

National Bat Conference 2023 Abstracts

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Saturday 16 September 2023

Keynote: From hibernating horseshoes and bats on the pill, to how biodiversity responds to ecological restoration **Speaker - Professor Kirsty Park, University of Stirling**

In this talk I will cover a range of topics and studies that I have led, or been involved with, from my PhD to the present day. During my PhD, I followed Greater Horseshoe bats with temperature sensitive radio tags to see what they got up to in winter. As you can imagine, this involved a lot of sitting around in sub-zero temperatures, but allowed us a unique insight into patterns of torpor, arousal and activity in free-ranging bats over longer periods than had previously been possible.

After I moved to Stirling, I investigated whether bats could be exposed to endocrine disrupting chemicals, known to have impacts on a range of aquatic organisms. The short answer is yes, they are exposed to these synthetic chemicals, but we don't yet know what effect they may be having.

The latter half of the talk focusses on what have become major themes of my research over the past 15 or so years:

1. Wildlife ecology and conservation in heavily anthropogenic landscapes (such as agriculture, urban, commercial forestry).
2. Ecological restoration of degraded systems, with a particular focus on woodland.

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An update on the work of the Bat Conservation Trust - Kit Stoner, Bat Conservation Trust

As ever, it has been a busy time for the Bat Conservation Trust and Kit will share a selection of highlights from the last year, including updates on BCT's policy work, our science and monitoring projects, our work with different sectors and on the ground, and our work with the wider public. She will also share an update on the incoming strategy.

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Bat Conservation: Global evidence for the effects of interventions - Dr Anna Bethinussen, Conservation First

Evidence-based knowledge is key for planning successful conservation strategies and for the cost-effective allocation of scarce conservation resources. The Conservation Evidence project, based at the University of Cambridge, aims to collate and summarise evidence from the scientific literature about the effects of conservation actions, such as habitat or species management. The available evidence is presented in synopses containing concise plain-English summaries. Expert panels are then asked to assess the effectiveness (or not) of actions, based on the summarised evidence. To date, twenty-four evidence synopses have been published for a wide range of taxa and habitats, with more currently under way. The Bat Conservation Synopsis was originally published in 2014. The synopsis brings together and summarises scientific evidence relevant to the practical conservation of bats. We worked with an international advisory board of bat experts to develop a global list of interventions that could benefit bats, and then used a subject-wide evidence synthesis approach to search both the scientific and grey literature and summarise the available evidence. Updates to the Bat Conservation Synopsis were published in 2019, 2020 and 2021 to incorporate new research and give conservationists access to the latest and most relevant knowledge. I will present the theory behind the Conservation Evidence approach, and discuss the findings from the most recently published Bat Conservation Synopsis and expert assessment. The synopsis is freely available online and, alongside the Conservation Evidence online database, is a valuable asset to the toolkit of practitioners and policy makers seeking sound information to support bat conservation.

Using acoustics to monitor the impacts of land-use change on bats in Borneo - Vincent Weir Scientific Award Winner 2023 – Natalie Yoh, Durrell Institute for Conservation & Ecology, University of Kent

Southeast Asia is a bat biodiversity hotspot with over 388 species. However, these species are threatened by unprecedented rates of habitat loss and degradation. A quarter of Southeast Asian bat species are predicted to be lost by the end of the century. Most research studying how tropical bats respond to land-use change has been concentrated in the American tropics where a large proportion of the bat community can be well sampled using mist-nets. Here, we outline how acoustic monitoring can be used as a complementary method to assess how bat communities are responding to land-use change in Southeast Asia, where communities are dominated by insectivores. So far, acoustic studies in Southeast Asia have been limited by a lack of species reference calls and a lack of time and resources. Using Malaysian Borneo as a case-study, we demonstrate how acoustic classifiers can improve monitoring capacity in land-use change studies even where we lack knowledge about all species present in a community. Our findings demonstrate how bats can benefit from conservation initiatives that protect landscape features in human-modified landscapes but crucially, as disturbance increases, less resilient species are lost. Collectively, the findings and resources presented here contribute towards future evidence-based management strategies for bat conservation in Southeast Asia.

