COEDWIG DYFI

SITE OF SPECIAL SCIENTIFIC INTEREST

Coedwig Dyfi at Aberllefenni © Natural Resources Wales / Alastair Wilson

YOUR SPECIAL SITE AND ITS FUTURE

‘Your Special Site and its Future’ is part of our commitment to improve the way we work with Site of Special Scientific Interest (SSSI) owners and occupiers. In it, we explain what is special about the wildlife on your site, and what care is needed to look after its wildlife into the future.

All SSSIs are considered to be of national importance and we recognise the crucial role that owners and occupiers play in their management and protection. We need you to share your views and knowledge of this site with us, to help safeguard it.

We hope that you will find ‘Your Special Site and its Future’ interesting and helpful. Please contact us if there is anything about the site and its management that you would like to discuss.

What is 'special' about the wildlife at Coedwig Dyfi SSSI?

Coedwig Dyfi SSSI has seventeen special features:

- **Lichens associated with southern oceanic woodland.** Coedwig Dyfi is one of the most important sites in Wales for this assemblage of lichens. They occur on a range of tree species of different ages. Of most importance are oak, ash, willows, hazel, sycamore, and to a lesser extent alder, birch, holly. Some occur on smooth bark young trees or hazel, whilst others rely on the rough bark of old trees.

Lichen-rich ash tree by the Afon Dulas, hosting several species on the SOWI index, including *Pectenia (Degelia) atlantica*. © Natural Resources Wales / Alastair Hotchkiss

- **Lichens associated with upland rainforest.** The site is of special interest for lichens associated with upland rainforest habitats. The trees of most importance for these lichens tend to be birch, alder, oak, and rowan.

- **Western oceanic 'temperate rainforest' woodland habitat.** The broadleaved woodland habitats of Coedwig Dyfi are of special interest, including several types that are particularly good examples in a Montgomeryshire context. In common with temperate rainforests in other parts of the world, these woodlands are strongly influenced by their oceanic climate, with high rainfall and humidity, and relatively mild temperatures which rarely get extremely cold or hot. They are further characterised by the abundance and diversity of mosses, liverworts, ferns, and lichens that thrive in these conditions.

Birch with good upland rainforest lichens in Coed Rhyd-y-biswail. © Natural Resources Wales / Alastair Hotchkiss

- **Atlantic woodland bryophyte assemblage.** The site supports an important assemblage of mosses and liverworts, many with highly restricted global distributions. These are associated with the most humid streamside and riverside woodlands, where they occur on rocks in and beside the watercourses as well as on trees and large fallen logs and woody material.

- ***Fuscopannaria mediterranea*** **(Mediterranean shingle lichen).** The population of this red listed lichen by Nant Maes-y-gamfa is within an important area of Wales for this species.

- ***Graphina pauciloculata*** **(a script lichen).** The global distribution of this species is entirely restricted to the British Isles and Brittany in France. It occurs in several parts of Coedwig Dyfi, mainly on the smooth bark of hazel, but also holly.

Ancient temperate rainforest woodland habitat in Cwm Coeg. © Natural Resources Wales / Alastair Hotchkiss

- ***Leptogium brebissonii* (blobby jelly-skin lichen).** The only known population of this species in Montgomeryshire occurs on trackside willows in Cwm Ceirig.

- ***Ricasolia* (*Lobaria) amplissima* (parchment lichen).** The only known population of this species in Montgomeryshire occurs in riverside woodland near Aberllefenni.

- ***Lobaria pulmonaria* (tree lungwort).** The largest population of this lichen species in Montgomeryshire. It occurs in several parts of Coedwig Dyfi, including in Cwm Ceirig and around Aberllefenni. Large populations also occur in the part of Coedwig Dyfi in Gwynedd, around the Afon Angell and Coed Talymieryn.

- ***Ricasolia* (*Lobaria) virens* (green satin lichen).** The largest population of this species in Montgomeryshire is in woodland above the Afon Dulas. It also occurs in Gwynedd in Cwm Gerwyn and by the Afon Angell.

- ***Menegazzia terebrata* (tree flute lichen).** The only known population of this lichen in Montgomeryshire, on only a few trees, mainly in the Cwm Glesyrch area.

- ***Micarea hypoviolascens* (a dot lichen).** This lichen is only known from three places in the world. Two of these are within Coedwig Dyfi, in Cwm Gerwyn and by the Afon Dulas near the bottom of Cwm Celli. The other is in Argyll, Scotland.

