AGREEMENT FOR THE CONSERVATION OF BATS IN EUROPE (EUROBATS)

Report on the implementation of the Agreement in the United Kingdom

2014

This document reports on actions undertaken by the United Kingdom (UK) between January 2010 and December 2013 to meet its obligations under the Agreement.

A. GENERAL INFORMATION

Party: United Kingdom

Date of Report: July 2014

Period Covered by Report: January 2010 – December 2013

Competent Authority: The Department for Environment, Food and Rural Affairs (Defra)

Changes Regarding:

Competent Authority -
Appointed member of the Advisory Committee -
Membership of other committees/working groups -

Abbreviations

AHVLA	Animal Health and Veterinary Laboratories Agency
BCT	Bat Conservation Trust
CCW	Countryside Council for Wales[1]
Defra	Department for Environment, Food and Rural Affairs
JNCC	Joint Nature Conservation Committee
GB	Great Britain
NBMP	National Bat Monitoring Programme
NE	Natural England
NERC	Natural Environment Research Council
NRW	Natural Resources Wales
SAC	Special Area of Conservation
SNH	Scottish Natural Heritage
SSI	Site of Special Interest (Jersey classification)
SSSI	Site of Special Scientific Interest
UK	United Kingdom

[1] With effect from 1 April 2013, CCW Environment Agency Wales and Forestry Commission Wales ceased to exist as their functions were transferred to a new body called Natural Resources Wales

B. STATUS OF BATS WITHIN THE TERRITORY OF THE PARTY

1. Summary Details of Resident Species

UK

Since the reported discovery of Alcathoe bat (*Myotis alcathoe*) at swarming sites in the UK, and then at swarming sites in Southern England (Sussex) in 2010, foraging specimens of the species have been reported to occur at a further site in Northern England (Yorkshire). The addition of Alcathoe bat brings the total number of breeding resident species to 17. The bat was discovered by researchers from University of Leeds and University of Sheffield.

Gibraltar

There are currently 3 species of bat in Gibraltar; Soprano pipistrelle (*Pipistrellus pygmaeus*), Schreiber's bat (*Miniopterus schreibersii*) and the European free-tailed bat (*Tadarida teniotis*).

Jersey, Channel Islands

Although 12 species of bats have been recorded in Jersey it is likely that the Island is host to only 9 or 10 of these with other species occurring as either seasonal migrants or occasional vagrants.

As an island positioned 15 miles from the French mainland with offshore reef systems providing convenient stepping stones, occasional vagrants are more than likely.

2. Status and trends

UK

Status of UK's bat species monitored by the National Bat Monitoring Programme (NBMP) carried out by Bat Conservation Trust (BCT) on behalf of the Joint Nature Conservation Committee (JNCC)

Table 1 below summarises NBMP trends to 2013. This information and full details of NBMP survey and analysis methods are available in the online NBMP 2013 Annual Report, published in May 2014, which can be read on the following pages: http://www.bats.org.uk/pages/nbmp_annual_report.html.Further explanation for some species is provided via a short explanatory discussion below.

At present sufficient data are collected by the programme to produce population trends for 11 of the UK's 17 resident bat species. In 2013, five species showed statistically significant increases in at least one survey. Significant positive trends were reported for the following species:

1. **Greater horseshoe bat** *Rhinolophus ferrumequinum* (Roost Count)
2. **Lesser horseshoe bat** *R. hipposideros* (Hibernation Survey & Roost Count)
3. **Natterer's bat** *Myotis nattereri* (Hibernation Survey)
4. **Daubenton's bat** *M. daubentonii* (Hibernation Survey)
5. **Common pipistrelle** *Pipistrellus pipistrellus* (Field Survey)

From these results we conclude that both the greater horseshoe bat and lesser horseshoe bat populations are increasing. The greater horseshoe bat population is considered to be increasing due to the significant increase in the Roost Count and an almost significant increase seen from the Hibernation Survey. We also conclude that the common pipistrelle population is increasing, as Field Survey data are considered to be more reliable than Roost Count data for this species. It is less clear whether the increasing trend seen in Natterer's

bat from the Hibernation Survey is a real reflection of population increase or other factors as the Roost Count data do not support the increase. Daubenton's bat is showing a small, but significant increase from the Hibernation Survey and a small, but not significant increase from the Waterway Survey so it is unclear at the moment whether this species is stable or increasing at the UK level.

The Field Survey showed a significant increase for common pipistrelle and a stable trend for soprano pipistrelle, and these Field Survey trends are presently considered more robust than the Roost Count trends which reported a significant negative trend. The negative trends may be highly influenced by the mobility of these species.

Whiskered/Brandt's bat, brown long-eared bat, soprano pipistrelle, noctule and serotine all showed no significant trends for the period of monitoring to 2013 in other surveys at the UK level. The Hibernation Survey trend for the whiskered/Brandt's bat species group has shown a small, but not significant increase in population trend. Both the Roost Count and Hibernation Survey trends for brown long-eared bat have fluctuated over the period of monitoring but there is no overall significant trend from either survey. Soprano pipistrelle showed a borderline significant increase in the Field Survey in 2010 but this has been followed by a decrease and the overall trend is stable for the period of monitoring. Noctule had also started to show an increase due to very high counts in 2008 but counts have dropped in subsequent years and the overall trend is not significant. No significant trend has been shown for serotine from either the Field Survey or Roost Counts. Sample sizes are small and confidence limits relatively large for this species, however, as it is encountered relatively infrequently and has a restricted range in the UK, and it may be difficult to detect trends.

Whilst these are positive results, it should be remembered that these trends reflect relatively recent changes to bat populations since the 1990s and it is likely that prior to this, in the second half of the twentieth century, there were significant historical declines in bat populations.

Table 1: UK long-term population trends and average annual percentage change

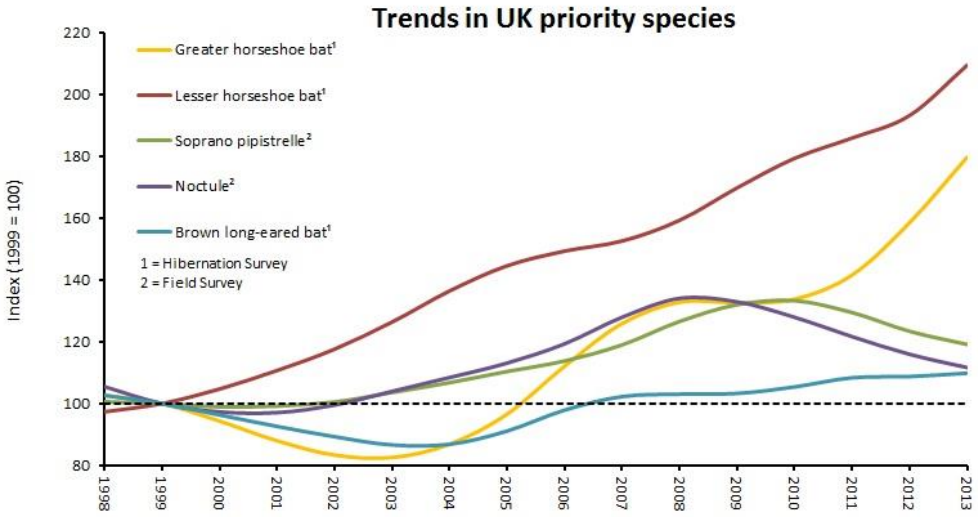
Species	Status	Survey	Trend time period	Long-term trend (since base year) %	Average annual change (since base year) %	Comments
Rhinolophus ferrumequinum	Rare	Hibernation Roost	1997-2011 1997-2011	79.6 109	4.3 5.4	Statistically significant increase from Roost Counts
Rhinolophus hipposideros	Rare	Hibernation	1997-2011	109	5.4	Statistically significant increase on both surveys

Species	Status	Survey	Trend time period	Long-term trend (since base year) %	Average annual change (since base year) %	Comments
		Roost	1997-2011	60.7	3.5	
Myotis mystacinus / M. Brandtii	Common in N and W England, rare elsewhere	Hibernation	1997-2011	31.4	2.0	No significant change
Myotis nattereri	Common	Hibernation Roost	1997-2011 2000-2011	93.6 -14.3	4.8 -1.4	Statistically significant increase from Hibernation Survey
Myotis daubentonii	Common	Hibernation Waterway	1997-2011 1997-2011	22.7 4.5	1.5 0.3	Statistically significant increase from Hibernation Survey
Eptesicus serotinus	Widespread but scarce in southern Britain	Field Roost	1998-2011 1997-2011	32.1 -25.7	35.2 -29.1	No statistically significant change from either survey
Nyctalus noctula	Uncommon	Field	1998-2011	11.7	0.8	No statistically significant change
Pipistrellus pipistrellus	Common	Field Roost	1998-2011 1997-2011	66.0* -54.0	3.7* -5.4	Both changes statistically significant; Field Survey considered more robust, therefore considered to be increasing
Pipistrellus pygmaeus	Common	Field Roost	1998-2011 1997-2011	19.2 -49.4	1.3 -4.7	Field Survey considered more robust, no statistically significant change
Plecotus auritus	Common	Hibernation Roost	1999-2008 2001-2011	9.9 12.4	0.7 1.00	No statistically significant change from either survey

