



Does human activity influence site occupancy choices of the European nightjar (*Caprimulgus europaeus*)?

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1: Introduction

Human population is estimated to have grown by 65% between 1950 – 2015, further estimations indicate a growth of a further 25% by 2050 (EEA, 2020). The growing population increases the demand for housing and infrastructure (Gov.UK, 2010), which leads to increased land development, causing habitat fragmentation (Taylor *et al.*, 1999).

Habitat fragmentation is thought to be the biggest cause of loss in biodiversity (Latimer and Zukenburg, 2020), many species rely on specific habitats for foraging and breeding.

One of the species that relies on specific habitats is the European nightjar (*Caprimulgus europaeus*). The European nightjar is a migratory species that breeds throughout Europe and winters in subtropical Africa (Evens *et al.*, 2017; Holyoak, 2001).

Nightjars breed in lowland heathland and forest clearings. Foraging usually occurs away from breeding sites and studies have shown a preference to semi natural areas particularly deciduous woodland (Liley and Clarke, 2003).

As well as the need for specific habitat, nightjars nest on bare ground which makes them vulnerable to disturbance (Liley and Clarke, 2003).

Nightjars are protected under annex 1 of the European Birds Directive and listed as amber in the Birds of Conservation Concern (RSPB, 2015; Eur-Lex, 2010). Because of its protected status it is important to understand any factors that may influence nightjars' choices when choosing potential nesting and foraging sites.

There is conflicting evidence on the relationship between human disturbance and nightjar activity (Polkowski *et al.*, 2020; Langston *et al.*, 2007) and more studies are needed to confirm if this is an influencing factor for site occupancy choices. This study will examine the presence and absence of nightjars in the Forest of Dean in relation to human activity to see if this may influence the nightjars choice of breeding and foraging areas.

2: Data collection

- Audio moths were deployed at 33 forest clearings across the Forest of Dean in mid June – mid July.
- The audio moths were set to record for half an hour before sunset, for a duration of 120 minutes
- These were collected and analysed for nightjar songs “churring” and nightjars were defined as present or absent depending on any churring activity on the audio moths.
- The sites were mapped using Digi map aerial roam (Digi Map, 2021) and distances were measured from the centre of each site to the nearest housing estate, minor road and main road.



Figure 2: European nightjar photograph by Ben Locke (Locke, 2020)

3: Methods

- The median number of measurements from each of the distance categories was calculated and separated into two categories.
- For distances to the nearest housing estate this was less than or greater than 725.5 m, for distances to the nearest roads less than or greater than 83.1 m and for distances to nearest main roads, less than or greater than 1222 m.
- This data was then compared against nightjar presence and absence. As some of the cells had frequencies of less than 5 a Fisher's exact test was used to analyse the data.

4: Preliminary results

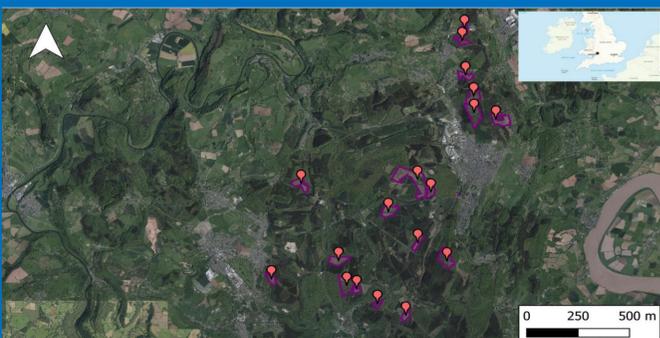


Figure 1; Ariel image of the sites studied with an inset map of the Forest of Dean in the South West UK

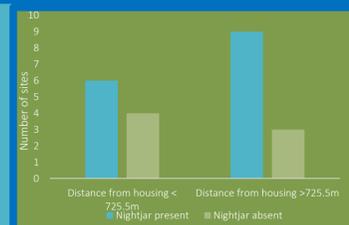


Figure 3: There was no significant relationship between nightjar presence and nearest housing estate ($p= 0.652$).

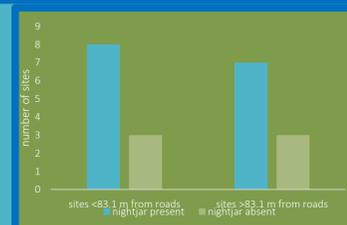


Figure 4: There was no significant relationship between nightjar presence and the distance to the nearest minor road ($p= 1$).



Figure 5: There was no significant relationship between nightjar presence and distance to the nearest main road ($p= 0.362$).

5: Preliminary discussion and next steps

Currently distances between housing estates and major and minor roads do not appear to be affecting nightjar site occupancy choices, most sites that have nightjars present are located nearer to main roads than sites without nightjars. There is a possibility that insects that are attracted to light could be attracted to passing vehicle lights and that the nightjars are using the roads for foraging (Jackson, 2009). Also the main roads were further away from minor and roads and housing estates which could have affected the results.

Further steps include:

- Continue analysing the distances of the remaining data with a Fisher's exact test or chi square.
- Find the sites and surrounding areas on England's Light Pollution and Dark Skies interactive map (CPRE, 2021) to assess the light pollution within and around the sites and compare high and low levels to the presence and absence of nightjars.

6: Acknowledgements

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