



NISF - Trees for Red Squirrels





Northern Ireland Squirrel Forum

Trees for red squirrels

The purpose of this document is to inform the landowner on the selection of appropriate trees and shrubs for planting in a range of settings, including gardens, parkland and farm woodlands, in order to help conserve local populations of red squirrels.

The tables and figures within this document have been adapted from a Forestry Commission Scotland Practice Note - Managing forests as red squirrel strongholds (2012).

- Dr. Jon Lees, Secretary to the Northern Ireland Squirrel Forum, August 2015.

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Plate1. Red Squirrel (C. Cassidy)



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Squirrel distribution in Northern Ireland

Squirrel surveys from the 1990s have consistently shown the expansion of the range of the grey squirrel throughout every county in Northern Ireland. Figure 1 shows the distribution of the red and grey squirrel throughout Northern Ireland based on recorded observations from 2000-2014. The distribution of the pine marten is also shown, because recent research suggests that the pine marten may be a limiting factor in the spread of the grey squirrel by not only preying on the greys but through disruption of their feeding and breeding. Further detail and up to date mapping is available on the Centre for Environmental Data and Recording (CEDaR) website: <http://www2.habitas.org.uk/records/maps>

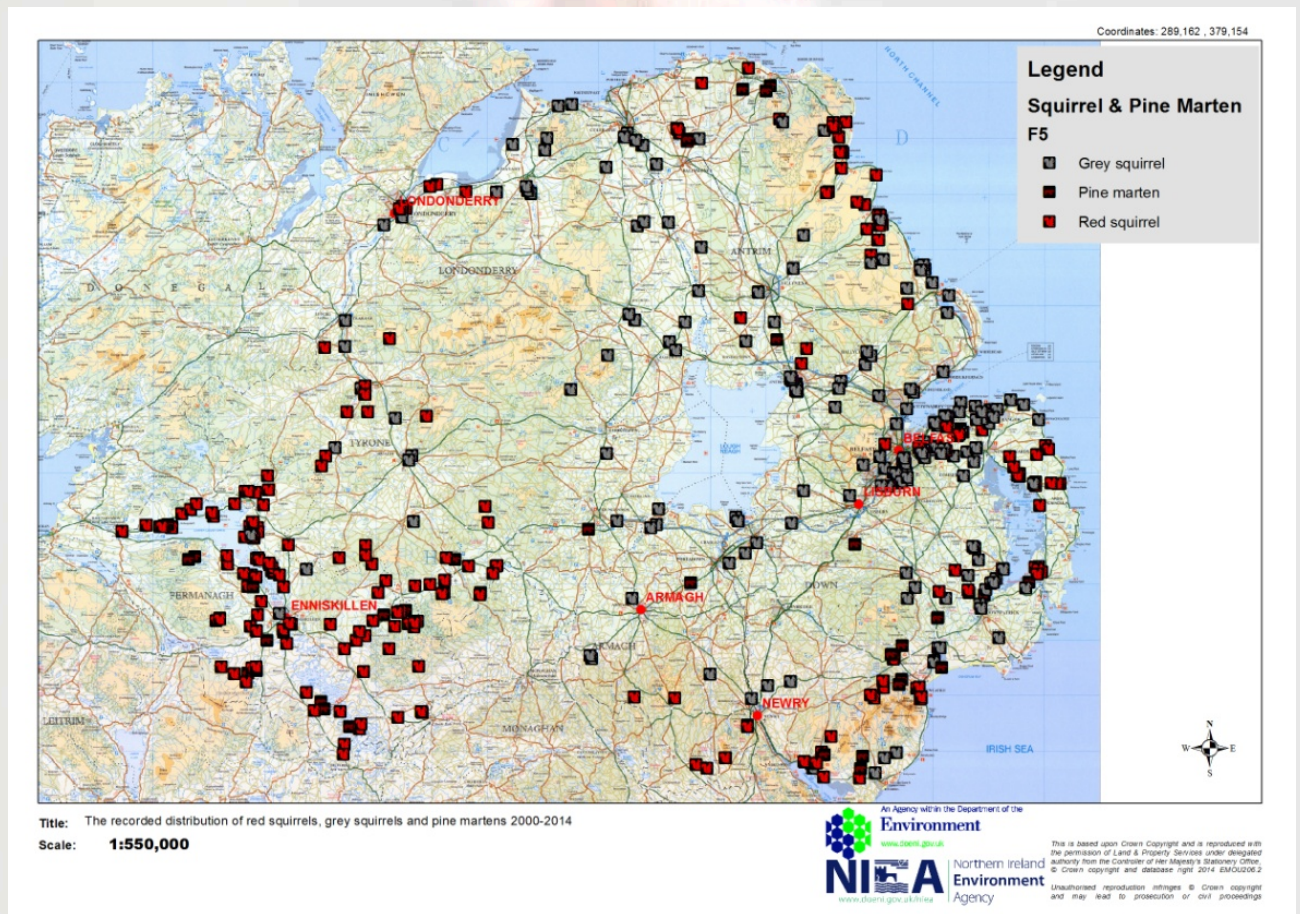


Figure 1. The recorded distribution of the red and grey squirrel and pine marten in Northern Ireland 2000-2014



Plate 2. Red Squirrel (M. Hamblin),
front cover image also by M. Hamblin.



Plate 3. Banagher Glen, Co. Londonderry
(NIEA)

Dispersal characteristics of red and grey squirrels

Both species of squirrel are predominantly tree dwelling, but they will venture onto the ground to feed or to cross open areas on occasion. Grey squirrels tend to live at higher densities than reds, and they are 'more adventurous' spending greater proportion of time on the ground, ranging greater distances, across more diverse habitats they appear more comfortable in open spaces. The greys will typically extend their range by moving along narrow woodland strips, such as river corridors, or utilise mature hedgerows to travel between larger woodlands and parkland.

