



**COEDWIGOEDD GLAW CELTAIDD CYMRU**  
**CELTIC RAINFORESTS WALES**



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## Introduction

### Celtic Rainforests Wales

The term Celtic Rainforests refers to the Atlantic oak woodlands which run along the western coast of the British Isles. They form part of a biome type named 'coastal temperate rainforests', which can be found globally from the seaboard of western Canada and Chile, to areas around the Black Sea, parts of eastern Asia, and eastern areas of Australasia. Such habitats are located within the temperate zone, receive moderate to heavy annual rainfall, and have mild climatic conditions.

Tree species which typically make up the Celtic Rainforests include sessile oak (*Quercus petraea*), ash (*Fraxinus excelsior*), hazel (*Corylus avellana*) and downy birch (*Betula pubescens*), whilst holly (*Ilex* spp.) is often found in the lower canopy. Some of Wales' Celtic Rainforests are considered to be amongst the best examples of natural oak woodland in Europe. However, it is important to remember that these magnificent woodlands are characterised by much more than just the trees that are present. The rich and diverse assemblage of lower plants which thrive under such conditions - the ferns, the mosses and liverworts (collectively known as bryophytes), and the lichens, not to mention pied flycatchers, bluebells, hazel bushes, shrews, wood sorrel, wood mice, woodpeckers, ferns, mosses, toadstools and oak saplings, are amongst 1000's of other living organisms which call the Celtic Rainforests their home.

Unfortunately, these types of woodlands are rare throughout Europe, and it is important that we recognise and manage the numerous threats these forests face. In Wales, these include:

- The spread of invasive alien species such as *Rhododendron ponticum* which can outcompete and replace native species;
- Lack of sustainable grazing within the woodlands, which can lead to issues such as an over developed shrub layer which is to the detriment of native plant species, or lack of tree regeneration depending on whether the woodland is under or over grazed;
- The presence and encroachment of undesirable tree species, considered non-native to the Atlantic oak woodlands of Wales, often as a result of historic management of the sites, or adjoining sites.

Such threats not only affect the ecology of these wonderful habitats, but can have profound adverse impacts on the social-economic value of the woodlands. For example, the Celtic Rainforests have the ability to support farm businesses by provision of long term shelter for livestock or creating an income from timber.

Consequently, the project aims to tackle some of the biggest threats to our Celtic Rainforests in order to secure their long-term future for the benefit of all.





## Project Areas

### Special Areas of Conservation (SAC's)

1. Eryri SAC & Meirionnydd Oakwoods and Bat Sites SAC



2. Coed Cwm Einion SAC



3. Cwm Doethie - Mynydd Mallaen SAC



4. Elan Valley Woodlands SAC



This leaflet outlines some of the key objectives of the Celtic Rainforests Wales project, whilst providing some examples and advice on how best to sustainably manage these magnificent woodlands against some of the threats they face.





# Invasive Alien Species

The term **invasive alien species (IAS)** refers to species that have been introduced, either deliberately or unintentionally, to an area that lies outside their natural habitat range. In some instances, species may be considered native to one part of a country or a specific habitat type, but alien to another. Unlike IAS, a native species is defined as one which naturally resides in an area and generally complements the existence of other native species within that habitat / biome as they have lived and developed together over thousands of years.

Not all alien species are considered invasive, but those which are can have drastic detrimental impacts on the environments they colonise. For example, they can take over habitats, in doing so excluding all other species. Due to the fact that there are no other plants or animals associated with them in their new environments, they fail to complement symbiotic relationships and natural processes that have developed over millennia.

## **Rhododendron ponticum**

### **Why is *Rhododendron ponticum* so successful?**

Like many IAS, *Rhododendron ponticum* was first introduced to the British Isles during the Victorian era as an ornamental shrub. It was planted in the gardens of many large houses where it successfully grew. It thrives in areas of high humidity with damp substrates and acidic soils, making many of the naturally occurring habitats of Wales ideal for its growth. A single *Rhododendron* flower is capable of producing many thousands of seeds each year, which are primarily dispersed

by wind, enabling the plants to spread widely. Initially, the plant was largely confined to well managed gardens, where any seedling growth was removed. However, a reduction in large estates and their staff has seen *Rhododendron ponticum* spread unchecked into the wider environment during the 20th century.

