WOODLAND TRUST

Wood Wise

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Woodland Conservation News

Invasive species management in woodland habitats

American skunk cabbage – deer – floating pennywort
giant hogweed – Himalayan balsam – rhododendron

Himalayan balsam

Invasive Species

Fallow deer northeastwildlife.co.uk

Invasive Non-Native Species (INNS) are defined as 'species whose introduction and/or spread threaten biological diversity or have other unforeseen impacts'.[i] They are one of the most serious global threats to biodiversity today, along with habitat destruction and climate change. They also impact on humans; each year they cost the UK economy alone £1.7 billion, whereas the European Union spends at least €12 billion a year, and figures suggest the damage caused by INNS amounts to around five per cent of the world's economy. Eradication efforts also require many man hours.

In Great Britain, native species are classed as those that colonised the land naturally at the end of the last ice age. As the glaciers melted, flora was able to grow in the re-emerging soil beneath, gradually moving northwards as the ice retreated, and fauna took advantage of the expanding habitats. But the melting ice also raised sea levels, until the land bridge connecting Britain to mainland Europe was flooded. Only species that crossed over naturally before Britain became an island once more are classed as native.

Human intervention

Humans arrived in Britain about 8,000 years ago, and most non-native species found today have been introduced through human activities. A small number have found their way here naturally, including the tree bumblebee, *Bombus hypnorum*, first recorded in the UK in 2001 and not invasive. Natural boundaries, such as seas and mountains, prevent the spread of many species between certain areas of the globe. However, international trade and travel by humans has artificially transported species across these previously impenetrable borders.

Williamson initially proposed a 'tens rule'; approximately 10 per cent of introduced species will establish in a new area, and 10 per cent of those will become invasive.[ii] But recent research shows this to be incorrect. For many animal taxa the actual proportion that can establish and become invasive exceeds 50 per cent.[iii]

In the UK some non-native species have become naturalised but do not pose a threat to native species/habitats, including sweet chestnut, *Castanea sativa*. However, due to climate change, there is a worry that some currently benign non-natives could become invasive. They could respond better to the changing climate than native species and may become problematic in the future. Non-natives that have already become invasive in the UK include Himalayan balsam, *Impatiens glandulifera*, and rhododendron, *Rhododendron* sp..

Prevention is the most effective method for dealing with INNS, and this should guide future policy. If a species has become established then early detection and rapid, coordinated action is essential for successful eradication. Where eradication is not possible, in the case of long-term INNS, control and containment are the priority.

Government action

In January this year, Environment Minister Richard Benyon announced a ban on the sale of five invasive non-native aquatic plant species:

- Water fern, *Azolla filiculoides*
- Parrot's feather, *Myriophyllum aquaticum*
- Floating pennywort, *Hydrocotyle ranunculoides*
- Australian swamp stone-crop (New Zealand pygmyweed), *Crassula helmsii*
- Water primrose, *Ludwigia peploides*

However, the ban does not come into effect until April 2014. Retailers will risk a fine of up to £5,000 and six months in prison if they are found selling any of these species once the ban is in place. It is hoped similar bans will be placed on other INNS in the future. A new EU Directive is also in development, many hope this will strengthen the mechanisms in place to deal with and prevent INNS.

The following case studies illustrate the problems caused by species that are already established, and what action can and should be taken to eradicate them.

[i] Department for Environment, Food and Rural Affairs. *The Invasive Non-Native Species Framework Strategy for Great Britain* (2008) para 3.3.

[ii] Williamson M. (1996) *Biological Invasions*. Chapman & Hall, London.

[iii] Keller P., Geist J., Jeschke, J., Kühn, I. (2011) *Invasive species in Europe: ecology, status and policy*. Available online: http://www.enveurope.com/content/23/1/23.

Tree bumblebee Aiwok, Wikicommons

American skunk cabbage

American skunk cabbage (ASC), *Lysichiton americanus*, is a terrestrial, semi-aquatic perennial plant native to western North America. Although it is not listed under Schedule 9 of the Wildlife and Countryside Act 1981, it is one of a growing number of species slowly being recognised as a threat at national level.

