

Conservation Plan for Red Squirrels in Wales



Meeting the challenge to keep reds in Wales

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Prepared by the Wales Squirrel Forum
in consultation with the Wales Squirrel Partnership

December 2009



The Wales Squirrel Forum and Wales Squirrel Partnership

The Wales Squirrel Forum (WSF) and Wales Squirrel Partnership (WSP), aim to enable effective red squirrel conservation and grey squirrel management in Wales.

The Wales Squirrel Forum is made up of statutory, non statutory organisations and local groups and aims to coordinate, support and provide advice on the implementation of the UK Red Squirrel Species Action Plan in Wales and also the recently agreed targets and actions for Wales.

The Wales Squirrel Partnership provides a mechanism for information exchange and networking and membership is open to those with an interest in red squirrel conservation and grey squirrel management in Wales.

The Forum and Partnership are currently chaired by the Countryside Council for Wales and the secretariat is provided by Forestry Commission Wales.

Membership of the Wales Squirrel Forum currently includes:

- Anglesey Red Squirrel Project
- Clocaenog Red Squirrel Project
- Confederation of Forest Industries
- Countryside Council for Wales
- European Squirrel Initiative
- Forestry Commission Wales
- Forest Research
- Local Biodiversity Action Plan representative
- Mid-Wales Red Squirrel Project
- Wildlife Trust Wales
- Welsh Assembly Government

Ministers' Foreword for Wales Red Squirrel Conservation Plan

The red squirrel is the only squirrel that is native to the British Isles and it is an iconic species of Wales' forests. Red squirrels live and breed in trees, making their nests, or dreys, in them and feeding on tree seeds. At one time, red squirrels were found in the woodlands and forests throughout Wales and many people may remember seeing red squirrels in local woodlands during their childhood.

However, unfortunately, this is a sight that we can no longer take for granted. Red squirrels, like other members of our fauna and flora, have suffered as the result of the release and spread of a non-native species – in this case the grey squirrel. Since its introduction in the 19th century the grey squirrel, originally from North America, has become widespread throughout Wales, as well as in England and parts of Scotland. As the grey squirrel has spread, red squirrel populations have declined, due in part to competition for food and also to the spread of a disease that is fatal to red squirrels.

Red squirrels are now only found at handful of sites in Wales with the main populations being on Ynys Mon, in Clocaenog forest and in the complex of forests of mid-Wales in and around the Tywi valley. Genetic studies have shown that each of these red squirrel populations contain DNA which is unique to Wales.

We have a duty to protect red squirrels in Wales and to ensure that future generations will continue to have the privilege of seeing them in the wild.

In recognition of the importance of these three populations, we have agreed that Anglesey, Clocaenog and mid-Wales sites should be Focal Sites for red squirrels and that urgent strategic action is needed in these areas.

We also welcome the production of this Conservation Plan for Red Squirrels in Wales, which has been prepared by the Wales Squirrel Forum together with the Wales Squirrel Partnership. This Conservation Plan will provide the basis for action in Wales to protect and enhance the red squirrel Focal Sites and support an increase in the red squirrel population.



Jane Davidson AM
Minister for Environment,
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Minister for Rural Affairs

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1. Background

Red squirrel (*Sciurus vulgaris*) populations have declined catastrophically in recent years and in most places have been completely replaced by the North American grey squirrel (*Sciurus carolinensis*). The range of the red squirrel is now restricted to a small number of isolated populations, predominately in mid and north Wales (see Figure 1). A similar decline has been seen in England and, to a lesser extent, Scotland.

Under the UK Biodiversity Action Plan process the red squirrel has been identified as a priority species and in 1995 the Red Squirrel Biodiversity Action Plan was published (see www.ukbap.org.uk for details). Subsequently, the Joint Nature Conservation Committee published the UK Strategy for Red Squirrel Conservation (JNCC 1996) and the implementation of the UK strategy within Wales was set out in the Wales Red Squirrel Strategy (Warren and Matthews 1999).

The production of this Conservation Plan for Red Squirrels in Wales will provide a framework for the conservation and recovery of the red squirrel using up to date management recommendations and recent survey information. This Conservation Plan will replace the 1999 Wales Red Squirrel Strategy. The conservation plan will be implemented through a series of actions managed through the Biodiversity Action Reporting System (BARS, see www.ukbap-reporting.org.uk).

