

Title: Independent effects of habitat loss, habitat fragmentation and structural connectivity on the distribution of two arboreal rodents, *Journal of Applied Ecology*, 2010

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Background to study

Forest loss and fragmentation are often used together as a mechanism responsible for the decline in dormice and red squirrel populations; however these two factors require different conservation measures and few studies have addressed the influence of each on the distribution of both species. It is predicted that the loss of forests will be the primary factor determining distribution, followed by fragmentation and that the role of hedgerows in aiding dormouse dispersal will be dependent on the amount of forest habitat available within the landscape.

Method

- The presence of dormice and red squirrels was investigated within 41 4 x 4 km landscape squares with contrasting amounts of forest cover, forest fragmentation, land use types, hedgerow density and connectivity with forests. All variables were recorded and measured using Corine Land Cover maps and aerial photographs within GIS (Arcview 3.3).
- Presence of dormice and red squirrels in forest patches was determined using 745 nest boxes and 591 hair tubes respectively. Sampling stations were spaced 70 m apart, nest boxes were checked regularly from spring to spring in 2006/7 and 2008/9 and hair tubes were checked every 10 days per month in spring-summer in 2007 and 2008. The number of sampling stations employed was determined using probability of detection from the first year's preliminary data.
- The number of forest patches sampled per landscape square varied between 1 and 6 and always included one or two of the largest patches present.

Key results

- Hazel dormice were found present in 29 landscape squares and red squirrels in 14.
- The probability of hazel dormice being present increased with increasing forest cover and network of hedgerows; however when landscapes had just 5-10% of forest cover, the amount of hedgerows and their connectivity did not increase the probability of dormice being present.
- Forest fragmentation had relatively little influence on the probability of dormouse presence.
- The probability of red squirrels occupying forest patches increased with the amount of forest available in the landscape and corresponds to a substantial increase when forest cover is >25%.

Key messages to landowners and managers derived from these results

- Maintain and plant new hedgerows to help improve connectivity between forest fragments as these are likely to increase dormice distribution within the landscape.
- If forest cover is low (5-10%), restoring habitat to increase the amount of forest cover within the landscape may be a more cost effective conservation measure in the short term than planting new hedgerows to increase connectivity.
- Where dormice are present, hedgerow connectivity via planting and maintenance should be conducted irrespective of the amount of forest cover.

Key words/phrases

Hazel dormouse; *Muscardinus avellanarius*; red squirrel; distribution; habitat fragmentation; landscape; structural connectivity; hedgerows; nest boxes; hair tubes