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:

S1308 - Barbastelle (*Barbastella barbastellus*)

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.

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NATIONAL LEVEL	

1. General information

1.1 Member State	**UK (Wales information only)**
1.2 Species code	**1308**
1.3 Species scientific name	**Barbastella barbastellus**
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Barbastelle

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	Ancillotto L, Cistrone L, Moscini F, Jones G, Boitani L, Russo D. 2015. The importance of non-forest landscapes for the conservation of forest bats: lessons from barbastelles (Barbastella barbastellus). Biodiversity and Conservation, 24 (1), 171-185.

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Natural Resources Wales, 2013. Supporting documentation for the Third Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2007 to December 2012. Conservation status assessment for Species: S1308 - Barbastelle bat (Barbastellus barbastellus). 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

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5.3 Short-term trend Direction	Unknown (x)	
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	1995-2017	
6.2 Population size (in reporting unit)	a) Unit	number of individuals (i)
	b) Minimum	
	c) Maximum	
	d) Best single value	500
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	2007-2018	
6.8 Short-term trend Direction	Unknown (x)	
6.9 Short-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval	
6.10 Short-term trend Method used	Insufficient or no data available	
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 | |

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)? | Unknown |
| | 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 | Insufficient or no data available |

| 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
Conversion to other types of forests including monocultures (B02)	H
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)	H
Removal of old trees (excluding dead or dying trees) (B08)	H
Clear-cutting, removal of all trees (B09)	M
Application of synthetic fertilisers in forestry, including liming of forest soils (B19)	M

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Drainage for use as agricultural land (A31)	M
Other invasive alien species (other then species of Union concern) (I02)	M
Conversion from one type of agricultural land use to another (excluding drainage and burning) (A02)	M

Threat	Ranking
Conversion to other types of forests including monocultures (B02)	H
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)	H
Removal of old trees (excluding dead or dying trees) (B08)	H
Clear-cutting, removal of all trees (B09)	M
Application of synthetic fertilisers in forestry, including liming of forest soils (B19)	M
Drainage for use as agricultural land (A31)	M
Other invasive alien species (other then species of Union concern) (I02)	M
Conversion from one type of agricultural land use to another (excluding drainage and burning) (A02)	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		

Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land (CA01)
Manage drainage and irrigation operations and infrastructures in agriculture (CA15)
Prevent conversion of (semi-) natural habitats into forests and of (semi-)natural forests into intensive forest plantation (CB01)
Adapt/manage reforestation and forest regeneration (CB04)
Adapt/change forest management and exploitation practices (CB05)
Stop forest management and exploitation practices (CB06)
Manage the use of chemicals for fertilisation, liming and pest control in forestry (CB09)

Restore small landscape features on agricultural land (CA02)

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 | Insufficient or no data available |

| 12.4 Short-term trend of population size within the network Direction | Unknown (x) |

