

BRIEFING NOTE | BATS AND WIND FARMS IN EUROPE - CONTINENTAL SCALE EFFECTS?



Photo by: Steve Betts, BSG Newcastle

This article is part of our on-going review of new research into wind farm impacts on bats. It considers a recent paper published in the journal *Biological Conservation* by Voigt *et al.* (2012) titled “*The catchment area of wind farms for European bats: a plea for international regulations*”¹. It makes interesting and challenging reading for those involved in wind farm development in continental Europe, and has some possible implications for future assessment of impacts on bats at wind energy installations within the UK both on-shore and off-shore.

Here, we set out a brief review of the paper and consider what implications there might be for the wind energy industry in the UK.

The Research

The study investigated the likely geographical origin of bats killed at wind turbines in Germany during the summer and autumn through the analysis of stable hydrogen isotopes in fur. Four bat species were considered: common pipistrelle (*Pipistrellus pipistrellus*), Nathusius' pipistrelle (*Pipistrellus nathusii*), noctule bat (*Nyctalus noctula*) and Leisler's bat (*Nyctalus leisleri*). All of these species, which also occur within the UK, have been known to be killed by turbines. In the UK, Natural England classifies common pipistrelle as being at medium risk from turbines; the three other species Natural England classifies as being at high risk from turbines.

The basis of the analysis is that ratios of hydrogen isotopes vary across hydrological catchments according to variations in temperature and rainfall, and that body tissues (including fur) comprise

nutrients that animals have assimilated from the places where they live or spend significant periods of time. Thus, isotopes in fur correspond to those of surface water in the summer habitat, enabling the isotope ratios in fur to be related to isotope ratios in different geographical locations.

The study found that for Nathusius' pipistrelle bats found dead at wind turbine sites in Germany, the most probable summer habitat of these animals was quite distant, within Estonia or Russia. This indicates that the bats killed in Germany had most probably migrated south over a distance of hundreds of kilometres. In contrast, the dead common pipistrelle bats probably originated from much closer areas including other locations within Germany. In other words the common pipistrelle is as likely to have originated locally as anywhere else. However the paper is not absolutely clear with regard to when bats of the various species were killed.

For noctule bats the most likely source of origin (i.e. summer habitat) was considered to be Poland, Scandinavia, the Baltic States or Belarus. Leisler's bats were considered most likely to have originated from the Baltic States or Belarus. As with Nathusius' pipistrelle, the implication of these findings is that both of these large bat species had travelled significant distances.

Nathusius' pipistrelle appears to have the most distinct regional origin, but this is not surprising as other research and monitoring such as ringing studies have already indicated that this species migrates over long distances.

The authors call for greater cooperation within Europe and adjacent northern states to better assess impacts of turbine developments across national boundaries.

This has potentially large implications for impact assessments of wind energy projects within Europe. For example, the size of estimated national bat populations, which may be considered as a starting point for impact assessment, may not be an accurate reflection of the size of bat populations outside the breeding period. Without good data on migration and bat populations outside the summer breeding period, the assessment of in-combination effects could become unmanageable. This paper will give policy makers and those undertaking assessments of impacts much food for thought.

Implications for the UK and Ireland

Currently, there is little definitive evidence of large scale regular migration of bats within the UK, or between the UK and continental Europe or the Republic of Ireland with the notable exception of Nathusius' pipistrelle. For this species there is increasing anecdotal and survey evidence of migration between the UK and continental Europe. We are currently undertaking our own research at coastal sites for Nathusius' pipistrelle. Previously, we have also undertaken ferry-based surveys, which recorded this species, but not to any extent that would indicate regular migration and movement – more detailed and longer term studies would be required.

In addition, on-going studies of the genetic variation within Leisler's bat in Ireland and the UK may provide some further indications of how bat populations within the UK and the Republic of Ireland interact with each other.

The paper by Voigt *et al.* has limited direct application to the UK as it studies bats

killed in Germany, but the results confirm earlier studies of long distance migration within Europe for bat species considered to be at high risk from wind turbines. For *Nathusius' pipistrelle* the anecdotal evidence of migration between the UK and continental Europe would suggest migratory behaviour similar to that exhibited in Europe. This study does, however, highlight the need for more research to inform our knowledge of bat migration and seasonal range across Europe, and whether bats move into or out of the UK on a seasonal basis – this information would better inform assessment of the effects of offshore or coastal wind farms on bats.

For on-shore wind farms, the current survey guidance² indicates there is a need for surveys to cover the main migratory periods. As such, for coastal sites, sudden seasonal increases in the recording of *Nathusius' pipistrelle* may well indicate migratory behaviour that would need to be taken into account during any assessment as bats have been shown to be killed in higher numbers during migration.

For off-shore wind farms there are similar implications in terms of seasonal migration back and forth from the UK and it may follow that any survey effort should be focussed on the migratory periods. This is on the assumption that bats crossing the open sea are unlikely to be resident species heading out to forage, although such behaviour has been observed in in Kalmarsund in the Baltic Sea and in Oresund between Sweden and Denmark by Ahlen *et al*, 2009 . However, given the current lack of understanding of the scale

of bat migration into and out of the UK, the heights bats move at when migrating and the potential attraction of turbines as roosting areas for migrating animals, more strategic work to address questions with regard to migratory ecology (such as surveys at coastal locations) combined with monitoring at built turbines during key periods of the year may be more useful than piecemeal offshore survey at this stage.

If you would like to discuss this paper and the views expressed in this article then please contact Dr Peter Shepherd.

¹ Voigt, C.C., Popa-Lisseanu, A.G., Niemann, I & Kramer-Schadt, S. (2012). The catchment area of wind farms for European bats: a plea for international regulations. *Biological Conservation*; 153: 80 DOI: 10.1016/j.biocon.2012.04.027

² Hundt, L.. (2012) *Bat Surveys: Good Practice Guidelines* (2nd edition), Bat Conservation Trust.