

# Habitat Management for **Natterer's Bat**

*Myotis nattereri*

by Peter G. Smith & Paul A. Racey *University of Aberdeen*



Mammals Trust UK, 15 Cloisters House, 8 Battersea Park Road, London SW8 4BG  
Tel: 020 7498 5262 Fax: 020 7498 4459 [www.mammalstrustuk.org](http://www.mammalstrustuk.org)

A MAMMALS TRUST UK PUBLICATION

The Bat Conservation Trust



PROTECTING OUR NATIVE ANIMALS AND THEIR HABITATS



**Mammals Trust UK**



## Acknowledgements

The advice in this booklet draws on many sources, as referenced. However, a substantial part is the result of our radio tracking study of Natterer's bats at the University of Aberdeen from 1995 to 2000. The study was made possible by the sponsorship of four bodies. During the first year it received a grant from The Endangered British Mammal Fund (EBMF), a restricted fund of the People's Trust of Endangered Species (PTES), developed in partnership with five conservation charities including The Bat Conservation Trust. This initial grant was matched by English Nature and The Countryside Council for Wales. In subsequent years, the EBMF grant was replaced by direct funding from PTES.

Special thanks are due to Mike O'Connor and Marcus Liddiard, who gave substantial assistance with field work. We are very grateful for the regular access into roof spaces given by many roost owners; also to the many land owners who have allowed access at all times of the day and night for radio tracking. Bat group members such as Phil Morgan and David Priddis, and staff of the Vincent Wildlife Trust, namely Dr. Laurent Duvergé, John Messenger and Dr Henry Schofield helped in many ways. Tony Hutson and Dr. Tony Mitchell-Jones of English Nature plus others too numerous to name also gave invaluable support to the project. Finally, Sheelagh Kerry put up with Peter Smith being out on field work or occupied on the computer to an unreasonable degree, yet also helped immensely with fieldwork and discussion of ideas.

We also thank Frank Greenaway for the beautiful photographs in this booklet and Oliver Bennet for the attractive illustrations.

## About Mammals Trust UK

In April 2001, building on the successes of the Endangered British Mammal Fund, it was decided to launch Mammals Trust UK (also a restricted fund of PTES) as a successor to the EBMF, in order to heighten the public profile and raise more vital funding for mammals in this country. An advisory body has been set up to include those previously on the EBMF panel, the Wildlife Trusts, all the Statutory Agencies and individual eminent scientists. Results are therefore now being published under the auspices of Mammals Trust UK.

# Contents

<b>What is Natterer's bat?</b>	Page 3
How many are there?	Page 3
Natterer's bat facts	Page 3
Where do they live	Page 4
How do they forage?	Page 5
Where do they forage?	Page 6
How large is a colony's home range?	Page 6
Threats facing Natterer's bat	Page 7
<b>Recommended actions</b>	Page 10
Legal protection	Page 11
<b>What YOU can do...</b>	Page 12
<b>References</b>	Page 13



Caption copy here

# What is Natterer's bat?



Caption copy here

SIXTEEN SPECIES of bat have breeding populations in Britain, yet the life habits of many are poorly known. This is especially true of the five species of *Myotis* bat, of which Natterer's (*Myotis nattereri*) bat is one. Natterer's bat was first described in 1817 from Germany (*Kuhl 1817*) and has been known in Britain since at least 1837 (*Barrett-Hamilton & Hinton 1910-21*), yet it is only recently, by using radio tracking techniques, that characteristics such as foraging range and patterns of movement between roosts have begun to be documented (*Siemers, Kaipf & Schnitzler 1999; Smith 2000*).

