

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

2019-2024

Conservation status assessment for the species:

S1312 - Noctule
(Nyctalus noctula)

England



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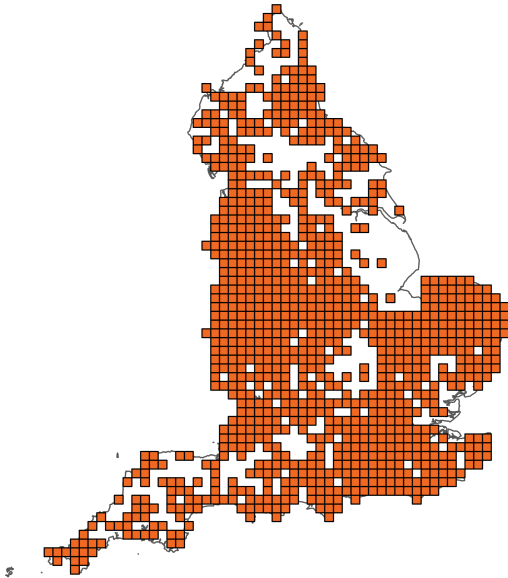
Important note - Please read

- 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: Noctule

Distribution Map



Range Map



Figure 1: England distribution and range map for S1312 - Noctule (*Nyctalus noctula*). 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 S1312 - Noctule (*Nyctalus noctula*). 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)

Unknown (XX)

Habitat for the species (see section 7)

Favourable (FV)

Future prospects (see section 10)

Unfavourable-inadequate (U1)

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National Level

1. General information

1.1 Country	England
1.2 Species code	S1312
1.3 Species scientific name	<i>Nyctalus noctula</i>
1.4 Alternative species scientific name	
1.5 Common name	Noctule
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) 126,641.21

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 (km ²)	126,913
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b) Pre-defined increment	
--------------------------	--

c) Unknown	No
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d) Method used	Model-based approach
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e) Quality of information	moderate
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5.11 Change and reason for change in surface area of range

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

No additional information

6. Population

6.1 Year or period	1995-2024
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6.2 Population size (in reporting unit)

a) Unit	number of individuals
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b) Minimum	17,700
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c) Maximum	1,872,000
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d) Best single value	565,000
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6.3 Type of estimate	95% confidence interval
6.4 Quality of extrapolation to reporting unit	high
6.5 Additional population size (using population unit other than reporting unit)	
a) Unit	
b) Minimum	
c) Maximum	
d) Best single value	
e) Type of estimate	
6.6 Population size; Method used	Complete survey or a statistically robust estimate
6.7 Short-term trend; Period	1995-2024
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	Complete survey or a statistically robust estimate
6.11 Long-term trend; Period	1995-2024
6.12 Long-term trend; Direction	Stable
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

a ii) Unit

b) Pre-defined increment Unknown

c) Unknown Yes

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

Although no population level assessment has been conducted since Mathews et al 2018, the population stability reported here is based on trend information from the following: Bat Conservation Trust. 2024. The National Bat Monitoring Programme. Annual Report 2023. Bat Conservation Trust, London. Available at (www.bats.org.uk/pages/nbmp_annual_report.html)

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? 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 extrapolation from a limited amount of data

b) Sufficiency of quality of occupied habitat; Method used Based mainly on extrapolation from a limited amount of data

7.3 Short-term trend; Period

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
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	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	Medium (M)
PA15: Use of other pest control methods in agriculture (excluding tillage)	Ongoing and likely to be in the future	Medium (M)
PB02: Conversion from one type of forestry land use to another	Ongoing and likely to be in the future	Medium (M)
PB07: Removal of dead and dying trees (including debris)	Ongoing and likely to be in the future	High (H)
PB08: Removal of old trees (excluding dead or dying trees)	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	High (H)
PB14: Forest management reducing old growth forests	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)
PF02: Construction or modification (e.g. of housing and settlements) in existing built-up areas	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	Medium-term results (within the next two reporting periods, 2025–2036)

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	Medium (M)
MB05: Adapt/change forest management and exploitation practices	High (H)
MB06: Stop forest management and exploitation practices	Medium (M)
MB01: Prevent conversion of (semi-) natural habitats into forests and of (semi-) natural forests into intensive forest plantation	High (H)
MC03: Adapt/manage renewable energy installation, facilities and operation (excl. hydropower and abstraction activities)	High (H)
MF10: Other measures related to residential, commercial, industrial and recreational infrastructures, operations and activities	Medium (M)

MB04: Adapt/manage reforestation and forest regeneration	Medium (M)
MK03: Restoration of habitats impacted by multi-purpose hydrological changes	High (H)
MA05: Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning)	High (H)

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

Although no population level assessment has been conducted since Mathews et al (2018), the population increase projected here is based on ongoing trends from the following: Bat Conservation Trust (2024). The National Bat Monitoring Programme. Annual Report 2023. Bat Conservation Trust, London. Available at (www.bats.org.uk/pages/nbmp_annual_report.html)

11. Conclusions

11.1 Range	Favourable (FV)
11.2 Population	Unknown (XX)
11.3 Habitat for the species	Favourable (FV)

11.4 Future prospects Unfavourable-inadequate (U1)

11.5 Overall assessment of Conservation Status Unfavourable-inadequate (U1)

11.6 Overall trend in Conservation Status Stable

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.

