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Ecological Monitoring using Wildlife Detection Dogs: Bat Carcass Searches at the Wanlip Wind Turbine

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Planning permission is often conditional upon post-construction, ecological monitoring of wind turbine developments to assess impacts on wildlife. Ecological monitoring at wind turbines frequently focuses on bird and bat carcass searches, which in some cases can be carried out more effectively and efficiently using wildlife detection dogs. This article describes the use of wildlife detection dogs to identify bat carcasses at Wanlip wind turbine, demonstrating the value of this novel monitoring option as an effective method to be used alongside other ecological monitoring methods.

Introduction

There is a risk of bird and bat fatalities from collision with turbine blades when a windfarm is operational. Ecological monitoring, to try and quantify this impact, is a common requirement when planning permission for wind turbines is granted, which can be required for several years after the windfarm becomes operational. Ecological monitoring for bat carcasses carried out by humans is constrained by the limitations of our vision. The common pipistrelle *Pipistrellus pipistrellus* can weigh just 5 g and measure only 7 cm from head to tail; a dead pipistrelle against a backdrop of vegetation or even bare brown earth can be extremely difficult to spot. Wildlife detection dogs have the potential to be much more effective than humans, using scent to detect carcasses rather than visual cues. This is particularly advantageous in tall and/or thick vegetation.

There is little published information from the UK on the use of wildlife detection dogs to guide ecological monitoring surveys. This article describes the use of wildlife detection dogs to detect bat carcasses at Wanlip wind turbine in Leicestershire. To the best of the author's knowledge, the use of detection dogs for commercial bat monitoring at this site is the first carried out in the UK. Based on the Wanlip wind turbine case study, bat carcass searches by humans alone would be ineffective, particularly in areas of dense vegetation. In contrast, the use of the detection dogs is a valid and effective method to be used alongside other monitoring methods.

Wanlip wind turbine

Wanlip wind turbine was constructed at Wanlip Sewage Treatment Works between 2013 and 2014. The bat survey report and Environmental Statement prepared to support the planning application for the turbine concluded that the presence of a single turbine at Wanlip was unlikely to have significant impacts on populations of bats. However, planning conditions required monitoring of bat mortality for three years post-construction.

There is currently no agreed procedure for post-construction wind turbine monitoring in the UK, although methods have been developed in North America and Europe. Atkins Ltd devised the methodologies for monitoring the Wanlip wind turbine on behalf of Severn Trent Water Renewables (Atkins 2012), including searches for bat carcasses. The methodologies were agreed with Charnwood Borough Council in 2013. The first year of bat monitoring was carried out between April and September 2014 (poor weather prevented monitoring in March and October).

The field surrounding the wind turbine is disused arable land and now supports tall ruderals, including dense thistles growing to head height. The lack of vegetation control was required by a planning condition in order to deter wintering birds such as lapwing *Vanellus vanellus*, for which there was a potential risk of collision with the turbine blades. Due to the difficulty of visually detecting bat carcasses in a large search area with overgrown vegetation, the use of wildlife detection dogs was proposed as part of the monitoring methodology for bat carcass searches. The search area covered a 132 m radius surrounding the turbine base; equal to the height of the turbine mast plus blades. Research has found that most bats will be found within 50 m of the turbine base (Johnson *et al*. 2003, Arnett 2006). However, a larger search area following a review of some North American studies summarised by the Bat Conservation Trust and University of Bristol (2009) was used to account for bats being thrown or blown further from the turbine base.

Monitoring of bats at the wind turbine also involved activity transects and static detection, although these methods are not discussed further in this article.

Bat carcass searches

Wagtail UK Ltd was approached by Atkins in 2013 to conduct the bat carcass searches. The company was established to offer detection dogs for criminal investigations, for example in the search for drugs, firearms, explosives, illegal immigrants and human corpses. The detection dogs and their handlers are trained to British Military and Police standards. Since 2011, Wagtail has been developing some of their dogs for specialist wildlife detection, recognising this as an area of potential growth, starting with Twister, a springer spaniel who was trained in the detection of dead bats (see Figure 1). In this study, Twister and two younger dogs

Figure 1. Louise Wilson, former Director of Wagtail UK Ltd, with her springer spaniel Twister. Reproduced with the permission of Wagtail UK Ltd.