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

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13. Complementary information
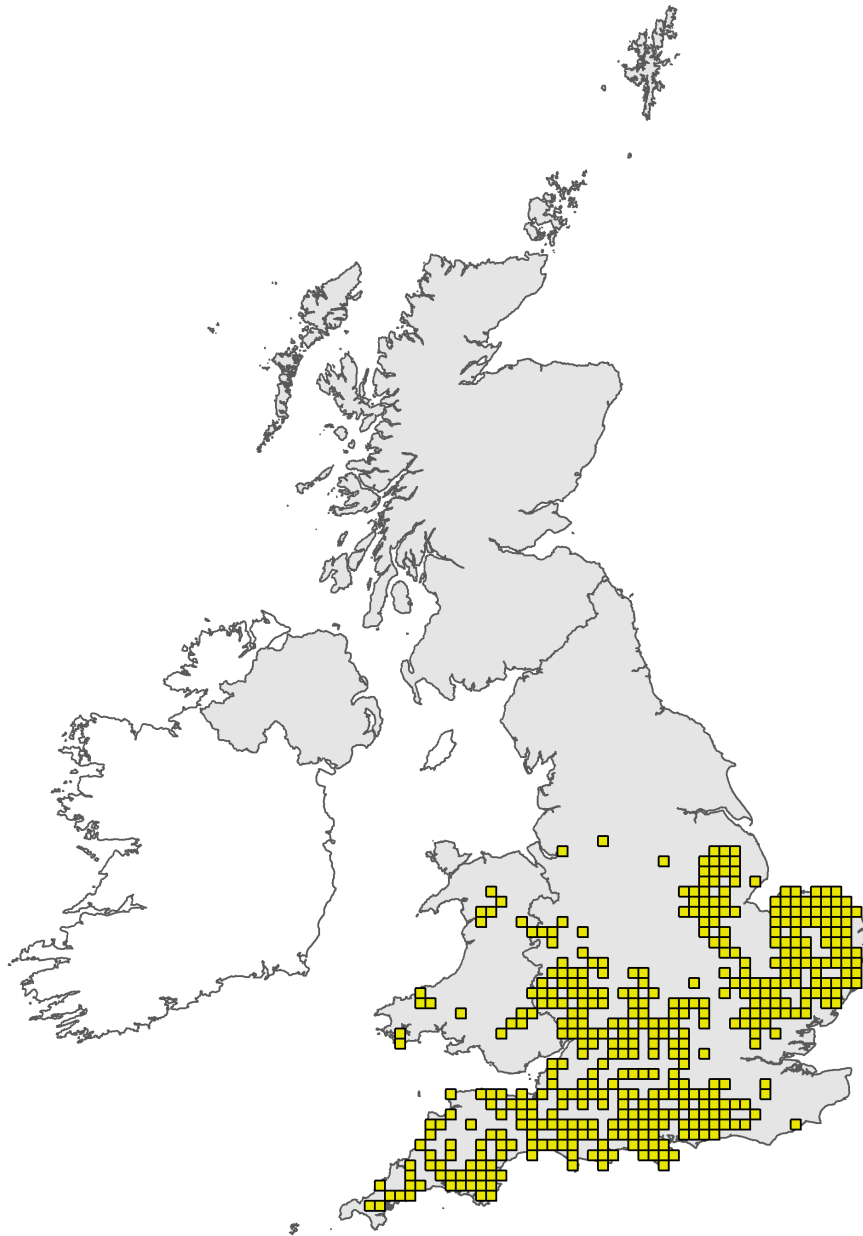
Distribution Map

Figure 1: UK distribution map for S1308 - Barbastelle (*Barbastella barbastellus*). 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.
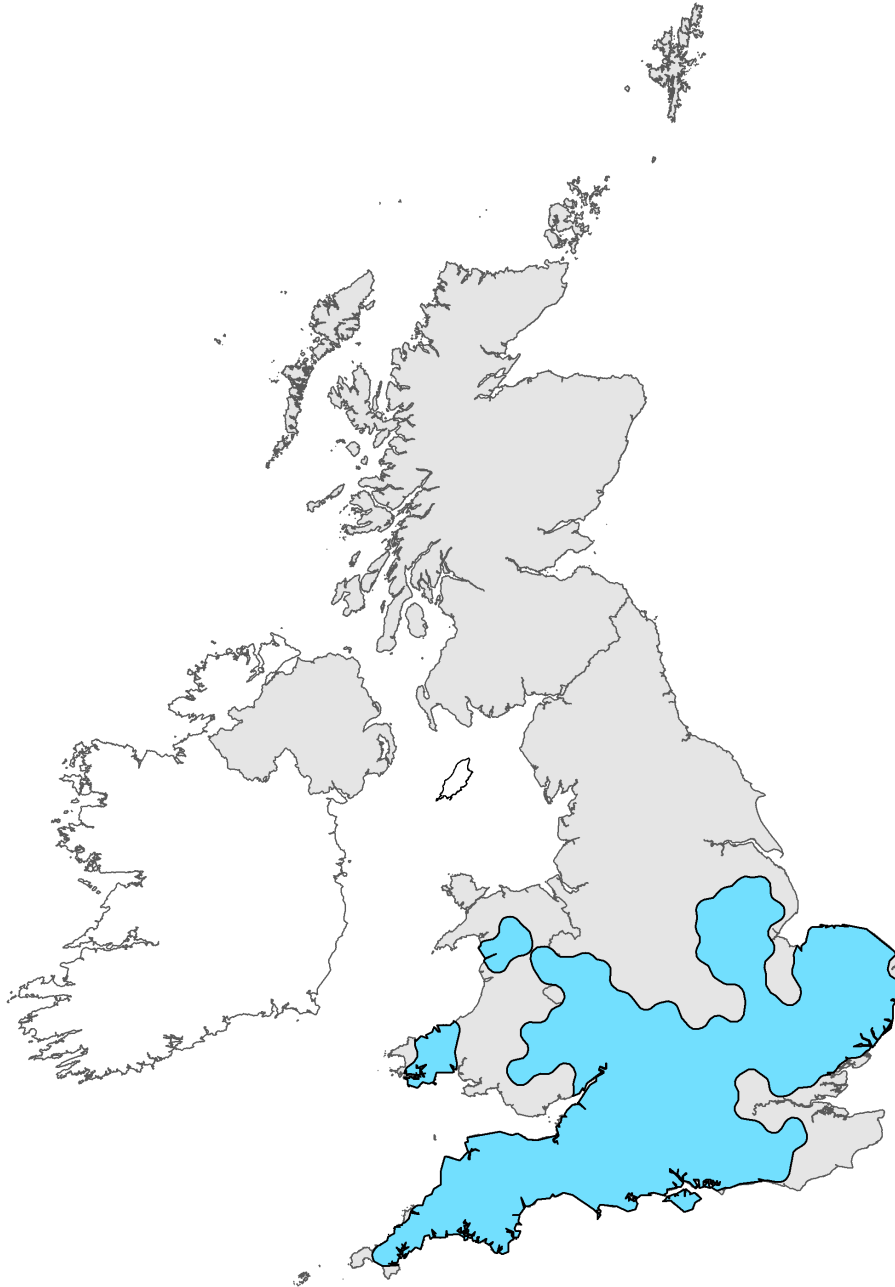
Range Map

