



**An Introduction To  
The Bats of  
Scotland**

**1<sup>st</sup> Edition  
December 2006**

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## Contact Details

Any queries relating to this publication or the details within should in the first instance be sent by email to:

Neil Middleton

**Echoes Ecology Ltd**  
25 Killin Drive  
Polmont  
Scotland  
UK  
FK2 0QQ

Email: [neil.middleton@echoesecology.co.uk](mailto:neil.middleton@echoesecology.co.uk)

Website: [www.echoesecology.co.uk](http://www.echoesecology.co.uk)

## Introduction

This booklet is by no means intended to be a definitive field guide, but more of an appetiser to inform those interested in finding out about the bat species occurring within Scotland.

We would appreciate any suggestions, records or photographs that would make this account more accurate and, naturally, any such contributions will be credited within future editions.

Bats are poorly understood and fascinating mammals. Within Scotland we have at least 8 species of bat occurring as breeding residents, with two further species (Nathusius' pipistrelle and Brandt's bat) thought to possibly breed, albeit to date no breeding records have come to light.

Nathusius' pipistrelle has been recorded quite a few times, during field surveys, using bat detectors.

Brandt's bat, which does occur in northern England, has not been encountered within Scotland since the nineteenth century. It is very similar to a recognised, albeit rare resident, Whiskered bat. It can be very difficult to tell these two species apart in the hand and impossible to differentiate them in the field using bat detectors. Needless to say that bat workers who are lucky enough to encounter Whiskered bats in Scotland should always consider the possibility of Brandt's in their assessment.

The diversity our bat heritage reduces, the further north you travel in the country, with only a few species found in the far north of the mainland (e.g. Bandit pipistrelle and Daubenton's bat). Bandit pipistrelle also occurs in the Orkney Isles, the Isle of Lewis and a number of the Inner Hebrides. Brown long-eared has also been recorded on a number of the Inner Hebrides (e.g. Mull).

Although some of the species that occur within Scotland are not easily encountered, the further south you are, the more it is possible (e.g. in areas such as Dumfries & Galloway) to come across almost all of our established resident species living in fairly close proximity to each other.

## Conservation Challenges

In many cultures bats have numerous myths and misunderstandings pertaining to their behaviours (see Table 1). This, far too often, results in their illegal persecution and the destruction of their roost sites. Much of the knowledge which exists within the mainstream of our own culture is indeed also falsely based. In fact bats have many attributes and perform roles important to the maintenance of a healthy environment. In doing so they also help to make our own lives more bearable.

Table 1: Some myths about insect eating bats in Europe

<b>Myth</b>	<b>Truth</b>
Bats are blind	Bats are able to see perfectly well and in addition they can find their way through the darkness using their own sophisticated sonar system we call echolocation
Bats get caught in peoples hair	This is extremely unlikely to happen. If a bat is flying close to your head it is likely that it is helping you by eating insects that are swarming around you
Bats make nests	Bats do not build nests or create holes etc. They purely use what is already there
Vampire bats occur in Europe	Only 3 species of blood sucking vampire bats exist worldwide. They all occur in South America and usually take blood from livestock and poultry
Bats are evil	Bats are sophisticated mammals that operate during darkness, eating insects (e.g. midges). In many parts of the world (e.g. China) bats are seen as being symbols of good luck and fortune

We are often asked what benefits bats bring to our environment. Like most things within the natural world, bats have an extremely important role to play and they contribute greatly to a healthy, naturally balanced environment as described below in Table 2.

Table 2: The benefits that bats bring to our environment

Insect eating bats (Scotland: up to 10 species)	One pipistrelle bat can eat up to 3,000 insects in a single evening. A colony of 200 can eat almost 110 Million insects in a single year.
	A natural controller of insect populations without the need or expense of chemicals that cause damage to the environment

In order to interact naturally with their surroundings, establish viable populations and indeed survive, bats need all of the following occurring within their immediate environment:

### **- Roosts -**

A choice of different roosts (including alternatives) allowing for different times of the year, unseasonable changes in weather conditions and disturbance. Also, male and female roosting requirements can differ. The following are typical examples of roosting scenarios:

Maternity roosts    Male roosts    Harems / Breeding sites  
Spring & autumn transitional roosts    Hibernacula

Depending upon the species involved a number of these requirements could potentially occur at one site. In reality, however, more often they tend to be separate to each other, albeit in the same locality.

