

Squirrel and Pine Marten Presence/Absence Survey 2020 Report



Acknowledgements

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Dr Josh Twining's assistance was vital to ensuring that, despite the challenges posed by the pandemic, excellent survey coverage was achieved in 2020.

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We would also like to thank the **private landowners and organisations** that supported the survey including **NI Forest Service** and **NIEA**.

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1. Introduction

Red squirrel (*Sciurus vulgaris*) populations are threatened across the UK and Ireland by habitat loss and the presence of 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 red squirrel populations due to competition and its ability to take advantage of food resources the red squirrels 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.

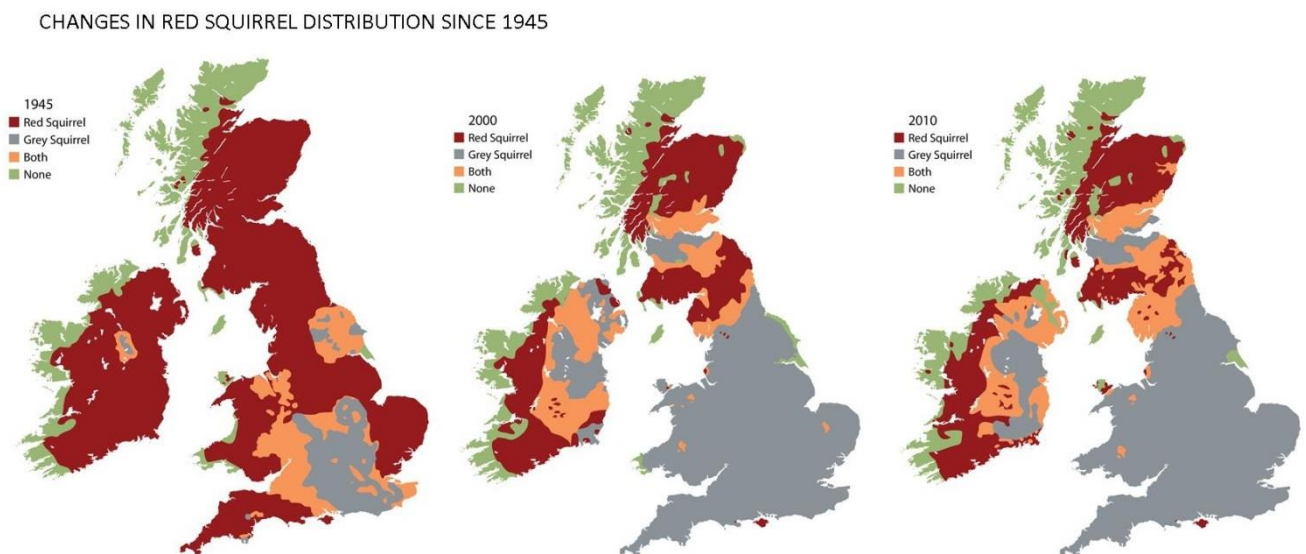


Figure 1. The distribution of grey and red squirrels from 1945 through to 2010.

The grey squirrel can carry the Squirrel pox virus which is infectious to red squirrels causing lesions around their eyes, mouth and genitalia, and eventually leading to a slow death from starvation. This virus can kill a red squirrel within two 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. A recent paper by Twinning et al. (2020) highlighted the role of pine marten recovery in grey squirrel decline and the positive impact on red squirrel in NI.

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 Co. Fermanagh. Due to this apparent relationship between pine martens, grey squirrels and red squirrels, 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 Conservation 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**).

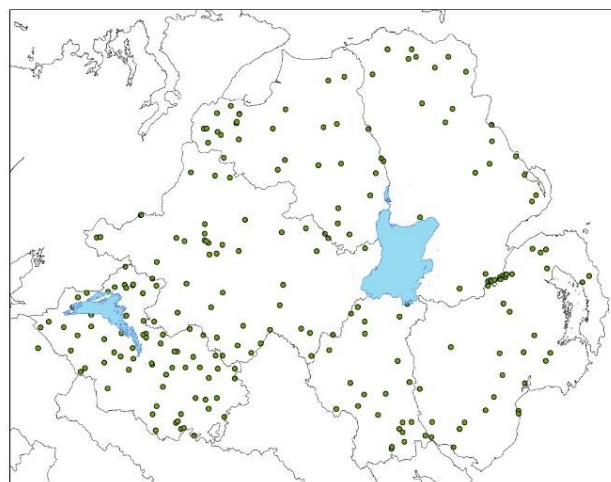


Figure 2. Distribution of survey sites taken from 2014/2015 survey (n=348).

