

National Bat Monitoring Programme Annual Report 2016

The National Bat Monitoring Programme (NBMP) is an annual series of bat surveys undertaken by thousands of dedicated volunteers, which allow us to monitor changes in British bat populations. The data we collect are used by the Government and conservation organisations to monitor the health of our environment, inform policy and improve the conservation of bats.

This report provides population trends for 11 of Great Britain's 17 resident bat species derived from data collected up to and including summer 2016. Trends are provided at GB-level and also at country-level where sufficient data are available (for 11 species in England, three species in Scotland and seven species in Wales; we have insufficient data to provide trends for Northern Ireland at present). This report also provides information on our survey methods.

The next set of bat population trends, incorporating data collected up to and including summer 2017, are due to be published in May 2018.



Official Statistics: These statistics have been produced to the high professional standards set out in the Code of Practice for Official Statistics.

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The National Bat Monitoring Programme is run by the Bat Conservation Trust, in partnership with the Joint Nature Conservation Committee, and supported and steered by Natural England, Natural Resources Wales, Northern Ireland Environment Agency, and Scottish Natural Heritage. The NBMP is indebted to all volunteers who contribute data to the programme.

Bat Conservation Ireland contributes Northern Ireland bat records collated by the Irish Bat Monitoring Programme which is funded by the National Parks and Wildlife Service of the Department of Arts, Heritage and the Gaeltacht, Republic of Ireland and Northern Ireland Environment Agency. Data are shared on the NBN Atlas and GBIF.



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Summary of findings

This report presents the findings of the National Bat Monitoring Programme (NBMP) up to 2016.

The NBMP is a world-leading citizen science programme which produces population trends for British bat species. The information produced by the NBMP is used by Government and conservation bodies to inform evidence needs, address policy-relevant questions and provide metrics of bat population status, change and distribution.

Data from four 'core' NBMP surveys are used to produce population trends: Roost Count, Hibernation Survey, Field Survey and Waterway Survey.

Volunteers taking part in our four core surveys contributed approximately 17,700 hours of their time, representing an in-kind contribution to the NBMP of £264,760.

In total 6,330 sites have been surveyed as part of the NBMP since its inception in 1996. In 2016 1,984 sites were surveyed by 960 volunteers.

At present sufficient data are collected by the NBMP to produce population trends for 11 of Great Britain's 17 resident bat species.

Of these species, all are considered to have been stable or to have increased since the baseline year of monitoring (1999 for most species).

Species considered to have increased in Great Britain in comparison to the baseline year are greater horseshoe bat, lesser horseshoe bat, common pipistrelle and soprano pipistrelle. There is also evidence from the Hibernation Survey that populations of Natterer's bat have increased, however this finding should be treated with caution

until the effect of this species' roost switching behaviour on the Roost Count trend is better understood.

Species considered to have been stable in Great Britain in comparison to the baseline year are noctule, serotine, Daubenton's bat, whiskered/Brandt's bat and brown long-eared bat. However these findings should be treated with caution for several species:

Serotine is encountered relatively infrequently during surveys and therefore there is a high level of uncertainty associated with serotine trends, meaning population changes are more difficult to detect for this species.

Trends for whiskered/Brandt's bat combine data from two species with differing ecological requirements and potentially differing conservation status, and may also include records of a third cryptic species, Alcaho bat.

For brown long-eared bat, the Roost Count trend shows no significant change since the baseline year, while the Hibernation Survey shows a marginally significant decline in the most recent year when compared to the baseline year. Given the provisional nature of estimates for the most recent year, the small margin of significance in the Hibernation Survey trend and the fact that this margin is likely to change when additional years of monitoring data are added to the trend, there is not yet sufficient certainty to assess the population as declining, however this will need to be carefully monitored and the assessment potentially revised in light of the results from the next year of monitoring.

No species for which we produce population trends is considered to have declined significantly since the baseline year.

While data from the National Bat Monitoring Programme indicates that populations of the bat species we monitor are stable or recovering, it should be remembered that these trends reflect relatively recent changes in bat populations (since 1999 for most

species). It is generally considered that prior to this there were significant historical declines in bat populations dating back to at least the start of the 20th century. **This suggests that current legislation and conservation action to protect and conserve bats is being successful, and it is vitally important that this continues.**

Bat Monitoring in the UK

The National Bat Monitoring Programme (NBMP) is a citizen science programme run by the Bat Conservation Trust, in partnership with the Joint Nature Conservation Committee, and supported and steered by Natural England, Natural Resources Wales, Northern Ireland Environment Agency and Scottish Natural Heritage. We are extremely grateful to all the dedicated volunteers who have taken part in the NBMP since its inception in 1996, without which the programme could not continue.

Effective conservation requires monitoring of underlying population trends to provide a detection system that can indicate population declines; to ensure scarce conservation resources are targeted towards sustaining bat populations and the habitats on which they depend; and also to inform policy.

The NBMP collects data to deliver this information and to enable us to understand more about the drivers of change in population trends. The NBMP aims to deliver some of the key information needs for UK and country biodiversity strategies and Habitats Directive obligations.

Bats are widely distributed through the range of landscapes and habitats in the UK. A combination of their reliance on insect prey, sensitivity to prevailing weather conditions, dependence on a range of habitats and vulnerability to changed land and site management approaches, makes them valuable indicators of the 'health' of the environment. Since 2008 NBMP data have contributed to the suite of UK biodiversity indicators which are being used to help measure progress towards the Government's target of halting biodiversity loss.

Through continued development of new surveillance techniques, training approaches and volunteer recruitment, the NBMP has grown substantially in capacity since it was first established in 1996. It now delivers statistically robust trends for 11 of the UK's

17 resident bat species at GB level, and we report country-level trends for 11 species in England, three species in Scotland and seven species in Wales. Currently we have insufficient data from Northern Ireland to provide trends for Northern Ireland or to calculate UK-wide trends. All-Ireland bat population are trends produced by Bat Conservation Ireland.

Monitoring approaches

The NBMP is an integrated programme that employs a number of different survey methods. This approach means that, for some species, bats are surveyed at more than one stage of their annual life cycle. As a general rule, trends from the Field Survey and Waterway Survey are currently considered most robust, followed by the Hibernation Survey, and then Roost Counts.

A sampling approach is used on all surveys with the assumption that trends occurring in sample sites reflect trends occurring in the general population. Theoretically this assumption is strongest when sample sites are chosen at random and where a proportion of sites do not contain the species of interest, such as for the Field Survey. Monitoring sites where the species of interest is not present can help identify if populations are expanding into new areas.

The main monitoring techniques employed by the programme and their survey periods and site selection methods are summarised here:

NBMP survey details

Species monitored	Start year	Survey period	Site selection and survey method
Roost Count common pipistrelle, soprano pipisrelle, serotine, Natterer's bat, brown long-eared bat, greater horseshoe bat, lesser horseshoe bat	1997 (Natterer's bat: 2000, brown long-eared bat: 2001)	6th - 25th June (lesser horseshoe: 9th May - 27th June, greater horseshoe: 7th - 21st July	Known roosts Roost emergence counts
Field Survey	1998	1st July - 30th July	Stratified random 1km squares

noctule, serotine, common pipistrelle, soprano pipistrelle			Walked transect with heterodyne bat detector
Waterway Survey Daubenton's bat	1997	1st August - 30th August	River Habitat Survey sites Walked transect with heterodyne bat detector
Hibernation Survey greater horseshoe bat, lesser horseshoe bat, Daubenton's bat, Natterer's bat, whiskered/Brandt's bat, brown long-eared bat	1997	January/February (data also now included from December to March)	Known or potential hibernacula Internal hibernacula survey
Bats and Roadside Mammals Survey / iBats UK (not currently running)	2005	May - September	Self-selected transects Car survey with time expansion bat detector
Woodland Survey Barbastelle	2005	July - September	SAC sites for barbastelles (plus other woodlands with suitable habitat surveyed up to 2010) Walked transect with broadband bat detector
Nathusius' Pipistrelle Survey Nathusius' pipistrelle (not currently running - superceded by the project below)	2009	September	Lakes/lochs allocated from UK Lakes online database (website no longer live) Walked transect with broadband bat detector

National Nathusius' Pipistrelle Project Nathusius' pipistrelle	2014	Spring to autumn, avoiding key breeding period	Sites with known/likely Nathusius' pipistrelle presence Harp trapping survey
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Robustness of monitoring

The robustness of the data obtained from the different survey methods used in the NBMP will vary depending on how the data are collected. In general, random samples and surveys are considered to be most robust and best representative of the total population compared to surveys using self-selected samples.

Overall, the Field and Waterway Surveys are considered to provide the most robust trend information, followed by the Hibernation Survey and then the Roost Counts.

Field and Waterway Surveys

Field Survey volunteers are assigned a random-stratified 1km OS grid square to survey. Field Survey sites are stratified by ITE landclass to ensure a representative sample of UK land classes. Waterway Survey sites are randomly selected from the network of River Habitat Survey sites. The random selection process includes sites where the species of interest may not occur at present but has the potential to do so in the future. This provides a means of assessing change in distribution as a result of population expansion as well as change in relative abundance.

Potential challenges to address include volunteers using different types of equipment and changes in prevalence of different models of equipment over time, volunteer turnover and volunteer experience. These are included as covariates in the data analyses to assess potential influence on the results.

Hibernation Survey

For the Hibernation Survey volunteers select a known or potential hibernation site to survey. This includes sites that are suitable for hibernating bats but have not previously found to be occupied. This survey can therefore detect instances of bats moving into

sites where they have not previously been recorded.

A potential issue with counts of bats carried out in hibernation sites is the relationship between the numbers of bats observed and the actual numbers of bats present. Bats can hide in cracks and crevices and there is evidence that large numbers of bats can be present even when few are actually observed. However, if the proportion of bats seen/not seen remains constant over time at any given site, population trend conclusions will remain valid.

Roost Count

Roost Count sites are known roosts that are self-selected by surveyors. Roost Counts are most effective for monitoring population change when a high proportion of existing roosts are counted and when the species tends to be faithful to their roost site.

Many bat species will move between roost sites, either individually, in groups or as an entire roost. Bats may abandon a roost temporarily for several weeks, months or years before reoccupying it, or they may abandon it permanently. This is known as 'roost switching'. Roost switching may negatively bias Roost Count trends if monitoring ceases before a roost is reoccupied or if the roost is permanently abandoned, as this results in a zero count being the final value entered into trend analysis for that roost and therefore a negative site trend being included in trend analysis. It is also possible for a roost to 'split' into two or more smaller roosts if it outgrows its original site, which will negatively bias the trend if bats occupying the new site(s) are not included in the count.

Species which switch or split roosts more frequently, in greater numbers or for longer periods of time are likely to have more biased Roost Count trends. Common and soprano pipistrelle show a high degree of roost switching and therefore Roost Count trends for these species should be treated with caution. However species that are highly faithful to their roost sites, such as greater and

lesser horseshoe bat, and likely to have less biased trends. For these species Roost Count trends appear robust and are supported by evidence from other surveys.

Population Trend Analysis

In order to produce a clear picture of the long-term trend for each species, GAMs (General Additive Models) have been used to fit a smoothed line to each dataset, allowing for factors that could influence the means (e.g. bat detector make, temperature) where appropriate (see [Barlow et.al. 2015](#) for more details). These smoothed curves are quite robust against random variation between years, except at the ends of the series where annual fluctuations and extreme outliers can have an unacceptably large impact on the first and last few years. To counteract this problem, it is best not to use the first year of a survey as the baseline year (where the index equals 100) and in this report the year 1999 has been taken as the baseline year wherever possible. Most surveys start from 1997, although there are a few exceptions. The Field Survey starts from 1998, and some Hibernation Surveys and Roost Counts have earlier years of data for some species. Where these data are available and improve trend estimation, they have been included in the GAMs but as they comprise small amounts of data, the start year is still shown as 1997. In all cases, the estimate for the most recent year should be regarded as provisional and a dotted line is used on the graphs to indicate this.

The average annual percentage change is an approximation based on the assumption that the trend during the period considered is constant and linear. It is estimated by calculating the annual percentage change that would take the population from 100 in the base year to the index value in the current year.

The Generalised Additive Models (GAMs) are based on the method described by [Fewster et al. \(2000\)](#). These involve fitting a log-linear generalised linear model (i.e. a regression model with a logarithmic relationship to the explanatory variables and a Poisson error distribution) to the counts on each survey. A site term is fitted in the model to allow for differences in abundance

between sites and the time trend is modelled using the GAM framework to fit a smoothed curve. These GAM models are essentially a more sophisticated version of a polynomial curve, and are less likely to display misleading trends at the extremes of the data than a polynomial. The degree of smoothing is controlled by specifying the degrees of freedom for the smoothing process; this may vary between 1 (equivalent to a simple linear trend) and one less than the number of years (a 'saturated model' equivalent to fitting individual annual means). For the results presented here the degrees of freedom are generally set to the default value suggested by Fewster et al. (2000), which is 0.3 times the number of years. However curves for different degrees of freedom are always checked to ensure that the model provides an appropriate degree of smoothing to the annual means without being unduly influenced by individual outlying years. The index values are derived from the fitted curve, taking the base year to be 100. Annual means from the saturated model are also shown on the graphs in order to give a visual impression of any deviations from the smoothed curve.

The other feature of these models is that confidence limits based on standard theory will not be valid due to temporal correlations. In addition NBMP data suffer from other complications not present in the data examined by Fewster *et al.* which also invalidate the usual method of calculating confidence limits. Firstly the data are much more variable than would be expected from a Poisson distribution. This phenomenon, known as 'overdispersion', is very common in biological data, but is particularly extreme in these datasets. Fewster et al. (2000) suggest a negative binomial distribution might be an alternative but simulations suggest that, whilst it sometimes produces more precise results, this is not always the case. Secondly the repeat counts in each year add a further complexity to the correlation structure of the data. All these problems are avoided by using the bootstrap approach recommended by Fewster in which the model is fitted to a large number of new datasets created by resampling sites with

replacement from the original sites. At least 400 bootstrap samples are used for each model to ensure robust 95% confidence limits. The same bootstrapping approach can be used to produce confidence limits to other quantities of interest, including the short- and long-term assessments used in the Defra biodiversity indicators.

Data for Great Britain are weighted to allow for the different sampling rates in England, Scotland and Wales. This is achieved by weighting each site in proportion to the ratio of non-upland area to the number of sites surveyed for the relevant country, thus ensuring that each country contributes equally to the trends based on land area. Weighting is not applied to those species, such as serotine and horseshoe bats, which have a restricted range within the UK.

Overdispersion is a particular problem for the bat detector surveys, where a single bat repeatedly flying past the observer may give rise to a large count of bat passes. This results in wide confidence limits for Poisson or negative binomial GAM models and so we have instead presented results for a binomial model of the proportion of observation points on each survey where the species was observed. Apart from this difference in the response variable, the same GAM approach, with bootstrap confidence limits, is adopted. Simulations suggest that these binomial models have greater power to detect trends with the high levels of overdispersion seen in the bat detector surveys.

In order to test whether the smoothed curves differed between different countries or regions Fewster et al. (2000) suggest a deviance test. However, simulations have suggested that this test can produce too many significant results, and so the results presented here use a randomisation approach to obtain a probability value from the change in deviance.

Analyses were conducted in Genstat and in R (version 3.4)

References

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Detecting population change

The purpose of the NBMP is to allow us to draw accurate conclusions about what is happening to our bat populations. We need to be able to identify any significant changes to these populations, and in particular identify possible declines early on, so that swift conservation action can be taken.

The NBMP uses a detection system which is aimed at identifying problems at an early stage. The detection system follows that used by the British Trust for Ornithology which identifies Red and Amber alerts for individual species population trends as follows:

- **Red alert:** Severe decline of 50% or more over 25 years (equivalent to a 2.73% decline per year)
- **Amber alert:** Moderate decline of between 25-49% over 25 years (equivalent to a 1.14% decline per year)

An assessment based on power analyses and the width of the confidence limits for the current trend estimates suggests that our samples sizes should be sufficient to detect an Amber or Red Alert change within 25 years at most.

Species coverage

The core surveys in the National Bat Monitoring Programme are:

- Field Survey (noctule, serotine, common pipistrelle and soprano pipistrelle)
- Waterway Survey (Daubenton's bat)
- Hibernation Survey (greater horseshoe bat, lesser horseshoe bat, Daubenton's bat, Natterer's bat, whiskered / Brandt's bat and brown long-eared bat)
- Roost Counts (greater horseshoe bat, lesser horseshoe bat, common pipistrelle, soprano pipistrelle, Natterer's bat, brown long-eared bat and serotine)

Species coverage

These surveys currently provide sufficient data to produce GB-level population trends for 11 of the UK's 17 resident bat species, and country-level trends for 11 species in England, three species in Scotland and seven species in Wales. More details of the trends for each species can be found [here](#).

Some species are monitored by using more than one of the survey methods. As a general rule, trends from the Field Survey and Waterway survey are considered most robust at present, followed by the Hibernation Survey and then the Roost Counts. More details on the robustness of surveys can be found [here](#).

The table below shows which surveys provide data for each of the UK's bat species.

Species	Roost Count	Field / Waterway Survey	Hibernation Survey
Greater horseshoe bat	✓		✓

Lesser horseshoe bat	✓		✓
Common pipistrelle	✓	✓	+
Soprano pipistrelle	✓	✓	+
Daubenton's bat		✓	✓
Natterer's bat	✓		✓
Whiskered/Brandt's bat			✓
Noctule		✓	
Serotine	✓	✓	
Brown long-eared bat	✓		✓
Bechstein's bat			+
Alcathoe bat			
Nathusius' pipistrelle			+
Leisler's bat		+ (NI only)	
Barbastelle			+
Grey long-eared bat	+		

✓ = enough data collected for trend. + = recorded, but insufficient data to produce trend

Trends are not produced within the NBMP for the remaining GB resident species: Bechstein's bat, Alcathoe bat, Nathusius' pipistrelle, Leisler's bat or barbastelle. In addition to these

resident species a single male greater mouse-eared bat is consistently recorded during hibernation in South East England.

Information on the distribution of certain species is available from the Woodland Survey (barbastelle), National Nathusius' Pipistrelle Project and Bechstein's Bat Project (discontinued).

Bechstein's bat



This rare species is restricted to southern England and southern Wales. It is associated with semi-natural woodlands and is difficult to survey using standard methods as it produces low intensity echolocation calls which are difficult to pick up on a bat detector, and it spends much of its time foraging high up in the canopy.

The Bechstein's Bat Project, which ran from 2007-2011, used survey techniques specifically designed for Bechstein's bats in order to establish baseline distribution data on this species from woodlands in southern England and South Wales, and to gather information to inform future conservation policy and woodland management.

Full details of the project, results and final report can be found on the Bechstein's Bat Project pages. An article on the project and follow-on work was published in British Wildlife in 2013 (Barlow et al. 2013)

Click [here](#) for the Bechstein's bat factsheet.

Greater mouse-eared bat



This species was declared extinct in the UK in 1990. However, a single juvenile male was found during a Hibernation Survey in southern England in winter 2002/2003 and has been recorded annually ever since.

Alcathoe bat



The latest addition to the UK bat fauna, this species was first described in 2001 ([von Helversen et al. 2001](#)) and confirmed as a resident species in the UK in 2010 ([Jan et. al/2010](#)). It is rare in the UK, with records confirmed in North Yorkshire, Sussex, Surrey and Kent. It is very similar in appearance to the whiskered and Brandt's bat and is likely to have been overlooked in the past. It is not currently recorded as a separate species in the Hibernation Survey, although future recording of this species separately will be encouraged.

Leisler's bat



This species is uncommon but widespread throughout England, Wales and Scotland. It is more abundant in Northern Ireland, as Ireland is a stronghold for the species. It is a mobile species and bats move between roosts regularly; it is primarily a woodland species, but will also use buildings for roosting, although few building roosts are known.

It is not included in the Field Survey, although the use of broadband bat detectors and recording devices on this survey could allow monitoring of this species depending on encounter rates.

A modification of the Field Survey for Northern Ireland was introduced in 2008 to allow for monitoring of Leisler's bats instead of the noctule and serotine monitored by this survey in Great Britain, as these species are not found in Ireland. Three sites in Northern Ireland have been surveyed using this modified methodology to date. A larger sample size is required before these data can be used to calculate species population trends.

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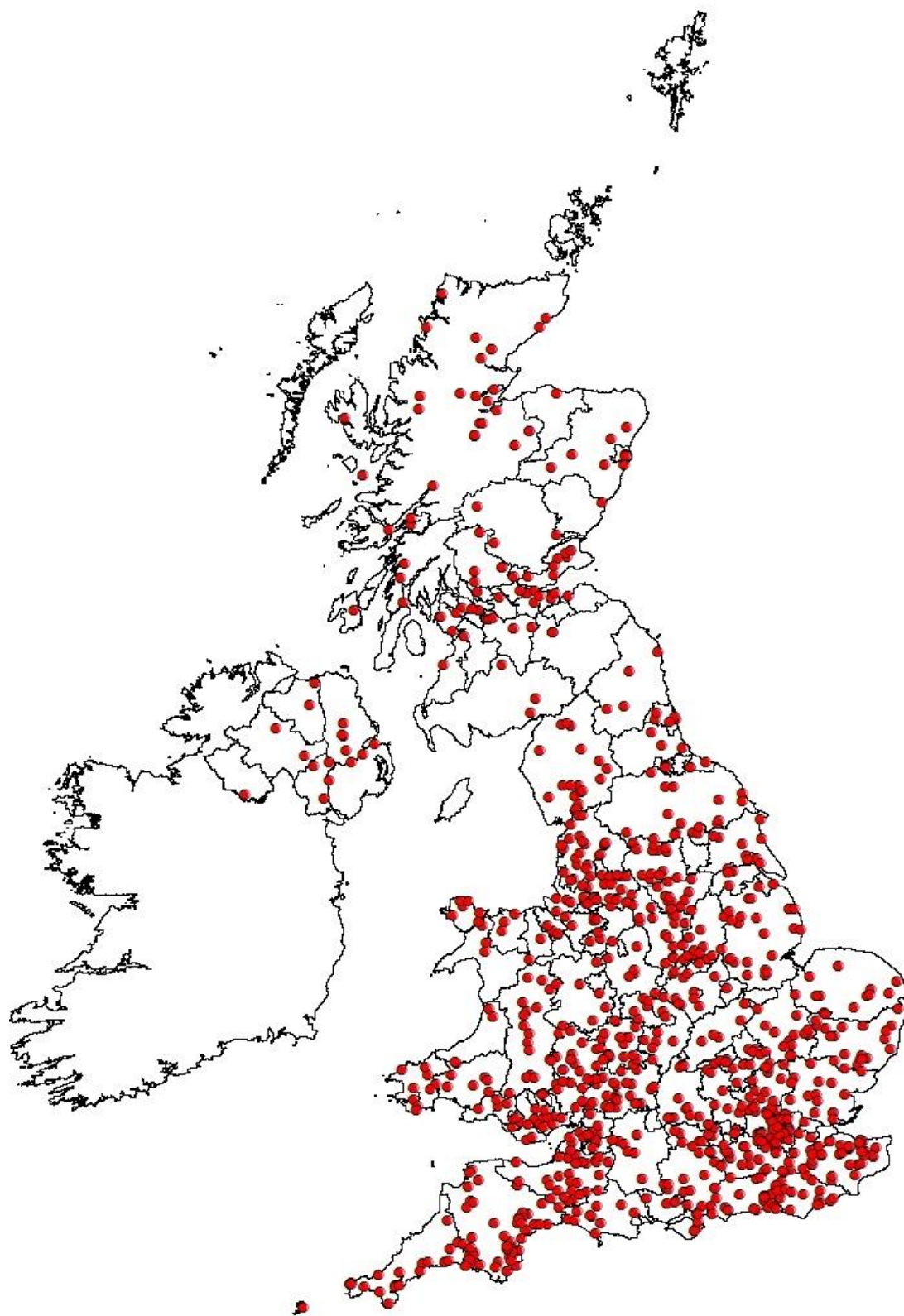
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Survey coverage

UK site network

The total site network for all surveys completed up to 2016 is 6,330 sites. In 2016, 960 of our dedicated NBMP volunteers completed surveys at a total of 1,984 sites. (Site figures do not include Sunset/Sunrise Survey, as sites are less clearly defined for this survey.) This is a slight decrease on the number of sites surveyed in 2015 (-1.9%).

