

AGREEMENT FOR THE CONSERVATION OF BATS IN EUROPE (EUROBATS)

Report on the implementation of the Agreement in the United Kingdom

2011

This document reports on actions undertaken by the UK in 2011 to meet its obligations under the Agreement.

A. GENERAL INFORMATION

Party: United Kingdom

Date of Report: March 2012

Period Covered by Report: January – December 2011

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 -

A. Abbreviations

BAP	Biodiversity Action Plan
BCT	Bat Conservation Trust
BRE	Building Research Establishment
CCW	Countryside Council for Wales
CEO	Chief Executive Officer
CIEF	Construction Industry Research and Information Forum
DEFRA	Department for Environment, Food and Rural Affairs
EEA	European Environment Agency
EA	Environment Agency
EBLV	European Bat Lyssavirus
GONHS	Gibraltar Ornithological and Natural History Society
HPA	Health Protection Agency
HAP	Habitat Action Plan
JNCC	Joint Nature Conservation Committee
IBDA	Integrated Biodiversity Delivery Area
IEEM	Institute of Ecology and Environmental Management
ILE	Institute of Lighting Engineers
IWG	Intercessional Working Group
LBAP	Local Biodiversity Action Plan

MP	Member of Parliament
NBMP	National Bat Monitoring Programme
NE	Natural England
NWCU	National Wildlife Crime Unit
RIBA	Royal Institute of British Architects
RICS	Royal Institution of Chartered Surveyors
RSPB	Royal Society for the Protection of Birds
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SAC	Special Area of Conservation
SAPs	Species Action Plans
SEBI 2010	Streamlining European 2010 Indicators (SEBI 2010)
SEPA	Scottish Environment Protection Agency
SNCO	Statutory Nature Conservation Organisations
SNH	Scottish Natural Heritage
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UK BAP	United Kingdom Biodiversity Action Plan
UKGBC	UK Green Building Council
VLA	Veterinary Laboratories Agency
WIIS	Wildlife Incident Investigation Scheme
WCO	Wildlife Crime Officer

B. STATUS OF BATS WITHIN THE TERRITORY OF THE PARTY

1. Summary Details of Resident Species

UK

Since the reported discovery of alcaethoe bat *Myotis alcaethoe* 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 *Myotis alcaethoe* brings the total number of breeding resident species to 17. The bat was discovered by researchers from University of Leeds and University of Sheffield.

Additionally, recent work in Scotland has revealed that the range of Leisler's bat (*Nyctalus leisleri*) extends approximately 80km further north in south west Scotland than previously thought (this effectively extends the GB distribution for this species by the same amount).

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*). It is very likely that the common pipistrelle (*Pipistrellus pipistrellus*) is also present in Gibraltar and further investigations are being carried out at present by the Gibraltar Ornithological and Natural History Society (GONHS)

2. Status and Trends

Status of UK's bat species monitored by the National Bat Monitoring Programme (NBMP) carried out by BCT, funded by JNCC

Table 1 below summarises NBMP trends for 2010. This information, and full details of NBMP survey and analysis methods, are available in the NBMP 2010 Annual Report. In 2010 the Annual Report was completed as an online report and can be read on the following pages: http://www.bats.org.uk/pages/national_bat_monitoring_programme_annual_report_2010.htm

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Analysis of the data collected during 2011 is currently in progress and the online report will be updated to include these results during May 2012. 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 2010, five species showed statistically significant increases in at least one survey. Significant positive trends were reported for the following species:

1. **Greater horseshoe bat** (Colony Count)
2. **Lesser horseshoe bat** (Hibernation Survey & Colony Count)
3. **Natterer's bat** (Hibernation Survey)
4. **Common pipistrelle** (Field Survey)
5. **Soprano pipistrelle** (Field Survey)

From these results, BCT concludes that the lesser horseshoe population is increasing as both sources of data are indicating the same trend. BCT also concludes that the common pipistrelle population is increasing, as Field Survey data are considered to be more reliable than Colony Count data. 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 Colony Count data do not support the increase. Similarly for the soprano pipistrelle as the Field Survey increase is of borderline significance for the first year in 2010 and the Colony Counts indicate a decline. BCT stresses that the greater horseshoe bat trend should be treated with caution at present mainly due to the relatively small sample size and short duration of use of consistent survey protocol for this species.

Significant negative trends were reported for common pipistrelle and soprano pipistrelle in 2010 (Colony Counts), though these negative trends may be highly influenced by the mobility of these species. The Field Survey showed a significant increase for both species and these Field Survey trends are presently considered more robust than the Colony Count trends.

The remaining species: **Daubenton's bat**, **whiskered/Brandt's bat**, **brown long-eared bat**, **noctule** and **serotine** all showed no significant trends in 2010.

Daubenton's bat has shown a fairly stable trend from both Hibernation and Waterway Survey data, although there has been a slight, but not significant decline since 2005. Whiskered/Brand's bat has shown an increase in recent years but this has not continued and there is no significant trend; this trend should be treated with extreme caution as it combines data from more than one species and is likely to be less reliable. Brown long-eared bat had shown a slight increase since 2005, but lower counts in 2008 and 2009 have resulted in no overall significant trend from either the Hibernation Survey or Colony Count. Noctule had also started to show an increase due to very high counts in 2008 but these high values have returned to previous levels and the overall trend is not significant. No significant trend has been shown for serotine from either the Field Survey or Colony Counts. Sample sizes are small and confidence intervals large for this species however, as it is encountered infrequently and has a restricted range in the UK, and it may be difficult to detect trends

Whilst these are positive results, it should also be taken into account that these trends reflect changes in bat populations from 1997 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.