In 2017/18 the aim of this survey was to cover a minimum of 150 woodlands over the six 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 three of the target species widely occur beyond the Forest Service estate in areas such as private woodlands, gardens and public parks.

During 2020, the program of in person volunteer engagement and training of new surveyors had commenced in February but was obviously suspended with the advent of COVID-19 restrictions. Furthermore, during the initial weeks of lockdown from March 2020 onwards, all Forest Service properties were closed to the general public and all surveying was suspended as volunteers and Ulster Wildlife staff adhered to the *stay-at-home* guidance. Subsequent relaxation of the restrictions in late spring/ summer permitted Ulster Wildlife staff, and those volunteers who were able to survey safely (whilst observing all relevant contemporary guidance), to undertake a program of surveying. Additionally, Ulster Wildlife collaborated with Dr Joshua Twinning's British Ecological Society funded research which also took place in summer 2020, undertaking camera trap surveying of numerous woodlands and other habitat types, across the six counties.

Sightings which were gathered by camera trapping in 2020 followed the protocol used during the 2017/18/19 surveying. Volunteer fieldworkers were asked to place camera traps and squirrel feeders in forests for at least 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.
3. Ensure the feeder contains sunflower seeds/peanuts and that it is no more than half full.
4. Put sunflower seeds/peanuts 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.

The bait provided for the feeders was a mix of sunflower seeds and peanuts. No additional attractants were used on feeders. It was important that the bait used was noted by surveyors.

Both Bushnell and Browning camera traps were used. 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 two (so that every time the camera was activated the camera would take two pictures). The interval between the camera being activated and photographs was 20 seconds and the sensor level was set to automatic.

3. Results

3.1 2020 results

During 2020 Ulster Wildlife did not run a public marketing campaign to attract volunteers for the survey due to oversubscription of volunteers in relation to available equipment in previous years. Volunteers in 2020 were drawn from the previous cohorts or individuals that had heard about the survey through local squirrel groups. However, during 2020 the majority of fieldwork was undertaken by Ulster Wildlife staff and Dr Josh Twinning due the COVID-19 pandemic. A total of 149 woodlands were surveyed (**Figure 3**).

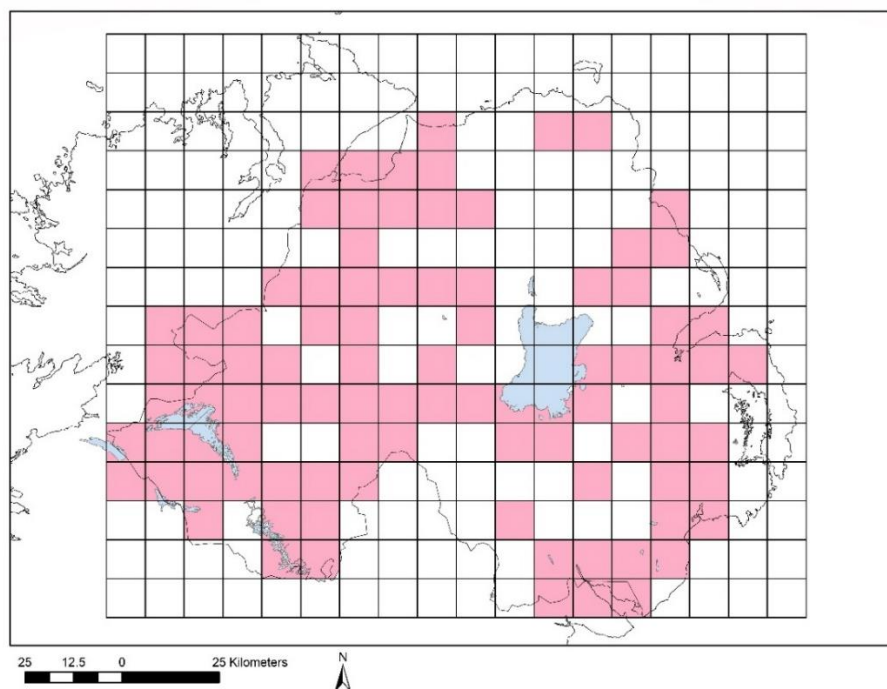


Figure 3: Coverage in 10km² squares of the 2020 survey.

Species maps 2020

During the 2020 survey, red squirrels were recorded in every local county (**Figure 4**), including Co. Armagh, and it highly likely that the unavailability of red squirrel group volunteers resulted in lower coverage and hence records in certain areas.

