encountered species to date in Ireland based on identifications in the hand.)

Other mammals

Badgers are very much in evidence at Luttrellstown. Fresh paw prints were evident towards the north-western corner of the estate (see Figure 6).

Two badgers were watched for a period of fifteen minutes in 2005 on the lawns surrounding the Castle car park. In 2002, a badger was encountered along a path in the southwestern area of the estate.

In total, four badger setts were noted in the area covered during this assessment one of which was clearly a main sett and in occupation. The gamekeeper, Mr. Paddy Smith, reported that he was aware of six badger setts in total on the estate.

The main sett on the estate is towards the south-eastern corner close to the gate lodge facing the Broomfield estate (see Figure 7). The sett has twelve entrances and an active latrine close to a number of entrances. Tracks lead from the sett through the surrounding woodland and signs of feeding and commuting are evident in the wood. A second one-entrance sett was noted towards the edge of the estate connected by well-worn tracks to the surrounding area and giving access to adjoining lands.

A 5-6 entrance sett was noted in cover towards the centre of the estate but this sett was clearly inactive. A single entrance sett was also noted in the glen running south through the estate.

Badger digging was seen in all areas south of the golf course. A badger dung pit and track was located in the cover behind the farm buildings on the west side of the estate in the area where a badger was seen in 2002.

A latrine with fresh dung was noted along the ditch leading to the triangular wood in the centre of the estate. A track connected this latrine and nearby feeding signs with a dug-out wasps' nest. A number of wasps emerged from this nest during inspection and clearly the excavation of the nest was recent.

Stoats have been observed repeatedly over the years by gamekeeper, Mr. Paddy Smith catching rabbits or rats on the estate.

Mink have been trapped and killed on the estate to reduce effects of predation on pheasants etc. and this species is almost certainly a regular visitor to the estate.

Otters have been seen repeatedly over the years on the estate, the most recent sighting being 2004. No fresh spraints were found on any of the water bodies, streams etc. in Luttrellstown. A recent (but not current) spraint was found on a pipe spanning the stream that empties into the River Liffey from the Glen through the Broomfield estate.

While foxes are actively culled on the Luttrellstown estate, scats were found in a number of sites, to the west of the walled garden as well as to the south-east of the walled garden, for example.

Rabbits are widespread and common on the estate. These should provide ample prey for the resident and breeding buzzards.

Hares were seen late in the evening around the Castle, along the main avenue and in the parkland adjoining the avenue. Mr Paddy Smith reported that hares had been numerous prior to their capture for coursing and that following the removal of consent of the estate owners to this capture, numbers were beginning to recover.

Interestingly, hares hide with their young (leverets) in tree hollows during the day according to Mr. Smith. Hares are typically reported as hiding their leverets in long grass (a form) and not in burrows or tree hollows.

Grey squirrels are very numerous on the estate although there are measures to control their numbers occasionally implemented. They are especially obvious in the trees north of the gate to the Castle car park.

There are no red squirrels within the estate. This species is absent for more than a decade and probably more.

Not surprisingly, all of the other common rodent species are abundant on the estate and rats and mice (house and wood) were all noted throughout the estate.

A single deer is reported as being present or frequenting the estate. This may be a roaming individual from the Phoenix Park.

Hedgehogs were not seen but have been encountered occasionally by Mr. Paddy Smith.

Significance of the Luttrellstown Estate for Mammals

The most significant sites within the estate for mammals are:

- 1) the Glen and the associated structures (“The Folly” and the tunnel)
- 2) the western farmyard and adjoining woodland
- 3) the south-eastern woodland
- 4) the eastern section of the main lake

The golf course area has limited interest for mammals including bats and badgers. The coniferous plantation has some benefits in terms of feeding bats (along the perimeter) but this is unlikely to be of as much interest to bats as broadleaved sites and most especially wooded sites close to water.

Clearly, the most important features for retention at Luttrellstown for mammals are the Glen and all mature woodland. Any sites such as “The Folly” and the tunnel in the Glen must be safeguarded against uncontrolled changes.

Approved development is under way on the estate and the farm buildings within which the brown long-eared bats (and previously whiskered bat and soprano pipistrelle) reside will be altered to accommodate humans.

It is essential that as laid out in the EIS for this development the buildings are examined prior to building work for the presence of bats. So far, three species have availed of the structure as a roost site (the most numerous of these being the brown long-eared bats noted in this study). In light of this, mitigation appropriate to the species concerned must be applied.

The abundance of badger setts within Luttrellstown exceeds the evidence of badgers in any other site examined during this current season of surveys. Badger abundance (based on the extensiveness and number of setts) is only exceeded by the Tolka Valley Park at Blanchardstown and is comparable to the badger activity in St. Catherine’s Park, Lucan.

The woodland cover adjacent to pasture with cattle grazing provides an ideal combination for badgers, especially given the restriction on public access to the setts.

Luttrellstown is most likely providing shelter for mammals feeding along the River Liffey and within the Liffey Valley through woodland (burrows as well as trees) and buildings.

Monitoring of the Mammal Fauna at Luttrellstown

Luttrellstown Castle and demesne is in private ownership. It is difficult to ensure uninterrupted monitoring of the health of mammal fauna within private property in many cases. Access to Luttrellstown was made possible by the gamekeeper, Mr. Paddy Smith, for which the author is grateful. A difficulty exists in monitoring if it considered detrimental to a landowner's future development prospects should an important site or feature be identified for mammals (birds, invertebrates, plants, habitats etc.).

The key elements to be monitored at Luttrellstown are the four sites listed in the previous section (i.e.)

- 1) the Glen and the associated structures ("The Folly" and the tunnel)
- 2) the western farmyard and adjoining woodland
- 3) the south-eastern woodland
- 4) the eastern section of the main lake

This will provide information on the bat fauna if a nighttime assessment is carried out between early June and September and on badgers and otters. Given that the main sett is known, it would also be possible to carry out survey work even in summer to check on badgers.

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The key elements to be monitored at Luttrellstown are the four sites listed in the previous section (i.e.)

