

Executive summary

- The grey squirrel is an invasive non-native species that has negative impacts on tree and woodland health and survival, native red squirrel populations, biodiversity and timber production, and the ecosystem services that mature trees and woodlands provide.
- Without management of grey squirrels, native red squirrels could become extinct in the UK.
- In 2010, economic costs of grey squirrels to the UK economy were estimated at £14 million. The costs of grey squirrels to the forestry sector over the next 150 years are estimated at £22.5 billion.
- Grey squirrels are major obstacles to the planting and survival of broadleaf woodland.
- Grey squirrels can be successfully removed from large areas, but gains can quickly be lost if projects end and grey squirrels reinvade.
- Management efforts need a cross-border, well-resourced, on-going approach to ensure they are effective in the long term.
- UKSA and Defra are funding research into a fertility control for grey squirrels that could provide another effective, humane management option.

The UK Squirrel Accord (UKSA) is a UK-wide partnership of 37 leading conservation and woodland organisations, Government agencies and companies. UKSA works collaboratively to preserve the UK's wooded landscapes and associated biodiversity under the following objectives:

- Secure and expand UK red squirrel, *Sciurus vulgaris*, populations beyond current thresholds.
- Ensure UK woodlands flourish and deliver multiple benefits for future generations of people and wildlife.

To achieve this, the negative impacts from invasive non-native species (species intentionally or accidentally introduced by humans to places outside their natural range that cause negative environmental, economic or public health impacts) must be effectively managed at a landscape scale, such as the grey squirrel, *Sciurus carolinensis*.

The UKSA's written submission concentrates on issues most relevant to preventing our objectives, as outlined above. We would also like to offer to provide oral evidence to the Environmental Audit Committee as required.

Please note, Defra is a signatory to UKSA but has submitted a separate response to this inquiry rather than endorsing UKSA's response.

1. How well is the UK and its overseas territories managing the impact of invasive species and controlling the risks of further invasion?

- 1.1. Within the UK, a number of invasive species continue to have significant negative impacts on the health, biodiversity value and productivity of UK woodlands and other habitats. Further resources and coordination could help to more effectively prevent invasion from new species, to enable early detection and eradication measures for new invasions, and to manage the impacts of already established invasive species in the longer term. Offering incentives through land management schemes and grants, supported by measures to assess

success, would enable and encourage more land owners and managers to tackle problem species.

- 1.2.** Grey squirrels were introduced from North America to southern England in 1876 and Ireland in 1911, since then they have spread across the UK and have only been stopped from invading certain areas by active management or physical, natural barriers. Through competition and disease transmission they have caused serious declines in red squirrel populations. Their bark stripping behaviour weakens trees and leaves them more susceptible to disease and windblow, which can be fatal. This can prevent trees reaching maturity, yet mature trees are shown to deliver greater ecosystem service benefits than younger trees, including supporting more biodiversity, sequestering carbon, reducing air pollution and intercepting rainwater.
- 1.3.** The 1985 Broadleaves Policy saw a change towards planting more tree species that support native biodiversity and have the potential to provide an important hardwood timber resource. However, there is a reluctance to plant broadleaves for timber purposes due to the impact of bark stripping by high densities of grey squirrels. Valuable species such as oak, beech and hornbeam are highly susceptible to attacks by grey squirrels.
- 1.4.** To achieve a good form, trees must be well managed and healthy during their first 30 years. Grey squirrels target young broadleaved trees, 5-40 years of age, stripping the protective bark from them to access the nutritious sap beneath. This creates open wounds that can become infected by pathogens, which can cause irreversible damage and tree fatalities. Grey squirrels can cause the loss of leaders, lesions, callus growth and dysfunctional shape, and lead to public health and safety issues on roads and highways through the loss of limbs and falling trees.¹
- 1.5.** In 2014, a survey of Royal Forestry Society members highlighted grey squirrels as the greatest threat to broadleaf timber production, above the threats posed by tree diseases and deer. One member stated, “I replanted the major part of my woodlands in 1987 with 80% English oak. The bark stripping by grey squirrels over those 26 years has seriously damaged an estimated 40% to 50% of the crop, in many cases fatally.”²
- 1.6.** In 2010, the Centre for Agriculture & Bioscience International estimated the economic impact of grey squirrels on Britain’s forestry sector at £6 million per year. The overall cost to the British economy rose to £14 million when their impacts on construction and infrastructure were included.³ Recently Graham Taylor estimated the long-term cumulative cost of grey squirrel damage to the timber trade, over the next 150 years needed to produce mature, productive hardwoods, to be over £22.5 billion. This is made up of £40 million per year lost to the rural economy and £110 million per year spent on foreign imports by businesses who need the sawn timber that UK woodlands are failing to deliver when trees are damaged.⁴
- 1.7.** Grey squirrel numbers continue to increase and a collaborative report, funded by Royal Forestry Society, Forestry Commission, National Forest Company, Natural Resources Wales and Woodland Trust, to update the economic costs of grey squirrels is currently in creation and will be published in the summer.

