scottish strategy for
red squirrel conservation

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Edited and produced on behalf of the Scottish Squirrel Group

SCOTTISH NATURAL HERITAGE

Scottish Strategy for Red Squirrel Conservation

2004

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The Scottish Squirrel Group

The Scottish Squirrel Group is a forum to facilitate the co-ordination of activities aiming to conserve the red squirrel in Scotland. It is co-chaired by Scottish Natural Heritage and the Forestry Commission, and comprises a number of statutory and non-statutory organisations, together with representatives of local voluntary squirrel groups dedicated to conserving red squirrels within their area. The following are currently represented on the Scottish Squirrel Group.

Angus Squirrel Group

Ayrshire Red Squirrel Group

Badenoch and Strathspey Conservation Group

Central Squirrel Group

Borders Squirrel Management Group

Forest Enterprise

Forestry and Timber Association

Forestry Commission

Grampian Squirrel Group

Highland Squirrel Group

Perth and Kinross Squirrel Group

Red Alert South West Scotland

Red Squirrels in South Scotland

Royal Society for the Protection of Birds

Scottish Natural Heritage

Scottish Wildlife Trust

The National Trust for Scotland

The Scottish Squirrel Group is represented on the UK Red Squirrel Group to facilitate the co-ordination of red squirrel conservation action throughout the UK.

CONTENTS

1 INTRODUCTION

1.1 The UK Strategy

In 1996, the Joint Nature Conservation Committee (JNCC) published the *UK Strategy for Red Squirrel Conservation*. The intention of this document was to provide a framework for the development of red squirrel conservation throughout the UK, by recommending objectives and approaches.

The UK strategy's main function is to encourage co-ordination and set UK-wide objectives for common themes - in particular, surveying and monitoring, ecosystem (habitat and species) management, public education and awareness, research and legislation. As the distribution of red squirrels across the UK is patchy, national and regional variations in implementation of the strategy need to be taken into consideration.

1.2 The Situation In Scotland

The Scottish Squirrel Group (SSG) was set up in 1996, following a forum on Squirrel Management in Scotland. The SSG is currently co-chaired by Scottish Natural Heritage and the Forestry Commission, who are jointly responsible for assisting the implementation of the UK Red Squirrel Species Action Plan in Scotland.

Given that the majority of red squirrels in the UK are found in Scotland (estimates suggest 75% of the population), it was felt that it was appropriate to have a strategy to guide and co-ordinate action across the whole of Scotland, which in turn could provide a framework for action at a regional level. As a result, the first Scottish Strategy for Red Squirrel Conservation was produced in 1998.

The purpose of the Scottish Strategy for Red Squirrel Conservation is to provide a framework for action, for local squirrels groups or any individual or organisation interested in red squirrel conservation.

2 BACKGROUND

2.1 Status

The red squirrel (*Sciurus vulgaris*) is native to Britain and is one of the most popular and easily recognised of our mammal fauna. Formerly widespread throughout the country, it has been lost from large areas, particularly during the last 50 years, and is now restricted primarily to Scotland, the north of England, and small pockets in Wales and southern England.

Records of red squirrels from the past few hundred years show that numbers have fluctuated markedly with time. Numbers fell to very low levels in Scotland around the 18th and 19th centuries, to the point of extinction in some areas. Several translocations were carried out in Scotland using English stock to counter these losses, for example at Dalkeith (Midlothian) in 1772, Minto (Borders) in 1824, Mauchline (Ayrshire) in 1866, Minard House (Argyll) in 1847, Beaufort Castle (Inverness-shire) in 1844 and in Dumfriesshire in 1837. Introductions were also made using stock from other countries, for example, from Scandinavia to Dunkeld (Perthshire) in 1793 (Lowe & Gardiner, 1983).

Restockings were stopped around 1920, after which the population began to decline rapidly again south of the border. This effect was not so marked in Scotland, although red squirrel numbers continue to decline. The map in Appendix A shows records of red and grey squirrels across Scotland (extending southwards into northern England) from 1991 to 2001.

2.2 Threats

The precise reasons for the red squirrel's decline are unknown, but the following have been identified as likely factors:

*2.2.1 Competition from the introduced grey squirrel (*Sciurus carolinensis*)*

The main cause of the red squirrels continuing decline is the American grey squirrel (Skelcher, 1997). Grey squirrels were introduced into Scotland at the start of the 20th century, and have since spread from the main centres of introduction.

Red and grey squirrels occupy a similar ecological niche, and therefore rely on similar food sources (e.g. tree seeds, nuts, berries). However, differences in their ability to digest large seeds from broadleaved trees, in particular acorns, give grey squirrels a competitive advantage over red squirrels in broadleaved and mixed woodland. This can result in weight loss and reduced breeding success for reds squirrels. The continuing spread of the grey squirrel is currently a major threat to the survival of the red squirrel in some areas of Scotland.

2.2.2 Changes in woodland habitat

Between 1900 and 1950, extensive felling of woodlands occurred throughout Britain. These woodlands, together with subsequently felled mature Scots pine and Norway Spruce plantations, have often been replaced with new plantations of Sitka spruce, which offer a limited and unpredictable food supply for red squirrels.

Large-scale felling can lead to the isolation of red squirrel populations from both each other and their food sources, and increases the risk of predation if red squirrels are forced to cross open areas.

2.2.3 Conflicting management objectives for woodland habitats

The management of woodland habitats for red squirrels may conflict with other management objectives or requirements for the site. These may include economic, amenity, landscape or other conservation factors, all of which could influence the mix of tree species present. This in turn affects the suitability of a site to support a viable long-term red squirrel population.

2.2.4 Disease

Outbreaks of disease can cause red squirrel populations to decline dramatically, or even become locally extinct. Grey squirrels seem to be involved in the transmission of the parapox virus to red squirrels (Sainsbury, 2000). The virus has been responsible for significant losses of red squirrels in England. The first

incidence of parapox virus in Scotland was recorded from a grey squirrel in the Borders, in August 2001. As of yet, the disease has not been detected in red squirrels in Scotland. Should this materialise, the retreat of red squirrels is likely to speed up and currently co-existing populations may be adversely affected.

2.2.5 Predation

Red squirrels are vulnerable to predation particularly if they have to cross open ground. Natural predators of red squirrels include pine martens, birds of prey (Halliwell, 1997; Ross 1999) and, in more urban areas, domestic cats. It should be noted that predators are likely to take grey squirrels as well as red squirrels (Kenward *et al,* 1998).

2.2.6 Road kills

Red squirrels may be killed due to road accidents, (Holm, 1987), especially where woodland borders either side of a road. This can affect local populations where 'black spots' occur.

3 LEGISLATION

3.1 Red squirrels

The red squirrel is protected under Schedules 5 and 6 of the Wildlife and Countryside Act 1981 (as amended). Under Section 9 of this Act, it is an offence to intentionally kill, injure, take or possess a wild red squirrel, or to intentionally damage, destroy or obstruct access to any structure or place used by a red squirrel for shelter or protection; or to disturb it while it is in a drey.

It is also an offence to sell, offer for sale, expose for sale or have for the purpose of sale, any red squirrel, or to infer that red squirrels can, or are intended to be bought or sold. They are also protected from certain indiscriminate methods of taking red squirrels, such as snaring or poisoning.

There is provision within the Wildlife & Countryside Act for some activities, that would otherwise be illegal, to be carried out under licence. Scottish Natural Heritage and the Scottish Executive share the responsibility for licensing.

Red squirrels are also protected under the Wild Mammals (Protection) Act 1996, which makes it illegal to subject them to any wilful act of cruelty or abuse.

The species is listed under Appendix III of the Bern Convention but, in view of its more favourable conservation status in mainland Europe, is not listed on the EC 'Habitats' Directive (EC/92/43).

3.2 Grey squirrels

The Grey Squirrels (Prohibition of Importation and Keeping) Order 1937 makes it an offence under the Destructive Imported Animals Act 1932 to import grey squirrels into Britain or to turn loose any captive grey squirrel. Section 14 (Schedule 9) of the Wildlife and Countryside Act 1981 states that the release of grey squirrels into the wild is an offence.

The control of grey squirrels is legal and practiced by many landowners and managers across Scotland. The only currently legal and recommended grey control

methods in areas containing red squirrels are shooting and live-capture cage trapping (Forestry Commission Practice, 1998). Most grey control in Britain is carried out to reduce grey squirrel bark stripping damage to trees. For further information see Forestry Commission Practice Note No. 4: Controlling Grey Squirrel Damage to Woodlands (2003).

4 AIM OF THE SCOTTISH STRATEGY

4.1 To Maintain Populations of Red Squirrels Across Their Current Range

Implicit in this aim is that the populations will be viable in the long term and that they will be present in all of the main centres of population where they occur today. The aim also accepts that, at the moment, not enough is known about the population in Scotland, or about the management of red squirrels, to be able to predict what proportion of the present red squirrel population might be safeguarded.

5 STRATEGIC OBJECTIVES

5.1 Establish The Red Squirrel Resource And Monitor

5.1.1 Complete the identification of significant populations of red squirrels

Although the status of both red and grey squirrels is understood in some areas of Scotland (for example, Dumfries and Galloway, Borders), information may be scarce in others (for example, Highland). A priority should be to survey these areas to identify any significant populations of red squirrels that are currently unrecorded.

5.1.2 Establish baseline monitoring for red and grey squirrels across Scotland

This will provide information on the national distribution of both species of squirrel across Scotland. Individual records should be based on presence/absence in 1km squares. This information will be primarily collected by local interest groups and where possible, passed to Local Records Centres. It is recognised that Local Records Centres do not exist in all regions and that this is a major constraint to achieving adequate data collation for Scotland. Local Scottish Natural Heritage offices may be able to temporarily hold records while this problem is addressed. A local squirrel interest group representative should negotiate such an arrangement.

