Cyfoeth Naturiol Cymru
Natural Resources Wales

Lichen survey of Cae Gwyn, Bronaber, Meirionnydd

D. M. Lamacraft

Report No 620

Lobarina scrobiculata and *Sticta fuliginoides* on willow at Cae Gwyn

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We work for the communities of Wales to protect people and their homes as much as possible from environmental incidents like flooding and pollution. We provide opportunities for people to learn, use and benefit from Wales' natural resources.

We work to support Wales' economy by enabling the sustainable use of natural resources to support jobs and enterprise. We help businesses and developers to understand and consider environmental limits when they make important decisions.

We work to maintain and improve the quality of the environment for everyone and we work towards making the environment and our natural resources more resilient to climate change and other pressures.

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- Having a well resourced proactive programme of evidence work;
- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
- Communicating our evidence in an open and transparent way.

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1. Crynodeb Gweithredol

Comisiynwyd Dave Lamacraft i gynnal arolwg o'r cennau ar eiddo newydd Cyfoeth Naturiol Cymru yng Nghae Gwyn, ger Bronaber.

Bu'n arolygu dros dridiau ym Mawrth ac Ebrill 2022.

Amcan yr arolwg oedd ffurfio darlun sylfaenol am amrywiaeth cennau, yn benodol:

- Fel y gellid cynnal gwaith adfer gorlifdir Afon Eden heb effeithio cennau nodedig.
- I archwilio'r eiddo ehangach gan roi blaenoriaeth i'r ardal goediog yn ne-ddwyrain y safle.

Cofnodwyd 158 rhywogaeth, gyda 39 ohonynt yn nodedig, gan gynnwys:

- 10 ar restr goch Cymru (dan fygythiad neu uwch)
- 1 ar restr goch Prydain (dan fygythiad neu uwch)
- 1 rywogaeth Adran 7, ac un gymuned Adran 1
- 8 rhywogaeth o gyfrifoldeb rhyngwladol
- 18 ar fynegai Coedwig Gefnforol Ddeheuol (SOWI)
- 11 ar fynegai Coedwig Law Ucheldir (URI)

Mae'r rhywogaethau a gofnodwyd yn cynnwys:

- *Lobarina scrobiculata* CR Cymru, IR, S7 *Lobarion*
- *Opegrapha fumosa* VU Cymru, NS, IR
- *Sticta fuliginoides*
- *Sticta fuliginosa s. str.*
- *Arthonia vinosa* NT Cymru, S7 *Lobarion*, SOWI
- *Catinaria atropurpurea* NT Cymru, S7 *Lobarion*
- *Cetrelia cetrarioides / Cetrelia olivetorum s. lat.* NT Cymru
- *Hypotrachyna sinuosa* NT Cymru, IR
- *Parmeliella parvula* NT Cymru, IR, S7 *Lobarion*
- *Sticta limbata* NT Cymru, IR, S7 *Lobarion*
- *Sticta sylvatica* NT Cymru, IR, S7 *Lobarion*
- *Usnea florida* NT GB, S7
- *Phaeographis inusta* NS

Cysylltir y cennau nodedig yn bennaf â'r gymuned rhisgl llai asid neu 'base-rich' (ynn, hen dderi, helyg, criafol a chyll); y gymuned rhisgl asidaidd (deri, bedw a helyg); a'r cymunedau rhisgl llyfn (cyll, helyg, criafol).

Mae'r amrywiaeth nodedig yn awgrymu parhad ecolegol hirhoedlog h.y. gorchudd coed parhaol gyda digon o oleuni.

Datgelodd yr arolwg yn yr ardal adfer gorlifdir gryn ddiddordeb, a nodwyd y coed perthnasol efo rhif; ceir manylion yn Atodiad 2.

Parthed meini prawf Safleoedd o Ddiddordeb Gwyddonol Arbennig, mae'r safle yn cyrraedd sgôr o 18 ar fynegai SOWI; 11 URI; a 3 ar y Mynegai Pennau Pin (PI). Tra mae'r rhain yn brin o'r trothwy ar gyfer dynodi SoDdGA (30, 15, a 10), mae'r ddau fynegai cyntaf wedi eu creu ar gyfer safleoedd gydag o leiaf 100 hectar o goedwig, felly mae pwyntiau Cae Gwyn yn sylweddol ar gyfer safle mor fach.

Gwneir argymellion rheoli ar gyfer y coed ar lan yr afon ac ar y safle ehangach, gyda phwyslais ar gynnal y cynefinoedd gydag amodau agored a golau.

2. Executive Summary

Dave Lamacraft was contracted by Natural Resources Wales to undertake a lichen survey of recently purchased land at Cae Gwyn, near Bronaber, Meirionnydd.

The survey took place over three days in March and April 2022.

The aim of the survey was to form a baseline survey of the lichen assemblage - mainly but not exclusively - on trees at Cae Gwyn, specifically:

- To inform the planned floodplain restoration along Afon Eden, where some trees will be cut, and the embankment reprofiled.

- To search the wider NRW property of Cae Gwyn for lichens, prioritising the sparsely wooded area to the southeast of the site, but including all other potential lichen hotspots, and then the wider site as time limits allow. Tag where relevant, to allow future monitoring, and report as above.

The site was surveyed on three days in March and April 2022.

158 taxa were recorded of which 39 are notable species, including:

- 10 red-listed in Wales at NT or higher
- 1 red-listed at the GB level at NT or higher
- One Section 7 species and 1 Section 7 community
- 8 International Responsibility species
- 18 Southern Oceanic Woodland Index (SOWI) taxa,
- 11 Upland Rainforest Index (URI) species

Species recorded included:

- *Lobarina scrobiculata* CR Wales, IR, S7 *Lobarion*
- *Opegrapha fumosa* VU Wales, NS, IR
- *Sticta fuliginoides*
- *Sticta fuliginosa s. str.*
- *Arthonia vinosa* NT Wales, S7 *Lobarion*, SOWI
- *Catinaria atropurpurea* NT Wales, S7 *Lobarion*
- *Cetrelia cetrarioides / Cetrelia olivetorum s. lat.* NT Wale
- *Hypotrachyna sinuosa* NT Wales, IR
- *Parmeliella parvula* NT Wales, IR, S7 *Lobarion*
- *Sticta limbata* NT Wales, IR, S7 *Lobarion*
- *Sticta sylvatica* NT Wales, IR, S7 *Lobarion*
- *Usnea florida* NT GB, S7
- *Phaeographis inusta* NS

This interest is mostly associated with the base-rich bark community (on ash, old oak, willow, rowan and hazel), the acid-bark community (on oak, birch and willow) and the smooth-bark communities (mostly on hazel, willow and rowan).

The interest is indicative of sites with a long-standing ecological continuity i.e. continuity of woodland cover, and of well-lit conditions.

The survey of trees in the floodplain restoration area did reveal some interest and trees were tagged accordingly, these are detailed in Appendix 2.

With reference to the relevant SSSI criteria the site scores 18 on the Southern Oceanic Woodland Index (SOWI), 11 on the Upland Rainforest Index (URI) and 3 on the Pinhead Index (PI). Whilst these fall short of the thresholds for consideration for SSSI notification (30, 15 and 10 respectively), the former two indices are supposed to be applied to sites of at least 100ha of woodland cover, so these scores for Cae Gwyn are impressive for such a small site.

Management recommendations are made for the riverbank trees in the floodplain restoration area and for the wider site. These mostly focus on maintaining and expanding the well-lit open-grown tree habitats.

3. Introduction

Dave Lamacraft was contracted by Natural Resources Wales to undertake a lichen survey, with a focus on epiphytic lichens, of recently purchased land at Cae Gwyn, Bronaber, Meirionnydd. The survey took place over three days in March and April 2022.