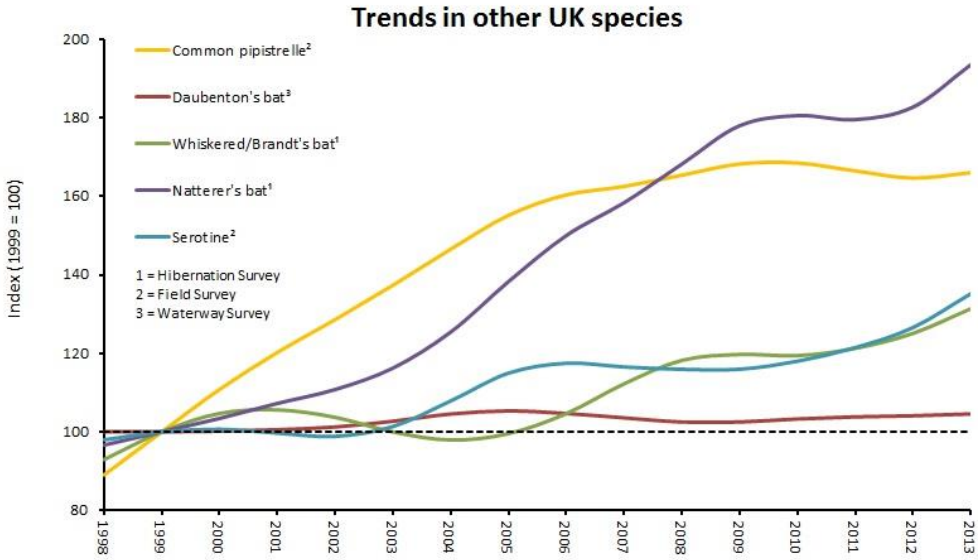
The total NBMP site network now stands at 5,976. In 2013 a total of 2,019 sites were monitored by 1018 dedicated NBMP volunteers. For the core surveys, 39% of these were repeat sites.

Figure 1: NBMP trends to 2013 for a) UK priority species and b) other species.

a)



b)



For the remaining UK bat species (Bechstein's bat, Alcathoe bat, Leisler's bat, Nathusius' pipistrelle, barbastelle, grey long-eared bat) there are insufficient data available at present to allow calculation of population trends (Table 2).

Table 2: Summary information for species with limited trend data

Species	Status	Survey	Trend time period	Long-term trend %	Average annual change %	Comments
Myotis bechsteinii	Very rare	No trend data available; baseline distribution survey completed in 2011. (http://www.bats.org.uk/pages/bechsteins_bat_project.html)				
Nyctalus leisleri	Scarce in GB, common in Ireland	Recorded on Roadside Survey but more data needed to detect trends.				
Pipistrellus nathusii	Rare	Recorded on Roadside Survey but more data needed to detect trends. Systematic distribution survey run since 2009. (http://www.bats.org.uk/pages/nathusius_pipistrelle_survey.html).				
Barbastella barbastellus	Rare	No trend data available. Recorded on Woodland Survey at SAC sites to monitor presence.				
Plecotus austriacus	Very rare	No trend data available.				
Myotis myotis	Status unconfirmed	Only one individual known in UK at present; recorded on Hibernation Survey.				

Bechstein's bat (*M. bechsteinii*)

This rare species, which is associated with semi-natural woodlands, 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 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 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. Between 2009 and 2011, 199 target woodlands were surveyed in which 838 bats of 12 species were caught, identified and released. This included 57 Bechstein's bats (29 female and 28 males) at 37 sites. The full report was completed in January 2012 and can be downloaded here:
http://www.bats.org.uk/pages/bechsteins_bat_project.html
An article on the project and follow on work was published in British Wildlife in 2013 (Barlow et al. 2013).

Barbastelle (*B. Barbastellus*):

The NBMP Woodland Survey was originally piloted in 2004 by BCT as a new method to survey and monitor bats in woodlands with particular focus on barbastelle. It has been further developed with funding from NE, to monitor woodland sites that are designated as Special Areas of Conservation (SACs) due to the presence of barbastelles. Currently, NE fund monitoring of barbastelles using the Woodland Survey method as part of the NBMP, principally at sites that have been designated as SACs for this species' presence. Six sites are currently targeted for surveying using the Woodland Survey method (5 in England and 1 in Wales). All of these sites were surveyed in 2013: Ebernoe, The Mens, Eversden and Wimpole Woods, Exmoor and Quantocks Woodland, Mottisfont and North Pembrokeshire Woodlands. All sites had confirmed presence of barbastelles.

Nathusius' pipistrelle (*P. nathusii*):
Nathusius' pipistrelle is generally not encountered during standard surveys. 192 volunteers have taken part in the Nathusius' pipistrelle survey between 2009 and 2013 surveying 230 sites.

Nathusius' pipistrelle presence has been verified through sound analysis at 70 sites (30% of sites surveyed). A further 80 sites (35% of sites surveyed) have had possible but unconfirmed Nathusius' pipistrelle records. These include sites where Nathusius' pipistrelle was reported but recordings were not made that would enable verification, and ambiguous calls identified from recordings. These will be a priority for revisiting with broadband detectors and recording equipment in future years.

Grey long-eared bat *(P. austriacus)*:
The grey long-eared bat is one of the rarest bat species in the UK. It may be under-recorded due to the difficulty of separating it from brown long-eared bat. In 2012, JNCC provided funding for a project to improve our knowledge of the distribution of grey long-eared bat across its UK range. The project involved carrying out DNA analysis on droppings collected from long-eared bat roosts in target areas to provide verified identification to species level. 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. As part of the project, 73 samples from 44 roosts were submitted to the laboratory for DNA analysis. A single new grey long-eared roost was identified in Devon.

A new conservation management plan for grey long-eared bat was published in 2013 based on research conducted at University of Bristol supported by BCT. The management plan can be downloaded from the BCT website (see http://www.bats.org.uk/pages/conserving_grey_long-eared_bats_across_our_landscape_a_conservation_management_plan.html). Key recommendations included allocating the grey long-eared bat "priority species status" to assure full protection to all maternity colonies and their surrounding foraging habitats and implementing mandatory molecular species identification of droppings collected from all long-eared roosts within the species' distribution where development or bat exclusion are planned.

Jersey, Channel Islands
This status report is a culmination of data from 2006 to 2013. Although baseline data was established in 2001, monitoring methodologies have since been adapted to better reflect the species composition and available sampling resource.

Jersey has adopted iBats as the primary monitoring methodology however additional data is available from roost exit surveys, isolated samples and studies, VLA submissions and the genetic analysis of droppings. Meaningful trend analysis depends on sufficient sample data which is not yet available.

Table 3 : Summary information for bat species observed in Jersey

Species	Status	Comment
Rhinoloplus ferrumequinum	Unknown, possible vagrant	Sound recording made in June 2013.
Myotis nattereri	Uncommon resident	Present in 2010 (2nd Jersey Bat Report)
Myotis mystacinus	Uncommon resident	Roost discovered 2012 through DNA analysis of droppings.
Plecotus austriacus	Relatively common resident	Present in 2010 (2nd Jersey Bat Report)
Plecotus auritus	Uncommon resident	5 pregnant females recorded 2011.
Pipistrellus pipistrellus	Common resident	Present in 2010 (2nd Jersey Bat Report)
Pipistrellus pygmaeus	Relatively common resident	Present in 2010 (2nd Jersey Bat Report)
Pipistrellus nathusii	Relatively common resident	Present in 2010 (2nd Jersey Bat Report)
Pipistrellus kuhli	Uncommon resident	2 dead bats found in 2011
Pipistrelles savii	Unknown	Likely uncommon resident or vagrant. Last definitive record 1996
Eptesicus serotinus	Unknown	Believed uncommon resident
Nyctalus leisleri	Unknown, possible vagrant	One male individual recorded 20.5.02

3. Habitats and Roost Sites

UK

The UK's habitats are protected by both European and UK legislation and directives. Habitat and roost protection information can be found under section 7.

Jersey, Channel Islands

Habitats are designated as Sites of Special Interest (SSI) sites through the Planning and Building (Jersey) Law 2002. The States of Jersey Island Plan 2011 specifically targets: conservation and enhancement of biological diversity, species protection, wildlife corridors and trees, woodland and boundary features. Mitigation of impacts is required through the development control process.

The Conservation of Wildlife (Jersey) Law 2000 protects all species of bats and their roosts.

4. Threats

Main threats to bat conservation within the UK are:

- Building demolition;
- Maintenance and alterations to buildings (including inappropriate timing of works);
- Woodland management and tree work;
- Barn conversions;
- Loss of habitat due to development;
- Loss of traditional farmland landscape and agricultural practices;

- Disturbance to underground sites;
- Lack of knowledge on what mitigation approaches are successful;
- Potential impact of wind farms;
- Inappropriate management or clearance of key habitats for foraging, commuting and roosting bats (including inappropriate timing of habitat management):
- Habitat fragmentation:
- Zero/low carbon new build which does not include space for bats.

In addition there is a threat which, although it is not new, is increasing:

- Tree diseases requiring active measures to control/contain

In Gibraltar main threats are:

- Development and subsequent loss of foraging habitat in the vicinity of the Upper Rock Nature Reserve;
- Re-roofing;
- Cliff Stabilisation works.

The main threat to bats in Jersey is the loss or damage of roost sites. This can come about through the maintenance alteration and demolition of buildings, the conversion of older structures or associated tree work, habitat loss through development and habitat fragmentation. All bat species found in Jersey can be found roosting in buildings.The move to low carbon new build construction techniques is likely to exclude bats from new structures at least for some species of bats. The upgrading of current housing stock to increase energy efficiency may also compromise current roosts.