2. Red squirrels in Wales

As the only squirrel native to the UK, red squirrels were once widespread in Wales, and the first known reference to red squirrels in Wales was in the 13th century in the laws of the Welsh prince Howel Dda. Historically, there are records of population fluctuations, and between 1908 and 1920 there was a widespread crash in the red squirrel population in Wales. Red squirrel numbers subsequently recovered in most counties.

The first documented release of grey squirrels in the UK was in Henbury, Cheshire in 1876, although there is evidence of what is probably a grey squirrel from Llandisilio Hall, Denbighshire in 1828. Documented releases in Wales include Wrexham (1903), Aberdare (1922) and Glamorgan (1922). Grey squirrels gradually spread from the east and by the 1970s were found throughout Wales.

Since the introduction of the grey squirrel to the UK, numbers of red squirrels have gradually declined as the range of the grey squirrel has spread. Section 4 provides a brief explanation on the causes of this decline.

At the present time (2009), survey evidence suggests that red squirrels are restricted to three main areas within Wales (Clocaenog forest, Anglesey and mid-Wales), with a small population also present in Cynwyd. Red squirrels may still be present at a number of other sites (Aberhirnant, Brechfa, Cwm Mynach, Nantyr, Rheola), although updated survey information is needed to determine the status of these populations.

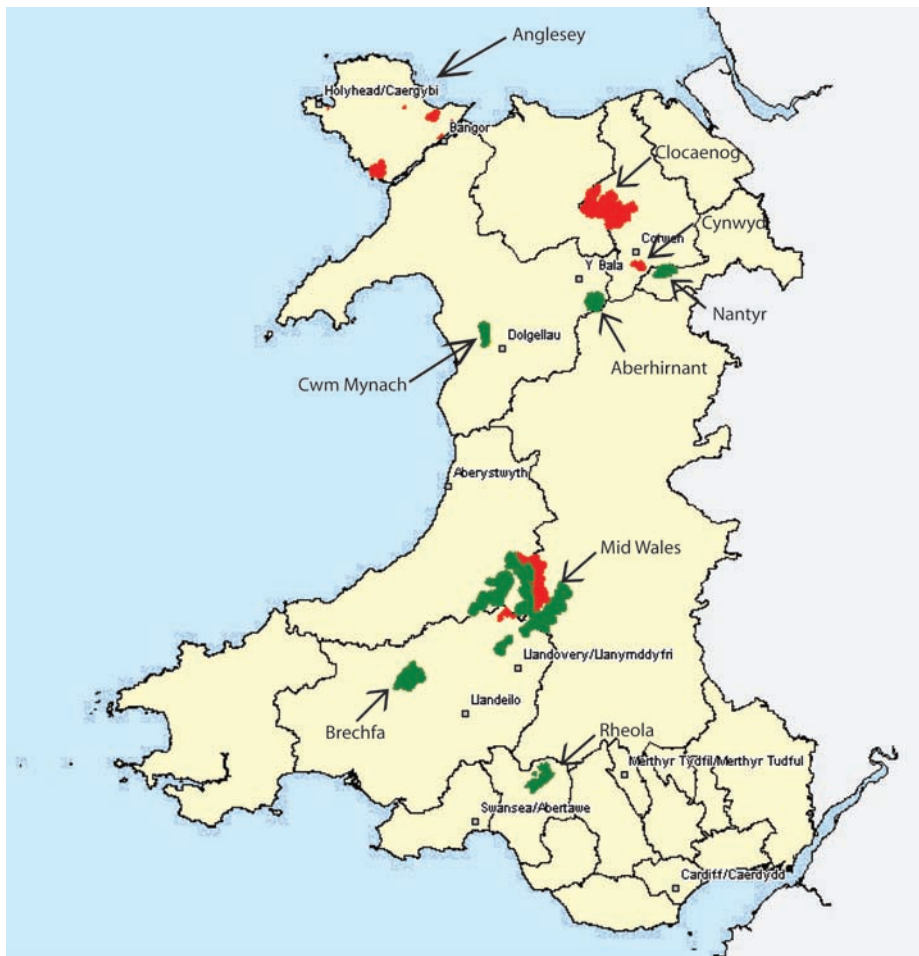


Figure 1. Distribution of red squirrels in Wales (red areas – sites with survey evidence of red squirrels; green areas – no recent survey information)

3. Why do we need to conserve the red squirrel in Wales?

3.1 The red squirrel is important

The red squirrel is a readily identifiable flagship species of the forests of Wales. It has an intrinsic value and people derive much enjoyment both from seeing red squirrels in the wild and knowing that they are present in their local woodlands, giving them a strong affinity with this species.