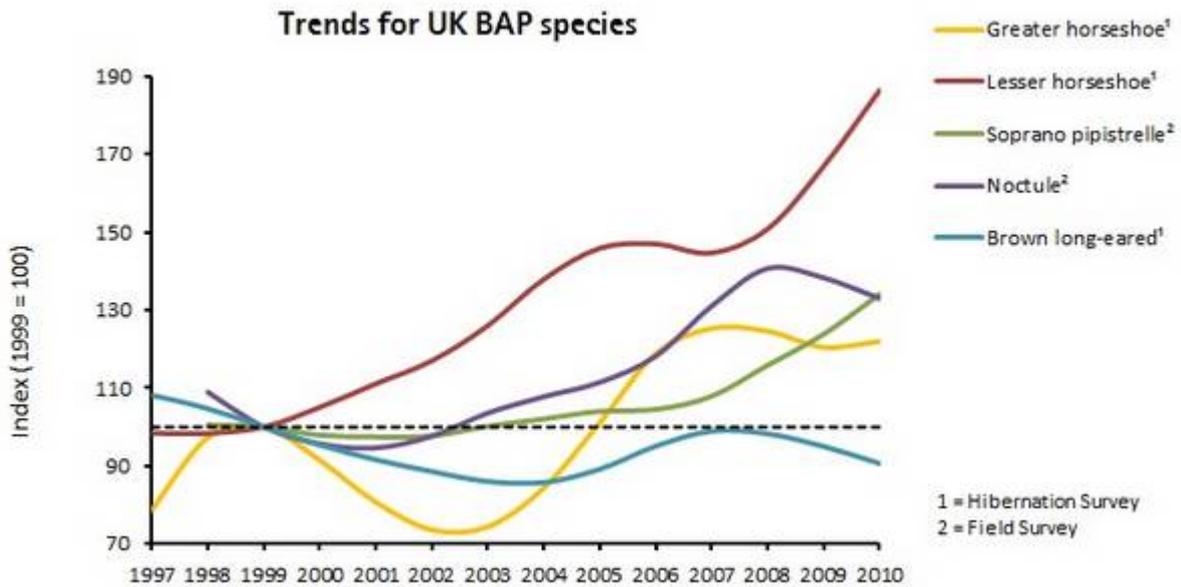
Species	Status	Survey	Trend time period	Long-term trend %	Average annual change %	Comments
<i>Rhinolophus ferrumequinum</i>	Rare	Hibernation	1999-2008	22.0	1.8	Statistically significant increase from Colony Counts
		Colony	1999-2008	89.9	6.0	
<i>Rhinolophus hipposideros</i>	Rare	Hibernation	1999-2008	86.5	5.8	Statistically significant increase on both surveys
		Colony	1999-2008	56.0	4.1	
<i>Myotis mystacinus</i> / <i>M. Brandtii</i>	Common in N and W England, rare elsewhere	Hibernation	1999-2008	31.3	2.5	No statistically significant increase
<i>Myotis nattereri</i>	Common	Hibernation	1999-2008	90.0	6.0	Statistically significant increase from Hibernation Survey
		Colony	2000-2008	-15.9	-1.7	
<i>Myotis daubentonii</i>	Common	Hibernation	1999-2008	7.7	0.7	Both trends are no longer statistically significant
		Waterway	1999-2008	4.2	0.4	
<i>Eptesicus serotinus</i>	Widespread but scarce in southern Britain	Field	1999-2008	23.5	1.9	No statistically significant trend from either survey
		Colony	1999-2008	-6.9	-0.6	
<i>Nyctalus noctula</i>	Uncommon	Field	1999-2008	33.0	2.6	No statistically significant increase
<i>Pipistrellus pipistrellus</i>	Common	Field	1999-2008	63.2	4.6	Both trends statistically significant; Field Survey considered more robust, therefore considered to be increasing
		Colony	1999-2008	-46.6	-5.6	
<i>Pipistrellus Pygmaeus</i>	Common	Field	1999-2008	34.1	2.7	Field Survey considered more robust, trend significant for first time in 2010 and therefore should be treated with caution
		Colony	1999-2008	-36.1	-4.0	

Species	Status	Survey	Trend time period	Long-term trend %	Average annual change %	Comments
<i>Plecotus auritus</i>	Common	Hibernation	1999-2008	-9.4	-0.9	No statistically significant trend from either survey

The total site network for all surveys completed up to 2010 is 4,866 sites. In 2010, 1015 of BCT's dedicated NBMP volunteers completed surveys at a total of 1907 sites.

Figure 1. NBMP trends for a) BAP species and b) other species.

a)



b)

