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:

S1330 - Whiskered bat (*Myotis mystacinus*)

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.

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NATIONAL LEVEL

1. General information

1.1 Member State	**UK (Scotland information only)**
1.2 Species code	**1330**
1.3 Species scientific name	**Myotis mystacinus**
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Whiskered 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

Bat Conservation Trust, 2018. The National Bat Monitoring Programme. Annual Report 2017, Bat Conservation Trust, London.
Berge, L., 2007. Resource partitioning between the cryptic species Brandt's bat (Myotis brandtii) and the whiskered bat (M. mystacinus) in the UK, University of Bristol.
Brown, P.A., 2016. The Cryptic Group of Small Myotis Bats (M. Mystacinus, M. Brandtii and M. Alcathoe) and Habitat Use by Woodland Bats Species in Britain, University of Bristol.
Buckley, D.J., Lundy, M.G., Boston, E.S., Scott, D.D., Gager, Y., Prodohl, P., Marnell, F., Montgomery, W.I., Teeling, E.C., 2013. The spatial ecology of the whiskered bat (Myotis mystacinus) at the western extreme of its range provides evidence of regional adaptation. Mammalian Biology-Zeitschrift fur Saugetierkunde 78, 198-204.
Dietz, C., Kiefer, A. 2016. Bats of Britain and Europe. Bloomsbury, United Kingdom.
Glover, A.M., Altringham, J.D., 2008. Cave selection and use by swarming bat species. Biological Conservation 141, 1493-1504.
JNCC, 2013. Third Report by the United Kingdom under Article 17 on the implementation of the Habitats Directive from January 2007 to December 2012. Species S1330 - Whiskered bat (Myotis mystacinus), Peterborough: JNCC, Available from: www.jncc.gov.uk/article17
Jones, G., 1991. Hibernal ecology of whiskered bats (Myotis mystacinus) and Brandt's bats (Myotis brandti) sharing the same roost site. Myotis 29, 121-128.
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

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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.
Norberg, U.M., Rayner, J.M. 1987. Ecological morphology and flight in bats (Mammalia; Chiroptera): wing adaptations, flight performance, foraging strategy and echolocation. Phil. Trans. R. Soc. Lond. B. 316, 335-427.
Parsons, K.N., Jones, G., Davidson-Watts, I., Greenaway, F. 2003. Swarming of bats at underground sites in Britain-implications for conservation. Biological Conservation. 111, 63-70.
Ruedi, M., and Mayer, F. 2001. Molecular systematics of bats of the genus Myotis (Vespertilionidae) suggests deterministic ecomorphological convergences. Molecular phylogenetics and evolution. 21, 436-448.
Schober, W., Grimmberger, E., 1989. Bats of Britain and Europe. Hamlyn, London.

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	Genuine change Use of different method The change is mainly due to:	 Improved knowledge/more accurate data
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	

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6.4 Additional population size (using population unit other than reporting unit)	a) Unit	number of individuals (i)
	b) Minimum	
	c) Maximum	
	d) Best single value	1500
6.5 Type of estimate	Best estimate	
6.6 Population size Method used	Based mainly on expert opinion with very limited data	
6.7 Short-term trend Period	2006-2017	
6.8 Short-term trend Direction	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		
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)?	Unknown
7.2 Sufficiency of area and quality of occupied habitat Method used	Insufficient or no data available	
7.3 Short-term trend Period	1995-2016	
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		

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7.9 Additional information

8. Main pressures and threats

8.1 Characterisation of pressures/threats

Pressure	Ranking
Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) (A05)	M
Abandonment of grassland management (e.g. cessation of grazing or mowing) (A06)	M
Removal of old trees (excluding dead or dying trees) (B08)	M
Logging without replanting or natural regrowth (B05)	H
Intensive grazing or overgrazing by livestock (A09)	M
Clear-cutting, removal of all trees (B09)	H
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	H
Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F01)	M

Threat	Ranking
Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) (A05)	M
Abandonment of grassland management (e.g. cessation of grazing or mowing) (A06)	M
Removal of old trees (excluding dead or dying trees) (B08)	M
Logging without replanting or natural regrowth (B05)	M
Intensive grazing or overgrazing by livestock (A09)	M
Clear-cutting, removal of all trees (B09)	M
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	H
Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (F01)	H

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

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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)
Maintain existing extensive agricultural practices and agricultural landscape features (CA03)
Manage conversion of land for construction and development of infrastructure (CF01)
Restore small landscape features on agricultural land (CA02)
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