Scottish Natural Heritage will trawl data sources for records every 5 years and collate them into the Scottish Squirrel Database. This information will be made available to all members of the Scottish Squirrel Group. National distribution maps will be produced from this, and will be made available to Scottish Squirrel Group members after each update. Liaison will be maintained with the UK Mammal Monitoring Network ('Tracking Mammals') to facilitate information exchange, and to ensure that the methodology is fully compatible with that adopted by the Interim Working Group on Mammal Monitoring.

5.1.3 Monitor red squirrel populations in Priority Woodlands

The main effort in monitoring the status of red squirrels should target 'Priority Woodlands' (see Section 2) where it will form an integral part of any squirrel

management plan. Information on survey and monitoring methods can be found in Forestry Commission Practice Note 11, *Practical Techniques for Surveying and Monitoring Squirrels* (2001). Again, the methods used will be consistent with the methods adopted through the Tracking Mammals network.

5.2 Prioritise Woods Where Conservation Work Will Be Focussed

5.2.1 Identify 'Areas of Potential'

There is a need to identify and focus on woodlands where red squirrel conservation work will maximise the survival of the species, either through natural means or with the support of conservation initiatives. The first step is to identify woods which currently support red squirrels, and are large enough to sustain a viable population. These woods have been defined by the Scottish Squirrel Group as 'Areas of Potential'. The map in Appendix B shows these 'Areas of Potential' for Scotland, identified using methodology described in Mayle, B, Griffiths, M. and &, J. (2002)

Definition of 'Areas of Potential'

All woodlands containing areas of conifer over 200 ha in size, with less than 5% broadleaf species present, within the current distributional range of the red squirrel

The 'Areas of Potential' identified in Appendix B, together with detailed local knowledge, provides an overview of areas where management to benefit red squirrel populations will be a priority.

The approach for identifying Areas of Potential will need to be reviewed in light of different geographical regions of Scotland, such as the Highlands, where smaller connected woodlands may also have a significant role to play.

5.2.2 Prioritise woods for conservation action

'Areas of Potential' provides a broad-brush assessment of squirrel distribution across Scotland in relation to woodland habitats. However, where resources are limited, it may be necessary to target more specifically the conservation action required. It is therefore important to identify and focus on red squirrel 'Priority Woodlands', within 'Areas of Potential' where conservation efforts will be most successful.

The process of identifying priority woodlands will follow the guidelines set out in the Reynolds & Bentley paper (reproduced in Appendix C). This considers red and grey squirrel presence/absence, the wood's physical attributes, the defendability of the site, other management objectives, and the support of the owners/managers. By allocating 'scores' for each factor, woods can then be tentatively ranked according to their suitability to maintain populations of red squirrels in the long-term. The woodlands that score highly can then be

targeted for conservation work, including appropriate woodland management, squirrel population monitoring, and grey squirrel control.

Definition of 'Priority Woodlands'

Woodlands over 200 hectares which have been assessed (using the criteria described above) and identified as having the greatest potential for sustainable red squirrel conservation in the long term.

This process requires local knowledge, and may be best achieved by local squirrel groups with support from forest managers and the Scottish Squirrel Group. The Scottish Squirrel Group will provide guidance to individuals keen to set up a local squirrel group in their area.

Even if the different geographical areas of Scotland covered by the groups are assessed independently, using the same assessment criteria will allow compilation of a list of national priority woodlands upon which future plans can be based. Islands where known viable populations exist should also be considered when identifying Priority Woodlands for red squirrel conservation, as these woods are less likely to become colonised by grey squirrels.

5.3 Improve Woodlands For Red Squirrels

5.3.1 Contribute to forest planning

There is huge scope to protect and improve the habitat for red squirrels through appropriate practices and by forest planning.

It is important to monitor the Forestry Commission's Register of New Planting and Felling Applications, in order to comment on proposals affecting Priority Woodlands. Where possible, squirrel interest groups should establish links with Forestry Commission offices, local Forest Enterprise offices and private forestry organisations, in order to provide input into the earlier stages of scoping meetings which will, in turn, influence the management of Priority Woodlands. At this stage, the incorporation of 'the conservation of red squirrels' as a management objective within Forest Plans should be encouraged.

In areas where there may be a conflict between protecting against the fragmentation or loss of red squirrel habitat and building developments, local squirrel groups should aim to participate in the consultation process for planning applications in liaison with the regional LBAP officer. Where possible, information on red squirrel distribution and Priority Woodlands should be provided to planners to ensure that they are considered when drawing up development plans.

5.3.2 Promote 'red squirrel-friendly' woodland management

Many of the woodlands occupied by red squirrels are managed primarily for timber production. But whatever the management objective (to improve timber production, amenity or conservation value), many forest practices, for example felling, thinning and restocking, affect the quality[1] and quantity[2] of the habitat available for red squirrels. However, these same practices are the very means needed to develop the forest resource for red squirrels by increasing food availability through improvements to the tree seed mix and restructuring even-aged forests. The support of foresters and landowners, especially in Priority Woodlands, is therefore pivotal to the success of the strategy.

Guidance on how best to manage woodlands for the benefit of red squirrels can be found in Forestry Commission Practice Note 5, *Red Squirrel Conservation*, and also in *Woodlands for Red Squirrels*, a booklet produced by the Red Squirrels in South Scotland project. As well as existing local squirrel groups, advice can be obtained nationally from Forest Research, and locally through Forestry Commission Woodland Officers and Scottish Natural Heritage Area Officers.

5.4 Minimise Or Reduce The Threat From Grey Squirrels

5.4.1 Monitor the distribution and spread of grey squirrels

Current distribution maps indicate the approximate areas occupied by grey squirrels but there is little information on how far greys have spread, or their rates of advance. We should aim to clearly identify the current extent of both red and grey squirrel distribution, and to monitor any changes through regular campaigns which encourage the public to report sightings. The presence and spread of parapox virus in both red and grey squirrels should also be carefully monitored. Information collated centrally (see Section 5.1.2) should provide an up-to-date overview of the situation across Scotland, and a source of information to assess how quickly it is changing over time.

5.4.2 Identify natural barriers and prioritise and implement control measures at 'pinch-points'

There are still large areas of Scotland that are free of grey squirrels. It is therefore both sensible and practical to examine physical features at the landscape level, such as large areas of open ground or hill ranges that might make the spread of the grey squirrel more difficult. It is however, important not to be complacent that these physical features will keep grey squirrels out.

It is generally agreed that wooded river corridors and/or woodland belts make it much easier for grey squirrels to cross otherwise inhospitable areas. These relatively narrow habitat strips form important 'pinch-points' where control measures to prevent the spread of greys will be most effective.

Monitoring of grey squirrel sightings and grey squirrel control should be carried out at these 'pinch-points' on a regional level to prevent the spread of grey

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[1] The choice of tree species mixes and age structure will affect food availability, and hence the quality of the habitat for red squirrels.

[2] Felling plans need to take into account existing red squirrel populations, ensuring connectivity between stands to minimise isolation of red squirrels from food and each other.

squirrels into ‘red-only’ areas, and at a local level to prevent the spread of greys into Priority Woodlands.

5.4.3 Address artificial introductions of grey squirrels

It is important that the general public is aware of the importance of maintaining ‘red squirrel only’ areas as such. In particular, the consequences of releasing grey squirrels into the countryside should be clearly explained. The issue of the introduction of alien species, such as grey squirrels, has been highlighted by the report of the Working Group on the Review of Non-Native species (Department for Environment, Food and Rural Affairs, 2003). The line taken by the Scottish Squirrel Group on managing competition between these species is consistent with the recommendations of this report. There may also be a need for a campaign to enforce the legislation regarding keeping grey squirrels as pets in a red-only area, such as the Highlands. Vets must be made aware of the situation regarding the release of injured grey squirrels brought in for treatment, whether as pets or as wild animals, and may have an important role to play in this situation in educating the public.

Local squirrel groups should be vigilant to respond to ‘accidental’ introductions of greys. There should be an agreed procedure in place to respond to reports of grey squirrels in hitherto red-only areas with a view to eliminating them and increasing public awareness to the threat posed by grey squirrels. This should include a network of contacts such as a local SNH representative, persons able to undertake or provide training on control and local volunteers to monitor for further sightings.

5.4.4 Undertake grey squirrel control

Although Priority Woodlands are partly selected for their reduced threat of grey squirrel incursion, local grey squirrel control may be required within the Priority Woodland area, including the ‘buffer zone’ (Appendix C) and surrounding ‘pinch-points’ to prevent grey squirrels moving in.

Conifer stands are sub-optimal habitat for grey squirrels (Kenward *et al,* 1998) and, therefore, any grey squirrels present in coniferous woodland may be more likely to succumb to baited traps (Shuttleworth *et al,* 2002). It is therefore likely that a live-trapping programme will quickly remove most invading grey squirrels from the conifer woodland itself. However, it is essential, that a co-ordinated approach be taken around the perimeter of the Priority Woodland block. This will require the co-operation of a number of different landowners/managers and is vital to ensure that any grey control programme is efficient and effective. All grey squirrels, which are shot or trapped, should always be considered for testing for parapox virus as part of any grey squirrel control programme, in order to identify areas at risk of a parapox outbreak.

In order to evaluate the effectiveness of management for red squirrels in priority woodlands, it is important that a programme of monitoring is carried out.

