

**European Community Directive  
on the Conservation of Natural Habitats  
and of Wild Fauna and Flora  
(92/43/EEC)**

**Second Report by the United Kingdom under  
Article 17  
on the implementation of the Directive  
from January 2001 to December 2006**

**Conservation status assessment for :  
S1303: *Rhinolophus hipposideros* - Lesser  
horseshoe bat**

Please note that this is a section of the report. For the complete report visit <http://www.jncc.gov.uk/article17>

Please cite as: Joint Nature Conservation Committee. 2007. *Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006*. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)

# S1303 *Rhinolophus hipposideros* Lesser horseshoe bat

*Audit trail compiled and edited by JNCC and the UK Inter-Agency Mammal Working Group*

This document is an audit of the data and judgements on conservation status in the UK's report on the implementation of the Habitats Directive (January 2001 to December 2006) for this species. Superscript numbers accompanying the headings below, cross-reference to headings in the corresponding Annex B reporting form. This supporting information should be read in conjunction with the UK approach for species (see 'Assessing Conservation Status: UK Approach').

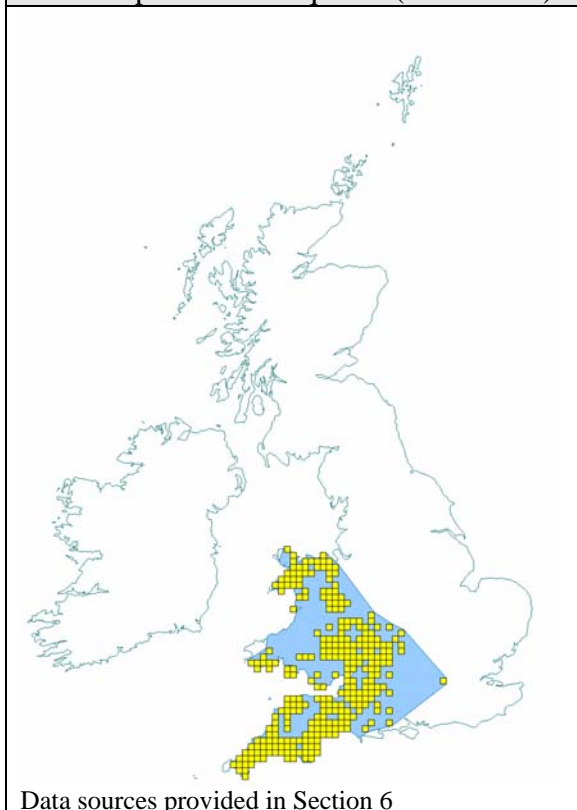
## 1. Range Information<sup>2,3</sup>

*Rhinolophus hipposideros* is widely distributed in south-west England and Wales, south and west of a line from Chester to Southampton. The English and Welsh populations form one of the European strongholds for this species (Harris *et al.* 1995). The species does not occur in Scotland or Northern Ireland.

### 1.1 Surface area of range<sup>2,3,1</sup> 58,483 km<sup>2</sup>

The above estimate was calculated within Alpha Hull software, using extent of occurrence as a proxy measure for range (as shown in Map 1.1). The value of alpha was set at 45 km to reflect the mobility of this species.

**Map 1.1.** Current extent of occurrence and occupied 10-km squares (1990-2006)



## **1.2 Date of range determination<sup>2.3.2</sup>**

**1990 – 2006**

This species has been subject to a relatively high level of recording meaning that it is possible to consider current range using only data collected since 1990.

## **1.3 Quality of range data<sup>2.3.3</sup>**

**Moderate**

This species has been subject to a high level of recording; coordinated monitoring of summer roosts in Wales and England has taken place since 1993 and 1998 respectively. Monitoring of some hibernation sites started in 1997 and some sites have been monitored on an *ad hoc* basis for many years. However, there has not been a full census or full survey to assess distribution. Quality of data is therefore assessed as moderate.

## **1.4 Range trend<sup>2.3.4</sup> and range trend magnitude<sup>2.3.5</sup>**

**Stable**

There is no information to suggest that there has been a decline in range for this species during the specified time period 1990-2006 and there have been recent range increases with bats occurring further east in Dorset (Harris *et al.* 1995).

## **1.5 Range trend period<sup>2.3.6</sup>**

**1990 – 2006**

The time period selected is considered to reflect the current situation regarding range change for this species and incorporates the time period since the Habitats Directive came into force. Historic information is provided to set the current situation in a historic context.

