

Shared Experience of

Red Squirrel

Conservation Practice



LOTTERY FUNDED
ARIENNIR GAN Y LOTERI

Edited by

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The European Squirrel Initiative is delighted to have sponsored this 'Red squirrel perspectives' book. This is an important snapshot of the current situation and illustrates the breadth of conservation effort being carried out in our battle to save the red squirrel in Great Britain and Northern Ireland.

Each chapter demonstrates how diverse the projects are in terms of their geographic location, their size and their membership. We can see that wide and active partnerships are well established across the public, private and voluntary sectors to deal with the grey squirrel from a landscape level to virtual eradication in an urban situation. This book provides an excellent opportunity for us to share good practice and learn from each other's good and bad experiences.

We should be mindful that Governments and squirrel projects come and go, but underpinning all the red squirrel conservation work across the country are the hard-working, loyal and committed volunteers who have enabled the red squirrel to survive in places where they should have long ago been overwhelmed by the grey tide. The authors have done a great job in compiling and editing this book and ESI thanks and congratulates them for their efforts. They have managed to draw out just how important our volunteers have been in the past, how important they are now and how important they will be in the future of red squirrel conservation.

Andy Wiseman

Chairman
European Squirrel Initiative (ESI)

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SHARED EXPERIENCE OF RED SQUIRREL CONSERVATION PRACTICE

Community participation and learning have become central to successful regional red squirrel conservation programmes in the last decade. Geographically extensive landscape initiatives depend upon the generosity of landowners for woodland access and increasingly rely upon local people as ambassadors for the red squirrel conservation cause. Individuals are central to the evolution and co-ordination of volunteer networks which carry out grey squirrel control, red squirrel monitoring and community advocacy themselves. In short, the voluntary sector can both lead and empower communities and hence this vital support provides a degree of project sustainability within a climate of funding uncertainty.

Participation means communicating and working together with different people and groups in order to achieve common goals. Participation also involves learning from each other's knowledge and mistakes. This volume brings together the opinions, experiences and perspectives of squirrel conservation groups from across the British Isles to enable us to learn from each other by sharing techniques, approaches, successes and failures.

We have deliberately taken a light touch towards editing in order to allow participants to describe, illustrate and document their projects in their own words. As a result, case studies may contain opinions and views that conflict with, or challenge, established approaches to red squirrel management. We hope that these contribute to open debate, to the evolution of 'best practice' and to the extensive conservation efforts that have sustained red squirrel populations across the country.

We would like to extend our thanks to European Squirrel Initiative for supporting the initial concept for a 'perspectives' volume and to Dave Everest and Julie Bailey for assistance in pulling together case studies. Publication was generously funded by Heritage Lottery Fund Wales through the 'Hafan Y Wiwer Goch' project.

Craig, Peter & Liz
August 2015

The Case Studies

In February 2015 we invited a wide and diverse range of local red squirrel conservation initiatives in England, Wales, Scotland and Northern Ireland to contribute to an e-book. The initiatives varied from large regional programmes managed by statutory Conservation Bodies and/or Non Government Organisations (NGOs), to smaller local scale activities co-ordinated by volunteer groups many of which had formed Limited Companies or Charities.

In order to make information easily accessible, authors were asked to complete a standard template, which contained defined headings, a maximum word limit per section and two standard tables to complete. The initial sections cover project titles, geography and a list of key partners. Resources are presented within a table listing the number of paid contractors (1-6 months duration) per year, the number of paid contractors (7-12 months duration) per year, the number of volunteer trappers (shooting more than 7 days a year, trapping more than 2 weeks per year), how many other active volunteers were involved (these may be fundraising or educational work) and finally an indication of any other resource or information relating to resources.

A short overview section is followed by a list of project aims to provide a foundation for the following longer section within which the project activity is described. Each case study then presents (i) Success Indicators, (ii) Major Difficulties Faced, (iii) Major Lessons Learned, (iv) Success of the Project and (v) the Reasons for the level of success.

The final sections of each case study present key areas for future development and list any reports or published findings that would be useful additional reading.

Case studies are presented alphabetically for each of the four countries.

Grey Squirrel Control in the Urban Landscape

Saving Scotland's Red Squirrels (North East Scotland)

Geographical area of conservation work

Aberdeen City, Aberdeenshire, Scotland

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Key partners

Scottish Wildlife Trust
 Scottish Natural Heritage
 Forestry Commission Scotland
 Scottish Land & Estates
 Red Squirrel Survival Trust
 Aberdeen Greenspace
 Biffaward
 Rural Aberdeenshire LEADER

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	Currently four full-time staff in the north east: 1 Project Officer 2 Grey Squirrel Control Officers 1 Surveyor/ GSCO The numbers of paid staff / contractors has varied over time.
Volunteers involved with Grey Squirrel Control	c. 50 at any given time, more than 300 participants in total since 2009.
Active Volunteers	c. 35 survey volunteers.
Other Resources	Through the Scottish Government's Scottish Rural Development Programme (SRDP) we work with 10 landowners across the City and Shire who receive funding for a collective total of 220 traps to be run for a period of approximately 50 days per trap per annum.

Introduction

Saving Scotland's Red Squirrels (SSRS) is a project to stop the decline of Scotland's core red squirrel (*Sciurus vulgaris*) populations and to improve conditions for viable red squirrel populations across Scotland. It is a partnership project between the Scottish Wildlife Trust, Scottish Natural Heritage, Forestry Commission Scotland, Scottish Land and Estates and Red Squirrel Survival Trust.

Aberdeenshire's grey squirrels (*Sciurus carolinensis*) form an 'island' population geographically isolated from the rest of the United Kingdom population. Introduced in the 1970s, the grey squirrel progressively spread beyond the city limits, with the wooded corridors of the Rivers Dee and Don providing easy dispersal into the wider countryside. Where grey squirrels became established, red squirrels started to disappear and it was apparent that the thriving red squirrels of the Grampian region, and the Highlands beyond, were increasingly threatened with replacement by the introduced species.

From 2005, the Scottish Forestry Grant Scheme funded grey squirrel control on four privately owned estates in Aberdeenshire. The successor scheme, the Scottish Rural Development Programme, currently funds 10 estates to control grey squirrels in the area. In 2007 Scottish Natural Heritage funded two contractors to control grey squirrels in the river valleys of the Dee and Don.

SSRS launched in 2009 aiming to establish strategic and systematic grey squirrel control, in both the wider countryside and the urban landscape. Despite many logistical challenges, the project has had considerable success in trapping urban areas through deploying control staff to work in privately owned, local authority and Forest Enterprise woodland combined with a trap loan scheme to cover private gardens.

Project aims

- To systematically reduce the occupancy and abundance of grey squirrels in Aberdeen City and rural Aberdeenshire by adaptive grey squirrel control supported by systematic monitoring. The long-term aim is eventual eradication of grey squirrels from north east Scotland.
- To assure the recovery of the native red squirrel back to former haunts across the rural and urban landscape of north east Scotland.
- To continue to build public support for the work and greater engagement with grey squirrel control.

Description of the project

In north east Scotland the focus of Saving Scotland's Red Squirrels is grey squirrel control for the delivery of a key element of the Scottish Strategy for Red Squirrel Conservation. The regional project team is employed by the Scottish Wildlife Trust and managed by a centrally located Project Manager overseen by a steering group consisting of SSRS Partnership representatives. The SSRS project also delivers national strategic objectives in the Central Lowlands and Southern Scotland. The Project Officer North East co-ordinates all project activities in the region, assisted at the time of publication by three full-time staff with grey squirrel control or survey duties. The control officers run batches of traps, adjusting trap numbers and duration of operation to the characteristics of the location. In so doing they consider trapping history and the current level of trap-returns. Traps usually remain set until three days have elapsed with no captures at the site. Traps are checked twice daily.

In the wider Aberdeenshire countryside grey squirrel control operations are similar to many other projects, but tackling control in the urban landscape has additional challenges. Here the project runs a trap-loan scheme in which householders take on the responsibility for a trap provided by the project.



Figure 1. Boxed trap in situ
© S. Willis.



Figure 2. Boxed trap open to show cage trap inside
© S. Willis.

Grey squirrel dispatch is by project staff providing an on-call service year-round. Exemplary humane standards and discretion are essential when trapping in gardens, with great care taken to avoid either the trap or the dispatch process being inadvertently encountered by anyone but the householder. The traps used in these situations are live cage traps that contain a bird feeder and a shelter. They are mounted on walls, trees, or fences a metre or so from the ground.

Initially reticent to overtly promote grey squirrel control, the project relied on increasing participation gradually by word-of-mouth. Later we were emboldened to publicly promote the scheme in newsletters, the press and targeted leaflet drops, which greatly increased participation. The trap-loan scheme now contributes a significant proportion (typically c.50%) of annual captures for the region. Approximately 40-50 householder traps are active at a time, but in total around 300 people have participated in the scheme, a very encouraging level of public support. Traps are loaned for a few weeks but can be loaned for the very long term - e.g. a garden in Bridge of Don has caught over 120 grey squirrels over a five year period.

SSRS efforts, and those of grant-funded partner estates trapping on the city margins, have brought about a significant decline in grey squirrel numbers and range (Tonkin and Mackenzie 2011). A growing number of city residents are starting to see red squirrels return to their gardens as regular visitors. In the SSRS north east study area the decline in grey squirrel capture rate was associated with increasing numbers of red squirrel captures (released unharmed), and red squirrels are now constantly seen in Hazlehead Park and breeding has been confirmed in suburban gardens.

As we move towards the stated objective of grey squirrel eradication, the project is increasing survey resolution, using GIS to map survey-coverage, trapping effort and public sightings to help identify overlooked breeding populations. The aim is a network of hair-trap survey boxes, some with trail cameras, at a density of at least one box per square kilometre.

An essential element in the urban effort has been the access permission granted by local authorities to trap their land, including some very well used parks and gardens. However, there are still some city sites where gaining access to conduct trapping has been difficult, because of high footfall and little cover for traps. For these situations we are trialing a means of trapping unobtrusively "in plain view", utilising a large box housing an Elgeeco™ trap hung on a tree-trunk at a height of four metres (Figure 1 and 2), so that an individual can safely lift or lower the box using a boat hook. A pointer attached to the trap door indicates when it has been sprung. After some design changes following early trials employing a trail camera to monitor squirrel behavior at the trap, the boxed trap - looking not unlike an owl nest box - was installed at a busy city park. Four grey squirrels were caught in the first week without any public reaction. The team is now assessing further sites for their deployment across the city.

Success indicators within the project

- Sustained decline in grey squirrel occupancy and abundance as indicated by trapping returns, presence/absence surveys and sightings records.
- Increase in the occupancy of red squirrels as indicated by presence/absence surveys and sightings records.
- Increased engagement of the public in red squirrel conservation work as indicated by participation in the trap-loan scheme, numbers attending events and sightings records submitted.
- Access to all necessary locations to carry out trapping.

Major difficulties faced

- Difficulty in locating all breeding populations of grey squirrels.
- Persuading all relevant stakeholder organisations that we can achieve our aims.
- Promoting grey squirrel control to a wide audience, many of whom are unlikely to see grey squirrels lost from their gardens replaced by red squirrels.
- Lack of published knowledge of grey squirrel population dynamics in urban areas, making it difficult to predict the timescale for eradication, which is of key interest to the project's funders.

Major lessons learned

- It is possible to progressively decrease the occupancy and abundance of grey squirrels in a mainland situation by a co-ordinated and sustained control programme.
- Red squirrels can recover to occupy their former range if grey squirrels are excluded or reduced to low levels.
- Most people are supportive and do understand the issues when explained, making it possible to involve the public in control of an invasive non-native species.
- With care it is possible to undertake grey squirrel control even in areas with high levels of use by the public.
- Eradication will require innovation, flexibility, and – above all – persistence.

Success of project

Success or Failure	
Highly Successful	X
Successful	
Partially Successful	
Failure	

Reason(s) for success/failure of the project

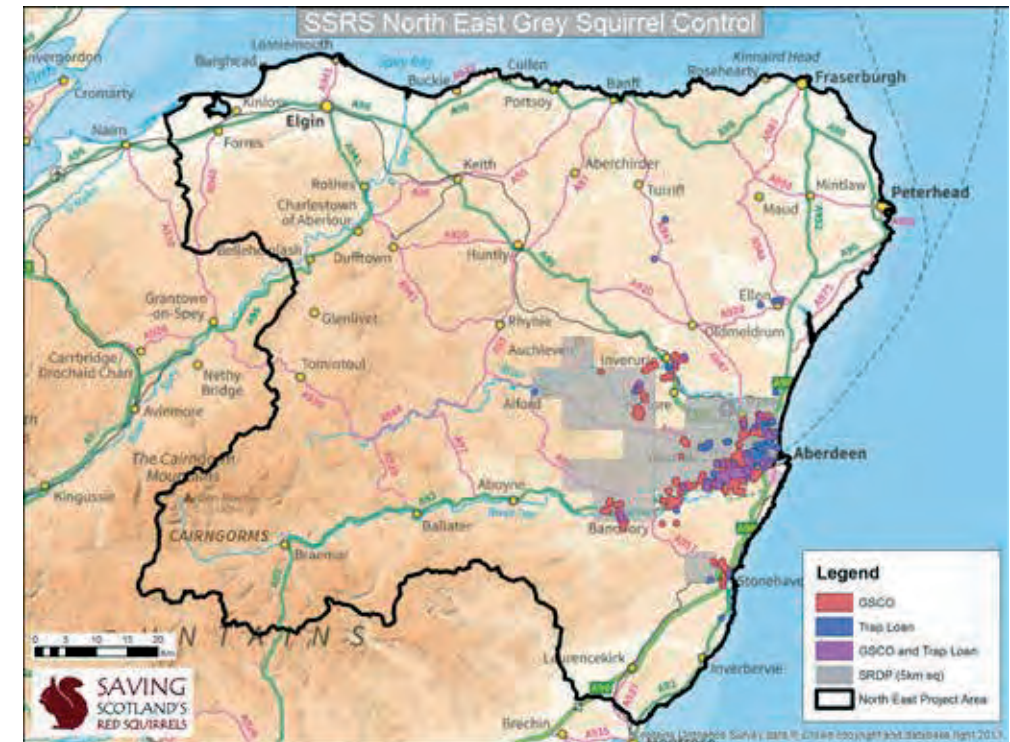
- Control work was targeted to prioritised areas and was co-ordinated and sustained.
- Squirrelpox virus is absent from this isolated grey squirrel population and red squirrels therefore only face the competitive impact of sympatric grey squirrels.
- Red squirrels were still present near our areas of operation, providing a source for recovery and recolonisation of trapped areas.
- Community engagement was a critical element of work in Aberdeen right from the start of the project. Without the participation and acceptance of so many people the success would be at a much reduced level.
- Support from the local authorities for access has been invaluable, as has been the support of our funders.

Future project development

- As grey squirrel numbers dwindle to near-zero, we aim to develop a modification of our intensive monitoring strategy for red and grey squirrels in Aberdeen and Aberdeenshire that is sufficient to reliably detect early recovery of the grey squirrel population arising from any overlooked residual animals and elicit a rapid response by removal trapping.
- In order to secure long-term resource commitments, we need to assess the minimum resource necessary to provide a rapid trapping response sufficient to maintain protection from competitive replacement by grey squirrels for the red squirrels of Aberdeenshire and City and an efficient means of evaluating it.

References

- I. Tonkin M, Mackenzie I (2011) *Evaluation of grey squirrel control in the Saving Scotland's Red Squirrels partnership project: 2009-2011*. Internal SSRS Partnership report.
- II. Oliver M (2013) *Saving Scotland's Red Squirrels Project Phase 2 Data Analysis: Modelling changes in grey squirrel capture rates in response to spatial cumulative control effort*. Consultant's report to SSRS Partnership.



Map - The Saving Scotland's Red Squirrels area of control operations in north east Scotland, including grey squirrel control officers (GSCO), Scottish Rural Development Programme (SRDP) funded landowners and the project trap-loan scheme.

Arran Squirrel Project

Scientific research

Geographical area of conservation work

Isle of Arran, Scotland.

Author and organisation contact details

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Heriot-Watt University
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Independent Consultant
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Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	1
Paid Contractors (7-12 months)	0
Volunteers involved with collecting Red Squirrels killed by road traffic	10-20

The work was mainly funded via student projects: an existing PhD project at Heriot-Watt University and a Masters degree project at Edinburgh University (Dick Vet). The project was supported by People's Trust for Endangered Species and Forestry Commission Scotland.

Introduction

A key part of the Scottish Government's strategy to conserve red squirrels (*Sciurus vulgaris*) in Scotland has been the establishment of 19 stronghold areas throughout the country under the leadership of Forestry Commission Scotland (FCS). The Isle of Arran is unique in that it is the only Scottish stronghold that is an island; it is home to a viable and large red squirrel population and grey squirrels (*Sciurus carolinensis*) are not present. For these reasons, should grey squirrels be released on the island accidentally or deliberately, they must all be removed as soon as possible. Moreover, because grey squirrels, which have a competitive advantage over red squirrels in deciduous woodland, are absent, woodland management on the island does not need to focus on conifer species alone as advocated for the mainland stronghold forests. There is an opportunity, therefore, to include native, deciduous tree species as well as conifer species in tree planting prescriptions. Most of the woodland on the island currently is conifer dominated. Woodland cover is extensive in the east and south of the island and scarcer to the west and north.

Project aims

The Arran squirrel project addresses the potential risk of disease to the island's red squirrel population and aimed to develop an integrated habitat and disease management strategy.

Specific objectives were to:

- Maintain and improve habitat quality of FCS woodlands in order to ensure a dependable, long term seed food supply for red squirrels and to safeguard their population viability on Arran.
- Carry out baseline disease (micro- and macro-parasite) surveys in order to identify the current health status of red squirrels and any potential disease risk.
- Integrate the above findings and provide conservation recommendations with respect to population and disease monitoring and habitat management for red squirrels on Arran.
- Make public the findings and promote the importance of the red squirrel population on the Isle of Arran in the national context.

Description of the project

Acknowledged red squirrel conservation experts provided guidance on tree species harvesting and restocking operations and worked in collaboration with the local FCS office on Arran. This encompassed around 8,300 hectares of FCS state managed woodland. Site visits and meetings with local forest staff considered tree crop management options including the relative limitations of different species (e.g. with respect to soil types, different climates on western and eastern parts of the island, and tree diseases that do not favour or allow planting of particular species). Ensuing from this process, recommendations on future harvesting and replanting forest design plans were made that would benefit the red squirrel population in the future.

Health examinations on red squirrels were carried out by:

- I. *Post-mortem analysis of dead red squirrels collected opportunistically by volunteers.* The red squirrels killed on roads on Arran were collected by the National Trust for Scotland ranger service as well as FCS staff and members of the public. Bodies were kept in a freezer on the island and sent in batches to Edinburgh for post-mortem analysis to determine disease and parasite loads.



Figure 1. Red squirrel health monitoring using mobile general anaesthesia equipment. © Peter Lurz.

- II. *Veterinary health checks on live-trapped red squirrels to assess current health status.* These checks were carried out under general anaesthesia (gaseous) of live-trapped red squirrels on the island (Figure 1), and blood samples were taken for haematological and biochemical analysis and viral serology including Squirrelpox virus (SQPV).

The project also used mathematical modelling approaches to evaluate the likely outcome should SQPV accidentally be introduced to the island in order to determine the risk to the island red squirrel population.

Success indicators within the project

- Determining the health status of red squirrels.
- Assessing the risk posed to the island should SQPV be introduced.
- Developing forest design plans in collaboration with FCS staff to ensure long term red squirrel population viability.

Major difficulties faced

- Field work was conducted in the presence of the biting-fly 'Midge' (*Culicoides impunctatus*).

Major lessons learned

- Island populations can be particularly vulnerable, and factors such as disease, inbreeding or changes in forest composition as a result of normal forest operations can significantly affect red squirrel numbers and survival. Arran's red squirrels appeared exceptionally healthy when compared to other UK island (e.g. Jersey where the population suffers from a lack of genetic diversity and very high levels of amyloidosis), and mainland populations (where for example Squirrelpox virus or adenovirus have been linked to mortality in red squirrels; Everest et al. 2010, La Rose et al. 2010).
- The Arran squirrel project also highlighted important lessons for stronghold management. Assessments of strongholds for red squirrel conservation should not only consider total forest areas and age classes of strongholds as a whole, but also local geography, and the impacts of felling plans on outlying parts of the forest. The assessment of proposed felling operations illustrated the vulnerability of squirrel populations in the more isolated forest blocks in the north and especially in the west of the island. This highlighted the need

for two permanent red squirrel core management areas to be established on the island (Lurz 2014).

- Key management challenges in the future will include the provision of a minimum diversity of tree species to ensure a constant seed food supply for red squirrels in the face of planting restrictions for larch (*Larix* spp.) and pine (*Pinus* spp.) species due to tree diseases such as *Phytophthora ramorum*, or red band needle blight (*Dothistroma septosporum*). It will also be important to be ready to remove any grey squirrels should they be introduced to the island, and to continue to monitor both red squirrel distribution and population health.
- Using a tested computer modelling approach (White et al. 2014) the risk of SQPV to red squirrels on Arran was assessed. This indicated that based on our current knowledge of SQPV epidemiology, any disease outbreak will burn out before reaching all the red squirrels on the island. Importantly, the work has shown that when modelling disease spread in complex landscapes it was important to include local firsthand knowledge of dispersal links and barriers, and to work closely with staff on the ground to ensure effective translation of research findings into management advice.

Success of project

Success or Failure	
Highly Successful	X
Successful	
Partially Successful	
Failure	

Reason(s) for success/failure of the project

- Close co-operation between project partners.
- Dedicated project staff and volunteers.
- Adequate resources to carry out all fieldwork and analyses.
- Local community support.

Future project development

- There are no current plans to develop the project, but it is hoped that the approach developed on Arran could be extended to other island populations in the future.

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Saving Scotland's Red Squirrels in Southern Scotland

Saving Scotland's Red Squirrels

Geographical area of conservation work

Scottish Borders, Dumfries and Galloway, parts of Ayrshire and South Lanarkshire

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Key partners

Official partners in Saving Scotland's Red Squirrels (SSRS):
Scottish Wildlife Trust
Scottish Natural Heritage
Forestry Commission Scotland
Scottish Land & Estates
Red Squirrel Survival Trust
RSPB Scotland

Red Squirrels in South Scotland Steering Group: Borders Squirrels Management Group, Red Alert South West Scotland, Southern Upland Partnership and Ayrshire Red Squirrel Group.

Resources

Typical Resource available	Number of people
	Five full-time staff working directly to the project in South Scotland: 2 Project Officers 3 Grey Squirrel Control Officers
Paid Contractors (7-12 months)	Forestry Commission Scotland also employs the following to carry out grey squirrel control on the national forest estate: 3 Grey Squirrel Control Officers 1 part time Control Officer for the Fleet Basin Red Squirrel Stronghold *The number of paid staff/contractors has varied over time.
Volunteers Involved with Grey Squirrel Control	216
Active Volunteers	114 (survey & awareness raising volunteers)
Other info	Through the Scottish Government's Rural Development Programme (SRDP) we work with 93 landowners across southern Scotland who receive funding for the trapping of grey squirrels.

Introduction

Saving Scotland's Red Squirrels (SSRS) aims to stop the decline of Scotland's core red squirrel populations and to improve conditions for viable red squirrel populations across Scotland. The SSRS project carefully targets grey squirrel control measures at locations where it is thought they will bring the greatest benefit to red squirrels.

In southern Scotland, SSRS builds on previous red squirrel conservation work undertaken by the long-running Red Squirrels in South Scotland project (RSSS). Initially two separate but co-operating projects, SSRS and RSSS merged in 2012. The work reported here is a combination of RSSS and SSRS red squirrel conservation efforts.

Squirrelpox virus was first detected in southern Scotland's slowly expanding grey squirrel population in 2001 in the border area of Scotland. It was thought to be arriving in grey squirrels spreading northwards from Cumbria, where the disease was known to be endemic in grey squirrel populations.

Given the limited geographic spread of positive results from widespread Squirrelpox antibody testing, it was considered worthwhile to try to halt the influx of pox-carrying grey squirrels and contain the spread of the virus through Scotland's previously pox-free grey squirrel population, Map 1. Thus a relatively small area of south west Scotland was seen as the 'frontline' of defence from the disease for the country's considerable remaining red squirrel populations. Later, as grey squirrels expanded northwards in Northumberland, there was also an increasing risk of Squirrelpox spread in the south east of Scotland.

Red squirrels remain the most widespread and numerous squirrel species across Dumfries and Galloway and there are significant red squirrel populations in the western Scottish Borders. However grey squirrels have ousted reds through much of the northern and eastern stretches.

Project aims

- Primary aim between 2008 to 2014: containment of Squirrelpox spread, to prevent its expansion northwards through grey squirrel populations contiguous with those established in Scotland's central urban belt from Glasgow to Edinburgh in order to protect Scotland's core red squirrel populations of Argyll, the Highlands, Grampian and upland Stirling and Tayside where grey squirrels had not yet arrived.
- Protection, where limited resources allowed, of the red squirrel populations of Dumfries & Galloway from replacement by grey squirrels and from Squirrelpox disease.

- To set up targeted, coordinated and sustained landscape-scale grey squirrel control across the frontline of the disease spread via a combination of project staff, Forestry Commission Scotland staff, landowners funded under the Scottish Rural Development Programme (SRDP) and a project trap-loan scheme for local people wishing to assist in the protection of local red squirrels.
- During 2013-14 a change of approach was seen to be necessary, and the primary aim in southern Scotland became:
- Protection of red squirrel populations from replacement by grey squirrels and from disease for the long-term in carefully chosen Priority Areas for Red Squirrel Conservation (PARCs) in the most "at risk" parts of southern Scotland.

Description of the project

Before 2014 the conservation aim for red squirrels in southern Scotland was prevention of the further spread of Squirrelpox through the existing grey squirrel populations towards the Central Lowlands. The RSSS project established a blueprint for coordinated landscape-scale grey squirrel control delivered by networks of project staff, volunteers and grant-funded landowners to provide effective population control of the species. This work delivered the southern elements of the strategic grey squirrel control outlined in the Scottish Strategy for Red Squirrel Conservation (2007), which set out an integrated approach to red squirrel conservation in Scotland, including habitat management, grey squirrel control, survey and monitoring, and addressing the threat of Squirrelpox virus.

When Squirrelpox was first detected in Scotland, widespread antibody testing of grey squirrels revealed that it was restricted to a very small area, such that it seemed worthwhile to try to contain it. The project set about delivering grey squirrel control measures focused on the known Squirrelpox areas, but delays in setting this up unfortunately allowed the infection to spread further along the riparian corridors of the Liddle, Annan and Esk waters. The first known Squirrelpox disease outbreak in red squirrels in Scotland occurred in May 2007 close to Lockerbie.

Over the ensuing years the project's trapping brought grey squirrel numbers to very low levels in these three river valleys. Nevertheless the infection managed to leapfrog many kilometres of sero-negative testing forest land into the neighbouring valley of Nithsdale. A major outbreak of Squirrelpox disease in red squirrels followed at Drumlanrig Castle estate, where red squirrel densities were artificially high due to liberal supplementary feeding. By the time control

measures were fully established in the Nith valley, the disease had spread to the valley's upper reaches near Cumnock, again traversing tens of kilometres of upland landscape supporting only very sparse populations of grey squirrels. Project control measures subsequently brought grey squirrel densities in the lower Nith to very low levels and red squirrels began to return to the Upper Nith after many years' absence. Red squirrels continue to thrive at Drumlanrig and the Nithsdale catchment as well as in the neighbouring Annan and Esk catchments.

Meanwhile, in the east of the country grey squirrels and Squirrelpox disease were spreading northwards through Northumberland to initiate a new eastern epicentre of the disease on the Berwickshire border. Rapid deployment of additional staff to the area and early recruitment of some key estates to the SRDP scheme were insufficient to prevent the spread of the virus northwards through Berwickshire. It began to seem right to question whether sufficient resources would ever be available to tackle the disease right across the wide front it now presented.

In 2013 Scottish Natural Heritage commissioned computer modelling to examine Squirrelpox transmission dynamics and to predict likely future spread of the virus. White and Lurz (2014) developed a deterministic, spatially explicit individual based stochastic model of the population and epidemiological dynamics of red and grey populations. This work concluded that control effort to date had significantly slowed down the spread of the disease, but that it was unlikely that the levels of control achieved thus far by the project would be sufficient to prevent its eventual spread throughout most of Scotland's grey squirrel populations.

However, it was also evident that the control networks of the previous seven years had been critical in enabling red squirrel populations not only to persist, but to thrive despite the disease. This supported the SSRS project's own evidence from standardised survey, trapping and sightings records, presented in 2013 within an unpublished report for project partners, which showed healthy populations of red squirrels right across Galloway, Dumfriesshire and the western Scottish Borders and multiple examples of local recovery after being absent for many years.

These findings have prompted a change in the direction for red squirrel conservation in southern Scotland, shifting the emphasis from Squirrelpox containment to focussed protection of red squirrels in a number of Priority Areas for Red Squirrel Conservation (PARCs), Map 2. The aim is to build on existing grey squirrel control networks in eight PARCs ranging from 23 to over one thousand square kilometers in size, in order to protect the resident red squirrels from replacement by greys and from disease. This will better target resources towards active protection of what is still a significant red squirrel

asset in southern Scotland, especially when taken as contiguous with the red squirrel populations of northern England.

Following the model set up by volunteer-led squirrel groups in Cumbria which have prevented the disappearance of red squirrels faced with infiltrating grey squirrels and disease, the SSRS project is now working with local groups, volunteers and landowners to develop self-sustaining control networks for the long term protection of the red squirrel.

The enormous conservation gains already made by landowners and volunteers across the region are testament to what can be achieved when empowering local communities to take a stake in their local wildlife and provides encouragement to be positive about the future of the red squirrel in south Scotland.

Success indicators within the project

- Stabilisation or reduction of the geographic range of Squirrelpox spread, as shown by large-scale standardised Squirrelpox surveillance testing across the landscape.
- Persistence of the red squirrel populations in key parts of Dumfries & Galloway and the Scottish Borders.
- A cohesive network of project staff, Forestry Commission Scotland staff, landowners and volunteers delivering grey landscape-scale squirrel control across a large area of south Scotland.
- A system of standardised annual presence/absence surveys developed to allow changes in red and grey squirrel distributions to be monitored.

