



# National Bat Conference 2019 Abstracts

Saturday 7 September 2019

## Session 1

### **Keynote Speech: Do bats hold the secret of ever-lasting youth and can we find it?**

*Professor Emma Teeling, University College Dublin, [Emma.Teeling@ucd.ie](mailto:Emma.Teeling@ucd.ie)*

Of all mammals, bats possess the most unique and peculiar adaptations that render them as excellent models to investigate the mechanisms of extended longevity and potentially halted senescence. Indeed, they are the longest-lived mammals relative to their body size, with the oldest bat caught being >41 years old, living approx. 8 times longer than expected. Bats defy the 'rate-of-living' theories that propose a positive correlation between body size and longevity as they use twice the energy as other species of considerable size, but live far longer. The mechanisms that bats use to avoid the negative physiological effects of their heightened metabolism and deal with an increased production of deleterious Reactive Oxygen Species (ROS) is not known, however it is suggested that they either prevent or repair ROS damage. Bats also appear to have resistance to many viral diseases such as rabies, SARS and Ebola and have been shown to be reservoir species for a huge diversity of newly discovered viruses. This suggests that their innate immunity is different to other mammals, perhaps playing a role in their unexpected longevity. Here the potential genomic basis for their rare immunity and exceptional longevity is explored across multiple bat genomes and divergent 'ageing' related markers (e.g. microbiome, telomeres, mitochondria, cellular dynamics). A novel blood-based population-level transcriptomics approach is used to explore the molecular changes that occur in an ageing wild population of bats to uncover how bats 'age' so slowly compared with other mammals and to further validate in silico functional predictions. These findings provide a deeper understanding of the causal mechanisms of ageing, potentially uncovering the key molecular pathways that could be eventually modified to halt, alleviate and perhaps even reverse this process in humans.

### **An Update from BCT**

*Kit Stoner, CEO, Bat Conservation Trust [kstoner@bats.org.uk](mailto: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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## Back from the Brink: The Grey Long-Eared Bat Project

Craig Dunton, Bat Conservation Trust [cdunton@bats.org.uk](mailto:cdunton@bats.org.uk) @Devonhabitats

*Back from the Brink* is one of the most ambitious conservation projects ever undertaken. Its aim – to save 20 species from extinction and benefit over 200 more through 19 projects that span England.

It's the first time ever that so many conservation organisations have worked collaboratively at this scale and since 2017, the Bat Conservation Trust has been leading on the grey long-eared bat project.

The project's key focus has been to engage with landowners in key areas of the grey long-eared bat's range, working together to retain and enhance the precious foraging habitats these bats rely on. The project has also been working with organisations and communities to raise awareness and knowledge of this species, to create a long lasting legacy that will see grey long-eared bat's protected into the future.

This presentation will cover an overview of the project, and a summary of the key successes and challenges to date.

## Surveying Bechstein's Maternity Roosts: A New Approach

Jim Mullholland, Bats Ltd, [jim@batlicence.co.uk](mailto:jim@batlicence.co.uk)

For some time, it has been widely accepted that bats move between tree roosts on a regular basis. Whilst we may not fully understand this behaviour it nonetheless presents a challenge for those tasked with trying to locate bat roosts in trees.

Building on work presented at the 2018 National Bat Conference, a study focussing on four Bechstein's maternity tree roosts was undertaken in 2018/19. This aimed to evaluate the efficacy of monthly physical inspections (climbing inspections) in relation to identifying bat roosts. In the second year of the study wildlife trail cameras were deployed as an alternative method for identifying bat roosts in trees.

The results of the study will be presented and suggestions made on how we can improve the likelihood of locating bats whilst keeping surveys affordable.

## Session 2

### Bats in Agricultural Landscapes in Zambia

Helen Taylor-Boyd, University of Stirling [h.l.taylorboyd1@stir.ac.uk](mailto:h.l.taylorboyd1@stir.ac.uk)

Human population growth is increasing pressure on our natural resources and habitats. Crop production in particular results in large scale land clearance and is known to be one of the largest drivers of habitat loss; however these landscapes can also result in conditions favourable to particular species assemblages.

The study of species assemblages can tell us about the potential effects of anthropogenic activity on ecosystem functions. Bats can be used as indicators in this regard, with a wide diversity of species co-existing in a variety of niches, with different levels of resilience to human disturbance.

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Studies worldwide provided evidence for a provision of ecosystem services insectivorous bats, with some demonstrating that they can reduce insect pest populations significantly. For Africa, insect pest control services by bats and the effects of agriculture on biodiversity have been largely understudied.