¹ Taylor, G., 2019. Presentation at the Red Squirrel South West conference. Pryor & Rickett Silviculture.

² Royal Forestry Society, 2014. Survey of RFS members’ views and experiences of grey squirrel control. Available online: <https://www.rfs.org.uk/media/405831/rfs-grey-squirrel-impact-survey.pdf>

³ Williams, F, et al. 2010. Economic cost of Invasive Non-native species on Great Britain. CABI. Available online: https://www.researchgate.net/publication/298559361_The_Economic_Cost_of_Invasive_Non-Native_Species_on_Great_Britain

⁴ Taylor, G., 2019. Presentation at the Red Squirrel South West conference. Pryor & Rickett Silviculture.

1.8. Further research is needed into effective, humane methods of grey squirrel management. UKSA and Defra are collaborating to fund research conducted by the Animal and Plant Health Authority into a fertility control for grey squirrels. The research is currently in the second of a five-year project and hopes are high that this will provide another tool for the humane management of grey squirrels and perhaps other mammals.⁵

2. Of those that are already in the UK, which invasive species are posing the greatest harm to:

- a. human health;**
- b. animal health;**
- c. plant health and biodiversity.**

2.1. Established species such as grey squirrels, *Rhododendron ponticum*, Himalayan balsam, Japanese knotweed, giant hogweed, fallow and sika deer, and muntjac are currently the biggest threats to the health of woodland ecosystems.

a. Human health

2.2 Trees bark stripped and girdled by grey squirrels can pose health and safety issues through negatively impacting the structural integrity of the tree. This can pose problems during felling operations, but also to the wider public if trees or their limbs fall onto roads and highways, buildings or people themselves.

b. Animal health

2.3 Grey squirrels are larger and more aggressive than native red squirrels, which they outcompete for food and territory. They also carry a disease, squirrel pox virus (SQPV), which they rarely contract but that is almost always fatal to reds. Red squirrels decline in the presence of grey squirrels due to competition for food and territory, which results in malnutrition, reduced reproduction rates and starvation in reds.

2.4 Grey squirrels also increase psychological stress in red squirrels, which significantly increases the concentrations of stress hormones released into their bodies by up to three times. Sustained elevations could reduce body growth and reproductive rate, and may explain “studies where the co-occurrence of the invasive grey squirrel was associated with smaller size and lower reproductive output in red squirrels”.⁶

2.5 In broadleaved woodland without active management, grey squirrels can replace reds within 15 years of invasion. However, where SQPV is also present reds decline 17-25 times faster⁷. Current estimates believe there are now 2.5 to 3 million grey squirrels in the UK, but only around 140,000 red squirrels remaining in various strongholds (see figure 1 below). These are either actively managed by volunteers and land managers to remove grey squirrels or have natural barriers to prevent grey squirrel invasion, including islands such as the Isle of Wight.

