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:

S1314 - Daubenton's bat (*Myotis daubentonii*)

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	**1314**
1.3 Species scientific name	**Myotis daubentonii**
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Daubenton's bat

2. Maps

2.1 Sensitive species	No
2.2 Year or period	1995-2016
2.3 Distribution map	Yes
2.4 Distribution map Method used	Based mainly on extrapolation from a limited amount of data
2.5 Additional maps	No

3. Information related to Annex V Species (Art. 14)

3.1 Is the species taken in the wild/exploited?	No	
3.2 Which of the measures in Art. 14 have been taken?	a) regulations regarding access to property	No
	b) temporary or local prohibition of the taking of specimens in the wild and exploitation	No
	c) regulation of the periods and/or methods of taking specimens	No
	d) application of hunting and fishing rules which take account of the conservation of such populations	No
	e) establishment of a system of licences for taking specimens or of quotas	No
	f) regulation of the purchase, sale, offering for sale, keeping for sale or transport for sale of specimens	No
	g) breeding in captivity of animal species as well as artificial propagation of plant species	No
	h) other measures	No

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

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.
Warren, R, D., Waters, D, A., Altringham, J.D., and Bullock, D.J. (2000). The distribution of Daubenton's bats (Myotis daubentonii) and pipistrelle bats (Pipistrellus pipistrellus) (Vespertilionidae) in relation to small-scale variation in riverine habitat. Biological Conservation, 92 (1), 85-91
Langton, S. D., P. A. Briggs and K. A. Haysom (2010). Daubenton's bat distribution along rivers - developing and testing a predictive model. Aquatic Conservation: Marine and Freshwater Ecosystems, 20(S1), S45-S54.
Lucan, R. K. & Radil, J. (2010). Variability of foraging and roosting activities in adult females of Daubenton's bat (Myotis daubentonii) in different seasons. Biologia, 65, 1072-1080
Abbott, I. M., Sleeman, D. P. & Harrison, S. (2009). Bat activity affected by sewage effluent in Irish rivers. Biological Conservation, 142, 2904-2914.
Racey, P. R., Swift, S. M., Rydell, J. & Brodie, L. (1998). Bats and insects over two Scottish rivers with contrasting nitrate status. Animal Conservation, 1, 195-202
Vaughan, N., Jones, G. & Harris, S. (1996). Effects of sewage effluent on the activity of bats (Chiroptera: Vespertilionidae) foraging along rivers. Biological Conservation, 78, 337-343.
Shirley, M. D. F., Armitage, V. L., Barden, T. L., Gough, M., Lurz, P. W. W., Oatway,

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

D. E., South, A. B. & Rushton, S. P. (2001). Assessing the impact of a music festival on the emergence behaviour of a breeding colony of Daubenton's bats (Myotis daubentonii). Journal of Zoology, 254, 367-373.
Fensome, A. G. & Mathews, F. (2016). Roads and bats: a meta-analysis and review of the evidence on vehicle collisions and barrier effects. Mammal Review, 46, 311-323.

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	Minimum	
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) 6220 1020000
6.5 Type of estimate	95% confidence interval	
6.6 Population size Method used	Based mainly on extrapolation from a limited amount of data	

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

6.7 Short-term trend Period	2007-2018
6.8 Short-term trend Direction	Stable (0)
6.9 Short-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval
6.10 Short-term trend Method used	Based mainly on extrapolation from a limited amount of data
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 extrapolation from a limited amount of data	
7.3 Short-term trend Period	2007-2018	
7.4 Short-term trend Direction	Stable (0)	
7.5 Short-term trend Method used	Based mainly on extrapolation from a limited amount of 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
Use of other pest control methods in agriculture (excluding	M

tillage) (A23)	
Logging without replanting or natural regrowth (B05)	M
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	M
Mixed source pollution to surface and ground waters (limnic and terrestrial) (J01)	M
Modification of hydrological flow or physical alteration of water bodies for agriculture (excluding development and operation of dams) (A33)	M
Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (B27)	M
Other modification of hydrological conditions for residential or recreational development (F31)	M
Other modification of hydrological conditions for industrial or commercial development (F32)	M
Residential or recreational activities and structures generating noise, light, heat or other forms of pollution (F24)	H
Industrial or commercial activities and structures generating noise, light, heat or other forms of pollution (F25)	H

