

Ulster Wildlife

Squirrel and Pine Marten Presence and Absence Survey: 2017 Report



Contents

Section	Page
1. Introduction	3
2. Survey sites and methods	4
3. Results	7
3.1. Volunteer fieldworker recruitment	7
3.2. Presence or absence of squirrels and pine marten	9
3.3. Comparison with 2014/2015 survey	16
4. Conclusions and recommendations	16
4.1. Rapid response networks	17
4.2. Volunteer recruitment for grey squirrel control	17
4.3. Areas needing increased survey effort	18
4.4. Recommendations for organisations	18
5. Acknowledgements	19
6. References	19

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.

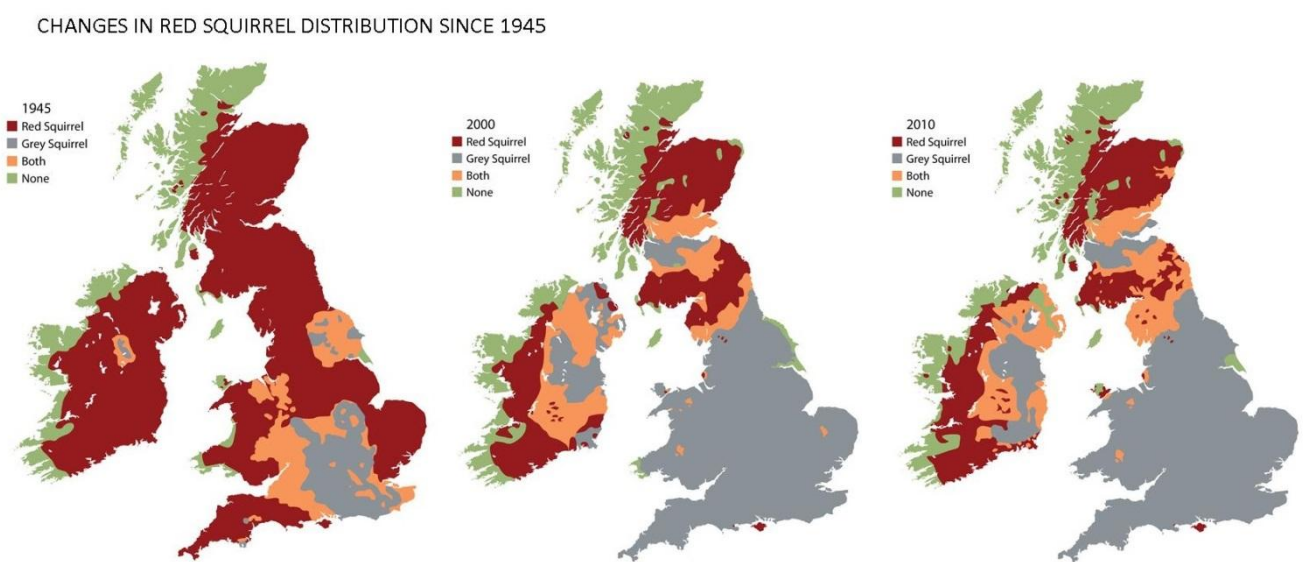


Figure 1. The distribution of grey and red squirrels from 1945 through to 2010.

The grey squirrel also carries a virus that can infect 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 will be incredibly beneficial to analyse the location of both squirrel species to aid red squirrel conservation. Not only will it help current projects and volunteer groups target their conservation efforts and use resources in the most efficient way, it will also add 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 have some effect on the abundance and density of grey squirrels. Sheehy and Lawton (2014) suggests that the recovery and subsequent population increase of pine marten (*Martes martes*) in Ireland will lead to a population decrease in grey squirrels. Due to this relationship it was deemed important to record the presence and absence of pine marten as well as the two squirrel species in this survey. If this survey is continued in the future the data can be used to show the change in range of these species, and the success or failures 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 selected for the survey were based on the 348 sites that were visited in 2014/2015 (figure 2).