The species is a particular danger to wet woodland, a Biodiversity Action Plan priority habitat that is already endangered. Its tall, large colonies outcompete native species for light.

As with many plants, ASC became popular with gardeners and is sold widely by garden centres and the nursery trade. The problem comes when this fast spreading species escapes its domestic confines, often caused by deliberate planting or the careless disposal of garden material in the wild. This bog plant has been identified at sites across the UK and Ireland, and is limited by soil moisture content.

ASC can grow to 1.5m in height and has large, leathery leaves that come out early and last for much of the growing season. It forms dense colonies that shade any plants beneath, degrading previously species-rich communities. The yellow hood-like spathes are similar in shape to those of the native plant wild arum or lords-and-ladies, *Arum maculatum*. Berries are produced in summer and the seeds can be dispersed long distances along waterways, and by birds and mammals.

Invasives in the New Forest

The New Forest Non-Native Plants Project (NFNNPP) was established in 2009 and is hosted by Hampshire & Isle of Wight Wildlife Trust (HIWWT). It is a partnership project funded by organisations such as HIWWT, Environment Agency, Natural England, Forestry Commission and the New Forest National Park Authority. ASC is a priority species being tackled to prevent the spread of invasive non-native plants in the New Forest, especially in wetland habitats. The project also helps to implement The Invasive Non-Native Species Framework Strategy for Great Britain published by Defra in 2008.

American skunk cabbage infestation Catherine Chatters

In 2010, HIWWT conducted experiments on the treatment of ASC. Two areas were treated by qualified professional contractors, one with 2, 4-D amine, the other with glyphosate. 2, 4-D amine is a man-made selective herbicide that only kills broadleaf plants, but can be harmful to fish. Glyphosate is a common non-selective broad spectrum herbicide that is only effective on actively growing plants, where it inhibits enzymes. The Environment Agency has approved 2, 4-D amine and the glyphosate-based herbicide called Roundup Pro-Biactive for use near water.

Both types of treatment were found to have a negative effect on ASC. Early observations found those plants sprayed with 2, 4-D amine to be less healthy. However, two months later there appeared to be far higher levels of mortality among those individuals sprayed with glyphosate. The latter was therefore deemed to be the most effective control method.[i]

To date, control of ASC has cost the NFNNPP over £6,000, and work continues. Following ASC removal, recolonisation by native species such as sallow, *Salix caprea*, and hawthorn, *Crataegus monogyna*, is taking place. However, some of the cleared areas are now being infested with another INNS, Himalayan balsam, *Impatiens glandulifera*, which causes its own serious problems.

American skunk cabbage research

During 2012, the NFNNPP focused on researching the impact of ASC on native vegetation. The aim of this research was to: *describe the characteristics of the native vegetation susceptible to invasion by American skunk cabbage in the New Forest area and to indicate the relative ecological value of these habitats in a national context.*[ii] This built on work in 2010 by the Centre for Ecology and Hydrology which sought to fill evidence gaps relating to the economic, social, habitat and biodiversity impacts of ASC.

American skunk cabbage following herbicide treatment Catherine Chatters

The report found that initial colonisation appears to be slow, but as plants mature and numbers grow there is exponential expansion, resulting in areas of total ground cover. The length of time it takes for the infestation to become a problem may be why ASC was not thought to be a considerable threat until recently. However, projects such as this highlight the true invasive nature of the species and serve as a caution to others with ASC on their land.

[i] Gadsby, A. & Fox, T. (2010) *Non-native invasive plant species in the New Forest National Park – 2010 report*. Hampshire & Isle of Wight Wildlife Trust and University of Southampton.

[ii] Sanderson, N. (2013) *New Forest Non-Native Plants Project research on the impact of skunk cabbage Lysichiton americanus on native vegetation*. Hampshire and Isle of Wight Wildlife Trust.

Fallow deer stag northeastwildlife.co.uk

Deer

In the UK there are around 1 million deer made up of six species, but only red deer, *Cervus elaphus*, and roe deer, *Capreolus capreolus*, are native. Fallow deer, *Dama dama*, were introduced to Britain by the Normans in the 11th century. Sika deer, *Cervus nippon*, were introduced from Asia into Britain in 1860. Muntjac deer, *Muntiacus reevesi*, were introduced from China in the early 20th century. Chinese water deer, *Hydropotes inernis*, escaped from Whipsnade Zoo after being introduced there in 1929 – the UK population is thought to represent 10 per cent of global populations.

