

Is the Noctule Bat really Uncommon?

Author: Matt Hobbs

Reviewed: Owain Gabb

2nd Review: Peter Shepherd

April 2015

Summary

This article explores some of the challenges of assessing the significance of impacts on noctule bat *Nyctalus noctula* from onshore wind farms in the UK.

The article reviews discrepancies between sources with regard to the status of noctule in the UK, considers how differing conclusions relate to our own experience (from a sample of 52 sites), and questions whether the recent focus on this species in wind farm assessments is appropriate.

Background

Noctule is a bat that has generated more interest for renewables developers and their consultants than most other UK species in recent years. Noctule is not considered to be rare or threatened at the European level, and is not listed on Annex II of the Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive). Unlike Annex II species, noctule is not thought to be particularly vulnerable to habitat loss and fragmentation, and has not been the subject of many research studies.

The interest in noctule has arisen due to its susceptibility to being killed at wind farms. At European wind farms, where bat monitoring surveys have been carried out, 14% of the total fatalities recorded have involved noctule bats, with more fatalities recorded only for common pipistrelle *Pipistrellus pipistrellus* (18%). Nathusius' pipistrelle *Pipistrellus nathusii* runs noctule a close third, with 13%.

Published guidance on survey and assessment

The two most widely adopted guidance documents on surveying for bats and wind farms in the UK are Natural England's Technical Advice Note (TIN) 051 (the third edition was published in 2014) and the Bat Conservation Trust's (BCT) Good Practice Guidelines (published in 2012). The latter includes a chapter on surveying for bats at onshore wind farms. TIN 051 includes two tables that provide an assessment framework for bats at wind farms. The first splits UK bat species into three categories (low, medium and high risk) based on how likely they are to be killed by wind turbines. The second splits UK bats into the same three categories based on how threatened by wind turbines the populations of the bats are likely to be.

The second table classifies noctule (along with Leisler's bat *Nyctalus leisleri* and Nathusius' pipistrelle) as being at high risk of population level effects, but concludes that common pipistrelle, which is apparently killed more frequently than any other bat species in Europe, is at low risk of population-level impacts. The BCT guidance supports TIN051 in this respect "...until UK-based evidence is provided that may necessitate a re-assessment of this approach".

In Appendix 2 of TIN 051, some further information is provided on the relative population status and population size of each bat species. This information is important to the assessment of whether a population (and, by implication, the favourable conservation status of that population) of bats is likely to be significantly affected by fatalities resulting from the operation of wind turbines.

For all bat species listed in TIN051, status is taken from the Joint Nature Conservation Committee's (JNCC) Tracking Mammals Report (2005). Of the high-risk species, noctule is classified as "*uncommon*" with Leisler's bat "*scarce*" and Nathusius' pipistrelle "*rare*". The description of the status of noctule as "*uncommon*" is, in combination with the fact that it appears to be one of the species most likely to be killed by wind turbines, the key reason why TIN 051 predicts it is likely that noctule populations are among those most at threat from the operation of wind turbines.

The Origin of Status ...

The status of noctule, according to Natural England (TIN051), who follow JNCC (2005), is "*uncommon*". The full description in JNCC (2005) is "*Native, generally uncommon, but more numerous in well wooded areas*". The population estimates published in JNCC (2005) are repeated from population estimates for UK mammals made by Harris *et al.* (1995). For many of the bat species, the estimates from Harris *et al.* were derived in turn from Speakman (1991), published 24 years ago. Harris *et al.* acknowledged particular difficulties in estimating populations of bats, as follows:

"For the bats, few density estimates were available. For greater horseshoe bat *Rhinolophus ferrumequinum* and lesser horseshoe bat *Rhinolophus hipposideros*, total population size was reasonably well known, but

for most others there were few data on which to base a population estimate. Thus relative abundance was the only approach available for calculating population size for most bats, and the estimates had to be based on the subjective assessment of relative abundance by experienced bat workers."