- ***Parmeliella testacea* (a shingle lichen)** a population of this red listed lichen by Nant Maes-y-gamfa. There is only one other known site for this species in Wales.

- ***Parmelinopsis horrescens*** **(hairy-spined shield lichen).** The only known population of this species in Montgomeryshire. It occurs in several places including Cwm Glesyrch, Coed Rhyd-y-biswail, Nant Llwydo and also beside the Afon Dulas.

Tree lungwort on oak above the Afon Angell. © Natural Resources Wales / Alastair Hotchkiss

- ***Porina hibernica*** **(Irish pimple lichen)** is vulnerable in Wales and the colony by Nant Maes-y-gamfa is part of an important suite of sites in northwest Wales.

- ***Pyrenula occidentalis*** **(a pox lichen)** is known from Coed Cwm-du, at the south-eastern edge of its range in the UK. It is a species of high rainfall and temperate rainforest habitats and is known from very few sites in Wales.

- ***Rinodina isidioides*** **(a pepper-spore lichen)** is a species for which the UK has an international conservation responsibility. Meirionnydd is an important hotspot for this species, and the colony on two trees by Nant Maes-y-gamfa represents one of the few recorded fruiting populations of this species in Wales.

What do we want Coedwig Dyfi to look like?

The following is a description of how we would like to see Coedwig Dyfi:

Coedwig Dyfi supports thriving populations of lichen species associated with old-growth oceanic woodlands and temperate upland rainforests. Across the whole of Coedwig Dyfi, at least seventy old-forest lichen species are known to occur, with different valleys and woodland areas contributing different species to the overall assemblage. At least fifty species of lichen associated with old-growth southern oceanic woodland are known in Coedwig Dyfi. Some larger and more easily identified species are readily encountered, with lichens such as the Sticta species strongly characterising Coedwig Dyfi by their abundance, with over two hundred trees supporting Sticta fuliginosa (sens. lat.) and over one hundred trees with Sticta limbata. The old woodland lichen Thelotrema lepadinum (a barnacle lichen) is frequent in many areas across Coedwig Dyfi. Over fifty trees are known with Pannaria conoplea and around one hundred trees with Parmeliella triptophylla. Rinodina isidioides and Porina hibernica occur as part of the assemblage. Lobaria pulmonaria (tree lungwort) continues to thrive around the Afon Dulas in Aberllefenni, Cwm Ceirig, and the Afon Angell and Coed Talymieryn. It is colonising new and young trees in all of these areas, and some individuals are fertile, producing fruit bodies and spores. It occurs on at least eighty trees across Coedwig Dyfi, including at least forty trees around Aberllefenni and Afon Dulas, ten trees at Cwm Ceirig, and twenty trees at Coed Talymieryn and Afon Angell area. Ricasolia (Lobaria) virens is found on at least twenty trees, mainly beside the Afon Dulas in Aberllefenni, but also on along the Afon Angell. Ricasolia (Lobaria) amplissima continues to be found on trees by the Afon Dulas in Aberllefenni, Leptogium brebissonii, Fuscopannaria mediterranea and Parmeliella testacea also all continue to occur within the site.

At least twenty-five species of lichen associated with upland temperate rainforest in the UK are known from Coedwig Dyfi. Hypotrachyna laevigata is abundant on acid barked trees, and is seen on most well-lit birch, alder and acidic oaks in all parts of Coedwig Dyfi. Hypotrachyna taylorensis is known to occur on around forty trees. Other key species such as Parmeliella parvula and Cetrelia olivetorum sens. lat. are known from at least fifty trees each. Other frequently encountered upland rainforest lichens include Megalaria pulverea and Graphina ruiziana, which is sometimes accompanied by Graphina pauciloculata. Parmelinopsis horrescens is found on well-lit acid barked trees, including birch and alder, including on at least fifteen trees in the woods around Aberllefenni, Cwm Glesyrch and in the Nant Gwybedyn and Nant Llwydo areas. Menegazzia terebrata continues to be found in and around Cwm Glesyrch, Pyrenula occidentalis continues to occur in Coed Cwm-du, and Micarea hypoviolascens is found on the damp hard wood of dead oaks by the Afon Dulas and Cwm Glesyrch area.