- 5) the Glen and the associated structures ("The Folly" and the tunnel)
- 6) the western farmyard and adjoining woodland
- 7) the south-eastern woodland
- 8) the eastern section of the main lake

This will provide information on the bat fauna if a nighttime assessment is carried out between early June and September and on badgers and otters. Given that the main sett is known, it would also be possible to carry out survey work even in summer to check on badgers.

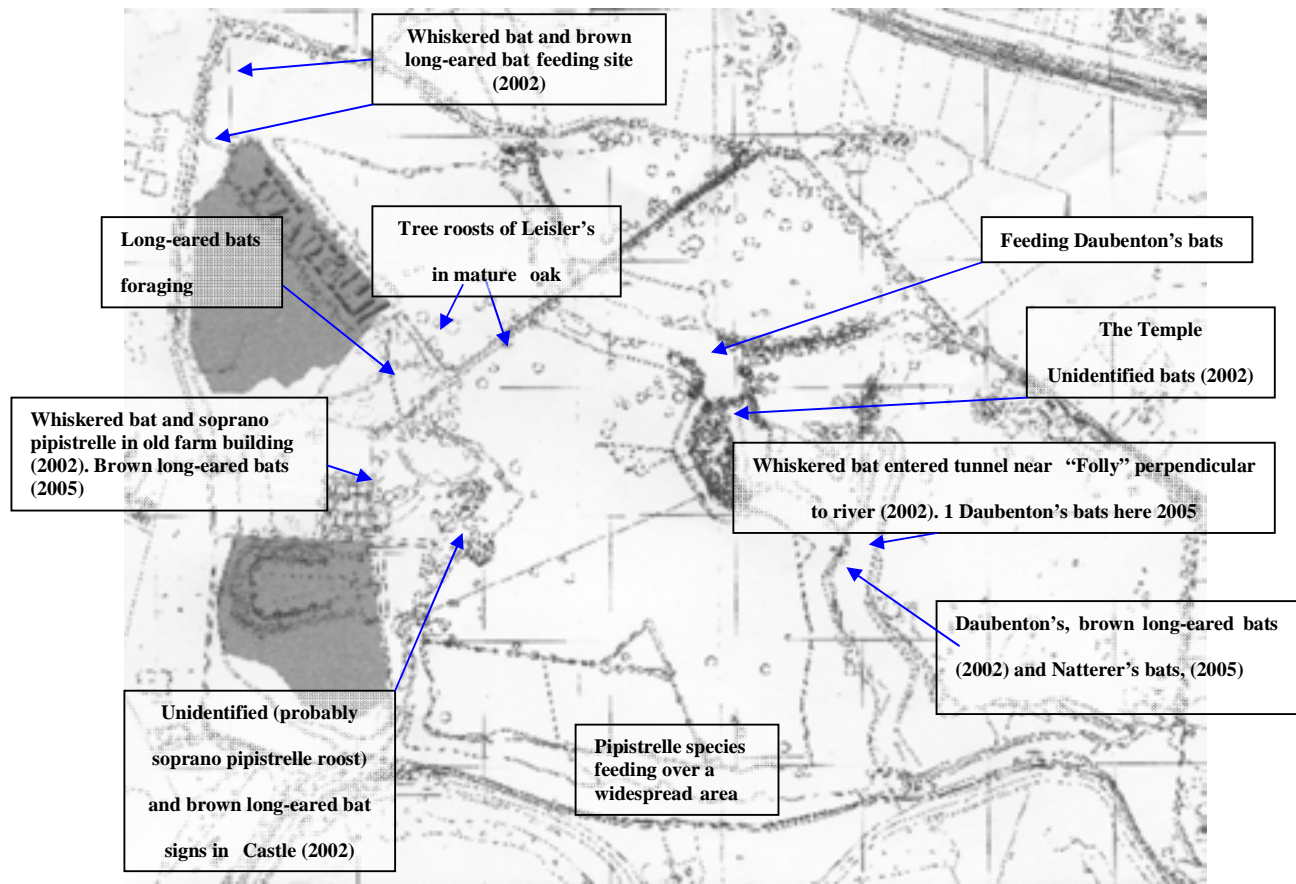


Figure 1: Bats in Luttrellstown. Brown long-eared bats were well represented on the estate. Pipistrelles, Daubenton's and Leisler's bats were noted during the two surveys. Natterer's bats were present in 2005 and whiskered bats were present in 2002.



Figure 2: Luttrellstown Castle
 showing (above) two roost sites on the roof and below:
 (a) Entrance to attic with bat roost
 (b) Bat dropping pile in attic
 (c) Typical roosting site entrance
 (d) Other Attic spaces (not noted to be in use)



Figure 3: Brown long-eared bats in farm buildings at Luttrellstown



Figure 4: (a) Brown long-eared bat roost in “The Folly”. (b) Bat in flight. (c) Tunnel entrance near “The Folly”

