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

Fourth Report by the United Kingdom under Article 17

on the implementation of the Directive
from January 2013 to December 2018

Supporting documentation for the
conservation status assessment for the species:

S1320 - Brandt's bat (*Myotis brandtii*)

ENGLAND

IMPORTANT NOTE - PLEASE READ

- The information in this document is a country-level contribution to the UK Report on the conservation status of this species, submitted to the European Commission as part of the 2019 UK Reporting under Article 17 of the EU Habitats Directive.
- The 2019 Article 17 UK Approach document provides details on how this supporting information was used to produce the UK Report.
- The UK Report on the conservation status of this species is provided in a separate document.
- The reporting fields and options used are aligned to those set out in the European Commission guidance.
- Explanatory notes (where provided) by the country are included at the end. These provide an audit trail of relevant supporting information.
- Some of the reporting fields have been left blank because either: (i) there was insufficient information to complete the field; (ii) completion of the field was not obligatory; (iii) the field was not relevant to this species (section 12 Natura 2000 coverage for Annex II species) and/or (iv) the field was only relevant at UK-level (sections 9 Future prospects and 10 Conclusions).
- For technical reasons, the country-level future trends for Range, Population and Habitat for the species are only available in a separate spreadsheet that contains all the country-level supporting information.
- The country-level reporting information for all habitats and species is also available in spreadsheet format.

Visit the JNCC website, https://jncc.gov.uk/article17, for further information on UK Article 17 reporting.

Report on the main results of the surveillance under Article 11 for Annex II, IV and V species (Annex B)

NATIONAL LEVEL

1. General information

1.1 Member State	**UK (England information only)**
1.2 Species code	**1320**
1.3 Species scientific name	**Myotis brandtii**
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Brandt's bat

2. Maps

2.1 Sensitive species	No
2.2 Year or period	2010-2016
2.3 Distribution map	Yes
2.4 Distribution map Method used	Based mainly on expert opinion with very limited data
2.5 Additional maps	No

3. Information related to Annex V Species (Art. 14)

3.1 Is the species taken in the wild/exploited?	No	
3.2 Which of the measures in Art. 14 have been taken?	a) regulations regarding access to property	No
	b) temporary or local prohibition of the taking of specimens in the wild and exploitation	No
	c) regulation of the periods and/or methods of taking specimens	No
	d) application of hunting and fishing rules which take account of the conservation of such populations	No
	e) establishment of a system of licences for taking specimens or of quotas	No
	f) regulation of the purchase, sale, offering for sale, keeping for sale or transport for sale of specimens	No
	g) breeding in captivity of animal species as well as artificial propagation of plant species	No
	h) other measures	No

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3.3 Hunting bag or quantity taken in the wild for Mammals and Acipenseridae (Fish)

a) Unit

b) Statistics/ quantity taken	Provide statistics/quantity per hunting season or per year (where season is not used) over the reporting period					
	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
Min. (raw, ie. not rounded)						
Max. (raw, ie. not rounded)						
Unknown	No	No	No	No	No	No

3.4. Hunting bag or quantity taken in the wild Method used

3.5. Additional information

BIOGEOGRAPHICAL LEVEL

4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs

Atlantic (ATL)