Bat Conservation Trust (BCT). 2024. The National Bat Monitoring Programme. Annual Report 2023. Bat Conservation Trust, London. Available at (www.bats.org.uk/pages/nbmp_annual_report.html)

Boye, P., Dietz, M. 2005. Development of good practice guidelines for woodland management for bats. English Nature.

Dietz, C., Kiefer, A., 2016. Bats of Britain and Europe. Bloomsbury, United Kingdom.

Harris, S., Morris, P., Wray, S. & Yalden, D. 1995. A review of British Mammals: population estimates and conservation status of British mammals other than cetaceans. JNCC, Peterborough.

Joint Nature Conservation Committee. 2013. Third Report by the United Kingdom under Article 17 on the implementation of the Habitats Directive from January 2007 to December 2012.

Jones, G. (1995). 'Flight performance, echolocation and foraging behaviour in noctule bats *Nyctalus noctula*.' *Journal of Zoology* 237(2): 303-312.

Mackie, I. J. and P. A. Racey (2007). 'Habitat use varies with reproductive state in noctule bats (*Nyctalus noctula*): Implications for conservation.' *Biological Conservation* 140(1-2): 70-77.

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.

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

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.

Speakman, J. 1991. The impact of predation by birds on bat populations in the British Isles. *Mammal Review*. 21, 123-142.

Main pressures

8.2 Sources of information

No sources of information

15. Explanatory Notes

Field label	Note
1.5: Common name	The noctule is a typical forest species that forages, breeds, mates, and hibernates in woodlands. However they have a characteristic powerful, direct flight on narrow pointed wings and fly in the open, often well above tree-top level, with repeated steep dives when chasing insects. The species has a loud echolocation call which is easily picked up on bat detectors, although overlap in call parameters with <i>N. leiseri</i> and <i>Eptesicus serotinus</i> can make accurate identification difficult if heterodyne detectors are used. The noctule is considered to be the most widespread and common of these species.
2.2: Year or Period	This time period has been selected as distribution has been calculated using data from Mathews et al 2018.
2.3: Distribution map	The noctule is widespread in England, but is absent from the uplands of northern England. Although there has been no structured distribution surveys, this species has been reasonably well recorded by local bat groups and during monitoring surveys organised by the National Bat Monitoring Programme due to the relatively long distance over which their calls can be heard and their high altitude flight in open space (Dietz and Keifer 2016). There is considerable overlap in the call parameters with the other Nyctaloid bats, <i>N. leiseri</i> and <i>Eptesicus serotinus</i> . 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, but the noctule is considered to be the most widespread of these species.
5.3: Short-term trend; Direction	Structured field surveys for the species have been undertaken since 1998 through the National Bat Monitoring Programme (NBMP). There has not been a full survey of every 10km square within the species range and the species is not often encountered in dwelling houses. However, the level of recording is high for this species

	through surveys conducted by local bat groups and those conducted for development work.
6.1: Year or Period	Presence data was collected between 1995-2024 at 10km resolution or higher, gathered from the NBN gateway, local records centres, individual species experts, national and local monitoring schemes and iRecord for each species for the 'Review of the Population and Conservation Status of British Mammals (Mathews et al, 2018) used to determine population status for the species for this report. However, the population was determined between 2016-2017 and only data that had been verified by the source organisation was included in the distribution maps.
6.5: Additional population size	These estimates are the same as those reported by Mathews et al., 2018 due to a lack of updated data analysis. Mathews et al (2018) calculated a population size of adult individuals of 565,000 for England with upper and lower confidence intervals of 17,700 - 1,872,000. There is considerable uncertainty surrounding the population estimates for this species as demonstrated by the wide confidence intervals. Population size was calculated using the median adult density (bats/km ²) x total habitable area within the range (km ²) (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. 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. The density of maternity roosts accross England is highly uncertain as it is highly likely large numbers of roosts are unreported. Further, a colony may make use of multiple roosts and switch between them, meaning that there is likely to be high variability in counts at individual sites. There is a lack information available from the literature indicating that that there is little or no understanding of noctule bat roost (or colony) density. No information is available on the sex ratio within maternity colonies pre-breeding. The calculations

presented by Mathews et al (2018) are based on an assumption that all individuals in recorded sites are female. If half of the individuals are male, this would halve the estimates presented. Given the large effect on the total population size, further research is urgently required. The main population size estimates provided by Mathews et al (2018) are an order of magnitude greater than those in Harris et al. (1995) and the Article 17 Reports (Joint Nature Conservation Committee 2013). Nevertheless, the values previously estimated do fall within the plausible limits.

