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# Practical Techniques for Surveying and Monitoring Squirrels

PRACTICE NOTE

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**On behalf of the United Kingdom Red Squirrel Group**

## INTRODUCTION

Red squirrels (Figure 1) are native to Britain but their future survival is threatened by loss of habitat (Pepper and Patterson, 1998) and by the spread of the grey squirrel, a native of North America introduced into Britain in the 1870s. There is some evidence (Pepper *et al.*, 2001) that, given the right conditions, the native red can compete successfully with the introduced grey. But in managing habitats to create these conditions (Gurnell and Pepper, 1991) it is advisable to monitor squirrel populations to assess how numbers and distribution are responding to changes in habitat and management practices.

Techniques for monitoring squirrel populations must be cost-effective, preferably capable of being carried out by volunteer labour and harmless to the squirrel population. Direct or indirect methods of monitoring can be used.

This Practice Note provides advice on indirect methods; advice on direct methods is provided in Gurnell and Pepper (1994). Indirect methods do not involve handling squirrels and while not so accurate in assessing population densities they can be sufficiently accurate for monitoring purposes.

Monitoring is usually done to determine:

- the presence of red and/or grey squirrels;
- if present, their relative densities;
- changes in relative densities through time.

**Figure 1** Red squirrel.

Direct methods involving trapping and handling squirrels require particular skills. As red squirrels are fully protected under the Wildlife and Countryside Act 1981, a licence is required from the appropriate country agency (English Nature, Countryside Council for Wales, Scottish Natural Heritage) for any study that would interfere in any way with the animals or their nests. The grey squirrel is also subject to legislation that prevents any trapped or captive-held animal being released back into the wild (Pepper, 1990).

## METHODS

Five indirect methods can be used for surveying and monitoring squirrel populations (Table 1). Most are

**Table 1** Indirect methods for surveying and monitoring squirrels

| Method | Can it detect squirrel presence? | Can it distinguish red from grey? | How good is it for estimating densities? | What type of woodland? |
|---|---|---|---|---|
| Visual surveys | Yes | Yes | Moderate | All |
| Hair tube surveys | Yes | Yes | Poor–moderate | All |
| Drey counts | Not always | No | Poor–moderate | All* |
| Feeding transects | Yes | No | Moderate | Conifer |
| Whole maize bait | Yes | No | No | All |

*But difficult in dense plantations.

effective in assessing the presence of squirrels and, to varying degrees, giving density estimates. However, only two methods – visual surveys and hair tube surveys – can distinguish red from grey squirrels and so provide separate population assessments. Drey counts can be useful in some circumstances, but are not always reliable. Feeding transects can only be carried out in conifer woodland, although where hazel is present, the characteristic split shells can also be observed. The use of whole maize bait is a quick and easy method to ascertain whether squirrels of either species are present in a woodland.

Standardised methods allow the comparison of surveys carried out at different times or places or by different people. Surveys can be modified initially to take into account local circumstances, such as the area of woodland to be surveyed and the number of people who can help with the work. The method, season and survey effort (e.g. how often within one year and over how many years) should be carefully chosen with regard to the objectives of the project; once a method has been adopted, however, it should not be changed.

## VISUAL SURVEYS

Visual surveys involve making standardised time–area counts of squirrels. Surveys carried out each season for a number of years can monitor changes over time. Sightings are often just a fleeting glimpse of an animal as it moves through a leafy tree canopy and it is not always easy to distinguish red from grey squirrels, even though adult grey squirrels are about a third larger than red squirrels.

Surprisingly, general fur colour is not a reliable guide to identification. The dorsal coat of red squirrels varies considerably in colour from grey to brown or dark brown, or from sandy to bright red; the underside is whitish or creamy. Frequently the tail may be darker than the rest of the coat. During the autumn the ears grow long tufts which are at their finest in mid-winter (Figure 1), and then thin during the spring and by the summer have largely disappeared. The dorsal coat of grey squirrels also varies in colour, but is generally grey with some reddish brown on the back, sides, limbs and paws. The underside is white or pale grey. The underfur is grey but the longer guard hairs have a characteristic salt-and-pepper 'mottled' appearance resulting from their grey bases, black and brown shafts and white tips. Grey squirrels never have prominent ear tufts (Figure 2).

There are two methods of carrying out visual surveys. These are similar but the second gives greater accuracy.