Studies have shown that some populations of red squirrels in Wales have a genetic structure that is unique which indicates an ancestral Welsh population. These red squirrels represent an important gene pool and need to be preserved.

If we do nothing it is likely that each of the remaining red squirrel populations will be lost in the near future, making the red squirrel the first indigenous mammal to go extinct since the beaver in the 12th century.

3.2 Other strategies and plans require action

In addition to ensuring the continuation of a robust and healthy red squirrel population, the Conservation Plan for Red Squirrels in Wales will contribute to delivery of commitments and actions from other plans and strategies.

UK Red Squirrel Biodiversity Action Plan

The UK red squirrel BAP was published in 1995 and aims to maintain and enhance red squirrel populations. In 2006 BAP targets were agreed at the country level (see Annex A) and these are now being disaggregated to local BAP level.

Environment Strategy for Wales (Welsh Assembly Government 2006): Outcome 19 of the Environment Strategy for Wales requires that ‘the loss of biodiversity has been halted and we can see a definite recovery in number, range and genetic diversity of species, including those species that need very specific conditions to survive’. The timeline follows the international commitment under the Convention on Biological Diversity to halt biodiversity loss by 2010 with recovery underway by 2026.

NERC Act (2006): Section 42 of the NERC Act requires the National Assembly for Wales to publish a list of species and habitats which are of principle importance for the purpose of conserving biodiversity. The Act also requires that the Assembly take such steps as required to further the conservation of species on the list. The red squirrel is one of 17 mammals on the published Section 42 list.

Woodlands for Wales (The Welsh Assembly Government’s strategy for Woodlands and Trees, 2009): The vision in the strategy is that ‘Wales will be known for its high-quality woodlands that enhance the landscape, are appropriate to local conditions and have a diverse mixture of species and habitats’. Within ‘Environmental Quality, outcome 6.3 requires that ‘Woodland biodiversity is supported and native woodland is in favourable management’. The strategy states that ‘We are committed to halting the loss of biodiversity from woodlands in Wales, with recovery underway in wildlife numbers, range and genetic diversity by 2026’, adding that ‘Some threatened species such as the nightjar, red squirrel and the hazel dormouse occupy more recently planted woodlands, often conifers, and their importance should not be overlooked.’

Living Within Natural Limits (CCW Corporate Plan 2008-12): CCW supports the long term outcome that the ‘loss of biodiversity will have been halted and we can see a definite recovery in

the quality and extent of our key habitats and species populations'. To help achieve this outcome CCW can 'support practical action that helps improve the extent, quality and connectivity of priority habitats and secures viable populations of priority species on land and as sea, and deliver all BAP actions assigned to CCW as lead partner'. By 2012 CCW will 'achieve agreed BAP targets for which CCW is a lead partner and support delivery of BAP targets by other organisations ...'.

Local Biodiversity Action Plans in Wales

The red squirrel is a biodiversity action plan species in a number of Welsh LBAPs: Anglesey, Carmarthen, Ceredigion, Conwy, Denbighshire, Neath Port Talbot, Powys, Rhondda Cynon Taff, and Snowdonia National Park. See [HYPERLINK](http://www.biodiversitywales.org.uk/local_to_you-3.aspx)

"http://www.biodiversitywales.org.uk/local_to_you-3.aspx"

http://www.biodiversitywales.org.uk/local_to_you-3.aspx for further details.

4. Conservation of the red squirrel in Wales

Before embarking on a species conservation plan, it is important to understand the reasons for the decline so that action will ensure effective conservation and recovery. This document gives a brief introduction to these issues for the red squirrel, although they are discussed extensively elsewhere (see Bryce et al. 2005, Gurnell et al. 2004).

4.1 Causes of decline

The decline of red squirrel populations in the UK is thought to be the consequence of a number of factors:

Competition for resources with grey squirrels.

The primary cause of the replacement of the red squirrel by the grey squirrel results from the grey squirrel's ability to exploit certain food resources more effectively, particularly those found in broadleaved woodland. Grey squirrels feed on hazelnuts earlier than reds, are better adapted to digesting acorns and pilfer red squirrel food caches. They can reach high densities in these habitats. In broadleaved woodland when both red and grey squirrels are present, red squirrels have reduced breeding success and lower growth rates than at sites where only red squirrels are present, leading to population declines and ultimately exclusion of red squirrels (Gurnell et al. 2004). Depending on the mix of tree species present, red squirrels appear to have a competitive advantage over greys in conifer woodlands, particularly spruce dominated forests. However, the presence of large-seeded broadleaves within the forest enables grey squirrels to colonise these sites more rapidly and greys have also replaced red squirrels in pine dominated forests such as Cannock Chase.