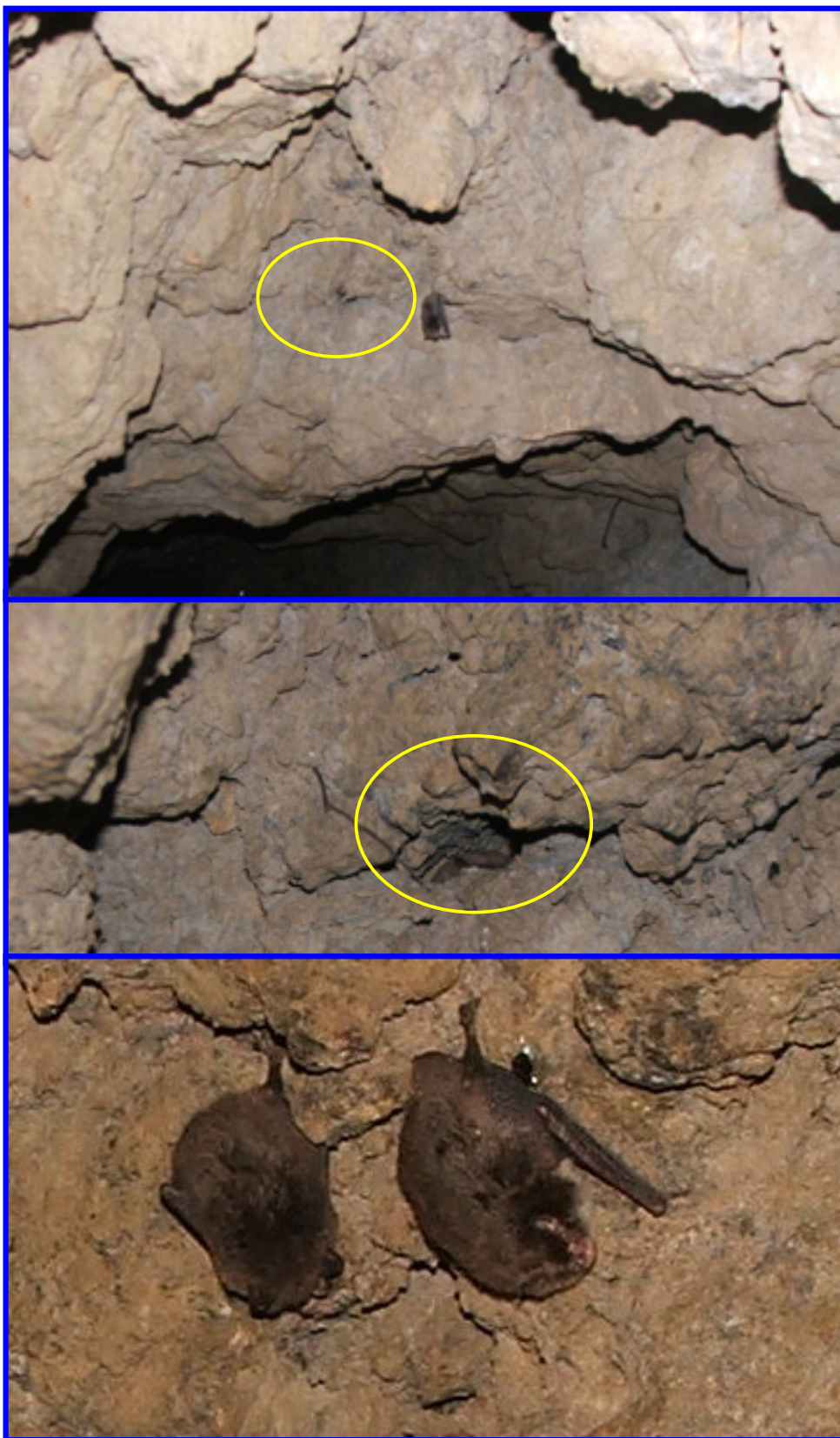


Figure 5: Daubenton's bats in the tunnel in the Glen.
The crevice into which one bat entered is highlighted



**Figure 6: Two Leisler's bat mating roosts (top) and other typical Leisler's bat mating roost trees (middle)
Badger paw prints in mud (below)**



Figure 7: Badger sett entrances at the main sett

**Mammals Of
Knockmaroon House,
Knockmaroon, Castleknock
Dublin**

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December 2005

Mammal assessment- Methodology

Knockmaroon House estate was examined for the presence of bats and other animals during three separate visits, one daytime examination of sites such as the stable yard, sheds and outbuildings at the main house, one nocturnal for the bat detector evaluation of the estate and one daytime in winter to identify sites occupied by ground-based mammals (e.g. badgers).

The survey dates were September 2nd and 3rd (bats) and November 13th 2005 (all other mammals). The bat assessment involved a nighttime bat detector survey commencing at the main house and examining all buildings, mainly externally with some outbuildings undergoing a more thorough examination. Surveying commenced at sunset and continued until sunrise (the survey period commenced at 9.00 pm and continued until 5.00 am).

A combination of bat detectors was used for corroboration: a Pettersson D240X and a QMC Mini3 heterodyne bat detector.

The bat detector assessment commenced in the stable yard following a daytime examination of the buildings for evidence of bats. The estate was then traversed on foot (not the steep wooded slopes as this was impossible in darkness), providing coverage of the pasture, parkland and the edge of the estate leading down towards the Liffey.

Evaluation for other mammals involved an examination of all tree lines, woodland / plantations, hedgerow, ditches, streams and burrows for faeces, paw prints, tracks or other signs of resident or passing species. Mr Malachy Guinness and Mr Ciaran Guinness were questioned regarding any observations they may have made on the mammals of the estate.

Species of bat at Knockmaroon House

Leisler's bat	<i>Nyctalus leisleri</i>
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Common pipistrelle	<i>Pipistrellus pipistrellus</i>
Whiskered/ Brandt's bat	<i>Myotis mystacinus/ brandti</i>
Brown long-eared bat	<i>Plecotus auritus</i>

A Leisler's bat was noted to emerge from the roof of a house on the stable yard and returned to this roof at sunrise. The occupants of the house had earlier stated that no bats roosted within the house. The bat emitted very loud squeaks clearly audible up to ten metres away from the house.

A Leisler's bat male was calling from a mature beech tree on the edge of farmland during the night.

A soprano pipistrelle also returned to this roof at sunrise. This species was heard flying over the house during the night emitting social calls. Common pipistrelles were also noted occasionally throughout the site including along the eastern edge of the estate.

A whiskered bat/ Brandt's bat was noted flying along the former main avenue (no longer leading to the main house) that enters from the Farmleigh cross-roads south-westerly. A whiskered/ Brandt's bat was also encountered on the steep hill marking the western edge of the estate.

Bat droppings in a storage shed to the west of the main house indicate the presence of brown long-eared bats here although none were seen.

Bat numbers were not high on the estate but there are clearly ample roosting opportunities for bats.

The author visited the estate previously (c. 1992) to examine a tree within which bats had been heard squeaking. The bats were within the tree and could be heard squeaking and some droppings could be seen. However, the tree was not easily accessible and the species of bat was not determined. This tree may have been felled in the interim.

