

Report on Red Squirrel Trapping Project in Tywi Forest, February-March 2008

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1. Introduction

The red squirrel (*Sciurus vulgaris*) has become a priority species within the UK Biodiversity Action Plan on account of its widespread and long-term decline that continues to accelerate. In Wales it has become confined mostly to a few sites in Anglesey, Gwynedd, Conwy, Denbighshire and central Wales, with only sporadic and often unconfirmed reports elsewhere. It is seriously threatened everywhere within this range.

This trapping session was commissioned by the Mid Wales Red Squirrel Partnership (MWRSP) as part of the ongoing project aimed at conserving the population of red squirrels in Mid Wales. The Partnership includes Carmarthenshire County Council, Powys County Council, Private Forest Manager, Countryside Council for Wales, Forestry Commission Wales, Brecknock Wildlife Trust and South & West Wales Wildlife Trust.

1.1 Aims

The aim of the trapping sessions was to capture red squirrels (*Sciurus vulgaris*) in Tywi forest. This followed on from earlier trapping sessions carried out in the winter of 2005 and 2006 when two red squirrel were caught near Llyn-du in north Tywi and in 2005 in south Tywi and Irfon forests when 14 red squirrels were caught in Y Fannog and Nant yr Hwch. A trapping session carried out in March and April 2007 didn't result in any captures of red squirrels though grey squirrels were caught.

It was hoped that data collected would provide additional information regarding red squirrel distribution and population size in Tywi Forest. DNA samples were to be gathered from each individual red squirrel captured for subsequent genetic analysis, with the aim of assessing (i) level of genetic variation in mid Wales relative to other Welsh localities and (ii) relationship of squirrels captured in these new sites to squirrels previously captured in Y Fannog, Nant yr Hwch, Bryn Arau Duon and Llyn Du and relationship of these squirrels to other Welsh, UK and European populations.

An added benefit of trapping for red squirrels is the capture and killing of grey squirrels and the collection of grey squirrel blood to determine the incidence of squirrel-pox virus in the local population.

2. Survey site selection

Tywi Forest is an extensive area of coniferous plantations in central Wales in the counties of Ceredigion and Powys. It includes land which is managed by the Forestry Commission (Llanymddyfri Forest District) on behalf of the National Assembly for Wales. There are also extensive private forests in the area managed by Tilhill Ltd, SelectFor Ltd, Flintshire Woodlands and other private forest managers.

This area of Mid Wales forest amounts to an estimated 17,000 hectares with over

10,000 hectares managed by Forestry Commission and extends from Pontrhydfendigaid in the north-west to Llanwrtyd in the east to Pumsaint in the south. To date, only relatively small areas concentrated for example around Y Fannog, Nant yr Hwch, Bryn Arau Duon have been intensively surveyed, and even there for only relatively short trapping sessions. In addition, trapping has been concentrated in areas of mainly lodgepole pine of cone bearing age (>15 years old). There is evidence that squirrels favour pine over spruce due to the food value of the seeds and the more frequent coning of lodgepole pine. Lodgepole pine is the most common conifer that supplies suitable food for red squirrels in Tywi forest and although it is not regarded as being as nutritious or the seeds as big as Scots pine or Norway spruce seeds, it does produce prodigious quantities of cones and seed on a frequent and regular basis. Although the seeds are smaller than Norway spruce and Scots pine seeds, lodgepole pine commences coning at an earlier age and cones every two to three years. In addition, lodgepole pine has the characteristic of retaining seeds in some cones for several years which can help supply food to the squirrels in a poor coning year. Norway spruce and Scots pine are rare in Tywi. As lodgepole and Scots pine amounts to less than 7% of these forests in mid Wales this has been helpful in focussing of trapping effort on a smaller area of the forest.

Following discussion by management team it was decided that it would be beneficial to expand the trapping effort to encompass areas not previously surveyed or trapped. It was decided to continue trapping effort in pine areas as it would take considerable effort and resources to survey the very extensive Sitka spruce areas. Therefore, following consultation with FCW, areas of lodgepole pine of cone bearing age were identified from stock maps in Cwm Berwyn and Clywedog plantations and Nant-y-neuadd. FCW offered to carry out the initial survey of pine in these areas to determine whether chewed pine cones and signs of squirrels were present.

Unfortunately, FCW rangers reported that there were no signs of feeding by squirrels in Cwm Berwyn and Clywedog plantations and only limited signs at Nant-y-neuadd.