### **Why is it a problem?**

*Rhododendron ponticum*...or pied flycatchers, bluebells, hazel bushes, shrews, wood sorrel, wood mice, woodpeckers, ferns, mosses, toadstools and oak saplings? We can't have both.

Although the flowers are attractive, *Rhododendron ponticum* has few other attributes that offset the negative impact it can have on a site that it invades.

Given the right conditions, *Rhododendron ponticum* can form an extensive and continuous canopy layer which casts a dense shade over existing ground flora. Thus flowering plants, grasses, ferns, bryophytes and lichens are all suppressed, and tree seedlings are unable to become established. This is particularly worrying for woodland succession, and for many lower plants who are dependent on mature native trees as host species.

*Rhododendron ponticum*, particularly the leaves of young plants, is not suited to most mammals, birds and insects. Consequently, land infested with *Rhododendron* can become unsuitable for browsing animals, which are an essential part of a healthy functioning woodland ecosystem.

When combined, the above can have drastic adverse impacts on the dynamics of a natural woodland, meaning that you can't have a healthy native woodland ecosystem with *Rhododendron ponticum* present.

### **Future outlook**

Already there is productive land, both commercial forestry and grazing land, that has to all intents and purposes been abandoned due to *Rhododendron ponticum* becoming so established at these sites. Little attempt is currently being made to work these lands due to the economic costs associated with controlling *Rhododendron ponticum* and if no attempt is made to control and eradicate the plant, it will persist in its spread into the wider environment. This will have profound adverse impacts on the ecology, the socio-economic value and the aesthetic qualities of the Celtic Rainforests in Wales.



# Management of *Rhododendron ponticum*

The Celtic Rainforests Wales project endorses a **3-stage approach** to controlling *Rhododendron ponticum*, as follows:

## Stage 1: the 'Attack phase'

The attack phase is in almost all cases the most expensive phase as it is very labour intensive. Methods of control during this stage vary depending on such factors as site characteristics, density of stands, or landowner requirements, but the most common methods used include stem injection with systemic herbicide, cutting the plant and then either stacking, burning or chipping it, foliar spraying with an approved herbicide, or manual uprooting of seedlings.

Stem injection will usually be the first line of treatment. Simply put, you drill a hole down into the stem with a normal cordless drill and fill it with an approved herbicide. The chemical

is then absorbed and transported throughout the plant, which when done correctly results in the complete death of a plant. This method uses less herbicide, and as it is injected directly into the plant, reduces the amount of chemicals entering the wider environment. If done well, this method should also remove the need for follow up treatments due to achieving a whole plant kill. The potential down side to this method is that it leaves you with large areas of standing dead timber, which should be left for at least a year before removal in order to limit re-growth. After this time, the dead timber can be felled and removed in order to improve the appearance or accessibility of the site, or be left to rot naturally.

## Stage 2: the follow-up phase

Usually undertaken two years after the attack phase, follow up action is always necessary. Even with high mortality stem injection, there is always the chance that a few bushes or branches have been missed, thus it is essential to complete a stage 2 treatment on any site. As with

the attack phase, the method used during stage 2 will depend on the amount and size of re-growth, in conjunction with site characteristics, but usually consists of foliar (leaf) spraying, manual uprooting, and in some instances further stem injection or cutting and burning / chipping / stacking may be used.

## Stage 3: the maintenance phase

The maintenance phase is reached when *Rhododendron ponticum* is reduced to levels where it no longer has significant adverse impacts on conservation interests or on land management practices. However, if left untreated at this point, significant recolonisation would happen over subsequent years. By this stage, all mature bushes should have been successfully treated, with no more than a few occasional seedlings to be found scattered across a site. Flowering plants should be absent, or present in very small quantities. However, it must be noted that the maintenance phase will never be reached if significant seed source remains on areas of adjacent land which is why it's important to tackle the plant on a landscape scale to ensure success.