Threat	Ranking
Use of other pest control methods in agriculture (excluding tillage) (A23)	M
Logging without replanting or natural regrowth (B05)	M
Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (E01)	M
Mixed source pollution to surface and ground waters (limnic and terrestrial) (J01)	M
Modification of hydrological flow or physical alteration of water bodies for agriculture (excluding development and operation of dams) (A33)	M
Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (B27)	M
Other modification of hydrological conditions for residential or recreational development (F31)	M
Other modification of hydrological conditions for industrial or commercial development (F32)	M
Residential or recreational activities and structures generating noise, light, heat or other forms of pollution (F24)	H
Industrial or commercial activities and structures generating noise, light, heat or other forms of pollution (F25)	H

8.2 Sources of information

8.3 Additional information

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

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

Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land (CA01)
Other measures related to agricultural practices (CA16)
Adapt/manage reforestation and forest regeneration (CB04)
Adapt/manage renewable energy installation, facilities and operation (CC03)
Reduce impact of hydropower operation and infrastructure (CC04)
Reduce impact of transport operation and infrastructure (CE01)
Reduce/eliminate diffuse pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities (CF05)
Reduce/eliminate noise, light, heat or other forms pollution from industrial, commercial, residential and recreational areas and activities (CF09)
Reduce impact of mixed source pollution (CJ01)

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:

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

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

13. Complementary information

13.1 Justification of % thresholds for trends

13.2 Trans-boundary assessment

13.3 Other relevant Information

Distribution Map

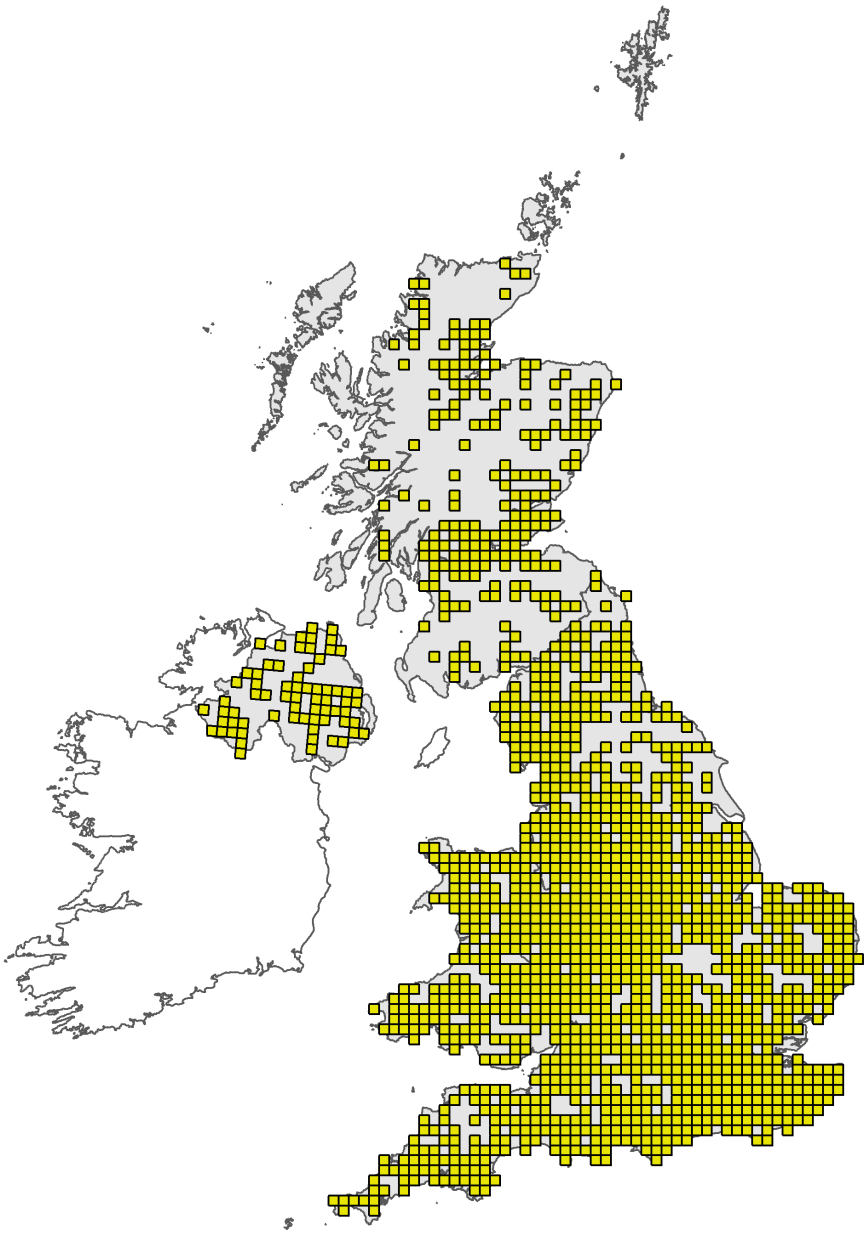

Figure 1: UK distribution map for S1314 - Daubenton's bat (*Myotis daubentonii*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