White-nose syndrome

In 2012-13 BCT, the Animal Health & Veterinary Laboratories Agency (AHVLA) and Northern Arizona University collaborated on a small scale project to test for the presence of *Pseudogymnoascus destructans (*Pd*)* (the fungus that causes white nose syndrome (WNS) in North America) in environmental samples at sites in the South East of England. Soil and surface swabs were collected from six sites by NBMP volunteers, and positive results were confirmed at five of these sites.

In addition we have also had two positive results – one in 2013 and the second in 2014-for the fungus from samples taken on live bats, as part of the on-going passive surveillance programme (with testing provided by AHVLA). Like the rest of Europe, there have been no cases of WNS in the UK.

Following on from these positive results the UK is currently taking part in a pan-European project, to understand the distribution of Pd across Europe. This is another collaboration supported by the AHVLA and BCT and led by a research team in Germany. NBMP volunteers collected environmental samples from 26 sites across the UK for inclusion in this project. Results are expected in late 2014.

Bat workers and carers are encouraged to follow the WNS guidelines, produced by BCT (with the support of the UK's various Statutory Nature Conservation Organisations). These are updated prior to each hibernation season, to reflect the latest research and findings from within the UK and other countries. Any suspected cases continue to be tested as part of the passive surveillance programme.

Rabies

Only 10 positive case of EBLV (type 2) have been confirmed since surveillance began in 1987. The last in the UK was found in 2009. Public Health England, Public Health Wales, Health Protection Scotland, Public Health Agency (Northern Ireland), AHVLA and Defra continue to monitor bat bite issues and incidents as well as supporting the UK wide passive monitoring programme. BCT's National Bat Helpline provides appropriate information and guidance in response to any calls involving a bat bite. Rabies guidance information, which is reviewed annually, is available for bat workers and bat carers.

Other parts of the British Islands, specifically Jersey and the Isle of Man contribute recovered dead bats to the AHVLA as part of the ongoing passive monitoring programme.

5. Data Collection, analysis, interpretation and dissemination

UK

The National Bat Monitoring Programme (NBMP)

NBMP has been run by BCT since 1996. Since 2001, NBMP has been a partnership with JNCC, including funding from NE. In 2012 two new partners joined the programme, Defra and CCW (now NRW). It is the longest running purpose-built multi-species monitoring programme for mammals in the UK, producing statistically robust population trends for 11 of the UK's resident bat species. Four core survey methods are employed to monitor the UK's bats:

- Field surveys with bat detectors;
- Hibernation site surveys;
- Summer maternity colony counts; and
- Car survey with broadband detectors.

Trends (see Table 1 and Figure 1) and methods are reported annually on the BCT website http://www.bats.org.uk/pages/results_and_reports.html . Recent work included completion of a literature review to identify potential drivers of population change, and extending the applications of the data through research collaborations including several PhD research studentships that are utilising NBMP data (see section 12). Work is underway to replace the existing NBMP database and to develop online data entry for volunteers taking part in the programme; the first phases of the online reporting were launched in 2013 (for Roost Counts and Hibernation Surveys). Geo-referencing of NBMP survey data was also undertaken during 2012 to allow future spatial representation and analysis of data from the programme.

Use of bat population trend data in biodiversity indicators

A composite indicator on trends in bat populations, to contribute to our overall understanding of changes in biodiversity and increase public awareness of changes in populations is published for England and the UK. These indicators are updated annually (between October and December) and the most recent versions of the indicators are published on the JNCC website (see http://jncc.defra.gov.uk/page-4271) and at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/252290/5_farmland_species_FINAL.pdf respectively.

During this period European Environment Agency commissioned work to develop a prototype indicator of trends in European populations of hibernating bats. The work was led by a partnership of BCT, Dutch Mammal Society and Statistics Netherlands with the

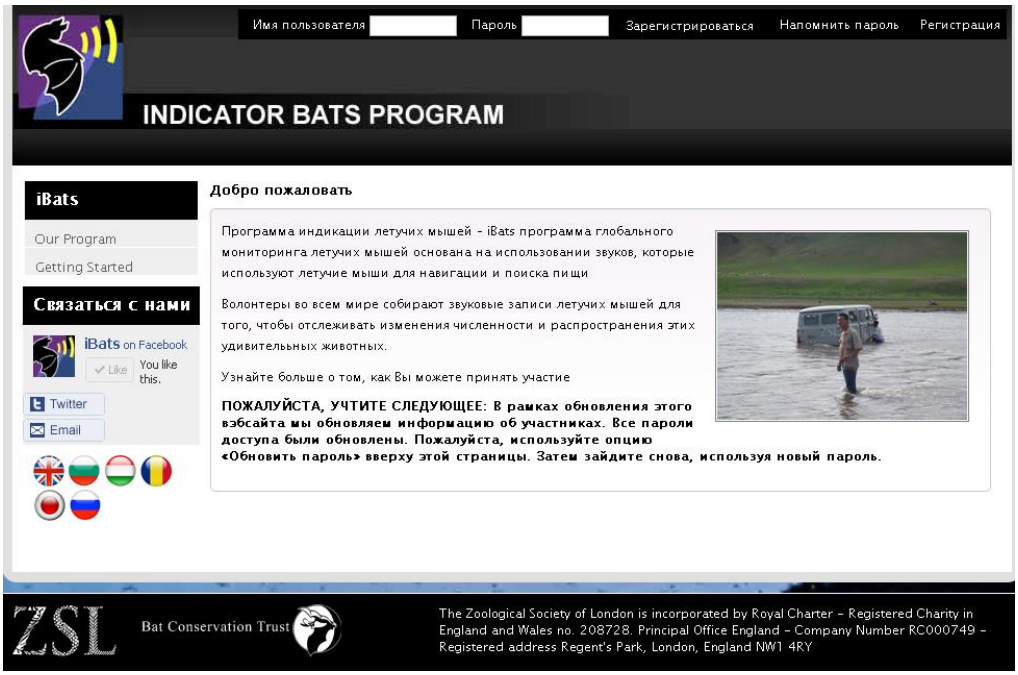
cooperation of national and regional monitoring schemes from nine countries. The work was undertaken in autumn 2011 and was published in January 2014 (see http://www.eea.europa.eu/publications/european-bat-population-trends-2013). The publication attracted global media attention with more than 200 articles published in leading newspapers and interviews on prime-time radio current affairs programmes in the UK and several other countries**.**

Indicator Bats Program (iBats)

The Indicator Bats Program (**iBats**), a partnership project between The Institute of Zoology and BCT, aims to develop national bat monitoring programmes globally in order to generate long-term data on biodiversity indicator species to assess the impact of national developments and global climate change.

All data are now reported through the iBats web portal (www.ibats.org.uk). It has a better reporting tools for volunteers than are currently available and it has been translated into 6 languages of the different countries involved in iBats. The new web portal not only improves the data management aspect of the project but also allows volunteers to explore their own data more easily: data and training resources can be easily viewed and downloaded by the project volunteers, for example to generate maps of data, download survey routes and geo-referenced bat call data, and produce reports.

Figure 2: The new iBats web portal (Russian language version).



The web portal incorporates transect data gathered using the application for the iPhone and smartphones running the Android operating system.This application was completed in collaboration with Dr. George Roussos at Birkbeck (University of London). The 'iBats app' allows a smartphone to be directly attached to the ultrasonic detector and the sound recorded and geo-referenced directly onto the phone. These geo-referenced files are automatically uploaded onto the web portal, replacing the recording device, GPS unit and the recording sheets. These applications were launched in June 2011 and are available for

free to download from iTunes or the Android market place. Survey protocols relating to the iBats smartphone application were developed and made available on the website.

Figure 3: Screenshots from the iBats application

Funding from the Rufford Foundation and The Darwin Initiative allowed these developments to be made. Along with additional funding from the Whitely Award to the Western Russian NGO (PERESVET) for continued monitoring in 2011, 80 (40 repeats) transects were completed in Russia, which exceeded expectations and 44 (21 repeats) transects were collected in 2011 from Ukraine, which was slightly below the target of 50. However, additional work was done instead on improving analysis techniques.

As part of the iBats programme the methods for analysis of data have been improved and standardised, by using a modified version of Sonobat to isolate bat calls and automatically extract call parameters. The processing time for a 90 minute recording has been reduced from 6-8 hours to 1 hour. Parameters are extracted from each call and stored as text files. A neural network tool for species identification for Eurasia has also been developed. This identification tool was trained using 12 call parameters measured from over 1250 calls from 33 species of European bats. The network is hierarchical, whereby species are first classified as 1 of 5 ‘higher groups’ and are then classified to species level within each group. Recognition rates for the 5 main groupings of bat species is excellent, with an average of 98.7% of calls classified correctly at this stage. Identification to species level within each group varies between 61.5 and 100%. The best recognition rates are within *Rhinolophus* and the worst within *Myotis.*

Call abundances between countries, a review of the project and an initial analysis of the habitat suitability for the common pipistrelle bat (*Pipistrellus pipistrellus*) were published (Jones *et al*. 2011 In: Biodiversity monitoring and conservation: bridging the gaps between global commitment and local action. Eds. Collen, B, P. *et al*. Blackwell Press, London). A review of the challenges of developing a global bat acoustic monitoring programme and the technical challenges of identifying species from acoustic signals was also published (Walters, *et al.* 2013. In: Current trends in bat evolution, ecology and conservation. Eds. Adams & Pedersen, Springer Science Press). A paper using the techniques by Dr. Jon Russ

was published (Roche *et al*. 2011. Animal Conservation), which shows trends in 3 species over a 6 year monitoring period in Ireland.