My PhD research focuses on how bats use agricultural landscapes so as to better understand effects of agriculture on bat diversity and ecology, but also investigate the potential provision of insect pest control services by bats in an Afrotropic environment.

Acoustic and trapping methods were used to record bat species assemblages and activity levels on 30 farms in Zambia during cropping seasons. Insect traps were used to assess food availability and droppings were collected for dietary analysis by molecular techniques to screen for known crop pests in diets. Here, I present initial findings of the project to date.

### Ecosystem Dis-services in Coffee Plantations in Malawi – The Role of Bats and Birds

Dr Emma Stone, African Bat Conservation, Lilongwe, Malawi / University of the West of England, [emma4.stone@uwe.ac.uk](mailto:emma4.stone@uwe.ac.uk) @africanbatconservation

Conversion of tropical forest and agricultural intensification are important drivers of biodiversity loss globally. Malawi has the highest rate of deforestation in southern Africa and the rapid expansion of agriculture has resulted in habitat degradation and fragmentation. Bats are 'keystone' species performing fundamental ecological roles as seed dispersers and pollinators, and are of great economic importance due to their role in insect pest control.

We conducted a controlled field experiment in coffee plantations in Southern Malawi to quantify the ecosystem services provided by bats through insect pest control. Thirty sites were selected randomly in coffee fields on Satemwa Coffee estate in the Southern Shire Highlands. At each site (block), three exclosures (n = 90 in total) were constructed from wooden frames with wire mesh large enough to exclude bats and birds but allow insects. Each exclosure in each block were assigned to one of three treatments: 1 = control comprising the external cage but no netting; 2 = birds and bats: cage is closed all day and all night; and 3 = bats: cage is closed at night only to exclude bats.

Experiments commenced in June 2015 and ended in August 2015. We collected data on insect pest damage (leaf and berry) and harvest data in each exclosure. There was no significant difference in levels of leaf damage from *Leucoplemma dohertyi* (Leaf skeletoniser) and *Ascotis selenaria reciprocaria* (Giant looper moth) between treatments. Leaf damage from *Cercospora coffeicola* fungus was significantly lower in exclosures when bats and birds were excluded compared to control plots.

There was no difference in proportion of bad/damaged coffee berries harvested between bat and control, or bird and control exclosures. Contrary to other studies, here we show that bats and birds do not control leaf pests in coffee plantations but show that bats may be vectors of the *Cercospora* fungus due to increase fungal damage when bats and birds are present. This is the first record of bats as a potential vector of a fungal plant pathogen and requires further investigation.

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## Session 3

### Evaluating Methods to Deter Bats

Lia Gilmour, University of Bristol [lvqliarose@yahoo.co.uk](mailto:lvqliarose@yahoo.co.uk) @BatDeterrentRes

With an ever-expanding human population, human-wildlife conflicts and interactions are on the increase and are a major conservation concern for many species. Current mitigation methods therefore aim to reduce conflict and often include ways of keeping animals out of an area, for example using deterrent methods. Bats are one group for which deterrence has been suggested as a potential mitigation method for reducing conflict with humans. Being slow to reproduce, long-lived and subject to the high energy requirements of flight, bats are already regarded as vulnerable to threats such as habitat loss, climate change and emerging diseases. Exploration of bat deterrence methods is therefore warranted for effective future bat conservation. I will present findings from three chapters from my PhD, including results from field experiments evaluating bat deterrence methods. In my first chapter, I compared acoustic and radar deterrents at foraging sites using near infrared video and acoustic methods and determined that bat activity was significantly reduced by acoustic, but not radar methods. Throughout my PhD, I also developed flight path tracking methods using thermal imaging and MATLAB coding. I then used 2-dimensional flight path tracking to determine the effective range of the acoustic deterrent speakers and 3-dimensional tracking methods to investigate behavioural responses of bats to these deterrents.

### Think International, Act Local – Two Local Planning Policy Approaches to the Protection of Sites of International Importance for Bats and Their Supporting Habitats.

Ben Mitchell, Johns Associates [bmitchell@johnsassociates.co.uk](mailto:bmitchell@johnsassociates.co.uk)

This presentation will introduce two approaches used in Wiltshire to take a measure of control over the protection of the Bath & Bradford-on-Avon Bats – Special Area of Conservation (SAC) in the face of the threat of softening legislation.

