# How to detect dormice: a comparison of footprint tunnels and camera traps as monitoring methods

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## Introduction

Dormice lead a cryptic life style and are therefore difficult to detect. In Germany, the garden dormouse (*Eliomys quercinus*) and the edible dormouse (*Glis glis*) are specially protected, whereas the hazel dormouse (*Muscardinus avellanarius*; Fig. 1) is listed in Annex IV of the EU Habitats Directive and is therefore strictly protected under the German Federal Nature Conservation Act. However, information on the exact geographical distribution of these dormouse species is still incomplete and a reliable and efficient monitoring method is therefore needed.

**The aim of this study was to compare the detection probabilities of footprint tunnels and camera traps for edible dormice, garden dormice and hazel dormice.**

## Results

### Edible dormouse

- 16 transects checked 31 times
- recorded between July and September
- methods did not differ in their detection rate (GLM: p>0.3 ; Fig. 2, top).
- no effect of month (Tukey: p>0.6)

### Garden dormouse

- 13 transects checked 52 times
- recorded between June and October
- camera traps had almost 10 times higher detection probability than footprint tunnels (GLM, p<0.001; Fig. 2, middle)
- detection rate of camera traps was significantly lower in October (p<0.05)

### Hazel dormouse

- 19 transects checked 39 times
- recorded between June and October
- footprint tunnels had almost 3 times higher detection probability than camera traps (GLMER, p<0.001; Fig. 2, bottom)
- no effect of month (p>0.1)

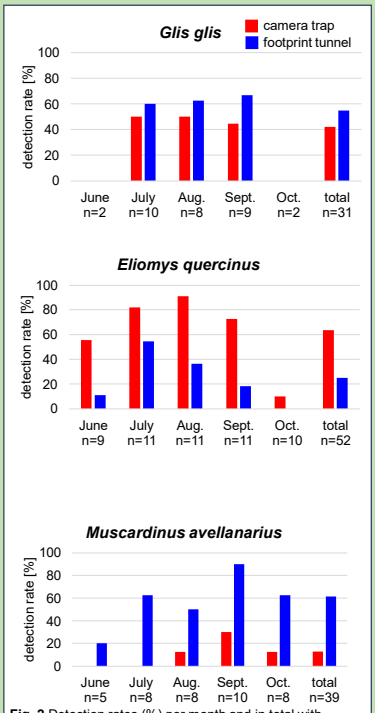



**Fig. 2** Detection rates (%) per month and in total with camera traps and footprint tunnels for edible dormouse, garden dormouse and hazel dormouse.

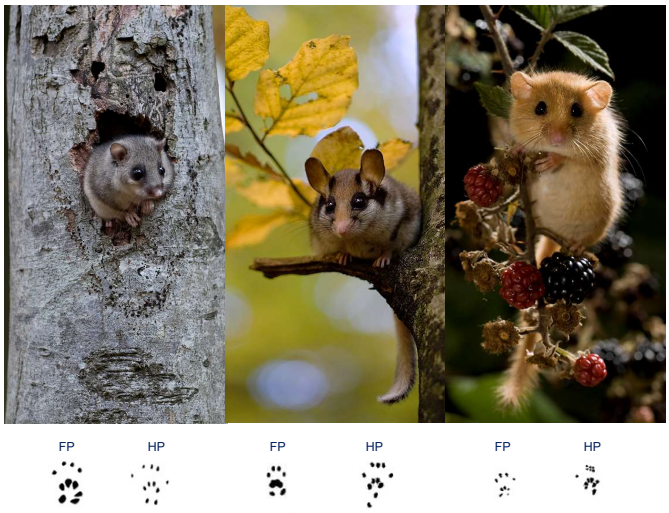



**Fig. 1** Edible dormouse (*Glis glis*), garden dormouse (*Eliomys quercinus*) and hazel dormouse (*Muscardinus avellanarius*) and their footprints (FP: front paw; HP: hind paw, Sources: K. Echle & probilche.ch).



**Fig. 3** Footprints of the garden dormouse and a fixed foot print tunnel, Source: K. Echle.

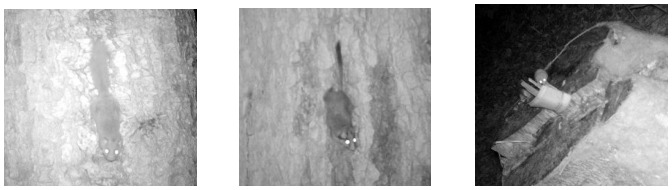


**Fig. 5** Images from camera traps. From left to right: edible dormouse, garden dormouse, source: R. Vorderbrügge and hazel dormouse, source: F. Langer.

## Conclusions

For **edible dormice**, there was **no difference** in detection rates between the two methods. For **garden dormice camera traps** had a higher detection rate than footprint tunnels, whereas **hazel dormice** were better detected by **footprint tunnels**.

It should be noted, that in this study camera traps and footprint tunnels were set with a **focus on the detection of garden dormice**.

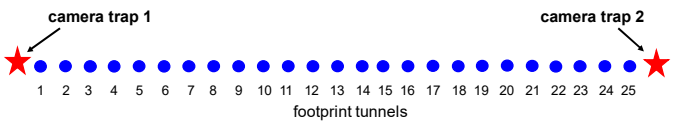



**Fig. 4** Schematic layout of a transect with 25 footprint tunnels and two camera traps.

## Methods

41 transects were monitored in Germany between June and October in the years 2019 - 2022. A transect consisted of 25 footprint tunnels, which were placed 25 m apart and fixed to a tree (Figs. 3 & 4). In addition two camera traps (MINOX-DTC550) baited with pumpkin seed or walnut oil were fixed to a tree at either end of each transect (Figs. 4 & 5). Camera traps and footprint tunnels were set with a focus to detect garden dormice. Transects were checked after 3-4 weeks of exposure, some of them several times. Only transects where the presence of the respective species was known, were included in the analyses. The detection probabilities of the two methods and all three species were analysed with GLMERs and GLMs (family binomial), taking into account possible effects of month. For GLMRs, transect ID was included as a random factor. The Tukey test was used for post-hoc comparisons between months. The study was conducted as part of the national biodiversity project "In Search of the Garden Dormouse".



**Fig. 6** Camera trap (MINOX-DTC550) and bait (tissue with pumpkin seed oil, right tree), source: S. Mandl

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