In the UK, since the surveys started in 2005, 405 surveys have taken place along 229 routes involving 189 volunteers. This amounts to just over 14,500km and 5,220 echolocation calls have been identified along these transects.

BICCO-Net

The BICCO-Net project (www.bicco-net.org) is a multi-taxa study funded by Defra and the UK Statutory Nature Conservation Organisations that is investigating links between species populations and climate change. The project brings together analyses on all major UK species population monitoring data sets, including NBMP data provided by BCT, to identify which weather variables affect species' population growth across species groups and the times of year when species are most sensitive to change.

Gibraltar

Bat monitoring is carried out throughout Gibraltar on an intermittent basis.

Jersey, Channel Islands

Jersey ibats

Jersey completed its third year of the iBats monitoring programme initiated 2011 in line with established protocol, in order to:

- to provide long-term monitoring at the local, national and regional level.
- to increase the number of records of mammals (primarily bats) along roads;
- to determine which roadside habitats are important for bats;

In 2013 IBats program covered 280 km of car transects where ultrasonic detectors capture bat echolocation calls on driven routes.

11 transects were each monitored twice, with the addition of a trial new transect made by bicycle on the railway walk and around the adjoining sports fields. This takes the monitoring to areas that are beyond the scope of motorised transport and additional bicycle transects are likely to be added in subsequent years.

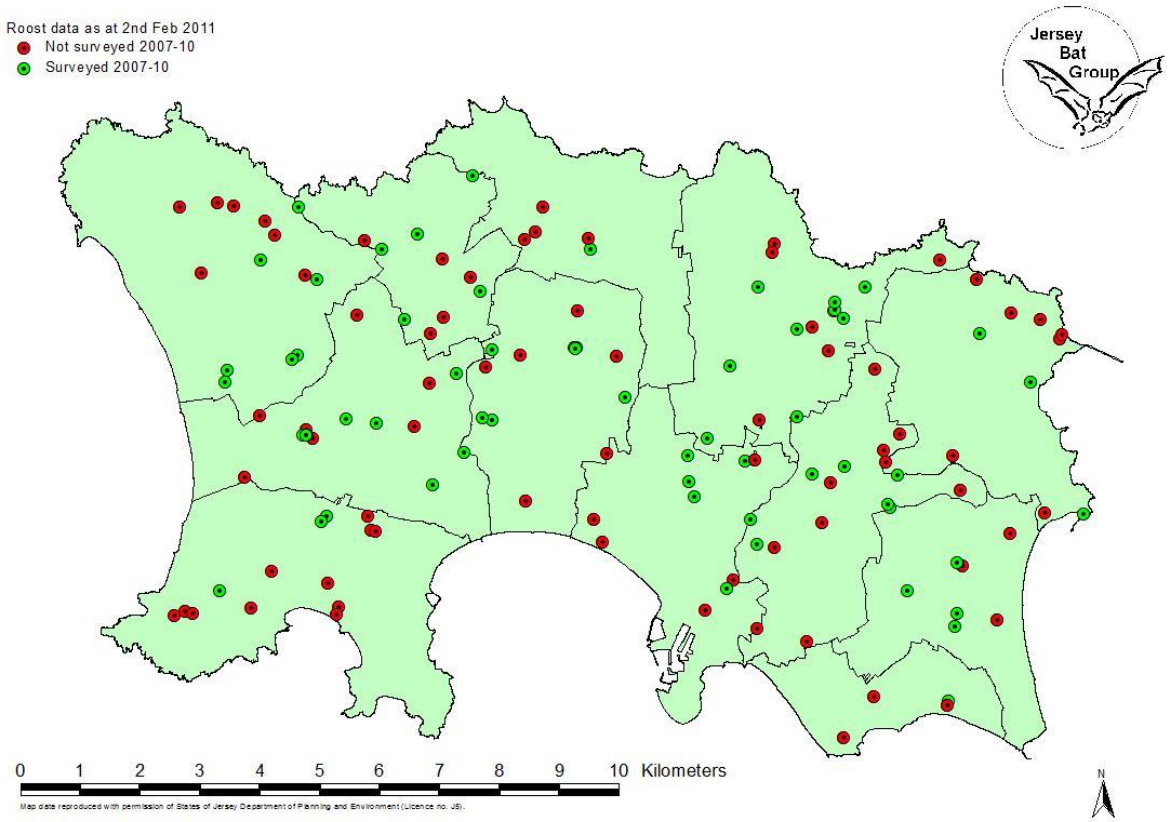
Total transect distance surveyed to date is 1,713km. The project is in part run with the support of a group of volunteers. Repeat surveying of transects over time produces population trend data.

Figure 4: iBat transects recording Jersey bats

Jersey Bat Group roost exit survey program

The Jersey Bat Group monitors bat roost occupancy as well as maintaining the bat roost register. This is done throughout the summer period by volunteers performing evening bat emergence surveys. In 2011 Jersey had 136 known or suspected bat roost sites illustrated below outlining roost surveyed and not surveyed.

Figure 5:



Newly identified roosts and queries made by the public are also assessed and added to the roost register.

C. MEASURES TAKEN IN ACCORDANCE WITH ARTICLE III TO THE AGREEMENT

6. Legal measures taken to protect bats, including enforcement action

UK

Bat crime has been confirmed once again as one of the UK's wildlife crime priorities and has equal standing with issues of raptor persecution and the illegal trade in endangered species. The BCT's Investigations Project continued to operate during 2010-2013. BCT have been working with government agencies to raise awareness of bat crime, prevent offences and to assist with effective investigations and prosecutions. BCT submits intelligence directly to the National Wildlife Crime Unit (NWCU).

In 2013, BCT referred 125 allegations of bat crime to the Police (134 in 2012 and 138 in 2011). The building development and maintenance sector were the focus of the vast majority of referred incidents. Proactive police action prevented a large number of offences occurring.

2013 saw four incidents of bat crime being heard by the courts, results were mixed with one offender receiving a fine of only £35 for each of seven roosts destroyed. A further four cases carried over from 2013 have also been heard and in a ground breaking decision one offender was referred to the upper court where consideration is to be given to the seizure of assets under Proceeds of Crime legislation (appeal against conviction now pending).

Further details on the Investigations Project can be found at:
http://www.bats.org.uk/pages/bat_crime_investigations.html

Natural Resources Wales (NRW) has developed a "Programme of Works Licence" process under which a range of forestry management activities are undertaken under a licence issued annually at a Forest Design Plan scale. The licence is issued with appropriate prescriptions selected from a toolkit for activities that could otherwise contravene the Conservation of Habitats and Species Regulations 2010.

NRW issues all species licences, a function formerly undertaken by CCW. NRW provides a free advisory service to householders and works with developers and Local Planning Authorities to ensure that impacts on bat populations are considered as part of the planning process.

Scottish Natural Heritage (SNH) continues to provide advice to householders as required, including a free roost visit advisory service, if necessary. These visits are undertaken by contracted bat workers. Advice is also provided to developers, planners and consultants on a day to day basis in relation to proposed developments and supporting Environmental Statements.

SNH continues to provide funding for the BCT's Scottish Bat Officer and is working with the Trust to find ways to improve the level of NBMP coverage in Scotland.

Jersey, Channel Islands

The Conservation of Wildlife (Jersey) Law 2000 protects all species of bats found in Jersey under Schedules 1 (protected wild animals) and 3 (animals which may not be killed or taken by certain methods).

Locations of known roosts are held by the Jersey Bat Group on a register that enables the cross-referencing of development applications and a process for identifying potential roosts has been developed. Planning applications are screened by the States of Jersey Natural Environment team. When a likelihood of bats is identified, conditions are applied to planning permits to protect the bats and their roosts. Visits and evidence of bats are recorded and added to the roost register.

In 2013, 1,767 planning applications were screened for their likely impact on bats of which 376 underwent a more detailed investigation. Of these applications 269 permits were issued that held conditions directly relating to the protection of bats. All properties identified for government support under the energy efficiency service were checked against the list of known roosts prior to undergoing enhancement.

7. Sites identified and protected which are important to the conservation of bats

England

Natural England commissioned BCT to complete a review of sites within the NBMP database that match the SSSI designation criteria in England. The work involved extracting sites from the NBMP database that match the JNCC SSSI criteria for bats and had at least 5 years of monitoring data, checking against existing SSSI sites, gathering additional information on the sites from the volunteers involved in their monitoring and mapping the sites using GIS. A number of potential SSSI sites proposed by Natural England were also assessed. The work was completed between December 2011 and March 2012 and a report was provided to Natural England on the site assessments. In 90 cases at 80 sites the SSSI criteria were met (at least to some extent) for bats.

Wales

In 2011, 4 new SSSIs with bat interest were designated - three for greater horseshoe bats and one for lesser horseshoe bats. One SAC site with lesser horseshoe bat interest was enlarged.

In 2012 one new SSSI was designated for bats in Wales comprising a breeding roost of about 250 lesser horseshoe bats and habitat used as flight routes from the roost.

No new SSSIs were designated in 2013 although surveys were undertaken for a proposed SSSI for lesser horseshoe bats.

Scotland

There are no sites designated specifically for bats in Scotland. However, several important sites with high bat species richness, e.g the National Trust for Scotland properties at Threave and Culzean are protected by virtue of their ownership.

