

Towards a Forestry Commission England Grey Squirrel Policy



Introduction

1. The Sustaining England's Woodlands Review¹(SEW) report committed the Forestry Commission (FC) to 'develop, with partners, a clear modern policy towards grey squirrels, backed by appropriate practical management strategies'. The report said that the FC would work with the England Squirrel Forum (ESF), and ask for its advice in developing policy and practice in this area. This report examines the impacts of grey squirrels in England, and explores options for control. It is intended to provide an agreed context and understanding from which policy and actions can be developed.
2. This report has been prepared in conjunction with the ESF and other interested parties. The names of the organisations who have been involved and/or consulted are listed at the end of this report.

Background

3. The grey squirrel was introduced to Britain in the 19th century and has spread widely, especially in lowland areas with broadleaved and mixed woodlands². As well as occupying much of the former range of the native red squirrel, grey squirrels frequently cause significant damage to trees by bark stripping, resulting in economic losses and reduced amenity and habitat value. The perception of grey squirrel damage acts as a disincentive to planting and managing broadleaved trees for their timber value. However, grey squirrels are now part of our wildlife and whilst an increasing number of people see them as a problem, many people self-evidently enjoy their presence in parks, gardens and woodland picnic sites and car parks.
4. Grey squirrel spread, presence and damage provoke strong feelings in many tree growers, and views that the species causes widespread woodland destruction and threatens sustainability are not uncommon. Against this, evidence over 30 years of survey and monitoring by the Forestry Commission's Forest Research Agency (FR) and others consistently shows that usually less than 5% of damaged trees within plantations actually die as a result of grey squirrel damage (far fewer than from poor and delayed thinning practice). However, the trees that die may often be dominants selected as final crop trees. If 30% of the canopy is lost from squirrel damage, timber yield can be affected by up to two yield classes. Generally most urban towns and woods and most ancient semi-natural woodland (with the exception of some beechwoods and some beech/oak woods) suffer minimal bark stripping damage and usually only within tree crowns, even though squirrel densities can be higher than in plantations. Trees in young plantations, including beech, severely damaged by basal bark stripping, may recover by the mature phase; bark calluses over and young oak may readily respond to crown damage by throwing out replacement shoots. There is no doubt though that tree damage and timber degrade in managed even-aged broadleaved and mixed conifer/broadleaved plantations (or the perception of damage), acts as a disincentive not only to the planting of new broadleaved woodlands, but also to the management of existing plantations for timber production. The effects may in turn impact on public goods provision.

Impacts on Sustainable Woodland Management

5. The FC's objectives are to support sustainable woodland management and to enhance the public benefits generated by woodlands and forestry. The main impacts that grey squirrels have on the achievement of these objectives are summarised in the following paragraphs.

Economic Impacts

6. Grey squirrels strip the bark of trees and can cause severe damage to many species, including sycamore, beech, oak, sweet chestnut, pine, Norway spruce and larch. In young plantations or areas of natural regeneration, trees aged between 10 and 40 years are generally most vulnerable, although younger and older trees may be damaged depending on size, vigour and bark thickness. Particular stands may remain vulnerable for 30 years or more. The risk of damage may be enhanced following silvicultural thinning. Normally fewer than 5% of the damaged trees die, but many more have degraded timber value through rot, callusing and broken tops. There may be a reduction in annual increment of up to two yield classes and a significant loss of timber value in plantations. Semi-natural woodlands and woodlands established using new native woodland principles and by natural colonisation can suffer much less than single species, even-aged plantations.
7. The economic cost of grey squirrel damage to beech, sycamore and oak woodlands in GB (discounted at 6% to a common year of 2000) was estimated to reduce the value of tree crops by around 25% or £10 million, of which £8 million is in woodlands outside the public forest estate³. Note though that due to the assumption made in this evaluation that all damaged trees are rendered valueless, the researchers considered this an upper limit of the direct economic impact. Anecdotal evidence suggests that repeated grey squirrel damage to trees acts as a disincentive to owners to manage their woods and create new woods. This in turn impacts upon the delivery of the wider public benefits associated with well-managed woods and overall sustainability. Severely damaged trees may affect the amenity value of a woodland or landscape.