These problems are exacerbated for noctule, as they rarely form maternity roosts in houses, preferring to roost almost entirely in trees. As a consequence, the noctule population was *"estimated from general reports of abundance relative to other species in surveys undertaken by local bat groups, and ... is likely to be the least accurate (Speakman 1991)."*

The relative population estimate for noctule was, according to Harris *et al.*, taken from a number of sources, none of which were considered particularly reliable (according to the author) but which, taken together, built a picture of how frequently noctule was recorded in comparison to other species. The data used confirmed that noctule had been recorded in 4.7 % of 10 km squares in the UK, with 3.4 % of the total number of bat records received by Biological Records Centres (BRCs) and 2 % of the proportion of bat carcasses submitted for rabies testing referring to noctule. From these data, a population estimate of 50,000 bats and a status description of *"generally uncommon, but more numerous in well-wooded areas"* was derived. Harris *et al.*'s reliability rating of the above estimate was 3, meaning that *"the population estimate was based on a limited amount of data on population densities in different habitat types, or for which the population estimate was obtained by scaling abundance relative to a species for which there was a reasonable population estimate"*.

Although Harris *et al.* did not provide any definition of the terms used to describe the status of species, such as what the difference between 'rare', 'scarce' and 'uncommon' might be, there is a definition of conservation status in the Appendix of Harris *et al.* (Table 15) which tentatively (it is listed as 'V?') assigns noctule to the category of V or 'Vulnerable', which means it may be *"a species whose populations are either small or threatened"*. The same tentative assignation was made for Leisler's bat, whiskered bat *Myotis mystacinus* and Brandt's bat *Myotis brandtii*. It is assumed (from the use of the terms threatened and vulnerable), although not stated in the paper, that Harris *et al.* are suggesting that there is some potential for the species to become extinct in the UK.

The JNCC Tracking Mammals Report (2005) takes its bat population estimates directly from Harris *et al.* (1995) but also acknowledges data collected as part of the National Bat Monitoring Programme (NBMP) which is run by BCT. The NBMP was set up to monitor population trends and does not aim to estimate the abundance of bat species, due to the lack of accurate data. The NBMP includes the 'Field Survey' method, which only collects data on noctule, serotine *Eptesicus serotinus*, common and soprano pipistrelle *Pipistrellus pygmaeus*. The surveys are of randomly selected 1 km squares within the UK, with a total of 800 sites within the network by the end of 2013. Some sites are visited over more than one year with, for example, 224 sites surveyed in 2013 (NBMP, 2013) and only sites which have been surveyed over more than one year were included in the latest population trend analysis (Barlow *et al.* 2015). Data taken from the Field Survey method during 1998-2003 (as acknowledged in JNCC, 2005) recorded noctule from 43 % of surveys. In 2013, the most recent year from which data are available, noctule were recorded at 46 % of sites which was a similar proportion to that recorded for soprano pipistrelle (52 %), a species that has been described as *"common across the UK"* with a UK population estimated at 1.3 million (JNCC, 2005). During the first ten years (1998-2009) of NBMP, noctule was recorded at 59 % of sites. Although it might be said from the NBMP data that noctule is widespread, but not necessarily common, it would be difficult to conclude that noctule is uncommon and potentially vulnerable based on the data that are available now, given that the proportion of sites at which this species has been recorded is similar to soprano pipistrelle.

A Confused Status?

The existing assessment of status is acknowledged as being based on relatively poor data sets. This situation is not clarified by differences between assessments of the status of noctule in various published sources. Natural England (2014), in TIN 051, classed the status of noctule as uncommon, referencing JNCC (2005) and Harris *et al.* (1995), but JNCC (2007) in their "Second UK Report on Implementation of the Habitat Directive" described the status of noctule as *"relatively common in England, Wales and southern Scotland, but absent from Northern Ireland"* in their conservation status assessment report audit trail of 2007. This document acknowledged the flaws in the previous population estimates, describing the quality of the data as *"Poor"*, and took into account the species' range in the UK as well as trend analysis of the NBMP dataset, rather than just population estimates. The report concluded that the range and population are stable (based on the 1995 estimate as the reference population estimate) and that the population assessment is favourable. In the third UK Report in 2013, the same conclusions were reached but an accompanying audit

trail document was not produced and the status of each species was not given, although the distribution, range, population and population trend data were provided.

