

Report on Red Squirrel Trapping Project in Tywi Forest, March - April 2007

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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.

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 owned and 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.

Following advice from the management committee it was decided that the same locations as last year should be trapped again this year; namely Llyn-du and Moel-

prysgau. In addition, two new areas centred around Dôlgoch and Esgair Hirnant were selected, based on presence of lodgepole pine. Both areas have plantations of lodgepole pine surrounded by Sitka spruce and larch and are in a relatively sheltered position facing south-east. The new areas were surveyed for recent signs of squirrels in accessible lodgepole pine on the 6th March 2007.

Suitable habitat targeted for trapping comprised one or more of the following tree species: Norway spruce *Picea abies* (Lurz *et al.*, 1995) and Scots pine *Pinus sylvestris* (Gurnell *et al.*, 1997; Cartmel, 2000b); Lodgepole pine *Pinus contorta*, Japanese larch *Larix kaempferi*, and Douglas fir *Pseudotsuga menziesii* of seed and cone bearing age. The three study areas are primarily comprised of Sitka spruce *Picea sitchensis* with lesser areas of lodgepole pine, larch with few areas of other species. Sitka spruce and larch are generally little used by red squirrels (Bryce, Cartmel & Quine 2005). 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 early age, cones every two to three years and produces large quantities of cones and seeds during coning years. In addition, lodgepole pine has the characteristic of retaining seeds in some cones for several years. Norway spruce and Scots pine are rare in Tywi.

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.

The field surveys identified numerous squirrel feeding signs on cones and signs of arboreal tracks in lodgepole pine plantations in the three survey locations. Evidence of recent squirrel feeding was confirmed from the recently spread maize.

It was observed that very few lodgepole pine cones had been produced during the immediate coning season and most of the cones present were retained unopened cones from the previous season. 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 precisely.

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.
- Up to 30 traps were placed in groups of three in 10 sites at each study location. Each site was in lodgepole pine where there was evidence of feeding on cones and maize.
- 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.
- Esgair Hirnant and Dôlgoch was trapped during the first 10 day session, during which time Llyn Du and Moel Prysgau was surveyed and pre-baited.
- Llyn Du and Moel Prysgau was trapped during the second 10 day session, during which time Esgair Hirnant and Dôlgoch 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 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 to be 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.)
- Each squirrel was weighed and examined to determine sex, age-class and condition, including presence of parasites or signs of disease.
- Data were recorded in 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 third trapping sessions

Trap number	Location number	Location	Map ref	Tree species	Comment
1	1	Esgair Hirnant	SN804585	Lodgepole pine	
2	1	Esgair Hirnant	SN804585	Lodgepole pine	
3	1	Esgair Hirnant	SN804585	Lodgepole pine	
4	1	Esgair Hirnant	SN804585	Lodgepole pine	
5	2	Esgair Hirnant	SN804584	Lodgepole pine	
6	2	Esgair Hirnant	SN804584	Lodgepole pine	
7	3	Esgair Hirnant	SN804583	Lodgepole pine	
8	3	Esgair Hirnant	SN804583	Lodgepole pine	
9	3	Esgair Hirnant	SN804583	Lodgepole pine	
10	3	Esgair Hirnant	SN804583	Lodgepole pine	
11	4	Esgair Hirnant	SN804582	Lodgepole pine	
12	4	Esgair Hirnant	SN804582	Lodgepole pine	
13	5	Esgair Hirnant	SN805582	Lodgepole pine	
14	5	Esgair Hirnant	SN805582	Lodgepole pine	
15	5	Esgair Hirnant	SN805582	Lodgepole pine	
16	7	Cwm Hirnant	SN801582	Lodgepole pine	
17	7	Cwm Hirnant	SN801582	Lodgepole pine	
18	7	Cwm Hirnant	SN801582	Lodgepole pine	
19	8	Cwm Hirnant	SN802582	Lodgepole pine	
20	8	Cwm Hirnant	SN802582	Lodgepole pine	
21	8	Cwm Hirnant	SN802582	Lodgepole pine	
22	9	Dôlgoch	SN801575	Lodgepole pine	
23	9	Dôlgoch	SN801575	Lodgepole pine	
24	10	Dôlgoch	SN801574	Lodgepole pine	* see note
25	10	Dôlgoch	SN801574	Lodgepole pine	* see note
26	10	Dôlgoch	SN801574	Lodgepole pine	
27	10	Dôlgoch	SN801574	Lodgepole pine	