Air quality remains relatively clean, and the entire site shows little or no sign of lichen communities being influenced by atmospheric nitrogen and ammonia in particular. Nitrogen-loving lichen species like Xanthoria parietina and Physcia adscendens/tenella are very rare or absent in all areas of Coedwig Dyfi.

The Atlantic Mosses and liverworts that are special features of these temperate rainforest habitats continue to characterise the most humid woodlands, particularly along watercourses and where aspect and topography retain moisture longest. Some

species are relatively widespread such as Scapania gracilis, Plagiochila spinulosa and Lejeunea patens. The area along the Afon Dulas, between Aberllefenni and up into Cwm Gerwyn and Cwm Celli continue to support a rich assemblage, including Plagiochila bifaria, Plagiochila exigua, and Heterocladium wulfsbergii on river rocks.

The temperate rainforest habitats are characterised by dominance of native trees of a range of species including sessile oak, downy birch, holly, rowan, hazel, and in some areas, particularly alongside water courses, ash, alder, wych elm and small-leaved lime. The impacts of ash dieback are being managed and wherever possible ash trees are being retained. Where trees supporting important lichen communities are dying or dead, action is being taken to ensure that the life of these trees is extended, as far as possible, and that new trees with appropriate bark characteristics are available in suitable locations. Areas that have not been grazed for some time have a well-developed layer of bilberry and heather. Some areas are dominated more by grasses including sweet vernal-grass, wavy hair-grass and creeping soft-grass. Ferns are often abundant, including broad buckler-fern and hard fern. Mosses and liverworts also strongly characterise the field-layer in many areas. Alongside these are a range of other plants including wood sorrel, bluebell, and yellow pimpernel. In some areas, particularly along watercourses and where water flushes out of springs, lusher vegetation occurs with meadowsweet, opposite-leaved golden-saxifrage, marsh hawk's-beard, smooth-stalked sedge, sanicle and upland enchanter's-nightshade.

Woodland habitats are structurally diverse, from dense wooded groves of closely competing trees and most shady and humid situations, to much more open glades and scattered trees in more open situations with numerous open-grown trees. Fallen trees and other natural disturbances create glades and contribute to plentiful fallen and standing decaying wood. Some areas are rich with large diameter standing decaying wood. Invasive non-native species or other threats are generally scarce. The woodland habitats support characteristic fauna of the area including dormice, wood warblers and pied flycatchers. Lesser horseshoe bats roost and forage in the forest. A range of woodland insects are also found including the Welsh clearwing moth.

There is variation in amounts of natural regeneration, with some areas of denser young trees developing, and woods with strong regeneration layers present, to other areas of woodland and scattered trees which are maintained as more open and well-lit with limited regeneration of young trees. Overall, regeneration across Coedwig Dyfi is ensuring that the full range of native trees are perpetuated, and that there is sufficient continuity in the ages and sizes of trees, at an appropriate scale. In the long term, the woods across Coedwig Dyfi will include native trees of all ages, and particular attention will be paid towards maintaining existing veteran and ancient trees and developing mature trees into the ancient trees of the future, particularly through management of space and light for individual trees. In some areas this may occur through natural processes, through livestock grazing, or through silvicultural interventions.

Restoration is underway in all plantations of conifers and other non-native timber trees such as beech on ancient woodland sites. Where feasible, this is carried out through thinning and a gradual transformation of the canopy to more irregular high-forest structures, supporting the development and recruitment of native broadleaved trees. Timber haulage and forest roads are managed in a way that does not impact on lichen populations.

What management is needed at Coedwig Dyfi SSSI and why?

Although Coedwig Dyfi SSSI is an excellent place for wildlife, it will only remain so if the necessary management is implemented. NRW's priority is to work with you to achieve this. We place great importance on our relationships with owners and occupiers because, without your help, it will be impossible for us to safeguard the special features on your land.

What does this mean in practice?

These are the key issues that are of importance for the features of Coedwig Dyfi to be in good ecological condition. Some of these could damage the special features of Coedwig Dyfi if they are not properly managed. This Statement does not constitute consent for any of the 'operations requiring consultation with Natural Resources Wales'. The written consent of Natural Resources Wales may be required before carrying out any of those operations. Please contact your local NRW team (contact details at the bottom of this document) if you wish to discuss any of these.

