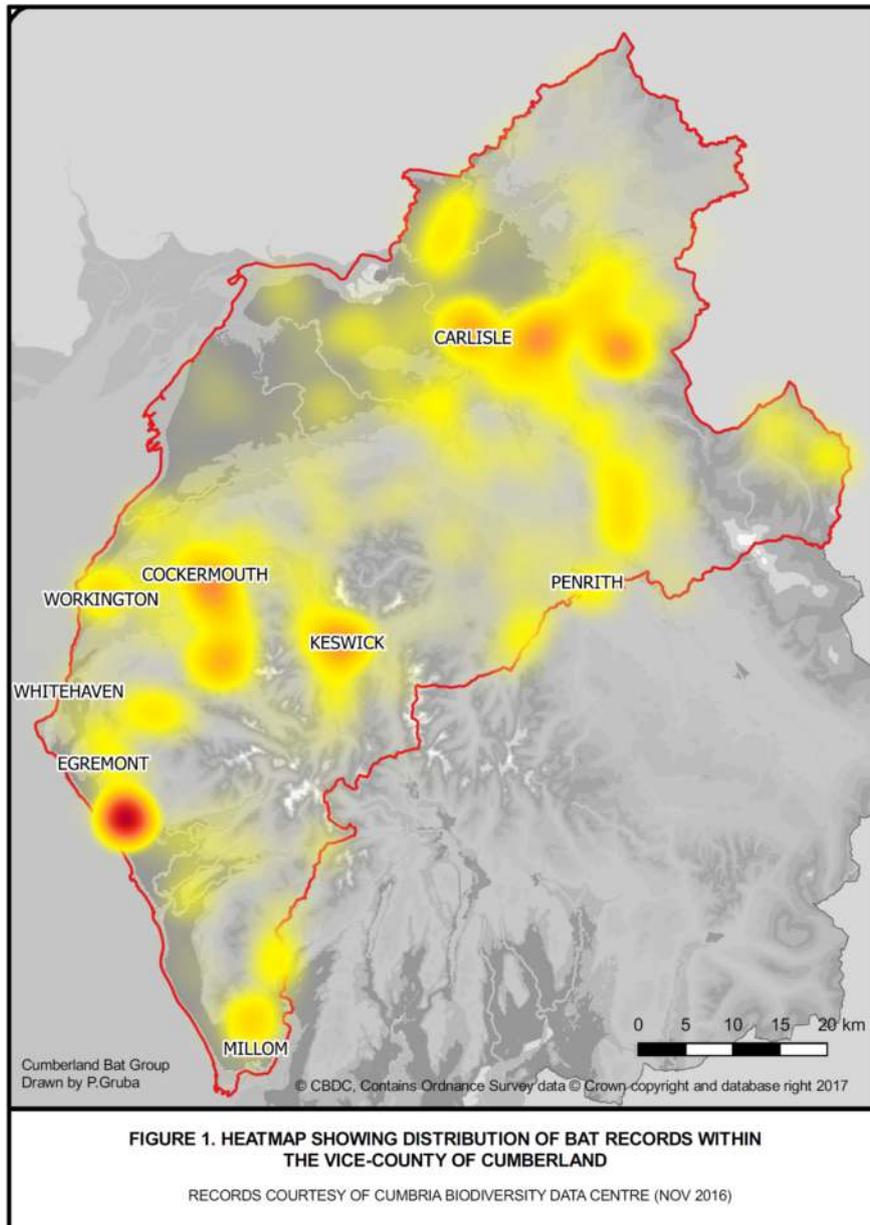


## Cumberland Bat Recording Project.

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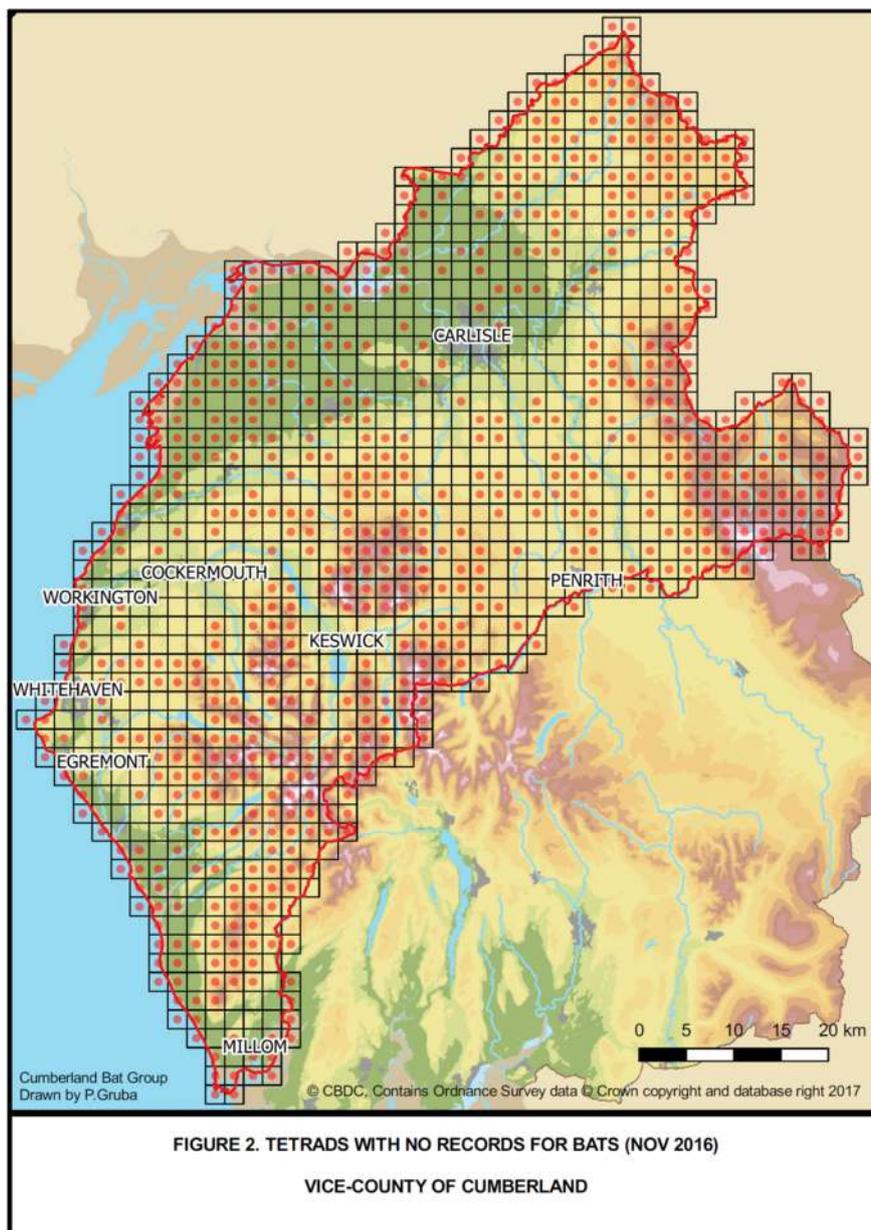
Cumbria is home to 10 of 18 resident UK bat species with eight species being confirmed breeding within the county. Most of the landscape within the county is rural with a broad range of habitats including open fells, wooded valleys, extensive wetland areas, estuaries and coastal habitats. Some of these provide excellent habitat for bats to forage, commute and roost.

Although, there are plenty of suitable habitats that are likely to support a range of bat species within the vice-county of Cumberland, the actual records for bats that are held by the Cumbria Biodiversity Data Centre are very scarce. As depicted by the heatmap (Figure 1), the majority of the records are distributed around the main settlements (Carlisle, Keswick, Penrith, Cockermouth and Egremont) with very few records from the rural areas.

