

National Bat Conference 2021 Abstracts

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Friday 29th October 2021

Keynote: Human dimensions of bat conservation – hunting of flying foxes in Southeast Asia - Prof. Tigga Kingston, Texas Tech University

Human behavior directly and indirectly affects bat conservation. If we want to conserve bats, we must understand the drivers of people's behaviors towards them. Here I summarize a recent overview of human dimensions research as applied to bats and highlight key recommendations to improve and diversify studies. One of the central recommendations is to position studies in a conceptual framework, and I illustrate this approach with a case study by the South East Asian Bat Conservation Research Unit (SEABCRU) on hunting of flying foxes. Hunting of flying foxes, species of *Pteropus* and *Acerodon* (Pteropodidae), is widespread in Southeast Asia, and threatens 22 of the region's 29 species (IUCN 2021). The primary use of hunted bats reported in Red List assessments is for human consumption (20 species), but this simple explanation does not capture the diverse

beliefs and motivations driving hunting behavior, hampering conservation intervention. The goal of our project was to develop, test and distribute a standardized, scientifically sound protocol to study hunting of flying foxes regionally and develop effective responses to conserve flying foxes. Our protocol is intended to both quantify the magnitude and extent of flying fox hunting and characterize factors affecting hunting behavior. The Theory of Planned Behavior provides our conceptual framework, and posits that behavioral intention is predicted by attitude, subjective norms and perceived behavioral control. This is a powerful approach because analysis of the differential influences on behavior can help identify the most important barriers to change and targets for intervention. The protocol was developed and implemented in three areas of intense hunting in Sulawesi (Indonesia) and the Philippines. Here I report and compare our findings across hunting sites. Although all sites shared a positive attitude towards hunting (hunting is a “good thing” to do), they differed in the significance of social norms and perceived behavioral control as well as in specific behavioral, normative and control beliefs. I highlight how our findings are being used to guide pilot conservation programs to reduce hunting.

[The drivers of spatial activity patterns in greater horseshoe bats \(*Rhinolophus ferrumequinum*\) - Thomas Foxley, University of the West of England](#)

Background: Healthy bat populations require ample foraging habitat that is accessible through a connected landscape. Development threatens bats in the UK via habitat loss and fragmentation. Understanding how bats use the landscape is thus of key importance to allow development to proceed without negatively impacting sensitive species.

Aims: This study aimed to identify local and landscape metrics that are linked with greater horseshoe bat activity, in order to understand how this species uses the landscape around nationally important maternity sites in the North Somerset and Mendip Bats Special Area of Conservation.

Methods: Fieldwork ran from July-October 2020. Sixty-four full spectrum bat detectors were placed at random locations, weekly, along linear landscape features within 4km of two maternity roosts in North Somerset. Automated species classification was used to identify bats in recordings, this was manually verified with error rate modelling. Generalised additive models were used to model bat response to local and landscape-level metrics, controlling for spatial-autocorrelation and temporal differences in sampling.

Results: Vegetated field margins were found to have a positive association with bat activity ($p < 0.001$). Field margin trees were also associated with increased bat activity ($p < 0.001$). Arable land was found to have reduced bat activity ($p < 0.001$). Models were used to map predicted activity over the entire study area, highlighting important foraging habitat and commuting routes.

Conclusions and future work: The approach used in this study is of great utility for modelling how bats use the landscape. Predicted activity maps will be used by North Somerset Council to make informed development decisions that minimise the impact of development on greater horseshoe bats. We plan to expand the study with a citizen science programme that will enable us to cover a larger area and model changes in activity patterns over time.

Saturday 30th October 2021

[Impacts of part-night lighting regimes on riparian bats – implications for current mitigation strategies - Jack Hooker, University of the West of England](#)

