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*)

WALES

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 (Wales 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	1995-2016
2.3 Distribution map	Yes
2.4 Distribution map Method used	Based mainly on extrapolation from a limited amount of 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

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Mathews F, Kubasiewicz LM, Gurnell J, Harrower C, McDonald RA, Shore RF. 2018. A review of the population and conservation status of British Mammals. A report by The Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage.
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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) b) Operator c) Unknown d) Method	
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		

6. Population

6.1 Year or period	2016-2017	
6.2 Population size (in reporting unit)	a) Unit b) Minimum c) Maximum d) Best single value	number of map 1x1 km grid cells (grids1x1)
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 extrapolation from a limited amount of data	
6.7 Short-term trend Period	1999-2016	
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	Based mainly on extrapolation from a limited amount of data	

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6.11 Long-term trend Period	
6.12 Long-term trend Direction	
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	Improved knowledge/more accurate data Use of different method No information on nature of change The change is mainly due to: Use of different method
6.17 Additional information	

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	2007-2018	
7.4 Short-term trend Direction	Unknown (x)	
7.5 Short-term trend Method used	Insufficient or no data available	
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
Logging without replanting or natural regrowth (B05)	H
Removal of dead and dying trees, including debris (B07)	H
Clear-cutting, removal of all trees (B09)	H
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	H

Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas (F02)	H
Removal of old trees (excluding dead or dying trees) (B08)	M
Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F01)	M
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
Sports, tourism and leisure activities (F07)	M

Threat	Ranking
Logging without replanting or natural regrowth (B05)	M
Removal of dead and dying trees, including debris (B07)	H
Clear-cutting, removal of all trees (B09)	M
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	H
Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas (F02)	H
Removal of old trees (excluding dead or dying trees) (B08)	H
Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F01)	H
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
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		Long-term results (after 2030)

9.5 List of main conservation measures

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Reduce impact of transport operation and infrastructure (CE01)
Stop forest management and exploitation practices (CB06)
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)
Adapt/change forest management and exploitation practices (CB05)

9.6 Additional information

10. Future prospects

10.1 Future prospects of parameters

a) Range
b) Population
c) Habitat of the species

10.2 Additional information

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:

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

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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