Other mammals

Badger	<i>Meles meles</i>
Fox	<i>Vulpes vulpes</i>
Rabbit	<i>Oryctolagus cuniculus</i>
Grey squirrel	<i>Sciurus carolinensis</i>
Brown rat	<i>Rattus norvegicus</i>
House mouse	<i>Mus musculus</i>
Wood mouse	<i>Apodemus sylvaticus</i>
Fallow deer	<i>Cervus (Dama) dama</i>
Irish hare	<i>Lepus timidus hibernicus</i>
Stoat	<i>Mustela erminea hibernica</i>
Hedgehog	<i>Erinaceus europaeus</i>

At least two badger setts occur within the estate. There is a large area of sloping hill facing down towards the River Liffey, sections of which are extremely difficult to penetrate. The setts that were identified were a 3 entrance and a 4 entrance sett both to the eastern side of the estate and both on the woodland edge allowing badgers to gain access to woodland and pasture easily. Of the 4 entrance sett, 3 entrances were in the wood while the fourth was within the field. This is a typical location for a sett.

There were signs of badger digging within the pasture. In the north-western edge of the estate, there were large tracks probably of badger origin but there were no current signs of badger activity. The author has been aware of badgers in this estate over the past 15 years but it would appear from discussions with the residents and staff that badger activity has lessened.

Fallow deer regularly enter the estate from Phoenix Park and grey squirrel although shot by residents and staff are numerous.

An outdoor swimming pool previously served as a breeding site for newts (*Triturus vulgaris*). This pool has been reclaimed (i.e. cleaned and covered with plastic when not in use) and is now devoid of newts.

Significance of Knockmaroon House for Mammals

The mammal fauna at Knockmaroon is very much what would be expected here. The badger activity has dropped within the estate with no clear explanation for this.

The bat fauna within the estate is potentially more numerous than would appear from this assessment. While there was a diversity of bat species, the number of bats encountered was very low. If this is representative of the bat numbers throughout the year, then this is a surprisingly low take-up of roost opportunities. Equally, bats may be availing of trees more than buildings on the estate.

The presence of a number of mature trees with cavities (oaks, beech, cherry) would create suitable conditions for species such as the Leisler's bat and the whiskered bat while all other bat species in this area also avail of tree roosts occasionally.

Species such as the Daubenton's bat, relatively common along the Liffey Valley, would also benefit from the proximity of mature trees to the river and while Daubenton's bats were not noted to feed within the estate, they may well roost in trees here.

There are a number of roost options for bats including a farmyard, a large stable yard and the main house. Bats have not been encountered within the main house and given their interest in wildlife it is the family would have noticed any large numbers here.

The tree-covered slopes may have good potential for bats but access at night would be difficult for one person to examine safely.

In 1997, ultrasonic signals of a species of bat unrecorded in the hand in Ireland, the noctule (*Nyctalus noctula*) was purportedly recorded by two world-renowned bat specialists, Professor Ingemar Ahlén and Dr. Hans Baagøe in Chapelizod, an area close to this estate. As the noctule is primarily a tree-dwelling species in Britain (the closest population), it is likely that this species will be found in tree roosts if it is present in Ireland. Knockmaroon House, Farmleigh and the Phoenix Park would all be the most likely locations for such a species.

Noctules (and Leisler's bats) are noisy occupants of tree cavities and either of these may account for the tree roost discussed earlier

Monitoring of the Mammal Fauna at Knockmaroon House

The mammals at Knockmaroon are easily monitored throughout the majority of the estate and would require a bat detector assessment and a mammal walk-through survey. The wooded slope would best be examined by two people together for safety reasons as this terrain is very overgrown and difficult to manage in darkness.

Examination of some of the trees would be of interest and this would be simplified if bat boxes were erected throughout the estate on the larger trees to provide easily checked roost sites. This is a privately owned estate but given the interest of the family in wildlife, bat boxes would be welcome if provided and erected.

Surveying in mid June may provide evidence of bats in greater abundance during the breeding period.

**MAMMALS OF
BEECH PARK HOUSE AND
BARBERSTOWN,
CLONSILLA**

Brian Keeley

B.Sc. (Hons) in Zool.

Mammalogist

December 2005

Mammal assessment- Methodology

The Beech Park House lands and adjoining lands at Barberstown were examined for the presence of bats and other animals during two visits: September and November 2005. The bat assessment involved a nighttime bat detector survey commencing at the main house and examining all buildings, mainly externally with some outbuildings undergoing a more thorough examination. Surveying commenced at sunset and continued until sunrise (the survey period commenced at 9.00 pm and continued until 5.00 am).

A combination of bat detectors was used for corroboration: a Pettersson D240X and a QMC Mini3 heterodyne bat detector.

Evaluation for other mammals involved an examination of all hedgerow, ditches, streams and burrows for faeces, paw prints, tracks or other signs of resident or passing species. Mrs Mary McDermott and family were questioned regarding any observations they may have made on the mammals over their period of residence.

The bat survey was undertaken on September 3rd / 4th, 2005 within the estate while the further mammal assessment was carried out on November 13th 2005. The terrain surrounding the Barberstown estate was also examined on a subsequent date in September (20th) for bat activity.

Species of bat at Beech Park House and Barberstown

Whiskered/ Brandt's bat	<i>Myotis mystacinus/ brandti</i>
Daubenton's bat	<i>Myotis daubentoni</i>
Brown long-eared bat	<i>Plecotus auritus</i>
Leisler's bat	<i>Nyctalus leisleri</i>
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Common pipistrelle	<i>Pipistrellus pipistrellus</i>

Other mammals

Fox	<i>Vulpes vulpes</i>
Rabbit	<i>Oryctolagus cuniculus</i>
Grey squirrel	<i>Sciurus carolinensis</i>
Brown rat	<i>Rattus norvegicus</i>
House mouse	<i>Mus musculus</i>
Wood mouse	<i>Apodemus sylvaticus</i>
Hedgehog	<i>Erinaceus europaeus</i>
Otter	<i>Lutra lutra</i>
Irish hare	<i>Lepus timidus hibernicus</i>
Stoat	<i>Mustela erminea hibernica</i>

The most significant species of bat at Beech Park House is the whiskered bat (or Brandt's bat). This species was encountered in a number of places around the estate but most commonly flying within a corrugated hay shed to the canal side of the housing. Towards sunrise, the bat was flying in the corrugated shed and at the corner of the nearest house. It is not known where the bat finally returned as observations were interrupted by residents of the house.