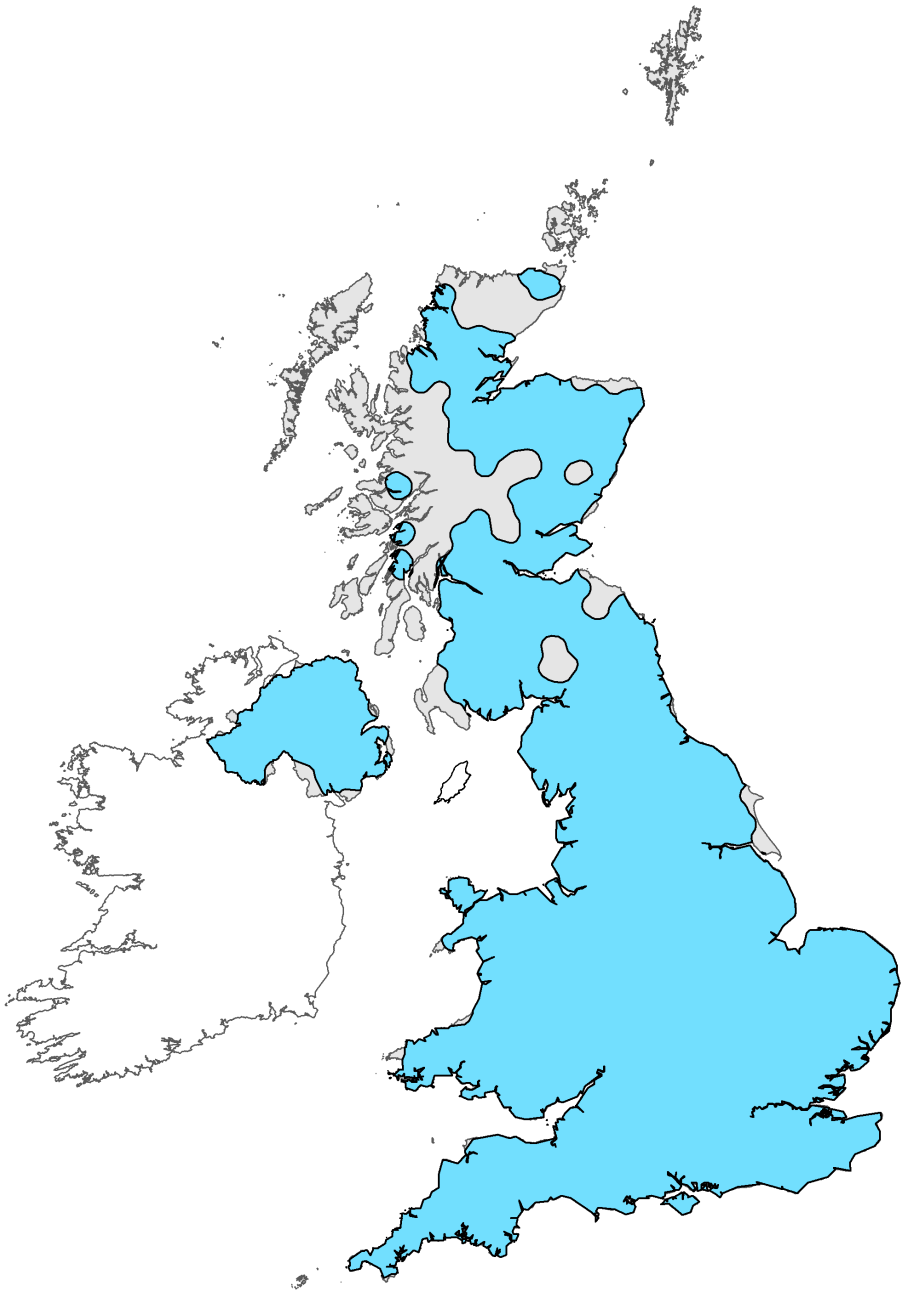

Figure 2: UK range map for S1314 - Daubenton's bat (*Myotis daubentonii*).Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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: Myotis daubentonii (1314) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	Range is based on presence data collected between 1995-2016 and a comparison of the 2018 range against 2013 range, combined with expert opinion.
5.11 Change and reason for change in surface area of range	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.
6.4 Additional population size	Mathews et al, (2018) gives estimates of 6,220 individuals (lower plausible limit) to 1,020,000 (upper plausible limit) in Scotland, with a main estimate of 235,000. The overall estimate was based on information on adult population density across mized habitat types and multiplied by the available habitable area within the range of the species. Habitable area as defined as all habitats within the range, excluding montane habitats, since these are unlikely to provide suitable locations for roosts. The plausible range of the estimated population size for Daubenton's bats is extremely wide. This is partly because of uncertainty about roost size. The median roost size was 40 but the 95% confidence intervals were 20-143 individuals. It appears likely, based on data from elsewhere in Europe, that Daubenton's bats have a fission-fusion social structure and frequently move roosts (Lucan and Radil, 2010). Not only do colonies switch roosts very frequently, but the group can also divide across multiple sites before re-joining. It is possible that there is some over-estimation caused by smaller subunits of the colony not being counted and a tendency for observers to report large roosts only, biasing the data towards the roost containing greater numbers of individuals. However, this bias may be counteracted by the difficulty of performing complete exit counts. The roost density estimates are likely to be underestimated in both the published literature and expert opinion since a relatively low proportion of all roosts are in houses, and it is difficult to find roosts in trees, bridges and tunnels. Therefore the true population size is likely to be somewhat higher than the lower limit.
6.8 Short term trend; Direction	The population of Daubenton's bat in Scotland has shown the greatest increase between 1999-2006, remaining stable since 2006 (Bat Conservation Trust, 2018).
6.16 Change and reason for change in population size	The population of Daubenton's bat in Scotland has shown the greatest increase between 1999-2006, remaining stable since 2006 (Bat Conservation Trust, 2018).
7.1 Sufficiency of area and quality of occupied habitat	This species is strongly associated with riparian habitats. It prefers large waterways with abundant woodland within the local vicinity (Langton et al, 2010) and, at least in upland areas, appears to favour locations with trees on both banks (Warren et al, 2000). Maternity roosts are usually located in trees, most comminly in broadleaved woodland, but also within solitary trees, bat boxes, buildings, bridges etc. Roosts are usually near riparian habitats, although not always.