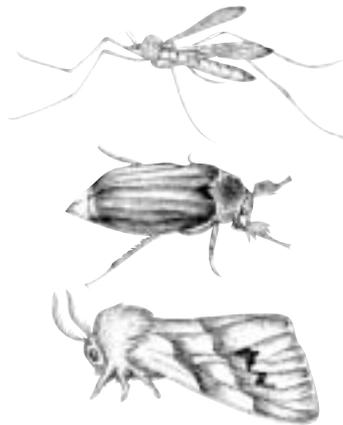
Natterer's bats are elusive creatures, often inconspicuous both within their roosts and when out foraging. They change roosts frequently, don't emerge until about an hour after sunset when it is almost dark, and even when they roost in buildings their presence and exact whereabouts may be hard to discover.

## How many are there?

Attempts have been made to determine the abundance of *Myotis nattereri* across England, Scotland and Wales (*Speakman 1991; Morris 1993; Harris et al. 1995*). However, these have failed to produce reliable estimates for the species, as acknowledged by the authors, due to the very limited amount of information available.

## Natterer's bat facts

- The species is named after an Austrian naturalist, Johann Natterer. The bats are generally quiet in their roosts.
- One bat weighs about 7 grams or the same as a 2 pence coin.
- The species is distributed throughout Britain and Ireland excepting the far north of Scotland.
- Diet is predominantly spiders and true flies, especially dung-flies, house-flies,



Caption copy here



Caption copy here

blow-flies, midges, crane-flies, snipe-flies and window midges; in addition, harvestmen, dung beetles, chafers, weevils, moths, caddis flies, ichneumons and true bugs are frequently taken, while other arthropods such as caterpillars and earwigs are eaten occasionally (e.g. *Shiel, McAney, & Fairley 1991; Swift 1997; Vaughan 1997; Geisler & Dietz 1999; Swift & Racey submitted for publication*). Natterer's bat is probably the only British *Myotis* species which takes such a large range of prey (*Corbet & Harris 1991*).

- Semi-natural broad-leaved woodland and open water sheltered by tree cover are the prime foraging habitats, though grassland too is well used for foraging (*Smith 2000*). Arable and dense conifer plantation are avoided (*Smith 2000*).

## Where do they live?

### SUMMER

Many types of day roost are used in the

summer. These include various forms of tree cavity, attic apex sites, mortises in attics and barns, soffit boxes at eaves, tops of gable walls, crevices in stone walls and the space within modern cavity walls (*Smith 2000*). A typical roost building is 150 years old and built of solid stone walls under a slate roof. Medium to large trees (at least 20cm diameter at breast height) may contain Natterer's bat roosts. Of the 25 or more trees or buildings that a summer colony may use as roosts, perhaps a third are in buildings, with the remainder in trees.



Caption copy here

However, from late May to mid-July attic roosts are used predominantly.

In one study (Smith 2000) day roosts were mainly concentrated in an area covering some 2 sq. km within the colony's home range at a density of up to 15 roosts per sq. km. However some day roosts, including the roost in which the young were born in the case of one colony, were located on the periphery of this range. Hence it is not possible to estimate the position of a colony's home range from the location of a roost.

Natterer's bats emerge from their roosts relatively late in the evening to forage and they return well before sunrise to avoid high light levels. However, most of the intervening period is spent foraging, which suggests that any time lost through unnatural delay in evening emergence times cannot be compensated for by foraging at



Caption copy here

other times in the night without incurring higher predation risks that are likely to be associated with flying at higher light levels (e.g. Jones & Rydell 1994; Rydell, Entwistle & Racey 1996).

#### WINTER

Underground sites such as canal and railway tunnels, caves, mines and ice houses are used as winter roosts (Stebbing 1993; Smith in press). Tree cavities and wall cavities are also used at this time (Smith 2000), though it is likely that bats move to use more sheltered sites during periods when sub-zero temperatures persist.

### How do they forage?

Natterer's bats have long been considered to be gleaners, that is, while in flight they pick at least a proportion of their prey directly from surfaces. A recent study has demonstrated that Natterer's bats do this (Swift & Racey submitted for publication). Another recent study (Siemers & Schnitzler 2000) has shown that they can hawk for prey that are either flying or suspended just a few centimetres from vegetation, a foraging strategy unknown so close to surfaces in any other species. During the latter study the bats never foraged by gleaning. The differing foraging strategies observed in the two studies may reflect flexible or regionally distinct behaviour in this species.