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12.1 Population size inside the pSCIs, SCIs and SACs network (on the biogeographical/marine level including all sites where the species is present)	a) Unit b) Minimum c) Maximum d) Best single value
12.2 Type of estimate	
12.3 Population size inside the network Method used	
12.4 Short-term trend of population size within the network Direction	
12.5 Short-term trend of population size within the network Method used	
12.6 Additional information	

13. Complementary information

13.1 Justification of % thresholds for trends
13.2 Trans-boundary assessment
13.3 Other relevant Information

Distribution Map

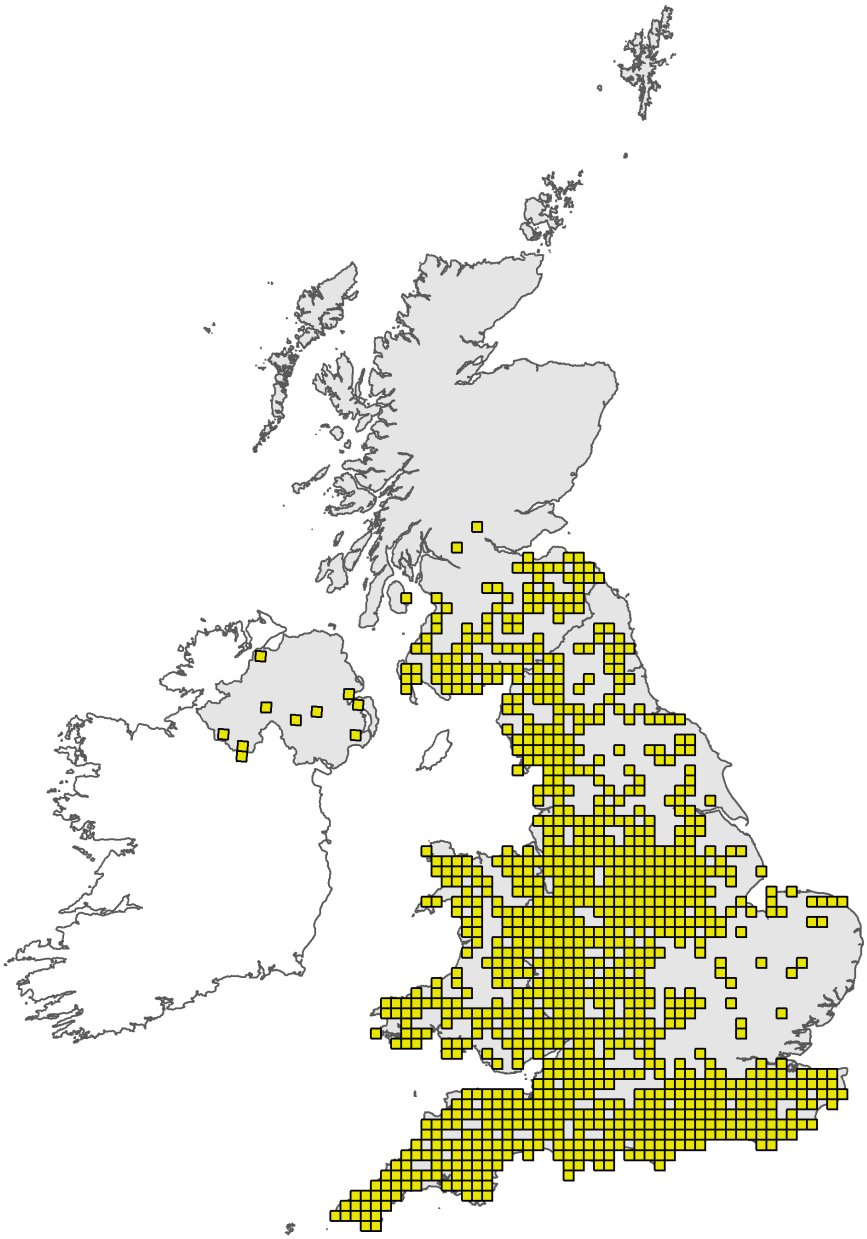

Figure 1: UK distribution map for S1330 - Whiskered bat (*Myotis mystacinus*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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 S1330 - Whiskered bat (*Myotis mystacinus*). 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 mystacinus (1330)