Major difficulties faced

- The lack of information on the rate of spread of Squirrelpox through the northern English counties towards Scotland made it difficult to anticipate when the infection would arrive across the Border. The rapid spread of Squirrelpox and the difficulty of raising the necessary funding for additional containment work rapidly enough to be fully effective hampered containment efforts. This has implications for decisions on continued testing as an early warning system for protection of the remaining Central Lowlands red squirrel populations.

- Uncertainties within the funding schemes for landowners: delays in building the control networks were encountered due to a gap of more than a year between successive SRDP funding schemes. Funding for control under SRDP may be finite and we cannot guarantee that every estate under the current scheme will continue to control if the funding ceases. The implications of this for the long-term need to be considered.
- A reluctance of Government to relinquish attempts to contain Squirrelpox in favour of protection of red squirrels and learning to live with the disease made for considerable delays in the public engagement work needed for setting up the new Priority Areas for Red squirrel Conservation.
- The challenge of collecting easily analysable data at the same time as conducting adaptive conservation trapping has not yet been overcome, making data collection impossibly time-consuming; a more user friendly approach for both project staff and volunteers needs to be developed.

Major lessons learned

- Squirrelpox must be tackled very rapidly via grey squirrel control once it has arrived in an area if there is to be any chance of containing its spread to vulnerable red squirrel populations. Once established, Squirrelpox is unlikely to be containable and further spread can be expected even if control measures are instituted.
- Sustained and co-ordinated grey squirrel control in areas of high Squirrelpox sero-prevalence can contribute to red squirrel population persistence and recovery, giving us a means of protecting greater numbers of red squirrels going forward.
- There is greater appetite for red squirrel conservation across the south than initially anticipated as evidenced by the recruitment of over 80 new squirrel monitoring volunteers in the last three years. The large number of co-operating landowners and volunteers involved in the Project is testament to the enthusiasm for red squirrel conservation in southern Scotland and to what can be achieved.
- Investing time, providing feedback and sharing information with all those involved are key to maintaining support, motivation and ensuring efforts remain coordinated.

Success of project

Success or Failure	
Highly Successful	
Successful	
Partially Successful	X
Failure	

Reason(s) for success/failure of the project

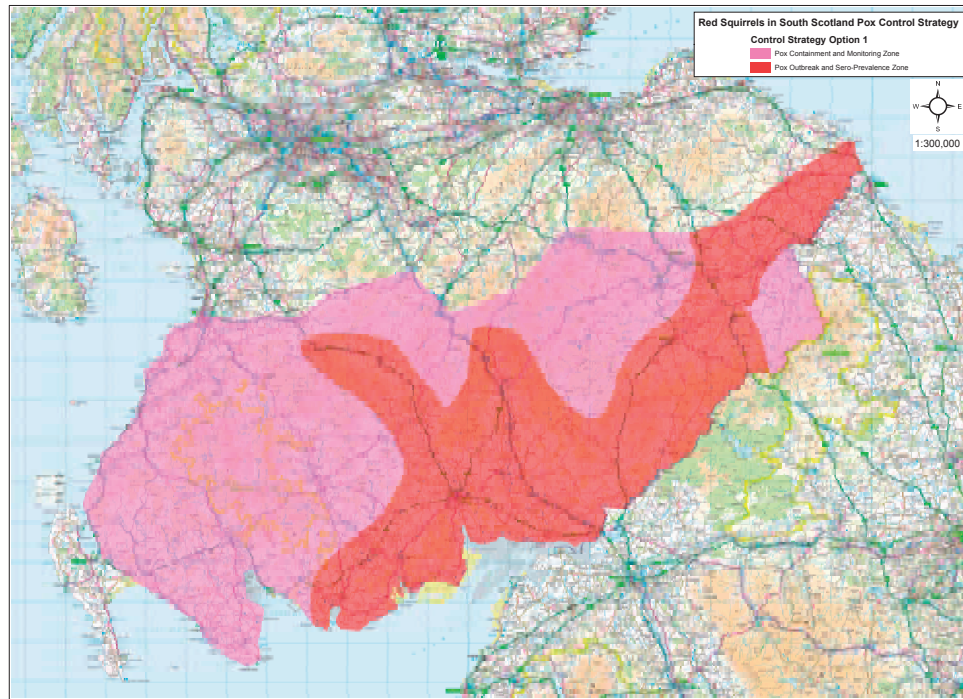
- The primary aim of earlier phases of the project of containment of Squirrelpox to a small area was not achieved.
- It has been possible to maintain landscape-scale control work that is targeted, co-ordinated and sustained within changing priority areas.
- Grey squirrel control at a sufficient scale and intensity enables red squirrels to remain present, and makes possible recolonisation to areas that have lost resident populations of red squirrels.
- The activity of the SSRS project in the south builds on the historic red squirrel conservation work previously undertaken by the RSSS Project and members of the Borders Squirrel Management Group and Red Alert South West Scotland, providing a platform on which existing efforts have been built. The support from Government, landowners, land managers, gamekeepers and, crucially, members of the public, have all been critical in enabling the project to achieve its aims.

Future project development

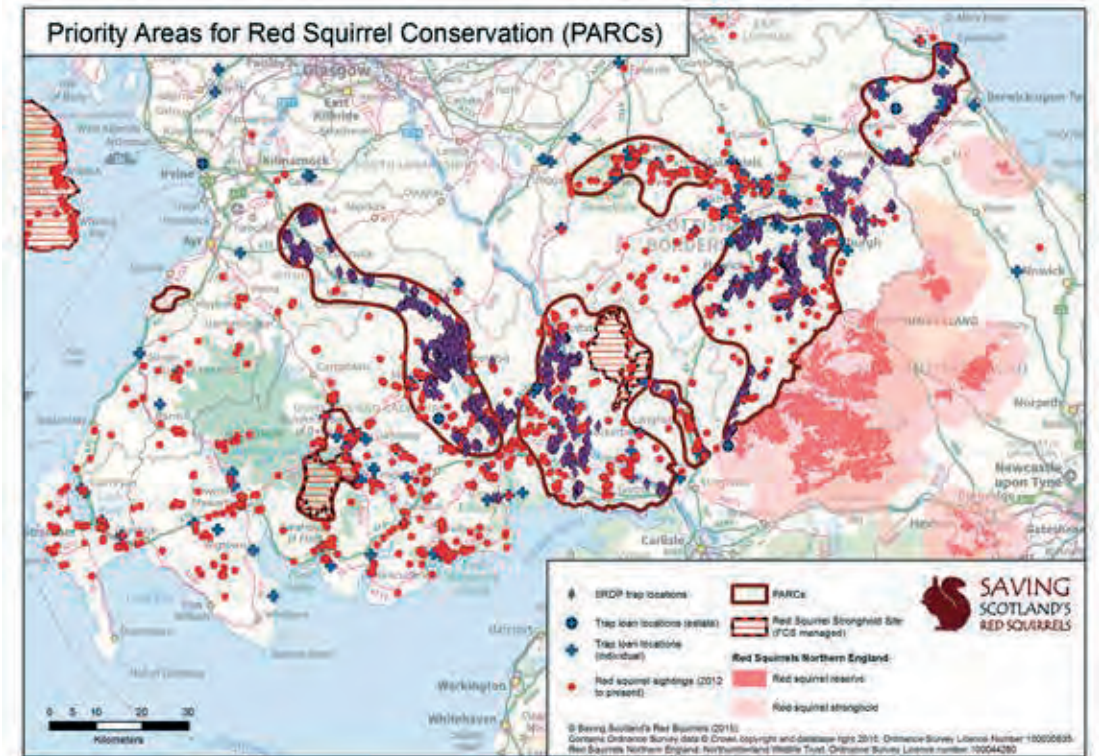
- As the PARCs strategy grows in southern Scotland there will be a strong emphasis on engaging and supporting local people to take on responsibility for the practical conservation work involved in looking after their local red squirrel populations, fostering a sense of ownership and pride in their role in the conservation of this charismatic species. The role of SSRS will gradually be reduced to one of co-ordinating, supporting and monitoring the progress of this work.

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- I. Ramoo K (2011) Evaluation of the Red Squirrels in South Scotland Project: 2000-2010. Internal Partnership Report.
- II. Scottish Natural Heritage (2004) Scottish Strategy for Red Squirrel Conservation. SNH, Battleby.
- III. Tonkin M, Mackenzie I (2011) Evaluation of grey squirrel control in the Saving Scotland's Red Squirrels partnership project: 2009-2011. Internal SSRS Partnership Report.
- IV. White, A and Lurz, P (2014) A modelling assessment of control strategies to prevent/reduce Squirrelpox spread. Commissioned report to Scottish Natural Heritage No. 627.



Map 1: SQPV containment strategy map by 2011, reflecting expanding SQPV range



Map 2: PARCs map

Brampton & District Red Squirrel Project

Brampton & District Red Squirrel Group (B&DRSG)

Geographical area of conservation work

Carlisle District, Cumbria, England.

Author and organisation contact details

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Key partners

National Trust
Woodland Trust
Woodlands.co.uk
Cumbria Wildlife Trust
RSPB
RSNE
Parish Councils
Private & individual landowners and members of public.

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with collecting Red Squirrels killed by road traffic	4-50
Active volunteers	3-20
Other information	150 members of the local group

Introduction

Historically, red squirrels were in abundance in the Brampton area of North Cumbria. The area sits on the fringes of the Kielder Forest red squirrel stronghold buffer zone; a landscape that must be maintained as grey squirrel free.

A news report in the summer of 2007 highlighted a decline in local red squirrel numbers, a fact coinciding with the local invasion of grey squirrels to this part of the county. This news prompted the launch of the Brampton Red Squirrel Group in September of that year.

With increasing volunteer support, coordination and local knowledge, the group were able to identify and target significant grey squirrel populations threatening the local red squirrels. The group expanded into neighbouring and surrounding land areas in the summer 2010.

In February 2012 the group achieved charitable status as Brampton & District Red Squirrel Group (B&DRSG).

B&DRSG is volunteer based and contributes immensely to the red squirrel conservation movement in the north of England.

Project aims

The Brampton squirrel project seeks to control grey squirrels in order to safeguard regional red squirrel populations.

Specific objectives:

- To maintain a volunteer and community based contribution to the wider integrated conservation of red squirrels in northern England.
- To raise awareness of the plight of the red squirrel through community events and educational activities.

Description of the project

The Brampton & District Red Squirrel Group project delivers direct and practical red squirrel conservation by controlling grey squirrels (where we have secured access and permission from the landowner) across key target areas identified as containing populations. The woodlands covered within this project are a range of broadleaved, coniferous and mixed deciduous habitats.

We systematically trap (live trapping) and shoot grey squirrels that currently threaten our existing red squirrel population. The retention of red squirrels in the project area contributes towards the wider regional conservation of red squirrels in adjoining areas within the Cumbrian landscape.

We have many other resources to aid our work including trail cameras for monitoring sites and FLIR thermal imaging cameras which have proven to be an invaluable resource in detecting grey squirrels which can then be culled.

All of our group's work is carried out by volunteers. We have approximately 40 regular volunteers involved in grey squirrel control and a further 10 doing occasional control. The group membership currently sits at 150 members. Work encompasses administration, fundraising, the provision of talks, project representation at shows and events, management of the group's activities, record coordination, charity collection boxes monitoring, merchandise sales and media representation.



Figure 1. Keith Wells (B&DRSG Chairman) and Kirsty Kenny (B&DRSG Treasurer)

Our grey squirrel controllers have successfully removed over 5,250 grey squirrels since the group was founded seven years ago (with standardised recording of their work for the last four years). Red squirrels have returned to many areas following grey squirrel control however grey squirrels continue to move in again, and are regularly reported so we must provide continuity of grey squirrel control work to ensure the benefits to red squirrels are maintained.

Our programmes of control focus upon restricting grey squirrel invasion from the incursion corridors of the River Gelt and the River Eden. Work is ongoing and we will continue to facilitate grey squirrel removal and complete associated monthly standardised records which provide us with invaluable data.

Below is a summary of greys removed across four years by the volunteers of B&DRSG from standardised recording data:

Year	Greys culled
2011	769
2012	812
2013	1,340
2014	1,818
Total	4,739

Success indicators within the project

- Secure woodland sites as free from grey squirrels as possible in order to allow the return of red squirrels to such habitats.

Major difficulties faced

- The prevalence of grey squirrels in some urban areas is becoming increasingly problematic, and with access denied, leaves a huge opportunity for grey squirrels to breed and spread out, with the risk of displacing red squirrels.



Figure 2. Julie Bailey (B&DRSG Secretary)

Major lessons learned

- Red squirrels have returned to several woodland areas following intensive and sustained grey squirrel control.
- Population monitoring using feeder boxes and sightings records, and the use of thermal imaging cameras, are all invaluable components of the project.
- Grey squirrels continue to move in to woodland sites previously controlled and repeated control is therefore always necessary.
- The same, if not more effort, has to be applied to remove that one grey squirrel that was missed during control relative to the initial removal of many resident animals!

Success of project

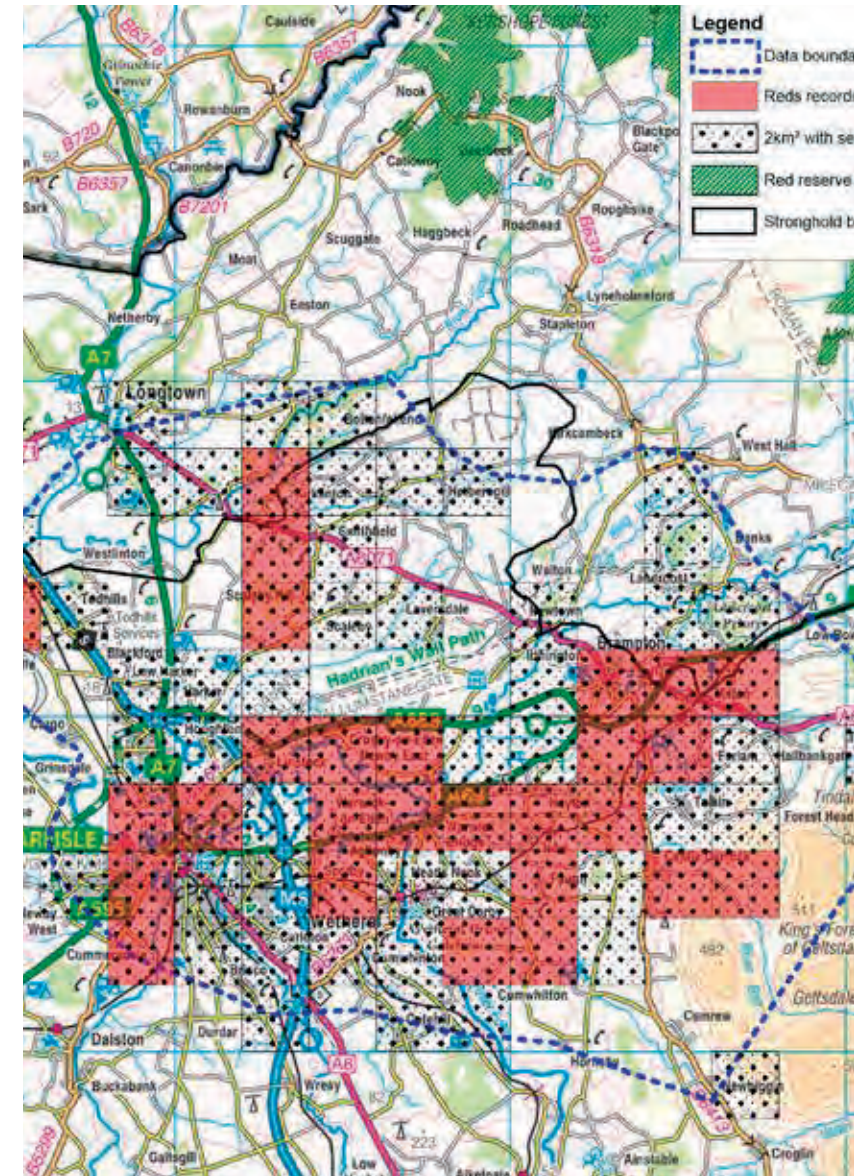
Success or Failure	
Highly Successful	X
Successful	
Partially Successful	
Failure	

Reason(s) for success/failure of the project

- Increasing support, coordination and local knowledge are key to the ongoing success of this project.
- Red squirrel distribution has been maintained and many local populations have recovered following grey squirrel control.

Future project development

- Brampton & District Red Squirrel Group are keen to further develop our proven success where woodlands have been repopulated with red squirrels (following grey squirrel control) following an absence of many years.
- We will seek additional funding to provide continuity of grey squirrel control work where clear benefits to red squirrels will be demonstrated.



Map - The Brampton and District Red Squirrel Area

Breeding programme co-ordinated by Pensthorpe Conservation Trust

East Anglian Red Squirrel Group

Geographical area of conservation work

Norfolk, Eastern England

Author and organisation contact details

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Key partners

Countryside Restoration Trust (enclosure at Mayfields)
Pensthorpe Conservation Trust
Easton College
Kelling Heath Holiday Park
Pettitts Animal Adventure Park
Natural Surroundings
Weybourne Forest Lodges
Whitwell Hall

The group also provide samples to Dave Everest at the Animal Plant Health Agency for his research.

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	0
Active Volunteers	Each member is responsible for the costs of upkeep and husbandry requirements of the squirrels. Project time is volunteered by all members and at least two other interested people. This would also include PCT staff and volunteers and staff who work at some of the other sites.

Introduction

The East Anglian Red Squirrel Group (EARSQ) was formed by the late David Stapleford, with the help of Kevin Hart in 1998. Before this, David Stapleford had a long term interest in British mammals and particularly red squirrels. He also pioneered the captive breeding of red squirrels in his back garden for many years, and provided squirrels for the National Red Squirrel Captive Breeding Programme.

In his book 'An affair with red squirrels' David highlights the history of red squirrel decline in Norfolk as indicated in the annual mammal reports of the Norfolk and Norwich Naturalist's Society. It was reported that in 1963 red squirrels were one of the most widespread of our mammals in Norfolk with the Thetford Forest population estimated at several thousand; grey squirrels were noted at several locations on Norfolk boundaries. By 1988 there were no red squirrels outside Thetford and the population in the forest was scarce and scattered, these were the last reported sightings by the Society.

Currently there are no suitable sites in Norfolk for any reintroduction project due to the strong grey squirrel population. However the Group members are committed to supporting any such viable projects nationally and have most recently been providing squirrels for the successful reintroduction of red squirrels to Anglesey.

The squirrels in the EARSQ breeding programme belong collectively to group members. Pensthorpe Conservation Trust (PCT) has been elected by the Group to coordinate squirrel movements and manage the project. Kevin Hart, co-founder of the Group, is Chairman.

Project aims

- To educate the public about the red squirrel and its conservation status in Great Britain.
- To be part of a national breeding programme that provides red squirrels for release into the wild through appropriate projects.
- To develop and improve best practice for holding and breeding red squirrels in captivity.

Description of the project

The eight member organisations are located across Norfolk. Some of the members have sites that are open to the general public, others are private individuals and others education establishments. This gives a wide ranging accessibility to reach a number of different sectors of the community to highlight red squirrel conservation.

Individual EARSQ members are responsible for the husbandry and upkeep of the squirrels and any young produced, until they need to be transferred to either Pensthorpe for holding, other group members, release projects or other captive breeding programmes.

In 2008, PCT worked closely with David Stapleford to build two extra enclosures in addition to the existing enclosure built at the beginning of the project (Figure 1). Quarantine facilities with outside cages, connected to and behind each enclosure, allow space to accommodate a number of squirrels when necessary. These facilities also enable PCT to hold two breeding pairs as well as act as coordinator for the Group to ensure good management of genetic variability and to take care of red squirrels for other members when required. All three enclosures are connected by overhead runs where access to different enclosures can be allowed as necessary. This gives more freedom to move kittens away from their parents minimising the need for handling.



Figure 1. Example of one of the East Anglian Red Squirrel Group enclosures at Pensthorpe Conservation Trust.

The collective working of the Group is key to the success of our breeding programme. At least one breeding pair of red squirrels is normally held at each member location; currently each of the members has between one and three enclosures. The Group meets bi-annually to discuss objectives and husbandry.

Husbandry

One of our objectives is to develop and improve best practice for holding and breeding red squirrels in captivity. Captive squirrels need a specialised diet and we provide them with a variety of fresh foods such as cucumber and sweetcorn, as well as nuts, seeds and deer antlers. Sweetcorn cobs provide a good source of energy especially important after producing a litter. Such a varied diet is key to their health and breeding success.

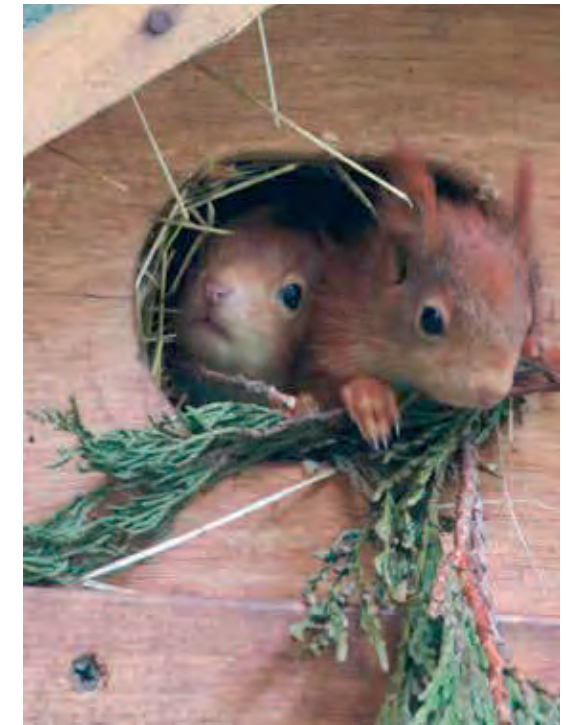


Figure 2. Red squirrel kittens in a nest box.

Studbook names are given to the kittens every year, with each year corresponding to a letter of the alphabet. For example the kittens of 2011 were named with an A; 2012 with B; 2013 with C and so on.

We minimise handling of kittens, but will move the spring litter before the female produces her summer litter to avoid competition (Figure 2). Care is also taken when introducing red squirrels, making sure there are plenty of boxes and different feeding stations to avoid competition.

The captive squirrels offer great opportunities for public engagement, photography and press coverage. Good management of genetics is essential to keep a viable captive population and strong kittens for release where possible.

Education and information

Group members have different sectors of the public visiting their squirrel enclosures and all offer some educational information in the form of interpretation about red squirrels and the issues they face. At Pensthorpe we also offer adoptions, write regular updates for the visitors and have a page

dedicated to red squirrels on our website www.pensthorpetrust.org.uk. Easton and Otley College and Whitwell Hall focus on education in countryside matters and they have access to develop education packages for schools and colleges specifically related to squirrels.

Release

The best end result for our captive breeding programme is to release animals back into suitable habitat. We have been pleased to supply red squirrels for the Anglesey release project over a number of years and are keen to support other viable release projects in the future.

Success indicators within the project

- Successful breeding and rearing of healthy red squirrel kittens.
- Releasing squirrels to suitable reintroduction projects.
- Raising awareness of the conservation of the red squirrel.

Major difficulties faced

- Lack of suitable areas for release projects, and a lack of funding and willingness to create them. The process required for any reintroduction is long, expensive and difficult. This leaves us with the issue of justifying captive breeding as well as placement of young red squirrels.
- There is a perception that this is a zoo species, not a native one, with a general misunderstanding of the problems facing red squirrels in the wild. It has been a long time since red squirrels were seen in Norfolk.
- Stereotypical behavior – this is difficult to alleviate, even while improving enrichment and receives a negative response from the public making this a difficult species to keep on show for raising awareness and education.
- Variable availability of dedicated resources, we are under-resourced with no fundraising.

Major lessons learned

- There is a lot of interest in red squirrel reintroductions but there are very few suitable sites left. Grey squirrel trapping is not considered a viable or cost effective way forward, particularly in an area where no red squirrels remain and the grey squirrel population is large.
- Repopulating or boosting a wild red squirrel population becomes a less viable objective and the project has become more about learning and research, particularly increasing public awareness, and keeping a population base (albeit in captivity) in Norfolk.
- Stress caused by handling and moving red squirrels is a major consideration for their captive management.

Success of project

Success or Failure	
Highly Successful	
Successful	
Partially Successful	X
Failure	

Reason(s) for success/failure of the project

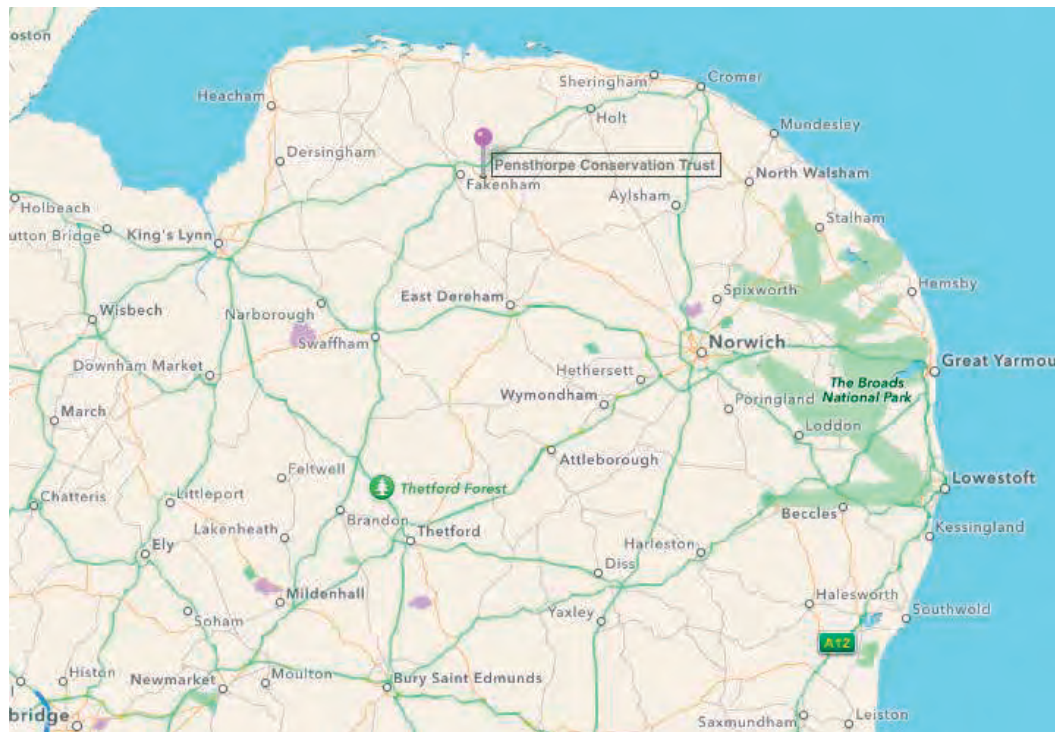
- Success in captive breeding of red squirrels.
- Providing squirrels for reintroduction on Anglesey.
- Increasing awareness of the red squirrel and conservation activities, including regular press coverage, both local and national.
- Without reintroduction opportunities the captive management of the red squirrel breeding programme does not have the most favoured outcome.

Future project development

- Increasing the profile of the group and red squirrel conservation by creating online information via a website and social media.
- Creating an educational resource via Easton College, with an outdoor classroom in the red squirrel enclosure.
- Increasing Group members.

References

1. Stapleford D (2003) *An Affair with Red Squirrels: Forty years of squirrel mania*. The Larks Press.



Map – Location of Pensthorpe Conservation Trust in Norfolk.

A Safe Haven for Red Squirrels in East Devon

Red Squirrel Project South West (RSSW)

Geographical area of conservation work

Escot Park, Ottery St. Mary, Devon, England.

Author and organisation contact details

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 www.escot-devon.co.uk

Key partners

Making it Local (Blackdown Hills & East Devon AONB)
 Country Landowners Association
 Charitable Trust
 Devon Mammal Group

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	3
Active Volunteers	3
Other Resources	1 hour/day paid Ranger to feed, check enclosure & give public talk

Introduction

Red squirrels (*Sciurus vulgaris*) died out in Devon and Cornwall in the late 1960s. Habitat, particularly in Devon is well suited to red squirrels, being mixed compartments of soft and hard woods. Many estates across the county have been planted and managed for shooting, so connecting corridors and small spinneys are abundant. For a time in the 60s and 70s there was a Government bounty on grey squirrels (*Sciurus carolinensis*), the fur trade paid for grey tails and the Forestry Commission encouraged 'poling' of winter dreys. Escot Park in East Devon continues this tradition of drey poking and has been controlling grey squirrels more ardently (shooting & trapping) all year round since 2007.

The core of the estate is open to the public and contains a number of captive native animal species including wild boar (*Sus scrofa*), otters (*Lutra lutra*), European beavers (*Castor fiber*), birds of prey, and, since 1999 red squirrels. In 2009 a group of South West landowners met in Somerset to form Red Squirrel Project South West (RSSW). In reality this crystalized as a core group consisting of four people. Escot offered to become the face of the project, providing education (and red squirrel breeding, if appropriate) facilities and a showcase enclosure. The British Wildlife Centre (BWC) in Surrey pioneered the walk through enclosure for squirrels and allowed Escot to reproduce the concept. A 50% *Making it Local grant*, and other grants & donations, including considerable input from Escot Estate, enabled the three quarter acre walk through red squirrel enclosure (Figure 1) to become a reality by August 2011.

Project aims

- Raising public awareness of the plight of the native red squirrel.
- To provide an opportunity to study red squirrels in a natural but secure environment.
- To create a fundraising and public relations (PR) tool.

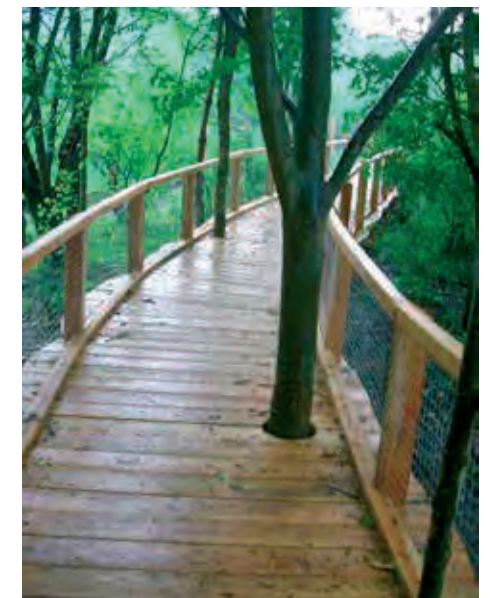


Figure 1. Red squirrel walk through route inside the Escot enclosure.