Whichever approach is used for foraging, echolocation is used continually (Siemers & Schnitzler 2000; Swift & Racey submitted for publication). The ability of the species to distinguish prey from nearby background clutter by means of echoloca-



Caption copy here

tion alone is surprising and when hawking for prey close to surfaces, capture success increases rapidly with distance of prey to background (Siemers & Schnitzler 2000). However, the echolocation repertoire of Natterer's bat does not seem especially adapted for foraging in open situations (Siemers & Schnitzler 2000). Natterer's bats also take prey by landing briefly on the ground, completing the approach by running if necessary, then grabbing the prey in their mouth and taking off again (Ahlén 1990; Swift & Racey submitted for publication).

### Where do they forage?

Mature semi-natural broad-leaved woodland, tree-lined river corridor and ponds are preferred for foraging, while arable and dense conifer plantations are avoided

(Smith 2000). However, the species regularly forages over grassland too (Smith 2000). In the latter case they will fly over an area of up to one hectare close to the grass in search of prey (Arlettaz 1996) which may be gleaned from the surface or hawked from the air close by. Once taken the prey are generally eaten on the wing during an undulating flight up to several metres above the ground (Arlettaz 1996). The foraging flight is occasionally interrupted by perching for periods of up to a few minutes, generally in outgrown hedges or trees (Smith 2000). The purpose of this may be to consume larger items of prey.

### How large is a colony's home range?

Breeding colonies of about 35 adult females



Caption copy here

occupy a home range of about 12 km during the summer (Smith 2000). Within this, a scatter of core areas amounting to between 1.5 and 2 km<sup>2</sup> within the overall range can provide over 80% of a colony's foraging requirements (Smith 2000).

Although members of the same colony share roosts and individual foraging areas overlap, there appears to be no overlap in range use between colonies occupying adjacent ranges (Smith 2000). Core foraging areas are used up to 4 kilometres from day roosts and occasionally bats will forage up to 6 kilometres from their roost (Smith 2000). It appears that populations are sustained by the relatively small areas of preferred habitats within their home range (Smith 2000). It is unclear to what extent interconnections between these by linear landscape elements such as hedge rows or tree lines is necessary for access by the bats, though observations by de Jong

(1994) suggest that sheltered flyways are important to them.

### Threats facing Natterer's bat

#### LOSS OF OLD HEAVILY TIMBERED BARN

Natterer's bats use many and various roosts over the course of a year, typically returning to the same roosts year after year, even though some may be used for only a few days in any one year (Smith 2000). Priority for conservation should be given to old barn roosts of the style that have large timbers with deep mortise joints having a gap within the mortise beside the tenon. Bats roost within the joint cavities, sometimes also using space at the back of the joint behind the tenon. Many such joints may be used in a single building with numbers of bats in a joint cavity ranging from one to a dozen or

more. Timbers in churches and old farmhouses may offer similar conditions. Such roosts are often used in late summer and autumn, though they may also be used when the young are born. Where the latter is not the case, the site that is used by the colony for that purpose should also be given conservation priority.

Many old barn roosts have been lost upon conversion to dwellings, despite efforts to save them by retaining access to some apparently suitable mortise joints (Briggs 2000). Such buildings are generally scarce and their loss as roosts, especially when no similar alternative is available locally, will pose a threat to the maintenance of the colony at its former numbers and possibly to its survival over the long term. The loss of roosts used for birth of young may be similarly damaging.

#### LOSS OF MATURE TREES

Mature field margin trees make up a major proportion of the trees used as roosts by Natterer's bats (Smith 2000). Many are of considerable age and losses during winter gales are often not replaced. Regeneration should be promoted to provide a stock of mature trees in which potential roost cavities can develop to provide continuity of roosting opportunities as older trees are lost. Woodland management should also aim to preserve trees with potential roost cavities.