3.1. Scope of the Project

To form a baseline of the lichen assemblage - mainly but not exclusively - on trees at Cae Gwyn.

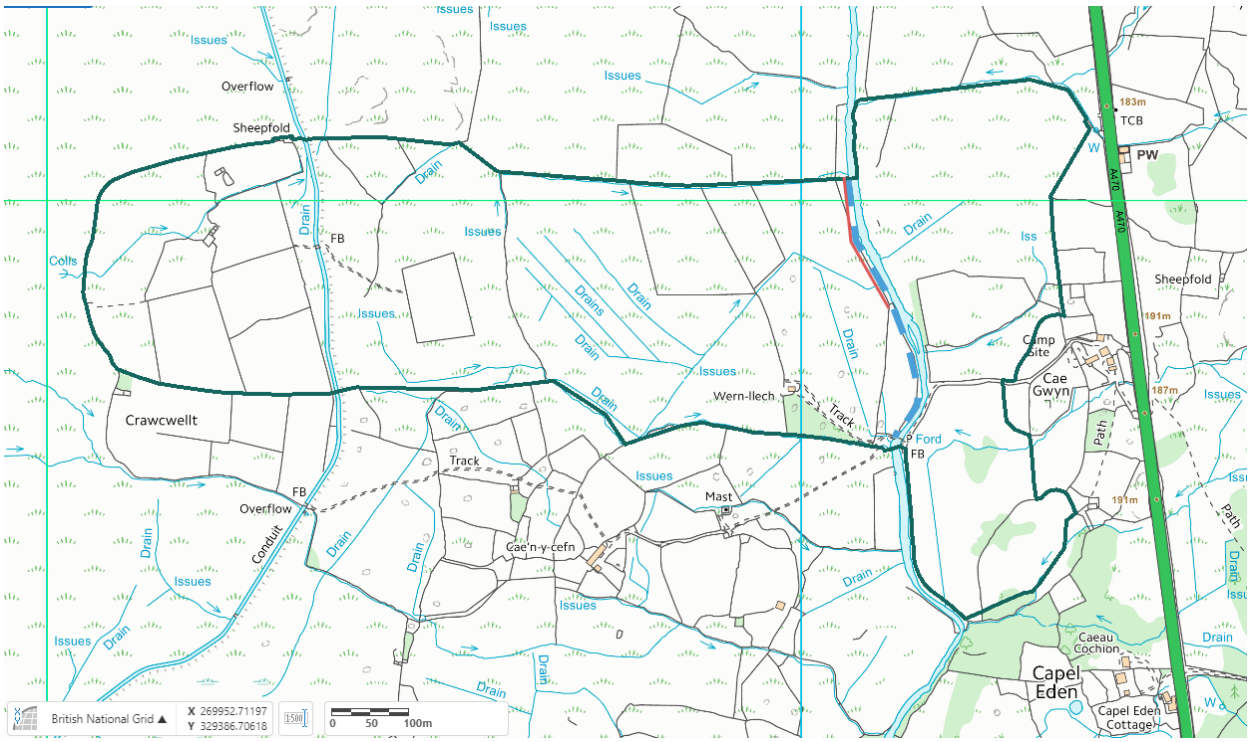
In the immediate future it will also inform the planned floodplain restoration along Afon Eden, where some trees will be cut, and the embankment reprofiled:

- Survey for lichens along the west bank of Afon Eden as a priority, focusing particularly on notable species (Section 7, GB Red List, Wales Red List, and TNTN). The contractor must not enter the river to gain access to any location;
- Mark all trees (or in some instances possibly, specific branches) that support notable lichens, and that should NOT be felled/reduced/pruned. Use the aluminium numbered discs (and Al nails) provided by NRW; liaise with PW if more are required. Record location with a GPS (using the National Grid, not longitude-latitude);
- Make a photographic record of notable lichens and their locations, with tag numbers included in the file name as appropriate;
- Report to include a map indicating the locations of all notable species, using the tag numbers as target notes where relevant. Please also supply an excel (or equivalent open document) spreadsheet with all species recorded;
- In the case of saxicolous lichens, where recorded, please make a photographic record so that NRW may easily identify the location, and add as target notes on the map;

and,

- Search the wider NRW property of Cae Gwyn for lichens, prioritising the sparsely wooded area to the south east of the site, but including all other potential lichen hotspots, and then the wider site as time limits allow. Tag where relevant, to allow future monitoring, and report as above.

Figure 1. The survey area

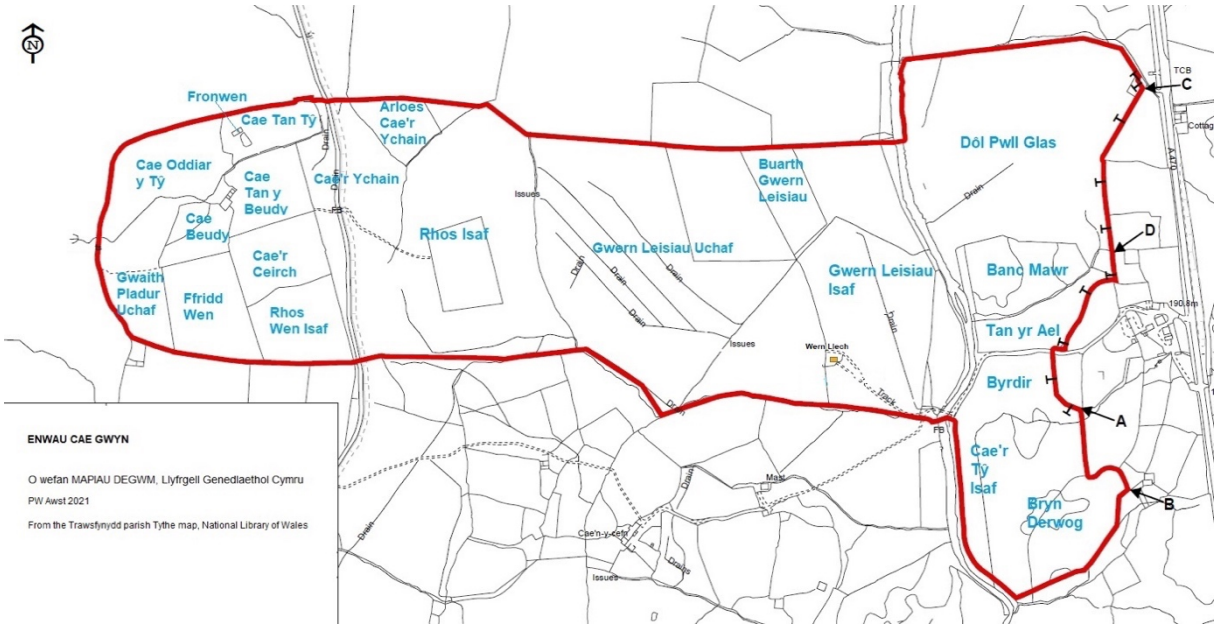


Map Key:
The dark green solid line shows the site boundary.
The blue dashed line represents the priority survey area on the west bank of Afon Eden.
The thin red line shows the fenced area of the west bank.

Map from the specification provided by Natural Resources Wales

Figure 2. Survey area with field names

Map provided by Natural Resources Wales



4. Method

As per the specification the survey focussed on the trees on the western riverbank and on the trees in the south-eastern part of the site (Cae'r Ty Isaf and Bryn Derwog) but also covered the remainder of the site.

Searching and recording focussed on notable species (as per specification), with red-listed and SSSI qualifying species recorded systematically. Some notable species were not recorded systematically due to being abundant across the site e.g. the Section 7 listed and NT at GB level *Usnea florida*.

Recording was made using an iPhone SE, which was also used for taking photos along with an Olympus Tough TG-6 for macro photos. GPS readings were made using a Garmin GPSMAP 64s.