### **- Commuting Corridors -**

Bats need to find their way from their roosts to feeding sites and other roosting sites. This is greatly aided by the presence of linear features along which bats can navigate and orientate themselves in the dark. This is especially true for smaller species and it has been suggested that a gap of as little as 30m in such a feature could act as a barrier to movement for some species. In addition to this, these features also can provide a degree of protection from potential predators, and can act as valuable feeding corridors allowing bats to catch prey whilst travelling to specific foraging areas. On windy nights the leeward side of these features may not only be more attractive to bats because it saves them energy by avoiding the windy conditions, but additionally they can find more insect food which will also be taking shelter for the same reason. The following are examples of features used by bats whilst commuting:

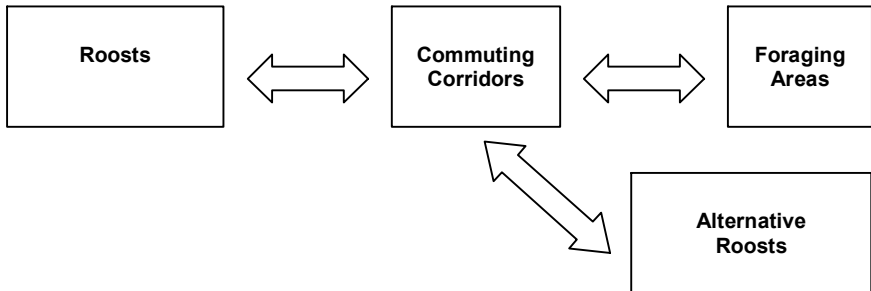
Tree lines    Woodland edge    Hedgerows  
Waterways (i.e. rivers/canals/loch shores)    Woodland tracks

### **- Foraging Sites -**

Finally bats need a healthy supply of food (insects) in order to survive. As such it is important that good healthy insect populations thrive in the environment and are accessible to bats throughout periods of activity.

### Habitat Use Model – Bats in Scotland

The simple model shown below demonstrates the interaction between the required features.



### In Conclusion

If any of the above features are not available or are removed from the immediate environment then bat populations could struggle to be successful. Therefore all aspects relating to these features need to be considered carefully when conserving bats.

### Legal Protection

All bat species in Scotland are legally protected at all times. It is an offence to, amongst other things, intentionally, deliberately or recklessly kill, injure, capture or take a bat. In addition it is also an offence to damage, destroy or obstruct access to any structure or place that a bat uses for shelter or protection (i.e. all bat roosts are protected at all times regardless of whether bats are present or not).

The legal protection given to bats within Scotland stems from many legislative sources including, amongst others, the following:

- The Nature Conservation (Scotland) Act 2004
- The Conservation (Natural Habitats, & C.) Regulations 1994
- Wildlife & Countryside Act 1981

## An Overview Of The Species Present

There are approximately 1000 species of bat worldwide, representing in excess of 20% of all known mammals. Bats are the only mammals capable of active flight and belong to the order Chiroptera.

Table 3 (below) shows the species present in Scotland. In addition to those shown it is also feasible that a further species, Brandt's bat, also occurs in southern Scotland, however this species is very difficult to separate in the field from Whiskered bat and, to our knowledge, no recently confirmed records exist.

Table 3: Bat species present in Scotland

Sub-order	Family	Genus	Species
Micro-Chiroptera	<i>Vespertilionidae</i> (Vesper bats)	<i>Pipistrellus</i>	<i>P. pygmaeus</i> (Soprano pipistrelle)
			<i>P. pipistrellus</i> (Bandit or Common pipistrelle)
			<i>*P. nathusii</i> (Nathusius' pipistrelle)
		<i>Myotis</i>	<i>M. daubentonii</i> (Daubenton's bat)
			<i>M. nattereri</i> (Natterer's bat)
			<i>M. mystacinus</i> (Whiskered bat)
		<i>Nyctalus</i>	<i>N. leisleri</i> (Leisler's bat)
			<i>N. noctula</i> (Noctule)
		<i>Plecotus</i>	<i>P. auritus</i> (Brown long-eared bat)



## Species Descriptions

This section aims to provide an overview of each of the species known to be present in Scotland based upon recent observations. The template used for each species is self explanatory and as far as possible pictures are included. We apologise for omitting photographs for a couple of the species and we would gratefully receive and acknowledge contributions in this area.

