



Ulster Wildlife
Squirrel and pine marten presence/absence survey
2019 report



1. Introduction

Red squirrel (*Sciurus vulgaris*) populations are threatened across the UK and Ireland by the invasive grey squirrel (*Sciurus carolinensis*). In Ireland the grey squirrel was originally introduced in 1911 in Co. Longford from North America. Since then it has spread throughout the island of Ireland leaving only a few areas in the west untouched (Carey *et al.* 2007).

The grey squirrel is a threat to the red squirrel due to competition and its ability to take advantage of food resources the red squirrel cannot (Wauters *et al.* 2000, 2002; Gurnell *et al.* 2004). This means the red squirrel is driven out of these habitats in search for resources elsewhere. In figure 1 you can see that this pattern is repeated throughout Great Britain and the island of Ireland.

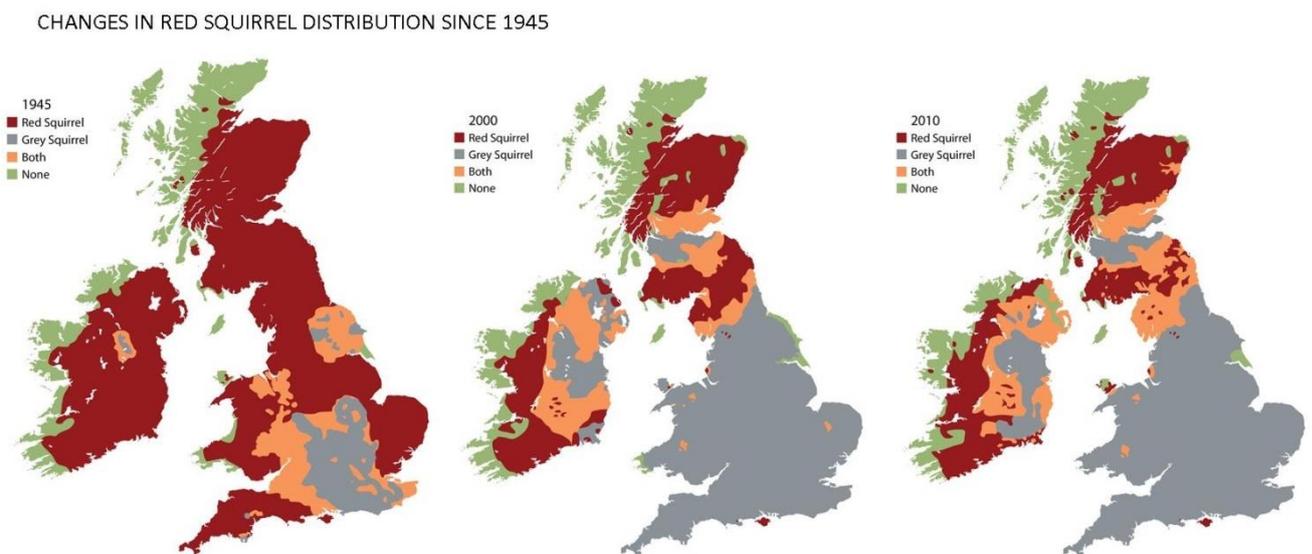


Figure 1. The distribution of grey and red squirrels from 1945 through to 2010.

The grey squirrel can carry the Squirrel pox virus which is infectious to red squirrels causing lesions around their eyes, mouth and genitalia eventually leading to a slow death from starvation. This virus can kill a red squirrel within 2 weeks (Rushton *et al.* 2006).

It is very beneficial to analyse the location of both squirrel species to aid red squirrel conservation. Not only does this help current projects and volunteer groups target their conservation efforts strategically and use resources in the most efficient way, it also adds to

known databases of these species for researchers to further study the effect an invasive mammal is having on a native species in a very similar ecological niche. In recent studies, it has been suggested that the pine marten may influence the abundance and density of grey squirrels. Sheehy and Lawton (2014) suggested that the recovery and subsequent population increase of pine marten (*Martes martes*) has depressed or removed Grey Squirrels in certain parts of Ireland. Sheehy et al. (2018) demonstrated a similar process in parts of Scotland.

Furthermore, with the disappearance of Grey Squirrels, Red squirrels have frequently recolonised (without translocations or captive bred releases) woodlands deserted for decades. Previous surveying by Dr Dave Tosh (Queen's University Belfast) and anecdotal reports suggested that Grey Squirrel populations might have collapsed in certain parts of NI such as Fermanagh. Due to this apparent relationship between Pine Marten/ Grey Squirrel/ Red Squirrel, the presence and absence of pine marten was deemed to be important and was monitored in addition to the two squirrel species in this survey. This will provide data to inform the development of a Red Squirrel Strategy for NI and in evaluating the impact of conservation efforts.

2. Survey sites and method

This survey directly follows on from the survey conducted by Dr. Dave Tosh in 2014/2015. The sites initially selected for the survey were based on the 348 sites that were visited in 2014/2015 (figure 2; left picture).

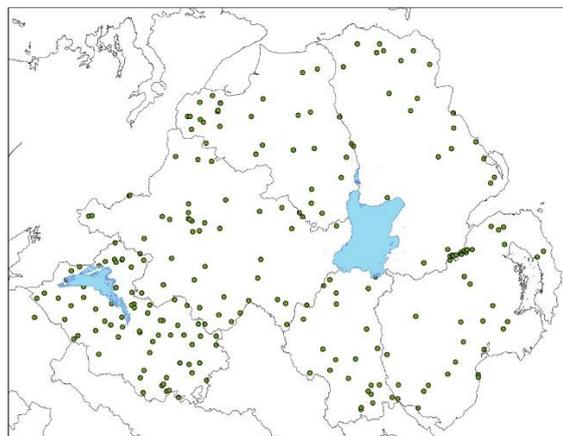


Figure 2. Distribution of possible survey sites taken from 2014/2015 survey on left (n=348)

In 2017/18 the aim of this survey was to cover a minimum of 150 woodlands over the 6 counties of Northern Ireland. This total was selected due to the number of sites holding a

licence agreement with Forest Service which provided access for surveying and the equipment available at the start of the survey period. It is worth noting that all 3 of the target species widely occur beyond the Forest Service estate in areas such as private woodlands, gardens and public parks.