Pull Up a Pew: Conversations about Bats in Churches - Kate Jones, Natural England

Bats in Churches is a 5-year Heritage Lottery funded Partnership project between Natural England, BCT, Historic England, Church of England, and Churches Conservation Trust, which ends in October. The project aimed to trial a novel class licence that allows ecologists more freedom to explore mitigation approaches at churches, while carrying out a suite of engagement activities with stakeholders, church communities and local schools.

The project carried out a range of capital interventions at over 30 churches in England and explored protective coverings for heritage objects, the impact of a professional clean at a church with bats, and how partnering churches with local bat and nature enthusiasts led to positive outcomes.

Our findings suggest that, although the Bats in Churches class licence is a useful tool at complex sites where major works are planned, it is sometimes a better choice for ecologists to work closely with churches to find softer, lower impact solutions such as catch trays or 'sails' that allow the church to manage bat mess while living alongside them, without the need for excessive surveys. Significantly, the project found that education and community buy-in is one of the most important factors in determining how churches feel about their bats. Several case studies demonstrate that church communities can, in the right circumstances, move from a serious dislike of bats to seeing them as an asset to the church through bat walks and talks that draw in new members of the community. Ecologists, bat workers and bat enthusiasts can play a role in this through thoughtful and compassionate engagement, and the project presents case studies and best practice on having meaningful conversations with the people who care for churches with bats.

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Interspecific cohabitation of maternity colonies of noctule (*Nyctalus noctula*) and Daubenton's bats (*Myotis daubentonii*) in woodland tree roosts - Dr Morgan Hughes University of Wolverhampton

"Woodland bat species may 'time share' tree roost features and occasionally have been recorded cohabiting in low numbers. However, few observations exist of substantial maternity roosts of sympatric species cohabiting in a single roost feature. Following an emergence survey in June of 2021 of a known maternity roost of 28 *Nyctalus noctula* individuals (pre-parturition), a further emergence from the same feature of 59 *Myotis daubentonii* was recorded and filmed using infra-red and thermal cameras. Cohabitation records of maternity colonies of this size have not been previously submitted to the UK Bat Tree Habitat Key database, nor do similar observations appear in the literature. Following the 2021 destruction of the roost feature during a storm, we were able to describe the entire feature in detail, including transverse section analysis and photography.

Surveys in 2022 and 2023 have now shown that these two bat colonies have cohabited in features in at least four separate trees within the study site (a small, suburban, broad-leaved woodland), over at least three (but probably four) seasons, and in a woodland with abundant suitable features that are used by both colonies separately. Winter tree climbing and roost inspection has provided

further insight into exactly what makes this type of cohabitation possible, and just how much resource partitioning is at play (or not!).

This novel record of interspecific cohabitation has recently been recently published in the Journal of Bat Research and Conservation, and not only adds to the body of knowledge regarding roost cohabitation of Vesper bats in temperate woodlands, but also highlights the value of infra-red and thermal optics for improving the efficacy of bat emergence surveys, particularly in forest habitats.”

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Mass pipistrelle hibernation sites in Northumberland - Tina Wiffen Manchester Metropolitan University

Mass pipistrelle hibernation sites are under-recorded in the UK. This talk reflects on hibernation surveys at four large pipistrelle hibernacula over a number of years and considers over 20 sites with lower counts of hibernating pipistrelles. Frost swarming behaviour of pipistrelles has been discovered in the Netherlands. This study documents the bat activity in relation to air temperature at five pipistrelle hibernation sites in the north east of England and seeks to show that frost swarming does occur in the north east of England. It will also consider if these techniques can be used to find previously unknown large hibernation sites using acoustic surveys.

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Sunday 17 September 2023

Bat protection in the sky: Investigating effects of unmanned aerial systems for acoustic bat surveys - Marc Roswag, HAW Hamburg, Universität Hohenheim

The protection of wildlife, including bats (Chiroptera), has become a critical issue, particularly in light of the increasing expansion of wind energy. To protect bats, it is essential to understand their flight and activity patterns. Currently, stationary nacelle monitoring is the most effective method to determine bat activity levels at greater heights close to wind turbines. However, it only covers 23% of the risk area for bats calling with 20 kHz and 4% for bats with 40kHz calls (assuming 60m blade length). To protect bat more efficiently, new technologies for monitoring bats at greater heights are needed.