The other area where activity was noted over a period was the tree line leading from the walled garden running southwest to the edge of the estate.

The most notable site for bats overall on the estate was the stream running south-east from the walled garden towards the gate of Luttrellstown Castle. Within the sheltered pond that comprises the area closer to the walled garden, bat activity was significant and both soprano pipistrelles and Daubenton's bats were very conspicuous here. A relatively large number of soprano pipistrelles were present (in excess of six) and two Daubenton's bats were noted at any one time. A small number of Daubenton's bats were noted in a survey of the Royal Canal passing close to these farms (Beech Park and Barberstown) in 2004.

Occasional common pipistrelles were noted around the perimeter of the main house while a soprano pipistrelle male called here also.

A Leisler's bat male was actively calling on the woodland edge and over the grassland to the south of the main house, over flying the main avenue east to west.

A brown long-eared bat was noted flying in and out of sheds to the rear of the main house and returning to buildings behind the house towards sunrise.

Fox scats and scent were widespread and foxes were reported by the McDermott family who occupy the main house. Rabbit warrens and droppings were ubiquitous and were clearly a target of fox visits based on the positioning of the scats and urine scent. Large entrances at the railway embankment may indicate the presence of a fox earth here but the main presence here is rabbit.

Rodents were most in evidence towards the railway but it is probable that rodents are present throughout the estate.

A young hedgehog was noted by the McDermott family early in 2005.

No evidence of otters was noted on the estate nor were the residents aware of any otter activity. That otters entered the Luttrellstown estate from Beech Park House and Gardens (now obsolete) was proposed by Mr. Paddy Smith of the Luttrellstown staff. This may be possible but there was some evidence that otters moved from the River Liffey to Luttrellstown rather than from Beech Park House. Otters are known to frequent the Royal Canal although a survey in 2004 provided no evidence of their presence in this section of the canal.

It is probable that hares occur on the farm and on adjoining farms as they are present in Luttrellstown across the road. Equally, stoats are very likely occupants or visitors to the farm for the same reason.

Bat activity at Barberstown was not examined to the same extent as access to the site was not secured. Common pipistrelles were noted at sunset in farm buildings along the perimeter road leading to the railway level crossing. Leisler's bat activity was first noted to the west of the estate and later to the northwest of the estate.

The Barberstown estate is an exposed stud farm and has less cover for mammals. The ditch between these two farms provides some of the best opportunities for mammal abodes but no setts were noted here.

The only potential sett was noted in the Beech Park House section of railway embankment and other burrows in the separating ditch to the south-eastern edge of Barberstown offer good potential but no evidence of any species other than rabbit and rat.

Significance of Beech Park House for Mammals

The most significant fauna at Beech Park House are the bats. Here, whiskered bats were almost certainly roosting, while Daubenton's and soprano pipistrelle bats fed along the water body between the house and the road passing between here and Luttrellstown. This water body was undergoing major works possibly of dredging or vegetation clearance and was devoid of water in November 2005.

Bat activity was concentrated into a relatively small area; around the houses and farm buildings out as far as the midpoint of the stream flowing to Luttrellstown.

There was little evidence of badgers, otters and other larger mammals and overall the estate was less important for these species than would be expected.

Monitoring of the Mammal Fauna at Beech Park House

Only the bats on the estate merit any monitoring and the fauna concentrates into an area with its focal point in the vicinity of the houses and stretching little more than 200 metres in radius.

**Mammals Of
Somerton House,
Astagob, Castleknock
Fingal, County Dublin**

December 2005

Potential of the Somerton Estate for Mammals

As the resident family refused access to this estate the following report can only deal with observations made on areas accessible to the public, the perimeter of the estate and adjoining sites within which bats were feeding that were potentially emerging from Somerton.

The estate is approximately one third the area of the Luttrellstown demesne and from an examination of the map, there are clearly a number of buildings with high potential for bats. Part of the estate has been developed as a hotel and there is a golf course in construction adjacent to the hotel. Further development is ongoing and has received planning permission.

No bat assessment was undertaken on this estate as part of the Environmental Impact Statement for the development although it would appear to be a site with great potential for bats, given the presence of old buildings, parkland, the proximity of the River Liffey and wooded areas on the eastern side of the main estate.

Mammal observations at Somerton

An evaluation of the bat fauna on the hotel grounds and around the perimeter of the estate was undertaken on September 1st 2005 as well as repeat examinations through the Liffey Valley as part of an overall examination of the mammal fauna here.

High levels of bat activity were noted directly south of the Somerton estate predominantly comprising soprano pipistrelles and Leisler's bats. Common pipistrelles were common along the perimeter road at the north-western and north-eastern corners of the estate but the bats were not encountered along the northern perimeter where the new Castleknock Hotel and Golf Club has been built.

This hotel complex is extremely brightly lit throughout the exposed car park, so much so that it is moderately dazzling to the eyes of motorists passing on the public road. No bats were noted within this area at any time. Nor did bats fly over or around the newly created lakes or on any part of the examinable golf course area. At the time of survey, this area was very bare of vegetation.

A whiskered/ Brandt's bat flew past the entrance gate on the east side of the estate within an hour of sunset and were later encountered 100 metres south of the gate. It is highly probable that this bat is roosting here.

The nearest site at which this species was encountered in 2005 was the Knockmaroon estate to the east of here.

Given that brown long-eared bats are present in Knockmaroon, Beech Park House and Luttrellstown, it is highly probable that they are also present at Somerton.

This would then provide a potential bat fauna for this estate of the following:

Soprano pipistrelle and common pipistrelle

Leisler's bat

Brown long-eared bat

Whiskered / Brandt's

(Species such as Natterer's and Daubenton's bat cannot be ruled out.)

Other mammals

Badger tracks could be seen emerging from the estate to the south of the main gate. Clearly species such as grey squirrel (and all other common rodents), rabbit, hare, hedgehog and fox are all probable components of the mammal fauna.