The JNCC (2007) audit trail report did not provide a detailed breakdown of how it concluded that noctule is relatively common, but the status closely matches that given to noctule by the International Union for Conservation of Nature (IUCN), which classifies noctule as a species of Least Concern¹, and “*A widespread species, relatively common throughout much of its range*”.

Although the 2007 document and IUCN listing might seem to clarify the position, at least partly, the UK Priority Species page for noctule, published by JNCC in 2010 (Version 2) concludes that there has been a marked decline in noctule populations in the UK, with a decline of 21 % over six years reported in the NBMP annual report for 2004. This appears to be the criterion for the classification of noctule as a Priority Species and is an important piece of information to take account of when assessing potential impacts on and the conservation status of noctule.

This seems to stand at odds with JNCC's own assessment (in 2007 and 2013) that the population is stable and assessed as favourable. More recent data suggest that the situation for noctule is not as severe as the NBMP 2004 report might suggest. The most current NBMP report (from 2009) at the time Priority Species Version 2 was published shows a significant upward overall trend for noctule with an average annual increase of 4.2 % during 1999-2008. Latest NBMP population trend data for noctule (from Field Survey results), as published in Barlow *et al.* (2015), conclude that the trend shows a non-significant increase of 20.1 % from 1999 to 2012. These data, albeit not statistically significant, appear to show a reversal of the situation reported for noctule in the 2004 NBMP report that showed a 24.6% decline, also not significant. The 2015 data suggest that noctule populations have at least remained stable between 1999 and 2012, and may have increased, and there appears to be need for a review of the status of noctule not only in terms of population trends but also its status as a Priority Species.

BSG Ecology noctule data

The NBMP data is very useful in making an assessment of current population trends of noctule and other species, with trends generated for ten of the UK's seventeen breeding bat species, including noctule (Barlow *et al.*, 2015) and the data on which these trends are based are clearly described. However, there is a large amount of data collected from consultancy surveys that may also usefully contribute to this discussion and the development of even more robust assessments of current status. BSG Ecology has, as a consequence, undertaken a preliminary review of data collected for noctule and other bat species from a number of proposed development sites across the UK. This has been carried out by selecting sites where automated / static bat detector data was collected and where bat detectors were deployed for at least nine nights, with at least three nights' consecutive recording in spring, summer and autumn. This kind of data generates relative activity levels for bats, (bat passes recorded per hour or per night) that can be compared, when collected using similar methods, between sites. Fifty two sites were selected with these widely and fairly evenly distributed across England, Scotland and Wales (see Figure 1).

A comparison has been made between all of the species recorded during BSG Ecology surveys at this sample of sites, a summary of which is presented in Table 1. The table shows how many sites, of the total of 52, each species was recorded at. The table also uses JNCC range data² to determine the proportion of sites that each species was recorded at in relation to that species' known range. The table also gives a mean relative activity rate (bat passes per hour (B/h)) recorded for each species across all of the sites where they were recorded.

Noctule was recorded at nearly all (98 %) of the sites within its known range. It was not recorded at one site outside (in northern Scotland) and one site within its known range. The mean relative activity recorded for noctule was 0.24 Bats/hour (B/h) which equates to around one bat pass recorded every four hours on average from each automated bat detector location (from 76,663 hours of data collected). The sites were located within a broad range of habitats with the dominant habitat at each site described as arable (20 sites),

¹ The IUCN Red List of Threatened Species includes nine classifications of conservation status and their stated aim is to provide an “explicit, objective framework for the classification of the broadest range of species according to their extinction risk”. The definition of Least Concern is used when “it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category”. The population trend for noctule is described as ‘unknown’ by IUCN but noctule has not been classified as Data Deficient, which suggests that appropriate data on abundance and distribution were available to make the assessment.