During May 2007, a red squirrel was reported in Dalar-wen. There was discussion regarding the origin of this squirrel and whether it was a red squirrel from nearby Bryn Arau Duon or Y Fannog or whether there could be a resident population present. Dalar-wen had been trapped on previous occasions and no red squirrels were captured while a small number of grey squirrels were captured. It was suggested during Partnership discussions that it would be desirable for future trapping sessions, that red squirrels should be pit-tagged (following appropriate training) in order to learn more about red squirrel movements and dispersal.

Based on the presence of lodgepole pine and other suitable habitat in target areas, recent cone feeding in Nant-y-neuadd and the recent sighting of a red squirrel at Dalar-wen, the management team recommended that Dalar-wen and Nant-y-neuadd should be the focus of trapping on this occasion. Nant-y-neuadd forms a peninsula which juts in a southerly direction into Llyn Brianne and is therefore relatively isolated. The northern end is generally open due to recent clearfells. It has a high proportion of lodgepole pine in the southern part of the block on steep slopes and cliffs.

2.1 Field survey

Prior to pre-baiting, areas identified from maps were visited to assess for signs of squirrels. Dalar-wen was surveyed for signs on the 21st January 2008 and Nant-y-neuadd on the 29th January.

Field survey work involved looking for signs of squirrel activity including feeding signs on cones and shoots, dreys and evidence of tracks and trails by squirrels on tree trunks and limbs. Whole maize grain was scattered on the ground in areas where there was evidence of squirrel feeding and this was used to confirm recent presence of squirrels, although it was not possible to distinguish between red and grey squirrel feeding signs.

Very few recent feeding signs were observed in lodgepole pine compartments while chewed Sitka spruce cones were found in spruce plantations adjacent to pine areas. It was observed that no lodgepole pine cones had been produced during the immediate coning season and most of the cones present were retained unopened cones from earlier seasons. A few lodgepole pine cones chewed by squirrels were found although it was impossible to identify which species of squirrel had eaten them, and it was not possible to date the cones. Mature Norway spruce at Nant Llety-gleision and Nant Brianne in Dalar-wen were visited and were found to have cones on the trees and on the ground surrounding the trees, but no chewed cones were found.

3. Method

Trapping was carried out in accordance with Forestry Commission Practice Note 'Controlling Grey Squirrel Damage to Woodlands'. Huw Denman has a red squirrel trapping and handling licence and Phil Harries is a nominated agent.

3.1 Placement of Individual Traps and 'Pre-baiting'

- Field survey of areas identified as potential red squirrel habitat was carried out to confirm presence of squirrels. Field survey work involved looking for signs of squirrel activity including feeding signs on cones and shoots, dreys and evidence of tracks and trails by squirrels on tree trunks and limbs.
- Whole maize grain was scattered on the ground in areas where there was evidence of squirrel feeding and this was used to confirm their recent presence (kernels removed from the maize leaving a characteristic v-shape), although it was not possible to distinguish between red and grey squirrel feeding signs.
- Thirty-three traps were placed in groups of two to five in nine sites at each study location.
- Traps employed were modified mink traps; live-single-capture cage trap attached to a wooden platform, fitted with a wooden box in which squirrels could take refuge after being captured.
- Each trap was positioned at approximately 1.7 metres up each tree and tied onto the branches using plastic ties or placed on the ground. The entrance of the trap was placed where possible to face the trunk of the tree or a branch used for arboreal travel to encourage squirrels to enter the traps and to reduce exposure of squirrels to predators.
- The ground was 'pre-baited' in a 20 metre radius of each trap with whole

maize only, and the traps pre-baited with two handfuls of whole maize with the addition of peanuts in a 5:1 ratio and left unset and open.

- Pre-baiting commenced 5 days prior to trapping. Traps were visited on 2 occasions before traps were set to replenish pre-bait as required. Maize was spread on the ground on a smaller radius of approximately 3 metres during the second visit and only the traps were pre-baited prior to setting the traps.
- The ground was only pre-baited on the first two occasions, after which, only traps were pre-baited. During visits, trap and ground pre-bait was examined for signs of squirrel feeding on the maize.

3.2 Setting Traps

- Traps were baited daily with a mixture of mostly maize with some peanuts. Traps were left set over night and checked twice daily. Traps were initially viewed from a distance before approaching traps in order to reduce disturbance.
- Traps remained in a set position for 10 days. During this period the next consecutive location identified for trapping would be pre-baited in preparation for trapping 10 days later.
- Dalar-wen was trapped during the first 10 day session, during which time Nant-y-neuadd was surveyed and pre-baited.
- Following each site trapping session, all traps utilized were cleaned thoroughly, disinfected and left to dry, before employing in the subsequent survey site. This was performed in order to reduce risk of spreading disease, especially of squirrel-pox virus. Traps were also disinfected immediately after the capture of a grey, before re-setting, during trapping sessions.

