

The state of the UK's bats 2017

National Bat Monitoring Programme Population Trends



Headlines

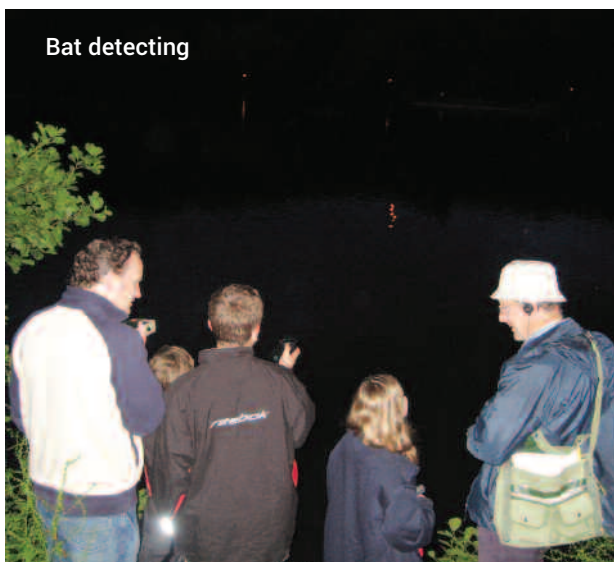
- Over the last three years the in-kind contribution of volunteers to the National Bat Monitoring Programme (NBMP) has been valued at £902,340 (p.3) enabling us to monitor the state of the UK's bats.
- The latest trends indicate that populations of the bat species we are able to monitor are stable or recovering (though a few results need treating with caution at present), which suggests that current legislation and conservation action to protect and conserve bats are having a positive impact and should be continued (p.4-5).
- However, any improvements must be seen in the context of dramatic historic declines and many pressures on bat populations still remain, including ongoing roost and habitat loss, increased urbanisation (p.9), impacts of artificial lighting (p.11), and wind turbines, where they have been installed and managed inappropriately (p.14).
- For several species there are gaps in our knowledge of their distribution and how they are faring. These gaps are being addressed through new projects (p.13 & 15).



Why is it important to monitor bat populations?

- Bats have undergone dramatic declines in the last century due to human activities.
- Monitoring bat populations provides an important measure of the value of conservation work and both domestic and international wildlife legislation.
- Bats are indicators of healthy ecosystems which are important for a wide range of species, are greatly valued by society and have proven benefits for human health.
- Bats have huge importance for economies and well-being across the world, for example as pollinators, seed dispersers and insect pest controllers.
- Bats make an important contribution to the UK's biodiversity as they account for more than a quarter of our native mammal species.
- Bats are protected species under the Habitats Directive and the UK has an obligation to periodically report on their status.
- Bats are included in the UK Biodiversity Indicators which report on progress towards meeting international biodiversity goals and targets.

About the National Bat Monitoring Programme (NBMP)



The NBMP is an annual series of bat surveys undertaken by thousands of dedicated volunteer citizen scientists, which allow us to monitor changes in UK bat populations. Survey methods include roost emergence counts, internal counts at hibernacula and walked transects using bat detectors.

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. Data from the NBMP are also used in scientific research and made publicly available via the NBN Atlas. Results are published in the NBMP Annual Report, newspaper and magazine articles, e-bulletins, blogs and on social media.

The State of the UK's Bats summarises the latest species population trends and also looks at some new initiatives from the NBMP. We look at some of the results in more detail in order to highlight key findings and conservation issues. Detailed trend information on all species monitored can be found in the NBMP Annual Report at www.bats.org.uk/pages/nbmp_annual_report.html.

Volunteers

We are extremely grateful to all the dedicated volunteers who have taken part in the NBMP since its inception in 1996, without whom we would not be able to monitor how bats are faring across the UK. We also receive valuable data from volunteers in the Isle of Man and the Channel Islands.

Over the three years since the publication of the last edition of *The State of the UK's Bats*:

1,287 volunteers have participated in the

National Bat Monitoring Programme (NBMP)