Description of the project

The enclosure construction was started in February 2011 when home grown Larch (*Larix* spp.) trees were felled and a mobile saw was brought in to process the timber we needed for the project. The Probation Service provided labour for site clearance and ground preparation. The first pair of squirrels was introduced to the enclosure in late summer that year. The whole process was filmed to provide a record of methods, and as a teaching resource. A high quality webcam was installed but Broadband at Escot currently (2015) only provides 0.75MB so streaming live footage is out of the question.

Escot supervises the enclosure by providing a paid ranger to unlock/lock the gates morning and evening, check the perimeter, feed the red squirrels, and give a public talk daily at 1pm. Cob nuts (50Kg per annum) are purchased from Kent, to supplement natural seasonal fayre within the enclosure. Initially a single pair of red squirrels were provided by The British Wildlife Centre, then the following Spring, 2012, another pair were donated. In 2014, 11 kittens (young red squirrels) were born in the enclosure, and once weaned were returned to BWC.

The squirrels are very tame and accustomed to people; even large groups, and so very few visitors leave without having seen at least one animal (Figure 2). The 100m long and raised 'all ability' boardwalk enables close proximity to the red squirrels, but on their terms. The animals can retreat or withdraw without being pursued by people. Beyond the enclosure, grey squirrels are controlled all year round and results recorded. The Kent cobs are used to attract grey squirrels onto a Fenn IV trap, using Nutella hazelnut spread as a 'glue', within an open topped wooden 'box'. The Fenn trap delivers an instant, humane dispatch. Over time this method has provided seasonal trend data and serves as an example of local control to others.



Figure 2. Red squirrels provide an exciting and rich visitor experience
© Richard Austin.

Initially, and through RSSW, there was a push to involve other estates and landowners. Interest was encouraging but without funding to coordinate trapping and keep up momentum and enthusiasm, the flame diminished. Today we are four active volunteers: a Trustee of the European Squirrel Initiative (ESI), a Secretary/Treasurer, a web and social media blogger, and myself (author). Other volunteers and interested parties are currently 'sleepers' – awaiting the necessary oxygen to the flame. We have a project for the Isle of Purbeck to clear the peninsula of grey squirrels and allow natural recolonisation of red squirrels which are known to periodically swim from Brownsea Island to the mainland – only to risk being infected with Squirrelpox virus. We are also in close touch with the Cornish Red Squirrel Project (CRSP) and are ready to assist as and when appropriate. Our ultimate goal would be to clear the South West peninsula of grey squirrels. We are inspired by squirrel groups in the northern border counties who are defending red squirrels in the north of England. In the South West we have the advantage of the sea on two sides. Our disadvantage is that we no longer have red squirrels in the area for the public to get passionate about – hence the importance of the showcase enclosure. How can you care if you don't know?

Success indicators within the project

- The open plan, walk-through natural enclosure has been a resounding success as a concept.
- Public reaction to the project has been overwhelmingly positive.
- Creation of eco-tourism for the area has been beneficial.

Major difficulties faced

- Politics of controlling grey squirrel populations.

Major lessons learned

- Controlling grey squirrels in the vicinity of the enclosure is paramount as the animals are determined to get into the red squirrel exhibit.
- Controlling rats and mice within the enclosure is paramount to reduce disease risk.
- Recognising individual red squirrels helps stock management, disease control and alerts to escapees.

Success of project

Success or Failure	
Highly Successful	X
Successful	
Partially Successful	
Failure	

Reason(s) for success/failure of the project


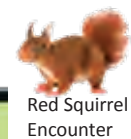
- Public endorsement of the project.
- Education potential has been maximised.
- Dedication of staff inspire and educate visitors.

Future project development


- Employ a Devon squirrel liaison officer.
- Support reintroduction programmes in Cornwall and the Isle of Purbeck (Dorset).

References

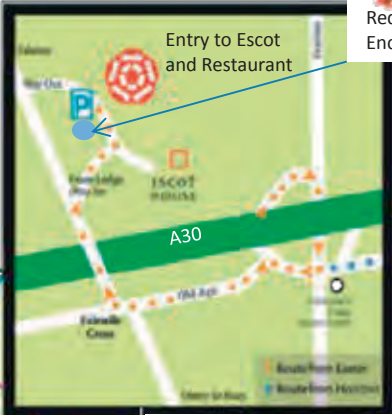
1. <http://britishredsquirrel.org/blog/id:43> (seven minute video).

how to find us... just 15 mins from Exeter



**Escot,
Ottery St Mary,
Devon EX11 1LU
Tel: 01404 822188
Email: mish@escot-devon.co.uk**



Escot is just off the A30, between Exeter and Honiton, at Fairmile.

Coming from Exeter, leave at Patteson's Cross Junction for Fairmile and follow the brown signs.

Approaching from Honiton, leave the A30 at the Iron Bridge exit, follow directions for Fairmile and then the brown signs.

Map - Escot location.

Gibside Estate Red Squirrel Conservation

The National Trust

Geographical area of conservation work

Gibside Estate, Burnopfield, Tyne & Wear, England

Author and organisation contact details

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Key partners

Red Squirrels Northern England

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	5
Active Volunteers	5

Introduction

The Gibside estate, situated in the lower reaches of the Derwent river valley, has approximately 138 hectares of mostly coniferous woodland, predominately Corsican pine (*Pinus nigra*), interspersed with areas of semi-natural broadleaves. The Derwent Valley is a series of steep gorges, clothed in ancient semi-natural woodland, surrounded by a mosaic of rural farmland and intersecting blocks of mainly coniferous woodland. Grey squirrels (*Sciurus carolinensis*) first appeared at Gibside in the late 1990s and subsequently the red squirrel (*Sciurus vulgaris*) population crashed with Squirrexpox virus cases recorded. The author had been involved in tree felling operations as a contractor in the early 2000s when occasional red squirrels were seen and small numbers also turned up dead in dreys, often with Squirrexpox virus type symptoms evident (Figure 1). During the intervening years to the present day, red squirrels have been present in Gibside albeit in very low numbers.

Red squirrels were formerly abundant throughout the region, but appear to be absent from most of the lower valley now, although they are still found in good numbers in the upper reaches, above the Derwent Reservoir. These populations, lying 12 miles to the west of Gibside, and another in Gosforth Park, Newcastle, 12 miles to the east, are probably the nearest to the isolated Gibside population.

Project aims

- The systematic control of grey squirrels in the Gibside area.
- Protection and an increase in numbers of red squirrels.

Description of the project

The National Trust property at Gibside currently has a group of five unpaid volunteers culling grey squirrels by shooting. With visitor numbers to the estate in excess of 150,000, trapping is considered to be a difficult option and thus shooting is preferred and this is carried out outside of visiting hours. Currently between 300 and 400 grey squirrels are culled annually.

An annual squirrel distribution survey has been undertaken on the property since 2012 in conjunction with the Red Squirrels Northern England project. This uses baited squirrel feeders and trail cameras to record the presence of squirrels annually. Other feeders are used elsewhere, some enclosed in wire cages, with a mesh size (44mm x 46mm) allowing access to red squirrels (Figure 2) but not grey squirrels. Smaller, younger grey squirrels could gain entry but cameras have

only ever recorded this on one occasion although many have tried. Evidence of feeding at these feeders can therefore initially be suspected as possibly being red squirrels and is subsequently followed up with a trail camera to confirm.



Figure 1. Red squirrel numbers declined following the arrival of grey squirrels and some remains were found in dreys and on the forest floor.



Figure 2. A wire mesh box surrounding a wooden feeder. Adult grey squirrels are unable to pass through the mesh but the smaller adult red squirrels can.

Success indicators within the project

- The continuing presence of red squirrels within the Gibside estate.

Major difficulties faced

- A lack of grey squirrel control in surrounding woodland areas leads to dispersal of grey squirrels into the estate.

Success of project

Success or Failure	
Highly Successful	
Successful	
Partially Successful	X
Failure	

Reason(s) for success/failure of the project

- Effective control of grey squirrels is carried out annually.
- Red squirrels are still present but numbers do not appear to be increasing.

Future project development

- The project will continue using volunteers to control grey squirrels and will monitor red squirrel distribution using feeder boxes and wildlife cameras.

Grasmere Red Squirrel Group

Geographical area of conservation work

Grasmere, Cumbria, England

Author and organisation contact details

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Key partners

Red Squirrels Northern England

South Lakes District Council & Lake District National Park Authority, Cumbria, England.

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	1
Volunteers involved with Grey Squirrel Control	5-10
Active Volunteers	20

Introduction

The English Lake District has always had red squirrels; people in Grasmere remember them visiting their houses. Grey squirrels arrived in the 1990s.

The Grasmere area is 36 km² (14 square miles) with a total of 200 hectares of woodland. There are several larch and conifer plantations but the majority is broadleaf (predominantly oak and beech) with a number of medium sized estates around Victorian houses containing tall mature specimen pines and conifers. The woodland forms a fairly narrow ribbon on both sides of the valley.

To the east and west are ridges of mountains reaching an altitude of 400 to 760m; at the northern end the vale splits into several valleys all ending at least at 230m. This forms a natural boundary on three sides, well above the treeline (NB very occasionally grey squirrels have been seen on the fells). Four kilometers to the north is the edge of the Thirlmere red squirrel reserve/stronghold. To the south, where the grey squirrels come from, the valley continues to Rydal and the adjacent valley of Great Langdale.

Grasmere Red Squirrel Group (GRSG) was formed in early 2006 to coordinate and maximise grey squirrel control effort to preserve the remaining red squirrels.

Fortunately our area is part of the buffer zone of the Thirlmere stronghold and is therefore eligible for English Woodland Grant Scheme (EWGS) and Woodland Improvement Grants (WIG), which have provided the bulk of our funding. This was initially via the National Trust (NT) and is currently through Red Squirrels Northern England (RSNE). Additional funding has been provided by donations from individuals, grants from a local charity and the Lake District National Park Authority.

Project aims

- Protection of red squirrels from Squirrelpox virus and competition from grey squirrels.
- Maintaining/expanding the red squirrel population.
- Stopping grey squirrels reaching the Thirlmere stronghold from the south.
- Educating the public about red squirrels and encouraging them to get involved in their conservation.

Description of the project

From 2009 to 2012 the bulk of the control work was carried out by three people though over 20 people have helped with dispatching grey squirrels and more than 50 households have helped with monitoring traps. Currently our ranger (contractor) does the vast majority of grey squirrel control. We have built a network of over 100 people who contribute towards the effort by monitoring garden feeders and walking local woodlands.

The members were all volunteers up to 2012 and since then the services of one part time ranger have been used. The work has been carried out entirely by people living in the village and is a real community effort.

In 2009 we undertook a clearout of grey squirrels from the northern end of our area. With the large population of grey squirrels, trapping was very effective. We deploy mainly 'Beck' feeder/traps (designed in Cumbria) which catch only grey squirrels based on weight, allowing red squirrels to access the food and escape should they set off the trap. They have many advantages over cage traps but cost much more.

We have also put holes in cage traps to allow red squirrels to escape and mounted them off the ground in wooden sleeves to prevent interference from badgers. Young grey squirrels can also escape from these traps (we don't have any young grey squirrels).

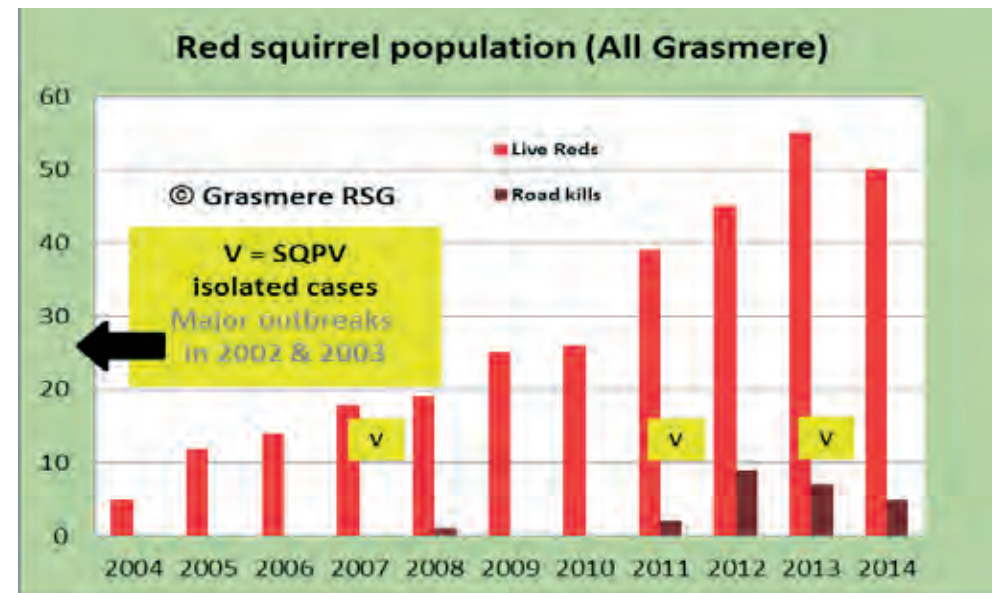


Figure 1. Project data showing how the red squirrel population has recovered.

Our methods changed when the area became red squirrel only and free shooting is now the most effective method. The proportion of grey squirrels culled by free-shooting has increased from 30% in 2010 to 80% currently.

From 2010 we have concentrated on the 'frontier' areas which are the main incursion routes for immigrating grey squirrels travelling north from Rydal and Skelwith Bridge/Elterwater. Our aim is to remove newly arriving grey squirrels as quickly as possible in order to minimise the chances of Squirrelpox virus transmission to the red squirrels.

Beck feeder/traps have been placed out at established locations on the incursion routes and monitor activity with trail cameras that send emails with a photo in near real time. So far we have received over 32,000 emails.

We have a grey squirrel sightings hotline and communicate daily via email. We also have a FLIR infrared spotting scope but this hasn't proved very useful over the winter as the sky swamps the image. Landowners' permission has been obtained to trap and shoot.

Other activities include supplementary feeding of red squirrels, deploying road signs, production of a newsletter and monitoring for RSNE. We have given talks to the public at Allan Bank, the local primary school, and local groups as well as helping to train countryside leadership trainees.

Our work has enabled the National Trust property of Allan Bank in Grasmere to gain a national reputation for being an excellent location for the public to see red squirrels and the NT heavily promote this aspect.

We carry out red squirrel population surveys in our area and keep detailed statistics on red squirrels and grey squirrels by sub-area. Data is analysed to establish trends etc. and change our strategy when appropriate.

Red squirrel numbers have recovered following population crashes caused by major outbreaks of Squirrelpox virus in 2002 and 2003 (Figure 1). The ratio of red squirrels to grey squirrels has changed dramatically from approximately 1:20 in 2004 to more than 10:1.

All the effort has paid off with a healthy population of red squirrels which has now expanded outside our area. The overall density of red squirrels in the Grasmere woodlands is now approximately 0.3 per hectare, with some woodlands supporting more than 0.6 per hectare. Many of the red squirrels in Grasmere have two litters a year.

Success indicators within the project

- Maintain or grow our red squirrel population.
- Keep our area free from grey squirrels.
- Ensure long term sustainability of effort by recruiting new volunteers and getting local landowners/institutions, e.g. NT, to contribute towards the work.

Major difficulties faced

- Despite the presence of a full time ranger and volunteers working to the south of Grasmere for the past three years, the number of grey squirrels coming to Grasmere remain similar year on year requiring us to maintain the same level of resources to combat them.
- Major landowners, e.g. NT, have granted access to their woodlands for the control of grey squirrels but do not undertake control themselves nor fund the GRSG to carry out the work.
- Once the EWGS/WIG funding ends we will not have resources to pay a ranger (contractor).
- A small number of people contribute the majority of volunteer time and hence the project is vulnerable should any of these people cease involvement.

Major lessons learned

- Resident grey squirrels reduce the breeding success of red squirrels, so we decided early on to make the area 'red only'.
- Following each Squirrelpox virus outbreak, red squirrels repopulated the location of the outbreak. Of course this could only happen if healthy red squirrels already existed in the vicinity. In 2003 repopulation took nine months. In the case of the 2011 casualty, red squirrels were continuously present within several hundred yards. An outbreak in one part of Grasmere did not seem to spread to other areas.
- Obtaining permission to shoot in the woodlands is essential to ensure individual grey squirrels are picked off rapidly before they infect the red squirrels. Also grey squirrels are extremely wary of traps when they enter a red squirrel only area.
- We only use traps with holes to allow red squirrels to escape.

Success of project

Success or Failure	
Highly Successful	X
Successful	
Partially Successful	
Failure	

Reason(s) for success/failure of the project

- An experienced and dedicated ranger with support from everyone in the village.
- Elimination of grey squirrels as soon as they enter the area to minimise the chance of them breeding in the area and also of passing on Squirrelpox virus infection to the red squirrels.
- Use of technology to provide close to real time monitoring of key routes for grey squirrels to enable a quick response as soon as they enter our area.
- Communicating the plight of the red squirrels and our conservation work to local people and the public, encouraging them to get involved in their own areas.

Future project development

- We intend to continue as we are for now and exploit technology where possible.



Map – Grasmere group location shown with red pin.

Red squirrel conservation on the Isle of Wight

Wight Squirrel Project and The Isle of Wight Red Squirrel Trust

Geographical area of conservation work

Isle of Wight

Author and organisation contact details

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Key partners

Wildlife Veterinary Investigation Centre, Cornwall

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	1
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	10
Active Volunteers	26

Introduction

The Isle of Wight is currently a stronghold for red squirrels where grey squirrels are absent. There have been occasional grey squirrel records, usually where a squirrel is found dead. The most recent report, confirmed with photographic evidence, was of a grey squirrel washed up dead on a beach in 2012.

There are contingency plans in place to deal with any grey squirrels that may be detected. There is interest in the creation of a road link to mainland England with a company formed to push for a fixed link. This would create a significant risk of grey squirrel colonisation of the island.

Woodlands on the island are small and fragmented, often with busy roads running through them. Development has encroached into many woods so red squirrels are often fed in gardens but development also presents perils such as cats, rat poison, fenn traps and waterbutts. Road traffic deaths are common when red squirrel numbers are good but, as expected, drop when numbers are poor. These numbers are used as part of our monitoring programme.

Where woodlands are small and isolated, red squirrels are absent. Woodland management is varied and red squirrels are in very low numbers in neglected woods or where other species or objectives (usually commercial) are a priority.

Wight Squirrel Project (WSP) is run by volunteers and The Isle of Wight Red Squirrel Trust by trustees. We are currently recruiting more volunteers to help with monitoring and management of a shop.

Project aims

- Keep the Isle of Wight free of grey squirrels.
- To lobby against a fixed link between the Isle of Wight and the UK mainland.
- Educate the public regarding garden feeding and better woodland management.
- Encourage tree planting, especially to create corridor links.

Description of the project

Red squirrel monitoring is ongoing, starting in 1991 and is carried out by the Wight Squirrel Project. Its main aim is monitoring without using invasive techniques, which we actively oppose, using the following techniques:

- Bi-annual woodland monitoring carried out by trained volunteers – currently there are 11 volunteers monitoring 15 woods. Methodology is slow and tedious so few who are trained stick with the monitoring. There are only five volunteers who have kept up the surveys for more than five years.
- Garden questionnaires – people with red squirrels in the garden are encouraged to fill in questionnaires.
- Sightings from the general public – as well as red squirrel sightings, grey squirrel sightings are sometimes received and always recorded. During an interview to obtain a description of the animal, where it was and what it was doing, it can usually be established whether it was a red squirrel with a grey coat, a cat or if it was such a fleeting glimpse that no description was possible. Where several ‘grey squirrel’ sightings are reported in the same area, hair tubes and camera traps are deployed.
- Post mortem examinations are carried out on suitable squirrel corpses. Where there is pathology, samples are sent to Mr Vic Simpson in Cornwall. This work has resulted in a number of published papers.



Figure 1. Members of the army building a red squirrel hide.

- Hair tubes are used for a specific purpose, i.e. suspected grey squirrel sightings in an area.
- Camera traps have so far been used to check grey squirrel reports, monitor woodland at the owner’s request and at our red squirrel hide sites.

An ‘All Island Red Squirrel and Dormouse Survey’ is carried out every five to seven years by The Hampshire and Isle of Wight Wildlife Trust. The methodology involves looking for signs or sightings and recording how long it took to find them. A time limit is put on the length of the search. Only woods greater than one hectare are included in the survey. A 25 year report (1991 to 2016) is currently being prepared by Helen Butler which will show population dynamics, disease, woodland surveys etc over that period.



Figure 2. Red squirrel volunteers.

Films and books are produced as an aid for giving talks and also for general sale, again to raise awareness and educate the public. Attending shows and giving talks also engages with the public and schools.

Projects are funded by grants or sponsorship. Monitoring, education and raising public awareness and running costs are paid for by fundraising and donations. Hides for red squirrel watching are provided for members and, on a smaller reserve, for the general public. They are used not only by locals who do not have squirrels visiting their gardens, but also by holiday makers who have never seen a red squirrel. We are currently negotiating for a larger woodland on a lease to use as an education centre.

Advice is given to the general public. This is very varied and ranges from landowners asking for advice, to holiday makers enquiring about the best place to see red squirrels. Household owners often ring up due to concerns about trees being cut down or a planning application that may destroy a corridor link.

Success indicators within the project

- Grey squirrels are kept off the island.
- Public involvement, education and awareness greatly increased.
- Red squirrel road crossings and signs in place.
- Private hide for members to see red squirrels.

Major difficulties faced

- Limited funding.
- Recruiting dedicated volunteers.
- Not enough support from agencies and organisations that should be supporting red squirrels.
- Commerce coming before conservation.

Major lessons learned

- The reliance on volunteer input and the difficulty recruiting dedicated people with the right skills could put the charities at risk in the future. Wight Squirrel Project has been running for 22 years but this is due to the persistence of one person with help from a few dedicated individuals and volunteers that come and go.
- The need to keep up local media attention was apparent from the start.
- Supplementary feeding in gardens has its advantages by providing food in times of shortage but the cost to squirrel health can be high if it causes the spread of disease.
- For a species that is often used as a business name and to generate income to the island, red squirrels are not given the priority they deserve when it comes to habitat conservation. This is an ongoing battle and it's very much some you win, some you lose.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

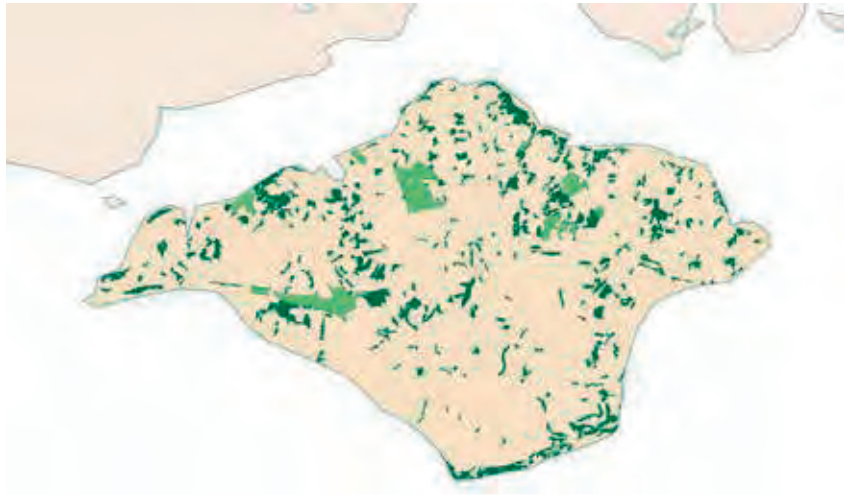
- Hard work by volunteers starting from nothing and building a viable long lasting project.
- Public interest and support has greatly increased over the years due to publicity and, naturally, the charisma of red squirrels.

Future project development

- Increase paid help from one day a week to four.
- Establish a base in the shop so the public can come to visit for information.

References

- I. Simpson VR, Hargreaves J, Butler HM, Davison NJ, Everest DJ (2013) Causes of mortality and pathological lesions observed post-mortem in red squirrels (*Sciurus vulgaris*) in Great Britain. *BMC Veterinary Research* 9: 229.
- II. Butler H (2004) *Red Squirrels on the Isle of Wight*. Red Squirrel Enterprises.



Map - Red squirrel woodland within the Isle of Wight project area.

Three Valleys Plus

Westmorland Red Squirrel Society

Geographical area of conservation work

Longsleddale, Kentmere and Langdale Valleys, Lake District National Park, Cumbria.

Author and organisation contact details

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Key partners

Lake District National Park Authority
Forestry Commission
National Trust
Red Squirrels Northern England
Grasmere Red Squirrel Group.

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	3
Volunteers involved with Grey Squirrel Control	4
A two-year Sustainable Development Fund grant from the Lake District National Park Authority.	1

Introduction

The south-eastern part of Cumbria and the Lake District is at the front line in managing the interface between indigenous red squirrel populations and grey squirrels, which are expanding their range northwards. Volunteer effort over more than 10 years has shown that concerted control of grey squirrels has created space for existing red squirrel colonies where they have been able to survive and thrive. Now there is evidence that red squirrels are beginning to reclaim territory where concerted and sustained grey squirrel control occurs.

The valleys in which the project has focused its efforts are primarily under pastoral farming but all contain substantial tracts of broadleaved, mixed and deciduous woodland. These provide good habitat for red and grey squirrels. Wooded river and stream banks also make excellent corridors - easy routes for both species to expand their territory.

The project area is at the heart of the iconic Lake District landscape. More than 15 million visitors come each year to its villages and towns and to the many hotels, guest houses, holiday cottages and campsites. Visitors and residents love to see red squirrels and this project seeks to improve their chances of doing so.

Thanks to the Lake District National Park Authority's financial support the project has been able to retain contractors to augment Westmorland Red Squirrels Society volunteers in delivering the project's objectives.

Project aims

- The main objective of the Three Valleys Plus project was to extend the range of grey squirrel control to 'join up' the valleys of Kentmere and Longsleddale with the Ambleside and Langdale area. This would provide a protective barrier against grey squirrels moving towards the north of the county including into the red squirrel stronghold areas around Grasmere and in the northern Lake District.
- Secondly it sought to raise public awareness and encourage local people to become active in red squirrel conservation and grey squirrel control.

Description of the project

The Three Valleys Plus project controlled local grey squirrel populations primarily through the use of live capture traps supported by some shooting. Control was undertaken largely to prevent grey squirrels from spreading further

north where they would compete with the healthy and growing red squirrel populations in Grasmere.

The project area contains known enclaves of red squirrels but in some areas, such as the Troutbeck Valley to the east of Ambleside, red squirrels had not been seen for many years.

Control initially focussed on woodlands which we knew to contain populations of red squirrels. This was to try and remove the direct competitive pressures posed by grey squirrels but also to remove the threat of Squirrelpox virus, a couple of cases of which had been identified in the woodlands on the eastern shore of Windermere.

The effect has been to see the restoration of red squirrels in the Troutbeck valley and around Troutbeck Bridge. We also received record numbers of sightings all down the east side of Windermere, including in Windermere town itself.

The majority of the grey squirrel control was done by paid contractors, which allowed trapping to be concentrated in key locations. However, our volunteers, private woodland estates, members of the public, field sportsmen and some NGOs including the National Trust, also culled squirrels or permitted control on their land.

We ran two public meetings for local people to come and learn about the project's objectives and the techniques used to catch and kill grey squirrels. These were well attended (typically 60 plus people). We also gave illustrated talks and provided information stalls at agricultural shows. The project has enjoyed good and invariably positive media coverage.

The National Park Authority's much appreciated financial support for our Three Valleys Plus project over 2013 to 2014 has enabled significantly increased coverage of grey squirrel control in the project area. Red squirrels returned to the Troutbeck valley in 2014, and have been seen in Windermere for the third year running - these are the outstanding achievements of the project, which has built on previous work by our group. It demonstrates that grey squirrel control works, and that red squirrels will re-establish when grey squirrel numbers are reduced. The removal of grey squirrels in the project area gives further protection to red squirrels in the wider area - such as those in Grasmere/Thirlmere stronghold and in the Ullswater valley. It has filled an important gap in the red squirrel conservation jigsaw.

One of the reasons for this success has been the involvement of local volunteers, and our new sub-groups formed as part of the project continue to make a significant contribution. Another reason for success is having the funding available to pay for contractors where voluntary effort is insufficient - it

is vital to have the flexibility to target areas where grey control is of strategic importance.

Red Squirrels Northern England's monitoring is showing that red squirrels are doing best in areas like ours where there is an active community-led red squirrel group working to protect them. This year (2015) we are co-operating very closely with RSNE and the Forestry Commission as they step up grey squirrel control in Grizedale Forest and in the area northwards towards Grasmere.

Success indicators of project

- Maintaining the project area as one where grey squirrel populations are sufficiently suppressed to enable red squirrels to survive, thrive and reclaim territory.
- Controlling grey squirrel populations sufficiently to prevent the spread of Squirrelpox virus and the recolonisation by grey squirrels of red squirrel strongholds to the north of the project area.
- Progressively increasing a network of volunteer trappers and local people involved in the project.

Major difficulties faced

- While the two-year grant from the National Park Authority has been essential to the project's success, fund raising for continuing control has not been available from the NPA or from other sources. Potential funders seem to prefer one-off or innovative projects and seem reluctant to commit funding even though it is recognized that ongoing control of grey squirrels is essential to the survival of the red squirrels or at least until a more cost effective solution is found.
- Grey squirrels rapidly recolonise woodlands where intensive trapping has removed large numbers of animals. Perversely, in part of the area, additional grant aid has been made available by the Forestry Commission where red squirrels are at risk of dislocation due to extensive felling of larch plantations where they are affected by *Phytophthora ramorum*.
- While we are lucky to have the support of Red Squirrels Northern England in collating and sharing survey data on grey squirrel culling and red squirrel distribution we remain concerned about our long term capacity to support the activity with robust research evidence.

Major lessons learned

- Despite the successful survival and recovery of red squirrels in the area, it is a continuing challenge to get local people and landowners to proactively control grey squirrels without volunteer or contractor support.
- A small number of people contribute the majority of volunteer time and hence the project is vulnerable should any of these people leave.
- The National Park Authority, Forestry Commission and National Trust have been happy to allow volunteer and contractor access to their woodlands for the control of grey squirrels, subject to licensing, risk assessments, insurance and training. But they appear to lack the resources or to be able to give priority to undertake control themselves, which does not set a good example to private landowners.