#### HABITAT LOSS

Even ancient woodland is still under threat in the UK (Woodland Trust report: *Why the UK's ancient woodland is still under threat*). Loss of any semi-natural broadleaf woodland is likely to have a significant impact on local populations of Natterer's bats as this is prime foraging and roosting habitat for them.

#### CONFLICTS WITH MAN

Within some roosts, such as churches, M. nattereri roosts have become a nuisance due to urine staining and deposition of droppings when the bats have used the large



Caption copy here

interior space for flight (e.g. Sargent 1995). In some cases excreta may be scattered widely inside the building in addition to accumulations below the roost. However, a recent radio tracking study indicates that, for some colonies at least, *M. nattereri* may not require roosts to have a large volume of open space, such as the interior of a church, to be available to them at their roost sites, even at roosts where young are born (Smith 2000).

It is thus possible that, with the possible exception of late summer roosts, flights within a roost building are incidental to the use of the building as a roost and that the facility to fly within the building is of little value to the bats. Hence, it may be that

if *M. nattereri* could be denied access to such spaces within their roost buildings, or otherwise discouraged from flying therein, this would not be detrimental to the colony, provided that the roost site micro-climate and access to the roost site were not adversely affected in the process (Smith 2000). Further work is required to devise and investigate both practical and effective means of preventing access to, or flight in, such spaces and the possible impacts of such restrictions on the bats. Any modifications to roosts that would affect bats would need to be carried out under licence and roosts would need to be monitored before, during and after any modifications in order to assess their impact.



Caption copy here

## Recommended Actions

NATTERER'S BAT is a widespread species that is probably under recorded so that habitat management for the species can be justified without reference to known roosts.

Over the long term this species would benefit from planting of new broad-leaved woodland of mixed native species. Further, the management of existing broad-leaved woodlands should be planned within each locality to maintain moderate amounts in a mature state at all times by limiting the extent that is clear felled and regenerated in any period.

Any change that reduces the foraging value of improved grassland to Natterer's bats, such as use of pesticides or loss of convenient night roosts in outgrown hedgerows could be detrimental to the survival of local populations. Therefore, pastures and meadows should preferably be managed organically and be enclosed by tall hedges, with fields not exceeding a width of 150 metres.

### Specific conservation measures of benefit to Natterer's bats are as follows:

- A high priority in roost conservation should be given to roosts where young are born and raised until weaned and to heavily timbered old barn roosts.

- Conservation management should guard against the loss of any day roost.

- When searching for roosts, timber crevices and mortises, soffit boxes, wall cavities and the top of gable walls should be examined closely, especially within buildings over 100 years old with solid stone walls and slate roofs. Mortises in heavily timbered old barns should also be checked especially diligently for evidence of use by bats.

- Access points to roosts should not receive artificial lighting that might delay evening emergence of bats.

- Potential roost trees should be protected on field boundaries, within parkland and also within woodland.

- Selection of saplings or new planting of trees at intervals of perhaps 20 metres (Entwistle et al. in press) on field margins should be promoted to provide a stock of mature trees in which potential roost cavities can develop to provide continuity of rooting opportunities as older trees are lost.

- Woodland management should aim to maintain in perpetuity a proportion of trees having potential roost cavities. Reduce impacts of clear-cutting by leaving groups of trees standing, or by use of selective logging instead (Entwistle et al. in press).

