

National Bat Conference 2018

All presentations will take place in Business School South Auditorium B52

Saturday 8 September 2018

Session 1

Keynote talk: Challenges and opportunities of global bat conservation

Dr Winifred Frick, Chief Scientist, Bat Conservation International, wfrick@batcon.org @FrickWinifred

Loss of biodiversity is a global crisis caused by pervasive threats from anthropogenic activities, including land-use change, over-exploitation of species, introduction of invasive species, and climate change. With almost 1,400 species now recognized, bats account for nearly quarter of mammalian diversity and are important contributors to biodiversity and ecosystems around the globe. Yet, of the 1,241 species classified by the IUCN, significantly more bats (18%) are considered 'data deficient' than other mammals (13%) or birds (< 1%). Habitat loss or modification, roost site loss or disturbance, human health issues, persecution, lack of information, and overexploitation for food were identified as major threats to bats globally now almost 20 years ago by Mickelburgh et al. Many of these issues remain high priorities, but in the intervening years, new threats have also emerged, including mortality from wind energy turbines and the emergence of an infectious fungal disease of bats, white-nose syndrome, in North America. While many threats to bats (e.g. habitat loss, bushmeat hunting, climate change) reflect broader conservation challenges of our era, there are specific challenges and opportunities for conservation for bats. Bat species that aggregate in large numbers in concentrated habitats such as caves or mines are particularly vulnerable to direct mortality threats and loss of large colonies can have a disproportionate impact on populations. However, these focal habitats can be tractable targets for conservation with the opportunity to safeguard species from extinction. Conservation efforts for bats should address primary threats and prioritize actions with the greatest impact for sustaining populations. Increased attention to monitoring and assessing population trends are needed to assess and prioritize conservation actions.

An update from BCT

Kit Stoner, CEO, Bat Conservation Trust kstoner@bats.org.uk @KitStoner

The challenges to bat protection continue. Over the past year, BCT has been working to raise the positive profile of bats with policy makers, as well as working with our NGO partners on trying to ensure that we maintain wider environmental protection when Britain leaves the EU. Kit will update you on BCT's latest advocacy work and how you can help, as well as filling you in on the latest news of some of BCT's projects and activities such as the Helpline, the NBMP, Back from the Brink and many others.



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A DNA metabarcoding approach to analyse diet and foraging habitat preference in Bechstein's bat *Myotis bechsteinii*

Dr Helen Hipperson, Data Analyst, University of Sheffield,

h.hippersion@sheffield.ac.uk



The technique of DNA metabarcoding of faecal samples is revolutionising studies of animal diet and providing greater insights into species' life histories and habitat use, information which can be a great aid to conservation. Here we use this approach to identify invertebrate prey species from faecal samples collected from Bechstein's bats across their UK range, and to determine the importance of different foraging habitats. We amplified two barcoding genes (COI and 16S) for faecal sample DNA from 104 Bechstein's bats. We compared these data to a reference database of sequences from known invertebrate species, and identified Lepidoptera, Dermaptera (earwig) and Diptera (particularly crane flies), Coleoptera and Orthoptera as being the most common prey items.

Examining habitat preferences for many of these prey species revealed a strong habitat preference for deciduous oak-beech woodland but also revealed that open and wetland habitats surrounding inhabited woodland fragments are frequently visited for foraging. The identification of preferred habitats, associations with specific plant species and necessary resources for prey items will allow tailor-made conservation guidelines to be generated at the field site level to mitigate against further habitat loss. These data give us new insights into the foraging habits of one of the rarest UK mammals and will help in guiding their conservation in the future.

A Plan for the British Bat Survey

Dr Alison Fairbrass, Postdoctoral Research, University College London, alison.fairbrass@gmail.com
@AlisonFairbrass

A NERC-funded research collaboration between the BCT, University College London, Oxford University and the British Trust of Ornithology has been developing a plan for the British Bat Survey (BBatS), a new citizen science methodology for monitoring British bats using low-cost acoustic sensors and machine learning bat call detection and identification algorithms. Here we will outline the plans for the BBatS as well as results from a pilot of the methodology conducted in Scotland in the summer of 2018.