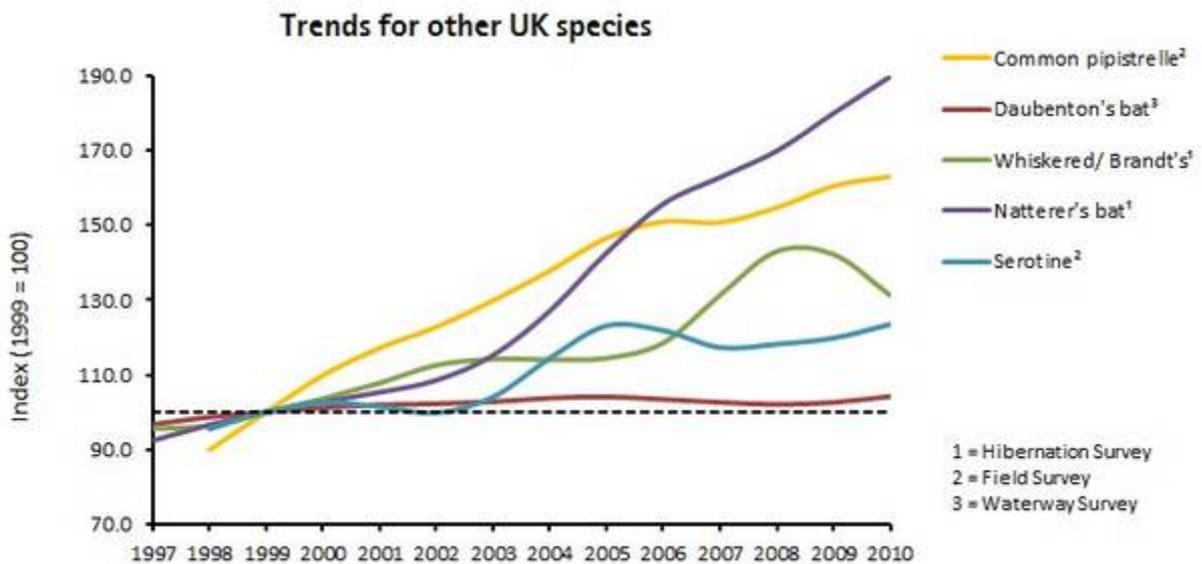


Table 2: Summary information for species with limited trend data

Species	Status	Survey	Trend time period	Long-term trend %	Average annual change %	Comments
<i>Myotis bechsteinii</i>	Very rare					No trend data available; baseline distribution survey completed in 2011
<i>Nyctalus leisleri</i>	Scarce in GB, common in Ireland					Recorded on Roadside Survey but more data needed to detect trends
<i>Pipistrellus nathusii</i>	Rare					Recorded on Roadside Survey but more data needed to detect trends. Systematic distribution survey piloted in 2009 and 2010.
<i>Barbastella barbastellus</i>	Rare					Recorded on Woodland Survey but more data needed to detect trends
<i>Plecotus austriacus</i>	Very rare					No trend data available
<i>Myotis myotis</i>	Status unconfirmed					Only one individual known in UK at present; recorded on hibernation survey.

Barbastella 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 *Barbastella barbastellus*. It has been further developed and is funded by Natural England with the key aim of monitoring sites that are designated as Special Areas of Conservation (SACs) due to the presence of barbastelles. In 2010 a total of 30 sites were surveyed following the Woodland Survey method, including six SAC sites. A total of 34 Woodland Survey transects were completed in 2010 at seven SAC sites. This is a 100% increase in survey effort from 2009, when 17 transects were completed at six SAC sites. The surveys completed in 2010 confirmed the presence of barbastelle in all seven of the SAC sites monitored: Ebernoe, The Mens, Eversden and Wimpole Woods, Exmoor and Quantocks Woodland (Quantocks area), Mottisfont, North Pembrokeshire Woodlands and Briddlesford Copses.

Pipistrellus nathusii

Nathusius' pipistrelle is generally not encountered during standard surveys. A Nathusius' pipistrelle survey was piloted for the first time in September 2009 and repeated in 2010 at lakes and lochs across the UK. The key aim of this pilot survey is to improve knowledge of the autumn distribution of this species across the UK. The survey uses broadband detectors to enable recordings to be made of the bats encountered on the survey and for records of Nathusius' pipistrelle to be verified using sound analysis.

After two years of the pilot Nathusius' pipistrelle survey (2009 and 2010), 102 volunteers have taken part, surveying 114 sites. Nathusius' pipistrelle presence was verified through sound analysis at 31 sites (27% of sites surveyed). A further 14 sites (12% of sites surveyed)

recorded Nathusius' pipistrelle from heterodyne field data but these records are not yet verified. Sites with unverified records were made a priority for revisiting with recording equipment in 201.

3. Habitats and Roost Sites

England

Through, Biodiversity 2020, Natural England will be seeking to develop large-scale conservation delivery mechanisms through agri-environment and other relevant schemes to restore and create habitats of importance for priority bat species.

Wales

The largest pre-parturition count of *Rhinolophus hipposideros* in Wales was 900 at a site in Llandogo, Gwent.

4. Threats

UK

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 planning proposals;
- 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

Gibraltar :

Main threats to bat conservation in Gibraltar are:

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

5. Data collection, analysis, interpretation and dissemination

The National Bat Monitoring Programme

The National Bat Monitoring Programme (NBMP) has been run by BCT since 1996. Since 2001, NBMP has been a partnership with JNCC. 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 methodologies are reported annually on the BCT website. Current work is focusing on extending the applications of the data, through research collaborations including several PhD research studentship links (see section 12). Work is also ongoing to replace the existing NBMP database and to develop online data entry for volunteers taking part in the programme.

Indicator Bats Program (iBats)

The Indicator Bats Program (**iBats**), a partnership project between The Institute of Zoology (IoZ) 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 development and global change.

In the last year, work continued on the new iBats web portal (www.ibats.org.uk) and all data were transferred onto the new system for its launch in May 2011. It now has better reporting tools for volunteers 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 will be able 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. The new web portal incorporates transect data gathered using the application for the iPhone and smartphones running the Android operating system.



The new iBats web portal (Russian language version).

This application has been 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.



Screenshots from the iBats application

Funding from the Rufford Foundation and The Darwin Initiative has 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.

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*.

All data collected up until 2008 and for most of 2009 have been manually analysed for all the projects and a simple key was developed based on peak frequency and call shape to identify calls to species or species groups. Call abundances between countries and a review of the project and an initial analysis of the habitat suitability for the common pipistrelle bat (*Pipistrellus pipistrellus*) is in press (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 is in preparation (Walters, *et al.* in prep. 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 5220 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, BCT and the UK statutory nature conservation bodies that is investigating links between species populations and climate change. The project brings together analyses on all major UK species population monitoring data sets and the website will provide the latest information on the impacts of Climate Change on UK biodiversity.

Gibraltar

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

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

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

England

BCT's Investigations Project continued to operate during 2011. The past year has seen a great deal of work being undertaken in relation to the UK bat crime wildlife crime priority. Julia Hanmer, the BCT Chief Executive continues to be the Bat Persecution Plan Owner. The priority delivery group have met and agreed objectives. BCT continue to strengthen links with enforcement bodies and have welcomed the introduction of revised legislation protecting bats.

In 2011, 339 incidents of bat crime were logged. Of those incidents 138 were reported to statutory organisations for investigation. Anecdotal evidence from bat workers, the general public, and building and forestry professionals indicate that these figures represent only small percentage of actual incidents. The building development and maintenance sector accounted for 91% (all bar 9) of the incidents referred for investigation – a proportion in line with findings from previous years.