During 2019, the approach and methodologies were refined for two main reasons.

1. 2019 marked the final year for the Red Squirrel United (RSU) project and a conscious decision was made to encourage local Red Squirrel Groups to take a greater role in the implementation of the survey. Additionally, the survey was completed with reduced staff resources to supplement volunteer effort.
2. 2019 also saw the concurrent completion of the All Ireland Squirrel Survey on a 32 county basis (a partnership between National Parks and Wildlife Service, Ulster Wildlife, National University of Ireland Galway and Vincent Wildlife Trust). This survey collected public sightings of red and grey squirrels (and pine marten) through web portals operated in both jurisdictions.

As a result, the RSU survey in 2019 includes both camera trapping data (as in previous years) and also incorporates unstructured sightings (as in the 2019 All Ireland Squirrel Survey). All data collected by the RSU survey also fed into the dataset for the 2019 All Ireland Squirrel Survey.

Sightings which were gathered by camera trapping in 2019 followed the protocol used during the 2017/18 survey period. Volunteer fieldworkers were asked to place camera traps and squirrel feeders in forests for 7 to 14 days using the following protocol:

1. Find two trees that are no more than 5m apart (5 to 7 paces)
2. Attach **feeder** to **SOUTH** facing side of tree at head height. The higher a feeder is attached the more it should attract red squirrels.
3. Ensure the feeder contains sunflower seeds and that it is no more than half full.
4. Put sunflower seeds on the ledge of squirrel feeder, on the roof and on the ground around the feeder. This should help attract animals.
5. Attach camera to a tree opposite the feeder also at head height. Ensure that **camera** is **NORTH** facing to stop sunlight from obscuring any images.
6. Attach camera to tree using webbing first. Then attach using cable ties.
7. Ensure feeder can be seen by camera. Do this by either putting a stick where the camera lens is and checking the direction it is pointing OR take a photo from the lens of the camera trap with a camera/phone.

8. Once camera is attached to tree securely switch the camera on.

A 7-14 day survey period window gave volunteers and staff enough leeway that if the weather was unsuitable to collect the camera, they could revisit in the following week. In other similar studies it has been found that 7-14 days is a suitable survey period to allow squirrel species to find the feeder. RSNE in 2015 found that 82% of red squirrel populations and 77% of grey squirrel populations found the feeder within the first 5 days of the feeder being installed. This increased to 93% and 91% for red and grey squirrel populations in the next 5 day period. The previous survey in NI found that 85% of red squirrel populations and 97.5% of grey squirrel populations found the camera within the first week. Leaving the camera and feeder out any longer could potentially find smaller populations, but increases the risk of the camera being stolen and reduces the amount of woodlands that could potentially be surveyed.

The bait provided for the feeders was sunflower seeds. This bait was deemed suitable as it attracted both squirrel species and pine marten, it is not an allergen like peanuts, it is relatively cheap, and will limit the attraction to what is in the local area.

The settings for the majority of the cameras were set to take still photos at 5M pixel resolution and the capture number of the picture was set to 2 (so that every time the camera was activated the camera would take 2 pictures). The interval between the camera being activated and photographs was 20 seconds and the sensor level was set to automatic.

Every volunteer was equipped with a feeder, Virkon and a spray bottle to disinfect the feeder and their boots. They were also provided with rubber gloves to wear while using Virkon to protect their hands.

3. Results

3.1 2019 results

During 2018 & 2019 Ulster Wildlife did not run a marketing campaign to attract volunteers for the survey due to oversubscription of volunteers in relation to available equipment. Volunteers in 2019 were drawn from the previous cohorts or individuals that had heard about the survey through local squirrel groups. In addition, the publicity surrounding the All-Ireland Survey attracted some new recruits.

The volunteers were asked to leave the camera traps out for 7-14 day as the preferred option. Additionally, due to the all Ireland sightings survey some volunteers decided to submit sightings without camera trapping data.