Every effort was made to identify lichens in the field, limiting the need for collection for later confirmation in the lab. The chemicals commonly used by lichenologists in the field, sodium hydroxide (NaOH) made from a diluted solution of caustic soda, and sodium hypochlorite (NaClO), in this case Milton Sterilising Fluid, were used for chemical tests to aid in field identification. Some specimens were collected for later microscopic confirmation.

Records of notable species were mapped using QGIS and input into the standard British Lichen Society recording spreadsheet.

4.1. Synonyms used

Old name	***New name***
Arthonia cinnabarina	*Coniocarpon cinnabarinum*
Arthonia punctiformis	*Naevia punctiformis*
Arthonia spadicea	*Diarthonis spadicea*
Bacidia squamellosa	*Bacidina squamellosa*
Dimerella lutea	*Coenogonium luteum*
Leptogium lichenoides	*Scytinium lichenoides*
Lobaria scrobiculata	*Lobarina scrobiculata*
Mycoblastus fucatus	*Violella fucata*
Opegrapha atra	*Arthonia atra*
Opegrapha ochrocheila	*Alyxoria ochrocheila*
Opegrapha varia	*Alyxoria varia*
Pertusaria albescens	*Lepra albescens*
Pertusaria amara	*Lepra amara*
Pertusaria corallina	*Lepra corallina*
Pertusaria multipuncta	*Lepra multipuncta*

5. Results

This site was visited in March and April 2022, see Figure 3 for the survey route and the maps at the starts of Appendix 2 and Appendix 3 for recording locations.

- 158 taxa were recorded of which 39 are notable species, including:
  - 10 red-listed in Wales at NT or higher
  - 1 red-listed at the GB level at NT or higher
  - One Section 7 species and 1 Section 7 community
  - 8 International Responsibility species
  - 18 Southern Oceanic Woodland Index (SOWI) taxa,
  - 11 Upland Rainforest Index (URI) species

Notable species are those as defined in the specification i.e. Section 7, GB Red List, Wales Red List, and International Responsibility species (species with internationally important populations in GB).

The records are summarised in Table 1, with more detail on notable species below. Detailed records, including photos, are in Appendix 2 for the surveyed and tagged riverside trees, and in Appendix 3 for the wider survey.

5.1.1. Notable species recorded

Lobarina scrobiculata CR Wales, IR, S7 *Lobarion*, SOWI (base-rich bark community)
Recorded twice; once on a post-mature ash on the west bank of the river in Gwern Leisiau Isaf (CG16), where it was growing with *Sticta* species, and on a large spreading willow in Bryn Derwog (CG29). In both cases it wasn't particularly abundant but was looking healthy with fresh growth present on the ash. See CG16 in Appendix 2 and CG29 in Appendix 3. See Appendix 4 for map.

Opegrapha fumosa VU Wales, NS, IR (acid bark community)
Recorded once, on a post-mature boundary oak in Bryn Derwog, CG27 (Appendix 3 and Appendix 4 for map).

Sticta fuliginoides VU Wales, IR, S7 *Lobarion*, SOWI (base-rich bark community)
Recorded on two trees in Bryn Derwog, a hazel (CG25) and the willow with *Lobarina scrobiculata* (CG29), see Appendix 3 and Appendix 4 for map.

Sticta fuliginosa s. str. VU Wales, IR, S7 *Lobarion*, SOWI (base-rich bark community)
Recorded on six trees, mostly in the SE of the site e.g. Bryn Derwog and Cae'r Ty Isaf; two willow (CG17, CG56), two oak (CG22, CG41), a hazel (CG25) and a rowan (CG42), see Appendix 2 and 3 and Appendix 4 for map.

Arthonia vinosa NT Wales, S7 *Lobarion*, SOWI (base-rich bark and lignum communities)
Recorded on two oaks; a small amount on a decorticate stump in Cae'r Ty Isaf (CG28), and the other a live tree in Bryn Derwog with extensive damage (CG34), assumed to be from fire damage, where it was frequent on the north side of the trunk. See Appendix 3 and Appendix 4 for map.

Catinaria atropurpurea NT Wales, S7 *Lobarion*, SOWI (base-rich bark community)
Recorded on 4 oaks in the Bryn Derwog area on the trunks of post-mature trees: CG27, CG30, CG33 and CG 41. See Appendix 3 and Appendix 4 for map.

Cetrelia cetrarioides / Cetrelia olivetorum s. lat. NT Wales, URI (acid bark community)

C. cetrarioides was recorded from six trees; three oaks (inc. CG10, CG27), two willow CG3, CG36) and an ash (CG50), along the river and on old boundary trees elsewhere. In some cases e.g. CG50 it was well developed. *C. olivetorum s. lat.* was recorded on one tree, a hazel (CG37) and on rock at CG10. *C. cetrarioides* was identified by its bright UV reaction to the medulla. *C. olivetorum s. lat*. was not tested with UV, but probably also represents *C. cetrarioides*. See Appendix 2 and 3 and Appendix 4 for map.

Hypotrachyna sinuosa NT Wales, IR, URI (acid bark community)
Small amounts recorded on three trees, a birch (CG8) and two willows (CG11, CG20). See Appendix 2 and 3 and Appendix 4 for map.

Parmeliella parvula NT Wales, IR, S7 *Lobarion*, SOWI (base-rich bark community)
Recorded on a mossy dry stone boundary wall (at CG23) and frequent on two rich old rowans in Bryn Derwog (CG40, CG42), growing with abundant *Sticta fuliginosa s. str* in the latter case. See Appendix 3 and Appendix 4 for map.

Sticta limbata NT Wales, IR, S7 *Lobarion*, SOWI (base-rich bark community)
Recorded on five trees, mostly in the SE: three oaks (inc. CG22, CG23), a hazel (CG21) and an ash (CG50). In most cases it was rather rare on these trees with small and/or scattered thalli or just a few lobes. See Appendix 3 and Appendix 4 for map.

Sticta sylvatica NT Wales, IR, S7 *Lobarion*, SOWI (base-rich bark community)
Recorded on just one tree, the rich ash on the riverside in Gwern Leisiau Isaf (CG16). See Appendix 2 and Appendix 4 for map.

Bacidina squamellosa DD Wales, NS (base-rich bark community)
Recorded on one tree, a rich rowan in Bryn Derwog (CG40). See Appendix 3 and Appendix 4 for map.

Usnea florida NT GB (twig community)
Not systematically recorded as so abundant on the site, growing on most trees and the most abundant on fence posts, not mapped.

Phaeographis inusta NS, SOWI (base-rich bark community)
Recorded once on a hazel on the roadside near the bridge (CG55)

Lecanora hybocarpa NR (smooth bark community)
Probably significantly under recorded and not really Nationally Rare. More easily separated microscopically now with the use of polarising film on standard microscopes. Recorded from one tree, an ash.

The following Nationally Scarce species:

Arthothelium ruanum Not systematically recorded or mapped, but quite frequent on smooth bark on the site.
Chaenothecopsis pusila Recorded on one oak with a good lignum community in Bryn Derwog (CG35), growing with *Calicium glaucellum* and *Hypocenomyce scalaris*. See Appendix 3 and Appendix 4 for map.
Dactylospora parasitica On *Ochrolechia androgyna* on the riverside in Gwern Leisiau Isaf (CG11). See Appendix 3 and Appendix 4 for map.
Gyalecta derivata on ash on the riverbank near the gate in Tan yr Ael. See Appendix 3 and Appendix 4 for map.
Lecanora alboflavida on 3 trees, two oak (inc CG53) and a birch (CG46). See Appendix 3 and Appendix 4 for map.