It is imperative that work is carried out over a 5-year period, as it can take up to five years for new plants to emerge and be visible from propagated seeds. Even beyond this period, continuous monitoring of those sites treated should continue to ensure no further recolonisation. This is why building good, long-term working relationships with landowners is essential if we are to achieve our ultimate aim of eradicating *Rhododendron ponticum* from within the Celtic Rainforests in Wales.





## Case Study



### Nant Gwynant

Eradicating *Rhododendron ponticum* in Nant Gwynant has undoubtedly been one of the greatest conservational challenges the Snowdonia National Park Authority and partners have faced over the last 15 or so years. And despite significant inroads being made into its control, the highly invasive plant still poses a threat to the woodlands and other highly valued habitats within the valley.

A recent success story is at a site overlooking the village of Beddgelert, which lies at the western end of the Nant Gwynant valley. VVery steep and craggy in parts, the site was until recently covered in a dense carpet of mature *Rhododendron ponticum* around 3m in height. The steep and open aspect of the site, coupled with strong westerly winds, meant it was a major seed source facilitating the spread of *Rhododendron ponticum* up the Nant Gwynant valley.



However, back in 2015, Snowdonia National Park worked alongside the Beddgelert Community Council in getting circa £15,000 of Welsh Government funding to eradicate this dense stand of *Rhododendron ponticum*. Due to the density of *Rhododendron* at the site, and the challenging terrain present, the 'cut and burn' method of control was used in Phase 1 of the work. This was undertaken during the winter so as to minimise the impact on residents and companies in the village, which is highly popular with tourists during the summer months. Phase 2 work was undertaken around 18 months after the initial work was completed, and primarily included foliar spraying with an approved herbicide. Phase 3 will follow with further foliar spraying and hand weeding of any seedlings in year 5.

In its place, a mixture of native trees including sessile oak, rowan, birch and hazel were planted at the site, alongside alder in the wetter areas at the bottom of the slope. This work was done by volunteers, again getting buy-in into the work from the local community. Within weeks of completing the removal of the dense *Rhododendron* stand, native bluebells were growing in its place, and in time, the young trees planted at the site will develop into a highly valued and wildlife rich native woodland, providing a fitting backdrop to the picturesque village of Beddgelert.



# Invasive Alien Species

## Montbretia (*Crocsmia x crocosmiliflora*)

Due to its sprays of reddish orange flowers that appear in late summer, Montbretia is an extremely popular plant amongst gardeners. With its smooth upright green leaves, the plant can grow to more than 60cm tall, and is commonly found on roadside verges and hedge banks, along cliff tops and woodland edges, and on waste ground where garden plants are discarded.

The hybrid Montbretia, which is the main species to have spread into the wild in the British Isles, originates from South Africa and was first introduced from France in the 1880's as a garden plant. Since then, it has become widely established in the wild, especially in western parts of the British Isles. Once established it can spread rapidly, giving it the ability to quickly outcompete native flora. Although viable seed is produced, most reproduction is vegetative from underground corms and long creeping rhizomes (underground stems), with even the smallest fragments of root readily able to establish new stands.

Montbretia is listed as a Schedule 9 species under the Wildlife and Countryside Act 1981, meaning it is an offence to plant the species or otherwise cause it to grow in the the wild.

### Mechanical control

Plants can be dug out but it is essential that all the plant material and corms are removed. If corms are broken up or accidentally left in the ground they can produce new plants, potentially making the problem worse.

Due to its classification as a Section 9 species, any soil containing the plant waste of Montbretia is classified as controlled waste and should be correctly disposed of at a licensed landfill site.

### Chemical control

Stands can be effectively treated with herbicide whilst the plants are actively growing. When treating large areas, a suitable grass and forb mix should be sown to prevent bare ground from colonising with other unwanted species.



## Skunk cabbage (*Lysichiton americanus*)

Native to western parts of north America, *Lysichiton americanus* goes by many names including American skunk cabbage, western skunk cabbage, and yellow skunk cabbage. Like many of our invasive alien species, the plant was introduced to the British Isles as an ornamental bog plant, where it thrives in wetter soil conditions and along ditches. Since 2015, the plant has been listed under the provisions of the Invasive Alien Species Regulation (2014) as an invasive alien species which is considered to be of concern to the European Union. The regulation imposes restrictions on keeping, importing, selling, breeding and growing any species on the list.