(Ned and Luna, one- and five-years-old respectively) were trained and used as bat carcass detection dogs.

Dog handlers from Wagtail were trained by Atkins ecologists in the bat carcass search methodologies so that the dog handlers could conduct the visual transect searches for bat carcasses on the same visit as they carried out dog searches, for cost efficiency.

The transect methodology involved walking at 5 m intervals throughout the search area, shortly after sunrise, visually searching the ground on either side of the transect for dead bats. Easy-to-recognise markers within the turbine field were used to indicate the edge of the search area, including distance markers extending to the north-west and north-east of the turbine location at 30 m intervals, which were erected to aid noise monitoring. Following the visual transect, the handler would then cover the search area with the detection dogs. It was concluded early on that human visual transects were worthless in some areas of overgrown ruderal vegetation, as the surveyor could not see the ground. These areas were searched solely using the detection dogs.

Searcher efficiency trials

Trials were carried out to test the effectiveness of the detection dogs in finding bat carcasses. Searcher efficiency trials were carried out in April, June and September to allow for variation in vegetation cover.

The trials involved an Atkins ecologist placing five to seven bat carcasses within the search area immediately prior to one of the scheduled carcass searches (carried out by staff from Wagtail UK who were unaware of the location of the carcasses). The carcass search would then be carried out as usual, recording any bat carcasses that were found. The Atkins ecologist would then review the bat carcass finds to determine how many of the known carcasses had been identified.

The Atkins ecologist tried to ensure that no obvious paths were left in vegetation leading directly to the distributed carcasses, and some areas were walked but no carcass left in order to leave a 'false trail'.

The bat carcasses used during the searcher efficiency trials were 'wet': they were defrosted for use during the trials before being refrozen for the next trial. These carcasses may have given off a stronger scent than any fresh bat carcasses. This was evident during the June and September searcher efficiency trials when a very old, desiccated bat carcass was used, which had lost any noticeable smell to humans, and the detection dogs were unable to locate it. However, the detection dogs were able to pick up the scent of fresher bat carcasses used during the searcher efficiency trial, with all 'fresh' bat carcasses being found by the detection dogs during the sessions in September when the two younger dogs, Ned and Luna, were used. Twister, the springer spaniel used during the earlier searcher efficiency trials, managed to find a maximum of three out of five bat carcasses without help, finding the other two carcasses only when directed to the approximate location of the carcasses.

There was no direct comparison of the time it took a human to find bat carcasses compared to the detection dogs as the dogs could cover a much larger area including areas of tall ruderal vegetation that could not be checked visually. The human surveyors found none of the bat carcasses set out during the searcher efficiency trials.

No bats that had died as a result of wind turbine collision were found during the bat carcass searches.

Practicalities

Recording the search area: Whereas the visual transects for humans were based on a repeatable methodology, it was more difficult to make the detection dogs follow a set transect. In order to record the search area covered by the dogs, the dog handler carried a smart phone with a GPS recording application. An example of a screen shot of the application collected during a carcass search in July 2014 is shown in Figure 2.

Dog 'enthusiasm': The 'pilot' dog used early in the monitoring period, Twister – a nine-year-old springer spaniel – became tired and less interested toward the end of the search, particularly when no carcasses were found and therefore there was no 'reward'. Also, due to the uneven terrain and vegetation cover (see below) the search area took between two and four hours to cover thoroughly (including both human transects and detection dog search). Detection dogs usually work 20

Figure 2. Screenshot of GPS recorder used during carcass search in July 2014.

minutes at a time with a rest in-between, hence the search area proved to be too large for a single dog to cover on one visit. Therefore, the search area was divided into sectors, so that one dog could rest whilst the other searched a sector (see Figure 3). The blank area on Figure 3 could not be searched for health and safety reasons as it is within the operational sewage works.