² Distribution and range maps for all European protected species are available as shapefiles on the JNCC website - <http://jncc.defra.gov.uk/page-6568>.

pasture (7), arable / pasture (6), arable / woodland (2), moorland (3), quarry (3), marshy grassland / unmanaged grassland (6), brownfield (1), residential (1), amenity (1), wetland (1) and woodland (1).

The table shows that all of the species listed as common by JNCC (2005) were recorded at 87-100 % of the sites within their known range. Noctule, which was recorded at 98 % of sites, is listed as uncommon. For the two common pipistrelle species, much higher relative activity levels were recorded than for all other species and these species were both recorded at 100 % of sites. Species of the genus *Myotis* were grouped together as many of the species have overlapping call parameters, making species identification problematic. *Myotis* bats were also recorded at 50 sites (96 %) with all 52 sites within the known range of Daubenton's and Natterer's bat, which are listed as fairly common and common respectively by JNCC (2005). It is likely that most *Myotis* calls were recorded from one or other of these two species. *Myotis* bats were the third most frequently recorded 'species' with 0.53 B/h.

For long-eared bats, and brown long-eared bat *Plecotus auritus* in particular (which the large majority of records will refer to due to the rarity and limited distribution of grey long-eared bat *Plecotus austriacus*) the overall relative activity level recorded was very low (0.02 B/h) in relation to its status and apparent population size. This is reflected in its recording at the lowest proportion of sites for a common species – 45 sites. This is most likely due to the fact that this species apparently regularly forages without calling at all (Swift, 1998) and echolocation data is almost always not representative of real activity levels for the species. An example of this is provided from one site for which data were collected over several years. At this site mist-netting and harp-trapping was carried out as well as automated bat detector survey. Although less than 0.1 % of echolocation calls recorded from this species, 20 % of bats caught were brown long-eared bats.

For the rarer species, Leisler's bat (65 % of sites; 0.05 B/h) and Nathusius' pipistrelle (67 % of sites; 0.1 B/h) were recorded at more than half of the sites but at low activity levels. Leisler's bat was recorded at several sites outside its known range, indicating that further data collection is likely to result in some adjustment of known range. Nathusius' pipistrelle was largely recorded during migration periods which reflects patterns noted during recent research carried out on this species by BSG Ecology³. The research suggests that this species is quite broadly distributed and not uncommon during spring and autumn. Barbastelle was recorded at 53 % of sites, which reflects the fact that it is thought to be widespread within its known range, and at a slightly higher activity level than noctule (0.29 B/h). Much of the barbastelle activity was recorded at a single site from this particular sample, with the mean activity level reduced to 0.06 B/h with this site removed from the analysis. Serotine was recorded at 68 % of sites but at a relatively low activity rate (0.09 B/h). The horseshoe bats were both recorded at around a third of sites within their known range and at low activity levels.

The question raised is whether these data support the 'uncommon' conservation status given to noctule in TIN 051; or is it more in line with JNCC's judgement (in the 2007 conservation status assessment) that it is a 'relatively common' species? The data certainly appears to support the suggestion that noctule is widespread and relatively frequently recorded given that it was recorded at 98 % of sites within its known range. However, it is theoretically possible for mobile species that are 'uncommon' to be recorded at a high proportion of sites if enough time is spent surveying for them, and they are mobile enough. Using automated bat detectors deployed at fixed locations for several nights often means that bat species are recorded that may only occasionally be present and might not be detected during a short transect survey in the evening. As such, it is not unexpected that the proportion of sites that each species has been recorded at is higher than those recorded by the NBMP 'Field Survey' method, which employs a transect method that samples for a shorter period of time.

Overall, the picture presented from preliminary data collected by BSG Ecology (in Table 1 and Figure 1) is that the status of noctule is best matched by the description in JNCC (2007) as 'relatively common', is certainly 'widespread', and is apparently not 'uncommon', given the very high proportion of sites at which this species has been recorded and the frequency at which it has been recorded.

Conclusions

There are a number of points raised in this article and they are summarised below before concluding.