### Basic method

This method involves walking along predetermined survey lines, through or alongside woodland, recording all the squirrels seen. First the survey area of woodland should be selected; it can be any size or shape. Several (ideally between 6 and 12) survey lines at a density of about one line per 10–20 ha are then marked out. Each line should be between 500 m and 1000 m long, and situated along rides or inspection racks, or between rows of trees within suitable squirrel habitat. A single observer walks a line on specified days of the year, starting as soon after first light as possible as this is the time when squirrels are most likely to be active. The observer should stop at 100 m intervals for 2–5 minutes, taking about 5 minutes to walk each intervening 100 m. Some observers may wish to use binoculars, but they are not essential. All squirrel sightings are recorded, together with time and place seen and behaviour. If the weather is unsuitable then the survey should be postponed. Squirrels are unlikely to be very active in heavy rain, strong winds or when it is very cold. The surveys should be repeated two to four times within a two-week period to take into account variations in weather and squirrel activity. The highest number of squirrels seen on a single visit should be recorded.

The data collected consist simply of the number of red and/or grey squirrels seen along the stated transect length, and may be used as a relative index of numbers to compare dates and sites. The method is not sufficiently accurate to measure density fluctuations over time as sightings will depend upon tree canopy density and seasonal variation in squirrel activity. Where woodlands are small and fragmented and cannot accommodate a 500 m long survey line, several woods of similar tree species and age composition may be combined.

**Figure 2** Grey squirrel.

## Distance sampling method

This method is essentially the same as the basic method, but gives improved accuracy by estimating the perpendicular distance of each squirrel seen to the survey line. This is done either by noting down the perpendicular distance *y* of each squirrel *S* seen to the survey line, or the distance from the squirrel *S* to the observer (the sighting distance *x*) and the angle between the direction of the squirrel and the survey line (the sighting angle α) (Figure 3). The perpendicular distance *y* can then be worked out as follows:

$$y = x \text{ sine } \alpha$$

As it is difficult to assess distances or angles in woodland it is a good idea to measure out some distances accurately with a tape measure until the observer gets his or her 'eye in'. However, this may disturb other squirrels in the area. In plantations, the regular spacing of trees in rows and between rows can be used as a guide. The distances from the line to the observed animals allows the estimation of the width of the sampling 'belt'. The width of the belt to either side of the transect line will depend on habitat, and will vary along the survey line according to habitat structure and 'visibility'. If the length of the line *l* is known, then *w* x *l* gives the area from which the squirrels were sampled; squirrel density can be estimated from the number of squirrels seen within that area. (Note that in an area where there are both red and grey squirrels, density should be estimated separately for each species.) Density estimation is described more fully below.

## What to do with the data

The number of animals seen can be used as a simple relative index of population size. Densities can be estimated by working out the area of the visual belt within which the animals have been seen.

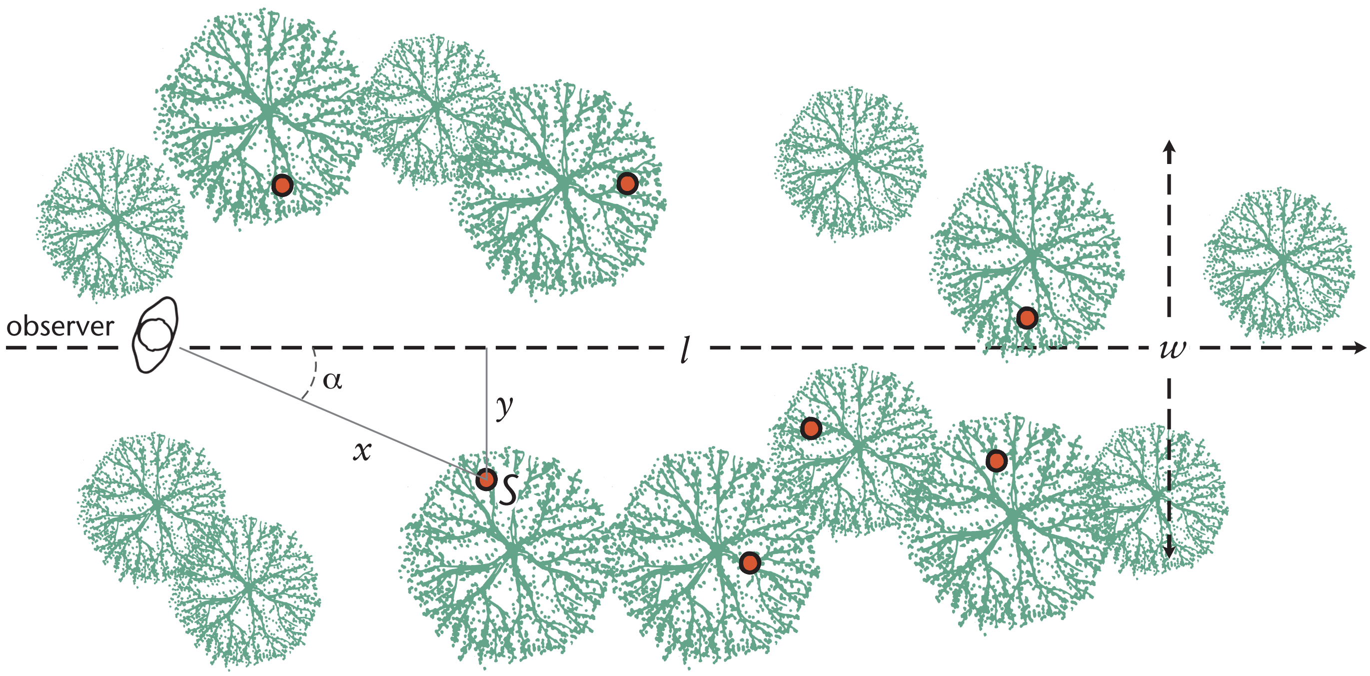
There are two methods of estimating the density of squirrels.