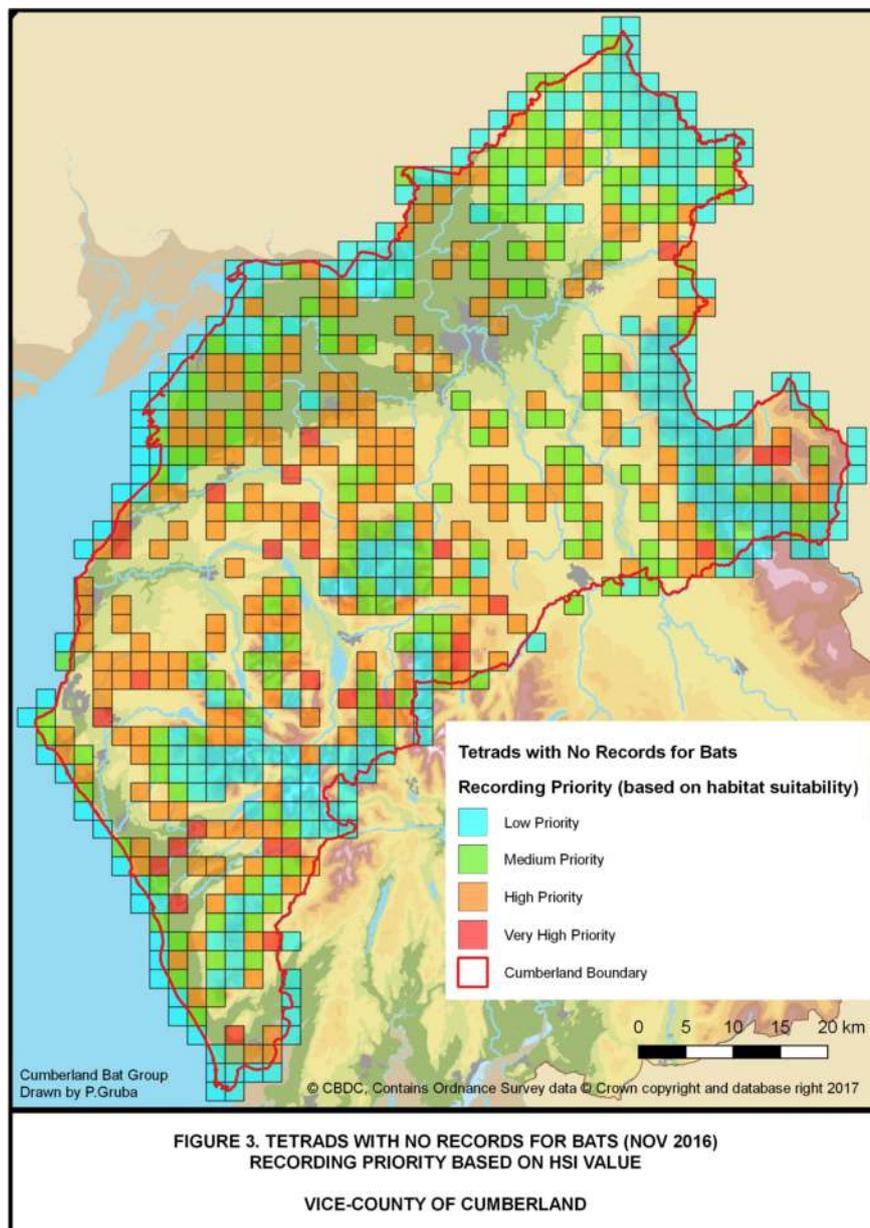


As indicated by Figure 1, there are major gaps in the recorded bat distribution (as per November 2016). Therefore, inspired by the Nottinghamshire Bat Group's project "Echo Location Location", the Cumberland Bat Group embarked on the new project to identify the distribution and current status of bats within the vice-county of Cumberland. We hope that the results of the project can eventually aid the production of a "Cumbria Bat Atlas" that can accurately illustrate distribution and range of the bat species that occur within our county.

To aid the recording project, in April 2017, I created a list of tetrads with not a single record for bats; the total number of tetrads with no records accounts for 664 out of 1137 tetrads that cover the Cumberland area (Figure 2 with the red dots depicting tetrads with no records for bats).



As seen in Figure 2, there are a lot of tetrads with no records and the attempt to undertake recoding in all of these would be very challenging and might take several years! The blank tetrads cover a range of habitats, from the top of Scafell Pike to wetlands of the Solway Plain and Kielder Forest and all these vary in their suitability for bats. Therefore, to steer the focus towards the tetrads that have the greatest chance of bats being present, all of the tetrads have been categorised by their habitat suitability to the local bat populations (Figure 3).



In order to calculate the habitat suitability, I have taken into account three factors: proximity of woodland (in this case Priority Broadleaved Woodland), proximity of freshwater habitat and proximity of buildings. With the aid of GIS software (specifically QGIS) and readily available spatial data from Natural England Database, Ordnance Survey and Open Street Maps, I have calculated a percentage distribution of the above three factors within each tetrad in order to establish Habitats Suitability Index (HSI) score for an individual tetrad.

To work out the HSI values I have used the following equation (which is similar to the equation generally used by ecologists to evaluate the suitability of habitat for great crested newt *Triturus cristatus*). The HSI is a geometric mean of three factor indices:

$$\text{HSI} = (\text{F1} \times \text{F2} \times \text{F3})^{1/10}$$

- F1 – percentage cover of Priority Broadleaved Woodland (+500m buffer area) within a tetrad (Natural England Database)
- F2 – percentage cover of buildings (+500m buffer area) within a tetrad (Open Street Maps)
- F3 – percentage cover of waterways (+200m buffer area) within a tetrad (Ordnance Survey Open Rivers Data)
- Calculated values are between 1 (minimum) and 100 (maximum)
- All of the 0 values for individual factors have been replaced by 1

Finally, a habitat suitability within each tetrad has been assign into four categories:

- Very high suitability for bats – HSI value equal or greater than 51 (out of maximum value of 100) – 29 tetrads in total
- High suitability for bats – HSI value equal or greater than 16 and lower than 51 – 213 tetrads in total
- Medium suitability for bats – HSI value equal or greater than 6 and lower than 16 – 165 tetrads in total
- Low suitability for bats – HIS value lower than 6 – 257 tetrads in total

I am aware that the method I used is subjective and there may be some drawbacks in the analysis and reasoning; however, I hope it will help with the recording process and target the areas of habitats that are likely to support important bat populations.

In 2017, we had number of records coming in to fill the gaps on the map, but there is still a long way to go. So If you already hold any records for bats from the target tetrads, please submit them directly to Cumbria Biodiversity Data Centre (details can be found on their website), through iRecord or send them to the Cumberland Bat Group.

If any “batty” people would like to help with the project, please get out there after dusk in the bat active season (May till September) and start recording our Cumbrian bats! If you don’t own any detectors, the Cumberland Bat Group has recently purchased an Anabat Express and Echo Meter Touch 2 bat detector so these can be booked and used for the recording. The Cumberland Bat Group will be regularly posting updates on the project on their Facebook page and website.

For anybody that would like to help with the projects, the excel spreadsheet, PDF map and Google Earth (kmz) file showing coordinates and HSI values for all of the target tetrads can be obtained from here:

[https://drive.google.com/open?id=1\\_lqHMMPtL32-YUST51bs3fgufXd0XpLn](https://drive.google.com/open?id=1_lqHMMPtL32-YUST51bs3fgufXd0XpLn)