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*)

SCOTLAND

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 (Scotland 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	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

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

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

Bat Conservation Trust, 2018. The National Bat Monitoring Programme. Annual Report 2017, Bat Conservation Trust, London.
Boye, P., Dietz, M., 2005. Development of good practice guidelines for woodland management for bats. English Nature.
Dietz, C., Kiefer, A., 2016. Bats of Britain and Europe. Bloomsbury, United Kingdom.
Entwistle, A., Racey, P., Speakman, J., 1996. Habitat exploitation by a gleaning bat, Plecotus auritus. Phil. Trans. R. Soc. Lond. B 351, 921-931.
Entwistle, A., Racey, P., Speakman, J., 2000. Social and population structure of a gleaning bat, Plecotus auritus. Journal of Zoology 252, 11-17.
Howard, R.W., 1995. Auritus: a natural history of the brown long-eared bat. William Sessions.
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.
Newson, S.E., Evans, H.E., Gillings, S., Jarrett, D. & Wilson, M.W. 2017. A survey of high risk bat species across southern Scotland. Scottish Natural Heritage Commissioned Report No. 1008.
Park, K., Masters, E., Altringham, J., 1998. Social structure of three sympatric bat species (Vespertilionidae). Journal of Zoology 244, 379-389.
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.
Swift, S., Racey, P., 1983. Resource partitioning in two species of vespertilionid

bats (Chiroptera) occupying the same roost. Journal of Zoology 200, 249-259.

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	Improved knowledge/more accurate data 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	number of individuals (i) 12800 543000
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	2010-2015	
6.8 Short-term trend Direction	Stable (0)	

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

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
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	

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	1995-2016	
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)	H

Conversion to other types of forests including monocultures (B02)	M
Logging without replanting or natural regrowth (B05)	H
Logging (excluding clear cutting) of individual trees (B06)	H
Removal of dead and dying trees, including debris (B07)	M
Removal of old trees (excluding dead or dying trees) (B08)	H
Clear-cutting, removal of all trees (B09)	H
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	M

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 to other types of forests including monocultures (B02)	M
Logging without replanting or natural regrowth (B05)	M
Logging (excluding clear cutting) of individual trees (B06)	M
Removal of dead and dying trees, including debris (B07)	M
Removal of old trees (excluding dead or dying trees) (B08)	H
Clear-cutting, removal of all trees (B09)	M
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	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)
Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land (CA01)
Restore small landscape features on agricultural land (CA02)
Other measures related to residential, commercial, industrial and recreational infrastructures, operations and activities (CF12)