The map shows the distribution of all NBMP volunteers who took part in surveys in 2016.



We also encourage new volunteers to get involved in the NBMP by taking part in our Sunset / Sunrise Survey. In 2016, 161 Sunset/Sunrise Surveys were completed by at least 119 volunteers. Bats were recorded on 153 surveys (95%) and six bat roosts were located. [Click here to view a map of Sunset/Sunrise site distribution in 2016.](#)

Value of the volunteer contribution to the NBMP

In 2016 volunteers taking part in our four core surveys (Field Survey, Waterway Survey, Roost Count and Hibernation Survey) contributed approximately 17,700 hours of their time, representing an in-kind contribution to the NBMP of £264,760^a. The equivalent cost of these surveys if they were undertaken by professional ecologists would be £653,332^b.

Repeat sites

For the core surveys (Field Survey, Waterway Survey, Roost Count and Hibernation Survey), 1838 sites (93%) had been surveyed in at least one previous year (repeat sites). There was a very slight overall increase compared to 2015 when 92% of sites surveyed were repeat sites.

Maximising the number of sites that are surveyed for at least two years is a priority for NBMP, as data from a site can only contribute to species trends once it becomes a repeat site.

The table shows the number of sites both in the network and surveyed in 2016 compared to 2015, and the levels of repeat survey sites for each survey type. [Click here to view maps of the distribution of sites in the network for each survey type.](#) [Click on the survey or species names in the table to view maps of site distribution in 2016.](#)

UK NBMP survey coverage 2016

Survey type	No. sites in network 2016	Total sites surveyed 2016	Total sites surveyed 2015	% change in sites surveyed from 2015 to 2016	% repeat sites 2016
Field Survey	891	231	233	-0.9	93.9
Waterway Survey	1370	333	344	-3.2	93.7
Hibernation Survey	1184	564	545	+3.5	96.3
Woodland Survey (barbastelle)	49	16	16	0	100
Roost Counts:					
Greater horseshoe bat	38	30	32	-6.3	93.3
Lesser horseshoe bat	357	193	187	+3.2	94.3
Common pipistrelle	628	194	219	-11.4	92.3
Soprano pipistrelle	484	164	185	-11.4	91.5
Unidentified pipistrelle sp.	757	73	76	-3.9	82.2
Natterer's bat	101	41	40	+2.5	92.7
Serotine	146	39	41	-4.9	97.4
Brown long-eared bat	221	69	75	-8.0	97.1
Other species	104	37	30	+23.3	64.9
All surveys	6330	1984	2023	-1.9	93.4

Country level site networks

The NBMP produces trends for Great Britain and at country-level where sufficient data are available. Reporting of trends at country level is possible providing the sample size is sufficient. Power analyses were completed for the NBMP in 2001, and from these it was recommended that a core of 30-40 sites need to be surveyed annually for any given survey to provide sufficient data for trends to be calculated that will detect changes in populations effectively (BCT, 2001). More recent power analysis has indicated that the sample size needed can vary between each species and survey. However, we use 30-40 sites as our initial target number of repeat sites at each geographical scale. Further power analysis would need to be carried out in order to more precisely assess the sample size needed at the country or regional scale for each species and survey method.

For more information on detecting population changes, [click here](#).

The table below provides further information on survey coverage in 2016 at a country level. Country level trends are calculated where sufficient data were available and are included in this report. We are exceeding our basic target of 30 repeat sites in England for all surveys except for the greater horseshoe bat Roost Count. In Wales, we are exceeding this target for the Hibernation Survey and the lesser horseshoe bat Roost Count. In Scotland we are exceeding this target for the Waterway Survey. A power analysis commissioned by Scottish Natural Heritage further demonstrated that the trend for Daubenton's bat estimated from Waterway Survey data and the trends for common and soprano pipistrelle estimated from Roost Count data had low or medium levels of sample error and could therefore be considered statistically robust (although not necessarily free of bias, see Robustness of Monitoring). These trends are included in a Trend Note published by Scottish Natural Heritage in 2015. Here we present additional Scottish trends for common and soprano pipistrelle estimated from Field Survey data. Of the survey methods used to monitor common and soprano pipistrelle,

the Field Survey is considered to most reliably reflect the underlying population trend. However the number of Field Survey sites monitored in Scotland is small and therefore the confidence intervals associated with these trends are wide, reflecting a high degree of uncertainty. Increasing the number of Field Survey sites monitored in Scotland in the future is a priority. Samples sizes in Northern Ireland are currently too small for any species trends to be calculated.

Country level NBMP survey coverage 2016

Survey type	England	Scotland	Wales	Northern Ireland	Channel Islands
Field Survey	200 (189)	18 (16)	8 (7)	1 (1)	4 (4)
Waterway Survey	249 (237)	35 (33)	19 (15)	30 (27)	0
Hibernation Survey	398 (381)	25 (24)	141 (138)	0	0
<i>Roost Counts:</i>					
Greater horseshoe bat	30 (28)	-	5 (5)	-	-
Lesser horseshoe bat	80 (72)	-	113 (110)	-	-
Common pipistrelle	150 (140)	22 (20)	22 (19)	0	0
Soprano pipistrelle	111 (102)	26 (24)	21 (20)	6 (4)	0
Pipistrelle sp.	56 (47)	10 (8)	4 (3)	3 (2)	0
Natterer's bat	37 (34)	3 (3)	1 (1)	0	0
Serotine	38 (37)	-	1 (1)	-	0
Brown long-eared bat	51 (49)	11 (11)	5 (5)	2 (2)	0

Total for all surveys	1400	150	340	42	4
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Note: no. of repeat sites in brackets

^a Volunteer contribution calculated using the daily rate given for unskilled and skilled volunteers by the Heritage Lottery Fund in their application guidance (Dec 2013), and assuming a 7.5 hour day.

^b Equivalent professional contribution calculated using the mid-point of the daily rate range for an Assistant Ecologist (lowest level of experience) and Ecologist given by CIEEM in the guidance to members, and assuming a 7.5 hour day.

Survey coverage maps

These maps show survey coverage of core NBMP surveys in 2016 and the overall site network for the following surveys:

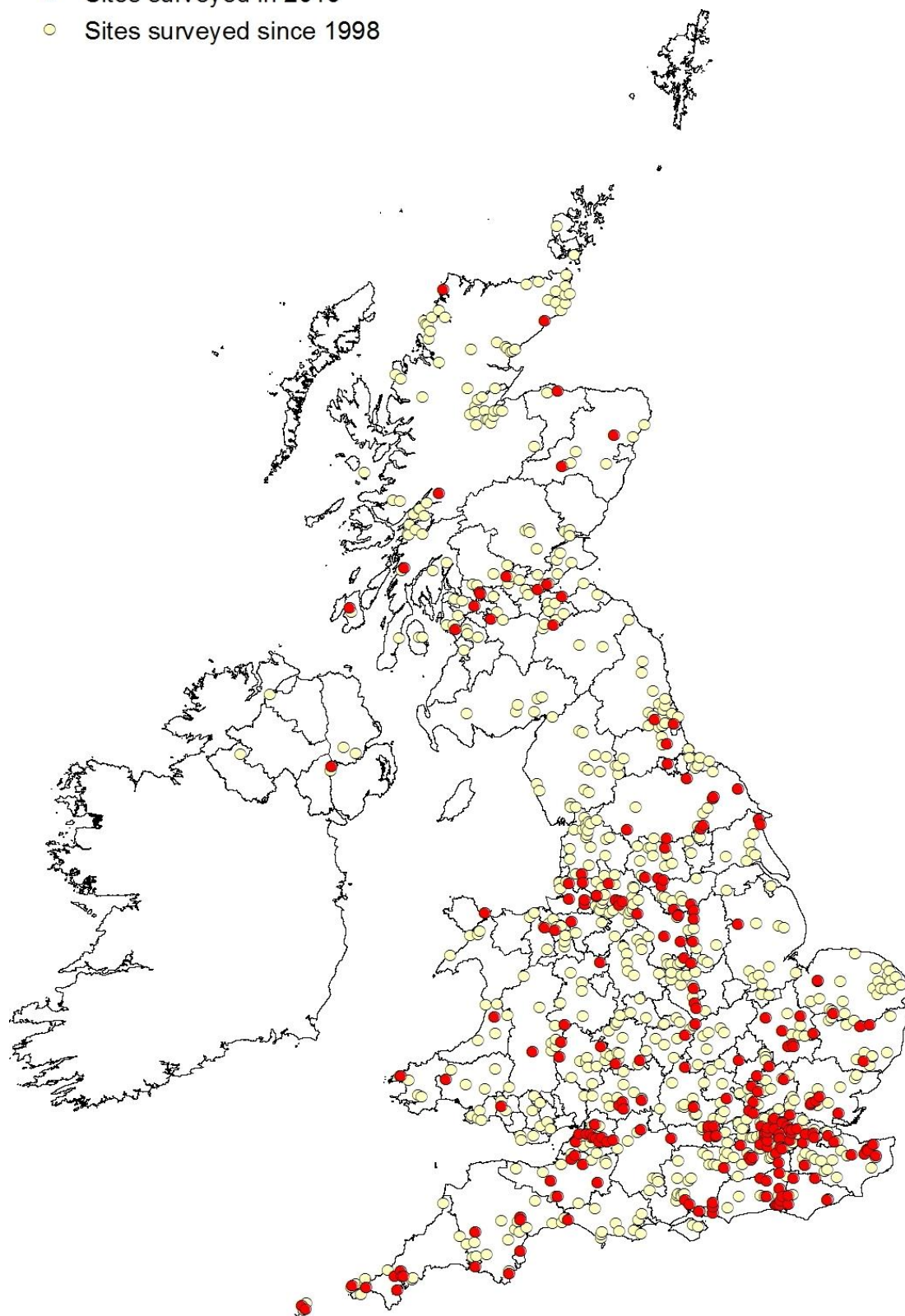
- Field Survey
- Waterway Survey
- Hibernation Survey
- Roost Counts

Field Survey

Distribution of Field Survey sites

231 sites were surveyed in 2016 (shown in red), representing 25.9% of the total Field Survey site network (other sites in the network are shown in yellow).

- Sites surveyed in 2016
- Sites surveyed since 1998

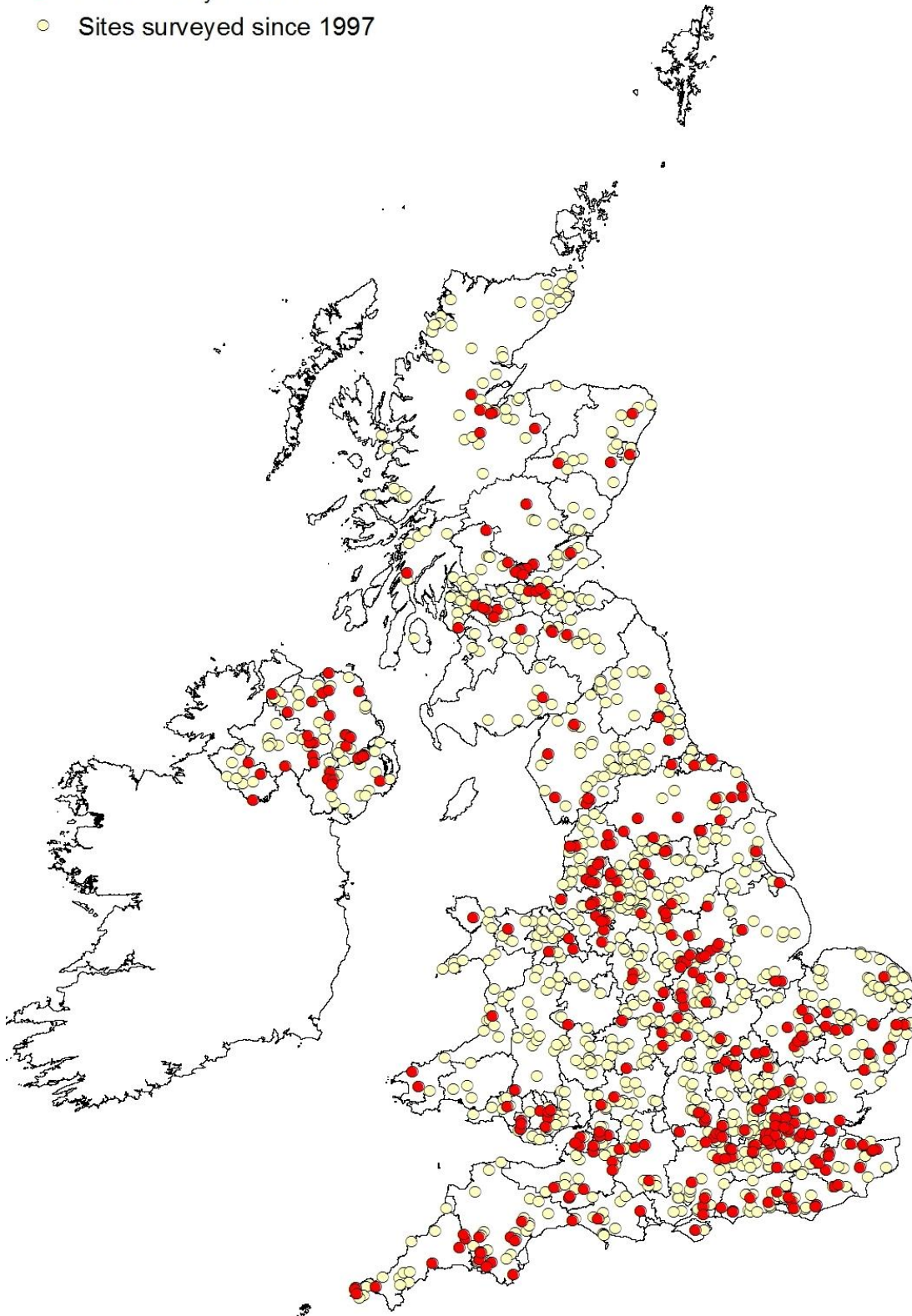


Waterway Survey

Distribution of Waterway Survey sites

333 sites were surveyed in 2016 (shown in red), representing 24.3% of the total site network (other sites in the network shown in yellow). Northern Ireland sites are from the All-Ireland Waterway Survey, run by Bat Conservation Ireland, and funded in NI by the Northern Ireland Environment Agency.

- Sites surveyed in 2016
- Sites surveyed since 1997

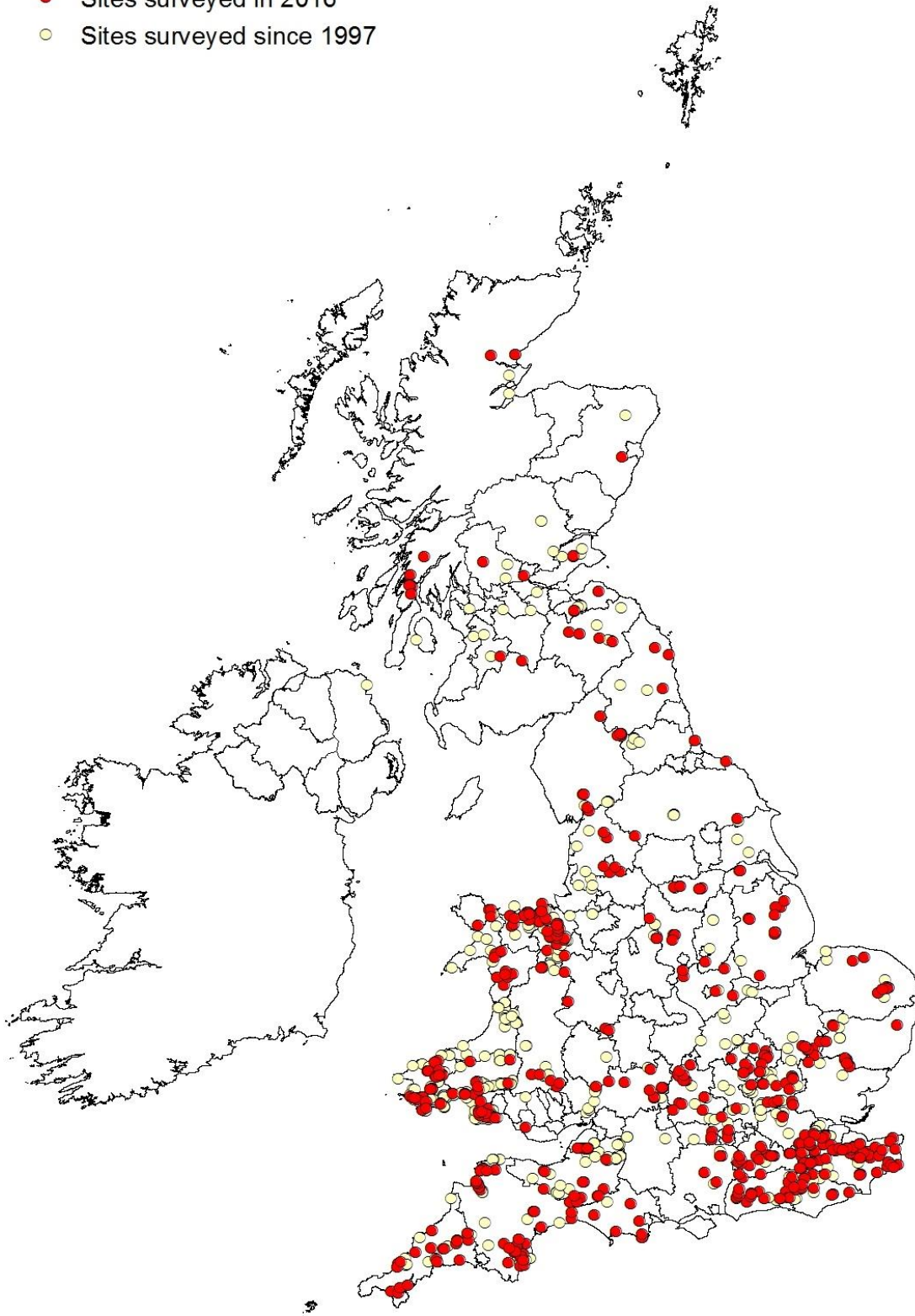


Hibernation Survey

Distribution of Hibernation Survey sites

564 sites were surveyed in 2016 (shown in red) representing 47.6% of the total site network (other sites in the network are shown in yellow).

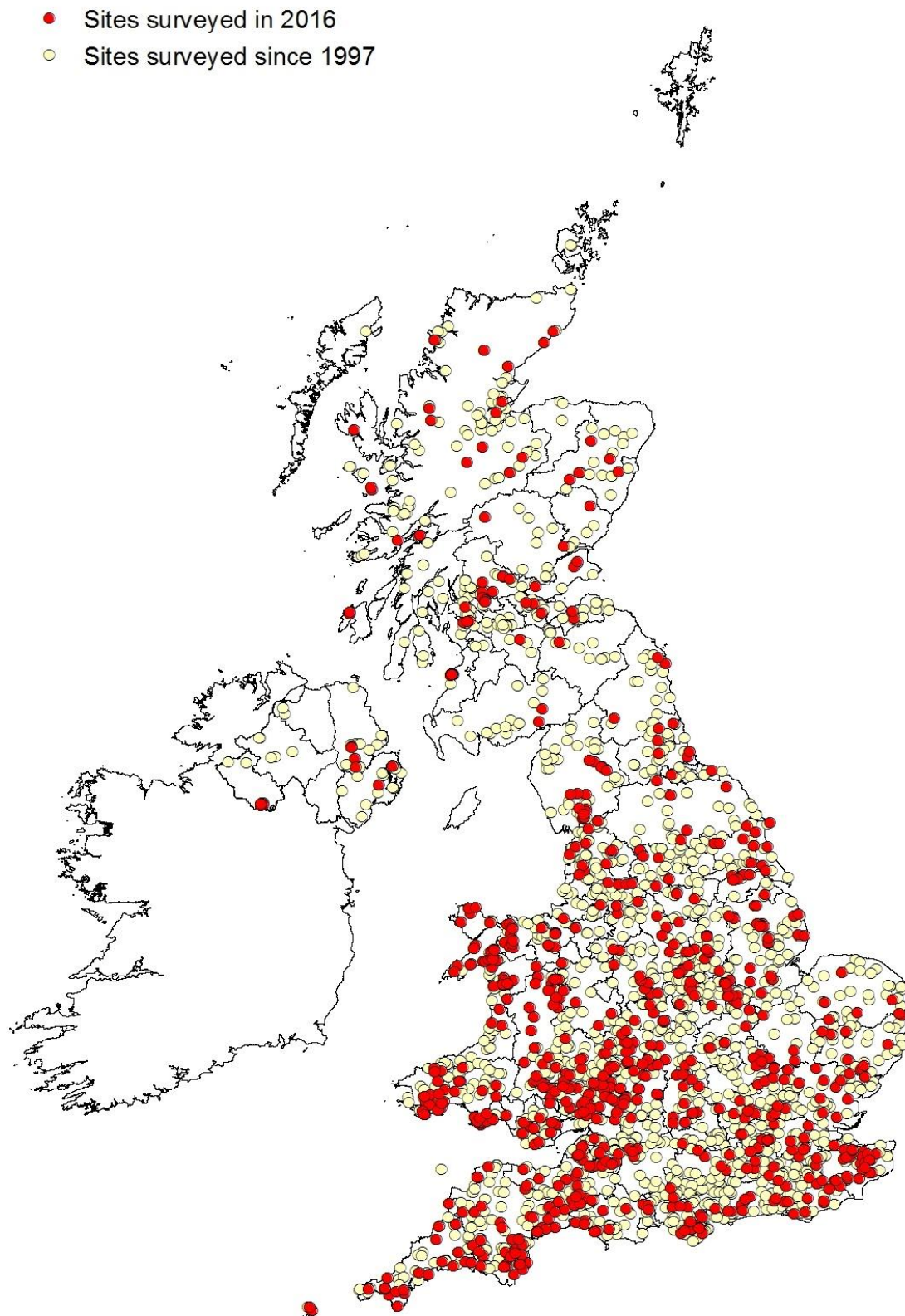
- Sites surveyed in 2016
- Sites surveyed since 1997



Roost Count

Distribution of all Roost Count sites

A total of 840 sites were surveyed in 2016 representing 29.6% of the site network.



Species Population Trends for Great Britain

Summary of species trends for Great Britain

This page provides a summary of the population trends at GB-level for species monitored by the NBMP. For a summary of the results of the country-level trends for England, Scotland and Wales, [click here](#).

The table below shows the smoothed population indices derived from NBMP data in Great Britain to the end of 2016. For each species, the number of sites contributing to the 2016 trend calculations is shown as well as an approximation of the average annual percentage change in the index since the baseline year. It should be noted, however, that the average annual percentage change makes assumptions about the data analysis, and is only genuinely appropriate for those species for which the trend line appears to be linear.

Click on the species names in the following table to access information on:

- The species population trends for GB and information at country or regional level where data are available
- Graphs showing the trends calculated from each survey
- The surveys that provide data for that species
- Information on the distribution and abundance of the species

For the remaining UK bat species (Bechstein's bat, Alcaho bat, Leisler's bat, Nathusius' pipistrelle, barbastelle, grey long-eared bat and greater mouse-eared bat) there are insufficient data available at present to allow calculation of population trends.

Information about the factors that affect our bat populations can be found here

GB bat species population trends summary table

Species	Survey	No. sites trend analysis	Base year	Long-term trend (since base year) %	Average annual change %
Greater horseshoe bat	Hibernation	201	1999	162.7*	5.8
	Roost Count	32	1999	145.3*	5.4
Lesser horseshoe bat	Hibernation	300	1999	158.0*	5.7
	Roost Count	294	1999	80.4*	3.5
Daubenton's bat	Hibernation	399	1999	47.7*	2.3
	Waterway	848	1999	1.6	0.1
Whiskered/Brandt's bat	Hibernation	231	1999	38.5	1.9
Natterer's bat	Hibernation	506	1999	66.4*	3.0
	Roost Count	82	2002	-3.1	-0.2
Common pipistrelle	Field	626	1999	82.1*	3.6

	Roost Count	489	1999	-58.0*	-5.0
Soprano pipistrelle	Field	626	1999	58.9*	2.8
	Roost Count	377	1999	-52.0*	-4.2
Noctule	Field	626	1999	27.6	1.5
Serotine	Field	432	1999	7.2	0.4
	Roost Count	96	1999	-19.9	-1.3
Brown long-eared bat	Hibernation	427	1999	-31.3 *¹	-2.2
	Roost Count	158	2001	20.1	1.2

Notes:

* indicates significant result at 5%

Bold indicates which trend is considered to be most statistically robust if two trends are produced.