Success of project

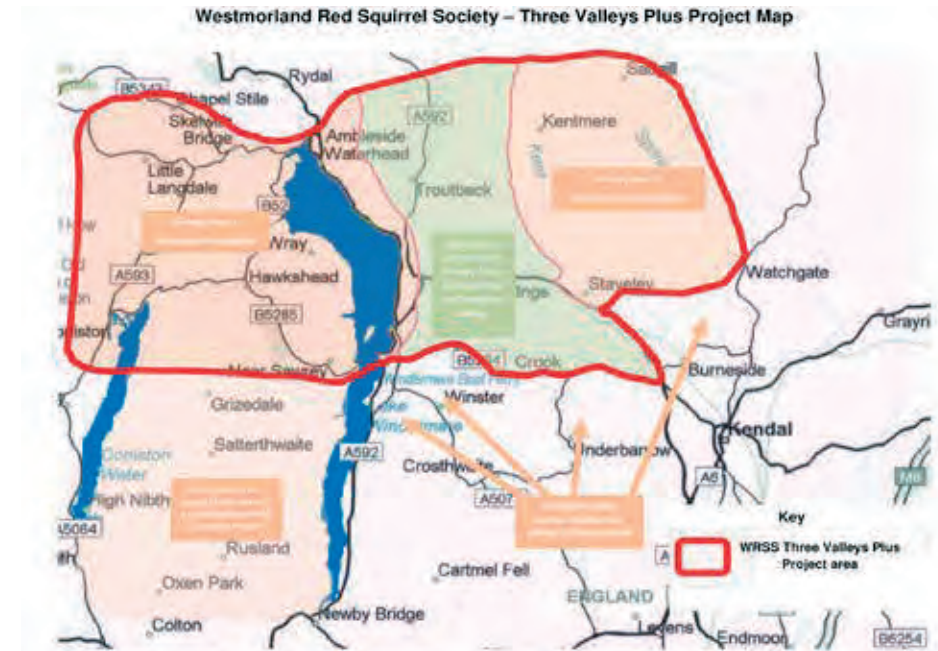
Success or Failure	
Highly Successful	X
Successful	
Partially Successful	
Failure	

Reasons for success of the project

- Grey squirrel control has suppressed resident populations and is likely to have helped prevent grey squirrels invading neighbouring red squirrel strongholds.
- Red squirrel populations have survived, thrived and increased their range within the project area during the course of the project and since.
- The project has attracted many new members to the Westmorland Red Squirrel Society and also drawn in several active volunteers who control squirrels and raise funds for our continuing work.
- However, the project has now finished in its original form as we failed to attract the resources necessary to continue a comprehensive programme (though we continue to let some contracts in key locations within the project area).

Future project development

- We hope that legacy of this successful project will be a spur to local residents and landowners to support continued red squirrel conservation throughout the Westmorland red squirrel area.
- We continue to hold public meetings, attend shows and work through local and social media to increase the number of local volunteers.



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Map - The Three Valleys plus project area

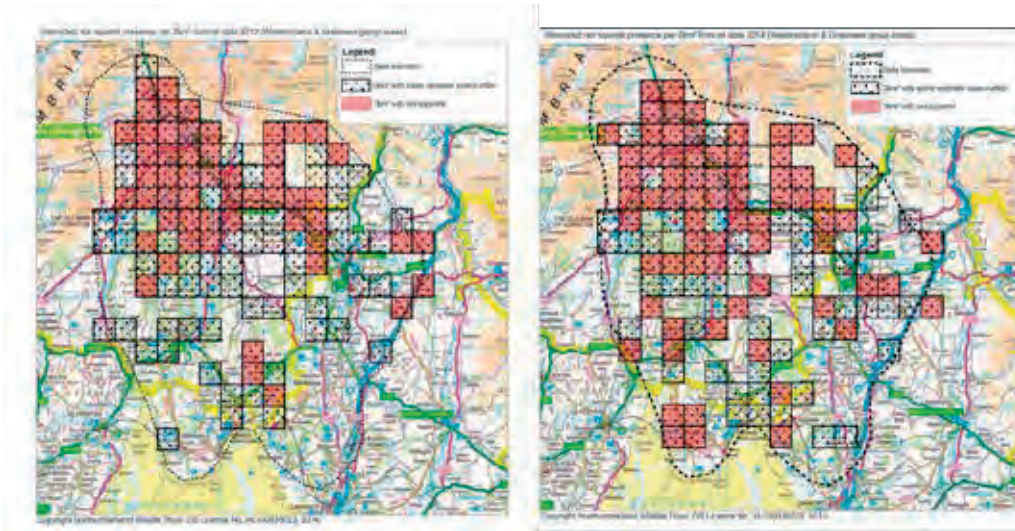


Figure 1. 2013: red squirrels in 54 2km²

Figure 2. 2014: red squirrels in 70 2km²

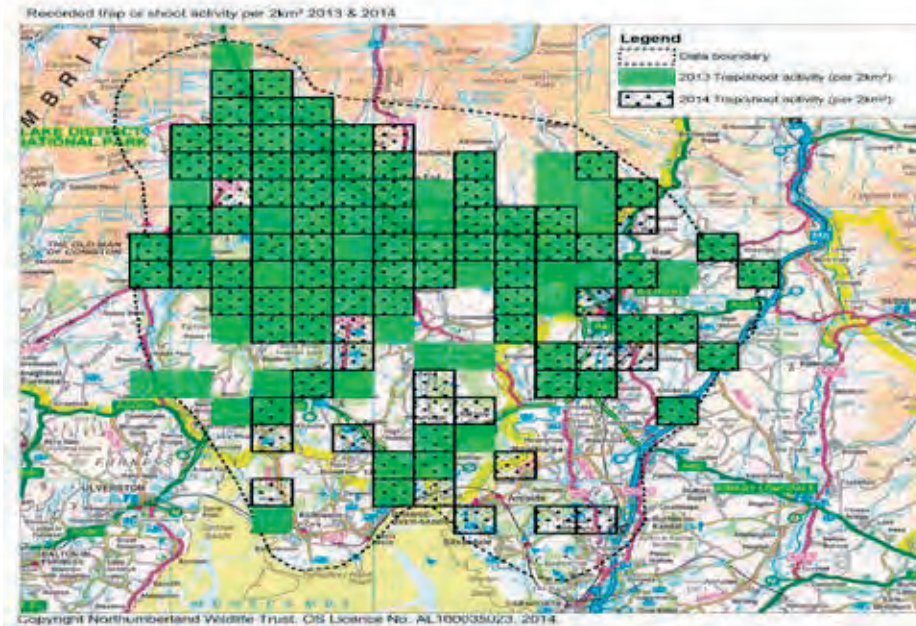


Figure 3. Recorded trap effort in the project area

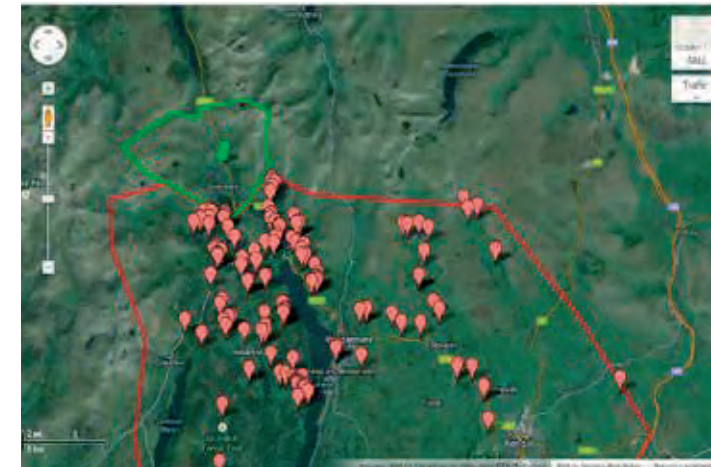


Figure 4. WRSS 2013 Red Sightings Map Three Valleys Plus Area - up to 27th October 2013



Figure 5. WRSS 2014 Red Sightings Map Three Valleys Plus Area - up to 27th October 2014

Cornwall Red Squirrel Project (CRSP)

Geographical area of conservation work

Cornwall – target areas The Lizard and West Penwith

Author and organisation contact details

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Key partners

Duchy of Cornwall
Trelowarren Estate
Bolitho Estate, Caerhays Estate
Bonython Estate, Tregothnan Estate

Steering Group:
Charles Williams (Chair)
Robin Hanbury-Tenison (President)
David Woolcock - Paradise Park (Red Squirrel advice)
Professor Nick Sotherton – Game and Wildlife Conservation Trust (Scientific advice)
Giles Clotworthy (PR advice)
Phil Reed (Legal advice)

Stakeholder group:
The Duchy of Cornwall
Natural England
The Forestry Commission
Cornwall Council
Cornwall Wildlife Trust
The National Trust

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months) (permanent)	1
Volunteers involved with Grey Squirrel Control	5-10
Active Volunteers	1-5

Introduction

Following the arrival of grey squirrels in Cornwall in the mid-20th century the red squirrel population of the county progressively declined and eventually the species was lost from Cornwall in 1984.

In 2009 a project was conceived to try and reintroduce red squirrels to the county. The reasons for attempting a project in Cornwall were:

- Geographical isolation, with both The Lizard and West Penwith being peninsulas sited in the far south and west of Cornwall, which in itself is a peninsula
- Presence of suitable habitat, with 10% woodland coverage on The Lizard and 5% woodland coverage in West Penwith
- Landowners keen to support project, with many already undertaking grey squirrel control
- Relatively recent loss of red squirrels from the county

Between 2009 and 2011 the steering group undertook fundraising and in September 2011 a full time project coordinator started. Over the next eighteen months the project achieved Registered Charity Status, created a website and started a membership scheme, as well as enlisting landowners throughout the areas to partake in grey squirrel control.

In February 2013 the project coordinator went part time and a full time grey squirrel trapper commenced with the CRSP. The trapper concentrates primarily on The Lizard where over 85% of the land area was signed up by February 2014.

Grey squirrel control is undertaken using warfarin (usage in the United Kingdom ending 15th August 2015), shooting, a small number of live traps, and kill traps. Volunteers mainly undertake trapping and shooting on their own land.

Fundraising is primarily achieved through the membership scheme, private donations, small grants (for example Duchy of Cornwall, Forestry Commission) and annual fundraising events.

Project aims

- Eradication of grey squirrels from The Lizard and West Penwith peninsula target areas
- Preventing grey squirrel spread from the buffer zones into the target area.
- Introduction of red squirrels to The Lizard and West Penwith.
- Maintenance of reintroduced red squirrel population.
- Eventual spread of red squirrel population.

Description of the project

The Cornwall Red Squirrel Project controls grey squirrel populations using all four legal methods of control; warfarin use, kill traps, live traps and shooting. Warfarin will no longer be available for use after 15th August 2015 and so the other three methods will be used after this date. Lethal methods (warfarin and kill trapping) are available because there are no red squirrel populations present in the South West of England.

Kill trapping is the most favoured method because, in our opinion, it is the most efficient method of removing grey squirrels, and provides grey squirrel cadavers for biometric recording and Squirrelpox virus testing. CRSP uses primarily BMI Bodygrip traps, which are deployed in a uniquely designed box. The box is designed with double baffles to guide the squirrel into exactly the right place for a clean kill. The boxes are wooden and stained green or brown and then erected in trees. They appear for passers-by to be bird or bat boxes, and grey squirrels within the boxes are invisible because of the height of the box. Hazelnuts are used to bait the box and have proved to attract grey squirrels easily (more so than when using maize for example). The boxes are so successful that the design has now been adopted for manufacture and is available from:

Trap Box (Tel: 07891340123, website: www.facebook.com/Trapbox).

Shooting and live trapping using Albion Cage Traps is undertaken in specific circumstances when kill trapping is not suitable. Traps are set on trapping “lines” which are routes that can be walked or quad biked in one round trip. The use of BMI Bodygrip traps is again favoured in this scenario, because they are relatively lightweight and easy to carry.

Grey squirrel control is undertaken by a full time grey squirrel ranger who commenced work with CRSP in February 2013. Trapping effort is currently being concentrated on The Lizard which has a large area of mixed woodland in the centre of The Lizard peninsula, primarily around the Trelowarren and Bonython Estates, and so would provide the best place for red squirrel release.

The Lizard also has a number of key landowners (8-12) who undertake their own grey squirrel trapping. These were trained by the CRSP trapper and run similar trapping lines. This smaller number of owner-trappers is manageable and helps release the CRSP trapper for plots where owners are not able or available to undertake their own control.

The project has been offered grey squirrel shooting resource on a number of occasions, but because of the need for the utmost care in humane dispatch, the sensitive public handling of the project and reluctance to allow “unknowns” onto participating land owners holdings CRSP has not yet identified suitable volunteers to train and then allocate a regular shooting route.

At present because of resource limitations CRSP only undertake grey squirrel control on The Lizard. However, the project is still active in West Penwith and landowners signed up to the project between 2011 and 2013 continue to undertake their own control.



Figure 1. Group of school children visiting Trewithen where a group of red squirrels are being captive bred as part of the National Studbook and providing an educational resource in the process (enclosure in background). Copyright Bernie Petterson

Trapping success is measured in three ways:

- Keeping biometric records of grey squirrels trapped, e.g. weight, length, sex, estimated age.
- Transect walking (1 kilometre transects timed to 2 minutes per 100m plus 2 minutes standing still every 100m).
- Recording of anecdotal evidence with regard to sightings.

As grey squirrel numbers continue to decline it is anticipated that additional monitoring methods will be implemented, including camera traps and hair tubes.

Away from trapping the education and public engagement aspect of the project is extremely important and is undertaken by the part time project coordinator. Public engagement includes:

- Attendance at events such as agricultural shows, fairs and fetes.
- Talks for local interest groups such as Womens Institute (WI), Old Cornwall Society, Rotary and Café Scientifique.
- Talks and fun wooden squirrel pencil holder making sessions for children's groups such as Brownies and Scouts.
- Schools talks, which include visits to schools or whole days out at Trewithen where the children listen to a talk, make wooden squirrels, feed the red squirrels and undertake a woodland tree identification walk.
- A newsletter (typically twice per annum) to members and interested parties.
- Events such as an annual fundraising dinner, local dinners and talks on red squirrels with the target areas and the rest of Cornwall.

Success indicators of project

- Controlling The Lizard and West Penwith grey squirrel populations to a point where zero trapping, sighting (using a transect walking methodology) and camera trap returns are made.
- Achieving the reintroduction of red squirrels in the target area, and maintaining the population.

- Progressively increasing a network of volunteer trappers and local people involved in the project.
- Maintaining public support for the project.

Major difficulties faced

- Fund raising has proved more difficult than was anticipated, particularly as many bodies will not fund salaries, or will only fund projects with discrete end points and timescales.
- Volunteer management is time consuming and difficult to manage in terms of finding dedicated volunteer trappers who are trusted to undertake scientifically rigorous and humane grey squirrel control.
- Grey squirrels rapidly recolonised woodlands where intensive trapping had removed large numbers of animals. The project is yet to see how easily they can maintain low grey squirrels following two years of intensive trapping.

Major lessons learned

- A short break in trapping effort leads to a rapid recovery of grey squirrel numbers.
- Fundraising is difficult, primarily because of a lack of appetite from some bodies to fund projects in which culling is a major element, but also because of a frequently occurring requirement that projects have a definite end date which is not possible with projects like this which have long timescales.
- Stakeholder engagement with key bodies (Natural England, Wildlife Trusts, National Trust etc.) is key in creating a well-respected project, and will also help ensure the project is run on scientifically rigorous basis.
- Both Non-Governmental Organisations (NGOs) and State bodies are happy to grant access to their woodlands for the control of grey squirrels. but lack the resources or in some cases desire to undertake control themselves.

Success of project

Success or Failure	
Highly Successful	
Successful	
Partially Successful	X
Failure	

Reason(s) for success/failure of the project

- The project is too young to be sure of success.
- Grey squirrel numbers have been greatly reduced, but recover quickly when trapping effort ceases for a short period of time, regardless of the time of year.
- Culling has not affected the rates of Squirrelpox infection recorded year on year from grey squirrel cadavers tested.

Future project development

- It is hoped that CRSP will be successful in winning a large grant which will secure the future of the project for three to five years.
- A series of local squirrel management workshops are planned across Devon and Cornwall to try and increase the number of local volunteers.
- Scientific work monitoring the project will continue with statistical analysis of trapping data and grey squirrel biometrics, Squirrelpox prevalence in trapped grey squirrels and a strategic red squirrel reintroduction plan.

References

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- II. Shuttleworth C (2012) *A Landscape Scale Grey Squirrel Control Strategy for Cornwall*. Unpublished report to the Cornwall Red Squirrel Project.



Figure 2. County of Cornwall

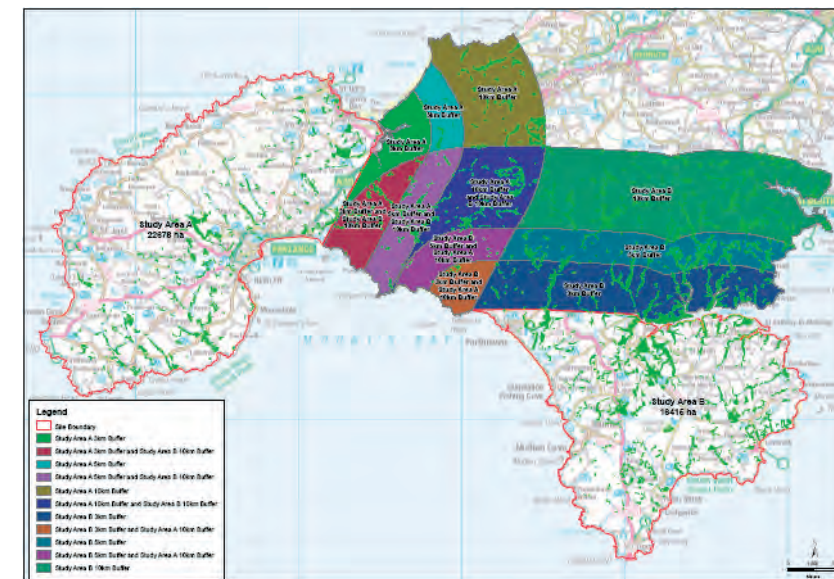


Figure 3. West Penwith (Area A) and The Lizard (Area B) with associated overlap areas in buffer zones. Woodland recorded on the Forestry Commission Woodland Inventory is shown in light green. © CRSP

Red Squirrels Northern England (RSNE)

Geographical area of conservation work

Northern England

Author and organisation contact details

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Key partners

Northumberland Wildlife Trust
Forestry Commission (FC)
Natural England (NE)
Red Squirrel Survival Trust (RSST)
Northern Red Squirrels

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	13
Paid Contractors (7-12 months)	7
Volunteers involved with Grey Squirrel Control	1282 regularly reporting grey squirrel management (mainly through local NRS groups).
Active Volunteers	–

Introduction

Our work covers the seven northern English counties in which red squirrels are still present. The project has been active since late 2011 and aims to stabilise red squirrel range on the English mainland, with a particular focus on the designated red squirrel “stronghold” forest areas. This activity builds on three decades of historic conservation activity involving local communities and many other partners. RSNE is a direct response to a series of government agency reviews of red squirrel conservation from 2008 to 11 which pointed to an urgent need for annual squirrel range monitoring, unified recording and compilation of grey squirrel management and focused conservation effort to protect vulnerable red squirrel populations. The RSNE team (11 staff and 13 contractors in 2015) uses a range of income sources to cover costs.

Project aims

Stabilisation of red squirrel range in northern England through:

- Landscape-scale grey squirrel management.
- Sound science.
- Partnership building.
- The project continues to work toward the delivery of a series of outcomes as referenced in sections below.



Figure 1. RSNE team with Prince Harry Feb 2015

Description of the project

Overall Outcome: Conservation of red squirrels follows a strategic direction, resourced effectively and inclusive of all organisations.

The project has now entered a fifth year of action and uses a range of income sources to support the team's work. These currently include Heritage Lottery Fund, agri-environment scheme contracts and regular donations from both individuals and businesses. The project will need to continue to diversify income streams to ensure long-term continuity.

Developing opportunities include:

- The new English agri-environment scheme is in the final stages of design and expected to open in summer 2015, with the first new agreements available from January 2016. With strong support from Forestry Commission and Natural England, we still hope the scheme will provide opportunities to secure funding for grey squirrel management in red squirrel areas. The predecessor scheme (English Woodland Grant Scheme) contributed 50% of our grey squirrel management-specific income.
- Applications to domestic charitable trusts continue with little success in recent months.

Outcome 1: *Increasing the scale of grey squirrel control across red squirrel range.*

Compiled summary data for northern English grey squirrel management can be seen below in the context of historic information held in our database.

Year	RSNE team ONLY			NON RSNE			TOTAL		
	Grey kills	Trap days	Shoot days	Grey kills	Trap days	Shoot days	Grey kills	Trap days	Shoot days
2011	426	4537	80	2075	8745	219	2501	13,282	299
2012	2994	49,798	629	7833	43,708	370	10,827	93,506	999
2013	2729	47,523	1375	6843	54,053	1964	9572	101,576	3339
2014	4063	44,712	1630	9755	63,197	2975	13818	107,909	4605

Geographical tetrads in which conservation effort was recorded.

Year	RSNE team	Everyone else	TOTAL
2011	48	81	129
2012	246	465	644
2013	240	577	735
2014	240	651	806

This data (contributed by over 1,000 individuals in 2014) demonstrates the scale of conservation work building across northern England. The geographical footprint of this work in 2014 is shown in Map 1.

Outcome 2: *Delivering effective landscape-scale monitoring and sponsoring novel research.*

At the time of writing, the 2015 range monitoring programme is underway across northern England, running as in previous years between March and May at 300 woodland and garden sites. 73% of these sites will be covered by community volunteers in 2015.

Occupancy modelling of our 2012 to 2014 monitoring data is now completed and a paper was submitted to the Journal of Applied Ecology in May, in anticipation of peer review and publication later in the year.

Deborah Brady, the PhD student at the University of Newcastle upon Tyne whose studies we are supporting, is in the middle of a fieldwork campaign close to Harwood Forest in Northumberland. Deborah has tagged and tracked red squirrels at a woodland site over several months and will continue monitoring through a period of grey squirrel culling.

Outcome 3: *Building partnership working and improving communication.*

Recent highlights in these work areas include:

A project visit from Prince Harry on February 25th 2015. In the company of Northumberland Wildlife Trust's patron Conrad Dickinson, we introduced the Prince to community volunteers in Haydon Bridge and Fourstones, giving them the chance to share their experiences of working locally to conserve red squirrels. The visit generated enormous media interest, with BBC and ITV

regional news coverage and extensive international, national and regional newspaper coverage.

Our segment on 'More Tales of Northumberland' was broadcast on March 30th and the BBC's the 'Pennine Way' was broadcast later.

Being awarded BBC Countryfile Magazine's Wildlife Success Story of the Year 2015.

Our Ranger team continue to work with Forestry Commission rangers to train community volunteers to trap and monitor squirrels on Forestry Commission land across northern England. The latest training was held at Hamsterley Forest on April 8th, bringing the total number of volunteers trained through this mechanism to 50 over the last two years.

The project e-newsletter, the Red Report, continues to be a really useful tool for engagement, with the January 2015 edition being sent to 2,425 people. The RSNE twitter (2,660 followers) and facebook (2,152 friends) continue to grow and red squirrel sights submitted to the website remain steady at 700 per annum.

We will be consulting project partners throughout 2015 to help us gauge the impact of the team's efforts to build resilient communication and partnership networks.

Success indicators of project

- Stablising red squirrel range in northern England. Monitoring and modelling data generated in the last three years shows definite progress toward this key objective. Several more years of continuous work will be required to demonstrate true achievement on this.

Major difficulties faced

- Establishing the project was a huge effort for all involved, including community volunteers monitoring or recording their own conservation work for the first time. This relied enormously (and still does) on the goodwill, trust and commitment of all of those involved.
- We still struggle to find enough time and the right tools to analyse our work so that we can keep learning about how to make more of a difference for red squirrels.

Major lessons learned

- Spending significant time and money (and encouraging others to do so) in recording conservation effort and independently monitoring impact has proved extremely powerful in demonstrating the scale and coherence of red squirrel conservation efforts on the English mainland.
- Red squirrels seem to have a rosy future wherever high quality, coherent conservation work is being delivered in northern England. This applies to a range of landscape types and methods of working and in the context of an almost universal presence of grey squirrels.
- We have no current evidence of grey squirrel range reduction or progress towards eradication in northern England.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

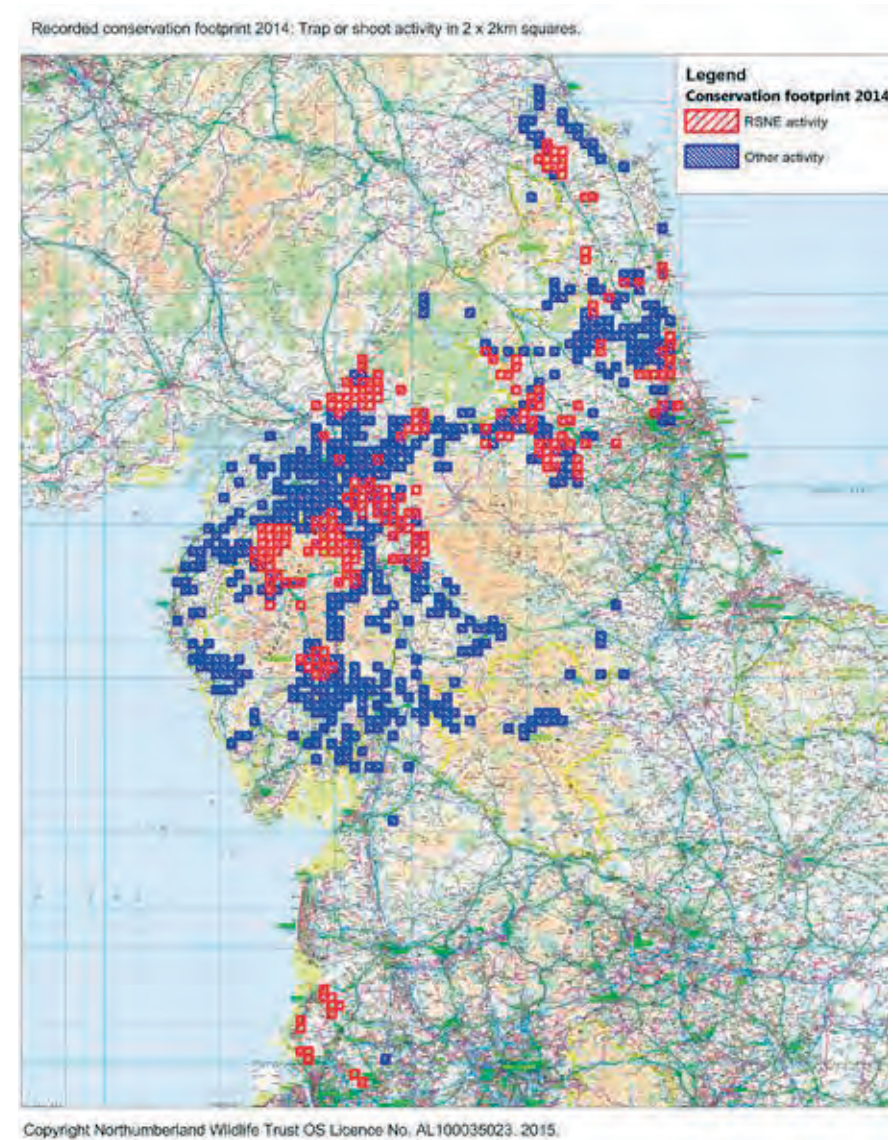
We have made excellent progress toward our project targets with enormous help from over 1,000 individuals and organisations. It will be several more years before the true ecological impact of these efforts becomes clear.

Future project development

We hope to diversify methods by which grey squirrel management can be recorded and shared. Recording and compilation is currently via spreadsheets. In time, online recording (including via smartphone) will be essential to reduce recording time for the 1,000+ individuals involved and reduce the size of some of the barriers that stop many more people sharing their conservation work.

References

- I. Parrott, D, Quy R, van Driel K, Lurz PWW, Rushton S, Gurnell J, Aebischer N, Reynolds J (2009) *Review of Red Squirrel Conservation Activity in Northern England*. Report to Natural England. Natural England Contract No. 08/09/N/004.
- II. Seward A, O'Hare S (2015) The importance of community support and participation for regional red squirrel conservation: a case study from northern England. pp In: *Red squirrels: Ecology, Conservation & Management in Europe*. (Eds) Shuttleworth CM, Lurz PWW, Hayward M. European Squirrel Initiative.



Map - The geographical footprint of the RSNE project

Red Squirrel Project

The Wildlife Trust for Lancashire, Manchester and North Merseyside

Geographical area of conservation work

North Merseyside and West Lancashire, England

Author and organisation contact details

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Key partners

Natural England
National Trust Formby
Sefton Council
Red Squirrels Northern England,
Liverpool University
Forestry Commission
Knowsley Safari Park and Estate
30 different local landowners

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	1
Volunteers involved with Grey Squirrel Control	3
Active Volunteers	50
Urban trap loan volunteers	6

Introduction

The project is based in the north Merseyside and west Lancashire red squirrel stronghold, a 400 hectare coastal coniferous woodland on the Sefton Coast surrounded by small, privately owned woodlands inland. The area is heavily populated with large urban areas in the north and south. There is a misconception that red squirrels are simply confined to the coastal woodlands. Red squirrels are present throughout the stronghold, throughout the urban areas to the north and south and in isolated woodlands as far inland as west Lancashire. In addition, there is a separate, smaller population centered on the Earl of Derby's estate at Knowsley Park to the east of Liverpool.

Very few grey squirrels have ever been sighted in the coastal pinewoods and grey squirrel control measures have been concentrated in the surrounding urban areas and woodlands. Trapping is the main method of grey squirrel control undertaken by two paid members of staff. A small number of volunteers undertake *ad hoc* shooting and run a trap loan scheme in the urban areas.

In 2008 almost 80% of the red squirrel population in the reserve woodlands was lost due to an outbreak of Squirrelpox virus. Since then, the population has recovered to almost pre-pox numbers and there have only been isolated incidences of pox. The Wildlife Trusts have been co-ordinating red squirrel conservation in the area since 1993. Volunteers assist with a bi-annual monitoring programme, grey squirrel control and local fundraising efforts. Recent funding has been secured mainly through landfill tax and England Woodland Grant Schemes.