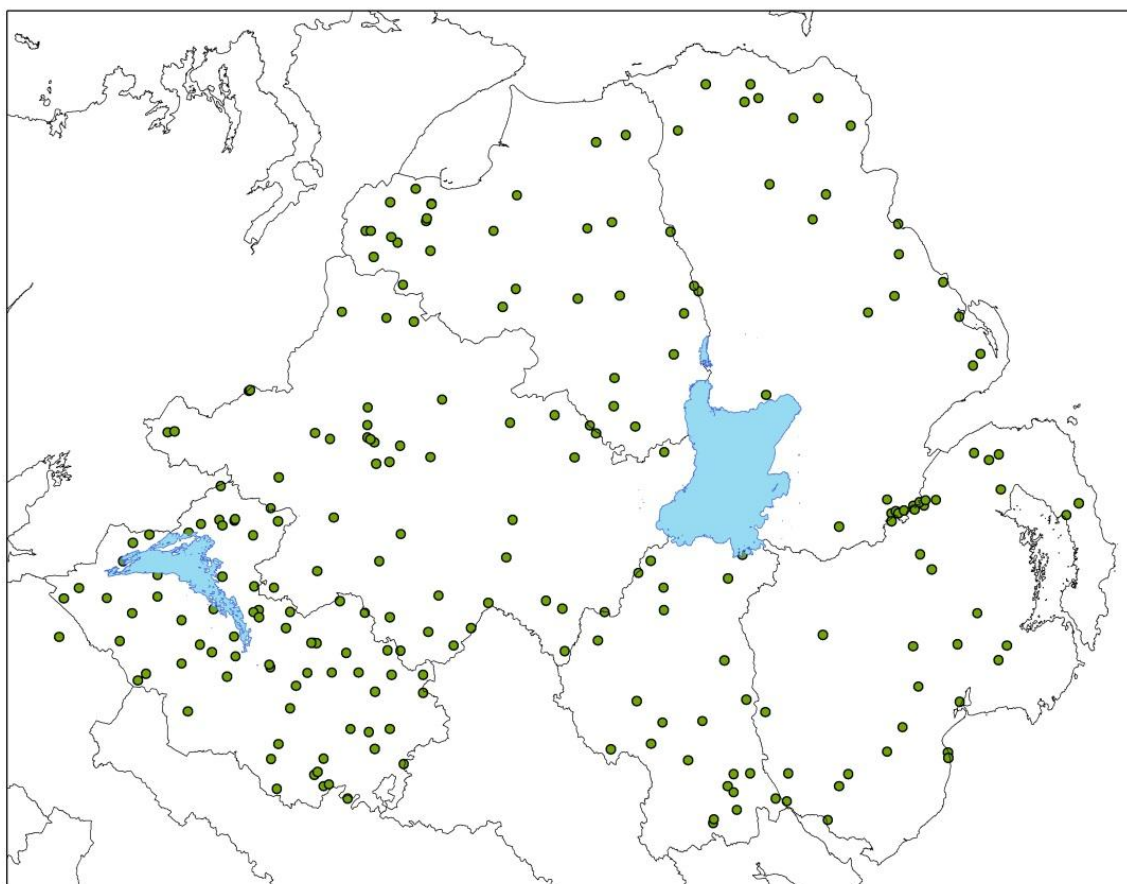


Figure 2. Distribution of possible survey sites taken from 2014/2015 survey (n=348).

The aim for this survey was to cover a minimum of 150 woodlands over the 6 counties of Northern Ireland. This number was selected due to the number of sites RSU had a licence agreement for and the equipment available at the start of the survey period. In total 235 woodlands were surveyed during the survey period running from March to August 2017, distribution of sites shown in figure 3. This increase is due to the large number of volunteers recruited, more equipment being procured during the survey period and more forests being added to licence agreements. A number of forests in Donegal were also surveyed, due to their proximity to the border and proximity of red squirrel populations.



Figure 3. Woodland sites surveyed in the 2017 survey (n=235)

During the 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 lee way 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 put out. This then increases 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% 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 not bringing species in from neighbouring areas. Some feeders did have extra foodstuffs included but this is easy to see in the images provided so can be taken into account in any additional work with this data.

The camera settings for the majority of the cameras were set to only take still photos, at 5M pixel resolution, 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 was 20 seconds and the sensor level was set to automatic.

Every volunteer that took a feeder was also provided with 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. Volunteer fieldworker recruitment

Throughout March 2017, 5 workshops were held in Greysteel, Ballygally, Enniskillen, Silent Valley and Belfast. These workshops were open to the public and advertised on all social media platforms, the Ulster Wildlife website, via local papers, radio shows and emailed to people who had previously taken part in the survey with Dr. Tosh. Further to these 5 workshops, one more was held in Cookstown. This was necessary as mid Ulster in preliminary mapping was shown to have a lack of coverage. Figure 3 shows the number of volunteers recruited at each event. The small number recruited in Cookstown is explained by it being a private talk specifically for a Wildlife Trust group in the area.

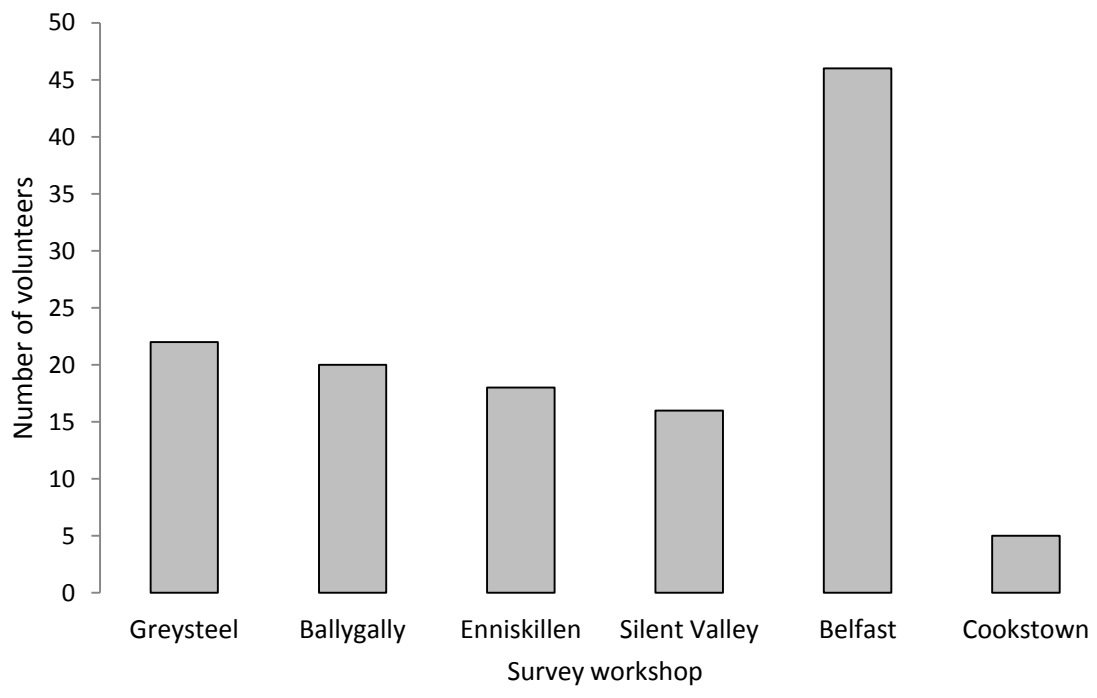


Figure 4. The number of volunteer fieldworkers recruited at each survey workshop.

