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:

S1326 - Brown long-eared bat (*Plecotus auritus*)

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.

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NATIONAL LEVEL

1. General information

1.1 Member State	**UK (England information only)**
1.2 Species code	**1326**
1.3 Species scientific name	**Plecotus auritus**
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Brown long-eared 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	Complete survey or a statistically robust estimate
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

Anderson, M.E., Racey, P.A., 1991. Feeding behaviour of captive brown long-eared bats, Plecotus auritus. Animal Behaviour 42, 489-493.
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Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C., McDonald, R.A., Shore, R.F., 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.
Mitchell-Jones, T., 2010. Bats in houses-the conservation challenge. Species Management: Challenges and Solutions for the 21st Century'.(Eds JJ Baxter and CA Galbraith.) pp, 365-378.
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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		

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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)	129683
	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 range has been taken from Mathews et al 2018, whereby an alpha hull value of 20km was drawn around the presence records, which 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 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. However, the current estimate combines both species due to the difficulties of identification which reduces the accuracy of this figure.
5.11 Change and reason for change in surface area of range	Improved knowledge/more accurate data Use of different method	
	The change is mainly due to:	Use of different method
5.12 Additional information	Range is given by Mathews et al. (2018) as 130,000 km2 for England (area of suitable habitat within range). Range was not estimated for England in the previous Article 17 report (JNCC 2013). Habitable area was defined as all area within the range excluding montane habitat since this is unlikely to include suitable locations for maternity roosts. The distribution is similar to that reported by Arnold (1993). The range is slightly smaller than that given in the JNCC Article 17 report (Joint Nature Conservation Committee 2013); this difference is likely to reflect the methodological differences as 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

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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	number of adults (adults)
	b) Minimum	34000
	c) Maximum	1430000
	d) Best single value	
6.5 Type of estimate	95% confidence interval	
6.6 Population size Method used	Complete survey or a statistically robust estimate	
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		
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	
	The change is mainly due to:	Use of different method
6.17 Additional information	The difference in population size between reporting rounds is most attributable to a change in methodology, although more data are also available. The 1995 population estimate for Great Britain (Harris et al 1995) was based on very limited information, and was largely derived from expert opinion on the ratio of Brown long-eared to pipistrelle bats (roosts and individuals). Direct comparison is therefore not possible. The new estimate, taken from Mathews et al (2018) is considered to be more robust.	

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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)?	Yes
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	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
Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) (A05)	H
Conversion from one type of agricultural land use to another (excluding drainage and burning) (A02)	M
Conversion from mixed farming and agroforestry systems to specialised (e.g. single crop) production (A03)	M
Logging without replanting or natural regrowth (B05)	H
Conversion to other types of forests including monocultures (B02)	M
Removal of dead and dying trees, including debris (B07)	H
Clear-cutting, removal of all trees (B09)	M
Forest management reducing old growth forests (B15)	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

Threat	Ranking
Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) (A05)	H
Conversion from one type of agricultural land use to another (excluding drainage and burning) (A02)	M

Conversion from mixed farming and agroforestry systems to specialised (e.g. single crop) production (A03)	H
Logging without replanting or natural regrowth (B05)	M
Conversion to other types of forests including monocultures (B02)	M
Removal of dead and dying trees, including debris (B07)	H
Clear-cutting, removal of all trees (B09)	M
Forest management reducing old growth forests (B15)	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

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)
Restore small landscape features on agricultural land (CA02)
Other measures related to residential, commercial, industrial and recreational infrastructures, operations and activities (CF12)
Adapt/change forest management and exploitation practices (CB05)
Stop forest management and exploitation practices (CB06)
Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land (CA01)
Reduce impact of outdoor sports, leisure and recreational activities (CF03)

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	The range for brown long eared bats is likely to have remained stable as the species is widespread and appears to be covering roughly the same range as in the previous reporting round (2007-2012), even though different methods were used to perform this calculation. The population appears to be stable at present, but although there has not been a change in estimated range size in the last 20 years, a lack of data on population densities, size, and the conflicting effects of drivers of population change means that the reported stable range size is not considered to be sufficient evidence for a stable population. The future prospects for population size for this species are therefore uncertain.