Project aims

- Control grey squirrels to prevent colonization of the Sefton Coast reserve woodlands.
- Control grey squirrels throughout the stronghold to reduce the risk of further outbreaks of Squirrelpox and reduce the effects of competition, allowing the red squirrel population to increase in size and range.
- To raise awareness among landowners and the public and encourage them to become involved in red squirrel conservation and grey squirrel control.
- Undertake bi-annual surveys to monitor trends in both red and grey squirrel populations and ensure continuity in data already collected.

Description of the project

Until the early 1990's grey squirrels were rare in north west England. As sightings became more frequent, grey squirrel control was carried out in north Merseyside and west Lancashire by gamekeepers and volunteers in response to these sightings. In 2008 a Squirrelpox virus outbreak decimated the local population, reducing the coastal woodland population to approximately 100 to 150 red squirrels. Not all areas were affected and widespread fears that red squirrels would be wiped out from Merseyside and Lancashire proved to be unfounded. By 2010 the population had recovered to more than half of its previous level.

In response to the Squirrelpox outbreak, a Red Squirrel Field Officer was employed in 2009 to carry out targeted pro-active grey squirrel control. The north Merseyside and west Lancashire red squirrel project was formed and a three stage grey squirrel control strategy was implemented. This strategy involved an initial survey of all woodlands within the stronghold to identify priority areas for grey control. Control was then focused on these areas for 12 months and then the entire stronghold was resurveyed again to evaluate the success of the strategy. The main method of grey squirrel control is trapping with humane live-capture traps. This is undertaken by the Red Squirrel Field Officer and one part time contractor. Shooting is carried out by volunteers on sites where trapping is ineffective or not possible.



Figure 1. A volunteer dressed in the red squirrel suit at a fundraising event.



Figure 2. An orphaned red squirrel kitten was hand reared before being released in a soft release pen.

The strategy has so far proved successful as grey squirrel numbers appear to have significantly reduced in the priority areas. This coincides with new sightings of red squirrels in woodlands they were absent from at the beginning of the project. Also, recolonisation by grey squirrels of smaller, isolated woodlands has not occurred. There is also a separate reactive element to the strategy which deals with sightings of grey squirrels from members of the public in the towns and urban areas. A trap loan scheme allows members of the public who have grey squirrels visiting their gardens on a regular basis to loan and monitor a trap and then call a volunteer to dispatch any grey squirrels caught. This trap loan scheme is primarily co-ordinated by a core group of volunteers and is an area of the project that needs to be expanded.

A bi-annual monitoring programme has been an integral part of the project since 2002. Monitoring began in 1994 and was extended in 2002 to its current form. This is the activity that most volunteers are involved with; there are currently 30 volunteers undertaking visual transects and hair tube surveys. This monitoring programme follows trends in both red and grey squirrel populations and has been invaluable in tracking the decline and subsequent recovery of the red squirrel population following the squirrelpox outbreak in 2008. As red squirrel range within the stronghold increases, the monitoring programme needs to increase and new areas are currently being added.

Management of the Sefton Coast Woodlands was previously through a forest plan produced by Mersey Forest on behalf of the Forestry Commission and the Sefton Coast Partnership. Due to the landscape and the number of landowners involved, this approach ensured that work was co-ordinated to secure suitable habitat for red squirrels. This plan has now ended and although red squirrels are still considered in individual management plans, the harmonization between works has been lost.

Volunteer meetings are held three times a year under the name of Red Alert. This is an opportunity for all of the volunteers involved with grey control, monitoring, fundraising and administration to meet and discuss the project and any concerns or problems they have come across, as well as receive updates from Lancashire Wildlife Trust staff.

In 2006 a North of England Heritage Lottery Project 'Save Our Squirrels' delivered a three year education project. This increased community awareness and increased squirrel sightings due to a high profile. Since 2010 there has been limited community engagement and education carried out primarily by volunteers. In 2012, a successor to the Save Our Squirrels Project was launched; Red Squirrels Northern England (RSNE), funded by the BIFFA environmental fund. RSNE has supported work in north Merseyside and west Lancashire and we hope to continue this partnership into the future.

Success indicators of project

- Prevent further outbreaks of Squirrelpox virus in the stronghold red squirrel populations.
- Maintain the current red squirrel distribution through the Sefton Coast reserve area and maintain the landscape as grey squirrel free.
- Increase distribution of red squirrels throughout the stronghold and into the wider landscape.

Major difficulties faced

- Finding sources of funding and keeping continuity between funding pots. Landfill tax has been the main source of funding through SITA Environmental for three years but there is a lack of options in the area and a reluctance to fund the same project more than once.
- Access to woodlands has proved difficult in certain areas. This is either due to a lack of co-operation from the landowner or gamekeeper, or because the landowner is unknown. This has resulted in gaps in our knowledge of red and grey squirrel distribution or in control work being undermined by rapid re-colonisation of areas by grey squirrels.
- The first stage of the project took far longer than expected due to the large numbers of grey squirrels trapped in certain woodlands.
- Volunteer base has become stagnant and recruiting new volunteers is quite challenging, especially for grey squirrel control. People are mainly interested in surveying red squirrels rather than controlling grey squirrels. Volunteers who are interested in grey squirrel control would rather shoot than trap which is not only less effective, but not possible in many woodlands.

Major lessons learned

- Difficulty in recruiting new volunteers for grey control has highlighted the need to promote the project more and run more community events. There is a lack of understanding as to what red squirrel conservation involves.
- The same core group of volunteers undertake most of the work and the small number of grey squirrel control and trap loan volunteers makes the project vulnerable if any of them should leave.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

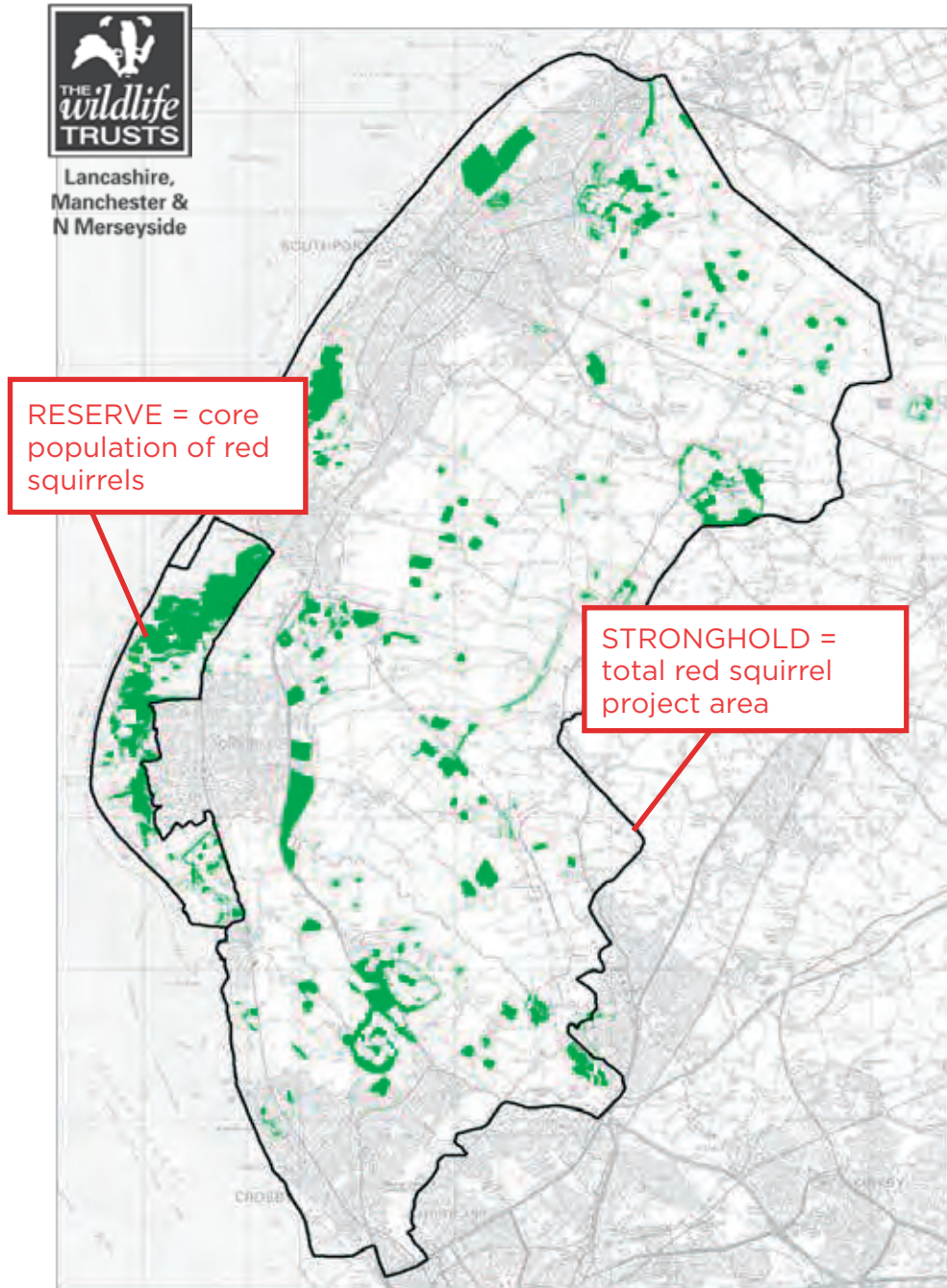
- There has been no outbreak of Squirrelpox in the stronghold woodlands for seven years.
- Red squirrel distribution has increased throughout the stronghold with red squirrels returning to woodlands they have been absent from for a number of years.
- It has been difficult to recruit new volunteers.

Future project development

- It is hoped that the north Merseyside and west Lancashire project will form a component in a national red squirrel conservation programme involving partners in England, Wales, Scotland and Northern Ireland.
- Increase volunteer support for trap loan through publicity and workshops.

References

1. Lurz P, Gurnell J, Rushton S (2007) *Assessing the risk of encroachment of grey squirrels into red squirrel forest reserves*. Report to Forestry Commission.



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Map - The Red Squirrel reserve and wider stronghold areas

Penrith & District Red Squirrel Project

Penrith & District Red Squirrel Group

Geographical area of conservation work

Eden District, Cumbria, England

Author and organisation contact details

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Key partners

Lake District National Park Authority
 National Trust
 Oglesby Charitable Trust
 Red Squirrels Northern England RSPB
 Nurture Lakeland
 Corporate and Individual Sponsors,
 Private and public landowners & members of public

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	4 rangers & 1 administrator (sourced by P&DRSG)
Volunteers involved with Grey Squirrel Control	Approx. 25
Active Volunteers	100 - 150
Other info here	2 other rangers (sourced by others)

Introduction

Penrith & District Red Squirrel Group (P&DRSG) are a long established red squirrel conservation group having been operational for approximately 30 years. Becoming constituted and committee led in 2006, reaching charitable status in 2008 and with tremendous development since, the troop of red squirrel rangers and volunteers involved with P&DRSG now function in a territory of approximately 600 square miles, some with interesting and demanding terrain!

Red squirrel distribution remains encouragingly high and stable in the project area. The landscape incorporates the expanses of the Northern Eden Valley, the Upper Eden Valley, Ullswater and the designated red squirrel reserves of Greystoke and Whinell Forests. The team of Red Squirrel Rangers protecting the indigenous red squirrels from the grey squirrels in these areas of Cumbria are funded from various sources. Penrith & District Red Squirrel Group also adjoins eight other red squirrel conservation groups in Cumbria.

Project aims

- Constantly promote the view that red squirrel conservation is predominantly about grey squirrel control.
- Maintain and increase the range of red squirrel distribution in the Eden District.



Figure 1. A Rangers view from Lowther Estates across to Haweswater

Description of the project

The Penrith & District Red Squirrel Project is ongoing and helps protect red squirrels primarily through grey squirrel control. The majority of grey control work is carried out by six Red Squirrel Ranger posts; four of which are on short term self-employed contracts funded by Penrith & District Red Squirrel Group and a further two are employed by RSNE and Center Parcs. The group also has an administrator to manage the membership scheme etc. on a short-term, one day per week self-employed contract and a strong network of volunteer grey controllers assisting the rangers.

Grey squirrels are controlled using the approved humane shooting and trapping techniques. Monitoring and thermal imaging cameras are used as additional resources, which have proved to be invaluable in increasing the efficiency of control work.

Approximately 150 volunteers are actively involved in the other activities of P&DRSG including providing educational talks, selling red squirrel themed merchandise, representing at shows and events, hosting charity collecting boxes, coordinating recording data etc. This support is vital to our strategy and helps to ensure delivery of conservation work to help protect our reds. The coordination of standardised squirrel data recorded by Penrith & District Red Squirrel Group over the last three years shows that red squirrel sightings in the Eden District remain encouragingly high and stable. This is directly due to the culling of 4,938 grey squirrels in the same time period. Sadly, 68 cases of symptoms associated with Squirrelepox virus disease were also noted by our Group in red squirrels.



Figure 2. Lowther Show 2014 (left to right) Jerry Moss, Jake Sargeant, Leon Fairless, Simon Cockayne and Christian Bensaïd

Success indicators of project

- Ensure accurate and efficient reporting/recording of squirrels to measure the work effort and effect on both red and grey squirrel abundance/distribution.

Major difficulties faced

- There are many routes of access for grey squirrel incursion into the P&DRSG's areas of operation and prevention of this is therefore limited.
- Whilst red squirrel conservation has support from many key partners, assistance from some Government departments and NGO's is absent.

Major lessons learned

- Some existing sources of funding to carry out vital work to save the red squirrels will reduce and some will cease in 2015 and subsequent years. This scenario will leave the population of resident red squirrels in a vulnerable position for the future.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

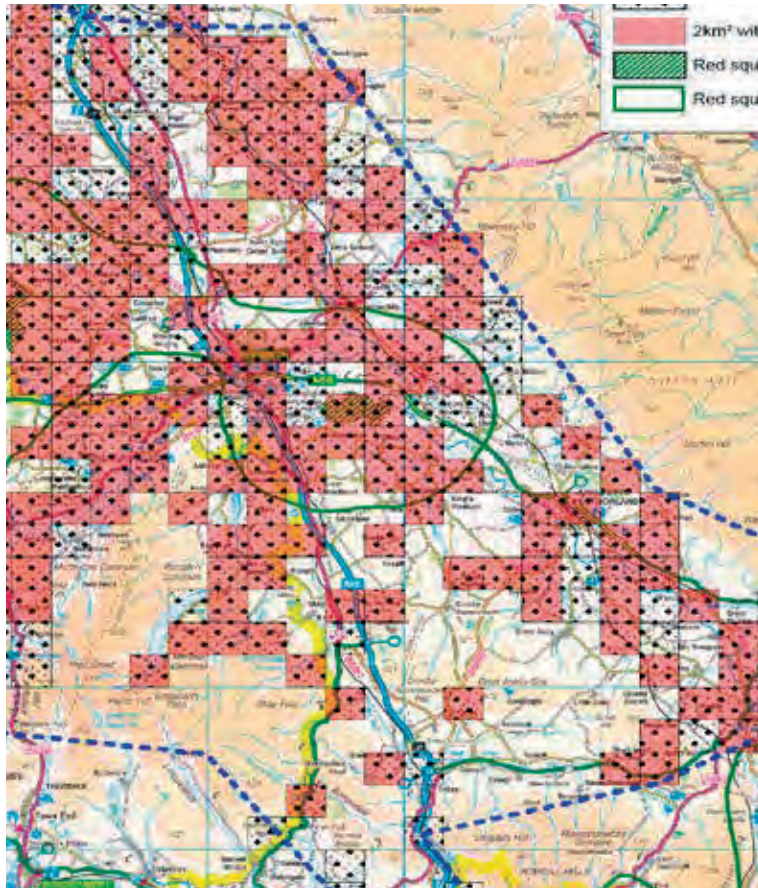
- The success of this project is mainly due to the deployment of red squirrel rangers and volunteers providing steadfast grey squirrel control work throughout each of five main locations within the project area.

Future project development

- Seek sustainable funding streams for the ranger programme to continue in its current form.

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Map – Project area

Red Squirrels in Poole Harbour

Dorset Wildlife Trust and Bournemouth University

Geographical area of conservation work

Poole Harbour, Dorset, UK.

Author and organisation contact details

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Key partners

National Trust
Dorset Wildlife Trust
Bournemouth University
(and previously NERC and CEH)

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	Monitoring Furzey 1 (< 1 week typically per year)
Paid Contractors (7-12 months)	N/A
Volunteers involved with Grey Squirrel Control	0
Active Volunteers	None on Furzey
Other info	A number of student projects have been carried out on Brownsea squirrels. Approx. 110 hectares of Rhododendron were eradicated over 50 years with squirrel conservation one of several targets of the management on Brownsea.

Introduction

Thought to be the largest natural harbour in Europe, Poole Harbour consists of extensive shallow water, intertidal saltmarsh and fringing reedbed habitats. The northern shoreline consists of almost continual urban development from the town of Poole round to the Harbour entrance at Sandbanks with a high grey squirrel population. The southern shoreline is mostly undeveloped with extensive heathland and pine woodland.

Poole Harbour retains a remnant population of red squirrel confined to Brownsea and Furzey Islands with animals occasionally making movements beyond these. Brownsea Island, the largest of the five main Islands in the Harbour is approximately 250 hectares in extent and the population, believed to average around 200 individuals, is considered native.

Poole Harbour is designated a Site of Special Scientific Interest (SSSI) a Special Protected Area (SPA) and a Ramsar site. The heathlands surrounding the harbour have been designated a Special Area of Conservation (SAC). Some areas of the harbour have also been declared local and national nature reserves. Much of the Harbour is also within Purbeck Heritage Coast and part of an Area of Outstanding Natural Beauty (AONB).

No formal project exists for red squirrels in Poole Harbour but considerable *ad hoc* work has been undertaken to ensure stability and continuity of the population over the last 50 years. This reflects the significance of the population in southern Britain and also the cultural value placed locally on their presence.

Project aims

- To maintain a viable population of red squirrels on Brownsea and Furzey islands.
- To protect the population from any incursion from grey squirrels and to protect it from Squirrelpox virus and any other diseases.
- To maximize public access to, and understanding of, red squirrels and issues affecting them.

Description of the project

Brownsea Island

In 1962 the National Trust acquired Brownsea Island, the largest of five main islands in Poole Harbour, Dorset. The Island retained a population of red squirrels when they were becoming extremely uncommon in the rest of the county. Following several decades of benign neglect by the previous owner, the woodlands on the Island contained a dominant understory of *Rhododendron ponticum*. In addition, a fire in 1934 burnt over 50% of the island, leaving an even aged woodland structure.

National Trust leased the northern portion (100 hectares) of the Island to Dorset Wildlife Trust (DWT) and the two organisations concentrated on *Rhododendron* clearance and woodland regeneration. Scots (*Pinus sylvestris*) and maritime pine (*P. pinaster*) dominate, but there are also areas of mixed broadleaves. The removal of *Rhododendron* on Brownsea is almost complete. On the DWT managed land, the clearance was completed in 2010, after 48 years, and is estimated to have recovered 56 football pitches of habitat and deployed approximately 40,000 volunteer days.

The difficulties of establishing woodland structure are compounded by the presence of a large, and highly mobile, population of introduced Sika deer (*Cervus nippon*). Efforts to control the deer population have borne little fruit so far, and on Brownsea, deer and rabbit-proof fencing has been deployed to encourage woodland re-growth.



Figure 1. Using modified mink traps to monitor squirrels on Brownsea Island by mark-release-recapture. The wooden box provides shelter for the animal until it is extracted

In 2010, NT and DWT entered into a 10-year Higher Level Stewardship (HLS) agreement with Natural England. This is primarily aimed at heathland restoration to 1950's levels, effectively doubling the open area of heath with a substantial reduction in woodland on those parts of the Island. There is a strong emphasis on management of the retained woodland to provide continued viable habitat for the red squirrels. A student project showed maritime pine cones to be the optimal prey type on the island due to a significantly higher net energetic gain per unit time (Gregory 2007).

In the early 1990s, a mark-recapture survey by the Institute of Terrestrial Ecology estimated between 100 to 150 squirrels on the island. Surveys of the red squirrel population since have been undertaken on a relatively informal basis (including distance sampling and drey counts by students). These indicate a population averaging 200 animals but with extensive fluctuations. Periodically, an as yet indeterminate disease infects a proportion (estimated as up to 20%) of animals. This manifests itself with swelling around the face, especially the ears, and sometimes affects limbs and genitals. A number of corpses have been collected over the years but results are inconclusive (Animal Plant Health Agency, Penrith) Observations of recognisable individuals suggests that the animals can survive for many months with the condition.

Furzey Island

The 13 hectare island lies approximately 400m from Brownsea and includes six hectares of mixed woodland with some areas dominated by *Pinus sylvestris*. The island has been used for oil extraction since the 1980s and the operators (BP, subsequently Perenco) have sponsored regular population monitoring of the squirrels by ITE, CEH and Bournemouth University. The squirrels on Furzey were introduced from Cannock chase, Staffordshire in 1977 (Kenward 1989). They have been monitored with annual mark re-capture estimates from 1989 to 2009 giving a median of 34 squirrels on the island, including juveniles. Single day trapping assessments (2010 to 2014) suggested that numbers caught were within this normal range (based on first-day catch records). This relatively high density of red squirrels may benefit from feed provided to the resident golden pheasants although many of the pine trees also provide a substantial seed crop, and radio-tracking suggested that the pheasant feeding stations were not centres of squirrel activity (Kenward et al. 1995). Fortunately, the disease signs noticed on Brownsea have not been recorded in the Furzey squirrels.

Grey Squirrels

To date, there has only been a single authenticated record of a grey squirrel on Brownsea (1976) but a grey squirrel contingency plan, based on one for the Isle of Wight has been produced. The plan was agreed by the island stakeholders:

National Trust, Dorset Wildlife Trust, John Lewis Partnership (Brownsea), Perenco (Furzey) and owners and managers of Green and Round Islands. Green Island is comparatively small and has a transient population of a few red squirrels but is identified as a potential refuge in the plan.

Success indicators of project

- Maintaining the Brownsea and Furzey island populations free from grey squirrels.
- Maintain the Brownsea and Furzey Island populations free from Squirrelpox virus.

Major difficulties faced

- The pre-requisite to better woodland management, *Rhododendron* removal, proved an attritional project that took nearly five decades to achieve on Brownsea.
- On Furzey, the requirement to maintain a visual screen for oil well pumping sites means that dense understory is required in areas. Some trees have also been cleared on the island, under the management plan, to create open areas for heathland restoration. Consequently, there is a lack of regenerating pine - which threatens the long-term persistence of the red squirrel population.

Major lessons learned

- Partnership working has proven very successful, drawing on considerable goodwill, and a high value placed on red squirrels locally.
- Brownsea Island has a natural carrying capacity, surveys since the 1990's suggest a population consistently around 200 individuals.
- Long-term management projects (i.e. *Rhododendron* eradication) are achievable with determination, especially in an Island context.
- Given the importance of these island populations, it will be essential to maintain adequate woodland habitat. Further discussion with relevant agencies will be required to ensure that conservation priorities for woodland and open habitats do not conflict to the detriment of the red squirrels on the islands.

Success of project

Success or Failure	
Highly Successful	
Successful	
Partially Successful	X
Failure	

Reason(s) for success/failure of the project

- The red squirrel population in Poole Harbour remains healthy and viable.
- Measures are in place to deal with the threat of grey squirrels through support of a network of partners.
- There is still no adequate understanding of the pox type disease that periodically afflicts a percentage of the Brownsea red squirrels.
- There is inadequate pine regeneration on Furzey Island.

Future project development

- It is planned to continue the grey squirrel contingency plan within the Harbour, through the Harbour Islands Safety Group, and to continue to use Brownsea to maximise public interest in red squirrels.
- Poole Harbour may prove to be a fertile study ground for further academic research.
- We hope to resume Furzey Island population monitoring with trapping and health checks every five years. We also hope to work with the leaseholders and agencies to ensure management for pine regeneration occurs.
- Hair samples from squirrels on Furzey and Brownsea have been taken to extract mtDNA in order to investigate the ancestry of the squirrels and the genetic diversity within the two populations. This work is ongoing and is being carried out by staff at Bournemouth University (Dr Wei-Jun Liang and colleagues).

References

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Solway Red Squirrel Conservation Project

Solway Red Squirrel Group (SRSG)

Geographical area of conservation work

Cumbria, England.

Author and organisation contact details

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Key partners

Individual members of public
Private landowners
Civil Parish Councils
Cumbria Wildlife Trust
Natural England
Red Squirrels Northern England
Solway AONB

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	20 - 38
Active Volunteers	3 - 6

The Solway Red Squirrel Group has a membership of 60+ individuals.

Introduction

In October 2012 it became apparent that the numbers of red squirrels were declining in the Solway area of North Cumbria. This led to the formation of a new volunteer based red squirrel conservation group - Solway Red Squirrel Group (SRSG) - and the beginnings of the Solway Red Squirrel Conservation Project which is ongoing. Project activities link up with the activities of other geographically adjacent red squirrel conservation groups.

Volunteer based work directly contributes towards the delivery of Biodiversity Action Plan targets for the red squirrel in England, creates new opportunities for learning, training and skills and adds value to existing red squirrel conservation projects.

The Solway area is strategically located to the north of the red squirrel forest reserves in the North Lakes (England) and to the south of red squirrel stronghold areas in Southern Scotland.

Key agencies including Northern Red Squirrels, Natural England, the Forestry Commission, The Wildlife Trusts, Red Squirrels Northern England and the Red Squirrel Survival Trust recognise that the Solway project area acts as a squirrel dispersal corridor and is a vital incursion route for grey squirrels travelling towards the reserves and strongholds. This is particularly crucial as until 2007, squirrelpox virus (SQPV) was absent from southern Scotland. The virus is now well established there and additional grey squirrels carrying the virus continue to spread northwards from England and the Solway area.

The Solway Red Squirrel Group has received invaluable financial support and other assistance from landowners, members of the public, local and national organisations and neighbouring red squirrel conservation groups.

Project aims

- To reduce or completely remove resident grey squirrel populations across the Solway area to allow red squirrels to thrive.
- To recruit new members.
- To help in the effective management of Squirrelpox virus by monitoring the prevalence of the virus.
- To ensure group sustainability into the future by engaging and securing ongoing support of landowners and potential future funders across the project area.

Description of the project

The Solway Red Squirrel Conservation Project aims to secure the Solway area as a haven for red squirrels with widely distributed populations found in native broadleaved woodlands. This is achieved through a co-ordinated grey squirrel control programme.

Volunteer activities focus on restricting grey squirrel dispersal, removing established source populations and maintaining areas free from grey squirrels using established techniques. These encompass the use of live capture traps and shooting, both of which follow strict protocols.

Government funding for grey control in England is primarily focussed upon red squirrel reserve areas and it should therefore be emphasised that community funding is crucial to cover work outside of these reserves such as the Solway area. By harnessing the support and enthusiasm of local communities and landowners they not only become increasingly involved with the Solway Red Squirrel Conservation Project, but it allows us to deliver ongoing direct and practical conservation in key woodlands across the Solway area.

Success indicators within the project

- Completion of standardised squirrel control and sighting record forms to provide base line data on the distribution of both squirrel species.
- Repeated control over time to indicate levels of success in removal of grey squirrels.



Figure 1. Solway Red Squirrel Group promotional brand image (© Sarah McNeil).

- Host ‘engaging local communities’ awareness meetings to encourage people to get involved in the project.
- Providing talks to advance the education of the public in the subject of red squirrel conservation.
- Host open group meetings on a quarterly basis to bring organisations and/or communities together to co-operate in tackling any problems and promoting new ideas.

Major difficulties faced

- The major difficulty faced is the continued persistence of grey squirrels in the Solway area.
- Residual grey squirrel populations reproduce and disperse which leads to them displacing local red squirrel populations and spreading Squirrelpox; elevating the risk of extinction for our genetically unique Cumbrian red squirrels.

Major lessons learned

- More ‘boots on the ground’ working consistently at grey squirrel control is the key to the success of any red squirrel conservation project.

Success of project

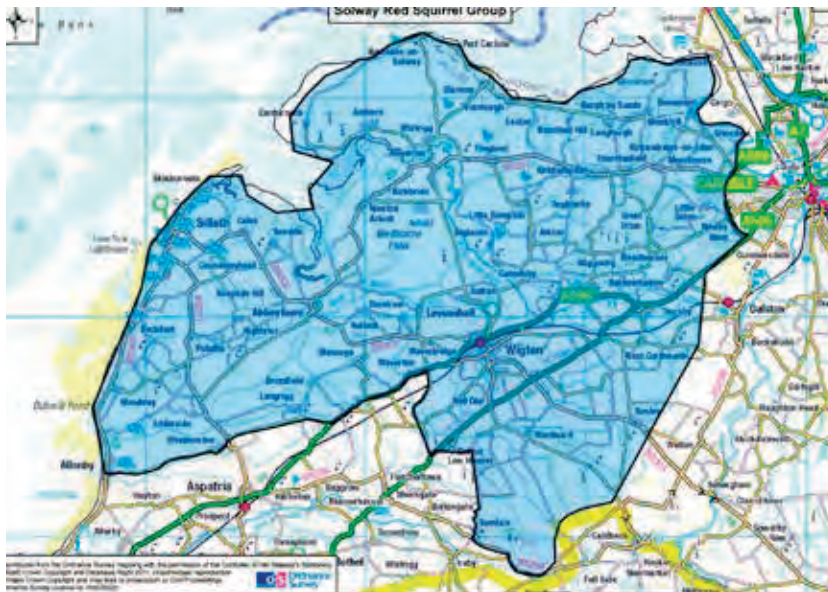
Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

- Remaining ever-vigilant and keeping focused allows rapid removal of grey squirrels infiltrating the area and this has been key to maintaining the success of the Solway Red Squirrel Conservation Project.
- The scale of the Solway Red Squirrel Conservation Project has grown significantly with activities increasing every year. We have successfully removed over 1,500 grey squirrels in the period October 2012 to March 2015. This activity has assisted in the retention of red squirrels in the Solway area.
- Solway Red Squirrel Group regularly features in local newsletters and magazines with appeals for donations, sightings reports and for others to get involved, all of which are essential in developing our project. The main photograph used consistently on all our promotional material (Figure 1) is increasingly being recognised as our Logo which plays a vital role in building our group image.

Future project development

- We are further developing our fund raising strategy to enable continued grey squirrel control by utilising grant funding when available and by increasing the volunteer support network. This will ensure a sustainable system of red squirrel conservation activities across the area for red squirrels to continue to thrive, in the absence of grey squirrels.