4.2 Sources of information

Arnold, H., 1993. Atlas of Mammals in Britain.(Institute of Terrestrial Ecology Research Publication no. 6), London.
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Dietz, C., Kiefer, A. 2016. Bats of Britain and Europe. Bloomsbury, United Kingdom.
Ekman, M., de Jong, J. 1996. Local patterns of distribution and resource utilization of four bat species (Myotis brandti, Eptesicus nilssoni, Plecotus auritus and Pipistrellus pipistrellus) in patchy and continuous environments. Journal of Zoology 238, 571-580.
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Norberg, U.M., Rayner, J.M. 1987. Ecological morphology and flight in bats (Mammalia; Chiroptera): wing adaptations, flight performance, foraging strategy and echolocation. Phil. Trans. R. Soc. Lond. B. 316, 335-427.
Parsons, K.N., Jones, G., Davidson-Watts, I., Greenaway, F. 2003. Swarming of bats at underground sites in Britain-implications for conservation. Biological Conservation. 111, 63-70.
Ruedi, M., and Mayer, F. 2001. Molecular systematics of bats of the genus Myotis (Vespertilionidae) suggests deterministic ecomorphological convergences. Molecular phylogenetics and evolution. 21, 436-448.
Russ, J. 2012. British bat calls: a guide to species identification. Pelagic publishing.
Schober, W., and Grimmberger, E. 1989. Bats of Britain and Europe. Hamlyn, London.
Speakman, J. 1991. The impact of predation by birds on bat populations in the British Isles. Mammal Review. 21, 123-142.
Bat Conservation Trust, 2018. The National Bat Monitoring Programme. Annual Report 2017, Bat Conservation Trust, London.
Vaughan, N., 1997. The diets of British bats (Chiroptera). Mammal Review 27, 77-94.
Richardson, P. W. 2000. Distribution Atlas of Bats in Britain and Ireland, 1980-1999, Bat Conservation Trust.

5. Range

5.1 Surface area (km²)		
5.2 Short-term trend Period		
5.3 Short-term trend Direction	Stable (0)	
5.4 Short-term trend Magnitude	a) Minimum	b) Maximum
5.5 Short-term trend Method used		
5.6 Long-term trend Period		
5.7 Long-term trend Direction		
5.8 Long-term trend Magnitude	a) Minimum	b) Maximum
5.9 Long-term trend Method used		
5.10 Favourable reference range	a) Area (km²)	109201
	b) Operator	
	c) Unknown	
	d) Method	Range is based on presence data collected between 1995-2016. Areas that contain very isolated records may not have been included in the area of distribution. The new method for calculating range from Mathews et. al., 2018 has not been used for this species. Additional data for whiskered bat distribution in Scotland were provided after

publication of the Mathews et. al. report and the JNCC 2013 method to assess range was used whereby a 45km alpha hull value was used with a starting range unit of individual 10km squares . Given these two species are difficult to tell apart it was more appropriate to use the same method for calculating range for Brandt's bat.

5.11 Change and reason for change in surface area of range	Use of different method	
	The change is mainly due to:	Use of different method
5.12 Additional information	The current distribution estimate for the species is based on all known records of whiskered/Brandt's bats since 1995 and is similar to that reported by Arnold (1993). The previous Article 17 Report (Joint Nature Conservation Committee 2013) is based on records described as Brandt's bats only, whereas the current estimate combines both species due to the difficulties of identification. Brandt's bat is widely distributed across England. However, it is probably under recorded due to its similarity in physical appearance to whiskered bat and its inability to be separated from this species easily through sound analysis, as the species echolocation calls are very similar. There is no evidence to suggest that this species range has declined for the specified time period.	

6. Population

6.1 Year or period	1995-2016	
6.2 Population size (in reporting unit)	a) Unit	number of map 1x1 km grid cells (grids1x1)
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.3 Type of estimate	Best estimate	
6.4 Additional population size (using population unit other than reporting unit)	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate		
6.6 Population size Method used	Based mainly on expert opinion with very limited data	
6.7 Short-term trend Period	2006-2017	
6.8 Short-term trend Direction	Stable (0)	
6.9 Short-term trend Magnitude	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.10 Short-term trend Method used	Complete survey or a statistically robust estimate	
6.11 Long-term trend Period		
6.12 Long-term trend Direction		

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6.13 Long-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval
6.14 Long-term trend Method used	
6.15 Favourable reference population (using the unit in 6.2 or 6.4)	a) Population size b) Operator c) Unknown d) Method
6.16 Change and reason for change in population size	No change The change is mainly due to:
6.17 Additional information	Accurate predictions of population size cannot be made as very few roosts are known, and it is highly likely that there is considerable misidentification of the species. It is therefore unknown whether there has been a change in population size between reporting rounds.

7. Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	a) Are area and quality of occupied habitat sufficient (to maintain the species at FCS)?	Yes
	b) Is there a sufficiently large area of occupied AND unoccupied habitat of suitable quality (to maintain the species at FCS)?	
7.2 Sufficiency of area and quality of occupied habitat Method used	Based mainly on expert opinion with very limited data	
7.3 Short-term trend Period	1999-2016	
7.4 Short-term trend Direction	Stable (0)	
7.5 Short-term trend Method used	Based mainly on expert opinion with very limited data	
7.6 Long-term trend Period		
7.7 Long-term trend Direction		
7.8 Long-term trend Method used		
7.9 Additional information		

8. Main pressures and threats

8.1 Characterisation of pressures/threats

Pressure	Ranking
Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) (A05)	M
Abandonment of grassland management (e.g. cessation of grazing or mowing) (A06)	M
Removal of old trees (excluding dead or dying trees) (B08)	M
Logging without replanting or natural regrowth (B05)	H

Removal of dead and dying trees, including debris (B07)	H
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	H
Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F01)	M
Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas (F02)	H
Sports, tourism and leisure activities (F07)	M

Threat	Ranking
Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) (A05)	M
Abandonment of grassland management (e.g. cessation of grazing or mowing) (A06)	M
Removal of old trees (excluding dead or dying trees) (B08)	H
Logging without replanting or natural regrowth (B05)	M
Removal of dead and dying trees, including debris (B07)	H
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	H
Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F01)	H
Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas (F02)	H
Sports, tourism and leisure activities (F07)	M

8.2 Sources of information

8.3 Additional information

9. Conservation measures

9.1 Status of measures

a) Are measures needed? Yes

b) Indicate the status of measures Measures identified and taken

9.2 Main purpose of the measures taken: Maintain the current range, population and/or habitat for the species

9.3 Location of the measures taken: Both inside and outside Natura 2000

9.4 Response to the measures: Medium-term results (within the next two reporting periods, 2019-2030)

9.5 List of main conservation measures

Adapt/manage reforestation and forest regeneration (CB04)
Reduce impact of transport operation and infrastructure (CE01)
Stop forest management and exploitation practices (CB06)

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Manage conversion of land for construction and development of infrastructure (CF01)

Restore small landscape features on agricultural land (CA02)

Reduce impact of outdoor sports, leisure and recreational activities (CF03)

Other measures related to residential, commercial, industrial and recreational infrastructures, operations and activities (CF12)

9.6 Additional information	Legal and administrative measures continue to be required to ensure that the protection provided by the legislation is effective and that protected habitats for the species are managed appropriately. Road design, construction and operation need to take into account the likely impact on bats, e.g. in relation to the provision of safe crossing structures and the loss of and severance of bat habitat and lighting. Brandt's bats hunt within woodland and field boundaries. Environmental land management schemes in the agricultural and forestry sectors are now widely used to ensure these habitats in the vicinity of roosts are well-managed and provide appropriate insect food at the correct time of year. Planning at landscape scale is required to conserve commuting routes and foraging areas. Impacts of recreation (caving) on swarming and hibernation sites need to be limited.

10. Future prospects

10.1 Future prospects of parameters	a) Range b) Population c) Habitat of the species
10.2 Additional information	Future prospects for this species are thought to be stable. Although, there is currently limited data available regarding roost densities, the importance of swarming sites, effects of cumulative pressures of land use change, lighting, etc., on local populations and there is also confusion between this species, alcathoe and Whiskered bat, which makes current data unreliable. However, there is no data available to suggest that the future prospects for the species would be poor as the species occupies a mosaic of habitat types which are not under significant pressure. Similarly, there is little to suggest that roosting and foraging resource is likely to be under pressure so the future prospects have been assumed to be stable until further evidence suggests otherwise.

