Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A

2019-2024

Conservation status assessment for the species:

S1327 - Serotine

(*Eptesicus serotinus*)

Wales

Cyfoeth Naturiol Cymru
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JNCC

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This report was produced by JNCC in collaboration with Natural Resources Wales.

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Important note - Please read

- The information in this document represents the Wales Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A, for the period 2019-2024.
- It is based on supporting information provided by Natural Resources Wales, which is documented separately.
- The Habitats Regulations reporting 2019-2024 Approach Document provides details on how this supporting information contributed to the UK Report and the fields that were completed for each parameter.
- Maps showing the distribution and range of the species are included.
- Explanatory notes (where provided) are included at the end. These provide additional audit trail information to that included within the assessments. Further underpinning explanatory notes are available in the related country reports.
- 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; and/or (iii) the field was not relevant to this species (section 12 National Site Network coverage for Annex II species).

Further details on the approach to the Habitats Regulations Reporting 2019-2024 are available on the JNCC website.

Assessment Summary: Serotine

Distribution Map

Range Map

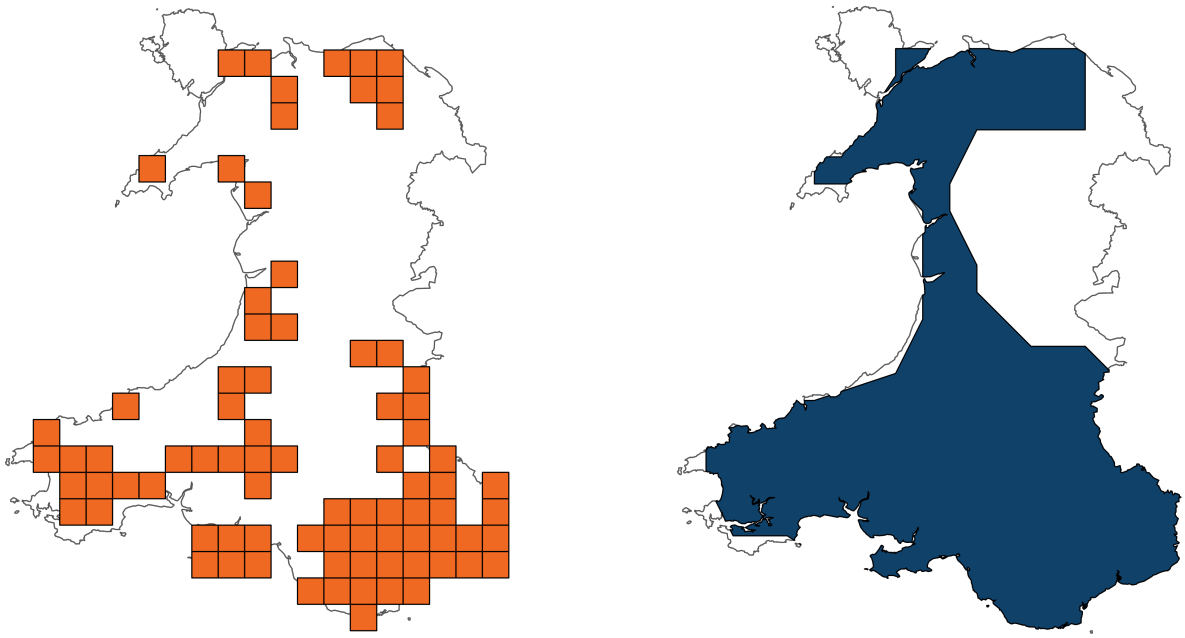

Figure 1: Wales distribution and range map for S1327 - Serotine (*Eptesicus serotinus*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority. The 10km grid square distribution map is based on available species records within the current reporting period.

Table 1: Table summarising the conservation status for S1327 - Serotine (*Eptesicus serotinus*). Overall conservation status for species is based on assessments of range, population, habitat for the species, and future prospects.