¹ Sustaining England's Woodlands. Forestry Commission, 2002.

² Controlling Grey Squirrel Damage to Woodlands. FC Practice Note 2004.

³ An Evaluation of the Costs of Grey Squirrel Bark-Stripping Damage in British Woodlands. Broome and Johnson. FC 2001.

Biodiversity Impacts

8. Grey squirrels occupy much of the former range of the native red squirrel. They are able to utilise broadleaved and mixed woodland areas more efficiently than reds, reaching higher population densities⁴. Where expanding populations of greys meet red squirrel populations, the reds are usually displaced within 15 years of the arrival of greys in the absence of any effective intervention and perhaps sooner if squirrelpox virus disease is present. Grey squirrels may be carriers of the squirrelpox virus to which they are resistant but which is fatal to reds. Apart from isolated populations on the Isle of Wight, Poole Harbour Islands and the Sefton coast in Lancashire, most of the English population of red squirrels is confined to the larger conifer woods in Cumbria and Northumbria. In particular the FC's Kielder Forest may support as much as 75% of the surviving population of England's red squirrels.
9. Grey squirrels also damage and eat seeds from naturally regenerating trees and shrubs, which may lead to long-term damage to certain ancient semi-natural woodland types. Such impact, where combined with the impact of deer browsing and grazing, may be threatening the sustainability of natural processes in some of our native woodlands. Together with differential bark stripping of tree species, this has the potential to eliminate individual tree species, affecting future composition and structure in some types of native woodlands, although in practice management intervention should counter any such potential. Competition for food and shelter may be affecting priority species such as common dormouse and red squirrel⁵. The FC is committed to protect, maintain and enhance priority woodland habitats and species. Native beech woodland is particularly threatened by grey squirrel damage in some areas.
10. Grey squirrels are implicated in the decline of woodland birds through predation of eggs and nestlings and competition for food⁶. Populations of woodland birds are one of the Government's Headline Quality of Life Indicators and the FC led Woodland Bird Group has highlighted this possible impact as a priority for research. At the same time, however, squirrel damage in the crowns of mature trees helps create decaying wood habitat, of value to a wide range of species, within otherwise simple structured plantations (although this habitat feature could equally be created, albeit at cost, through management). Grey squirrels may also form a significant part of the diet of our larger native predators (e.g. goshawks).

Social Impacts

11. Squirrel damaged crowns of trees can pose a safety hazard, which not only increases the costs for woodland owners in terms of managing their liabilities to the public but may also discourage owners from allowing wider public access to their woodlands. Expanding public access in woodlands is a priority FC England target.
12. For many people, the grey squirrel is one of very few truly wild mammals that they are likely to see regularly. They are engaging creatures and viewing them contributes to public enjoyment of the outdoors. Despite fairly widespread appreciation of nuisance from entry to and damage in houses and to gardeners' crops, the feeding of squirrels remains an attraction for some people in public parks. The public, however, rarely encounter or notice bark stripping damage, even where grey squirrel numbers may be high. As awareness and education of countryside issues improve, people are becoming more exposed to the need for the humane controlling of wild animals, including grey squirrels, for biodiversity conservation reasons. There is little evidence, however, to suggest that control of wild animals is becoming any more acceptable to the public.

Population and Damage Dynamics

13. Grey squirrels are now an established part of our wildlife, with a population estimate of 2 million⁷. They live at densities of up to 18 per hectare⁸. Young animals move considerable distances, with recorded home ranges of 5-11ha, and dispersal distances of up to 3 km⁹. They will quickly colonise available areas of suitable habitat at a rate of 2-4 km per year. Reproduction is influenced by food-availability, with mating usually occurring between January and July and two litters of up to 7 young being produced. Annual adulthood mortality is low. In years of high seed-availability, mating will start earlier and exceptionally 3 litters may be produced.
14. Grey squirrel population levels are influenced by food availability. They will take food put out for garden birds or in woodlands for game birds. This boosts winter survival, and thereby subsequent populations, and ensures rapid re-colonisation of controlled areas. Populations of squirrels are adversely affected by cool, wet weather, through reduction of food availability and increased mortality. Predicted climate change is therefore likely to result in increased population densities and ranges¹⁰.