The volunteers were asked to fill in a registration form at the beginning of the workshops. Information on this form included contact details, how they had heard about the workshop, if

they had completed a survey like this before and if they were a member of a red squirrel group. Figure 5 illustrates that the predominate way the volunteers heard about the workshop was through the Ulster Wildlife website. This could be due to links set up on social media taking them to the website, so the number of volunteers that actually found out about the workshops through social media underrepresented.

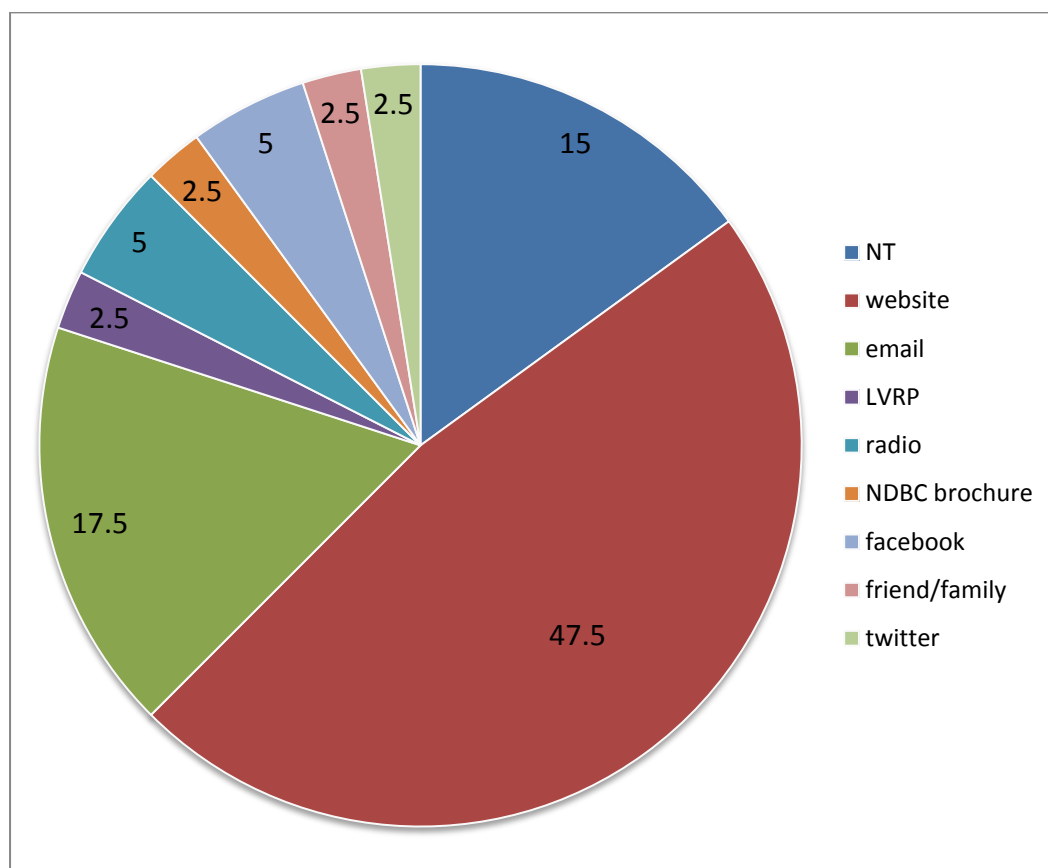


Figure 5. The percentage of volunteers that said they heard about the workshops from each media source. (LVRP= Lagan Valley Regional Park. NDBC = North Down Borough Council and NT= National Trust).

In total there were 127 new volunteers recruited during the 6 workshops. The largest number of volunteers recruited was in Belfast. Some volunteers did drop out due to various reasons, but the majority completed the survey and attended thank you events held in July and August. Out of the 235 forests surveyed, volunteers covered 78.7% and staff 21.3%.

During the thank you events volunteers were asked to fill in an evaluation sheet. This sheet asked the volunteers to rank their experiences of the survey, and fill in demographic information. They could select strongly agree, agree, neither agree nor disagree, disagree,

strongly disagree or not applicable, to 5 statements. The statements are as follows; I learned new things about red and grey squirrels, I learned new skills, the event was done well, I enjoyed the event, and I would recommend it to others. They were also given the opportunity to leave extra comments about the survey experience.

Table 1. The percentage of respondents that answered strongly agree to strongly disagree for various statements on event evaluation sheets, after the survey period.

	I learned new things about red and grey squirrels (% of respondents)	I learned new skills (% of respondents)	The event was done well (% of respondents)	I enjoyed the event (% of respondents)	I would recommend it to others (% of respondents)
Strongly agree	40	40	68.6	74.3	74.3
Agree	45.7	37.1	31.4	22.9	25.7
Neither agree nor disagree	8.6	17.1	0	0	0
Disagree	5.7	5.7	0	0	0
Strongly disagree	0	0	0	0	0
N/A	0	0	0	2.9	0

Table 1 shows that the majority of volunteers greatly enjoyed the experience of taking part in the survey and 100% would recommend it to others. The only statements where a number of volunteers selected disagree were “I learned new things” and “I learned new skills”. Around a quarter of the volunteers had originally come from red squirrel groups (24.2%) and may have been doing work very similar to this for a number of years before, so it is not surprising that they did not gain additional skills or knowledge from the workshops. Among the volunteers surveyed 10.8% had completed the survey before so were experienced with the methods.

3.2 Presence or absence of squirrels and pine marten

The average number of days the cameras were left out was 11.5 and on average if species were present in the woodland they would activate the camera in 4.6 days. Red squirrels were the fastest to find the feeders with an average of 4 days, pine marten found the feeders after 4.5 days and grey squirrels found the feeder after 5.5 days. There may be some bias with

some of the woodlands where red squirrels were recorded, as they may have had a feeding station previously, so the squirrels are used to feeders and this removes an element of neophobia.