Disease

The squirrelpox virus (SQPV) is a fatal infectious disease in red squirrels. Grey squirrels transmit the disease to red squirrels, although the transmission route is not known. Grey squirrels appear to be unaffected by the virus and rarely show clinical signs of infection. The replacement of red squirrels by grey squirrels is 19-22 times faster where SQPV is present (Rushton et al. 2006).

Habitat loss

Increasing fragmentation and degradation of woodlands and the loss of hedgerows may have led to a decline in red squirrel populations in the past (Gurnell 1987). However, the planting of large areas with conifer trees has provided a habitat that favours red squirrels, although these habitats support lower densities of red squirrels than optimal habitats.

4.2 Conservation management

Conservation of red squirrel populations depends upon maintaining sites free of grey squirrels and ensuring a suitable habitat for sustaining red squirrels. On mainland sites, red squirrel conservation is focussed on conifer woodlands where grey squirrels are more easily excluded and where red squirrel populations are more able to persist. Habitat management in these sites is focussed on minimising suitability for grey squirrels, whilst maintaining the red squirrel population. On Anglesey grey squirrels are being eradicated and so red squirrel habitats can be managed to maximise red squirrel suitability.

In general, private forest owners and managers should consult their forest neighbours to produce complimentary forest plans which benefit red squirrels, and when managing grey squirrels. Forest owners and managers should seek advice and guidance from local red squirrel groups and experts at an early stage in forest planning and also prior to all high impact operations.

Forest management

Red squirrel conservation should be a major objective within forest management plans and forest design plans in woodlands designated as red squirrel 'Focal Sites' (see section 6.2), or sites where red squirrels are known to be present. It should be a primary objective of management in areas of good habitat used by red squirrels for breeding or feeding within Focal Sites known as 'key areas'. Consideration will also need to be given to other objectives for the site.

Site specific advice on forest management for red squirrels should always be obtained, but in general, the following principles should be observed:

The Welsh mainland

- During forest planning 'key areas' which contain Norway spruce and all pine species should be identified and surveyed for the presence of red squirrels. These key areas provide important food sources and should be designated as natural reserves or long-term-retentions. They should be managed by minimum intervention or according to continuous cover forestry principles.
- Fragmentation of the forest and isolation of key areas should be avoided and arboreal connectivity maintained between key areas through the use of continuous cover, long-term retentions, natural reserves and a series of connected restocking sites of various ages.
- Felling coupe sizes should be minimised and the size and shape of the coupe structured to avoid the loss of important linkages and reduce disturbance (adjacent coupes should have a minimum height of three metres). Consider retaining some stable trees in clearfells to provide early future structure and seed trees on the restocked site. Clearfells should be promptly restocked to aid rapid recovery of forest conditions. Where possible, retain trees standing to grow to maximum coning age, and retain some stable trees in clearfells to provide early future structure and seed trees on the restocked site.
- Thinning should be carried out to improve the canopy size and increase cone and seed production. If possible when thinning, retain some areas in an undisturbed state to allow red squirrels to retreat to and delay thinning in Norway spruce stands during heavy coning years. Avoid canopy fragmentation. Avoid high impact operations in red squirrel breeding areas during February to October.
- On stable sites continuous cover silviculture (CCF) should be used to maximise stand diversity (avoid using uniform systems). CCF areas if possible should be located in areas close to important key areas to maximise the area of permanent habitat available and to maintain connectivity in the forest.

- Increase the percentage of Norway spruce, larch and Scots/lodgepole pine (to a maximum of 12%). Do not plant large seeded broadleaved trees such as oak, chestnut, beech, ash, sycamore and hazel.
- Ideally 50-60% of the forest should contain conifers of seed producing age. In a commercial forest managed using clearfelling, a structure should be developed so that approximately one third of trees are below seed bearing age, one third are 'middle aged' and one third are older.