¹For brown long-eared bat the Hibernation Survey shows a marginally significant decline in the most recent year when compared to the baseline year. Given the provisional nature of estimates for the most recent year, the small margin of significance and the fact that this margin is likely to change when additional years of monitoring data are added to the trend, there is not yet sufficient certainty to assess the population as declining.

Trends in context:

These trends reflect relatively recent changes to bat populations since the 1990s. It is generally considered that prior to this there were significant historical declines in bat populations dating back

to at least the start of the 20th century, although evidence is fragmented and few data were collected in a systematic way.

Summary of trends for England, Scotland and Wales

This page provides a summary of the country-level population trends for bat species monitored by the NBMP. Population trends are produced at a country-level for England, Scotland and Wales for species and survey types where sufficient data are available. Further details of survey coverage in these countries and the power of these data to detect country-level population changes is given [here](#). There are currently insufficient data from Northern Ireland to be able to report on trends at the country-level or include them with data from the rest of the UK to produce UK trends. Information on how bats are faring in Ireland can be found on the [Bat Conservation Ireland website](#).

Click on the species names in the tables below to access the following information:

- The species population trends at country-level
- Graphs showing the trends calculated from each survey
- The surveys that provide data for that species

England

The table below shows a summary of the bat species trends derived from NBMP survey results in England to the end of 2016. For each species, the number of sites contributing to the 2016 trend calculations is shown as well as an approximation of the average annual percentage change since the baseline year. It should be noted, however, that the average annual percentage change makes assumptions about the data analysis, and is only genuinely appropriate for those species for which the trend line appears to be linear.

England bat species population trends summary table

Species	Survey type	No. sites trend analysis	Base year	Long-term trend (since base year) %	Average annual change %
<u>Greater horseshoe bat</u>	Hibernation	104	1999	181.9*	6.3
	Roost	27	1999	118.7*	4.7
<u>Lesser horseshoe bat</u>	Hibernation	142	1999	154.9*	5.6
	Roost	113	1999	114.1*	4.6
<u>Daubenton's bat</u>	Hibernation	286	1999	55.9*	2.7
	Waterway	684	1999	-7.9	-0.5
<u>Whiskered/Brandt's bat</u>	Hibernation	151	1999	48.5	2.4
<u>Natterer's bat</u>	Hibernation	356	1999	89.3*	3.8
	Roost	69	2002	4.2	0.3
<u>Common pipistrelle</u>	Field	515	1999	96.6*	4.1
	Roost	388	1999	-54.3*	-4.5
<u>Soprano pipistrelle</u>	Field	515	1999	32.7	1.7
	Roost	244	1999	-50.1*	-4

<u>Noctule</u>	Field	515	1999	9.0	0.5
<u>Serotine</u>	Field	397	1999	4.1	0.2
	Roost	94	1999	-23.2	-1.6
<u>Brown long-eared bat</u>	Hibernation	325	1999	-22.0	-1.5
	Roost	113	2001	-3.5	-0.2

Notes: * indicates significant result at 5% (**Bold** indicates which trend is considered to be most statistically robust if two trends are produced).

Scotland

The table below shows a summary of the bat species trends derived from NBMP survey results in Scotland to the end of 2016. For each species, the number of sites contributing to the 2016 trend calculations is shown as well as an approximation of the average annual percentage change since the baseline year. It should be noted, however, that the average annual percentage change makes assumptions about the data analysis, and is only genuinely appropriate for those species for which the trend line appears to be linear.

Scotland bat species population trends summary table

Species	Survey type	No. sites trend analysis	Base year	Long-term trend (since base year) %	Average annual change %

<u>Daubenton's bat</u>	Waterway	115	1999	22.7	1.2
<u>Common pipistrelle</u>	Field	76	1999	19.5	1.1
	Roost	64	1999	-63.3*	-5.7
<u>Soprano pipistrelle</u>	Field	76	1999	54.1	2.6
	Roost	83	1999	-50.0*	-4.0

Notes: * indicates significant result at 5% (**Bold** indicates which trend is considered to be most statistically robust if two trends are produced).

Wales

The table below shows a summary of the bat species trends derived from NBMP survey results in Wales to the end of 2016. For each species, the number of sites contributing to the 2016 trend calculations is shown as well as an approximation of the average annual percentage change since the baseline year. It should be noted, however, that the average annual percentage change makes assumptions about the data analysis, and is only genuinely appropriate for those species for which the trend line appears to be linear.

Wales bat species population trends summary table

Species	Survey type	No. sites trend analysis	Base year	Long-term trend (since base)	Average annual change %

				year) %	
<u>Greater horseshoe bat</u>	Hibernation	93	1999	101.4	4.2
<u>Lesser horseshoe bat</u>	Hibernation	157	1999	159.8*	5.8
	Roost	172	1999	71.6*	3.2
<u>Daubenton's bat</u>	Hibernation	88	1999	28.8	1.5
	Waterway	47	2000	34.7*	1.9
<u>Whiskered/Brandt's bat</u>	Hibernation	78	1999	-4.2	-0.3
<u>Natterer's bat</u>	Hibernation	129	1999	94.9*	4.2
<u>Brown long-eared bat</u>	Hibernation	81	1999	36.3	1.8

Notes: * indicates significant result at 5% (**Bold** indicates which trend is considered to be most statistically robust if two trends are produced).

Greater horseshoe bat trends for Great Britain

Rhinolophus ferrumequinum

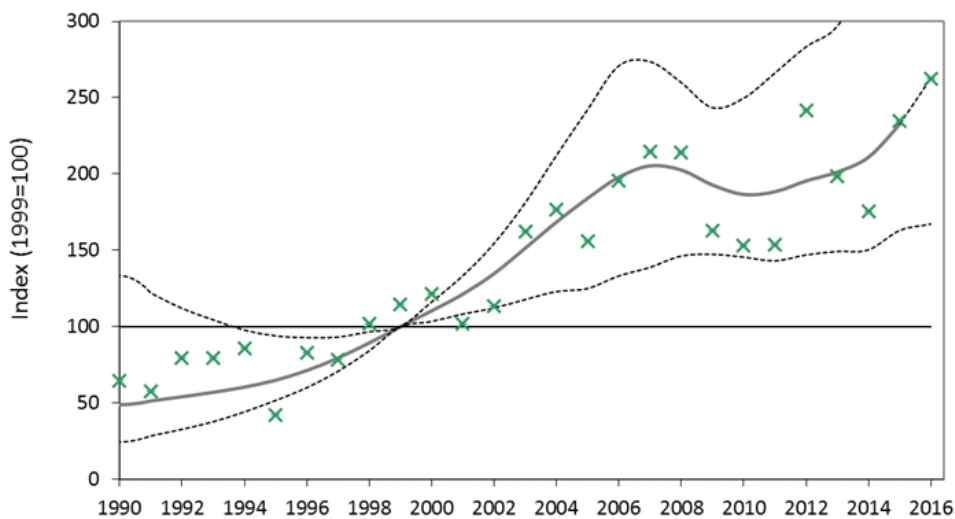
Species factsheet; Distribution and abundance

GB-level population trends for greater horseshoe bat from the Hibernation Survey and the Roost Count are shown on this page.

Population trends are also calculated for greater horseshoe bat at a country-level for England and Wales. This species is not found in Scotland.

Hibernation Survey

GB index of greater horseshoe bat population from Hibernation Surveys



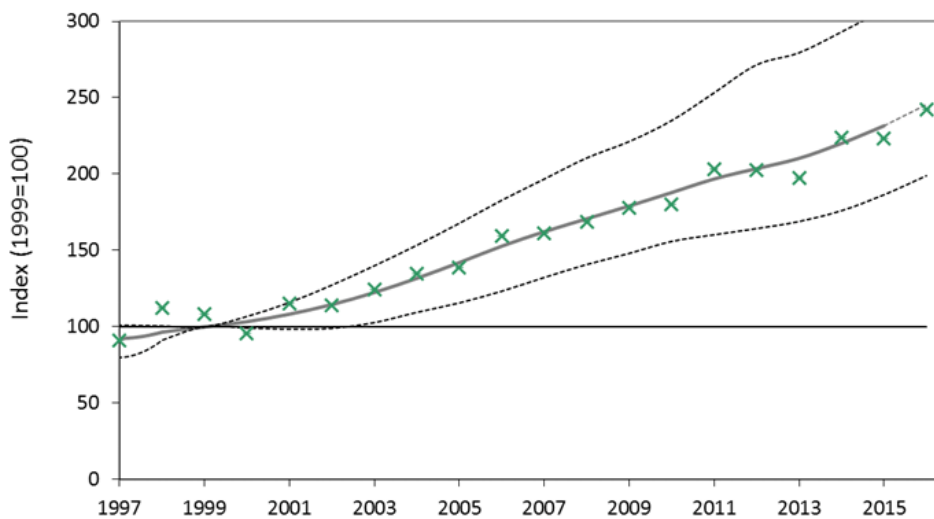
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 162.8% above the 1999 base year value, equivalent to an annual increase of 5.9%. There has been a **significant increase in the smoothed index** since the baseline year. There are no significant differences in trends between England and Wales.

From all years for which data are available (1990-2016), counts from 201 sites contribute to the overall trend analysis (sites surveyed in two or more years with greater horseshoe bat recorded in at least one year).

Roost Count

GB index of greater horseshoe bat population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 145.3% above the 1999 base year value, equivalent to an annual increase of 5.4%. The smoothed trend has increased consistently since the baseline year, and the provisional smoothed index for 2016 shows this trend continuing. There has been a **significant increase in the smoothed index** since the baseline year.

Data from 32 sites surveyed between 1997 and 2016 contribute to the trend analysis (sites surveyed in at least two years).

Summary of survey results

Trends from both the Hibernation Survey and Roost Count show a statistically significant increase in the smoothed population index since the baseline year. Overall the **population of greater horseshoe bat in Great Britain is considered to have increased since 1999.**

Distribution and Abundance

The greater horseshoe bat is rare in the UK with a distribution restricted to south-west England and south Wales. It is absent from Scotland and Northern Ireland.

Population estimate

The population estimate for this species is considered to be of moderate accuracy, being based on a comprehensive survey inventory.

Country	UK	England	Wales	Scotland	N.Ireland
Number	>6,600	unknown	unknown	does not occur	does not occur
Source	Battersby <i>et al.</i> 2005				

References

Battersby. J. (Ed) & Tracking Mammals Partnership. (2005) *UK Mammals Species Status and Population Trends. First Report by the Tracking Mammals Partnership.* JNCC/Tracking Mammals Partnership, Peterborough.

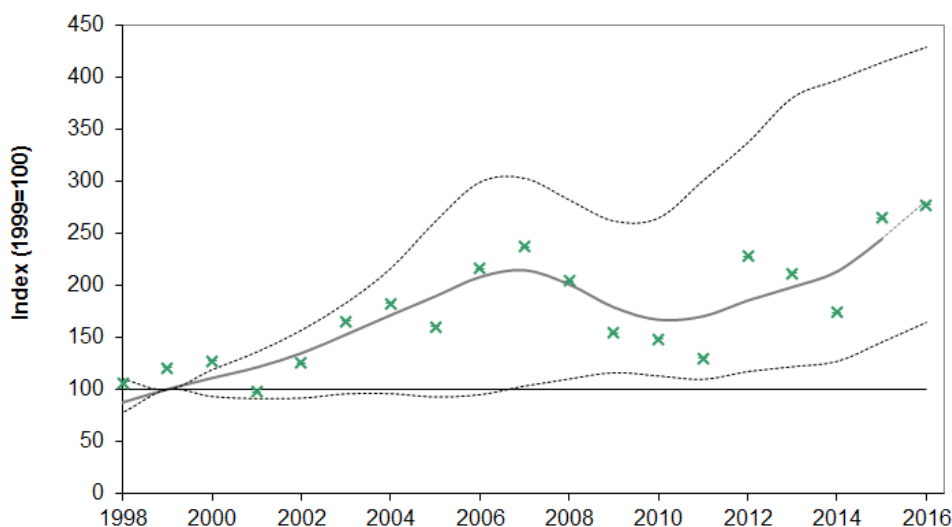
Greater horseshoe bat trends for England

English-level population trends for greater horseshoe bat from the [Hibernation Survey](#) and [Roost Count](#) are shown on this page.

Population trends are also calculated for greater horseshoe bat for [Great Britain](#) and [Wales](#).

Hibernation Survey

England index of greater horseshoe bat population from Hibernation Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

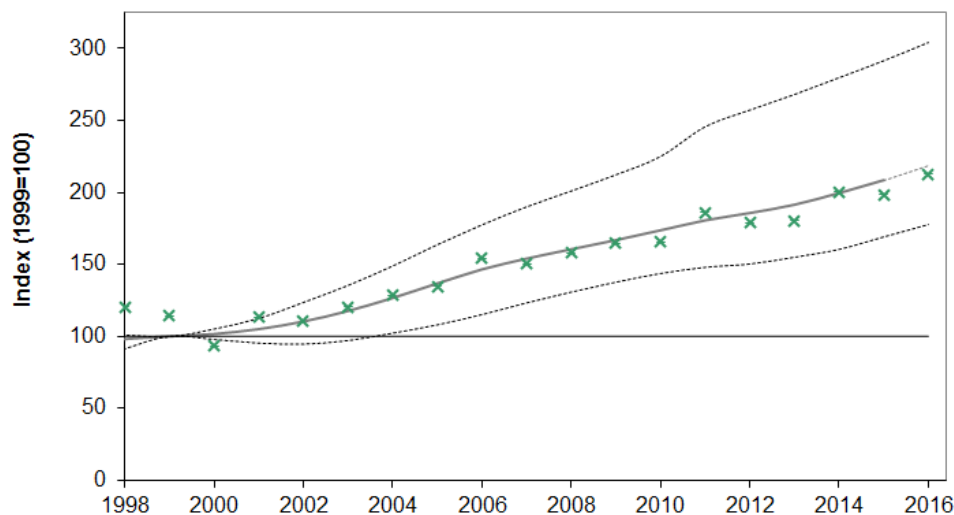
The smoothed index is currently 181.9% above the 1999 base year value, equivalent to an annual increase of 6.3%. The

smoothed index has fluctuated over the monitoring period, but has been steadily increasing since 2011. Overall there has been a **significant increase in the smoothed index** since the baseline year.

From all years for which data are available (1990-2016), counts from 104 sites contribute to the trend analysis in England (sites surveyed in two or more years with greater horseshoe bat present in at least one year).

Roost Counts

England index of greater horseshoe bat population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed trend is currently 118.7% above the 1999 base year, equivalent to an annual increase of 4.7%. The smoothed index has increased consistently since the baseline year. Overall

there has been a **significant increase in the smoothed index** since the baseline year.

From all years for which data are available (1997-2016), counts from 27 sites contribute to the trend analysis in England (sites surveyed in at least two years).

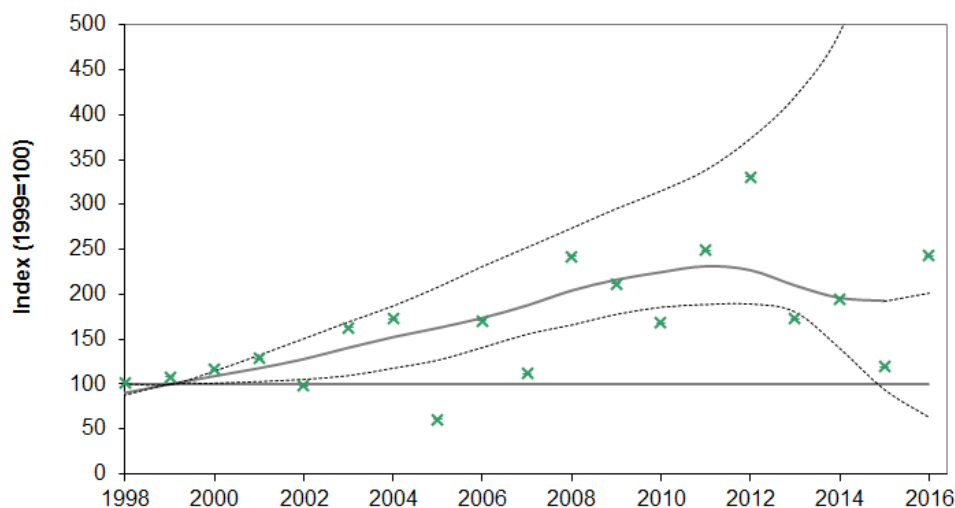
Greater horseshoe bat trends for Wales

The Welsh-level population trend for greater horseshoe bat from the [Hibernation Survey](#) is shown on this page.

Population trends are also calculated for greater horseshoe bat for [Great Britain](#) and [England](#).

Hibernation Survey

Wales index of greater horseshoe bat population from Hibernation Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

In Wales the smoothed index is currently 101.4% above the 1999 base year value, equivalent to an annual increase of 4.2%. In

previous years the smoothed index has been significantly higher than the baseline year, however the precision of the trend in recent years has reduced and as a result **the smoothed index is no longer significantly different from the baseline year.**

From all years for which data are available (1990-2016) counts from 93 sites contribute to the trend analysis in Wales (sites surveyed in two or more years with greater horseshoe bat present in at least one year).

Lesser horseshoe bat trends for Great Britain

Rhinolophus hipposideros

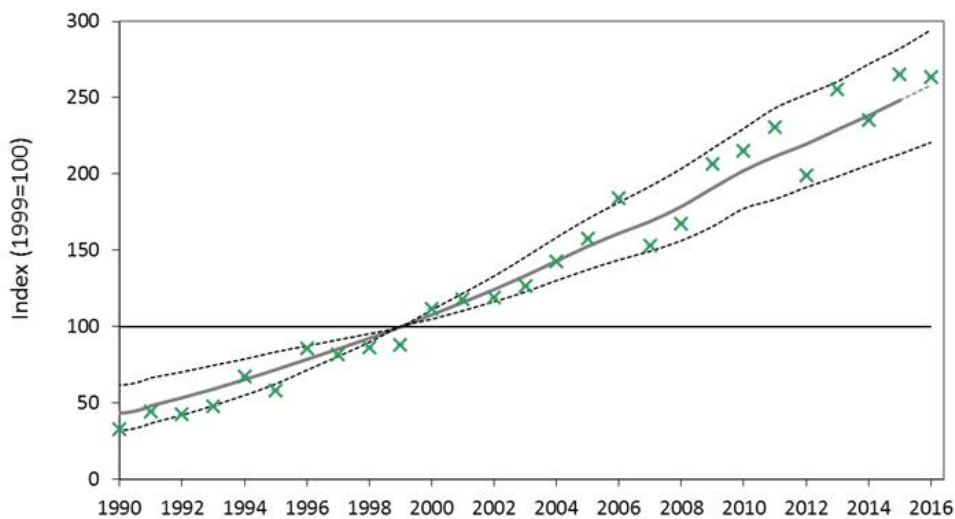
Species factsheet; Distribution and abundance

GB-level population trends for lesser horseshoe bat from the Hibernation Survey and the Roost Counts are shown on this page.

Population trends are also calculated for lesser horseshoe bat at a country-level for England and Wales. This species is not found in Scotland.

Hibernation Survey

GB index of lesser horseshoe bat population from Hibernation Surveys



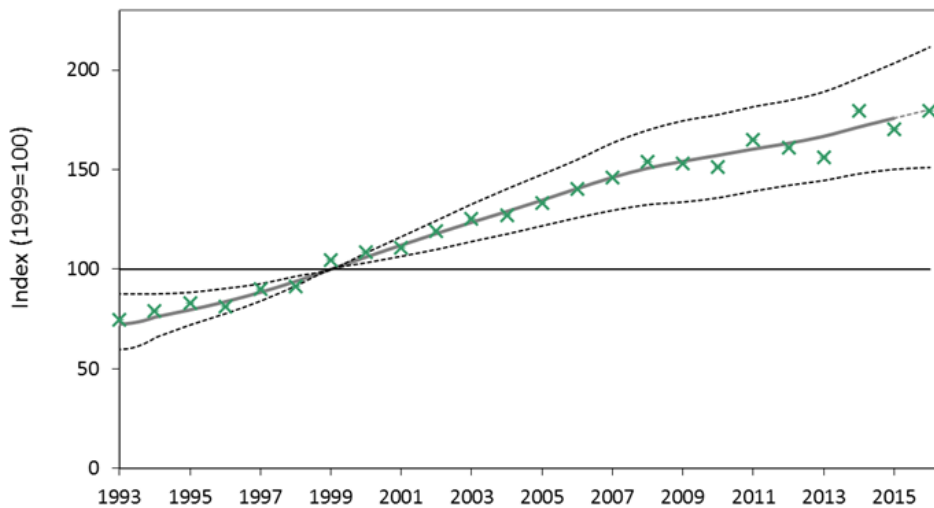
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 158% above the 1999 base year value, equivalent to an annual increase of 5.7%. The smoothed index has increased consistently since the start of the monitoring period and this trend has continued in 2016. There has been a **significant increase in the smoothed index** since the baseline year. There are no significant differences in trends between England and Wales.

A total of 300 sites contribute to the overall trend analysis (sites surveyed in more than one year and with lesser horseshoe bat present in at least one year).

Roost Counts

GB index of lesser horseshoe bat population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 80.4% above the 1999 base year value, equivalent to an annual increase of 3.5%. The smoothed index has increased consistently since the start of the monitoring period and this trend has continued in 2016. There has been a **significant increase in the smoothed index** since the baseline year. There are no significant differences between trends for England and Wales over the last six years.

Data from 294 sites surveyed between 1993 and 2016 contribute to the overall trend analysis (sites surveyed in more than one year).

Summary of survey results

Trends from the Hibernation Survey and Roost Count survey both show a significant increase in the smoothed population index since the baseline year. **The population of lesser horseshoe**

bat in Great Britain is considered to have increased since 1999.

Distribution and Abundance

The lesser horseshoe bat is rare in the UK with a distribution restricted to Wales and western England. It is absent from Scotland and Northern Ireland.

Population estimate

Country	UK	England	Wales	Scotland	N.Ireland
Number	c. 50,000	unknown	28,000	does not occur	does not occur
Source	Henry Schofield, <i>pers. comm.</i> 2008		Matthews & Halliwell 2009		

References

Matthews, J. E. & Halliwell, E. C. (2009) Lesser Horseshoe Bat Summer Roost Surveillance 20 May to 17 June 2003 - 2007 CCW Staff Scientific Report No. 06/9/1.

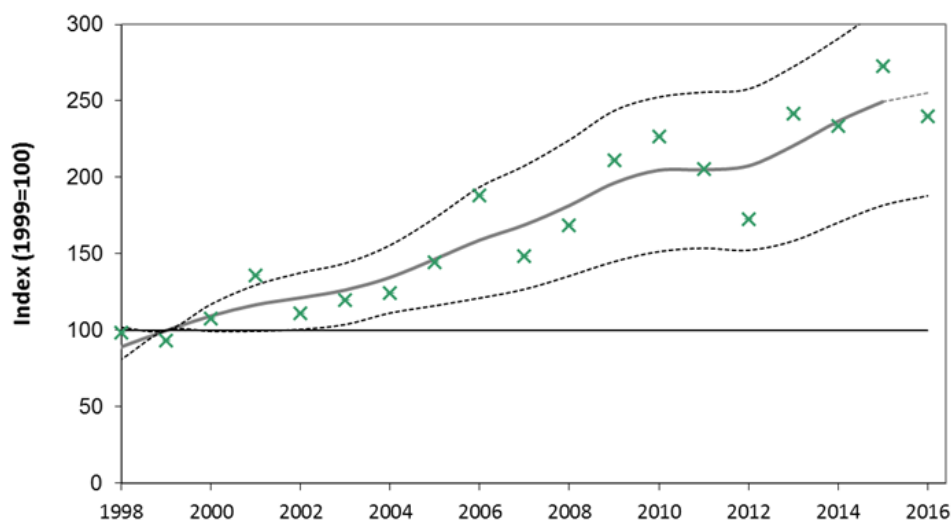
Lesser horseshoe bat trends for England

English-level population trends for lesser horseshoe bat from the [Hibernation Survey](#) and the [Roost Counts](#) are shown on this page.