Lecanora argentata Not recorded systematically, probably the most frequent Lecanora on the site.
Ropalospora viridis Recorded on one rich rowan in Bryn Derwog (CG40). See Appendix 3 and Appendix 4 for map.
Usnea wasmuthii Recorded on oak, but not systematically recorded.

And the following SSSI assemblage species (not otherwise notable):

Anisomeridium ranunculosporum SOWI
Calicium glaucellum PI
Chaenotheca brunneola SOWI
Cladonia caespiticia SOWI
Hypotrachyna laevigata URI
Japewiella tavaresiana URI
Lecanora jamesii SOWI
Lepra multipuncta SOWI
Megalaria pulverea URI
Mycoblastus caesius URI
Mycoblastus sanguinarius f. sanguinarius URI
Mycoporum antecellens SOWI
Scytinium lichenoides SOWI
Sphaerophorus globosus URI
Trapelia corticola URI

See Appendix 2, 3 and 4.

5.1.2. Description of areas surveyed

The site is dominated by rhos to the north, on both sides of the river, with pasture to the south and at the western extent of the holding. The Afon Eden cuts though the site from the north to the south. The main habitats, from a lichen perspective, at Cae Gwyn are:

- The remnant woodland or wood pasture in the south-east – Bryn Derwog and Cae'r Ty Isaf – of which the main features are the groups of well-lit post-mature oak with hazel, rowan, birch and willow.

- The riverbank with its cover of mature willow and occasional old ash, amongst younger birch and some rock habitats.

- Old boundary trees scattered around the site

The presence of the lichen *Ochrolechia parella* on rocks in some areas e.g. around the base of the ash tree CG16 indicates some basic influences in the rock.

And to a lesser extent:

- The various rock habitats, largely artificial e.g. dry stone walls, with some occasional natural rock exposures.

- Stands of bog myrtle within the rhos

- Softwood fence posts

The presence of some base-rich rocks adjacent to the river could indicate some similar base influence within the river which could potentially support interesting lichens e.g. River Jelly-lichen *Collema dichotomum* and the river could well be worth surveying for lichen interest. The river was not entered but some aquatic lichens were visible e.g. *Dermatocarpon luridum* and what may have been *Leptogium plicatile*.

Figure 3. Survey routes

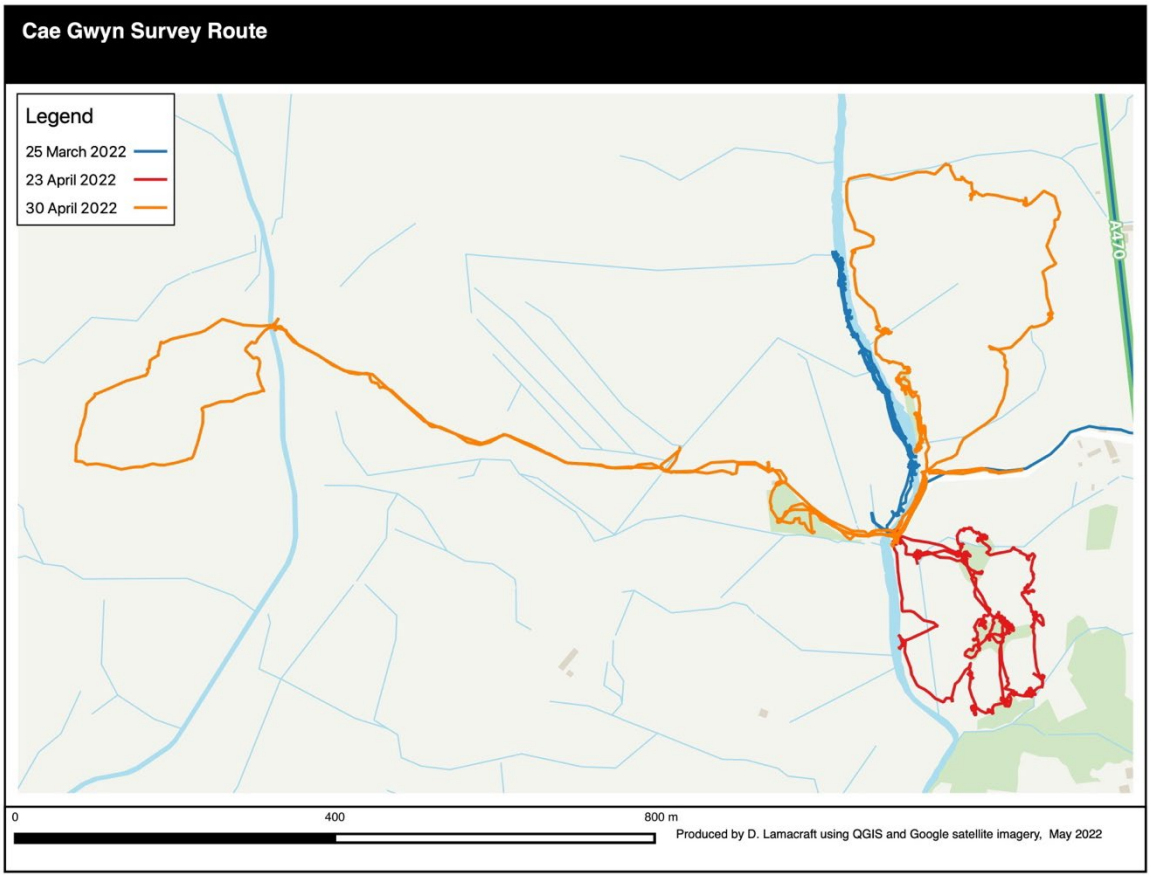


Table 1. Notable species

Key
GB RL: Great Britain Red List
Wales: Wales Red List
NR/NS: Nationally Rare/Nationally Scarce
IR: International Responsibility species
SOWI: Southern Oceanic Woodland Index (SSSI criterion)
URI: Upland Rainforest Index (SSSI criterion)
PI: Pinhead Index (SSSI criterion)
(NT) or (VU (Wales)): Taxon is a recent segregate from a taxon listed on red list, SOWI or URI
CR (Wales): listed as Critically Endangered on Wales Red List
VU (Wales): listed as Vulnerable on Wales Red List
NT (Wales): listed as Near Threatened on Wales Red List
DD: Data Deficient

Taxon name	Status
Usnea florida	NT (GB RL)
Lobarina scrobiculata	CR (Wales), IR, SOWI
Opegrapha fumosa	VU (Wales), NS, IR
Sticta fuliginosa s. lat.	VU (Wales), IR, SOWI
Arthonia vinosa	NT (Wales), SOWI
Catinaria atropurpurea	NT (Wales), SOWI
Cetrelia cetrarioides	(NT, SOWI, URI)
Cetrelia olivetorum s. lat.	NT (Wales), SOWI, URI
Hypotrachyna sinuosa	NT (Wales), IR, URI
Parmeliella parvula	NT (Wales), IR, SOWI, URI
Sticta limbata	NT (Wales), IR, SOWI
Sticta sylvatica	NT (Wales), IR, SOWI
Bacidia squamellosa	DD (Wales), NS
Sticta fuliginoides	(VU (Wales), SOWI)
Sticta fuliginosa s. str.	(VU (Wales), SOWI)
Chaenothecopsis pusilla	NS, PI
Dactylospora parasitica	NS
Gyalecta derivata	NS
Lecanora alboflavida	NS, SOWI, URI
Lecanora argentata	NS
Lecanora hybocarpa	NR
Phaeographis inusta	NS, IR, SOWI
Ropalospora viridis	NS
Usnea wasmuthii	NS
Arthothelium ruanum	NS
Anisomeridium ranunculosporum	SOWI
Chaenotheca brunneola	SOWI, URI
Cladonia caespiticia	SOWI
Lecanora jamesii	SOWI
Mycoporum antecellens	SOWI
Lepra multipuncta	SOWI
Scytinium lichenoides	SOWI
Megalaria pulverea	URI
Mycoblastus caesius	URI
Mycoblastus sanguinarius f. sanguinarius	URI
Sphaerophorus globosus	URI
Trapelia corticola	URI
Hypotrachyna laevigata	URI

Japewiella tavaresiana	URI
Calicium glaucellum	PI

6. Discussion

6.1. Riverbank trees in floodplain restoration area

There is significant lichen interest in the riverside trees and associated rocks e.g. the Critically Endangered (Wales) *Lobarina scrobiculata*.