Several studies using unmanned aerial systems (UASs) for acoustic bat surveys show that it is possible to record echolocation calls during bat flight using UASs. However, there are important considerations such as the possible impact of the noise and light emitted by UASs on bat behaviour and the potential for bias due to deterrence or attraction effects.

In this study, we investigated a possible impact (deterrence or attracting effect) by two different – so far unresearched – types of UASs on bats activity: the multicopter (an UAS with six large rotor

blades which produces noise in lower frequencies so interference with echolocation calls of bat's can be avoided) and a lighter than air (LTA) UAS (which produces less noise and has a longer flight duration).

We experimentally investigated possible deterrence or attracting effects of both systems on bats in the field. We used an ultrasonic recorder that recorded bat calls in three phases. One without any UASs as a control and in the second and third phases, we recorded bat activity while the multicopter or LTA UASs were flown 20m above the ground.

Our study found no significant difference of bat activity levels between LTA UAS flights and the control. However, during multicopter flights, bat activity was significantly reduced compared to the control. Further research is required into the reasons for the deterrence effect on bats. Our findings suggest that LTA UASs may be a promising solution for acoustic bat surveys at greater heights, as they do not affect bat activity. Nonetheless, the LTA UAS in our study was highly susceptible to wind, making stable flight at higher altitudes difficult. Overall, our study collects new data and provides new insights into the use of UASs for bat surveys and highlights the need for further research in this field to develop effective protection for bats in the context of wind energy expansion.

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Surveying trees for bats: A new hope - Jim Mullholland and Carys Peotto, BATS Research and Training

Since the commencement of the Bat Tree Habitat Key project, our knowledge of tree roosting bats has increased dramatically. Despite this, standard tree surveys yield poor results (the probability of finding bats on a single visit may be as low as 5%). What can be done to improve prospects for bat surveyor and bats alike?

Jim will share further findings from his ongoing research which aims to improve how we survey for bats in trees. Can off-the-shelf trail cameras give us the advantage we need? What information can these cameras give us? And who would win in a fight between a noctule and a grey squirrel? For the answer to these questions, and many more, come along and find out.

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Bat Survey Guidelines 4th edition is published! - Jan Collins, Head of Biodiversity, Bat Conservation Trust

Jan Collins, BCT's Head of Biodiversity, will be speaking about the publication of Bat Surveys for Professional Ecologists Good Practice Guidelines 4th edition. Jan will give a flavour of what it really takes to update a major piece of guidance like this and the highlights and key messages from the 4th edition. She will also touch on other related guidance that is in production. Jan will be available throughout the conference to answer any questions you have regarding this publication.

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Roost Award

The [Roost Awards](#) promote best practice bat roost mitigation and enhancement. Case studies should showcase data collection techniques at the baseline and monitoring stages and also show a thorough understanding of the planning and design process. Judges, including last year's winner Chris Damant, look for examples of best practice but also who could share learning from their experiences.

2023 winning project – High Marks Barn SSSI submitted by Tom Kitching from Vincent Wildlife Trust
<https://www.bats.org.uk/our-work/buildings-planning-and-development/roost-replacement-and-enhancement/case-studies/high-marks-barn-4>

Ringling the Changes: A centralised database and guidelines for bat ringing in the UK - Lisa Worledge, Director of Conservation, Bat Conservation Trust

Bat ringing is a long-established research technique in the UK that has become more widely used in recent years. A growing number of researchers, bat groups and consultants are involved in long-term ringing projects. However, there was no centralised system to track ringed bats in the UK, despite being a requirement of EUROBATS Resolution No. 4.6 in 2003, and existing ringing guidance was almost 20 years old.

Funded by bat groups and ringers, Ringling the Changes aims to implement a centralised database for ringed bats in the UK and an agreed set of guidelines for bat ringing, supported by the Statutory Nature Conservation Organisations and the bat ringing community. This talk provides an overview of the project, what has been achieved so far and what remains to be done.

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For the greater good - Steph Murphy and Daniel Hargreaves, Sussex Bat Group & VWT

In 2019 a Sussex bat group member discovered a colony of greater horseshoe bats roosting in a derelict building in West Sussex. This was a significant find as the nearest maternity colony was almost 100km away in Dorset. The late Tony Hutson, with several bat group members, rallied together to change this potentially perilous discovery into a conservation benefit. This presentation demonstrates the importance of organisations working together, spurred on by the tremendous support from bat groups and individuals, to purchase and refurbish one of Britain's smallest but most significant roosts.

