

Red Squirrel Survey of Threestoneburn Forest, Northumberland

Report Produced By

SFA Surveys
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1. BACKGROUND

1.1 The Brief

In June 2007, SFA Surveys were invited to undertake a squirrel survey of Threestoneburn Forest, specifically to:

- Confirm the presence of red squirrels
- Undertake a population assessment of red squirrels, if present
- Identify key habitat areas within the forest
- Assess the suitability of the surrounding habitat as a corridor for squirrel egress.

1.2 The Site

Threestoneburn Forest is located on the edge of the Cheviot Hills, and covers an area of 712.8 hectares. The woodland is predominantly Sitka spruce, with a small amount of lodgepole pine and Japanese larch, found both as single-species stands and in a mix with Sitka spruce. Planting began in 1967, although the majority was planted in the 1970s, with a small area added in 1982.

2. METHODOLOGIES

2.1 Red Squirrel Presence

Organisations that may hold squirrel sightings records for the area will be contacted. During this survey, the presence of red squirrels will be confirmed by checking for feeding signs (nibbled cones). Any sightings will also be recorded.

2.2 Cone Transects

Cone Transects are a systematic assessment of complete cones on the forest floor, and the remains of cones fed on by squirrels. This indirect survey method can give an approximate estimate of the number of squirrels within a known area of forest, based on the average number of cones consumed. It must be remembered that the energy of seeds and cones can vary between individual trees and stands. Similarly, estimates for squirrel energy requirements represent an average and vary with climate and activity. The figures used in this report were calibrated using data from forests in northern England and southern Scotland, and therefore should provide a relatively accurate match for this site. This method does not distinguish between red and grey squirrels, and therefore is suitable for use in areas where only one species is present.

To undertake cone transects, the trees must be producing cones (over 20-30 years old, depending on species and site conditions). As even the youngest trees in the forest are 25 years old, this means that the entire forest fulfils this criterion.

The number of transects placed in each tree species should be representative of the forest composition, but it is important to ensure that there is more than one transect in each species, as cone distribution is patchy. Given the species composition of Threestoneburn Forest, transects were allocated as follows:

Sitka spruce	521.9ha	25 transects
Lodgepole pine	35.2ha	3 transects
Japanese larch	10.7ha	2 transects

Transects are only able to yield meaningful data for analysis from single-species stands, so mixed species stands were not included. Transect locations were evenly, but randomly, distributed across the forest block.

Transects were marked out as 25m x 2m lines, and all the uneaten cones and eaten cone cores along the transect counted. Each transect was subdivided into 25 sections, to facilitate accurate counting.

2.3 Habitat Assessment

Since the entire plantation is more than 25 years old, the whole block is suitable for red squirrels. Pine and larch are considered to be favoured by red squirrels, although they will also use Sitka spruce. The results of the cone transects will indicate the estimated number of squirrels living in the total forest area, and highlight areas of poor food availability.

The surrounding habitat was assessed visually, from both within and outwith the forest. At the request of Scottish Woodlands, particular attention was paid to the Lilburn Burn valley. This was surveyed on foot from Middleton Dean to the forest entrance.

3 RESULTS

3.1 Red Squirrel Presence

The Hancock Museum and Northumberland Wildlife Trust's Save Our Squirrels Conservation Officer were contacted. Threestoneburn Forest and the area immediately surrounding it is currently classed as red squirrel-only, although occasional sightings of grey squirrels have been reported to the south and east (e.g. Wooler, Morpeth) in recent years, as they have started to spread north. Red squirrel presence at Threestoneburn (from feeding signs) was confirmed during the Red Alert North East Reserves assessment process in 2002, although the forest was not selected as a Reserve.

Feeding signs (nibbled cones) were observed in 25 of the 30 cone transects. Transects where no 'squirrelled' cones were recorded were in areas which were coning poorly, with low total numbers of cones found within the transects.

In addition, two sightings of red squirrels were made during the course of the fieldwork. These were located at NT966202 and NT965198.

3.2 Cone Transects

The locations of the transects are marked on the accompanying map (Appendix A). The raw data from the cone transects is included as Appendix B. In order to calculate the mean squirrel density, transects were first sorted by tree species. The number of squirrelled cones was divided by the area of the transect for each transect, giving a squirrelled cone density for each transect. This is shown in table form in Appendix C. A mean was calculated for each tree species:

Tree Species	Mean Squirrelled Cone Density
Sitka spruce	0.3528
Lodgepole pine	0.0467
Japanese larch	0.11

These values were then multiplied by the energy value of the tree species, according to the values listed below (based on Gurnell *et al*, 2001).

Tree Species	Average Energy Content Of Cones
Sitka spruce	5.25kj
Lodgepole pine	2.48kj
Japanese larch	1.73kj

These figures were multiplied by 10,000 to convert to hectares, and then multiplied by the total hectareage of the tree species. This was then divided by the energy needed per red squirrel per year (142026kJ/year). Based on cone consumption (as discussed by Gurnell *et al.*, 2004), it can be estimated that Threestoneburn Forest supports a population of 69 red squirrels.