Session 2

Did the bat cross the road: Impact of traffic noise on bat activity

Domnhall Finch, PhD Student, University of Sussex, d.finch@sussex.ac.uk @domhnallfinch

Increasing levels of man-made noise is creating new soundscapes that have the potential to negatively impact wildlife across the globe. Roads are a major source of anthropogenic noise yet it is difficult to separate the effect of noise from other features associated with roads such as habitat structure and quality. The impacts of road noise on wild mammals are therefore poorly understood. Here we present the first controlled field experiment to examine the potential impacts

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traffic noise can have on bats. Using both acoustic and ultrasonic recordings we created a 'phantom road' along linear features at 7 sites known to be used by bats, and documented changes in the activity of five UK bat species, including the greater horseshoe bat (*Rhinolophus ferrumequinum*). Our findings, based on more than 20,000 bat calls, demonstrate a profound negative impact of road noise on bat activity. Further research is now required to understand whether bats can habituate to this stimulus.

Lesser horseshoe bat mitigation and monitoring on a major road scheme in south Wales

Richard Green, Director, Richard Green Ecology Ltd r.green@richardgreenecology.co.uk

@RichardGreenEco

The A465 Heads of the Valleys Road Dualling (Section 2) Scheme passes through the Usk Bat Sites SAC. Construction started in January 2015 and is due to finish in 2019. Along the route there are numerous caves and flight lines; and four lesser horseshoe bat maternity roosts, one of which is directly under the road in a viaduct.

Extensive bat surveys were undertaken to inform design and assessment. A Technical Advice Group was set up to provide input into the relevant assessment processes; and provide an opinion on the likely effectiveness of the proposed mitigation measures.

Lesser horseshoe bat mitigation includes:

- maintaining flight lines, including retaining modified existing under-road culverts
- and providing temporary connective measures until vegetation matures
- providing replacement bat foraging habitat
- sensitive working practices, particularly over caves and the viaduct maternity roost
- provision of replacement bat roosts, including a bat house that was used by lesser horseshoe bats within one season, and 'stepping-stone' night roosts, required as compensatory measures.

Ongoing monitoring involves:

- pre-parturition and juvenile counts at maternity roosts
- hibernation survey of caves
- use of replacement roost structures
- monitoring of bat flight lines.

Lesser horseshoe bat numbers in both maternity roosts and caves do not appear to have been affected by scheme construction, with overall numbers increasing in comparison to pre-construction numbers. Existing and new under-road crossings are being used by bats.

Thermal Imaging Bat Surveys

Dr Kayleigh Fawcett Williams, Director, KFW Scientific & Creative kfw.sci.create@gmail.com

@KayleighFawcett

Kayleigh has kindly stepped in after the previous speaker was unable to attend and will be discussing the use of thermal imaging for bat surveys and the development of a first draft of "Guidelines for Thermal Imaging for Bat Surveys".

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Session 3

Speaking bat: How can we better engage others with bats?

Ed Drewitt, Freelance naturalist eddrewitt1@gmail.com @eddrewitt

When working with bats in different and sometimes difficult situations, the language we use and the solutions we provide can greatly influence how other people involved perceive bats. During this talk Ed will give some top tips on how to get others excited about bats and what language to use so others can better live and work alongside them.

Surveying trees for bats: can we do better?

Jim Mullholland, BATS Ltd jim@batlicence.co.uk

The UK is home to 17 species of bats, 15 of which are known to roost in trees. With all UK bat species, and their roosts, receiving legal protection, the potential presence of bats is an important consideration for those responsible for surveying or managing trees.

Guidance for surveying for bats in trees exists for the arboricultural, forestry and ecological industries; the most recent addition is the British Standard 8596 – *Surveying for bats in trees and woodland*.

Research was undertaken to improve our knowledge of how bats use trees for roosting. This comprised monthly checks of potential roosting features on a range of trees. These inspections aimed to identify roost sites, investigate bat species present, numbers of bats, the nature of the roost as well as identifying how this changes throughout the year.

The findings were often surprising, and provide a useful insight to this little researched topic. Long-held assumptions are challenged in the light of this new evidence, including: the types of trees used by bats, the effectiveness of field signs and how frequently bats were encountered in roosts.

Overall the results highlight the difficulties in performing robust surveys, and identify short comings in current industry guidance.

