

Looking up to the sky: using high resolution remote sensing to characterise hibernaculum locations of the Hazel Dormouse

Leonardo Gubert[‡], Fiona Mathews[§], Jon Bennie[‡], Robbie McDonald[|], Robert Wilson[|], Ruud P.B. Foppen[¶], Pim Lemmers[#], Maurice La Haye[▫]

[‡] University of Exeter, Penryn, United Kingdom

[§] University of Sussex, Brighton, United Kingdom

[|] University of Exeter, Exeter, United Kingdom

[¶] Radboud University, Nijmegen, Netherlands

[#] Natuurbalans, Nijmegen, Netherlands

[▫] The Dutch Mammal Society, Nijmegen, Netherlands

Corresponding author: Leonardo Gubert (lg385@exeter.ac.uk)

Abstract

The Hazel Dormouse is predominantly an arboreal species that moves down to the ground to hibernate in the autumn in temperate parts of its distributional ranges at locations not yet well understood. In this study, we tested whether environmental characteristics surrounding Hazel Dormouse hibernacula can be identified using high-resolution remote sensing and data collected *in situ*. We modelled remotely sensed variables, including canopy height and cover, topographic slope, sky view, solar radiation and cold air drainage around 83 dormouse hibernacula in England (n=62) and the Netherlands (n=21), and identified environmental characteristics that may be favoured by pre-hibernating dormice. We also collected and analysed data on leaf litter depth, temperature, canopy cover and distance to the nearest tree collected *in situ* at hibernaculum locations in England. We found that remotely sensed data were effective in identifying attributes surrounding the locations of dormouse hibernacula and, when compared to *in situ* information, provided more conclusive results. Our study suggests that remotely sensed topographic slope, canopy height and sky view have an influence on animals choosing suitable locations to hibernate; whilst *in situ* data suggested that average daily mean temperature at the hibernaculum may also have an effect. Remote sensing proved capable of identifying localised environmental characteristics in the wider landscape that may be important for hibernating dormice. We also propose that this method can provide a novel progression from habitat modelling to conservation management for the Hazel Dormouse, as well as other species using habitats where topography and vegetation structure influence fine-resolution favourability.

Keywords

Hibernation, remote sensing, LiDAR, radio tracking, habitat

Presenting author

Leonardo Gubert

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Ethics and security

Field work in England was conducted under licence from Natural England 2015-11955-SCI-SCI, Home Office PPL 3003431 and PIL I69D694C7, and with the approval of the University of Exeter College of Life and Environmental Sciences (Streatham Campus) animal ethics committee. Work within designated areas were carried out under consent from Natural England. In the Netherlands, all permits were held by Wageningen University where trapping and handling of Hazel Dormouse was carried out under permit number FF/75A/2015/007 (Flora and Fauna act) and radio tracking undertaken under experiment number 2017.D-0045.007 as part of a larger project on conservation and research of fauna under number 2017.D-0045 (Animal Welfare Act). in the Netherlands.

Author contributions

The manuscript was created by LG. Fieldwork in the UK was planned by LG, FM and RW and conducted by LG and in the Netherlands, it was planned by PL, MLH and RF and

carried out by PL and RF. Data was analysed by LG, with advice from FM, JB, RM and RW. The manuscript was written by LG and reviewed and revised by FM, JB, RM, RW, PL, and RF.

Conflicts of interest

None.