Drawing on our experiences of creating a voluntary neighbourhood plan “Batscape” policy (the voluntary approach) and a policy driven by the requirements of European legislation to mitigate for the impacts of a particular housing allocation plan (the Regulatory approach), we will describe our journeys through the perilous realms of local policy to support threatened bat populations.

We will use two case studies to describe how we overcame these significant obstacles in developing the Corsham Neighbourhood Plan and the Trowbridge Bat Mitigation Strategy:

- The efforts that are required to create policies to protect bat species
- The key conditions to establish the case for the creation of such policies
- The fundamental challenges involved in the process:
  - Patchiness/bias of bat and habitat data
  - Lack of proven mitigation research
  - Proportionality
  - Balancing recreation and mitigation

Could this local approach be one tool that is within our power to mitigate against the potential repeal of existing European legislative protection for bats post Brexit?



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## Updating the Bat Mitigation Guidelines

Stephanie Wray, RSK Biocensus [Stephanie.Wray@biocensus.com](mailto:Stephanie.Wray@biocensus.com)



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## Sunday 8 September 2019

All presentations will take place in Business School South Auditorium B52

### Session 4

#### The Big Bat Year - Conservation Challenges From Around the World

Nils Bouillard, *Big Bat Year*

The Big Bat Year is a world tour during which Nils is attempting to see as many bat species as possible. But it is also much more! It is an opportunity to improve our knowledge of bats and to raise awareness on the importance of bat conservation by exposing some poorly known conservation issues. From habitat destruction to the impact of religion on bat conservation, this talk is a window on the complex issues threatening bats around the world.

#### Batting in the Channel

Annika Binet, *BCT Trustee/Hampshire Bat Group*

Bat work in the Channel Islands has been growing in recent years as more bat workers have got involved, helping engage the public, survey new roosts and identify new species on the islands. Island life can provide some unique challenges and opportunities for both bats and bat workers and Ani describes some of her experiences and highlights from Jersey, Guernsey and Alderney.

#### Assessing the Value of Single, Isolated Trees in Different Agricultural Landscape Contexts for the Conservation of Bats in Farmland

Jeremy Froidevaux, *University of Bristol/French National Institute for Agricultural Research (INRA)*

Single, isolated trees (SITs) in the agricultural matrix are key landscape features in many anthropogenic landscapes worldwide. Their disproportionate ecological value have been highlighted for many taxa including birds and insects, yet the maintenance of such features in the landscapes are often overlooked in conservation plans. SITs may provide suitable foraging habitat and roosting opportunities for insectivorous bats. Nevertheless, further information regarding the role of tree characteristics and landscape context in driving bat activity around SITs are crucially needed in order to recommend adequate conservation actions. In this study, we aimed to (i) investigate the relationship between bat activity and tree characteristics; and (ii) assess the role of habitat connectivity in mediating the use of SITs by bats. Fieldwork took place in the Jura Mountain (Eastern France) during the summer 2017. We acoustically sampled bats around 57 SITs located along a gradient of distances from woody habitats (forests and hedgerows). Tree characteristics such as tree height, diameter at breast height, crown cover, and diversity of tree related microhabitats were measured in the field. We will present the results and discuss their implications for the conservation of bats in farmland.

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## Questioning Assumed Trade-offs in Agave Use by Bats and People in Northeast Mexico, and Implications for Bat Conservation Efforts

*Kristen Lear, University of Georgia*

The Mexican long-nosed bat (*Leptonycteris nivalis*) is a nectar-feeding bat that is listed as endangered in both Mexico and the United States, as well as by the International Union for Conservation of Nature. It is thought that the species' decline is in part due to a loss of floral resource availability, specifically agave plants (*Agave* spp.) upon which the bats rely during their long-distance migrations. Agaves are important cultural and economic resources for farmers and communities throughout Mexico, and the current conservation paradigm assumes that there is a clear trade-off between bat and human use of agaves.

Specifically, it is assumed that all agave harvest is detrimental to the bats because it reduces available food resources. This assumption is the basis for ongoing conservation efforts in Mexico. In this study, I took a critical look at this underlying assumption to interrogate whether it holds true in northeast Mexico, a region critical to the survival of the Mexican long-nosed bat. Within the states of Nuevo Leon and Coahuila, I worked in 14 communities that harvest and use agaves to address three research questions:

- 1) What practices do people use to harvest and manage agaves?
- 2) To what extent has agave harvest and use persisted within communities?
- 3) What are the implications for agave growth, reproduction, and demography of specific agave harvest practices and the intensity of agave harvest?