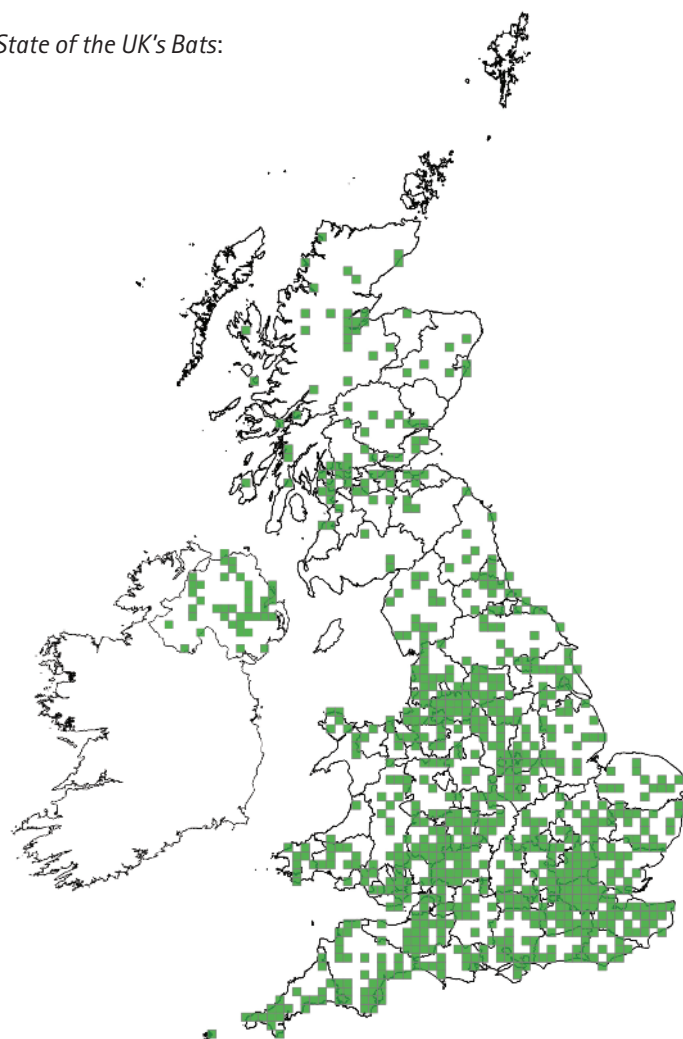
That's **59,069** volunteer hours

Which represents a **£902,340**

in-kind contribution to the NBMP*

We have run **85** workshops
and trained **1,129** volunteers

Volunteers have participated from across the UK



Volunteer distribution from 2015 to 2017

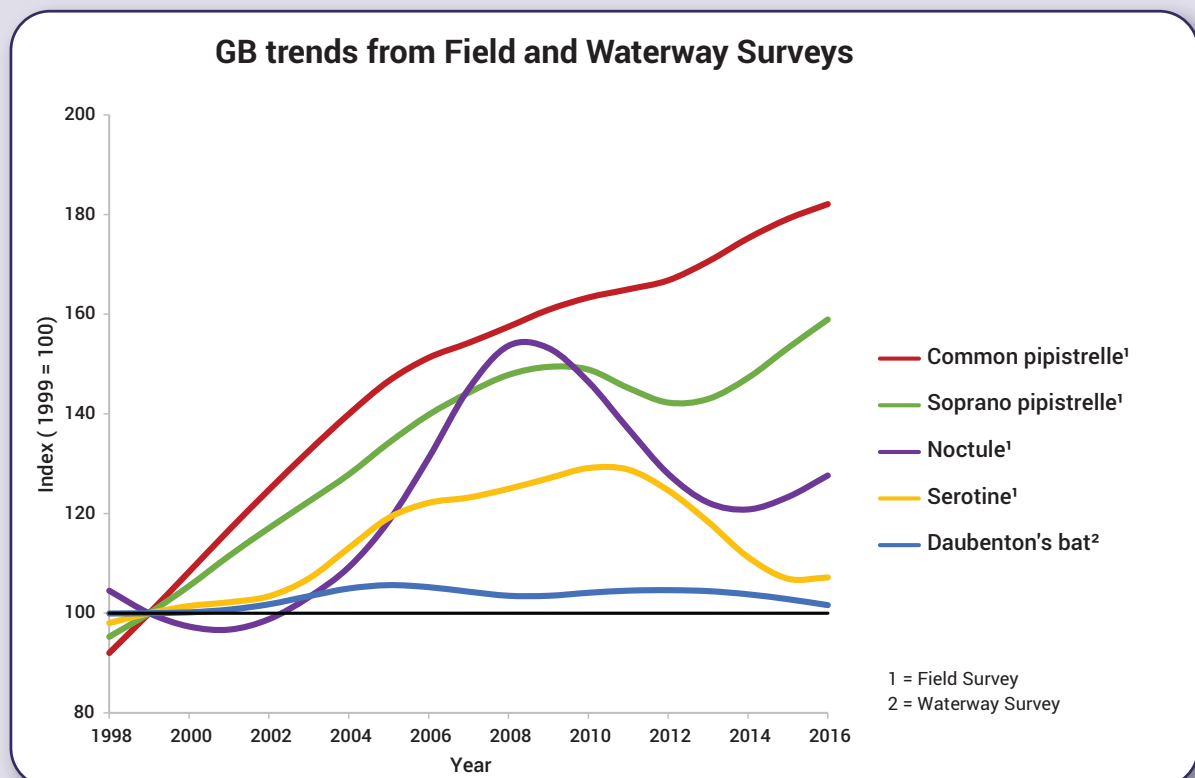
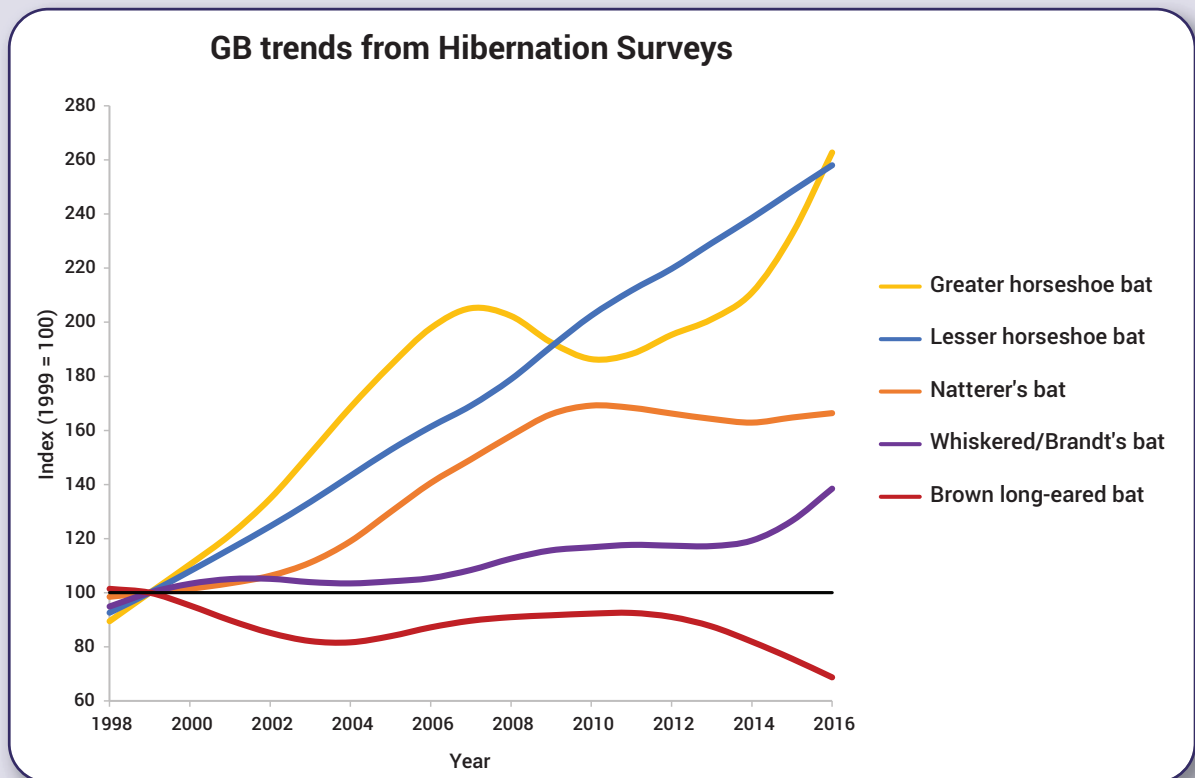


*Volunteer contribution calculated using the daily rate given for unskilled and skilled volunteers by the Heritage Lottery Fund in their application guidance (Dec 2013).

GB population trends from 1999 to 2016

Data from the National Bat Monitoring Programme indicate that populations of the bat species we monitor are stable or recovering, though a few results need treating with caution at present^a. However, it should be remembered that these trends reflect relatively recent changes in bat populations (since 1999^b 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 actions to protect and conserve bats are having a positive impact, and it is vitally important that these continue.