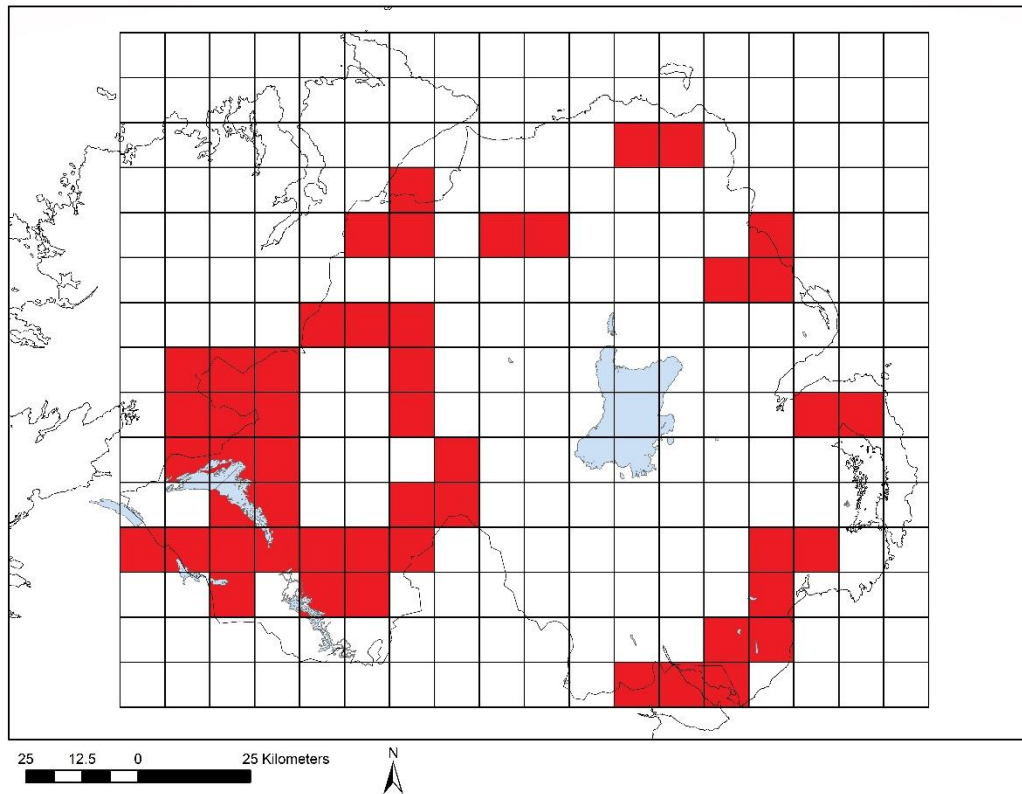


Figure 4. The 10km² squares which contain at least one record of a red squirrel during the 2020 survey.

The distribution of red squirrel sightings recorded in 2020 clustered around four key areas, namely Fermanagh and west Tyrone, north/ mid Antrim, south/ mid Down and the Derry area. In total red squirrels were recorded in 49 10 x 10 km squares across the six counties. More than 59% of all squares with red sightings occurred in Counties Fermanagh and Tyrone (29/49). This is partially a reflection that Ulster Wildlife staff working on the survey in 2020 were based in Fermanagh and could access local sites. However, the percentage of total red squirrels occupied squares in these counties as part of the overall distribution in NI, is very similar to 2019 (52% of all occupied squares where in Fermanagh and Tyrone) – again highlighting the importance of these counties for red squirrels.