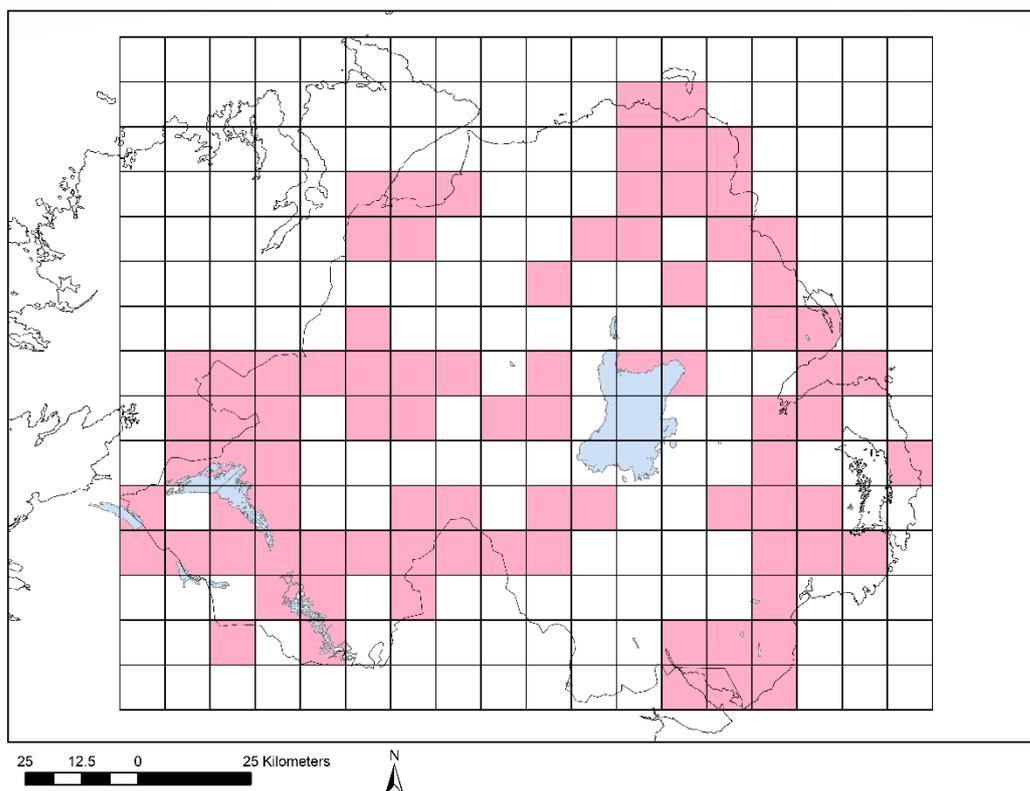


Figure 3 Coverage in 10km² squares of the 2019 survey (pink square include at least one sighting in that square). Sightings were received from all six counties in NI

Species maps 2019

During the survey, red squirrels were recorded in every county apart from Co. Armagh, which had the lowest level of survey volunteers.

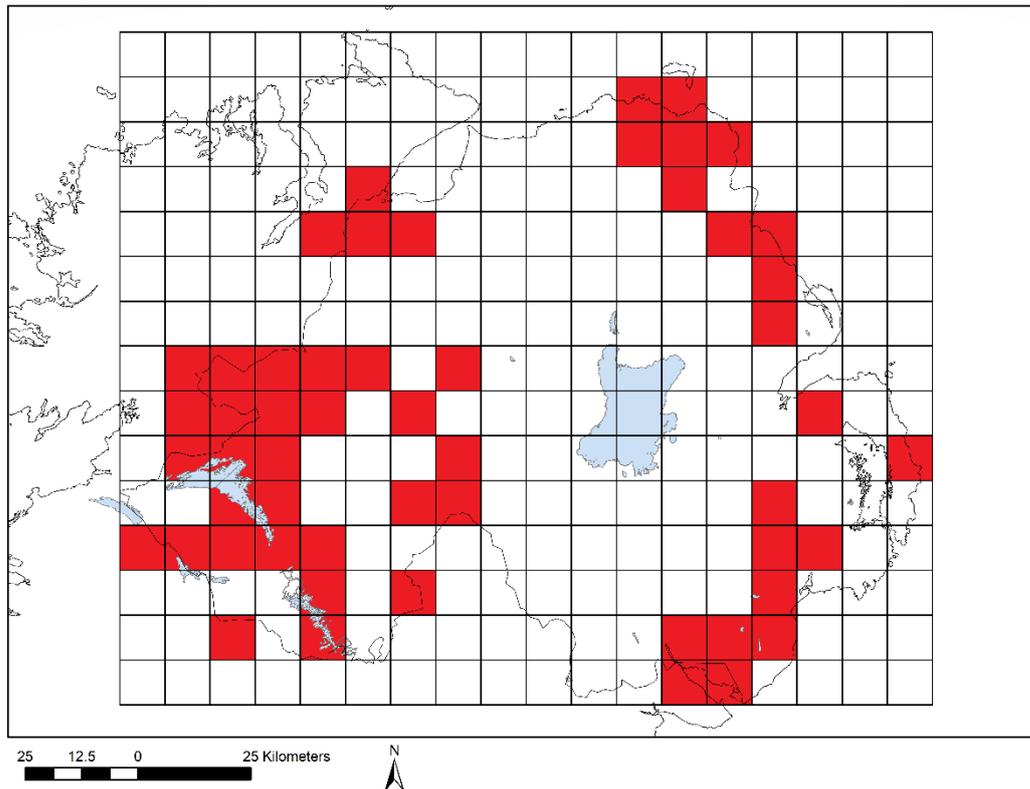


Figure 4. The 10km² squares which contain at least one record of a red squirrel during the 2019 survey period.

The distribution of red squirrel sightings recorded in 2019 clustered around the four key areas, which were targeted for RSU activity namely Fermanagh and West Tyrone, north/ mid Antrim, south Down and the Derry/Londonderry City area. In total Red squirrels were recorded in 53 10 x 10 km squares across the six counties, with more than 52% of all squares with red sightings occurring in Counties Fermanagh and Tyrone (28/53). The other main clusters of sightings came from south/ mid Down, north/ mid Antrim and Derry City/ environs. The number of squares with red sightings in 2019 (53) was slightly larger than the 50 squares in 2018.