Tree species

It is important that Coedwig Dyfi continues to maintain the conditions to support the persistence and regeneration of many different native tree species. Different tree species support different lichens because of the acidity, nutrient status and texture of their bark. Oak and ash are key species for their longevity and bark conditions. Sycamore is of value as a lichen host in Coedwig Dyfi and may become increasingly important if suitable ash trees are lost, so large sycamores in suitable locations should be protected. Birch and alder are important for their rougher acid bark, holly and rowan for their smooth acid bark and hazel and willows for their smooth base-rich bark. Small-leaved lime is a scarce tree in Coedwig Dyfi and Welsh woodlands generally, and although less important as a lichen host, it is an important tree in characterising these ancient woodlands. The range of tree species is also fundamental in supporting wider woodland biodiversity from insects that feed on tree leaves to birds that use different trees for feeding or nesting. Non-native trees generally contribute much less, and conifer timber trees are very poor for lichens.

Ash dieback

Ash is a particularly important tree in Coedwig Dyfi, for its base-rich bark. Its loss to ash dieback may have a significant impact on the lichen communities of Coedwig Dyfi and it is vital that any response to ash dieback considers this. Trees should only be felled if there is an imminent threat to public safety or infrastructure for example, based on an adequate survey of a trees condition and crown dieback. It is important to follow the most current guidance for high conservation value sites and consider aspects such as temporary closure of paths for example. Where trees do have to be managed, every effort should be made, wherever practicable and safe, to retain as much standing ash trunk as possible, through pollarding or crown reducing. Consideration also needs to be made to whether other species of tree might help support lichens in areas where ash is being lost. In some instances, this may include protection and management of other trees that are potentially suitable. This includes sycamore for example, but an

important balance needs to be made to ensure that sycamore regeneration does not become too abundant to the detriment of the upland ash-woodland ground flora. In other areas, it may be necessary to consider planting locally sourced and grown trees. For example, aspen, which will not colonise on its own. Although small-leaved lime is not a good tree for lichens, it may replace other ecological functions shared with ash, including for decay fungi and associated wood-decay invertebrates.

Tree ages

It is important that Coedwig Dyfi continues to maintain a spectrum of trees of different ages, from very young trees to large old veteran and ancient trees. Associated lichens make use of young trees with smooth bark (e.g., young oaks, young ash). Very old and ancient trees are generally scarce in Coedwig Dyfi but are known to support lichens not found on younger trees. Older, and particularly cavity-bearing and hollowing trees are also important in supporting wider woodland biodiversity as part of the habitat, with birds, bats and dormice nesting in cavities for example. This places great importance on the maturing trees, particularly the oaks between around 80 to 150 years of age. These can be the ancient trees of the future, and it is important that they have the conditions and space to persist and age. For other light-demanding smaller trees, like birch and rowan, space and light are beneficial to the individual trees' development and the lichen communities on their trunks.

(Left) old oak above Nant Cwm-du – old trees are important hosts for lichens including *Calicium lenticulare* on this tree, and other key species such as *Cresponea premnea*. (Right) young birch in Cwm Glesyrch with the URI species *Hypotrachyna sinuosa*, a more mobile coloniser of younger trees. © Natural Resources Wales / Alastair Hotchkiss

Tree habitats and space

Coedwig Dyfi should include a spectrum of wooded habitats, from well-lit open grown trees to those growing in denser groves of more closely competing trees with largely complete canopy closure. Generally, many of the lichens of high interest require relatively well-lit trees, and it is important that this is maintained by either grazing or silviculture. This space for trees will also help individual trees to develop and potentially become the large ancient trees of the future. In other areas, particularly with high interest for oceanic bryophytes, denser groves of trees will provide higher humidity levels. This spectrum of openness is also critical in supporting wider woodland biodiversity, and many of the woodland birds in Coedwig Dyfi depend on different situations, from tree pipits and redstarts in more gladed open woodland to the denser woodland groves where wood warbler and nuthatches occur.