All behaviours and measurements provided are typical for the species concerned, but the reader should be aware that differences to typical can occur. These descriptions are designed to give the reader a good overview of the species in question, as opposed to being a thorough account. For considerably more detail on any particular species or aspect of bat behaviour please refer to the 'Further Reading' section at the end of this booklet.

It is also worth stressing that bat echolocation is a complex subject, often relating almost as much to where a bat is and what it is doing, than what it is. As such please treat the echolocation descriptions as being typical for the particular species described, present in its typical habitat and typical distance from clutter. It is not the intention of this publication to give definitive accounts of species specific bat echolocation.

Finally, due to its similarity to Whiskered bat and the lack of any recent confirmed records, we have not included a specific account relating to Brandt's bat.

## ***Pipistrellus pipistrellus* (Bandit or Common pipistrelle)**

### **General Overview**

A common species of bat occurring throughout Scotland, however in some areas it is not nearly as common as the Soprano pipistrelle. Often referred to as Bandit pipistrelle because of the masked appearance created by its dark face. It appears to be a generalist in terms of habitat association, occurring in most habitats provided suitable roosting, foraging and commuting opportunities exist.

### **Identification Features**

**Hair base:** Almost black  
**Dorsal colour:** Brown  
**Ventral colour:** Brown  
**Face:** Black  
**Forearm:** 29 - 34mm  
**Wingspan:** 180 - 240mm  
**Weight:** 3.5 - 8.5g  
**Tragus:** Short and blunt  
**Calcar:** Short with post-calcarial lobe



© J Sinclair, 2006

**Foraging habitat:** Suburban, parkland, woodland edge, farmland and areas near or above water

**Roosts:** Buildings, man-made structures, trees

**Emergence from roost:** Sunset +20mins

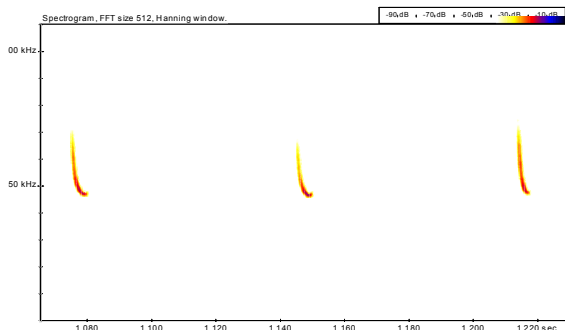
**Feeding strategy:** Hawker

### **Echolocation**

**Call structure:**  
Frequency modulated  
ending with a tail

**Frequency max energy:**  
44 - 47kHz

**Call duration:**  
5 - 7ms



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

### **General Overview**

In some parts of Scotland (e.g. the central belt) our most commonly occurring bat. Studies have shown that it seems to prefer habitat associated with water features, however in some areas of Scotland it has been shown to occur in all appropriate habitat types. On average it is very slightly smaller than Bandit pipistrelle and does not have the black masked appearance.

### **Identification Features**

**Hair base:** Dark brown  
**Dorsal colour:** Brown  
**Ventral colour:** Brown  
**Face & ears:** Brown  
**Forearm:** 28 - 33mm  
**Wingspan:** 180 - 240mm  
**Weight:** 3.5 - 8.5g  
**Tragus:** Short and blunt  
**Calcar:** Short with post-calcarial lobe



**Foraging habitat:** Often close to riparian. Also found in woodland, parkland, farmland and suburban areas

**Roosts:** Buildings, man-made structures, trees

**Emergence from roost:** Sunset +20mins

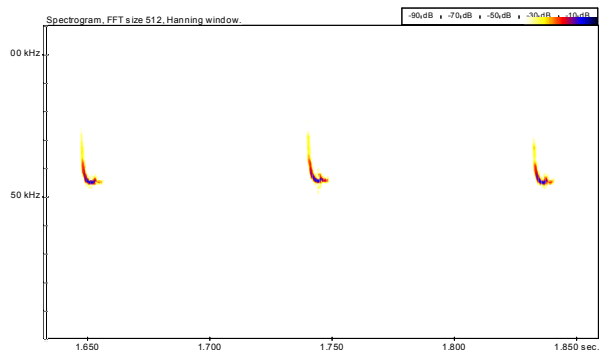
**Feeding strategy:** Hawker

### **Echolocation**

**Call structure:**  
Frequency modulated  
ending with a tail

**Frequency max energy:**  
53 - 57kHz

**Call duration:**  
5 - 7ms



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

### **General Overview**

A very rare bat, only recently found to be breeding within the UK (Northern Ireland and England). So far no breeding records exist within Scotland, however a number of positive identifications using bat detector recordings have been made and it is generally accepted that this species is possibly breeding within Scotland, albeit rarely. This bat is slightly larger than the other species of pipistrelle occurring in the area.