Species	Survey	Countries/regions for which trends can be produced	Base Year	GB change from base year to 2016(%)	GB short-term change 2010-2015(%) ^c
Greater horseshoe bat	Hibernation	GB, ENG, WAL	1999	162.7	24.8
	Roost	GB, ENG	1999	145.3	23.3
Lesser horseshoe bat	Hibernation	GB, ENG, WAL	1999	158.0	22.7
	Roost	GB, ENG, WAL	1999	80.4	11.8
Daubenton's bat	Hibernation	GB, ENG, WAL	1999	47.7	23.2
	Waterway	GB, ENG, WAL, SCO	1999	1.6	-1.2
Whiskered/Brandt's bat	Hibernation	GB, ENG, WAL	1999	38.5 ^a	8.4
Natterer's bat	Hibernation	GB, ENG, WAL	1999	66.4	-2.6
	Roost	GB, ENG	2002	-3.1	3.1
Common pipistrelle	Field	GB, ENG, SCO	1999	82.1	9.7
	Roost	GB, ENG, SCO	1999	-58.0 ^d	-14.2 ^d
Soprano pipistrelle	Field	GB, ENG, SCO	1999	58.9	2.9
	Roost	GB, ENG, SCO	1999	-52.0 ^d	-19.1 ^d
Noctule	Field	GB, ENG	1999	27.6	-15.8
Serotine	Field	GB, ENG	1999	7.2^a	-17.2^a
	Roost	GB, ENG	1999	-19.9 ^a	1.0 ^a
Brown long-eared bat	Hibernation	GB, ENG, WAL	1999	-31.3^a	-18.1^a
	Roost	GB, ENG	2001	20.1	9.4
Leisler's bat	Recorded by iBats UK; more data needed to detect trends.				
Nathusius' pipistrelle	See page 14 for further information.				
Bechstein's bat	See pages 12-13 for further information.				
Barbastelle	See pages 12-13 for further information.				
Grey long-eared bat	No trend data available.				
Alcathoe bat	Presence in UK confirmed in 2010.				
(Greater mouse-eared bat)	Only one individual known in the UK at present.				

Bold indicates the trend considered to be most statistically robust, where two trends are produced.

Colours indicate trends which are statistically significant population **increases** or **declines** at a 95% confidence level.

GB = Great Britain; ENG = England; WAL = Wales; SCO = Scotland.

At present, trends are produced for GB rather than UK, as NBMP sample sizes in NI are not yet large enough to produce statistically robust trends, so NI data are not currently included in analysis. See page 6 for more information about bat monitoring in NI.

- a A few results need treating with caution. 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, Alcathoe bat. For brown long-eared bat there is not yet sufficient certainty to assess the population as declining, due to the provisional nature of estimates for the most recent year, and the small margin of significance.
- b Results are based on the smoothed general additive model (GAM) trends for the time period stated in the table. Although the trend lines in the charts start from 1998, 1999 has been taken as the baseline year as the first point in a GAM trend is less robust. More information about how these trends are produced can be found in the NBMP Annual Report at www.bats.org.uk.
- c Short-term % change is calculated to 2015 to avoid the extra uncertainty in the final year of a GAM trend.
- d There has been a significant decline in the smoothed index from roost counts for common and soprano pipistrelles since 1999. **However it is likely that for these species, frequent roost switching results in a negative bias in Roost Count data. The Roost Count trend is therefore not considered a reliable measure of population change for these species.** We are currently investigating the causes of this negative bias in more detail and exploring ways to correct it (see page 15).

Country-level trends

The NBMP is able to produce population trends at a country level for England, Scotland and Wales. The map below shows how many species we have sufficient data for to enable statistically robust trends to be produced for each country.

Why is it important?

Country-level trends provide us with a better understanding of bat populations, as UK- or GB-level trends can mask differences in how species are faring at different geographical scales.

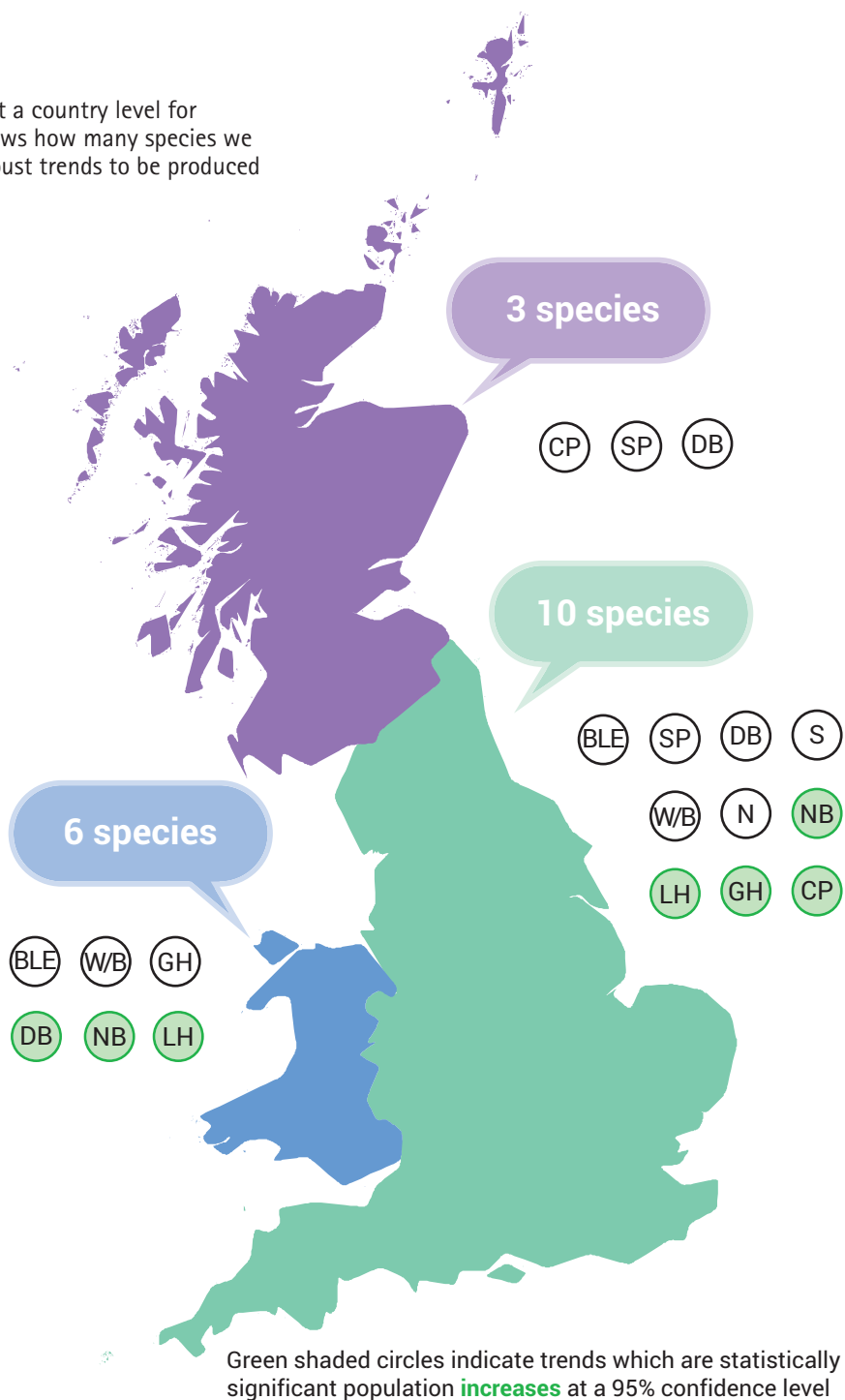
They also ensure that conservation effort can be tailored to each country and better inform policy decisions.

