

**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 :
S1323: *Myotis bechsteinii* - Bechstein's bat**

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

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S1323 *Myotis bechsteinii* Bechstein's 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').

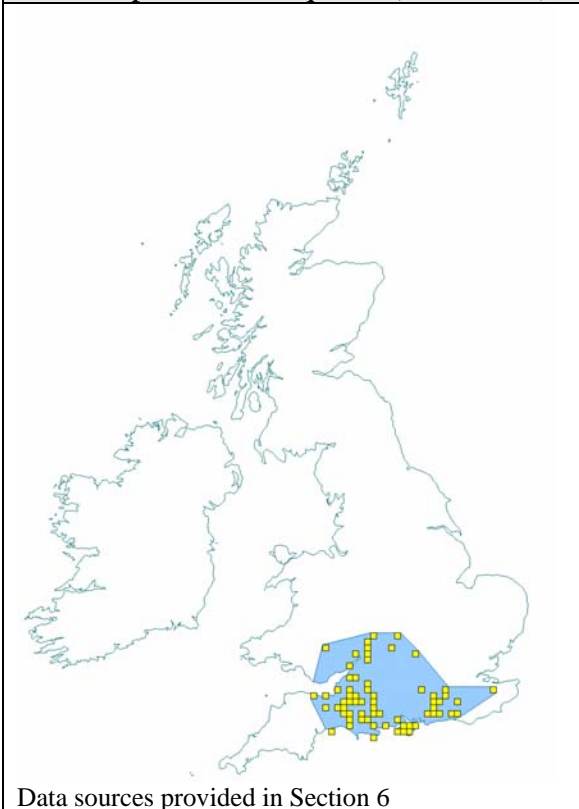
1. Range Information^{2,3}

Myotis bechsteinii is uncommon throughout its range. It is thought to be one of the UK's rarest mammals and is classified as Vulnerable (Vu2Ac) in the IUCN Red List of Threatened Species (IUCN 2006). The species occupies a restricted distribution with population centres across the south of England and there are also records from Wales.

1.1 Surface area of range^{2,3,1} 31,850km²

The above surface area 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 (1900-2006)



1.2 Date of range determination^{2.3.2}

1980 – 2006

The date range indicated has been selected to reflect current range/surface area for the species for the following reasons:

- There are limitations in the quality of the data available. The largest dataset used, Distribution atlas of bats in Britain and Ireland (Richardson 2000), has data ranging from 1980-1999 but the year of recording for individual records within this dataset is not known, making it impossible to divide the data into different date ranges. Deviating from this time period would mean having to exclude these records, and since other datasets may not be fully comprehensive in isolation of these, such exclusion would be inappropriate.
- The greatest level of change affecting populations of this species probably occurred prior to 1980, and so 1980 to the present is likely to reflect current distribution and range.
- International treaties and national protective legislation affecting all European bat species came into force from 1980 onwards and is likely to have had an effect on their status.

1.3 Quality of range data^{2.3.3}

Poor

Since the early 1980s there has been an increase in the level of survey effort afforded to UK bat species following the increased level of protection in Wildlife legislation, such as the Wildlife and Countryside Act 1981 (as amended) and the Conservation (Natural Habitats, &c) Regulations 1994 (and equivalent legislation in Northern Ireland), and a growing interest in wider conservation issues. More recently a research project assessing the distribution of this species within its known range and using novel techniques, has considerably increased the number of records (Hill, Fitzsimons & Greenaway, 2004; Hill & Greenaway, 2005). However, there is still relatively little information on its distribution, and trend analysis is constrained by historic under-recording and lack of surveillance methods.

1.4 Range trend^{2.3.4} & Range trend magnitude^{2.3.5}

Unknown

There is very little information to assess current trend in range for this species.

1.5 Range trend period^{2.3.6}

1980 – 2006

The time period selected is considered to reflect the current situation regarding range change for bat species and incorporates the time period since the Habitats Directive came into force.