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

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

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

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

13. Complementary information

13.1 Justification of % thresholds for trends

13.2 Trans-boundary assessment

13.3 Other relevant Information

Distribution Map

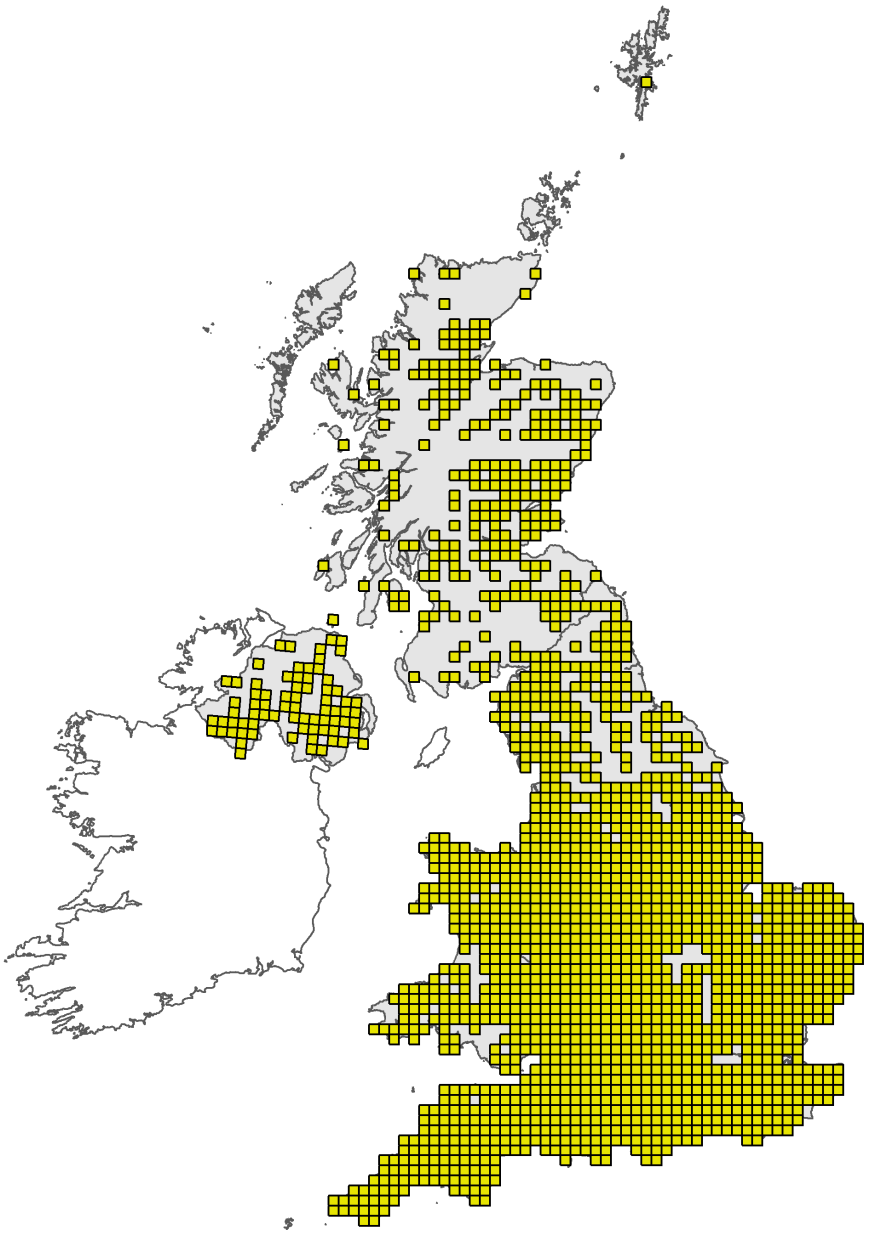

Figure 1: UK distribution map for S1326 - Brown long-eared bat (*Plecotus auritus*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

