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*)

England

NATURAL ENGLAND

JNCC

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Important note - Please read

- The information in this document represents the England 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 England, 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

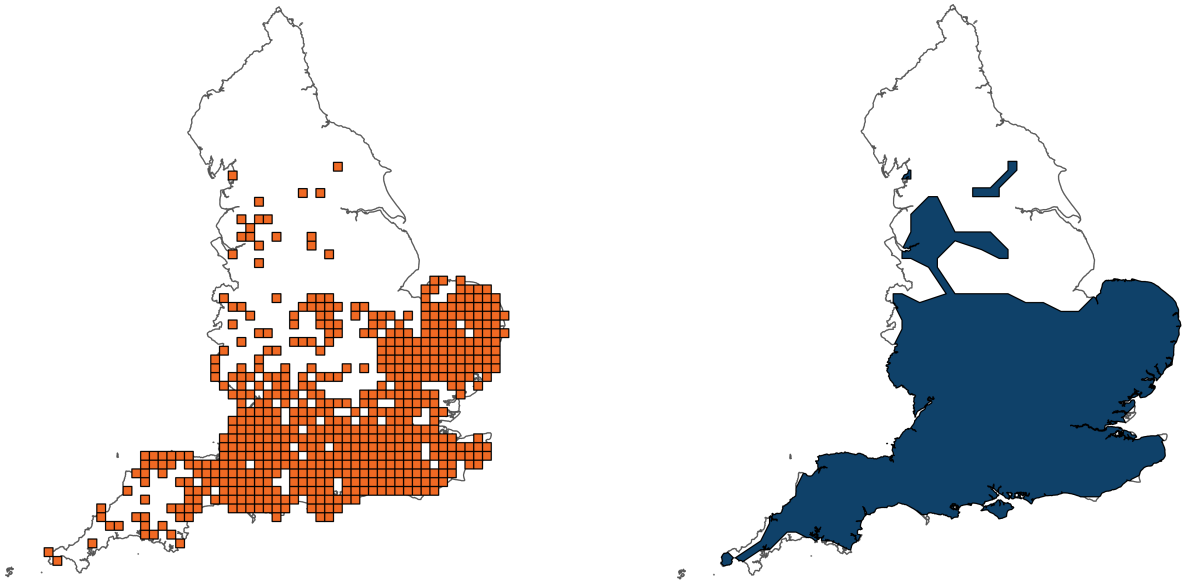

Figure 1: England distribution and range map for S1327 - Serotine (*Eptesicus serotinus*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority. The 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)	**Favourable (FV)**
Population (see section 6)	**Unfavourable-inadequate (U1)**
Habitat for the species (see section 7)	**Unfavourable-inadequate (U1)**
Future prospects (see section 10)	**Unknown (XX)**

List of Sections

National Level

1. General information

1.1 Country	England
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)	82,859.96
5.2 Short-term trend; Period	1995-2024
5.3 Short-term trend; Direction	Stable
5.4 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	
f) Rate of decrease	
5.5 Short-term trend; Method used	Based mainly on extrapolation from a limited amount of 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)	78,100
b) Pre-defined increment	
c) Unknown	No
d) Method used	Expert opinion
e) Quality of information	low

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	No
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	1995-2024

6.2 Population size (in reporting unit)

a) Unit	number of map 1x1 km grid cells
b) Minimum	
c) Maximum	
d) Best single value	533

6.3 Type of estimate	Best estimate
6.4 Quality of extrapolation to reporting unit	low

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

a) Unit	number of adults
b) Minimum	6,250
c) Maximum	356,000
d) Best single value	117,000
e) 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	2017-2022
6.8 Short-term trend; Direction	Stable
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	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	
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	Current population is between 5% and 25% smaller than the FRP
c) Unknown	No
d) Method used	Expert opinion
e) Quality of information	low

6.16 Change and reason for change in population size

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

6.17 Additional information

No additional information

6.18 Age structure, mortality and reproduction deviation	No deviation from normal

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

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	Unknown
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