Map - Solway project area

Red Squirrels on the Wallington Estate

National Trust, Wallington Hall, Northumberland

Geographical area of conservation work

Wallington Hall grounds and estate, Cambo, Northumberland.

Author and organisation contact details

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Key partners

Red Squirrels Northern England

Resources

Typical Resource available	Number of people
Paid Full time employee	1
Volunteers involved with Grey Squirrel Control	2

Introduction

The 30 square mile Wallington Hall estate is made up of farmland with numerous woodlands of varying size, featuring conifer plantations and mixed woodlands with a wide variety of maturity. Some of the woods have high levels of public access, particularly near Wallington Hall itself, whilst others are much more remote. The northern boundary of the estate features Harwood Forest (Forestry Commission) which is a red squirrel stronghold. However, the areas to the east and northeast of the estate boundary have large numbers of grey squirrels, and so Wallington finds itself on something of a “front line”. There are pockets of red squirrels to the south, and also some grey squirrels to the southwest.

Following the arrival of grey squirrels onto the estate the red squirrel population declined rapidly, and eventually the species became extinct from most of the woodlands, leaving just a remnant population. Grey squirrels increased in number near the buffer zone of the Harwood red squirrel stronghold.

Funding from an England Woodland Grant Scheme (EWGS) grant allowed Red Squirrels Northern England (RSNE) to employ a ranger to undertake grey squirrel control in June and August 2012. Large numbers of grey squirrels were removed in the first month, but woods were recolonised within a month. The decision was therefore made by Wallington to employ a ranger on a part time basis to continue control year round. This strategy resulted in an increase in red squirrel numbers within one year, well beyond expectations, and was thus continued.

Project aims

- To control grey squirrel populations on the Wallington estate and prevent the species from recolonising from external land by liaising with adjacent landowners and offering assistance/advice where required or possible.
- To control grey squirrels in order to increase the population of red squirrels on the entire estate (30 square miles) and lower the risk of Squirrelpox virus infection.
- To raise public awareness and introduce visitors to red squirrels, many of whom are seeing red squirrels for the first time.
- To build towards resourcing the complete eradication of grey squirrels from the Wallington estate, which shares a boundary with the Harwood forest red squirrel stronghold.

Description of the project

The Wallington project is aimed at rebuilding the red squirrel population. Local grey squirrel populations are controlled through the use of live capture traps and with shooting at target feeders or an *ad hoc* basis. Control is undertaken where and when appropriate, according to the time of year, grey squirrel feeding/behaviour patterns and visitor use of the various parts of the estate.

Because of the size of the estate and remoteness of some of the woodlands, grey squirrels arrived undetected and introduced Squirrelpox virus to the resident red squirrels, resulting in their almost complete loss. Initially, the control work was undertaken by RSNE for two months spread over a three month period. However, it was identified by the estate that continuous control is required to prevent the return of grey squirrels. The Woodland Improvement Grant was therefore utilised directly by the National Trust, (which was available due to Wallington being partially within the “buffer zone” of the Harwood red squirrel stronghold) to employ a grey squirrel control contractor on a part time basis. This was subsequently also found to be insufficient given the size of the estate, and also an especially successful breeding year for grey squirrels outside the estate’s boundaries, and so other sources of finance were accessed to create a full time ranger post.

The strategy has been to start in the woods immediately around Wallington Hall where a small remnant population of red squirrels (possibly as low as two to four individuals) was found. Once an envelope of woodland around this population had been cleared of grey squirrels, control was then pushed outwards towards the Harwood Forest red squirrel stronghold with the intention of creating a “corridor” to address the genetic isolation of surviving pockets of red squirrels and creating a safe environment for those red squirrels expanding from the large population in Harwood forest.



Figure 1. Red squirrel siblings at West Wood Wallington Hall. The year before this photograph was taken the area was completely dominated by grey squirrels.

Photo: Norman Scott.

From this position, the ‘corridor’ is to be widened in time until all woods on the estate have been cleared of grey squirrels. The intention thereafter is to monitor continuously for the return of grey squirrels using feeders and hair pads in every wood on the estate, combined with periodic use of trail cameras. If grey squirrels are detected appropriate action will be taken quickly and whenever possible within 24 hours.

A year round feeding programme for red squirrels has provided quick population expansion into the woodlands cleared of grey squirrels by limiting the usual cause of first year mortality in young red squirrels. This proved to be very effective, and appears to be directly responsible for a rapid increase in red squirrels in years one and two.

The project also aims to increase visitor enjoyment and knowledge of red squirrels. Guided walks and displays are periodically provided, and a regularly updated explanatory book about progress is maintained in the visitors’ wildlife hide. A sign in the hide tells visitors that grey squirrel control is carried out and gives a telephone number for visitors to report sightings of grey squirrels. This has proved to be a very useful tool and in effect increases the number of observers by an order of magnitude. It has also been interesting to learn that visitors will report grey squirrels without hesitation.

Success indicators within the project

- Substantial lowering of observed numbers of grey squirrels on the estate.
- Increase the population of red squirrels on the estate to return to previous natural levels.
- Raise public awareness and enjoyment of red squirrels by providing information and places to view them.
- Work with and encourage surrounding landowners to control grey squirrels so that red squirrels can expand and re-establish even further than our estate boundary.

Major difficulties faced

- Grey squirrels rapidly recolonise woodlands previously cleared if control is stopped.
- Surrounding areas – grey squirrels are constantly at the perimeter of the estate.

- Monies had to be found to enable the project to provide constant control cover by a ranger as sporadic and part time control proved insufficient.

Major lessons learned

- Periodic, sporadic or one-off grey squirrel control does not protect red squirrel populations, and in the presence of grey squirrels on adjacent land, only constant control is sufficient.
- A proper thought out strategy specific to the site or area is essential.
- Public support by providing sightings is hugely valuable and a large section of the public are happy to do so even when fully aware that it is to inform grey squirrel control.
- Red squirrel populations increased with feeding, and building populations faster gives resilience in case of Squirrelpox virus outbreak.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

- Grey squirrel control has cleared complete woodlands, and supplemented by feeding, these woodlands have been recolonised by red squirrels.
- Control only needs to stop for as little as one month for grey squirrels to re-enter and risk infecting red squirrels with Squirrelpox virus.
- Public reporting – when the reasons for grey squirrel control are explained properly, public reporting becomes a powerful tool.
- We would have said the project is highly successful given the increase in red squirrel numbers, but there was a setback last autumn following a grey

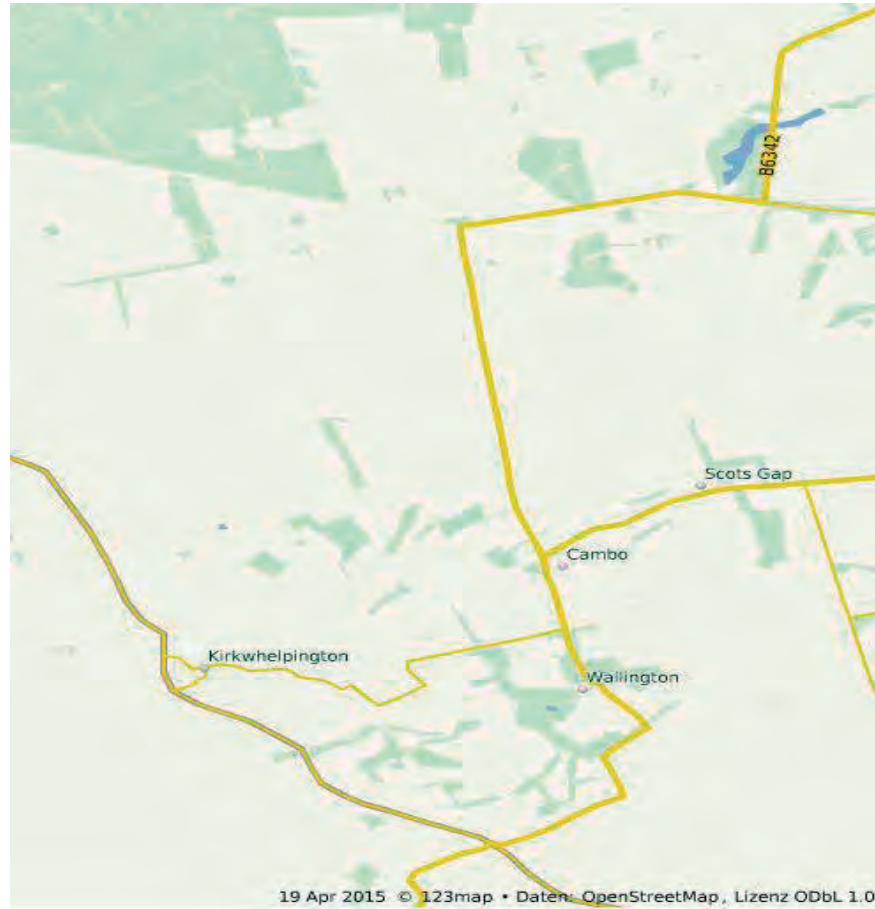
squirrel incursion which introduced Squirrelpox virus. This demonstrated the need for full time control given the size of the estate. On the plus side, the policy of year round feeding to improve young red squirrel survival meant the population was large enough to leave a substantial remnant from which to rebuild and constant grey squirrel control is now in place with incursions acted upon immediately. By late 2016 we confidently expect red squirrel population numbers to be at pre-grey squirrel levels in parts of the estate.

Future project development

- A full time ranger being in place means a very quick response from now on to grey squirrel incursions.
- Involvement of surrounding landowners to be encouraged and assisted.

References

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Map – Wallington Hall project area.

Red Squirrel Conservation in West Cumbria

West Lakes Squirrel Initiative (WLSI)

Geographical area of conservation work

West Cumbria, England. Primarily the Copeland and Allerdale boroughs.

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Key partners

Certain of our supporters have asked for discretion and no publicity in our dealings with them and so we have decided not to name any supporters/partners. We can however confirm that several large companies, trusts and private landowners are using our services to carry out grey squirrel control and red squirrel monitoring over a total area of woodland in excess of 10,000 acres in the west of Cumbria.

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	14
Active Volunteers	14

Introduction

Red squirrels have always been part of the fauna of the Lake District and when the two current co-ordinators of West Lakes Squirrel Initiative (WLSI) were first alerted to the presence of grey squirrels in our local area, and the potential for them to eradicate the native red squirrels, we decided to join together with other local people to do something about it.

With a steadily rising number of volunteers, we have expanded our work from the Workington area down the west coast as far as Bootle and inland approximately 5 miles from the coast. The area we cover ranges from parkland to managed woodland and from uncultivated fell side to private gardens.

There is still a good population of red squirrels in most of the areas we visit but we are not in a designated 'stronghold' even though on most days we can see 10+ red squirrels visiting our feeders in a small area. The grey squirrels have wiped out red squirrels in some areas and will, if unchecked, continue to spread through what is now red squirrel territory due to the abundance of food and suitable remote areas of woodland in which to nest and breed.

In common with news reported from other groups, in areas where we have been removing grey squirrels for an extended period, we have seen increased red squirrel numbers and even the return of red squirrels to woods where they had previously been driven out by the tide of grey squirrels.

Project aims

- To manage conservation programmes to help maintain the health and welfare of indigenous red squirrels for the benefit of future generations, by providing supplementary feeding stations for red squirrels and the culling of invasive grey squirrels.
- To co-ordinate experienced pest controllers to provide a grey squirrel trapping and culling service to existing local groups within the Northern Red Squirrels and Red Squirrels Northern England organisations, private landowners and public bodies as required.
- To monitor the population of native red squirrels through collection of red squirrel sightings data and grey squirrel culling data and to pass on these data through the appropriate channels to make the information available for the public benefit through study and education.
- To give presentations to raise awareness among landowners, public bodies and other organisations and thus to gain support for the conservation and protection of red squirrels.

Description of the project

We have received some funding in the past from parish councils, the Lake District National Park Authority, Red Squirrels Northern England, charitable gifts from other organizations such as the Woman's Institute (WI) and private individuals. Some organisations currently reimburse WLSI for the cost of squirrel bait used on their land, but the majority of funding comes from collection tins in various places, stalls at country fairs, raffles and auctions and any shortfall is filled by the two co-ordinators themselves. We do not pay expenses to any volunteers but we do provide feeders, food for the feeders, cameras and traps as required and insurance cover.

Our approach is to firstly gain permission from the landowner to investigate squirrel populations through the use of feeder boxes and cameras and then, if grey squirrels are present, to remove the grey squirrels by shooting with air rifles (Figure 1). Prior to shooting commencing, we produce a full written risk assessment and engage in stakeholder discussions with the landowner to ensure that everyone is satisfied with the way the work is to be undertaken and that any risks are mitigated.



Figure 1. Feeder boxes draw in grey squirrels which can then be shot. This avoids the risk of indiscriminate capture of red squirrels which exists if live trapping operations are undertaken.

We use this method for two main reasons:

- I. Trapping in areas where red squirrels are present presents a hazard to the red squirrels, particularly nursing females during the breeding season. Selectively shooting grey squirrels, even in areas where the red squirrels are much more numerous than grey squirrels, does not give rise to this hazard. Furthermore, the Wildlife and Countryside Act prohibits any action which prevents a red squirrel gaining access to a place of shelter and we believe that holding reds in traps for several hours is, in effect, preventing them gaining access to their drey.
- II. Feeder boxes can be filled when convenient, left for several days and then checked. There is less manpower involved during the monitoring stage than using traps. No harm can come to any red squirrel from using a feeder, whereas it may become victim to a predator or may be unable to tend dependent young when held in a trap. When the grey squirrels (and red squirrels) are regularly using a feeder box, we can assign a volunteer to visit the area on one or more occasions to remove the grey squirrels which are observed. It is not unusual to remove half a dozen grey squirrels from a single feeder in a couple of hours. This process is repeated until monitoring shows that no further grey squirrels are visiting.
- III. The organisation is occasionally invited to speak to groups to explain what we are doing and why. We have found that almost everyone who we speak to is greatly in favour of the work being undertaken and many offer their help and support.

Success indicators within the project

- Our success criteria is to see increasing numbers of red squirrels and decreasing numbers of grey squirrels throughout the west of Cumbria.

Major difficulties faced

Forestry Commission restrictions on our methods

- The Forestry Commission's long standing 'Trapping Only' policy for grey squirrel control in their (often very remote) woodlands would require a volunteer to attend traps several times a day to release any trapped red squirrels. Trapping only, if this continues to be the only method allowed by the FC, would be a very inefficient use of volunteer time and, where the traps are regularly being triggered by red squirrels, will not be an effective control method for small numbers of grey squirrels in a predominantly red squirrel area.

- Because we are a small group and have very limited personnel and resources, we are unable to assign the manpower required to monitor traps and carry out grey control in the extensive Forestry Commission woodlands on a meaningful scale.

Funding and Grant applications

- Funding organisations do not understand the urgency and importance of grey squirrel removal from red squirrel areas, especially those based in the parts of England with no red squirrels.
- Funding organisations often seem more concerned about public perception and adverse publicity for supporting a cull of grey squirrels than they are about conserving an indigenous and endangered mammal.
- Although we would be able to expand our operations as we have sufficient volunteers (and potential new volunteers waiting to join) and landowner permission for large areas of woodland with both grey and red squirrels present, the lack of funds means that we are more likely to shrink in both size of group and area being covered over the next 6 to 12 months.
- We currently have 14 active volunteers who, between them, average around 50 hours of grey squirrel control and red squirrel monitoring at up to 60 locations each week. This resulted in almost 500 grey squirrel being culled and over 1,200 red squirrel sightings in 2014. We think that these results should be compared to the results and cost of a paid contractor while bearing in mind that our group is in danger of folding due to a shortage of funding.

Grey squirrel reserves

- We need to have access to 'joined up areas' of woodland in order to achieve a 'grey squirrel free' zone where red squirrels can thrive and expand into vacant territory without the threats posed by grey squirrels.
- A small but significant number of landowners do not understand that if they do not choose to help the red squirrels they are, in effect, setting up a reserve for the grey squirrels.

Identification of Landowners

- In several areas we have had reports of squirrel activity but have had great difficulty in tracing the landowner, and in some cases have failed to establish ownership completely, which has made it either very time consuming or impossible to gain permission for monitoring and/or control work.

Major lessons learned

- Shooting from feeders has very little effect on the activities and wellbeing of local red squirrels whereas trapping in areas where both red and grey squirrels are present will always result in trapped red squirrels (and associated risks of confinement) at some point.

Success of project

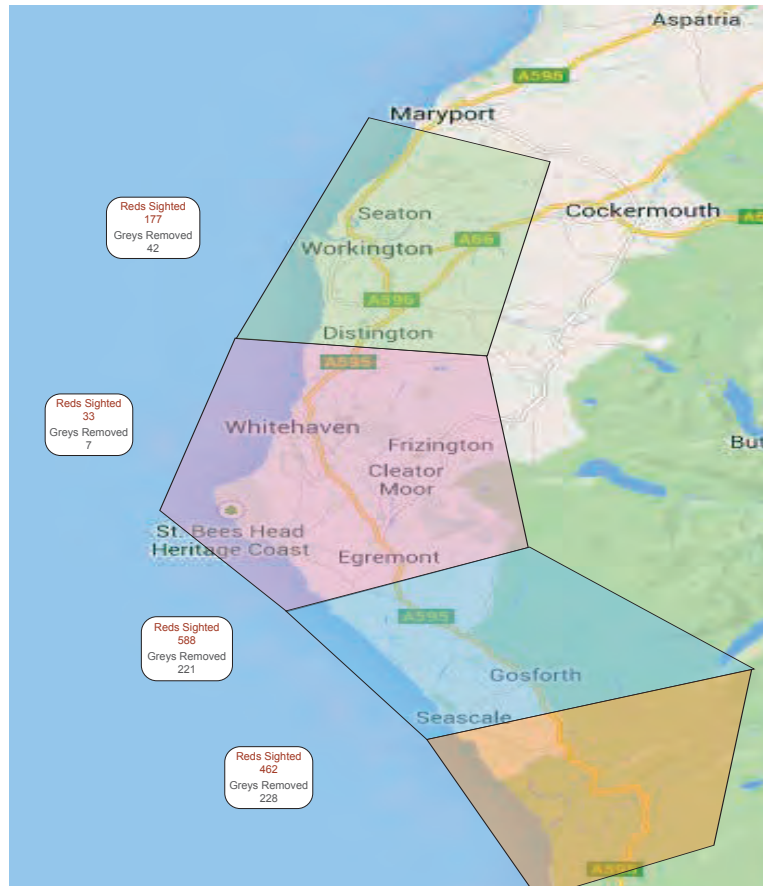
Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

- We are significantly reducing the numbers of grey squirrels in our area and in several places this has resulted in a repopulation or increased abundance of red squirrels.
- Local residents understand the issues and are almost 100% behind our work.
- We would have hoped that funding would have been available to continue, or even to expand this successful venture, but it appears that most available funding is directed towards the designated red squirrel stronghold forests in England.

Future project development

- The project is likely to reduce levels of activity unless a source of funding can be found.



Map - West Lakes Squirrel Initiative (WLSI) project area and summary of results 2014.

Red Squirrel Conservation Work in the Yorkshire Dales National Park

Yorkshire Dales National Park Authority

Geographical area of conservation work

Yorkshire Dales National Park

Author and organisation contact details

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Key partners

Landowners and land managers including Cam Forest Trust and the Kemp family
Forestry Commission
Wensleydale Red Squirrel Group
Garsdale Red Squirrel Group
Red Squirrels Northern England National Trust

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	We do not have resources for undertaking grey squirrel control
Active Volunteers	108 volunteer days per year total across the YDNP (46 days hair tube work, 52 at view-point and 10 practical conservation work)
Other info here	A key objective is to raise awareness of red squirrel conservation amongst residents and visitors to the Yorkshire Dales National Park, with the Dales Countryside Museum in Hawes acting as a focal point for information and interpretation.

Introduction

Red squirrels have been present in the three Cumbrian parishes within the Yorkshire Dales National Park for many years, but it was not until the late 1990s that there were any records of red squirrels in the Yorkshire part of the national park. These initial sightings were from conifer woodlands planted in and around the 1970s that had recently reached cone-bearing age. Since the early 2000s, survey work coordinated by the Yorkshire Dales National Park Authority (YDNPA) has shown a spread eastwards to colonise other conifer woodlands in the Hawes area.

The Garsdale and Mallerstang and Widdale Red Squirrel Reserves were included in the original designations by the Forestry Commission. Following submission of a proposal from the YDNPA, Greenfield plantation (in Upper Wharfedale) was added as a reserve in 2008 after it was confirmed that red squirrels had colonised this woodland, presumably from populations present in the Hawes area.

The narrow linear topography of the Dales within the national park has enabled targeted control of grey squirrels to be undertaken by landowners and managers, helping to deliver the objectives of the reserve strategy.

The survey and monitoring work undertaken within the area is coordinated by the YDNPA using 'Dales Volunteers', who operate alongside other local fieldworkers. Grey squirrel control comprises of a mix of paid staff employed by forest managers, funded by FC grants, and local volunteers working under the auspices of the local red squirrel groups.

Project aims

The key objectives are to:

- Deliver the Forestry Commission red squirrel reserve strategy by maintaining red squirrel populations within designated core areas.
- To prevent incursion of grey squirrels into these red squirrel refuge areas.
- To raise awareness of the importance of red squirrels and their conservation.
- To promote, where appropriate, opportunities for the public to see red squirrels.

Description of the project

Given the relatively recent recolonisation of red squirrels within this part of Yorkshire, one of the main objectives has been to determine their distribution within the area in order to target conservation advice. Much of this survey work has been coordinated and implemented by the YDNPA using national park 'Dales Volunteers', and more recently, working alongside newly formed local red squirrel groups in Wensleydale and Garsdale.

This information has been used to provide conservation advice that has resulted in positive management being implemented at a number of sites in the key areas for red squirrels. Whenever the Authority is consulted on the management of woodlands (conifer or broadleaved) that are within the red squirrel refuges or buffer area, our advice would be to manage the woodlands in order to favour red squirrels and deter grey squirrels. Consultation has, in the past, primarily come from Natural England and the Forestry Commission. Many new native woodlands have been created within the red squirrel buffer areas and these have all been designed to benefit red squirrels (along with other conservation interests) by providing an appropriate and diverse food source. These new woodlands are designed so that grey squirrels are not provided with a food source. For example, we would not look to plant large-seeded broadleaves in, or close to, the core red squirrel areas, and would instead look to include some appropriate conifer planting.



Figure 1. YDNPA staff being helped by volunteers carrying out maintenance work at the Snaizeholme red squirrel viewpoint



Figure 2. Waymarking arrow for the red squirrel trail at Snaizeholme.

The Authority has also worked with a local landowner to provide a free public red squirrel viewpoint at Snaizeholme, near Hawes. This gives opportunities for members of the public to use the public rights of way network to see red squirrels in their natural habitat. We have developed a local community minibus public transport link to the site and provide a leaflet to increase awareness of red squirrel conservation. We also run educational visits to the site that sometimes incorporates practical conservation work, which runs alongside the standard 'walk and talk'. These visits have attracted a wide range of groups from the local area and further afield, including local schools, underrepresented ethnic groups, and service personnel from the Help For Heroes recovery centre at Catterick.

We have also worked closely with the Wensleydale Red Squirrel Group to provide live footage of a red squirrel feeder at Hawes National Park Centre, complimented with pre-recorded footage, so there is always something for the public to see on the large screen. The aim of the camera is to encourage visitors to get out into the countryside and visit the viewpoint in Snaizeholme and see the red squirrels.

The Authority also provides a local link between visitors, accommodation providers and the local community for red squirrel conservation.

Success indicators of project

- Maintaining the current red squirrel range within the YDNP.
- Continuing to work with local landowners to allow members of the public the opportunity to see red squirrels.

Major difficulties faced

- Trying to bring together different parties with differing opinions and objectives.
- Managing expectations of what is achievable.
- The relatively small size of conifer plantations within the YDNP, along with other physical constraints of woodland management (such as wind blow), reduce the long-term management options.
- Funding for grey squirrel control.

Major lessons learned

- Maintaining the long-term availability of food within commercial conifer plantations requires considerable planning, along with the willingness by the owner to look at different management options. In particular, removing significant amounts of coning conifer crop before new trees reach coning stage decreases food availability, and this may require some commercial flexibility.
- It is extremely positive that red squirrel conservation has significant support within the wider community.
- Using this support and goodwill can benefit landowners who are willing to undertake red squirrel conservation.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

The project has:

- Maintained the distribution of red squirrels within the YDNP.
- Continued to raise awareness of red squirrel conservation with landowners, residents and visitors to the Yorkshire Dales National Park.

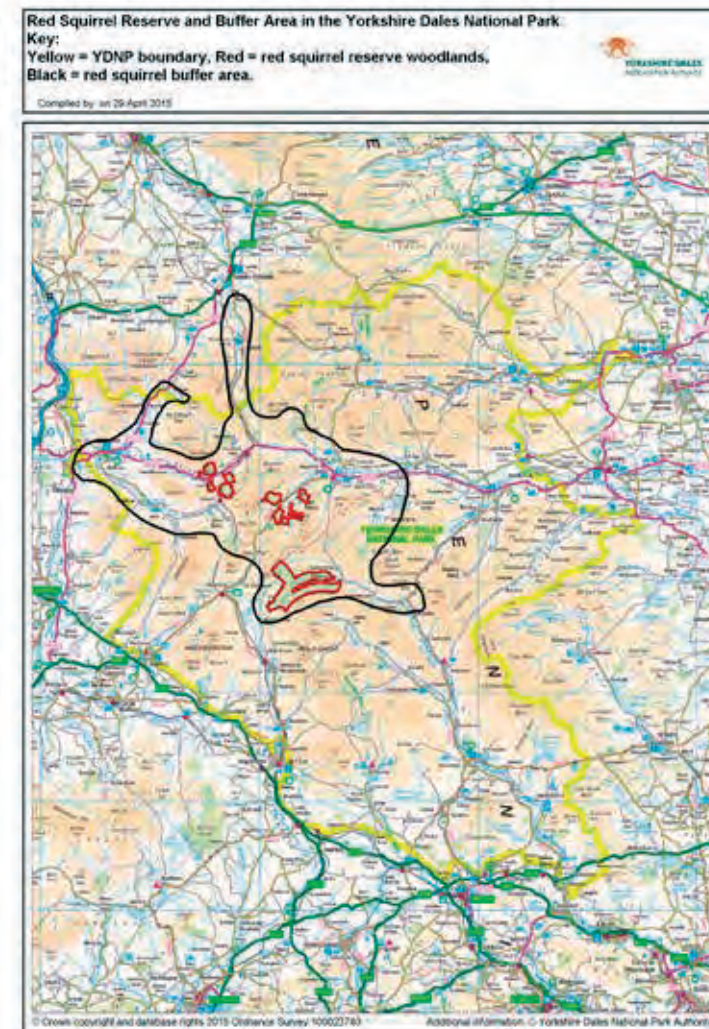
Future project development

- Maintain existing survey and monitoring work
- Continue to raise awareness of red squirrel conservation

- Continue to develop links with local red squirrel groups
- Assess opportunities for incorporating red squirrel management into new Countryside Stewardship Schemes.

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Map - YDNP boundary and location of red squirrel refuge and buffer areas.

Island Haven

Red Squirrels Trust Wales

Geographical area of conservation work

Isle of Anglesey, Wales.

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Key partners

Animal and Plant Health Agency
Bangor University
National Trust Wales
Natural Resources Wales
Zoological Society of Wales

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	1
Paid Contractors (7-12 months)	1
Volunteers involved with Grey Squirrel Control	10
Active Volunteers	200+

Introduction

Grey squirrels crossed the Menai Straits sea channel from mainland Wales and colonised the 720km² island of Anglesey in the mid 1960s. By 1998 the species had replaced the red squirrel almost completely and only 40 red squirrels remained. All of these animals were found with the spruce and pine dominated Mynydd Llwydiarth forest plantation near Red Wharf Bay. A grey squirrel control programme was subsequently initiated in 1998 and this facilitated the natural expansion of the remnant red squirrel population and allowed additional reintroductions to be undertaken elsewhere on Anglesey. The most notable releases were of captive bred red squirrels first into Newborough pine forest (2004), then into broadleaved woodland near Beaumaris (2006) and finally within the National Trust Plas Newydd estate (2008).

The Heritage Lottery funded 'Island Haven' project ran from 2011 to 2015. This had an emphasis upon creating learning and participation opportunities for people. Local people were encouraged to become involved in red squirrel conservation, whilst grey squirrel control was undertaken by professional contractors with the aim of completely eradicating grey squirrels from the island.

Project aims

- To eradicate the last remaining grey squirrels from the island of Anglesey.
- To seamlessly create learning opportunities by facilitating the return of red squirrels across Anglesey and back into the full spectrum of habitats in which they should be found in the absence of grey squirrels.
- To establish an island wide network of red squirrel supplemental feeding stations monitored by local people, create three red squirrel forest trails and establish three live-feed red squirrel online webcams.
- To conduct research to better understand the potentially pathogenic viral infections in red squirrel populations on Anglesey.

Description of the project

A fundamental project objective was to create opportunities for people to be able to see and learn about wild red squirrels on Anglesey. It built upon earlier work (1998 to 2010) which had restored squirrels to parkland and gardens. The Trust had also previously developed protocols for red squirrel reintroduction and red squirrels were reintroduced to two woodlands from 2011 to 2013. This included the Llangefni Dingle a narrow wooded valley in the town which is the administrative centre for the island.

Local volunteers managed the releases and monitored the squirrels once they were in the wild. After animals began to visit nearby gardens, the project was able to supply wooden feeding boxes to home owners. These proved to be very popular and the supplemental feeding is now well established. The creation of dedicated red squirrel viewing areas and red squirrel forest walks offers the chance for those not lucky enough to have red squirrels visiting their gardens to be able to see animals in the wild.

The project employed several contractors to systematically trap across the island in order to eradicate the last remaining grey squirrels that were present. The intensity and systematic approach of this work was such that it was beyond the capacity of local volunteers and thus contract staff were essential.

Live trapping provided useful data on the distribution of red squirrels. Both contract staff and volunteers raised awareness of red squirrel conservation and were a key interface with the wider local community. The project encouraged the reporting of dead red squirrels and many bodies were collected and then sent for post mortem examination. The Heritage Lottery funding covered the costs of histological tests and a focus upon determining the presence of viral infections. The resulting data were essential in understanding the disease threats faced by the red squirrel population.