The protection and conservation of greater horseshoe bats has resulted in the UK being a European stronghold for the species. The increase in their population is helping the species reclaim areas where they once lived. In a world of species reintroductions, bats are doing it for themselves, and we need to ensure there are enough stepping stones in the landscape to help them. The next phase of this project is to improve the landscape and enhance further sites for greater horseshoe bats.

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Very high resolution spatial modelling to inform landscape-level, strategic conservation planning for bats - Thomas Foxley, University of West of England

Habitat loss and fragmentation are among the greatest threats to biodiversity globally. In the UK, development is badly needed to tackle the current housing crisis but poses a threat to bats through habitat loss and fragmentation. There is both a moral and legal requirement to ensure that new development does not negatively impact bats and the habitats they depend on; however, local decision-makers are unable to make informed decisions without a detailed understanding of how bats use the landscape.

Using the greater horseshoe bat (*Rhinolophus ferrumequinum*) in Somerset as a model, we aimed to develop an innovative framework to map important habitat and model landscape connectivity, and to produce high resolution outputs that can be used to inform local development decisions.

We gathered fine scale data on *R. ferrumequinum* habitat use with GPS telemetry, mapped habitat using the latest high resolution, satellite derived land classification, and built a detailed vegetation map with LIDAR. We used these data to build high resolution models of habitat suitability and landscape connectivity for *R. ferrumequinum* in Somerset.

With these models we develop a habitat importance index (HII) and connectivity importance index (CII) that can be used to guide local development decisions. We present a case study to explore how the different mapping outputs can aid development decision-making. We propose that the use of robust tools, such as integrated spatial modelling, should be central to the planning process; both at local county planning departments and at a national level.

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Vincent Weir Scientific Award Winner 2021: Domhnall Finch, University of Sussex, in collaboration with the Vincent Wildlife Trust and the Devon Wildlife Trust

Using Before-After-Control-Impact (BACI) experimental designs, Domhnall demonstrated that traffic noise has a significant negative impact on the presence of all bat species recorded and the foraging activity of pipistrelle species. This is the first time such an experiment has been undertaken and highlights how noise can potentially cause fragmentation for bats at a local and landscape scale.

Using Circuitscape, he modelled the potential movement and dispersal of greater horseshoe bats from their roosting locations in Devon into the wider landscape, e.g., their foraging locations. This work identified critical pinch points for species conservation and highlighted the cumulative effects landscape features can have in the environment. His research also focused on identifying how bats use agricultural landscapes and how hedgerow management might influence species activity; the effect endectocides might have on dung fauna, prey items of greater horseshoe bats; and conducted social network analysis of hibernating greater horseshoe bats.

Uniting nature and neighbourhoods: lessons learned from two years of Project NightWatch - Hannah van Hesteren and Lucy Houliston, NightWatch Project for BCT

At the Bat Conservation Trust, our vision is of a world rich in wildlife where bats and people thrive together, so it was a concern when a 2021 More Onion report into the volunteer demographics for the National Bat Monitoring Programme revealed that some communities remained underrepresented across our citizen science projects. Project NightWatch piloted in 2021 with the aim of bringing bats to new audiences while also increasing urban bat records. In 2022, we co-designed its engagement strategy with our volunteer NightWatch 'Champions' to include a mix of targeted digital outreach and events. In the first two years of the project, 10% of individual volunteers belonged to ethnic minority communities, whereas targeted event attendance from ethnic minority communities rose to an average of 55% thanks to our collaborative, community-first approach. 2023's outreach and engagement strategy focuses on building meaningful and long-term community connections in order to help us continue to increase our reach. Hannah and Lucy will share the feedback they've received, explore the challenges and successes they've faced since the project's launch and encourage you to celebrate and actively harness the power of diversity and community in your own efforts to protect and champion the UK's bats.

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The Bat1K Genome Project: A global effort to catalogue and preserve the unique genetic diversity of bats - Sonja Vernes, Bat1K

Bats are unparalleled amongst all living mammals for their unique and extraordinary characteristics. Within the ranks of Chiroptera are found some of the rarest mammalian adaptations including self-powered flight, echolocation, exceptional longevity, vocal learning, unique immune systems and contracted genomes. Given the range of extraordinary characteristics possessed by bats, together with their importance for the environment, studying bats is of broad interest and high priority.