As things stand, the starting point for carrying out an Ecological Impact Assessment or any evaluation of, or assessment of impact on, noctule bats at an onshore wind farm, is the assumption that noctule is a species that is at high-risk of being killed by wind turbines. A second assumption is that the death of noctules is likely to lead to a negative and 'high' population-level effect on the species, which may affect the species'

³ See reports on bat migration available at <http://www.bsg-ecology.com/research/bsg-ecology-bat-migration-research-2012-2014/>.

favourable conservation status. This second assumption is based on the fact that the status of noctule is uncommon. If it were a common species then presumably its populations would not be considered to be at high-risk from the operation of onshore wind farms.

This article, in reviewing the status of noctule, shows that there does not seem to be agreement among statutory nature conservation bodies about what the status of noctule is. Natural England base their view on JNCC (2005), which uses a population estimate derived from Harris *et al.* 1995. The 2007 JNCC review of noctule conservation status is fairly clear that this reference population data is of limited value and has been superseded by the NBMP method of calculating population trends, which seem to be the best currently available method for monitoring change in bat species' populations. The NBMP results are based on a small time series and sample size and the trend information (for noctule) is not yet statistically significant. However, the apparent non-significant increase in population indicates that the population is, at least, stable and not declining. The NBMP data also indicate that noctule is recorded from almost the same proportion of 'Field Survey' sites as the soprano pipistrelle, a common species of bat thought to be the second most common species of bat in the UK. The JNCC (2007) review concludes that noctule is 'fairly common', a view that is apparently shared by IUCN, who classify noctule as of 'Least Concern'. This view is also supported by a preliminary analysis of BSG Ecology automated detector data from 52 sites in England, Scotland and Wales, which show that noctule has been recorded from 98 % of those sites, a proportion that is matched only by the two common pipistrelle species. This is much higher than any other 'scarce', 'rare' or 'uncommon' species of bat that were recorded at much lower proportions of sites, and at lower activity levels (with the exception of barbastelle, the reasons for which are explained above).

The question remains as to what conclusions can be taken from this. Although it may be seen as unimportant by some whether noctule is classified as common or uncommon, this is a situation where a single word has made a considerable difference to the practices and attitudes of the onshore wind industry, professional ecological consultants, the statutory and non-statutory conservation sectors, and decision-makers. As a result of noctule's classification, much of the recent attention on the potential impacts on bats at wind farm sites has been on this species. The consequence of this is an imbalance between the level of concern we have about impacts on this species and the fact that we are recording noctule at most or all the sites that we survey for bats. It is counterintuitive that a species that is recorded very widely is genuinely uncommon and of significant concern wherever it is recorded. If the classification of noctule as uncommon is outdated it may be a good time to look again at this issue.

Our poor knowledge of the abundance of most bat species (which is unlikely to change in the foreseeable future) should be balanced against the positive initiatives that have been taken in measuring population trends using citizen science, and the use of new and improved survey methods, based on new technology, and the question remains as to whether we should continue to rely on population estimates that are widely regarded as lacking.

