Europe's largest badger study finds rare long-distance movements

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Animal movement is a key part of population ecology, helping us understand how species use their environment and maintain viable populations. In many territorial species, most movements occur within a home range. Occasionally, however, individuals make long-distance movements.

Long-distance movements are important: they ensure that populations mix and do not inbreed, but they can also spread infection between populations. They are also rare, so long-distance movements are difficult to study and require large, long-term studies.

Because of their importance as a reservoir for bTB, badgers are a well-studied species. While we know a great deal about how badgers move in and around their home territories, very little is known about rare long-distance movements and nothing about how often badgers travel these long distances.

To answer these questions, scientists from Ireland and Canada studied badger movements for four years across a 755km2 area of County Kilkenny in the Republic of Ireland – the largest spatial-scale badger study of its type ever conducted in Europe.

Dr Andrew Byrne of University College Dublin, who led the research while at University College Cork, said: "To study these longer distance movements, a correspondingly large study area is required. And because very long-distance movements occur infrequently, a large sampling

effort is required to pick up such events."

Between 2008 and 2012, the team tagged and tattooed 963 badgers at their setts, measuring how far these badgers had travelled when they were next trapped. Although on average the badgers only dispersed 2.6km from their setts, five per cent of these movements were over 7.5km, and the longest recorded distance a badger travelled was 22.1km.

"These long-distance movements may be important for 'seeding' infection, if an infected animal moves to a TB-free location. Overall, long-distance dispersal of infected badgers may allow TB bacteria, *Mycobacterium bovis*, to survive and persist by finding new hosts despite disease control efforts," he explains.

The findings are important because better understanding of badger movements is essential when trying to model how infection is maintained and spread within badger populations. It is also essential when trying to design policies to tackle tuberculosis within cattle populations.

"These data could be used during the design of intervention strategies aimed at stopping the spatial spread of infection across badger populations. One approach could be to vaccinate badgers across a strip creating a 'cordon sanitaire' or a biological barrier to infected badgers immigrating into a disease-free area. Our data could be used to estimate an appropriate effective width for such a barrier," says Dr Byrne.

The authors recognised that population density could be an important factor affecting movement lengths. Looking at studies from across Europe, the authors found that study area size could have limited the ability to record rare long-distance movements, but there was tendency for shorter movements reported in high-density populations.

The movement study is part of a larger project investigating the impact of orally administered vaccination on bTB levels, funded by the Republic of Ireland Department of Agriculture. The study is now looking at the bTB status of the badgers that make long-distance movements.

"We now want to find out if badgers that make long-distance movements in this population are also those with a greater probability of being TB positive. If so, even though these events are rare, they could have a disproportionate effect on the spread of infection," he says.

More information: Andrew Byrne et al (2014) "Large-scale movements in European badgers: has the tail of the movement kernel been underestimated?", DOI: 10.1111/1365-2435.12126 , is published in the *Journal of Animal Ecology* on Friday 7 March 2014.

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