Like many small organisations, Red Squirrels Trust Wales has a small but dedicated core of volunteers and the 'Island Haven' project allowed the organisation to reach out and connect



Figure 1. Red squirrel in trap showing grey body fur.

with a much wider audience. This led to an increase in volunteering and involvement especially via social media. The accessibility of red squirrels has allowed amateur photographers to get some fabulous pictures, many of which are posted online along with details of when and where the squirrels were seen. This has allowed people to take ownership of their local red squirrel populations and in sharing they are ambassadors for conservation of the species.

The last grey squirrel was trapped on Anglesey in 2013 and with red squirrels having crossed the Menai Straits into Gwynedd, the project has left a strong legacy and an obvious need to focus activity on the mainland through the 'Painting the Town Red' project.

Success indicators within the project

- Evidence that grey squirrels were no longer present on Anglesey (e.g. an 18 month period without any sightings, captures or other evidence of grey squirrels).
- The establishment of a network of 150+ red squirrel supplemental feeding stations widely distributed across the island.
- Evidence of continual geographical expansion of red squirrels within Anglesey to more than 1,500 hectares of mature forest.
- Creation of red squirrel forest signage, establishment of dedicated walks and the installation of red squirrel web-cams.

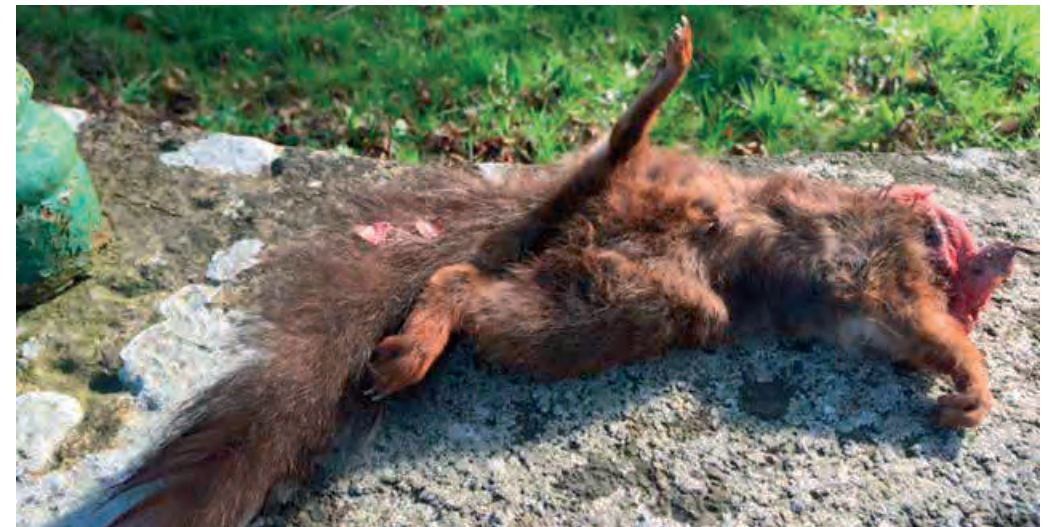


Figure 2. Road killed red squirrel from Llansadwrn 2015.

Major difficulties faced

- Despite a documented commitment to produce a red squirrel conservation plan for Newborough forest, government agencies did not adhere to the timetable for delivery. This led to project energy and resources being focused upon political lobbying to get the plan produced.
- Ecological consultants acting on behalf of developers approached a local biodiversity record centre which had only limited data on red squirrel distribution. This led to inappropriate surveying and assessment of a development's potential impact upon local red squirrel populations.
- It proved difficult to secure the resources necessary to carry the work on beyond the four year 'Island Haven' project (2011 to 2015).
- Many of the red squirrels on the island have grey body fur and this can lead to a mis-identification as grey squirrels (Figure 1).

Major lessons learned

- The local island community was willing to support grey squirrel eradication and very enthusiastically embraced red squirrel monitoring, supplemental feeding and reporting of squirrel sightings.
- Parallel research into adenovirus has revealed that the infection is present more widely than originally suspected and it is therefore important to regularly clean feeding stations in order to reduce the chance of cross infection between squirrels.
- Post project sustainability on Anglesey will be dependent upon continued work in the neighboring mainland county of Gwynedd; this emphasises the reality that landscape scale conservation requires an integrated approach beyond administrative boundaries.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

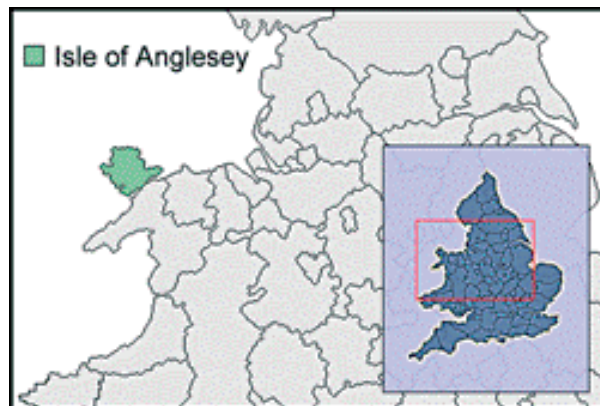
- The last confirmed record of a grey squirrel on Anglesey was from the summer of 2013 and red squirrels have now colonised all of the available habitat on Anglesey.
- There are now four red squirrel woodland walks, three online webcams and a network of 150+ garden or forest feeding stations visited by red squirrels.
- The project has developed viral surveillance which has greatly illuminated the threat posed by pathogenic viral infections to red squirrels.
- Habitat and canopy fragmentation within Newborough forest as part of sand dune habitat restoration work threatens the viability of red squirrels in the forest. Although tree planting grant schemes do allow the use of coniferous and large seeding broadleaves on Anglesey, a financial premium is placed upon native mixes dominated by small seeding broadleaved species. This financial lever is lowering forest carrying capacity for red squirrels.

Future project development

- The future sustainability of the Anglesey red squirrel population is now firmly dependent upon intensive mainland grey squirrel control to prevent island reinvasion by this invasive species.
- Local woodland owners will be encouraged to manage habitats sympathetically for red squirrels and to plant tree species that offer useful seed crops.
- Red Squirrels Trust Wales will continue to provide local people with information about red squirrels and monitor squirrel populations across Anglesey.

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Map – Location of the Isle of Anglesey in North Wales

Painting the Town Red

Red Squirrels Trust Wales

Geographical area of conservation work

Arfon District, Gwynedd, Wales.

Author and organisation contact details

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Key partners

Animal and Plant Health Agency
British Association for Shooting and Conservation
Bangor City Council
Bangor University
Gwynedd County Council
National Trust Wales
Natural Resources Wales
Zoological Society of Wales

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	1
Volunteers involved with Grey Squirrel Control	10-20
Active Volunteers	10+
An annual Glastir grant contract 3 months	1

Introduction

Following the arrival of grey squirrels in the mid 1960s, the local Gwynedd red squirrel population progressively declined and eventually the species became extinct in the Bangor area. Successful grey squirrel eradication from the adjacent island of Anglesey led to recolonisation of the island by red squirrels, and in 2009/10 the first animals were found having dispersed across the Menai Straits into the Arfon District of Gwynedd. This mainland landscape is heavily wooded with mixed deciduous stands and coniferous plantations, including many within the City of Bangor. Grey squirrels are widely distributed and abundant throughout the area and show high sero-prevalence to the Squirrelpox virus (60 to 80%).

Anglesey is one of three Welsh focal sites for red squirrel conservation (Wales Squirrel Forum 2009) and therefore it is important to prevent grey squirrels from returning to the island. Red squirrels have been found breeding on the mainland and although animals have been found inland as far as Llanberis and Rhyd Ddu, the population is unlikely to number more than 50 animals (Halliwell et al. 2015) and may be much smaller.

Efforts to control grey squirrels are underway through a mixture of *ad hoc* trapping by volunteers, a small number of estates trapping grey squirrels through Glastir funding (Government rural payment) and the efforts of a contract trapper funded by money raised by the Trust.

Project aims

- To control grey squirrel populations in Gwynedd and prevent the species from recolonising the adjacent island of Anglesey.
- To control grey squirrels in order to increase the population of red squirrels in Gwynedd and lower the risk of Squirrelpox virus infection.
- To raise public awareness and encourage local people to become active in red squirrel conservation and grey squirrel control.
- To build towards resourcing the complete eradication of grey squirrels from a 90km² area of Gwynedd bordered by the Menai Straits and the Snowdonia mountain range.

Description of the project

The Gwynedd project controls local grey squirrel populations primarily through the use of live capture traps but with some *ad hoc* shooting also taking place. Control is undertaken largely to prevent animals from crossing the Menai Straits and dispersing onto the red squirrel focal site of Anglesey. The island contains approximately 700 red squirrels in a range of broadleaved and coniferous habitats encompassing parkland and garden habitats. There are also 150 garden supplemental feeding stations and red squirrels are a common sight at these.

Mainland control often targets key coastal woodlands known to contain small re-establishing populations of red squirrels. This is in order to try and remove the direct competitive pressures posed by grey squirrels but also to remove the threat of Squirrelpox virus. Current key sites include Treborth botanical gardens, Faenol estate and Penrhyn estate woodlands. Red squirrels are occasionally reported from other woodlands but there are often insufficient resources to trap these sites with any meaningful intensity.

The Gwynedd project evolved as a result of red squirrels moving from Anglesey onto the mainland and also with the realisation that the two bridges over the Menai Straits offer an attractive dispersal route for squirrels. Although there have been some preliminary discussions into potential ways of limiting or preventing animals from accessing or crossing the bridges, these have either proved to be logistically unfeasible or, in the case of sonic and odour based deterrents, assessed as being ineffective. The removal of grey squirrel populations in the vicinity of the bridges and culling further afield to remove young animals prior to dispersal is therefore the current strategy.



Figure 1. Children building red squirrel feeders in Gwynedd. This is a great educational activity but currently there are no grey squirrel free areas and without control in place grey squirrels quickly find and use feeders.

The majority of the grey squirrel control is done by a paid contractor, this allows trapping to be concentrated in key locations. However, local woodland estates, members of the public, field sportsmen and some non-governmental organisations (NGOs) also cull squirrels. The Painting the Town Red project has run several grey squirrel control training events at which local people can come and learn how to catch and kill grey squirrels and these have been well attended (typically 10 plus people). Evening illustrated talks and information stalls at agricultural shows, garden fetes and festivals have also proved effective ways of raising awareness of the Gwynedd project. The project has also had some good media coverage and has developed a red squirrel mobile phone App so that people can keep up to speed with events and report squirrel sightings.

With the close proximity of the Snowdonia mountain range and a northern sea coastline, the Gwynedd project area has relatively limited routes of grey squirrel dispersal from the wider landscape. A 90km² core project area has been identified which includes the City of Bangor, the Ogwen valley and Llanberis. It is estimated that there are around 1,500 hectares of woodland habitat and perhaps some 5,000 grey squirrels. Current grey squirrel control is only covering a small fraction of these habitats and although local control may depress squirrel populations for a short period, dispersal from other habitats quickly results in recolonisation. It is unclear whether Squirrelpox virus has ever affected the red squirrel population but repeated testing of local greys has shown a high sero-prevalence of 60-80%, so there are obvious risks.

The project area is not an identified part of a Welsh Government red squirrel focal site, although it forms a buffer to protect Anglesey which is a focal site. A small number of local landowners have obtained Glastir grants which include payment for grey squirrel control. Although this is a welcomed resource, the funding is for short term programmes (perhaps three months of trapping) and is restricted only to certain woodlands which may not be the most important sites to remove grey squirrel for red squirrel conservation. The project has in one instance been contracted to control grey squirrels as part of the delivery of a Glastir grant and as the payment rates are quite generous it has been possible to make a small profit, the monies enabling some grey squirrel control work to be undertaken elsewhere in Gwynedd.

Success indicators within the project

- Maintaining the island of Anglesey as red squirrel focal site free from grey squirrels.
- Controlling mainland grey squirrel populations sufficiently to increase the distribution, productivity and abundance of red squirrels in Gwynedd.
- Progressively increasing a network of volunteer trappers and local people involved in the project.

Major difficulties faced

- Fundraising has proved much more difficult than was anticipated particularly as many bodies will only fund year long projects and ask for evidence that these will deliver long-term and sustainable outputs.
- Grey squirrels rapidly recolonise woodlands where intensive trapping has removed large numbers of animals and the project has not been able to maintain habitats along the Menai Straits as free from grey squirrels.
- There is only very sporadic and incomplete survey data on red squirrel distribution and a paucity of data on productivity. This makes it difficult to deploy trapping resources to maximise the benefit to red squirrels.

Major lessons learned

- The bridges over the Menai Straits offer greater opportunities for dispersal of both squirrel species than had been anticipated. This indicates that Anglesey is relatively easy for the grey squirrel to recolonise.
- Despite the successful conservation of red squirrels on Anglesey, and the presence of red squirrels on the mainland, it has proved difficult to get local people and landowners to proactively control grey squirrels in Gwynedd.
- A small number of people contribute the majority of volunteer time and hence the project is vulnerable should any of these people leave.
- Both NGO and State bodies are happy to grant access to their woodlands for the control of grey squirrels but lack the resources, or in some cases desire, to undertake control themselves.

Success of project

Success or Failure	
Highly Successful	
Successful	
Partially Successful	X
Failure	

Reason(s) for success/failure of the project

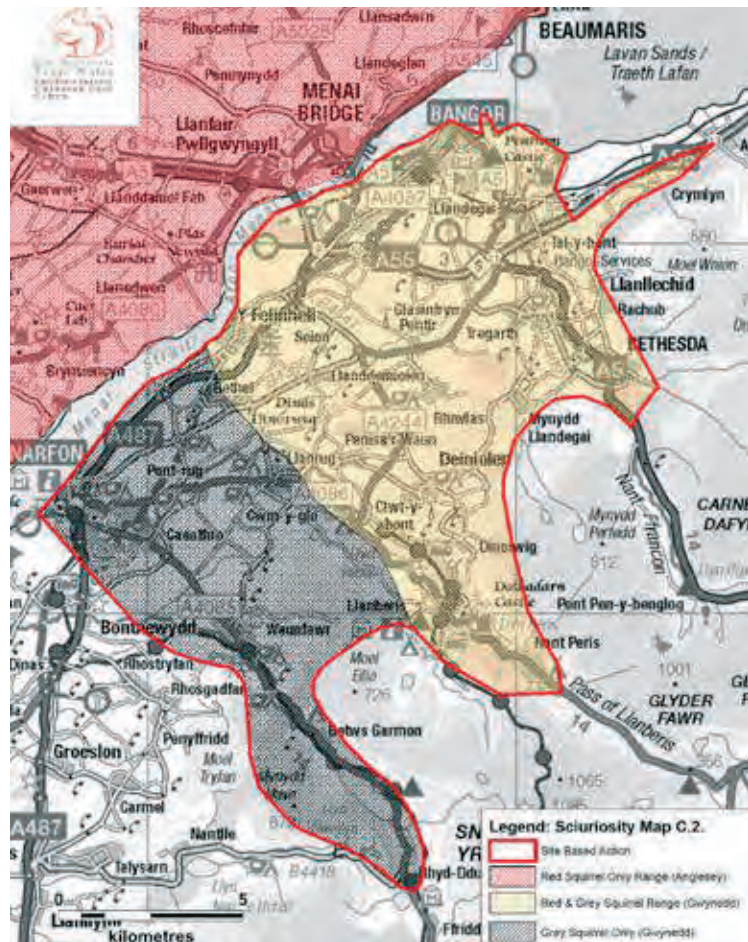
- Grey squirrel control has depressed resident populations near to the two bridges over the Menai Straits and is thus likely to have helped prevent grey squirrels crossing onto Anglesey.
- However, the project lacks the resources necessary to carry out extensive and intensive culling in a landscape where broadleaved woodlands are likely to support large and productive grey squirrel populations which recover quickly.
- Culling has not affected rates of Squirrelpox virus infection amongst grey squirrels caught in red squirrel areas and there remains a risk of disease amongst resident red squirrel populations.
- In the absence of survey data there is only very limited understanding of red squirrel distribution and the project has failed to generate significant numbers of local volunteers in Gwynedd.

Future project development

- It is hoped that the Painting the Town Red project will form a component in a national red squirrel conservation programme involving partners in England, Scotland and Northern Ireland.
- A series of local squirrel management workshops are planned to try and increase the number of local volunteers.

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- II. Wales Squirrel Forum (2009) *Conservation plan for red squirrels in Wales*. Forestry Commission, Welsh Assembly Government, Countryside Council for Wales, Bangor, UK.



Map - Painting the Town Red project area. Copyright Northumberland Wildlife Trust OS Licence AL 100035023

Mid Wales Red Squirrel Partnership

Geographical area of conservation work

Eastern Ceredigion, north east Carmarthenshire and south west Powys, Wales.

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Key partners

Carmarthenshire County Council
Powys County Council
Ceredigion County Council
Natural Resources Wales (NRW)
Wildlife Trust of South and West Wales (WTSWW)
Brecknock Wildlife Trust
The National Trust
Sylvaen Ltd
SelectFor Ltd
Tilhill UPM
Scottish Woodlands
The Mammals in a Sustainable Environment Project (MISE)
A number of other private woodland owners and interested individuals

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	3
Paid Contractors (7-12 months)	None at present
Volunteers involved with Grey Squirrel Control	49
Active Volunteers	23
Other resources	One part time dedicated member of staff on 5 year project funding, managing Mid Wales Red Squirrel Project

Introduction

Following the arrival of grey squirrels in mid Wales in the late 1950s, the red squirrel population retreated to the upper Tywi valley, where extensive coniferous plantations in the Cambrian Mountains, buffered on much of their boundary by extensive open upland habitat, offered a partial refuge. The population of red squirrels in the mid Wales focal area is thought to have declined to between 100 and 500 individuals.

Since its inception in 2002, the Mid Wales Red Squirrel Partnership has worked to establish a sound baseline of information about the red squirrel population in mid Wales, leading to the development of a robust understanding of the work required to conserve them.

The Partnership aims to protect and expand the genetically unique population of red squirrels in mid Wales. Conservation efforts include establishing a buffer area around the red squirrel stronghold with control of grey squirrels, ongoing monitoring, helping landowners to improve habitat for red squirrels, involving local schools and communities and feeding into forest planning to maximise the suitability of forests for red squirrels.

The work of the Partnership has depended upon the availability of external funding. Whilst the Partnership currently has a dedicated staff member hosted by the Wildlife Trust of South and West Wales, work has also been carried out by contractors subject to funding. The work of the Partnership is currently focused on engaging volunteers in grey squirrel control; this complements grey squirrel trapping funded by Welsh Government schemes for forest/woodland management (Better Woodland for Wales (BWW), Glastir).

Project aims

- To maintain and where possible enhance the red squirrel population and its habitat in mid Wales, particularly through grey squirrel control.
- To research and monitor the distribution and status of red squirrels in mid Wales.
- To raise public and professional awareness of the red squirrel population in mid Wales, to increase understanding of its conservation needs and encourage people to get involved in the Partnership's work.
- To ensure that red squirrel conservation issues (including grey squirrel control) are incorporated in all relevant plans and policies that affect the mid Wales' forests and that these plans and policies are implemented effectively.

Description of the project

When the Partnership was set up in 2002, its focus was on research and proof of principle, with the aim of demonstrating that mid Wales was still home to a viable population of red squirrels. This culminated in the area being confirmed by the Welsh Government as one of three Welsh focal sites for the conservation of the species in 2009, empowering the Partnership to prioritise its resources on conservation action.

The Partnership's direct conservation activity can be broadly divided into three areas: optimising habitat management in the red squirrel focal area, grey squirrel control, and advocacy and education.

Optimising land management has proved challenging, but the Partnership's influence has increased with the quantity of research data it has generated. The Partnership works with private foresters and Natural Resources Wales to inform forest design planning, with a focus on maintaining 'Key Areas', stands of conifer species such as lodgepole pine, Norway spruce and Scots pine, and maintaining landscape connectivity during the process of clearfell rotation. Land management advice has been guided by a habitat suitability study (Cartmel and Denman 2012) funded by NRW, and the local knowledge of Partnership members. Influencing land management remains a significant area

of work with many challenges. Significant threats are still posed by the large size, location and scale of clearfell coupes, inappropriate clearfelling of Key Areas, *Phytophthora ramorum* disease of larch, loss of arboreal connectivity and forest fragmentation. The failure to replant some important tree species (future proofing) is also a potential threat to future red squirrel food supplies and habitat.

Grey squirrel control remains critical to the Partnership achieving its objectives, as significant riparian sessile oak woodlands within the buffer zone host populations of grey squirrels, which periodically invade the red squirrel core area (Figure 1). Grey squirrel control has been funded for a number of years on some privately-owned sites through BWW and Glastir grant schemes from Welsh Government, but this could never achieve coordinated, systematic coverage. However, two significant grants to WTSWW in 2011 (Environment Wales) and 2012 (Welsh Government) allowed the Partnership to pilot landscape-scale grey squirrel control using contractors. This approach proved ecologically successful, but financially unsustainable. Consequently in 2014, funds were sought from Environment Wales and other donors for a five year project officer (hosted by WTSWW). The project officer set up a Trap Loan Scheme (TLS) in the red squirrel focal site, to give local people free access to trapping equipment,



Figure 1. The Mid Wales Red Squirrel Project focusses on training and supporting local residents and volunteers to undertake grey squirrel control.



Figure 2. Setting up a camera trap (left to right) volunteer Merryll Hills, with NRW Conservation Manager, James Tinney and WTSWW Red Squirrel Officer Becky Hulme.

training and support for grey squirrel control. The TLS operates from volunteer 'hubs' headed by volunteers, who co-ordinate trapping activity in their local areas. These local community networks of trappers present a more sustainable model of grey squirrel control and complement the trapping carried out by contractors funded through Welsh Government grant schemes.

Further to the direct conservation action there remains a significant need for advocacy work. Generally this has been undertaken by many members of the Partnership through their own professional roles within the partner organisations. Public awareness of the presence of red squirrels in mid Wales remains low, but is growing. A website has been set up, leaflets are distributed, and events and talks are held. Press releases are written by many members of the Partnership, as well as by the WTSWW project officer.

Research into the red squirrel population is also ongoing and ties closely with volunteer and public engagement. The MISE project, which was part-funded by the European Regional Development Fund (ERDF) through the Ireland Wales Programme (INTERREG 4A), has contributed to red squirrel research as part of the Partnership's activity and has identified new woodland sites for the red squirrel within the focal site, and undertaken monitoring and research such as hair tubes, camera traps (Figure 2), live-trapping and radiotracking of red squirrels. This work remains key to our understanding of the red squirrel and its needs in mid Wales.

Opportunities for the Partnership to progress its work have been dependent on fixed term sources of grant funding, so activity has varied over time in extent and intensity. However, the diversity and commitment of the Partnership has proved a great strength, with different partners leading at different times according to their capacity, skills, and access to resources.

The Partnership also liaises with other UK projects and contributes to the Wales Squirrel Forum, whose remit is to address red squirrel conservation issues across Wales.

Success indicators within the project

- Grey squirrel control in place across a significant area of the mid Wales red squirrel focal site, with focus on the buffer zone in particular.
- Long term trend of decline in numbers of grey squirrels caught (as a ratio of effort expended).
- An increase in the size and extent of the red squirrel population in the focal site. The low density of red squirrels makes assessment of their status difficult, but

we are seeking a proxy measure to help quantify our future impact, with the intention of recording increasing red squirrel numbers as a success indicator.

- At least eight active volunteer groups and at least 50 active volunteers.

Major difficulties faced

- Lack of sufficient and consistent funding to achieve all of the desired outcomes.
- Ensuring that all of the major forest managers in the focal site are managing their forests with red squirrel conservation in mind; difficulties quantifying and mitigating impact of forestry operations on red squirrels in the presence of grey squirrels.
- Failure to achieve systematic landscape scale grey squirrel control in all areas and over time.
- The current low density of red squirrels and the infrequency with which they are seen is a barrier to public engagement.

Major lessons learned

- Advocacy for red squirrels, publicising red squirrels' local status, and threats to their survival, are critically important if support for grey squirrel control is to be secured and maintained.
- Sound evidence for the presence of a significant population of red squirrels (trapping and photographic records, not just sightings) proved necessary to secure engagement of large forest owners and managers.
- Dedicated members of staff are necessary to support the development of volunteers and volunteer groups for grey squirrel control.
- The partnership approach, whereby the varying strengths and opportunities of the different partners and sectors are utilised to achieve different elements of the work programme, has been very successful.

Success of project

Success or Failure

Highly Successful

Successful

Partially Successful

X

Failure

Reason(s) for success/failure of the project

- Since the formation of the Partnership in 2002 we have learned much more about the distribution of red squirrels in mid Wales, and have an active network of volunteer and contract grey squirrel trappers and the beginnings of a meaningful dialogue with forest managers.
- However, recent results from red squirrel monitoring suggests that red squirrel numbers are low and the population may be very vulnerable to local and regional extinction in the short-term. We do have anecdotal evidence of increasing red squirrel numbers, but much still to do.
- There are currently many areas where grey squirrel control is still not practised, and more resources are required to achieve a uniform standard and a systematic landscape scale grey squirrel control in all areas and over time.
- Additional work is required to ensure that no further key areas are lost to clearfelling and that forest managers fully understand and implement the requirements to maintain arboreal connectivity across the forest landscape.

Future project development

- Seek to increase capacity to support volunteers and volunteer co-ordinators (volunteer interest is starting to out-strip our support capacity).
- Seek resources to achieve uniform and systematic landscape scale grey squirrel control in all areas and over time.

References

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- II. Hobbs AM (2005) *Assessment of the status of the red squirrel in central Wales*. Unpublished project report, WTSWW.
- III. MacPherson J (2013) Hair tube survey for the presence of red squirrels, *Sciurus vulgaris*, in Cwm Berwyn, mid Wales. Unpublished project report, Vincent Wildlife Trust.
- IV. Wilberforce EM, Denman H (2013) *Mid Wales Red Squirrel Project: grey squirrel control in the focal site buffer*. Grant report to the Welsh Government Ecosystem Resilience and Diversity Fund.



Map – Mid Wales Red Squirrel Project area, with the core red squirrel area shown in red and the buffer zone in blue. Contains Ordnance Survey Data © Crown Copyright and Databaseright 2011.

Ards Red Squirrel Group



Geographical area of conservation work

Ards Peninsula, Co. Down, Northern Ireland

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Key partners

Northern Ireland Environment Agency
British Association for Shooting and Conservation (BASC)
Strangford Lough & Lecale Partnership
Queens University Belfast

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	1
Active Volunteers	10

Introduction

The Ards Peninsula has always been a stronghold for the red squirrel in Northern Ireland.

Ards Peninsula is bounded on the west side by Strangford Lough and on the east side by the Irish Sea, making it easier to defend against invasion from grey squirrels. The land is rolling, intensive mixed lowland farmland. The only significant areas of woodland are within large estates, most of which are in private ownership.

Grey squirrels have only appeared in the last 5 to 10 years and are gradually spreading south down the Peninsula.

The project comprises staff from a range of interested organisations, landowners with red squirrels on their estates, and volunteers recording squirrel sightings/monitoring transects and undertaking grey squirrel control transects. There are no paid staff specifically dedicated to this project.

Project aims

- Collect sightings of live and dead red and grey squirrels across the Ards Peninsula and North Down.
- Liaise with estate owners/managers across the Ards Peninsula to encourage red squirrel conservation.
- Establish a buffer zone south of Newtownards and Donaghadee down to known red squirrel hotspots at Mount Stewart and Carrowdore. This involves preventing colonisation by grey squirrels through working in partnership with landowners.

Figure 1. Road signs were erected to reduce the number of red squirrels killed on roads



Description of the project

The Ards Red Squirrel Group (ARSG) was set up at the end of 2011. A group of interested organisations and individuals came together and the National Trust took on the role of lead partner for the Group. The majority of red squirrels are found on private estates within the Ards Peninsula, therefore it was important to meet up with all these landowners. The response was very positive towards protecting the red squirrels and there was a commitment to control any grey squirrels coming in.

We are part of the Northern Ireland Squirrel Forum and regularly liaise with other red squirrel groups here to learn about how they have gone about red squirrel conservation.

Our main focus has been to be the main contact point for people living on the Ards Peninsula to report squirrel sightings (records passed on to the local biological recording centre). We have also done a lot of publicity work to encourage landowners to control grey squirrels, particularly within a buffer zone.

The Mount Stewart property (owned by National Trust) offers the main opportunity for the group to raise awareness of red squirrel conservation – we have a red squirrel trail (with leaflet available), there is supplementary feeding, we have developed a red squirrel education programme and our annual red squirrel day regularly attracts up to 120 people. We also have a team of seven volunteers undertaking regular red squirrel monitoring transects. None of the people involved with ARSG are paid as part of the project. Grey squirrel control is carried out by suitably certificated volunteers.



Figure 1. Community awareness is a key part of the project

Success indicators of project

- Our main indicator of success was to prevent the establishment of grey squirrel populations on the Ards Peninsula to the south of Newtownards-Donaghadee and ensure that existing red squirrel populations are maintained.

Major difficulties faced

- Ability to address the grey squirrel problem in urban areas of Newtownards and Donaghadee, which are the source for grey squirrels invading the Ards Peninsula. We are aware that 50% of grey squirrels in Newtownards have been exposed to the Squirrelpox virus (Queens University Belfast study 2011 to 13).
- Time constraints amongst members of Ards Red Squirrel Group – most of us are doing this in addition to our busy day jobs.
- Challenges of undertaking grey squirrel control on sites that are widely accessible to the general public and having responsible individuals who can comply/operate under the associated limitations.
- Challenges of intercepting grey squirrels in the 'buffer zone', given that they are highly mobile.

Major lessons learned

- Tracking down transient grey squirrels attempting to colonise red squirrel hotspots on the Ards Peninsula is very time consuming and often unsuccessful. It is therefore better to deal with the source populations of grey squirrels if possible.
- It would be more effective to have individuals paid (if resources allow) to carry out grey squirrel control rather than rely on the goodwill of volunteers.
- It is essential that people know who to contact if they see grey squirrels and that sightings are reported rapidly in order to have a chance of dealing with the animals.

Success of project

Success or Failure

Highly Successful

Successful

Partially Successful **X**

Failure

Reason(s) for success/failure of the project

- Whilst there have been significant advances in awareness amongst the general public and proactive conservation work amongst landowners of the threat to the red squirrel population, we are continuing to see grey squirrels consistently trying to establish themselves within red squirrel hotspots on the Ards Peninsula.