**Method 1**

The belt width *w* can be estimated by using a simple graphical method as outlined in Figure 4 overleaf. Objectively, this can be taken as the distance when the number of detections drops to approximately half the previous interval (Hoodless and Morris, 1993).

**Figure 3**

How to estimate the distance between the position of the squirrel seen (*S*) and the survey line. Red circles are squirrels in a wood and a survey line, length *l*, is walked in the direction of the arrow. The observer sees a squirrel (*S*) and notes down either the distance *y*, or the angle α and the distance *x*. *w* is the estimated width of the sampling belt.



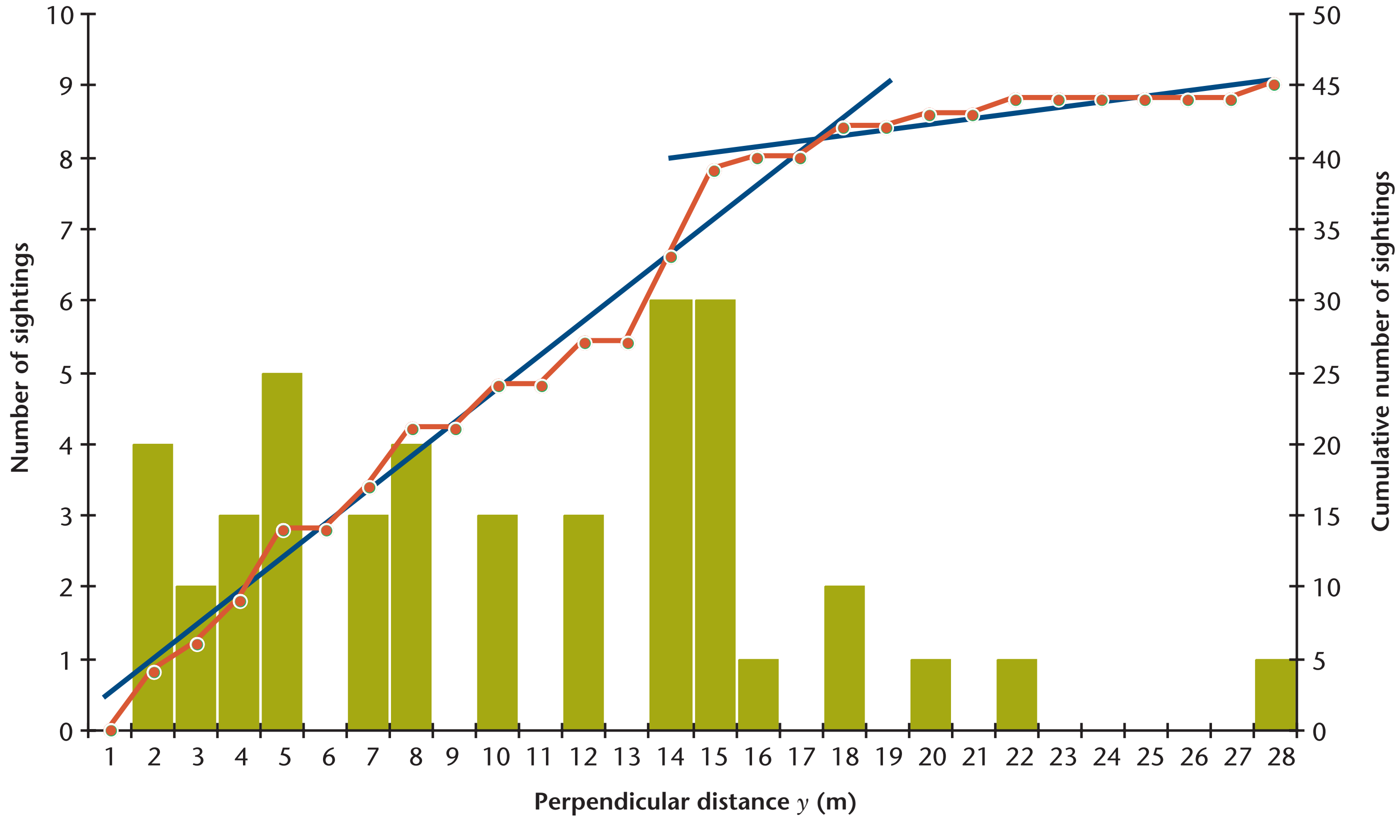



**Figure 4**

A hypothetical example of how to estimate belt width *w*. The cumulative number of sightings (from most distant to least distant) are plotted against distance, and the fall-off distance (the distance beyond which squirrels cannot reliably be seen) is calculated by drawing two trend lines through the data points by eye. The first line is drawn through the series of steeply rising points on the curve and the second through the points on the curve where it starts to level off as the detection rate falls away. The intersection of the two lines is taken as the width of the fall-off distance and hence the belt width *w* (about 17 m in this example). Forty-five squirrel sightings have been used in this plot. In practice, this number of squirrels seen would probably be achieved by pooling the data from several walks along a particular survey line. The belt width can also be taken as the point where the number of detections drops to approximately half the previous interval (Hoodless and Morris, 1993).

Knowing the area sampled, squirrel density $d$ is then estimated by:

$$d = \frac{n}{2wl}$$

where $n$ is the number of animals seen, $l$ is the length of the transect line and $w$ the belt width to either side of the line. We can illustrate how density is estimated using the information provided in Figure 3, and assuming the data have been pooled together from 8 walks along a 1000 m transect, i.e. $l$ = 8 x 1000 = 8000 m. We use the figure for $w$ as 17 m taken from Figure 3, and find that the number of squirrels seen within 17 m either side of the line, $n$, = 42. Therefore, the density of squirrels, $d$ = 42/(2 x 17 x 8000) = 0.000154 squirrels $m^{-2}$ = 1.54 squirrels $ha^{-1}$.

An assumption with this calculation is that all animals will be seen within the belt width to either side of the line. This is unlikely to be the case (see below) and more sophisticated methods can be used to estimate the detection curve, i.e. the probability of detecting an animal that is a certain distance from the transect line, mathematically.

**Method 2**

Squirrel density can be estimated in a more complex manner, by first estimating the detection function, $g(x)$, which is obtained by fitting a curve to the frequency distribution of detection distances. The definite integral of this function is referred to as the effective strip width and defines the width at which the number of animals seen outside the strip equals the number missed inside it.