A more open marshy glade above Nant Esgair-neiriau within a denser grove with open-grown oaks and scattered regeneration of a range of species including more light demanding birch, willow, rowan, and oak. © Natural Resources Wales / Alastair Hotchkiss

Decaying wood

Standing and fallen decaying wood is an important habitat in woodlands, including for some of the lichens, mosses and liverworts of special interest, as well as more generally for insects, birds and the wider ecosystem. This accumulates over time, with natural disturbances such as storms. In many of the less accessible, steeply sloping, parts of Coedwig Dyfi, fallen trees, ripped branches and standing decaying trunks occur, and in some areas are plentiful where these processes have been operating for decades if not centuries. Elsewhere, dead wood should generally be left where it falls

and standing dead trees should be left to decay naturally. In some areas, there may be opportunities to contribute to decaying wood levels. For example, where selectively thinning to give crown space to identified trees to develop them as lichen legacy trees or the ancient trees of the future (see Silvicultural Interventions / Woodland Thinning and Felling). In these situations, the felled material can be left as decaying logs, or instead of felling trees at the base, standing decaying wood features can be created on surrounding trees by ripping crowns and trunks. This may result in standing dead trunks or veteranised trees, where they respond and regrow. These methods should not be carried out on existing veteran trees, or in areas where natural processes are clearly operating well, and such material is being created naturally in abundance.

Decaying wood in different forms. (Left) fallen trees from storms and ripped branches. (Right) large standing decaying wood in Cwm-du. © Natural Resources Wales / Alastair Hotchkiss

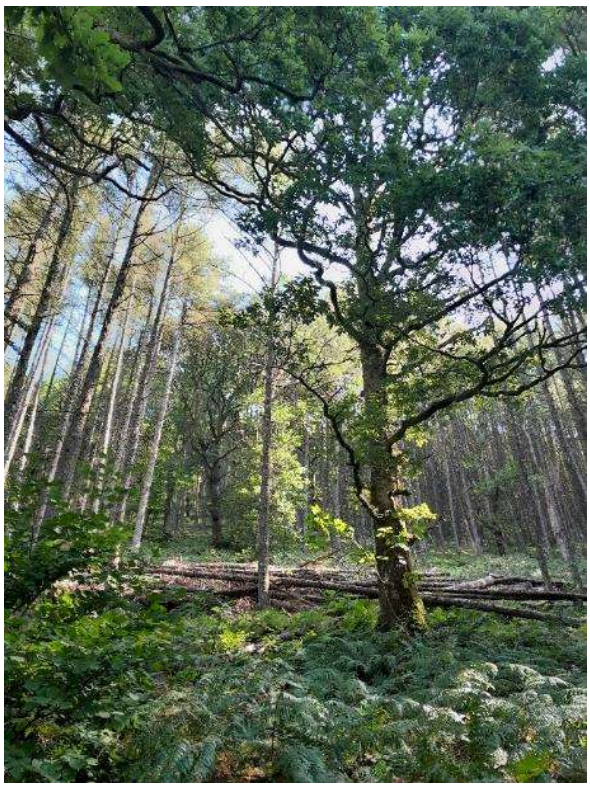
Grazing

Within Coedwig Dyfi, there is a spectrum of different wooded habitat structures, from the densest groves to well-lit scattered trees in more open settings. Much of this is driven by variation in grazing of livestock, and some of the richest areas for lichens are on trees which have been part of grazed landscapes for decades if not centuries. Wild deer are generally scarce or absent in Coedwig Dyfi. Whilst this has its benefits, and tree regeneration and colonisation are forthcoming, it also means that some areas risk become too dense with young trees which can be detrimental to lichen communities. Some existing wood-pasture areas should continue to be grazed sustainably, and some additional grazing, ideally with cattle, could be considered in some denser wooded areas in order to help them develop more open-woodland structures and more diversity in tree habitats and space. It is important to be mindful of potential air quality impacts associated with livestock (see Air quality).

Some wooded areas may benefit from light grazing, ideally with cattle. © Alastair Hotchkiss

Silvicultural interventions / Woodland thinning and felling

In some areas silvicultural intervention will be important to develop desired woodland structures. For example, in denser young regenerating stands of native trees (e.g., 15 to 30 years old), early thinning interventions can help to give considerable crown space to develop future lichen 'legacy trees' of a range of tree species. This is also the case in areas that were grazed as wood-pasture historically but have become infilled with regeneration or planting. In some situations, it may be possible to combine this with appropriate grazing to maintain space, and where animals may browse tree regrowth.



(Left) active silvicultural intervention to give crown-space and light to develop future lichen host trees in Coed Pen-lan, Blaen Glesyrch / (Right) halo-thinning oaks in larch plantation on ancient woodland site as part of restoration of ancient woodland in Coed Maes-mawr. © Natural Resources Wales / Alastair Hotchkiss

The same approach can be taken by ‘halo-thinning’ around older trees, particularly ancient and veteran trees which are experiencing significant crown competition or are being overtopped by other trees. Likewise, mature trees (e.g., oaks of approximately 50-100 years old) that can become the veteran and ancient trees of the future can be haloed in this way. This can often also contribute to other objectives at the same time (see Decaying wood / Tree habitats and space).