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)
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)
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)
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)
PD01: Wind, wave and tidal power (including infrastructure)	Ongoing and likely to be in the future	High (H)
PJ11: Desynchronisation of biological / ecological processes due to climate change	Only in future	High (H)

8.2 Sources of information

See section 14 References

8.3 Additional information

PJ11: There is limited current evidence on the risks or potential benefits to bats from the desynchronisation of biological and ecological processes due to climate change. While

some changes, such as longer foraging seasons or increased prey availability in certain regions, could have positive effects, there is insufficient evidence to confirm this. Many bat species rely on precise seasonal cues for hibernation and foraging, and disruptions in food availability, such as shifts in insect emergence, could negatively impact their survival. Hibernating bats depend on stored energy and the predictable availability of prey upon emergence. Therefore, despite the uncertainty, it is important to consider this factor when assessing the broader impacts of climate change on bats.

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
MA02: Restore small landscape features on agricultural land	Medium (M)
MA14: Other measures related to agricultural practices	High (H)
MB05: Adapt/change forest management and exploitation practices	Medium (M)
MA01: Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land	High (H)
MA04: Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures	High (H)

ME01: Reduce impact of transport operation and infrastructure	Medium (M)
MF10: Other measures related to residential, commercial, industrial and recreational infrastructures, operations and activities	High (H)
MA03: Maintain existing extensive agricultural practices and agricultural landscape features	Medium (M)
MB01: Prevent conversion of (semi-) natural habitats into forests and of (semi-) natural forests into intensive forest plantation	Medium (M)
MC03: Adapt/manage renewable energy installation, facilities and operation (excl. hydropower and abstraction activities)	Medium (M)
MJ02: Implement climate change adaptation measures	Medium (M)

9.6 Additional information

No additional information

10. Future prospects

10.1a Future trends of parameters

ai) Range	Overall stable
bi) Population	Overall stable
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	Favourable (FV)

11.2 Population	Unfavourable-inadequate (U1)
11.3 Habitat for the species	Unfavourable-inadequate (U1)
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

Arnold, H., 1993. Atlas of Mammals in Britain. Institute of Terrestrial Ecology Research Publication no. 6, London.

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Boughey, K.L., Lake, I.R., Haysom, K.A., Dolman, P.M. 2011. Effects of landscape-scale broadleaved woodland configuration and extent on roost location for six bat species across the UK. Biological Conservation. 144(9):2300-10.

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December 2018.https://jncc.gov.uk/jncc-assets/Art17/S1327-EN-Habitats-Directive-Art17-2019.pdf

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Mathews F, and Harrower C. (2020). IUCN – compliant Red List for Britain's Terrestrial Mammals. Assessment by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough ISBN 978-1-78354-485-1

Mitchell-Jones, T.J. 2010. Bats in houses - the conservation challenge. Pp 365-378 in Species Management:challenges and solutions for the 21st century.

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.

Robinson, M., Stebbings, R. 1993. Food of the serotine bat, Eptesicus serotinus—is faecal analysis a valid qualitative and quantitative technique? Journal of Zoology. 231(2):239-48.

Rodrigues, L., Bach, L., Dubourg-Savage, M.-J., Karapandža, B., Kovač, D., Kervyn, T., Dekker, J., Kepel, A., Bach, P., Collins, J., Harbusch, C., Park, K.J., Micevski, B., Minderman, J., 2014. Guidelines for consideration of bats in wind farm projects - Revision 2014

Rydell, J., Bach, L., Dubourg-Savage, M.-J., Green, M., Rodrigues, L., Hedenström, A., 2010. Bat mortality at wind turbines in northwestern Europe. Acta Chiropterologica 12, 261-274.

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Vaughan N. The diets of British bats (Chiroptera). Mammal Review. 1997;27(2):77-94.

Main pressures

8.2 Sources of information

PJ11: Festa, F., Ancillotto, L., Santini, L., Pacifici, M., Rocha, R., Toshkova, N., Amorim, F., Benítez-López, A., Domer, A., Hamidović, D. and Kramer-Schadt, S., 2023. Bat responses to climate change: a systematic review. Biological Reviews, 98(1), pp.19-33.