Figure 2: UK range map for S1308 - Barbastelle (*Barbastella barbastellus*).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: Barbastella barbastellus (1308)

Field label	Note
2.2 Year or Period	The time period has been selected as distribution has been calculated using data from Mathews et al. 2018.
2.4 Distribution map; Method used	B. barbastellus is a rare species throughout its UK range, with relatively few roosts known. Distribution maps are based on validated records, but the species is likely to be under recorded. The widespread use of bat detectors and sound analysis software is increasing the number of records of the species due to a relatively distinct echolocation call but low contact rates make this resource-intensive. There have been some specific surveys for the species using trapping (e.g. Zeale, 2011) but others have occurred as a result of surveys associated with developments (particularly road schemes) and it is considered that further intensive surveys would provide better distribution data for the species. Currently records are scattered, but present at low density throughout lowland areas of Wales and England south of a line from the Mersey to the Humber. Specifically targeted survey effort is required to further determine the status and distribution of the species in Wales.

Species name: Barbastella barbastellus (1308) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	The rarity of the species and a lack of systematic survey leaves its current range and any trend in range poorly understood.
5.11 Change and reason for change in surface area of range	Area of land (including unsuitable habitat) contained within the Welsh range is given as 6,386 km2 (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. 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. The distributions reported in previous Article 17 reports were based on very sparse data compared with the data currently available. Whilst, Arnold (1993) suggested that there had been a serious decline in the population, based on the difference in the range of the species inferred from records up to 1959 compared with those from 1960 onwards, the current data indicates that range is similar to all available historical data with the exception that there are no longer any records north of the Humber. Whereas, Arnold (1993) shows positive hectads in S.Yorkshire. The last Article 17 report for this species (2007-2012) used a larger alpha kernel (45km compared with 20km) used in this report, taken from Mathews et al. (2018). The choice of alpha value is a compromise between over estimating the range and giving too much weight to absences that result from lack of recorder effort. Given the recent increases in observer effort and the widespread deployment of static acoustic detectors, it has been possible to use a smaller alpha kernel. The current range is therefore considered likely to be more appropriate than the previous report. The apparent change in range is therefore an artefact.