The flowers of skunk cabbage are bright yellow in colour, and can reach up to 40cm in height, whilst the leaves, which form after the flower, can reach up to 1.5m in height. The plant dies down over winter leaving vast areas of bare soil which can be susceptible to erosion. The flowers have a very strong fragrance similar to that of the skunk, hence its common name. It has no specific soil requirements and will grow well on most sites, particularly wetter sites.

Most plants in the wild arise from garden material being disposed of as colonies quickly outgrow their intended space within domestic gardens. It is also likely that some populations in the wild have become established from seed dispersed from nearby sites. Once established, the plant is very invasive - its large leaves and rapid rate of spread allows it to out-compete native plants and cause extensive damage locally. It can also spread via its rhizomes, and is easily distributed by water, birds or mammals.

### Mechanical control

Plants, new seedlings and rhizomes can be dug up and removed and should be disposed of at a licenced site. However, if fragments of rhizome remain, these can regenerate and new plants will grow.

### Chemical control

The leaves can be effectively treated with herbicide but there are limitations to which herbicides are permitted to be used near water. The plant should be treated between June and October when the leaves are fully grown and ground conditions are drier. Multiple applications may be required over a number of seasons in order to achieve full eradication.





## Invasive Alien Species

### **Japanese knotweed (*Fallopia japonica*)**

Like many other invasive alien species, Japanese knotweed was first introduced to the British Isles from parts of Eastern Asia in the mid-nineteenth century. Its creamy white flowers can be seen from mid to late summer, whilst the stems can often look a bit like an orangey brown bamboo, particularly later in its growing season, which typically runs from May to October. The dead stems of the plant persist throughout the winter, whilst the leaf litter decomposes very slowly, leading to the formation of a deep ground layer which can be impenetrable to native vegetation. The plant therefore has the ability to quickly exclude all other plant species, actively taking over a site as it spreads.

Japanese knotweed can often be found growing along rivers and streams, and infrastructure such as roads and railways. Although the plant flowers in the British Isles, its seed is not thought to be viable. Therefore, its main methods of dispersal is by vegetative reproduction (via its rhizomes), or re-growth from tiny plant fragments. The most effective way of managing its spread is via chemical control using an approved herbicide, and this should be applied in late summer. Other methods include the digging up of the plant and disposing of it at a licensed waste disposal site. It is not recommended that the plant be controlled using mechanical methods as this is likely to encourage the spread of existing stands, or cause it to colonise new areas.

Whilst it is not unlawful to have Japanese knotweed growing on your land, it is illegal to plant it, or otherwise cause it to grow in the wild, due to its inclusion in Schedule 9 of the Wildlife and Countryside Act 1981.



### **Himalayan balsam (*Impatiens glandulifera*)**

Often found along watercourses and other damp environments, its attractive pink flower made it popular as an ornamental plant, from where it has spread rapidly into the wild. The flowers give rise to seed pods, which explode when the seeds are mature, hence where it derives its Welsh name Jac-y-neidiwr. This usually happens around mid to late summer. The seeds can be propelled up to 20 feet from a plant, and when doing so next to a watercourse can be carried downstream to new colonise new areas. Each plant can produce up to 800 seeds annually, giving it the potential to spread rapidly once established in an area.

The impacts of Himalayan balsam are similar to other invasive alien plant species in that it quickly becomes dominant in colonised areas, shading out and suppressing the growth of native species. It can be treated in numerous ways, including chemical control using an approved herbicide, strimming over several years as close to the ground as possible (below its lowest node), or by pulling up the stems by hand and allowing the dead material to decompose in situ (with the option of burning the dead plants once dried out). All treatment should be undertaken before the plant flowers in any given year. Like Japanese knotweed, it is listed in Schedule 9 of the Wildlife and Countryside Act 1981.