In some areas of native woodland, non-native regeneration will require removal, as will some larger seed-bearing non-native trees. Some areas are Plantations on Ancient Woodland Sites (PAWS), with denser stands of planted conifers or other non-native trees such as beech. These include areas of Cwm Glesyrch, Coed Maes-mawr, Coed y Ffridd and Cwm Celli. Some of these retain ground layers typical of ancient temperate rainforest, especially under larch or stands that have been well thinned and are developing more irregular forest structures. Where feasible, restoration should be through successive and regular thinning and a gradual transformation of the canopy to irregular high-forest, whilst developing and recruiting native trees in the process. Sometimes this won’t be achievable because of a lack of thinning history/instability, poor access, tree diseases or other factors, but it can be important to precede a clear-fell with targeted halo-thinning of any native trees. Some areas of PAWS have already been clear-felled, including Coed Ffridd-newydd and Coed Cwm-du. These areas may require removal of non-native conifer regeneration, and when they develop into thickets and pole-stage stands of young native trees, thinning can be considered.

Dormouse in amongst Usnea lichens near Aberllefenni. Woodland management in Coedwig Dyfi must also consider the requirements of protected species such as dormouse. © Natural Resources Wales / Isobelle Hotchkiss

Woodland expansion / Tree planting

Generally, most the site is already part of a spectrum of wooded habitats. In some parts of the site there may be opportunities for trees to expand out from existing woodland into more open land. In most instances fenced-off areas with conventional planting densities are not appropriate, and an expansion of wooded habitats is generally most beneficial through scattered and parkland style planting, or through natural colonisation of trees, often combined with an element of grazing. Therefore, protection of young trees may often be needed, through enclosures or guards.