The coverage of the survey was over 6 of the counties in Northern Ireland and the border region of Donegal. Figure 6 shows the coverage of the survey and the additional squares included in the Inishowen peninsula.

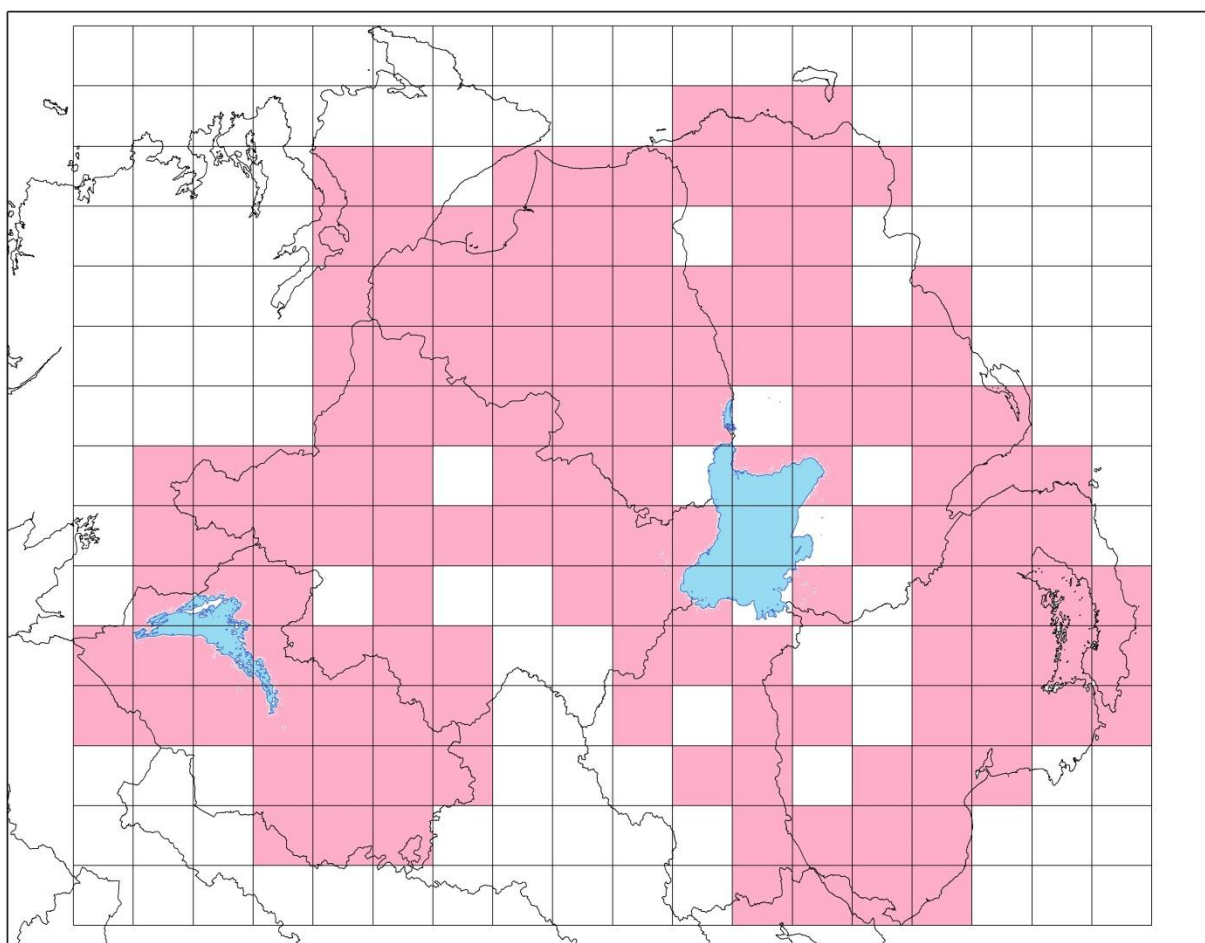


Figure 6. Coverage in 10x10km squares of the 2017 survey (pink areas contain at least one survey site).

The areas that were not as well represented during the survey were Armagh and Tyrone, with only 0.08 and 0.1 sites per 10km² surveyed. The border region between Armagh, Tyrone and Monaghan especially has very little coverage in the survey. All other counties within Northern Ireland have a good coverage of over 0.14 sites over 10km², the majority having over 0.2 sites per 10km² (Table 2). The average coverage for the 6 counties of Northern

Ireland is 0.17 sites per 10km². This is lower than the average in the 2014/2015 survey, which had 0.23 sites per 10 km², but there were fewer forests surveyed in 2017.

Table 2. The number of survey sites per 10km² of each County in Northern Ireland and Donegal, and the number of these sites that had a positive record of each of the target species.

County	County area (km ²)	Survey sites per 10km ² (effort)	Number of woodlands surveyed	No. of sites with red squirrel (%)	No. of sites with grey squirrel (%)	No. of sites with pine marten (%)
Antrim	3095.63	0.14	41	16 (39.0)	5 (12.2)	7 (17.1)
Armagh	1325.86	0.08	11	2 (18.2)	4 (36.4)	2 (18.2)
Donegal	4857.44	0.02	11	3 (27.3)	2 (18.2)	0 (0)
Down	2498.76	0.22	54	9 (16.7)	23 (42.6)	11 (20.4)
Fermanagh	1850.59	0.25	46	20 (43.5)	0 (0)	19 (41.3)
L/Derry	2121.13	0.2	42	4 (9.5)	13 (36.0)	0 (0)
Tyrone	3264.88	0.1	32	6 (18.8)	3 (9.4)	4 (12.5)

The majority of red squirrels were recorded in Fermanagh. The lowest amounts of red squirrel records were found in L/Derry. Figure 7 shows that the red squirrels found in L/Derry were located around the city and border region. There were no red squirrels discovered in south and mid L/Derry possibly due to the populations there being so small that the short period allowed for this survey did not pick them up or the grey populations found there as demonstrated in figure 8 have pushed them out of this habitat.