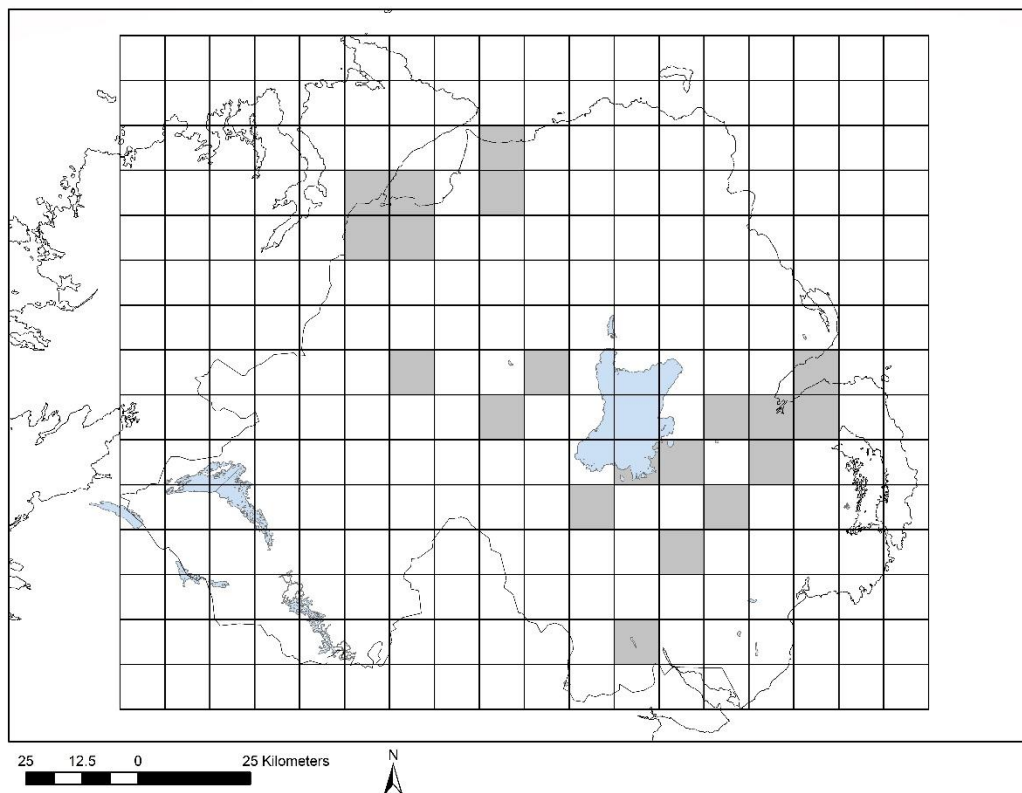


Figure 5. The 10km² squares which contain at least one record of a grey squirrel during the 2020 survey period.

During 2020, grey squirrels were recorded in 20 10km² squares across NI (**Figure 5**). The only county in NI with no grey squirrel sightings during the 2020 survey (as in the 2017-19 surveys) was Fermanagh. Greys were recorded in all other counties with 40% (11/20) squares with sightings occurring in Greater Belfast area and across Co. Down. Sightings elsewhere occurred sporadically across the other counties, somewhat localised in Co. Tyrone (around Foyle catchment and east of the Sperrins) and in the northwest in the Derry City area. The area round Lough Neagh had been a survey gap in previous years and it is useful to now have the presence of grey squirrels confirmed in a number of areas.

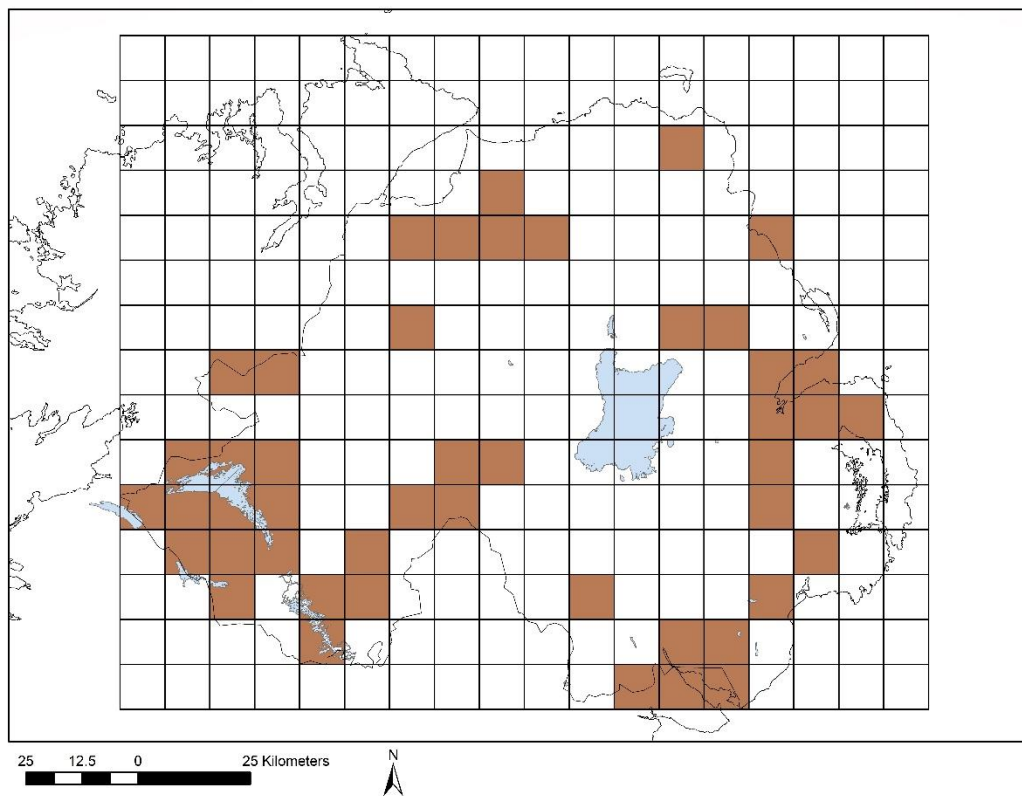


Figure 6. The 10km² squares which contain at least one record of pine marten during the 2020 survey period.