How can you help?

To provide country-level trends we need 30-40 sites to be surveyed annually for any given survey.

To increase the number of species we can provide trends for we need volunteers to survey more sites in Wales and Scotland for the Roost Count, Hibernation, Waterway and Field surveys.

You can help us by joining the NBMP volunteer network and going out to count bats! See the back page of this publication for information on how to get involved.



Northern Ireland

Bat Conservation Ireland coordinates a range of bat monitoring and distribution surveys across Ireland with funding from the National Parks and Wildlife Service and Northern Ireland Environment Agency. In Northern Ireland these include the Daubenton's bat Waterway Survey, car surveys and the Batlas 2020 project. More info and latest results at www.batconservationireland.org.

BCT is working with BCIreland, Northern Ireland Bat Group (NIBG) and CEDaR to promote the various surveys in NI. This includes working closely with NIBG to increase the number of roosts and hibernacula monitored in the NBMP. More info on surveys in NI can be found at www.bats.org.uk/pages/bat_monitoring_ni.html.

CP = Common pipistrelle
SP = Soprano pipistrelle
DB = Daubenton's bat
BLE = Brown long-eared bat

S = Serotine
W/B = Whiskered/Brandt's bat
N = Noctule
NB = Natterer's bat

LH = Lesser horseshoe bat
GH = Greater horseshoe bat

CASE STUDY | Greater horseshoe bat

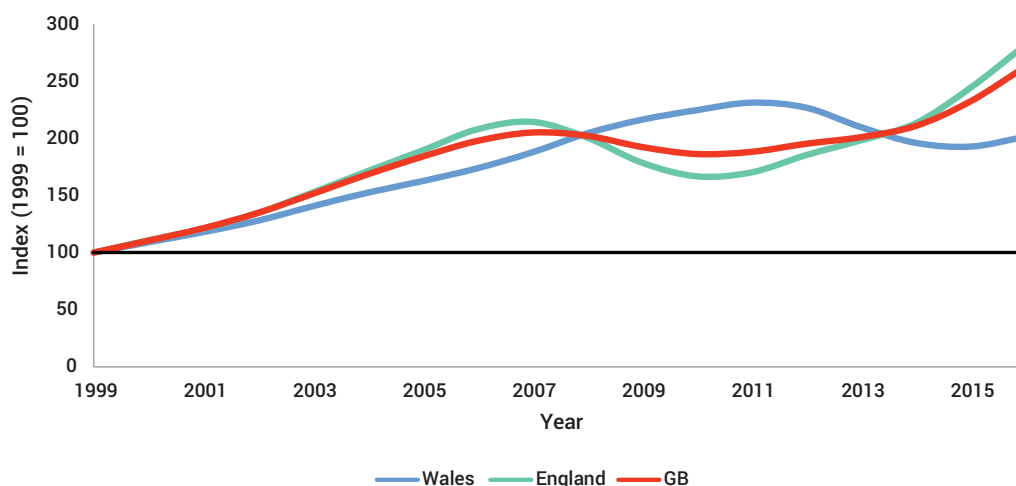
GB-level trends for greater horseshoe bat from the Hibernation Survey shows a statistically significant increase since the baseline year figure. However, at a country level some differences can be seen. Although the greater

horseshoe bat population is increasing significantly in England, the trend in Wales is not yet significant; further research is needed to explore the reasons behind this difference between countries.



© Hugh Clark

Greater horseshoe bat trends from Hibernation Survey



CASE STUDY | Daubenton's bat

The GB-level trend for Daubenton's bat from the Waterway Survey shows a stable population which has remained close to the baseline year figure. However, at a country level some differences can be seen.

Scotland: The population of Daubenton's bat in Scotland has shown the greatest increase between 1999-2006, remaining stable since.

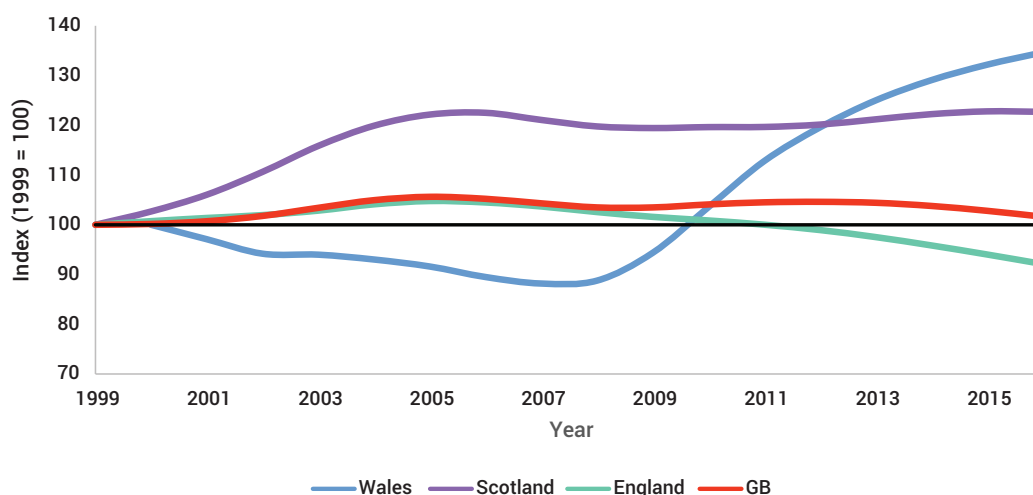
Wales: The long-term trend for Daubenton's bat shows a significant increase since 2013.

England: The long-term trend for Daubenton's bat has been slowly declining since 2007 but this is not statistically significant.



© Kevin Durose

Daubenton's bat trends from Waterway Survey



Common and soprano pipistrelles

Common and soprano pipistrelles are the most common and widespread of all British bat species and are therefore the species most often spotted by the public in gardens and other habitats.

Common pipistrelles forage in a wide variety of habitats, including woodland, hedgerows, grassland, farmland, and suburban and urban areas.

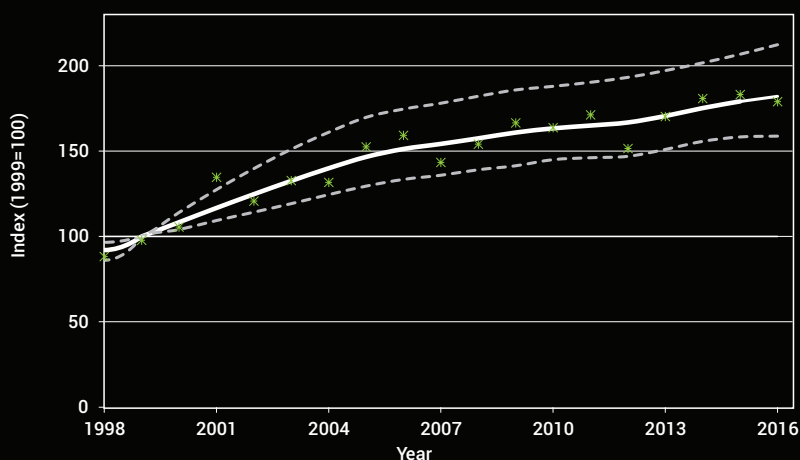
Soprano pipistrelles are more specialised and favour wetland habitats, lakes and rivers, and also marginal habitat such as woodland edge, treelines and hedgerows.