Significance of Somerton House for Mammals

It is not possible to entirely address the importance of Somerton House as a reservoir or shelter for mammals satisfactorily. The presence of whiskered bats on site would raise a concern in relation to the effects of development here on the bat fauna within any buildings due for alteration.

Whiskered bat roosts are not readily discernible to untrained persons and bats may be entombed or otherwise injured/ killed during restoration or demolition.

Monitoring of the Mammal Fauna at Somerton House

It is hoped that there will be future access to this estate to allow a proper evaluation of the mammal fauna. Alternatively, monitoring will necessitate examine from the perimeter to identify bat feeding and commuting activity.

In the absence of co-operation, it can only be assumed from survey work that where bat species are unrecorded in future surveys that they have been negatively affected by development. This may range in impact from a loss in suitable feeding up to wilful destruction of roosts or killing of bats.

A BAT ASSESSMENT OF 1) COLDBLOW AND 2) WESTMANSTOWN/ LARAGHCON

Brian Keeley B. SC. (Hons) in Zool.

1) Coldblow

The bat fauna of Coldblow was examined on the night of September 12th 2005 to determine the relative abundance bats based on the number of interactions with flying and feeding bats and to identify the species of bat present here. The survey kept to within the agricultural area and away from St. Catherine's Wood to ensure that the ecological value of the agricultural land itself rather than the woodland edge was examined.

The survey area covered the agricultural land away from the hedgerow boundaries to the west and north, the avenue leading into St. Catherine's Park (examined in 2003) and away from the wood itself.

All bat activity was noted from sunset and for a period of three hours. The site was repeatedly visited on three separate occasions to determine whether results were affected by weather conditions etc.

The commencement of the survey and the following two hours were mild and dry with increased winds towards the latter period of the assessment. On all other nights, conditions commenced mild and dry with subsequent deterioration of weather conditions to frost or cold temperatures above freezing.

The results of this assessment are compared with the adjoining woodland as studied in 2003 by the author.

Bat fauna of agricultural lands at Coldblow

In all, one bat was encountered within the agricultural lands at Coldblow during this assessment. This was a Leisler's bat flying over the site, commuting rather than feeding.

Other mammals within the farm were a fox, feral goats and rabbits. Badgers are known to feed on the farm and live in St. Catherine's Wood.

Within St. Catherine's Park, common and soprano pipistrelles, Leisler's, whiskered (/Brandt's) and Daubenton's bats were all noted in a survey in 2003. A whiskered bat was noted along the woodland edge on the 2003 survey.

Brown long-eared bat activity was noted along the tree-lined avenue running east-west towards St. Catherine's Park in a survey in 2003. This path is flanked by mature beech and ash and roost sites are likely within the trees themselves suitable for brown long-eared bats.

In relation to roost potential, there are several buildings with potential for bats within the farmland. These all bound the public road but this is unlikely to be significant in terms of their take-up as roosts.

Hedgerow leading towards the Royal Canal may have shown greater activity if it had been included but an examination of the Canal in 2004 showed patchiness in bat feeding activity rather than great abundance or diversity of bats along the entire stretch. The bat activity along the stretch of Canal level with St. Catherine's Park was nil in this earlier study.

2) Westmanstown/ Laraghcon

The bat fauna of the Westmanstown/ Laraghcon site to the south-western edge of Luttrellstown was examined for the presence of bats over a number of nights in September 2005 between the 2nd and 18th to provide data on the species of bat present and levels of bat activity. This included visits to Coldblow, Luttrellstown and the Liffey Valley for the purpose of comparison.

The level of bat activity was low throughout most of the site with a concentration of activity in the northern edge of the area (the road running east-west to the Luttrellstown western gate). The species present were soprano and common pipistrelles.

A single soprano fed along the south-western edge of the area.

Pipistrelles were present along this east-west road on most of the nights of examination.

No Leisler's bats were noted during this study even though they were present to the north-east of here in Luttrellstown and to the south-west in Coldblow/ St. Catherine's Park. A number of individuals of this species were noted flying over the Westmanstown golf club at emergence time in a casual assessment of the Royal Canal by the author approximately 10 years ago. It may be that the roost site of this species was lost and that this species is not as locally abundant as formerly.

Significance of bat fauna at Coldblow and Westmanstown/Laraghcon

The bat fauna in these two sites is depauperate and the numbers of bats and number of species within the agricultural land is limited. To the west of Coldblow and to the east of Westmanstown, bat fauna is considerably more diverse and abundant. Even within the Coldblow site, the avenue running east-west offers more feeding opportunities than the entire agricultural area.

The principle features in a landscape for bats are typically the sites where insects cluster or hatch (hedgerow, tree lines, wet ground, rivers, lakes, ponds free from direct illumination and with cover against strong cross-winds and (for some if not all species) availability of vegetation cover to assist in evading aerial predation by birds of prey and owls.

In areas of intensive agriculture, there is a drive towards the removal of hedgerow and ditches to allow ease of movement for harvesting equipment and a consequent increase in field size and exposure to wind and rain. Cereal crops are intensively sprayed against insect and fungal attack and do not give rise to the insect diversity associated with grazing animals.

Areas such as these may be of greater benefit to bats and other mammals if there are mature lines of vegetation, preferably dense hedgerow to create connections between different estates such as Luttrellstown and St. Catherine's Park.

Monitoring of the Bat Fauna

There is little to learn from monitoring these sites unless they are improved for wildlife in terms of the amount of cover for mammals.

Clearly, they may serve a role in allowing the movement of bats between the various estates along Liffey Valley and hence reducing the isolation of populations that may arise from increasing development both around and within the protection of the demesnes and estates.