## **1.6 Reasons for reported trend in range<sup>2.3.7</sup>**

**1. Improved knowledge/more accurate data**

**2. Climate change**

**3. Direct human influence (restoration, deterioration, destruction)**

Reported recent range increases with bats occurring further east in Dorset (Harris *et al.* 1995), are probably the result of increased winter survival rate and better breeding condition due to climate change.

Some of the historic decrease may be due to the loss of populations at the extreme edge of the species northern range. Climate change could provide suitable conditions for the population to re-colonise those areas, where suitable habitat occurs, but the habitat links are not in place to allow that to occur, nor are likely to be in the future.

## **1.7 Favourable reference range<sup>2.7.1</sup>**

**58,483 km<sup>2</sup> (Equal to current)**

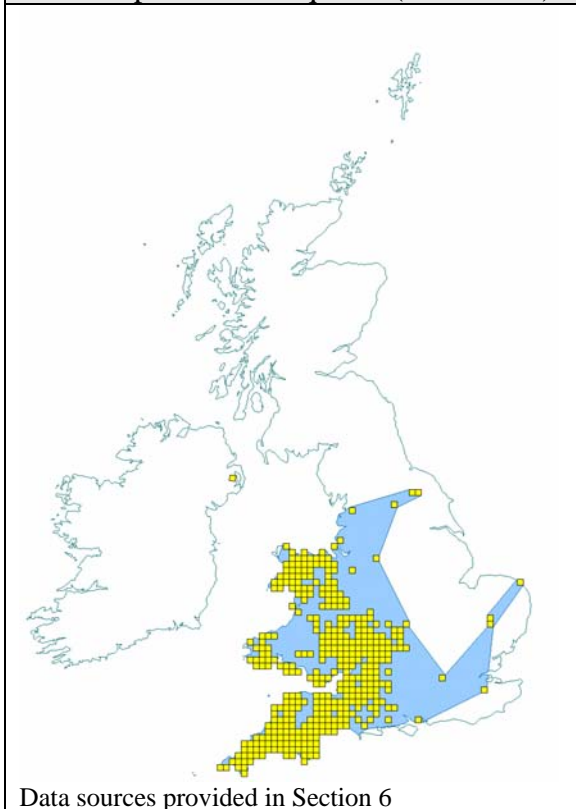
The favourable reference range value has been derived using 1994 as the baseline and making a judgement on whether the range in 1994 was sufficient to allow the long-term survival of the species, using the decision tree in Note 1 (see 'Assessing Conservation Status: UK Approach') as a guide. Historic and current information on range size and trends have been used to assess this and, if the 1994 level was not sufficient, then consideration has been given to what would constitute a large enough range.

The current range is no less than it was in 1994, and is stable or may be increasing.

Map 1.2 shows *R. hipposideros* historical extent of occurrence (1900-2006) and has been included to provide contextual information. A comparison between current and historic range suggests a 31% decline since the beginning of the 20<sup>th</sup> century (current = 58,483 km<sup>2</sup>, historic = 85,083km<sup>2</sup> using Alpha Hull software and assuming an alpha value of 45 km). However, it is important to note that some of the historic records in the east of England are individual records of dubious quality and there is no evidence that they are indicative of local populations. Furthermore, it is recognised that habitat loss and fragmentation at the northern edges of the historic range may mean that the species will be unable to recolonise those areas in the future.

On this basis, although current range is relatively restricted, it is probably of sufficient size to support a viable population in the long-term. Furthermore, it is large enough to allow for increase in distribution within the current range, and is therefore set as the favourable reference range.

**Map 1.2.** Historic extent of occurrence and occupied 10-km squares (1900-2006)



The rationale for including all records in the historic range estimate, and not only those obtained prior to 1990, is that we have assumed a decline over time for this species was more likely than an increase and that where the species occurs currently it would also have occurred historically, but historic recording was not comprehensive enough to provide sufficient information. Data prior to the 1900s has been excluded from the analysis of historic range, on the basis that it is unlikely to be numerous or reliable. Historic range has been calculated from the total of the data accumulated over the longer period, is not adjusted for natural fluctuations in range, and could exceed the maximum actual range occupied by the species at any given time during that period.

## **1.8 Range conclusion<sup>2.8</sup>**

### **Favourable**

There is no evidence of decline in range for this species over the time period specified, and with the increasing population the range may be expanding again. The current range is smaller than the historic range, but is equal to the favourable reference range and is considered large enough for the long-term survival of the species. This combination of factors makes the range assessment Favourable.