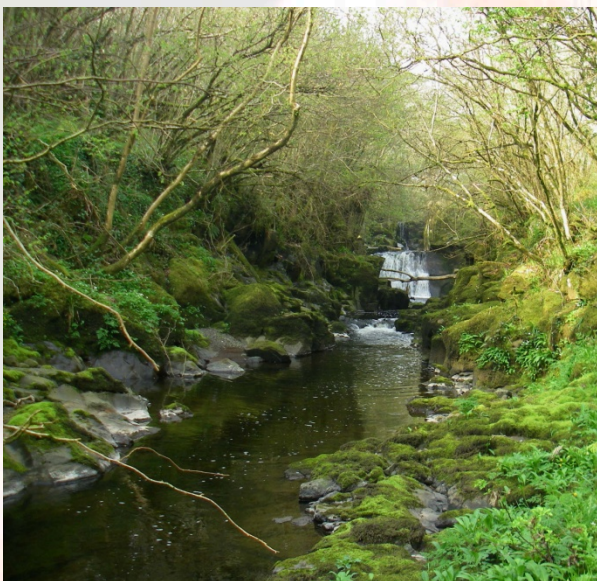


Plate 4. Glenarm River; river corridors often provide routes for squirrels to travel great distances. These tree lined 'highways' are widely used by grey squirrels as dispersal routes and on sites where grey invasions are a risk these routes should be monitored. (NIEA).



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By contrast, in the UK and Ireland the 'shyer' red squirrels are reluctant to use hedgerows, parks and gardens to find new territories, which can limit their dispersal, although in mainland Europe red squirrels are often found in public parks. This reluctance to disperse may lead to the demise of local populations once the food supply is exhausted.



Plate 5. Largalunny, Co. Fermanagh. Pockets of forest surrounded by heath may inhibit red squirrel movement if the distances between patches is too great, however the isolated conifer plantations provide habitat for reds which are less favourable to the greys. (NIEA)



Coordinates: 334,218 , 332,275



Title: **Tollymore Forest Co. Down**
 Scale: **1:19,696**



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Figure 2. The habitat surrounding a forest containing red squirrels will play a major role in the future survival of those red squirrels. For example in Tollymore Forest shown above there are distinct benefits and risks for the site. The upland heath may restrict grey squirrel movement from the south, but it will also prevent red dispersal. Urbanisation benefits grey squirrels, so connectivity with gardens etc should be avoided. Creating corridors toward neighbouring forests can be beneficial providing those woods are free of greys, but if the reds have to cross busy roads then this may require management solutions.

Competition.

Grey squirrels have the ability to out-compete red squirrels in broadleaved woodland by their ability to thrive on tannin-rich large seeds such as acorns long before they would be considered ripe and palatable by the reds, (Gurnell *et al.*, 2004; Kenward *et al.*, 1998).