1.6 Reasons for reported trend in range^{2.3.7}

Not applicable

1.7 Favourable reference range^{2.7.1}

31,850km² (Equal to current)

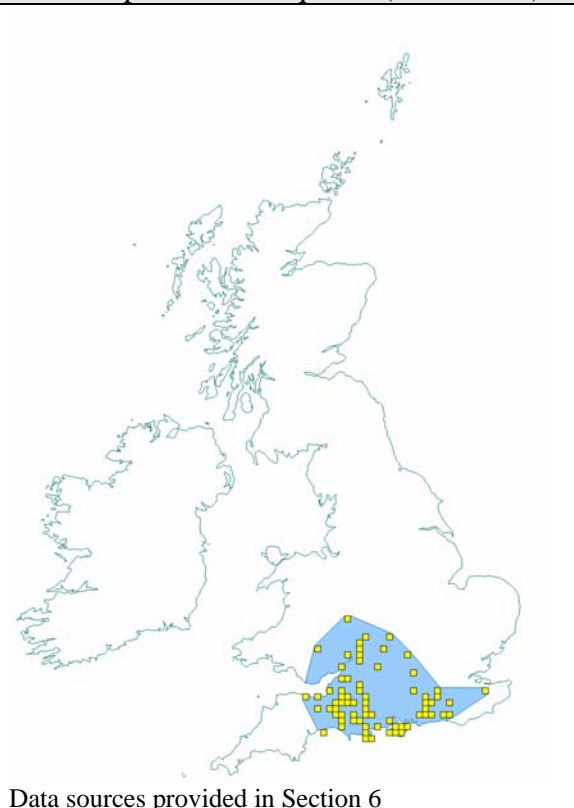
The favourable reference range value has been derived using 1994 as the baseline and making a judgement on whether the range in 1994 was sufficient to allow the long-term survival of the species, using the decision tree in Note 1 (see 'Assessing Conservation Status: UK

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 species has been persisting within the current range over a long period of time. The current range is of sufficient size to support a viable population of the species in the long-term. Furthermore, it is large enough to allow for increase in distribution within the current range, although it is more restricted than for most other bat species in the UK and there may be some risk from stochastic events. At present it is not possible to say whether the situation is improving or deteriorating, but research and survey work currently underway should provide better information on the species distribution and population size and help to establish a more quantitative estimate for the favourable reference range and direction of change. For now, the current range is considered equal to the favourable reference range.

Map 1.2 shows *M. bechsteinii* historical extent of occurrence (1900-2006), which has been included to provide contextual information. A comparison between current and historic range suggests a 7% decline since the beginning of the 20th century (current = 31,850 km² historic = 34,250 km² using Alpha Hull software and assuming an alpha value of 45 km). Given the lack of records, a change of this magnitude cannot be considered a real decline. At the beginning of the 20th century records were few, and even then it was considered to be the rarest British bat (Barrett-Hamilton & Hinton 1910-1921); Millais (1904-1906) listed three known records, and fifteen years later this had only increased to six (Thorburn 1920).

Map 1.2 Historic extent of occurrence and occupied 10-km squares (1980-2006)



Records of this species are unlikely to be numerous or reliable prior to 1900. The rationale for including all records in the historic range estimate, and not only those obtained prior to 1980, is that we are assuming a decline over time for this species is more likely than an increase and that where the species occurs currently it would also have occurred historically, but historic recording may not have been good enough to provide

sufficient information. 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^{2.8}

Favourable

This judgement is based on the fact that the current range is equal to the favourable reference range. At present, there is no information on current trends in range to assess whether the situation is improving or deteriorating. Current and historic records for this species are sparse and make it difficult to provide a robust assessment.

2. Population of the species^{2.4}

2.1 Population estimate^{2.4.1}

1,500 individuals

2.2 Date of population estimate^{2.4.2}

1995

2.3 Method of population estimate^{2.4.3}

1 = based on expert opinion

The population estimate was based on subjective estimates of relative abundance because there were few density estimates and little quantified data on bat numbers in relation to habitat associations and patterns of land use.

2.4 Quality of population data^{2.4.4}

Poor

The reliability rating of the above estimate from Harris *et al.* (1995) was four, meaning that it is an “estimate based on a very limited amount of information on the species”. At the time of the estimate only one maternity site and 20 hibernation sites were known for this species. However, improved survey methods have increased that number to 12 maternity sites and it is likely that more will be discovered during distribution surveys in the future. The original population estimate will be revised in the light of improved knowledge.