Anglesey

On Anglesey, where grey squirrels are being eradicated, it is the objective that red squirrels will recolonise all available habitat. With this objective in mind, the main forest areas on Anglesey of Mynydd Llwydiarth and Newborough should be managed to enhance the red squirrel carrying capacity and to maximise the area of suitable squirrel habitat, to ensure the long term survival of red squirrel populations. In addition to the main forest management recommendations above, the following recommendations should be observed in Anglesey:

- Continuous cover systems should be used to emphasise spatial diversity within the stand and to reduce canopy fragmentation, with an emphasis upon small scale coupe felling and restocking rather than a uniform approach to thinning.
- Early thinnings can be relatively heavy, but as the stand develops the emphasis should be on lighter and less frequent thinning. Heavy late thinning should be avoided as fragmented canopy is unsympathetic with the requirements of the red squirrel.
- Restocking should avoid the use of small seeding broadleaved species and Sitka and Norway spruce. Oak, beech, sweet chestnut, hazel, lime, rowan, larch and pine (eg Scots, Corsican, lodgepole, maritime, stone and mountain) are preferred.

Grey squirrel management

In areas containing red squirrels only shooting and live-capture cage trapping can be used to control grey squirrels. Section 14 (Schedule 9) of the Wildlife and Countryside Act 1981 states that the release of grey squirrels into the wild is an offence and therefore all captured grey squirrels should be despatched humanely at the point of capture. Best practice trapping procedures should be followed (see Forestry Commission Practice Note 4), and must include disease control measures.

On the mainland, grey squirrel control should be focussed on three main areas:

- Areas where grey squirrels may have a direct impact on red squirrel populations. These areas will often be red squirrel 'key areas'.
- Buffer areas immediately adjacent to red squirrel focal sites. These will often be broadleaved woodlands with potentially high concentrations of grey squirrels.
- Source areas elsewhere in the landscape from which grey squirrels may spread – these will be areas of large seeded broadleaved trees such as beech, oak, ash, sycamore, hazel, sweet chestnut.

It is recommended that grey squirrel control is carried out at a strategic landscape scale. Ideally, this will be co-ordinated and managed by an external organisation which has an understanding of the strategic landscape connectivity of the focal site.

4.3 Legal protection

The red squirrel is protected under Schedule 5 of the Wildlife and Countryside Act (1981) making it an offence intentionally to kill, injure or take a red squirrel. It is also an offence to damage, destroy or obstruct access to place or structure being used by a red squirrel for shelter or protection, or to disturb a red squirrel whilst it is using such a place.

5. Conservation objectives

The conservation of red squirrels in Wales will depend on ensuring the persistence of core populations and assessing the potential for protecting and enhancing populations that remain at other sites.

In 2005 the targets for the red squirrel UK BAP were reviewed and devolved targets were set for each country. The Wales Squirrel Forum agreed a target to:

Maintain red squirrels at the current range by 2010 and 2015.

At the time, red squirrels were assessed to be present in a total of 20 10km squares in Wales. The targets will be reviewed in 2010. See Annex A for a copy of the paper agreed by the Wales Squirrel Forum setting out the targets for Wales.

An initial assessment of sites where red squirrel conservation will be actively pursued has identified three red squirrel Focal Sites (see section 6.2) and resources will be focussed on safeguarding these sites. The primary objective of the Wales Red Squirrel Conservation Plan is to:

Maintain breeding populations of red squirrels at all Focal Sites within Wales.

If resources permit, a secondary objective is to:

Maintain the current distribution of red squirrels within Wales.

6. Conservation actions

Taking into account the requirements for red squirrel conservation, it has been agreed that the following actions should be undertaken in order to meet the conservation objectives.

6.1 Identify and monitor populations of red squirrels

Reliable monitoring of squirrel populations can be difficult as red and grey squirrel field signs cannot be separated and squirrel populations undergo natural fluctuations in size. However, it is important to understand the status and trends of each of the populations of red squirrels in Wales, particularly population declines, to ensure resources are targeted effectively (Gurnell et al. 2007).

Some populations in Wales are relatively well studied (eg Anglesey and Clocaenog), whilst extensive surveys of others have only recently commenced (eg mid-Wales). Surveys of other sites have not provided conclusive evidence of the status of those populations (eg Aberhirnant).

6.1.1 Survey all sites with records of red squirrels in the last 10 years.

Survey all sites with recent reliable records of red squirrels using appropriate techniques to provide reliable information on the status of the populations at those sites. Encourage the submission of sightings from members of the public, providing guidance on red squirrel identification.

6.1.2 Establish monitoring of Focal red squirrel populations in Wales

Using an agreed protocol, establish regular monitoring of Focal Sites within Wales to determine the status of red squirrel populations. Monitoring should also provide information on the distribution and abundance of grey squirrels within focal sites and buffer zones and be used to target control effort.