Jersey, Channel Islands

Two key woodland sites are proposed as ecological Sites Special Interest – St Catherine's Wood and St Peter's Valley. Designation is awaiting final sanction. No sites have yet been designated purely on their value for bats.

8. Consideration given to habitats which are important to bats

UK

Churches

Many ancient churches are also traditional roosting places for bats. Although congregations often coexist with small numbers of bats, larger roosts can create problems because of the quantity of droppings and urine produced in the summer. In this situation, people may be deterred from holding services and other events at the church, cleaning the church may be difficult or expensive, and artefacts or the church fabric may be damaged.

The *Bats, Churches and Communities* pilot project was funded by NE between November 2012 and August 2013 focused on improving the guidance and support available to churches that have problematic bat roosts and improving information exchange As part of the project information for church communities about bats and the National Bat Helpline service has been updated on the BCT website including a number of case studies (see http://www.bats.org.uk/pages/bats_and_churches.html).

Defra funded a project to look at whether bats could be safely encouraged/discouraged to relocate within the church to other areas in the building that are considered less sensitive by congregations. Tests were conducted using tailored light and acoustic deterrents in selected churches in the East of England, the region that generates most church enquiries about bats. Results of this research suggest that judicious use of acoustic and lighting deterrents may enable Natterer's bats to be deterred from roosting and flying in areas of churches where they cause problems and that this can be achieved without detrimental effects on behaviour, at least in the short-term. However particular caution is required in relation to use of lighting, to avoid serious harm to bats.

A further project funded by English Heritage *Management of bats in churches – a pilot* will examine the efficacy of using deterrent approaches earlier in the year and pilot their use in five churches which experience severe problems due to the presence of bats. This project will produce a toolkit on the operation, policy and licensing of these management approaches for churches.

NRW, BCT and The Vincent Wildlife Trust are working on a project to identify woodlands important for Rare Woodland Bats (barbastelle and Bechstein's bats). Woodland management has the potential to affect these and other bat species both positively and negatively, but information on their status and distribution is lacking. The project uses habitat suitability models to help prioritise sites for bat detector surveys in the first instance. Three training workshops have been held for bat group volunteers and surveys will commence in summer 2014.

Jersey, Channel Islands
The States of Jersey Island Plan 2011 targets wildlife corridors and trees, woodland and boundary features for protection

9. Activities carried out to promote the awareness of the importance of the conservation of bats

UK

The UK continues to promote the importance of the conservation of bats.

The Bat Conservation Trust
Bat Surveys: Good Practice Guidelines
Following feedback from experts in the field and authored by professionals, in 2012 BCT has updated and revised the *Bat Surveys: Good Practice Guidelines*.
BCT are now in the process of reviewing and producing the 3rd edition of the guidelines for publication in 2015.

Professional Training Standards
BCT published Professional Training standards in 2012, designed to raise standards in professional bat work (complementing the survey guidelines) and outline the knowledge and skills required to be a responsible consultant. The standards provide an outline of what a professional consultant would be expected to know within each subject area. Details of this can be found on the BCT website (www.bats.org.uk).

Other publications
- *Landscape and Urban Design for Bats and Biodiversity* - A publication aimed at landscape architects, designers and planners was published in September 2012. http://www.bats.org.uk/pages/landscapedesign.html
- Designing for Biodiversity: A technical guide for new and existing buildings - The second edition of this text was published in September 2013.

Artificial Lighting and Wildlife Symposium 2014
The BCT in partnership with Arup will be hosting a European Symposium on Artificial Light and Wildlife: determining solutions for practitioners. The aim of the Symposium is to:

- Bring together academics, ecological consultants, bat workers and the lighting industry
- Share the current state of scientific knowledge and highlight gaps and solutions
- Introduce the UK audience to the research and practices occurring elsewhere in Europe

The presentations from the symposium are now available to view online. Other reports of interest are:

- Interim Guidance: Artificial lighting and wildlife - Recommendations to help minimise the impact of artificial lighting

- Dr Emma Stone's report: Bats and Lighting - Overview of current evidence and mitigation guidance
- Results from the consultation at the symposium

ROOST mitigation website (http://roost.bats.org.uk/)
The Roost mitigation website is a resource developed by the BCT to aid in the gathering of information on bat roost mitigation, compensation and enhancement techniques. The aim is for this site to provide accessible information to support everyone involved in bat conservation and development. The site contains 14 case studies so far.

Woodlands
BCT has continued working to counter the threat to bats from woodland management and tree work by:

- Developing in partnership with other biodiversity groups a pilot multi-taxa toolkit giving guidance for woodland managers to provide the range of habitat mosaics within a wood to help priority species.
- Producing a woodland owners guide to managing woodlands containing Bechstein's bats
- Producing a paper for submission to Department of Energy and Climate Change (DECC) on wood fuel and biodiversity.
- Taking part in consultation workshops by the Independent Panel on Forestry who were tasked by Government with shaping the future of England's forests.

BCT also operate memberships of their organisation for adults, children and teachers/youth leaders and produce membership magazines for their c. 5000 members. Regular email bulletins are also sent to interested bat workers.

Countbat Project
During 4 years (2008-2012), the Count Bat Project worked towards BCT's vision of bats and people living in harmony and tried to involve as wide a spectrum of people as possible in bat conservation with members and volunteers reflecting modern Britain. Over 20,000 people were involved in project events, 1500 bat sightings were added to the Big Bat Map and over 1,200 hours of volunteer time were generously donated. BCT has produced an end of project resource pack DVD called **'Bats for All**' which they hope will help in holding events in future and keep the spirit of the Count Bat project alive (available as a download from the BCT website).

National Bat Helpline
Review of 2013;
In 2013 the Helpline fielded a total of 10,242 bat-related enquiries (calls, emails and letters). This was lower than in 2012, and represents a reduction of 9.2% in enquiries received by BCT.
The Out of Hours (OOH) service received another 1,876 calls on top of this, and peaked at 53 calls on Saturday 14th July 2013. This is higher than 2012 and represents a 19.2% increase. The reason for this substantial increase is unknown, but it could be due to increased awareness of the service or a larger number of bats being first discovered later on in the evening.

Over the busy summer period (June, July and August) the total number of enquiries received on the Helpline was 4,282 (of which 3,192 were via phone and post and 1,090 were via email). The average number of enquiries received per day in the summer period was 47.

NE casework is an important part of the work that the Helpline does and in 2013, BCT was contracted by NE to organise and oversee all bat casework. Forty-eight percent of calls taken in 2013 were regarding a roost/potential roost in one of the NE regions.

Figure 1 below highlights the sheer variety of calls that the Helpline dealt with over the year; from general queries about bats, to specific questions about a roost; help and advice about a development or just reassurance and information.

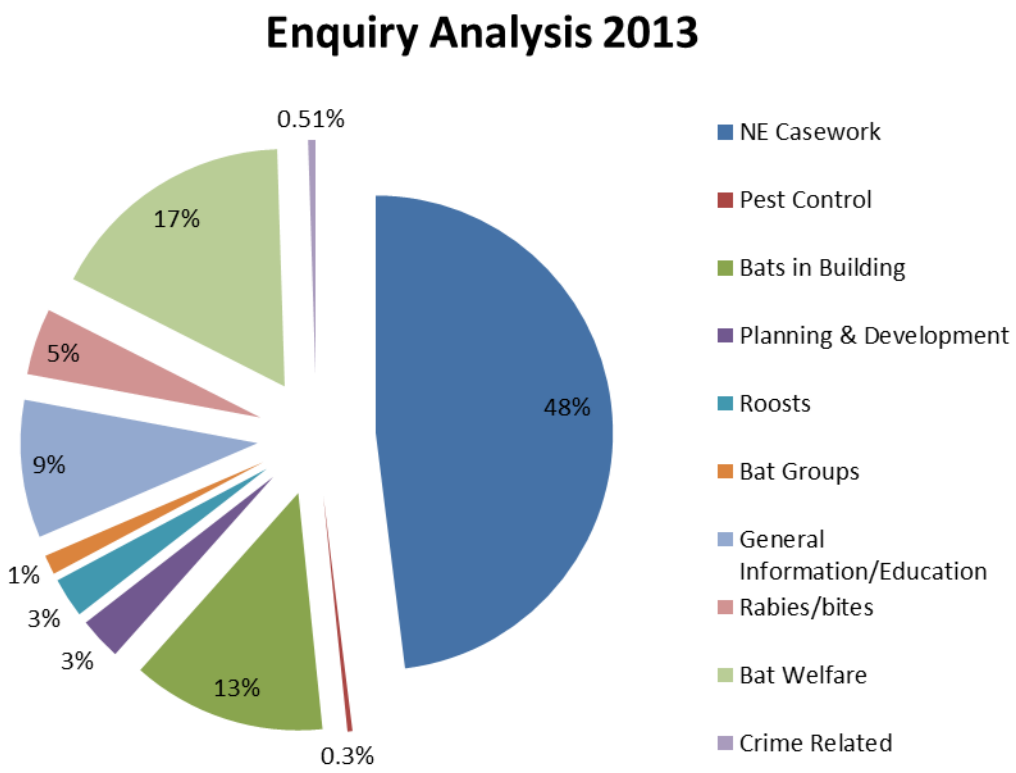


Figure 6: Variety of calls dealt by the Helpline broken down into specific categories

In 2013 the positive feedback was 90%, the same as 2012.