7.2 Sufficiency of area and quality of occupied habitat; Method used	Habitable area was defined as all habitats within the range excluding montane habitats since these are unlikely to provide suitable locations for roosts. Because of the landscape-wide movements of bats and their dependency on a matrix of habitats and roosting locations, it is not currently possible to make more refined estimates of the area of suitable habitat within the range.
7.4 Short term trend; Direction	Although the estimated area of suitable habitat for this species appears to have increased since the last Article 17 report, it is likely that this results from mapping species records at a finer scale, using an alpha hull value of 20km an adding an additional 10km buffer to the final hull polygon to provide smoothing to ensure that the hull covered the areas recorded. It is assumed that this species which can occupy a wide variety of habitat types could be present throughout the entire area, except for montane areas.
8.1 Characterisation of pressures/ threats	Drivers of change to M. daubentonii, including pressures and threats, include: the loss of roosts during works to bridges, tunnels and other structures; alterations to ater quality and riparian vegetation management, resulting in an alteration in the abundance of prey (Abbott et al, 2009; Racey et al, 1998; Vaughn et al, 1996); the impact of lighting, particularly around bridges and waterways (Mathews et al, 2018); the negative impact of noise (Shirley et al, 2001) and collisioons with vehicles (Fensome & Mathews, 2016). There are data deficiencies in areas such as the effect of lighting around riparian habitats; the impact of road casualties and habitat fragmentation in Britiain; impacts of agricultural changes; and the impact of aquatic pollution.
9.5 List of main conservation measures	Legal and administrative measures continue to be required to ensure that the protection provided by the legislation is effective. If roosts are to be destroyed, damaged or lost due to development, adequate mitigation/compensation methods must be put in place to maintain the favourable conservation status of the species. Road design construction and operation need to take into account the likely impact on bats, for example, in relation to the provision of safe crossing structures and the loss and severence of bat habitat and lighting. Guidance is being developed and will shortly be available from the agencies to help planners, developers and ecological consultants to consider the potential effects of onshore wind energy developments on bats. Guidance is available for land managers on how to manage their land holdings for bats.
10.1 Future prospects of parameters	The range for Daubenton's 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. There are insufficient data on any change in the level of suitable habitat or any change in the quality of habitat for the species, however given that the population appears to be stable and range is stable it is considered that the habitat can also be considered to be stable.