Fitting this function and calculating densities and confidence intervals is most easily done using either of the following two computer programs:

*Distance*, obtainable from:
**www.ruwpa.st-and.ac.uk/distance**

*DfD – Density from Distances* supplied by Pisces Conservation Ltd: see **www.irchouse.demon.co.uk**

With both these methods the following assumptions are made, in the order from most to least critical:

- Squirrels directly on the line will never be missed (i.e. they are seen with a probability of 1.0). In practice, it is quite easy to miss a squirrel, even if it is sitting on a branch over the observer's head.
- Squirrels do not move in reaction to the observer before being detected and none are counted twice.
- Distances and angles are measured without bias.
- Sightings are independent events, i.e. seeing one squirrel does not influence the probability of seeing another squirrel.

In practice, many of these assumptions may not hold, but the estimated densities can still be useful and are worth doing.

## HAIR-TUBE SURVEYS

The collection of squirrel hairs in tubes is a simple and inexpensive way of identifying the presence of red or grey squirrels in an area. As the animals enter the tubes to get the food, they leave some of their hairs on the tapes, which are removed for later examination under a microscope. Up to 20 tubes may be used to survey one piece of woodland by deploying them 100 m to 200 m apart in lines or in the pattern of a grid. The number of tubes used for each site in any survey should be standardised. The tubes should be 300 mm long and made out of 65 mm diameter round, or 65 mm x 65 mm square ended, PVC drain pipe. Tubes should be attached (by wire, straps or two Terry clips) to branches at a convenient height, i.e. it should not be necessary to use a ladder, and baited by placing sunflower seed and peanuts or maize inside them (Figure 5). (Note that permission must be obtained if nails or screws are used to fix clips to trees.) Clips enable the tubes to be removed and replaced quickly.

Two wooden or plastic blocks (2.5 x 2.5 x 0.5 cm), covered by double sided sticky tape (e.g. Scotch 'pressure sensitive' tape; Stock reference no. 465; North British Tapes Ltd, Killingworth, Tyne & Wear) are placed on the inside roof at either end of each tube, approximately 3 cm in from the entrance. Sticky tapes can lose their adhesiveness on wet surfaces and the roofs of the tubes should be dried off; the blocks can also be held in place with clips made out of fencing wire.

Sticky blocks should be retrieved and numbered after 7 or 14 days (Figure 6). They should be protected at collection by covering with a strip of waxed paper or polythene sheet to prevent the hairs being damaged. The tubes can be left in place for future surveys.