The younger dogs (Ned and Luna) who shared the search later in the monitoring period were found to conduct the searches more quickly and accurately and tended to keep their interest in the search for longer. There was a learning curve both for the dogs and handlers, and the training for Ned and Luna was refined using knowledge of the site.

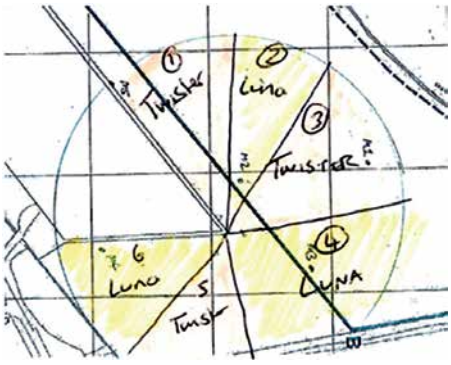

Figure 3. Examples from survey notes of the sectors used during the bat carcass search in May 2014.

Habitat in the search area: The swards of tall ruderal plants including thistles made some parts of the field impossible to visually search for bat carcasses. This author, during the searcher efficiency trails, struggled to spot a bat carcass on the ground that they had placed there only minutes before. The use of the detection dogs reduced this limitation. However, neither the dogs nor the handler could search within areas of dense, tall thistles due to health and safety considerations (the dogs developed blisters when trying to search these areas early in the monitoring period) and these areas were not searched from late June onwards. Before the 2015 monitoring period, Severn Trent Water aim to control the growth of thistles and areas of dense, tall ruderals using chemical or mechanical control.

Weather conditions: Scent molecules can be suppressed in damp conditions. Therefore, on humid mornings there were likely to have been limitations to the distance that scent carried from any bat carcasses. This would have lessened during the search as the sun rose, air temperature increased and the humidity in the air decreased. However, the searches had to begin early in the morning, at a time of high humidity and dew cover, to reduce the risk of predation of bat carcasses. Weather was monitored for five days preceding a scheduled bat carcass search to ensure favourable weather conditions.

Sample 'familiarity': There was initially concern that 1) the dogs would only be able to detect bat species used for their training (common pipistrelle, Natterer's *Myotis nattereri* and brown long-eared bats *Plecotus auritus*); and 2) the dogs would only be able to detect those specific carcasses that had been used during training. Bat carcasses used in the searcher efficiency trials used both 'training' bats and new bats introduced by Atkins ecologists and the dogs were able to detect both, alleviating the second concern. Due to the lack of availability of carcasses from a range of bat species during the searcher efficiency trials, we have so far been unable to test the first concern. An attempt to source the carcasses of other bat species will be made during the 2015 monitoring period.

Future use of wildlife detection dogs

Rodrigues *et al*. (2015) includes the use of detection dogs as a method for wind turbine monitoring. During trials in the US (Bats and Wind Energy Cooperative 2005), detection dogs have been shown to be more effective than humans at finding bat carcasses. Recent research carried out in the UK for Defra by the University of Exeter on the effectiveness of detection dogs compared to human observers recommends dogs as an effective means of monitoring bat fatalities, particularly when a high degree of search accuracy is important (Methews *et al*. 2013). It is anticipated that the University of Exeter's research project relating to bats and wind turbines, carried out over the last four years, will be published by Defra in 2015.

In the UK, wildlife detection dogs are already being used to detect great created newts *Triturus cristatus* in a pilot study for Amphibian and Reptile Conservation (ARC) UK; to detect dormice *Muscardinus avellanarius* nests for Cheshire Wildlife Trust; and to detect pine marten *Martes martes* scat for the Vincent Wildlife Trust. International work includes the detection of cheetah *Acinonyx jubatus* scat in South Africa. It is essential that this work is only carried out by trained handlers, for the scientific validity of the work and to protect the welfare of both the dogs and the wildlife.

Possible future uses could include locating live bats in roosts, and searching for dormice hibernation nests. This non-invasive method may be used to reduce the risk of injuring animals during hand searches carried out by ecologists, which may also damage habitat, where the presence of protected species is considered to be a low risk.

While there are many applications for ecologists to use detection dogs, there is also a need for standard methodologies to develop this new tool in wildlife detection and monitoring.

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