⁵ Massei, G. 2017. Fertility Control for Grey Squirrels: what do the next 5 years look like? National Wildlife Management Centre – Animal and Plant Health Authority. Available online:

http://squirrelaccord.uk/assets/gio-massei_fc-squirrels-york-19-oct-2017.pdf

⁶ Santicchia, F., 2018. Stress in biological invasions: Introduced invasive grey squirrels increase physiological stress in native Eurasian red squirrels. Journal of Animal Ecology. Available online:

https://www.researchgate.net/publication/325318746_Stress_in_biological_invasions_Introduced_invasive_grey_squirrels_increase_physiological_stress_in_native_Eurasian_red_squirrels

⁷ Rushton, SP, et al., 1999. Modelling the distribution of red squirrels (*Sciurus vulgaris*) on the Isle of Wight. Animal Conservation, 2:111–120. Available online:

https://www.researchgate.net/publication/266205696_Landscape_scale_impacts_of_culling_upon_a_European_grey_squirrel_population_culling_reduce_population_size_and_decrease_the_threat_of_squirrelpox_virus_infection_for_the_native_red_squirrel#pdf

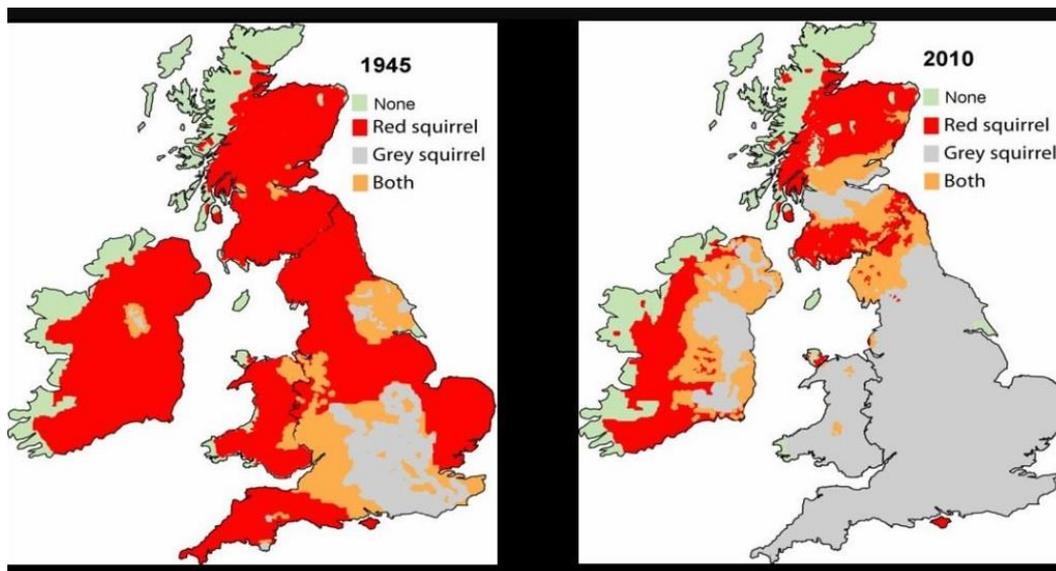


Figure 1. Red and grey squirrel distribution in the UK, 1945 and 2010.⁸

c. Plant health and biodiversity

2.6 Grey squirrels pose a threat to the health of our trees and woods through intensive bark stripping. There are concerns that bark stripping can increase the risk from and spread of plant pathogens. Bark stripping can reduce the health and vigour of a tree, making it more susceptible to tree diseases. The open wounds created by the bark stripping also expose vulnerable areas of tree tissue that can more easily be invaded by pathogens. As grey squirrels move from tree to tree, they can pick up, carry and transmit pathogens via their feet and faces. When coupled with the increasing number of plant pests and pathogens being introduced into the UK, this makes bark stripping a serious tree health concern.

2.7 The loss of trees in the landscape and reduction in tree health caused by bark stripping also has knock-on, negative impacts on the biodiversity that relies on tree and woodland habitats for survival. Oak trees support more biodiversity than any other native, UK tree species and are particularly at risk from grey squirrels. Over 2,000 species of birds, mammals, invertebrates, fungi, mosses and lichens have been recorded using oak, with 300 of them found only on oak trees.⁹ As trees mature the aging process provides more habitat niches for a wider range of species. However, if trees are unable to survive to maturity due to bark stripping damage and as we lose older trees over time in the landscape, this subsequently reduces the UK's biodiversity.