3.3 Methodology used for Processing Captured Squirrels

- Grey squirrels were transferred from the traps to a hessian sack (separate to that used to handle red squirrels), and as the law necessitates, humanely dispatched.
- A blood sample was taken for subsequent analysis for squirrel-pox virus antibodies, this was performed immediately after dispatching the squirrel (1ml of blood collected into a 2ml phial labeled with the squirrel I.D. code; obtained either directly from the heart using a medical needle and syringe, or from the aorta after opening the abdomen down the ventral midline with a scalpel blade. Separate scalpel blades were used on each occasion to avoid contamination.)
- The captured and dispatched squirrel was weighed and examined to determine sex, age-class and condition, including presence of parasites or signs of disease.
- Data were recorded on Grey Squirrel Recording Forms
- Blood samples collected were allowed to clot and were stored in a fridge before sending to Moredun Research Institute (Penicuik) for analysis.

3.4 Location of traps

Table 1

Table showing location of squirrel traps for first and second trapping sessions

Trap number	Location number	Location	Map ref	Tree species	Comment
1	1	Dalar-wen	SN785995	Oak/hemlock/pine	
2	1	Dalar-wen	SN785995	Oak/hemlock/pine	
3	1	Dalar-wen	SN785995	Oak/hemlock/pine	
4	1	Dalar-wen	SN785995	Oak/hemlock/pine	* see note
5	2	Dalar-wen	SN799503	Lodgepole pine	
6	2	Dalar-wen	SN799503	Lodgepole pine	
7	2	Dalar-wen	SN799503	Lodgepole pine	
8	2	Dalar-wen	SN799503	Lodgepole pine	
9	2	Dalar-wen	SN799503	Lodgepole pine	
10	3	Dalar-wen	SN798504	Lodgepole pine	
11	3	Dalar-wen	SN798504	Lodgepole pine	
12	3	Dalar-wen	SN798504	Lodgepole pine	
13	3	Dalar-wen	SN798504	Lodgepole pine	
14	3	Dalar-wen	SN798504	Lodgepole pine	
15	4	Dalar-wen	SN790506	Sitka spruce	
16	4	Dalar-wen	SN790506	Sitka spruce	**see note
17	4	Dalar-wen	SN790506	Sitka spruce	
18	4	Dalar-wen	SN790506	Sitka spruce	
19	5	Nant-y-neuadd	SN804506	Sitka spruce	
20	5	Nant-y-neuadd	SN804506	Sitka spruce	
21	6	Nant-y-neuadd	SN803507	Sitka spruce	
22	6	Nant-y-neuadd	SN803507	Sitka spruce	
23	6	Nant-y-neuadd	SN803507	Sitka spruce	
24	6	Nant-y-neuadd	SN803507	Sitka spruce	
25	7	Nant-y-neuadd	SN804509	Lodgepole pine	
26	7	Nant-y-neuadd	SN804509	Lodgepole pine	
27	8	Nant-y-neuadd	SN803512	Lodgepole pine	
28	8	Nant-y-neuadd	SN803512	Lodgepole pine	
29	8	Nant-y-neuadd	SN803512	Lodgepole pine	
30	9	Nant-y-neuadd	SN805511	Lodgepole pine	
31	9	Nant-y-neuadd	SN805511	Lodgepole pine	
32	9	Nant-y-neuadd	SN805511	Lodgepole pine	
33	9	Nant-y-neuadd	SN805511	Lodgepole pine	

** See results of trapping session below.

* Brown rat captured

4. Results

4.1 Grey squirrels

Only one grey squirrel was caught in 26 man-days of trapping.

Table 2

Results of trapping sessions

Date	Squirrels caught	Location
16/02/08	Female grey – 400grms	Dalar-wen
Total number	1	

4.1.1 Results of Squirrel-pox virus tests

Blood sample sent away for analysis on 13th March and awaiting results.

4.2 Red squirrels

No red squirrels were caught during this trapping session. However, on the 6th March at 10.00am, the trapper, Phil Harries saw a red squirrel crossing the road near Hafdre, in the northern part of the Nant yr Hwch forestry block. The squirrel was seen crossing the road in a west to east direction and came out of a Norway spruce plantation and entered a Japanese larch plantation. Red squirrels have been captured and observed in this general area on past occasions. Nant yr Hwch and Nant-y-neuadd are geographically close to each other but are separated by the open water of Llyn Brianne and open land around Hafdre.