6.1.3 Establish and maintain a squirrel database and bibliography and ensure that data are made available to the National Biodiversity Network

A squirrel database will be established and used as a central repository for all squirrel records (survey information and casual records). This will ensure that records and distribution maps are kept up to date and are available to a range of organisations and groups.

6.2 Focal sites for conservation action

To ensure effective use of resources, conservation action for the protection of red squirrels within Wales will initially be concentrated at the sites considered to be the most robust in the long term. However, red squirrels are legally protected under the Wildlife and Countryside Act (1981) and forest managers should take account of the needs of red squirrels at all sites where they are present.

6.2.1 Agree focal sites for Wales

Criteria for identifying priority sites for red squirrels which were prepared by the UKRSG have been adapted for use in Wales. An initial assessment has been completed and three Red Squirrel Focal Sites have been identified (Anglesey, Clocaenog and mid-Wales).

6.2.2 Review focal sites list

The assessment of focal sites will be periodically reviewed to take account of any changes in the status of red squirrel populations or the availability of new information.

6.3 Protect red squirrel populations

Conservation action to protect red squirrels on mainland sites needs to focus on ensuring suitable habitat is present to support viable red squirrel populations and yet deter grey squirrels. Each Focal Site will need to have a management plan that has been agreed with all landowners, detailing the action required to maintain a viable population.

6.3.1 Review and comment on forest management planning

The adoption of forest planning that ensures an appropriate mix of tree species, tree age and stand structure in the long-term is critical to safeguarding red squirrel populations. Where grey squirrels continue to be a threat, the priority is to provide good quality red squirrel habitat that at the same time minimises the suitability of the habitat for grey squirrels.

Forest Design Plan reviews for the Assembly Woodland Estate and Better Woodlands for Wales (BWW) management planning for private woodlands provide an opportunity to ensure effective woodland management is in place. Advice will be provided to Forest District planners and BWW management planners on good practice management techniques.

6.3.2 Agree and implement red squirrel management plans for Focal Sites

Effective management of focal sites and their associated buffer zones will depend on a co-ordinated partnership approach, particularly where there are multiple landowners. This will be achieved most effectively through the agreement of a red squirrel management plan. Private woodland owners will be given advice on entry to relevant grant schemes, eg BWW or Tir Gofal.

6.3.3 Grey squirrel control within Red Squirrel Focal Sites

A trapping programme will be established within focal red squirrel sites to eradicate greys squirrels from the core of each forest. Monitoring using hair tubes and sightings records may be used to target control. Research at Clocaenog Forest has shown that grey squirrels may periodically move into the forest to exploit the seed crop at certain times of year (ref). Consideration may be given to monitoring cone crops to forecast when increased control within the forest is needed.

6.3.4 Establishment and protection of Red Squirrel Focal Site buffer zones

To inhibit grey squirrel incursion into red squirrel sites it will be necessary to establish a buffer zone around each site. The size of the buffer zone will depend on habitat type and the permeability to grey squirrels. Control effort will be focussed on habitats which greys are more likely to use as dispersal routes. Management of buffer zones will require engagement of a wider partnership of landowners and links with grey squirrel control for other objectives, eg tree protection.

6.3.5 Development advice

Where red squirrel sites may be affected by developments, red squirrel conservation issues will need to be addressed. Effective and timely advice, expertise and representation should be provided in the planning process, land use planning, planning applications, development proposals and environmental impact assessments. Generic advice will be given by WSF.

6.4 Policy advocacy

6.4.1 Respond to relevant consultations

Seek to ensure that the needs of red squirrels are addressed in relevant policy documents to

secure long-term favourable management through land use consultations (eg BWW grant schemes, Tir Gofal).

6.5 Disease control

Squirrelpox virus (SQPV) is a fatal infectious disease in red squirrels and the presence of the disease has been found to significantly increase the rate of replacement of the red by the grey squirrel in parts of England. The incidence of disease in red squirrels appears to be related to the level of presence of grey squirrels in an area, suggesting they are involved in transmission of the disease, although the mechanisms of transmission have not yet been determined. Grey squirrels with antibodies to SQPV have been found in all the red squirrel sites in Wales where testing has been undertaken.

6.5.1 Monitor incidence of squirrelpox virus in grey squirrels

Blood from grey squirrel carcasses will be submitted for SQPV antibody analysis. VLA to advise on required sampling level.