Plate 6. Grey Squirrel (J Lees).



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This has frequently resulted in red squirrel displacement from broadleaved woodlands, pushing them into the marginal habitat found in coniferous forests.



Plate 7. Red Squirrel eating fungi (Michael Ryan)

Red Squirrel diet

The produce from trees and shrubs form a large part of a red squirrel's diet. This may take the form of berries, seeds, bark, sap, buds, tree flowers and catkins. Figure 3 (adapted from Forestry Commission Scotland (2012) provides a breakdown of the range of food available during the year to the red squirrel from trees or shrubs). It highlights the requirement for a broad range of seasonal food stuffs, with a dependency on broadleaved seeds and cones from conifers, particularly in winter.

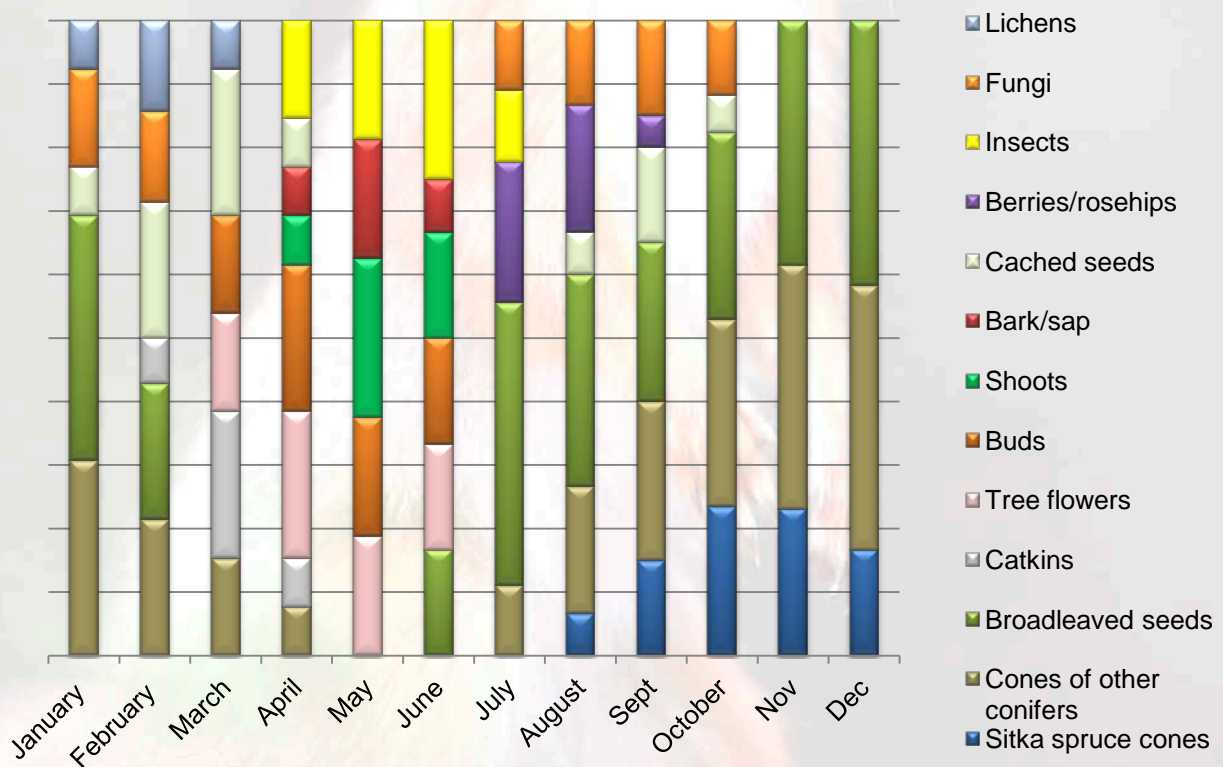


Figure 3. Components of the red squirrel's diet

Seed production rates of tree species commonly found in Ireland

There is considerable variation between the quality and quantity of seed crops produced by tree and shrub species which will be influenced by age structure of the plants, local climate, light levels, and soil conditions. This is particularly noticeable with conifer species, where several poor years of seed production can reduce the viability of an isolated red squirrel population. Additionally there is a considerable lag between planting and the first 'good' seed (or mast) crop, which is clearly shown in Table 1 below.



Plate 8. A squirrel nibbled conifer cones stalk (D.McAfee).