The potential negative impacts of increasing artificial light at night (ALAN) is well documented and light pollution is considered to be a major threat to biodiversity globally, with increasing urbanisation placing nocturnal animals such as bats at ever increasing risk. Although different

lighting management options are being explored in an attempt to mitigate the impacts of artificial lighting on wildlife, there is limited evidence on the impacts of disturbance through the insensitive use of lighting encountered by bats utilising waterways. Furthermore, to date little is known about the effects of lighting on *Myotis* bats, with some members of this genus, *Myotis daubentonii*, and to a lesser extent *M. nattereri*, relying heavily on waterways as foraging and commuting habitats. Amongst these management regimens, part-night lighting schemes have been adopted by many local authorities across Europe in order to save energy and reduce their light pollution levels, however little is known about their effect on biodiversity. Increasing development around waterways, even with part-night lighting schemes in place, may constitute a form temporary habitat fragmentation with the potential to sever extensive tracts of important ecological features, altering individual and colony behaviour, community composition and population dynamics at both the local and landscape scale. Using an experimental approach, we compared the activity levels and feeding rates of bat species utilising waterways across rural areas in the south west of the UK under unlit, part-night and full lighting conditions. Results from this experimental study will help highlight whether these mitigation strategies are effective in maintaining landscape connectivity for bats who rely on these riverine habitats for foraging and commuting.

Roost Award 2021 – Chris Damant, Bernwood Ecology
[Avoidance of swarming site loss during restoration works at Cliveden](#)

Squeaky Blinders - Monitoring the bats of the Black Country Canal Network: A novel method for the selection of urban dark corridors for bats – Morgan Hughes and Scott Brown, University of Wolverhampton and Birmingham and the Black Country Bat Group

In the West Midlands conurbation, an urban landscape characterised by major motorways, railways and hardstanding, Daubenton's bats (*Myotis daubentonii*) are utilising other remnants of the area's industrial past (namely, the region's extensive canal network) to commute from their roosts to foraging grounds, potentially mitigating the barrier effects to dispersal that such structures can represent to other species.

We present the preliminary results from the field testing of our novel technique comprising a combination of visual observations and aural detection to obtain quantitative and qualitative data on the movements of Daubenton's bats on waterways. The techniques presented in this study provide a standardised, repeatable method to gather landscape-scale data without the need for bat handling, radio-tracking equipment or advanced survey licences. Ultimately, this method can be employed using readily-available equipment by bat groups or consultancies which seek to gain information about key features and commuting routes along waterways for bats.

Particularly in areas where the planning system is under pressure to allow the release of green belt sites in order to meet rising housing needs, waterways provide a lifeline to facilitate survival in the built environment. The data gathered using our method may be used to support conservation, land management and planning by informing the targeted reduction of lighting and the retention of vegetation in key locations, and the subsequent designation of what we have called "blue bridges" and associated dark corridors.

The bat-moth arms race keeps getting more exciting – Prof Marc Holderied, University of Bristol

Bat monitoring for the future - Dr Katherine Boughey, BCT

An update on the innovative and exciting work underway at BCT to develop new approaches to large-scale bat monitoring. This includes our new passive acoustic surveys, our automated sound classification system, our new web portal *EchoHub – the bat sound library*, research collaborations investigating genetic surveillance techniques, the development of new indicators of bat population health, our future plans and more.

Sunday 31st October 2021

Another Mouth to Feed – How a recent colonist of the desert fits in at the dinner table – Evie Morris, University of Exeter

Extensive land use change in the deserts of southern Israel is thought to be facilitating the colonisation of the desert by *Pipistrellus kuhlii* a mesic species, native to the Mediterranean basin. In its native range, it is known to be anthrophilic, and therefore it has been assumed that *P.kuhlii* is managing its expansion into an arid area by remaining closely associated with humans. Despite initially being exclusively found in human-dominated habitats in the desert, in recent years *P.kuhlii* has been found in natural desert areas – raising the question: to what extent does this species pose a competitive threat to native species? Using dietary data, generated from DNA metabarcoding, we compare *P.kuhlii* to three other bat species, native to the deserts of Israel and consider the extent to which this novel species is likely to compete with native bats for food resources.

Advances in trail cameras for recording bats emerging from roosts – Gareth Lang, BSG Ecology

A growing evidence base, as captured by the Bat Tree Habitat Key (Andrews, 2018), highlights the difficulties of surveying trees for bats. Achieving a high level of confidence in the use of a Potential Roost Feature (PRF) can require the application of significant survey effort or the use of advanced bat survey techniques. Increasingly close inspection surveys are used to provide greater certainty about the potential or actual use of a PRF. Whilst such inspections have demonstrable advantages over emergence / re-entry surveys conducted from the ground, the method has significant drawbacks owing to irregular use of tree roosts by bats, and the rapidity with which evidence of use disappears. Tree climbing is also a physically demanding and time-consuming survey method.