Pine marten were found in every county (**Figure 6**), although likely to have been under recorded in Co. Armagh due to lower survey effort. More than 47% (22/46) of squares with pine marten sightings recorded during 2020 occurred in Fermanagh and Tyrone (slightly lower than the 55% of all sightings in 2019).

Fascinatingly, the recovery of pine marten in Co. Derry appears to be continuing. During the 2017 survey no pine marten were recorded in the county, but during the 2018 survey pine marten were recorded in two squares and during the 2019 survey pine marten were found in three squares (not the 2018 sites) with another site immediately adjacent to Derry City in Co. Donegal. During the 2020 survey the species was recorded in five 10km squares in the county.

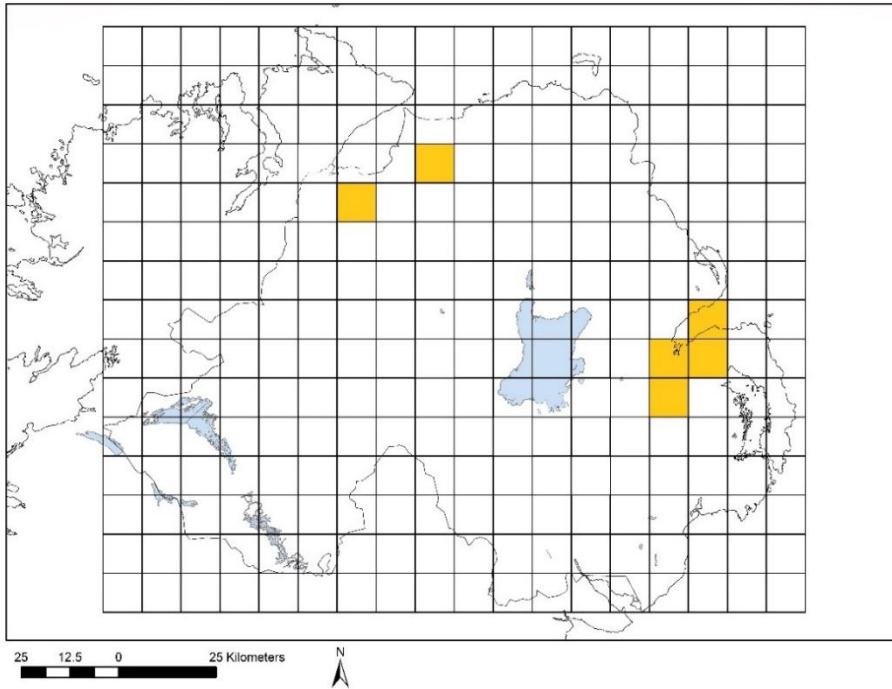


Figure 7: The 10km² squares which contain at least one record of pine marten and grey squirrel during the 2020 survey period.

This year there were three counties and six 10km² squares that had both grey squirrels and pine marten present, with the majority clustered in the Greater Belfast/ north Down area (**Figure 7**).

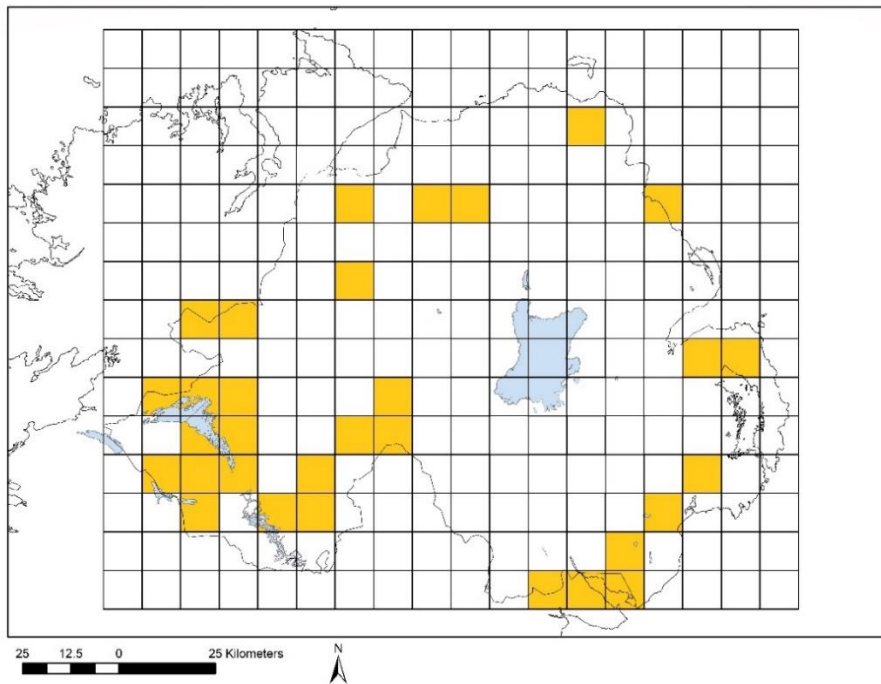


Figure 8: The 10km² squares which contain at least one record of red squirrels and pine marten during the 2020 survey period.