Population trends are also calculated for lesser horseshoe bat for [Great Britain](#) and [Wales](#).

Hibernation Survey

England index of lesser horseshoe bat population from Hibernation Surveys



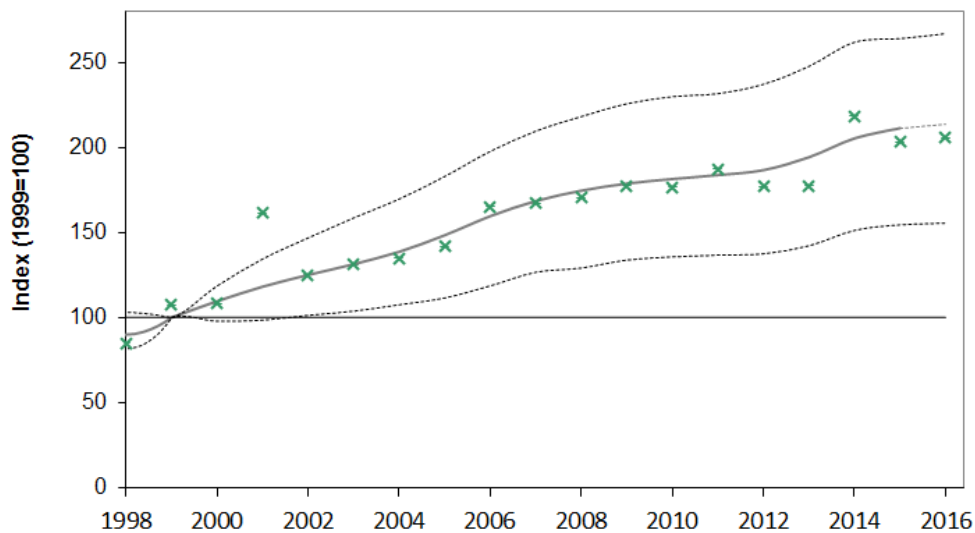
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 154.9% above the 1999 base year value, equivalent to an annual increase of 5.7%. The smoothed index has increased every year since the baseline year and overall there has been a **significant increase in the smoothed index since 1999**.

From all years for which data are available (1990-2016), counts from 142 sites contribute to the trend analysis in England (sites surveyed in more than one year and with lesser horseshoe bat present in at least one year).

Roost Counts

England index of lesser horseshoe bat population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 114.1% above the 1999 base year value, equivalent to an annual increase of 4.6%. The

smoothed index has increased consistently since the baseline year and overall there has been a **significant increase in the smoothed index** since 1999. There are no significant differences between trends for regions within England.

Data from 113 sites contribute to the trend analysis in England (sites surveyed in more than one year).

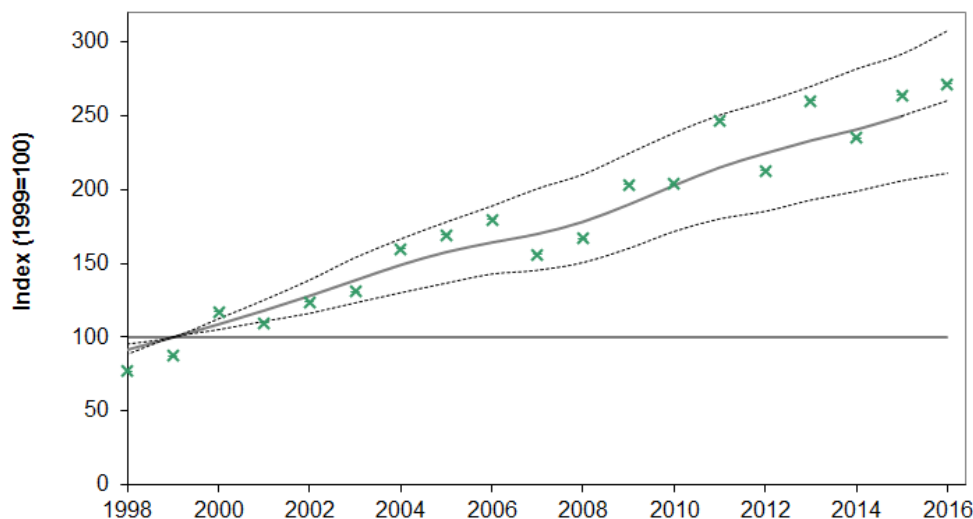
Lesser horseshoe bat trends for Wales

Welsh-level population trends for lesser horseshoe bat from the [Hibernation Survey](#) and the [Roost Counts](#) are shown on this page.

Population trends are also calculated for lesser horseshoe bat in [Great Britain](#) and [England](#).

Hibernation Survey

Wales index of lesser horseshoe bat population from Hibernation Surveys



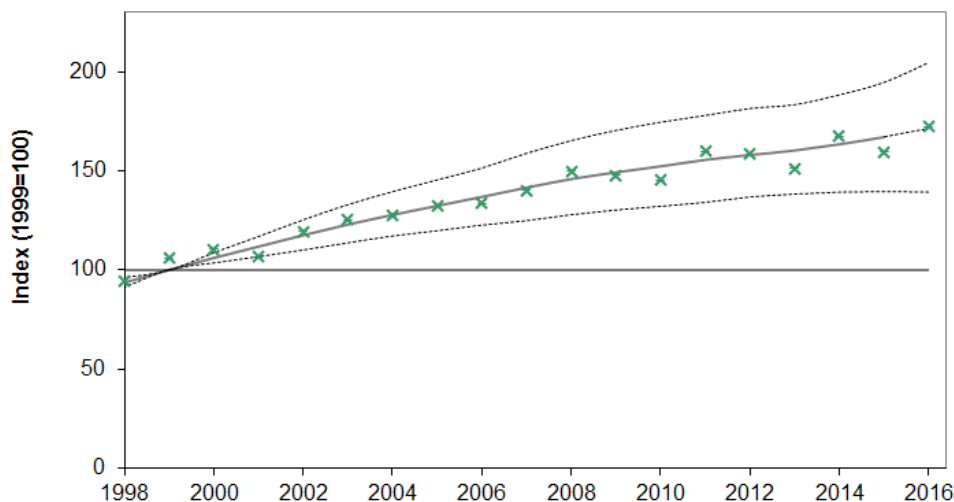
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 159.8% above the 1999 base year value, equivalent to an annual increase of 5.8%. The smoothed index has increased consistently since the baseline year and overall there has been a **significant increase in the smoothed index** since 1999.

From all years for which data are available (1990-2016), counts from 157 *sites* contribute to the trend analysis in Wales (sites surveyed in two or more years with lesser horseshoe bat present in at least one year).

Roost Counts

Wales index of lesser horseshoe bat population from Roost Counts



Note: The trend for 2016 is shown as a dashed line to indicate that it is provisional. The figure shows trend analysis results (solid line) with 95% confidence limits (dotted lines).

The smoothed index is currently 71.6% above the 1999 base year value, equivalent to an annual increase of 3.2%. The smoothed index has increased consistently since the baseline year and

overall there has been a **significant increase in the smoothed trend** since 1999.

Data from 172 sites contribute to the trend analysis in Wales (sites surveyed in at least two years).

Daubenton's bat trends for Great Britain

Myotis daubentonii

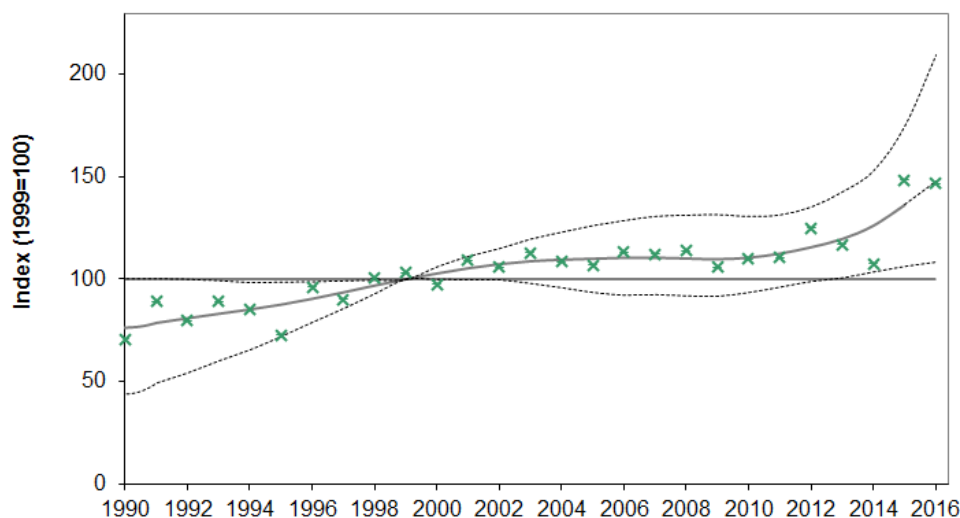
Species factsheet; Distribution and abundance

GB-level population trends for Daubenton's bat from the Hibernation Survey and the Waterway Survey are shown on this page.

Population trends are also produced for Daubenton's bat at a country-level for England, Scotland and Wales.

Hibernation Survey

GB index of Daubenton's bat population from Hibernation Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

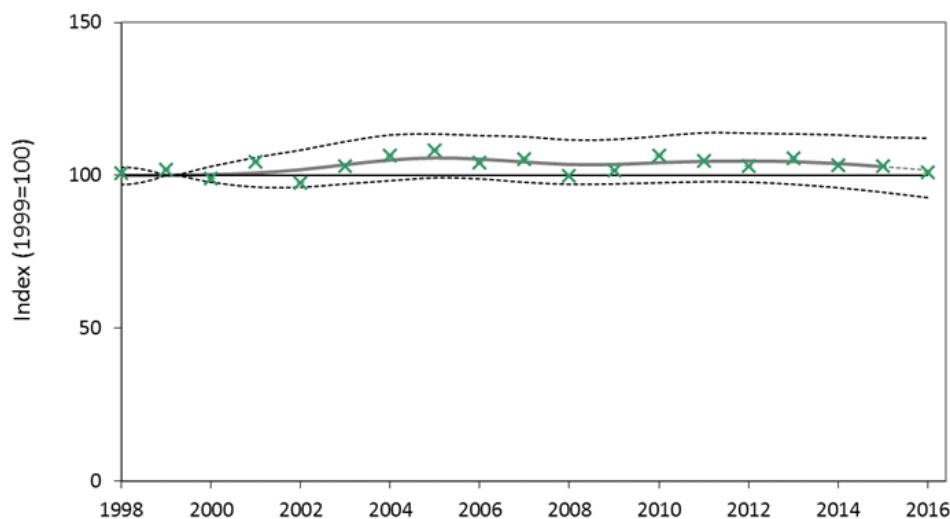
The smoothed index is currently 47.7% above the 1999 base year value, equivalent to an average annual increase of 2.3%.

Between 1999 and 2012 the index value did not differ significantly from the baseline year, however as a result of several high average counts between 2013-2016 the trend is now increasing. Overall there has been a **statistically significant increase in the smoothed index** since the baseline year. There are no significant differences between trends for England and Wales.

From all years for which data are available (1998-2016) counts from 399 sites contribute to the overall trend analysis (sites surveyed in two or more years with Daubenton's bat present in at least one year).

Waterway Survey

GB index of Daubenton's bat population from Waterway Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 1.6% above the 1999 base year value, equivalent to an average annual increase of 0.1%. Since the start of monitoring the index value has remained close to the baseline year, and overall there has been **no significant change in the smoothed index** since the baseline year. There are no significant differences between trends for England, Scotland and Wales.

Data from 848 sites surveyed between 1998 and 2016 contribute to the GB trend.

In Ireland the Waterway Survey is co-ordinated by Bat Conservation Ireland. Results can be found [here](#).

Summary of survey results

For Daubenton's bat the Waterway Survey shows no overall trend since the baseline year of monitoring, whereas the Hibernation Survey trend has increased significantly from 2013 onwards. Of the two surveys, the Waterway Survey is considered to be a more accurate measure of population change (see Robustness of Monitoring), **therefore the population of Daubenton's bat in Great Britain is considered to have been stable since 1999**, although the divergence between the two trends will continue to be monitored and investigated as further years of data become available.

Distribution and abundance

Daubenton's bat is relatively common and widespread across the UK.

Population estimate

The population estimates are considered to be poor and should be treated with caution. Estimates are based on very limited or no population data and rely on expert opinion only

Country	UK	England	Wales	Scotland	N.Ireland
Number	560,000	95,000	15,000	40,000	410,000
Source		Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Russ 1999

References

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.

Russ, J.M. 1999. *The Microchiroptera of Northern Ireland: community composition, habitat associations and ultrasound*. Unpublished PhD thesis. Queen's University, Belfast.

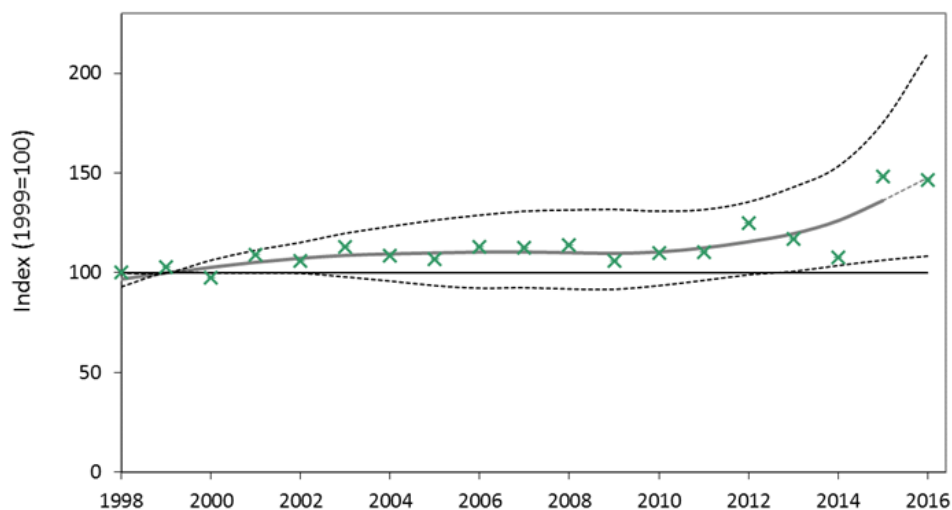
Daubenton's bat trends for England

English-level population trends for Daubenton's bat from the [Hibernation Survey](#) and the [Waterway Survey](#) are shown on this page.

Population trends are also calculated for Daubenton's bat [Great Britain](#), [Scotland](#) and [Wales](#).

Hibernation Survey

England index of Daubenton's bat population from Hibernation Surveys



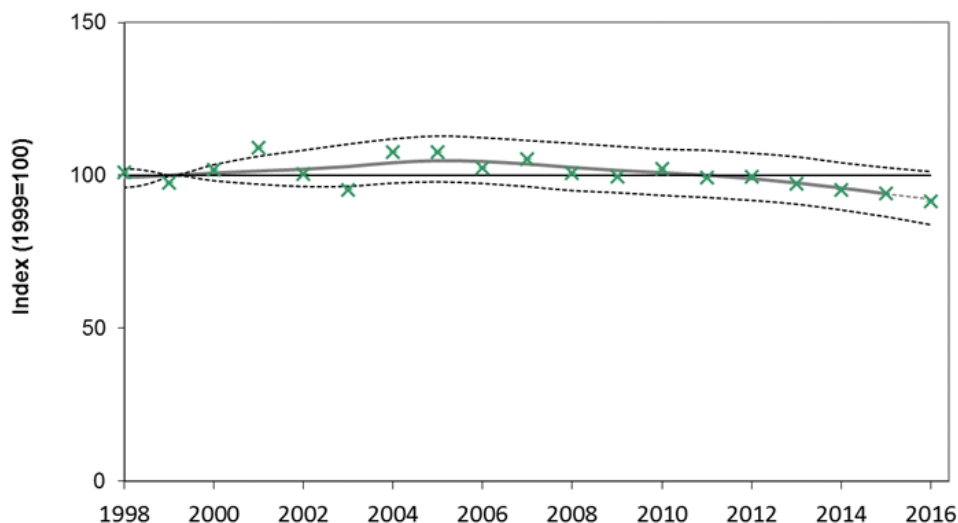
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 55.9% above the 1999 base year value, equivalent to an annual increase of 2.7%. Between 1999-2013 the index value did not differ significantly from the baseline year however it has increased in recent years and since 2014 it has been significantly higher than the baseline year. Overall there has been a **significant increase in the smoothed index** since 1999.

From all years for which data are available (1993-2016), counts from 286 sites contribute to the trend analysis in England (sites surveyed in two or more years with Daubenton's bat present in at least one year).

Waterway Survey

England index of Daubenton's bat from the Waterway Survey



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 7.9% below the 1999 base year value, equivalent to an annual decrease of 0.5%. The smoothed index has been slowly declining since 2007 but does not yet differ significantly from the baseline year. Overall there has been **no significant change in the smoothed index** since 1999. There are no significant differences between trends for regions within England over the last six years.

Data from 684 sites contribute to the trend analysis in England.

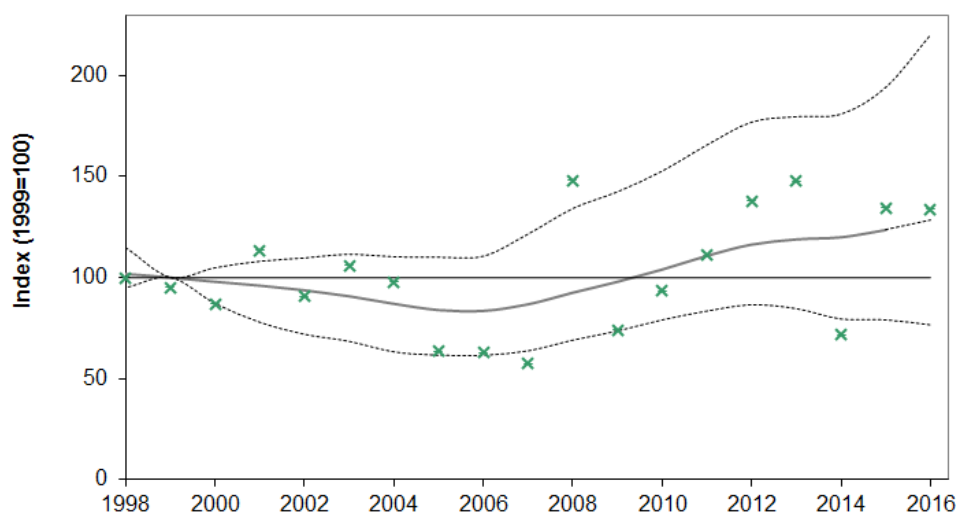
Daubenton's bat trends for Wales

Welsh-level population trends for Daubenton's bat from the [Hibernation Survey](#) and the [Waterway Survey](#) are shown on this page.

Population trends are also calculated for Daubenton's bat for [Great Britain](#), [England](#) and [Scotland](#).

Hibernation Survey

Wales index of Daubenton's bat population from Hibernation Surveys



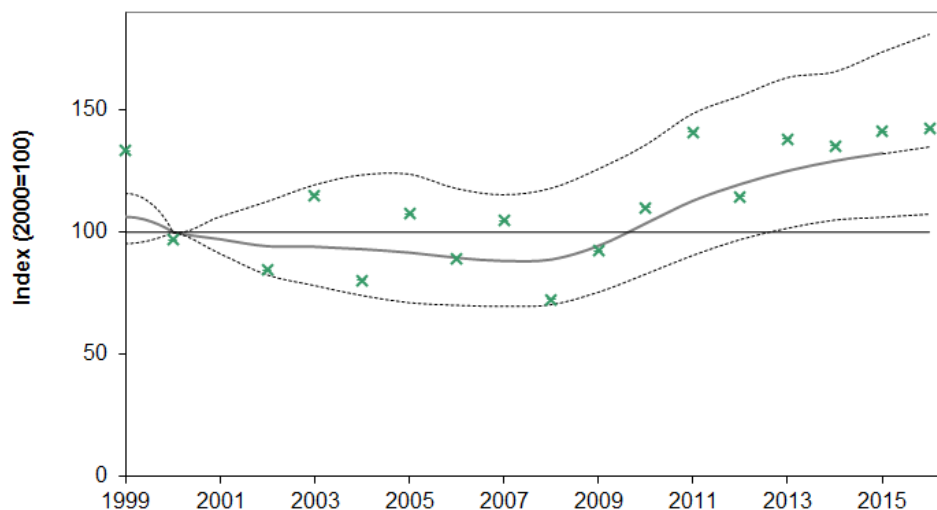
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 28.8% above the 1999 base year value, equivalent to an annual increase of 1.5%. There has been **no significant change in the smoothed index** since 1999.

From all years for which data are available (1990-2016), counts from 88 sites contribute to the trend analysis in Wales (sites surveyed in two or more years with Daubenton's bat recorded in at least one year).

Waterway Survey

Wales index of Daubenton's bat population from Waterway Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 34.7% above the 2000 base year value, equivalent to an annual increase of 1.9%. Between 2000 and 2012 the smoothed index did not differ significantly from the

baseline year, however the index has been increasing since 2009 and from 2013 onwards it has been significantly higher than the baseline year. **Currently the smoothed index is significantly higher than in 2000.**

Data from 47 sites contribute to the trend analysis in Wales.

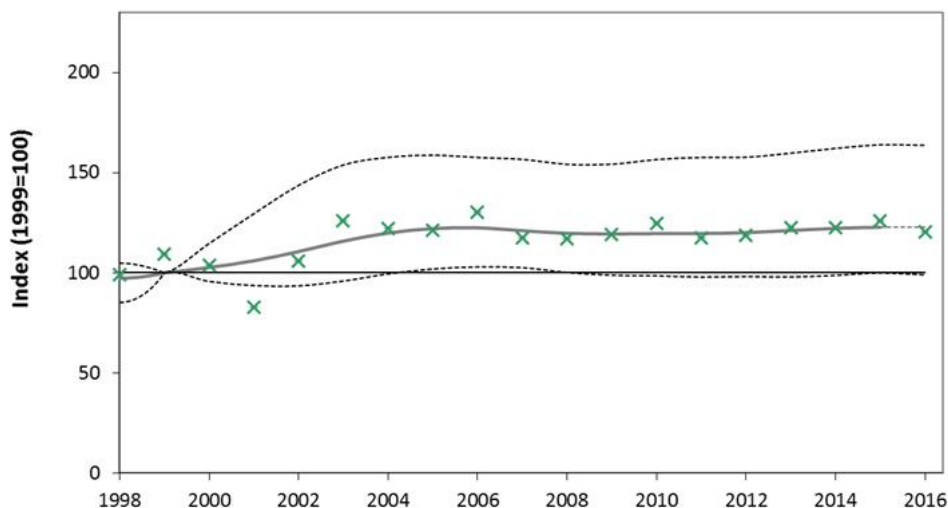
Daubenton's bat trends for Scotland

The Scotland-level population trend for Daubenton's bat from the [Waterway Survey](#) is shown on this page.

Population trends are also calculated for Daubenton's bat for [Great Britain](#), [England](#) and [Wales](#).

Waterway Survey

Scotland index of Daubenton's bat population from Waterway Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The index is currently 22.7% above the 1999 base year value, equivalent to an annual increase of 1.2%. The smoothed index

value rose between 1999 and 2006, but since then has be relatively stable. It was significantly higher than the baseline year, by a very small margin, between 2005 and 2008, but **there is currently no significant difference between the smoothed index in comparison to the 1999 baseline year.**

Data from 115 sites contribute to the trend analysis in Scotland.