**Figure 5** A hair tube in a tree.

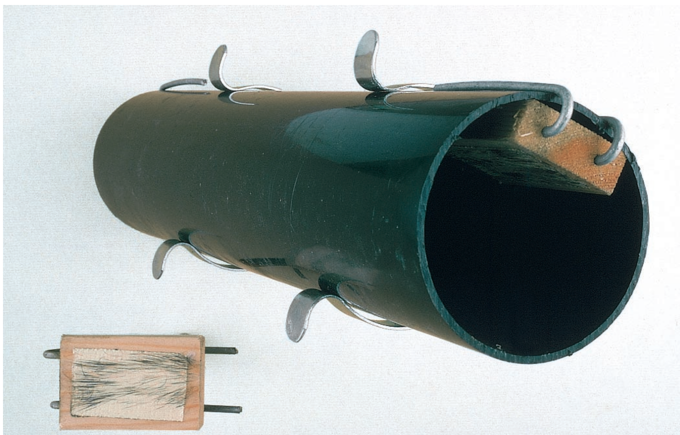


**Figure 6** Close up of hair tube and removable sticky block with squirrel hair attached.

## Hair identification

Hairs can be identified using a reference collection of hairs from mammals that are small enough to enter the tubes (e.g. mice, voles, weasels, stoats as well as squirrels; polecats and pine martens are too big to enter the tubes). It is not possible to separate red and grey squirrel hairs on the basis of colour, and the hairs have similar cuticle scale patterns and medullas. However, when viewed under a microscope (x400) the cross-section differs; red squirrel hairs have a concave or a dumb-bell shaped cross-section whereas grey squirrels have a round one (Figure 7). Staining a sample of hairs with ink using the negative staining technique enables the type of cross-section to be seen more easily (Gurnell and Pepper, 1994; Dagnall *et al.*, 1995; and see Teerink, 1991).

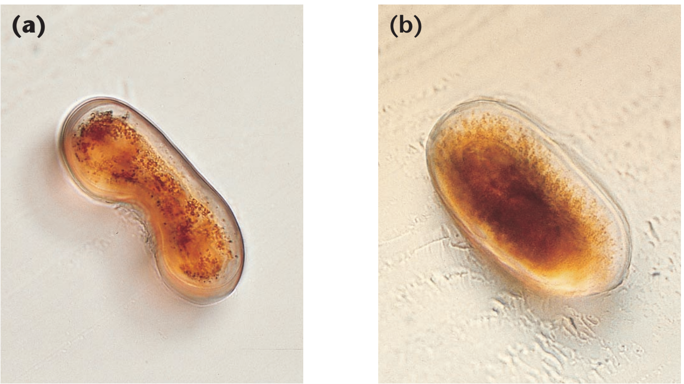



**Figure 7** Cross-section of red **(a)** and grey **(b)** squirrel hair.

**Negative staining technique**

- Place the tapes in warm water containing a strong detergent and leave to soak overnight.
- With forceps, remove at least 10 representative hairs from each identifiable cluster, avoiding very fine, small underfur hairs, and cracked or damaged hairs. Hairs <1.5 mm long should be discarded; these will be from mice or voles.
- Only use complete hairs and measure the length from bulb to tip. Make a note of the colour bands along the hair. A binocular microscope at x80 is useful here.
- Place hairs in a 5:1 solution of Indian ink: water. Place two or three hairs on a slide together with a few drops of ink solution. Cover with a coverslip and examine using a light microscope (x400 is best). Look at the hairs at their widest part, i.e. the shield region. Mounts that show a continuous dark band along this part of the hair are likely to be red squirrel.

## What to do with the data

Squirrel presence is confirmed by finding hairs in at least one of the tubes. The number of squirrel hairs left in a tube is not necessarily related to the number of individuals visiting the tube. The problem is that one squirrel may visit many tubes, and the sampling area of each tube is not known. However, the number of tubes visited in a given time period within a woodland may be used as a relative index of squirrel numbers. Furthermore, where tubes are placed in a grid pattern, there may be a relationship between the number of tubes visited in a particular wood and squirrel density. The relationship between the number of tubes visited and squirrel density should be verified by carrying out a live-trapping study in the particular wood in question (Box 1). Where squirrel densities are 0.5 $ha^{-1}$ or above, the time between hair tube inspections should be reduced to 7–10 days.

# DREY COUNTS

The presence of active dreys is a reliable indication of squirrel presence, and the density of dreys may give some idea of squirrel numbers. Dreys are greater than 50 cm diameter and more than 30 cm deep. They are usually built close to the main stem of a tree with support from one or more side branches and at heights from 3 m upwards. There is no obvious difference between a drey built by a red squirrel and a drey built by a grey squirrel, and both species will use the same dreys at different times. If dreys look unkempt (ragged, with falling twigs and daylight passing through) they should not be counted.