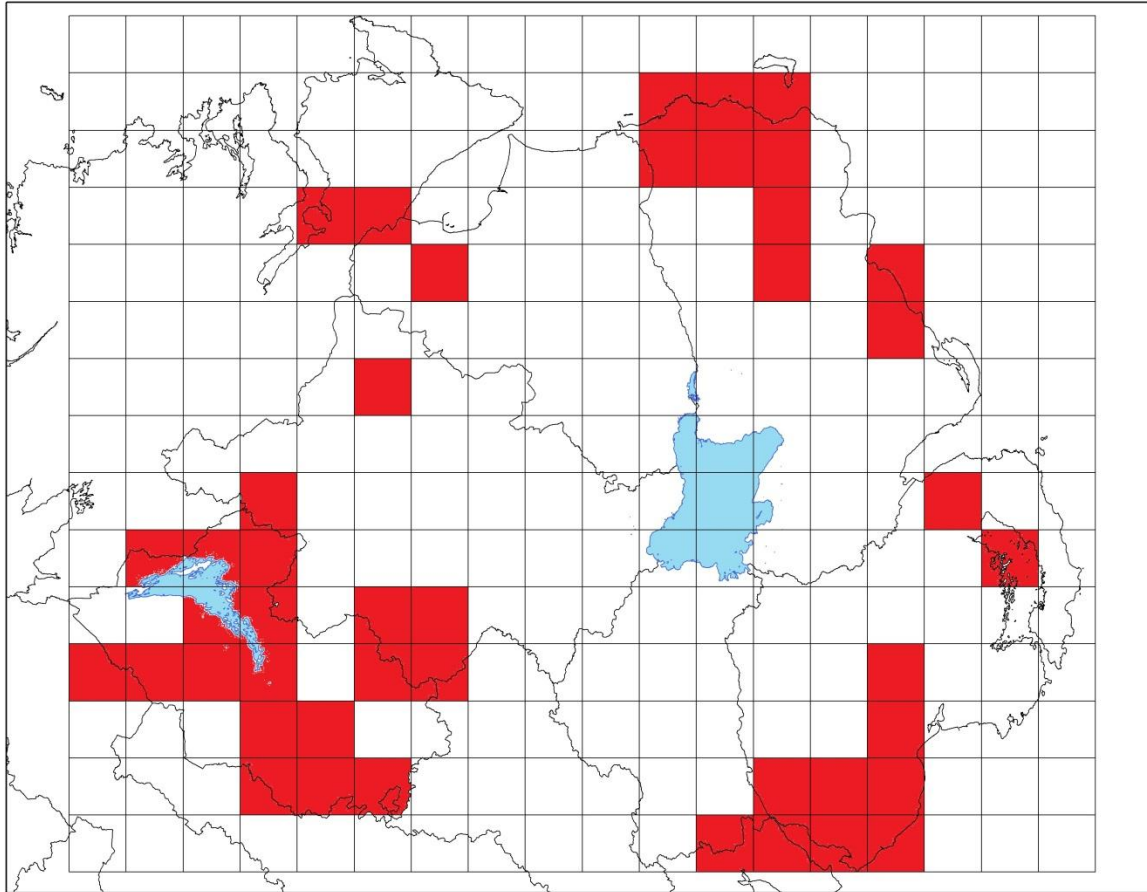


Figure 7. The 10 km² squares which contain at least one record of a red squirrel during the 2017 survey.

In comparison the red squirrel populations in Fermanagh are wide spread and seem to have little interference from grey squirrels. During the survey there were no grey squirrels found in Fermanagh (the best covered county by number of sites/10km²) or near the border in other counties. This does not mean that they are not in the area, but the population could have an extremely low density.

Figure 8 makes it seem as if there is a large population of greys in the Mourne area of South Down, this however could be due to the observation bias of the ranger working in that area. There is a much larger incidence of survey effort in the Mournes area compared to other areas of Northern Ireland. Often the greys sighted are lone individuals moving through or trying to move back into a previously cleared area. There are rare sightings with multiple individuals.