Increased awareness and knowledge through various sources is the likely explanation behind the slight growth in reporting possible instances of bat crime. 0.39% of enquiries the Helpline received in 2012 related to crime, rising to 0.51% in 2013.

Review of last four years;

The total number of enquiries dealt with by the Helpline in 2013 was 10,242, 11,279 in 2012, 12,534 in 2011 and 10.599 in 2010. Figure 2 below shows how the number of enquiries varies by month and year for the period 2010 – 2013.

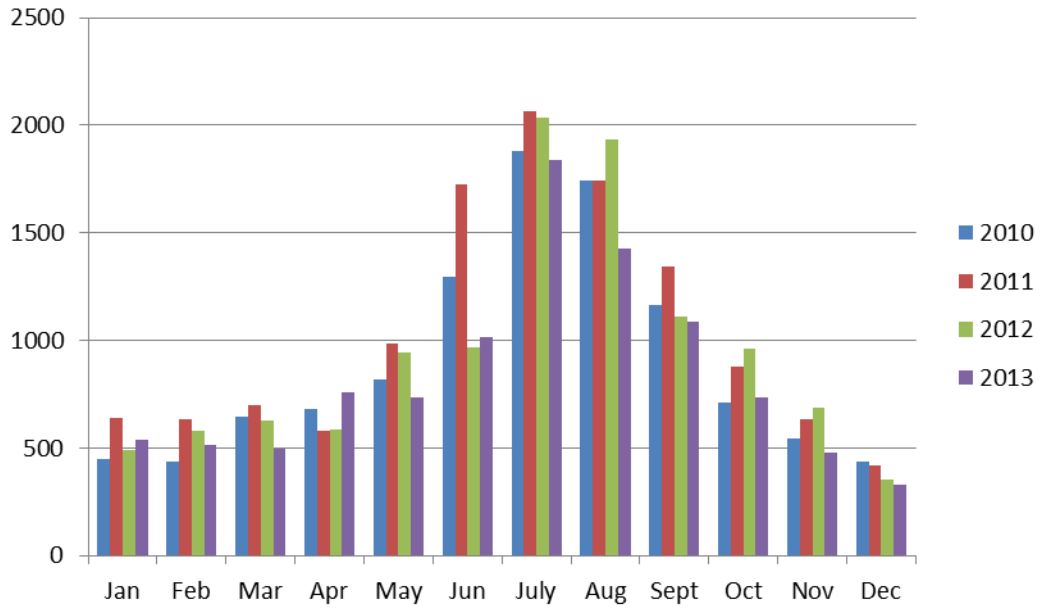


Figure 7: Number of enquiries by each month the Helpline has received over the last four years.

Figure 2 demonstrates the wide fluctuation of calls witnessed throughout each month of the last four years and can be directly correlated to the seasonal life cycle of bats in the UK.

England

Through Biodiversity 2020, NE will be seeking to develop large-scale conservation delivery mechanisms through the new environmental land management scheme (NELMS) and other relevant schemes to restore and create habitats of importance for priority species throughout the wider countryside as well as on protected sites. NE will work with its partner organizations and NGO's to deliver conservation benefits for bat species.

NE works in partnership with local government, developers, local communities and other key stakeholders to ensure every opportunity is taken through the planning process to protect and whenever possible enhance the natural environment.

NE offers a Discretionary Advice Service for planning proposals, which aims to help developers and consultants take appropriate account of species at an early stage of the proposed development.

Wales

Guidance has been produced for the Glastir Agri-Environment Scheme including mapping target areas for selected species – Bechstein's, barbastelle, greater and lesser horseshoe bats and specific packages of prescriptions for the target species. The following guidance documents were prepared - Contract Manager Guidance and Farmer Fact Sheets.

The Mammals In a Sustainable Environment (MISE) is a project undertaken by the NRW, the Vincent Wildlife Project, Waterford Institute of Technology & Waterford Council in Eire. The project will use volunteers to collect bat droppings for DNA analysis for information on the diet of selected species.

NRW continued their funding support for the Wales Bat Project. The aims of this project are to contribute towards bat conservation in Wales and the UK

Two Wales Bat Conferences were held in July 2011 and May 2013 and were, as usual, extremely popular. The first National Bat Carers Workshop was held in October 2011. A Welsh Bat Workers Day was held in 2012.

Scotland

The 2020 Challenge for Scotland's Biodiversity promotes a landscape scale (ecosystem approach) to conservation, with associated benefits to bat populations, focusing on climate change, invasive non-native species, habitat fragmentation and diffuse pollution.

The Scottish Bat Project continued to promote awareness of bats and encourage bat conservation by working with a variety of audiences. These ranged from professionals such as council architects, planners and countryside rangers through to school groups and the general public. The Scottish officer worked with bat groups across all Scotland ranging from Inverness in the North of Scotland south to the Scottish Borders. SNH continued their funding support for the Scottish Bat Project.

Particular highlights of the 2010-2013 include;

- Work on the distribution of Leisler's bats in SW Scotland has extended to the island of Arran. A preliminary survey in September 2012 confirmed (for the first time) the presence of Leisler's bats. The results have significantly extended the known range of these bats in Scotland.
- The Scottish bat workers conference in November 2011, 2012 and 2013 and "Spring into Action" April 2010. Training for council staff to raise awareness of bats and ways of protecting bat roosts and habitats.
- Training in handling bats and in hibernaculum surveys for staff of the National Trust for Scotland.
- Training to bat groups, wildlife groups, college and university students in using bat detectors and carrying out surveys.
- 3 training events for bat carers in Scotland.
- Over 20 media items were produced or initiated as a result of the Scottish project. These items ranged from TV and radio interviews to website articles, blogs, "tweets" and more conventional newspaper and magazine items.
- A new full colour leaflet "Bats in Scotland" was printed in spring 2012.
- A new version of the SNH "Bats & People" leaflet was published with new supporting web-based publication providing extensive guidance to the general public and to developers and planners etc – see http://www.snh.gov.uk/about-scotlands-nature/wildlife-and-you/bats/

Jersey, Channel Islands

The Jersey Bat Group (JBG) in close association with the Jersey Dept of the Environment ran a program of events including public bat walks and talks and in June 2013 hosted the first Channel Island Bat Conference with representatives travelling from Guernsey, Alderney and from BCT in the UK. The conference included BCT presentations about the work of the Trust and developing relationships between local bat groups and recent developments in the study of bat disease. Dr Orly Razgour from the BCT updated the conference about her study of grey long-eared bats focussing on how populations have expanded into the UK from Europe possibly via the Channel Islands, before giving an introduction into local bat species ID, habitat use and sound analysis. Channel Island bat groups provided talks about their progress, surveys and other initiatives the groups have been involved in. There was also a discussion about habitat management for bats in the Channel Islands, and about how local bat groups can further research resident populations.

10. Responsible bodies, in accordance with Article III.5 of the Agreement, nominated for the provision of advice on bat conservation and management

- Natural England
- Natural Resources Wales[2]
- Scottish Natural Heritage
- Department of Environment Northern Ireland
- Joint Nature Conservation Committee
- Bat Conservation Trust
- Environment Department of the States of Guernsey
- La Societe Guernesiaise
- Nature Conservancy Councils (Gibraltar)
- Gibraltar Ornithological and Natural History Society
- The States of Jersey Department of Environment

11. Additional action undertaken to safeguard populations of bats

Covered elsewhere.

12. Recent and ongoing programmes (including research and policy initiatives) relating to the conservation and management of bats. In the case of research, summaries of completed projects should be provided, giving references where possible and acknowledging the sources of funding.

UK

The Bat Conservation Trust

Welsh Agri-environment Scheme Monitoring

From April 2009 to March 2012, a consortium of wildlife NGOs led by RSPB investigating the impact of the Welsh higher level agri-environment scheme, Tir Gofal, on farmland biodiversity. Funded by Welsh Government, this contract involved the monitoring of a range of flora and fauna on Welsh farmland and addressed the question: does the Tir Gofal agri-environment scheme help maintain and enhance biodiversity?

Over the three years of the project, BCT carried out 684 bat surveys at 290 farms across south Wales. Target species were detected on most farms and BCT have collected new records for serotines, which are rarely recorded in Wales. The project is now complete and the final report has been submitted to Welsh Government, who have published it on their website (http://wales.gov.uk/topics/environmentcountryside/farmingandcountryside/farming/schemes/glastir/tircynnal-tirgofal-monitoring-evaluation/?lang=en).

University of Bristol - Prof. Gareth Jones

Mitigating the impacts of bats in historic buildings and houses, with a focus on churches (Defra and the SITA Trust, in collaboration with BCT)).

Researched what happens to soprano pipistrelles when they are excluded from roosts in domestic buildings, and how to reduce problems caused by Natterer's bats roosting in churches. Lead researcher is Dr Matt Zeale. Summary results of the research and a link to the full final project report can be found at www.batsandchurches.org.uk . Madeleine Ryan

[2] With effect from 1 April 2013, CCW ceased to exist as their functions were transferred to a new body called Natural Resources Wales.

(PhD student) has been investigating the use of churches by soprano pipistrelles in East Anglia since spring 2014 focusing on assessing which aspects of church structure and surrounding landscape character influence the use of churches by this species, how bats use the church and surrounding landscape throughout the year, and microclimate characteristics of roosts.