Humans have hunted to extinction any natural predators of deer in the UK, such as the wolf, *Canis lupus*. This, and other factors such as milder winters, mean their number are increasing. Parallel to this is the reduction of natural habitat through human development. An excess of deer leads to over-grazing and excessive browsing and trampling.

This is especially problematic for ancient woodland flora and fauna. Over-grazing causes the loss of iconic woodland ground flora, such as bluebells, and can prevent natural regeneration. This loss of food plants results in a decline in invertebrate species. Woodland birds are negatively affected by a loss of prey, but ground nesters also struggle as ground cover is consumed.

Too many deer can also cause health problems for themselves (through lack of food), damage to farmland and gardens, and an increase in traffic accidents. It is estimated that there are up to 74,000 deer-vehicle collisions each year. Defra estimates that deer cause £4.3 million of damage to agriculture in England alone. The GB Non-Native Species Secretariat estimates some 350,000 deer are culled each year to try and manage populations and reduce damage.[i]

Deer at Brede

Brede High Woods is a 262 hectare Woodland Trust site in East Sussex, in the High Weald Area of Outstanding Natural Beauty. Fallow deer are the main species in the area, although roe and muntjac are on the increase. It was estimated that up to 60 fallow deer were using Brede. Fallow deer are widespread in England and Wales, but are patchier in Scotland.

When the Trust took over the wood in 2007, deer were quickly identified as an immediate issue. There was some damage being inflicted on the wood, but Brede is fairly robust. They were, however, far more of a problem to neighbouring land. Two orchards next to Brede were almost unviable because of the deer impact, which was causing environmental and economic issues. A deer impact assessment was carried out at Brede. This showed a high level of deer activity and a moderate level of impact, with a risk to sensitive features such as coppice.

The Deer Initiative suggests that an unmanaged fallow deer population can double its numbers in five years and treble in seven years. Unlike other deer species they do not seem to have found a limit to population growth due to lack of food or habitat. Therefore, it was also recognised that allowing the deer population to rise would cause Brede increasing problems in the future. As a rule, early preventative action is the best option for dealing with any invasive species.

Deer management

In collaboration with the Deer Initiative, the Trust tried to set up a deer management group with local stakeholders, but this proved too difficult. Deer stalking is competitive and there was found to be a poaching problem, so it was initially difficult to get information on deer culls in the area. Over time relationships were built with local deer stalkers and this has increased the flow of information, although it is not the full picture. Co-ordination at a landscape scale is important for successful deer control.

One problem with deer stalking is that male bucks are sometimes killed over does, as they make more impressive trophies. However, to successfully control a population the females should be targeted. At Brede a flow chart was created to keep track of numbers, sexes and ages. This was used to set a cull figure to reduce the population by 10 per cent.

Deer management can be expensive, but Brede entered into a mutually beneficial arrangement with a local stalker. He carries out culling to a figure set in collaboration with the Trust, and in return he keeps the deer killed to generate income. The deer impact assessment was first carried out in 2009 and then repeated in 2013, they both produced similar results. This indicates that the population is being maintained at a suitable level and is not increasing.

Due to the open access policy at Brede, there are constraints in place to protect the public. In the last couple of years, increased public access and opening up the woods through thinning and rhododendron clearance has made it more difficult to reach cull targets.

Deer control can be a sensitive subject, but is often essential to maintain the health of habitats and the diversity of species using them. A landscape approach involving all stakeholders is the best method, and the Deer Initiative is an excellent source of information and guidance.

[i] GB Non-Native Species Secretariat (2011) *Deer.* Available online: https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?pageid=195

Fallow deer northeastwildlife.co.uk

Floating Pennywort –

Floating pennywort, *Hydrocotyle ranunculoides*, is a freshwater aquatic invasive plant that is native to North America. It is listed under Schedule 9 of the Wildlife and Countryside Act 1981, therefore it is an offence to plant or otherwise cause this species to grow in the wild. A ban on the sale of floating pennywort was announced earlier this year and was welcomed by many. Its ability to rapidly choke slow flowing waterways increases flood risk and causes problems to wildlife. It can grow up to 20cm a day and costs the British economy £23.5 million a year. Due to its potential impact on the Water Framework Directive (WFD) status of water bodies it is viewed as a priority to control.