This interest is associated with the older habitats – the older trees and rock habitats – that pre-date the canalisation of the Afon Eden. Indeed, some of this interest is probably a link back to a time when the flood plain was significantly more wooded.

No significant lichen interest was found on the young trees although the retention of some is important for future generations of tree and lichen habitat.

No significant lichen interest was found on the 'new' embankment alongside the Afon Eden in the southern field.

It should be possible to retain the lichen interest whilst also restoring the Afon Eden to its pre-canalisation conditions, indeed some thinning of younger, denser stands of e.g. birch would probably be beneficial to the lichen interest.

The trees are detailed in Appendix 2.

6.2. The lichen interest of the site as a whole

Cae Gwyn supports important lichen interest with a number of species of conservation significance e.g. *Lobarina scrobiculata*, assessed as Critically Endangered on the Wales Lichen Red List (Woods 2010), and a good number of species that are indicative of ancient woodland and/or habitats with a long continuity of ecological conditions i.e. long-stranding woodland cover and well-lit conditions.

The most significant community is the **base-rich bark community** – the *Lobarion* – considered the climax community of woodland in Britain. This community includes some of our most characteristic large foliose lichen species such as the *Lobaria* or lungwort species and includes many for which Britain supports internationally important populations – assessed as International Responsibility or IR species. Species of this community at Cae Gwyn include *Catinaria atropurpurea*, *Lobarina scrobiculata*, *Parmeliella parvula*, *Sticta fuliginoides*, *S. fuliginosa*, *S. limbata* and *S. sylvatica*, and the most important area is the south-east of the site where old trees are scattered amongst relatively low intensity pasture. The riverbank is also important. The most important tree species are oak, ash, hazel, and willow.

There is an important **acid-bark community** – the *Parmelion* – on acid-barked trees, mostly oak and birch, found in similar locations as the base-rich bark community. Key species include *Cetrelia olivetorum s lat*, *C. cetrarioides*, *Hypotrachyna sinuosa* and *Sphaerophorus globosus*.

A small but important **dry lignum community** is present in the south-east of the site, occupying bare wood on a live oak, and on an old oak stump. The lignum communities are typified by the 'pinhead' species, lichens and non-lichenised bark fungi whose fruiting bodies are rounded heads held on the tips of short stalks – looking like tiny pins. Species include *Calicium glaucellum*, *Chaenotheca brunneola* and *Chaenothecopsis pusilla* (a scarce species in Meirionnydd).

Smooth bark communities – the *Graphidion* with *Graphis scripta* and *Coniocarpon cinnabarina* predominating on hazel and rowan, and the *Pertsarietum* with *Pertusaria* species predominant. Scarcer species include *Arthothelium ruanum* and the two lichenicolous fungi *Dactylospora parasitica* (on *Ochrolechia androgyna*) and a taxon which matches an as yet unnamed species of *Lichenocora* on *Pertusaria hymenea* (Canon et al 2021).

Other communities include those of twigs and the tree canopy e.g. Usnea species and those of saxicolous rock.

The key species are detailed in Section 5.1.1.

6.3. Lichen interest assessed using SSSI criteria

The lichen interest of sites can be assessed for inclusion as SSSI features using a set of criteria (Sanderson et al 2018), which also provides a useful means of assessing regional and national importance of a site aside from for SSSI consideraitons.

Cae Gwyn does not qualify as SSSI in its own right with any species-specific lichen features. Using the relevant assemblages for Cae Gwyn, the site scores:

- 18 on the Southern Oceanic Woodland Index (SOWI)
  The SOWI represents the base-rich bark community well alongside other species of ancient woodland, wood pasture and parkland habitats. The threshold score for consideration as a SSSI feature in this area is 30, so Cae Gwyn falls short. However this index is ideally to be applied to cohesive woodland areas of at least 100ha, the woodland component of Cae Gwyn is tiny, so the site scores quite impressively in this context.

- 11 on the Upland Rainforest Index (URI)
  The URI represents the acid-bark community generally of higher altitude leached bark. The threshold score here is 15, so Cae Gwyn falls short, but again in the context of the threshold to be applied to sites of 100ha or more this score of 11 is impressive.

- 3 on the Pinhead Index (PI)
  This index covers standing deadwood and large trees with dry bark crevices. The threshold for this index is 10, so again Cae Gwyn falls short. This is not surprising as Meirionnydd is not particularly rich in these ancient dry bark species, which probably partly relates to past management practices and partly to climate making their specialist niche scarce.

All in all, the site falls short of SSSI qualification thresholds. However, it is significantly smaller than the size of site to which these criteria are to be applied (cohesive blocks of 100ha). The scores are impressive for a site with such a small woodland component.

6.4. Consideration of the interest within the landscape

The lichen interest of Cae Gwyn is clearly an extension of the incredibly important lichen interest of the extensive woodland and forest that extends through Coed y Brenin and Ganllwyd. The land immediately to the south was surveyed in the early 2000s (Orange 2003) and was found to support an interesting ancient woodland lichen flora including a record of *Pertusaria ophthalmiza*, a very rare species in Wales. The woodland components of the lichen interest at Cae Gwyn should be seen as an extension of this interest and part of the Coed y

Brenin - Ganllwyd meta-site. Indeed, three SSSI assemblage species – *Hypotrachyna sinuosa*, *Phaeographis inusta* & *Mycoporum antecellens* – were recorded at Cae Gwyn that had not as yet been recorded in the Afon Eden woodland to the south. If these new records are added this raises the existing SOWI score of the Afon Eden woodland complex from 29 to 31 and of the URI from 19 to 20, the former therefore newly qualifying for SSSI consideration with the inclusion of Cae Gwyn.

6.5. Habitat management recommendations

6.5.1. Riverside trees in the floodplain restoration area

All tagged trees and associated rocks should be retained where possible (except for CG13), these are detailed in Appendix 2, but retain trees supporting the most significant interest as a minimum.

There is significant interest on rock associated with some trees e.g. CG10, and more widely the scattered rock and dry-stone wall supports well-developed lichen communities. These should be retained as they are if possible.

Cut adjacent thorn sapling and epicormic growth of ash CG16.

In the longer-term, allow the woodland to expand from its current narrow strip. It will be important to maintain open conditions though, perhaps aiming for scattered open grown trees rather than dense woodland given the light-demanding nature of the lichen interest here.

Thinning of some of the younger growth e.g. dense stands of birch on the riverbank would probably be of benefit regardless of any river restoration works.

The ‘new’ embankment in the southern field.


An example of where it may be beneficial to thin the younger tree growth.

6.5.2. The wider site

The most significant lichen interest here is associated with the older trees in well-lit situations, notably in the south-eastern part of the site, along with more scattered old boundary trees. It is unsurprising that reference to the OS six-inch maps 1888-1913 (https://maps.nls.uk/geo/explore/#zoom=16&lat=52.84825&lon=-3.91428&layers=6&b=1) shows woodland cover in the exact same areas as the most significant woodland lichen interest present today, the name Bryn Derwog for the larger field in the south-east of the site, also indicating a history of oak cover. Interestingly, there appears to be more woodland cover present today than there was in the late 19th Century, but these more recent areas of woodland don't have quite the same interest as those areas that were wooded 100+ years ago. Older landscape history is not known but the lichen interest certainly indicates a long-standing ecological continuity.