3. What are the risks of invasive non-native species migrating to the UK from future climate change?

3.1. Changing environmental conditions may enable the spread and establishment of invasive non-native species and create new opportunities to spread to or better survive in areas they would previously have been unable to. Species currently unable to establish or thrive in the UK could become problematic as the climate changes. Where these species have no natural control measures, e.g. predators or diseases, then they may become invasive and have negative environmental, economic and/or public health impacts. Rapid climate change

⁸ Dr Craig Shuttleworth / Red Squirrel Survival Trust (2010).

⁹ Scottish Environment, Food and Agriculture Research Institutes, 2019. Assessing the impact of tree diseases on the wider environment. Available online: <https://sefari.scot/research/assessing-the-impact-of-tree-diseases-on-the-wider-environment>

is threatening the ability of native species and habitats to adapt to cope with that change, and invasive non-native species can add extra negative pressure if they are not prevented, eradicated or managed.

4. What actions should the UK take to mitigate the risk, or adapt to, climate migrations of invasive species?

- 4.1.** Regular horizon scanning can be carried to identify and monitor species that could pose a future problem, while risk assessments on those species can inform measures that can be taken to mitigate this. Increasing public understanding of invasive species, the problems they create and solutions to tackle them may help to prevent new invasions, to support early detection and eradication efforts if they do enter the UK, and encourage long-term management efforts of already established species.
- 4.2.** Committing more resources to biosecurity measures at ports would help to prevent invasive non-native species being introduced through the import of products, such as firewood, wooden packaging and live plants.

5. Where should the four nations prioritise resources to tackle invasive species?

- 5.1.** Invasive non-native species are estimated to cost the UK at least £1.7 billion each year. The inclusion of invasive species control in agricultural and forestry land management funding schemes could provide positive incentives for land owners and managers to more effectively tackle invasive species.
- 5.2.** Risk assessments could be carried out on species before they are brought into the UK. Prevention is the most effective and least expensive approach. After this early warning and rapid response are key for effective eradication efforts. However, effective, long-term management measures must be put in place for those species that are already established and that have serious negative impacts.
- 5.3.** Improving public knowledge and understanding of invasive non-native species and effective communications campaigns could help prevention, early detection and rapid eradication, and long-term management efforts, such as the inclusion of information posters at ports and garden centres, and increasing awareness through education programmes and institutes.
- 5.4.** A greater focus could be placed on understanding and closing off the pathways of introduction. “The ornamental pathway contributes the highest number of non-native species considered to have a negative ecological impact – the majority of these are higher plants” (see figure 2 below).¹⁰

¹⁰ Helen Roy, et. al., 2012. Non-Native Species in Great Britain: establishment, detection and reporting to inform effective decision making. NNSIP. Available online: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwip44WCmPXhAhUypnEKHb5tBWYQFjAAegQIAxAC&url=http%3A%2F%2Fwww.nonnativespecies.org%2FdownloadDocument.cfm%3Fid%3D753&usg=AOvVaw3hOqG9a0qP_qPGnaanec4o