Putting woodland bats on the map

Sonia Reveley, Woodland Officer, Bat Conservation Trust sreveley@bats.org.uk

Surveying for bats within cluttered and structurally complex woodlands is difficult, especially for those woodland interior specialists. This project is piloting survey approaches and technologies, including those developed for the British Bat Survey, with the aim of establishing a method for surveying bats in woodlands that could be carried out with volunteers at a large enough scale to provide species-specific trend data. As well as delivering a baseline for long-term monitoring, the data are being incorporated into a hierarchical modelling framework to predict species distributions at national, regional and local scales under current and future conditions. This approach, when sufficiently developed, can inform site to landscape scale planning, decision-making and strategies in support of a more resilient wooded landscape. We will provide an update on the pilot survey and highlight initial key findings, plus provide the latest on modelling approaches to predict species distributions, unpick associated drivers and forecast the impacts of potential changes.

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Session 4

The ecology of white-nose syndrome in UK bats

Dr Joseph Hoyt, Research Faculty, Virginia Tech jrhoyt@vt.edu

Emerging infectious diseases can have devastating and lasting effects on wildlife populations. Despite the importance of diseases in regulating populations, few studies have examined pathogen dynamics for diseases in native or endemic regions. We examined host infection patterns and environmental reservoirs for *Pseudogymnoascus destructans*, the fungal pathogen causing white-nose syndrome, in 11 hibernacula across the UK for two winters (2016/17 and 2017/18). We then compared disease dynamics to North America, where the pathogen is invading. Infection prevalence and fungal loads were much lower on bats in the UK than in regions where the disease is causing mass mortality, and hibernacula surfaces had significantly lower amounts of fungus. Prevalence was highest for *Myotis daubentonii* increasing from 25% to ~75% at the end of winter. These results indicate that transmission intensity is lower in the UK than in the US, which may allow for less resistant species to persist due to a lower force of infection.

What every bat handler needs to know about rabies prevention

Dr Katherine Russell, Consultant Epidemiologist, Public Health England katherine.russell@phe.gov.uk

All those who regularly handle bats should be vaccinated against rabies and should also report any bat bites, scratches or other direct exposures to ensure they can be offered prompt post-exposure treatment. In 2018, there have been a number of changes to rabies guidance in the UK and bat handlers should be aware of how these changes may affect them.

Changes to pre-exposure prophylaxis guidance include clarifying the employer's legal responsibilities for providing rabies vaccination, how vaccine is accessed from PHE, and what those with impaired immune systems need to be aware of before starting bat handling. Changes to post-exposure treatment guidance include a reduction in the number of vaccines required following an exposure for those who have not had any rabies vaccine before and how those with impaired immune systems are managed after an exposure.

The challenge of emerging lyssaviruses

Dr Ashley Banyard, Research Scientist, APHA, Ashley.Banyard@apha.gsi.gov.uk

The lyssaviruses constitute a group of viruses that cause 100% fatality following the establishment of symptomatic infection. The archetypal lyssavirus is rabies virus, historically one of the most feared pathogens on the planet, and one that globally causes over 65,000 deaths every year. Alongside rabies virus, the genus comprises a number of genetically related viruses that cause fatal encephalitis clinically indistinguishable from rabies. Whilst the human burden of these non-rabies lyssaviruses remains unclear, fatalities have been reported. Furthermore, novel lyssaviruses continue to be isolated from different species globally although most commonly, novel isolates are described in bats. Tools that can be used to either pre-immunise individuals (vaccines) against rabies or treat potential exposures to virus (vaccines and rabies immunoglobulin) in



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prodromal periods as post-exposure treatments have been available for decades. Despite these tools, the continued annual mortality rate remains, predominantly through a lack of availability of these preparations in areas where the virus is endemic. Importantly, whilst currently available pre- and post-exposure tools are able to protect against all detected strains of rabies, their ability to protect individuals from the other lyssaviruses varies significantly. The lyssavirus glycoprotein is the sole target for virus neutralising antibodies induced by vaccination and targeted by rabies immunoglobulin yet divergent lyssaviruses are not neutralised by these preparations. Here we describe the current situation regarding the continued discovery of novel lyssaviruses and the challenges to the development of tools to counteract potential infection with antigenically divergent members of this important group of viruses.