11. Conclusions

11.1. Range	
11.2. Population	
11.3. Habitat for the species	
11.4. Future prospects	
11.5 Overall assessment of Conservation Status	
11.6 Overall trend in Conservation Status	
11.7 Change and reasons for change in conservation status and conservation status trend	a) Overall assessment of conservation status No change The change is mainly due to:

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b) Overall trend in conservation status

No change

The change is mainly due to:

11.8 Additional information

12. Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network (on the biogeographical/marine level including all sites where the species is present)

a) Unit

b) Minimum

c) Maximum

d) Best single value

12.2 Type of estimate

12.3 Population size inside the network Method used

12.4 Short-term trend of population size within the network Direction

12.5 Short-term trend of population size within the network Method used

12.6 Additional information

13. Complementary information

13.1 Justification of % thresholds for trends

13.2 Trans-boundary assessment

13.3 Other relevant Information

Distribution Map

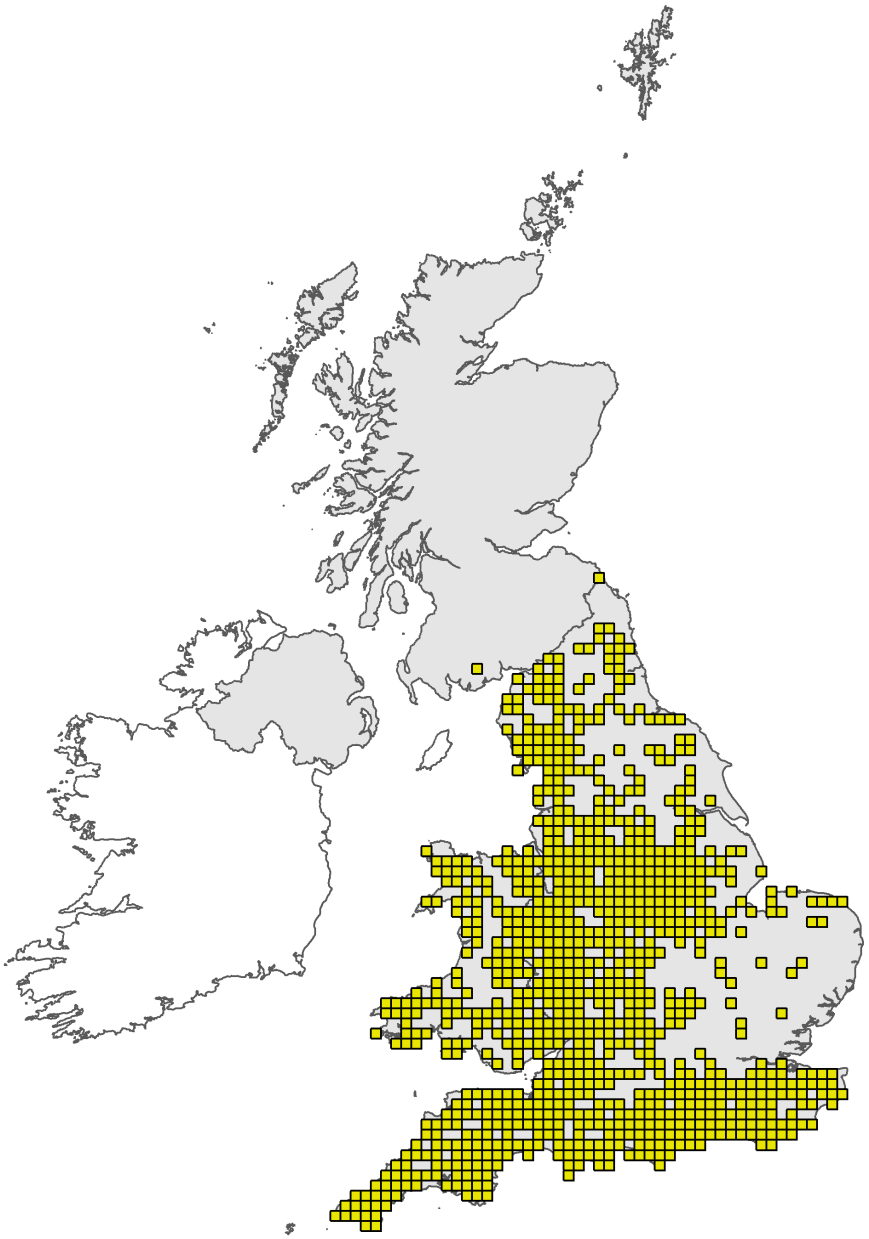

Figure 1: UK distribution map for S1320 - Brandt's bat (*Myotis brandtii*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The 10km grid square distribution map is based on available species records within the current reporting period. For further details see the 2019 Article 17 UK Approach document.