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 all six counties (**Figure 8**).

The majority of squares with red squirrels and pine marten recordings were in Counties Fermanagh and Tyrone – 58% (18/31), with an additional 22.5% (7/31) occurring in Co. Down.

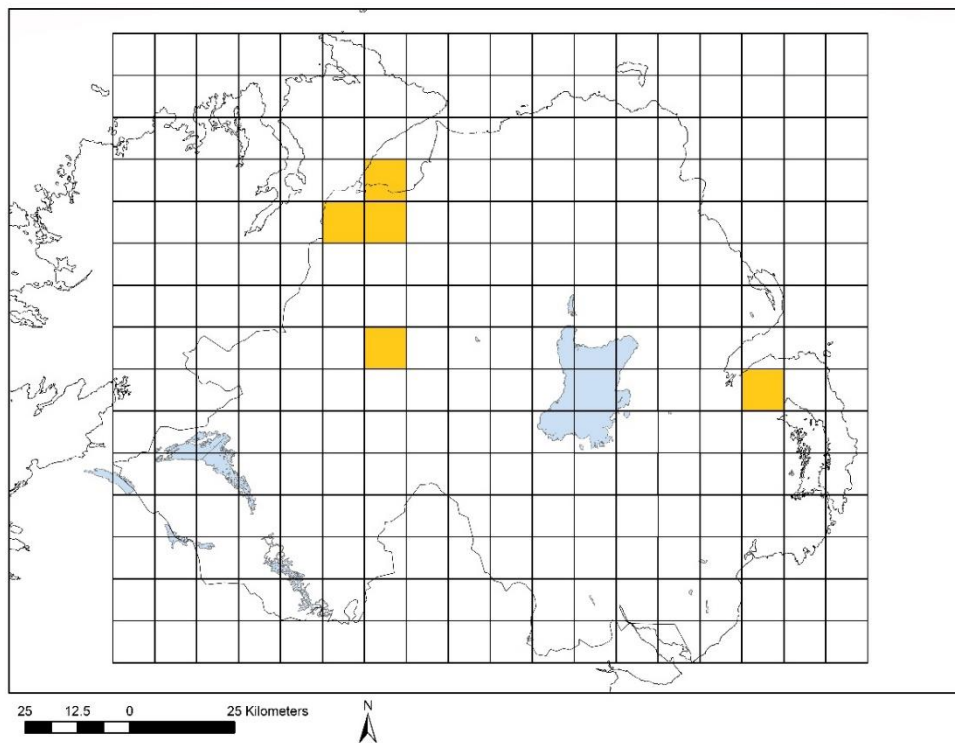


Figure 9: The 10km²squares which contain at least one record of red squirrels and grey squirrel during the 2020 survey period.

The overlap between red and grey squirrel sightings during the 2020 survey was limited to just five squares in three counties with the majority of relevant squares in Co. Derry (**Figure 9**).

3.2 Combining data from 2017-20

The four 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 the most comprehensive contemporary illustration of the current distribution of the species and facilitates the development of future conservation/ management strategies and actions.