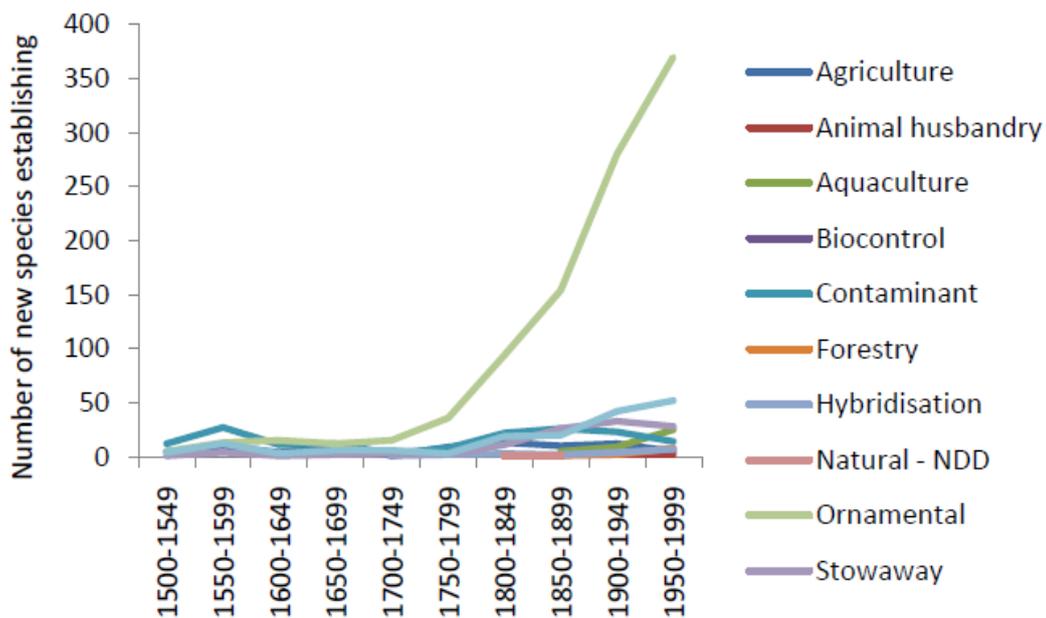


Figure 2. Number of established non-native species arriving in GB through different pathways against date of first record.¹¹

6. How can the risk of trade and future trading relationships bringing non-native invasive species to the UK be mitigated?

6.1. Effective biosecurity measures need to be in place to inspect and, where necessary, restrict imports in order to prevent invasive non-native species being entering the UK. Imports of firewood and potted plants are particularly risky¹², as they provide opportunities for invasive non-native species to be introduced.

6.2. Risk assessments could be carried out on species before they are brought into the UK and regular horizon scanning carried out to identify potential threats. Prevention is the most effective and least expensive approach, and supports a precautionary principle. After this early warning and rapid response are key for effective eradication efforts. However, effective, long-term management measures must be put in place for those species that are already established and having serious negative impacts.

6.3. The EU list of species of concern could become a national list that is regularly reviewed and species added that pose the greatest threat to the UK. Restrictions on the sale and movement of these species could then be put in place.

¹¹ Helen Roy, et. al., 2012. Non-Native Species in Great Britain: establishment, detection and reporting to inform effective decision making. NNSIP. Available online: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwip44WCmPXhAhUypnEKHb5tBWYQFjAAegQIAxAC&url=http%3A%2F%2Fwww.nonnativespecies.org%2FdownloadDocument.cfm%3Fid%3D753&usg=AOvVaw3hOqG9aOqP_qPGnaanec4o

¹² Confor, 2019 Plant health and Brexit. Available online: <https://www.confor.org.uk/media/246818/plant-health-and-brexit-statement-jan18.pdf>

7. How effective have the European Union's Invasive Alien Species Regulations been at addressing and tackling invasive species?

- 7.1. The regulation has helped to highlight the issue of invasive non-native species and improve collaboration across the EU. However, grey squirrels and other species continue to cause serious environmental, economic and public health impacts.
- 7.2. Grey squirrels are one the 37 species specifically listed by the European Union's Invasive Alien Species Regulation, due to their invasiveness and ability to establish in other Member States. The species included on the Union list are subject to restrictions and measures set out in the Regulation, including restrictions on keeping, importing, selling, breeding and growing. Member States are required to take action on pathways of unintentional introduction, to take measures for the early detection and rapid eradication of these species, and to manage species that are already widely spread in their territory.¹³
- 7.3. The list was drawn up in 2016, but the UK has yet to implement an effective, collaborative management plan for the already established grey squirrel. In 2014, Forestry Commission and Defra produced a Policy and Action Plan for Grey Squirrels and England's Woodlands.¹⁴ In 2015 in Scotland, where the focus is on red squirrel conservation, there is a Scottish Strategy for Red Squirrel Conservation that sets out strategic areas for grey squirrel control¹⁵; with the implementation co-ordinated under the auspices of the Saving Scotland's Red Squirrels Partnership Project. In 2018, Welsh Government produced a Grey Squirrel Management Action Plan for Wales.¹⁶
- 7.4. However, management efforts need a cross-border, well-resourced, on-going approach to ensure they are effective in the long term. Various projects, such as the eradication of grey squirrels on Anglesey that enabled the successful recovery of red squirrels on the peninsula¹⁷, show that grey squirrels can be successfully removed from large areas. In the absence of the efforts of local red squirrel projects to manage grey squirrels, such as on Anglesey, it is likely that the red squirrel would be close to extinction in Wales.¹⁸ But when projects end, through lack of funding, resources and effort, gains can quickly be lost as grey squirrels rapidly reinvade areas.