## Non-native trees & Ancient Woodland Restoration

Many tree species commonly seen growing in our Celtic Rainforests are not considered native to these particular habitats. This includes all commercial conifer species, in addition to some deciduous trees such as sycamore (*Acer pseudoplatanus*) and beech (*Fagus sylvatica*). Essentially, this means that without the intervention of humans, it's unlikely these species would have been found naturally growing in these woodlands. Their presence will primarily have been as a result of deliberate introduction i.e. for the purposes of timber production or for aesthetic purposes, but in some instances they will have been introduced accidentally and are now spreading of their own accord.

Many non-native tree species have an important role to play in modern day forestry, particularly in the commercial forestry sector. However, in the context of the Celtic Rainforests they often have a detrimental effect on the ecology of these sensitive woodland habitats. Evidence shows that even on sites where non-native tree species dominate, valuable fragments of ancient woodland flora, old broadleaved trees, and more natural forest soils survive, and it is important to protect these from threats; mostly excessive shading, or conversely too much light or other risk factors such as over grazing and browsing.

Careful and gradual restoration management can secure and enhance the remnants of the original ancient woodland, moving it towards a revitalised, more natural state and slowly transforming it back into precious Celtic Rainforest habitat. At the same time, these processes can often have added benefits for woodland owners including the production of timber and wood fuel during the transformation stage and a range of wider long term benefits such as the protection of soils, the provision of durable shelter for grazing animals, and improved water quality.

Assessing the site to identify key features and current threats to the woodland will create a restoration plan to help owners and managers prioritise work. The recommendations can then feed in to a long term management plan, with on-going monitoring and assessment of threats guiding owners' future management. Urgent targeted action may be required to halt further decline of important features. Once these features such as notable trees are in a more robust condition, long term improvements to the woodland canopy can be implemented. These should involve a gradual move towards more native species through interventions which also account for the owners' specific objectives and other site specific constraints. Woodland operations on sensitive Celtic Rainforests sites can follow standard woodland management practice, however all management must ensure that secured valuable woodland features are effectively protected. Clear felling on important woodland sites should be a last resort, with suitable assessment, recording and preparation works carried out to minimise the detrimental impact on remaining key features. By careful management it is possible to incorporate owners' aims such as sustainable timber and woodfuel production with an increase in biodiversity. Once the site is free from threats (such as over-shading or over-grazing) the woodland can move towards long term sustainable management reflecting a more predominant Celtic Rainforest habitat.







## Coed Dolgun Uchaf

Coed Dolgun Uchaf is part of a network of designated woodlands to the East of Dolgellau which form part of the Meirionnydd Oakwoods and Bat Sites Special Area of Conservation (SAC). Coed Dolgun Uchaf, like many ancient woodlands in Wales, had its broadleaf canopy removed almost entirely in the mid-20th century and the site was replanted with non-native conifers, namely Western hemlock (*Tsuga heterophylla*), Douglas Fir (*Pseudotsuga menziesii*) and Norway spruce (*Picea abies*). The conifers have shaded out the understorey of the woodland which has left the site lacking in the rich suite of mosses, lichens and flowering plants that are typical of the Atlantic oak woodlands of Wales.

There is still a link with the site's previous ecology though in the form of several remaining mature broadleaf trees and small pockets of biodiversity around rocky outcrops and along the edges of streams. Luckily some of the large standard trees, such as sessile oak, ash and small-leaved lime, were retained and cling on within the surrounding conifers. However, the conifers were beginning to dominate the crowns of the broadleaves, leading to their suppression and gradual dieback. In 2016 a local forestry agent worked with a forestry contractor to begin the process of restoration and save these majestic trees. Halo thinning was carried out around the oak and small-leaved lime to gradually release them from competition with the conifers. In areas where Western hemlock was planted, the conifers were removed completely in order to remove the vigorous seed source, and the areas re-planted with a mixture of native broadleaves. The remaining stands of Douglas fir were thinned in order to create an income from timber sales and also to leave a productive crop for future extraction. Over time, as the conifers are gradually removed, the site's ecology will become more characteristic of the neighbouring ancient semi-natural woodlands with regeneration of broadleaf trees and the spread of a rich floral diversity throughout the understorey.