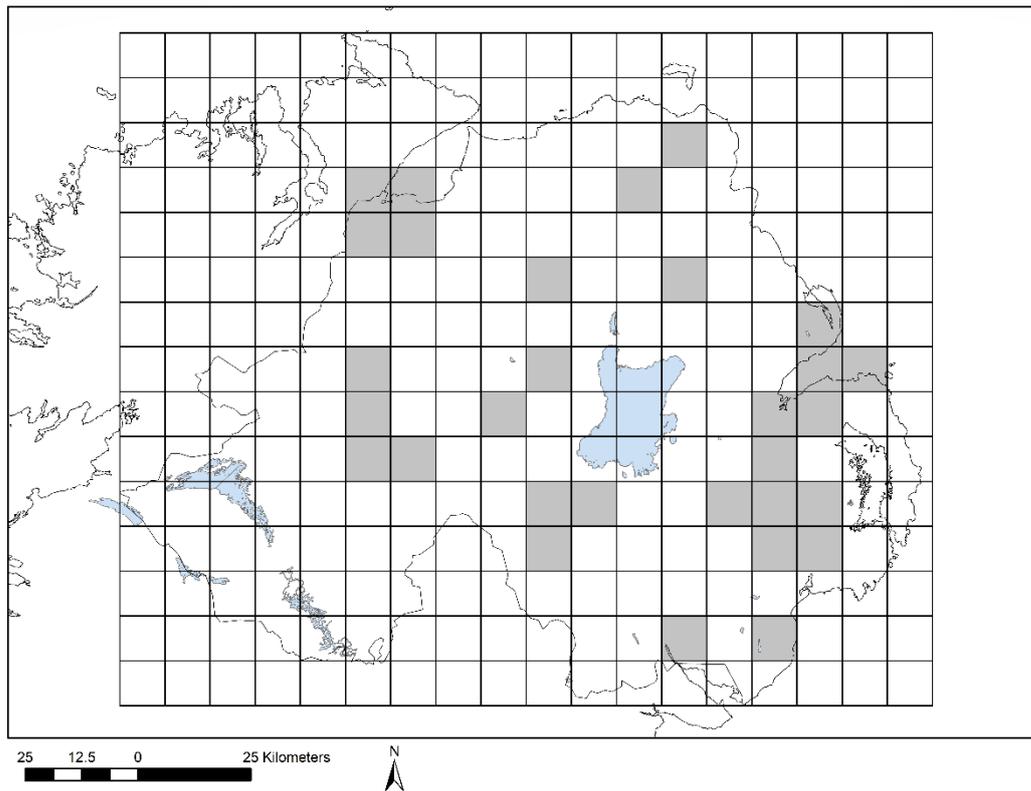


Figure 5. The 10km² squares which contain at least one record of a grey squirrel during the 2019 survey period.

During 2019 Grey Squirrels were recorded in 30 10km² squares across NI. The only county in Northern Ireland with no grey squirrel sightings in the 2019 (as in the 2017/8 surveys) was Fermanagh. Greys were recorded in all other counties with 40% (12/30) squares with sightings occurring in Co. Down. Elsewhere sightings occurred widely across the other counties, although somewhat localised in Co. Tyrone (around Foyle catchment and east of the Sperrins).

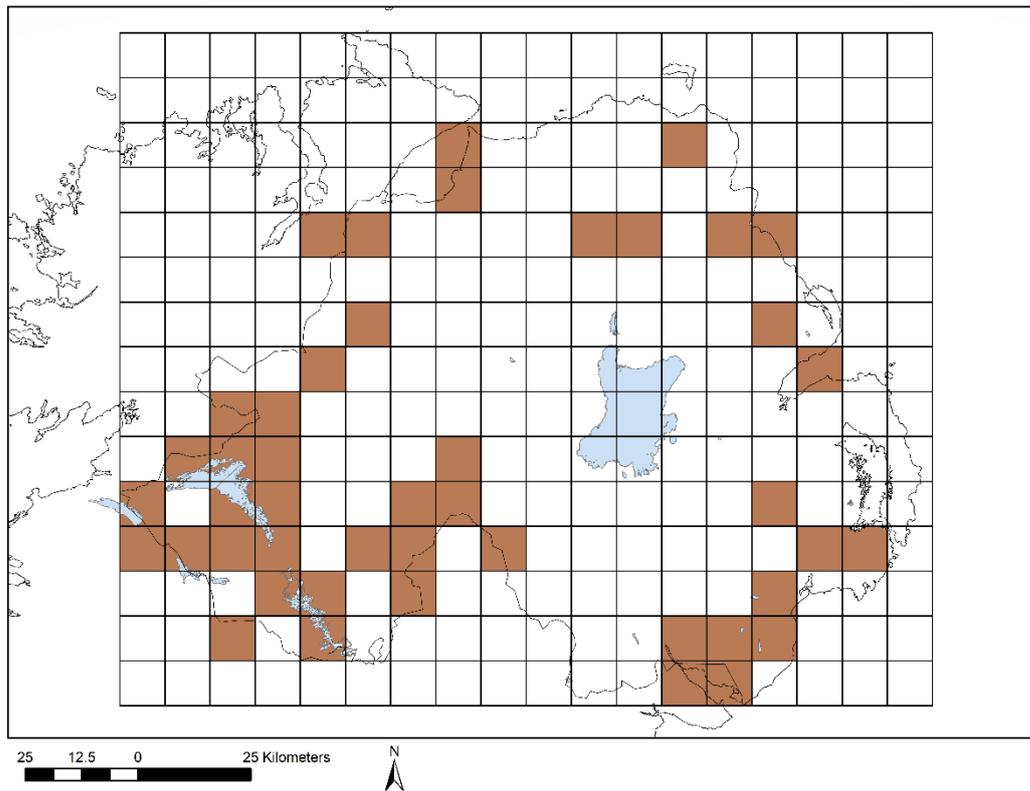


Figure 6. The 10km² squares which contain at least one record of pine marten during the 2019 survey period.

Pine marten were found in every county, although very likely to have been under recorded in Co. Armagh due to lower survey effort. More than 55% (25/45) of squares with Pine Marten sightings recorded during 2019 occurred in Fermanagh and Tyrone. During 2017 no pine marten were found in Co. Derry, but during 2018 pine marten were recorded in 2 squares and during 2019 Pine Marten were found in 3 squares (not the 2018 sites) with another site immediately adjacent to Derry City in Co. Donegal.