The number of incidents reported in 2011 increased by 12% to 339. Of those incidents 138 were referred to enforcement agencies an increase of 20%. As in previous years the vast majority of incidents relate to the damage or destruction of roosts. Further details on the Investigations Project can be found at:

http://www.bats.org.uk/pages/bat_crime_investigations.html

Wales

In Wales 38 incidents were reported, No prosecutions were taken forward but cautions were issued in 3 cases and another 9 were dealt with by official warnings or advice.

The Countryside Council for Wales, the Forestry Commission Wales and the Welsh Government are developing a "Programme of Works Licence" process under which a range of forestry management activities can be undertaken according under a general management plan where these activities could otherwise contravene the Conservation of Habitats and Species Regulations 2010.

Scotland

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 Bat Conservation Trust's Scottish Bat Officer. SNH has also provided support to the National Trust for Scotland's Threave Bats Project.

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

No new SSSIs or SACs were designated in England 2011 where bats are part of the notified interest of the site. Work is ongoing to safeguard Bentley Barn in Suffolk, a traditional farm building which is home to several species of bat. Work also continues in partnership with Natural England to safeguard Paston Barn, a site of importance to Barbastelles and other species in Norfolk.

A review of potential SSSI's was undertaken by BCT on behalf of Natural England. The results of which will be published in the coming year.

In Wales, 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.

8. Consideration given to habitats which are important to bats

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.

Wales

Guidance has been produced for the proposed 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 and a training day was provided for Contract managers.

The Mammals In a Sustainable Environment (MISE) is an Interreg project undertaken by the Countryside Council for Wales and 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.

The Bat Conservation Trust

Bat Surveys: Good Practice Guidelines

Following feedback from experts in the field and authored by professionals, the Bat Conservation Trust has updated and revised the *Bat Surveys: Good Practice Guidelines*. In line with the latest evidence and best practice the second edition features new chapters and content, with revised advice and guidance. This is the essential reference and guide for anyone involved in professional bat work.

Professional Training Standards

BCT have also published Professional Training standards, 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).

Woodlands

BCT have worked to counter the threat to bats from woodland management and tree work by:

- Acting for bats as member of both the England Woodland Biodiversity Group (EWBG) and the England Woodland and Timber Partnership (EWTP).
- Producing a paper on behalf of the EWBG for submission to Department of Energy and Climate Change (DECC) on woodfuel 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.
- Working closely with the Defra working group on Common Agricultural Policy (CAP) reform of the Woodland Grant Scheme and agri-environment schemes for England.

ROOST mitigation website (<http://roost.bats.org.uk>)

The Roost mitigation website discussed at last year's meeting is now live. It 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 is particularly useful for those involved in projects which require mitigation for loss of bat roosts, and for those who wish to provide additional resources for bats in buildings. The site contains 12 case studies so far and BCT are always looking for more, so members are encouraged to submit some.

BCT also operate memberships of their organisation for adults, children and teachers/youth leaders and produce membership magazines: Bat News and The Young Batworker and an education pack for their 4,500 members. Email bulletins are also sent to interested bat workers. BCT works with the media to promote a positive image of bats and provides journalists with up to date information and advice, resulting in extensive coverage of bats in national and regional media in both print and broadcast press.

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 have 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.

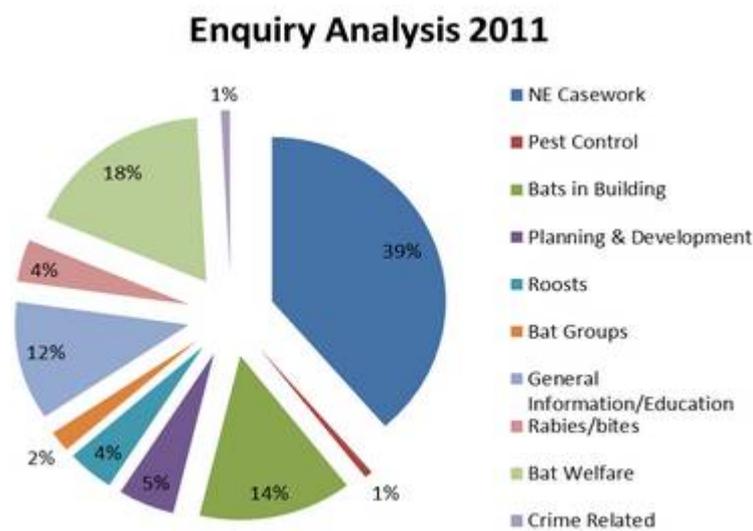
National Bat Helpline

In 2011 the BCT Helpline fielded a total of 12,352 bat-related enquiries (calls, emails and letters). This was substantially higher than in 2010, when 10,369 were received and represents a rise of 19.2% in enquiries received by BCT. The Out of Hours service received another 1296 calls on top of this, and peaked at 49 calls on Sunday 26th June 2011.

Over the summer period of June, July and August, the total number of enquiries received on the Helpline was 5,830 (of which 4,749 were via phone and post and 1,081 were via email). The average number of enquiries received per day in the summer period was 88.

Natural England casework is an important part of the work that the Helpline does. 39% of calls taken were regarding a roost/potential roost in one of the 21 regions for which BCT organises visits on behalf of Natural England. Thanks to the Helpline number being widely available, it is very often the first number people call after discovering a bat roost in their property.

The below pie chart 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.



Regional Bat Work

UK, Channel Islands and Isle of Man

BCT works with 64 Partner Groups and 23 Network Groups across the UK, Channel Islands and Isle of Man. Bat groups vary greatly in size (from just a handful of people to several hundred), the way they operate and the activities they undertake. Through effective communications, meetings with individual groups, regional meetings, regional conferences and an annual bat worker forum (which takes place on the Friday evening of the National Bat Conference) BCT have continued to build strong relationships with local groups. They are identifying opportunities for joint working with Partner Groups to deliver national conservation priorities at the local level. For example in 2011 BCT became involved in a collaborative project between Warwickshire County Council and Warwickshire Bat Group to understand and address the habitat needs of barbastelles. They are seeking to increase the number of such collaborations going forward.