Whiskered / Brandt's bat trends for Great Britain

Myotis mystacinus / brandtii

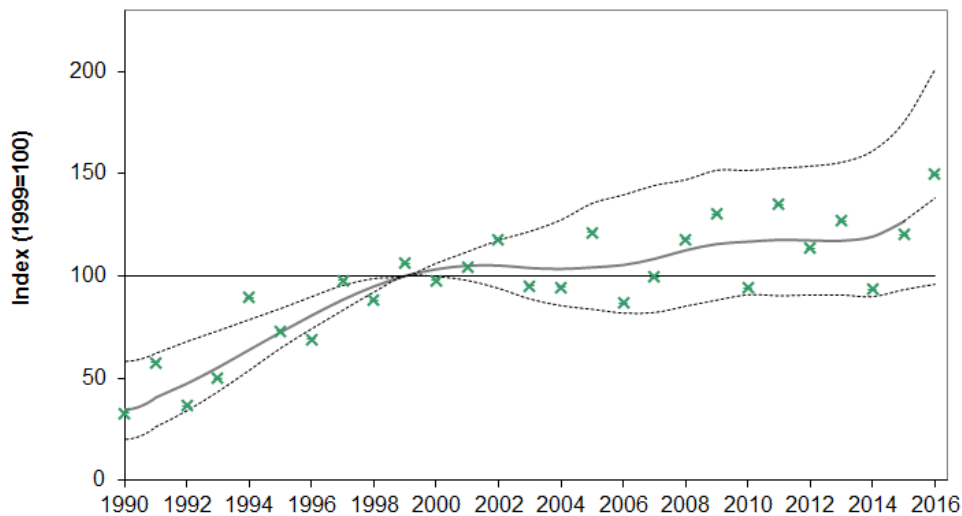
Species factsheet Whiskered bat / Brandt's bat; Distribution and abundance

A combined population trend is produced for these species due to the difficulty of separating them with confidence in the field. The GB-level population trend for whiskered/Brandt's bat from the Hibernation Survey are shown on this page.

Population trends are also produced at a country-level for whiskered/Brandt's bat in England and Wales. These species are only rarely recorded in Scotland, therefore insufficient data are available to calculate a trend for this country.

Hibernation Survey

GB index of whiskered/Brandt's bat population from Hibernation Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 38.5% above the 1999 base year value, equivalent to an annual increase of 1.9%. Several years of high average counts since 2008 have pulled the index slightly upwards, however overall there has been **no significant change in the smoothed index** since the baseline year. There are no significant differences between trends for England and Wales.

From all years for which data are available (1990-2016), counts from 231 sites contribute to the trend (sites surveyed in two or more years with whiskered/Brandt's bat recorded in at least one year).

Summary of survey results

The trend from the Hibernation Survey shows no significant change in the smoothed index since the baseline year. **Populations of whiskered and Brandt's bat combined are considered to have been stable in Great Britain over the period 1999-2016.** However this trend should be interpreted with caution as it combines data from two species with differing ecological requirements and potentially differing conservation status. This uncertainty has been compounded by the discovery of Alcahoie bat in the UK in 2010, a third cryptic species in this species group. The distribution of Alcahoie bat in the UK is poorly known although it is thought to be localised and rare. It is likely to have occurred in the UK prior to it's discovery in 2010, so it is possible that counts of whiskered/Brandt's bat made during the Hibernation Survey may also include Alcahoie bat. Further work is required to facilitate the reliable identification of these species and their differing ecological needs.

Distribution and abundance

The two species are uncommon but widespread in England and Wales. Whiskered bat is rare in Scotland and Northern Ireland. There are only a few records of Brandt's bat in Scotland and this species is absent from Northern Ireland.

Population estimate

The population estimates are considered to be poor and should be treated with caution. Estimates are based on very limited or no population data and rely on expert opinion only.

Country	UK	England	Wales	Scotland	N.Ireland
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Whiskered bat numbers	64,000	30,500	8,000	1,500	24,000
Brandt's bat numbers	30,000	22,500	7,000	500	does not occur
Source		Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Russ 1999

References

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.

Russ, J.M. 1999. *The Microchiroptera of Northern Ireland: community composition, habitat associations and ultrasound*. Unpublished PhD thesis. Queen's University, Belfast.

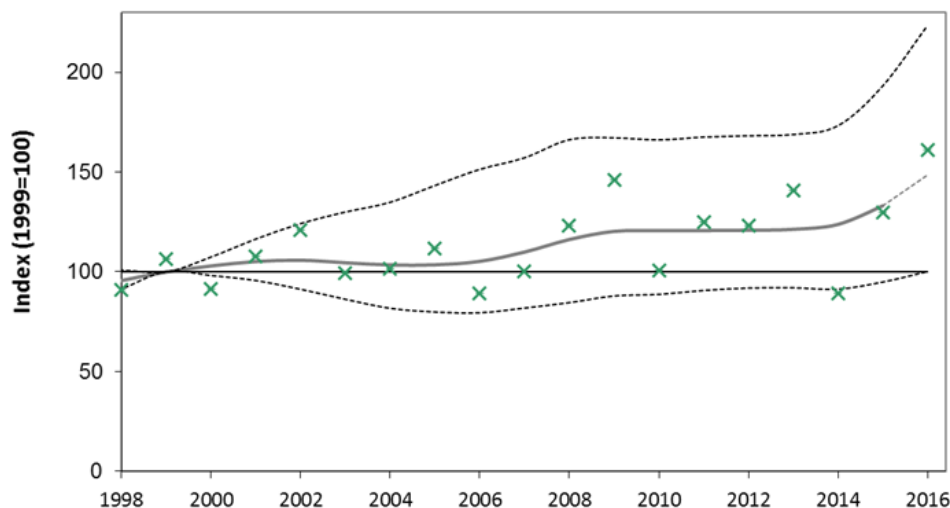
Whiskered/Brandt's bat trends for England

The England-level population trend for whiskered/Brandt's bats from the [Hibernation Survey](#) is shown on this page.

Population trends for whiskered/Brandt's bat are also calculated for [Great Britain](#) and [Wales](#).

Hibernation Survey

England index of whiskered/Brandt's bat population from Hibernation Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 48.5% above the 1999 base year value, equivalent to an annual increase of 2.4%. The trend

increased between 2006-2009 and again between 2014-2016; in other years it has been relatively stable. However at no point has it differed significantly from the baseline year and overall there has been **no significant change in the smoothed index value since 1999**.

From all years for which data are available (1990-2016), counts from 151 sites contribute to the trend analysis in England (sites that been surveyed for at least two years and at which whiskered/Brandt's bat have been recorded in a least one year).

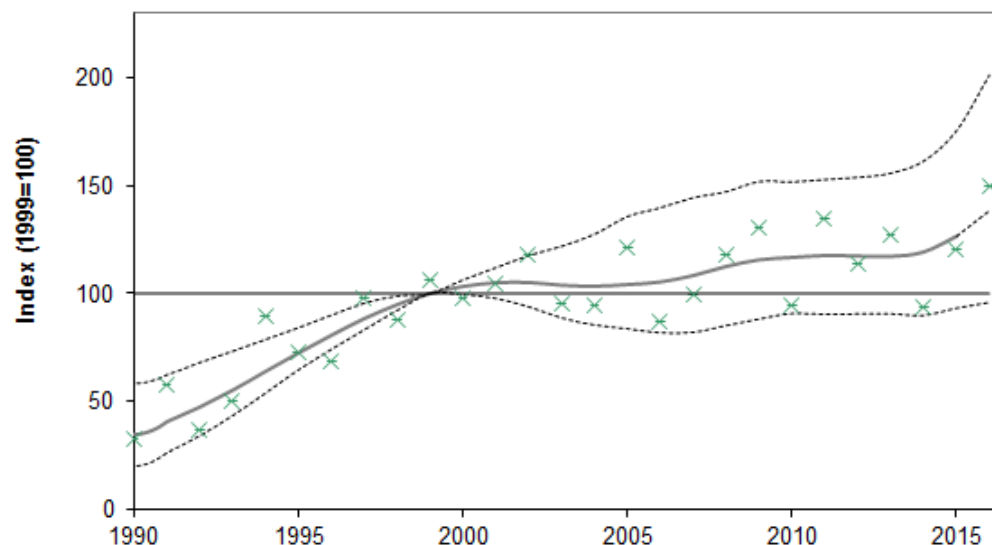
Whiskered / Brandt's bat trends for Wales

The Wales-level population trend for whiskered/Brandt's bat from the [Hibernation Survey](#) is shown on this page.

Population trends for whiskered/Brandt's bat are also produced for [Great Britain](#) and [England](#).

Hibernation Survey

Wales index of whiskered/Brandt's bat population from Hibernation Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 4.2% below the 1999 base year value, equivalent to an annual decrease of 0.3%. There has

been **no significant change in the smoothed index** since the baseline year.

From all years for which data are available (1998-2016), counts from 78 sites contribute to the trend analysis in Wales (sites surveyed in two or more years with whiskered/Brandt's bat recorded in at least one year).

Natterer's bat trends for Great Britain

Myotis nattereri

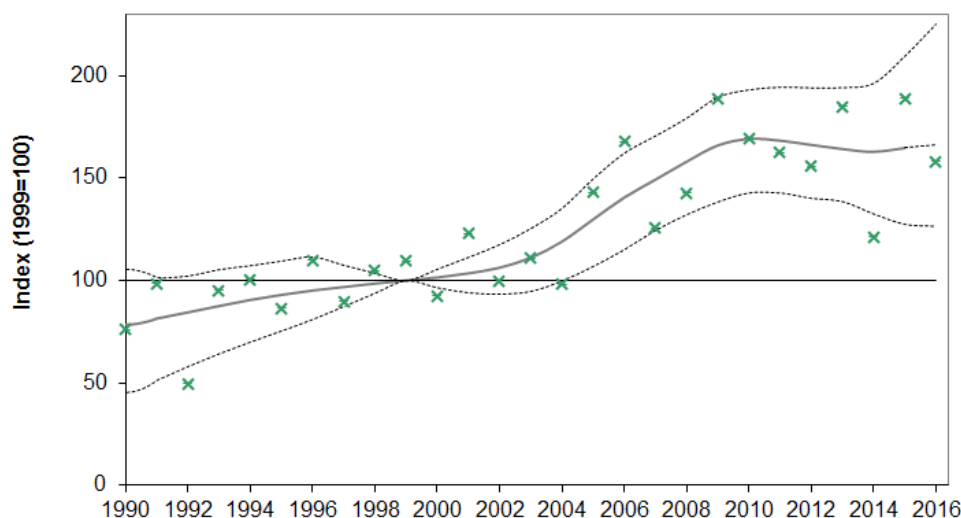
Species factsheet; Distribution and abundance

GB-level population trends for Natterer's bat from the Hibernation Survey and the Roost Counts are shown on this page.

Population trends are also produced for Natterer's bat at a country-level for England and Wales. Insufficient data are available to calculate trends for Scotland.

Hibernation Survey

GB index of Natterer's bat population from Hibernation Surveys



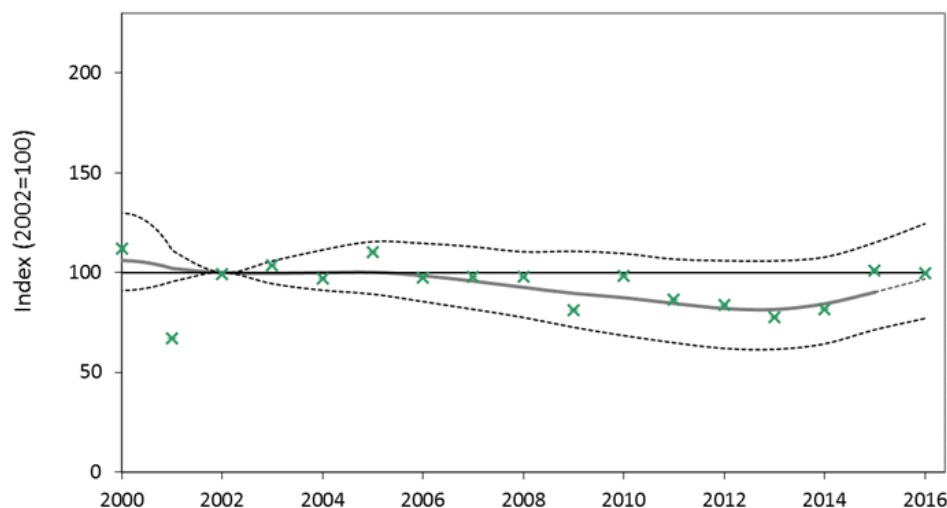
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 66.4% above the 1999 base year value, equivalent to an average annual increase of 3%. The smoothed index is **currently significantly higher than the baseline year**, however this is primarily the result of increases in the index value between 2004 and 2010 - since 2010 the smoothed trend has been relatively stable. Differences between trends for England and Wales are not significant.

From all years for which data are available (1990-2016), counts from 506 sites contribute to the overall trend analysis (sites surveyed in two or more years with Natterer's bat recorded in at least one year).

Roost Counts

GB index of Natterer's bat population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 3.1% below the 2002 base year value, equivalent to an annual decrease of 0.2%. Between 2006-2013 the smoothed index declined gradually, however at no point did it differ significantly from the baseline year. Since 2013 the smoothed index has been increasing, however overall there has been **no significant change in the smoothed index since the baseline year**. There are no significant differences between trends for England, Scotland and Wales over the last six years, although the limited sample size means that spatial patterns are difficult to assess.

Data from 82 sites contribute to the overall trend analysis from 2000-2016. The baseline year used to calculate this trend has been set at 2002 as very few roosts of this species were counted in earlier years.

Summary of survey results

The trend from the Hibernation Survey shows a significant increase in the smoothed index since the baseline year, while the trend from the Roost Count shows no significant change. As Natterer's bat switch roosts frequently (see Robustness of Monitoring), the Hibernation Survey is believed to be a more accurate measure of population change for this species. **There is therefore evidence that populations of Natterer's bat in Great Britain have increased since 1999, however this finding should be treated with caution until the effect of this species' roost switching behaviour on the Roost Count trend is better understood.**

Distribution and abundance

Natterer's bat is locally common and widespread throughout the UK.

Population estimate

The population estimates are considered to be poor and should be treated with caution. Estimates are based on very limited population data and rely on expert opinion only

Country	UK	England	Wales	Scotland	N.Ireland
Number	148,000	70,000	12,500	17,500	48,000
Source		Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Russ 1999

References

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.

Russ, J.M. 1999. *The Microchiroptera of Northern Ireland: community composition, habitat associations and ultrasound*. Unpublished PhD thesis. Queen's University, Belfast.

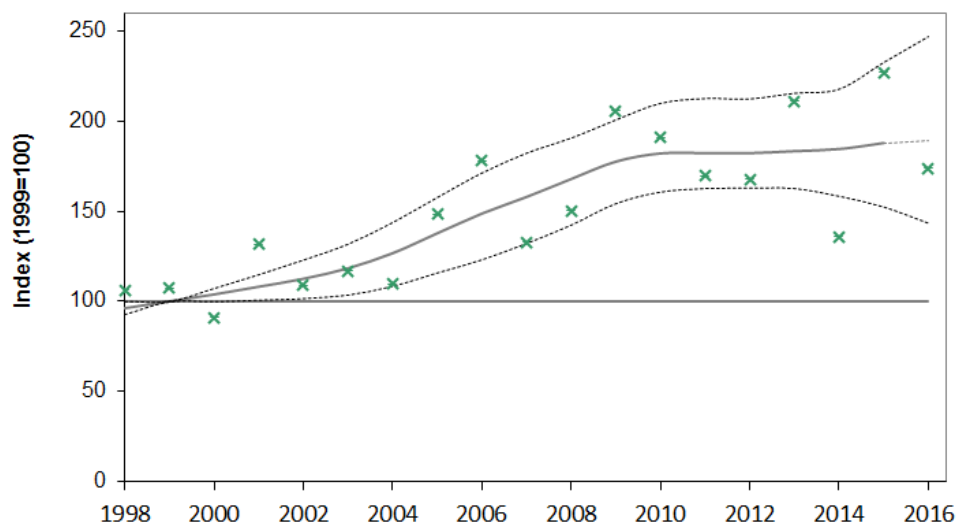
Natterer's bat trends for England

England-level population trends for Natterer's bats from the Hibernation Survey and the Roost Count are shown on this page.

Population trends are also calculated for Natterer's bat for Great Britain and Wales.

Hibernation Survey

England index of Natterer's bat population from Hibernation Surveys



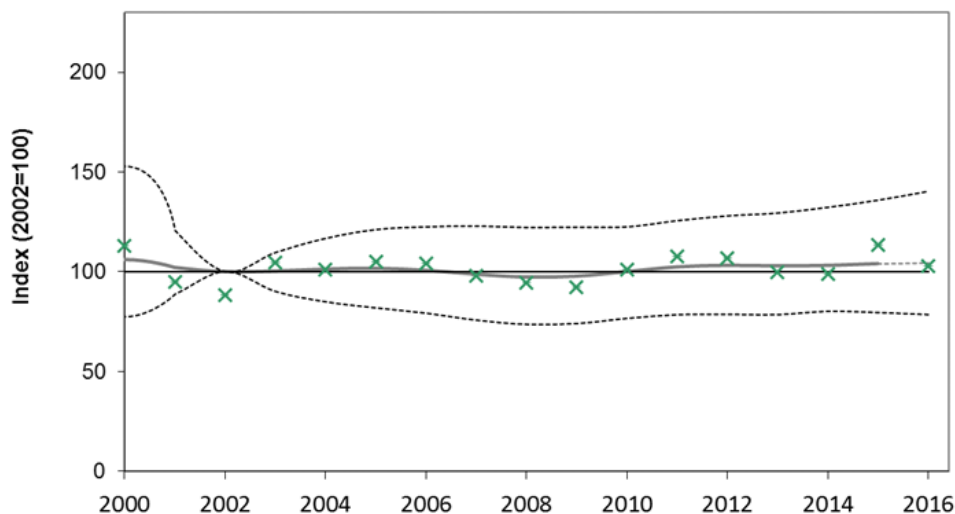
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 89.3% above the 1999 base year value, equivalent to an annual increase of 3.8%. The smoothed index value increased steadily between 1999-2010 but has been relatively stable since then. Overall there has been a **significant increase in the smoothed index since 1999**.

From all years for which data are included (1998-2016), counts from 356 sites contribute to the trend analysis in England (sites surveyed in two or more years with Natterer's bat recorded in at least one year).

Roost Counts

England index of Natterer's bat population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 4.2% above the 2002 base year value, equivalent to an annual increase of 0.3%. There has been very little change in the smoothed index value during the period

of monitoring. Overall there has been **no significant change in the smoothed index since 2002**. There are no significant differences between trends for regions within England, although the limited sample size means that spatial patterns are difficult to assess.

Data from 69 sites contribute to the trend analysis in England (sites surveyed in two or more years).

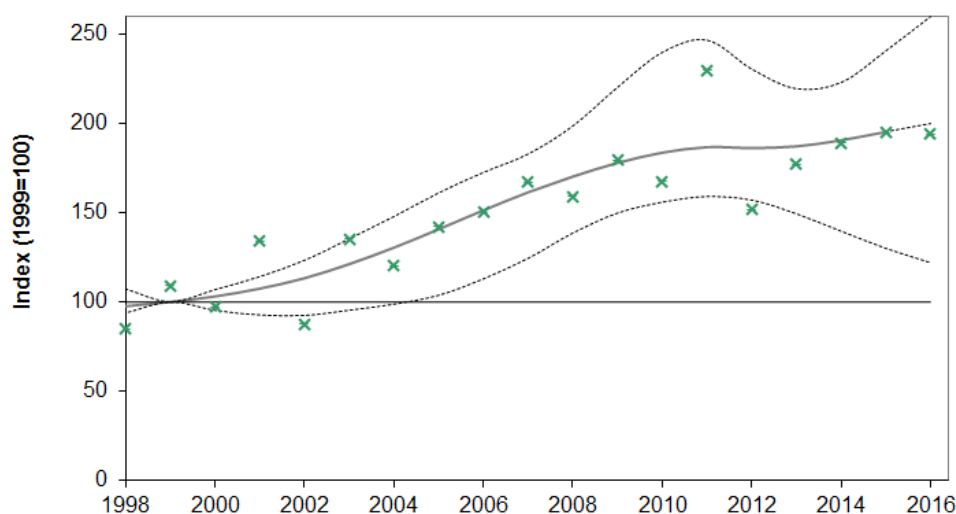
Natterer's bat trends for Wales

The Wales-level population trend for Natterer's bat from the Hibernation Survey is shown below.

Population trends for Natterer's bat are also calculated for Great Britain and England.

Hibernation Survey

Wales index of Natterer's bat population from Hibernation Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 99.9% above the 1999 base year value, equivalent to an annual increase of 4.2%. The

smoothed index increased steadily between 1999 and 2011, after which the rate of increase has slowed. Overall there has been a **significant increase in the smoothed index** since the baseline year.

From all years for which data are available (1998-2016), counts from 129 sites contribute to the trend analysis in Wales (sites surveyed in two or more years with Natterer's bat recorded in at least one year).

Common pipistrelle trends for Great Britain

Pipistrellus pipistrellus

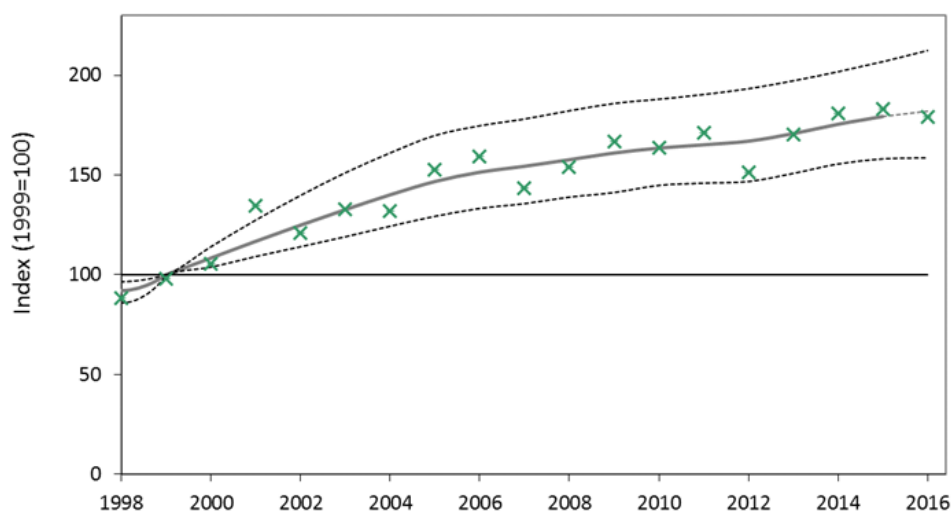
Species factsheet; Distribution and abundance

GB-level population trends for common pipistrelle from the Field Survey and the Roost Count are shown on this page.

Population trends are also produced for common pipistrelle at a country-level for England and Scotland. There are currently insufficient data to produce population trends for this species in Wales.

Field Survey

GB index of common pipistrelle population from Field Surveys



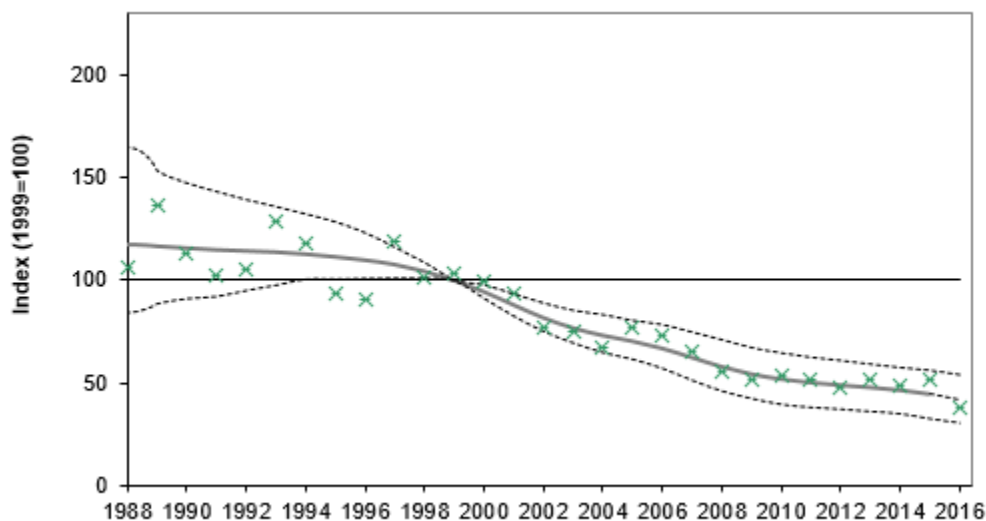
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 82.1% above the 1999 base year value, equivalent to an annual increase of 3.6%. The trend has increased consistently since monitoring began. There has been a **significant increase in the smoothed index** since the baseline year. There are no significant differences between trends in England, Wales and Scotland.

