



Summary

- Large areas of the ancient woodland at Cors y Gedol is in a critical and threatened condition due to historic management choices or lack of previous management.
- A gradual approach to restoration will enable mature un-thinned stands of beech to be selectively thinned whilst maintaining forest conditions, vital for preserving ancient woodland features.
- Due to the high levels of archaeological interest at the site, it was decided that a method of motor manual felling with horse extraction was favourable over the use of modern forestry machinery. Contractors were appointed using an Open Tender process.
- The high levels of archaeological interest also meant that a watching brief was needed to ensure the proposed works would not damage any archaeological features on site. This was an unforeseen cost to the project.
- Subsequent management will required in the medium (0 - 5 years) to long term (5 - 25 years) to aid further recovery of the site. Since the works commissioned through Celtic Rainforests LIFE, the woods at Cors y Gedol have benefited from further management funded by a combination of the site owners, the Woodland Trust, and a contribution from Welsh Governments The Woodland Investment Grant (TWIG).

Introduction

Cors-y-Gedol is a 39.3ha privately owned woodland located near the coast in west Meirionnydd, Eryri. The woodland is largely classified as a Restored Ancient Woodland Site (RAWS) under the ancient woodland inventory (AWI), with smaller areas of Ancient Semi-Natural Ancient Woodland (ASNW). However, the frequency of beech (*Fagus sylvatica*), along with the dense and uniform structure of the woodland, suggests that the site was felled and re-planted sometime during the first half of the 20th century. Consequently, parts of the woodland could be re-categorised as Plantation on Ancient Woodland Site (PAWS), especially where there is a concentration of beech.

The woodland forms part of the Meirionnydd Oakwoods and Bat Sites Special Area of Conservation (SAC) due to its lower plant interest, particularly rare bryophytes along the Afon Ysgethin. This includes the presence of lobarian communities (*Sticta* spp.), which are indicators of continuity of long-term woodland conditions. However, whilst the woodland still supports a suite of ancient woodland indicator species and some veteran trees, the lack of current management, along with historic activity, has led to ecological degradation.

Issues identified

Post WWII aerial photos show that large areas of woodland were clear felled, and subsequently re-stocked with sessile oak (*Quercus petraea*), ash (*Fraxinus excelsior*) and beech (*Fagus sylvatica*). Lack of management in the re-stocked areas has led to dense broadleaf stands with high frequency of stressed trees with under-developed crowns and over-shaded understorey with reduced floral diversity. In concentrated beech stands, the dense leaf litter also threatens the diversity of the understorey. Mature trees that were spared from previous clearfelling operations show that ash has always been an important component of the canopy cover. Conversation with the owner reveals that cattle were once grazed in the woodland and the sparse understorey of some of the compartments could be a result of this. In the future, the right levels of grazing for conservation could be an ideal way to improve structural diversity and keep down coarse vegetation.

In addition to the ecological interest of the site, prehistoric archaeological remains are found within the woodland, with the site being classified as a Scheduled Ancient Monument (SAM). The site is also a registered Historic Park and Garden. Consequently, this needed careful consideration when developing a restoration plan for the woodland, and there was a need to develop an archaeological watching brief for the work with Gwynedd Archaeological Trust (GAT).

Restoration plan: requirements and costs

Our overall objective was to begin the process of improving the structure of the woodland through light thinning operations which would allow crown development in selected trees and promote natural regeneration. Selected trees would form "legacy trees" that would be managed as the mature standards of the future. An initial Management Plan was completed in January 2020 which provided a habitat condition assessment and a set of prioritised management recommendations, both of which have enabled a discussion between the owner and project staff about how to instigate a programme of restoration at the site. The survey identified the critical threats to the semi-natural woodland features as:

- Excessive shading from beech canopy and suppression of understorey by beech leaf litter;
- Ash die-back (*Hymenoscyphus fraxineus*);
- Presence of invasive alien species (IAS), namely *Rhododendron ponticum*, Cherry laurel *Prunus laurocerasus*, and *Monbetria*.

A site inventory estimated that the site was stocked to approximately 1,100 stems/ha, with an average tree being 0.26m³. We agreed to select 200 stems/ha as legacy trees, and the first phase of management would remove suppressed or sub-dominant trees from the vicinity of these legacy trees,