Long-standing continuity of conditions is as important as continuity of woodland with the species found at Cae Gwyn being largely light-demanding species of well-lit ancient woodland sites. The 19th Century OS maps indicate the woodland was not separate from the wood pasture and it seems likely at this time it was wood pasture.

Future management of the south-eastern area at least should aim to:

- Maintain these conditions i.e. maintain woodland cover and maintain grazing.
- Increase tree cover (especially of oak) in this area, but only aiming for scattered open grown trees on the drier areas. Planting and protecting with tree guards may be the best way to achieve this. Building on and linking existing areas of tree cover would be a way to approach this. It will be important to maintain the current well-lit open structure of this area, partly as the existing areas of drier grassland look like they may be of interest for grassland fungi.
- Ash could be incorporated in any planting, depending on the progress of/resistance to ash dieback.
- Well-lit hazel and willow should be allowed to continue to persist and develop.

Elsewhere on the site, areas of existing tree cover should be maintained e.g. along the riverbank, and areas of mature boundary trees, but other objectives for the site may dictate plans for any further woodland expansion.

Rock interest is mostly of man-made structures e.g. dry stone walls but does add to the overall richness and diversity of the site, although some natural exposures do occur. This interest should be maintained where possible, but if they need to be removed to achieve other objectives e.g. floodplain restoration any rock should be remain as close to its origin as possible and left with lichens covered surfaces exposed.

Similarly there is some interest on softwood fenceposts, including the Section 7 listed Witches Whiskers *Usnea florida*, but this lichen is common in the area and frequent in tree canopies so there is little reason why this should hinder any habitat restoration plans.

A cursory inspection of oak twigs suggested very low levels of ammonia deposition.

7. References

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Appendix 1. List of species recorded

Abundance across the site is estimated in DAFOR scale relative to the surveyed area/surveyed trees and is likely to underestimate canopy and twig species.

Species/taxon	Substrate	Abundance (DAFOR)
Acrocordia gemmata	Ash	R
Alyxoria ochrocheila	Ash	R
Alyxoria varia	Ash	R
Amandinea punctata	Willow	R
Anisomeridium biforme	Oak	R
Anisomeridium polypori	Ash, oak	O
Anisomeridium ranunculosporum	Ash, birch, hazel	O
Arthonia atra	Ash, hazel	F
Arthonia didyma	Ash	R
Arthonia radiata	Ash, bog myrtle, hazel, rowan	O
Diarthonis spadicea	Oak	O
Arthonia vinosa (notable)	Oak	R
Arthopyrenia analepta	Rowan	R
Arthopyrenia salicis	Rowan	R
Arthothelium ruanum (notable)	Ash, hazel	O
Bacidina squamellosa (notable)	Rowan	R
Buellia griseovirens	Birch, oak, rowan, willow	F
Calicium glaucellum	Oak	R
Caloplaca crenularia	Stone post	R
Candelariella reflexa	Willow	R
Candelariella vitellina f. vitellina	Stone post	O
Catinaria atropurpurea (notable)	Oak	O
Cetrelia cetrarioides (notable)	Ash, oak, willow, rock	O
Cetrelia olivetorum s. lat. (notable)	Hazel	O
Chaenotheca brunneola (notable)	Oak	R
Chaenothecopsis pusilla (notable)	Oak	R
Chrysothrix flavovirens	Oak	R
Cladonia caespiticia (notable)	Birch	R
Cladonia chlorophaea s. lat.	Ash, birch, willow	O
Cladonia ciliata var. ciliata	Rock	R
Cladonia coccifera s. lat.	Oak	R
Cladonia coniocraea	Birch, oak, willow	F
Cladonia crispata var. cetrariiformis	Dry stone wall	R
Cladonia furcata subsp. furcata	Birch, oak, dry stone wall	O
Cladonia macilenta	Birch, oak	F
Cladonia polydactyla var. polydactyla	Birch, oak	F
Cladonia portentosa	Oak, rock	R
Cladonia pyxidata	Ash, oak, willow	O
Cladonia squamosa s. lat.	Birch, oak, willow, rock	F
Cladonia subcervicornis	Rock	R
Cladonia uncialis subsp. biuncialis	Dry stone wall	R
Cliostomum griffithii	Birch, oak, rowan	R
Dactylospora parasitica	*Ocrolechia androgyna*	R
Coenogonium luteum	Willow	R
Coniocarpon cinnabarinum	Ash, hazel	O
Ephebe lanata	Rock	R
Evernia prunastri	Birch, hazel, oak, willow	A
Flavoparmelia caperata	Birch, oak, willow	A

Fuscidea lightfootii	Birch, bog myrtle, willow	A
Graphis elegans	Birch, bog myrtle, hazel	A
Graphis scripta	Ash, hazel	A
Gyalecta derivata (notable)	Ash	R
Gyalecta truncigena	Ash	R
Homostegia piggotii	*Parmelia saxatilis*	R
Hypocenomyce scalaris	Oak	R
Hypogymnia physodes	Birch, European gorse, oak, willow	A
Hypogymnia tubulosa	Willow	R
Hypotrachyna afrorevoluta	Bog myrtle, European gorse, willow, dry stone wall	F
Hypotrachyna laevigata	Birch, oak, rowan, rock	F
Hypotrachyna revoluta s. lat.	Rowan, willow	F
Hypotrachyna spinuosa	Birch, willow	O
Japewiella tavaresiana (notable)	Willow	O
Lasallia pustulata	Dry stone wall	R
Lecania cyrtella	Willow	R
Lecanora alboflavida (notable)	Birch, oak	O
Lecanora argentata (notable)	Ash, hazel, oak, rowan	F
Lecanora campestris subsp. campestris	Stone post	R
Lecanora confuse	Willow	R
Lecanora dispersa	Stone post	R
Lecanora expallens	Birch, oak, rowan	O
Lecanora hybocarpa (notable)	Ash	R
Lecanora jamesii (notable)	Oak, rowan, willow	F
Lecanora muralis	Stone post	R
Lecanora polytropa	Stone post	R
Lecidea lithophila	Dry stone wall	F
Lecidella elaeochroma f. elaeochroma	Ash, willow	A
Lepra albescens var. albescens	Ash, oak, willow	A
Lepra amara f. amara	Birch, oak, rowan, willow	A
Lepra corallina	Dry stone wall	R
Lepra multipuncta (notable)	Rowan	O
Lepraria finkii	Birch, hazel	F
Lepraria incana s. lat.	Birch, willow	F
Lobarina scrobiculata (notable)	Ash, willow	R
Megalaria pulverea (notable)	Birch, oak, willow	O
Melanelixia fuliginosa	Rock	O
Melanelixia glabratula	Rowan	O
Melanelixia subaurifera	Willow	F
Micarea peliocarpa	Bog myrtle, oak	O
Micarea prasina s. lat.	Birch	O
Mycoblastus caesius (notable)	Birch, oak	O
Mycoblastus sanguinarius f. sanguinarius (notable)	Birch	R
Mycoporum antecellens (notable)	Birch, bog myrtle	O
Myriospora smaragdula	Dry stone wall	R
Naevia punctiformis	Willow	R
Nesolechia oxyspora	*Pamelia saxatilis*	*R*
Normandina pulchella	Ash, birch, hazel, oak, willow	F
Ochrolechia androgyna	Birch, oak, willow	A
Ochrolechia subviridis	Oak	R
Opegrapha fumosa (notable)	Oak	R
Opegrapha vulgate	Hazel	R
Parmelia omphalodes	Oak, dry stone wall	F