Data from 626 sites surveyed between 1998 and 2016 contribute to the overall trend.

Roost Count

GB index of common pipistrelle population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted

lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 58% below the 1999 base year value, equivalent to an annual decrease of 5%. There has been a **significant decline in the smoothed index since 1999. However it is likely that this species' frequent roost switching results in a negative bias in the Roost Count trend (see Robustness of Monitoring) and this trend is not therefore considered a reliable measure of population change for this species.** We are currently investigating the causes of this negative bias in more detail and exploring ways to correct it (see Developments and Future Directions). There are no significant differences between trends for England, Scotland and Wales.

Data from 489 sites surveyed between 1997 and 2016 contribute to the trend (sites surveyed in two or more years).

Summary of survey results

The trend from the Field Survey shows a significant increase in the smoothed index since the baseline year, while the trend from the Roost Count shows a significant decline. However the Roost Count trend is not considered a reliable measure of population change for common pipistrelle, therefore **the population of common pipistrelle in Great Britain is considered to have increased since 1999.**

Distribution and abundance

Common pipistrelle is common and widespread throughout the UK.

Population estimate

The population estimates are considered to be poor and should be treated with caution. Estimates are based on very limited population data and rely on expert opinion only.

Country	UK	England	Wales	Scotland	N.Ireland
Number	2,430,000	unknown	unknown	unknown	1,150,000
Source	Battersby <i>et al.</i> 2005 (incl N. Ireland)				Russ 1999

References

Battersby. J. (Ed) & Tracking Mammals Partnership. (2005) *UK Mammals Species Status and Population Trends. First Report by the Tracking Mammals Partnership.* JNCC/Tracking Mammals Partnership, Peterborough.

Russ, J.M. 1999. *The Microchiroptera of Northern Ireland: community composition, habitat associations and ultrasound.* Unpublished PhD thesis. Queen's University, Belfast.

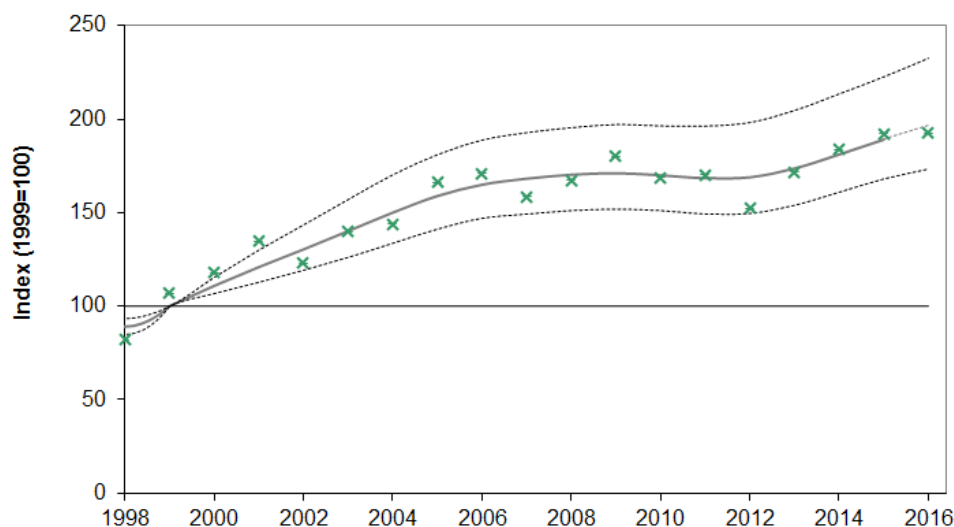
Common pipistrelle trends for England

England-level population trends for common pipistrelle from the Field Survey and the Roost Count are shown on this page.

Population trends are also produced for common pipistrelle for Great Britain and Scotland.

Field Survey

England index of common pipistrelle population from Field Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

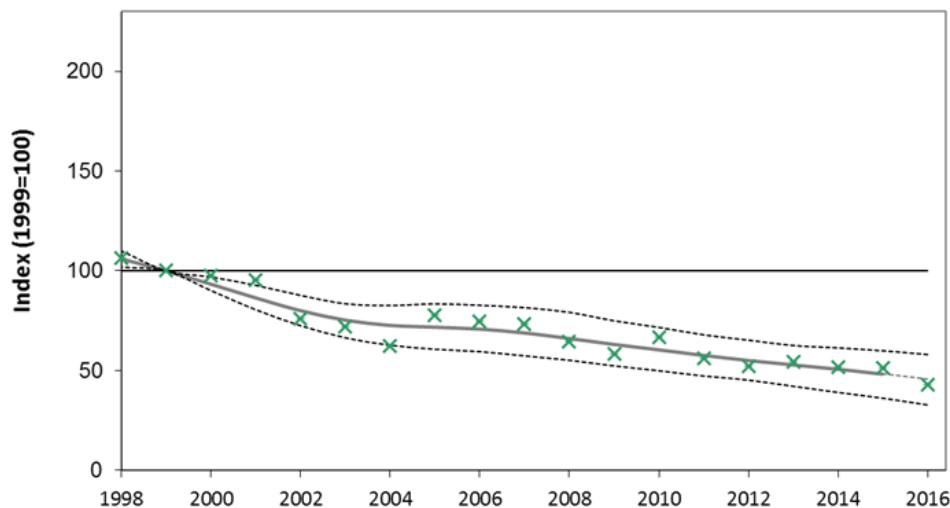
The smoothed index is currently 96.6% above the 1999 base year value, equivalent to an annual increase of 4.1%. The

smoothed index increased steadily between 1999-2006, was relatively stable between 2006-2012, and since 2012 it has been increasing again. Overall there has been a **significant increase in the smoothed index since 1999**. There are no significant differences between trends for each region within England.

Data from 515 sites contribute to the trend analysis in England.

Roost Count

England index of common pipistrelle population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 54.3% below the 1999 base year value, equivalent to an annual decrease of 4.5%. There has been a **significant decline in the smoothed index since 1999. However it is likely that this species' frequent roost switching results in a negative bias in the Roost Count**

trend (see Robustness of Monitoring) and this trend is not therefore considered a reliable measure of population change for this species. We are currently investigating the causes of this negative bias in more detail and exploring ways to correct it (see Developments and Future Directions). There are no significant differences between trends for regions within England.

Data from 388 sites contribute to the trend analysis in England (sites surveyed in two or more years).

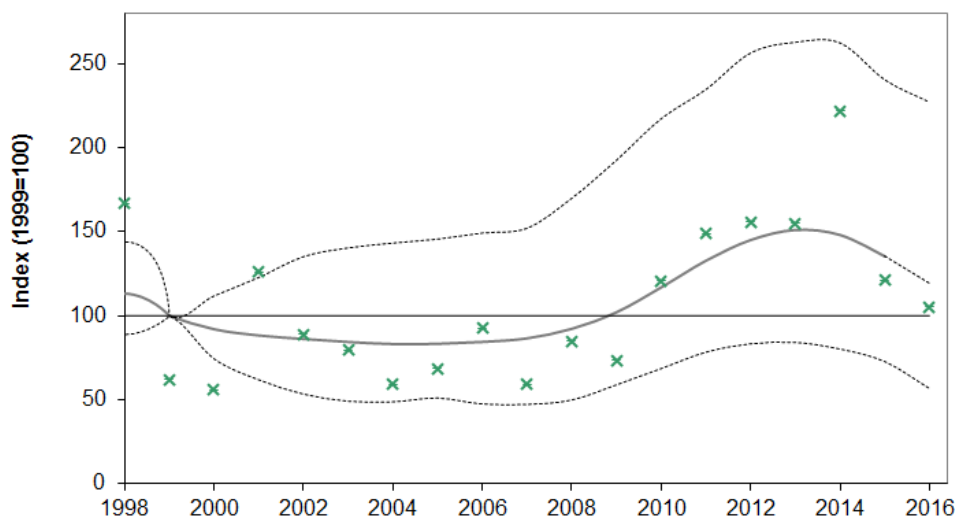
Common pipistrelle trends for Scotland

Scotland-level population trends for common pipistrelle from the Field Survey and the Roost Count are shown on this page.

Population trends are also produced for common pipistrelle for Great Britain and England.

Field Survey

Scotland index of common pipistrelle population from Field Surveys



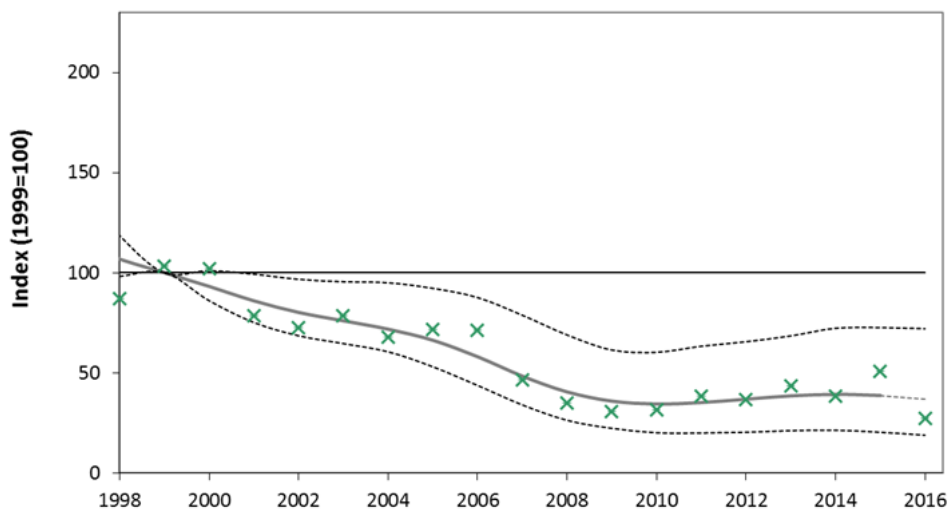
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 19.5% above the 1999 base year value, equivalent to an annual increase of 1.1%. The smoothed index has fluctuated above and below the baseline, but at no point has it differed significantly from the baseline year due to the low precision associated with this trend. Overall there has been **no significant change in the smoothed index since 1999**. However the number of sites monitored by the Field Survey in Scotland is small and the level of uncertainty associated with the smoothed index is high, meaning trends for common pipistrelle in Scotland may be difficult to detect using data from the Field Survey.

Data from 76 sites contribute to the trend analysis in Scotland.

Roost Count

Scotland index of common pipistrelle population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 63.3% below the 1999 base year value, equivalent to an annual decrease of 5.7%. There has been a **significant decline in the smoothed index since 1999. However it is likely that this species' frequent roost switching results in a negative bias in the Roost Count trend (see Robustness of Monitoring) and this trend is not therefore considered a reliable measure of population change for this species.** We are currently investigating the causes of this negative bias in more detail and exploring ways to correct it (see Developments and Future Directions).

Data from 64 sites contribute to the trend analysis in Scotland (sites surveyed in two or more years).

Soprano pipistrelle trends for Great Britain

Pipistrellus pygmaeus

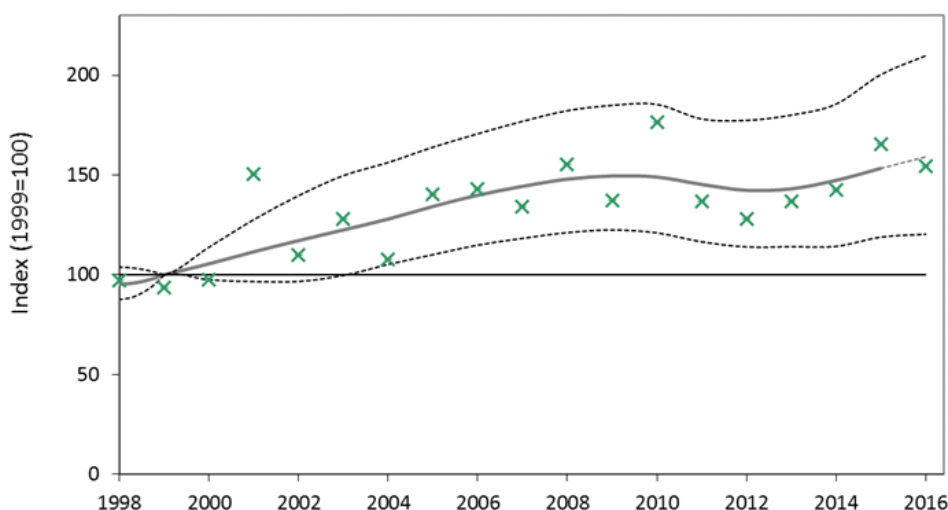
Species factsheet; Distribution and abundance

GB-level population trends for soprano pipistrelle from the Field Survey and the Roost Count are shown on this page.

Population trends are also produced for soprano pipistrelle at country-level for England and Scotland. There are currently insufficient data to produce population trends for this species in Wales.

Field Survey

GB index of soprano pipistrelle population from Field Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence

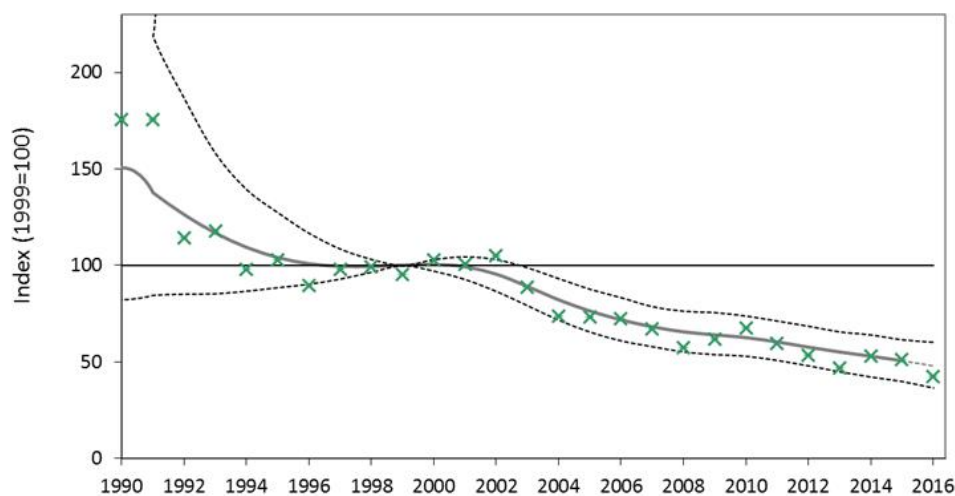
intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 58.9% above the 1999 base year value, equivalent to an annual increase of 2.8%. There has been a **significant increase in the smoothed index** since the baseline year. There are no significant differences between trends in England, Scotland and Wales.

Data from 626 sites surveyed between 1998 and 2016 contribute to the trend.

Roost Count

GB index of soprano pipistrelle population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 52% below the 1999 value, equivalent to an annual decrease of 4.2%. **There has been a significant decline in the smoothed index since 1999. However it is likely that this species' frequent roost switching results in a negative bias in the Roost Count trend (see Robustness of Monitoring) and this trend is not therefore considered a reliable measure of population change for this species.** We are currently investigating the causes of this negative bias in more detail and exploring ways to correct it (see Developments and Future Directions). There are no significant differences between trends for England, and Scotland.

Data from 377 sites surveyed between 1997 and 2016 contribute to the trend analysis (sites surveyed in two or more years).

Summary of survey results

The trend from the Field Survey shows a significant increase in the smoothed index since the baseline year, while the trend from the Roost Count shows a significant decline. However the Roost Count trend is not considered a reliable measure of population change for soprano pipistrelle, therefore **the population of soprano pipistrelle in Great Britain is considered to have increased since 1999.**

Distribution and abundance

Soprano pipistrelle is common and widespread throughout the UK, with the exception of the very northern parts of Scotland.

Population estimate

The population estimates are considered to be poor and should be treated with caution. Estimates are based on very limited population data and rely on expert opinion only.

Country	UK	England	Wales	Scotland	N.Ireland
Number	1,300,000	unknown	unknown	unknown	580,000
Source	Battersby <i>et al.</i> 2005 (incl. N. Ireland)				Russ 1999

References

Battersby. J. (Ed) & Tracking Mammals Partnership. (2005) *UK Mammals Species Status and Population Trends. First Report by the Tracking Mammals Partnership*. JNCC/Tracking Mammals Partnership, Peterborough.

Haines-Young *et al.*, 2000. *Accounting for nature: assessing habitats in the UK countryside*. Natural Environment Research Council.

Morton, D., Rowland, C., Wood, C., Meek, L., Marston, C., Smith, G., Wadsworth, R., Simpson, I. 2011. *Final Report for LCM2007 - the new UK Land Cover Map: CS Technical Report No 11/07*. Centre for Ecology & Hydrology.

Russ, J.M. 1999. *The Microchiroptera of Northern Ireland: community composition, habitat associations and ultrasound*. Unpublished PhD thesis. Queen's University, Belfast.

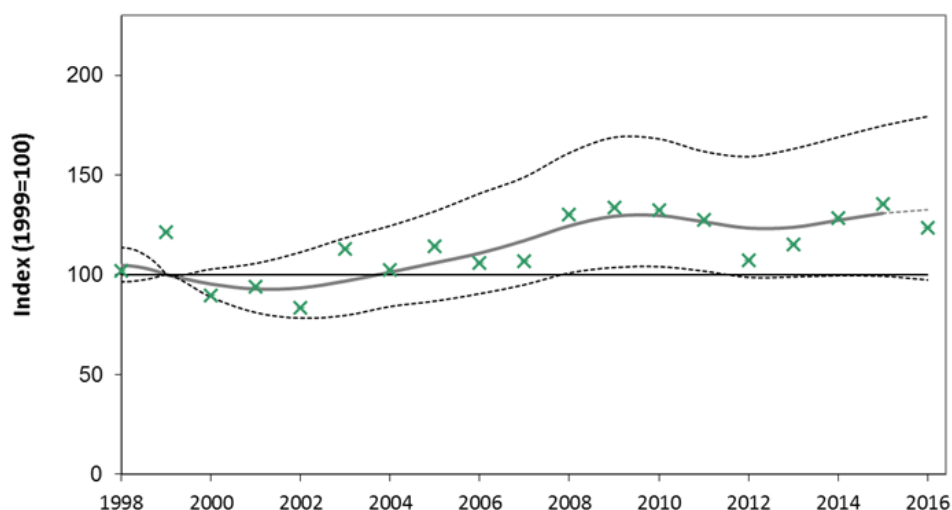
Soprano pipistrelle trends for England

England-level population trends for soprano pipistrelle in England from the Field Survey and the Roost Count are shown on this page.

Populations trends for soprano pipistrelle are also produced for Great Britain and Scotland. There are insufficient data to calculate a population trend for this species in Wales.

Field Survey

England index of soprano pipistrelle population from Field Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

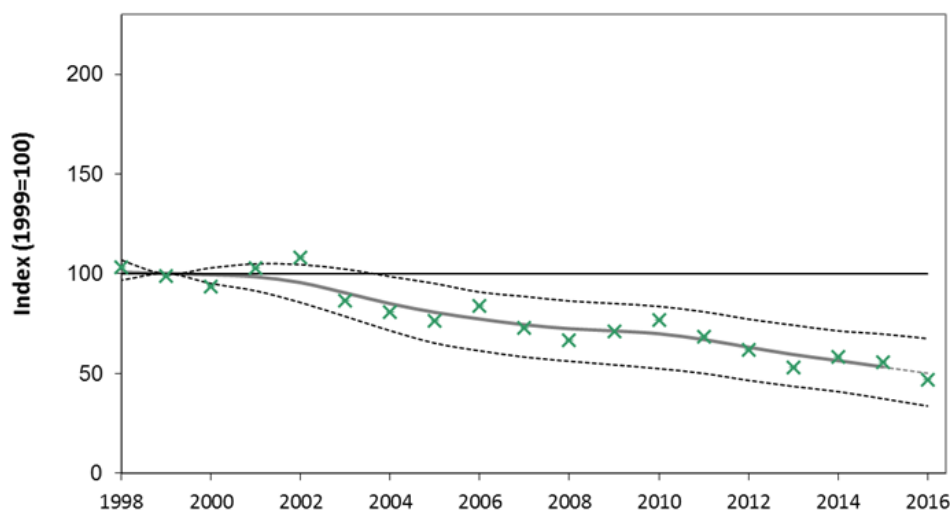
The smoothed index is currently 32.7% above the 1999 base year value, equivalent to an annual increase of 1.7%. After a

slight decline the smoothed index increased steadily between 2002 to a peak in 2010, at which time it was significantly higher than the baseline year. After 2010 it has been somewhat stable, although widening confidence limits mean that **currently the smoothed index does not differ significantly from the 1999 baseline value**. There are no significant differences between trends for regions within England.

Data from 515 sites contribute to the trend analysis in England.

Roost Count

England index of soprano pipistrelle population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 50.1% below the 1999 base year value, equivalent to an annual decrease of 4%. There has been a **significant decline in the smoothed index since 1999. However it is likely that this species' frequent roost**

switching results in a negative bias in the Roost Count trend (see Robustness of Monitoring) and this trend is not therefore considered a reliable measure of population change for this species. We are currently investigating the causes of this negative bias in more detail and exploring ways to correct it (see Developments and Future Directions).

Data from 244 sites contribute to the trend analysis in England (sites surveyed in two or more years).

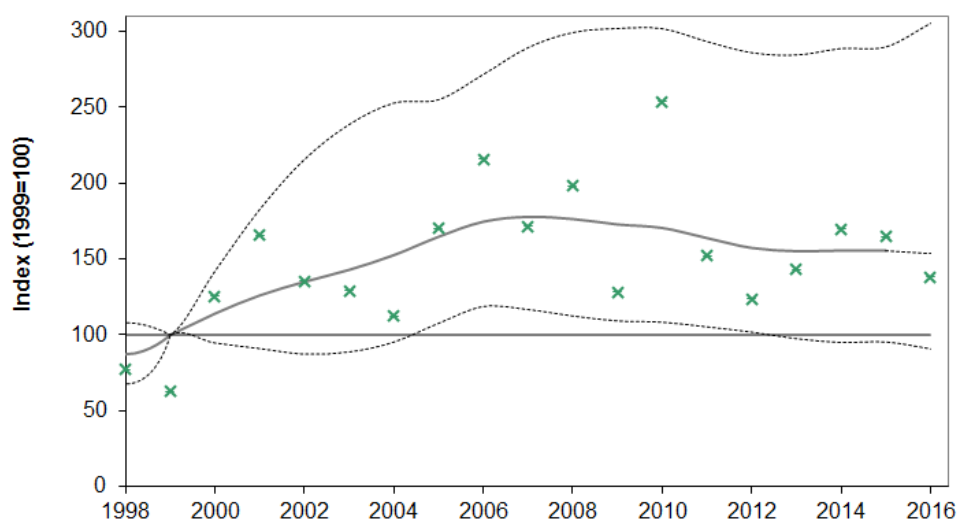
Soprano pipistrelle trends for Scotland

Scotland-level population trends for soprano pipistrelle from the Field Survey and the Roost Count are shown on this page.

Population trends for soprano pipistrelle are also produced for Great Britain and England.

Field Survey

Scotland index of soprano pipistrelle population from Field Surveys



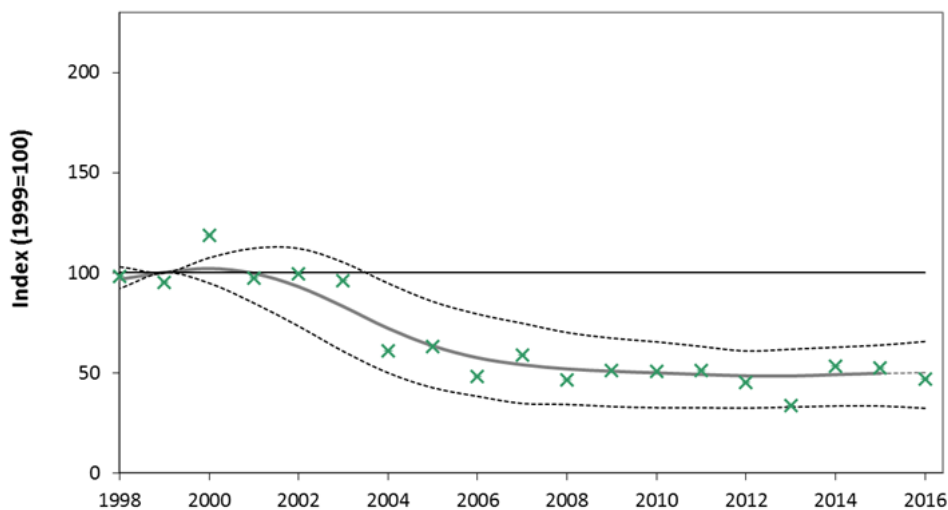
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 54.1% above the 1999 base year value, equivalent to an annual increase of 2.6%. The smoothed index increased steadily from 1999 to a peak in 2007, and was significantly higher than the baseline year between 2005 and 2012. Since 2008 the smoothed index has been gradually declining so that **currently the smoothed index does not differ significantly from the 1999 baseline**. However the number of sites monitored by the Field Survey in Scotland is small and the level of uncertainty associated with the smoothed index is high, meaning trends for common pipistrelle in Scotland may be difficult to detect using data from the Field Survey.