The impacts of climate change on bats.
Gareth Jones and Dr Hugo Rebelo have completed a book chapter on the effects of climate change on bats for *Bat Evolution, Ecology and Conservation*, ed. By R. Adams and S. Pedersen for Springer Verlag). Also investigating links between climatic change, distributions, and genetic diversity (Rebelo et al. (2012) and long-term changes in the timing of breeding and phenotypic plasticity (with Helen Ward, Stephen Rossiter and Roger Ransome – NERC-funded).

The impacts of street lighting on bats.
Investigate how bats respond behaviourally to lighting (lead researcher Dr Emma Stone). Investigating the impacts of new lighting technologies (Jennifer Singh, NERC) and the effects of lights of bat prey (insects, Andy Wakefield, NERC)

Using high throughput sequencing to study the diets of insectivorous bats.
PhD student Matt Zeale developed arthropod-specific primers that can be used to amplify insect DNA in bat droppings (Zeale et al. (2011) *Molecular Ecology Resources* 11: 236-244). Kristine Bohmann (Bristol and Copenhagen) is undertaking a PhD project investigating geographical and long-term temporal change in the diets of horseshoe bats using high-throughput sequencing.

Using species distribution modelling to predict bat distributions.
In collaboration with BCT, Lia Gilmour (MSc) is using these methods to locate new populations of Bechstein's bats at the edge of their range in Britain. Lia is also studying the effectiveness of calls emitted cvia acoustic lures for attracting bats of a range of species.

Bats and wind turbines.
An MSc student (Heather Nichol) is looking at acoustic activity of bats at height (in collaboration with Dr Simon Pickering of Ecotricity).

Molecular ecology of bats.
Bristol continue to research population genetics and molecular ecology of bats in Europe (grey long-eared bats – Orly Razgour, greater horseshoe bats Helen Ward – lead supervisor Dr Stephen Rossiter, QMUL), investigating the importance of populations at the edges of their edges, and the fitness consequences of genotypic variation.

Hibernation activity in bats
Paul Hope is using infrared loggers and bat detectors to monitor activity patterns in hibernating Natterer's bats. These data may be useful to establish natural hibernation behaviours that may change if populations become affected by white-nose syndrome or climate change. He has just completed a morphological analysis of winter diet in Natterer's bats, and this is being supplemented with DNA barcode data.

Bats in riparian landscapes.
Sarah-Jane Scott (jointly supervised by Professor Stephen Harris) is studying the effects of riparian buffer zones on bat activity for her PhD, and has recently focussed on edge effects.
Ecology of small *Myotis* bats.
Phil Brown is designing a study to investigate distribution and resource partitioning between *Myotis mystacinus*, *M. brandtii* and *M. alcathoe*.

Publications relevant to bat conservation in Europe

HOPE, P.R. & JONES, G. 2012. Warming up for dinner: torpor and arousal in hibernating Natterer's bats studied by radio telemetry. *Journal of Comparative Physiology 182B:* 569-578.

REBELO, H., FROUFE, E., FERRAND, N. & JONES, G. 2013. Integrating molecular ecology and predictive modelling for the conservation of rare bat species. *European Wildlife Research,* in press.

REBELO, H., FROUFE, E., BRITO, J.C., RUSSO, D., CISTRONE, L., FERRAND, N. & JONES, G. 2012. No barriers for postglacial colonization of Europe by the barbastelle bat, *Barbastella barbastellus*: agreement between molecular data and past predictive modelling. *Molecular Ecology* **21**: 2761-2774.

STONE, E.L., JONES, G. & HARRIS, S. 2012. Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats. *Global Change Biology*, **18**: 2458-2465.

ZEALE, M.R.K. & **JONES, G.** 2012. *Home* range use and habitat selection by barbastelle bats (*Barbastella barbastellus*): implications for conservation. *Journal of Mammalogy* **93**: 1110-1118.

WALTERS, C.L., FREEMAN, R., DIETZ, C., FENTON, M.B., **JONES, G**., MALTBY, A., OBRIST, M.K., PUECHMAILLE, S.J., SATTLER, T., SIEMERS, B.M., PARSONS, S. & JONES, K.E. 2012. A continental-scale tool for acoustic identification of European bats. *Journal of Applied Ecology*, doi: 10.1111/j.1365-2664.2012.02182..

RUSSO, D., CISTRONE, L. **& JONES, G**. 2012. Sensory ecology of water detection by bats: a field experiment. *PLoS ONE* 10: e48144.

STONE, E.L., **JONES, G**. & HARRIS, S. 2013. Mitigating the effect of development on wildlife: impact and effectiveness of mitigation licensing for bats in England. *Conservation Biology*, in press.

HOPE, P.R. & **JONES, G**. 2013. An entrained circadian cycle of peak activity in a population of hibernating bats. *Journal of Mammalogy* **94**, in press.

SANTOS, H., RODRIGUES, L., **JONES, G**. & REBELO, H. 2013. Using species distribution modelling to predict bat fatality risk at wind farms*. Biological Conservation* **157:** 178-186.

University of Exeter (Dr Fiona Mathews)

Impact of Wind Turbines on British Bats

This project investigates bat activity and mortality at large wind energy installations in Britain. A total of 48 sites have now been surveyed. The project used a combination of fatality surveys and acoustic monitoring at height and at ground level. In addition, the links between bat casualty rates and weather, habitat and invertebrate activity were investigated, with the aim of producing guidance on how to conduct surveys and mitigation action. A report is due in the autumn.

Effects of mid-sized wind energy installations on bats

This 3-year project focuses on areas known to have high bat biodiversity in South-West England and South Wales. In addition to monitoring casualty rates, the project is investigating the behaviour of bats near to turbines using a combination of thermal imaging and acoustic techniques. The potential impact on bat populations will be modelled at a landscape-scale, and recommendations for the future positioning of turbines will be developed.

Impacts of Street-lighting on Biodiversity

Focuses on the effect of night lighting on bats and their invertebrate prey species. The work is conducted at a landscape scale and investigates issues such as thresholds in the size and connectivity of darkened areas required for an area to be used by bats. It will also examine the effect of lighting regimes around maternity roosts on emergence and return times and colony productivity. The project has a particular focus on light-sensitive species including Greater and Lesser Horseshoe bats, but also includes comparative analyses of more light tolerant species.

The ecology of woodland bats and the epidemiology of their parasites and pathogens
Investigates the parasites and pathogens of Daubenton's, Natterer's and Brown long-eared bats in the context of their community ecology. It has identified Coronavirus for the first time in British bats (*M. nattereri* and *M daubentonii*). Prevalence was high in the Natterer's bats, with approximately two-thirds of animals being infected. In contrast, parasite burdens in Daubenton's bats, particularly among females, were markedly higher than those observed in Natterer's. Network analyses revealed strikingly different social structures in sympatric Natterer's and Daubenton's bats: Natterer's bats formed discrete mixed-sex social groups, with few linkages between the groups; whereas Daubenton's bat social groups were segregated by sex, with males, but not females, having frequent associations across social groups. There was no evidence of the sexual segregation in Daubenton's being driven by microclimate or proximity to key foraging areas. Male avoidance of parasite transmission may therefore be a driver of this behaviour. Work to understand more fully the social network of the population is ongoing, and non-invasive methods of monitoring reproductive state and stress hormone levels within the population are being developed.

Ecology and conservation of greater horseshoe bats using hibernation sites
This long-term project monitors the movement of greater horseshoe bats between hibernaculae, and their habitat use during spring and autumn. Through the analysis of ringing data, it has shown extensive movement across a network of alternative roosts during the winter. Radio tracking studies have identified roost sustenance zones and key flyways, and have also identified previously unknown mating and maternity sites. Social network analysis is now being used to understand the relative importance of linkages between different sites, and predict likely responses to loss of nodal roosts.

Population ecology and genetic structure of serotine bats
Serotine bat population structures are poorly characterised. This study has sampled bats from a range of roosts across southern Britain. Using a combination of population genetics and stable isotope analysis, it explores the linkages between British serotine populations and those of Northern Europe, as well as characterising population structures within the UK.

Grey long eared bat distribution in East Devon
Very few roosts of Grey long-eared bats are known in the UK. Lack of data makes assessment of the conservation status of the species extremely difficult. This project uses genetic analysis of droppings, together with netting, to identify previously unknown roosts. Radio tracking is then used to identify foraging areas.

University of Leeds **(**Prof. John Altringham)

John Altringham, Anita Glover, Chloe Bellamy, Chris Scott, Anna Berthinussen and Emma Grubb

Developing an effective method for the systematic surveillance of bats in woodland habitats
Survey protocols are being designed to gather systematic and reproducible abundance and diversity data on UK woodland bat species. Data will come from acoustic transects, using automated call extraction and identification tools. Existing software is currently being modified to improve its reliability with a wider range of time-expansion and direct-sampling detectors. The aim is to devise a method that can be used on a large scale by trained volunteers, without compromising scientific rigour.

Multiscale Habitat Suitability modelling for bats
Using data gathered from systematic acoustic transects (with automated call extraction and species identification) to build GIS-based, species-specific, multiscale Habitat Suitability Models (HSMs) for national parks in the north of England. Maps are complete for the Lake District National Park and a revised paper has recently been resubmitted to a major journal

describing the methods and results. The maps have been tested on independent data and have proven to be reliable predictors of the distribution of most species and they are now being used by the national parks for conservation planning and management.

The effects of roads on bats and the effectiveness of mitigation
Tested the effectiveness (as opposed to simply use) of underpasses and gantries at guiding bats safely across roads. Results show that wire gantries are ineffective and underpasses of variable effectiveness. Researchers have just begun a collaborative project with Fera to assess the utility of radar in studying how bats interact with roads and crossing structures.