8. In the event of EU exit, how should the UK establish its replacement for the European Commission's scientific forum to update the species list of concern?

- 8.1. The UK could use the format of the European Commission's scientific forum as a guide to establishing a national forum of experts to provide advice, interrogate and update the list of species of concern, and input into the horizon scanning for and risk assessing of species. Cross collaboration between the two forums would enable the sharing of knowledge and best practice, and help maintain relationships that have already been built.

¹³ European Commission, 2019. List of Invasive Alien Species of Union concern. Available online: http://ec.europa.eu/environment/nature/invasivealien/list/index_en.htm

¹⁴ Grey Squirrels and England's Woodland – Policy and Action. Available online: <http://www.charteredforesters.org/wp-content/uploads/2014/12/Grey-squirrels-policy-and-action-plan.pdf>

¹⁵ Scottish Squirrel Group, 2015. Scottish Strategy for Red Squirrel Conservation. Available online: <https://www.nature.scot/sites/default/files/2018-09/Scottish%20Strategy%20for%20Red%20Squirrel%20Conservation%20-%20June%202015.pdf>

¹⁶ Welsh Government, 2018. Grey Squirrel Management Action Plan for Wales. Available online: <https://gov.wales/sites/default/files/publications/2018-11/grey-squirrel-management-action-plan-for-wales.pdf>

¹⁷ Red Squirrels Trust Wales. Available online: <http://www.redsquirrels.info/education/grey-squirrel-control/>

¹⁸ Haliwell et al., 2015. Striving for success: an evaluation of local action to conserve red squirrels (*Sciurus vulgaris*) in Wales. In: Shuttleworth CM, Lurz PWW, Hayward M (eds) Red Squirrels: Ecology, Conservation

9. How should the UK work with the European Commission and others internationally to reduce the risk of invasive species?

- 9.1. The UK could continue to work collaboratively with the European Commission and others internationally on the prevention, early detection and rapid eradication, and long-term management of invasive non-native species. It would help to share horizon scanning, best practice and research, and collaborate on effective projects wherever possible, as species are only affected by physical rather than political borders.

Signatories to the UK Squirrel Accord:

British Association for Shooting and Conservation
British Red Squirrel
Country Land and Business Association
Confederation of Forest Industries
Department for Environment, Food and Rural Affairs (Defra is a signatory to UKSA, but has submitted a separate response to this inquiry rather than endorsing UKSA's response)
Duchy of Cornwall
European Squirrel Initiative
Forestry Commission (England)
Forestry Commission Scotland
Future Trees Trust
Institute of Chartered Foresters
Killgerm Group Ltd
National Forest Company
National Trust
Natural England
Natural Resources Wales
Northern Ireland Environment Agency / Northern Ireland Red Squirrel Group
Northern Ireland Forest Service
Red Squirrel Northern England
Red Squirrel Survival Trust
Royal Forestry Society
Royal Horticultural Service
Royal Scottish Forestry Society
Royal Society for the Protection of Birds
Scottish Government
Scottish Land and Estates
Scottish Natural Heritage
Scottish Wildlife Trust
Small Woods Association
Sylva Foundation
The Heart of England Forest Project
The Tree Council
The Wildlife Trusts England
Ulster Wildlife
Welsh Government
Woodland Heritage
Woodland Trust

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