## **2. Population of the Species<sup>2.4</sup>**

### **2.1 Population estimate<sup>2.4.1</sup>**

#### **18,000 individuals**

9000 in England, 9,000 in Wales, absent from Scotland and Northern Ireland. (UK BAP reporting 2002; [www.ukbap.org.uk/2002onlinereport/mainframe.htm](http://www.ukbap.org.uk/2002onlinereport/mainframe.htm))

### **2.2 Date of population estimate<sup>2.4.2</sup>**

**2002**

### **2.3 Method of population estimate<sup>2.4.3</sup>**

**2= Extrapolation from surveys of part of the population or from sampling**

### **2.4 Quality of population data<sup>2.4.4</sup>**

#### **Moderate**

For *R. hipposideros*, population size has been reasonably well documented from regular roost and/or hibernacula counts, but no full census has been undertaken. Quality of data has therefore been assessed as moderate.

*Note.* There is recent evidence that the population in Wales has been significantly underestimated. The justification for this is the number of bats counted during the summer roost surveillance scheme in Wales in 2005 was over 13,000 (Matthews & Halliwell, in prep). A revised estimate is required, but will need to consider the following factors a) the likely proportion of males counted at the summer roosts, b) movements of bats between roosts (where the roosts are not simultaneously counted) c) the rate of discovery of new roosts d) loss of known roosts and their relationship with newly discovered roosts, where possible e) the increase in the population as shown by the trend analysis f) the effects of inconsistency of sites monitored year on year. It is not known if the population in England is subject to the same degree of underestimation.

### **2.5 Population trend<sup>2.4.5</sup> and population trend magnitude<sup>2.4.6</sup>**

+

The UK National Bat Monitoring Programme has been carrying out standardised annual Colony Counts and Hibernation Surveys since 1998 and 1997 respectively. A significant upward trend has been detected in both surveys, representing a mean annual increase of 5.6% and 6.3% respectively, an increase of between 46% to 53% from 1998-2005 (BCT 2006). The percentage increase in the population has not been incorporated into the current published population estimate and needs to be considered with the factors in 2.4 to produce a more accurate estimate of the UK population.

### **2.6 Population trend period<sup>2.4.7</sup>**

**1997 – 2005**

This time period has been selected because it allows consideration of the most recent trend data from surveillance schemes and is indicative of population trends since the Directive came into force.

## **2.7 Reasons for reported trend in population<sup>2.4.8</sup>**

### **3. Direct human influence (restoration, deterioration, destruction)**

#### **5. Natural processes**

In recent times population recovery is probably the direct result of conservation action, legislative protection of the species, including strict protection of roost sites and the use of appropriate chemicals for timber treatment, but also, a series of mild winters over this period may have contributed by increasing overwinter survival. (Battersby & TMP 2005).

## **2.8 Justification of % thresholds for trends<sup>2.4.9</sup>**

The recent increase of 5.6% – 6.3% annually since 1998 is greater than the specified threshold and no justification is required.

## **2.9 Main pressures<sup>2.4.10</sup>**

**141 Abandonment of pastoral systems**

**151 Removal of hedges and copses**

**167 Exploitation without replanting**

**400 Urbanised areas, human habitation**

**401 Continuous urbanisation**

**410 Industrial or commercial areas**

**502 Routes, autoroute**

**624 Mountaineering, rock climbing, speliology**

## **2.10 Threats<sup>2.4.11</sup>**

**110 Use of pesticides**

**166 Removal of dead and dying trees**

**301 Quarries**

**320 Mines**

**402 Discontinuous urbanisation**

**624 Mountaineering, rock climbing, speliology**

**709 Other forms or mixed forms of pollution**

**740 Vandalism**

**803 Infilling of ditches, dykes, ponds, pools, marshes or pits**

## **2.11 Favourable reference population<sup>2.7.2</sup>**

### **14,000 individuals (Equal to 1994 estimate)**

The favourable reference population value has been derived using 1994 as the baseline and making a judgement on whether the population in 1994 was viable in the long-term, using the decision tree in Note 1 (see 'Assessing Conservation Status: UK Approach') as a guide. Historic and current information on population size, distribution and trends have been used in order to assess viability and, if the 1994 level was not viable, then consideration has been given to what would constitute a viable population.