Grey squirrel control for tree protection, although not conducted directly for red squirrel conservation, may have relevance in areas close to Priority Woodlands.

Grants are available to woodland owners and managers for red squirrel conservation through the Scottish Forestry Grants Scheme. Advice on grey squirrel control by approved methods can be found in Forestry Commission

Practice Note 4 *Controlling Grey Squirrel Damage to Woodlands* (2003) and Practice Note 5 *Red Squirrel Conservation* (1998).

5.5 Contribute To Red Squirrel Conservation Research

5.5.1 Undertake research relevant to the conservation of red squirrels in Scotland

Apart from ongoing monitoring of red and grey squirrel populations and their distribution across Scotland, other areas of research may be identified during the course of implementing the Strategy. These should be considered and supported where necessary to underpin red squirrel conservation as identified throughout the Strategy. Some areas for further research are described below.

- *Grey Squirrel Control*

Research into economic and effective methods of controlling grey squirrels.

- *Co-existence*

Some Scottish sites appear to have supported red and grey squirrels living alongside each other for several decades, and one (Craigvinean Forest, Dunkeld, Perthshire) has been studied in detail over several years (Bryce & MacDonald, 2000). Observations there suggest that, not only are there tree species mixes that favour red squirrel survival, but also that the physical layout of the woodlands might be important. Not enough is yet understood about the potential for habitat partitioning between red and grey squirrels, and considerable benefits could be gained from close monitoring of squirrels in these areas.

- *Computer modelling*

Decisions taken on forest design affect red squirrels for the following 40-50 years. It is therefore important to make sure we are doing it right. At present, the best use of computer modelling is at the regional level.

Projects involving computer modelling are helping to clarify the impact of long-term forest plans on red squirrel populations in Priority Woodlands (Armitage *et al,* 1997; Bowmaker, 2000; Gurnell *et al,* 2001; Rushton *et al,* 1997; Rushton *et al,* 1999). Modelling can look at the effects of changes in the proportions of different tree species on food availability, and flag up potential food bottlenecks for red squirrels in the future of a forest. Other factors, ranging from red squirrel birth rates and recruitment levels, to food competition with grey squirrels, can also be included in the model where they are quantified. However, the accuracy of assumptions underlying such models, and the costs attached, need to be weighed up against the benefits to red squirrel conservation. Similarly, the scale and economic repercussions of recommendations arising as a result of modelling need to be assessed fully, as the cost of changing forest plans due to the findings may be considerable.

- *Genetic variation*

The arboreal lifestyle of the red squirrel makes it a particularly hard species to study in detail. Direct behavioural observation and monitoring can be

complemented using genetic-based ecological monitoring. Genetic techniques can provide population estimates, plus additional data for the conservation management of the population under study. Examples of ecological data that can be estimated from genetic data include:

- census size;
- sex ratios;
- dispersal; and
- Description of breeding success.

In addition, genetic data can be used in conservation management to:

- Estimate the effective population size;
- Detect declines in genetic diversity; and
- Model past and future changes in population parameters.

Genetic analysis of samples can allow for direct comparisons with other geographical populations (Shuttleworth, 2002), and identify if the population has mixed with other populations, via artificial augmentation or natural colonisation. This information may then be used as a basis for making landscape management decisions, which benefit red squirrel populations (Hale *et al,* 2001). However, such studies require a robust sample size and suitable commitment to financial support. A comprehensive understanding of red squirrel populations regarding loss of genetic diversity and changes in the effective size, requires a long-term study be undertaken.

5.5.2 Supply all data and reports to the Red Squirrel Data Library[1]

Work on reviewing the red squirrel research and practical projects that have been undertaken across the UK to date has been completed up to the end of 2002, through The Wildlife Trusts' red squirrel project (2001-02). The report from this project, accompanying material and databases are currently held by the Scottish Wildlife Trust (SWT) at their headquarters at Cramond, Edinburgh[2] and SWT should be encouraged to maintain and update these twice yearly. All relevant material should be copied to this Red Squirrel Data Library and made available on request. Copies of this report should be distributed to members of the SSG following regular reviews.

5.6 Implement The Strategy Locally With Central Support

5.6.1 Co-ordinate the implementation of the strategy centrally

The implementation of this strategy is the responsibility of the Scottish Squirrel Group, and all its members. The establishment of a central co-ordinator offering a support service to local squirrel groups would assist the implementation of the

[1] The Wildlife Trust's Red Squirrel Conservation Review, Dr M Tonkin, in prep.

[2] Held as an Access database, information can be provided on request through Dr M Tonkin or the SWT Library.

Strategy across Scotland. This would include helping new groups set up, encouraging participation in red squirrel conservation work, organising technical training courses, providing information updates and educational materials, and providing feedback between local squirrel groups, the Scottish Squirrel Group and the UK Red Squirrel Group.

5.6.2 Develop the existing network of local squirrel groups

The success of this strategy depends on a partnership approach between landowners, forest managers, ecologists, statutory agencies, conservation groups and the general public. The best way to bring these groups together, at a local level, is to establish local squirrel groups through which a co-ordinated approach can be adopted.

Although the purpose of this strategy is to address red squirrel conservation in Scotland, cross-border liaison with squirrel groups in northern England is important to ensure a consistent approach on either side of the political boundary. Appendix D shows areas of Scotland, which currently have local squirrel groups and neighbouring groups in northern England, with Appendix E providing further information on contacts.

To ensure full coverage across the country, the formation of new groups will be encouraged by the Scottish Squirrel Group in the remaining areas known to support red squirrels, with particular attention paid towards Areas of Potential that are not covered by existing groups. Appendix F, 'The Role of Local Squirrel Groups', gives some initial guidelines.

5.7 Promote The Strategy And Raise Awareness Of Red Squirrel Conservation

As with the UK Strategy For Red Squirrel Conservation, the Scottish Squirrel Strategy will:

> 'promote an increased awareness of the conservation status and needs of the red squirrel and, in particular, of the conflict between the native red squirrel and the introduced grey squirrel'.

Projects aimed at communities, interest groups and schools can bring red squirrel conservation work to a wider audience, raise awareness of issues, and provide the public with a chance to have an input themselves. This can, in turn, benefit a project, e.g. reporting sightings improves the accuracy of distribution maps, volunteers can participate in surveys and the monitoring of local woodlands.

By encouraging a wider understanding and participation in the objectives of this strategy, we can produce a more robust plan for action, which will take red squirrel conservation forward into the 21st century.

5.8 Monitor And Assess The Progress Of This Strategy

This strategy has been developed as a framework for taking forward conservation work that will ultimately protect Scotland's red squirrel population.

It is designed to be a flexible working document that will be used as a guide by all those who are involved in red squirrel conservation work, and will be adjusted in light of future developments.

The aims and objectives of this strategy will be monitored by the Scottish Squirrel Group to assess whether they are being met and to identify shortfalls or the need for additional work. Local squirrel groups will report annually to the Scottish Squirrel Group on their achievements and how these are helping to meet the objectives of this strategy.