Two regional conferences took place in the South West and North of England during 2011, providing opportunities for knowledge-sharing and networking for 300 bat volunteers (with

waiting lists for both events). Conference presentations were from a range of organisations including volunteer bat workers, local consultants, universities, local authorities and BCT. Workshop sessions covered topics such as bats and trees, sound analysis, use of AnaBats, mitigation, survey techniques, bat identification, bat care, use of bat detectors, and biodiversity in the built environment.

Wales

The Countryside Council for Wales (CCW) continued their funding support for the Wales Bat Project albeit at a slightly reduced level. The aims of this project are to contribute towards bat conservation in Wales, and to the UK, by working:

1. To engage with the political network especially the Welsh Government as well as the Wales Biodiversity Partnership and its sub groups;
2. To maintain and enhance support for extant volunteer bat groups and their bat workers;
3. To recruit new volunteers, and to build on newly formed relationships; and
4. To provide support and advice to those who make decisions in relation to bats in a professional capacity

During 2011, the main focus of work has been on working in partnership with other environmental NGOs to influence the Welsh Government in their thinking on future delivery of biodiversity, planning and sustainable development. CCW expect this work will continue well into the next financial year and beyond.

The two big highlights for CCW's work in Wales were the Wales Bat Conference that was held in July and the first National Bat Carers Workshop held in October. Both proved to be extremely popular with 108 delegates for the Conference, some from Holland and Ireland, and a full house of 90 plus a reserve list of 15 for the Bat Carers Workshop.

Scotland

In Scotland 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 bat groups, school groups and the general public. The Scottish officer worked with groups all across Scotland ranging from the Orkney islands in the North East to field groups in South west Scotland.

Particular highlights of the year for SNH include;

- Work on the distribution of Leisler's bats in SW Scotland (with some equipment and training provided by BCT). The results have significantly extended the known range of these bats in Scotland.
- The Scottish bat workers conference in November. This attracted 140 attendees who enjoyed updating their bat knowledge through talks, workshops and networking.
- Training for council staff to raise awareness of bats and ways of protecting bat roosts and habitats. (Around 75 staff in 4 Council regions attended the training sessions.)
- Training in hibernaculum surveys for staff of the National Trust for Scotland.
- Training to wildlife groups in using bat detectors and carrying out surveys.
- A training day for bat carers in Scotland, this had 37 attendees plus a waiting list of around 30 should a second course run.
- 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.
- Work with schools and youth groups led to; a review of bat books for children by a local primary school, cub and scout projects to help bats and special needs students in Stirling used bats as a focus for their work in gaining a John Muir environmental award.
- Around 10 talks and bat walks were delivered to the public and special interest groups by the Scottish officer (many more appeared on the BCT events calendar)
- A new full colour leaflet "Bats in Scotland" was printed in spring 2012.

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
- Countryside Council for Wales
- Scottish Natural Heritage
- Department Of Environment Northern Ireland
- Joint Nature Conservation Committee
- Bat Conservation Trust (BCT).
- Environment Department of the States of Guernsey.
- La Societe Guernesiaise.
- Nature Conservancy Councils (Gibraltar).
- Gibraltar Ornithological and Natural History Society.

11. Additional action undertaken to safeguard populations of bats

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.

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?

BCT's target bat species were noctule, common and soprano pipistrelle, Daubenton's bat, and greater and lesser horseshoe bats. They used three types of survey which incorporated NBMP survey protocols and static recording methods to assess bat activity and foraging intensity on farms in Tir Gofal and on similar control farms that were not in the scheme. The field team carried out tailored habitat and bat activity surveys on farms from June to September, and work outside the field season included the analysis of survey sonogram recordings and data analysis.

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 will make it publicly available in the near future. This means information such as new species records should also be accessible soon.

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)).

Dr Emma Stone is researching what happens to soprano pipistrelles when they are excluded from roosts in buildings, and how to reduce problems caused by Natterer's bats roosting in churches. Madeleine Ryan (PhD student) is investigating the use of churches by soprano pipistrelles in East Anglia. Dr Stone has also completed a manuscript reviewing the outcomes of licensing applications for developments on bats (manuscript currently under review).

The impacts of climate change on bats.

Gareth Jones and Dr Hugo Rebelo have drafted 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, in review). Recent and ongoing research projects include using species distribution modelling to predict changes in distribution patterns and species richness under climate change scenarios (Rebelo, Tarroso and Jones (2010) *Global Change Biology* 16: 261-576); Hughes et al. (2012) *Global Change Biology*, in press online at DOI: 10.1111/j.1365-2486.2012.02641.x). They are also investigating links between past climatic change, distributions, and genetic diversity (Rebelo et al. (2012) *Molecular Ecology* in press, online at DOI: 10.1111/j.1365-294X.2012.05566.x).

The impacts of street lighting on bats.

BCT previously showed that high pressure sodium lights reduced commuting activity of slow-flying bats such as the lesser horseshoe bat (Stone, Jones & Harris (2009) *Current Biology* 19: 1123-1127). They now demonstrate that emerging LED technology has similar impacts, and dimming may have limited benefits for mitigation (Stone, Jones & Harris (2012) *Global Change Biology* in press, online at DOI: 10.1111/j.1365-2486.2012.02705.x). BCT have used light-changing implementation by local councils to understand the impacts of changes of high-pressure sodium to Cosmopolis lighting, and will build on these 'natural experiments' with a new PhD student, Michelle Nesbitt, who will begin her studies in 2012.

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). More recently BCT have collaborated with Professor Tom Gilbert and Kristine Bohmann at the University of Copenhagen to use high-throughput sequencing, rather than cloning in these studies (Bohmann et al. (2011) *PLoS ONE* 6 e21441. doi:10.1371/journal.pone.0021441). The method has been used to determine insect species eaten by barbastelles (Goerlitz et al. (2010) *Current Biology* 20: 1568-1572) and grey- and brown long-eared bats (Razgour et al. (2011) *Ecology and Evolution* DOI: 10.1002/ece3.49). Kristine Bohmann has just started 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.