15. Explanatory Notes

Field label	Note
1.5: Common name	Serotine bats roost mainly in buildings and utilise a broad range of habitats for foraging. They have a distinctive highly manoeuvrable flapping flight with broad wings. They have a loud echolocation call and are easily picked up with bat detectors, although confusion between Nyctalus noctula and N. leiseri can occur if heterodyne detectors are used.
5.11: Change and reason for change in surface area of range	Range is given by Mathews et al. (2018) as 78,100 km2 (area of suitable habitat within range). Range was not estimated for England in the 2013 Article 17 report (JNCC 2013). Habitable area was defined as all areas within the range excluding montane habitat since this is unlikely to include suitable locations for maternity roosts. It is difficult to say whether the range increase is reflective of a true expansion in range, or as a result of differences in methodology and datasets used from the last reporting round.
2.3: Distribution map	The Serotine occurs mainly south of a line drawn from the Wash in England to South Wales. Records come from a combination of reports of bats in houses and bat detector surveys as part of the National Bat Monitoring Programme. 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. 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). There is some evidence for a westward expansion of the population, possibly corresponding with a population decline in the east (Moussy et al. 2015), but further evidence is required to confirm this. Genetic evidence also suggests that there must be some gene flow across the English Channel (Moussy et al. 2015).

2.4: Distribution map; Method used	The widespread use of broadband bat detectors has significantly increased the number of records and extended the known distribution of Serotine bat. However, while the species makes loud echolocation calls that are readily recorded on modern broadband bat detectors, there is considerable overlap in the call parameters of the other Nyctaloid bats, Nyctalus noctula and N. Leisleri. Many acoustic records are not supported by regional records of bats identified in the hand (or by molecular analysis of droppings), raising doubts about their validity, particularly on Heterodyne detectors (BCT 2019). The species is however almost entirely dependent on building roosts and its droppings are distinctive. Therefore, despite being inconspicuous at its roost sites it is nevertheless well-recorded at roost sites compared with many bat species that rely primarily on tree roosts rather than buildings (Mathews and others 2018).
5.3: Short-term trend; Direction	Although the range has increased from that given for the last reporting round (JNCC 2013) and is considerably larger than that shown in Arnold (1993), with the range spreading west and north to now include south-west England, the Midlands, the Welsh borders and Merseyside, it is unclear how much of this change reflects a true range change rather than increased observer effort and a change in methodology to produce the maps. There are also expert opinion reports of declining populations in the East of England. The apparent increase in range has not been accompanied by a significant increase in population (BCT, 2024), although trends for this species are more difficult to detect as it is encountered relatively infrequently during surveys. The species is almost entirely dependent on building roosts and its droppings are distinctive. Therefore despite being inconspicuous at its roosts sites - colonies are small and individuals tend to be hidden in crevices -It is nevertheless well-recorded compared to many bat species that are less dependent on buildings. It also has a loud echolocation call with fairly distinctive call parameters (though note that there is some potential for confusion with