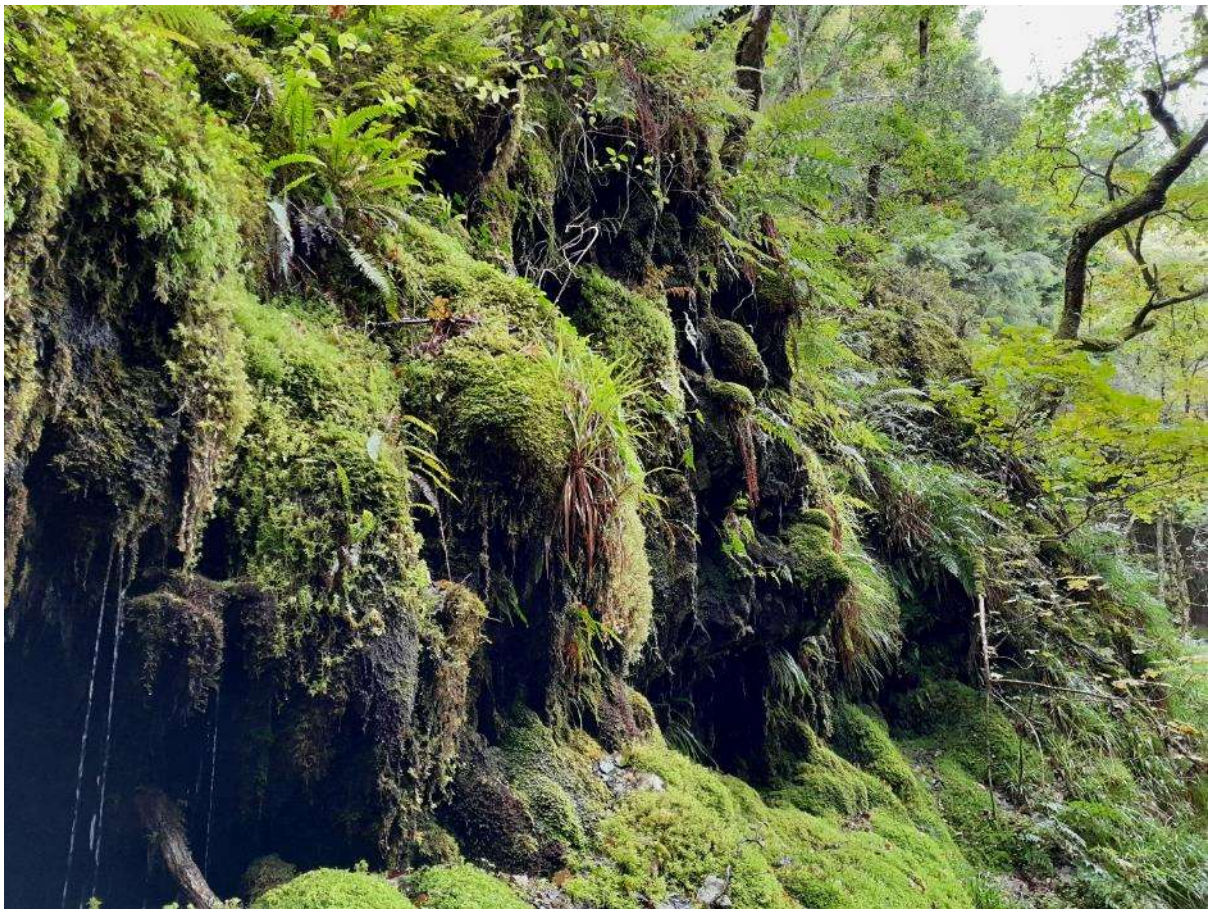
Tracks and roadsides

There are many forest roads and tracks within the site, and their management should be carried out in a way that is sympathetic to the special interest of Coedwig Dyfi. Tracksides can be important hotspots for lichens, where they are well-lit, and often where strips of native broadleaved trees, particularly willows, fringe conifer plantations. There may also be opportunities for developing better lichen habitats along track edges by having more scattered individual trees instead of thick dense strips of trees overhanging the tracks, which is also better for the condition of the roads. In some areas careful planning will be required, for example where grading forest tracks, including where material is pushed, and where timber is stacked.

Well-lit willow trees with *Sticta* lichens on edge of forest road in Cwm Glesyrch. © Natural Resources Wales / Alastair Hotchkiss

Air quality

The relatively clean air of Coedwig Dyfi is an important factor in why it is so rich for lichens. Many impacts on woodland air quality arise from outside the boundary of a site, from relatively local sources of ammonia in agriculture to longer-distance transport of nitrogen. Although livestock grazing will continue to be important management in Coedwig Dyfi, certain aspects may need careful consideration. For example, some trees may need to be protected where excessive lying-up is resulting in localised high ammonia levels. Stock feeding with silage, hay or feed blocks may also produce nutrient rich run-off and potential air quality changes. Mineral licks are also urea-based and may also contribute to localised increases in nitrogen.



Rock outcrop above Nant Esgair-neiriau which is dripping wet in the middle of summer. © Natural Resources Wales / Alastair Hotchkiss

Microclimate

As a temperate rainforest, the trees and woods and Coedwig Dyfi receive plenty of water. Generally, sunlight is more limited in these woodlands than humidity and water. But an increase in the frequency and severity of drought events associated with climate change may influence this. In some areas a balance needs to be considered between humidity and light. Generally, many of the lichens of interest in the site favour more well-lit situations, although there are always exceptions. Conversely, many of the specialist bryophytes and the filmy ferns rely on the highest levels of humidity. Of perhaps most importance are the humidity regimes associated with the riverside and

streamside woodland areas, and any developments which impact on the flow of these watercourses need considering carefully.

Invasive non-native plants

Generally, the woodland habitat in Coedwig Dyfi does not suffer from high levels of invasive non-native plants, such as rhododendron, which is a problem in many similar temperate rainforest habitats in parts of northwest Wales, and the west coasts of Scotland and Ireland. It is important that invasive non-native plant species are kept under control, including rhododendron, as well as non-native conifers such as western hemlock. The invasive Pirri-pirri-bur and montbretia occur in nearby areas, so efforts are required to ensure they do not establish in the site.

Finally

Our knowledge and understanding of wildlife is continually improving. It is possible that new issues may arise in the future, whilst other issues may disappear. This statement is written with the best information we have now but may have to change in the future as our understanding improves. Any information you can provide on the wildlife of your site, its management and its conservation would be much appreciated.

If you would like to discuss any aspect of your SSSI, or have any concerns about your SSSI, please contact your local NRW office. Details of your current local office can be found on the NRW website or by calling the number below.

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