Overall Conservation Status (see section 11)

Unfavourable-inadequate (U1)

Breakdown of Overall Conservation Status

Range (see section 5)	**Unfavourable-inadequate (U1)**
Population (see section 6)	**Unknown (XX)**
Habitat for the species (see section 7)	**Unknown (XX)**
Future prospects (see section 10)	**Unknown (XX)**

List of Sections

National Level

1. General information

1.1 Country	Wales
1.2 Species code	S1327
1.3 Species scientific name	*Eptesicus serotinus*
1.4 Alternative species scientific name	
1.5 Common name	Serotine
Annex(es)	IV

2. Maps

2.1 Sensitive species	No
2.2 Year or period	1995-2024
2.3 Distribution map	Yes
2.4 Distribution map; Method used	Based mainly on extrapolation from a limited amount of data

2.5 Additional information

No additional information

3. Information related to Annex V Species

3.1 Is the species taken in the wild / exploited?

3.2 What measures have been taken?

a) Regulations regarding access to property
b) Temporary or local prohibition on the taking of specimens in the wild and exploitation
c) Regulation of the periods and/or methods of taking specimens
d) Application of hunting and fishing rules which take account of the conservation of such populations

e) Establishment of a system of licences for taking specimens or of quotas

f) Regulation of the purchase, sale, offering for sale, keeping for sale, or transport for sale of specimens

g) Breeding in captivity of animal species as well as artificial propagation of plant species

Other measures

Other measures description

3.3: Hunting bag or quantity taken in the wild for Mammals and Acipenseridae (Fish)

a) Unit

Table 2: Quantity taken from the wild during the reporting period (see 3.3a for units). For species with defined hunting seasons, Season 1 refers to 2018/2019 (autumn 2018 to spring 2019), and Season 6 to 2023/2024. For species without hunting seasons, data are reported by calendar year: Year 1 is 2019, and Year 6 is 2024.

	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
b) Minimum	-	-	-	-	-	-
c) Maximum	-	-	-	-	-	-
d) Unknown	-	-	-	-	-	-

3.4: Hunting bag or quantity taken in the wild; Method used

3.5: Additional information

No additional information

Biogeographical Level

4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	ATL

4.2 Sources of information

See section 14 References

5. Range

5.1 Surface area (km²)	15,163.7
5.2 Short-term trend; Period	
5.3 Short-term trend; Direction	Unknown
5.4 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	Yes
e) Type of estimate	
f) Rate of decrease	
5.5 Short-term trend; Method used	Based mainly on expert opinion with very limited data
5.6 Long-term trend; Period	
5.7 Long-term trend; Direction	
5.8 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Rate of decrease	

5.9 Long-term trend; Method used	

5.10 Favourable Reference Range (FRR)

a) Area (km²)	
b) Pre-defined increment	Current range is less than 2% smaller than the FRR
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

5.11 Change and reason for change in surface area of range

a) Change	Yes
b) Genuine change	No
c) Improved knowledge or more accurate data	Yes
d) Different method	Yes
e) No information	No
f) Other reason	No
g) Main reason	Use of different method

5.12 Additional information

No additional information

6. Population

6.1 Year or period	2019-2024

6.2 Population size (in reporting unit)

a) Unit	number of map 1x1 km grid cells
b) Minimum	
c) Maximum	

d) Best single value	98
6.3 Type of estimate	Best estimate
6.4 Quality of extrapolation to reporting unit	

6.5 Additional population size (using population unit other than reporting unit)

a) Unit	number of individuals
b) Minimum	1,000
c) Maximum	57,000
d) Best single value	18,700
e) Type of estimate	Best estimate
6.6 Population size; Method used	Based mainly on extrapolation from a limited amount of data
6.7 Short-term trend; Period	2017-2022
6.8 Short-term trend; Direction	Unknown
6.9 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	
f) Rate of decrease	
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	
d) Rate of decrease	
6.14 Long-term trend; Method used	

6.15 Favourable Reference Population (FRP)

ai) Population size	
aii) Unit	
b) Pre-defined increment	
c) Unknown	Yes
d) Method used	
e) Quality of information	

6.16 Change and reason for change in population size

a) Change	Yes
b) Genuine change	No
c) Improved knowledge or more accurate data	Yes
d) Different method	Yes
e) No information	No
f) Other reason	No
g) Main reason	Use of different method

6.17 Additional information

No additional information

6.18 Age structure, mortality and reproduction deviation	Unknown

7. Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat (for long-term survival)

a) Is area of occupied habitat sufficient?	Yes
b) Is quality of occupied habitat sufficient?	Unknown
c) If No or Unknown, is there a sufficiently large area of unoccupied habitat of suitable quality?	Unknown