BCT have used species distribution models such as Maxent to predict bat distributions in the past (Rebelo et al. (2012) *Molecular Ecology* in press, online at DOI: 10.1111/j.1365-294X.2012.05566.x), present (at a range of spatial scales with ground-truthing – see Rebelo et al. (2010) *Journal of Applied Ecology* 47: 410-420; Razgour et al. (2011) *Biological Conservation* 144: 2922-2930) and future (see climate change section above). A new project 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.

Bats and wind turbines.

Gareth Jones continues to serve on the scientific committee of the Bats and Wind Energy Co-operative in North America (<http://www.batsandwind.org/>). He is involved in a study led by Dr Hugo Rebelo and Helena Santos on predicting risk areas for bat fatalities at wind farms in Portugal, and is supervising an MSc student (Heather Nichol) looking at acoustic activity of bats at height (in collaboration with Dr Simon Pickering of Ecotricity).

Molecular ecology of bats.

BCT 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 radio-telemetry (Hope & Jones (2012) *Journal of comparative Physiology B* in press, online at DOI: 10.1007/s00360-011-0631-x), 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.

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 (see Scott et al. (2010) *Journal of Zoology*, 280: 371-378).

University of Exeter

Impact of Wind Turbines on British Bats

Data are urgently required on the effects of wind turbines on bats throughout Europe. This project investigates bat activity and mortality at large wind energy installations in Britain. Fourteen sites were surveyed in 2011 and a further 18 surveys are planned for 2012. The project uses a combination of fatality surveys and acoustic monitoring at height and at ground level. A formal trial of the effectiveness and cost-efficiency of using trained search dogs compared with ecologists to find bat carcasses has been completed as part of the project: dogs are now used at all the survey sites, and guidance on common operational standards has been produced. The ability of acoustic data to predict bat fatalities will be assessed.

Lead investigators: Fiona Mathews & David Hosken, University of Exeter; PhD student Suzanne Richardson

Funders: Department for Environment, Farming and Rural Affairs, Department for Energy and Climate Change, Countryside Council for Wales, Scottish Natural Heritage, RenewableUK.

Effects of mid-sized wind energy installations on bats

There has been little research on the implications of mid-sized single or double-pole wind energy installations on bats, despite the rapid expansion in this sector. Of particular concern is the low-level of preconstruction survey effort usually required by Statutory Authorities. In addition, they are frequently situated in areas of high bat activity and in strongholds for rarer species. 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.

Lead Investigators: Fiona Mathews & David Hosken, University of Exeter; PhD student Alistair Moyle

Funders: Natural Environment Research Council, Countryside Council for Wales, Devon County Council.

Impacts of Street-lighting on Biodiversity

The amount and intensity of roadside illumination is increasing exponentially. The ecological impacts of these changes are poorly understood, and very little is known of the relative impacts of newer, energy-efficient, light-sources which have different spectral compositions compared with traditional lighting. This project 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.

Lead Investigators: Fiona Mathews & Kevin Gaston, University of Exeter in partnership with The Vincent Wildlife Trust

Funders: Department for Environment, Farming and Rural Affairs

The ecology of woodland bats and the epidemiology of their parasites and pathogens

Diseases of bats have potentially important consequences for both bat conservation and human health. This project investigated the parasites and pathogens of Daubenton's, Natterer's and Brown long-eared bats in the context of their community ecology. It 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.

Lead Investigators: Fiona Mathews, University of Exeter & Miles Nunn, Centre for Ecology and Hydrology; PhD student Tom August

Funders: Natural Environment Research Council

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. Radiotracking 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. This project, which focuses on Wiltshire and East Devon, is being used directly by local agencies to influence conservation management for the species.

Lead investigator: Fiona Mathews, University of Exeter

Funders: Wiltshire County Council, East Devon Area of Outstanding Natural Beauty Partnership

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.

Lead Investigators: David Hosken, Stuart Bearhop, Fiona Mathews; PhD student Caroline Moussy

Funders: FERA

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. Radiotracking is then used to identify foraging areas.

Lead investigator: Fiona Mathews

Funders: East Devon Area of Outstanding Natural Beauty Partnership; The Vincent Wildlife Trust

University of Leeds - Prof. John Altringham

Conservation research on European bats at the University of Leeds

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

Automated echolocation call extraction and species identification of swarming bats

University of Leeds (UoL) researchers have developed flexible software that automatically extracts bat calls from direct sampling or time-expanded (full spectrum) sound files and identifies them to species. The methods have been tested in the field by analysing data from swarming sites. Almost all species can be identified with >95% probability. Since swarming sites attract large numbers of bats from large catchment areas, they have the potential to be used as indicators of the status of populations in the catchment. Species relative abundance data are very similar to those obtained by catching. In addition to being non-invasive and less labour-intensive, this approach is more likely to pick up rare species than low intensity catching. Papers will shortly be submitted describing the software and results, and the software and source code will be made freely available to the bat conservation and research community so that it can be developed further. Chris Scott & John Altringham. Funded by the University of Leeds, PTES and CCW, 2009-2012.

Developing an effective method for the systematic surveillance of bats in woodland habitats

Survey protocols are being designed by UoL 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. The aim is to devise a method that can be used on a large scale by trained volunteers, without compromising scientific rigour. The methods will be piloted by volunteers with the aim of rolling it out nationally. Chris Scott & John Altringham in collaboration with the BCT. Funded by Defra, 2012-2014. In the longer term, funding permitting, the data will be used for GIS-based Habitat Suitability Modelling of woodland bats.