- Trees should be examined for the presence of bat roosts before they are felled. Trees containing a roost should be retained if possible, or the felling should be carried out (under licence) at a time when the roost is not occupied.
- Bat box schemes should be encouraged, though it should not be assumed that they can replace the need for roosts in either buildings or trees.
- All semi-natural broad-leaved woodland should be retained.
- New mixed native broad-leaved woodland should be created to increase the overall cover of this woodland type to a minimum of 15% within each 10 km<sup>2</sup> block of countryside.
- A minimum 7% of land area within each 10 km<sup>2</sup> block of countryside should be maintained with mature native (including semi-natural) broad-leaved woodland at least 35 years old at any one time.
- Coniferous plantations should incorporate corridors and edges of native broad-leaved trees (*Mayle 1990a,b*) and rides and clearings at least 10-15 metres across.
- Woodland blocks should be connected by linear landscape elements such as hedges or tree lines.
- Tree cover along river banks should be encouraged, except where conservation interests would be adversely affected.
- Avoid drainage of wet woodland, or its reversion to a pre successional pond state (*Entwistle et al. in press*).
- New ponds should be created to provide foraging habitat. This would increase foraging opportunities for many species of bat (*Mayle 1990a,b*), including Natterer's bat.
- Grassland should be managed organically, or with minimal use of pesticides and herbicides.
- Pastures and meadows should be enclosed by tall hedges and fields should not exceed a width of 150 metres.
- A proportion of hedges enclosing fields should be managed to achieve a broad structure (3-6 m across) at least 3 metres high.
- Trees or shrubs should not be planted and ponds should not be created on unimproved or semi-improved pasture or other land of high conservation value without seeking conservation advice.

### Legal protection

In the UK all bats and their roosts are legally protected under the Wildlife and Countryside Act 1981, the Conservation (Natural Habitats, &c.) Regulations 1994 and (in England and Wales) the Countryside and Rights of Way Act 2000. Under this legislation it is an offence to intentionally or recklessly damage, destroy or obstruct access to any structure used by bats for

shelter or protection (i.e. roosts), whether bats are present at the time or not, or to intentionally or recklessly disturb bats within a roost. Advice should be sought from the appropriate statutory nature conservation body before undertaking any action that could disturb or harm bats or their roosts.

The Town & Country Planning (Assessment of Environmental Effects)

Regulations (1988) requires that both public and private proposed major development works are preceded by an environmental assessment of the likely impact on bats and their potential foraging areas.

Planning Policy Guidance on nature conservation requires that the planning process considers bats and habitat conservation in all planning applications.

## What YOU can do...

■ **MAKE A DONATION**  
to help fund more research.

■ **SEEK EARLY ADVICE**  
from the Bat Conservation Trust's National Bat Helpline (Tel: **020 7627 8822** or **020 7627 2629**) and from your local Statutory Nature Conservation Organisation (i.e. the Countryside Council for Wales, the Department of the Environment - Northern Ireland, English Nature or Scottish Natural Heritage) before undertaking any works likely to affect bats or their roosts.

■ **RETAIN TREES CONTAINING CREVICES**  
as these may be used as bat roosts even though they have not made themselves obvious.

■ **PUT UP BAT BOXES** -  
these may be used by Natterer's bats in addition to other species.

*Further copies of this leaflet can be obtained from:*

**Mammals Trust UK,  
15 Cloisters House,  
8 Battersea Park Road,  
London SW8 4BG**



# References

**Ahlén, I.** 1990. Identification of bats in flight. Swedish society for conservation of nature and the Swedish youth association for environmental studies and conservation. Stockholm and Sollentuna.

**Arlettaz, R.** 1996. Foraging behaviour of the gleaning bat *Myotis nattereri* (Chiroptera, Vespertilionidae) in the Swiss Alps. *Mammalia*. 60: 181-186.

**Barrett-Hamilton, G.E.H. and Hinton, M.** 1910-21. A history of British mammals. Gurney & Jackson, London.

**Briggs, P.** 2000. A study of bats in barn conversions in Hertfordshire. Hertfordshire barn conversion survey 2000. Hertfordshire Bat Group. Unpublished.

**Corbet, G.B. and Harris, S. (Eds.)** 1991. The handbook of British Mammals. 3rd edn. Oxford: Blackwell.

**De Jong, J.** 1994. Distribution patterns and habitat use by bats in relation to landscape heterogeneity, and consequences for conservation. Published PhD. Thesis. Swedish University of Agricultural Sciences, Uppsala, Sweden. Rapport no. 26.