Table 2

Table showing location of squirrel traps for second trapping session

Trap number	Location number	Location	Map ref	Tree species	Comment
1	11	Llyn-du	SN777629	Lodgepole pine	
2	11	Llyn-du	SN777629	Lodgepole pine	
3	11	Llyn-du	SN777629	Lodgepole pine	
4	12	Llyn-du	SN773624	Lodgepole pine	
5	12	Llyn-du	SN773624	Lodgepole pine	
6	12	Llyn-du	SN773623	Lodgepole pine	
7	13	Llyn-du	SN773623	Lodgepole pine	
8	13	Llyn-du	SN773624	Lodgepole pine	
9	14	Llyn-du	SN761617	Lodgepole pine	
10	14	Llyn-du	SN761617	Lodgepole pine	
11	14	Llyn-du	SN761617	Lodgepole pine	
12	15	Llyn-du	SN760617	Lodgepole pine	
13	15	Llyn-du	SN760617	Lodgepole pine	
14	16	Llyn-du	SN758617	Lodgepole pine	
15	16	Llyn-du	SN758617	Lodgepole pine	
16	16	Llyn-du	SN758617	Lodgepole pine	
17	17	Llyn-du	SN759625	Lodgepole pine	
18	17	Llyn-du	SN759625	Lodgepole pine	
19	17	Llyn-du	SN759625	Lodgepole pine	
20	17	Llyn-du	SN759625	Lodgepole pine	
21	18	Moel-prysgau	SN825601	Lodgepole pine	
22	18	Moel-prysgau	SN825601	Lodgepole pine	
23	18	Moel-prysgau	SN825601	Lodgepole pine	
24	19	Moel-prysgau	SN821601	Lodgepole pine	
25	19	Moel-prysgau	SN821601	Lodgepole pine	
26	19	Moel-prysgau	SN821601	Lodgepole pine	
27	19	Moel-prysgau	SN821601	Lodgepole pine	
28	19	Moel-prysgau	SN821601	Lodgepole pine	
29	19	Moel-prysgau	SN821601	Lodgepole pine	
30	19	Moel-prysgau	SN821601	Lodgepole pine	

*see results of trapping session below.

4. Results of trapping sessions

Only three grey squirrels were caught in 30 man-days of trapping. This is in contrast to last year's trapping session when 46 grey squirrels were caught in a similar number of days. Evidence of maize feeding was seen in the vicinity of traps in all locations. No red squirrels were caught.

Table 3
Results of trapping sessions

Date	Squirrels caught	Location
01/04/07	Female grey – 430grms	Dôlgoch
02/04/07	Male grey – 505grms	Dôlgoch
05/04/07	Male grey – 517 grms	Dôlgoch
Total number	3	

4.1 Results of Squirrel-pox virus tests

Awaiting results sent to Brecknockshire Wildlife Trust

5. Discussion

The evidence of chewed cones and feeding on maize bait suggests that squirrels were present in trap locations and the three grey squirrels caught proved that there were squirrels present in the locations trapped. However, compared with the previous trapping session in the same general location of north Tywi forest the trapping results were poor. Several factors could be influencing the trapping results.

Work by Sarah Cartmel in Clocaenog forest shows that grey squirrels can periodically invade conifer forests when population numbers are high and when there is good food availability. Exhaustion of the food supply in broadleaved woodlands caused by high population numbers may also be a factor in the migration of greys from broadleaves to conifer forests. The successful trapping of 46 grey squirrels and two red squirrels in the trapping session of 2005/06 coincided with an excellent lodgepole pine coning year, which could have possibly attracted the high numbers of grey squirrels into the area, as well as providing food for the red squirrels. This had followed a good mast year in hazel the previous autumn which would have contributed to high numbers of hungry grey squirrels the following spring and summer. The cone crop on lodgepole pine during 2007 was poor and this may have been an important factor in the trapping results.

Competition for food and resources between red and grey squirrels is proven as a factor in the decline of red squirrels. Periodicity of coning and population dynamics of grey squirrels in adjacent broadleaved woodlands may need to be considered with regard to the future conservation of red squirrels in mid Wales. It is therefore particularly important that grey squirrel control is carried out when grey squirrel numbers are high in adjacent broadleaved woodlands and when there is good coning in pine stands.

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 have resulted in red squirrels being captured.

Very little is known about red squirrel population numbers, density, movement and range in mid Wales. As well as direct competition from grey squirrels present in the trapped areas and the poor cone crop other factors which may have contributed to the

low capture rate include the likely low population density of red squirrels or the fact that they were simply using another part of the forest at that particular time.

6. Appendices

6.1 Maps showing locations of traps

Map 1 – Location of traps at Dôlgoch & Esgair Hirnant

Map 2 – Location of traps at Llyn-du

Map 3 – Location of traps at Moel Prysgau

Huw Denman

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Amended March 2008