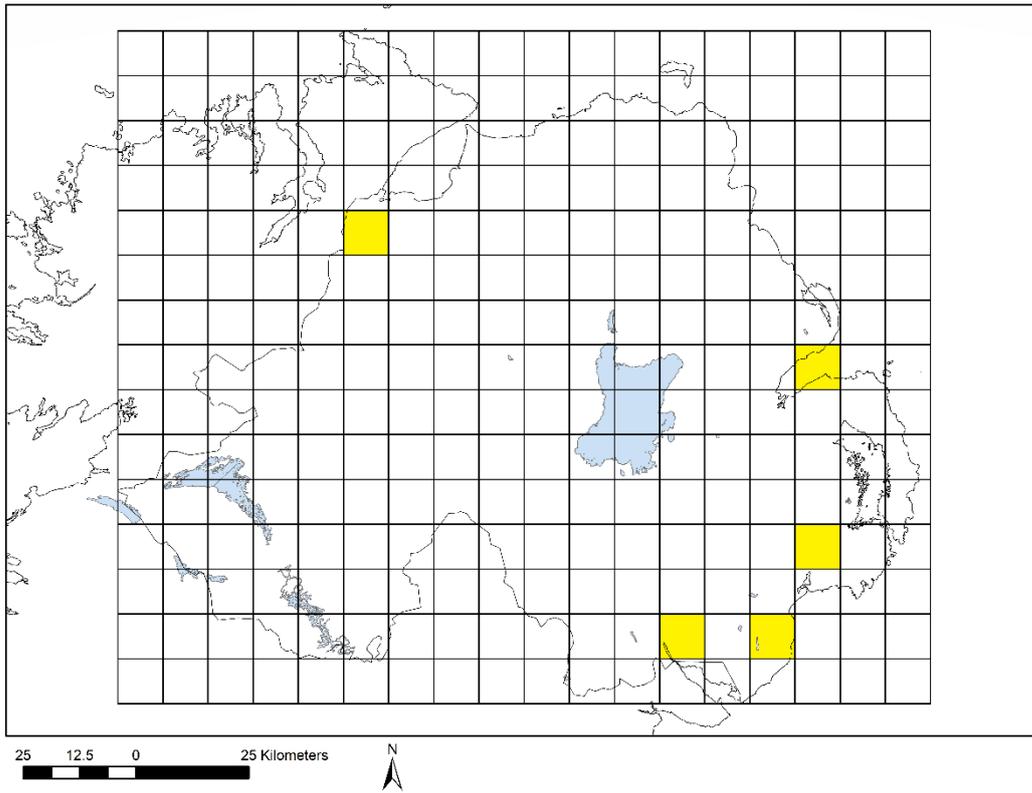


Figure 7. The 10km² squares which contain at least one record of pine marten and grey squirrel during the 2019 survey period.

This year there were three counties and 5 10km² squares that had both grey squirrels and pine marten present.

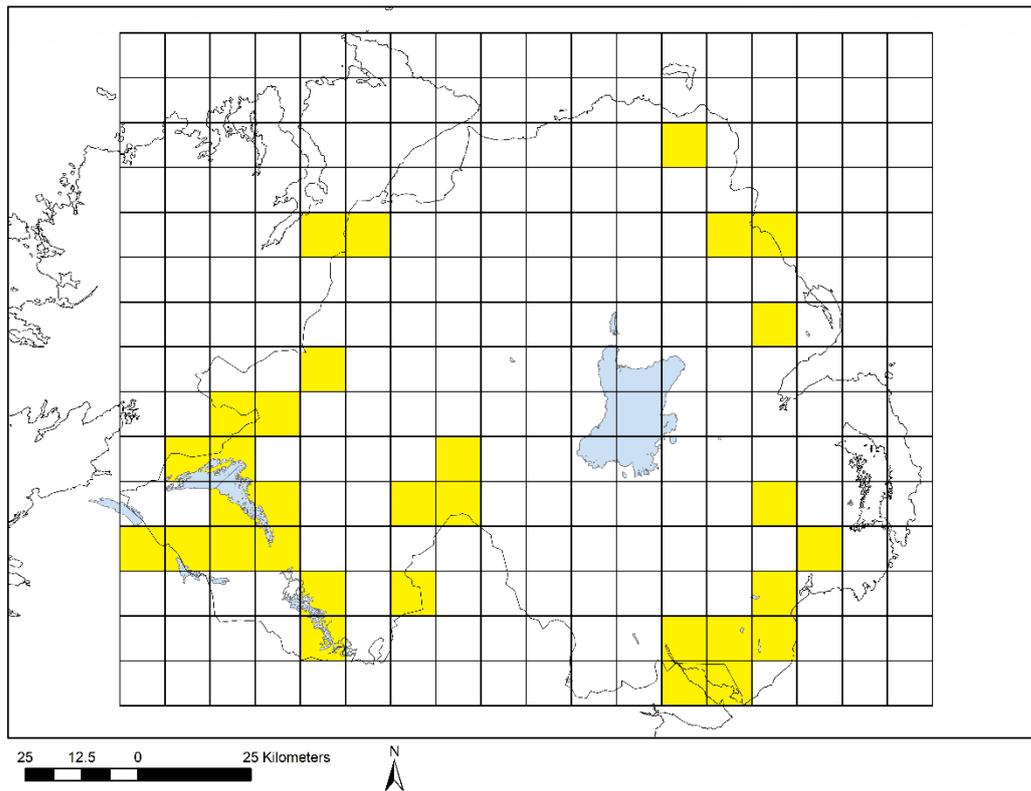


Figure 8. The 10km² squares which contain at least one record of red squirrel and pine marten during the 2019 survey period.

In contrast with the limited overlap of Grey Squirrel and Pine Marten sightings in the same 10km², there were 31 squares that contained both red squirrels and pine marten, across 5 counties (again very likely to occur in Armagh, but the lower volunteer surveying in area was a limiting factor).

The majority of squares with Red squirrels and Pine Marten recordings were in Counties Fermanagh and Tyrone – 54.8% (17/31), with an additional 25.8% (8/31) occurring in Co. Down.