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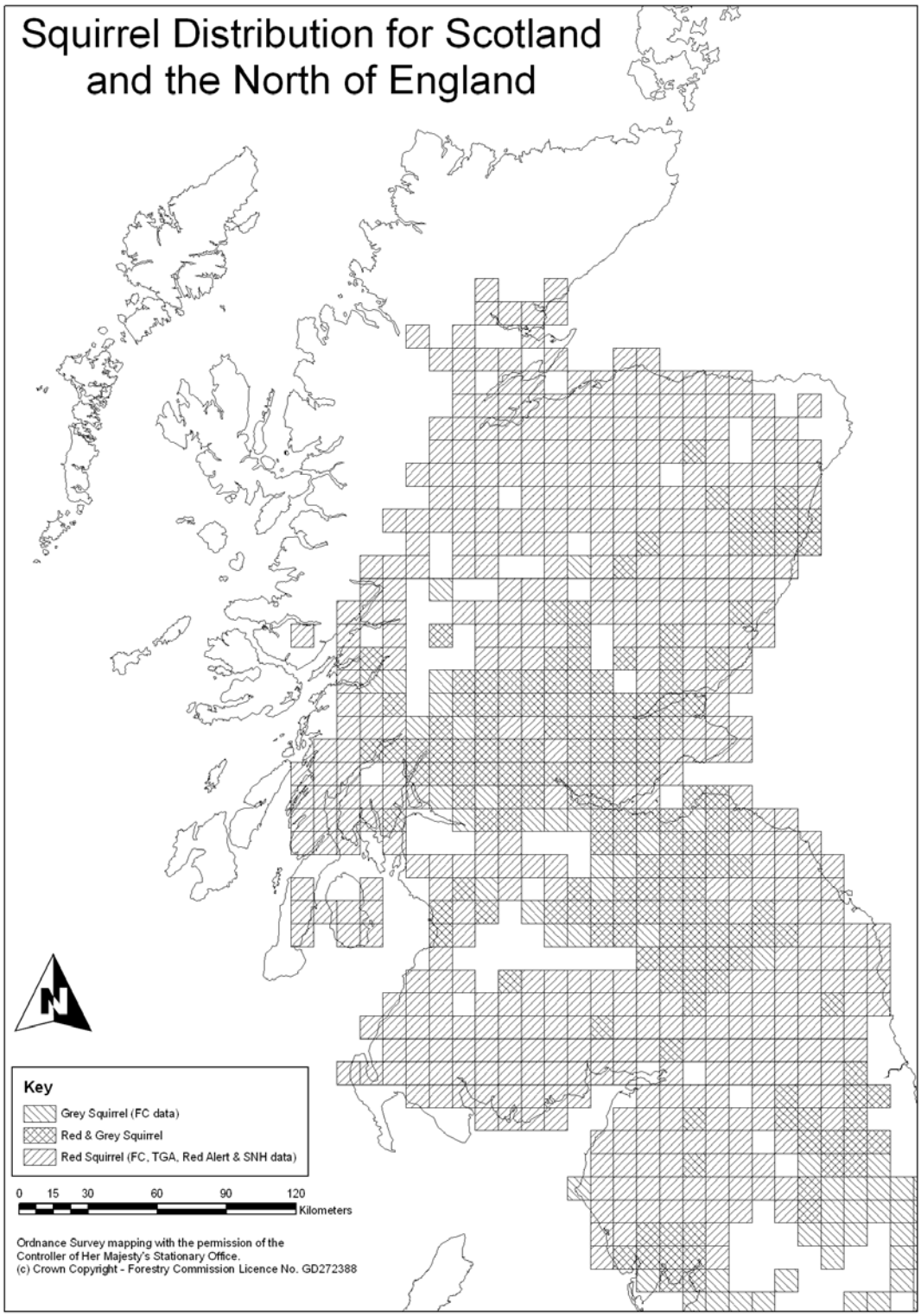
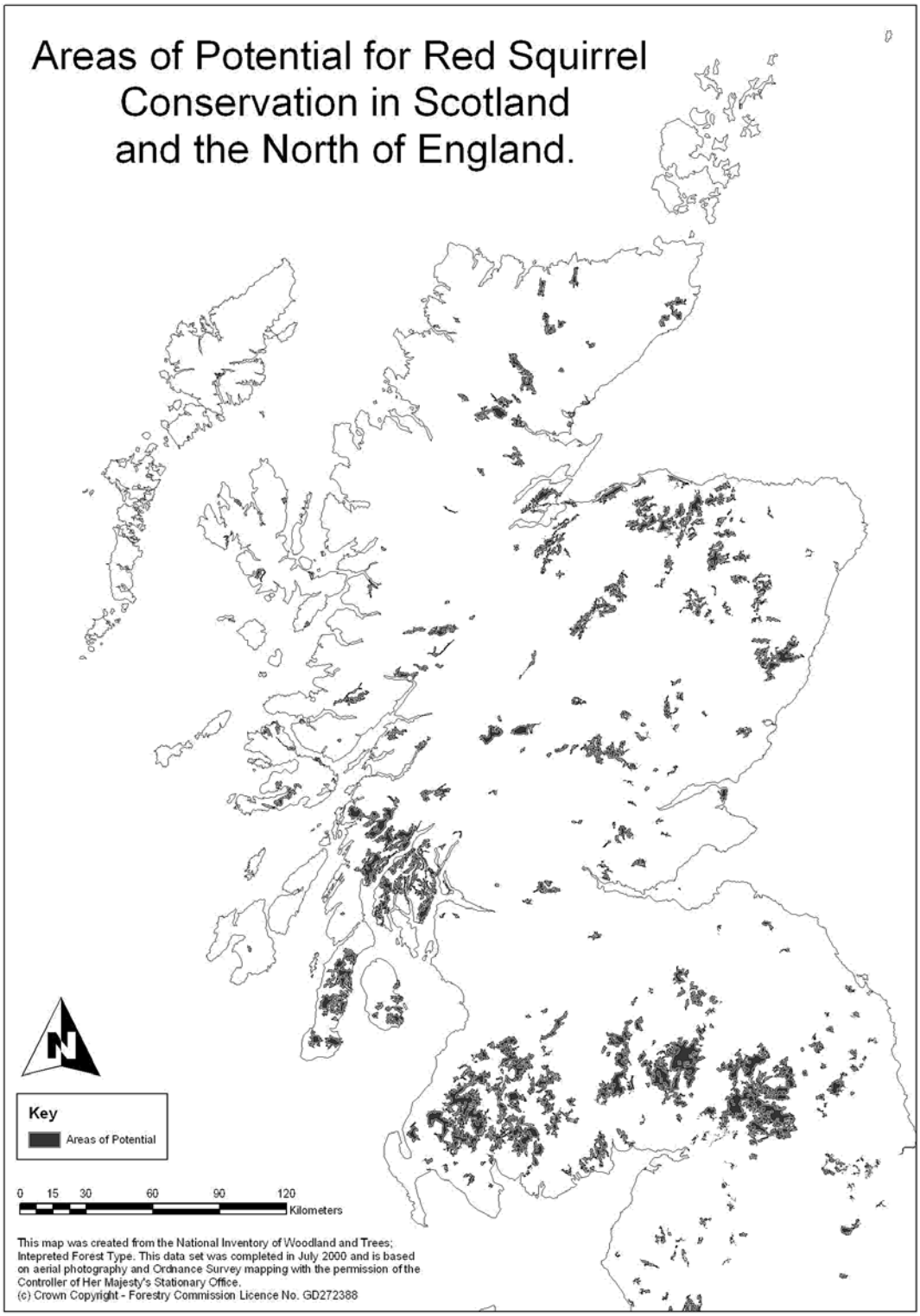
UK Red Squirrel Species Action Plan http://www.ukbap.org.uk

Appendix A: Map Showing Red And Grey Squirrel Distribution Across Scotland and Northern England 1991-2001



Appendix B: Map Showing 'Areas Of Potential for Red Squirrel Conservation in Scotland' (Forest Research)



Appendix C: Selecting Forest Reserves For Red Squirrel Conservation

Site Selection Paper by Jason Reynolds and Sarah Bentley for the UK Red Squirrel Group

1 BACKGROUND

The native red squirrel *Sciurus vulgaris* is currently declining throughout much of its range in Great Britain. This is as a result of competitive exclusion by the North American grey squirrel *Sciurus carolinensis* which was introduced into the country over 100 years ago. Although disappearance of the red squirrel has been recognised for well over 80 years there have been few coordinated attempts to halt the decline. Advances in scientific understanding and the Biodiversity Action Plan process have helped to focus attention on how the red squirrel might be saved. The selection of key forest reserves for red squirrels is seen as central to this conservation challenge. It is intended that reserves will be managed positively for the benefit of red squirrels in order to ensure their future survival in Great Britain.

2 AIMS

This paper aims to assist in the process of selecting and ranking forest reserves for conserving red squirrels throughout Great Britain. It is intended for use by a *group* of regional conservation practitioners.

3 THE PROCESS

To carry out the selection and ranking you will need:

- A clear picture of the woodland cover, ownership and general landscape composition within the search area. Reserves are selected using either digitised woodland cover in a computerised GIS system, or from the appropriate use of O/S maps and local knowledge, preferably a combination of both;
- To know the general distribution of red and grey squirrels within the defined area.

This paper generates a list of regionally important reserves by assessing the landscape against the following 4 criteria:

Reserve Scoping Phase	***Reserve Confirmation Phase***
1. Magnitude of threat from grey squirrels	*4. Socio-economic/other considerations*
2. Extent and suitability of habitat	
3. Site Defendability	

By following the criteria a list of sites will be generated and a clear picture of the sites' merits established. These can be ranked according to their overall quality, from which the list of reserves for red squirrels can be finalised.

PHASE I:

RESERVE SCOPING

Step 1: Identify all woodlands of 200 ha or more within your broad geographical Area Of Search

Identifying your woodland

*On mainland Britain***:** Our purpose is to identify discrete areas of woodland for management. Only *contiguous* wooded areas of 200 ha or more should be selected (very narrow gaps i.e. for power lines, minor roads etc can be seen in the context of contiguous cover). Nearby pockets of woodland should not be incorporated. Whilst it is accepted that squirrels may utilise these outlying habitats, their inclusion does not facilitate effective site selection or management.

*On islands***:** Select all woodlands.

Note: 'Biogeographic representation'
It is expected that there will be considerable support for retaining the red squirrel throughout the whole of its current range within Great Britain. In accordance with the BAP targets, this will ensure that populations are present in England, Northern Ireland, Scotland and Wales. Therefore as long as reserve selection using this paper, or a parallel process, is carried out in all countries there does not need to be a scored criterion to reflect this point.

Step 2*: *Now fill in a separate scoring sheet (page 34-35) for each woodland and complete the comparison table provided (page 36). Use the following notes to guide you.

Step 3: Assign a 'Magnitude of threat' rating for each woodland.

Magnitude of threat from grey squirrels.

Red squirrel presence/absence.

The magnitude of threat to red squirrels is the threat from grey squirrel incursion. Other factors, such as disease, are not considered since they occur in a stochastic manner that cannot readily be planned for in a regional strategy. Most forest design and woodland management plans are long term and it should be assumed that within the next 20 years grey squirrels will reach most sites in England, Wales and southern Scotland. It may take a little longer for grey squirrels to reach other parts of Scotland. Due to the timescale of forest planning and growth, however, all efforts to address the issue before greys enter woodlands should be encouraged. The

magnitude of threat will give an indication on the time frame available to plan and adopt squirrel management plans.

It is recommended that you should only continue with the whole exercise with woodlands that are rated 'Good' or better under this criterion. The resources to address grey squirrel eradication and red re-introductions are currently unavailable or undesirable.

Step 4: Assess and rate 'Extent and suitability of habitat'

Extent and suitability of habitat.

Woodland type and size

An assessment of the amount of available habitat.

On mainland Britain: Conifer woodland provides the best opportunities for red squirrel conservation. Deciduous woodland supports much higher densities of grey squirrels than reds, and the presence of large seeded broadleaves encourages the incursion of grey squirrels. Since resources are best targeted in areas where grey incursion is most readily prevented, conifer woodland is preferred for red squirrel conservation areas.