Range Map

Figure 2: UK range map for S1320 - Brandt's bat (*Myotis brandtii*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The range map has been produced by applying a bespoke range mapping tool for Article 17 reporting (produced by JNCC) to the 10km grid square distribution map presented in Figure 1. The alpha value for this species was 45km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Species name: Myotis brandtii (1320)

Field label	Note
1.5 Common name	Myotis brandtii is a cryptic species that is often confused with Whiskered bats (M. mystacinus) and Alcathoe bats (M. alcathoe), despite whiskered and Brandt's bat being only distantly related (Ruedi and Mayer 2001). Brandt's bat was only being recognised as a separate species in the UK in 1970; and Alcathoe bat, first described in 2001 was only identified in Britain in 2010 (Jan, Frith et al. 2010). It remains likely that the species are still frequently confused. They can roost in the same buildings as the much more common Pipistrellus spp. (Dietz and Keifer 2016) and may be overlooked as a consequence. In addition there is a high degree of overlap in the echolocation parameters. When recorded in cluttered environments - which they commonly frequent - there is also a high degree of similarity with the calls of other members of the Myotis genus (Russ 2012). Therefore confidence in the correct species identification using acoustic records alone is low. Genotyping has even revealed errors in identification of species in the hand, highlighting the difficulties of monitoring this group of small Myotis (Brown 2016).
2.2 Year or Period	This time period has been selected as distribution has been calculated using data from Mathews et al 2018.
2.3 Distribution map	Brandt's bats are widely distributed in England, although less common in eastern England. Athough they are monitored under the National Bat Monitoring Programme (NBMP) (BCT 2018), the difficulty of distinguishing them from whiskered bats means that results for these two species are combined and subsequently distribution data and trends are not available for the two species separately.

Species name: Myotis brandtii (1320) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	The difficulty of separating this species from M. mystacinus in terms of physical appearance and via echolocation calls limits the availability of data. Both M. brandtii and M. mystacinus are monitored through the National Bat Monitoring Programme (NBMP), however, the data is combined from the two species which limits its use. Because of this high probability of misidentification, a joint species' range was derived using all available data for whiskered and Brandt's bats combined. However, it should be noted that records from both swarming sites and roosts are patchier for Brandt's than for whiskered bats. The estimated range is therefore likely to be less reliable for Brandt's bats. Expert opinion suggested that there is a ratio of approximately 10:1 of captures of whiskered compared with Brandt's bats at swarming sites, woodland and hedgerows (Mathews et al 2018). The precise degree of overlap of the distributions of the species is unknown, but genotyping of bats captured at swarming sites across England confirms the previously reported general pattern of the ratio of Brandt's: whiskered bats increasing from West to East and from South to North in Britain (Richardson 2000). There is no evidence to suggest that this species range has declined for the specified time period.
6.1 Year or Period	Presence data was collected between 1995-2016 at 10km resolution or higher, gathered from the NBN gateway, local records centres, individual species experts, national and local monitoring schemes and iRecord for each species for the 'Review of the Population and Conservation Status of British Mammals (Mathews et al, 2018) used to determine population status for the species for this report. However, the population was determined between 2016-2017 and only data that had been verified by the source organisation was included in the distribution maps.