⁴ Conserving the Red Squirrel. FC Research Information Note, 1991.

⁵ Possible Impacts of Grey Squirrels on birds and other wildlife. Hewson, Fuller, Mayle and Smith. British Wildlife, Feb. 2004.

⁶ Impacts of Grey Squirrels on Woodland Birds: An important predator of nests and young? British Trust for Ornithology Research Report, 2003.

⁷ A Review of British Mammals. Harris et al. JNCC, 1995.

⁸ The effects of food availability and winter weather on the dynamics of a grey squirrel population in southern England. Gurnell, J. Applied Ecology, 1996.

⁹ Grey Squirrel. Gurnell, J. In the Handbook of British Mammals. Brackwell Scientific Publications, 1991.

¹⁰ Climate Change and the seasonality of Woodland Flora and Fauna. Sparks, T and Gill, R. In Climate Change: Impacts on UK forests. Forestry Commission Bulletin 125, 2002.

15. Bark-stripping occurs mainly between the end of April and the end of July. Spring population densities of more than 5 squirrels per hectare with high juvenile levels (0.5 per hectare) can be enough to cause significant damage to woodlands. Grey squirrels live at highest density in mature woodland consisting of mixed large-seeded broadleaves. Small areas of younger trees adjacent to such prime habitat are particularly vulnerable to damage.
16. In suitable habitats, densities can reach almost 18 squirrels per hectare. Most of the impacts of grey squirrels are 'density dependent', i.e. the more squirrels, the greater the impact. An exception to density dependence impact is the demise of red squirrels through the presence of squirrelpox virus, for which the grey is thought to be a vector¹¹.

Methods of Controlling Grey Squirrel Damage

17. In most areas, bark stripping damage caused by grey squirrels is tackled by reducing populations around vulnerable areas immediately before and during the damage-vulnerable period. Where timber production in woodlands is an objective and where the value of the trees is greater than the cost of control, the recommended methods, provided there are no red squirrels or pine martens, are the use of warfarin-coated bait placed in hoppers, or cage trapping. Shooting alone is generally ineffective and spring-trapping is less selective. Following a recent review by the European Commission, continued use of warfarin for controlling grey squirrels after April 2007 will be on condition that only pre-prepared products or baits are marketed rather than concentrates. The pressure to reduce the use of chemical pesticides in the countryside may independently lead to a reduction in the use of warfarin to control grey squirrel.
18. In the very long term, non-lethal methods of population control, such as immuno-contraception, may prove effective for squirrels and other mammalian pests. The FC and its partners have investigated use of an oral vaccine that, on the basis of laboratory tests, offered the promise of a highly specific immuno-contraception agent deliverable via bait. Unfortunately, it proved largely ineffective in field tests and the partners (which included the JNCC and timber growing interests) decided to discontinue the project. Nevertheless further recent advances have been made in other countries (notably USA and New Zealand) using different vaccines. The FC and Defra are in contact with the research teams involved. Although their studies are still some way from demonstrating efficacy at controlling wild populations, collaboration with a view to extending any successes to the UK situation is under active consideration.
19. Research efforts are currently focussed on predicting years and sites where damage will be high so that managers can focus their control efforts to best effect. If it becomes FR recommended guidance this 'index trapping' method could further inform FC grant support for bark stripping damage control in areas of critical threat.

Effectiveness of Control

20. Where control is carried out at recommended intensity, using recommended methods and recommended timings, research suggests that it is possible to reduce bark stripping damage to acceptable levels. However, many managers find that they cannot achieve this in all locations and in all years because of fluctuating populations. No control in a high-risk year may result in high damage, cancelling out all previous years' efforts and costs of control. Developing a reliable predictive method is therefore a priority.
21. Anecdotal evidence from forestry agents in the Chiltern Hills suggests that current efforts at grey squirrel control are ineffective at reducing damage to trees to acceptable levels at the required landscape scale, despite enthusiasm from a large proportion of owners to control squirrels. The fragmentation and diversity of ownerships nearly always means that there are always sufficient gaps in control coverage to ensure grey squirrel damage remains widespread. UKWAS certification requires management of wild mammals to be carried out in co-operation with neighbours where possible and this is also recommended by the FC, though is not currently a requirement for grant-aid. As more woodlands become certified, co-operative control may increase.