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

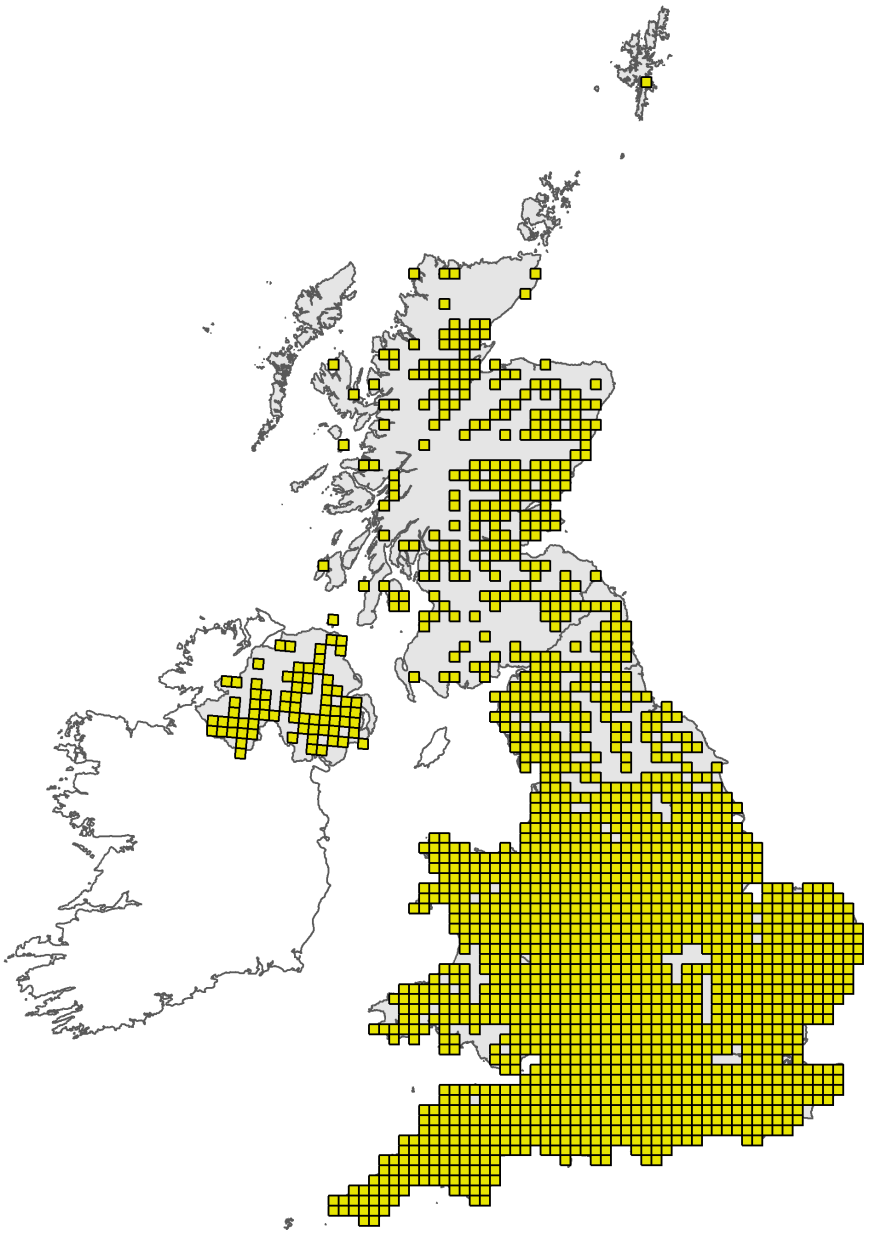

Figure 1: UK distribution map for S1326 - Brown long-eared bat (*Plecotus auritus*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

