

Current factors affecting UK woodlands and forestry industry: Pest species

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By virtue of geography, UK trees and woodlands have traditionally been protected from many continental pests and pathogens, however as the movement of humans and the global trade of plants and trees has increased, the movement of numerous harmful pests and diseases has increased concurrently.

The inadvertent transport of pests and pathogens beyond natural ranges, or the expansion of territorial range through environmental change, is a current phenomenon with significant future implications for natural and managed woodland systems. For free moving species, such as insects capable of flight, natural barriers may not totally restrict movement. In such instances, range boundaries are generally governed by environmental factors such as climate. Therefore, as a consequence of current and future climate change in the UK, woodland habitat which would have been previously inhospitable to species of animal typically favouring more temperate conditions, may also be invaded.

Introduced species can have significant influence on UK woodlands and the UK forestry industry, affecting biodiversity and economic potential. Threats come from a broad spectrum of organisms, from microscopic species to large mammals, which affect trees both independently and also through species interactions. In this context, pathogens are microscopic species (such as fungi or bacteria) and pests are larger organisms which can influence tree species through their activities, such as feeding resulting in defoliation. This article will focus on the pest species.

Insects - moths

In recent times four species of moth have spread from southern and central Europe across the continent to the UK. These species, whilst possessing very different strategies and life histories, are proving to be extremely successful in the UK.

[The horse chestnut leaf miner](#) *Cameraria ohridella* has spread widely throughout Europe since first being described as a new species in 1986. It was first identified in the UK in 2002, and is now found throughout England and Wales. Migration occurs readily as emerging adults have the ability to move actively from tree to tree, and may even be pushed further afield via the wind. The only constraint on spread currently is the limit of tolerable climate, which may explain why numbers remain small in Scotland. As a leaf mining insect, the larvae *C. ohridella* 'mine' the leaf tissue between leaf surfaces, spending their entire larval stage within a horse chestnut tree leaf. This is an effective strategy as the leaf offers protection from predators and a stable food source. Whilst *C. ohridella* larvae often appear to be present in almost every

leaf of heavily parasitized trees, this does not appear to do significant harm to the tree beyond a potential loss of photosynthetic ability. This may however limit the potential for tree resilience in the long term, and in areas where bleeding canker of horse chestnut is a problem, the added stress from this moth may serve to exacerbate the effects of this disease. Over the long term the influence *C. ohridella* may become less pronounced as natural parasites of this moth have been demonstrated to increase in density over time, as naturally occurring [generalist parasites](#) adapt to target this species in areas where it has been present for more than three years.

The [oak processionary moth](#) *Thaumetopoea processionea* has been present in Britain after accidental introduction in 2005, and is a concern for tree, human and animal welfare. During the larval phase this moth has the potential to defoliate trees by feeding on-mass on leaves, which can significantly affect tree performance and health, leaving the tree vulnerable to other pests and diseases, or unable to withstand other environmental effects such as drought. In instances where the resource of oak leaves becomes depleted or otherwise scarce, this species can exhibit a more generalist feeding approach and has been observed utilising hornbeam, hazel, beech, sweet chestnut and birch trees. For people and animals, the danger lies in the [urticating hairs](#) which cover the larvae and contain thaumetopoein, a substance that can cause allergic reactions ranging from skin rash to respiratory distress. These hairs are easily detached if the larvae are touched or can be actively shed and are small enough to become airborne and be transported by the wind, making outbreaks of these larvae particularly problematic, especially in urban settings.

The larvae of the [Gypsy moth](#) *Lymantria dispar* are also significant defoliators of broadleaf tree species and can cause major stress to infested trees which may make them susceptible to more severe attack from secondary pests and pathogens. This species can also feed on conifer foliage in instances where broadleaf food options become limited. *L. dispar* is currently restricted in the UK to London where it was discovered in 1995, however more recently colonies have been identified in Buckinghamshire and Dorset, suggesting the potential for further spread.

The [pine tree lappet moth](#) *Dendrolimus pini* has been identified at sites in Scotland surrounding Inverness since 2004, but as yet has not been reported as a permanent presence at any other location. Climate is currently accepted to be the reason for the limited spread of this organism across Scotland, however as the climate warms over the coming years and decades, the potential for outbreak may increase in likelihood. In such an event, this moth has the potential to offer significant threat to pine plantations and the ancient Caledonian pinewoods, as outbreaks can last for years at a time resulting in widespread defoliation which can impair tree health and increase tree mortality rate, consequently causing ecological and economic disruption.

Insects – beetles



Beetle species in principal have less dispersal potential than the above moths, even though certain species are capable of flight when the conditions are appropriate. Spread is more commonly the result of human induced movement, either by timber transportation or as an unwelcome passenger on forestry vehicles or machinery.