Brought to Britain in the 1980s by the aquatic nursery trade, floating pennywort first naturalised in 1990 due to plants being irresponsibly discarded from garden ponds. It was initially popular because it is easy to grow and can adapt to cope with full sun or shade. But its ability to spread quickly and completely cover ponds and lakes is not so favourable, although in full shade it does not dominate. The species can be found in ponds and waterways in woodland, either due to the reckless disposal of unwanted plants by individuals or its spread from infested areas upstream.

The fleshy-stemmed plant can be found rooted in shallow margins or free-floating on slow moving and still water. Its ability to grow at an impressive 20cm a day means it can quickly create interweaving dense mats that dominate water bodies, outcompeting native plants for space and light. Its sheer mass can deoxygenate the water and lower its temperature, causing stress to fish. Its tangled growth can also prevent air breathing insects from reaching the surface.

Floating pennywort Velela, Wikicommons

Floating pennywort mat Andrew Virtue

Floating pennywort reproduces asexually and vegetatively, meaning even small fragments of root can quickly give rise to new extensive mats - this makes control more difficult. It has large kidney-shaped lobed leaves with the stalk attached between the lobes. This allows it to be easily separated from the native marsh pennywort, *Hydrocotyle vulgaris*, which is smaller with round leaves and the stalk attached to the centre.

Yorkshire river infestations

In Yorkshire floating pennywort was first reported in the wild in 2008 by the Don Catchment Rivers Trust, but it had probably been growing there since the early 2000s. Luckily infestation was caught early and the only badly affected areas were on Calder Navigation and parts of Don Navigation. In other parts of Britain its spread is far more extensive.

In 2010 the Yorkshire Pennywort Forum was established. This partnership project provides a co-ordinated response to tackling, recording and monitoring the problem and spread of floating pennywort in Yorkshire. Action was targeted on the Rivers Don, Rother and Calder.

Floating pennywort control

There are two main methods of control:

- Chemical – using glyphosate with an appropriate adjuvant, such as 'Topfilm', which is a binding agent that makes the leaf sticky and allows the glyphosate to be absorbed better. This is applied during the growing season (which is very long) from April to December. Once applied, glyphosate is absorbed through the plant's foliage. It works by inhibiting an essential enzyme, causing the plant to stop growing and die off. However, good access is needed, often from a boat on larger water bodies, and it can kill non-target native plants.
- Mechanical extraction – removal by hand pulling or mechanised vehicle. However, this can cause fragmentation and result in lots of new growth. Therefore this method is only really suitable for low infestations. But extraction may be deemed appropriate for immediate short-term reduction of an intense infestation – to reduce the quantity of chemicals used or to aid access for chemical application. The areas affected should be fenced or netted off to ensure all cut material is contained and removed. Even tiny fragments can cause regrowth or infestations further downstream.

Sadly, long-term chemical control at the right time of year is the only really effective method of removal. Following treatment, decomposition of the dead material can be slow. On rivers this material dies then breaks up and travels downstream. Excessive amounts of dead material on still water can be problematic and should be removed if necessary. Due to the dense structure of the mats, there may need to be repeat spray treatments on the same area to ensure all of it has been reached. The Centre for Ecology and Hydrology recommend a follow-up treatment around 2-4 weeks after the initial application.

In Yorkshire £50,000 has been spent treating 40km of watercourse to date, but other regions have spent far more due to greater levels of invasion. They have also worked to raise public awareness of the problem through press releases. The money to finance the project was sourced from WFD funding.

Glyphosate spraying of floating pennywort Andrew Virtue, Environment Agency

The Yorkshire partnership has worked well as there are only four-five key partners, only two main landowners, the project has been centrally funded, it has highly active forum members, and the team is dynamic and committed. This means floating pennywort is being successfully eliminated from Yorkshire waterways. But the careless disposal of plants by gardeners must be addressed if this plant is to be kept from decimating aquatic habitats and the wildlife that they support. In December 2012 a new outbreak was reported on the River Rivelin in Sheffield, which shows that the group need to remain vigilant.