Plate 9. A field adjacent to some red squirrel habitat in the Glenarm, County Antrim, this land has high potential to revert to woodland, either through natural regeneration or land management. Take advice from the NIEA if the land falls within or as adjacent to an ASSI. (NIEA)



| Tree species | Age to 1 st 'good' seed crop (years). | Average interval between 'good' crops (years). | Period that seed is available to squirrels. |
|---|--|--|---|
| <p>Scots pine</p> <ul style="list-style-type: none"> ▪ retains cones and seeds until the following summer, provides food supply in cone failure years for other species ▪ crucial component in forests dominated by SS | 20-25 | 2-5 | June – late spring (Two-year seed maturation cycle) |
| <p>Lodgepole pine</p> <ul style="list-style-type: none"> ▪ holds cones for over 12 months and coning is less erratic than in SS and NS. ▪ provides a dependable food supply in cone failure years for SS and NS | 20-25 | 2-3 | July – late spring (Two-year seed maturation cycle) |
| <p>Sitka spruce</p> <ul style="list-style-type: none"> ▪ less preferred food source ▪ tends to shed most of seeds from cones in first 4 months after maturing in September, ▪ cone production fluctuates dramatically between years ▪ in SS plantations alternative food supplies should be available (see NS and SP). | 30-35 | 3-5 | August to January |
| <p>Norway spruce</p> <ul style="list-style-type: none"> ▪ preferred species for dreys ▪ cone production fluctuates dramatically between years, ▪ provides abundant food in high mast years ▪ crucial component for red squirrels in forests dominated by SS ▪ cones ripen later than SS and most seed is shed the following spring ▪ caution - masting in NS and SS tend to be synchronous so include an alternative food supply such as larch | 30-35 | 3-11 | August to late spring; in years of mast crops seed available for > 12 months |
| <p>Larch</p> | 20-25 | 3-5 | July – following spring (Important food plant in years of low pine and spruce seed) |



| | | | |
|--|-------|-----|--|
| | | | crops) |
| Douglas fir ▪ useful to provide a continuity of seed | 30-35 | 4-7 | September onwards |
| Western Red Cedar | 10-15 | | Ripe brown cones open in Autumn |
| Noble Fir | 40-50 | | Seeds release from cones in Autumn. |
| Ash | 25-30 | | Squirrels may eat catkins in early spring. Keys appear early spring but probably not palatable to red squirrels until seeds turn brown mid-summer. |
| Birch | 20 | | Squirrels may eat catkins in early spring. |
| Rowan | 15 | | Late Autumn/Winter |
| Alder (common) | 15-20 | | Pollen and catkins in Spring which mature in to seed cones which disperse seed in winter. |
| Yew | 40-50 | | Berries are ripe late summer and early autumn |

Table 1. A comparison of seed production characteristics of common tree species

Tree species selection

The appropriate selection of tree and shrub species for red squirrel conservation will be influenced by those species that contribute most significantly to a red squirrel's diet, the amount of seed produced, and the interval between good seed years. In addition, careful consideration must also be given before selecting a species favoured by grey squirrels when planting hedgerows or farm woodlands to avoid creating an incursion route for greys into nearby red squirrel habitat.



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It is also vital to match the selected tree species to the soil type, with consideration given to elevation, exposure to wind, sea spray and protection from browsing mammals. This should result in healthy trees growing vigorously and producing copious quantities of seed within the time spans indicated in Table 1.

The selection of tree species in or close to woodlands inhabited by red squirrels can have implications for the long term survival of localised populations of the red squirrel. In Table 2 below, commonly planted or naturalised tree/scrub species have been classed as '**Favourable**', '**Useful**', '**Neutral**' or '**Unfavourable**' for red squirrel conservation. Tree species are classed as '**Favourable**' if they provide a valuable source of food for the red squirrel with secondary resources classified as '**Useful**'. Although some of species considered '**Unfavourable**' may also provide the red squirrel with food, they are also a strongly favoured source of food for the grey squirrel therefore they are classified as '**Unfavourable**' only in the context where greys are present or likely to colonise the area. Other species are classified as '**Neutral**' as they contribute little to the red squirrel's diet but neither are they of benefit to grey squirrels.