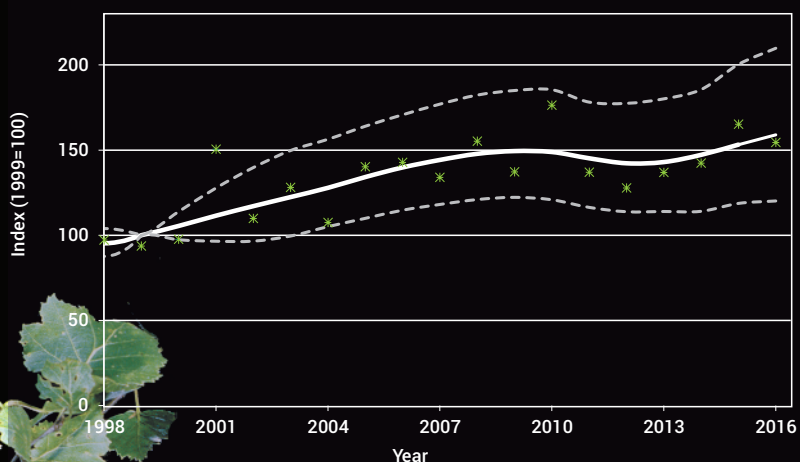
How are pipistrelle populations faring?



Field Survey data show statistically significant population increases for both species since 1999. While the upward trends are encouraging it is likely that these represent only a partial recovery from much greater population declines over the last century.



GB population trend for common pipistrelle (estimated annual means with confidence intervals calculated from NBMP Field Survey data)



GB population trend for soprano pipistrelle (estimated annual means with confidence intervals calculated from NBMP Field Survey data)

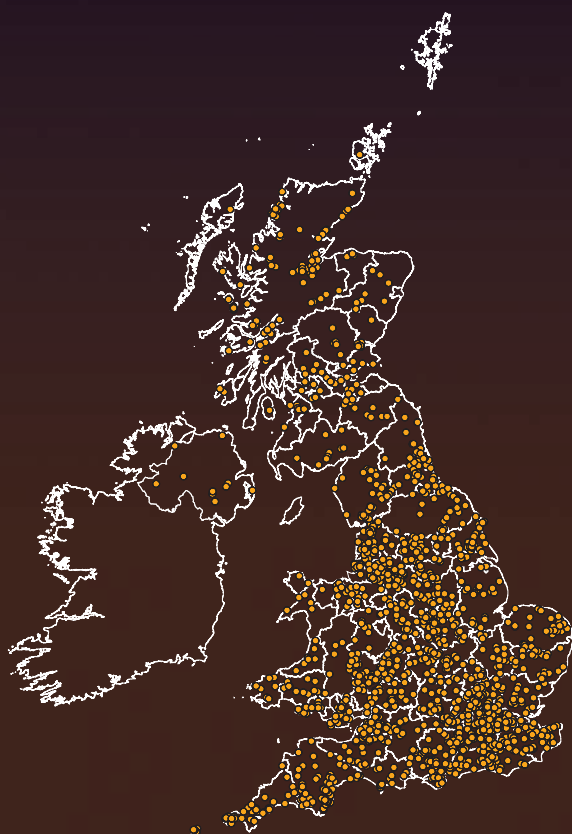


What's driving the increase in common and soprano pipistrelles?

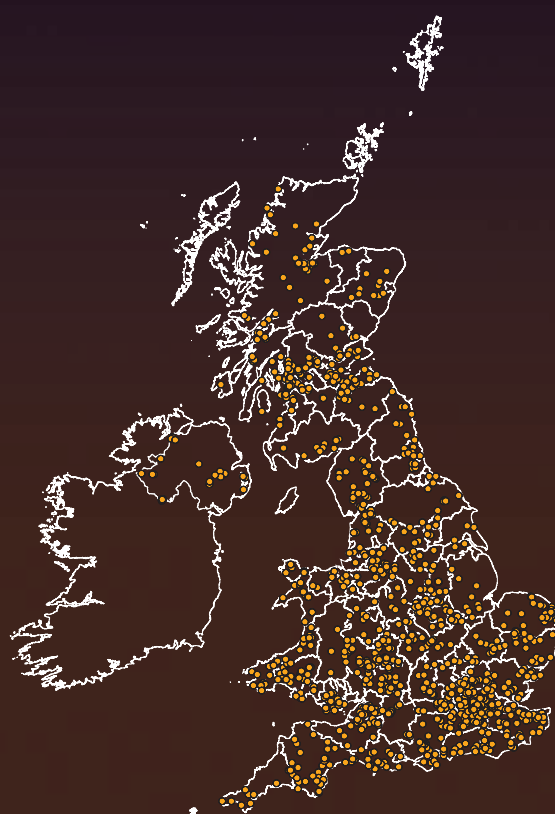
As these are the species most commonly encountered roosting in buildings, they are particularly likely to have benefitted from the legal protection of bats and their roosts since 1981, expert advice to the public provided by bat helpline services and roost visitors, public engagement events such as bat walks run by bat groups and other organisations,

and improved public attitudes to bats through positive media coverage.

However, even these relatively adaptable species have been shown to be negatively impacted by increased urbanisation (see below).



Common pipistrelle distribution (NBMP data)



Soprano pipistrelle distribution (NBMP data)

Urbanisation

While common and soprano pipistrelles are relatively well adapted to the urban environment, data from the NBMP have shown that both species are negatively impacted by increasing urbanisation. Common pipistrelles show a strong negative response to urbanisation and are more frequently found in landscapes with a high proportion of green space, while soprano pipistrelles are found more regularly in wooded urban landscapes containing freshwater.¹