	other Nyctaloid bats, particularly when using heterodyne detectors). As such, the range has been reported as stable.
6.2: Population size	Due to difficulties in identification and survey of this species, it is not possible to estimate population size at this time. The species has been recorded in 533 1x1km grid squares in England.
6.5: Additional population size	Mathews et al (2018) calculated a population size of adult individuals of 117,000 for England with upper and lower confidence intervals of 6,250 - 356,000. There is uncertainty surrounding the population estimates for this species as demonstrated by the relatively wide confidence intervals. Population size was calculated using the median adult density in mixed habitat (bats/km2) x total habitable area within the range (km2) (for full details see Mathews et al 2018). Habitable area was defined as all area within the range excluding montane habitat since this is unlikely to include suitable locations for maternity roosts. The density of maternity roosts accross England is uncertain as it is likely many roosts are unreported. The data available from studies were all conducted within known strongholds for the species, and are therefore likely to be somewhat higher than those expected elsewhere. The estimate given here is much higher than presented for the 2013 reporting round, which was taken from Harris et al (1995), however that estimate was graded as having very poor reliablity.
6.8: Short-term trend; Direction	The National Bat Monitoring Programme roost count data (BCT 2024) are suggestive of recent slight increases, however sample sizes are relatively small and the trends are not statistically significant. Field survey data also show a slight increase, but again, the trends are not statistically significant. Overall, it is considered the population has been stable since the baseline year of 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.
7.1: Sufficiency of area and quality of occupied habitat	Boye & Dietz (2005) provide a good overview of this species habitat requirements. E. serotinus requires a complex mosaic of habitats to support foraging, roosting and commuting behaviour. It is often associated with pasture and parkland and has slow, highly manoeuvrable flight which allows it to fly very close to the ground as well as among the canopies of trees. It preys mainly on large Coleoptera (beetles) including Aphodius spp. (dung beetles) and Melonotha spp. (cockchafers), on larger Lepidoptera (moths) and midges (Robinson and Stebbings 1993, Vaughan 1997). A wide range of habitats are used for foraging such as open fields, woodland, woodland edges, river banks, parks, tree rows, gardens, amenity areas and around streetlights. The species is able to locate and exploit temporary feeding sites such as recently mown grass (Catto et al. 1996). The foraging range is relatively large, with average commutes of 6.5km being recorded in a pastoral region (Catto et al 1996) and 8km in a more arable region of southern England (Robinson and Stebbings 1997). The maximum distance recorded was over 41km, and the bats largely commuted along hedgerows and treelines and over pasture. Maternity colonies are thought to be almost exclusively formed by adult females, with males roosting separately or in small groups (Catto 1993, Moussy et al 2015). Radio-tracking data indicate that females are faithful to a roost during the breeding season whereas males use several alternative roosts (Catto et al 1996). Maternity roosts are almost exclusively located in buildings, particularly residential houses constructed in the late 19th and early 20th century and which have high gables and a substantial roof-space. They are found only very occasionally in bat boxes. Roosts are closer to woodland (particularly broadleaved woodland), water, pasture, and have higher proportions of improved grassland within than would be expected by chance - though there are differences between studies in the spatial scale at which these effects are seen (Battersby 1999,

	Boughey et al 2011, Tink et al 2014). Hibernation sites are relatively unknown, with very few individuals being found in underground sites. It is presumed that most remain in roof spaces and cavity walls (Dietz and Keifer 2016). There is thought to be a sufficient area of habitat of suitable quality to support this species.
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 78,082 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.
7.4: Short-term trend; Direction	As this is a generalist species, using a mosaic of habitats across a large area and the population appears to be stable, the habitat is assumed to be stable.
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). Although roosts are strictly protected, a small number of licences permitting exclusion or roost destruction is issued every year. In addition, changes in building practices to improve energy efficiency mean that new buildings may offer fewer roosting opportunities (Mitchell-Jones, 2010). 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 could negatively affect populations.
2.5: Additional information	For the 2019-2024 Regulation 9A reporting round, distribution datasets for all features have been generated using

	existing Natural England source data, along with additional datasets provided under Open Government Licence (OGL) or Creative Commons (CC-BY) licence for Regulation 9A reporting. A key methodological change involves the reinterpretation of source data, which has led to adjustments in mapped distribution and, consequently, changes in range for some features. In some cases, the available data does not fully capture the complete distribution of a feature. To mitigate this, the presence data collection period for this species has been set from 1995 to 2024. Given the long life span of bats, this is considered appropriate. Where observed changes in distribution are due to the mapping methodology rather than actual shifts in range, these will be clearly identified in the assessment text, with any resulting range adjustments explained.
5.5: Short-term trend; Method used	Range is based on presence data collected between 1995-2024. Areas that contain very isolated records may not have been included in the distribution. The range map has been produced following the same methodology that was used in 2007 and 2013 whereby a 45km alpha hull value has been used for all species with a starting range unit of individual 10km squares. In 2018 range was 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 smooting to the hull and to ensure that the hull covered the areas recorded rather than intersecting them. That process led to the production of much finer detailed maps being produced. However, this approach to mapping was not an option for this reporting round (2019-2024) - see section 2.5.