When considering the conifer woodland it is important that a variety of species are present (e.g. pines, spruces, firs, larches), as a species mixture ensures that there is always food available for the reds throughout the year. You need not agonise over detailed information about species mixtures as this will be covered when forest planning is carried out.

On islands: Opportunities remain for selection of non-conifer woodlands particularly on islands and in isolated broadleaved woodlands where controlling grey incursion is a realistic possibility. All woodland types found on islands are therefore potentially quite good for red squirrel conservation so long as the trees bear food taken by squirrels. Again, the larger the woodlands the better.

Mixed woodland. Woodland with >20% broadleaf in a conifer wood *or* >20% conifer in a broadleaf wood.

Suitability of the habitat

On mainland Britain: As mentioned above, conifer woodlands are particularly important. However, if the woodland contains > 5% productive large-seeded broadleaves (particularly oak, hazel, beech and sycamore) grey squirrels may be able to rapidly colonise. Small-seed producing deciduous trees such as birch, alder, willows and rowan are not important food sources for grey squirrels and can be overlooked when selecting reserves.

On islands: All food bearing trees will be good for red squirrels. The focus on conifer trees and away from large seeded broadleaved trees needed on the mainland can be overlooked in this instance and a mix is acceptable. For this reason it is possible to overlook this criterion and move onto the next.

Forests tend to have 5-10 year management plans. Contacting the Forestry Commission or the landowner for any such plan will help you to obtain information on areas of broadleaved woodland and species mixtures.

Note: 'Population persistence'

Persistence of squirrel populations is likely to be closely related to the overall number of animals in a population. Habitat size, composition and age structure, disease processes and competition from grey squirrels are all factors which affect population size and, consequently, are likely to have a major influence upon persistence. Mathematical models of squirrel population persistence can be calculated using computers that examine all these and many other factors for a given population. They can consider management, planting and felling regimes and allow predictions to be made on the future persistence of red squirrel populations in chosen conservation areas. However, they require that data on woodland composition and proposed felling and forest design plans are available in a digitised format usable by a Geographic Information System (e.g. GRASS or Arcview). If the future management of a selected conservation area causes concern, modelling of squirrel populations should be carried out.

For the purposes of this paper, 'Magnitude of threat' and 'Extent and suitability of habitat' are both relevant to long term red squirrel persistence. We have not, therefore, scored persistence separately as another criterion as this would simply duplicate the scores previously entered.

Step 5: Assess and rate 'Site defendability'. In this section some overlap with Extent and Suitability of habitat is discussed. However a separate criteria has been created as it is important to think carefully about this issue.

Defendability

The potential for defendability will have an important part to play when determining where money and effort is best spent. Our position towards red squirrel reserves is different from many current approaches to conservation, which, on the whole, tries to increase habitat linkage. This is because emphasis is currently focused upon securing red squirrel populations away from greys. Our dilemma is this; which is the more immediate problem, extinction of reds due to greys or extinction of reds due to genetic/disease problems within an isolated population? Our experience places the emphasis firmly on the grey squirrel problem as it is a more immediate issue, therefore we favour isolated habitats for now. It is recognised that habitat linkage to enable population mixing of red squirrels may become important in the future.

1. Landscape defendability.

The nature of the surrounding landscape is the next most important factor in determining how well a site can be defended from grey squirrels.

A working best estimate of the potential grey squirrel routes into the reserve should be established, using local knowledge and by consulting O/S maps. Although we cannot exactly quantify the likely level of incursion we can predict the ways in which the majority of grey squirrels move within the landscape.

The following questions will help you to assess the potential for defendability from grey incursion, 'safe areas':

i. *Are there linear or broadleaf woodlands around the reserve that increase connections with the surrounding landscape, particularly along river corridors?* This will permit easy incursion for greys.

The more woodland cover within the buffer zone the greater potential for grey squirrels to move into the reserve site. You must also consider the type of the woodland, whether it is largely conifer, broadleaved or mixed. Again, large-seeded broadleaves constitute the greatest risk for permitting greys to establish in large numbers. If another potential reserve site falls within the buffer of your site this needs to be noted because there is then greater potential of favourable management for reds.

ii. Does the site have open ground/fen/moorland/mountains/cliffs on any sides? Restricts grey incursion.

iii. Is the site bounded by a large river or the sea on any sides? Restricts grey incursion, except where there are road/rail bridges crossing these, as squirrels may use them.

iv. Are there very major roads on any sides of the site? May possibly slow grey incursion.

v. *What is the size of the surrounding settlements and human population?* It is recognised that the wider public has a strong affinity for the red squirrel. However, experience indicates that town parks and gardens enable grey squirrels to become well established. For this reason, although it is desirable to deliver biodiversity benefits in areas where people can enjoy them, the proximity of towns, cities etc. to a reserve is considered detrimental to red squirrel conservation. Rate sites most highly where there is limited human settlement in the surrounding area.

It is hoped that forest reserves will be well promoted in order to engage local people and visitors. Similarly, other red squirrel conservation efforts, such a captive breeding, might be possible closer to centres of human population so as to encourage community interest.

vi. *Is the forest a vast area of conifer over 10000 hectares?* You are advised to start thinking about the best, most defendable areas within this large forest. Don't get too specific - this is solely the initial selection process.

Expecting the whole forest to be entirely managed for the benefit of red squirrels is unrealistic. You should aim to develop reserves as discrete areas within the much larger forest. For reserves within very large conifer forests the forest buffer around the reserve should be classed as only a slight barrier to grey movement because *any* woodland will facilitate their presence more than no woodland at all. However, a large area of non-grey squirrel preferred conifer forest may act to slow incursion and it will certainly not be as bad as large-seeded broadleaf habitat.

vii. Are there any other topographic or landscape features that may to act as barriers to grey squirrel incursion?

These factors have not been given individual scores as they are all important when assessing if a site has good defendability or not. An overall judgment should be taken.

2. Buffer size - Woodland perimeter (km).

A buffer zone is an area around the reserve that is actively managed to keep grey squirrel numbers absent or low. The size of the buffer will influence the chances of delivering effective grey squirrel control.

The buffer zone will have an important role to play in protecting red squirrel reserves.

To estimate the area of the buffer you will need to measure the reserve perimeter and compare it against those on the score sheet. If you do not have a GIS, the measurement can simply be done if you know the scale of you map and then running a length of string around the wood on the map. Measure the length of string and enter the woodland score on the sheet provided. You will quickly see that large sites will score very poor.

Large sites and linear (long, thin) sites have a larger area of buffer. It is important to realise that large sites have been assigned low ratings because we are considering the costs of grey squirrel control. Working on the basis that grey squirrel trapping has a set unit cost, large sites will require greater effort and, therefore, cost more to protect. When comparing sites, this score is important because it helps to identify smaller sites that may actually be more manageable against grey squirrel incursion because of their scale.

Grey squirrel dispersal movements can easily cover many kilometres. A 3km distance has been set for the buffer zone as this is thought to be a realistic balance between grey movement, the likelihood and the cost of managing such large areas of the countryside for red squirrels.

Although grey squirrels do occasionally cross open ground it is possible to reduce the buffer width in landscapes where, relative to woodland habitat, incursion by grey squirrels will be considerably more limited. For sites bordered by 'safe areas' (i.e. open fell/moorland) the buffer width can be reduced to 1 km. You may, therefore, need to select a lesser perimeter size on the score sheet. In these instances you should subtract the 'safe' perimeter measurement from the total and select the appropriate range. You will still need a buffer width of 3 km on any 'un-safe' sides of the reserve.

Step 6: Assess and rate 'Site management.

Site Management

Management potential of the forest and the buffer

We try to consider some fairly complex issues here. Competent Forestry Commission, Wildlife Trust, University, forest managers/consultants and/or other Conservation Agency staff should be involved to help to interpret the questions.

The Forest. Forests tend to have 5-10 year management plans to determine their timber production. The Forestry Commission or the landowner will tell you if there is such a plan. Rate your sites after considering these five questions.

i. *What is the species composition of the woodland? How is it intended to change?*

The greater the range of food producing tree species in the forest the better. A monoculture may leave squirrels short of food. Only consider cone-bearing trees (e.g. pines, spruces) and fruiting shrubs/plants (e.g. brambles, roses) in your deliberations. The presence of old large-seeded broadleaved trees (oak, beech, hazel) should be marked as negative.

ii. *How suitable is the current age structure of the wood and how is it intended to change?*

Squirrels will benefit if the woodland is constantly bearing seed and fruit. A good mixture of different aged trees throughout the wood is ideal. Emphasis should be placed on trying to keep a fairly high percentage of the wood between 30-60+ years old. These are the trees that will be providing a lot of seed for the squirrels on an ongoing basis.

iii. *What is the felling regime within the woodland and how is it intended to change?*

A regime where substantial clear-fell is planned will obviously deprive squirrels or food, shelter and habitat connectivity. Again, a mixture of retention and new planting should be sought and felling in smaller blocks is preferable. We have to remember that forest management is multi- objective, not just to save red squirrels. A balance should be possible.

iv. *Are there any conflicts with other conservation or development projects?*

Woodlands can be good for many species of wildlife. Ensure that you find out what other plans for conservation there might be for the wood. A woodland that is good for a variety of wildlife is best, but we need to remember that large seeded broadleaves should be avoided in red squirrel conservation areas. Site selection should therefore occur on a regional basis so that conservation efforts can be targeted to a variety of different sites and conflicts can be minimised.

v. *Is the future ownership and management of the wood secure?*

Find out if the wood is owned, a long-term lease or if the ownership is likely to change in the near future. Rapidly changing forestry circumstances can be responsible for ownership changes, which, in turn, may affect the chances of continued management for reds. Even if the woodland habitat appears highly suited to reds, it is strongly advised that this element is fully considered. A future owner may not have the same objectives as the current owner, so constant awareness of potential ownership changes and dialogue will be required.