Dreys tend to be semi-permanent when squirrels are resident, and thus the number of dreys tends to reflect squirrel numbers over a season, a year or even longer. However, if dreys are not found, then it does not mean that squirrels are absent, because dreys in the canopy may be difficult to see in some woodland habitats. This is particularly the case when they are built in young, dense conifer crops or among the thick clumps of ivy or honeysuckle that cover some trees. Sometimes squirrels make nests in holes in trees, called dens (Figure 8).

In broadleaf woodland, it is easier to see dreys when there are no leaves on the trees and so it is best to count them in mid to late winter. In addition, squirrels build more temporary, platform structures in the summer, which should not be counted.

## Box 1: An example of estimating squirrel numbers using hair tubes

Garson and Lurz (1998) compared the results from hair-tube surveys for red squirrels with live-trapping results in 11 sites (mean plantation size of 27±6 ha) over 2 years in Kielder and Wauchope Forests in the North of England. Hair tubes were deployed in a 100 m x 100 m grid and inspected after 14 days. The sites consisted of Sitka spruce or mixtures of Sitka spruce with Norway spruce, lodgepole pine and Japanese larch of cone bearing age. The relationship between the proportion of tubes used in each site and squirrel density is shown in the graph below.

This relationship can be used to predict red squirrel densities up to 0.5 squirrels $ha^{-1}$ within Sitka spruce dominated plantations in the absence of grey squirrels, by reading off the number of tubes used by squirrels from the appropriate line. For example, given a proportion of 0.4 tubes used by squirrels, it is predicted that there will be a density of 0.23 red squirrels $ha^{-1}$ in the plantation if it contains pine of cone bearing age, and 0.15 squirrel $ha^{-1}$ if it does not.

This approach can be used to calibrate hair-tube and trap data for other habitat types or areas where both squirrel species or only grey squirrels are present. It is not accurate enough to give exact population estimates, but will show population trends.

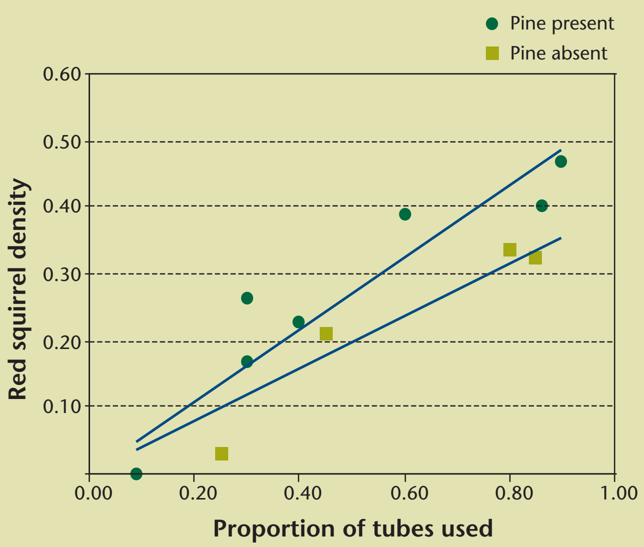



**Figure 8** Drey and den entrance in an oak tree.

Drey counting can be carried out by one person, but is better with several observers, walking 20 m to 25 m apart through the forest, in line, abreast and in view of each other. In planted woodland, the rows of trees can be used to maintain direction; if this is not possible, a compass is required. Observers may need to be closer together in woodlands with a high stocking density, or where visibility is poor. All dreys are counted except where they are unkempt. The total number of dreys is then related to the area of forest searched.

## What to do with the data

The density of dreys can be used as a crude index of squirrel density and it may be useful as a relative measure of habitat use. However, assessing the relationship between drey density and squirrel density can be problematic. Firstly, some dreys in an area of woodland may be missed during a count; secondly, dreys can be confused with birds nests, such as crows, magpies and some raptors. Thirdly, dreys are semi-permanent features of a wood and cannot easily be related to any particular day or month; and finally, squirrels use several dreys at any one time, so it is necessary to know the average number of dreys per squirrel before density estimates can be calculated.

The relationships between the density of dreys and the density of squirrels have been established as follows:

- Red squirrels

  Number of red squirrels per ha = number of dreys per ha x 0.26. This is taken from data from a variety of conifer and broadleaf woodlands in Belgium (Wauters and Dhondt, 1988). Counts were mostly made in November.

• Grey squirrels

Number of grey squirrels per ha = number of dreys per ha x 0.74. This is taken from a variety of broadleaf woodlands in southern England (Don, 1985). Counts were made between January and May. Data are not available on the relationship between the number of dreys and grey squirrel density in conifer woodlands. Since grey squirrels live at similar densities to red squirrels in conifers (Gurnell and Pepper, 1993; Wauters *et al*., 2000), the red squirrel relationship may be used with caution.