Surveillance, Epidemiology and Evolution of European Bat Lyssavirus 2

Dr Lorraine McElhinney, Senior Scientific Officer, APHA lorraine.mcelhinney@apha.gov.uk

Bat rabies cases in Europe are mainly attributed to two lyssaviruses, namely European Bat Lyssavirus 1 (EBLV-1) and European Bat Lyssavirus 2 (EBLV-2). Between 1977 and 2017, 1214 cases of bat rabies were reported, with the majority (>97%) being attributed to EBLV-1. In contrast, there have been only 39 suspected cases of EBLV-2, of which 34 have been confirmed by virus typing and presently restricted to just two bat species; *Myotis daubentonii* and *Myotis dasycneme*. In the UK, fourteen cases of EBLV-2 in *M. daubentonii* were reported through passive surveillance between 1996 and 2017 and a single human case in Scotland in 2002. In addition, EBLV-2 viral RNA was detected in a single oro-pharyngeal swab specimen collected from a healthy Daubenton's bat sampled as part of an active surveillance programme in Scotland in 2008. Analysis of available EBLV-2 genome sequences clearly supported geographical relationships with all EBLV-2 sequences clustering at the country level. However, there are high levels of genetic homogeneity between the EBLV-2 viruses, despite their widespread distribution both geographically and chronologically. Evolutionary clock analysis confirms the slow evolution of EBLV-2, between and within countries in Europe and also for viruses collected several years apart (2007, 2008, and 2014) from *M. daubentonii* at the same site (Stokesay Castle, Shropshire, UK).

Session 5

The cave-dwelling bats of Romania: research and conservation in key European sites

Dr Szilárd-Lehel Bücs, President & bat researcher, Centre for Bat Research and Conservation
szilardbux@gmail.com

The karst areas of Romania include a network of around 12.000 caves and a remarkable bat diversity associated with this habitat type. Out of the 32 Romanian bat species at least 14 are seasonal cave-dwellers, while five species form their colonies exclusively in caves. Among the most important caves we count sites that are home to some of Europe's largest colonies, like Huda lui Păpară and Șura Mare caves (around 100.000 bats in each), or Izvorul de la Tăușoare cave (around 10.000 bats). Projects in recent years have increased the number of key caves to 70, these being

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included also in EUROBATs's list of sites with continental importance. Discoveries are frequent especially in the bat diversity hotspot of the Banat region (SW Romania). Here we can mention one of Europe's largest *Rhinolophus* colonies in Topolnița cave (7.500+ bats in hibernation, counted for the first time only in 2015), or the multi-species hibernation site of Buhui cave (5.500+ bats, counted also for the first time also in 2015). The Păuleasa pothole, also in the Banat region, already has a winter fauna of 1.700+ bats, with only half the cave surveyed. But even in intensely studied karst areas like the Pădurea Craiului Mountains (NW Romania) there is still the possibility of significant discoveries. Here we present the status of key Romanian caves and that of resident bat colonies, by focusing on some notable examples. Several key sites, especially in NW Romania, received bat-friendly closings in the 2012-2013 period, but others continue to be threatened or even intentionally degraded, despite legislation and advice from bat expert groups. Generally, threats include mass-tourism, specialized speleo-tourism, religious activities, as well as the unwillingness of local and national decision/lawmakers to recognize the importance of these caves. Enlisting the help of caver clubs is crucial in long-term conservation of cave-dweller colonies, while such collaborations can also increase the number of national key roosts, through new discoveries done by mixed teams.

Stackpole and greater horseshoe bats in west Wales

Tom McOwat, peatmcowat@btinternet.com

Greater horseshoe bat monitoring in west Wales is centred at Stackpole where the first nursery roost was discovered in 1977. Afterwards the number of bats using the loft were logged and in 1978 attempts to find foraging areas by following exiting bats developed into the pioneering flight line work. The bats extend well beyond the Stackpole and Pembrokeshire boundaries and some hibernacula have been monitored since 1974.

A significant part of the work is counting the number of young born into the three known nursery roosts. It began at Stackpole in 1978, at Slebech in 1983 and at a third site in 2000, when a known intermediate site became a nursery.

Initially counting involved individually marking each baby but as numbers of both young and adults increased that became less practical in all sites and now a mixture of methods are used including photography. There has been a significant growth in the west Wales population since observations started and in 2017 a total of 731 young were counted, a long way from the 1987 low of 59.

Over the years a large number of volunteers and visitors have helped with different aspects of the work with many gaining their introduction to what has become an abiding interest.

With increasing numbers of bats using the lofts, over 1000 have been counted at Stackpole, greater numbers in hibernacula and the significant change in productivity it must be concluded that the species is recovering and doing well in west Wales.