### **Identification Features**

**Hair base:** Dark brown

**Dorsal colour:** Chestnut/reddish brown

**Ventral colour:** Yellow brown

**Forearm:** 32 - 37mm

**Wingspan:** 220 - 250mm

**Weight:** 6 - 15g

**Tragus:** Short and blunt

**Calcar:** Short with post-calcarial lobe

**Tale Membrane:** Hair covers half the upper surface of the tail membrane

**Foraging habitat:** Woodland, parkland, near or above water

**Roosts:** Buildings, trees

**Emergence from roost:** Sunset +30mins

**Feeding strategy:** Hawker

### **Echolocation**

**Call structure:**

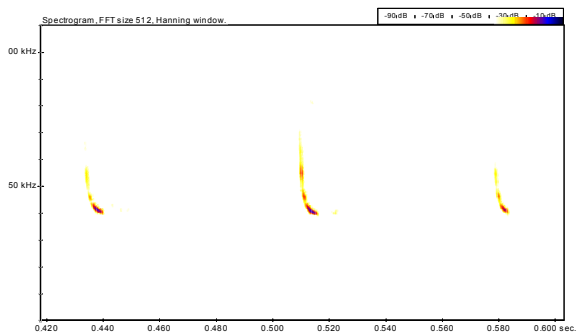
Frequency modulated  
ending with a tail

**Frequency max energy:**

35 - 39kHz

**Call duration:**

7 - 10ms



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

### **General Overview**

This bat is widespread, albeit less than common, occurring throughout most of mainland Scotland and some of the Inner Hebrides. It is often seen foraging very low over calm water surfaces, taking insects from on or just above the water surface. As well as foraging above water, where it can be fairly easily seen, it can also be found within open woodland.

### **Identification Features**

**Hair base:** Dark grey brown  
**Dorsal colour:** Greyish brown  
**Ventral colour:** Light grey  
**Forearm:** 35 - 42mm  
**Wingspan:** 240 - 275mm  
**Face:** Pinkish  
**Weight:** 7 - 15g  
**Tragus:** Blunt,  $< \frac{1}{2}$  length of ear  
**Calcar:**  $\frac{2}{3}$  length of tail membrane

**Foraging habitat:** Riparian and woodland

**Roosts:** Trees, man-made structures, caves and tunnels

**Emergence from roost:** Sunset +40mins

**Feeding strategy:** Hawker, skimmer

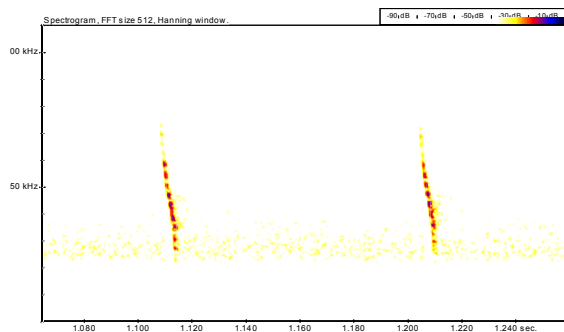


### **Echolocation**

**Call structure:**  
Frequency modulated, no tail

**Frequency of max energy:**  
45 - 50kHz

**Call duration:**  
4 - 7ms



## ***Myotis nattereri* (Natterer's bat)**

### **General Overview**

This bat is regarded as fairly widespread, but uncommon in Scotland. The further north you travel the less likely you are to encounter this species and there are no published records from the islands. It is medium sized, with relatively long ears and a long lancet shaped tragus. The tail membrane is lined with stiff bristles. It is often found in woodland areas with associated wetland habitat.