The use of trail cameras to capture bats emerging and re-entering roosts is becoming more popular as a supplementary survey method since trail cameras allow surveillance over several successive nights, typically have infrared illumination for night vision, and only record in response to a motion event. However, off-the-shelf cameras are designed to be triggered by larger, slower moving animals than bats, and their function is focussed on battery longevity and avoidance of ‘false triggers’ and as such these units have according to Andrews (2018) not been proven to be consistently reliable for detecting emergence of groups or individuals.

To try and address the shortcomings of standard trail cameras, BSG Ecology has supported the development of a camera that more effectively captures recordings of bats emerging from or re-entering roosts. The camera provides detection trigger from a narrow beam, high-sensitivity Passive Infrared (PIR) sensor and optional infrared beam array, and allows recording of 5 seconds prior to, and following the trigger event to ensure that the bat emergence is captured in its entirety. Replacement of batteries, remote activation and upload of videos can be performed from ground level to negate the need for more than two climbs to the PRF, while allowing long-term monitoring. Initial trials of the camera to test its performance have been undertaken and have supplemented survey results undertaken following current guidelines (Collins, 2016).

This talk will introduce the camera, present the results of initial trials and consider how it could be used to support research studies and supplement or enhance existing survey methods.

Better bat surveys; Using IR video for bats – Richard Crompton, Ecology on Demand

As technology advances the cost of equipment falls. It is now possible to buy high specification IR video cameras for less than the cost of most professional level bat detectors and for most emergence and re-entry bat surveys IR video is arguably even more useful than a bat detector (and best of all used alongside). This presentation will look at available and recent research, the pro's and con's of this technology, how to get better results, and introduce forthcoming guidance on the use of IR video for bat surveys.

BCT Wildlife Crime Project – Protecting the Voiceless – Mark Goulding, BCT

Mark Goulding, will present the work he does with UK Police forces in pursuit of those who flaunt the laws that protect bats and their breeding site/resting places.

He will outline the challenges, successes and failures his role faces on a weekly basis to ensure this iconic species remains in our landscape.

Visual communication of bat facts and encouraging empathy for bats through illustration and storytelling – Emma Reynolds, Emma Reynolds Illustration

The power of visual communication of bat facts, science and encouraging empathy for bats through illustration and storytelling. I would also focus on how picture books can be an inspiring asset to community outreach, understanding bats and their vital role in nature and our ecosystem, and how this can inspire the next generation.

The cause and effect of bat wing tears in the Common pipistrelle (*Pipistrellus pipistrellus*) - Rana Khayat, 2020 Vincent Weir Award winner

Bats represent a quarter of all mammalian species and play vital roles in many ecosystems. They are also the only mammals capable of powered flight and have large, light, thin wings to enable flight. However, bats face many threats, including collisions with man-made structures, fungal infections and predator attacks, all of which can cause severe wing injuries. Indeed, hundreds of bats with wing tears are taken to rescue centres annually in UK. During my PhD project I characterised the causes and effects of wing tears, for the first time, in common pipistrelles, and other UK bats species. I recruited bat carers from around the UK to send information, swabs and photographs of bat wing tears, and also to allow me access for the filming of injured bats.

Firstly, I characterised wing tears in *P. pipistrellus*, and found that most wing tears were located close to the body. There was no anatomical evidence to suggest that this part of the wing was weakest, therefore I suggested that predator attacks, such as from cats, are a likely cause. In agreement, 38% of all photographs collected had firm observational evidence of cat attacks (i.e. seen in a cat's mouth), and a further 38% were suspected by the bat carer to be cat attacks. Secondly, I went on to measure the effect of bat wing tears on the flight of *P. pipistrellus*. I developed a new method to objectively measure flight in rehabilitating bats. I found that bats with wing tears tilt their body towards the healthier wing; and that wing amplitude and frequency are affected when the bat has tears on both wings. Finally, I developed a novel forensic method for objectively finding the cause of bat wing tears, by identifying cat DNA from wing tear swabs. 68% of all wing tears were caused by cats, and this is even likely to be an underestimate!

Results from my project reveal that cat attacks on bats may be far more common than first thought. A better understanding of wing tears and their causes has serious implications for bat conservation;

especially so we can design preventative measures, such as keeping cats indoors and wearing bell collars.