2.5 Population trend^{2.4.5} & Population trend magnitude^{2.4.6}

Unknown

It is thought that the species has been rare throughout its range for the past 100 years or so, and that populations may be stable at low levels (Harris *et al.* 1995). There have been no organised distribution surveys for this species and surveying is extremely difficult. However, the level of recording effort has increased in recent years and the species is still not being recorded in places where it occurred historically, which indicates there may have been a real decline in distribution and probably population size.

2.6 Population trend period^{2.4.7}

1994 – 2006

2.7 Reasons for reported trend in population^{2.4.8}

Not applicable

2.8 Justification of % thresholds for trends^{2.4.9}

Not applicable

2.9 Main pressures^{2.4.10}

110 Use of pesticides

151 Removal of hedges and copses

160 General Forestry management

164 Forestry clearance

165 Removal of undergrowth

166 Removal of dead and dying trees

Low population density and slow population growth are likely to have made this species particularly vulnerable to factors such as: loss and fragmentation of ancient deciduous woodland habitat; the loss, destruction and disturbance of roosts in trees and underground sites; and the reduction in numbers of insect prey, due to habitat simplification and factors such as fertiliser use and intensive grazing.

2.10 Threats^{2.4.11}

110 Use of pesticides

151 Removal of hedges and copses

160 General Forestry management

164 Forestry clearance

165 Removal of undergrowth

166 Removal of dead and dying trees

2.11 Favourable reference population^{2.7.2}

2000 individuals (current is 25% below the favourable reference range)

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.

At present, population trends for this species are unknown, but the species is at relatively low abundance and there is some risk from stochastic events. Expert opinion considers that abundance has undergone declines prior to 1994 and that the current estimated population size may be too small to be viable in the long-term. However, more data are required to assess population trends and absolute abundance, because it is possible the species is considerably under recorded. At present the favourable reference population is set as at least 2,000 individuals, recognising that the current population is probably at least 25% below a viable population level.

2.12 Population conclusion^{2.8}

Unfavourable – Inadequate

Population trends are unknown for this species, but population level is considered to be at 75% of the favourable reference value, and the assessment is, therefore, Unfavourable – Inadequate.

3. Habitat for the species in the Biogeographic region or sea^{2.5}

M. bechsteinii requires a complex mosaic of habitats to support foraging, roosting and commuting behaviour. The favoured habitat for maternity colonies is unevenly aged, ancient or semi-natural deciduous woodland with a high number of oaks in the species mix and a dense mixed species understorey. A minimum of 40-50 hectares of woodland is required to maintain an average maternity colony and very large continuous areas of high forest are less favoured than slightly fragmented structurally diverse woodlands. Small streams that have at least some water in the summer are an important requirement for most woodlands with maternity colonies, as is connectivity of woodland patches by hedgerows (Greenaway & Hill, 2004). Orchards with old trees also provide good foraging habitat, where they exist (Boye & Dietz 2005).

The size of individual home ranges differs in relation to habitat quality: In optimal areas a home range might be smaller than three hectares (old oak forests or oak and beech forests), at other places its size is 15-30 hectares. However, in coniferous forests home ranges of more than 100 hectares have been recorded. Females of a maternity colony seem to use individual foraging areas exclusively for several years. Home ranges of neighbouring colonies are separated. The species shows a comparatively small range of movement around the summer roost, sometimes less than 1 km. Main foraging areas are usually at distances of 500-1,500 metres from the roost, but can be nearly 4 km and tend to be smaller in continuous woodlands than fragmented forests (Boye & Dietz 2005).

Most summer roosts are in woodpecker holes, sometimes behind loose bark or in tree crevices. Maternity colonies also use bat boxes and move roost sites frequently throughout the season. Roosts are found at a height of 0.5-18 metres. An excellent woodland would provide in excess of a dozen large available roosts within the forage woodland and many other smaller holes (Greenaway & Hill, 2004).

In winter the species usually roosts singly in underground hibernation sites (caves, mines, cellars). Most of the population may hibernate in tree holes or behind loose bark, but this is not proven. Usually distances between summer and winter roosts are quite small but can be as much as 39 km.

