



CreatureFeature



Hair tube baited with peanuts.
Photo: Andrew Harrington

Waterford squirrels: the secrets revealed

By Andrew Harrington
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The red squirrel is one of our most charismatic mammal species, and probably one of the first pioneer species to arrive in Ireland with the return of woodlands after the last ice age, around 12,000 years ago. Sadly, though, the last few centuries have been a troubled time in Ireland for this delightful little animal due to human activity.

From complete extinction (or almost so) sometime between the late 1600s and 1800, caused by near-complete deforestation and hunting for fur, they bounced back by the early 1900s, helped by reintroductions and the gradual replanting of woodlands.

However, they were dealt another blow with the introduction of the North American grey squirrel in 1911, which has since pushed the red squirrel out of many parts of its former range in the east of Ireland due to competition for food.

Recently, the squirrel pox has also reared its head in some areas; it is carried by but is harmless to grey squirrels, but it kills nearly all reds which contract it.

In addition, although Ireland now has much more woodland than in 1800, much of it is periodically clear-felled, destroying squirrel habitat. Many

woodlands are also very fragmented, which can isolate squirrel populations, possibly leading to inbreeding and subsequent local extinction.

These issues have led to a slow decline of the red squirrel, with a serious contraction of its range in recent decades, so that the red squirrel is now listed as "near threatened" in Ireland by the National Parks and Wildlife Service and has been a protected species here since 1976.

Welsh research partners

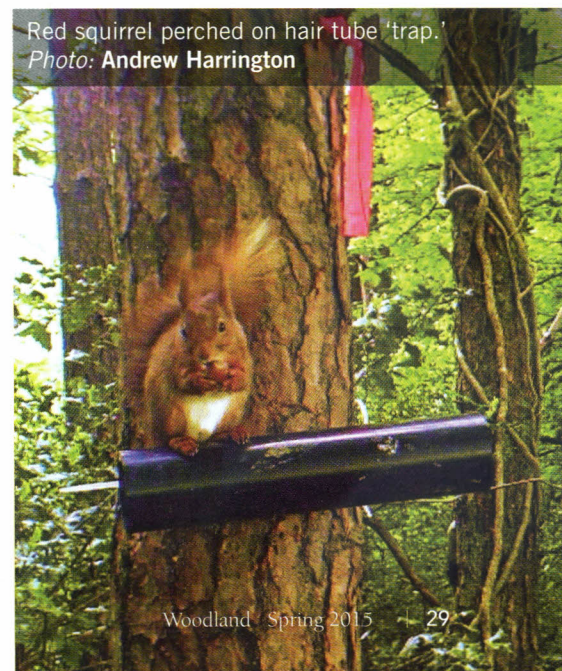
Because of the red squirrel's precarious situation it was included as one of the target mammal species for the **Mammals in a Sustainable Environment** (or MISE) project. This mammal conservation project, part-funded by the European Regional Development Fund through the Ireland-Wales Programme (Interreg IVA), brings together Waterford City and County Council, Waterford Institute of Technology and the National Biodiversity Data Centre in Ireland, and the Vincent Wildlife Trust, Natural Resources Wales and Snowdonia National Park in Wales. The basic idea of the project is to bring together the expertise of mammal ecologists, DNA technology and members of the public and community groups as volunteers, to carry out surveys and practical conservation work that will benefit vulnerable mammal species.

The MISE project's red squirrel work in Ireland has focused mainly on the red squirrel population in Waterford as there was very little known about their distribution there, or to what extent greys

had invaded, when we began this work in 2011; we assumed that the same pattern of the invasion of greys would be seen in Waterford.

Both of these questions are important starting points in assessing the future prospects for the red squirrel here. To do this, we first had to carry out surveys across Waterford to find out where both species occurred. It is relatively easy to find signs that squirrels are present in a woodland as they leave behind remains of the food they have been eating – usually hazelnut shells or conifer cones, which they gnaw to get at the seeds, leaving distinctive marks on them. However, it is impossible to tell which squirrel species has done the gnawing, let alone more detailed information on the squirrel population. Spotting

Red squirrel perched on hair tube 'trap.'
Photo: Andrew Harrington





Greys largely absent

We also discovered that although grey squirrels are present in County Waterford, they are currently mainly limited to a handful of small pockets along the River Suir on the northern and eastern border, probably originating from the larger grey populations in Kilkenny and south Tipperary. While these populations could pose a threat, they seem to have remained very small since they first appeared in the last 15 years and haven't rapidly expanded and pushed out red squirrels, as grey squirrel populations elsewhere usually do. It's unclear why greys haven't really taken off in Waterford, but recent research from NUI Galway suggests that an increase in the number of pine martens in the midlands in recent years has caused a grey squirrel population crash and the return of red squirrels there. Waterford has a healthy pine marten population, unlike many other areas, so it is possible that their presence here has prevented any major expansion of grey squirrels up to now.

By using "citizen science" with the help of our volunteers and the application of DNA technology, we now have far more information than before on the state of Waterford's red squirrel population and the scale of the challenges it faces, in an approach that could be used elsewhere in the country. The threats posed by grey squirrels, habitat loss and inbreeding still exist, but they do not seem as insurmountable as before, as our results and other research seem to suggest, and we now have the information needed to begin to tackle these challenges for the future conservation of Waterford's red squirrels.

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Pine cone stripped by red squirrel.
Photo: Andrew Harrington



squirrels themselves can be difficult, and although it is possible, it takes luck and persistence to find them.

Therefore, we had to use other methods to gain more information on the squirrels in our survey sites. Instead of trapping them, which requires licensing and is time-consuming, it is possible to attract squirrels to bait stations wired to the trunk of a tree. These "hair tubes" simply consist of a short section of drainpipe baited with hazelnuts and maize or peanuts and a little patch of glue placed just at the mouth of the tube. When a squirrel visits the tube, it has to poke its head inside to take the bait, snagging some of its fur on the glue patch, which we can collect later, unknown to the squirrel.

Once we have collected fur samples from our hair tubes, we subject them to a series of DNA tests, developed in WIT, which can give us information which wouldn't be available otherwise. This can tell us not only what species of squirrel visited each hair tube but, with DNA fingerprinting, it can identify different individual squirrels which have visited the tube. If we deploy several tubes in a wood for several weeks, we can build up a picture of the population of squirrels in the area, even getting an idea of the genetic diversity present in the local population and what the risk of inbreeding is.

Volunteers help with survey

With the help of a small number of dedicated volunteers, the MISE team has carried out fieldwork across much of County Waterford. Together with squirrel sightings submitted by the public to the NBDC mammal atlas project, this has given us some idea of how the red squirrel population in Waterford is faring. Red squirrels appear to be still widespread across the entire county (unlike some other parts of Ireland) and although their population density in any one survey site is relatively low, this is not unusual for red squirrels.

Although the red squirrel populations in Waterford generally appear not to be very genetically diverse, which could put them at risk of inbreeding in some isolated woodlands, we have discovered one apparent "hotspot" of red squirrel genetic diversity. This hotspot, located in a large expanse of old native woodland in the heart of the Comeragh Mountains, is of special importance as a source of diversity that can maintain the genetic health of the red squirrel population of the area as a whole into the future. A survey of squirrel habitat in Waterford showed that most of the county's woodlands are well connected, allowing for red squirrels to migrate, interbreed and avoid inbreeding, which is good news.