6.2 Population size	The population estimate quoted is taken from Harris et al. 1995 and was based on subjective estimates of relative abundance because there were few density estimates and a paucity of quantified data on bat numbers in relation to habitat associations and patterns of land use. For this species the estimate was based on subjective criteria thought to be within the right order of magnitude. Mathews et al. 2018 determined that insufficient data are available to derive a population estimate for the species and therefore there is no update of this estimate from the previous Article 17 reporting round (Jan 2007 - Dec 2012).
6.8 Short term trend; Direction	The population estimate cannot be updated for this species due to insufficient data for this species as such there is no data available to detect any change in trend so the trend is unknown.
6.16 Change and reason for change in population size	The population figure has remained the same as that recorded in the previous Article 17 reporting period (Jan 2007 - Dec 2012) as there is insufficient data to update the population for this species
6.17 Additional information	Whilst there have been studies on aspects of barbastelle bat ecology, current information on all aspects of reproduction, mortality and age structure is not available.
7.1 Sufficiency of area and quality of occupied habitat	- area = The habitable area within the Welsh range (defined as all broadleaved woodland within the range) is give as 6390 km2 (Mathews et al. 2018). There has been no systematic ground-truthing of this figure. -quality = Unknown - No or insufficient reliable information available Overall = Unknown The area and quality of habitat for the species has been assessed as unknown as there is insufficient information available for this species to undertake this assessment. Further to this, work in Italy has indicated that barbastelle bats can continue to use formerly forested landscapes long after they have changed to apparently unsuitable habitat, indicating that habitat suitability models based on woodland availability must be used with caution (Ancillotto et al., 2015). Also, in GB there appears to be a preference for old or dead oak, almost any tree with suitable cavities can be used (Zeale, 2011) and elsewhere in Europe, the species preferentially roosts in beech trees (Russo et al, 2004). This further demonstrates that caution must be used before inferring habitat suitability from woodland composition (Mathews et al., 2018). B. barbastellus requires a complex mosaic of habitats, and particularly large areas of mature woodland, to support foraging, roosting and commuting behaviour. Boye & Dietz (2005) provides a good overview of this species' habitat requirements. Foraging areas are predominantly in woodlands or parks, but they can also stretch along forest edges, tree rows, hedges, waterways, or field roads with trees. The home range extends up to 8-10 km around the roost. As this is a generalist species, using a mosaic of habitats, the area of distribution is used as an estimate of habitat area. This is calculated from the number of filled 10km squares in the distribution map. Most summer roosts are found in narrow crevices in trees or buildings, but the preferred natural roost sites seem to be behind loose bark. Sometimes woodpecker holes are used and the species is frequently found behind window shutters or wall cover (shingles from wood or slate) on houses. On rare occasions the species is observed in bat boxes. During spring and summer, roost sites are changed frequently, sometimes every day, so that the group composition varies continuously. Winter roosts are known in caves, old mines and bunkers. Most of the population probably hibernates in tree crevices and walls of houses. Summer and winter roosts seem to be a maximum of 20 km apart. 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	Although the habitat requirmements for this species are fairly well established, ground truthing of the estimated range from Mathews et al. 2018 has not yet been undertaken and the quality of the indicated habitats have not been assessed.
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.