3.1 Surface area of habitat^{2.5.2}

Unknown

Research on the distribution of *M. bechsteinii* in woodlands in south-east England found that a model developed to locate suitable woodlands was very accurate for determining *M. bechsteinii* presence, but showed that the number and area of such woodlands were very limited, the species being found in only 15% of woods surveyed (Hill & Greenaway, 2006). With this limited information it is very difficult to estimate the area of habitat used by the species.

3.2 Date of estimation^{2.5.3}

2006

3.3 Quality of data on habitat area^{2.5.4}

Poor

Although information is available on habitat requirements, it is not possible at present to calculate the combined area of habitat features that exist within the species range.

3.4 Habitat trend^{2.5.5}

Unknown

Approximately 8% of England and Wales is currently covered by broadleaved woodland (Haines-Young *et al.* 2000), the most suitable habitat 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). However, this is very limited information on which to base an assessment of trend in suitable habitat. The assessment is, therefore, Unknown.

3.5 Habitat trend period^{2.5.6}

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^{2.5.7}

Not applicable

3.7 Suitable habitat for the species (in km²)^{2.7.3}

Unknown

Since the current area of habitat is unknown, it would be inappropriate to try and estimate an area of 'suitable habitat'. However, research has shown what constitutes good habitat for this species and this appears to be limited in extent within the species range (Hill, Fitzsimons & Greenaway 2004).

3.8 Habitat conclusion^{2.8}

Unknown

Without better knowledge of the distribution of this species within its range and the availability of good habitat, it is very difficult to assess whether the existing area or quality of woodland habitat is sufficient to support a favourable reference population. Further research on population density and habitat availability is required before this assessment can be made. The conclusion is, therefore, Unknown at present.

4. Future Prospects^{2.6}

Unknown

Insufficient information to make a judgement.

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

Legislation. This species has full national and European protection. It 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. *M. bechsteinii* is listed as a priority species in the UK Biodiversity Action Plan (BAP). At least 12 maternity roosts have been recorded. There are 13 Special Areas of Conservation (SACs) where the species is recorded, with six of those designated as SACs for this species and three others where the species is a feature of interest. (McLeod *et al.* 2002). Research has been carried out to assess habitat requirements for the species and to develop survey methods to assess distribution, which could be adapted to assess population trends (Hill & Greenaway 2005). It is now possible to locate and monitor maternity roosts and some of the known hibernation sites are within Sites of Special Scientific Interest (SSSIs) and have now been protected by grilling.

Threats. The main problem for this species is the very specific habitat requirements which require careful and targeted management and which may be in conflict with other woodland management practices, such as coppicing (Greenaway & Hill 2004). Although forestry standards now require more old trees to be left standing, so the prospects may be improving. There is also the problem of competition for limited roosting sites with other species of bats and birds.

Low population density and slow population growth are likely to have made *M. bechsteinii* particularly vulnerable to factors such as loss and fragmentation of open ancient deciduous woodland habitat and loss, destruction and disturbance of roosts or potential roosts (particularly in old trees).

4.1 Future prospects conclusion^{2.8}

Unknown

Although there are high levels of protection and conservation action for *M. bechsteinii*, the species rarity and the poor level of information on its distribution and population status mean that future prospects are Unknown.

5. Overall Assessment^{2.8}

Unfavourable - Inadequate

Range assessment for *M. bechsteinii* is Favourable at present, although it is possible that the species has suffered historic range declines. The population assessment is Unfavourable - Inadequate, because of low population levels and suspected problems with long-term viability. The habitat assessment and future prospects are Unknown given the very specific habitat requirements of this woodland specialist and the lack of robust data on ecology and population status. In accordance with the guidance, the overall assessment is Unfavourable - Inadequate.

Table 5.1. Summary of conclusions

Parameter	Judgement	Grounds for Judgement (in accordance with Annex C)	Reliability*
Range	Favourable	Range is not less than the favourable reference range	3
Population	Unfavourable - Inadequate	Any other combination Current population is below the favourable reference population, but not by more than 25%. Current population level too low for long-term viability.	3
Habitat	Unknown	No or insufficient reliable information available	N/A
Future Prospects	Unknown	No or insufficient reliable information available	N/A
Overall Assessment	Unfavourable - Inadequate	One or more Unfavourable-Inadequate no Unfavourable-Bad	3

*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.

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Map Data Sources

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