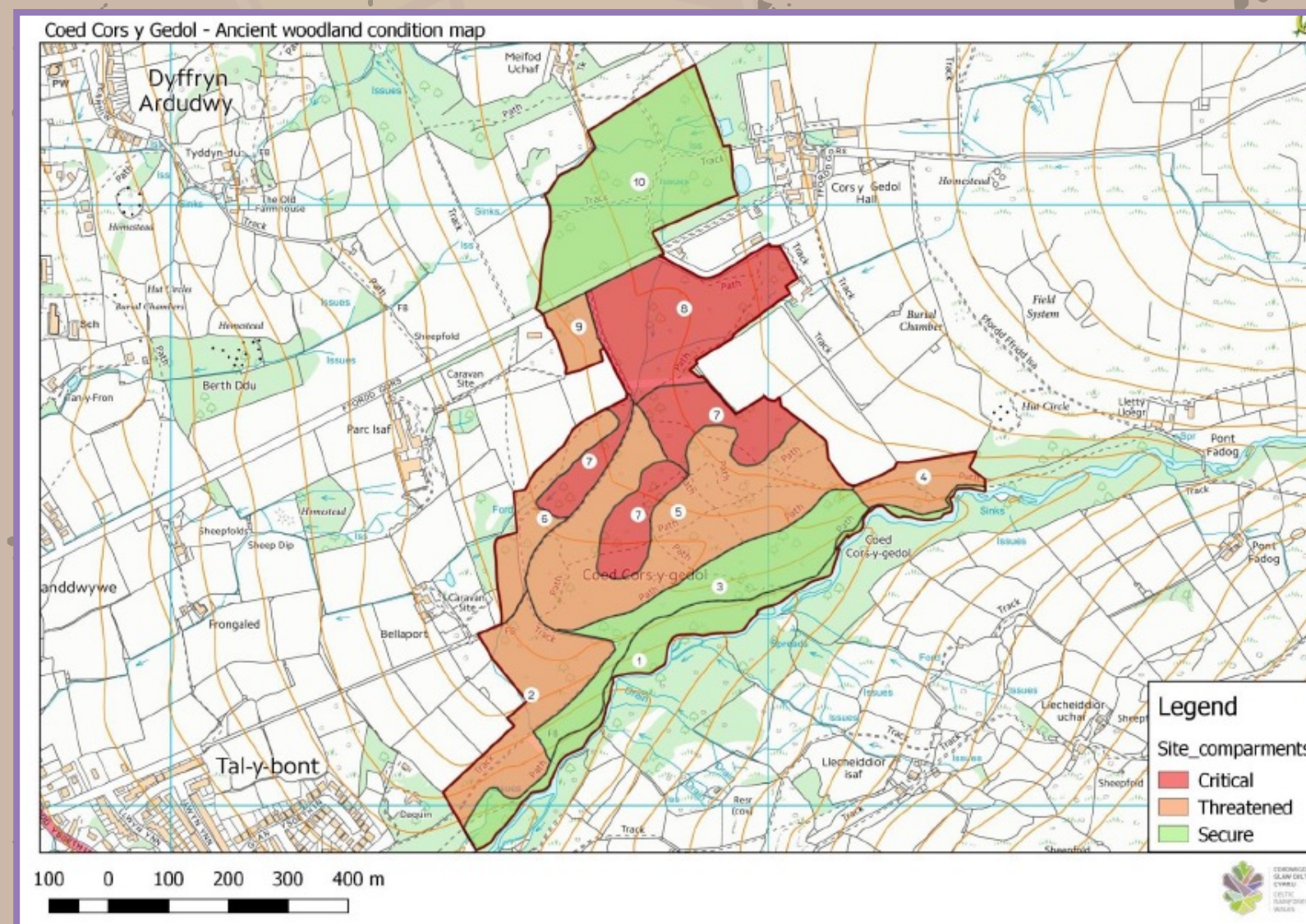


Figure 1. Areas identified as being of critical threat following woodland assessment.