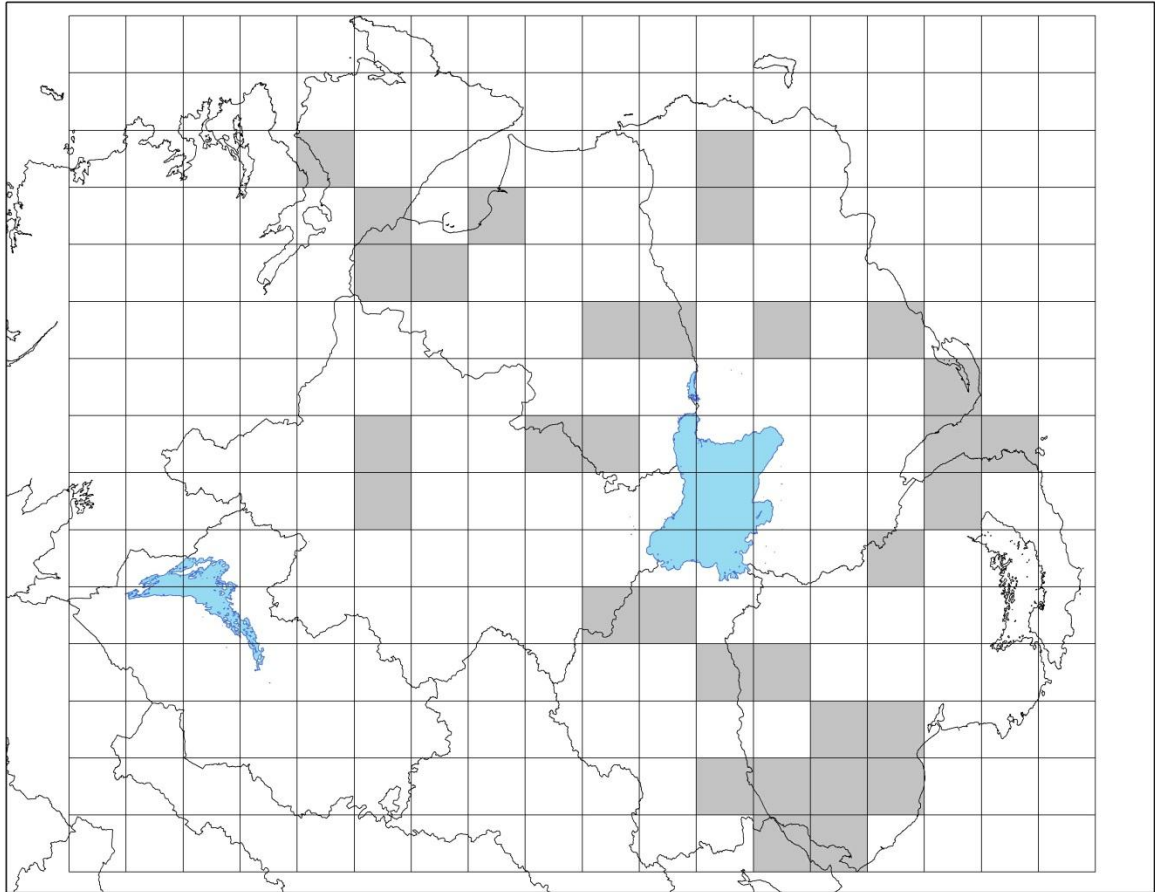


Figure 8. The 10km² squares which contain at least one record of a grey squirrel during the 2017 survey

The highest incidence of pine marten records came from Fermanagh with 41% of the sites surveyed in this county having pine marten present. Figure 9 shows that there are no records of pine marten recorded in L/Derry.

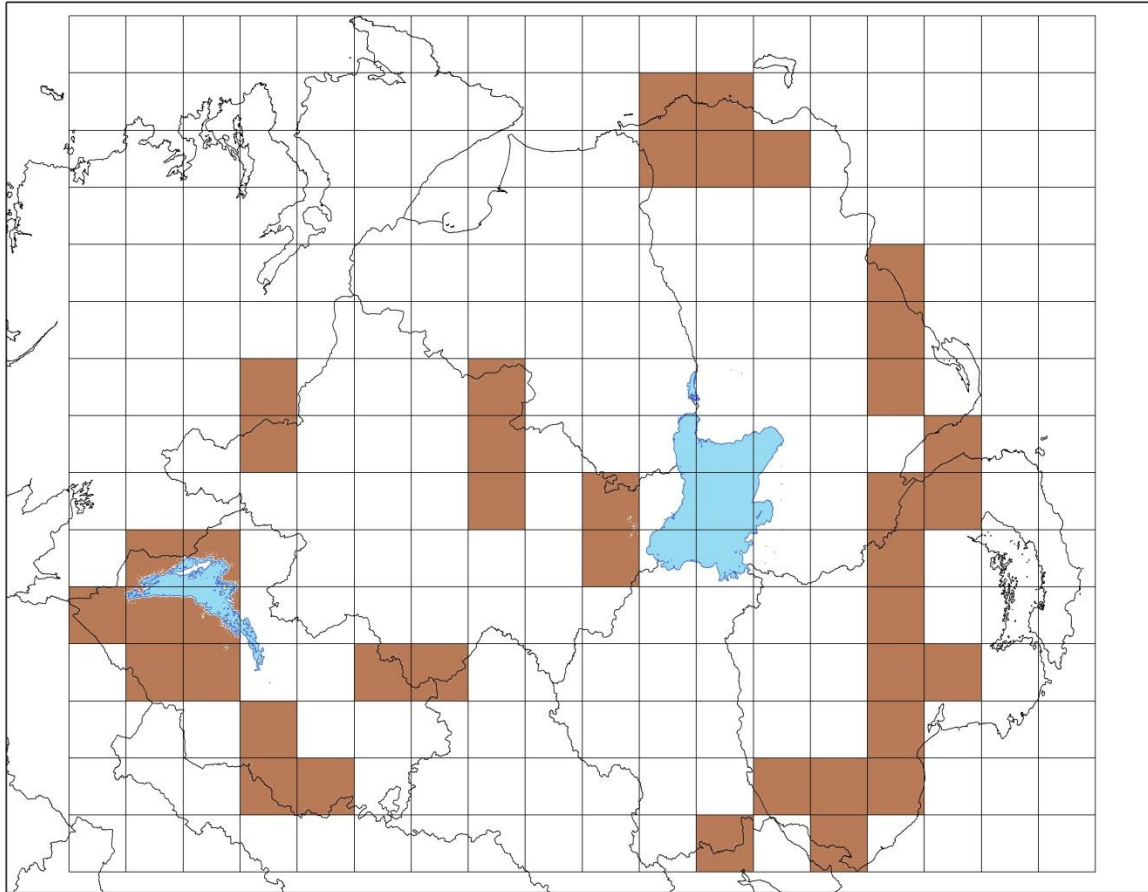


Figure 9. The 10km² squares containing at least one record of pine marten during the 2017 survey.

The areas of Northern Ireland that have both red and grey squirrel presence are shown in figure 10. These include the L/Derry, specifically around the city, north Antrim, north Down and around the Mourne.

The only areas that have both grey squirrels and pine marten are in the east of the country, in Antrim and Down.