6.5.2 Ensure that activities minimise the risk of disease transmission between red and grey squirrels

Produce and disseminate best practice guidance on trapping techniques, supplementary feeding and other activities that may bring red and grey squirrels into contact with each other.

6.5.3 Prepare squirrelpox virus action plan

In the event of an outbreak of squirrelpox virus, rapid action will be needed to ensure the disease is contained and infected squirrels are removed and treated. The preparation of an agreed action plan will ensure that all groups in Wales are aware of the best practice procedures to be followed.

6.5.4 Research into squirrelpox virus

Promote the need for funding into squirrelpox virus research and vaccine development, and facilitate co-operation between the relevant departments of the different UK administrations.

6.6 Advisory and public awareness

6.6.1 Facilitate and enhance communication and sharing of good practice between red squirrel practitioners within Wales and the UK.

Effective and regular communication between different groups working to safeguard red squirrel populations will ensure that experience and effective measures will be effectively disseminated.

6.6.2 Provide red squirrel conservation advice for developers, foresters and local authorities

Prepare generic advice to ensure activities are sympathetic to the needs of red squirrels and comply with the requirements of the Wildlife and Countryside Act (1981).

6.6.3 Establish red squirrel community groups for Focal Sites

Community groups play a vital role in promoting the importance of conserving red squirrels in the local area. Activities include education, raising funds and collation of red and grey squirrel sightings. Some individuals are willing to become involved in grey squirrel control programmes.

6.6.4 Promote public understanding of the red squirrel in Wales and its conservation

Develop bilingual promotional and educational material. In some situations opportunities may be provided for the public to view red squirrels thereby providing an enhanced appreciation of the issues involved, eg Anglesey red squirrel webcam. Encourage public participation and engagement in red squirrel conservation through the use of the media.

6.7 Research

6.7.1 Maintain an overview of red and grey squirrel research within the UK and ensure Wales' specific issues are addressed.

Review current literature and research and identify any gaps in knowledge that need to be addressed. Provide advice to the UKRSG and research organisations on identified research needs for Wales.

6.7.2 Review and assess the potential impact of climate change on red squirrel conservation in Wales.

In consultation with relevant experts, assess the likely impact of climate change on squirrel biology and future woodland structure and composition. Review the impact these changes may have on red squirrel conservation.

7. Implementation of the conservation plan

The Wales Red Squirrel Conservation Plan will be implemented through the Wales Squirrel Forum and the Wales Squirrel Partnership with these bodies and/or their member organisations/groups being responsible for selected actions.

The timescales and organisations responsible for implementing each of the actions in this Conservation Plan will be agreed and progress with implementation will be monitored through the Biodiversity Action Reporting System (www.ukbap-reporting.org.uk). The conservation plan will be reviewed every 3 years and updated as work progresses and to reflect changes in priority, additional actions identified or new findings from research.

8. References

Bryce, J., *et al.* (2005). Habitat use by red and grey squirrels: results of two recent studies and implications for management. Information Note 076. Forestry Commission, Edinburgh.

Gurnell, J. (1987). *The natural history of squirrels*. Christopher Helm, London.

Gurnell, J., *et al.* (2004). Alien species and interspecific competition: effects of introduced eastern grey squirrels on red squirrel population dynamics. *Journal of Animal Ecology* 73: 26-35.

Gurnell J., *et al.* (2007). *Developing a monitoring strategy for red squirrels (Sciurus vulgaris) across the UK*. Final report for JNCC and PTES.

JNCC (1996). *UK strategy for red squirrel conservation*.

Ogden, R., *et al.* (2005). Genetic management of the red squirrel, *Sciurus vulgaris*: a practical approach to regional conservation. *Conservation Genetics* 6: 511-525.

Rushton S.P., *et al.* (2006) Disease threats posed by alien species: the role of a poxvirus in the decline of the native red squirrel in Britain. *Epidemiology and Infection* 134: 521-533.

Warren, R., Matthews, J. (1999). *The Wales red squirrel strategy*. CCW Natural Science Report; 99/9/2, Countryside Council for Wales.

9. Annexes

Annex A – Wales Red Squirrel BAP targets

The range of the red squirrel in Wales has been declining for many years as a result of factors such as grey incursion, disease and habitat loss. Until mechanisms are available to counter these pressures, particularly the presence of grey squirrels and disease, the range of the red squirrel may continue to decline. However, the Wales Squirrel Forum agreed that to set a declining target which is then subsequently met would not reflect the conservation status of the red squirrel in Wales. It was therefore agreed that the BAP target for Wales would be to maintain red squirrels at their present range based on the number of 10km squares occupied and conservation efforts would be directed towards achieving this.