Parmelia saxatilis s. lat.	Birch, oak, rowan, willow, dry stone wall, rock	A
Parmelia sulcata	Willow	R
Parmeliella parvula (notable)	Rowan, dry stone wall	R
Parmotrema perlatum	Birch, rowan, willow	F
Parmotrema reticulatum s. str.	Ash	R
Peltigera hymenina	Birch, oak	F
Peltigera membranacea	Ash, willow	F
Peltigera praetextata	Ash, oak, willow	O
Pertusaria hymenea	Ash, rowan	F
Pertusaria lactescens	Rock	R
Pertusaria leioplaca	Hazel	R
Pertusaria pertusa	Ash, birch, willow, rock	O
Phaeographis inusta (notable)	Hazel	R
Phaeographis smithii	Hazel	R
Phlyctis argena	Ash, oak, rowan, willow	O
Physcia adscendens	Willow	O
Physcia aipolia	Oak, willow	O
Physcia tenella	Willow	R
Placynthiella icmalea	Oak	R
Platismatia glauca	Birch, oak, rowan, willow	A
Porina aenea	Ash	R
Pseudevernia furfuracea s. lat.	Oak	R
Punctelia borreri	Rowan, willow	R
Punctelia subrudecta s. lat.	Willow	R
Pyrenula macrospora	Ash, hazel	O
Pyrrhospora quernea	Oak	R
Ramalina calicaris	Hazel	R
Ramalina farinacea	Hazel, oak, willow	F
Ramalina fastigiata	Hazel, willow	O
Rhizocarpon geographicum	Dry stone wall	O
Rhizocarpon reductum	Dry stone wall	O
Rinodina sophodes	Willow	R
Ropalospora viridis (notable)	Rowan	R
Scytinium lichenoides (notable)	Ash, willow	O
Sphaerophorus globosus (notable)	Birch, oak, rowan, dry stone wall, rock	F
Stereocaulon evolutum	Dry stone wall, rock	O
Sticta fuliginoides (notable)	Hazel, willow	R
Sticta fuliginosa s. lat. (notable)	Ash, hazel, oak, willow	F
Sticta fuliginosa s. str. (notable)	Hazel, oak, rowan, willow	F
Sticta limbata (notable)	Ash, hazel, oak	O
Sticta sylvatica (notable)	Ash	R
Stigmidium microspilum	*Graphis scripta*	O
Tomasellia gelatinosa	Bog myrtle	O
Trapelia corticola (notable)	Birch	R
Trapeliopsis flexuosa	Oak	R
Trapeliopsis pseudogranulosa	Birch, oak	O
Tremolecia atrata	Dry stone wall	O
Usnea cornuta	Oak, willow	O
Usnea flammea	Birch, hazel, oak, willow	O
Usnea florida (notable)	Birch, hazel, willow, fence post	A
Usnea rubicunda	Willow	R
Usnea subfloridana	Willow	F
Usnea wasmuthii	Oak	O
Violella fucata	Oak	R

Vouauxiella lichenicola	*Lecanora argentata*	R
Xanthoparmelia conspersa	Dry stone wall, rock	F
Xanthoria parietina	Rowan, willow, stone post	R

Appendix 2. Target Notes; riverside trees

The following target notes are for the riverside trees surveyed in respect of the flood plain restoration.

Key
CG1 etc = name given to tree for recording purposes
Taxa in **bold** are notable species
SSSI URI = SSSI Upland Rainforest Index species
SSSI SOWI = SSSI Southern Oceanic Woodland Index species
S7 = Section 7 Environment Act species i.e. Principal Biodiversity Species
CR (Wales) = listed as Critically Endangered on Wales Red List
VU (Wales) = listed as Vulnerable on Wales Red List
NT (Wales) = listed as Near Threatened on Wales Red List

Map of recorded trees

CG1
SH 71066 30038
Tag 0082
Willow on northern boundary
Japewiella tavaresiana URI
Lecanora jamesii SOWI
Parmelia saxatilis
Hypotrachyna revoluta
Hypotrachyna afrorevoluta
Punctelia borreri
Buellia griseovirens

Lecidella elaeochroma
Fuscidea lightfootii
Melanelixia subaurifera
Punctelia subrudecta
Parmotrema perlatum
Lepra amara
Flavoparmelia caperata
Candelariella reflexa
Amandinea punctata
Lecania cyrtella


CG1

CG2
SH 71069 30028
Tags 0064 and 0032
Next 2 willow trees downstream
Similar range of species to CG1 including
Lecanora jamesii SOWI
Evernia prunastri
Usnea flammea
Cladonia coniocraea
Cladonia chlorophaea
Coenogonium luteum
Normandina pulchella


CG2

CG3
SH 71075 30028
Tag 0054
Next willow downstream
Similar to previous with,
Cetrelia cetrarioides NT Wales, SOWI, URI; rare
Nesolechia oxyspora on *Parmelia* sp.
Platismatia glauca
Hypogymnia tubulosa


CG3

CG4
SH 71074 30020
Tag 0047
Next tree downstream
Similar to previous (but no *Cetrelia*)
Usnea florida SSSI SOWI, S7
Cladonia pyxidata


CG4 centre left, with CG5 to the right

Next tree downstream
Not tagged
Lepraria incana

CG5
SH 71076 30012
Tag 0055
Next tree downstream
Lecanora jamesii SOWI
And similar range of species to previous trees but maybe not as rich


CG5

Next tree downstream (willow), not tagged
Usnea cornuta
Phlyctis argena
Physcia aipolia
Pertusaria pertusa

Next tree downstream (willow), not tagged

Lepra albescens
Cladonia pyxidata

CG6
SH 71078 30000
Tag 0018 (tag lost)
Next tree downstream (willow)
This was tagged on account of suspected *Megalaria pulverea* (SSSI URI) but chemical analysis of a specimen showed it to be a species of *Lepraria*.
Usnea rubicunda rare
Cladonia squamosa var *squamosa*
Parmelia sulcata
Peltigera praetextata
NO NEED TO RETAIN THIS TREE but it is a mature tree, likely to support *Lecanora jamesii* and would be worth retaining if possible.


CG6

Next tree downstream (willow), not tagged
Naevia punctiformis on twig

CG7
SH 71084 29968
Tag 0091
Willow
Usnea florida NT GB, SOWI, S7; rare, 1 small thallus


CG7

CG8
SH 71085 29957
Tag 0072
Birch, 2+ stems
Hypotrachyna sinuosa NT Wales, URI; occasional on 2 main trunks
Parmotrema perlatum
Flavoparmelia caperata
Evernia prunastri
Platismatia glauca


Hypotrachyna sinuosa

CG9
SH 71091 29936
Tag 0076
Rowan
Lecanora jamesii SOWI
Buellia griseovirens

Phlyctis argena
Arthopyrenia salicis
Lecanora argentata
Parmelia saxatilis
Platismatia glauca


CG9

Next tree downstream (willow), not tagged
Pseudevernia furfuracea
Ramalina subfarinacea

CG10
SH 71097 29916
Tag 0071
Oak
Post mature
Cetrelia cetrarioides NT Wales[1], SOWI[2], URI[2]; occasional
Sphaerophorus globosus URI; occasional on large limb projecting to se
Cladonia polydactyla
Cladonia coniocraea
Cladonia squamosa
Cladonia pyxidata
Cladonia furcata

Large rock on river side of tree 0071
Sphaerophorus globosus URI; occasional

And rocks below / adjacent to tree 0071
Cetrelia olivetorum s. lat. NT Wales, SOWI, URI; frequent
Cladonia uncialis

CG10, the oak and adjacent rocks

CG11
SH 71106 29902
Tag 0063
Willow
Hypotrachyna sinuosa NT Wales, URI; rocks below limb with tag and good patch on limb with tag
Lecanora jamesii SOWI; on branches
Ochrolechia androgyna with ***Dactylospora parasitica*** NS