Table 3

Summary of red squirrel sightings associated with trapping sites

Date	Location	Map ref	Recorder	Details
May 07	Dalar-wen			
06/03/08	Hafdre, Nant yr Hwch	SN805587	D P Harries	Seen crossing road

5. Discussion

The evidence of chewed cones and feeding on maize bait suggests that squirrels were present in trap locations. Bearing in mind that the traps were set in each location for a total of 26 days, the result of only a single grey squirrel captured is disappointing, particularly compared to the results of the winter of 2005/06 when 46 grey squirrels and two red squirrels were captured in Tywi forest.

The possible factors affecting the results have been discussed in previous reports. However, it is worth re-examining these potential factors.

It has been suggested that red squirrels will not use feeding stations or enter cage traps while larger and more aggressive grey squirrels are still present, and therefore a longer trapping session would possibly result in red squirrels being captured following the removal of the grey squirrels. However, only one grey squirrel was captured over a prolonged trapping session so it is unlikely that the presence of grey squirrels could be a strong factor on this occasion.

It is more likely that the poor pine cone crop has had an influence on either the population density of squirrels or the presence of squirrels in the vicinity of the pine stands, or that both factors apply.

A possible factor for the lack of success at Dalar-wen may be that much of the easterly part of the forest block has now been clearfelled, and has been fragmented into three much smaller blocks. These blocks are isolated by the surrounding clearfells and Llyn Brianne and may be too small to maintain permanent red squirrel populations, and too isolated to be used by neighbouring populations. Some of the lodgepole pine in compartment 3365 had only been recently clearfelled, thus reducing available habitat even further.

Another factor to be taken into consideration is the remoteness of much of the available habitat. This remoteness may have mitigated against clearfelling due to the costs involved in harvesting and access, and therefore provided large areas of good quality habitat for red squirrels. However, these areas are already becoming isolated from each other by felling which is not sympathetic to squirrel conservation. In addition, these areas have not been adequately surveyed for squirrel signs because of the difficulties and costs associated with remote areas and difficult terrain. Remote areas which are recommended for further survey are the western parts of Dalar-wen (cpts 3381 and neighbouring cpts) and steep slopes in Nant-y-neuadd (Cpts 3346, 3349 & 3351).

The trapping strategy in recent trappings sessions has been to target areas of lodgepole pine or other species in the vicinity of lodgepole pine where there have been recent feeding signs or recent red squirrel sightings. This has proved useful in that it has facilitated the focussing of efforts on a small proportion of the potential habitat available throughout Tywi and adjacent forests. This has generally been efficient and successful.

However, if there is a poor coning phase (winter 06-07 and 07-08) when the lodgepole does not produce such a good crop this may influence the population of red squirrels or cause those red squirrels present to disperse to other feeding areas, resulting in the search becoming more difficult due to the much more extensive areas involved. In other words, it may be possible that when food availability is low, red squirrels may range over the much more extensive area of Sitka spruce, than otherwise would have been the case. It may therefore be prudent to use more time and resources at the initial stage to survey more extensive areas (at the expense of potential trapping time when funds are limited) with the purpose of establishing where there is available squirrel food as well as signs of feeding and other squirrel signs. This would provide better information as where to target trapping efforts in the future and hopefully improve trapping results.

The MWRSP through live capture and recording sightings of red squirrels has been very successful in proving that red squirrels occur throughout most if not all of Tywi forest and adjacent forests. However, trapping results may reflect the many and variable factors involved in trapping in such a large area and over several seasons. It is becoming clearer that there is much more to be learnt about red squirrel population numbers, density, movement and range in mid Wales. In addition to more conservation efforts through grey squirrel control and habitat management, more work is also needed in habitat survey.

MWRSP has always maintained good communications with FCW, and FCW have generally responded very positively to recommendations provided by MWRSP. It was

therefore disappointing to see that areas of lodgepole pine are still being clearfelled. It is acknowledged that there may be sound landscape or other reasons for clearfelling lodgepole pine on certain occasions. However, in most circumstances in Tywi forest, clearfelling of lodgepole pine can only be regarded as a lost opportunity to maintain red squirrel habitat in an otherwise relatively poor habitat network. In addition, since economic returns from pine is extremely poor, and the site conditions often make harvesting very expensive, it would make sound economic sense for FCW to retain these areas rather than incurring costs of harvesting and replanting. Recommendations have been provided in a previous report for how FCW can successfully integrate red squirrel conservation with other important objectives such as timber production (without compromising economic performance or timber production forecasts). These recommendations include retaining areas of pine coupled with maintaining habitat connectivity between these areas.

Huw Denman
14th March 2008

6. Appendices

6.1 Maps showing locations of traps

Map 1 – Location of traps in Dalar-wen.

Map 2 – Location of maps in Nant-y-neuadd.