To truly unlock the potential of bats, it is crucial that we understand the genetic building blocks of these different species, by sequencing and annotating their genomes and couple this with an understanding of their ecology and evolutionary history. Complete genomic information is crucial to understand how genomes can build complex organisms, the biological bases of phenotypic traits, the evolution of traits and organisms, their susceptibility to threats, and how to combat disease.

The Bat1K project aims to sequence the genomes of all ~1400 extant bat species to reference quality, and to make these genomes publicly available. We will present current strategies and progress, as well as efforts to involve the community, particularly bat rehab centres in the project. Together our aim is to catalogue the extraordinary genomic diversity of bats to better understand and conserve these amazing creatures.

<https://bat1k.com/>

Investigating the emergence of a zoonotic virus: phylogenetic analysis of European Bat Lyssavirus 1 in the UK - Megan Golding, Virology Scientist at the Animal and Plant Health Agency

European bat lyssavirus 1 (EBLV-1, *Lyssavirus hamburg*) is predominantly detected in serotine bats (*Eptesicus serotinus*) and is responsible for the majority of bat rabies cases in mainland Europe. A passive bat rabies surveillance scheme at the Animal and Plant Health Agency (UK) detected the virus in the UK for the first time in October 2018 and as of June 2023, a total of 23 cases have been reported.

Analysis in this study focused on the nine isolates received between October 2018 and December 2021. Here, we investigated the emergence of EBLV-1 within the UK, aiming to determine where the virus may have originated from, if detections are the result of a single introductory event that may lead to disease establishment in the UK, or multiple continuous events, and finally, estimating when the UK virus diverged from its ancestor.

To achieve this, we carried out comprehensive whole genome sequence analysis and Bayesian phylogenetics with a dataset composed of the nine UK sequences and 106 sequences covering six countries in mainland Europe (France, Spain, Germany, Netherlands, Denmark, and Russia) from 1968 to 2019, including 18 French EBLV-1 positive samples sequenced for this study.

Sequence analysis revealed extreme similarity between UK EBLV-1 sequences (99.9-100%), implying a single source of introduction rather than multiple events from a number of sources. Bayesian analysis revealed the UK EBLV-1 sequences shared their most recent common ancestor with an EBLV-1 sequence from a serotine bat detected in Brittany, France in 2001, with an estimated date of divergence of 1997. Within the UK sequences, the earliest divergence was estimated to occur in 2009. This study provides valuable insights into the dynamics and epidemiology of an emerging zoonotic pathogen, crucial to better understanding the risk it poses to public and animal health.

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Virtual bats: the temporal dynamics of serotine populations - Susie Gold Quantitative Ecologist, Animal and Plant Health Agency

Bat populations show temporal and spatial variation across landscapes as a response to environmental conditions. Predicting changes in these populations is important for the management and conservation of bat species, and the study of bat disease. For these purposes, simulation models are a useful tool to represent bat demography and explore how population dynamics may respond to environmental change. We have developed an individual-based model of the serotine bat (*Eptesicus serotinus*) in the UK. Using this model, we suggest how increasing variation in demographic rates may increase the risk of population decline, particularly where survival is affected. We explore whether conservation actions that improve demographic rates linked to roost quality can mitigate for this effect.

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Kate Barlow Award Winner 2022, Elyce Gosselin

The Kate Barlow Award aims to encourage postgraduate students to conduct a substantive bat research project and to honour the late Dr Kate Barlow's contribution to bat conservation

While the Galápagos is an iconic island system and many species have been studied extensively, very little is known about the two bat populations: the Galapagos red bat (*Lasiurus blossevillii brachyotis*) and hoary bat (*L. villosissimus*), despite their status as two of the few terrestrial mammals native to the Galapagos. Elyce will use genomic data to evaluate the taxonomic status of the two species of bats, determine the timing and number of colonisation events, evaluate whether there is gene flow between islands, and estimate genetic diversity and effective population size. This information, as well as occupancy modelling and habitat-use data collected as another part of her project, will be used to create a data-informed, long-term management and monitoring plan with Galapagos National Park.