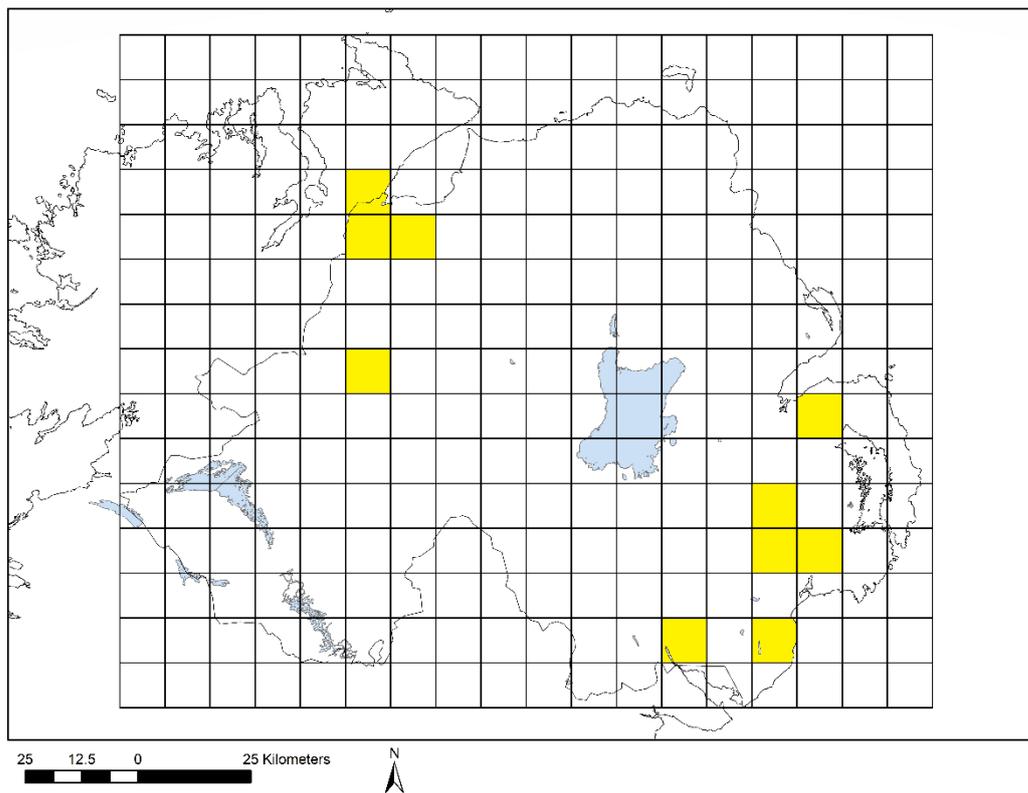


Figure 9. The 10km² squares which contain at least one record of red squirrel and grey squirrel during the 2019 survey period.

The overlap between red and grey squirrel sightings during the 2019 survey was limited 10 squares in 3 counties with the majority of relevant squares in Co. Down 60% and 30% in Co. Londonderry.

3.2 Combining data from 2017, 2018 and 2019

The three years' of data collected through the survey does not permit us to definitively identify what is occurring in terms of the distribution or population trends of the three target species. However, the data presented below does allow for contemporary illustration of the current distribution of the species and facilitates the development of future conservation/management strategies and actions.

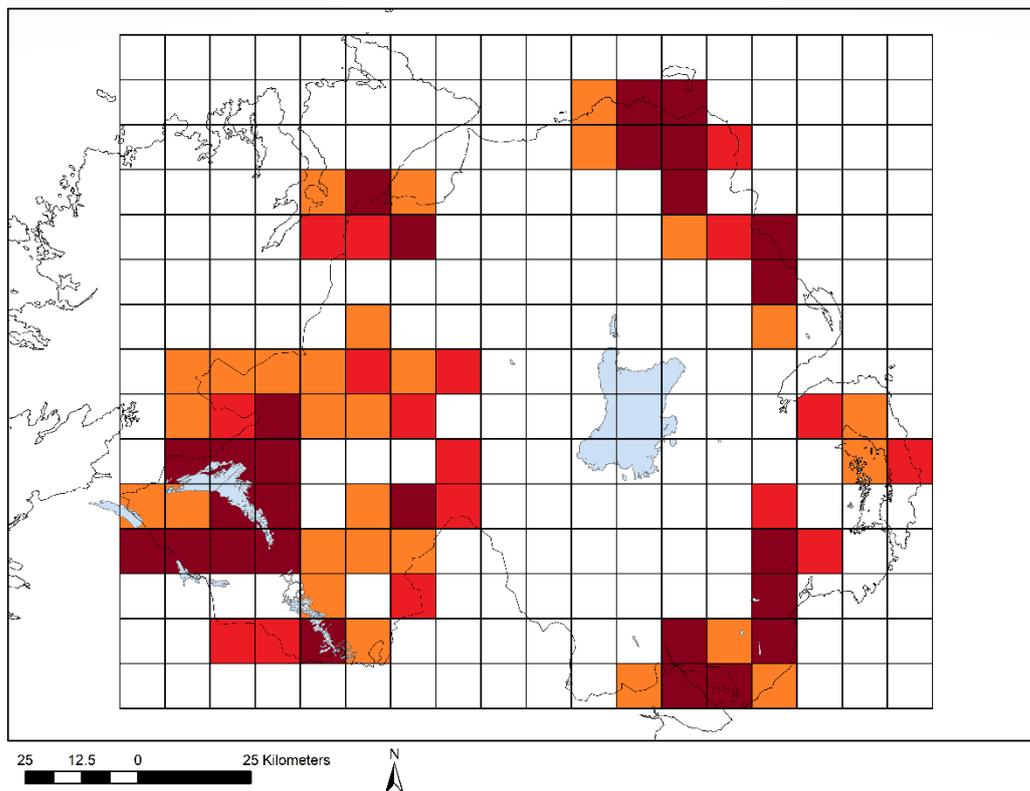


Figure 10. Showing the 10km² squares that have red squirrels have occurred during the 2017, 2018 and 2019 survey periods (Orange = 1 year, light red = 2 years and dark red = 3 years).

The data clearly illustrates that Red squirrels are well distributed across the 6 counties. In total Red squirrels have been recorded in 72 10km² at least once during 2017-19 surveying. In the west, in Co Fermanagh & western Co Tyrone Red squirrels occur in the majority of 10km² squares and this is clearly a stronghold for the species. Elsewhere, it is apparent that Red squirrels are widespread across much of south/ mid Co. Down as well north/ mid Antrim. In the northwest, Red squirrels appear to be restricted to the Londonderry City area

and absent from the rest of the county. It also seems that the Lough Neagh basin remains an area without significant (or potentially any) Red Squirrel populations.