Tree Species	Mean Squirrelled Cone Density	Energy Value Per Cone (kJ)	Total Area (ha)	Estimated No. Squirrels
Sitka spruce	0.3528	5.25	521.9	68.1
Lodgepole pine	0.0467	2.48	35.2	0.3
Japanese larch	0.11	1.73	10.7	0.1
TOTAL ESTIMATED RED SQUIRREL POPULATION				68.5

3.3 Habitat Assessment

Within The Forest -

Only one of the cone transects did not provide any cones. This was Transect 11, in lodgepole pine on the southern edge of the forest. This appeared to be very stunted and distorted, which could be due to either unsuitable provenance of trees or the amount of exposure at this location. A further five transects did not include squirrelled cones – all of these transects recorded low numbers of total cones, suggesting unsurprisingly that red squirrels are most likely to feed in areas which are coning heavily.

Overall, there appeared to be a relatively even distribution of red squirrel feeding activity throughout the forest. The random selection of cone transect locations is intended to allow for variation in coning within compartments as well as across the site as a whole. As Threestoneburn is a mature conifer plantation, squirrels will be able to travel easily through the habitat and make best use of food resources as they become available.

Within The Surrounding Habitat -

Threestoneburn Forest is almost completely surrounded by open hill ground, consisting of a mosaic of acid grassland, upland heathland, bracken and bog.

The only obvious route for red squirrel emigration is along the Lilburn Burn. This provides a corridor of mature alder along the course of the burn, with patchy canopy cover for most of its length. In recent years this has been supplemented with native broadleaf plantings.

The majority of the valley through which the watercourse runs has been fenced off from stock, resulting in the development of a luxuriant field layer, dominated on the drier slopes by bracken and nearer the burn by extensive stands of horsetail, meadowsweet and rush species.

The last stretch of the burn, from the ford to the start of the forest, runs through open ground.

4 DISCUSSION & CONCLUSIONS

Referring back to the brief, this section provides the conclusions of this survey.

- ***Confirm the presence of red squirrels***

The survey confirmed the presence of red squirrels in Threestoneburn Forest.

- ***Undertake a population assessment of red squirrels, if present***

Cone transects indicate that based on cone consumption, it can be estimated that Threestoneburn Forest supports a population of 69 red squirrels. This would equate to a population density of 0.12 red squirrels/hectare, which is typical for this type of habitat (Lurz, Garson & Ogilvie, 1998).

- ***Identify key habitat areas within the forest***

Squirrel feeding signs were seen on 25 of the 30 cone transects. It can be concluded that they are using all areas of mature coning conifer habitat.

- ***Assess the suitability of the surrounding habitat as a corridor for red squirrel egress.***

Whilst red squirrels have clearly colonised the forest, possibly via the Lilburn Burn valley, in its present state it does not provide an ideal exit route option. Upon leaving the forest, red squirrels would have to cross open ground, moving through grassland and/or heathland and bracken before reaching mature trees. Once in the canopy they would have to keep moving in order to reach food sources at Middleton Dean and beyond, as there is little food availability within the Lilburn Burn valley. The recently planted native broadleaves are not old enough to provide either food or continuous canopy cover, and therefore are presently of no benefit to red squirrel dispersal.

If clearfelling the entire forest over a short period of time is the intention, a more suitable corridor for emigration is required. The existing native broadleaf planting is unlikely to achieve continuous canopy cover for at least another 10 years, and any new plantings will take longer still. A possible alternative would be to create a corridor specifically for this purpose, using faster-growing conifer species, planted at a closer spacing.

It must also be noted that any felling plans should be designed to ensure that red squirrels do not become isolated, by maintaining connectivity through the remaining mature conifer habitat to facilitate red squirrel movement. Due to the presence of red squirrels in this forest, care should be taken to ensure that all harvesting operations are undertaken outwith the breeding season (February to September inclusive).

The red squirrel is protected by its inclusion on Schedules 5 and 6 of the Wildlife & Countryside Act, 1981, and the Nature Conservation (Scotland) Act, 2004, under which it is an offence to either intentionally or recklessly:

1. Kill, injure or take any red squirrel.
2. Damage, destroy or obstruct access to any structure or place used by a red squirrel for shelter or protection.
3. Disturb a red squirrel while it is occupying a structure or place used for shelter or protection.

The surveyors strongly recommend that given the evidence of a good population of red squirrels in Threestoneburn Forest, a longer phased felling programme or an alternative method of red squirrel emigration (e.g. translocation) should be considered.

5 REFERENCES

Gurnell, J., Lurz, P.W.W. & Pepper, H. (2001) *Practical Techniques for Surveying and Monitoring Squirrels*. Forestry Commission Practice Note 11. Forestry Commission. Edinburgh.

Gurnell, J., Lurz, P.W.W., Shirley, M.D.F., Cartmel, S., Garson, P.J., Magris, L. and Steele, J. (2004) Monitoring red squirrels *Sciurus vulgaris* and grey squirrels *Sciurus carolinensis* in Britain. *Mammal Review*, **34**, 51-74.

Lurz, P.W.W., Garson, P.J. & Ogilvie, J.F. (1998) Conifer species mixtures, cone crops and red squirrel conservation. *Forestry*, **Vol 71**, No. 1.

Nature Conservation (Scotland) Act 2004 www.jncc.gov.uk

Red Squirrels Booklet. *SNH Publications*. Battleby, Perth.

6 ACKNOWLEDGEMENTS

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