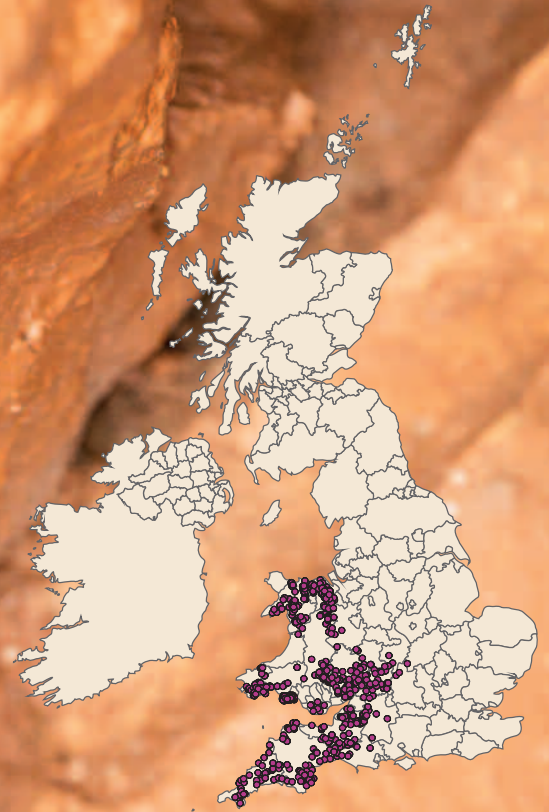
1. Lintott, P.R., Barlow, K., Bunnefeld, N., Briggs, P., Gajas Roig, C. & Park, K.J. 2016. Differential responses of cryptic bat species to the urban landscape. *Ecology and Evolution* 6: 2044–2052.

Greater and lesser horseshoe bats

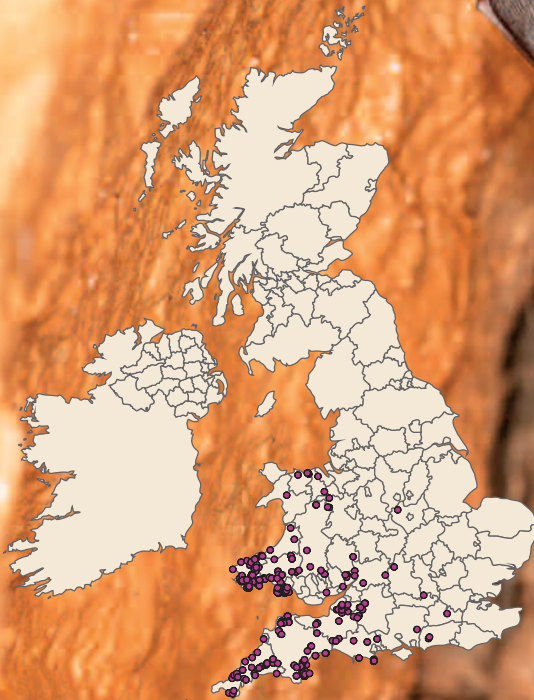
Horseshoe bats are largely restricted to the South West of England and Wales, with lesser horseshoe bats also present in western Ireland. Both species lost an estimated 90% of their UK populations during the 20th century.



Both Roost and Hibernation Surveys show significant population increases since 1999 for both species, although it is very unlikely they have yet reached their pre-decline population levels.



Lesser horseshoe bat distribution (NBMP data)



Greater horseshoe bat distribution (NBMP data)

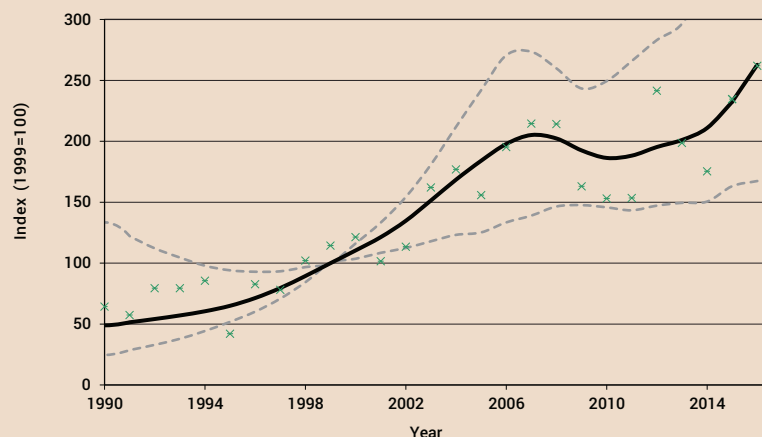
Drivers of greater horseshoe bat population change are revealed using NBMP data

Using NBMP Roost Count data, a study² found that **higher colony growth rates** of greater horseshoe bats are associated with **increased spring temperatures**, and **lower levels of precipitation** the previous spring. This suggests **climate change** is likely to be having a positive impact on greater horseshoe bat populations.

Larger colonies tend to be found in landscapes with **more broadleaf woodland or grassland**, a **higher density of linear features** and **less artificial light** at night. This suggests that **agri-environment schemes** which conserve essential landscape features around roost sites, may have played a part in long-term population increases. **Continued protection of horseshoe bat roosts along with the landscape surrounding roost sites is therefore vital for the continued recovery of greater horseshoe bat populations.**

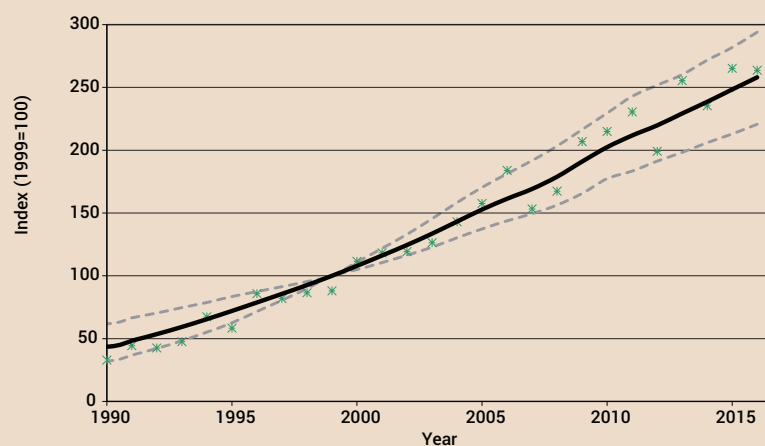
Trends in greater and lesser horseshoe bat populations from hibernation surveys

Greater horseshoe bat



© Mike Hammet

Lesser horseshoe bat



© Gareth Jones

GB trends (with confidence intervals) from the NBMP Hibernation Survey reveal statistically significant increases in population sizes for both greater and lesser horseshoe bats.

Impact of artificial lighting on horseshoe bats

Along with most other UK bat species, greater and lesser horseshoe bats are at high risk of disturbance from artificial lighting. Bats may react to artificial lighting in a number of ways, including:

- deserting roosts which are lit;
- delaying roost emergence thus shortening time available for foraging;
- avoiding drinking, foraging or commuting in lit areas.

Artificial lighting therefore has potentially devastating conservation consequences. It is shown to be associated with lower colony size in greater horseshoe bats² suggesting continued use of artificial lighting could negatively impact populations.

2. Froidevaux, J.S.P., Boughey, K.L., Barlow, K.E. and Jones, G. 2017. Factors driving population recovery of the greater horseshoe bat (*Rhinolophus ferrumequinum*) in the UK: implications for conservation. *Biodiversity Conservation* 26: 1601-1621.