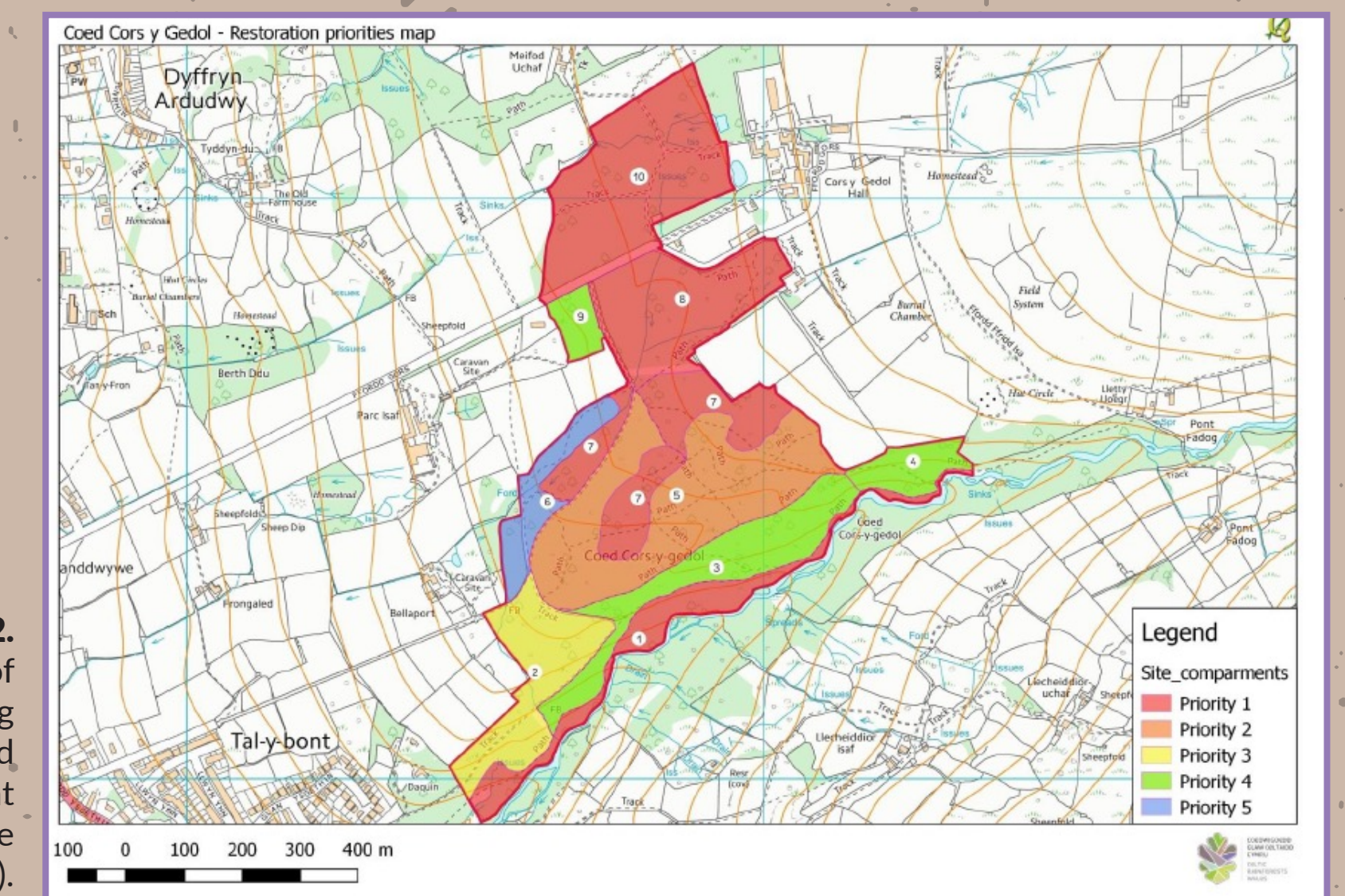


Figure 2. Prioritisation of works following woodland assessment (see below table for further details).

Cmpt	Threat Level	Priority	Primary Interventions Needed
1	Secure	1	Rp in river gorge – cut and stem inject, monitor for follow-up treatment.
2	Threatened	3	Reduce the dominance of beech through thinning to prioritise site-native broadleaves and particularly oak with good crown structures. Where oak is dominant, halo around oak with good crowns the thin out oak stands. Consider removing beech regeneration where it becoming dominant in the understorey.
3	Secure	4	Monitor beech for its impact over time. Remove beech regen where dominant. Consider removing some mature beech from the canopy through fell to waste or ring barking.
4	Threatened	4	Compared with other cmpts on site, #3 is in a relatively secure situation and close to a semi-natural condition, the only threat being beech which needs to be monitored for its impact over time. Consider removing threat from mature beech through ringbarking in order to create more large broadleaf standing dead wood and increase floral diversity in understorey.
5	Threatened	2	Dominance of beech needs reducing in places where it is having a negative impact on the semi-natural ecology of the site
6	Threatened	5	Cmpt should be left to provide wind buffer and possibly thinned during subsequent operations only once other cmpts have been left to develop wind firmness post thinning.
7	Critical	2	Carry out a low thin to prioritise ash of good form and healthy crown structure. The ash in cmpt 7 is very dense and thinning would reduce the stress upon the stand. Ash take a long time to develop good crown structure therefore, ash that a canopy dominants should be retained and a proportion of suppressed stems should be removed.
8	Critical	3	Carry out thinning of beech but very lightly and gradually, this can be via felling to waste or ringbarking, veteran beech should be retained. Increase frequency of hazel in the understorey by layering, a technique of pinning hazel branches to the ground so that they take root and once this has happened, severing the connection to the original tree in order to create a new specimen, albeit a clone of the original. This method should be carried out in late winter.
9	Threatened	1	Treat monbetria with Glyphosate and monitor, follow up spray if needed.
10	Secure	1	Stem inject cherry laurel, monitor for follow up treatment. Spray monbetria and monitor for follow up treatment. Carry out at same time to that in cmpt 9. Consider removing some beech, but those of smaller diameter which are suppressing site-native broadleaves. Fell to waste or ring bark to increase decaying wood component.