7.2 Sufficiency of area and quality of occupied habitat; Method used

a) Sufficiency of area of occupied habitat; Method used	Based mainly on expert opinion with very limited data
b) Sufficiency of quality of occupied habitat; Method used	Based mainly on expert opinion with very limited data

7.3 Short-term trend; Period	2013-2024
7.4 Short-term trend; Direction	Stable
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

No additional information

8. Main pressures

8.1 Characterisation of pressures

Table 3: Pressures affecting the species, including timing and importance/impact ranking. Pressures are defined as factors acting currently and/or during the reporting period (2019–2024). Rankings are: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Pressure	Timing	Ranking
PA03: Conversion from mixed farming and agroforestry systems to specialised (e.g. single crop) production	Ongoing and likely to be in the future	Medium (M)
PA04: Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.)	Ongoing and likely to be in the future	High (H)
PA05: Abandonment of management/use of grasslands and other agricultural and agroforestry systems (e.g. cessation of grazing, mowing or traditional farming)	Ongoing and likely to be in the future	High (H)
PA15: Use of other pest control methods in agriculture (excluding tillage)	Ongoing and likely to be in the future	High (H)
PB09: Clear-cutting, removal of all trees	Ongoing and likely to be in the future	Medium (M)
PD01: Wind, wave and tidal power (including infrastructure)	Ongoing and likely to be in the future	Medium (M)
PE01: Roads, paths, railroads and related infrastructure	Ongoing and likely to be in the future	High (H)
PF02: Construction or modification (e.g. of housing and settlements) in existing built-up areas	Ongoing and likely to be in the future	High (H)
PJ03: Changes in precipitation regimes due to climate change	Ongoing and likely to be in the future	Medium (M)

8.2 Sources of information

See section 14 References

8.3 Additional information

No 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 National Site Network
9.4 Response to measures	Long-term results (after 2036)

9.5 List of main conservation measures

Table 4: Key conservation measures addressing current pressures and/or anticipated threats during the next two reporting periods (2025–2036). Measures are ranked by importance/impact: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Conservation measure	Ranking
MA01: Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land	Medium (M)
MA02: Restore small landscape features on agricultural land	High (H)
MA04: Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures	High (H)
MA14: Other measures related to agricultural practices	High (H)
MB05: Adapt/change forest management and exploitation practices	Medium (M)
ME01: Reduce impact of transport operation and infrastructure	High (H)
MF10: Other measures related to residential, commercial, industrial and recreational infrastructures, operations and activities	High (H)

9.6 Additional information

No additional information

10. Future prospects

10.1a Future trends of parameters

ai) Range	Unknown
bi) Population	Unknown
ci) Habitat for the species	Overall stable

10.1b Future prospects of parameters

aii) Range	Unknown
bii) Population	Unknown
cii) Habitat for the species	Unknown

10.2 Additional information

No additional information

11. Conclusions

11.1 Range	Unfavourable-inadequate (U1)
11.2 Population	Unknown (XX)
11.3 Habitat for the species	Unknown (XX)
11.4 Future prospects	Unknown (XX)
11.5 Overall assessment of Conservation Status	Unfavourable-inadequate (U1)
11.6 Overall trend in Conservation Status	Unknown

11.7 Change and reason for change in conservation status

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

11.7 Change and reason for change in conservation status trend

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

11.8 Additional information

No additional information

12. UK National Site Network (pSCIs, SCIs, SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network

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 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Direction	
12.7 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Method used	

12.8 Additional information

No additional information

13. Complementary information

13.1 Justification of percentage thresholds for trends

No justification information

13.2 Trans-boundary assessment

No trans-boundary assessment information

13.2 Other relevant information

No other relevant information

14. References

Biogeographical and marine regions

4.2 Sources of information

Aderyn, LERC Wales' Biodiversity Information & Reporting Database. Data downloads under NRW licence 2024.

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Hutson AM. 2008. Serotine Eptesicus serotinus. Pp 356-360 in Harris, S. & Yalden, D.W. Mammals of the British Isles: Handbook, 4th edition. The Mammal Society, Southampton.799pp.