### **Identification Features**

**Hair base:** Dark grey  
**Dorsal colour:** Grey, tinged brown  
**Ventral colour:** Light whitish grey  
**Forearm:** 36 - 44mm  
**Wingspan:** 245 - 280mm  
**Weight:** 5 - 12g  
**Tragus:** Lancet,  $> \frac{1}{2}$  length of ear  
**Calcar:** S shape,  $\frac{1}{2}$  length of tail membrane

**Foraging habitat:** Woodland, parkland, riparian

**Roosts:** Buildings, trees and other man-made structures. Caves and tunnels (winter)

**Emergence from roost:** Sunset +50mins

**Feeding strategy:** Hawker, Gleaner, Ground Feeder

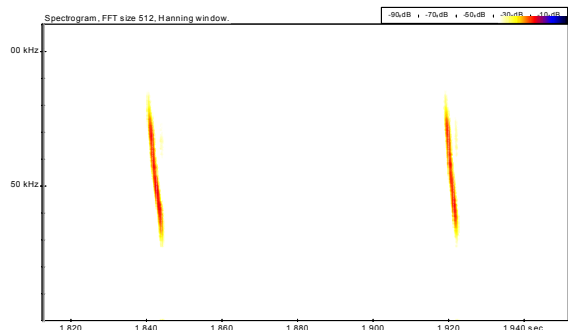


### **Echolocation**

**Call structure:**  
Frequency modulated, no tail

**Frequency of max energy:**  
45 - 55kHz

**Call duration:**  
3 - 4ms



## ***Myotis mystacinus* (Whiskered bat)**

### **General Overview**

This is the smallest *Myotis* species definitely occurring within Scotland. It is regarded as a species rarely encountered with only a handful of roosts having been discovered to date, mostly in southern areas. It can be very difficult to separate this species from *Myotis brandtii* which occurs south of the border. As such bat workers must always bear this in mind.

### **Identification Features**

**Hair base:** Dark grey  
**Dorsal colour:** Dark brown to grey brown  
**Ventral colour:** Grey  
**Forearm:** 30 - 37mm  
**Wingspan:** 200 - 240mm  
**Nose/ears:** Black/brown  
**Weight:** 4 - 8g  
**Tragus:** Pointed, ½ length of ear  
**Calcar:** <½ length of tail membrane

**Foraging habitat:** Woodland and riparian

**Roosts:** Trees, buildings, caves (winter)

**Emergence from roost:** Sunset +30mins

**Feeding strategy:** Hawker, gleaner

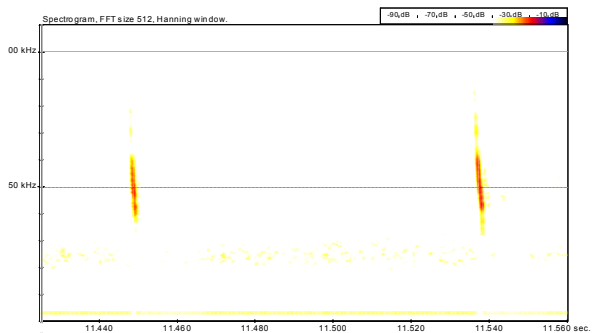


### **Echolocation**

**Call structure:**  
Frequency modulated, no tail

**Frequency max energy:**  
45 - 55kHz

**Call duration:**  
3 - 5ms



## ***Nyctalus noctula* (Noctule)**

### **General Overview**

This is our largest bat often seen hunting at sunset high above ground level. It is found feeding above woodland, parkland and wetlands. Within Scotland it is regarded as rare, albeit regularly encountered in Dumfries & Galloway and the Borders. It is generally accepted that its range is creeping north and unconfirmed records have materialised in recent years from areas such as Edinburgh, Clackmannanshire and Kinross.

### **Identification Features**

**Dorsal colour:** Reddish brown  
**Ventral colour:** Dull brown  
**Forearm:** 48 - 56mm  
**Wingspan:** 320 - 420mm  
**Weight:** 19 - 40g  
**Tragus:** Mushroom shaped  
**Calcar:** Almost ½ length of tail membrane with post-calcarial lobe

**Foraging habitat:** Woodland, parks, meadow and riparian

**Roosts:** Trees

**Emergence from roost:** Sunset

**Feeding strategy:** Hawker

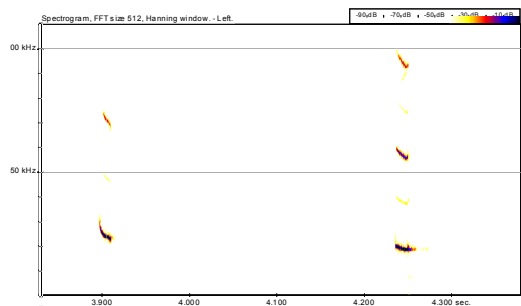


### **Echolocation**

**Call structure:**  
Produces a combination of shallow near constant frequency calls and frequency modulated calls with a tail

**Frequency max energy:**  
18 - 25kHz

**Call duration:** 11 - 25ms





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

### **General Overview**

This is a medium sized bat, which is regarded as very rare within Scotland. So far roosting has only found within the far south west of the country. It is usually found roosting in trees (bat boxes), but is also known to roost in man-made structures. It is often seen hunting just after sunset high above ground level. It is found feeding above woodland, parkland and wetlands.