Future project development

- We are working with BASC to provide a grey squirrel control service to local farmers/landowners through the Ulster Farmers Union.
- We have applied for funding for red squirrel conservation work on the newly acquired Demesne at Mount Stewart.

References

- I. Northern Ireland Environment Agency (2000) *UK Strategy for Red Squirrel Conservation - Action Plan for Northern Ireland*.
- II. Northern Ireland Squirrel Forum (2015) *Trees for Red Squirrels*.
- III. Northern Ireland Environment Agency (2001) Red Squirrel Education Pack.

Red Squirrel Conservation in County Fermanagh

Fermanagh Red Squirrel Group



Geographical area of conservation work

County Fermanagh, Northern Ireland.

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Key partners

Northern Ireland Squirrel Forum (NISF)
Northern Ireland Environment Agency (NIEA)
Forest Service
National Trust
Fermanagh & Omagh District Council
Derrygonnelly Field Studies Council
Quercus at Queens University Belfast.

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	2
Active Volunteers	20

In addition to volunteers involved with grey squirrel control, the project benefits from control undertaken by gamekeepers, wildfowlers and landowners in the county. Much of our activity has focused on outreach education through partnerships and providing advice and guidance to landowners.

Introduction

The formation of the Fermanagh Red Squirrel Group (FRSG) owes its origins to the interest and involvement local people and organisations have in the conservation of the endangered, priority species, the red squirrel (*Sciurus vulgaris*). The red squirrel has been identified as a national priority by the Northern Ireland Environment Agency (NIEA) and in turn featured within the Council's Local Biodiversity Action Plan. It was as a result of this action plan that the first public meetings regarding the species were held in early 2011 and the group has developed from there.

The group first met in February 2011. This was prior to the first outbreak of Squirrelpox virus in Ireland being confirmed during spring 2011. The outbreak occurred in County Down, and was followed by disease symptoms being recorded in County Antrim and later in County Wicklow. This crisis galvanised the group although fortunately the outbreak was confined and short-lived. The group was formally constituted in August 2012 and a management plan with Forest Service to allow members to undertake survey work followed in early 2013. The group have developed a website to highlight their work and to provide advice to members of the public. A Facebook™ presence was also developed in 2013.

The group was informally mentored by the Glens Red Squirrel Group and the Tollymore Red Squirrel Group in Northern Ireland. From the outset, the Northern Ireland Squirrel Forum (NISF) facilitated by the NIEA as well as Northern Ireland Forest Service (NIFS) and National Trust were key supporters to the development in the group.

Project aims

- To educate and raise awareness of the status of the red squirrel and promote best practice to improve their good conservation status.
- To promote and assist best practice for grey squirrel (*Sciurus carolinensis*) control across the county and beyond.
- To raise awareness of broader landscape-scale issues such as habitat fragmentation and maintenance of wildlife corridors which impact vulnerable red squirrel populations, as well as other wildlife.

Description of the project

The FRSG is an environmental charity with volunteer members who undertake positive action to support the conservation of the red squirrel. Much of what we do is education based although given the opportunity and capacity; we also work on-the-ground undertaking surveys, supplementary feeding and providing on-site guidance to landowners.

County Fermanagh's landscape is rural and diverse and has a well-documented abundance and variety of wildlife – including mammals and the red squirrel. We also have two large and distinct areas of conifer plantations, one in the east and the other in the west of the county, which have provided an essential habitat refuge for red squirrels. The county has a low population density and coupled with the rural, relatively-forested nature of the county, many members report red squirrels as regular visitors to their gardens.

Providing advice and guidance to home owners and landowners on how to best contribute towards the conservation of the species has been a priority for us from the outset. Over the last four years, we have developed a range of resources that we use to educate and inform members of the public. One of the first that we developed was a web presence which continues to be a really useful outreach tool. The website provides guidance on a range of issues and contains 'best-practice' documents that members of the NISF have agreed to.

We also signpost to other data and post updates on events.

We have also developed a flyer, poster and other educational resources with partners including the Derrygonnelly Field Studies Council which have been used to deliver outreach education to schools and at public events. We have also worked with partners to install four red squirrel interpretation panels (Figure 1) at key visitor sites across the county to promote the conservation of the species.

Over the last four years, we have organised a number of training sessions for members including grey squirrel control and squirrel survey/monitoring workshops. Grey squirrel control is undertaken in the county by a range of stakeholders although only a limited amount by our members to date. We established a trial population monitoring transect in a conifer forest in east Fermanagh in late 2012 but then agreed to pursue an alternative methodology as we felt that the effort involved to be unsustainable.

In early 2014 we participated in a citizen-science project designed by Dr. David Tosh of Quercus at Queens University Belfast, funded by the NGO Challenge Fund. We surveyed forests and woodlands across the county using camera traps and feeders to get presence/absence data for red and grey squirrels. The success of the project encouraged Quercus to apply for funding a Northern Ireland wide project in 2015. This was also successful and we again participated in this.



Figure 1. Red squirrel interpretation panel at Castle Archdale Forest



Figure 2. FRSG Members at the National Trust's Florence Court Estate (October 2013)

We are now confident using wildlife cameras and feeders to help support our work and hope that in the future with guidance, we can use this method to determine populations in given areas over employing the transect methodology. We are very excited by the research and debate on the impact that the expansion in pine marten range may be having on grey squirrels, to the benefit of red squirrels. We happily took part in a radio documentary on the subject with BBC Radio 4. Other areas that we have worked in include feeding-into policy work, conservation plans and funding applications of organisations including Northern Ireland Forest Service and Ulster Wildlife.

Success indicators within the project

- Successive funding secured for County Fermanagh by us and partners with a red squirrel focus.
- Sustained interest from group members (Figure 2), the public, media and partners in the work of the group and other groups across Northern Ireland and in cross border initiatives with the Irish Republic.
- Increase in species data gathered since the group first met. We are very active in promoting the recording of squirrel and other mammal sightings.

Major difficulties faced

- Rural landscape with a widely dispersed low human population making it difficult to attract active members to the group.
- All our work is voluntary and without a dedicated salaried officer, it is difficult to fully develop the goals and aims of the group.
- Low level of interest in active grey squirrel control, although we believe that people in the county largely have a good understanding of the need for invasive species control.

Major lessons learned

- Partnerships have been key to the success of the group - from getting permission to access Forest Service land, organisations applying and/or assisting with funding to being given access to meeting and training rooms.
- Volunteers need to be kept informed, nurtured and motivated to keep the group active. We are also still reliant on a very small number of volunteers to get committee work done, which is a concern going forward.

- Keep good records, record peoples contact information from events etc and circulate an E-Newsletter from time-to-time to keep the profile of the group up. Use all events as an opportunity to collect donations and membership.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

- We are fortunate to have some key volunteers and key partners operating in the area and to have good viable red squirrel populations.
- As a species, the red squirrel is an iconic one and attracts the support of a wide range of groups.
- The Challenge Fund (plastic bag tax levy), administered by the Northern Ireland Environment Link, which has been operating the last four years has been a valuable funding opportunity for us.

Future project development

- We would like to continue outreach education in schools and in the community in the area of wildlife recording, grey squirrel control and best practice.
- Ideally we would like to work at a wider landscape-scale, identify wildlife corridors, encourage appropriate planting and the wider conservation of the red squirrel.

References

- I. Dr. David Tosh. 2015. '*Pine Marten and Squirrel Survey of Northern Ireland*' project funded by Challenge Fund. 2015. Quercus at Queens University Belfast. <http://www.qub.ac.uk/sites/Quercus/CurrentProjects/Pinemartendistributionsurvey/>
- II. BBC Radio 4 programme '*Costing the Earth*'. Recorded 10/3/15 and broadcast 7/4/15. '*Reds Return*'. Listen to via BBC iPlayer or listen/download as a podcast <http://www.bbc.co.uk/programmes/b05pn674>



Map - County Fermanagh - The geographical project area shown in red.

Red Squirrel Conservation in North West Ireland

North West Red Squirrel Group

Geographical area of conservation work

The North West of Northern Ireland, in Derry City and within the Strabane District Council area.

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Key partners

Faughan Valley Landscape Partnership
Derry City and Strabane District Council
Northern Ireland Environment Agency (NIEA)

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	10
Active Volunteers	10

Introduction

The North West Red Squirrel Group was established by Derry City Council as an action under their Local Biodiversity Action Plan in 2010. It was constituted in 2011. The Group are volunteer led, with a committee made up of volunteers. The Group has matured and now no longer requires the support of the local authority to be sustainable.

The Local Biodiversity Action Plan listed red squirrels (*Sciurus vulgaris*) as a local priority species. The Group have estimated that there are less than 100 red squirrels and approximately 200 grey squirrels (*Sciurus carolinensis*) in the Derry City and Strabane District area.

Project aims

- To raise awareness of the protected local red squirrel within the Derry City and Strabane District Council districts.
- To work with Derry City and Strabane District Council, voluntary organisations, institutions, business and local residents, in a common effort, to protect and enhance the red squirrel, for wildlife conservation.
- To control the grey squirrel, to prevent the spread of Squirrelepox.

Description of the project

The project aims to remove grey squirrels through a co-ordinated control programme in order to help protect the local red squirrel population (Figure 1). This involves selecting a number of sites through the district, trapping and shooting grey squirrels, to suppress the grey squirrel population and prevent dispersal. The controller is paid mileage to cover travel expenses incurred in the grey squirrel control operations. This is paid for by donations to the Group. There are approximately 10 volunteers involved in the project.

In addition, the Group raise public awareness of red squirrel conservation by delivering education programmes and undertaking events.



Figure 1. A red squirrel in the project area ©Christine Cassidy.

Success indicators within the project

- To suppress the grey squirrel population through an annual control programme.
- To increase awareness and understanding among local people of the issues surrounding red and grey squirrels including the spread of Squirrelpox.

Major difficulties faced

- A lack of volunteers willing to take part in the control programme.
- A limited number of landowners willing to trap grey squirrels on their land.
- A lack of active volunteers willing to attend events etc, to promote the work of the group.
- A lack of understanding of the legal issues around controlling grey squirrels.

Major lessons learned

- Have an exit strategy, so that the Group can be sustainable after initial setup by the Council.
- Require revenue to continue raising awareness and control programmes.
- Require strategic planning to ensure long term effective control.
- Strong leadership to develop the Group and strategically move it forward with the Group’s vision.

Success of project

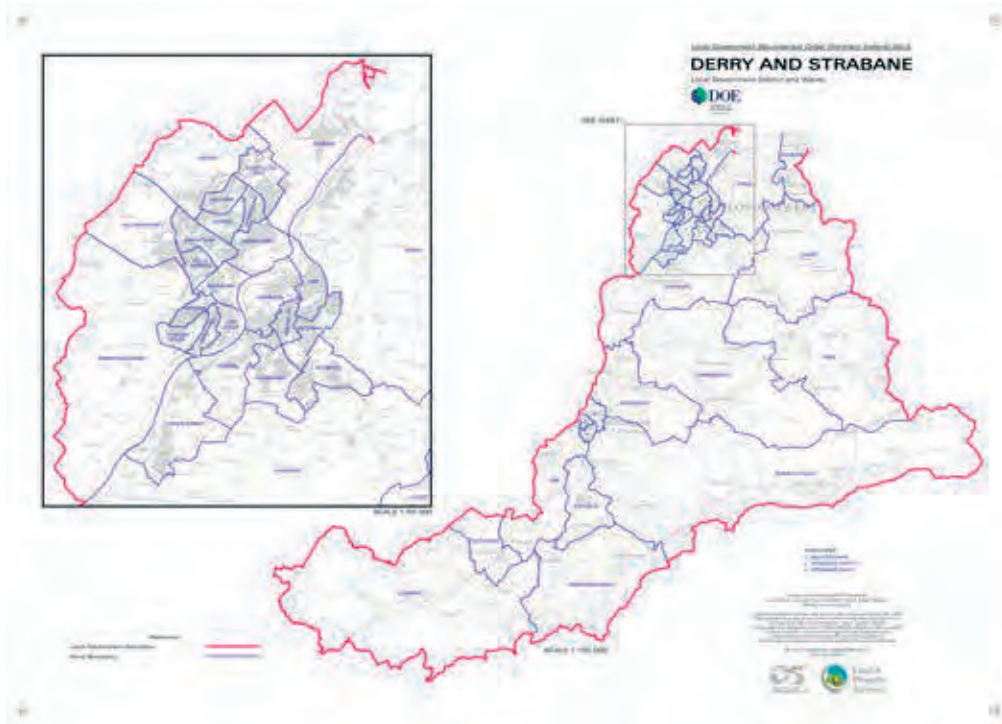
Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

- The Group have been in operation for over four years.
- They have implemented three control programmes and controlled over 100 squirrels to date.
- They have raised awareness, understanding and action of red squirrels.
- The Group is sustainable with volunteers leading the group with revenue to continue the project.

Future project development

- Expand control work further into the Strabane area following the amalgamation of Derry City and Strabane District Councils.
- Conduct pine marten (*Martes martes*) surveys to determine if the presence of this species could be a viable natural control option for the grey squirrel.



Map - Derry City and the Strabane area.

Red Squirrel Soft Release: Glenarm

Glens Red Squirrel Group

Geographical area of conservation work

Glenarm, County Antrim, Northern Ireland.

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Key partners

Belfast Zoo
Northern Ireland Squirrel Forum
Staff and management of Antrim Estates Glenarm

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	12
Active Volunteers	16
Donation of Pheasant pens for conversion to soft release pen.	1

Introduction

The Glens of Antrim are regarded as a red squirrel refuge with squirrels reported in every one of the famous nine glens. There was an outbreak of Squirrelpox virus in 2011 in Glenarm which sparked very active grey squirrel control. This has resulted in a great reduction in the presence of grey squirrels and they are now limited to transient incursions which are controlled by the estate gamekeepers. Belfast Zoo needed to release four young red squirrels bred in captivity and approached the Glens Red Squirrel Group (GRSG) through the Northern Ireland Squirrel Forum to facilitate a soft release in the grounds of Glenarm estate. The volunteers of the GRSG responded immediately and converted pheasant pens into a soft release structure.

Project aims

- To undertake the first ever soft release in Northern Ireland.
- To add new blood to the local red squirrel population that had been damaged by a Squirrelpox virus outbreak a few years earlier.
- To raise public awareness and encourage local people to become active in red squirrel conservation and grey squirrel control.



Figure 1. Red squirrel in the release pen.

Description of the project

The Glens Red Squirrel Group was approached by Belfast Zoo to capture three red squirrels from a forest in the Glens of Antrim. They captured two females and one male. Once in captivity the females successfully mated and two female and two male kittens were born. Belfast Zoo then approached the Glens Red Squirrel Group to release the four kittens. Glenarm Castle Estate was chosen as it had an established group of red squirrels. Also, inside the Estate was a secure compound surrounded by pine trees, hazel and beech.

Towards the end of August 2014, local members from the Glens Red Squirrel Group and the gamekeepers built a soft release pen using old pheasant pens. In the pen was a closed off area with a feeder. Planks were placed as runways and large branches of hazel with nuts on and another feeder. A bowl of water was provided and changed daily. Once the first two red squirrels, a male and female, were released into the pen three artificial dreys were added. Two remote cameras were placed on a fence opposite the pen and one remote camera was put inside the pen. The cameras on the outside could have the SD cards changed daily, whilst the camera inside could only be changed after the release of the red squirrels to minimise disturbance. Any food or water placed into the pen was done so by reaching through a small door at one side of the pen.

Whilst at the pens, members of the group would forage in the Estate to find food for the squirrels such as twigs of berries, pine cones, hazelnuts and



Figure 2. Red squirrel after release.

beechnuts. This was to provide food that the squirrels had never eaten before so that they would not be totally reliant on the feeders. Some pine cones were put on the runway and floor of the pen. It took a couple of days before one squirrel endeavored to pull the outer scales off of the cone to get at the seeds. The twig of berries was hung about a foot off the floor to encourage them to stretch for the food. Hazelnuts were placed on the floor, planks and the beams of wood round the pen. The beechnut was kept on the branches, and the branches were hung from the side wall of the pen. The red squirrels would walk down the branch and take the nut off the branch and pull it open. This turned out to be their favourite.

The members also felt that the red squirrels needed to learn about moss. They found this out from speaking to the gamekeepers who had witnessed the wild red squirrels gathering moss off one of the bridges. So when the group members were out looking for food they also took a small amount of moss from the top of a bridge. The moss was put in different places in the pen, for instance on the beam of wood around the pen or on the floor. It was noticed the next day that some of the moss was missing from part of a beam, and it had not been knocked to the floor. When the footage was checked from the cameras it could be seen that a red squirrel was gathering moss up from the floor of the pen.

The red squirrels were released into the trees using a plank running from the pen to a tree. When they left the pen, the squirrels first checked the feeder on the tree and then explored the tree before jumping to the next and the next and away. One looked very clumsy at first, but then went to the very top of the tree before leaving and by then seemed quite the expert.

The gamekeepers kept one member of the group informed of what they had seen and where. This enabled the member to put feeders up around the large Estate. Cameras were also put up opposite the feeders to record who was visiting them. The member also started to monitor the records from the cameras and photograph the red squirrels out in the Estate.

Success indicators within the project

- Releasing the first captive bred red squirrels into the wild in Northern Ireland.
- Having an effective programme of grey squirrel control in operation.
- Repeated sightings of released reds squirrels and thus proof of their assimilation into the local red squirrel population.

Major difficulties faced

- Members looking after the soft release pen had very little training.
- Not knowing what size a release pen should be for the number of red squirrels involved.
- Learning by observation and trial and error regarding what to put into the pen.
- Not having the funds to buy the right materials to build a release pen.

Major lessons learned

- Need to train the people who are going to look after the red squirrels that are to be released.
- Draw up plans of how the next release pen should be.
- A list of what should go into the release pen. For instance how many dreys, places (ledges) for the red squirrels to hide, a large branch from the nearby area for the red squirrels to run up and down, plus another from wall to wall.
- Have a sponsor to fund the building of a good quality portable release pen.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

- Four captive bred red squirrels were released into the wild.
- Have been spotted mixing with the resident wild red squirrels.
- The group has learnt valuable lessons from the project.
- Video footage has been made into a presentation for talks.

Future project development

- A sponsor has been found to underwrite the cost of a purpose build portable soft release pen once agreement has been reached with Belfast Zoo and the NI Squirrel Forum that soft release will be the approved method of releasing captive bred red squirrels.
- A core group of people have been established to assist in training and advising volunteers in any area to receive the next red release from Belfast Zoo.

References

1. Topping S (2015) *Report submitted to the NI Red Squirrel Forum meeting in January 2015.*



Map – Location of soft release site, Glenarm, Northern Ireland.

Red Squirrel Conservation in Tollymore Forest

Tollymore Red Squirrel Group

Geographical area of conservation work

Tollymore Forest Park, Newcastle, County Down, Northern Ireland.

Author and organisation contact details

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Key partners

DARD NI Forest Service
Northern Ireland Environment Agency
Northern Ireland Squirrel Forum
Mourne Heritage Trust
Down District & Newry & Mourne Council

Resources

Typical Resource available	Number of people
Paid Contractors (1-6 months)	0
Paid Contractors (7-12 months)	0
Volunteers involved with Grey Squirrel Control	0
Active Volunteers	6+
Other Resources	Grey squirrel control is carried out by NI Forest Service Wildlife Officer

Introduction

Tollymore Red Squirrel Group works in partnership with the Forest Service Northern Ireland (NI), aided by the Mourne Heritage Trust. The group is based in Tollymore Forest Park, Northern Ireland. The group was formed in 2004 by volunteers and Forest Service NI staff who were all concerned about the decline in the native red squirrel (*Sciurus vulgaris*) population and increase in grey squirrel (*Sciurus carolinensis*) abundance. A concerted effort was made by the Forest Service (FS) Wildlife Officer and FS staff to cull grey squirrels and the volunteers set up a supplementary feeding programme to boost the diminishing red squirrel population. At that time we estimate there may only have been 12 red squirrels remaining in the park.

In 2008, after four years of culling and supplementary feeding, a non scientific survey estimated that the red squirrel population had grown by 75%.

The group is aware that disease can be associated with supplementary feeding and consequently use the steel “McComb Red Squirrel Feeder” which excludes grey squirrels and is disinfected every 10 days. On the 15th March, 2011 the first reported case of the Squirrelpox virus in Northern Ireland was found in Tollymore Forest Park. We estimate that approximately 80% of the red squirrel population may have succumbed to the disease.

In November 2014, the group with the assistance of Forest Service NI and Dr David Tosh, Queens University Belfast, carried out a survey of the park and recorded 65 red squirrels and three grey squirrels, which is very encouraging.

Tree disease (*Phytophthora ramorum*) in Tollymore is our next challenge and felling of diseased larch (*Larix spp.*) trees has begun.

Project aims

- To safeguard the native red squirrel population within Tollymore Forest Park for future generations.
- To control grey squirrels in order to reduce the risk of the Squirrelpox virus and to stop them competing for resources with native red squirrels.
- To highlight the plight of our native red squirrel, educate about the dangers from the grey squirrel presence and give the local community a sense of ownership and pride in these iconic woodland creatures.
- To continue to work with Forest Service NI and other agencies to put a red squirrel friendly tree planting scheme into operation to replace trees felled because of disease and to limit habitat loss.

Description of the project

Tollymore Red Squirrel Group work in partnership with Forest Service NI, base all their red squirrel conservation work in local forests under the control of Forest Service NI and have a license to operate within these forests. We have great support from the Mourne Heritage Trust, the Northern Ireland Environment Agency, the Northern Ireland Squirrel Forum, Queens University Belfast, local newspapers and other red squirrel groups.

The group is very small and obtained charitable status in 2011, it does not have any premises or employees and its expenditure is largely made up of insurance, educational materials and feeder maintenance. We are fortunate that we get small subsidies and bursaries from local support organisations and have local fund raising events.

From 2004 our remit was to safeguard the local red squirrel population and over the last 10 years we have had many successes and some major setbacks to contend with, including the unenviable title in March 2011 of being the first forest in Ireland to have a recorded case of the Squirrelpox virus disease.



Figure 1. Tollymore red squirrel near a 'McComb feeder' © Anne McComb.

As a group we have adapted as circumstances around us have changed and our remit in many instances has had to be altered. Prior to 2011 the group had always been aware of the Squirrelpox virus and hygiene/disease related issues associated with supplementary feeding of red squirrels in the presence of even a handful of grey squirrels. Consequently over the years we developed "The McComb Feeder" (Figure 1) which we had hoped would eliminate or reduce the risk of infection. Since the 2011 outbreak of Squirrelpox infection, hygiene and grey squirrel control has been a main priority. The number of supplementary feeders within the park was reduced from nine to four and no feeders were located on the boundary with Bryansford village, where it was felt the risk from grey squirrels in private gardens could not be controlled. Any reported sightings of grey squirrels within the park are passed to volunteers who bait areas for the FS Wildlife Officer to deal with – we rarely have more than three grey squirrels in the park at any given time and these are usually near the village. Volunteers check the supplementary feeders every week and these are taken down every 10 days, cleaned and soaked with an animal high level surface disinfectant and relocated in the same vicinity.

The group has for many years been keen to develop a survey method which could record the red squirrel population within the park, be scientifically recognised and adaptable for other groups within Northern Ireland to use. In November 2014, with help from Forest Service NI and Dr David Tosh, Queens University Belfast, we began our survey. The 630 hectare park was divided into four sections, which were made up of transect lines covering approximately 62 kilometres. Ten volunteers using Trimble GPS units followed the transect lines, stopping every 10 paces to record any squirrels, dreys or other things of interest. The group managed to record 65 red squirrels and look forward to seeing all the facts and figures once the data has been collated.

A worrying development within Tollymore, has been the identification of *Phytophthora ramorum* in the Japanese larch (*Larix kaempferi*). These make up approximately 30% of the woodland and have been a very important food source for the red squirrels. These trees are currently being felled and our hope is that the disease does not spread to other species of larch trees, which make up a further 40% of the woodland. Over the last few years the group has been working with Forest Service NI in helping to develop a planting scheme which will be beneficial to the red squirrel population. It is hoped that when the felled areas of forest are replanted they will include a mix of trees which is beneficial and acceptable to all.

The group has recently been involved in a citizen science project co-ordinated by Queens University, Belfast to survey for Pine Martens (*Martes martes*).

The annual 'Red Squirrel Day' is our biggest yearly event, though we also take walks, visit schools/clubs/groups and attend events such as mammal day at Belfast Zoo and other game fairs and events throughout the year.

Success indicators within the project

- Having a viable and healthy red squirrel population within Tollymore Forest Park.
- Keeping on top of grey squirrel control.
- Helping the increasing red squirrel population to colonise outlying forests and campaigning for the council to cull grey squirrels in council owned land to facilitate this.
- Protecting and enhancing red squirrel habitat by encouraging appropriate planting schemes with Forest Service NI and other organizations/agencies.

Major difficulties faced

- Negative and public opposition towards culling grey squirrels, especially in urban areas – a factor which then influences councils in making policy.
- Lack of support by some government agencies, councils and large organisations to put a grey squirrel control policy into effect on all their property.
- Funding cuts which may be detrimental in developing a vaccine for the Squirrelpox virus.
- Recruiting more volunteers who are willing to become part of the committee and take on an administrative role.

Major lessons learned

- Events focusing on red squirrel conservation have created great local interest and support for all our native flora and fauna.
- Reducing the number of feeders has produced a smaller, healthier population of red squirrels which can be sustained by the local habitat, especially with the threat of tree disease.
- Replacing our wooden feeders with steel ones which can be disinfected, has enabled the group to reduce the risk of spreading of disease among the red squirrel population.
- The need to co-ordinate with other bodies to forward squirrel conservation.

Success of project

Success or Failure	
Highly Successful	
Successful	X
Partially Successful	
Failure	

Reason(s) for success/failure of the project

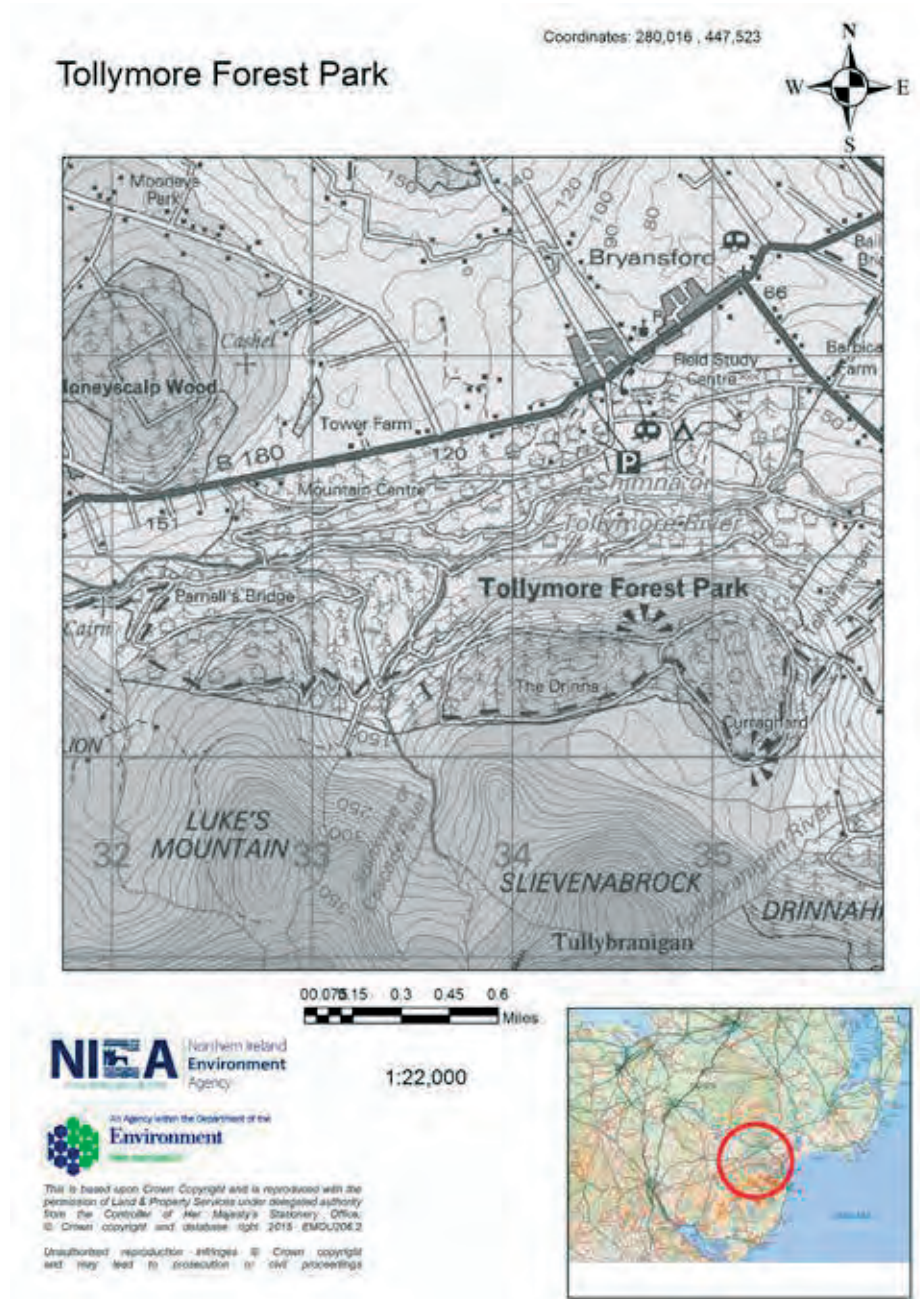
- We have a very active team of dedicated members who commit a tremendous amount of time and energy into the project.
- We have reduced the number of feeders so that the population is not boosted to an unnaturally unsustainable level, especially with the threat of tree disease.
- The group have a very good working relationship and receive good support from Forest Service NI and other local organisations and agencies.
- As a small group we acknowledge our limitations and work within our capabilities.

Future project development

- The Northern Ireland Squirrel Forum is backing our campaign to promote the planting of red squirrel favoured tree species and given the scale of tree disease throughout the United Kingdom we feel this is an important issue for everyone involved in red squirrel conservation.
- We hope to have the results of our squirrel survey collated and published soon.

References

1. Red Squirrel Conservation – Species Document produced by Mourne Heritage Trust (2010) Red Squirrel Group/Mourne Heritage Trust/Forest Service (DARDNI)



Map - Tollymore forest

Shared Experience of Red Squirrel Conservation Practice

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