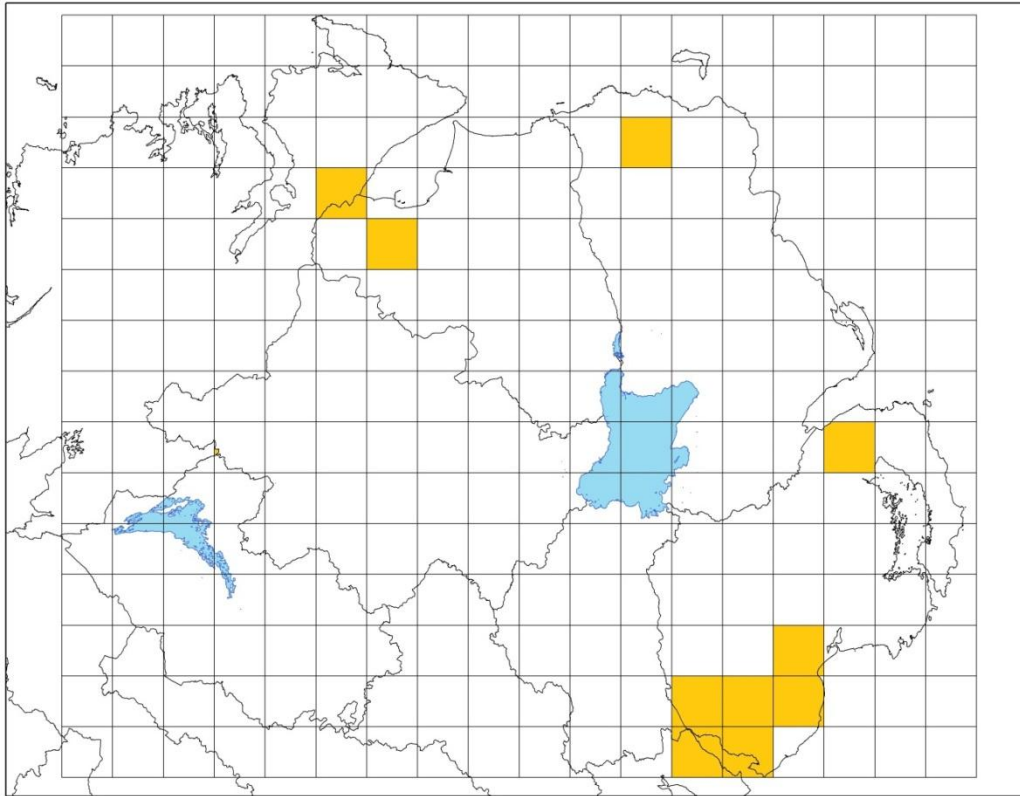


Figure 10. The 10km² squares that contain both red and grey squirrel records during the 2017 survey

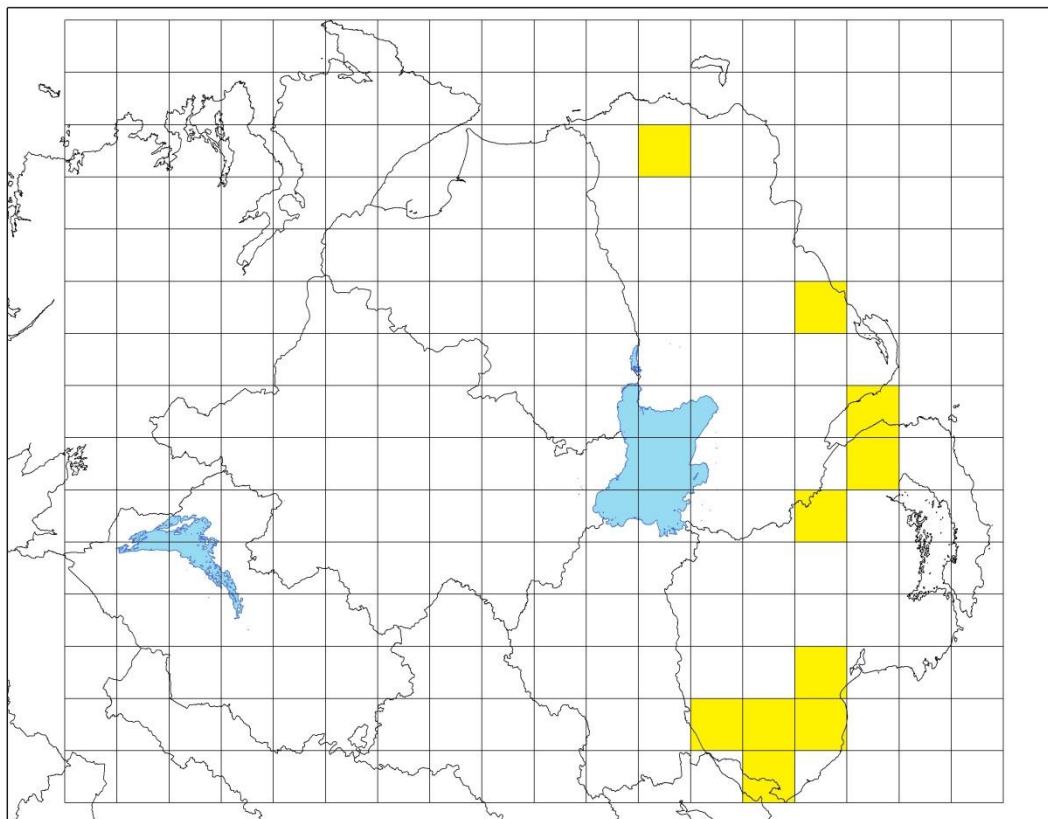


Figure 11. The 10km² squares that contain both grey squirrel and pine marten records during the 2017 survey.