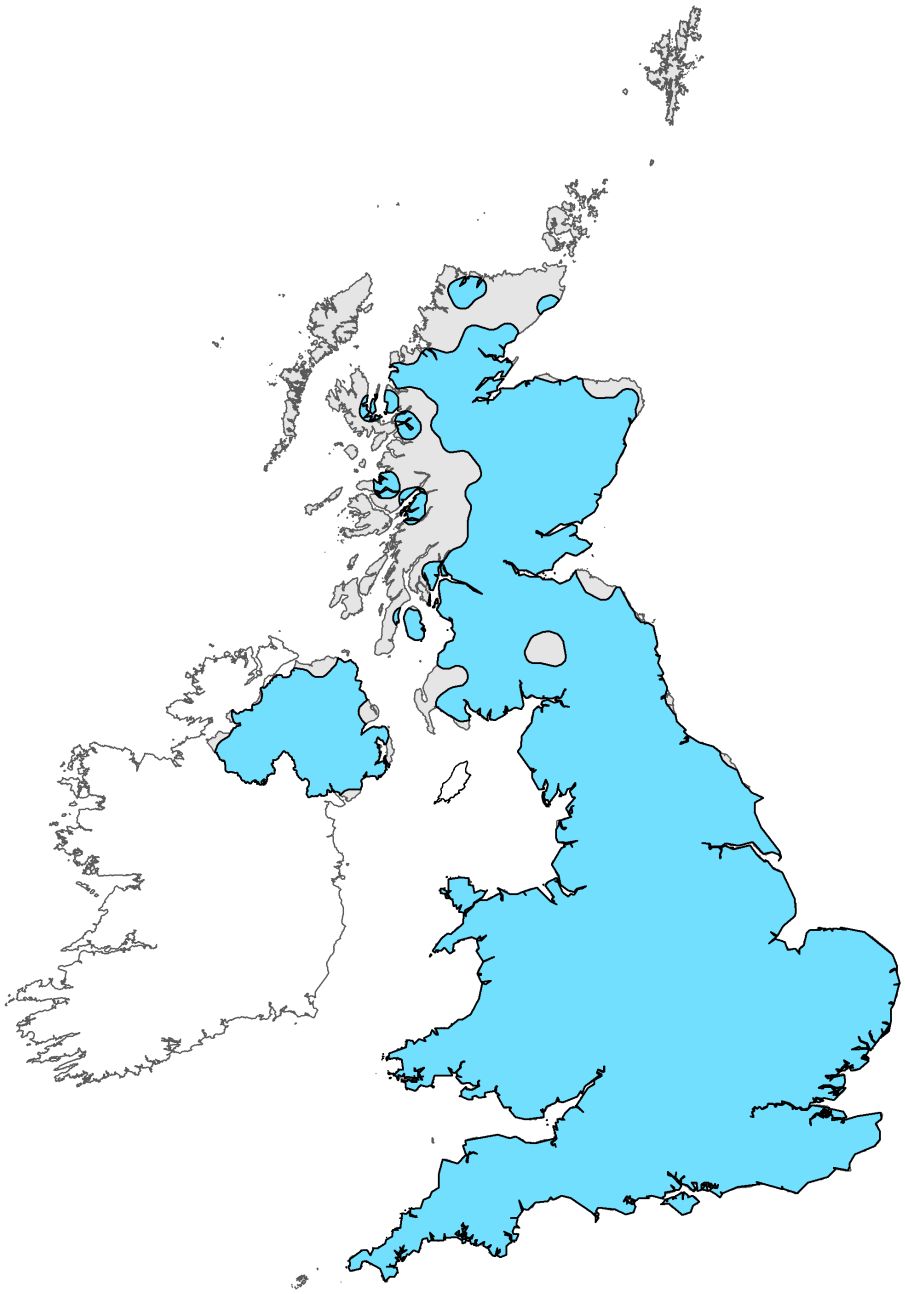

Figure 2: UK range map for S1326 - Brown long-eared bat (*Plecotus auritus*).Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The range map has been produced by The Mammal Society applying a range mapping tool as outlined in Matthews et al. (2018), to the 10km grid square distribution map presented in Figure 1. The alpha value for this species was 20km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Species name: Plecotus auritus (1326)

Field label	Note
1.5 Common name	Plecotus auritus is relatively common and widespread throughout England and often roosts in older buildings, barns, churches and trees. Many records come from householder requests for information or advice. The widespread use of bat detectors and structured surveys for the National Bat Monitoring Programme (NBMP) has increased the number of records in recent years, although it can be difficult to pick up on bat detectors due to its quiet echolocation.
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	Range is based on presence data collected between 1995 and 2016. Areas that contain very isolated records may not have been included in the area of distribution
2.4 Distribution map; Method used	Range is based on presence data collected between 1995 and 2016. Areas that contain very isolated records may not have been included in the area of distribution