Giant Hogweed

Giant hogweed, *Heracleum mantegazzianum*, is a terrestrial, perennial or biennial plant native to the Caucasus region of Eurasia. It is listed under Schedule 9 of the Wildlife and Countryside Act 1981, therefore it is an offence to plant or otherwise cause this species to grow in the wild. Its ability to rapidly dominate native vegetation and its toxicity make it a danger to wildlife and humans.

First introduced into Britain in 1893 as an ornamental plant (a member of the cow-parsley family), it soon escaped from domestic gardens into the wild. It grows 5m high with large, white umbel flowers, each flower head can produce thousands of seeds. These are easily transported by water, allowing the species to rapidly spread along waterways. Wasteland is also being colonised by giant hogweed.

It outcompetes native vegetation by forming dense colonies that shade out species growing beneath. This reduces floristic biodiversity, which has a knock-on effect along the food chain. It dies back in winter and leaves the banks of watercourses bare. This contributes to the risk of soil erosion and reduces winter cover available to wildlife.

Toxic danger

The sap of giant hogweed contains toxic chemicals called furanocoumarins. These are produced as an insect defence and, along with the loss of native foodplants, this may contribute to a reduction in invertebrate biodiversity. The same chemicals also have antifungal properties and are found in the roots as well as the leaves. It is therefore thought that giant hogweed can suppress soil fungi, which are crucial for maintaining soil fertility.

Giant hogweed (the lady hidden among the leaves is five feet tall) Wikicommons, Mark Nightingale

The furanocoumarins make control of this invasive particularly difficult. These poisons are found in the small hairs on the leaves and stems. If these touch human skin (the hairs can penetrate light clothing) and then the area is exposed to sunlight, they can cause the skin to become irritated, red, burnt and blistered for several months. This condition is called phyto-photodermatitis and sensitivity to light can persist for many years following the initial damage. Therefore chemical control is deemed the safest option. The poisonous sap also presents a problem to children who sometimes enjoy playing with the hollow stems of giant hogweed.

Giant hogweed control

Jacob's Well Wood is a small 1 hectare Woodland Trust site on the northern bank of the River Tweed, near Coldstream in the Scottish Borders. In 2000 areas of the riverbank were heavily infested with giant hogweed. A programme of annual spraying with glyphosate herbicide, two applications a year, was initiated. By 2012 it had been reduced by half and the eradication work continues. Cost to date for control on this small site is approximately £3,000.

The Scottish Rural Development Programme has the following advice for giant hogweed spraying:

- Wear protective clothing at all times.
- Spray with glyphosate during the growing season, when green leaves are present.
- Spray the top and underside of leaves.
- Spray at least twice in one growing season.
- Spray before the plant flowers and sets seed.
- Apply the herbicide once the plant is over 50cm in height.
- Annual follow-up spraying is required for regrowth and seedlings.

Cutting, mowing or digging up can also be undertaken, but these raise serious health issues for the individuals involved. In Scotland, the Scottish Environment Protection Agency must be consulted before mechanical removal is carried out. The resulting material must be carefully removed from the site and disposed of by an authorised individual. Strimming or composting giant hogweed must not be carried out.

Advice from the Centre for Ecology and Hydrology outlines reports of long-term damage to ducklings that had trodden on giant hogweed tissue. Even three weeks after their brief exposure, the beaks were deformed and the feet darkly discoloured. This highlights the risks posed to wildlife as well as humans.

Although there has been some regeneration of giant hogweed at Jacob's Well, none has reached flowering stage due to the on-going control programme. There has been some native vegetation regeneration, mainly grasses and herb species, such as comfrey, *Symphytum officinale*, and broom, *Cytisus scoparius*. This is part of a larger coordinated project to control INNS along the Tweed Site of Special Scientific Interest and Special Area of Conservation, overseen by the Tweed Forum.