3.3 Comparison with 2014/2015 survey

It is very difficult to directly show any patterns in presence and absence of these species with only two years' worth of data, but some comparisons can be made between years. The results of the 2017 survey are very similar to the results shown in the 2014/2015 survey conducted by Dr. Tosh. Although there were more forests surveyed in the 2014/2015 survey, the 2017 survey covered a larger area. There is a vast difference between the numbers of squares containing grey squirrels, but it is important to consider this could be due to differences between the survey periods rather than a reduction in grey squirrel range. A continuation of the survey in future years will allow some estimation into the effect conservation work is having on the range of these species.

Table 3. Comparing the 2017 survey to the 2014/2015 survey.

	2014/2015 survey	2017 survey (not including Inishowen peninsula squares)
Coverage	41 squares not surveyed	36 squares not surveyed (3 additional squares in Donegal)
Number of squares with grey	55	31
Number of squares with red	40	43
Number of squares with pine marten	46	40
Number of squares with grey and red	10	10
Number of squares with grey and pine marten	9	10

4. Conclusions and recommendations

This project set out to replicate the survey performed by Dr. Dave Tosh in 2014/2015. Although some of the counties do not have the coverage that was garnered during the original survey, this survey does cover a wide area and shows similar results.

4.1 Rapid response networks

One of the results that should be highlighted was the lack of grey squirrel records in Fermanagh. This could be due to a current absence or a very low density of this species in the area. Although, this is encouraging it is important not to be complacent regarding the potential for incursions from Co. Tyrone. In this area in particular, it would be helpful to develop a network of monitoring sites in north east Fermanagh to identify any attempts to re-colonise by the grey squirrel and have a rapid response control capacity in place to remove any individuals recorded extremely quickly.

Another potential area that could benefit from a rapid response network to grey squirrel sightings is the Glens of Antrim. Currently there are a number of areas in this range that have just red squirrels recorded, but there is a possibility of incursion of grey squirrel from the south, and west. It is possible that volunteer groups and organisations working together in this area could prevent any re-colonisation of grey squirrels.

4.2 Volunteer recruitment for grey squirrel control

The presence of grey squirrels in the Mourne/Strule Valley and the Omagh area is possibly further isolating small known populations of red squirrels in the Sperrins, especially the Gortin area, from those in west Tyrone. A strategic and well-resourced programme of grey squirrel control in the Mourne/Strule Valley and Omagh area could be beneficial for these smaller populations.

Another area where there is currently not a strategic grey squirrel control programme in place would be on the Donegal side of Lough Foyle. There is a gap currently between the work done by the North West Red Squirrel Group and Wild Inishowen which is particularly worrying given the amount of squares with grey squirrels present in the area. In the north west of Ulster it is extremely important that groups on both sides of the border work together to stop the spread of the grey squirrel further into the Inishowen peninsula and either side of the Foyle. Using Lough Foyle to strategic advantage in the removal of grey squirrels as a physical barrier to start from could be a possible control strategy for this area.

In north Down the grey squirrels seem to be primarily located at the north of the Ards peninsula, with none recorded south of Ballywalter in either survey. This could be an incredibly strategic area for grey squirrel control with water to either side of the peninsula

and a bottleneck at the top of the peninsula acting as a pinch point for greys moving into the area.

4.3 Areas needing increased survey effort

In the 2018 survey it would be beneficial to close some of the gaps there are currently in the coverage. These include the areas around the border region of Armagh, Tyrone and Monaghan especially. There was great success including a biodiversity group to cover a specific area with the Cookstown Wildlife Trust in mid-Ulster and this could be a possible solution in other areas.

It is likely that pine marten have a wider distribution in Fermanagh and west Tyrone than that recorded in the 2017 survey; it would be useful to have greater survey coverage in east Fermanagh/west Tyrone in 2018.

The data in the Mournes was particularly reliant on data from a ranger creating bias in results from this area. In 2018 it would be beneficial to transfer some of the forests covered by the ranger over to volunteers in the area.

There is possibly some bias from groups sticking to the woodlands and feeding areas they have been using for long periods of time, influencing the time the squirrels took to find the feeder. For this survey sticking to the time period of 7-14 days was suitable to conservatively discover populations of squirrels and pine martens in woodlands. In some of the areas where it was surprising that there was no species recorded it could be beneficial for groups to go back after the survey period to leave equipment out for longer to discover possible low density populations that would need conservation effort.

4.4 Recommendations for organisations

Organisations that own land within any of the areas with grey squirrels in either the 2014/2015 survey or the 2017 survey should take measures against this invasive species. Either by training staff on grey squirrel control measures or by allowing trained volunteer groups to control the species on their behalf. Grey squirrels are associated with tree damage which can lead to an estimated cost of £10 million in Britain and €4.5 million on the island of Ireland (Kelly *et al.* 2013), so it would be financially beneficial for the organisation to control grey squirrels.

It is important that organisations working in the same area join together to create a comprehensive control strategy for the area. Working independently without a strategy for grey squirrel eradication will allow the surrounding areas to act as a reservoir for grey squirrels from which they can repopulate.

Organisations which are in areas with a population of red squirrels that are currently not threatened by grey squirrels should implement rapid response networks in their area to monitor for greys coming into the area.

5. Acknowledgements

Thanks are given to our funders Life 14, Heritage Lottery Fund and National Lottery Players and the Northern Ireland Environment Agency. We would like to thank all the red squirrel groups, biodiversity groups and individual volunteers that took part in the 2017 survey.

Without volunteers giving up so much of their spare time we would never have been able to cover such a vast area and get such a comprehensive view of the species in Northern Ireland. We would also like to thank the private landowners and organisations that allowed staff and volunteers onto their land to survey for squirrels and pine marten. We hope that all the organisations involved use the information collected to inform their own strategies for the removal of grey squirrels and conservation of red squirrels.

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