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Mitchell-Jones TJ. 2010. Bats in houses – the conservation challenge. Pp 365-378 in Species Management: challenges and solutions for the 21st century. Baxter, J.M. & Galbraith, C.A. Tso Scotland, Edinburgh.

Mitchell-Jones TJ, Carlin C. 2009. Bats and onshore wind turbines, Interim Guidance. Natural England Technical Information Note TIN051.

Moussy C, Atterby H, Griffiths A, Allnutt T, Mathews F, Smith G, Aegerter N, Bearhop S, Hosken D J. 2015. Population genetic structure of serotine bats (Eptesicus serotinus) across Europe and implications for the potential spread of bat rabies (European bat lyssavirus EBLV-1). Heredity. 115(1):83.

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: S1327 – Serotine bat (Eptesicus serotinus)

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Main pressures

8.2 Sources of information

No sources of information

15. Explanatory Notes

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, and updated with recent records from Aderyn.
2.4: Distribution map; Method used	E. serotinus is most commonly recorded south of a line from the Wash to south Wales. Records come from a combination of reports of bats in houses and bat detector surveys as part of the NBMP and for surveys for developments. The greater use of bat detectors has extended the known distribution northwards in recent years, though few roosts are known in much of this area, and the species calls can be confused with cluttered/FM calls of Nyctalus species. Across the UK there is also some evidence for a westward expansion of the population, possibly corresponding with a population decline in the east (Moussy et al. 2015). Genetic evidence also suggests that there must be some gene flow across the English Channel (Moussy et al. 2015). The species is monitored by field survey and colony counts in the NBMP. A maternity roost was discovered in 2011 on the north Wales coast (CCW licence reports). Since then several other roosts have been found however the true distribution and population of the species in this region is unclear. Maternity roosts are known within south Wales. There appears to be distinct structuring of the population in England, in contrast with continental Europe, based on population genetics data. Three populations in the South of England have been identified (East; West and Isle of Wight) and these have only low levels of gene flow (Smith et al. 2011, Moussy et al. 2015). Serotines in south Wales have been shown to be linked to England's Western population however the north Wales serotines are a distinct population which are most closely related to the eastern population suggesting that this is not a recent increase in population or

	distribution (Aegerter J. pers comm.). The current records are likely to underestimate the distribution of this species.
5.3: Short-term trend; Direction	Given the significant change to the method for range determination, and suspected patterns of change in geographic occurrence, along with significant data deficiencies, the short-term range trend for this species is unknown.
5.11: Change and reason for change in surface area of range	In the 2019 Article 17 report, the area of land (including unsuitable habitat) contained within the range was given as 12,499 km2 (Mathews et al. 2018). Mathews et al. 2018, applied an alpha hull value of 20km 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 this reporting round, and also the 2013 and 2007 reports, whereby a 45km alpha hull value was used for all species with a starting range unit of individual 10km squares. To produce the range maps JNCC were provided with any additional 10km x 10km grid squares where bats roost records were located between 2018 and 2024, along with the 2019 Article 17 report data. No grid squares have been removed as there have not been any widespread surveys that could indicate loss of a species from any area. The resulting updated maps produced by JNCC indicate a range of 15,163 km2. This increase in range is likely mainly

	due to a change in methodology rather than a genuine change in range.
6.5: Additional population size	Based on Mathews et al. 2018 methodology: Unit = Individuals Minimum = 1,000 Maximum = 57,000 Best Single Value: 18,700 There is no update of this estimate from the previous Article 17 reporting round. Mathews et al. 2018 population estimates were derived by first calculating the adult bat density (bats/km2) within poor, average and good habitat and then multiplying this with the total habitable area within their range to give lower, median and upper population estimates. 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. Details of calculations are as follows: Adult bat density (bats/km2) Median density=[(median n. bats/roost†) x (p♀‡) x (n roosts/typical km2 average habitat)]x 2 Lower limit=[(lower plausible n. bats/roost) x (p♀min) x