Giant hogweed umbellifer Wikicommons, Rob Hille

Himalayan Balsam

Himalayan or Indian balsam, *Impatiens glandulifera,* is a terrestrial, annual plant native to the western Himalayas. It is listed under Schedule 9 of the Wildlife and Countryside Act 1981, therefore it is an offence to plant or otherwise cause this species to grow in the wild. Himalayan balsam, by forming tall, dense colonies, shades out and results in the extirpation of native vegetation.

Introduced to Britain in 1839, it was initially grown in gardens because of its beautiful pink slipper-shape flowers. However, it escaped and was first recorded in the wild in 1855. It favours the sides of waterways and damp ground, including wet woodland. Growing up to 3 metres high, it is one of the tallest annual plants now found in the UK and can completely dominate areas. It spreads rapidly through exploding seed pods. A single plant can produce 2,500 seeds. Once matured, the pods violently burst open when touched – scattering the seeds far and wide. The seeds are also easily carried by wind or water, so flooding can be a significant factor for seed dispersal.

Managing Himalayan balsam

Penstave Copse is an 8.5 hectare (ha) wood located near South Brent, Devon, on the southern edge of Dartmoor within the upper reaches of the Avon Valley. The site is a mix of ancient and secondary woodland and grassland fields. Mature oak, *Quercus* sp., ash, *Fraxinus excelsior,* hazel, *Corylus avellana*, and alder, *Alnus glutinosa*, high forest woodland occurs along the rivers edge and accounts for approximately 40 per cent of the site, which is notably rich in lower plant growth, such as bryophytes. Coppice hazel is often dominant in the sub canopy, and dormice, *Muscardinus avellanarius*, occur throughout the site.

Himlalayan balsam northeastwildlife.co.uk

The Himalayan balsam, at Penstave is found high up on the sides of the slopes as well as along the river edge – perhaps due to deliberate planting. The Woodland Trust has spent 10 years trying to control the spread of this invasive plant. Unfortunately, there is an upstream seed source, therefore reinvasion is a constant threat. This highlights the need for landscape scale working if effective INNS management is to be achieved. Spread of the plant at Penstave has been along pathways, where it is thought people and animals brush past the plants and assist the distribution of the seeds.

The important time to control Himalayan balsam is before the flowers appear. This prevents seed development, breaks the germination pattern and can help to drastically reduce an infestation. Thankfully the seeds are not persistent in the soil, only lasting about 18 months, so populations can be eradicated after 2 or 3 years of consistent control, providing infection by an outside seed source does not occur.

Himalayan Balsam closing in on a path Wikicommons, John Tustin

Previous management has included rolling it to crush the stems and chemical spraying with herbicide. Due to the diversity of the ground flora on site, such as lesser butterfly orchid, *Platanthera bifolia*, this practice was short lived. More recently mowing is carried out before flowering takes place in June. The plant must be cut below the lowest node on the stem, this prevents it flowering. If cut above the lowest node, the plant can regrow its damaged stem and go on to flower later in the season. Therefore mowing stems close to soil level can be very effective. Mechanical control can be difficult in areas of limited accessibility, but has proved more effective than using herbicides.

In the future the use of horses is being considered. Regular grazing by livestock helps prevent the spread of plants through trampling and the eating of young seedlings. Ponies are already abundant on Dartmoor, as they are hardy and can cope with steep slopes. Evidence from other projects shows cattle and sheep to be useful for controlling Himalayan balsam from April throughout the growing season.

Costs for Penstave are around £1,500 a year, combined with bracken and ragwort control – which the Himalayan balsam is mixed in with. This has been ongoing for at least 10 years, with total costs exceeding £15,000. It is hoped grazing will reduce the annual spend on control.

Water issues

Silver Wood (4.3 ha) and Hunkin Wood (5.9 ha) are also located in Devon. Both of these woods are sited on floodplains that flood annually. As with Penstave there is a seed source for Himalayan balsam further upstream. This makes control at the sites very difficult as new seeds are annually transported to them.

However, the Environment Agency is working on projects in the area focused on removing Himalayan balsam from the top of the catchment down. If successful, this landscape scale approach should stop seeds being transported along waterways and spreading during flood events.