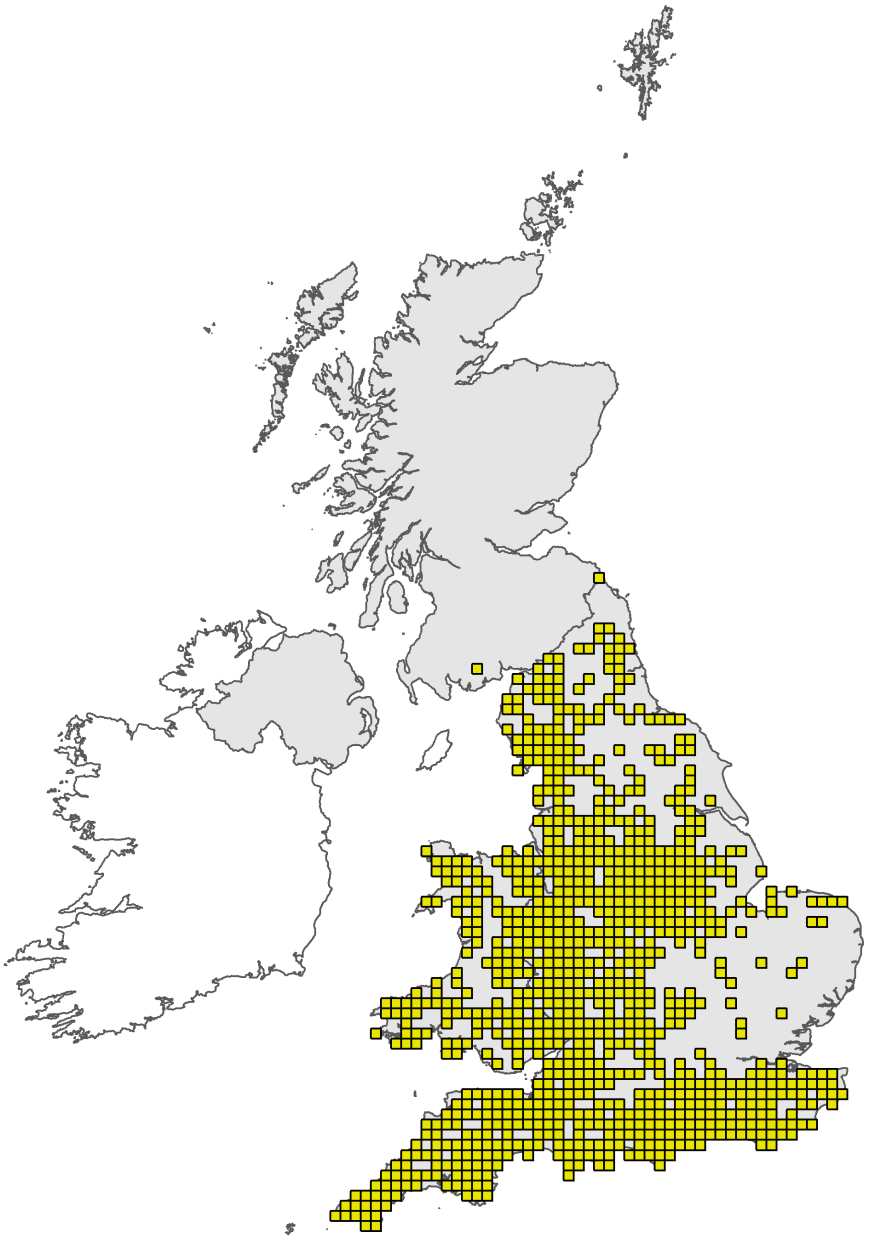

Figure 1: UK distribution map for S1320 - Brandt's bat (*Myotis brandtii*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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
2.2 Year or Period	This time period has been selected as distribution has been calculated using data from Mathews et al. 2018.
2.4 Distribution map; Method used	Brandt's bats are widely distributed across Wales. Some gaps in range in Wales are likely due to a lack of records rather than true absence. Because of the 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 more closely represent the true range for whiskered than Brandt's bats (Mathews et al. 2018). The two species are both morphologically similar and their echolocation calls are also difficult to differentiate. Current monitoring through NBMP is undertaken by counting M. mystacinus/M. brandtii in hibernation sites, but this may not give an unbiased trend estimate. Trends are not available for the two species separately. The species is often found in buildings, so its presence may be noted, however it can be difficult to observe within the roost and to confirm identification, so may be overlooked if present with other species or misidentified as one of the more commonly found species (common or soprano pipistrelle).

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

Field label	Note
5.3 Short term trend; Direction	The difficulty of separating whiskered bats from Brandt's bats 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, 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, so the estimated range is likely to more closely represent the true range for whiskered rather than 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.

5.11 Change and reason for change in surface area of range	Area of land (including unsuitable habitat) contained within the range is given as 20,488 km2 for Wales (Mathews et al. 2018). 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 range has been taken from Mathews et al. 2018, whereby an alpha hull value of 20km was drawn around the presence records, which was considered to represented the best balance between the inclusion of unoccupied sites (i.e. where records are sparse but close enough for inclusion) and the exclusion of occupied areas due to gaps in the data (i.e. where records exist but are too isolated for inclusion). An additional 10km buffer was added to the final hull polygon to provide smoothing to the hull and to ensure that the hull covered the areas recorded rather than intersecting them. This differs from the approach taken in 2013 and 2007 whereby a 45km alpha hull value was used for all bat species with a starting range unit of individual 10km squares. The new method has led to much finer detail maps being produced underpinned by data gathered at a much finer resolution, leading to the production of a more accurate FRR. Added to which acoustic detectors have changed considerably over the years in both accuracy and sensitivity, which also adds to the production of this value.
6.4 Additional population size	Mathews et al. 2018 was unable to give an updated population estimate. They state 'Given the absence of data on roost density it was not possible to compute a population estimate. It is considered unlikely that most maternity roosts in Britain are known and therefore it was also not possible to make a total count. No population genetics study has been conducted, and therefore no alternative metrics of population size were available.' The estimate by Harris et al. 1995 (population estimate for Wales = 7000 individuals) was based largely on expert opinion, based on very limited information, extrapolating from known size of Pipistrellus pipistrellus colonies in relation to size of M. brandtii 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 very little confidence can be placed on the estimate.
6.6 Population size; Method used	The reported figure in 6.2 is based on occupied 1km grid squares and is therefore reliant on existing records. This species is likely to be under recorded and the issue is compounded by the lack of separation between whiskered and Brandt's bat records. The reported figure in 6.4 is based mainly on expert opinion with very limited data.
6.8 Short term trend; Direction	The combined population of whiskered and Brandt's bats combined is considered to have been stable in Wales over the period 1999-2016: 'The smoothed index is currently 1.4% below the 1999 base year value, equivalent to an annual decrease of 0.1%. The index has remained below the baseline since 2003, although recent years have seen a gradual upward trend back to baseline level. Overall there has been no significant change in the smoothed index since the baseline year.' (BCT 2018a). 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	In NRW 2013, population was reported as number of individuals however the given EU reporting unit for the current report is 1x1km grid squares. This is based on the updated range estimates produced by Mathews et al. 2018. The reported Alternative Population (6.4) estimate is 7000 individuals and remains unchanged as there are no new population estimates available and thus Harris et al. 1995's value is given.