There has been an increase in the range of red squirrels from 40 squares in 2014/2015, to 43 in 2017, to 50 in 2018 and 53 squares in 2019. This is indicative of an increase in established range of the red squirrel, but longer term surveys are needed to confirm this trend.

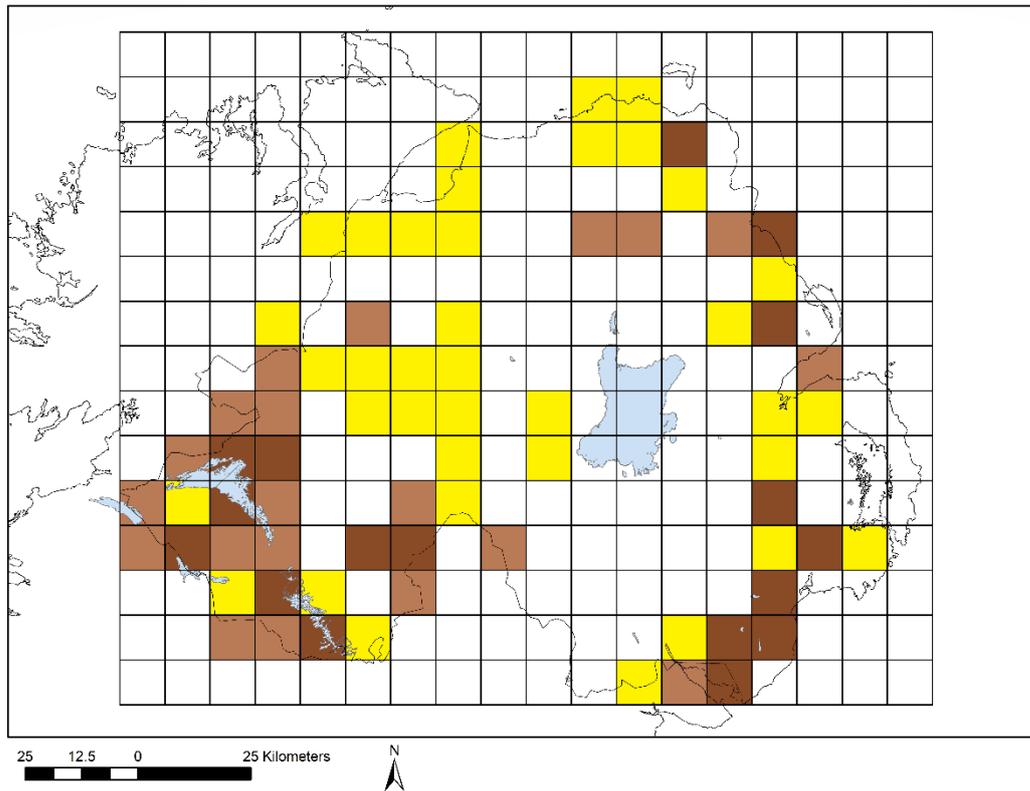


Figure 11. Showing the 10km² squares that have pine marten present in the 2017 and 2018 survey period (Yellow = 1 year, light brown = 2 years, dark brown = 3 years)

The combined map showing pine marten records in figure 13 indicates that pine martens are widespread throughout Northern Ireland. Pine Martens have been recorded in 74 10km² squares during the 2017-19 survey. The areas where they have been found in multiple year surveys include south and mid Down, Fermanagh, east Antrim and in Tyrone.

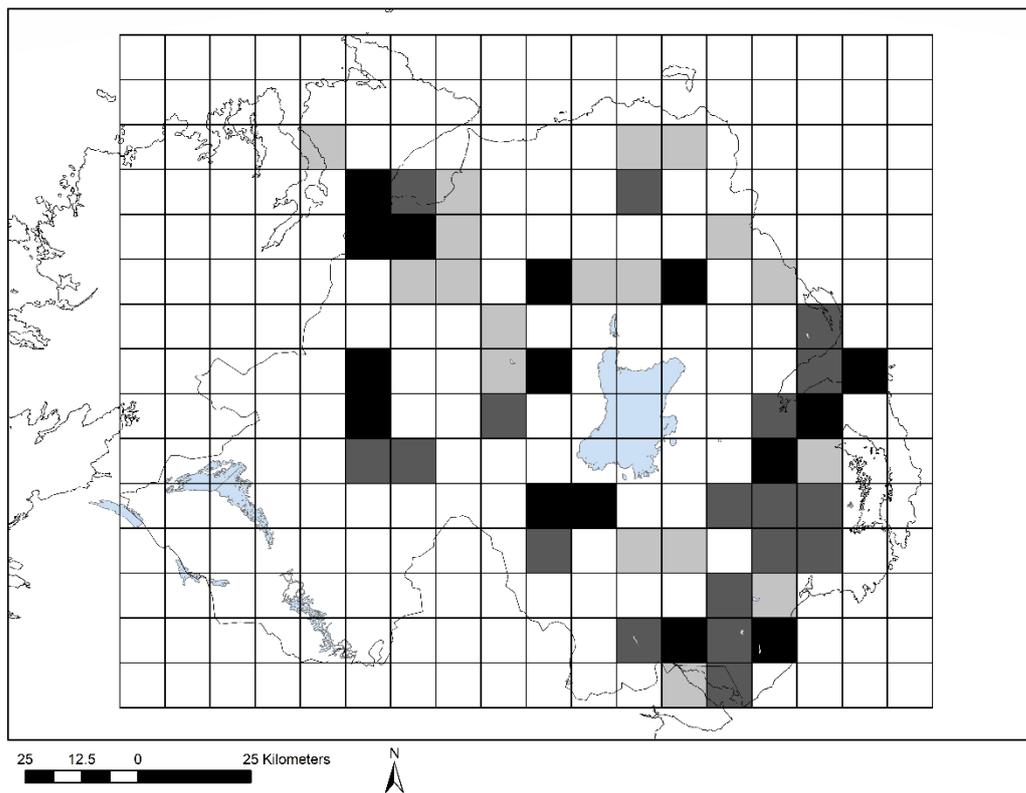


Figure 12. Showing the 10km² squares that have grey squirrel present in the 2017 and 2018 survey period (Light grey = 1 year, med grey = 2 years, dark grey = 3 years)

Grey squirrels have been recorded across 5 counties during surveying with no greys been recorded in Fermanagh during any of the 2017-19 surveys. In total Grey Squirrels have been recorded in 51 10km² squares across the 3 years (considerably fewer 10km² squares than Red squirrels 72 or Pine Marten 74). Areas with greys recorded in all years include squares in south Down, north Armagh, Omagh, Belfast, Derry, north Down and mid Ulster.