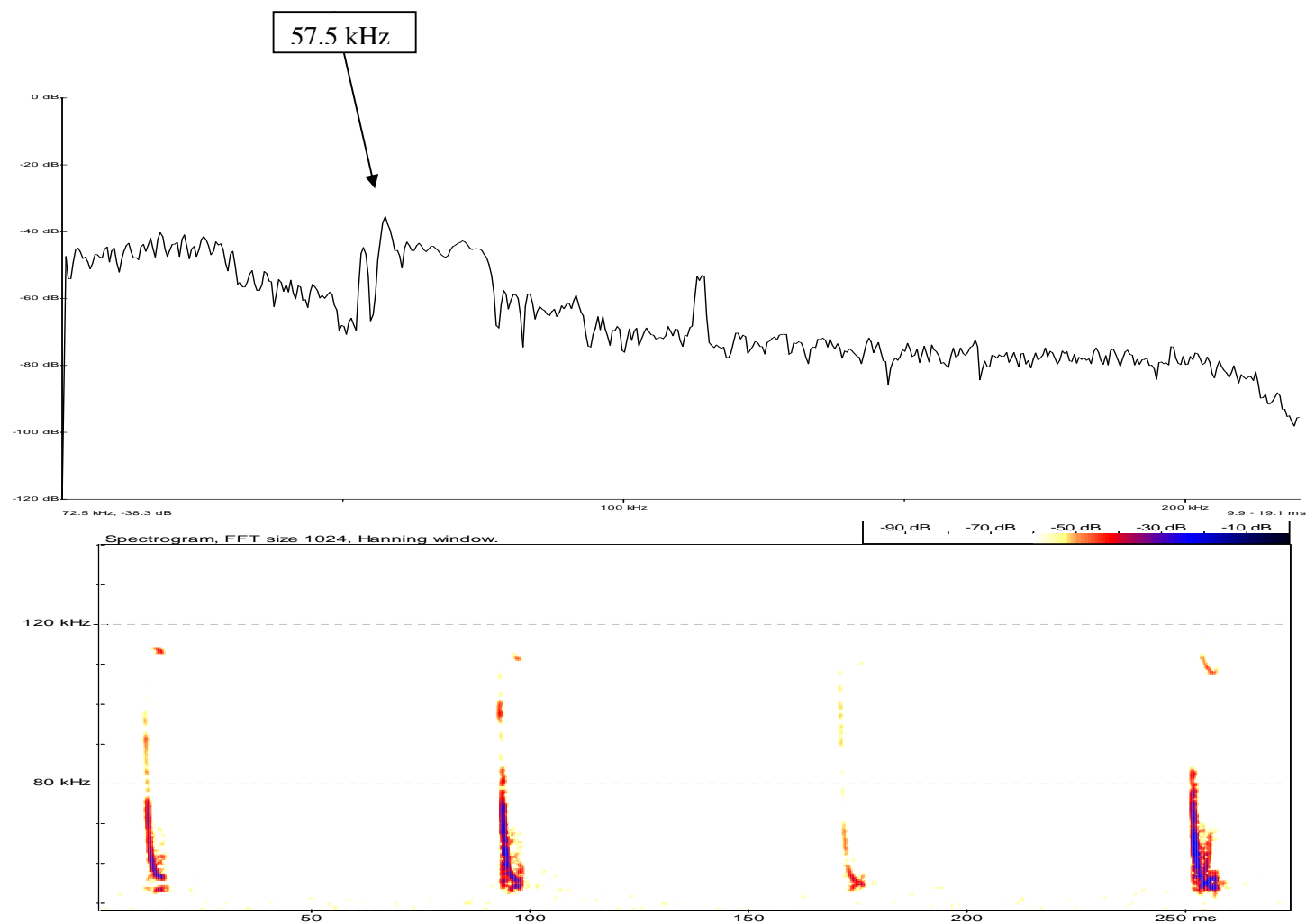


Figure 1: Typical signal of bats in the area to the west of Luttrellstown and close to Westmanstown.
The graphs show a soprano pipistrelle bat call peaking at 57.5 kHz.

**A MAMMAL ASSESSMENT OF THE
RIVER LIFFEY FLOOD PLAIN
(INCLUDING THE BROOMFIELD ESTATE)**

Brian Keeley B.Sc. (Hons) in Zool.

December 2005

The mammal fauna of the Liffey Valley flood plain was examined during two periods; September and November 2005. The bat fauna was examined during the period September 1st to September 23rd 2005, including two days (4th and 5th September 2005) during which the entire section was walked and additional car survey work when the transect (the river road through the Strawberry Beds and up to Lucan) was driven.

The main approach to the survey of this area was to walk along the riverbank where this was feasible and alternatively to walk along the road side closest to the river at night with the aid of two bat detectors a QMC Mini 3 heterodyne bat detector and a Pettersson D240X heterodyne and time expansion bat detector to allow for the cross-checking of bat signals encountered by two methods.

Surveying was difficult along the river for a number of reasons. Firstly, the road users are most often driving at speeds in excess of a safe limit given the narrow width and windiness of the road and thus there is considerable time and effort given to avoiding traffic. Secondly, the river becomes deep quickly and there is a safety consideration regarding any nighttime work here.

Surveying for otters is best undertaken from within a river and towards the river bank. Clearly, this is not possible for the River Liffey. Surveying is also best undertaken when vegetation has died back entirely. The deadline to meet funding criteria and the timing of surveying makes this impossible.

The flood plain was examined for the presence of badgers, otters and other terrestrial mammals on November 14th and November 15th 2005.

The widest section of land along the river not included in the estates examined as part of the overall study of this area of Fingal is the Broomfield estate. All of the area here was examined for evidence of mammal burrows. Access was not sought at night to examine for bats as the residents reported that they had never had bats roosting within the buildings and also security was clearly a consideration for the couple living here.

Species of bat present

Daubenton's bat	<i>Myotis daubentoni</i>
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Leisler's bat	<i>Nyctalus leisleri</i>
Common pipistrelle	<i>P. pipistrellus</i>
Brown long-eared bat	<i>Plecotus auritus</i> (previous record)

The bat that one would expect to be in evidence along the River Liffey was noted feeding here, the Daubenton's bat. One area within which this species was noted to feed was directly under the supports of the M50 between the Somerton estate and the Knockmaroon estate as well as in front of the boat club to the east of here.

Nowhere were bats as numerous along this stretch of the River Liffey as was noted at St. Catherine's Park, Lucan in 2003 (reported by the author as part of a survey for Fingal County Council). Daubenton's bats here fed in a cluster of three or four individuals.

Daubenton's bats were noted up to and beyond Lucan village at Shackleton's Mill, to the west of Broomfield and east as far as the "Angler's Rest" pub at Knockmaroon.