The population estimate in 1994 was approximately 14,000 individuals, 7,000 in England and 7,000 in Wales (Harris et al. 1995). The population declined historically, sometimes by up to

90% (Stebbing 1988), but surveillance schemes show increasing populations since at least 1997 (BCT 2006). Much of this increase is attributed to a high level of conservation management, but also to the absence of hard winters. Evidence suggests that the decline had already halted by 1994 and the population was beginning to recover (Harris et al. 1995). From available information, it is likely that the population was viable in 1994 and the 1994 estimate has been set as the favourable reference value. However, the value has been set with limited information and could be revised in the future if better information becomes available.

## 2.12 Population conclusion<sup>2.8</sup>

### Favourable

The current population is above the favourable reference population and surveillance schemes show increasing populations since at least 1997. The population is considered to be viable in the long-term and the assessment is therefore, Favourable.

## 3. Habitat for the Species in the Biogeographic Region or Sea<sup>2.5</sup>

*R. hipposideros* requires a complex mosaic of habitats to support foraging, roosting and commuting behaviour. Boye & Dietz (2005) provide a good overview of this species' habitat requirements.

Woodlands play a predominant role as foraging habitats for the species, especially in spring when *R. hipposideros* almost exclusively forages there. Foraging areas are close to summer roosts (distances up to 4.2 kilometres) and the animals spend about half of their activity time within a radius of 600 metres. The high importance of semi or unimproved wet pasture bounded by hedgerows has been found in the main foraging areas of one of the largest European colonies at Glynllifon in Gwynedd (Billington & Rawlinson 2006).

**Map 3.1** Potential distribution of *R. hipposideros* in the UK (from Schofield 1996). Dark grey and black areas indicate preferred habitat



Map 3.1 shows the projected range of *R. hipposideros* in the UK, based on assessment of the type and extent of habitat used (presence of the species in 1-km squares with areas of unsuitable habitat removed). *R. hipposideros* selected for landclasses generally associated with undulating countryside with hedgerows and tree lines and areas where agriculture was varied. They selected against those often associated with either flat open areas with intensive arable agriculture, or exposed upland areas. Estimating land cover from satellite data, only deciduous woodland was selected for, while urban areas, dense shrub cover and sea were selected against (Schofield 1996).

Summer roosts are usually situated close to woodland or a park. If this is not the case a system of continuous linear landscape elements, such as hedges or walls, provide guidance to the bats when flying to their foraging areas.

Undisturbed hibernation sites in underground caves, mines or cellars must be available at a maximum distance of 30 kilometres from the summer roosts.

Night roosts are important in extending the foraging area available to a colony and occasionally it may be advantageous for bats to remain in these satellite roosts during the day to conserve energy levels rather than return to the maternity roost that same night (Billington and Rawlinson 2006).

### **3.1 Surface area of habitat<sup>2.5.2</sup>**

#### **Unknown**

There is some detailed information on the habitat requirements/limitations of this species, but the total area of suitable habitat is unknown as the species depends on a matrix of habitats in a landscape. Only approximately 8% of England and Wales is currently covered by broadleaved woodland (Haines-Young et al. 2000), and there has also been a decline in grazed pasture, both important habitats for *R. hipposideros*. However, to obtain a proper estimate of suitable habitat used by the species, it would be necessary to first identify all of the foraging and roosting habitat located within the current range boundary; determine whether or not each of these features were being used; and subsequently calculate the combined area of all currently used habitats. This process would require very detailed habitat information at a fine scale across the UK. We do not currently have this level of information. Therefore area estimate is Unknown.

### **3.2 Date of estimation<sup>2.5.3</sup>**

**2006**

### **3.3 Quality of data on habitat area<sup>2.5.4</sup>**

#### **Poor**

Detailed information is available on the habitat requirements/limitations of this species. However the area of habitat/suitable habitat is Unknown as the species depends on a matrix of habitats in a landscape.

### **3.4 Habitat trend<sup>2.5.5</sup>**

#### **Unknown**

There is very limited information on changes in amount and quality of foraging and roosting habitats suitable for this species. Indications are that broadleaved, mixed and yew woodland have increased by about 4% in England and Wales since 1990 and there has been a small

increase in tree lines and hedgerows, and some loss of pasture (Haines-Young *et al.* 2000). This is very limited information on which to base an assessment of trend in habitat suitable for this particular species. The assessment is, therefore, Unknown.

### **3.5 Habitat trend period<sup>2.5.6</sup>**

**1990 – 1998**

The time period selected reflects the results of two Countryside Surveys carried out in 1990 and 1998 (Haines-Young *et al.* 2000).