The Buffer. Management of the buffer zone (3km around the site) is also of paramount importance to the forest reserve. Again, opportunities and constraints in favour and against of the reserve need to be assessed.

i. *Are there any new 'large-seeded' native woodland planting initiatives in the buffer?*

The presence of, or future creation of, new native woodlands in the buffer zone would potentially be detrimental to the reserve if it included species such as oak and hazel.

ii. *Are there plans to maintain/increase open ground land use such as bogs, heathland, arable farming, dune systems, reservoirs?* May restrict grey incursion.

iii. *Is there any major new residential building planned in the buffer?* May increase grey squirrel incursion.

iv. *Are there any landfill sites/quarries/MOD activity in or planned for the buffer?* Attention will need to be paid to any plans to influence the future land use.

v. (On islands only). *Are there plans for any bridges into the site?* May increase grey incursion.

Step 7: Your site list and the initial site selection, Phase I, is complete. In Phase II we consider the support you will need, as this is open to influence/negotiation and can only be considered once Phase I is complete. Some months of discussion may be needed before final judgments are made. This will further refine the site list

PHASE II

RESERVE CONFIRMATION

Socio-economic/other considerations.

Landowner/manager support.

The key question is: *What proportion of the woodland has owners/managers who will carry out the work needed to make it a red squirrel reserve?*

Without management for reds and defence against grey squirrels, the reserves will not work. If 9 out of 10 landowners/managers support red squirrel conservation but only own/manage 10% of the site you should rate the site as 'unsupportive' rather than 'supportive'.

Any potential or existing conflicts with other land uses and/or policy objectives for the woodland and surrounding landscape must be carefully considered and clearly stated. The needs of commercial forestry; other Biodiversity projects; community woodlands and National Parks, to name a few, cannot be overlooked and may be at odds with the priorities for the red squirrel.

Again, common sense is required. Landowners often say they support red squirrel conservation. You must enter a rating for the site, not their general attitude towards red squirrel work. If you have a forest that will require a lot of change to make it good for red squirrels but for commercial forestry reasons they cannot make the necessary changes to the forest, this is effectively ambivalent/unsupportive. Do not be afraid to enter an appropriate rating.

Step 8: Having considered and rated each of the criteria you can now compare and rank the sites.

Ranking Reserves

This paper is not intended to, and could not, provide all of the answers using a mechanistic process. Interested parties should certainly have open discussions when comparing the sites' different strengths and weaknesses. The value of the ranking is that once it has been carried out, the organisations, individuals and communities interested in red squirrel conservation can start to act.

The following points are suggested to assist the ranking and deciding between similar sites:

- Use the comparison table to help you. We have resisted applying weightings to each criterion because the interplay of potential pluses and minuses against each site is highly complex. Even so, you should be able to rank the whole list from best through to worst;
- Begin by generally clumping sites that are obviously better and worse. These separate groups of sites are the first step of ranking. The greater detail you consider for each site will then separate the differences between sites within each group;
- Involve others in the process to maximize the site knowledge/experience. It is pointless to carry out this exercise without wide circulation and discussion of the points contained. We are aiming to translate these considerations into action;
- Important: please make notes to accompany your discussions about each site. Make reference to why one site is better than another if it helps. By comparing the ratings and the notes it is often surprisingly straightforward to see a hierarchy of sites from the best through to the worst;
- Try and identify if there are some very good sites that cover a range of sizes. (The hectarage to which you label small, intermediate and large will depend upon the range of forest sizes in your region) It makes sense to have some very large, intermediate and smaller sites that are (only if the ratings justify it) near the top of your list. This will give a variety of forests where different management regimes can be adopted to suit. Remember, we still don't know which courses of action will work best for red squirrels, so don't put all of your effort into just one type of forest (i.e. all very large or all small);
- Are some potential sites geographically very close to each other? It may be sensible to work for red squirrels in several sites near to each other, or you may lower the priority of a site because others nearby are already higher on the list;
- If you're still having trouble deciding between which is the best of a few sites, have a look at wider geographical coverage. Do your 'top' sites cover a good geographic area or are they closely bunched? It may be worth spreading the coverage;
- It is important to remember differences in woodland cover. If two possible reserves seem similar, a high percentage of conifer woodland in the buffer or surrounding the reserve would certainly be preferable to an equally high percentage of broadleaf in the buffer;

- You may well find that there are some sites with excellent landowner support but which do not have good potential for red squirrels, no matter the goodwill. It is important to remember our objectives and delivery is key, therefore, it is justifiable to place these sites a little lower on the list. Conversely, you might find that the forest characteristics place a site high on the list but you might have to demote its ranking slightly if the landowner is unsupportive. However, do not shift sites a long way down the list because of an unfavourable score – just use it to place a site within its cohort of similar sites. This helps you to realize that your attention for actual red squirrel work should be aimed at the next best site;
- Be careful to rate 'management potential' independently of the rating for 'landowner/manager support' - apply the forest's merits, not your perceived one. It is worthwhile highlighting in your notes the forests which otherwise score well and where attention might be focussed on improving the landowner support;
- Do you still have a list with many excellent sites on it? Have you fully considered the 'management potential'? If several of your forests are mostly Sitka Spruce, this is going to need design changes to make it better for reds. Ask yourself is there are there any sites with a greater species mix that you can place higher up the list of priorities? These will require less to change to their design and therefore stand a greater chance of actually having work carried out in them;
- Is your ambition for a defendable site realistic? It doesn't matter how defendable a site is if the soil/climate etc means that only Sitka Spruce will grow. Such a forest is not likely to support a viable red squirrel population and changes to the species mix may not be possible. You may find it is sensible to lower the ranking;
- Try not to simply place all of the sites that have got, or will soon have, grey squirrels near them at the bottom of the list. This misses the point about conserving reds in the most appropriate settings, of which the grey is an important, but not the defining characteristic. These forests might have features that mean red squirrel conservation should be pursued. By mistakenly applying the former thinking we run the risk of simply moving back the boundaries of the red squirrel's range without adhering to the science and policy guidance which has suggested ways to save existing viable populations;
- A question such as, 'does the site have visitor potential?' may help when deciding between otherwise similar sites. This could be important to generate revenue for the site;
- As we have mentioned, it is likely that parts of a vast conifer forest might be earmarked as red squirrel reserves. Although we do not ask you to enter scores appropriate to the *particular* section of forest that might become the reserve, you should use this rating and ranking process to help you begin to identify potentially suitable areas.

Targeting resources

An important element of site protection will be the provision of resources by statutory, private sector and other non-statutory organisations. Once a list of potential reserve sites has been selected it needs to be clearly stated where and when money is going to be directed.

Allocating resources may not be a straightforward process of selecting the highest ranking sites. We now introduce the concepts of direct and indirect costs. Two of the most important to consider are:

- the indirect cost of changing forest planting/felling that may mean less timber profit in the future;
- the direct cost of grey squirrel control and population monitoring.

Sites that rate many 'Excellent' or 'Very good' scores are likely to be those at least threat from grey squirrels. These high ranking sites should have attention paid to the long term forest design issues - an indirect cost. It is important to think ahead, forest crops stand for at least 40 years, so it is vital to start thinking about how the forest might change and how to focus resources to plan for that future. This is essential.

At the same time, it is also essential to consider the forests that require immediate and direct spending to ensure red squirrel survival. Direct resources should be targeted at forests lower on the list where resources will result in greatest value added. These will be high ranking sites that are at greatest risk of losing their priority status if action is not taken to prevent grey encroachment into an otherwise viable red squirrel population.

The following example best captures the difference:

> A large island offers red squirrels an extremely good chance of absolute persistence, as long as greys are prevented from reaching it, a suitably large area of habitat is maintained and in the absence of detrimental stochastic events. The site is a high priority for conservation but there may be little need to spend resources to protect the populations.
>
> Contrast this with a large conifer woodland on the mainland that also has a viable red squirrel population, but greys are within a few miles. The woodland has a lower overall rating than the island and, without intervention, the greys will soon arrive and the chances for red squirrel persistence decline. However, this site will be high priority for any vital habitat management changes and spending upon grey squirrel control.

Enter the resource need in the final column of the site comparison table. The targeting of resources based upon the above discussion *should not* influence the final ranking. If a site is good, it is good whether the money is available to protect the site or can be determined later, not at the point of ranking, hence this column coming after the ranking.

Resources should be split into very simple headings.

- Direct costs: trapping and monitoring costs.
- Indirect: forest design planning/alteration.

Only enter Immediate needs. More detailed information and future needs might be written in a forest management statement that describes what is needed in the forest for red squirrels. We do not cover this here.

In order to work out the trapping resource needs you should think about two broad types of site, split between extremely large sites (many thousands of hectares) where it will not be financially feasible to undertake grey squirrel trapping and smaller sites where grey squirrel control may be a realistic proposition. It is known that grey squirrel control is expensive using present techniques. It will be beneficial to have a short list of sites at which you implement grey control. To determine if you will carry

out trapping it is worth considering a site's geographical isolation. If it just isn't going to be feasible to have contractors working for weeks at a time in some very isolated forests, then mention this in the notes. Remember, this is a pragmatic list. The more tightly you can focus what needs to be carried out, the more likely it is going to be achieved.

Be realistic about your list, the final number of reserves will be as long or short as available resources permit.