Soprano pipistrelles were more abundant than Daubenton's bats and were numerous in a garden in Astagob, were present at a boat club close to the M50 and along the road at Luttrellstown (outside Broomfield) and along the riverbank at Knockmaroon.

Leisler's bats were noted at Knockmaroon, in a garden at Astagob and flying over the flood plain for a sustained period (approximately 15 minutes). A Leisler's bat was noted at Lucan Bridge close to lighting several hours after sunset. This is a behaviour that has been noted repeatedly during these surveys, where Leisler's bats switch feeding strategy after darkness.

Common pipistrelles were noted occasionally along the road including at Luttrellstown and at Astagob, south of Somerton. This species is less closely associated with water courses and is widespread in most habitats.

Pipistrelles roosting within the former Shackleton's Mill were most probably common pipistrelles but the identity or presence of the two cryptic pipistrelle species had not been highlighted when these bats were observed (prior to 1992).

Evidence from Shackleton's Mill also revealed that brown long-eared bats had been present at a previous date but there were no signs of occupation at the time of examination.

This species was heard previously along the Liffey floodplain (c.1996) and it is almost certain that it occurs in this area as it is known from Luttrellstown and Knockmaroon (see the respective surveys of these estates as part of this series of studies).

No bats have been noted by the residents of Broomfield roosting within the house or the small stables.

This area of the river would certainly appear to be a good feeding area with a small number of potential tree roosts. The presence of the Luttrellstown estate in close proximity clearly offers a large variety of roost types and feeding areas for bats.

Activity upon the river itself was typically Daubenton's bat and soprano pipistrelle while Leisler's bat activity along the wet fields of the flood plain and along the river itself was noted. This is a common observation for rivers such as the Liffey and this has been observed in stretches of the Boyne at Slane, the Slaney at Enniscorthy, the Suir at Lismore and the Nore at Kilkenny city. Leisler's bats will often feed along such rivers early in the night.

Bat species such as the Natterer's bat will feed over the river surface itself as well as in cover like the brown long-eared bat.

The river and its flood plain provide feeding for bats directly as well as by creating breeding sites and shelter for insects that may also be found away from the river.

Other mammal species

Rabbit	<i>Oryctolagus cuniculus</i>
Brown rat	<i>Rattus norvegicus</i>
Otter	<i>Lutra lutra</i>
Fox	<i>Vulpes vulpes</i>
Grey squirrel	<i>Sciurus carolinensis</i>
House mouse	<i>Mus musculus</i>
Wood mouse	<i>Apodemus sylvaticus</i>
American mink	<i>Mustela vison</i>

Species likely to be present

Badger	<i>Meles meles</i> (feeding)
Irish hare	<i>Lepus timidus hibernicus</i>
Fallow Deer	<i>Cervus (Dama) dama</i> (from Phoenix Park, Knockmaroon House and Luttrellstown)
Hedgehog	<i>Erinaceus europaeus</i>
Stoat	<i>Mustela erminea hibernica</i>

There was little clear evidence of occupation of the area closest to the river by larger mammals. Most mammal evidence was either rabbit or rat. Some of the rabbit burrows at Broomfield are large enough to accommodate otters but there was no evidence of otters around these warrens/ burrows. An otter spraint was noted at the eastern edge of this estate and clearly otters pass along this stretch of river regularly.

No otter holts were evident in the accessible sections of the riverbank but the time of survey would render it more difficult to note any holts that were inactive at this time. No spraints were evident at the bridge at Lucan at the areas that were readily accessible to examination.

Foxes were identifiable from scats close to rabbit warrens and these are likely to be living in the demesnes along the river but may even use expanded rabbit warrens. Foxes do not dig as extensive a shelter as badgers and may occasionally occupy sites that badgers would shun due to their wetness.

Badgers were not noted in any of the areas examined close to the river including Broomfield. Nor had the owners of this estate encountered badgers at any time on the farm.

Badgers are numerous across the road in the Luttrellstown estate and it is probable that feeding along the farmland here occurs.

Mink were believed by the owners of the estate to be present and they have been trapped in the Luttrellstown estate. They are likely to connect with the river, Luttrellstown and possibly the Royal Canal to the north.

Species such as hare are often found in flood plains of rivers and their presence in Luttrellstown would again imply that they would occasionally or regularly frequent the Liffey floodplain.

Significance of the Liffey Valley Floodplain for Mammals

Clearly, the most significant aspect of the River Liffey in terms of mammals based on the conservation status in European terms is the presence of the Eurasian otter. While this is not unusual in Irish terms, with over 90% of rivers utilised by otters for feeding, resting and breeding, the otter has a protection status equal to the lesser horseshoe bat.

The bat fauna is less than that of the adjoining demesnes but this may be more a result of the nature of a short-term evaluation of the site and it is possible that species such as whiskered (/Brandt's) and Natterer's bats feed along the river.

Monitoring of the Mammal Fauna of the Liffey Floodplain

The presence and status of otters along the River Liffey would best be monitored by an examination of the bridges, weirs, prominent stones along the river for spraints. Searching for holts would require a winter/early spring assessment along the riverbank and may also require a river-based approach (e.g. from a canoe).

Positioning of suitable stones along the riverbank may assist in encouraging sprainting at a site that can be easily checked (e.g. the base of the M50 bridge). These supports would also be of benefit for the erection of bat boxes to assist in identifying the species of bat present along the river. A Schwegler bat box and a larger timber maternity box could be erected here in areas exposed to solar radiation. These could then be the basis for confirming species composition and breeding along the River Liffey at a future date.

Acknowledgements

Special thanks are due to all of the landowners who consented to the daytime and nighttime surveys within the demesnes and farmland including Mrs Mary McDermott, Mr. Malachy and Mr. Kieran Guinness. Thanks are due to Mr. Paddy Smith for his observations on the Luttrellstown demesne.

Within the text of these reports, reference is made to Fingal County Council surveys undertaken by the author along the Tolka and Ward rivers, in St. Catherine's Park and along the Royal Canal. These are available from the author or through Fingal County Council.