6.17 Additional information	There is no evidence to suggest reproduction, mortality or age structure is deviating from normal given the population data.
7.1 Sufficiency of area and quality of occupied habitat	Area: 20,500 km2. Habitable area as given by Mathews et al. 2018 has been used as a proxy for occupied habitat. The habitable area calculation defined all the area within the range as habitable excluding montane habitat since this is unlikely to include suitable locations for maternity roosts. Quality: Whilst we do not have a reliable measure of the quality of the occupied habitat, the population trend is not showing a decline and the species continues to be widespread across a mosaic of habitats. It is therefore assumed that quality is sufficient to support a viable population of the species and maintain FCS. 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 manouverable 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. There is thought to be a sufficient amount of habitat in the UK to support a viable population of the species. In order to obtain an estimate of actual occupied habitat, 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. We do not at present have a reliable measure of habitat quality across the species range in Wales, however the population trend is stable, and the species is widespread, using a mosaic of habitats; it is therefore assumed that quality is sufficient to support a viable population of the species and maintain FCS.
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, but the total area and overall quality of suitable habitat poorly understood as the species depends on a matrix of habitats in a landscape. 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 the population trend is considered stable and the species is widespread, using a mosaic of habitats; it is therefore assumed on the basis of expert judgement that both the area and quality of occupied habitat is sufficient to support a viable population of the species and maintain FCS.

7.4 Short term trend; Direction	There is insufficient data on any change in the level of suitable habitat or any change in the quality of habitat for the species. This is extremely difficult question to answer as this is a generalist species, using a mosaic of habitats across a large area.
8.1 Characterisation of pressures/ threats	Pressures: Pressures can generally be divided into those that affect roosts and those that affect commuting and foraging (including prey availability). Pressures mostly affecting roosts: B05 - Logging without replanting or natural regrowth, B07 - Removal of dead and dying trees, including debris, B09 - Clear-cutting, removal of all trees, F02 - Construction or modification (of e.g. housing and settlements) in existing urban or recreational areas, B08 - Removal of old trees (excluding dead or dying trees), F07 - Sports, tourism and leisure activities: The species is vulnerable to loss of roosts through development, renovation or conversion of buildings and to disturbance at (underground) hibernation and swarming sites. 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). Pressures mostly affecting commuting and foraging: E01 - Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels), F01 - Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions), A05 - Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.), A06 - Abandonment of grassland management (e.g. cessation of grazing or of mowing): 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 (including changes to water quality) could negatively affect populations. Threats: Threats can also generally be divided into those that affect roosts and those that affect commuting and foraging (including prey availability). Threats mostly affecting roosts:B05 - Logging without replanting or natural regrowth, B07 - Removal of dead and dying trees, including debris B09 - Clear-cutting, removal of all trees, F02 - Construction or modification (of e.g. housing and settlements) in existing urban or recreational areas, B08 - Removal of old trees (excluding dead or dying trees), F07 - Sports, tourism and leisure activities: The species is vulnerable to loss of roosts through development, renovation or conversion of buildings and to disturbance at (underground) hibernation and swarming sites. In addition, changes in building practices to improve energy efficiency mean that new buildings may offer fewer roosting opportunities (Mitchell-Jones, 2010). Threats to roost will continue into the future. Threats mostly commuting and foraging: E01 - Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels), F01 - Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions), A05 - Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.), A06 - Abandonment of grassland management (e.g. cessation of grazing or of mowing): Whiskered bats forage over lowland farmland, woodland parkland and woodland edges. Agricultural and forestry practices that remove, modify or fragment these habitats, or affect the biomass of suitable insect prey (including changes to water quality) could negatively affect populations. Threats to habitats and prey availability will continue into the future.

9.5 List of main conservation measures	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. CE01: Reduce impact of transport operation and infrastructure: 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. CB04: Adapt/manage reforestation and forest regeneration, CB06: Stop forest management and exploitation practices, CF01: Manage conversion of land for construction and development of infrastructures, CA02: Restore small landscape features on agricultural land, CB05: Adapt/change forest management and exploitation practices: 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. CF12: Other measures related to residential, commercial, industrial and recreational infrastructures, operations and activities: Planning at landscape scale is required to conserve commuting routes and foraging areas. CF03: Reduce impact of outdoor sports, leisure and recreational activities: Impacts of recreation (caving) on swarming and hibernation sites need to be limited. This species is offered full protection under national and European legislation. However, the lack of information on distribution, abundance and habitat requirements and the inability at present to detect population trends separately from those of M. mystacinus means that it is difficult to plan conservation management action and to know if action planned for other species will be effective for this species. Roost sites are probably not a limiting factor, and being generalists, it is unlikely that diet is a limiting factor either. It is perhaps most important therefore to concentrate on the conservation of foraging habitats and swarming sites.