Step 9: The process is complete. You should have a final, pragmatic list of reserve sites in rank order and a clear idea of where to allocate resources.

4 RECOMMENDATIONS FOR FUTURE ACTION

1. The above criteria, or a parallel process, should be applied as soon as possible within all regions where red squirrels occur in the UK.

2. A portfolio should be produced for all selected sites describing these points and the reasons why it has or hasn't been possible to retain a priority site within the overall programme of site protection for red squirrels.

3. Assign funds and negotiate favourable management of the site for red squirrel conservation.

4. Where appropriate, assess red squirrel population persistence for proposed management plans using GIS and modelling approaches.

5. Site lists must be agreed by any regional group, the national squirrel fora and then endorsed by the UK Red Squirrel Group. This endorsement will enable clear tracking of local sites when it comes to national reports on red squirrel conservation.

6. It is expected that these lists will be incorporated into statutory agency policy documents and strategy to support and reflect the squirrel BAP process.

7. It is essential that effective promotion and active adoption of Reserves amongst planners, foresters, conservation groups etc occurs if the landscape planning necessary is to be successful. National squirrel fora should assist in this promotion of nationally/regionally important sites.

5 CONCLUSIONS

Effective implementation of the red squirrel Biodiversity Action Plan will require some very difficult decisions. In particular, a coherent national and regional context needs to be reached between conservation, forestry, and landscape interests if common ground for red squirrel conservation is to be reached. This discussion must balance the following opposing views:

- There needs to be a shift away from 'native large-seeded broadleaf biodiversity in all places' towards an acceptance that red squirrel conservation will fail unless we retain non-native conifer forestry which does not contain large-seeded broadleaved trees.

- There is good reason for the current diversification within conifer woodlands. The reduction of conifer and the re-planting of deciduous trees should be strongly encouraged. Red squirrel conservation is a minor consideration that must fit in with this framework.

It is suggested that geographical separation of these two aspirations will result in both being achieved rather than one occurring at the expense of the other.

Just as this argument needs to be successfully addressed, there also needs to be a realisation that, in areas where both species occur, grey squirrel control is fundamental to red squirrel conservation at this time. The effectiveness and costs of this site protection are not yet known. It is essential that sufficient efforts are made, including monitoring of the effectiveness of any control/habitat management, both for the benefit of red squirrel populations where greys are just arriving, and for the knowledge we will need to apply to other sites when the time comes to protect them against the grey.

At all times it is important to recognise that red squirrel conservation may be at odds with some species, habitat or landscape objectives. Single species conservation efforts sometimes founder on the inability to compromise with other objectives. However, it is important to remember that forest design should cater for many different goals. We fully support the inclusion and planning of forests for other species, such as goshawk, pine marten, black grouse. This paper is not about woodlands *only* for red squirrels, but about woodlands to *include* red squirrels. It is intended that the presentation of a clear message for red squirrel reserves will win some compromise from other objectives. The management of these reserves will hopefully lay the foundation for the future of red squirrels in Great Britain.

SCORING SHEET FOR RED SQUIRREL FOREST RESERVES.

Reserve Scoping, Phase I

Magnitude of Threat

Red squirrel presence/absence		Rating
Only red squirrels present		Excellent
Only red squirrels present but greys are expected to appear soon		Very good
Red squirrel population and very few grey squirrels present		Good
Red squirrel population and many grey squirrels present		OK
Reds recently disappeared and no greys are present		Poor
Only grey squirrels present		Very Poor
Is it uncertain if any of the above apply*		Find Out

*Implement visual or hair tube surveys or transect monitoring in woodland, as described in *Practical techniques for surveying and monitoring squirrels.* Forestry Commission Practice Note 11, September 2001

Extent and Suitability of Habitat

Woodland Type and Size*

Coniferous woodlands: 2000 + ha or a large woodland on an island		Excellent
Coniferous woodlands: >200-2000 ha or a medium sized woodland on an island		Very Good
Mixed woodlands: containing 2000+ ha contiguous conifer or a small woodland on an island		Good
Mixed woodlands: containing 200-2000 ha contiguous conifer block		OK
All other woodlands		Poor

*Specifics about size, tree species and age structure will be required for precise planning – considered after the list has been drawn up.

Suitability of the Habitat (Do not apply this criterion to island populations)

No mature large-seeded deciduous trees		Excellent
<5% mature large-seeded deciduous trees		Very Good
>5% mature large-seeded deciduous trees		Poor

Site Defendability

Landscape defendability (Do not apply this criterion to island populations)

Expected to be a highly effective barrier	☐	Excellent
Expected to be a reasonably effective barrier	☐	Good
Expected to only be a slight barrier	☐	OK
Expected not to act as an effective barrier	☐	Very Poor

Buffer size - Woodland perimeter (km)

15+	☐	Very Poor
13-15	☐	Poor
8-12	☐	Good
5-8	☐	Excellent

Site Management

Management potential of forest and buffer Forest Buffer

Highly suited	☐	☐	Excellent
Good potential, a few compromises	☐	☐	Good
Some scope. Conservation value may arise, but not as a major consideration.	☐	☐	OK
Unsuitable and/or Many conflicts with red squirrel conservation	☐	☐	Poor

Reserve Confirmation, Phase II

Socio-economic/other considerations

Landowner/manager support

Majority of land managed by very supportive owners/managers	☐	Excellent
Majority of land managed by supportive owners/managers	☐	Very Good
Majority of land managed by ambivalent owners/managers	☐	Poor
Majority of landowners/managers unsupportive or don't know	☐	Very Poor

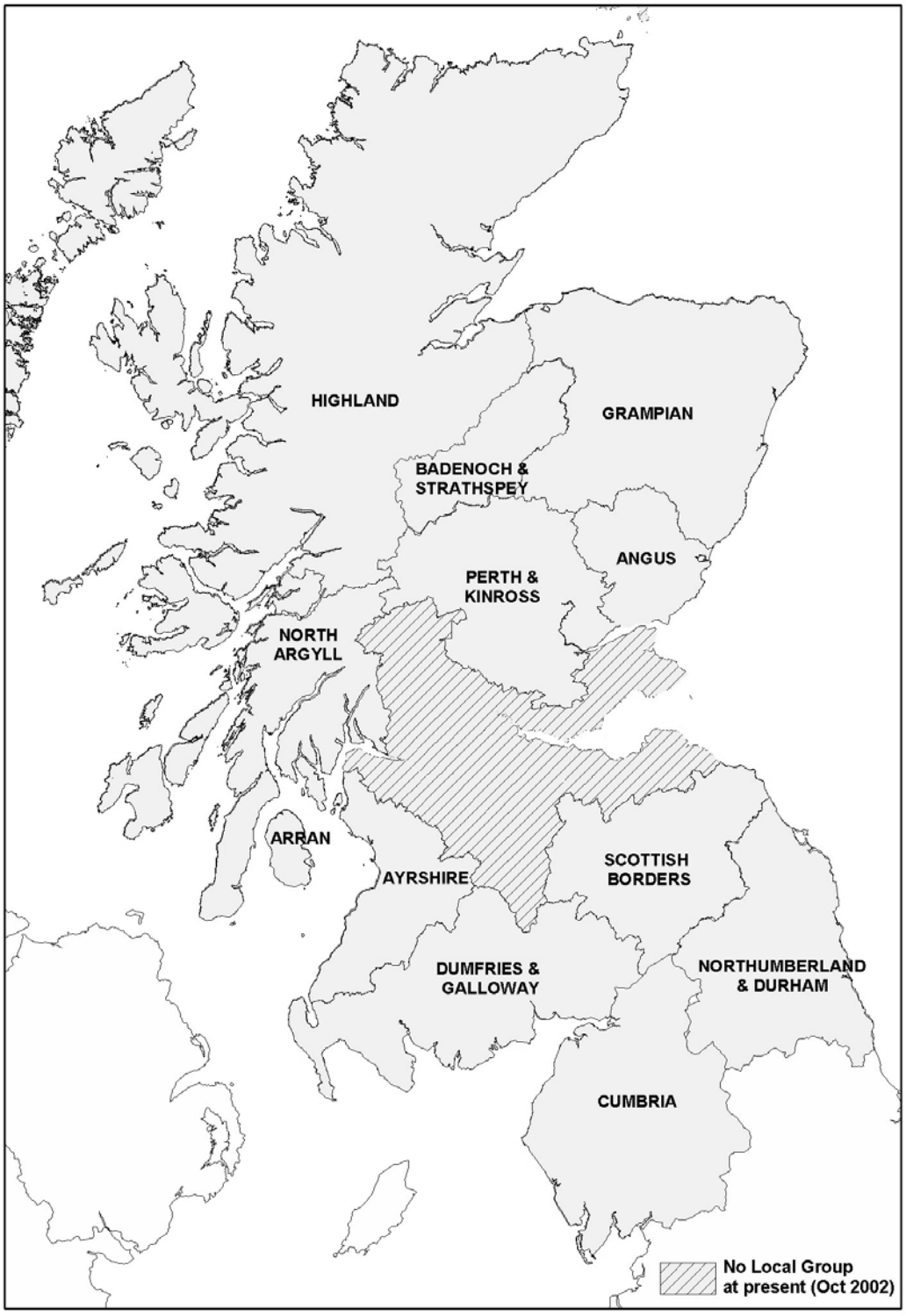
Selecting reserves for red squirrel conservation:

For Discussion: Site Comparison Table

Use this table to help you compare between the sites in your area to see which appear better than others

Site name	Phase I	Grid Reference	Ha (circa)	Presence / absence	Woodland type and size	Suitability of habitat	Defendability	Buffer size	Management potential		Phase II	Landowner support	Final ranking	Resource need
									Wood	Buffer			Best----------Worst	

Appendix D: Local Squirrel Group Boundaries1



[1] NB: Central Squirrel Group are in process of establishing at the time of printing, therefore no boundaries are available for inclusion.