Cost of Control

22. Control is best carried out in areas of mature seed producing trees adjacent to vulnerable stands. To control grey squirrels at recommended intensity using warfarin costs around £60 per hopper per season, which includes the costs of bait and the manpower required to keep the hoppers filled with bait (one to two visits per week at first, then fortnightly as bait consumption falls). On average there would need to be one hopper per 5 hectares of woodland, although in high damage years (about every 3-5 years) one hopper per hectare, the maximum legal density, would be needed across all woodlands on an estate to keep damage to tree crops to an acceptable level. Control may have to be sustained on a long-term basis. Under such circumstances costs of preventing damage to timber trees could outweigh potential revenue but control for other purposes may be necessary.

¹¹Routes to the development of a squirrelpox virus vaccine for red squirrels. McInnes and Nettleton. Draft Report to UKRSG, 2002.

23. Multi-capture or single capture cage traps can be used as an effective alternative to hoppers, though they are generally more expensive to run. These must be visited at least once a day to remove and kill trapped grey squirrels. It is illegal to release back into the wild trapped grey squirrels. Multi-capture traps should normally be set out at a maximum density of one per hectare. Index trapping (para.19) together with site risk assessment should enable better targeting of control, reducing both costs and numbers of squirrels killed. Once research results are published as recommended guidance, the use of index trapping as a means of justifying FC grant support in areas of "critical threat" will be considered.

The FC and Grey Squirrels

24. The FC has been involved in grey squirrel management for many years, through:

- funding research carried out by Forest Research and other providers
- surveys of grey squirrel populations and damage
- dissemination of advice and information on grey squirrel damage control, including seminars and training
- grant aid to private woodland owners for grey squirrel damage control
- sponsoring the England Squirrel Forum
- targeted control of grey squirrel damage on the public forest estate
- partnership action in preventing grey squirrel colonisation of red squirrel areas.

25. The FC's basic advice on targeted (in time and space) control of grey squirrels to combat bark-stripping damage in woodlands has remained largely unchanged over the 30 years of subsequent application, monitoring and research. During the period grey squirrels have extended their range in the UK, displacing red squirrels and possibly affecting woodland birds and other priority species, as well as hampering natural processes within woodlands.¹² The FC's role has changed over the period, with sustainability and provision of wider public benefits becoming the basis of its remit. Whilst these wider impacts of grey squirrels are now beginning to be considered, the public benefit of continued FC support for damage control in timber crops has been questioned on economic grounds¹³.

26. The FC grant contribution to grey squirrel control in private woodland, mainly as part of Annual Management Grant (AMG) cannot be separated out from the suite of operations which justify the grant. (Total AMG spend in England averages £4.5 million per year). The grey squirrel research and extension (including advice and technical transfer) GB programme costs in excess of £100,000 per year. Targeted control of grey squirrels on the public forest estate costs around £200,000 per year.

27. In seeking value for taxpayers' money, the FC must ensure that it can verify that grant-aided operations really are taking place and public benefits are being achieved. It has been difficult for FC Woodland Officers to verify that grey squirrel control is being carried out effectively because even if hoppers are mapped and checked, it is not possible to determine whether or not the control programme is taking place to the recommended standards. To judge control by the outcome (i.e. reduction in damage) is problematic because even with a great deal of effort in control, damage is unpredictable and may still occur or may not occur in vulnerable areas where no control is carried out.