Data from 76 sites contribute to the trend analysis in Scotland.

Roost Count

Scotland index of soprano pipistrelle population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 50.0% below the 1999 base year value, equivalent to an annual decrease of 4.0%. There has been a **significant decline in the smoothed index since 1999. However it is likely that this species' frequent roost switching results in a negative bias in the Roost Count trend (see Robustness of Monitoring) and this trend is not therefore considered a reliable measure of population change for this species.** We are currently investigating the causes of this negative bias in more detail and exploring ways to correct it (see Developments and Future Directions)

Data from 83 sites contribute to the trend analysis in Scotland (sites surveyed in two or more years).

Serotine trends for Great Britain

Eptesicus serotinus

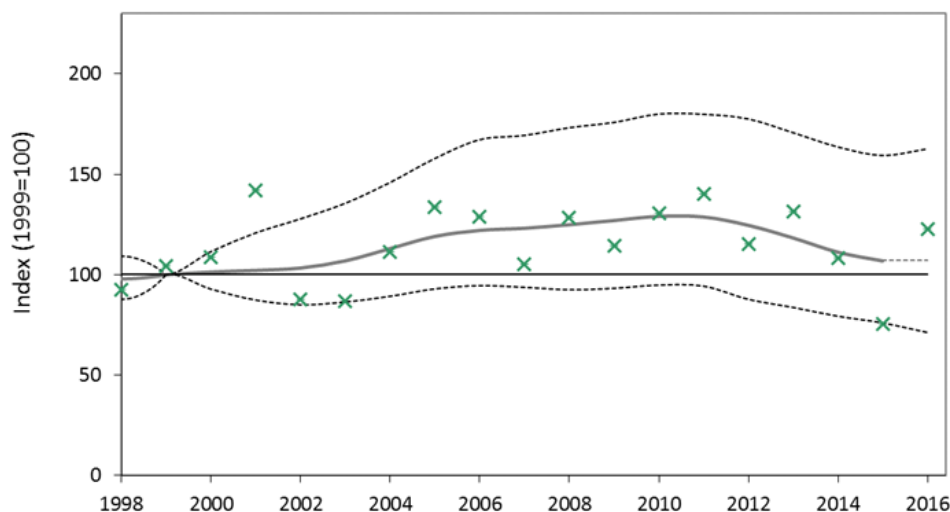
Species factsheet; Distribution and abundance

GB-level population trends for serotine from the Field Survey and the Roost Count are shown on this page.

Population trends are also produced for serotine in England. Serotine is only rarely recorded in Wales, therefore there are insufficient data to calculate a population trend for that country. This species does not occur in Scotland.

Field Survey

GB index of serotine population from Field Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted

lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

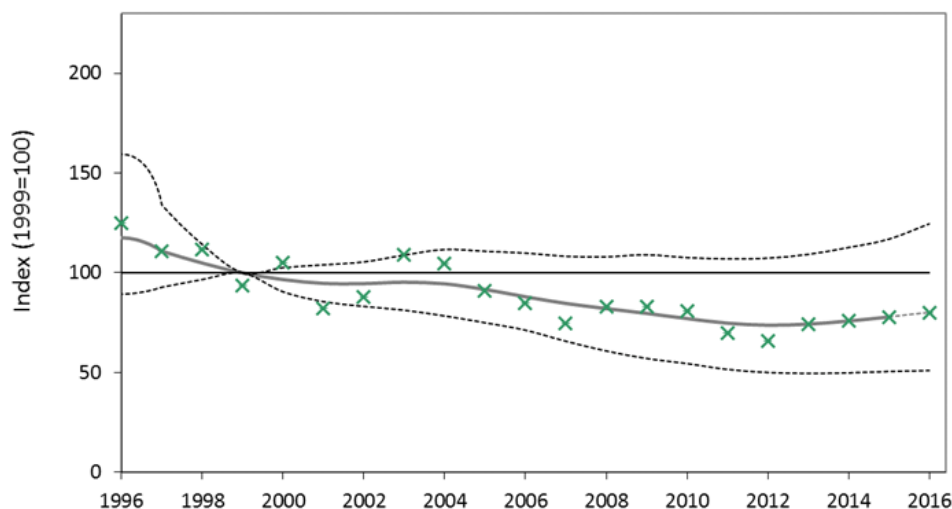
The smoothed index is currently 7.2% above the 1999 base year value, equivalent to an annual increase of 0.4%. The unsmoothed index value has varied considerably over the monitoring period, however at no point did the smoothed index differ significantly from the baseline year, and overall there has been **no significant change in the smoothed index** since the baseline year.

Data from 432 sites surveyed between 1998 and 2016 contribute to the overall trend analysis.

Note: As serotine is restricted to southern parts of GB no geographic weighting has been applied to this analysis.

Roost Count

GB index of serotine population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 19.9% below the 1999 value, equivalent to an annual decrease of 1.3%. Between 1999-2012 the smoothed index declined, however since 2013 it has been increasing slowly, although at no point has it differed significantly from the baseline year. Overall there has been **no significant change in the smoothed index** since the baseline year.

Data from 96 sites contribute to the trend analysis from 1997-2016 (sites surveyed in two or more years).

Summary of survey results

Trends from both the Field Survey and Roost Count show no significant change in the smoothed population index since the baseline year. **The population of serotine in Great Britain is considered to be 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.

Distribution and abundance

Serotine is an uncommon species, with a distribution mostly limited to areas south of a line drawn from the Wash across to

south Wales. More recently, records have also been found in North Wales. It is absent from Scotland and Northern Ireland.

Population estimate

The population estimates are considered to be poor and should be treated with caution. Estimates are based on very limited population data and rely on expert opinion only

Country	UK	England	Wales	Scotland	N.Ireland
Number	15,000	15,000	unknown	does not occur	does not occur
Source	Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995			

References

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.

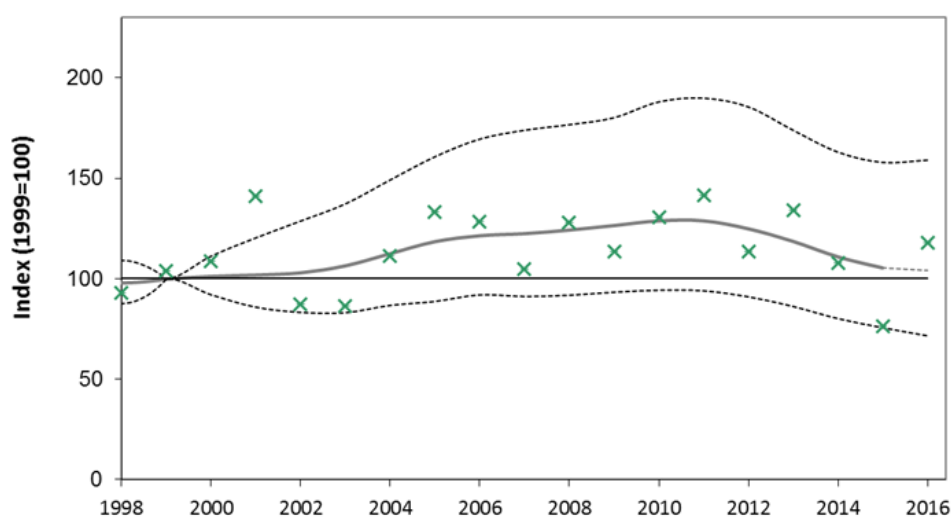
Serotine trends for England

England-level population trends for serotine from the Field Survey and the Roost Count are shown on this page.

Population trends for serotine are also produced for Great Britain.

Field Survey

England index of serotine population from Field Surveys



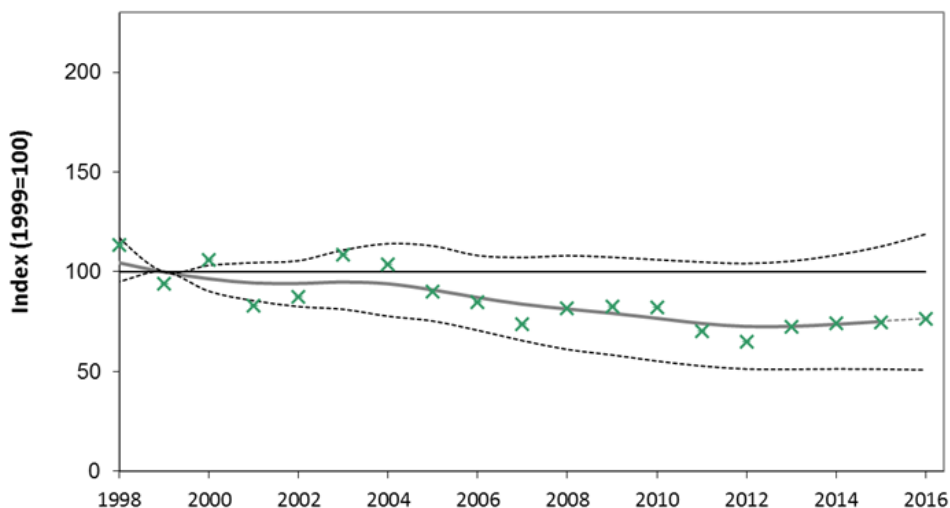
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 4.1% above the 1999 base year value, equivalent to an annual increase of 0.2%. There has been **no significant change in the smoothed index since 1999**. There are no significant differences between trends for regions within England.

Data from 397 sites contribute to the trend analysis in England.

Roost Count

England index of serotine population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 23.2% below the 1999 base year value, equivalent to an annual decrease of 1.5%. The smoothed index declined slowly between 1999 and 2013, but in recent years has been increasing, although at no point has it differed significantly from the baseline year. Overall there has been **no significant change in the smoothed index since 1999**. There are no significant differences in the trend over the last six years between regions within England.

Data from 94 sites contribute to the trend analysis in England (sites surveyed in two or more years).

Noctule trends for Great Britain

Nyctalus noctula

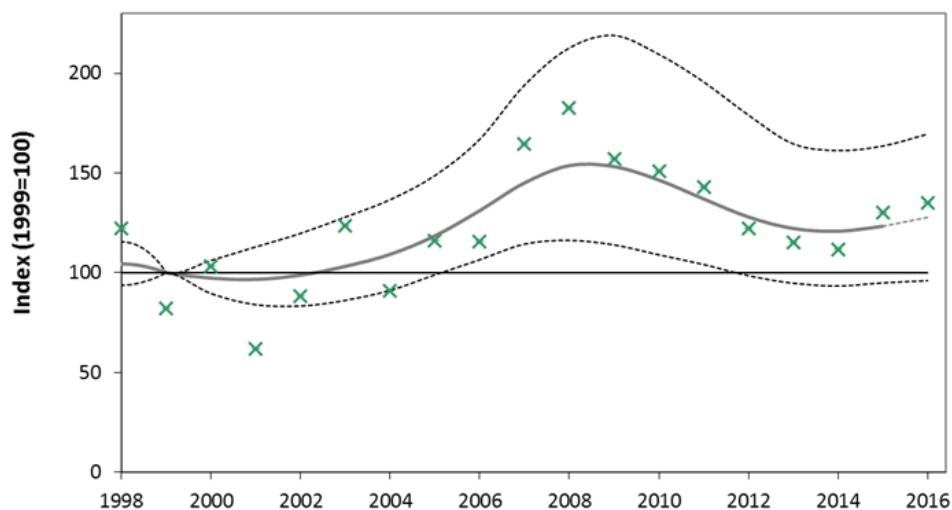
Species factsheet; Distribution and abundance

GB-level population trends for noctule from the Field Survey are shown on this page.

Population trends are also produced for noctule at a country-level for England. There are insufficient data to calculate a population trend for this species in Wales. This species is only rarely recorded in Scotland, therefore there are insufficient data to calculate a trend for Scotland.

Field Survey

GB index of noctule population from Field Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 27.6% above the 1999 base year value, equivalent to an annual increase of 1.5%. The trend has fluctuated considerably since the start of monitoring. The smoothed index increased from 1999 to a peak in 2008, at which point it was significantly higher than the baseline year. Between 2008-2014 the smoothed index fell steadily, however in recent years it has once again begun to increase although it is not yet significantly higher than the baseline year. Overall there has been **no significant change in the smoothed index** since the baseline year.

Data from 626 sites contribute to the overall trend.

Summary of survey results

The trend from the Field Survey shows no significant change in the smoothed index since the baseline year. **The population of noctule in Great Britain is considered to have been stable over the period 1999-2016.**

Distribution and abundance

Noctule is relatively common and widespread in England, Wales, and southern Scotland. It is absent from Northern Ireland

Population estimate

The population estimates are considered to be poor and should be treated with caution. Estimates are based on limited population data and are extrapolated from surveys of only part of the population

Country	UK	England	Wales	Scotland	N.Ireland
Number	50,000	45,000	4,750	250	does not occur
Source	Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	

References

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.

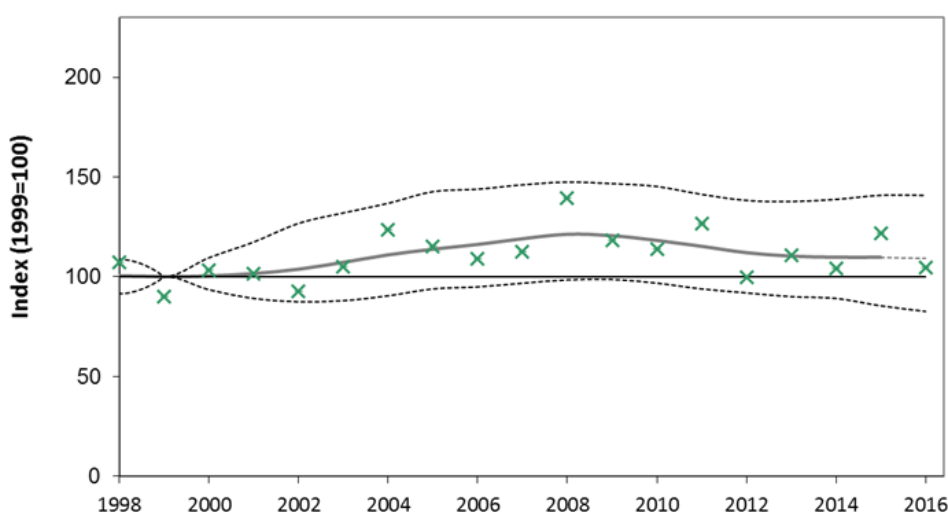
Noctule trends for England

The England-level population trend for noctule from the Field Survey is shown on this page.

Population trends for noctule are also produced for Great Britain.

Field Survey

England index of noctule population from Field Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 9.0% above the 1999 base year value, equivalent to an annual increase of 0.5%. The smoothed index has been relatively stable since the start of the monitoring period and overall there has been **no significant change in the smoothed index since 1999**. Differences between trends for regions within England are close to significant (randomisation test $P = 0.066$).

From all years for which data are available (1998-2016), counts from 515 sites contributed to the trend analysis in England.

Brown long-eared bat trends for Great Britain

Plecotus auritus

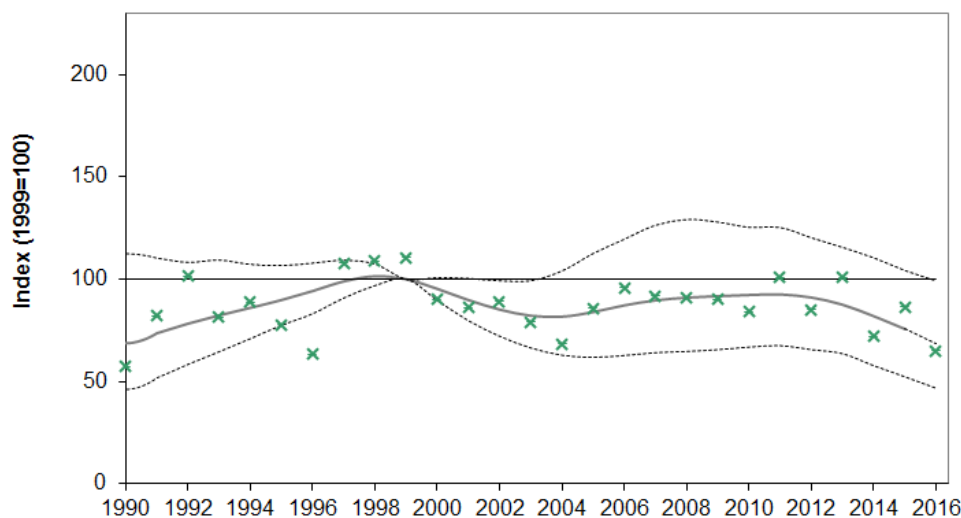
Species factsheet; Distribution and abundance

GB-level populations trends for brown long-eared bat from the Hibernation Survey and the Roost Count are shown on this page.

Population trends for brown long-eared bat are also produced at country-level for England and Wales. There are insufficient data available to calculate a population trend for this species in Scotland.

Hibernation Survey

GB index of brown long-eared bat population from Hibernation Surveys



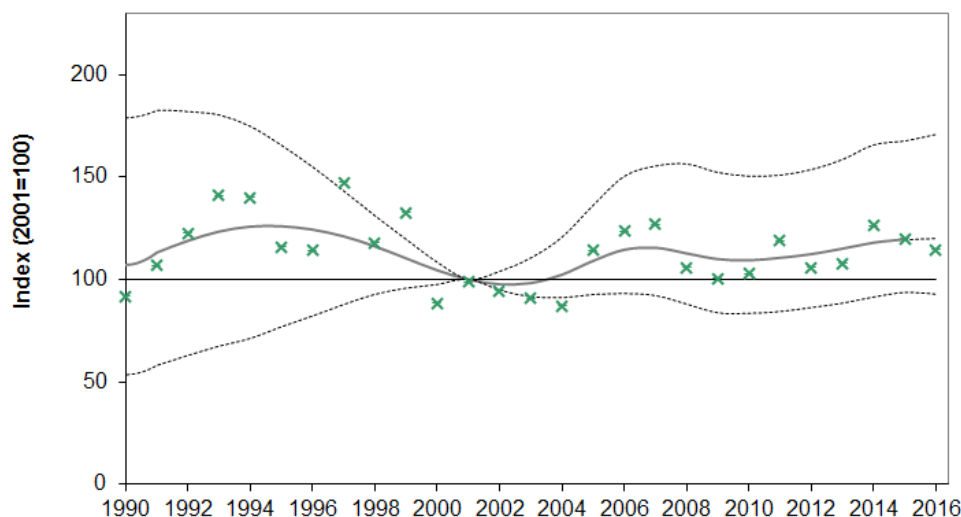
Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 31.3% below the 1999 base year value, equivalent to an annual decrease of 2.2%. The smoothed index has been below the baseline year since 1999, however this decline has only become significant in the current year, and by a very narrow margin. Overall **there has been a significant decline in the smoothed index since 1999**. Differences between trends for England and Wales are not significant.

From all years for which data are available (1990-2016), counts from 427 sites contribute to the trend (sites surveyed in two or more years with brown long-eared bat recorded in at least one year).

Roost Count

GB index of brown long-eared bat population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 20.1% above the base year value, equivalent to an annual increase of 1.2%. The trend has fluctuated since the start of monitoring. Since 2004 the smoothed index has been above the baseline year however at no point has it differed significantly from the baseline year. Overall there has been **no significant change in the smoothed index** since the baseline year. Differences between trends for England and Wales are not significant.

Data from 158 sites surveyed between 1990 and 2016 contribute to the trend (sites surveyed in at least two years).

Note: the baseline year for calculation of this trend has been set at 2001 as very few roosts were counted in earlier years.

Summary of survey results

The trend from the Roost Count shows no significant change in the smoothed index since the baseline year, while the Hibernation Survey trend shows a significant decline in the smoothed index in the most recent year when compared to the baseline year. The margin by which the Hibernation Survey trend is significant is small (the upper CI of the smoothed trend in 2016 is 99.2 compared to a baseline year index value of 100), and the estimate of the smoothed index value for the most recent year is considered provisional until confirmed by further years of monitoring (see Population Trend Analysis). Given the provisional nature of the estimate for the most recent year, the small margin of significance and the fact that this margin is highly likely to change when additional years of monitoring data are added to the trend, there is not yet sufficient certainty in the trend to alter the previous assessment of population change. Therefore **the**

population of brown long-eared bat in Great Britain is currently considered to have been stable since 1999, however this assessment will need to be reviewed and potentially revised in light of the results from the next year of monitoring.

Distribution and abundance

The brown long-eared bat relatively common and widespread throughout the UK with the exception of exposed islands with little woodland such as Orkney, Shetland and the Outer Hebrides.

Population estimate

The population estimates are considered to be poor and should be treated with caution. Estimates are based on limited population data and are extrapolated from surveys of only part of the population

Country	UK	England	Wales	Scotland	N.Ireland
Number	245,000	155,000	17,500	27,500	45,000
Source		Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Harris <i>et al.</i> 1995	Russ 1999

References

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.

Russ, J.M. 1999. *The Microchiroptera of Northern Ireland: community composition, habitat associations and ultrasound*. Unpublished PhD thesis. Queen's University, Belfast.

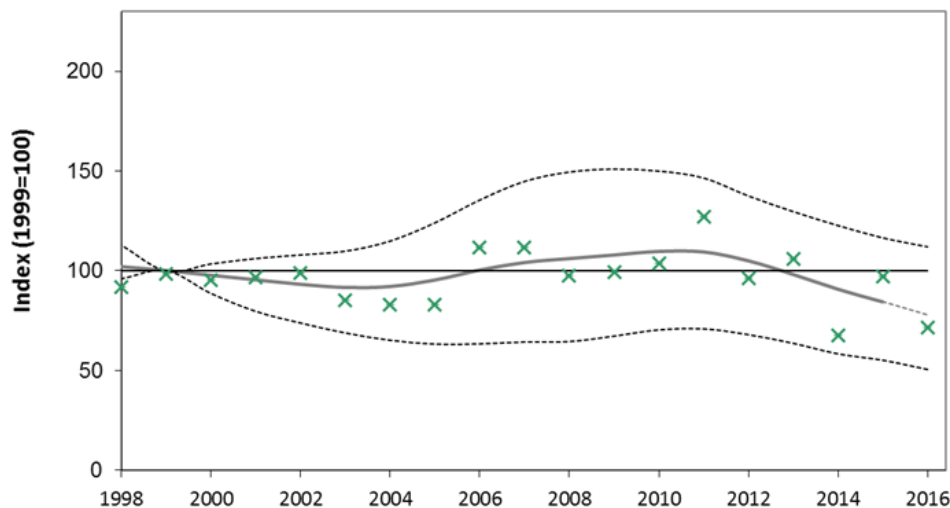
Brown long-eared bats trends for England

England-level population trends for brown long-eared bat from the Hibernation Survey and the Roost Count are shown on this page.

Population trends are also produced for brown long-eared bat for Great Britain and Wales.