## SQUIRREL FEEDING TRANSECTS

In conifer forests, a systematic assessment of the remains of complete cones and cone cores fed on by squirrels can provide good information on the timing and spatial distribution of conifer seed availability, and on habitat use by squirrels. There is little difference between feeding signs made by red and grey squirrels.

To sample cone cores, quadrats or line transects are marked out on the forest floor (Figure 9). Transects require less effort to manage and are therefore more frequently used. Each transect consists of a measured line, 50 m x 1 m, marked with small sticks. The lines do not have to be straight, and should not avoid natural objects such as logs or stumps. The transects are raked to remove all complete cones and cone cores.

**Figure 9** Feeding line transect in Scots pine.

Each transect line is visited at regular intervals of 2–3 months to remove and count all fresh complete cones and cone cores. The number of cores provides a measure of the intensity of feeding between successive inspection dates. After each visit the transect line is raked clean.

The number of line transects required for an assessment will depend on the area of forest, the mix of tree species and the resources available. One line for every 4 ha is a reasonable guide. Cone producing trees can be patchily distributed throughout a plantation, and edge trees generally produce more cones than centre trees. Where possible, lines should cross the most important cone producing areas. Squirrels will use different feeding areas at different times of the year, but this will become clear as the studies progress. If this method is also used to estimate cone crops, transects should be cleared in the autumn (e.g. October) taking account of any stripped green cones which can appear on lines as early as June/July in pine and August/September in spruce. A total count of stripped and normal cones over the course of one year will provide an estimate of the annual cone crop.

### What to do with the data

An estimate of the quantity of seed eaten can be obtained from knowledge of the number of seeds in a cone of average size. This relationship can be established by collecting a sample of up to 100 ripe cones, and counting the number of seeds contained in each. (More accurately, the relationship between the number of seeds and cone size could be obtained; this would require measuring the length of cones and cone cores.)

To extract the seeds, unopened cones should be placed on an aluminium foil tray and heated in an oven at 40ºC for 2 hours. The temperature of the oven should be increased gradually to 60ºC and the seeds heated for a further 8 to 10 hours. Cones should be allowed to cool without disturbing them, and the seeds can then be tapped out from a cone onto a sheet of white paper for counting.

The next step is to convert the number of conifer seeds eaten per unit area into numbers of squirrels per unit area, i.e. squirrel density. To do this, it is necessary to estimate the amount of energy in each seed, and from that to estimate the amount of energy in a cone of a particular size. This can be scaled up to the amount of energy consumed per unit area per day and, from knowledge of the energy requirements of adult red or grey squirrels, a crude estimate of squirrel density can be worked out (see Bryce *et al*., 1997). Without specialist laboratory apparatus, such as very accurate micro-balances and bomb calorimeters, this is difficult to do, because seeds are very small and squirrels only eat the material inside the seed coat.

Average energy values of seeds from common conifer species found in Britain have been obtained from laboratory studies (Table 2). Estimates of squirrel densities can be derived by using these figures, but will not be very accurate because cone length and seed size for a particular tree is very variable and changes with tree age, time of year and site factors such as soil type and region. Where both squirrel species are present, this method will only give an estimate of total squirrel density.

Estimates of the amount of energy consumed by a squirrel vary considerably and depend on location, season, breeding condition and body weight (Knee, 1983; Reynolds, 1985; Gurnell, 1987; Wauters *et al.*, 1992). It is advisable to use a range of energy consumption values: an adult red squirrel consumes between 400 and 700 kJ of energy a day and an adult grey squirrel between 500 and 800 kJ of energy a day. Using these figures, the density of squirrels can be estimated as shown in Box 2. Since squirrels feed in a patchy manner, concentrating their feeding in small areas of woodland at any one time, feeding across the woodland is not uniform. Thus, some lines may have many feeding remains one day, and very few the next. To help overcome this problem, it is better to use several lines and collections made every one or two weeks for a period of a season or a year (Box 2). With all these assumptions, it must be accepted that density figures derived from this method are very approximate at best.

## Box 2: An Example of calculating densities from seed line transects based on studies in Thetford Forest

Type of woodland = Scots pine
Size of woodland = 20 ha

Number of lines = 5
Length of each line = 50 m
Width of each line = 1m

Total area of forest floor sampled = 5 x 50 x 1 = 250 $m^2$

Cone cores accumulated and collected every 7 days between December and February inclusive, i.e. 12 collections in total over a period of 84 days.

Total number of cone cores collected on the 5 lines from all 12 collections = 240

Average number of seeds per cone = 25
(estimated from on site field studies)
Average energy value per seed = 0.18 kJ (see Table 2)

Total amount of energy consumed by squirrels on the lines between December and February =
240 x 25 x 0.18 = 1080 kJ

Since there are 10 000 $m^2$ in 1 ha, the total amount of energy consumed $day^{-1}$ $ha^{-1}$ =
1080/84 x 10 000/250 = 514 kJ $day^{-1}$ $ha^{-1}$

Assuming that adult red squirrels consume between 700 and 400 kJ $day^{-1}$, the estimated density of squirrels for the 20 ha woodland between December and February = 514/700 to 514/400 = 0.74 to 1.29 squirrels $ha^{-1}$.