28. An internal evaluation in 1999 of a sample of Annual Management Grant (AMG) Schemes that did not involve public access support found that grey squirrel control (along with ride management) formed the major justification for payment of AMG. However, control was rarely carried out to the recommended standards and was often not targeted, occurring in woodland not vulnerable to economic damage or where timber production was not an owner objective. Owners often experiment with their own variation of the recommended methods, and rely to a large extent on shooting and therefore damage control efforts often prove ineffective. Pheasant shooting enterprises ensures wildlife control skills are locally available but pheasant feeding boosts grey squirrel winter survival.

Discussion

29. The grey squirrel is an invasive non-native species within the terms of the Convention on Biological Diversity and the recent UK Government review. Consequently eradication has to be considered. Clearly, were this to be achieved, discussions about when and where to focus control resources would be superfluous. There would be support among some growers for a policy of eradication, but, given the diversity of woodland ownership in towns and rural areas, and the fact that many people enjoy seeing squirrels, a policy of eradication may be neither desirable nor practical at country level. It is nonetheless appropriate to keep this policy under review with regard to impacts on biodiversity. For example, more evidence is needed to assess the true environmental costs and benefits of targeted control versus eradication. At present there is no critical biodiversity benefit of eradication at a national scale, but preventing greys from expanding further into red squirrel areas is an obvious priority. Coupled with this is the need for a better understanding of the transmission route and conditions under which squirrelpox virus may be spread to red squirrels by greys. While there are no indications of wide public support for the eradication of grey squirrels, there is much support for their vigorous control in priority red squirrel areas.

¹²Grey Squirrel Control. FC Leaflet 56. HMSO, 1973.

¹³Economic Analysis of Forestry Policy in England. CJC Consulting, April 2003.

30. Even were government to regard eradication as acceptable, it would not be feasible with current methods. Using these methods, managers already encounter great difficulty and expense even in reducing numbers to levels where damage is acceptable. Moreover, control for timber protection is aimed at reducing numbers only through the limited period of the year when squirrels damage trees. The mobility of animals is such that populations are rapidly restored after the control period; even isolated woods may be re-colonised in 2 or 3 months. Grey squirrels are highly dispersed and enforcing an official control policy over many ownerships including urban parks and gardens would present formidable logistical difficulties and adverse public reaction. The mobility of greys and the difficulty of achieving concerted action by landowners have also made the success of exercises aimed at reducing numbers of grey squirrels in the vicinity of remnant red squirrel populations problematic. Sustained reduction in numbers has not often been convincingly demonstrated. Nonetheless, preventing grey squirrels from becoming established in red squirrel refugia should continue to be the goal, even though success may only be possible on a very local scale and in isolated habitats (such as on small islands).
31. It is sometimes suggested that a restoration of the bounty scheme operated by government in the 1950s could help to eradicate grey squirrels or at least make a serious impact on numbers. Such a scheme today would present a risk to public safety. The 1950s scheme made no significant impact on natural fluctuations in numbers, or on the rate of spread, and was abandoned as ineffective. Populations of grey squirrels actually rose during the scheme's lifetime.
32. As well as possible new immuno-contraception methods, modern technology offers the prospect of genetically engineering a virus or bacterium which is highly pathogenic to grey squirrels. Such a course of action has been recommended to government by some woodland owners. Even were this to be ethically acceptable, the example of myxomatosis does not inspire confidence that infectious disease would represent a long-term solution. Moreover, government scientists believe that absolute specificity to grey squirrels would be extremely difficult to achieve and impossible to guarantee and red squirrel populations would also be put at risk.
33. To prevent many of the impacts described in this paper, reducing grey squirrel populations at the appropriate time in the right place seems the only workable solution. However, given the resource implications of control and the need to minimise the number of animals killed, alternative solutions must always be given due consideration. For example, when planting a new woodland, the choice of species could be influenced by the vulnerability of the woodland to grey squirrel damage (or in some areas red squirrel conservation needs). Regeneration by natural processes in ancient woodlands may suffer less damage than grid planted trees; well structured, open canopy woodlands with dense shrub layers may suffer less basal bark stripping damage than closed canopy plantations with little ground vegetation.
34. It is important to note that the killing of grey squirrels does not necessarily equate to the reduction of damage caused by grey squirrels. It is clear that effective methods of squirrel control are available, but it is also clear that the exercise of effective control depends on the adoption of optimum techniques and the input of sufficient resources. The area of woodland that can be subject to effective control is therefore necessarily limited by the availability of resources and where the value of the crop, amenity or biodiversity benefits is sufficient to justify the costs.
35. For the FC to support the control of grey squirrels in a particular location, it must be convinced that doing so will further the FC's objectives of sustainable woodland management and delivery of public benefits from woodlands. There will be clear cases where it is in the public interest to support control to protect a key value, but there will also be cases where it is not; in the latter the FC cannot give financial support to control.

