Critique of tools used to monitor presence of squirrels

*Louise Amor-Seabrooke, Deborah Brady and Aileen Mill
130651570 – C100 Biology – l.c.amor-seabrooke@Newcastle.ac.uk – School of Biology

Introduction

Within the UK, populations of the native red squirrel (***Sciurus vulgaris)*** under threat since the introduction of the American grey squirrel (***Sciurus carolinous)*** in the late 1800's. Introduced to only 30 sites in England as décor[1], the spread of the grey squirrel has been relentless, with populations still increasing. Due to their wide tolerance of urban conditions, grey squirrels are much better adapted to the urbanisation of England than the native red squirrel.

The red squirrels are outcompeted for resources and are susceptible to Squirrel Pox Virus (SQPV) which grey squirrels are shown to be a reservoir host for[2]. Organisations such as Red Squirrels Northern England work to protect populations of red squirrels by eradicating grey squirrels in areas where both species are present. Monitoring of both species is needed to direct culling of grey squirrels and conservation of red squirrels.

Aims

An ongoing study on the National Trust Wallington Estate, Northumberland seeks to determine the spatial movements of red squirrels following a period of grey culling.

- To assess the reliability of camera traps (Figure 1) and hair tube traps (Figure 2) as monitoring tools
- To critique and compare these techniques while monitoring red and grey squirrels during a grey squirrel cull;

Methods

Project research time was equally divided between desk based analytical study and field based monitoring.

Field based studies involved

- collecting hair sample data and resetting the 104 hair tube traps placed around Rothley Wood. Species presence was determined by hairs collected on the hair tube traps either by identification by sight or further microscopic analysis
- Resetting and extracting memory card data from the 20 camera traps set up around Rothley Wood and taking them for further analysis.

Desk based study involved

- Image analysis of the 15 weeks of images from 20 cameras. Timestamps and dates for images showing squirrels were recorded, acknowledging whether it was a red or grey squirrel present

Analysis:

- Camera trap data were compared with hair tube trap data from the same 20 locations to determine the efficacy of each method to detect the presence of red and grey squirrels.

Figure 1: An image recorded from a camera trap, showing a time and date stamp

Figure 2: An image recorded from a camera trap of a squirrel feeding at a hair tube trap

References
[1]Mayle BA, Broome AC 2013, Changes in the impact and control of an invasive alien: the grey squirrel (*Sciurus carolinensis)* in Great Britain, as determined from regional surveys; Pest Management Science, **69:**323-333
[2]Rushton SP, Lurz PWW, Gurnell J, Nettleton P, Bruemmer C, Shirley MDF, Sainsbury AW 2006, Disease threats posed by alien species: the role of a poxvirus in the decline of the native red squirrel in Britain; Epidemiology and Infection **134(3):**521-533

Results

300 observations for each monitoring method were made across 20 sites around Rothley Wood over a 15 week period. The results from site 14 were not analysed due to a high level of inaccuracy through failure of the date stamp on the camera trap, resulting in 285 comparable data points.

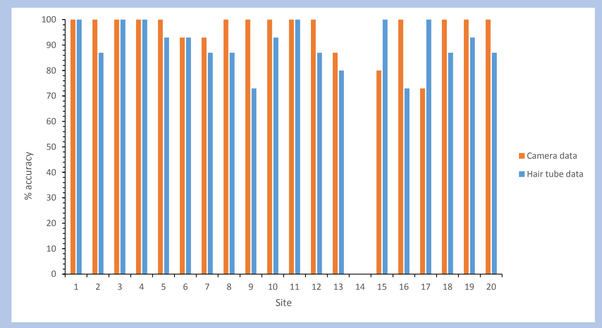

Figure 3..The average total % accuracy of each camera trap and hair trap at each site over the 15 week period.

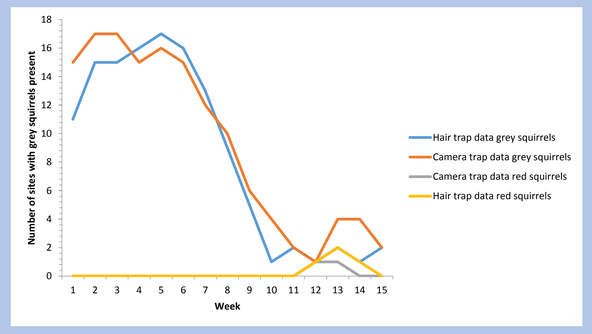

Figure 4. Number of sites with grey and red squirrels present each week. Culling of the grey populations began at week 6.

Of the 285 comparable data points, there were 37 occasions where the two methods did not show equal results (Figure 3). The average % accuracy of each method on each site based upon its failure to register squirrel presence where the other method had over the 15 week period. The hair trap data generally had a lower accuracy than that of the camera, failing to record a total of 25 instances of grey squirrel presence which had been recorded in the camera images. There were 11 occasions in which the camera traps failed to pick up a squirrel where the hair tube trap had, and on one sampling point both methods had picked up different results.

The number of sites where grey squirrels were recorded was similar for both methods but camera traps were better at detecting greys at the start and the end of the study period. There was a marked decline in detections of grey squirrels in both methods as the cullling progressed. The hair tube trap data detected red squirrels at more sites than the camera traps (2 rather than 1 in week 13; Figure 4).

Discussion

In this study neither the camera traps or the hair tube traps were shown to be 100% reliable at recording the presence of red or grey squirrels.

Overall the camera trap data had a higher accuracy and picked up the presence of squirrels more often than the hair tube traps. The camera traps had the advantage of being able to easily distinguish between red and grey squirrels. Furthermore, the use of images allowed the presence of more than one squirrel being in frame to be recorded as well as identifying distinguishable features, such as ear tags helped with determining abundance of squirrels around the wood. However, the camera traps encountered a few mechanical problems such as resetting or high sensitivity of the sensor. All of the data from camera 14 had to be discounted due to the high volume of images produced each week by high sensitivity and, due to constant resetting, had inaccurate time and date stamps. Looking through the high volume of images for each site each week also had a high time cost.

The hair tube traps, although showing a reasonable degree of inaccuracy, took a shorter time to reset and analyse. However, on occasions it was difficult to distinguish between squirrel hairs and that of small mammals (such as mice and rats).

Conclusion

Due to the higher level of accuracy shown by the camera traps, the use of camera traps would be more advantageous in determining as to whether there was more than one species present and in establishing abundance of each.

The hair tube traps would be useful in determining presence in the case of just one species being monitored, however not abundance of the species.

Using both in tandem, as is being done now, is most beneficial for further studies of spatial monitoring as it increases reliability by comparing results and, as shown, accuracy is increased when both are used together.