There has been an increase in the range of red squirrels from 40 squares in 2014/2015, to 43 in 2017, to 50 in 2018 and 53 squares in 2019. This suggests an increase in established range of the Red Squirrel, however on going surveys are needed to confirm this trend.

4. Conclusions and recommendations

The 2017/18 surveys were designed to closely replicate the previous survey conducted by QUB. During 2019 the unstructured sightings were incorporated for the reasons outlined previously. The overall 2019 species distribution data was broadly similar to previous years.

4.1 Conclusions from 2017-19 surveying

With 3 years of survey data it is impossible to accurately highlight specific trends for the target species. However, the results indicate that Red squirrels have expanded their range. It is clear that the target areas for RSU project now have widespread Red Squirrel populations.

The data demonstrates that it is likely that Red squirrels are now more widely distributed across NI than Greys, with the absence of Grey populations from many squares in the west of NI.

The widespread evidence of pine marten demonstrated through the surveying shows that it is likely to be increasing its range and indeed has been recorded in slightly more 10km² squares than Red squirrels (74 vs 72). The recovery of Pine Martens is a welcome development in its own right, but also appears to be having positive impacts on Red Squirrel populations in parts of NI as demonstrated elsewhere in Ireland and Scotland. (Sheedy & Lawton. 2014) (Sheedy et al. 2018)

However, due to the proclivity of pine marten to predate gamebirds/ poultry and create dens in inappropriate locations (attics/ shed etc.), when they increase in areas from which they were absent within living memory, conflict can often occur. During RSU Pine Marten conflict has frequently been recorded in the west (and elsewhere) and as the species is currently fully protected, in the absence of support/ workable solutions to ameliorate problems, illegal lethal control is likely to occur.

Education to help reduce any human-wildlife conflict will be important as Pine Marten populations continue to recover with a focus on protection of poultry/ gamebird pens and impacts on domestic buildings e.g. residency in attics.

Across the 3 years of surveying, Grey Squirrel have been recorded in every county in NI apart from Fermanagh. Grey Squirrels remain widespread across much of the remaining five counties, although there is evidence that they are largely absent from large areas of suitable

habitat in Tyrone and elsewhere. It is vital to note the potential correlation between the absence of Grey Squirrel in Co Fermanagh and the prevalence of Pine Marten locally.

The absence of Greys in Fermanagh has not been achieved by anthropogenic control (which has been very limited locally). The impact of Pine Marten on Grey Squirrels in this area (with apparent total collapse of Grey Squirrel populations) appears to be considerably greater than in any local area with human control (even at an intense level).

It is vital that supporting Pine Marten recovery is fully recognised as an essential component of Red Squirrel conservation in NI (perhaps the single greatest factor) moving forward.

Whilst human mediated control will remain necessary in target areas until alternative methods are available, such as Grey Squirrel contraception, Pine Marten recovery potentially offers the most effective Grey Squirrel management tool in many settings. Supporting Pine Marten recovery should be accompanied by appropriate education and support to reduce potential human conflict.

4.2 Specific areas of concern for future work

To consolidate on the progress achieved through the Red squirrels United project, conservation work needs to continue in the coming years, given the remaining widespread prevalence of Grey Squirrels and the levels of Squirrel Pox and Adenovirus. Future conservation work should concentrate on target areas with the main concentrations of red squirrels in NI, which are likely to be the most viable populations long term.

Specifically, south/ mid Down, mid/ north Antrim, the northwest (Derry and environs) and west Tyrone (to protect both local populations and the critical Fermanagh stronghold to the west). There is also considerable potential to undertake cross border work to eradicate Grey Squirrels in the Derry/ east Donegal/ west Tyrone triangle.

Many local volunteer groups continue to invest significant voluntary effort into red squirrel conservation and it is vital that these groups are supported in the future. A key experience of the RSU project locally has been that the effectiveness of local voluntary red squirrel conservation efforts are greatly enhanced by the presence of central coordination staff to support local groups through actions such as training volunteers, developing local conservation action plans and surveys to help target conservation work to where it will maximise effectiveness. Future red squirrel conservation initiatives in NI should seek to

synthesise professional and volunteer efforts focussed on the key Red squirrels stronghold areas identified previously.

4.3 Red squirrel reintroductions

There have been multiple red squirrel releases in Northern Ireland in recent years in Co. Antrim and Co. Down, and methods to enable the success of the releases to be evaluated should be considered e.g. microchipping, DNA sampling.

Reintroductions (captive bred or translocations) must take into account the IUCN guidelines, with rigorous disease and genetic monitoring adopted and target release areas and this should include screening for levels of Squirrel Pox and Adenovirus within the translocation areas. Natural expansion is preferable to release as the natural red squirrel range continues to expand.

5. Acknowledgements

The Red Squirrel United project was the first major conservation programme of its kind in Northern Ireland and the support and opportunity provided by the EU Life Programme and National Lottery Heritage Fund is acknowledged and thanks conveyed to the funders.

We would like to thank all the red squirrel groups, biodiversity groups and individuals that took part in the 2017 -19 surveys. Volunteering has been a key success factor in delivery of the survey enabling a comprehensive view of the three species across NI to be achieved.

We would also like to thank the private landowners and organisations that supported the survey including NI Forest Service and NIEA. We hope that the information collected has informed their local strategies for the removal of grey squirrels and conservation of red squirrels/ pine martens.

6. References

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