### **3.6 Reasons for reported trend in habitat<sup>2.5.7</sup>**

**Not applicable**

### **3.7 Suitable habitat for the species (in km<sup>2</sup>)<sup>2.7.3</sup>**

**Unknown**

Since the current area of habitat is Unknown, it would be inappropriate to try and estimate an area of 'suitable habitat'.

### **3.8 Habitat conclusion<sup>2.8</sup>**

**Unknown**

There is insufficient information to make a robust assessment on the habitat status for this species. The conclusion is, therefore, Unknown at the present time.

## **4. Future Prospects<sup>2.6</sup>**

**Good prospects**

Species is expected to survive and prosper.

Factors likely to affect the species over the next 12-15 years are considered below.

**Legislation** This species is listed on Schedules 5 & 6 of the Wildlife and Countryside Act 1981 (as amended) and the Conservation (Natural Habitats, &c.) Regulations 1994 and is listed on Annexes IIa and IVa of the Habitats Directive.

**Conservation action** There are 41 Special Areas of Conservation (SAC) where the species is recorded, with seven of those designated as SACs for this species and six other where the species is a feature of interest. Monitoring has been undertaken at Sites of Special Scientific Interest (SSSIs) and the first round of monitoring and reporting of SACs has been undertaken.

The species is the subject of a Species Action Plan under the UK Biodiversity Action Plan. Main aims include maintaining the current range and populations and in the long term expanding the current range through natural colonisation and landscape enhancement, into areas where research shows the climatic and landscape features are suitable.

There have been several research projects during the past three years that will inform management of habitats for the species in coming years. The management of underground sites has also been improved through better communication with the underground interest sector (cavers/mining history enthusiasts).

Partnership initiatives have improved access to underground sites for both cavers and persons wishing to monitor bats while protecting sites at the most vulnerable times of year for bats.

A review has been carried out in Wales, looking at the impact of new and improved road schemes on bats and the measures which are being implemented to reduce potentially adverse effects (Catherine Bickmore Associates 2003).

There is a well-established monitoring programme providing trend data as part of the UK National Bat Monitoring Programme. Common Standards Monitoring has been undertaken at SSSIs and the first round of monitoring and reporting of SACs has been undertaken.

**Threats** Population decline in the past was probably caused by loss of, or damage to, summer maternity roost sites due to deterioration and unsympathetic renovation of old buildings and barns, although identifying small colonies can be problematic; loss of, or damage to, underground sites used mainly for hibernation, often through blocking of old mines or similar sites for safety purposes, and increased leisure or `casual` use; and loss, damage and fragmentation of woodland foraging habitat, old hedgerows and tree lines, and other appropriate habitat.

The trend is towards a reduction in the availability of roost sites that provide the necessary conditions for *R. hipposideros* (a large entrance, enough space to fly around inside, non-illuminated entrance, range of temperatures to provide warm roosting sites for breeding, cool sites for torpid bats and cool stable undisturbed underground sites for hibernation). The resource of alternative roosting sites is diminishing and there is every reason to suggest that this trend will speed up over the next few years.

There is scope for positive action by ensuring that land planning policies take the species fully into account and from positive management through agri-environment schemes and through the network of protected sites. However, natural habitats are under continuing threat of loss and fragmentation resulting from urbanisation, rural development and the abandonment of low intensity land use and traditional management. With growing populations and increasing land values, the natural environment is likely to be subject to greater pressure. The possibilities for an expansion of the population are severely limited because of the particular requirements of this species and the current rate of loss of suitable roosts and habitat.

Bats whose echolocation pulses are adapted for cluttered situations such as *Rhinolophus spp.* do not seem to exploit insects around street lights. In fact they actively avoid such areas, and the erection of artificial lighting within foraging regions or along flight lines can be damaging to the foraging activities of [both] horseshoe species (Billington & Rawlinson, 2006) and may restrict range expansion.

**Climate change** Climate change appears at present to favour this species by increasing overwinter survival. The impact of climate change on prey populations will determine whether this increase is sustained.

Schofield (1996) notes that the cooler summer temperatures recorded at higher latitudes may have reduced the reproductive success of the populations of this species at the northern limits of its range, in Yorkshire, to a point where it became unviable. These areas may become more suitable with climate change, but there is very little likelihood of natural recolonisation,

because there is a large area of unsuitable habitat separating the nearest existing populations in north Wales. (Jean Matthews, *pers comm.*).

## 4.1 Future prospects conclusion<sup>2,8</sup>

### Favourable

The future prospects are good for this species, and provided the conservation management continues the species is likely to remain viable over the time period considered in this assessment, that is 12-15 years. However, it is important to note that there are threats and pressures that could affect the longer-term survival of the species if not managed properly. The conclusion is Favourable at present.