Field label	Note
1.5 Common name	Myotis mystacinus is a cryptic species that is often confused with Brandt's bats (M. brandtii) and Alcathoe bats (M. alcathoe). Brandt's bat was only recognised as a separate species in the UK in 1970. It remains likely that the species are still frequently confused. They can roost in the same buildings as the much more common Pipistrellus spp. (Dietz and Keifer 2016) and may be overlooked as a consequence. In addition there is a high degree of overlap in the echolocation parameters. When recorded in cluttered environments - which they commonly frequent - there is a high degree of similarity with the calls of other members of the Myotis genus (Russ 2012). Therefore confidence in the correct species identification using acoustic records alone is low. Genotyping has even revealed errors in identification of species in the hand, highlighting the difficulties of monitoring this group of small Myotis (Brown 2016).
2.2 Year or Period	The Southern Scotland Bat Survey (Newson et al., 2017) has increased the number of Whiskered/Brandt's records but there is no way of knowing what proportion of these records are whiskered bats.

Species name: Myotis mystacinus (1330) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	Range is based on presence data collected between 1995-2016. In addition, the Southern Scotland Bat Survey (Newson et al., 2017) has increased the number of Whiskered/Brandt's records but there is no way of knowing what proportion of these records are whiskered bats. However, previous records where the identification was confirmed in the hand, combined with capture data on the ratio of whiskered to Brandt's bats from swarming sites elsewhere in Britain, suggest that most undefined records are likely to be whiskered bats. Based on these sources, range is considered to be stable.
5.11 Change and reason for change in surface area of range	Range is based on presence data collected between 1995-2016 and acoustic records from the Southern Scotland Bat Survey (Newson et al., 2017). Areas that contain very isolated records may not have been included in the area of distribution. The range calculation is based on 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 for calculating range from Mathews et. al., 2018 has not been used for this species because additional data for whiskered bat distribution in Scotland were included after the Mathews report was published. It was not possible to revise the range calculations using the Mathews method and so the range surface area was calculated using the 2007/2013 method devised by JNCC.
6.4 Additional population size	The previous reporting round (Joint Nature Conservation Committee 2013) gave a population estimate of 1,500 for Scotland from Harris et al. 1995. It is stated that this estimate was based on expert judgement and extrapolation from limited field surveys. The 1995 population estimate for Great Britain was based on very limited information, extrapolating from known size of Pipistrellus pipistrellus colonies in relation to size of Whiskered colonies following the methods described by Speakman (1991) and Harris et al (1995). Harris et al's (1995) reliability rating of the estimate was 4, meaning that it is based on a very limited amount of information on the species. Better data are needed to provide a reliable population estimate.

6.16 Change and reason for change in population size	Accurate predictions of population size cannot be made as very few roosts are known, and it is highly likely that there is considerable misidentification of the species. It is therefore unknown whether there has been a change in population size between reporting rounds.
7.1 Sufficiency of area and quality of occupied habitat	Whiskered bats require a complex mosaic of habitats to support foraging, roosting and commuting behaviour. One radiotracking study indicated a preference for farm woodlands, hedgerows and wetlands in Yorkshire (Aegerter 2003); and a further radiotracking study in SW England indicated a preference for woodlands and semi improved and improved grassland habitats (particularly cattle-grazed pasture with hedgerows) with avoidance of urban and arable habitats (Berge 2007). They are frequently captured in mist nets placed along linear features such as tall hedgerows, woodland edges and small waterways enclosed by trees (Mathews et al 2016). In Ireland whiskered bats selectively favoured mixed woodland and riparian habitats both with respect to home range and foraging area selection (Buckley et al 2013). Elsewhere in Europe, the species uses a diversity of habitats including forests, gardens, orchards, riparian corridors and open areas, and can also forage within the crowns of trees (Dietz and Keifer 2016). Maximum foraging distances of females from maternity roosts have been recorded as 2.3km (Berge 2007) and 3.5km (Aegerter 2003), but are usually much less. Maternity roosts are usually located in buildings, though they are sometimes found in trees and bat boxes (Schober and Grimmberger 1989). Hibernation sites include underground tunnels, ice-houses and caves (Jones 1991). As with other Myotis species, whiskered bats frequently visit swarming sites such as cave entrances in the autumn (Parsons et al. 2003, Glover and Altringham 2008). Although the precise function of swarming is unknown, it is likely to play a role in social communication and mating display, and is therefore important to species conservation. Therefore these sites should be considered important habitat features for the species.
7.2 Sufficiency of area and quality of occupied habitat; Method used	There is some detailed information on the habitat requirements/limitations of this species, 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 country. 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). Whiskered 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.
9.1 Status of 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. 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. Whiskered bats hunt within woodland and field boundaries. 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.

10.1 Future prospects of parameters	The range for whiskered 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.