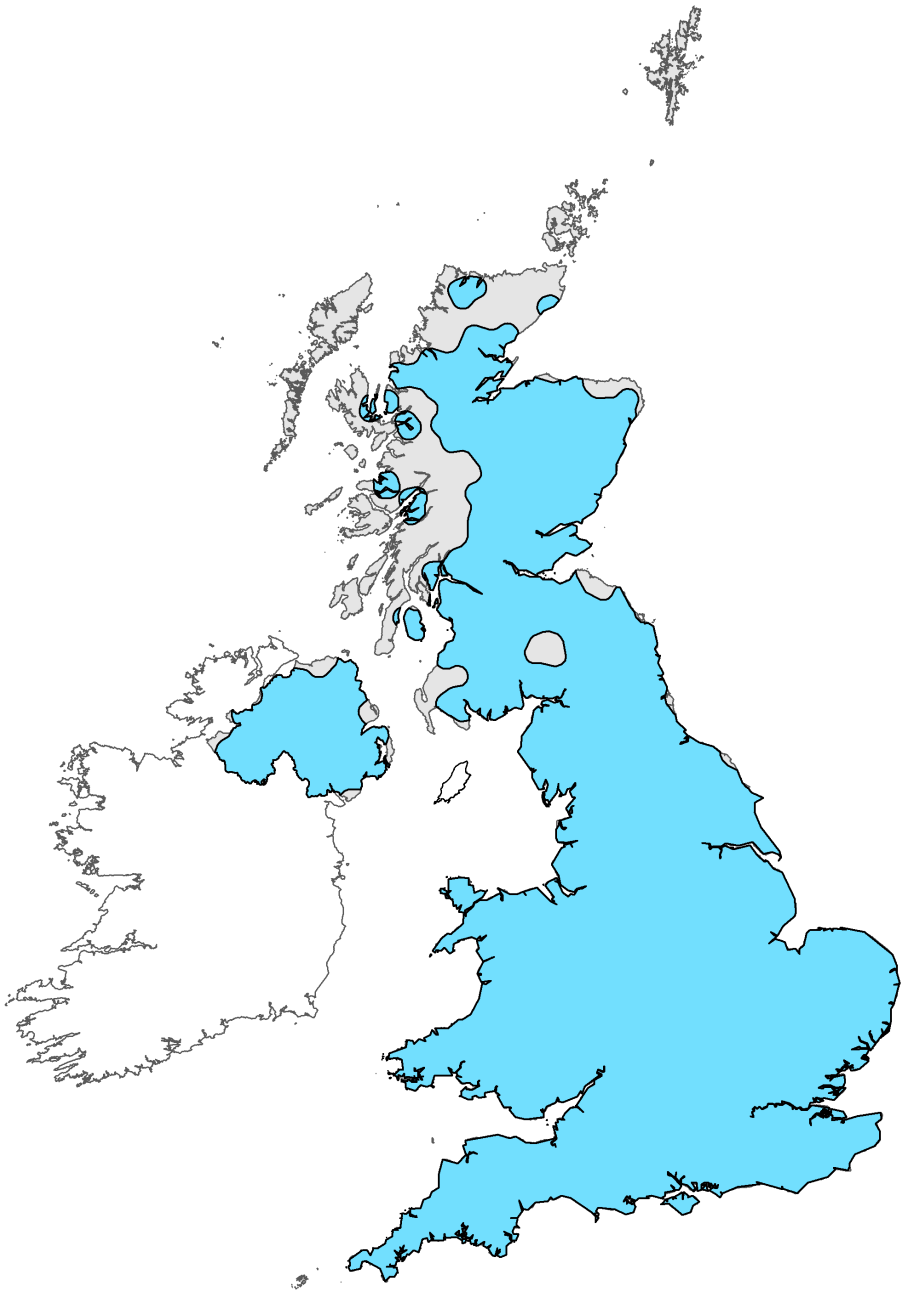

Figure 2: UK range map for S1326 - Brown long-eared bat (*Plecotus auritus*).Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	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.
5.11 Change and reason for change in surface area of range	Range is given by Mathews et al. (2018) as 49,100 km2 for Scotland (area of suitable habitat within range). Habitable area was defined as all area within the range excluding montane habitat since this is unlikely to include suitable locations for maternity roosts.
6.4 Additional population size	Mathews et al, (2018) gives estimates of 12,800 individuals (lower plausible limit) to 543,000 (upper plausible limit). This may have led to some over-estimation of population size: when all roosts were included the bat population density estimate fell by approximately a third. However, most data were derived from NBMP data and here all roosts were included regardless of size since they were part of a longitudinal monitoring programme. Given that the estimated roost size is close to expert opinion and published data, it is likely to be a reasonable basis for the calculations.
6.8 Short term trend; Direction	The GB trend is stable (NBMP data) but no equivalent Scotland trend is available.
6.10 Short term trend; Method used	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. No equivalent Scotland trend is available.
6.16 Change and reason for change in population size	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.

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. It is adapted to foraging in cluttered habitats. P. auritus gleans approximately half its prey from vegetation, with the remainder being caught in the air. It has been reported to use linear features such as treelines and large hedgerows to move between roosts and alternative foraging areas. 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. There is a high degree of fidelity to building roosts by both sexes, with evidence of natal philopatry, yet colonies do not appear to be inbred. Swarming sites, and associated genetic exchange, therefore appear particularly critical for brown long-eared bat conservation. Winter roosts are in caves, mines and cellars and occasionally in tree holes. P. auritus flies very frequently during the winter, 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. 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. 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	This stable habitat trend is expert opinion, with Mathews et al suggesting that the habitat future prospects for this species is 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. 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.
10.1 Future prospects of parameters	The range for brown long-eared bats is likely to have remained stable as the species 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 trend is unknown as there are insufficient data available from Scotland. There are insufficient data on any change in the level of suitable habitat or any change in the quality of habitat for the species, but both are thought to be stable. (See Mathews et al 2018).