The [Oak pinhole borer](#) *Platypus cylindrus* predominantly attacks oak trees which have already been weakened by other pests and diseases, but is also known to attack other hardwoods such as beech and sweet chestnut. The population size of this beetle has grown in the UK in recent decades, mainly as a result of the steady supply of oak trees suffering from dieback and decline, which make for highly suitable host plants. The adults bore into the tree to the heartwood, but don't in fact feed on the wood itself. Instead, the tunnels are used to grow ambrosia fungi, upon which adults and larvae feed. Whilst not directly responsible for tree mortality, this pest can affect the commercial value of timber after infestation, as the holes made during tunnelling may spoil the appearance of the final wood product.

The [pine weevil](#) *Hylobius abietis*, unlike that which the name suggests, feeds on a wide array of woody or herbaceous plants. The adult feeds on bark and can do significant damage particularly to young seedlings. Trees are killed when the bark is completely removed from a section of the stem (referred to as girdling or ring barking) restricting the flow of water and nutrients to the upper plant. This species typically has a two-year life cycle, but can live for up to four years and can be problematic at any point in the year where there is sufficient warmth to allow insect activity. Populations of this beetle can be substantial, with numbers per hectare estimated to be up to 150 thousand adults. This can result in significant damage to local trees from feeding. The size of adult populations is directly dependent on the availability of conifer root stumps which are key for breeding success. This can make forestry plantation sites post clear fell a significant source for this pest and result in greater rates of mortality among young transplanted trees used for site re-stocking.

The [spruce bark beetle](#) *Dendroctonus micans* was accidentally introduced from continental Europe in the 1980s and will attack all species of UK spruce. Trees are damaged by the activities of this beetle during the larval stage, as larvae feed on the inner woody layers of the bark, weakening and occasionally killing the tree. However, as no damage is done to the inner wood the timber quality is not necessarily affected, providing the tree is harvested before or soon after death. Spread between trees is achieved through crawling, with occasional flight possible if the temperature is greater than 22.5 °C. Management of this pest can be achieved through the introduction of a predatory beetle (*Rhizophagus grandis*) from its natural range, which has a high specificity for *D. micans*, and possesses somewhat extraordinary abilities for locating prey. This has proved so successful that this predator is even being considered as a detection method to identify *D. micans* presence in new sites at the limits of its expanding range.

Mammals

Both non-native and native mammal species have the potential to affect woodlands in the UK. Non-native mammal species introduced to this new range often capitalise on the abundance of new resources and the freedom from predation. This can result in pressure on natural species which lead to species replacement via competition.

The [grey squirrel](#) *Sciurus carolinensis* was introduced from North America to various locations across the UK at the end of the 19th century and early part of the 20th century as a fashionable addition to estate lands. Since introduction they have spread widely and are now recognised as one of the most common non-native species in the UK. The success of the grey squirrel in the UK has been at the expense of the native red squirrel (*Sciurus vulgaris*), which it successfully outcompetes for resources and which is vulnerable to the squirrelpox virus carried by *S. carolinensis*. Grey squirrels are a particular problem for woodland function and timber production as they frequently damage trees by bark stripping, predominantly in instances where populations exceed five squirrels per hectare. This can be fatal for trees where severe bark stripping effectively results in girdling, reducing the economic potential of managed woodlands and plantations. This could also affect biodiversity and sustainability where this action results in the localised loss of vulnerable tree species such as beech, oak or sycamore.

After 300 years' absence, wild boar have recently been reintroduced to UK woodlands. Whilst exactly how these animals were reintroduced remains unclear, populations of this large mammal are proving successful and are growing. Reports of boar distribution in the UK are varied, but there are certainly breeding populations in Gloucestershire/Herefordshire, Kent and Sussex. The influence of boar on trees is currently debated. Trees can be [damaged](#) when used for rubbing, or through the action of rooting, which often focuses on the base of trees and can damage large roots. This activity could lead to increased infection rates from fungal pathogens, or reduced water or nutrient uptake. Further research would be necessary to predict the scale of these effects as wild boar population grow, which is currently likely.

Mammal species may also perturb UK woodlands through excessive grazing in situations where populations grow unsustainably, due to the absence of large or apex predator species from UK woodland ecosystems. Without this top-down pressure from predation, management of large herbivore numbers must be undertaken to avoid overgrazing. [Deer species](#), both native and non-native, can impose significant pressure on UK woodlands, particularly when populations reach high density. Management of this pressure relies on either reducing numbers through culling, physically protecting trees with fences or guards, reducing the effect of damage by over-planting to allow a buffer for losses, or planting tree species which are less attractive to deer.



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