### **Identification Features**

**Hair base:** Very dark brown

**Dorsal colour:** Reddish brown

**Ventral colour:** Yellowish brown

**Forearm:** 39 - 46mm

**Face/ears:** Black/brown

**Wingspan:** 260 - 340mm

**Weight:** 11 - 20g

**Tragus:** Mushroom shaped

**Calcar:** Almost ½ length of tail membrane with post-calcarial lobe

**Foraging habitat:** Woodland, parks, meadow and riparian

**Roosts:** Buildings and trees

**Emergence from roost:** Sunset +15mins

**Feeding strategy:** Hawker

### **Echolocation**

**Call structure:**

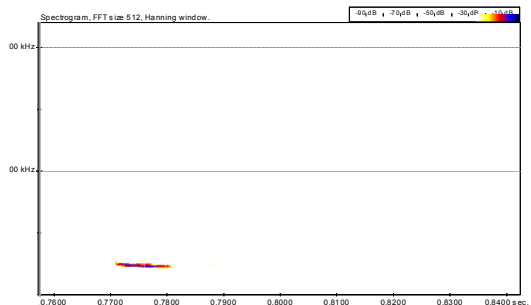
Produces a combination of shallow near constant frequency calls and frequency modulated calls with a tail

**Frequency max energy:**

22 - 29kHz

**Call duration:**

11 - 25ms



## ***Plecotus auritus* (Brown long-eared bat)**

### **General Overview**

Although widespread, this bat is regarded as a less common species. It tends to be found foraging in open woodland and parkland, roosting either in tree cavities or buildings with large loft spaces. It is the only bat we have with unmistakable large ears, making it easy to identify with good views. It is difficult to find using bat detectors due to its very quiet echolocation, which is often switched off as the bat listens for its prey amongst vegetation.

### **Identification**

**Hair base:** Dark brown  
**Dorsal colour:** Light brown  
**Ventral colour:** Yellowish brown  
**Forearm:** 35 - 43mm  
**Wingspan:** 230 - 285mm  
**Weight:** 6 - 12g  
**Tragus:** <5.5mm wide  
**Calcar:** c.½ length of tail membrane

**Foraging habitat:** Parkland, woodland

**Roosts:** Buildings and trees.  
Caves/tunnels (winter)

**Emergence from roost:**  
Sunset +50mins

**Feeding strategy:** Hawker, gleaner

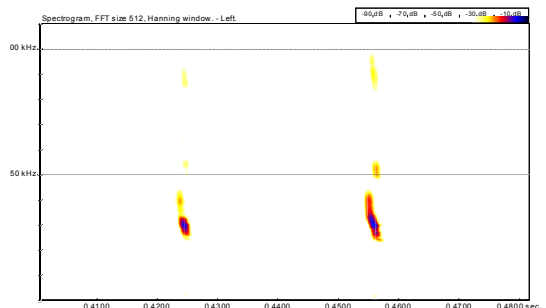


### **Echolocation**

**Call Structure:**  
A very weak frequency modulated call

**Frequency max energy:**  
c.40kHz

**Call duration:** 2ms



## Acknowledgements

We would like to take this opportunity to acknowledge the help and support of the following people in producing this booklet:

Picture credit – *Pipistrellus pipistrellus*, by John Sinclair (National Trust for Scotland), 2006

Picture credit – *Nyctalus noctula*, by Kelly Hunter (Dumfries & Galloway Bat Group), 2006

All sonograms produced using Batsound V3.0, Pettersson Elektronik AB, Sweden.

With the exception of the following, all sonograms have been produced from time expansion detector recordings made by N Middleton within Scotland:

*Pipistrellus nathusii* – recorded by French, K. and Froud, A. (Epping Forest, England, 2005)

*Nyctalus leisleri* – recorded by Middleton, N. E. and Hargreaves, A. (Drome, France, 2006)

## Further Reading

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