**Table 2** **Average energy value of seeds from several common conifer species in Britain**

| Tree species | Energy value of average seed (kJ) | Location | Source of information |
|---|---|---|---|
| Scots pine | 0.05–0.10<br>0.17<br>0.18 | Sweden<br>East Jutland<br>Thetford Forest, East Anglia | Grönwall, 1982<br>Jensen, 1985<br>Gurnell, unpublished |
| Corsican pine | 0.29 | Thetford Forest, East Anglia | Gurnell, unpublished |
| Lodgepole pine | 0.098 | British Columbia | Smith, 1968 |
| Sitka spruce | 0.04 | British Columbia | Smith, 1981 |
| Norway spruce | 0.07–0.13 | Sweden | Grönwall, 1982 |
| Larch | 0.09 | Central Europe | Grodzinski and Sawicka-Kapusta, 1970 |
| Douglas fir | 0.26 | British Columbia | Smith, 1968 |

## WHOLE MAIZE BAIT

The presence of squirrels can be determined from the remains of yellow whole maize put out as feed or bait for traps or hair tubes. Red and grey squirrels are the only species to remove the germ from the maize grain and discard the rest intact (Figure 10). However, it is not possible to determine which species is present, or level of presence, unless used in conjunction with trapping or hair tubes.

**Figure 10** **Maize grains: whole and damaged.**

Grains intact.

Grains with their germs removed (arrows) by squirrels.

Grains which have been chewed by mice.

## DATA STORAGE

Information on grey and red squirrel presence at the 10 $km^2$ scale allows the monitoring of changes in distribution over time, while at the local scale it will assist with decisions on priority areas for red squirrel conservation management. Records of squirrel presence, showing species, date, grid reference, survey method (including quality controls) and observer, should be stored in a readily retrievable manner and copied to the local/county mammal recorder or Local Biological Records Centre. Information on why the survey was organised, by whom and over what time scale should be included to allow confirmation of the integrity of the data. The local Wildlife Trusts, EN, CCW or SNH can provide contact names and addresses where required. Country or UK scale information can be easily collated from these sources as required.

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# USEFUL ADDRESSES

**UK Red Squirrel Group**
**(Working Group chaired by**
**English Nature)**

- Responsible for the co-ordination and delivery of Red Squirrel Species Action Plan.

**Joint Nature Conservation**
**Committee**
**Monkstone House**
**City Road**
**Peterborough PE1 1 JY**

**Tel: 01733 866808**

- Responsible for the UK red squirrel strategy and provides secretariat for UK Red Squirrel Group.

**English Nature (EN)**
**Northminster House**
**Peterborough PE1 1UA**

**Tel: 01733 455000**

**Countryside Council for Wales (CCW)**
**Plas Penrhos**
**Penrhos Road**
**Bangor**
**Gwynedd LL57 2LQ**

**Tel: 01248 385500**

**Scottish Natural Heritage (SNH)**
**Research and Advisory Directorate**
**2 Anderson Place**
**Edinburgh EH6 5NP**

**Tel: 0131 554 9797**

- Responsible for the National and regional red squirrel strategy, and grants and advice under the species recovery programme.

**NPI Red Alert**
**Cumbria Wildlife Trust**
**Brock Hole**
**Windermere**
**Cumbria LA23 1LJ**

**Tel: 015394 48280**

- Responsible for general advice.

**Forestry Commission**
**231 Corstorphine Road**
**Edinburgh EH12 7AT**

**Tel: 0131 334 0303**

- Assists red squirrel conservation by:
  - Providing funds under the Woodland Grant Scheme to encourage management for red squirrels
  - Management (by Forest Enterprise) of selected areas for red squirrel conservation
  - Habitat management advice.

**Forest Research**
**Alice Holt Lodge**
**Wrecclesham**
**Farnham**
**Surrey GU10 4LH**

**Tel: 01420 22255**

- Responsible for research and technical advice.

**DARDNI Forest Service Agency**
**Dundonald House**
**Upper Newtownards Road**
**Belfast BT16 3SB**

**Tel: 02890 520100**

- Responsible for woodland grants, and woodland management and advice in Northern Ireland.

**The Wildlife Trusts**
**The Kiln**
**Mather Road**
**Newark**
**Nottinghamshire NG24 1WT**

**Tel: 01636 677 711 or 0131 312 4761**

- Responsible for TWT's red squirrel projects, groups and contacts, and general regional and local advice.

**Red Alert: for addresses and phone numbers see Local Directories or via EN, CCW and SNH.**

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