| 8.1 Characterisation of pressures/ threats | Pressures: B02 - Conversion to other types of forests including monocultures, B05 - Logging without replanting or natural regrowth, B06 - Logging (excluding clear cutting) of individual trees, B07 - Removal of dead and dying trees, including debris, B08 - Removal of old trees (excluding dead or dying trees), B09 - Clear-cutting, removal of all trees, B19 - Application of synthetic fertilisers in forestry, including liming of forest soils: The barbastelle bat is predominantly a woodland species, roosting most commonly under loose bark on large old trees. The species appears to have a prefererence for old or dead oak in GB (Zeale et al., 2011). Radiotracking evidence shows that riparian margins and broad-leaved woodland are strongly selected for foraging but unimproved grassland, field margins and hedgerows are also important (Zeale et al., 2012). Forestry operations and preventing the maintenance or development of this resource are likely to have an adverse effect. A05 - Removal of small landscape features: loss of foraging habitat, severance of commuting routes and isolation of colonies is a pressure on the species. A02 - Conversion from one type of agricultural land use to another (excluding drainage and burning), A31 - Drainage for use as agricultural land: The barbastelle is a specialist moth feeder (>99% of diet; Sierro & Arlettaz, Zeale, 2011) so it's likely to be adversely affected by agricultural operations, including pesticide use that affect the biomass of suitable prey. I02 - Other invasive alien species (other then species of Union concern): This pressure best aligns to the recently established I05 category (plant and animal diseases, pathogens and pests) however this category isn't currently available for internal UK reporting purposes. This species is reliant on tree roosts and moves roosts frequently, requiring a large number of trees with suitable crevices. Loss of native broadleaf trees through new pathogens (such as Chalara fraxinea) could have a serious long term impact through reduction of resource. E01 - Roads, paths, railroads and related infrastructure: These pressures also act via construction of new, and widening/realignment of existing linear infrastructure projects. Road casualities have been reported in continental Europe. Lighting from urbanisation and infrastructure can sever commuting routes, impact foraging areas and delay emergence times. Threats: B02 - Conversion to other types of forests including monocultures, B05 - Logging without replanting or natural regrowth, B06 - Logging (excluding clear cutting) of individual trees, B07 - Removal of dead and dying trees, including debris, B08 - Removal of old trees (excluding dead or dying trees), B09 - Clear-cutting, removal of all trees, B19 - Application of synthetic fertilisers in forestry, including liming of forest soils: The barbastelle bat is predominantly a woodland species, roosting most commonly under loose bark on large old trees. The species appears to have a prefererence for old or dead oak in GB (Zeale et al., 2011). Radiotracking evidence shows that riparian margins and broad-leaved woodland are strongly selected for foraging but unimproved grassland, field margins and hedgerows are also important (Zeale et al., 2012). Forestry operations and preventing the maintenance or development of this resource are likely to continue as a threat. A05 - Removal of small landscape features: loss of foraging habitat, severance of commuting routes and isolation of colonies is a threat that is likey to continue into the future. A02 - Conversion from one type of agricultural land use to another (excluding drainage and burning), A31 - Drainage for use as agricultural land: The barbastelle is a specialist moth feeder (>99% of diet; Sierro & Arlettaz, Zeale, 2011) so it's likely to be adversely affected by agricultural operations, including pesticide use that affect the biomass of suitable prey. These operations will undoubtly continue in the future. I02 - Other invasive alien species (other then species of Union concern): This pressure best aligns to the recently established I05 category (plant and animal diseases, pathogens and pests) however this category isn't currently available for internal UK reporting purposes. This species is reliant on tree roosts and moves roosts frequently, requiring a large number of trees with suitable crevices. Loss of native broadleaf trees through new pathogens (such as Chalara fraxinea) could have a serious long term impact through reduction of resource. Further pathogens are likely to emerge and this remains a future threat. E01 - Roads, paths, railroads and related infrastructure: Construction of new, and |

widening/realignment of existing linear infrastructure projects combined with lighting from urbanisation and infrastructure severing commuting routes, impact foraging areas and delay emergence times are all threats that are likey to continue into the future.

9.5 List of main conservation measures	CA01 - Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land, CA15 -Manage drainage and irrigation operation and infrastructures in agriculture, CB01 - Prevent conversion of (semi-) natural habitats into forests and of (semi-)natural forests into intensive forest plantation, CB04 - Adapt/manage reforestation and forest regeneration, CB05 - Adapt/change forest management and exploitation practices, CB06 - Stop forest management and exploitation practices, CB09 - Manage the use of chemicals for fertilisation, liming and pest control in forestry, CA02 - Restore small landscape features on agricultural land: Low population density and slow population growth are likely to have made this species particularly vulnerable to factors such as loss and fragmentation of ancient deciduous woodland habitat; the loss, destruction and disturbance of roosts in buildings, trees and underground sites and the reduction in numbers of insect prey due to habitat simplification and factors such as fertiliser and pesticide use and intensive grazing. The availability of dead and dying trees as roost sites and the lack of wetland for foraging are still majojr factors likely to affect the species status. Legal and administrative measures continue to be required to ensure that the protection provided by the legislation is effective. However, although some measures have been identified for the species, the list is likely to be incomplete as several knowledge gaps persist for this species and further research is needed to identify further measures and the practical implementation of those measures for this species.
10.1 Future prospects of parameters	The future prospects of range for this species in Wales is currently unknown. The rarity of the species and a lack of systematic survey leaves its current range poorly understood thus predicting future prospects is challenging. Should the species be recorded in new areas in the future it will be difficult to distinguish between recent range increase and simply the discovery of long existing populations outside of the currently predicted range, which is based on modelling of current data. The future prospects of population for this species in Wales is currently unknown. Currnet population is an estimate based on limited data therefore monitoring for population change of such an infrequently encountered bat would be extremely difficult. The future prospects of habitat of the species in Wales is currently unknown. Due to the rarity of the species and and their requirement for high value habitats including deciduous woodland, managing habitats specifically for the species is difficult and habitat may be lost unknowingly.