Costs for control at Silver Wood are around £1,140 per year, and £700-£1,000 for Hunkin Wood. Silver Wood also has a dedicated volunteer group from the local parish. They hold one or two community days a year where they cut down and pull up the Himalayan balsam before it flowers. At Hunkin Wood there are plans to introduce grazing in the near future. Both sites have previously used chemical control, but, as with Penstave, mechanical removal has proved more effective.

Maintaining the ecological health of a habitat can prevent Himalayan balsam invading an area. A dense sward of native vegetation inhibits germination of the invasive plant's seeds. However, disturbed ground provides the perfect conditions to allow Himalayan balsam seeds to grow. Once established they then suppress native plant growth and dominate large areas. This is a strong argument for ensuring the resilience and health of natural habitats.

Himlalayan balsam seed pod northeastwildlife.co.uk

Rhododendron

Rhododendron ponticum is a terrestrial plant native to the eastern and western Mediterranean (such as Spain and Turkey) and through Asia to China. It is listed under Schedule 9 of the Wildlife and Countryside Act 1981, therefore it is an offence to plant or otherwise cause this species to grow in the wild.

It was first introduced to Britain in the 1700s. Victorian country estates planted it for its ornamental value and to provide cover for game birds. Its attractive leaves and flowers made it increasingly popular in gardens, and by the mid of the 19th century it was commonly planted.

Rhododendron can invade new areas via tiny seeds that are easily wind dispersed, and through vegetative propagation. As a single flower can produce three to seven thousand seeds each year, a large shrub can release many millions. They germinate best in areas with disturbed ground, as they find it difficult to establish where native ground cover is healthy and dense. This is a strong argument for ensuring the good condition of sites of high conservation value.

Invasive domination

Once established, evidence indicates that rhododendron has an allelopathic effect on competing plants. Toxins are thought to be created and released that hinder the growth of other species. It also produces toxic chemicals in its foliage, which are most concentrated in its young leaves and buds. This unfortunately makes it unpalatable and deadly to grazing animals that may have controlled its growth.

Invasive rhododendron is capable of dominating areas with its large canopies. It can even take over wetland habitats that are unsuitable for its growth; by maintaining its root system in drier soil it can extend its canopy out over the wetland.

Small waterways can be completely shaded over by rhododendron canopies, which can have major negative effects on wildlife such as fish.

Following successful rhododendron invasion little other plant life survives. Trees growing above the rhododendron level endure, but natural regeneration is prevented. Delicate native ground flora succumbs to competition for space and light, and suspected toxic effect of the rhododendron plants. There is a knock-on effect for fauna, as only two aphids have so far been associated with rhododendron in Britain.

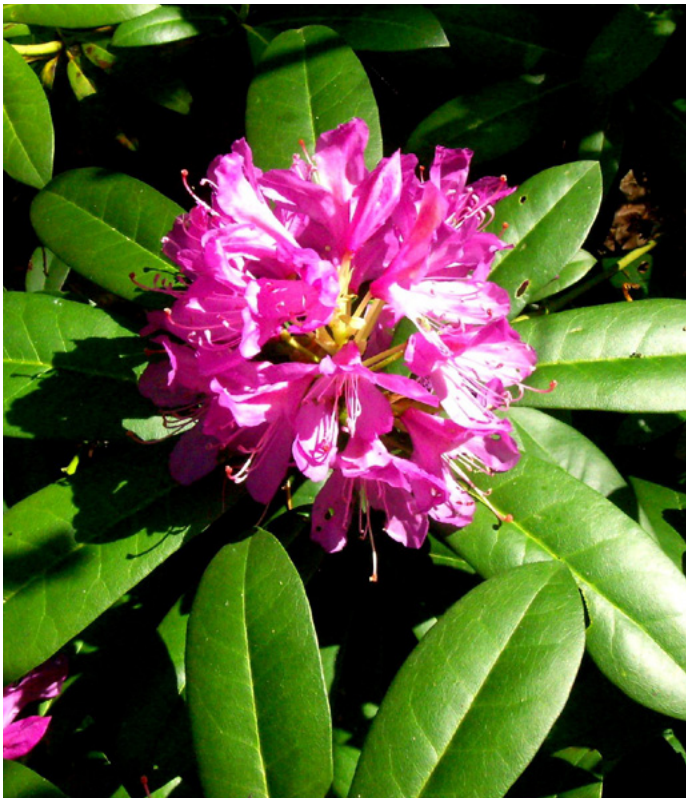
In 2007, the Woodland Trust acquired Brede High Woods, which lies within the High Weald Area of Outstanding Natural Beauty and the High Weald Natural Character Area. It covers a total of 262 hectares (ha) across the East Sussex parishes of Brede, Ewhurst and Sedlescombe, but about 10 ha (mostly in one large block) was infested with what was originally thought to be *R. ponticum*. However, recent evidence suggests that it is actually a hybrid swarm involving several rhododendron species, known as *Rhododendron x superponticum*. This super rhododendron is highly invasive in Britain and seriously suppresses native vegetation and its associated fauna.