Multiscale Habitat Suitability modelling for bats

UoL is 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 in progress for the Yorkshire Dales NP and North York Moors NP. The maps are tested on independent data and have proven to be reliable predictors of the distribution of most species. They are revealing data on key habitat characteristics and regional differences in distribution. The maps, data and GIS tiles are being made available to conservation practitioners and planners and the work is being prepared for publication. Chloe Bellamy, Chris Scott & John Altringham. Funded by the University of Leeds, PTES, Forestry Commission, North York Moors National Park, Yorkshire Dales National Park, 2008-2012.

The effects of roads on bats and the effectiveness of mitigation

Researchers at UoL have recently demonstrated that bat abundance and diversity can be considerably reduced in proximity to major roads, with effects extending to at least 1.6 km from the road. They are currently testing the effectiveness (as opposed to simply use) of underpasses and gantries at guiding bats safely across roads. Initial results show that wire gantries are ineffective and underpasses of variable effectiveness. Anna Berthinussen &

John Altringham. Funded by the University of Leeds, 2009-2012. Researchers have just begun a collaborative project with the Food and Environment Research Agency (Fera) to assess the utility of radar in studying how bats interact with roads and crossing structures.

Berthinussen A, Altringham JD (2012a) The effect of a major road on bat activity and diversity. *Journal of Applied Ecology* 49: 82-89.

Berthinussen A, Altringham JD (2012b) Do bat gantries and underpasses help bats cross roads safely? Under review.

Stable Isotope analysis as a tool for studying short range migration of bats

Researchers are currently analysing a large stable isotope dataset of fur samples collected from bats at swarming sites across Europe, to assess the potential of stable isotope analysis to further understanding of the short-range migrations of swarming bat species: *Myotis*, *Plecotus* and *Barbastella*. The work is being prepared for publication. Anita Glover & John Altringham. Funded by the Leverhulme Trust and the NERC. In collaboration with Exeter University, Sheffield University and SUERC (NERC), 2008-2012.

Ecology of *Myotis alcaethoe* in the UK

Following its discovery in 2010 in the UK, researchers are studying the ecology of *Myotis alcaethoe* using acoustic transects and radiotracking. The initial discovery was made at swarming sites, but they have now located a nursery colony in the south of England and found foraging individuals in the north. Analysis of foraging habitat preferences is ongoing. Anita Glover & John Altringham. Funded by the PTES, 2011-2012.

University College London - James Hales

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

Researcher: James Hales

Institution: Institute of Archaeology, UCL

Funded by: Pilgrim Trust

Completion date: January 2014

The purpose of the project is 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 U.K.

To this end 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. Physical, chemical and visual changes occurring as a result of bat dropping and urine deposition will be recorded and investigated.

The practical outcomes of the research are, that as a result of an improved understanding of the chemical interaction taking place between bat excreta and the fabrics commonly found within historic church buildings, UCL believe they are also be better able to do the following:

- Assess the susceptibility of different materials to deterioration

- Relate the frequency of deposition to the severity of the problem
- Discover if any damage mechanism is a rapid onset event or a process of gradual attrition
- Design better mitigation strategies
- Recommend improved cleaning conservation approaches

University of Reading

Bats and Breathable membranes

PhD student: Stacey Waring; In collaboration with the Bat Conservation Trust, Countryside Council for Wales, Natural England, the National Trust and Scottish Natural Heritage

The work is being undertaken by a Ph.D. research student and will investigate the properties of the 48 breathable membranes currently available in the UK and the traditional BS747 bitumastic roofing felt. Research work will incorporate (i) wear and tear experiments in the laboratory to test the likelihood of component fibres to pull apart and trap bats, (ii) measures of friction to assess the ability of the membrane surface to allow bats to grip (iii) measures of the effect on the physical, thermal and hydrostatic properties of the membrane as a result of the reaction of the material to bat urine (iv) a profile of the thermal properties of the membranes as they may affect the temperature regime within roosting areas and (v) changes of lux levels as a result of the colour of the membrane.

University of Stirling - Dr Kirsty Park

1. Assessing effects of small wind turbines on wildlife

Project summary: Whilst the majority of wind turbines worldwide are over 100m tall and installed in wind farms, a more recent development is that of Small Wind Turbines (SWT), up to 30m hub height and usually installed singly. Wind turbines can adversely affect wildlife in a variety of ways including direct collision mortality and disturbance effects. The majority of microturbine installations currently need planning permission. For this reason, better understanding of both (i) the potential wildlife impacts of and (ii) public attitudes towards SWT is vital, because these are two of the criteria used by planning officers assessing applications.

- i) In spite of numerous studies on the effects of large wind turbines on wildlife, there is little information on the impacts of SWT which are likely to affect a different suite of species under quite different situations. Research at Stirling University has been aimed at quantifying effects of SWT on wildlife (see papers 1, 2 below).
- ii) To date all studies on public attitudes in relation to wind energy technology have focused on large-scale developments. Given the recent expansion of small turbines which is set to continue in the foreseeable future, a better understanding of public attitudes towards small-scale installations is required. These issues are now being addressed by an interdisciplinary studentship which will look 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.

Researchers & partners: Dr Jeroen Minderman (Postdoctoral researcher), Cerian Tatchley (PhD student), Dr Kirsty Park (Biological & Environmental Sciences, Univ of Stirling), Prof Nick Hanley (Dept of Economics, Univ. of Stirling), Dr Chris Pendlebury (Natural Power), Dr James Pearce-Higgins (BTO).

Funding bodies: Leverhulme Trust, Natural Environment Research Council / Economic and Social Research Council

Project start / end date: Dec 2009 – Oct 2015 (further funding is currently being sought)

Scientific papers pending:

1. Minderman, J., Pendlebury, C.J., Pearce-Higgins, J.W. & Park, K.J. The effect of small wind turbine presence and operation on bird and bat activity: a field experiment. In review: *Proceedings of the Royal Society B, Biological Sciences*.
2. Minderman, J., Fuentes-Montemayor, E., Pendlebury, C., Pearce-Higgins, J.W. & Park, K.J. Correlates of bird and bat mortality at small wind turbine sites in the UK. To be submitted to: *Journal of Applied Ecology*.
3. Park K.J., Turner A. and Minderman J. Attitudes towards planning applications for Small Wind Turbines in England, Scotland and Wales: a joined up approach? To be submitted to: *Journal of Environmental Planning and Management*.