Records for red squirrels in Wales come either from survey information (trapping/hair tubes) or ad hoc sightings. For some sites survey information has shown that reasonable numbers of red squirrels are present. Whilst at other sites hair tube or trapping work has been inconclusive or information is based only on sightings. With this in mind, records have been divided into 10km squares with good information on the red squirrel population, 'Good data' and sites where there have been occasional sightings of red squirrels or inconclusive survey information 'Poor data' (see table below). Only squares which have records of red squirrels in the last 5 years have been included.

Using the current status of red squirrels as the baseline and a target to maintain red squirrels at the current range, the target set is to maintain the presence of red squirrels in 20 10km squares in 2010 and 2015. Maintenance targets need only be set until 2010 after which they can be reviewed.

Probable status of red squirrels in Wales in 2005

Sites where red squirrels have been recorded ¹	Status	No. 10 km squares	
		Good data	Poor data ²
Newborough	Reintroduction site	2	
Mynydd Llwydiarth	Studied population	2	
Clocaenog	Studied population	2	
Cynwyd and Nantyr	Sighting in each forest in 2005		2
Aberhirnant	Evidence of reds in hair tube survey in 2000; survey in 2001 no evidence		
Cwm Mynach	Sighting in 1999, hair tube survey in 2001 found no evidence	0	0
Tywi/Nant yr Hwch / Irfon/Bryn Arau Duon	c. 35 squirrels trapped in 2005 and sightings from other areas	2	8
Brechfa	No recent records		0
Rheola	Unconfirmed sighting		0
		8	12
Total number of squares		20	

Note 1 – only 10km squares with records in the last 5 years have been included, although other sites are referred to. Note 2 – see above introductory text for explanation of terms

Annex B – Bibliography of reports for sites in Wales

Cartmel, S. (1997). *Red squirrels in Clocaenog Forest*. CCW Science Report 190, Countryside Council for Wales.

Cartmel, S.J. (2002). *Red squirrel survey of central Wales 2001*. CCW Science Report 475, Countryside Council for Wales.

Cartmel, S. (2003). *Aberhirnant red squirrel survey: second phase, summer 2001*. CCW Science Report 589, Countryside Council for Wales.

Cartmel, S. (2003). *Review of red squirrel habitat in central Wales*. CCW East Area Report 22, Countryside Council for Wales.

Denman, H. (2006). *Assessment of the status of the red squirrel in central Wales 2005 - 2006*. (CCW Species Challenge Fund Report; 06/02/03). Bangor: Countryside Council for Wales (CCW).

Green, M. (2002). *Red squirrel survey of Cwm Mynach: November 2001 - January 2002*. CCW Science Report 540. Countryside Council for Wales.

Hobbs, A.M. (2005). *Assessment of the status of the red squirrel in central Wales*. (CCW Species Challenge Fund Report; 05/02/14).

Matthew, N.R.; Bevan, J.M.S. (2000). *The red squirrel in central Wales: a preliminary study*. CCW West Area Report 56, Countryside Council for Wales.

Ogden, R., McEwing, R. (2002). *Genetic analysis of the red squirrel, *Sciurus vulgaris*, from Pentraeth, Anglesey: and initial study utilising the mitochondrial DNA control region gene*. WDNAS, Bangor, unpublished report to Menter Môn.

Ogden, R., McEwing, R., (2003). *Genetic analysis of individual red squirrels for reintroduction at Newborough, Anglesey*. WDNAS, Bangor, unpublished report to Menter Môn.

Ogden, R., McEwing, R (2003). *Genetic analysis of the red squirrel, *Sciurus vulgaris*, from Pentraeth, Anglesey: a detailed study of population history and variability*. WDNAS, Bangor, unpublished report to Menter Môn.

Shuttleworth, C. (2004). *Grey Squirrel Control on the Island of Anglesey, A Report to the Countryside Council for Wales*. Menter Môn, unpublished report.

Shuttleworth, C., Jackson, N., Kenward, R. (2004). *The Reintroduction of the Red Squirrel, *Sciurus vulgaris*, to Newborough Forest, North Wales: a five year project review*. Menter Môn, unpublished report.

Shuttleworth, C., Bailey, M., Knott, H. (2002). *Red Squirrel *Sciurus vulgaris* L. conservation on Anglesey, North Wales: A report of the first five years of the Anglesey Red Squirrel Project*. Menter Môn, unpublished report.