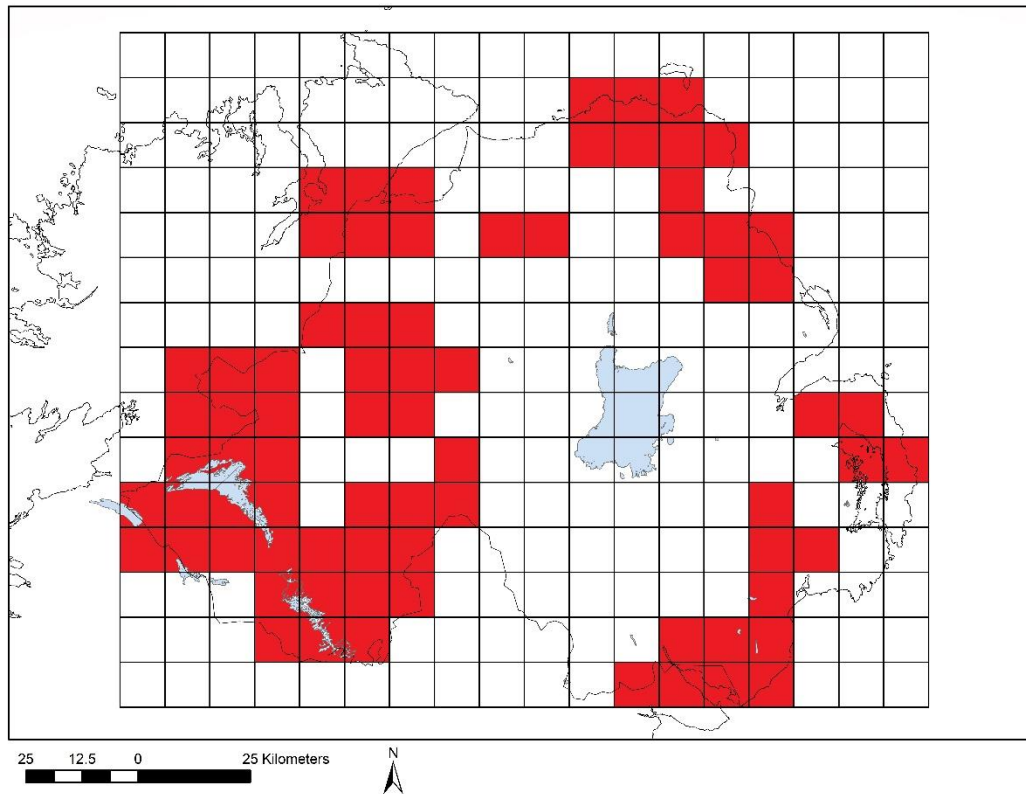


Figure 10: Showing the 10km² squares in which red squirrels have occurred during the 2017-20 surveys.

The data clearly illustrates that red squirrels are distributed across the six counties. In total Red squirrels have been recorded in 75 10km² at least once during 2017-20 surveying (**Figure 10**). 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 as north/ mid Antrim. In the northwest, red squirrels appear to be largely restricted to the Derry City area but have also been recorded in upland forests in the east of the county. It also

appears that the Lough Neagh basin remains an area without significant (or potentially any) red squirrel populations.

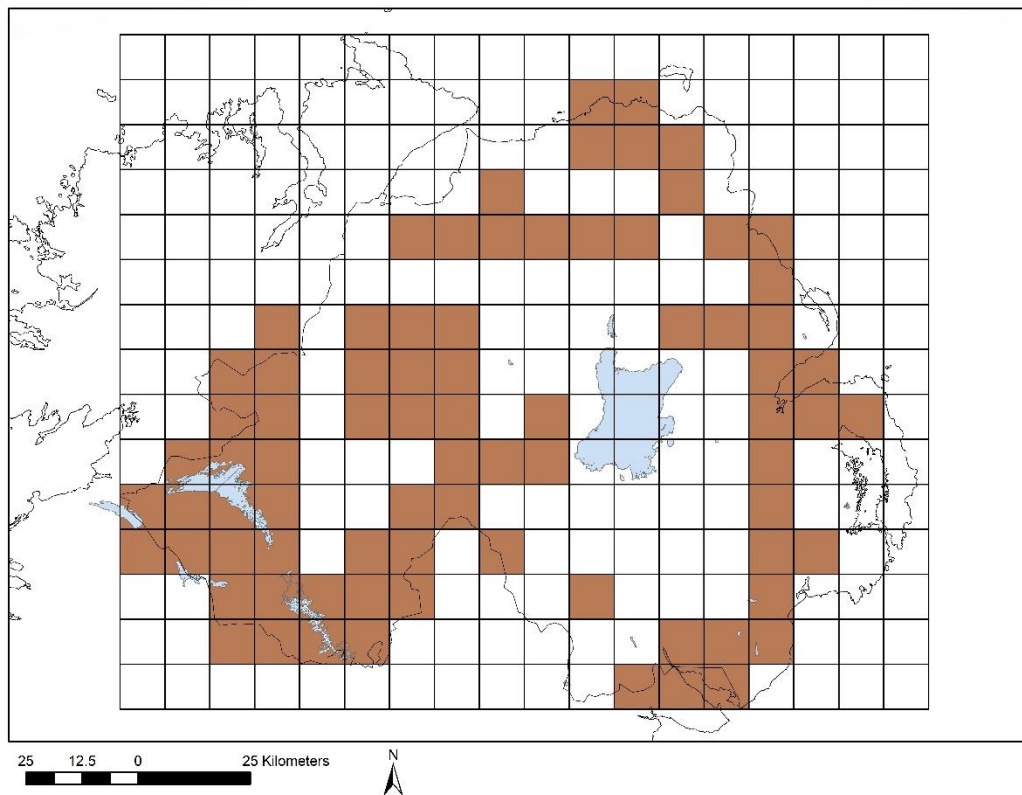


Figure 11: Showing the 10km² squares in which pine marten have occurred during the 2017-20 surveys.