## Conservation Grazing

Our native woodlands have a long history of grazing, either by wild animals or domesticated livestock, and this has led to the development of many of our most valuable habitats. However, in the more recent past, many areas, particularly those with ecological designations, were fenced off in order to exclude grazing animals. This was particularly true with woodlands, where browsing was seen to be detrimental to young trees. Over time, this lack of grazing had undesirable impacts on woodland ecosystems, namely an increase in the abundance of bramble, ivy and other species commonly found in the understorey. Whilst a small amount of bramble and ivy makes a fantastic habitat and food source, and our woods need saplings to be the mature trees of the future, too many of these can be detrimental to associated ground flora including the precious lichens and bryophytes of the Celtic Rainforests.

It is now widely acknowledged that conservation grazing is a very effective tool in managing native woodland habitats. A herd or flock of grazers can produce the desirable variation in habitat structure, either directly by grazing, or by moving around a site.

It is really important to select the right type of animal for a site - you'd be surprised at how grazing characteristics differs from one animal to the next. For example, sheep will nibble carefully at their preferred delicacy, and native breeds will usually browse small saplings. They are light, nimble, and can access most areas. However, they are prone to getting their wool tangled in the brambles. On the other hand, cattle are heavier and able to push through thicker vegetation such as bracken and bramble. They feed by wrapping their tongues around a patch of vegetation and tearing it away. This leaves a much rougher structure behind - great for making an interesting habitat. They can also reach higher into trees to browse. Ponies lie somewhere between the two - they

nibble, but they are large enough to have some impact on the physical structure of the site. Native breeds, are usually preferred for conservation grazing as they have developed and thrived on rough food and are hardy enough for our weather. In addition to their ability to create variation in woodland habitats, the dung of livestock is in itself a food source for many invertebrates such as dung beetles, thus adding another benefit of having livestock within a woodland.

When sustainable stocking levels are surpassed, there are often tell-tale signs within a woodland such as the presence of damaged trees at grazing height, or the complete absence of young saplings. At the other extreme, where there is too little grazing, one will soon observe more aggressive plants such as bramble or bracken becoming dominant within a site. Both situations are undesirable, and that is why having a balanced grazing regime using the correct animals can increase habitat diversity.

In order for grazing to be sustainable in the long-term, the work must be both economically attractive and practical for the grazier. This requires the correct infrastructure to be in place, such as access tracks, stock proof boundaries, adequate stock handling facilities, water supply and sustainable support payments in order to make the continued management of the woodlands economically feasible. Consequently, if the conditions are right, the use of livestock as a sustainable conservation tool can assist both the ecology condition of the woodland, and bring socio-economic benefits to land managers.







### Coed Dolmelynlyn, Ganllwyd

Owned and managed by the National Trust, the oak woodland at Dolmelynlyn has a history of management spanning several centuries. It was first designated a Site of Special Scientific Interest (SSSI) and National Nature Reserve (NNR) during the 1970's, and as a result much of the woodland was fenced off and grazing removed from within the site.

This endured for some 40 years, with the woodland remaining free of any livestock. Unfortunately, the lack of grazing had unwelcome impacts on the woodland; the shrub layer became over established, which adversely impacted on the establishment of tree saplings and on the rich lower plant communities which existed in the woodlands. This led to a deterioration in the condition of the SSSI and NNR as their conservation status became less favourable. Consequently, the decision was taken to seek a different approach to managing the woodland, by reintroducing sustainable grazing to the woodland as a way of controlling vegetation levels in the understorey.

As a result, three highland cattle were introduced to the woodland at Coed Ganllwyd in 2015. A hardy breed, they can withstand the tough weather conditions which are sometimes found in Snowdonia, and are perfect for managing levels of bramble, grasses and young trees within the woodland so that the ground flora and lower plant communities are able to flourish. In addition, the National Trust Rangers have complemented the work of the cattle by undertaking some selective thinning within the woodland, allowing more light to penetrate the ground layer and encourage the growth of native flora such as ramsons (wild garlic) and bluebells.







For more information regarding the project, including advice on how to best manage your woodland, please do not hesitate to contact us on the details provided.

It is only by working in partnership that we will be able to secure the long-term future of this valuable and irreplaceable asset for future generations.

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