I conducted semi-structured ethnobotanical interviews with agave harvesters in each community and found that the effects of harvest on agave growth, reproduction, and demography varied by practice and species of agave, with some species benefiting from increased harvest (through higher production rates of *hijos* (clonal offshoots) and other species being negatively affected by harvest. In addition, communities varied in their reliance on agave harvest as a livelihood activity. These results illuminate key factors that preclude a straightforward trade-off between bat and human use of agaves and bring to light potential win-win opportunities for conserving the Mexican long-nosed bat. Finally, this study demonstrates the importance of questioning commonly-held assumptions within conservation and considering the local contexts of the systems to achieve more effective and equitable conservation outcomes.

## Session 5

### Nightsniffing: Reimagining Bat Walks as an Exploration of Urban Change and Contestation

*Clifford Hammett, University of Sussex*

*Nightsniffing* is an artistic research project that reimagines urban public bat walking as a way to collectively investigate the systems that shape the city, combining transdisciplinary investigation, walking art and digital media design. It seeks methods to engage different publics with bats without reprising sometimes unhelpful divides between nature/culture or ecology/society, instead beginning from the complex relations that bats have with cities and human society. These include environmental regulation, varying consideration of the interests of bats within urban planning and



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the ways bats use, inhabit, affect and are affected by the built environment. Engaging with the technologies and methods that make bats perceivable, *Nightsniffing* will stage walks and events in London that allow different conversations to emerge regarding who and what are cities are for, and how we might wish for them to function differently.

The project has three stages. The first is an investigation of bat walks and surveys using biomapping - using physiological sensors and recorded sound to elicit accounts of what people feel and experience while looking for bats. The second is to investigate systems that affect the built environment, attending to how the interest of bats and other beings and communities coincide and come into conflict. These will be combined in the final stage to create the novel electronic contraptions and methods of walking to bring together the concerns of different communities of living beings in the city with the systems that might care for, disrupt or harm them.



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### **Swarming: Sites and Species**

*Nick Tomlinson, Dorset Bat Group*

The Dorset Bat Group has been studying swarming bats in the Purbeck for eight years. The results from this work, and previous work undertaken nearby, has led us to begin to challenge what we thought we understood about what constitutes a swarming species in the UK, how bats are using these sites and what implications that they might have for the long term security and management of them for swarming.

### **The Effects of LED Street Lighting on Bat Activity**

*Liz Rowse, University of Bristol*

Artificial lighting is an integral part of modern society; street lights, for example are commonly found in towns and cities across the world and as a result have the potential for widespread effects on the environment, biodiversity and human health. Generally, bats show species-specific responses to artificial lighting: some feed on the insects that are attracted to street lights, whereas others avoid light.

Many street lights across Britain, and elsewhere in the world, are being switched from older lighting technologies, such as low-pressure sodium (LPS) to light emitting diode (LED) lights. LED lights have a number of advantages over older lighting technologies, including energy efficiency, increased flexibility and longevity. I used a before-after-control-impact paired design to examine the effects of the switch-over from LPS to LED street lights on bat activity across southern England. I found no significant differences in either bat activity or feeding behaviour around LPS and LED lights. These findings are important given that many existing street lights are being, or have been, switched to LED lights before their ecological consequences had been assessed. However, my results need to be considered alongside the wider impacts of artificial lighting on bats. Artificial lighting generally has a negative impact on slow-flying bats, many of these species are already vulnerable, and changes in lighting technology do not address this issue.

As a follow-up study, I explored how light intensity affected bat activity. In addition to the

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installation of LED lights, many local authorities are also implementing centrally managed schemes such as part-night lighting and dimming. Dimming not only reduces the intensity of the street light, but also the amount of light distributed from the light source. Reducing the spread of light may be less detrimental to light-averse bats, by creating dark refuges and corridors which light-averse bats may use. I conducted a field experiment to determine how LED light intensity affects the activity of the light-opportunistic *Pipistrellus pipistrellus* bat and light-averse bats in the genus *Myotis* in suburban habitats, using four lighting levels (0%, 25%, 50% and 100% of the original output). The low lighting level (25%) did not have a significant effect on the bat activity of either *P.pipistrellus* or *Myotis* spp. My results suggest that dimming may be an effective strategy in mitigating some of the ecological impacts of artificial lighting at night (ALAN), possibly realigning the balance between light-opportunistic and light-averse species, whilst also offering cost benefits and reducing carbon footprints.



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