The Need to Work in Partnership

36. At the national level a variety of bodies representing the stakeholders in this issue are brought together in the ESF. Developing a policy and action plan with the help of the ESF helps to define a balanced approach to the problem. However, ultimately, it is up to individual landowners to take decisions on what they do on their own land and accept the consequences. Nonetheless, FC technical and operational advice should continue to be available to all woodland owners.
37. The mobility of the grey squirrel means that control can be best achieved when it takes place across a sufficiently large area. The fragmented nature of woodland ownership in England, particularly in the lowland broadleaved woodland areas most susceptible to damage, means that a co-operative approach between neighbours is usually required for control to be effective.
38. The FC, through its agency Forest Enterprise, manages nearly 20% of the woodland in England, and a further 30% of the woodland area in England is managed under schemes with the FC. The FC has limited influence over the owners and managers of this private woodland, and rather less influence over the management practices in the rest of the woodland, and the non-wooded land in this country. The FC can play its part in partnerships for grey squirrel control where these partnerships further our objectives but, as for any other stakeholder, we will not always be best placed to take a lead, or even to play a part in such work.

39. Partnership in research is also important if we are to explore new innovative and publicly acceptable methods of controlling populations. The jointly funded FC, JNCC, Scottish Forestry Trust and private growers research into immuno-contraception of grey squirrels has demonstrated the value of partnership in funding and directing research.
40. Delivering the England part of the UKBAP for red squirrels is a priority for government and ESF and can only be achieved by a wide range of stakeholders working in partnership, including at the UK scale. Trying to prevent grey squirrels from colonising key red squirrel areas and vigorous control of their numbers in such circumstances is a government priority and will be energetically pursued by the FC together with partners and the support of the public. Improving our understanding of squirrelpox virus transmission and then mitigating its effects is a key component of the red squirrel conservation partnership's work.

Organisations Represented on the England Squirrel Forum and Consulted in the Preparation of this Report:

Chiltern Woodlands Partnership
Country Land and Business Association
Cumbria Wildlife Trust
Department for Environment Food and Rural Affairs
English Nature
European Squirrel Initiative
Forest Enterprise England
Forest Research
Forestry and Timber Association
Forestry Commission England
Forestry Commission Forestry Group
Game Conservancy Trust
Isle of Wight District Council
Lancashire Wildlife Trust
National Trust
Northern Ireland Squirrel Group
Northumberland Wildlife Trust
Red Alert North East
Red Alert North West
Royal Society for the Prevention of Cruelty to Animals
Scotland Squirrel Group
Small Woods Association
UK Red Squirrel Group
Universities Federation of Animal Welfare
University of London Queen Mary College
Wales Squirrel Forum



Forestry Commission England
National Office for England
Great Eastern House
Tenison Road
Cambridge
CB1 2DU
t: 01223 314546
f: 01223 460699
e: nationaloffice.fce@forestry.gsi.gov.uk
w: www.forestry.gov.uk



Wildlife Administration Unit
Defra
Burghill Road
Westbury-on-Trym
Bristol
BS10 6NJ
t: 0845 601 4523
f: 0845 601 3438
e: enquiries.southwest@defra.gsi.gov.uk
w: www.defra.gov.uk/wildlife-countryside/vertebrates

European Wildlife Division
Defra
Zone 1/08
Temple Quay House
Bristol
BS1 6EB
t: 08459 335 577 (Defra's main helpline)
e: species@defra.gsi.gov.uk
w: www.defra.gov.uk