| Favourable | Useful | Neutral | Unfavourable (unless greys are totally absent) |
|---|--|---|--|
| Douglas fir Larch (all types) Corsican Pine Scots Pine* | Bird cherry* Blackthorn* Dog rose* | Alder* Ash* Aspen Birches* | Beech Chestnuts Hazel* Sessile Oak* Pedunculate Oak* Sycamore |
| Lodgepole Pine Norway Spruce Omorika Spruce Yew* Crab apple* Sitka spruce# | Hawthorn* Wild cherry* Wych elm* Sitka Spruce | Cypress Grand Fir Noble Fir, Silver Fir Holly* Juniper* Rowan* Western hemlock Western red cedar Willow Spp.* Lime Whitebeam | |

Table 2. The relative merits of tree and shrub species to red squirrel conservation. * Tree and shrub species native or originally native to Ireland are highlighted with an asterisk.

Although Sitka spruce is classed as a favoured tree, plantations consisting primarily of this species may be clear felled prior to the seed becoming palatable to the red squirrel.



Red squirrels will utilise broadleaf woodland where grey squirrels numbers are very low or absent; Kenward (1993) showed that in woodland with greater than 14% oak canopy, red squirrels are unlikely to persist if grey squirrels are present. However, according to Dunphy (2010), the red squirrel has a competitive advantage over the grey squirrel in conifer plantations with a low proportion of large-seeded broadleaves.

Tree diseases

There are currently planting restrictions on some of the favourable tree species shown in Table 2. The planting of European, Japanese and hybrid larches is not recommended due to the risk of infection by the fungus *Phytophthora ramorum*, although among the larches, European larch appears to have a higher level of resistance, it can act as a sporulating host and should not be planted. Corsican pine is not recommended for planting either, due to the risk of red band needle blight. There are restrictions on the movement of ash for planting due to outbreaks of Ash die-back disease in a number of European countries.

Planting considerations

Any future planting must be planned carefully taking the following into consideration -

- Plant a wide range of tree and shrub species, so that in a poor mast year for one species, the red squirrel still has an opportunity to obtain sufficient food.
- Ensure that new planting does not provide an incursion route for the grey squirrel into existing woodlands inhabited by red squirrels by selecting tree and shrub species carefully.
- If tree planting includes species which are a favoured food source of the grey squirrel, then grey squirrel control will be required for up to 40 years to protect these trees from damage. Research by Lawton 2003 indicates that in Ireland, sycamore and beech are most susceptible, followed by willow, alder, elm and hazel. Mayle *et al* 2007 also include oak in the list of 'most susceptible' to squirrel damage. If sustained control is not carried out, then nearby red squirrel populations will be more vulnerable to displacement by grey squirrels and squirrel pox disease.
- Consult neighbouring landowners to create a larger area of tree and shrub species beneficial to red squirrels. Linking new woodlands will enhance the contribution of small woodlands to red squirrel conservation.
- Consider the impact of any new planting planned within 3km of a known red squirrel forest

Other sources of information

Forest Management - The principles of managing large forests inhabited by red squirrels are included in the Forestry Commission Scotland publication 'Managing forests as red squirrel strongholds'. The value of a diverse age structure and the



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relative merits of the most commonly planted tree species for red squirrels are discussed in detail.

The possible impacts of climate change on the selection of tree species and the balancing of management objectives which have the potential to conflict with red squirrel conservation are also considered in this publication.

Supplementary feeding - will help red squirrels in times of food shortages. More information on the NIEA website:

<https://www.daera-ni.gov.uk/publications/squirrel-feeding-station-and-trap-hygiene-guidelines>

Grey squirrel control - Grey squirrels have the potential to damage trees - advice on legal and effective control measures is available on the NIEA website: <https://www.daera-ni.gov.uk/publications/control-grey-squirrels-red-squirrel-conservation-code-practice>

Squirrel pox - information on this disease which is fatal to red squirrels is available on the NIEA website: <https://www.daera-ni.gov.uk/articles/squirrel-pox-and-other-squirrel-diseases>

Advice on the re-planting of forests felled due to *Phytophthora ramorum*: [http://www.forestry.gov.uk/pdf/FCReplantingrecommendations.pdf/\\$FILE/FCReplantingrecommendations.pdf](http://www.forestry.gov.uk/pdf/FCReplantingrecommendations.pdf/$FILE/FCReplantingrecommendations.pdf)

<https://www.daera-ni.gov.uk/articles/phytophthora-ramorum>

The Northern Ireland Squirrel Forum was established to bring together statutory and non-statutory organisations as well as representatives of country parks, private landowners and local volunteer organizations dedicated to protecting the red squirrel in Northern Ireland. <https://www.daera-ni.gov.uk/topics/bio-diversity/northern-ireland-squirrel-forum>

Grants and subsidies

If you are improving or expanding an existing woodland, or creating new areas of woodland there may be grant aid available to assist you, subject to conditions.