2. Agri-environment schemes and bats

Project summary: Agri-environment schemes (AES) are potentially beneficial to bats and nocturnal insects, but the response of these taxa to their implementation had not been assessed prior to this study. In this project the 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) was assessed. Some AES prescriptions aim to increase the amount and quality of woodland on agricultural land, but little is known about how woodland character relates to bat abundance and insect prey availability; therefore, recommendations for woodland creation and management rarely consider the requirements of foraging bats. 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.

The work described above was conducted as a PhD studentship – follow up work (analysis ongoing) has used a GIS database of AES woodlands created throughout various grant schemes to assess the contribution that farm woodland creation schemes are making in providing suitable roosting and foraging resources for bats.

Researchers: Dr Elisa Fuentes-Montemayor (Postdoctoral researcher), Dr Kirsty Park, Prof Dave Goulson

Project start / end date: Aug 2007 – Jan 2012 (further funding is currently being sought)

Funding bodies: Mexican Government, University of Stirling, Glasgow Natural History Society, Peoples Trust for Endangered Species, British Ecological Society, Carnegie Trust for the Universities of Scotland.

Published and pending papers: (bat papers only – also two publications on moths):

1. 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, Cavin L, Wallace JM & Park KJ. Effects of woodland character and configuration on bats and nocturnal insects within farmland: implications for woodland management and creation schemes. To be submitted to: *Agricultural Ecosystems and Environments*

3. Ecology and conservation of urban bats

Project summary: Whilst some studies have shown a general avoidance of urban areas by bats, others have suggested that urban environments may have a positive role to play in resource availability for some bat species, particularly in landscapes dominated by intensive agricultural land use. The aim of this PhD studentship is to investigate the effect of urbanisation on bat ecology and conservation in the UK. This project will operate at a range of scales, regional to UK-wide. In 2011, urban woodlands within Central Scotland were surveyed for bats, using a combination of detection and capture methods, and their prey base. Here researchers will examine 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. Future work planned will use field survey data collected across the UK by volunteers in collaboration with the Bat Conservation Trust. This will examine foraging patterns in relation to urbanisation of the two sympatric pipistrelle species, *P. pygmaeus* and *P. pipistrellus*.

Key researchers: Paul Lintott (PhD student), Dr Kirsty Park, Prof Dave Goulson

Project start / end date: Oct 2010 – Oct 2015

Funding bodies: University of Stirling, British Ecological Society

Papers in preparation: Three manuscripts are pending from work already conducted; 1. Bat use of urban woodlands; 2. Moth communities in urban woodlands; 3. Method comparison for surveying bats in woodlands.

4. Bats without Borders: the distribution of cave dwelling bats in southern Africa

Determining a species' distribution is essential for any ecological or conservation research, such as understanding the implications of anthropogenic impacts on biodiversity. As with other species, bats are threatened by anthropogenic pressure. Climate change and extensive land use change are universally recognised as being the biggest threats to bat conservation globally. Southern Africa is an environmentally vulnerable region ill equipped for coping with extreme events, such as flooding or drought. As such, climate change is likely to have a significant impact on biodiversity in this region, which is rich in bat fauna. When research is undertaken in areas that are ecologically diverse but have little biological data, as in the case with bats in southern Africa, modelling can be a fundamental tool. This study will focus on cave-dwelling species which are very vulnerable to human impacts and considered to be a priority for conservation efforts as limited distribution data have hindered research into their ecology and conservation. To understand current and future conservation challenges, spatial distribution models will be employed to: (i) predict current distributions (ecological requirements) of focal species, (ii) direct fieldwork efforts, (iii) predict potential future shifts in distributions.

Researchers and partners: Rachael Cooper-Bohannon (PhD student), Dr Kirsty Park, Prof Gareth Jones (Univ of Bristol), Dr Hugo Rebelo (CIBIO, Portugal) Mr Marthin Kasaona

(Etosha National Park, Namibia), Dr Woody Cotterill (University of Cape Town), Ass. Professor Ara Monadjem (University of Swaziland), Dr Corrie Schoeman (University of KwaZulu-Natal), Ass. Professor Peter Taylor (University of Venda).

Project start / end date: Oct 2010 – Oct 2013

Funding bodies: University of Stirling, Rufford Small Grants

Papers: Data collection still underway.

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

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.

D. FUNCTIONING OF THE AGREEMENT

14. Co-operation with other Range States

White-nose syndrome

In October 2011 BCT (supported by the UK's various Statutory Nature Conservation Organisations) published updated White-nose syndrome (WNS) guidelines for bat workers in the UK. The changes were based on current research and experiences of other countries. These revised guidelines were circulated by BCT to NBMP volunteers as part of the hibernation survey packs, sent to bat groups via the bat group bulletin and put on the BCT website.

The national surveillance programme (with testing provided by the Animal Health and Veterinary Laboratory Agency (AHVLA)) has continued. The AHVLA has provided swabs for NBMP hibernation survey volunteers and some were supplied with their winter 2011/12 survey packs in winter. No positive cases of *Geomyces destructans* have yet been found in the UK.

Rabies

The last positive case of EBLV (type 2) in the UK was found in 2009 and only 10 cases have been confirmed since surveillance began in 1987. The Health Protection Agency, Animal Health and Veterinary Laboratory Agency and Defra continue to monitor bat bite issues and incidents as well as supporting the UK wide passive monitoring programme.

Scotland

In Scotland, a new version of the SNH "Bats & People" leaflet 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/>

SNH is a project partner and part-funder of the Defra-led study into bat mortality at GB wind farms, currently being undertaken by Exeter University. SNH is also involved with the Steering Group for the Defra and NE funded Bats & Woodlands Research Project.

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

England, Wales and Scotland

Project partner and part-funder in the proposed Defra-led study into bat mortality at GB wind farms. Bats & Windfarms Project