## 5. Overall Assessment<sup>2,8</sup>

### Favourable

Range, population and future prospects are all Favourable and habitat for the species is Unknown. Therefore, in accordance with Annex C, the overall assessment is Favourable.

**Table 5.1.** Summary of conclusions

Parameter	Judgement	Grounds for Judgement (in accordance with Annex C)	Reliability*
Range	Favourable	Range is stable and not smaller than the favourable reference range	2
Population	Favourable	Population(s) not lower than the favourable reference population	2
Habitat	Unknown	No or insufficient reliable information available	3
Future Prospects	Favourable	Main pressures and threats to the species not significant; species will remain viable in the long-term	2
Overall Assessment	Favourable	Three Favourable and one Unknown	2

\*1=High, 2=Moderate, 3=Low

High – Expert opinion is that the concluding judgement accurately reflects the current situation based on a professional understanding of the species. For range, population, and habitat, quality of data used to establish the current estimate has been identified as good; data used to inform trends is comprehensive and up to date.

Moderate – A greater understanding of the feature, or the factors affecting it, is required before a confident concluding judgement can be made by experts. For range, population, and habitat, the current estimate and/or trend are based on recent, but incomplete or limited survey data; or alternately, a comprehensive, but outdated (pre-1994) review.

Low – Judgements, and comprising estimates, are based predominately on expert opinion.

N/A – Assessment conclusion is unknown, on the basis of insufficient reliable information

## 6. References

BAT CONSERVATION TRUST. 2006. *The National Bat Monitoring Programme Annual Report 2005*. Available to download from Bat Conservation Trust website ([www.bats.org.uk](http://www.bats.org.uk)) and Tracking Mammals Partnership website ([www.trackingmammals.org](http://www.trackingmammals.org)).

BATTERSBY, J (Ed.) & TRACKING MAMMALS PARTNERSHIP. 2005. *UK Mammals: Species Status and Population Trends*. JNCC/Tracking Mammals Partnership.

BILLINGTON G. & RAWLINSON, M.D. 2006. A review of horseshoe bats flight lines and feeding areas. CCW Science Report No. 755. CCW, Bangor.

BOYE, P. & DIETZ, M. 2005. Research Report No 661: Development of good practice guidelines for woodland management for bats. English Nature.

CATHERINE BICKMORE ASSOCIATES 2003 Review of work carried out on trunk road network in Wales for bats. Report prepared for the Welsh Assembly Government Transport Directorate and countryside Council for Wales.

HAINES-YOUNG, R.H., BARR, C.J., BLACK, H.I.J., BRIGGS, D.J., BUNCE, R.G.H., CLARKE, R.T., COOPER, A., DAWSON, F.H., FIRBANK, L.G., FULLER, R.M., FURSE, M.T., GILLESPIE, M.K., HILL, R., HORNUNG, M., HOWARD, D.C., McCANN, T., MORECROFT, M.D., PETIT, S., SIER, A.R.J., SMART, S.M., SMITH, G.M., STOTT, A.P., STUART, R.C. & WATKINS, J.W. 2000. *Accounting for nature: assessing habitats in the UK countryside*. Countryside Survey 2000. DETR, HMSO, London.

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.

MATTHEWS, J.E. & HALLIWELL, E.C. (in prep). *Lesser Horseshoe Bat summer roost surveillance, 29 May to 17 June, 2002 - 2006*. CCW Staff Science Report No.06/9/1, CCW, Bangor.

RICHARDSON, P. 2000 *Distribution atlas of bats in Britain and Ireland 1980-1999*. Bat Conservation Trust, London.

RUSS, J.M. 1999 *The Microchiroptera of Northern Ireland: community composition, habitat associations and ultrasound*. Unpublished PhD thesis. Queen's University, Belfast.

SCHOFIELD, H.W. 1996 *The ecology and conservation biology of Rhinolophus hipposideros, the lesser horseshoe bat*. Unpublished PhD thesis. University of Aberdeen.

### **Map Data Sources**

Biological Records Centre - Mammals Database 100m; Natural England - Batsites inventory for Britain; Devon Biodiversity Records Centre - Devon incidental species records (1950-2002) (via NBN Gateway)

Bat Conservation Trust National Bat Monitoring Programme Colony Survey (1998-2005), Hibernation survey (1997-2005)

Bat Conservation Trust - Distribution atlas of bats in Britain and Ireland 1980-1999. GB data only.