Table 1. Recommended management interventions in each compartment.

Measurements suggested that the oak and beech were growing to yield class 4 on the site, but with no history of regular thinning operations, yield may improve once a thinning cycle was initiated. Based on yield class 4, a light thin would remove 186m³ under felling licence, or approximately 720 trees or 43 trees/ha. Standing volume across the 3 compartments which make up the felling licence was estimated at 3,867m³, so the proposed operation would only be removing just under-5%, meaning that canopy cover would be maintained above 80%, preserving humidity levels.

The high levels of archaeological interest and public access on the site, coupled with the relatively small-scale intervention measures proposed, meant that a combination of motor-manual tree felling

and extraction with horses was favoured over the use of modern machinery. Using an open tender process, a contract was awarded to Ceffylau Carnog and Kehoe Countryside Services. A contract was also awarded to GAT to provide a watching brief over the works given the high level of archaeological interest on the site. Some specialist lower plant surveys were also required as part of the process of gaining SSSI consent in order to identify any areas of particularly highly ecological interest in the proposed works area such that reasonable avoidance measures could be implemented, if necessary, to eliminate any potential threats to those interests. Alongside the lower plant surveys, data loggers were installed on site to measure humidity levels within the woodland so that any changes as a result of the thinning works could be tracked long-term. The costs of these surveys were in addition to those costs outlined in Table 2, and came in at approximately £1,000.00.

Description	Cost (ex VAT)
Archaeological Watching Brief	£4,052.50
Felling and extraction:	
Extraction with horses	£8,000.00
Motor manual felling	£12,400.00
Total	£24,452.50

Table 2. Outline costs of undertaking management at Cors y Gedol

Monitoring

Two types of monitoring was undertaken at the site; compliance monitoring (of the actual works themselves), and monitoring the impacts of the work on the woodland. The former was largely done by project staff by the way of regular site visits whilst operations were being undertaken, ensuring works are progressing in line with the agreed management plan. Once a monitoring visit was undertaken, monitoring forms were completed and saved on file in

order to create an adequate paper trail for the project.

Monitoring of the impacts of the work was largely done by the way of fixed-point photography across the site. Pre works photos were taken by project staff prior to works commencing, and repeat photos will then be undertaken upon completion of works, and at annual intervals for the duration of the project in order to visually capture changes happening within the woodland as a result of our direct interventions.

Impact of works, challenges encountered and future plans

Works were undertaken by the project in February 2022. As a result, the dense, dark PAWS areas of the woodland are now a lot more open and there is light around the crowns of the remnant mature broadleaves. Subsequent high winds in the prevailing months did not affect the site and it seems as though thinning works retained stability within the stands.

With regards to challenges encountered – fortunately, these were very little. Despite the relatively high levels of public use of the woodland, the timing of the works coincided with a quieter time of year in terms of people visiting the site, and the relatively short time scale of the works (approximately 4 weeks) meant that there was little disruption to recreationists. Fortunately, the timing of the works coincided with a period of relatively dry weather. Coupled with the method of extraction utilised, and the relatively good ground conditions and accessibility at the site, works were able to proceed with little adverse impact on the surroundings.



Figure 3 and 4. Timber extraction from track side undertaken with horses as high ecological interest at the site favoured a low impact method, before extraction via tractor and forwarding trailer to stacking area.



The presence of a large amount of archaeological interest at Cors y Gedol could have potentially posed a challenge to the proposed works. However, by adopting a less intrusive method of felling and extraction, and appointing an Archaeological Clerks of Works to provide a watching brief over the work, this meant that works could proceed without any adverse impacts on the archaeological interests on site. Nevertheless, the need for an archaeological watching brief did bring about unforeseen addition costs of £4,052.50 + VAT, which the project had to cover in order to progress the work.

Funding from Celtic Rainforest LIFE and support from project staff has enabled the owner to carry out much needed phase one restoration work. It is anticipated that this work should allow the current even aged stands with limited species diversity to develop a more complex and irregular structure of multiple species

with a varied ages of tree. Close observation of the impact of this will be needed to maintain this positive trajectory. Future interventions via selective thinning will be required to manage the site using continuous cover forestry principles, which will maintain forest conditions suitable for associated species of interest i.e. lower plant communities, whilst removing timber volume. In time, we anticipate seeing a shift from a rather monoculture and even-aged plantation towards more mixed species stands that make space for rejuvenation of the ancient woodland features of the site and the gradual spread of ancient woodland specialist flora into areas where they have been absent due to plantation establishment. Discussions are already underway with respective organisations in respect of the long-term management of the site, with an ambition to gain National Forest status for Coed Cors y Gedol as part of Welsh Governments National Forest programme.