(Invasive) alien vertebrates

Using novel methods to prioritise grey squirrel control

Ham, Cally[1*]; Scopes, Ellie[2]; Pickering, Mark[3]; Gill, Robin[1]

[1] Forest Research, Alice Holt Lodge, Farnham, UK
[2] Forest Research, Forestry Commission National Office, Bristol, UK
[3] University of Southampton, Southampton, UK
* cally.ham@forestresearch.gov.uk

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Grey squirrel (*Sciurus carolinensis*) is a non-native, invasive species threatening the health, resilience and economic viability of broadleaf woodlands throughout England, Wales, and southern Scotland. The impacts of grey squirrel bark-stripping is estimated to cost £37 million per year in lost timber quality and reduced carbon sequestration with unquantified damage to native biodiversity and woodland function. To date, the only method of controlling grey squirrel damage within woodlands is through lethal population control which is expensive and time consuming. Due to grey squirrel high fecundity and mobility the population is quick to recover following culls through migration and increased birth rate. As squirrel control resources are limited, there is a need for woodland managers to prioritise areas to target their efforts.

We present two novel methods that could aid prioritisation of squirrel control. Firstly, the use of UAV-based sensors to locate and identify signs of canopy damage during the summer season, when ground-based damage assessments are difficult due to leaf cover. And secondly, the use of predictive models to identify when food availability, in the form of European beech (*Fagus sylvatica*) seed, might be high and therefore enable an increase in squirrel population density. We found that UAV-based sensors can detect signals of canopy damage and that these can be identified using machine learning processes. We also found that there is a detectable increase in squirrel numbers recorded in the year following high beech seed availability. Future work will focus on developing a predictive tool to be used by forest managers to identify when and where to target their squirrel control efforts.