A global conservation intervention synopsis for bats
Researchers at University of Leeds are writing a conservation intervention synopsis for bats for www.conservationevidence.com. Synopses summarise published, quantitative evidence on the consequences of direct action taken to conserve species, communities or habitats. These give busy conservation practitioners up to date, objective and accessible summaries to support policy and management decisions.

University of Stirling (Dr Kirsty Park)

Bat research at Stirling focusses on bat ecology and conservation in heavily anthropogenic landscapes such as urban, agriculture and forestry; led by Kirsty Park (http://www.stir.ac.uk/natural-sciences/staff-directory/academic/kirstypark/).

Assessing effects of small wind turbines on wildlife
Research at Stirling University is assessing the effects of small wind turbines, SWT, on wildlife (birds and bats) using observations of flight lines and activity of different species, and also through experiments (manipulating the operation of turbines, moving turbines different distances from vegetation features e.g. hedgerows). Carcass searches and questionnaires have been used to try and quantify mortality from the operation of SWT. We are also investigating the planning process for SWT, and looking at the degree to which potential turbine owners may be prepared to incur financial losses to mitigate against wildlife losses, and the degree of public acceptance of this expanding technology (for more info: http://stics.org/projects/birds-bats-and-small-wind-turbines).

Relevant publications:

Park KJ, Turner A & Minderman J (2013). Integrating applied ecology and planning policy: the case of micro-turbines and wildlife conservation. *Journal of Applied Ecology* 50: 199-204.

Minderman J, Pendlebury CJ, Pearce-Higgins JW & Park KJ (2012) Experimental evidence for the effect of small wind turbine proximity and operation on bird and bat activity. *PLoS One* 7(7): e41177. doi:10.1371/journal.pone

Agri-environment schemes and bats
University of Sterling has assessed potential benefits (or otherwise) that bats and their insect prey species gain from the implementation of certain AES management prescriptions (field margins, water margins, hedgerows, species rich grassland). This project also examined the influence of woodland character (e.g. vegetation structure and patch configuration) and the surrounding landscape (e.g. % and connectivity of woodland) on bats and nocturnal insects was assessed. This work has now been expanded to incorporate a range of other taxa and aims to identify the relative importance of woodland and landscape characteristics such as woodland area and connectivity in a new project Woodland Creation and Ecological Networks (WrEN: http://www.stir.ac.uk/natural-sciences/research/groups/bes/ecologyevolutionandconservation/wren)

Relevant publications:

Fuentes-Montemayor E, Goulson D, Cavin L, Wallace JM & Park KJ (2013). Fragmented woodlands in agricultural landscapes: the influence of woodland character and landscape context on bats and their insect prey. *Agriculture Ecosystems & Environment* 172: 6-15.

Fuentes-Montemayor E, Goulson D, Cavin L, Wallace JM & Park KJ (2012). Factors influencing moth assemblages in woodland fragments on farmland: implications for woodland creation and management schemes. *Biological Conservation* 153: 265-275.

Fuentes-Montemayor E, Goulson D & Park KJ (2011). Pipistrelle bats and their prey do not benefit from four widely applied agri-environment management prescriptions. *Biological Conservation* 9: 2233-2246

Fuentes-Montemayor E, Goulson D & Park KJ (2011). The effectiveness of agri-environment schemes for the conservation of farmland moths: assessing the importance of a landscape-scale management approach. *Journal of Applied Ecology* 48: 532-542.

Ecology and conservation of urban bats

The aim of this research is to investigate the effect of urbanisation on bat ecology and conservation in the UK at a range of scales, regional to UK-wide. Important habitats for bats, woodland and water, in urban areas have been surveyed to examine the importance of habitat character (e.g. vegetation structure and patch configuration) and the surrounding landscape (e.g. % and connectivity of woodland) on bats and nocturnal insects. Future work planned will use field survey data collected across the UK by volunteers in a collaboration with BCT (for more info: http://www.stir.ac.uk/natural-sciences/staff-directory/postgraduates/paullintott).

Relevant publications:

Lintott, P, Fuentes-Montemayor, E, Goulson, D & Park KJ (2014). Testing the effectiveness of surveying techniques in determining bat community composition within woodland. *Wildlife Research* 40: 675-684.

Bats and coniferous plantations

The aim of this research is to assess how silvicultural practices influence bat populations in commercial coniferous plantations. Specific objectives are to: 1) Determine which attributes of commercial coniferous forests are most influential on the foraging activity and abundance of different bat species; 2) Experimentally quantify the short-term effects of harvesting on foraging activity and abundance of different bat species; 3) Assess the implications for bat populations of a move in forest policy from clearfell to continuous cover; 4) Inform forestry management options in the presence of European Protected Species (bats) legislation (for more info: http://www.stir.ac.uk/natural-sciences/staff-directory/postgraduates/lucindakirkpatrick).

University College London (James Hales)

Bats in Churches: An objective assessment of a perceived problem"

To gain a better understanding of damage and deterioration mechanisms, thought to be associated with the deposition of bat droppings and urine within historic churches in the UK. Work is being carried out to investigate the effect of bat droppings and urine on a range of materials commonly found within the interiors of historic churches. The outcomes of the research are, an improved understanding of the chemical interaction taking place between bat excreta and the fabrics commonly found within historic church buildings.

National Wildlife Management Centre (Dr. James Aegeter)

The National Wildlife Management Centre is a department of the Animal Health & Veterinary Laboratories Agency (an executive agency of Defra, formally Fera). It undertakes a range of ecological and epidemiological scientific studies with bats.

Active surveillance of Lyssaviruses in British bats
The benign sampling (tissue, blood and buccal swabs) of British species for evidence of diseases of policy concern; including EBLV1 in Serotine, EBLV2 in Daubenton's and BBLV in Natterer's bats. Focusing on descriptions of prevalence and a better understanding of the pathology and detection of disease in wild bats.

Research programmes
Research underpinning a quantitative prediction of the likelihood of establishment, spread, and the consequences of exotic diseases in British bats. As much of the work is associated with the first quantitative descriptions of the social and spatial dynamics of bat communities and populations and their modelling, this can also serve as evidence in decision-making associated with the conservation or management of bats where they cause conflict with man. This theme includes the following projects:

PhD - Population Ecology of the Daubenton's bat
Defra/AHVLA (formerly Fera) funded at University of Leeds (2006-2011)
Supervised by Prof. John Altringham
Analysis of a long-term geographically extensive data-set of Daubenton's bats to quantify demographic rates for the species. Development and validation of PIT tagging as a viable and benign marking approach and its deployment

PhD - Social & Spatial dynamics of the Natterer's bats
Defra/AHVLA funded at University of Newcastle (2013-2016)
Supervised by Prof. Steve Rushton
Attempting the first complete quantitative description of a community of Natterer's bats (both numbers and community composition), as well as the network of natural roosts across which they constantly re-sort themselves. Then quantifying and hopefully describing a typical and natural social dynamic and how this may mediate the establishment, spread or maintenance of a generic exotic disease.

Queen's University, Belfast (Ian Montgomery)
Queen's is part of the Centre for Irish Bat Research. This comprises Ian Montgomery and Prof Paulo Prodohl at Queen's and Prof Emma Teeling at Univ Coll Dublin. Projects include: phylogeography, molecular ecology and spatial ecology of *Myotis* species (Natterer's and whiskered); location and use of swarming sites; bat activity and impact on bats around wind turbines; and use of veteran trees by bats. There is also earlier work on the phylogeography, molecular ecology and ecology of Leisler's bat, as well as a review of impact of climate change on bats, in process of publication.

Jersey, Channel Islands

Phd Study by Orly Razgour published in 2012, research was undertaken into the ecological and conservation requirements of the grey long-eared bat. The study included genetic data from Jersey and concluded Jersey and Guernsey populations of the Grey Long-eared Bat have slightly lower genetic diversity than the mainland UK population. Although Jersey is geographically closer to France, Channel Isles grey long-eared bats are genetically closer to UK bats.

13. Consideration being given to the potential effects of pesticides on bats, and their food sources and efforts to replace timber treatment chemicals which are highly toxic to bats

In the **UK** BCT had a stand at the National Pest Technician's Association's national 'Pest Tech' Event in November 2011 in Birmingham (the largest one-day Pest Control Exhibition held in Europe for pest controllers, product manufacturers and distributors). The stand helped to raise awareness of the impacts to bats from pest control.

In **Jersey,** standing advice continues to be issued on the use of approved timber treatment pesticides for use in bat roosts. This work is ongoing and forms part of the standing statutory advice in relation to bats.

D. FUNCTIONING OF THE AGREEMENT

14. Co-operation with other Range States

See Indicator Bats projects in section 5.

15. Measures taken to implement Resolutions adopted by Meetings of Parties

Resolution 6.6 England has produced a draft White Nose Syndrome (WNS) contingency plan which it hopes to finalise in the next few months and has undertaken research to establish the existence of Pd.

Resolution 6.11 GB is funding a project to assess the effect of wind-turbines on bat populations. It is hoped that the results will allow us to update current guidelines.

Resolution 6.12 The NBMP Woodland Survey has continued. BCT produced a woodland owners guide to managing woodlands containing Bechstein's bats. Defra has funded a project on bats in woodland.

Resolution 6.14 A project has been funded to establish the success criteria for monitoring the effects of mitigation measures for bats on roads and other linear transport infrastructure. This includes bat bridges and underpasses.