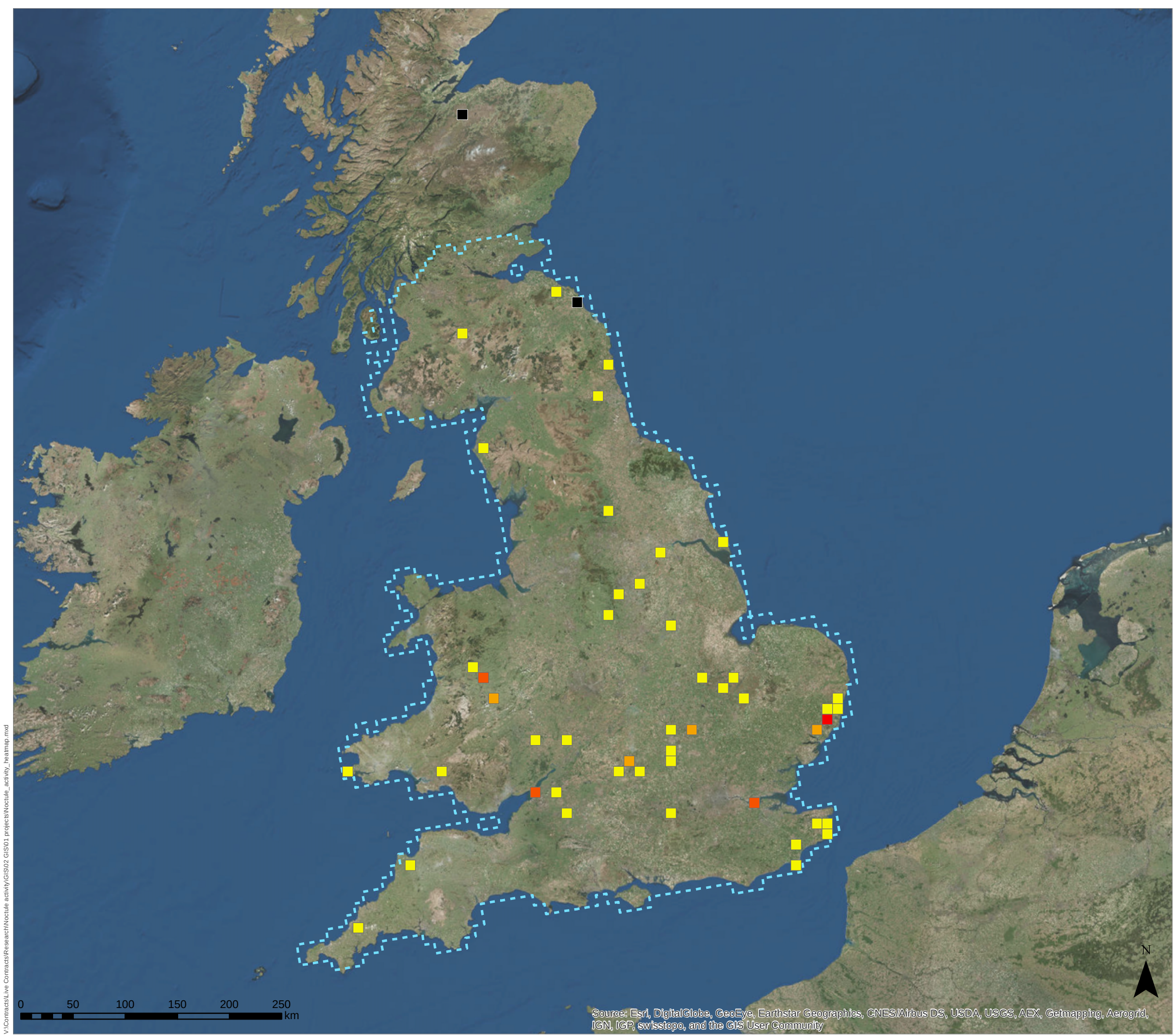
If the conservation status assigned to noctule were to be reviewed, it may then also be necessary to look again at the assessment methods that have been followed by the renewables and ecology industries over the last few years.