6.4 Additional population size	The previous reporting round (Joint Nature Conservation Committee 2013) gave a population estimate of 22,500 for England from Harris et al. 1995. It is stated that this estimate was based on expert judgement and extrapolation from limited field surveys. The 1995 population estimate for Great Britain was based on very limited information, extrapolating from known size of Pipistrellus pipistrellus colonies in relation to size of Brandt's colonies following the methods described by Speakman (1991) and Harris et al (1995). Harris et al's (1995) reliability rating of the estimate was 5, indicating that little confidence can be placed on the estimate. Although the estimate dates from 1995, NBMP data indicate that the population trend for this species (1997-2017) is stable.The NBMP hibernation count does not distinguish whiskered and Brandt's bats. It suggests that the populations are stable or increasing slightly. However, sample sizes at each site are relatively low, and there are no field or summer roost data available for comparison. Better data are needed to provide a reliable population estimate.
6.8 Short term trend; Direction	Populations of whiskered and Brandt's bat combined are considered to have been stable in Great Britain over the period 1999-2016 (BCT 2018). However, this trend should be interpreted with caution as it combines data from two species with differing ecological requirements and potentially differing conservation status. This uncertainty has been compounded by the discovery of Alcathoe bat in the UK in 2010, a third cryptic species in this species group. The distribution of Alcathoe bat in the UK is poorly known although it is thought to be localised and rare. It is likely to have occurred in the UK prior to its discovery in 2010, so it is possible that counts of whiskered/Brandt's bat made during the Hibernation Survey may also include Alcathoe bat. Further work is required to facilitate the reliable identification of these species and their differing ecological needs.
6.16 Change and reason for change in population size	Accurate predictions of population size cannot be made as very few roosts are known, and it is highly likely that there is considerable misidentification of the species. It is therefore unknown whether there has been a change in population size between reporting rounds.
7.1 Sufficiency of area and quality of occupied habitat	Brandt's bats require a complex mosaic of habitats to support foraging, roosting and commuting behaviour. The species has wing morphology and echolocation calls allowing highly manoeuvrable flight, indicating adaptation to foraging in edge or cluttered habitats (Norberg and Rayner 1987). Coniferous woodland, mixed woodland, forest edges and clearings are all frequently used, especially wetland areas (Berge 2007, Boye and Dietz 2005).Tree lines and hedges also play an important role as hunting grounds (Dietz and Kiefer 2016). It has a broad dietary range, feeding on Diptera (including midges and brown lacewings) and Lepidptera (moths) but also gleans Araneida (spiders) and diurnal Diptera from vegetation (Vaughan 1997, Berge 2007). The species is negatively affected by habitat isolation and may be particularly vulnerable to increased forest patchiness (Ekman & DeJong 1996). In England, a radiotracking study found the species had a maximum foraging distance of 2.3 km from the roost (Berge 2007). Loose bark and large holes in tree trunks are the original roost sites of Brandt's bats, but tree holes and bat boxes are also used, especially by males during mating time. Maternity colonies are more commonly found in buildings in wall crevices or roof lofts, and more rarely in trees, bridges and bat boxes (Schober and Grimmberger 1989). Winter roosts are commonly in disused mines and caves, occasionally in cellars (Berge and Jones 2008). The species also swarms at underground sites August - October, with a peak in early August (Parsons et al 2003). These sites should also be considered important habitat features for the species.

7.2 Sufficiency of area and quality of occupied habitat; Method used	There is some detailed information on the habitat requirements/limitations of this species. 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. However, as the species is thought to occupy a range of habitat types, it is assumed taht there is sufficient habitat for the species, which do not have appeared to have declined in range or population.
7.4 Short term trend; Direction	As this is a generalist species, using a mosaic of habitats across a large area this parameter thought to be stable.
8.1 Characterisation of pressures/ threats	Pressures can generally be divided into those that affect roosts and those that affect commuting and foraging (including prey availability). Although roosts are strictly protected, a small number of licences permitting exclusion or roost destruction are issued every year. In addition, changes in building practices to improve energy efficiency mean that new buildings may offer fewer roosting opportunities (Mitchell-Jones 2010). Brandt's bats forage within woodland, woodland edges and clearings, treelines and hedges. Agricultural and forestry practices that remove, modify or fragment these habitats, or affect the biomass of suitable insect prey could negatively affect populations.