Ancient woodland restoration

Almost all the invaded area was within the Plantations on Ancient Woodland Site (PAWS) section of Brede. The Woodland Trust is committed to restoring ancient woodland that has been planted with non-native conifers. Rhododendron was assessed to be the most immediate threat to the PAWS site. The rhododendron was last cut back in the early 2000s when the first thinning of Scot's pine, *Pinus sylvestris*, and Corsican pine, *Pinus nigra* subsp. *laricio*, was carried out. But it was then left and grew back densely, reaching chest height.

Rhododendron ponticum infestation

Wikicommons, Franz Xaver



Rhododendron ponticum Wikicommons, Kreinero

Rows of monoculture plantation trees and their extraction routes can have negative impacts on biodiversity and water quality/run off. However, they did prove useful in enabling large scale rhododendron clearance. A 400hp purpose-built mulcher was able to move in the open areas and up and down the racks. The driver was well briefed to ensure important features such as wood banks and old coppice stools were protected. Following this a smaller mulcher was employed to work in between the trees.

The whole process took around two weeks to complete and cost £15,000. This was funded through a Woodland Improvement Grant, Heritage Lottery Fund Grant and funding from the Tubney Charitable Trust. The removal of rhododendron is a high priority across the High Weald due to the acid soils which the plant prefers and prospers in.

As such a large area was cleared in one go and there were high spraying costs involved immediately. There are ongoing costs involved in spraying the regrowth, but these are reducing year on year.

The worst areas of rhododendron were within the section of old sweet chestnut, *Castanea sativa*, coppice stools. Both the stools and invasive shrubs were a substantial size. Here volunteers painstakingly removed it by hand, although this cost less economically it required many more man hours.

As the forestry and farming practices at Brede were not overly intensive, much of the former seedbank remained in the soil. Following removal it took three years for the native ground flora to start recovering, but it then responded well. The grasses and heather, *Calluna vulgaris,* responded most quickly.

Volunteers to the rescue

Joyden's Wood comprises ancient woodland and PAWS. It is a hilly site located on the Eastern suburban fringe of London close to Dartford and Bexley. Of the 136ha site, a third to a half was once covered in *R. ponticum*. Although it was mostly located on the northern part of the site, its extent was growing due to footfall.

Luckily there is a large dedicated group of volunteers that works at Joyden's for half a day each week. They were tasked with cutting back the rhododendron and digging out the roots. Most areas were cleared five years ago, but regrowth is coming through. Rhododendron hampers tree regeneration, but in the opened up areas broadleaf seedlings are germinating.

Contractors are also used to remove rhododendron. They cut it back, which is less effective than digging up the roots, but this is then followed up the next year by spraying glyphosate on the regrowth during the growing season. This is generally done on the larger clumps, where digging up by hand is not feasible and could damage adjacent native regeneration and ground flora. It requires 5-6 man days a year and costs £2000-£3000 annually.

Rhododendron control is an ongoing concern, and volunteer time dedicated to this is estimated at 15-20 days per year, around 30-40 per cent of their total volunteer hours. Manually digging up rhododendron can be carried out in any season, but in winter it is far easier to get into densely vegetated areas.

Rhododendron is a persistent invasive that is hard to control. It is prudent to take a landscape scale approach to removing it, to prevent reinvasion later from neighbouring land.

Ashenbank Wood Rhododendron clearance volunteers WTPL, Georgina Smith

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American skunk cabbage Catherine Chatters

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