Table 1: Comparison of bat species in relation to number and proportion of sites recorded in relation to range, relative activity rate (B/h) and status, as listed in JNCC (2005 and 2007). Species	No. sites recorded and proportion of total	No. sites and proportion of total within range of species	No. sites and proportion of total outside known range of species	B/h	JNCC (2005) status	JNCC (2007) status
Lesser horseshoe bat	7 (14 %)	7 (41 %)	0 (0 %)	0.06	Rare, endangered	Widely distributed within known range.
Greater horseshoe bat	6 (12 %)	6 (35 %)	0 (0 %)	0.04	Very rare, endangered	Occurs only in Wales and south-west England.
<i>Myotis</i> sp. – most likely to include:	50 (96 %)	50 (100 %)	0 (0 %)	0.52	NA	NA
Natterer's bat	NA	NA	NA	NA	Fairly common	Found throughout England, Wales and Northern Ireland
Daubenton's bat	NA	NA	NA	NA	Common	Relatively widespread across the UK
Noctule	50 (96 %)	50 (98 %)	0 (0 %)	0.24	Generally uncommon	Relatively common and widespread
Leisler's bat	34 (65 %)	21 (65 %)	13 (54 %)	0.05	Widespread but scarce	Local and uncommon
Common pipistrelle	52 (100 %)	52 (100 %)	0 (0 %)	4.29	Common	Most common UK bat - widespread
Soprano pipistrelle	52 (100 %)	52 (100 %)	0 (0 %)	1.89	Common	Second most common UK bat - widespread
Nathusius' pipistrelle	33 (58 %)	31 (67 %)	2 (33 %)	0.1	Rare	Confirmed as resident species – range unknown.
Serotine	30 (58 %)	29 (69 %)	1 (10 %)	0.09	Widespread in southern Britain	Widespread but scarce in southern England
Barbastelle	17 (33 %)	17 (53 %)	0 (0 %)	0.29	Widespread but rare	One of UK's rarest mammals. Found across England and south Wales.
Long-eared bat sp. – includes:	45 (87 %)	45 (87 %)	0 (0 %)	0.02	NA	NA
Brown long-eared bat	NA	NA	NA	NA	Common	Widespread across the UK
Grey long-eared bat	NA	NA	NA	NA	Very rare	Rare and found only in four counties

References

- Barlow, K. E, Briggs, P. A., Haysom, K. A., Hutsom, A. M., Lechiara, N. L., Racey, P. A., Walsh, A. L., Langton, S. D. (2015). Citizen science reveals trends in bat populations: The National Bat Monitoring Programme in Great Britain. *Biological Conservation* 182 (2015) 14–26.
- Battersby, J. (Ed) & Tracking Mammals Partnership. 2005. *UK Mammals: Species Status and Population Trends. First Report by the Tracking Mammals Partnership*. JNCC/Tracking Mammals Partnership, Peterborough.
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom*. Published by CIEEM.
- Harris, S., Morris, S., Wray, S. & Yalden, D. (1995). *A Review of British Mammals: population estimates and conservation status of British mammals other than cetaceans*. Published by JNCC.
- Hundt, L. (2012). *Bat Surveys: Good Practice Guidelines*, 2nd Edition. Bat Conservation Trust.
- Joint Nature Conservation Committee (2007). *Second Report by the UK under Article 17 on the implementation of the Habitats*. Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: www.jncc.gov.uk/article17.
- Natural England (2014). *Bats and Onshore Wind Turbines: Interim Guidance, third edition*. Natural England Technical Information Note TIN051.
- Richardson, P. 2000. *Distribution atlas of bats in Britain and Ireland 1980-1999*. Bat Conservation Trust, London.
- Speakman, J.R., Racey, P.A., Catto, C.M.C., Webb, P.I., Swift, S.M., & Burnett, A.M. (1991). Minimum summer populations and densities of bats in N.E. Scotland, near the northern borders of their distributions. *Journal of Zoology*, London, 225: 327-345.
- Swift, S. M. (1998). *Long-eared bats*. Published by T & A.D. Poyser Ltd, London.

Appendix 1: Noctule activity recorded (bats per hour) at 52 sites in the UK



V:\Contracts\Live Contracts\Research\Noctule activity\GIS\02 GIS\01 projects\Noctule_activity_heatmap.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

LEGEND

 Noctule range (JNCC 2013)

Noctule records (10km grid squares)

-  0.00 b/h
-  0.01 - 0.72 b/h
-  0.73 - 1.44 b/h
-  1.45 - 2.17 b/h
-  2.18 - 2.89 b/h

BSG | ecology

OFFICE: Monmouth
T: 01600 891576

DRAWING TITLE
Noctule activity recorded (bats per hour) at
52 sites in the UK

DATE: 31.03.2015	CHECKED: RT	SCALE: 1:3,500,000
DRAWN: COH	APPROVED: MH	STATUS: FINAL

Copyright © BSG Ecology

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2015. All rights reserved.
Reference number: 10048980

OS Open data © Crown copyright and database right 2015 | Aerial Photography © Esri

Sources: BSG Ecology survey data, range from JNCC Individual Species Reports 2013