Woodland specialists

Several UK bat species are woodland specialists meaning they are dependent on suitable woodland habitat in which to roost and forage. This makes them particularly vulnerable to habitat loss and fragmentation.

Most of these species are difficult to monitor using bat detectors because their calls are quiet and/or similar between species. Therefore for some of these species we do not currently have a very complete picture of their distributions across the UK and how their populations are faring.

A number of projects are helping fill in these gaps in our knowledge.



Natterer's bat

© Hugh Clark



Brandt's bat

© Hugh Clark

NBMP trends

We have sufficient data to produce species population trends at the GB scale for the following species that are woodland specialists or are largely reliant on woodland habitats:

- whiskered/Brandt's bat (Hibernation Survey)
- Natterer's bat (Hibernation Survey and Roost Count)
- brown long-eared bat (Hibernation Survey and Roost Count)

See the table on page 5 for trend information on these species.

Monitoring barbastelles at SAC sites

Barbastelle is a rare bat which favours ancient or old-growth deciduous woodland with substantial understorey.

Funded by Natural England, the NBMP Woodland Survey monitors the ongoing presence of barbastelles at woodland sites that are designated as Special Areas of Conservation (SACs) with barbastelle as a primary reason for their designation. Barbastelles produce distinctive calls enabling them to be monitored using bat detectors.



Barbastelle

© Hugh Clark

The Bechstein's bat project

Bechstein's bat is one of the rarest mammals in the UK. It is predominantly associated with ancient broadleaf woodlands.

The Bechstein's bat project ran from 2007–2011. Through surveying with acoustic lures and harp traps in target woodlands it established baseline distribution data across the species' entire range in England and Wales. This is informing conservation policy and woodland management and will enable future assessment of distribution change and colony trends.

Putting UK Woodland Bats on the Map

This partnership project with Forest Research aims to refine survey methodology for an acoustic woodland bat survey which will reliably detect trends in woodland bats, and to improve our knowledge of the distribution, habitat use and conservation status of a range of woodland bat species using data modelling techniques. It is being trialled as a citizen science survey for a two year period from December 2017 – December 2019.

Back from the Brink

Working with other species conservation partners this project aims to save threatened species, with woodland specialists as some of our priority target species. BCT are involved in three sub-projects – 'Roots of Rockingham – Life between trees' (barbastelle and brown long-eared bat), 'Ancients of the Future' (barbastelle, Bechstein's bat and noctule) and 'Adding Diversity to Dorset's Heaths' (Bechstein's bat). The projects will address woodland and tree management. Volunteers in these sub-projects will be trained to carry out monitoring, some of which will also be linked to NBMP surveys.



© Hugh Clark

Bechstein's bat

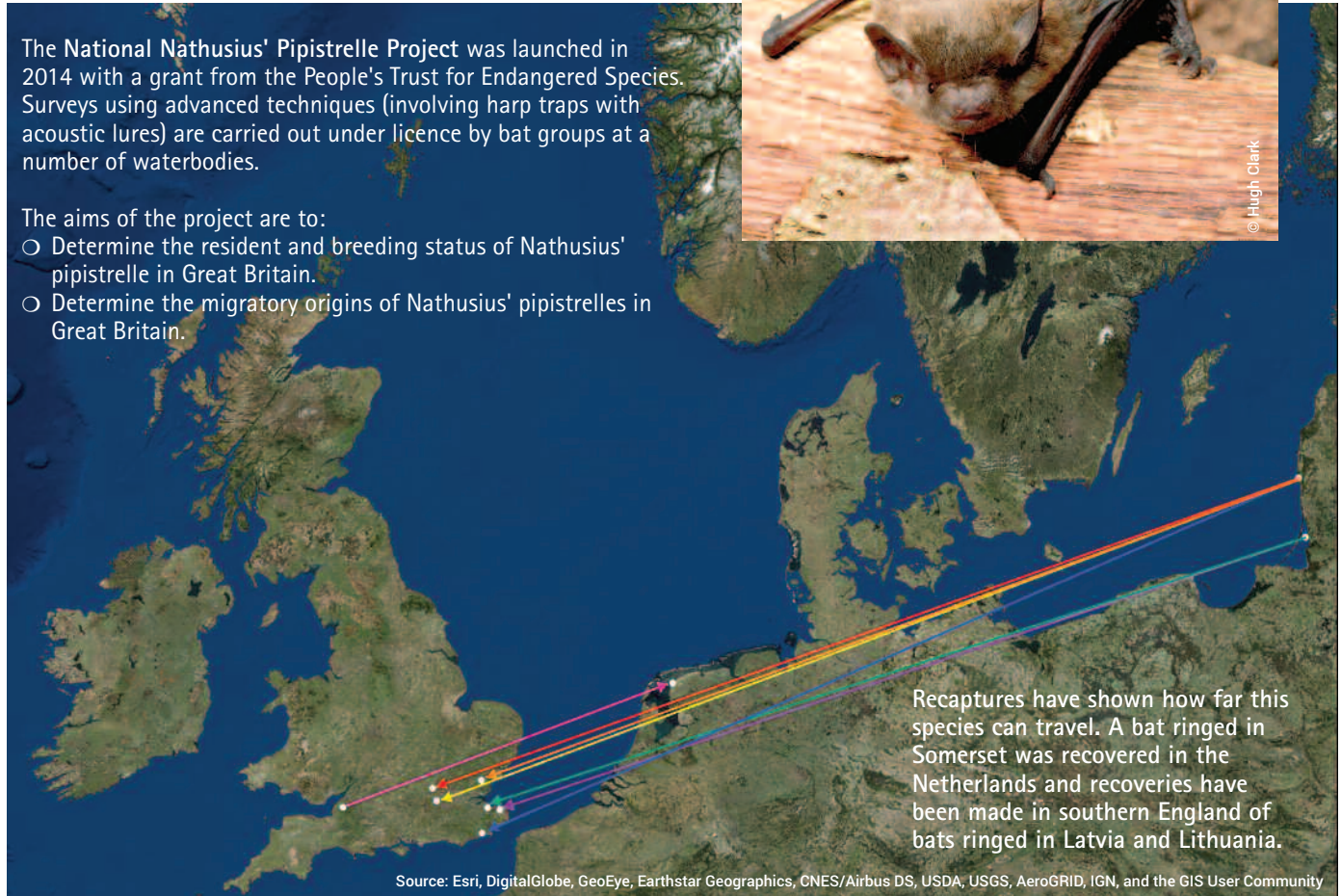
Nathusius' pipistrelle

Nathusius' pipistrelle occurs across the UK with a peak in records during the late summer and autumn when many individuals migrate from Eastern to Western Europe. Its ecology, current status and conservation threats in Great Britain are not fully understood.