<https://www.daera-ni.gov.uk/topics/forestry-grants-and-funding/forestry-grants>

The Woodland Trust are also a good source of advice and support for those wanting to create or improve woodland especially for nature conservation.

<http://www.woodlandtrust.org.uk/plant-trees/trees-on-land/>



Useful information

Tree spacing and density

It is very important to plant your new trees at the correct spacing to ensure they establish themselves quickly without competing with each other too much. Some competition is, of course, beneficial as it will cause the canopy to close more quickly, exclude sunlight from the ground which, in turn, prevents weeds from growing vigorously. This will also begin to provide the right conditions for the plants that we want to encourage amongst our trees - primrose, bluebell, wild garlic, etc. To this end we would suggest ~2m spacing between trees.

For rectangular areas

If you have an area 50m by 40m, that would be 2000m². To give us 2m between trees we just halve the edge dimensions - the 50m and 40m. This gives us 25 trees by 20 trees, or 500 trees.

For irregular areas

The same can be done for irregular shapes if you know the area. For 560m² we need to find the square root of this number (a calculator will be needed by most of us!). This gives us 23.7, which we halve to 11.85. All we do now is round it up to 12 and multiply this by itself - 12 x 12 = 144 trees.

Adapted from The Conservation Volunteers <http://www.tcv.org.uk/>

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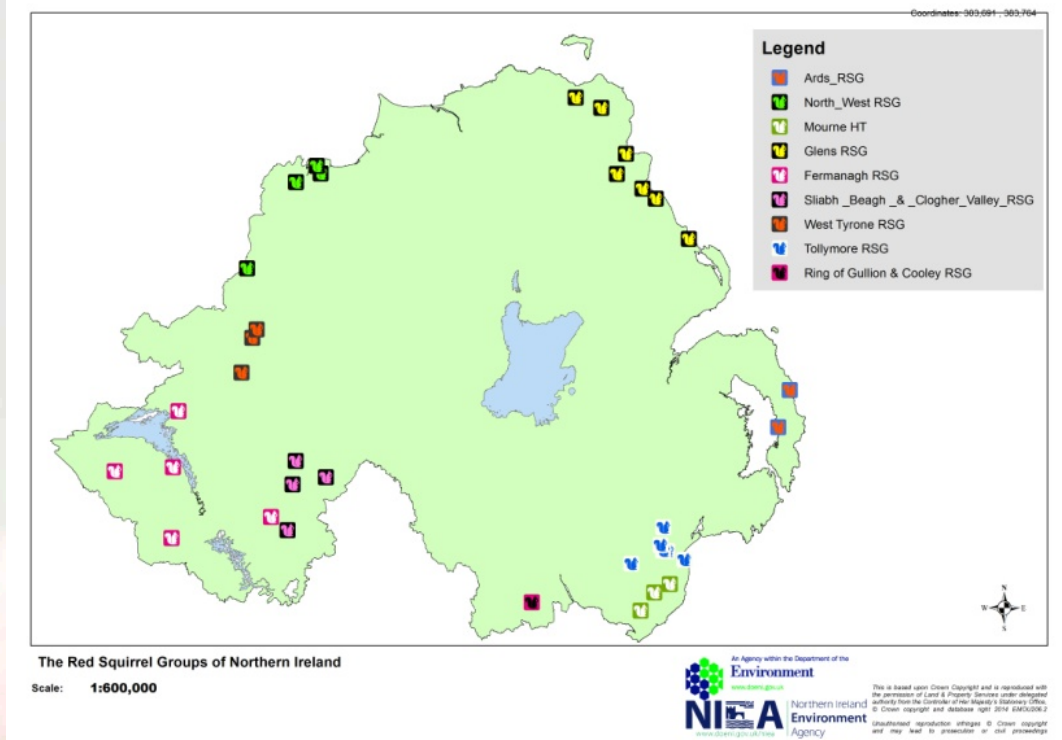
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<https://www.daera-ni.gov.uk/articles/red-squirrel-groups-northern-ireland>