The combined map showing pine marten records in figure 13 indicates that pine marten are widespread throughout NI. Pine marten have been recorded in 79 10km² squares across all six counties during the 2017-20 surveys (**Figure 11**). They appear to be the most widespread of the target species (although only marginally more so than red squirrels), with greys squirrel apparently having a considerably more localised contemporary distribution.

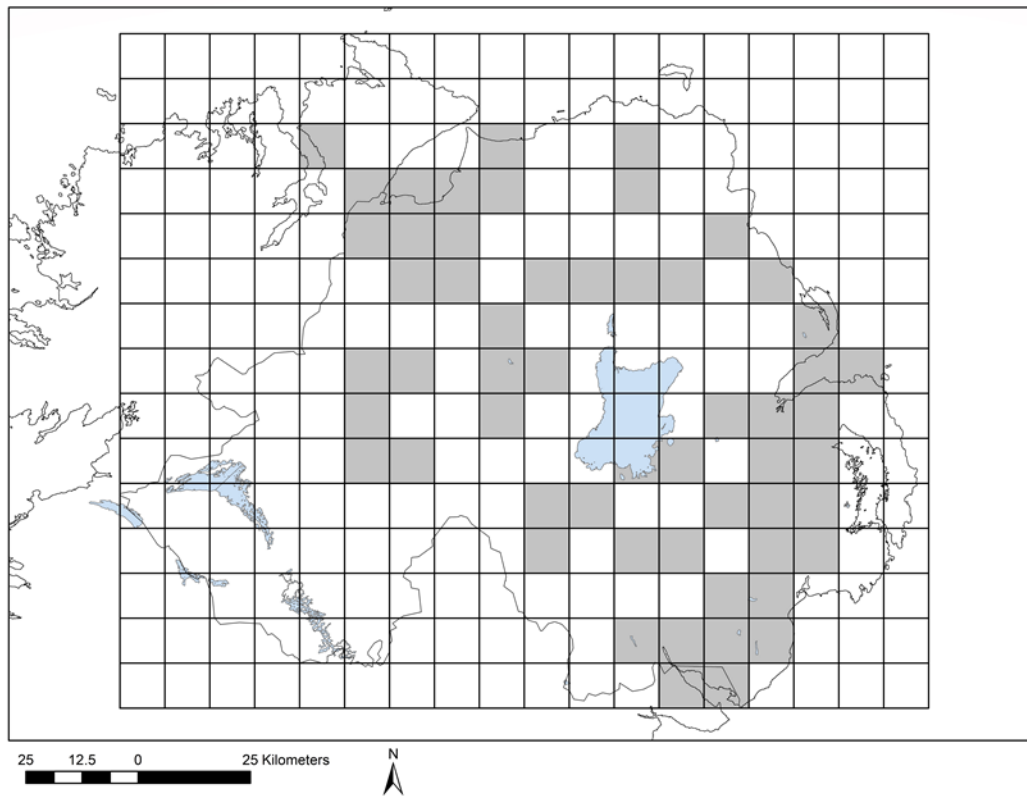


Figure 12: Showing the 10km² squares in which grey squirrels have occurred during the 2017-20 surveys.

Grey squirrels have been recorded across five counties during surveying (**Figure 12**) with no greys been recorded in Fermanagh during any of the 2017-20 surveys. In total grey squirrels have been recorded in 55 10km² squares across the four years (considerably fewer 10km² squares than red squirrels 75 or pine marten 79). Areas with greys recorded in all years include squares in south Down, north Armagh, Omagh, Belfast, Derry, north Down and mid Ulster.

4. Conclusions and recommendations

The 2017-20 surveys were designed to closely replicate the previous survey conducted by QUB. The overall 2020 species distribution data was broadly similar to previous years.

4.1 Conclusions from 2017-20 surveying

With only four years of survey data, it is impossible to accurately highlight specific trends for the target species. The data demonstrate 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. However, there are still large numbers of grey squirrels in these urban locations that act as source populations for the surrounding areas.

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 (79 vs 75). 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), Twining et al. (2020)).

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 recent years, 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 four years of surveying, grey squirrels 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 such as grey squirrel contraceptives are available. 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 (RSU) project and subsequent Ulster Wildlife efforts, 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 squirrel 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 (<https://www.iucn.org/content/guidelines-reintroductions-and-other-conservation-translocations>), with rigorous disease and genetic monitoring adopted, target release areas and inclusion of screening for levels of Squirrel Pox and Adenovirus within the translocation areas. Natural expansion is preferable to release as the natural red squirrels range continues to expand; however releases may be appropriate in some areas.

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