**Entwistle, A., Gibson, S., Harris, S., Hutson, A., Racey, P. and Walsh, A.** in press. Habitat management for bats. JNCC

**Geisler, H. & Dietz M.** 1999. Zur nahrungsökologie einer

wochenstubenkolonie der Fransenfledermaus (*Myotis nattereri* Kuhl, 1818) in Mittelhessen. *Nyctalus* 7: 87-101.

**Harris, S., Morris, P., Wray, S. and Yalden, D.** 1995. A review of British mammals: population estimates and conservation status of British mammals other than cetaceans. JNCC, Peterborough, UK.

**Hill, J.E. and Smith, J.D.** 1984. Bats. A natural history. British Museum (Natural History), London.

**Jones, G. and Rydell, J.** 1994. Foraging strategy and predation risk as factors influencing emergence time in echolocating bats. *Phil. Trans. R. Soc. Lond. B* 346: 445-455.

**Kapteyn, K.** 1993. Intraspecific variation in echolocation of vespertilionid bats, and its implications for identification. pp 45-57 in "Proceedings of the first European Bat Detector Workshop." Ed. Kapteyn, K. Netherlands Bat Research Foundation. Amsterdam.

**Kuhl, H.** 1817. Die deutschen Fledermäuse. Privately published, Hanau, 67 pp.

**Mayle, B.A.** 1990a. Habitat management for woodland bats. Forestry Commission Research Info. note 165.

**Mayle, B.A.** 1990b. A biological basis for bat conservation in British woodlands

- a review. *Mammal Rev.* 20: 159-195.

**Morris, P.A.** 1993. A red data book for British mammals. The Mammal Society, London.

Rydell, J., Entwistle, A. and Racey, P.A. 1996. Timing of foraging flight of three species of bats in relation to insect activity and predation risk. *Oikos* 76: 243-252.

**Sargent, G.** 1995. The bats in churches project. The Bat Conservation Trust, London.

**Shiel, C.B., McAney, C.M. and Fairley, J.S.** 1991. Analysis of the diet of Natterer's bat *Myotis nattereri* and the common long-eared bat *Plecotus auritus* in the west of Ireland. *J. Zool., Lond.* 223: 299-305.

**Siemers, B.M. Kaipf, I. and Schnitzler, H.-U.** 1999. The use of day roosts and foraging grounds by Natterer's bats (*Myotis nattereri* Kuhl, 1818) from a colony in southern Germany. *Z. Säugetierkunde* 64: 241-245.

**Siemers, B.M. and Schnitzler, H.-U.** 2000. Natterer's bat (*Myotis nattereri* Kuhl, 1818) hawks for prey close to vegetation using echolocation signals of very broad bandwidth. *Behav. Ecol. Sociobiol.* 47: 400-412.

**Speakman, J.R.** 1991. The impact of predation by birds on bat populations in the British Isles. *Mammal Rev.* 21: 123-142.

**Smith, P.G.** 2000. Habitat preference, range use and roosting ecology of Natterer's bats (*Myotis nattereri*) in a grassland-woodland landscape. Thesis submitted for PhD. University of Aberdeen. 297 pages.

**Smith, P.G.** in press. Natterer's bat *Myotis nattereri*. In: The new handbook of British mammals. Fourth edition. Ed. Harris, S. Blackwell Scientific Publications, Oxford.

**Stebbing, R.E.** 1993. The Greywell Tunnel An internationally important haven for bats. *English Nature*. Newbury.

**Swift, S.M.** 1997. Roosting and foraging behaviour of Natterer's bats (*Myotis nattereri*) close to the northern border of their distribution. *J. Zool. Lond.* 242: 375-384.

**Swift, S.M. and Racey, P.A.** submitted for publication. Gleaning as a foraging strategy in Natterer's bat *Myotis nattereri*.

**Vaughan, N.** 1997. The diets of British bats (Chiroptera). *Mammal Review* 27: 77-94.