6.17: Additional information	Limited accurate data for this species means that it is not possible to provide an accurate assessment of changes in population size for this species at this time. In England, the serotine Field Survey and Roost Count indices show no significant change since the baseline year of monitoring (1999) or over the last five years. The population of serotine in Great Britain is considered to have been stable in the long-term (since 1999) and short-term (since 2017). However, this finding should be treated with caution as serotine is encountered relatively infrequently during surveys resulting in increased variability in the data. Therefore, the level of uncertainty associated with these trends is large, making trends for this species more difficult to detect (BCT 2024)
6.18: Age structure, mortality and reproduction	There is no evidence to suggest any deviation from the normal age structure, mortality, or reproduction rates. However, this assessment is primarily based on anecdotal observations from bat workers in the field and stable trends in the NBMP surveys. No formal studies have been conducted to confirm these findings.
6.15: Favourable Reference Population (FRP)	The estimated population of the serotine bat in England is 117,000, with a wide plausible range (6,250–356,000) due to limitations in survey data. The estimate was based on population densities across habitats, historical surveys, and literature reviews, but confidence in its accuracy is low due to gaps in ecological data, such as colony sizes and roost densities (Mathews et al. 2018). The 2024 National Bat Monitoring Programme (NBMP) (BCT 2024) found no significant population change since 1999. The species is currently classified as Vulnerable on the England Red List (Mathews and Harrower 2020), mainly due to data deficiencies. A negative population trend (-1.6% per year) was observed in roost counts, though statistical significance is unclear due to small sample sizes. There are indications of a decline in the east of England but potential increases in the north and west. There is currently insufficient data to estimate the historical losses in species

	numbers prior to the start of the population monitoring programme, but when consulting evidence (Harris & Yalden 2008; Haysom and others 2010) and studies of other building reliant species such as Stebbings (1995), it is advised to adopt a precautionary approach. Previous reporting rounds derived the favourable reference population value using 1994 as the baseline and making a judgement on whether the population in 1994 was viable in the long-term (JNCC 2019). Historic and current information on population size, distribution and trends were used to assess viability. The population for this species in 1995 was estimated to be 15,000 individuals and, with stable trends and no intensive conservation action for this species the species was judged to be maintaining itself in the long-term and to have been viable in 1994. It was acknowledged that this figure was set with limited information and should be revised in the future if better information becomes available. Given the limited basis on which the previous FRP was calculated, and the red list status of this species, it is not considered appropriate to use this previous figure for this reporting round. Instead it is advised that an operator of between 5% and 25% smaller is used.
8.1: Characterisation of pressures	The Serotine bat is primarily a building-roosting species, so would be vulnerable to loss of roost opportunities in buildings through the demolition or alteration of buildings or changes to construction methods (Mitchell-Jones, 2010). A wide range of habitats are used for foraging such as open fields, woodland, woodland edges, riverbanks, parks, tree rows, gardens, amenity areas and around streetlights and commuting routes are along hedgerows and treelines and over pasture. Pressures that affect the biomass of flying insects, such as the widespread use of pesticides, would

	affect this species as well as removal of small landscape features used for commuting. Serotine bats have a high risk of collision with wind turbines as they fly and forage in open areas and are known to be killed by wind turbines in Europe (Rodrigues et al 2014, Rydell et al 2010).
11.5: Overall assessment of Conservation Status	The overall assessment for this species has been determined as 'unfavourable inadequate' as the population operator 5-25% less than the favourable reference population has been used, reflecting its vulnerable status on the UK red data list. The population trend has mostly been stable for this species since 1999 (BCT 2024). The future trends are unknown.
5.10: Favourable Reference Range (FRR)	The IUCN-compliant Red List Assessment for Britain's terrestrial mammals (Mathews & Harrower 2020) estimated the current extent of occurrence in England as 78,100 km2. It is considered that this figure reflects favourable range and distribution for the species.