The National Nathusius' Pipistrelle Project was launched in 2014 with a grant from the People's Trust for Endangered Species. Surveys using advanced techniques (involving harp traps with acoustic lures) are carried out under licence by bat groups at a number of waterbodies.

The aims of the project are to:

- Determine the resident and breeding status of Nathusius' pipistrelle in Great Britain.
- Determine the migratory origins of Nathusius' pipistrelles in Great Britain.



As a migratory species, Nathusius' pipistrelle has been identified to be at high risk of mortality from onshore and offshore wind turbines across Europe (see below).

The recorded range expansion of Nathusius' pipistrelle has been shown to be linked to climate change and future climate change is predicted to have further impact on this species'

distribution³. These issues highlight the need for conservation action at a European scale and the value of existing Europe-wide species and habitat conservation directives.



3. Lundy, M., Montgomery, I. and Russ, J. 2010. Climate change-linked range expansion of Nathusius' pipistrelle bat, *Pipistrellus nathusii* (Keyserling & Blasius, 1839). *Journal of Biogeography*, 37: 2232–2242.
4. Mathews, F., Richardson, S., Lintott, P., Hosken, D. 2016. Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management. Defra report WC0753
5. Newson, S.E., Evans, H.E., Gillings, S., Jarrett, D. & Wilson, M.W. 2017. A survey of high risk bat species across southern Scotland. Scottish Natural Heritage Commissioned Report No. 1008.

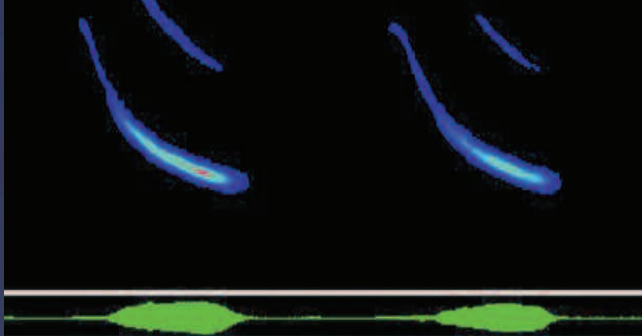
Developments and Future Directions

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 take advantage of the latest developments in low-cost sensors, bat call identification and population trend analysis.

A suite of software and hardware tools are under development, which will increase the number of bat species for which we are able to produce robust population trends, including species such as Leisler's bat and Nathusius' pipistrelle, and improve the utility of NBMP data for monitoring, planning, conservation and research.



Soprano
pipistrelle roost

© Roger Jiggins

Modelling drivers of bat population change

A new studentship between BCT, CEH and UCL will attempt to understand whether species roost dynamics impact the reliability of population trends derived from roost count data, and how to overcome any biases. This studentship will also use NBMP data and modern state-space modelling techniques to assess spatial changes in bat abundance and distribution and to reveal the causes for these changes.



Some recommendations for using automatic bat identification software can be found at: goo.gl/ut7bK9.

Nature Smart-Cities project (www.naturesmartcities.com)

The activity of urban bats in Queen Elizabeth Olympic Park, London, is being monitored in real-time using new, automated smart detectors that have been developed and installed by UCL and Intel scientists in collaboration with Arup, the Bat Conservation Trust, and the London Wildlife Trust.



This project uses cutting-edge wildlife monitoring technology, providing promising new avenues for continuous bat monitoring. Smart detectors are connected to Wi-Fi and a power supply to enable them to process audio data and give reliable identifications of bats in real-time.

© Simona Ciocoiu

How to get involved in the National Bat Monitoring Programme

You can join our network of over 3,000 volunteers across the UK who are signed up to take part in a range of NBMP surveys.

Discover bats in your local area and collect information that will help us identify how bats are faring at regional, country and UK levels.

We run surveys for all levels of skill and experience so anyone can get involved.

Find out more about the NBMP at www.bats.org.uk/pages/nbmp.html

- Sign up online and also submit your data and view summaries of your results via online recording pages.
- See the **latest results** from the NBMP and reports from other bat monitoring projects.
- Find out about bat detector training workshops across the UK and online training resources.
- NBMP volunteers receive the Bat Monitoring Post e-bulletin.

Or contact us at nbmp@bats.org.uk or on 0345 1300 228.

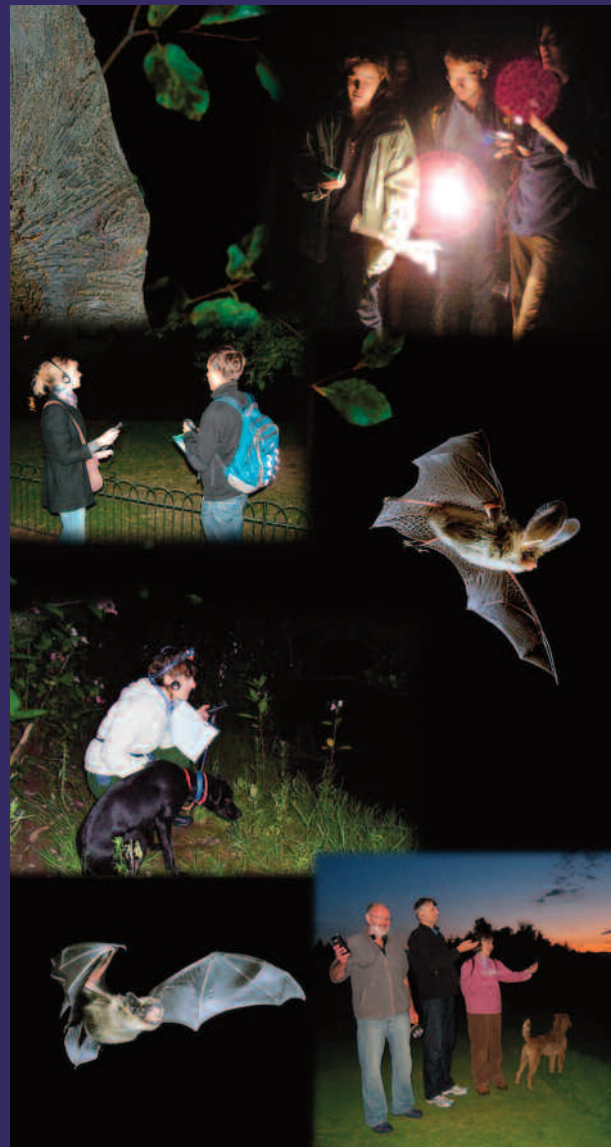
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Acknowledgements

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 and our regional trainers who generously give their time and expertise to train survey volunteers.

Compiled by Philip Briggs, Charlotte Hawkins, Thomas Sheppard and Becky Wilson.



Scottish Natural Heritage
Dualchas Nàdair na h-Alba

All of nature for all of Scotland
Nàdar air fad airson Alba air fad



This publication is dedicated to Kate Barlow (1970-2015) who made many important contributions to bat research and conservation including managing the National Bat Monitoring Programme from 2009 to 2015.



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