	(plausible n. roosts/typical km2 poor habitat)]x 2 Upper limit = [(upper plausible n. bats/roost) x (p♀max) x (plausible n. roosts/typical km2 good habitat)]x 2 † roost is typical maternity roost in the pre-parturition period. n. is number of adults. ‡ p♀: proportion female. p♀min and p♀max are lowest and highest plausible proportions of adult females in typical maternity roost Population size Total Adult Population = Median adult density (bats/km2) x total habitable area within range (km2) Lower Limit=Lower limit adult density (bats/km2) x total habitable area within range (km2) Upper Limit=Upper limit adult density (bats/km2) x total habitable area within range (km2) Narrative may need to cover NRW internal population unit and conversion method.
6.6: Population size; Method used	The reported figure in 6.2 is based on occupied 1km grid squares and is therefore reliant on existing records. The reported figure in 6.5 is based mainly on extrapolation from a limited amount of data.
6.7: Short-term trend; Period	Based on Bat Conservation Trust (2024) NBMP short-term period of 5 years.
6.8: Short-term trend; Direction	No trend data is available for Wales and therefore unknown has been selected. The National Bat Monitoring Programme roost count data (BCT 2024) states that the population of serotine in Great Britain is considered to have been stable since 1999.

	However, this finding should be treated with caution as serotine is encountered relatively infrequently during surveys and therefore the level of uncertainty associated with these trends is relatively large, meaning trends for this species are more difficult to detect. In addition, it should be noted that serotine bats can be confused with other Nyctaloid bats when detection is based on heterodyne bat detectors, as used in the field survey. The 12 year trend for Great Britain has shown field survey results indicate a 8.9% increase while roost counts show a 11.9 increase. These trends are not statistically significant. Field survey results are considered more statistically robust than roost counts.
6.10: Short-term trend; Method used	A reliable trend cannot be drawn for Wales due to insufficient available data.
6.16: Change and reason for change in population size	The best available population estimate remains unchanged as Mathews et al. 2018 has not been updated, however reported 1km x 1km grid squares have changed due to changes in methodology and surveyor effort between reporting time periods.
7.1: Sufficiency of area and quality of occupied habitat	Occupied habitat area 12,500 km2. Habitable area as given by Mathews et al. 2018 has been used as a proxy for occupied habitat. The habitable area calculation defined all the area within the range as habitable excluding montane habitat since this is unlikely to include suitable locations for maternity roosts. Occupied habitat quality Although we do not have a reliable measure of the quality of the occupied habitat the GB population trend for the species is stable and therefore the area and quality of occupied habitat is likely to be sufficient to maintain the species at FCS and this is also likely to be the situation in Wales. E. serotinus 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. In most cases the foraging areas are open fields with woodland edge, but occasionally within woodland. In agricultural landscapes the bats prefer pasture with tree rows for protection from wind. In addition, forest edges, river banks, parks, tree rows, gardens and amenity areas are appropriate foraging areas. The species also forages around streetlights. E. serotinus feeds mainly on beetles, especially ground chafer and dung beetles, moths and midges. In maternity colonies the bats commuted an average of 6.5 km to and from distinct foraging sites and used up to five sites per night (Catto et al. 1996). In towns the serotine rarely forages further than one km from the roost. Preferred summer roosts include crevices and other narrow holes in houses. Until now maternity colonies have only been recorded in buildings. The bats roost below the ridge of a roof, behind fascia boards, in ventilation holes of new housing blocks, or in the extension slits of bridges. Single animals, males in most cases, sometimes use tree holes or bat boxes. The serotine changes its roost site or hanging place if the microclimate in the roost becomes uncomfortable, e.g. if temperatures rise too much. Winter roosts are in cellars, mines and caves, in old buildings and crevices in walls. Bats occasionally hibernate in their summer roosts. Summer and winter roosts are thought to be less than 50 km apart, but there is little evidence to support this, though Hutterer et al. 2005 described the species as sedentary but occasionally performs dispersal flights.
7.2: Sufficiency of area and quality of occupied habitat; Methods used	The habitable area has been taken from Mathews et al. 2018, which defined all the area within the range as habitable excluding montane habitat since this is unlikely to include suitable locations for maternity roosts. The habitable area within the range is noted as 12,500 km2, but it is unlikely that the entirety of this area forms suitable habitat. 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.
8.1: Characterisation of pressures	Pressures can generally be divided into those that affect roosts and those that affect commuting and foraging (including prey availability). PA04 - Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.), PE01 - Roads, paths, railroads and related infrastructure and PF02 - Construction or modification (e.g. of housing and settlements) in existing built-up areas: Changes in building practices to improve energy efficiency mean that new buildings may offer fewer roosting opportunities (Mitchell-Jones 2010). Despite legal protection, the species remains vulnerable to accidental and deliberate loss of roost buildings through renovation, development or exclusion as a result of phobia. One of the primary historic pressures for E. serotinus has been the disturbance and destruction of roost sites. This species roosts almost exclusively in buildings, and is therefore particularly vulnerable to anthropogenic factors, such as development, building renovation and timber treatment. High dependency on building roosts and crevice-dwelling nature makes the species particularly vulnerable to issues connected to breathable roofing membranes, there are many case reports of entanglement (Waring, Essah et al. 2013). Development pressure is likely to result in greater loss of suitable foraging habitat over time. This includes road construction, where collision may also be a risk. PA03 - Conversion from mixed farming and agroforestry systems to specialised (e.g. single crop) production, PA04 -

	Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.), PA05 - Abandonment of management/use of grasslands and other agricultural and agroforestry systems (e.g. cessation of grazing, mowing or traditional farming), PA15 - Use of other pest control methods in agriculture (excluding tillage) and PB09 - Clear-cutting, removal of all trees: Serotines forage over lowland farmland, parkland and woodland edges. Agricultural and forestry practices that remove or modify these habitats, or affect the biomass of suitable insect prey (including changes in water quality) could negatively affect populations. Increased intensity farming practices may also have led to reductions in insect prey abundance and diversity; this species is thought to be reliant on different types of insect prey at certain stages of the reproductive cycle (Catto et al. 1994, 1996). PJ03 - Changes in precipitation regimes due to climate change: High juvenile fatality rates in the first few months of life are observed; the species is potentially particularly vulnerable to poor summer weather connected to climate change (Harbusch, Racey 2006; Chauvenet et al. 2014) PD01 - Wind, wave and tidal power, including infrastructure: This species is one that is considered to be at medium risk from fatalities associated with wind farms from studies in the European Continent (Rodrigues et al. 2015). Current research is considering this, but it is too soon to assess the risk that wind turbines pose to serotine populations in England and Wales.
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 and that habitats for the species are managed

	appropriately. MA02 - Restore small landscape features on agricultural land, MA14 - Other measures related to agricultural practices, MB05 - Adapt/change forest management and exploitation practices, MA01 - Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land, MA04 - Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures, ME01 - Reduce impact of transport operation and infrastructure, MF10 - Other measures related to residential, commercial, industrial and recreational infrastructures, operations and activities: Serotine bats hunt over pastures and in deciduous or mixed woodland. Environmental land management schemes in the agricultural and forestry sectors are now widely used to ensure these habitats in the vicinity of roosts are well-managed and provide appropriate insect food at the correct time of year. Agri-environmental schemes can be a tool to promote the restoration of small landscape features on agricultural land. Planning at landscape scale is required to conserve commuting routes and foraging areas.
10.1: Future trends and prospects of parameters	Future prospects of range The future prospects of range for this species is considered to be unknown in Wales. E. serotinus current range is likely to be under recorded. 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. Future prospects of population The future prospects of population for this species is considered to be unknown in Wales. E. serotinus is a rare and data deficient species within Wales and therefore the

	future prospects of population is considered to be unknown. Future prospects of habitat of the species The future prospects of habitat of the species is considered to be overall stable in Wales. E. serotinus uses a mosaic of habitats; currently available habitat is considered sufficient to maintain the species at FCS and there are no specific wide scale threats to the habitat for the species. There is therefore no reason to assume that the current reported trend will not continue over the next 12 years.
6.15: Favourable Reference Population (FRP)	The UK-level FRV for population was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. Following expert review, a Wales-level FRV was derived based on population trend and abundance data specific to Wales, rather than adopting the UK-level value. The revised FRV has been set as in Wales this species is rare and data deficient and therefore we recommend a country level FRP of 'unknown'.
5.10: Favourable Reference Range (FRR)	The UK-level FRV for range was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. This FRV was reviewed by Welsh experts and considered appropriate for use in Wales based on current distribution and trends.