6.8: Short-term trend;
Direction

The National Bat Monitoring Programme (BCT 2024) monitors noctule populations through field surveys of stratified random 1km squares. The assumption is that trends occurring in sample sites reflect trends occurring in the general population. Populations of Noctules are considered to have been stable in England over the period 1999-2022, although there have been fluctuations throughout this period. Overall there has been no significant change in the smoothed index since the baseline year. From 1999-2023 on average 144 sites per year contribute to the overall trend analysis (sites surveyed in two or more years with noctule present in at least one year).

7.1: Sufficiency of area
and quality of occupied
habitat

N. noctula requires a complex mosaic of habitats to support foraging, roosting and commuting behaviour. Boye and Dietz (2005) provide a good overview of this species' habitat requirements. Foraging areas may be in several parts of the landscape, all of which host a high abundance of insect fauna and offer the space needed by the fast flying *N. Noctula*. Large water bodies, valley pastures and broadleaved woodland are preferred, but the bats also forage in other habitats and even above harvested fields and urban street lights. The species emerges early, particularly during lactation (Jones 1995, Mackie and Racey 2007), and is therefore sometimes thought to benefit from artificial night lighting. However there is no evidence of higher noctule activity in areas that are lit compared with dark control sites (Mathews et al 2015). *N. Noctula* can

easily make foraging flights more than 10 kilometres away from the roost site, up to a maximum of 20 kilometres. However, the main activity of a maternity colony is within a radius of about 2 kilometres from the colony's roost. Summer roosts are predominantly in woodlands and parks. Deciduous and flood forests with a high percentage of old and dead trees are of highest importance. Roosts are mostly in woodpecker holes in broad-leaved trees. Maternity colonies use several roost sites in a network, which means that the individuals often change from one roost to another. Associations of males, which change their roost sites on average every second or third day, need at least eight tree holes suitable for roosting per square kilometre of forest. Besides tree holes, the bats also roost in bat boxes (flat constructions are preferred) and small spaces behind wall coverings of buildings or in houses. Winter roosts are mainly in forest and park trees, but large hibernation colonies also roost in buildings or rock crevices. Tree holes must provide a lot of space for a large number of bats in order to be a good hibernaculum for the species. There is no or insufficient reliable information available to determine the quality of the habitat, however, it is suspected that the amount of habitat in the UK is sufficient to support a viable population of the species.

7.2: Sufficiency of area and quality of occupied habitat; Methods used

The habitable area has been taken from Mathews et al (2018) (still the best available estimate), 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 126,913 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	Due to the species ability to roost in a variety of woodland locations and inhabit a matrix of woodland habitat types, the short term direction for habitat is thought to be stable.
8.1: Characterisation of pressures	The noctule bat is primarily a tree-roosting species, so would be vulnerable to loss of roost opportunities in dead, dying or damaged trees. The species can also roost in buildings, so could be vulnerable to roost loss through the demolition or alteration of buildings or changes to construction methods (Mitchell-Jones, 2010). Pressures that affect the biomass of flying insects, such as the widespread use of pesticides, could also affect this species. Noctule 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).
5.10: Favourable Reference Range (FRR)	Favourable reference range is based on presence data collected between 1995-2016 for Mathews et al 2018 (which is still the best source we have). Areas that contain very isolated records may not have been included in the area of distribution. 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, leading to the production of this current FRR. The FRR was not set at an England level in the 2007-2012 Article 17 report, however, it is broadly in line with what would have been set independently for England when set in the UK context. The quality of

	information is set to moderate (rather than high) due to the lack of population updates since Mathews et al (2018).
5.11: Change and reason for change in surface area of range	The English range stated by Mathews et al (2018) is 127,000 square kilometres. The JNCC provided current range (2025) is 126,641.21 square kilometres (using the same methodology as for 2007 and 2013), which is deemed similar enough to constitute 'no change'.
11.1: Range	This is deemed 'favourable' due to a stable range and a lack of a favourable reference range for comparison.
11.2: Population	This is deemed 'unfavourable-inadequate' as the current population is lower than the favourable reference population.
11.3: Habitat for the species	This is deemed 'favourable' due to a stable habitat area.
11.4: Future prospects	This is classified as 'unfavourable-inadequate' as species pressures are significant, but not currently a threat to long-term population viability.
11.5: Overall assessment of Conservation Status	This is classified as 'unfavourable-inadequate' as the answers for 11.1 - 11.4 contain 'one or more unfavourable-inadequate, but no unfavourable-bad'.
11.6: Overall trend in Conservation Status	This is classified as 'stable' due to a stable population, range and habitat area.