Hibernation Survey

England index of brown long-eared bat population from Hibernation Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

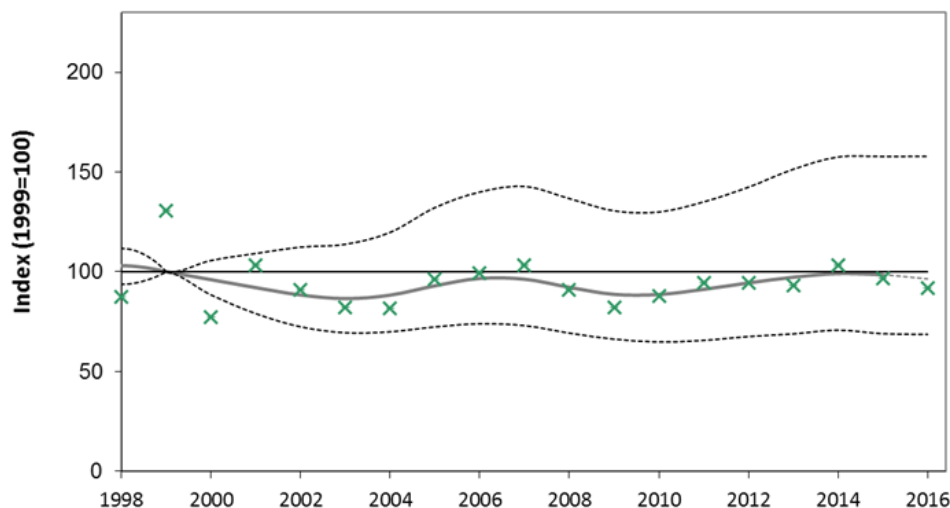
The smoothed index is currently 22.0% below the 1999 base year value, equivalent to an annual decrease of 1.5%. The

smoothed index has fluctuated above and below the baseline year but there has been **no significant change in the smoothed index since 1999**.

For all years for which data are available (1998-2016), counts from 325 sites contribute to the trend analysis in England (sites surveyed in two or more years with brown long-eared bat recorded in at least one year).

Roost Counts

England index of brown long-eared bat population from Roost Counts



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 3.5% below the 2001 base year value, equivalent to an annual decrease of 0.2%. Overall there has been **no significant change in the smoothed index since 2001**. There are no significant differences between trends for regions within England.

Data from 113 sites contribute to the trend analysis in England (sites surveyed in at least two years).

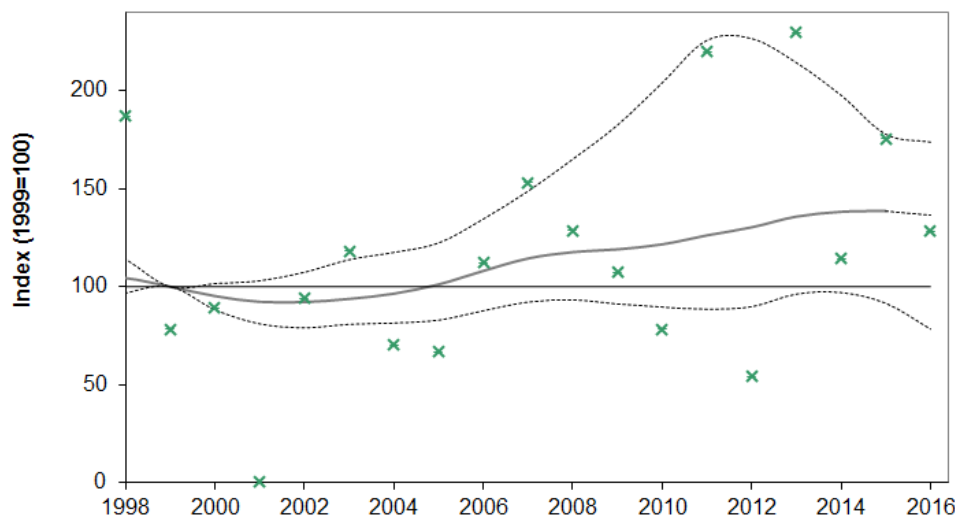
Brown long-eared bat trends for Wales

Wales-level population trends for brown long-eared bat from the Hibernation Survey are shown on this page.

Population trends are also produced for brown long-eared bat for Great Britain and England.

Hibernation Survey

Wales index of brown long-eared bat population from Hibernation Surveys



Note: The graph above shows the unsmoothed index value for each year (green crosses), the smoothed trend (solid line) and 95% confidence intervals (dotted lines). The smoothed trend for 2016 is shown as a dashed line to indicate that it is provisional.

The smoothed index is currently 36.3% above the 1999 base year value, equivalent to an annual increase of 1.8%. The

smoothed index has increased steadily since 2002, but as a result of the low precision associated with this trends there has been **no significant change in the smoothed index since 1999**.

From all years for which data are available (1998-2016), counts from 81 sites contribute to the trend analysis in Wales (sites surveyed in two or more years with brown long-eared bat recorded in at least one year).

Nathusius' pipistrelle

Pipistrellus nathusii

Species factsheet; Distribution and abundance

Nathusius' pipistrelle is a rare bat in the UK, though records have increased in recent years. Distribution data on Nathusius' pipistrelle have been collected by the Nathusius' pipistrelle Survey and more recently by the National Nathusius' Pipistrelle Project.

Key results from the National Nathusius' Pipistrelle Project include:

- Stable isotope analysis of fur samples of Nathusius pipistrelles caught during the project, carried out by the University of Exeter, suggest that these bats have a migratory origin further northeast than the UK, and that the Nathusius' pipistrelles originated from more northerly latitudes than soprano pipistrelles.
- Maternity colonies have been discovered in Kent and Northumberland.
- Four long distant migratory records have been found: one bat ringed in Britain was rediscovered in Holland, a bat from Latvia was recaptured in Sussex and two bats from Lithuania were recaptured in Kent.

Distribution and abundance

Nathusius' pipistrelle is rare but widespread throughout Great Britain. It is more abundant in Northern Ireland.

A more detailed distribution map can be found at www.nathusius.org.uk/Distribution.htm

Population estimate

Country	UK	England	Wales	Scotland	N.Ireland
Number	16,000	unknown	unknown	unknown	unknown
Source	Battersby <i>et al.</i> 2005				

References

<http://www.nathusius.org.uk/>

Battersby. J. (Ed) & Tracking Mammals Partnership. (2005) *UK Mammals Species Status and Population Trends. First Report by the Tracking Mammals Partnership.* JNCC/Tracking Mammals Partnership, Peterborough

Barbastelle

Barbastella barbastellus

Species factsheet; Distribution and abundance

Special Areas of Conservation designated for barbastelle are monitored through the Woodland Survey. Data on barbastelle are also collected from a small number of Hibernation Survey sites but currently there is insufficient data to produce a robust population trend.

Distribution and abundance

Barbastelle is uncommon in England and Wales. It is absent from Scotland and Northern Ireland.

Population estimate

Note: The population estimates are considered to be poor and should be treated with caution. Estimates are based on little or no population data and rely on expert opinion only

Country	UK	England	Wales	Scotland	N.Ireland
Number	5,000	unknown	unknown	does not occur	does not occur
Source	Harris <i>et al.</i> 1995				

References

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.

Grey long-eared bat

Plecotus austriacus

Species factsheet; Distribution and abundance

One grey long-eared bat roost is currently monitored as part of the Roost Count.

Distribution and abundance

This bat is considered to be one of the UK's rarest species and its population appears to be declining (Razgour, 2012). Its recorded distribution is primarily confined to the extreme south of the British Isles, from Sussex to Devon, including Somerset, the Isle of Wight and the Channel Islands. Recently, a grey long-eared bat roost was found in Pembrokeshire, indicating that the species may be also present in south-west Wales.

The map shows the current mapped distribution in the UK, including records from Razgour (2012).



Roost counts

Three grey long-eared bat roosts are included in the NBMP, although two of these are not currently monitored. A roost in Devon has been monitored annually since 2013.

Population estimate

Country	UK	England	Wales	Scotland	N.Ireland
Number	1,000 - 3,000	1,000 - 3,000	unknown	does not occur	does not occur
Source		Razgour, 2012			

NBMP Grey long-eared bat Project 2012

In summer 2012 the National Bat Monitoring Programme undertook an exciting project, the aim of which was to try to identify grey long-eared bat roosts and so expand our knowledge of the distribution of this rare species. We enlisted the help of long-eared bat roost owners within the species' known range and asked them to collect and return droppings from their roosts. Many roost owners and other volunteers kindly participated and the bat droppings they returned were sent off for DNA analysis to determine their species of origin. [Click here for the full report.](#)

References

Razgour O. (2012) From genes to landscapes: conservation biology of the grey long-eared bat, *Plecotus austriacus*, across spatio-temporal scales. PhD thesis, University of Bristol, UK

Woodland Survey Results

The NBMP Woodland Survey was piloted by BCT in 2004 and rolled out in 2005 as a new method to assess the presence and relative abundance of barbastelle (*Barbastella barbastellus*). The survey and analysis methods were revised in 2006 and surveys have been completed using this revised methodology since then.

The surveys are completed in three periods as follows:

- Period 1: 25th July to 8th August
- Period 2: 9th to 23rd August
- Period 3: 24th August to 7th September

Currently Natural England provide funding to monitor the presence of barbastelles using this survey methodology at five woodland Special Areas of Conservation (SACs) in England where the presence of barbastelle is a primary reason or qualifying feature for designation. An additional site is surveyed in Wales. The results across all survey years are summarised in the table below.

Summary of Woodland Survey results 2005-2016 (N/S = not surveyed)

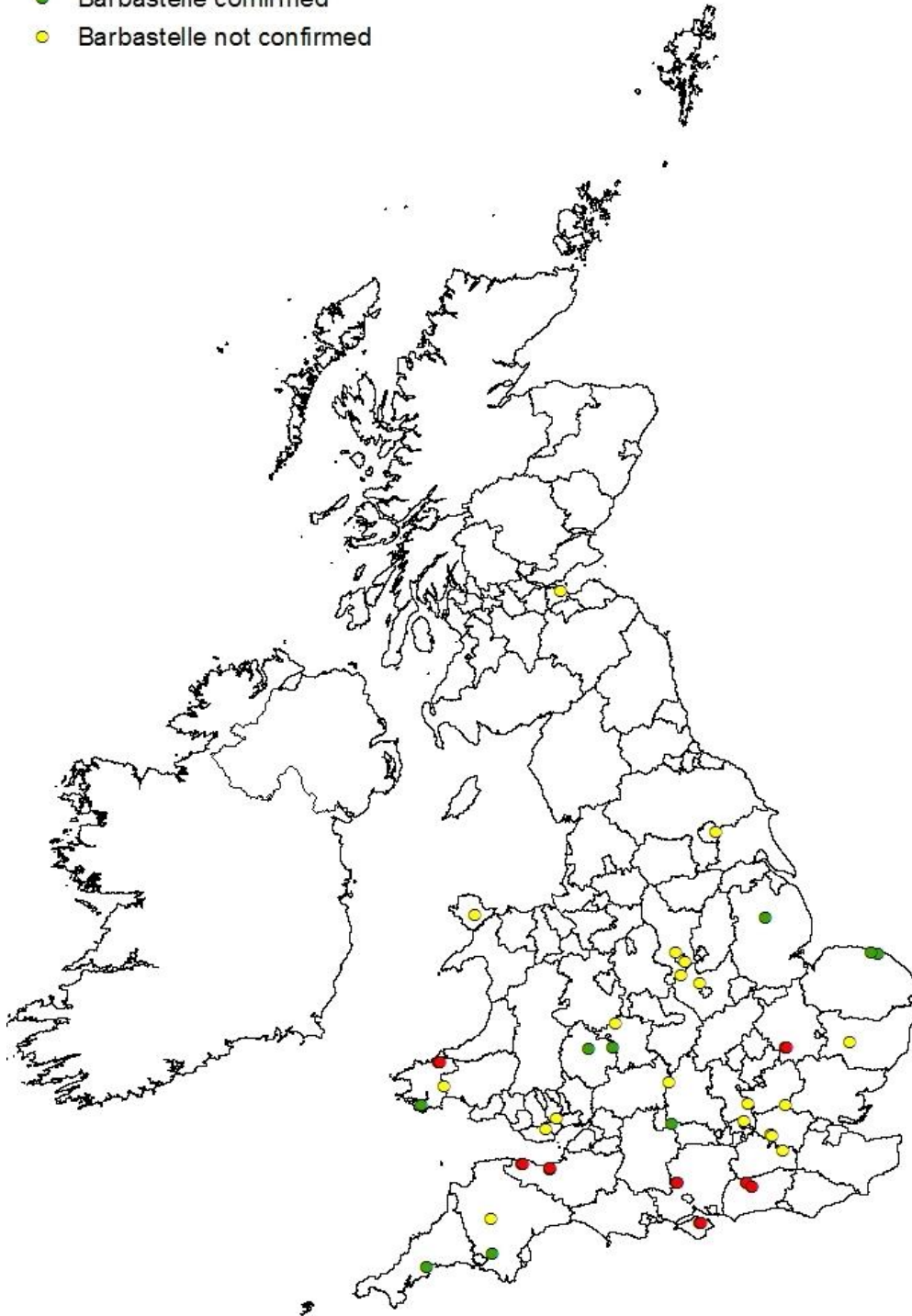
SAC site	County	Barbastelle recorded											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Briddlesford Copses	Isle of Wight	N/S	N/S	N/S	N/S	Y	Y	N/S	N/S	N/S	N/S	N/S	N/S
Ebernoe Common	West Sussex	N/S	N/S	N/S	N/S	Y	Y	Y	Y	Y	Y	Y	Y

Eversden and Wimpole Woodlands	Cambridgeshire	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Exmoor & Quantock Oakwoods	Somerset	N/S	N/S	N/S	N/S	Y	Y	Y	Y	Y	Y	Y	Y
The Mens	West Sussex	N/S	N/S	N/S	N/S	N/S	Y	Y	Y	Y	Y	Y	Y
Mottisfont Bats	Hampshire	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
North Pembrokeshire Woodlands/Coedydd Gogledd Sir Benfro	Pembrokeshire	Y	N/S	N/S	N/S	Y	Y	Y	N/S	Y	Y	Y	Y

Since 2005 a total of 49 transects have been surveyed. This includes transects in seven Special Areas of Conservation. From 2011 surveys have been primarily focused on the SAC sites. The map below shows the distribution of all Woodland Survey sites and confirmed barbastelle records from 2005-2016.

Distribution of Woodland Survey sites 2006-2016

- Barbastelle confirmed (barbastelle SAC site)
- Barbastelle confirmed
- Barbastelle not confirmed



Research and Conservation

Data from the National Bat Monitoring Program is used by researchers from a wide variety of academic institutions and conservation organisations. This is a summary of some the recent research and conservation work that has benefited from NBMP data.

Climate change

A PhD project at the University of Bristol is using data from the NBMP Roost Count to investigate the effect of climate change and agri-environment schemes on the population recovery of greater horseshoe bat. So far this research has shown that higher colony growth rates are associated with higher temperatures in the current spring and lower levels of precipitation in the previous spring. It has also shown that larger colonies tend to be found in landscapes with more broadleaf woodland and grassland, a higher density of linear features and less artificial light at night. See Froidevaux, J, Boughey, KL, Barlow, KE & Jones, G, 2017, Factors driving population recovery of the greater horseshoe bat (*Rhinolophus ferrumequinum*) in the UK: implications for conservation'. *Biodiversity and Conservation*.

NBMP data contributed towards an assessment of the effect of annual variation in weather on population trends of 501 mammal, bird, aphid, butterfly and moth species, undertaken by the British Trust for Ornithology. This research found evidence that climate trends have significantly affected population trends of 15.8% of species assessed, demonstrating that climate change has already caused large-scale population changes of some species and has had a significant impact on some invertebrate groups. See Martay, B.; Brewer, M.J.; Elston, D.A.; Bell, J.R.; Harrington, R.; Brereton, T.M.; Barlow, K.E.; Botham, M.S.; Pearce-Higgins, J.W, 2016, Impacts of climate change on national biodiversity population trends. *Ecography*

White Nose Syndrome

BCT have joined a study being undertaken by Joseph Hoyt at the University of California Santa Cruz, investigating the distribution and spread of *Pseudogymnoascus destructans*, the fungus responsible for White Nose Syndrome in North American bats, across Europe, Asia and North America. NBMP volunteers have collected swab samples from bats and hibernacula walls at selected NBMP Hibernation Survey sites under licence from Natural England. These samples are now being processed and the results will be made available at the end of this year.

Woodland use and management

BCT are collaborating with Forest Research to model the ecological and human factors impacting woodland bat species' distributions at local, regional and landscape scales, using data from the NBMP and other sources. These models will be used to predict current distributions of woodland bat species nationally, and locally and understand how distributions and assemblages of bat species may change, using future climate and land use scenarios.

Conservation and Monitoring

NBMP data contributed to the 2016 State of Nature report. This landmark report, a collaboration between 53 organisations led by the RSPB, represents the most comprehensive assessment to date of the status of species at land and sea. The report shows that the majority of species assessed (56%) are in decline while 15% have disappeared already. It also shows how appropriate legislation and education has helped the partial recovery of a number of bat species such as the soprano pipistrelle.

Data from the NBMP Hibernation Survey were used to update the European Bat Population Trend Indicator, produced by Statistics Netherlands and Slovenian Centre for Cartography of Fauna and Flora. The first iteration of the indicator, covering the

period 1993-2011, found that overall the species included in the indicator have increased by 43 % at hibernation sites.

Individually, nine species studied showed a positive European trend and one species (*Plecotus austriacus*) showed a significant decline. The updated indicator will be published in the coming year.

Data from the NBMP Roost Count are being used by the Bats in Churches Partnership for an exciting new project that has been awarded funding by the Heritage Lottery Fund. The aims of this project, a collaboration between Natural England, the Church of England, Bat Conservation Trust, Historic England and the Churches Conservation Trust, are to trial and perfect new techniques to enable bats and church congregations to live together; build up professional expertise and volunteer skill to share the best solutions with hundreds more churches and bring together church communities and bat enthusiasts to create a shared understanding and appreciation of England's historic places of worship and our rare flying mammals.

Developments and future directions

The strategic aim of the NBMP is to deliver a world-leading, cost-effective citizen science programme supported by motivated volunteers, providing high quality data able to inform evidence needs, policy-relevant questions and metrics of bat population status, change and distribution. Here is a summary of the some of the work undertaken in 2016 to further this aim, and work planned for 2017.

The British Bat Survey

BCT is collaborating with UCL, the University of Oxford and the British Trust for Ornithology to develop a new bat survey for the NBMP, the British Bat Survey (BBatS). This survey will incorporate the latest developments in bat detector technology, bat call identification and population trend analysis to increase the number of bat species for which we are able to produce robust population trends and improve the utility of NBMP data for monitoring, planning, conservation and research.

This summer will be launching a small scale pilot of BBatS in Scotland in collaboration with the BTO. This will build on the BTO's highly successful Southern Scotland Bat Survey. This pilot will test the IT infrastructure and working arrangements required for BCT and the BTO to jointly administer the survey.

Alongside this pilot, a partnership between BCT, UCL, BTO and the University of Oxford secured an Innovation Award from the Natural Environment Research Council to develop a suite of software and hardware tools needed to roll out BBatS nationwide. This includes an open-source automatic wildlife sound recognition tool, a low-cost acoustic sensor and a data submission and feedback system. These tools will also benefit a wide community of other users in industry, academia and government.

Sunset Sunrise Survey

In 2016 we relaunched the Sunset Sunrise Survey with a simpler methodology, a more engaging and educational recording form and a new online data submission system. Read more about the relaunched survey [here](#).

Online data submission

Use of the NBMP online data submission portal has continued to increase, allowing further savings in staff times and resources for the NBMP. Currently 73.4% of NBMP volunteers have signed up for online accounts (up from 62% in 2015) and 774 survey packs were downloaded in 2016 (up from 28 in 2015). Sixty four percent of data returns for core survey sites were made online (up from 59% in 2015).

In previous years NBMP survey routes were plotted on paper maps, making it difficult to access and use the spatial information they contained. Since the launch of the online portal, NBMP volunteers have been able to create a digital version of their routes. We have been working to digitise our paper archive of historic routes and after several years of effort the majority of this work is now complete. In 2017 we will be building new functionality into our online portal to enable us to store and interrogate this historic dataset for the first time.

Improving UK Biodiversity Indicator C8. Mammals of the wider countryside (bats)

In 2016 JNCC contracted BCT to establish the 'lifecycle' of roost sites within the NBMP; how this may affect the reliability of trends calculate from Roost Count data; implement a harmonized method for producing biodiversity indicators from combined species trends; and investigate how the inclusion of data from different NBMP surveys and species affects the magnitude, direction and precision of the UK Biodiversity Indicator C8: Mammal of the wider countryside (bats).

This work suggested that 'roost switching' by pipistrelle species is likely to contribute towards a negative bias in Roost Count trends for these species. Roost switching can negatively bias Roost Count trends as it can result in a zero count being the final value entered into trend analysis for a roost site, and therefore an incorrect negative site trend being included in trend analysis. In 2017 we will be investigating the reliability of Roost Count trends further (see here), and reviewing the production of the C8 indicator to reduce the influence of this negative bias.

Future directions

Modelling the drivers of population change in bats

BCT, in partnership with Dr Nick Isaac at the Centre of Ecology and Hydrology and Prof Kate Jones at UCL, has been awarded a CASE PhD studentship by the Natural Environment Research Council. The studentship will begin in October 2017 and will examine the drivers of population change in bats. Specifically, the project will use NBMP data and modern state-space modelling techniques to address the following objectives:

1. Understand if roost counts provide reliable information about bat population change.
2. Develop maps of bat abundance and how this has changed over time.
3. Reveal whether bat distributions are changing and, if so, why.
4. Reveal the causes of abundance and distribution trends over space and time.

Volunteer engagement and development

We are developing new volunteer engagement, development and training resources.

In 2016 we produced an online bat detector species ID quiz which we shared with bat detector workshop attendees in order to consolidate what they learnt on the workshop and improve their

confidence in species identification and taking part in surveys. We also share this with existing NBMP volunteers to help them refresh their skills and encourage more volunteers to take part in our bat detector surveys.

We have developed a new Level 1 NBMP workshop which is being piloted and rolled out in 2017. This is designed to enable attendees to feel confident in basic bat species ID and their ability to carry out the NBMP Waterway Survey. Our long-running "Using Your Ears" bat detector workshop is now designated as the Level 2 NBMP workshop. A future aim will be to offer the Level 1 followed by the Level 2 workshop in target workshop locations so that volunteers can choose their appropriate level of training and attend both workshops in order to progress their learning.

The NBMP e-bulletin "Bat Monitoring Post" is being relaunched as a bigger bulletin containing more content designed to engage, support, inform and inspire. It is sent to everyone who signs up for the NBMP. Regular features will include a Q&A with an NBMP volunteer, book and equipment reviews, focus on NBMP facts and figures from a country or region within the UK, and focus on ways in which NBMP data have contributed to science and conservation. This new look-bulletin is being published on a two-monthly basis from April 2017.

Acknowledgements

NBMP Volunteers

A huge thank you must go out to all of our hard-working NBMP volunteers who have collected bat data that have contributed to this report. The NBMP relies on the ongoing efforts of hundreds of volunteers whose dedication allows us to produce population trends for UK bats. Without our volunteers the NBMP would not exist.

Many of our volunteers have received training from our volunteer Regional Bat Detector Workshop Leaders (RBDWLs) and we would like to thank them for their continuing dedication to helping us to train up volunteers to maintain the high standards of NBMP surveys. RBDWLs include Ian Bond, Mike Castle, Rebecca Collins, Ian Cornforth, Richard Crompton, Richard Dodd, Colin Edwards, Emma Grubb, Andrea Hudspeth, Claire Lacey, Bill Landells, Steve Lucas, Helen Lundie, John Martin, Aidan Matthews, Steve Parker, Clare Rawcliffe, Adam Samson, Natalie Todman, Nick Tomlinson, Edward Wells, Lisa Worledge and Anne Youngman. Many BCT staff have contributed to the NBMP and special thanks go to our interns and office volunteers who contributed to the programme in 2016: Sophie Prideaux, Liz Ferrell and Naomi Cornwell.

About NBMP

The National Bat Monitoring Programme is run by the Bat Conservation Trust, in partnership with the Joint Nature Conservation Committee, and supported and steered by Natural England, Natural Resources Wales, Northern Ireland Environment Agency, and Scottish Natural Heritage.

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Members of the NBMP team at BCT were responsible for entering and processing the data used in this report, and Steve Langton completed all the statistical analyses.

This report was completed in May 2017.