Appendix E: List of Local Squirrel Groups contacts and other relevant organisations

Area	Contact Person	
Angus	Alan Ross Scottish Nature	Lower Flat, Mains of Hallyburton, Coupar Angus, Perthshire, PH13 9JR Tel: 01828 628081 alanross.sn@tesco.net
Argyll	Abbie Patterson Species Recovery Officer, National Trust for Scotland	NTS, 5 Charlotte Sqyare, Edinburgh EH2 4DU Tel: 0131-226-5922 apatterson@nts.org.uk
Ayrshire	Dianne Holman Area Officer, Scottish Natural Heritage	SNH 19, Wellington Square, AYR KA7 1EZ Tel: 01292 261392 enquiries@ayrshireredsquirrels.org.uk di
Badenoch and Strathspey	Gus Jones Badenoch and Strathspey Conservation Group	Fiodhag, Nethybridge, Inverness-shire PH25 3DJ Tel: 01479-821491 bscg@zetnet.co.uk
Borders	Elly Hamilton Red Squirrel Conservation Officer, Red Squirrels in South Scotland Project Andy Wiseman Chair, Borders Squirrel Management Group	Studio 2, Lindean Mill, Galashiels, TD1 3PE Tel 01750 23446 ellyhamilton@redsquirrels.org.uk Bowhill, Selkirk, TD7 5ET Tel: 01750-20753 awiseman@buccleuch.com
Central Squirrel Group	Lynn Campbell Clackmannan Biodiversity Partnership	Partnership Unit,, Clackmannanshire Council. Lyme Tree House, Alloa FK10 1EX lynncampbell@clacks.gov.uk
Dumfries and galloway	Zoe smolka Red Squirrel Conservation Officer. Red Squirrels in South Scotland Project Jamie Carruthers Secretary, Red Alert South West Scotland	c/o SOSWH, Barony College, Parkgate, Dumfries, DG1 3NE Tel: 01387 860442 zoesmolka@red-squirrels.org.uk carruthers.dormont@btuinternet.com

Dumfries and Galloway (Cont)	Geoff Shaw Forest Enterprise, Dumfries and Galloway	Galloway Forest District, Creebridge, Newton Stewart, DG8 6AJ geoff.shaw@forestry.gsi.gov.uk
Forestry Commmission		Forestry Commission Scotland, Silvan House, 231 Corstorphine Road, Edinburgh EH12 7,T Tel: 0131-334-0303 fcscotland@forestry.gsi.gov.uk
Grampian	Gavin Legge Forestry Commission, Grampian	Ordiqhill, Portsoy Road, Huntly, Aberdeenshire, AB54 4SJ Tel: 01466-794542 gavin.legge@forestry.gsi.gov.uk
Highland	Ian Collier Forestry Commission, Highland Conservancy	Woodlands Fodderty Way, Dingwall, IV15 9XB Tel: 01349-862144 ian.collier@forestry.gsi.gov.uk
Perth and Kinross	Polly Freeman Countryside Ranger, Atholl Estates	Atholl Estates Office, Blair Atholl, Perthshire, PH18 5TH Tel 01796-481355 pf@atholl-estates.co.uk
Northern England	Jason Reynolds Red Alert North West Red Alert North East	Cumbria Wildlife Trust, Plumgarths, Crook Road, Kendal, Cumbria LA8 8LX Tel:01539 816 300 cumbriawt@cix.co.uk Northumberaland Wildlife Trust, Garden House, St Nicholas Park, Gosforth, Newcastle Upon Tyne NE3 3XT Tel: 0191 284 6884 mail@northwt.org.uk
Scottish Natural Heritage		Scottish Natural Heritage, 2 Anderson Place, Edinburgh EH6 5NP Tel: 0131-446-2400 enquiries@snh.gov.uk

Appendix F: The role of the local squirrel groups

1 INTRODUCTION

The conservation of the red squirrel in Scotland cannot be solely addressed by a single organisation with a remit for its protection. The issues are complex, and there is a need for all who can contribute to the future survival of red squirrels to combine and approach the problem in a united effort.

This means that in addition to agencies such as Scottish Natural Heritage and the Forestry Commission who have an on-going commitment towards the red squirrel, it is important to include others in the process. The role of local squirrel groups is to do just that, by bringing together all stakeholders and providing a local focus on the needs of red squirrels. Every level of the community should be included, from local branches of national agencies and charities such as the Scottish Wildlife Trust and the National Trust for Scotland, through regional councils and organisations, down to individual communities where the general public can also make a significant contribution. There are groups and individuals at all these levels who can play a role in achieving the objectives of this strategy – landowners, foresters, gamekeepers, amateur naturalists, farmers, countryside rangers and wildlife managers are all people who can help locally but make a difference nationally.

But how can such a diverse group of people coming from different backgrounds and with other commitments begin to make decisions on what should be done for the red squirrels in their area?

The starting point should come from the aims and objectives laid out in the Scottish Strategy for Red Squirrel Conservation, which is based on current information and best practice. It is important that all local squirrel groups are working to common aims, using the best advice available. However, translating national guidelines into regional action is often difficult and it is here that the combined knowledge and expertise of a local squirrel group will be invaluable.

2 SETTING UP A LOCAL SQUIRREL GROUP

2.1 How to begin?

Perhaps the best way to begin the process of establishing a squirrel group for a region is to consult existing groups elsewhere. Not only will this allow experiences and information to be shared, but it will also build important links between groups, helping to maintain a co-ordinated approach to red squirrel conservation throughout Scotland. At present there are six squirrel groups in Scotland, details of which can be found in the Scottish Strategy for Red Squirrel Conservation.

It usually takes a relevant organisation or a group of interested individuals to start the ball rolling and raise awareness about the need for a local squirrel group, but even then it is likely that a lot of dedication will be needed before the group has attracted all stakeholders and can begin to operate fully.

2.2 Who should be involved with the group?

As red squirrel conservation relies on a partnership approach, there is no limit to the number of people who could be involved, and the more people that are aware of the issues the better! It is important, though, to ensure that the group at least has

representatives from Scottish Natural Heritage and the Forestry Commission, as these agencies have responsibilities for conserving red squirrels in Scotland and can provide useful contacts, information and resources. Other important group members will come from a variety of backgrounds. The following list can be used as a guide to those most relevant for a local squirrel group:

Landowners

Forest managers

Foresters

Gamekeepers

Farmers

Estate workers

Wildlife groups and clubs

Wildlife / Conservation organisations

Regional and Community councils

Police Wildlife Liaison Officers

Biological Records Centres / Local Wildlife Recorders

Countryside Rangers

Amateur naturalists

Universities / Colleges / Schools

A core can then be formed that will take forward the group and develop its role in the region. Through raising awareness at events, in newsletters and in the media, an invitation can be put out to the general public to join the group and support its work. This allows the profile of the squirrel group to be maintained, and produces a network of individuals who can be called upon to assist with the group's activities.

2.3 Funding the group

The amount of funding needed by a squirrel group depends on its level of activity. If it is being co-ordinated by an existing group or organisation, then they may be able to cover costs such as administration and meeting rooms, but otherwise this will need to be found from elsewhere. It may be possible through the group's contacts to find someone willing to offer this support in kind, but otherwise funds will have to come from either donations or in the form of a grant.

Scottish Natural Heritage may be able to contribute to the group's establishment through their grant schemes, or if the group can achieve charitable status then a number of trusts and grant making bodies could be approached for financial support. It is worth accessing the Grants Register that is produced by the Charities Aid Foundation, as this may reveal other sources of funding. Alternatively, it is often worth approaching local businesses and organisations with information about the group and a request for donations.

3 THE ROLE OF THE GROUP

Once a local squirrel group has been formed - what can it do? This may seem like an obvious statement, but there is little point in bringing people together if there is not a plan of action.

The Scottish Strategy for Red Squirrel Conservation is based on knowledge and research of red squirrel conservation gathered from many sources. It provides a framework within which red squirrel conservation in Scotland can be taken forward and it should be used as the starting point for deciding what a local squirrel group is going to do. However, it is important that this is considered using local knowledge and that plans are based on the local issues. It will be necessary for the group to pick tasks that can be realistically achieved, and wherever possible these should also contribute to meeting national objectives.

The production of a regional red squirrel action plan can be very useful in highlighting the local issues, identifying solutions and setting a timescale for their implementation. Local Biodiversity Action Plans (LBAPs) provide an ideal framework for the production of these plans, and local squirrel groups can become lead partners in their production and implementation.

It is therefore important that local squirrel groups involve the regional councils from the onset and contribute to the LBAP process through their collective expertise and knowledge. The regional council's production and implementation of their LBAP is a heavy responsibility, and local squirrel groups are in a position to assist with red squirrel action plans, ensuring that they fully address local and national issues.

4 DEVELOPING LOCAL SQUIRREL GROUPS

The implementation of red squirrel action plans requires time, resources and on-going co-ordination, which local squirrel groups formed from volunteers can often find very demanding. In Dumfries and Galloway and the Borders, Red Alert South West Scotland and the Borders Squirrel Management Group solved this problem by joining forces and raising the funds to appoint a Red Squirrel Conservation Officer for each region. The English groups Red Alert North West and Red Alert North East who operate similar projects inspired this initiative, showing how we can learn from the work of others to make improvements elsewhere.