Insights in autumn migration strategy of Nathusius's bats *Pipistrellus nathusii*

Dr Jurgis Šuba, Researcher, Latvian State Forest Research Institute "Silava" jurgis.suba@silava.lv

The Nathusius's bat is a migratory bat species, inhabiting lowland areas in eastern, north-eastern

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and central Europe in summer and hibernating in western and southern Europe. Banding and acoustic studies suggest that its autumn and spring migration between breeding and hibernation sites occur presumably in April-May and August-September, respectively.

In Latvia, a mass banding programme for bats during autumn migration period has been conducted in 1985–1992 and resumed since 2011 in collaboration with Leibniz Institute for Zoo and Wildlife Research at the Pape Ornithological Station (56°11'N 21°03'E). Almost 29,000 bats were banded and subsequent recaptures have provided much data on the migration direction (destination), distance and speed. In autumn 2015 and 2017, altogether three individual *Nathusius's* bats from Latvia were captured in the United Kingdom, confirming bat migration between Britain and Europe.

To gain more knowledge on autumn migration, studies on foraging performance and flight speed of migrating *Nathusius's* bats were conducted at the vicinity of Pape Ornithological Station in 2010 and 2011. Foraging intensity on a known migration flyway and at various habitats was indirectly estimated by presence or absence of feeding buzzes in automatic audio-recordings of bats' echolocation pulses. The speed of migration flights was measured on a known migration flyway using a stopwatch and two reference poles erected 20 metres apart. The observations indicated that migrating *Nathusius's* bats feed throughout the night during their migration flight. At slow wind, their mean speed of migration flight was 11–13 m/s (40–47 km/h), corresponding to the migration speed of 30–120 km per night. These results confirmed theoretical predictions and findings of other studies.

Battling for bats in Africa – using applied research, conservation and outreach to conserve bat populations in Malawi

Dr Emma Stone, Founder/Director, African Bat Conservation emma@conservationresearchafrica.org

Malawi has been highlighted by the International Union for the Conservation of Nature (IUCN) as of key importance to bat conservation in Africa (Hutson, Mickleburgh & Racey 2001), having high endemism and species diversity. However, bats are not protected in Malawi and suffer from habitat loss, active persecution and are hunted. Bats occupy the majority of buildings in communities causing conflict through accumulation of guano, noise and fear. Pest control agents exterminate bats and their roosts, and bats are traded for meat and cultural practices including witchcraft and female genital mutilation (FGM). Malawi is therefore a model environment to understand and predict the impacts of future global environmental change on bats. African Bat Conservation (ABC), is a charity registered in England and Wales which aims to conserve bat populations in Africa through applied research, education and conservation. Based in Malawi, the project was conceived by Dr Emma Stone (Bristol University, Cardiff University) in 2011. ABC conducts a diverse array of projects with both local and international volunteers playing a vital role in achieving their aims. The foundation of ABC's work is a long-term biodiversity monitoring programme (BMP), developed from the BCT NBMP. The BMP uses bats as bio-indicators to assess bat diversity and abundance at the landscape level across the Malawi providing long-term monitoring data to identify bat population trends and thresholds of decline. ABC is building a nationwide bat acoustics library and are

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investigating the diagnostic potential of acoustics for bat identification in Malawi. ABC are developing a genetic database of bats in Malawi, and are commencing a landscape genetics study (PhD Southampton) to identify the genetic impacts of habitat fragmentation on bats across landscapes. ABC focuses on human-bat conflict, and urban bat ecology research and conservation. Urbanisation and conflict are increasing threats in Africa. In partnership with Nottingham Trent University ABC are conducting an experiment to assess the impact of exclusions on white bellied house bats (*Mops niveiventer*). With Cardiff University ABC is assessing the social drivers of human-bat conflict Recent findings include uncovering a network of bat trade, consumption and cultural use in Malawi. ABC are currently conducting community surveys to investigate impacts on bat populations and human health (in partnership The Institute for Global Health & Infectious Diseases, University of North Carolina). Since uncovering these complex and varied conflict scenarios ABC have established a toll-free bat helpline (with support from BCT) through which the public receive support, advice and site mitigation visits to promote human-bat coexistence. ABC's research has a wide range of applications and is being used to inform conservation management for the benefit of bats and communities. Results have been used to implement evidence-based conservation measures and to build capacity within a variety of stakeholders including local government and the Department of National Parks and Wildlife.



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