Species name: Plecotus auritus (1326) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	P. auritus is a widely distributed species, found in all wooded landscapes but tree-roosts are critically under-recorded and acoustic surveys are also likely to substantially under-record the species because it has very quiet calls (Russ 2012). There is also potential for the species to be overlooked in open habitats, such as those for wind farms, as its calls are substantially different from those used in more enclosed areas (Mathews et al 2018); and because the calls can also be confused with those of Myotis spp, particularly when heterodyne detectors are used (Russ 2012). Because the species uses open areas such as parks and gardens, as well as woodland, habitable area within the range simply included all habitats except montane, potentially overestimating the true habitable area.
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	Mathews et al (2018) calculated a population size of adult individuals of 607,000 for England with upper and lower confidence intervals of 33,700-1,430,000). There is uncertainty surrounding the population estimates for this species as demonstrated by the relatively wide confidence intervals. Population size was calculated using the median adult density (bats/km2) * total habitable area within the range (km2) (for full details see Mathews et al 2018). Habitable area was defined as all area within the range excluding montane habitat since this is unlikely to include suitable locations for maternity roosts. There is an absence of data on roost density in trees, so it is difficult to compute a total population estimate. It is considered unlikely that most maternity roosts in Britain are known so it was not possible to make a total count. Although a population estimate of approximately 200,000 individuals was given in Harris et al. (1995) (England 155,000; Scotland 27,500; Wales 17,500), this estimate was graded as having very poor reliability (score 4/5) and was largely derived from expert opinion on the ratio of Brown long-eared to pipistrelle bats (roosts and individuals). Direct comparison is therefore not possible.

6.8 Short term trend; Direction	The National Bat Monitoring Programme (BCT 2018) trend from the Roost Count shows no significant change in the smoothed index since the baseline year. Following a statistically significant but marginal decline in 2016 from Hibernation Survey data, high counts in 2017 have pulled the curve back level again. Therefore, the population of brown long-eared bat in Great Britain is currently considered to have been stable since 1999.
7.1 Sufficiency of area and quality of occupied habitat	P. auritus 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. The species is commonly associated with trees, particularly broadleaved and mixed woodland, but less structured woodlands (including the edges of coniferous forests), forest edges, bushes and hedges, orchards, parks and gardens are used for foraging (Dietz and Keifer 2016, Entwistle et al. 1996). It is adapted to foraging in cluttered habitats and makes extensive use of sight, passive listening, and short duration echolocation (Anderson and Racey 1991, Anderson and Racey 1993, Eklof and Jones 2003). P. auritus gleans approximately half its prey from vegetation, with the remainder being caught in the air (Swift and Racey 1983, Anderson and Racey 1991, Anderson and Racey 1993). The species has highly maneovrable flight and gleaning is facilitated by its capability to hover in addition to using slow horizontal flight (Norberg 1976). It has been reported to use linear features such as treelines and large hedgerows to move between roosts and alternative foraging areas (Howard 1995, Murphy et al. 2012). P. auritus is a woodland bat that naturally roosts in tree holes, but has adapted very well to using loft spaces of large old buildings such as churches, barns and old houses. The species is also frequently found in bat boxes where they are located in woodland. Maternity roosts are located in trees, bat boxes and buildings - predominately barns, churches and dwelling houses with large internal flight spaces, preferably with a source of water nearby (Boyd and Stebbings 1989, Dietz and Keifer 2016). There is a high degree of fidelity to building roosts by both sexes (Entwistle et al. 2000; Park et al. 1998), with evidence of natal philopatry, yet colonies do not appear to be inbred (Burland et al 1999; 2001). Swarming sites, and associated genetic exchange, therefore appear particularly critical for Brown long-eared bat conservation (Burland et al. 2001; Furmankiewicz & Altringham 2007; Veith et al. 2004) yet the species forms only a very low proportion of total captures at swarming sites (Glover & Altringham 2008; Parsons et al. 2003). Winter roosts are in caves, mines and cellars, where animals prefer a temperature around 7 oC, and occasionally in tree holes (Boye and Dietz 2005). P. auritus flies very frequently during the winter (sometimes daily (Hays et al. 1992) so habitat quality around hibernacula is therefore likely to be very important to their conservation. Individual home ranges are related to habitat structures and prey abundance and vary between one and forty hectares (Boye and Dietz 2005). Individual foraging areas may overlap to a minor extent and during foraging flights bats usually stay close to the roost, travelling a maximum distance of about 3 kilometres, with core areas up to 1.5 kilometres from the roost. In England, females in the maternity period have been found to return repeatedly to non-overlapping core foraging areas which averaged 2.1ha (range 0.7-5.4; Murphy et al. 2012). There is thought to be a sufficient amount of habitat in the UK to support a viable population of 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, but the total area of suitable habitat is unknown 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.

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 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). Brown long eared bats forage within woodland, grassland and wetland habitats. Agricultural and forestry practices that remove, modify or fragment these habitats, or affect the biomass of suitable insect prey could negatively affect populations.