CG11


CG11, *Hypotrachyna sinuosa* on rock below

CG12
SH 71110 29895
Tag 0071 (notched tag)
Birch
Limb to north tagged
Sphaerophorus globosus URI; rare down and right or tag
Graphis elegans
Trapeliopsis pseudogranulosa


CG12

CG13
SH 71115 29889
Tag 0353
Willow
This was tagged as the *Parmotrema* species on here was large and robust and reminiscent of *P. robustum*, a rare species, but chemical analysis of a specimen showed it was an unusually large example of the common *P. perlatum*.
NO NEED TO RETAIN THIS TREE

CG13

CG13, the large *Parmotrema perlatum* thallus

Young hazel and birch
Arthonia radiata
Tomasellia gelatinosa
Naevia punctiformis
Lecidella elaeochroma
Rinodina sophodes

CG14
SH 71152 29808
Tag 0062
Willow
Lecanora jamesii SOWI, occasional on twigs/branches

CG15
SH 71139 29826
Tag 0341
Oak
Post mature
Usnea florida S7, SOWI; on twigs low over field

Xanthoria parietina v rare with just few tiny specks
Physcia aipolia similar
Usnea, *Evernia* and *Ramalina* species on twigs


CG15

Lepra amara ash
Normandina pulchella ash

CG16
SH 71166 29772
Tag 0375 (on sw trunk)
Ash
Post mature
Base-rich bark with the moss *Homolothecium sericeum*
Lobarina scrobiculata CR Wales, S7 *Lobarion*, SOWI; occasional: small fragment on s side at c1.5m (pink pin in photo), 2 decent little patches at c 1m on sw and w sides at bases of 2 stems, looking quite healthy
Scytinium lichenoides S7 *Lobarion*, SOWI, , frequent: small patch below the above on s side, at base on ne side and near *L. scrobiculata* on w side and scattered generally, good patches base nw side
***Sticta fuliginosa* s. lat.** VU Wales, IR, S7 *Lobarion*, SOWI; probably s. str., occasional: two thalli on s side above *L. scrobiculata* (yellow pin in photo)
Sticta sylvatica NT Wales, S7 *Lobarion*, SOWI; occasional: few small thalli below *L. scrobiculata* and tiny thalli above *S. fuliginosa*
Alyxoria ochrocheila
Anisomeridium polypori
Acrocordia gemmata
Cladonia chlorophaea
Pertusaria hymenea
Lepra albescens
Peltigera praetextata

CG16

CG16 s side, pink pin indicating small *Lobarina scrobiculata* thallus and yellow pin indicating *Sticta fuliginosa* s. lat

CG16 sw side, *Lobarina scrobiculata, larger thallus to right of trunk*

CG16 sw side, *Lobarina scrobiculata, closer view of larger thallus*


CG16 w side, *Lobarina scrobiculata, thallus centre*

Ochrolechia parella on boulders of wall at base

CG17
SH 71165 29762
Tag 0900
Willow
***Sticta fuliginosa* s. str.** VU Wales, S7 Lobarion, SOWI; rare, one decent sized thallus in a side of upstream trunk (the trunk with the tag)
Peltigera praetextata
Coenogonium luteum


CG17


CG17, *Sticta fuliginosa* s. str.

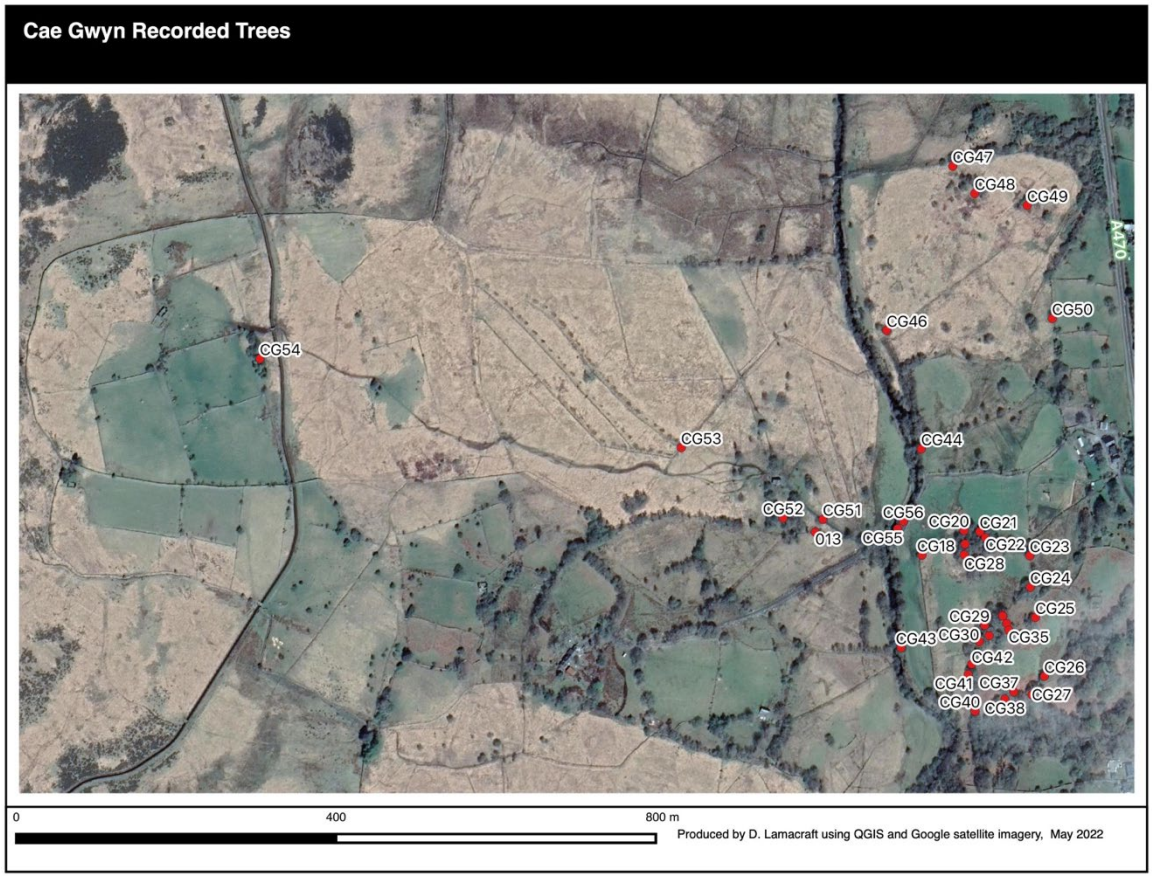
Rocks in the general vicinity, including the dry stone wall in the northern field and scattered rocks in the grassland:

Stereocaulon spp.
Parmelia saxatilis
Parmelia omphalodes
Xanthoparmelia conspersa
Hypotrachyna afrorevoluta
Cladonia furcata
Cladonia crispata var. *cetrarioides*
Cladonia ciliata var. *ciliata*

Appendix 3. Target notes; wider survey

The following target notes are for the wider survey of land at Cae Gwyn.

Key
CG1 etc = name given to tree for recording purposes
Taxa in **bold** are notable species
URI = SSSI Upland Rainforest Index species
SOWI = SSSI Southern Oceanic Woodland Index species
S7 = Section 7 Environment Act species i.e. Principal Biodiversity Species
CR (Wales) = listed as Critically Endangered on Wales Red List
VU (Wales) = listed as Vulnerable on Wales Red List
NT (Wales) = listed as Near Threatened on Wales Red List



CG18
SH 71172 29661
Willow
By ditch, middle of field (Cae'r Ty Isaf)
Parmotrema perlatum
Hypogymnia physodes
Hypotrachyna afrorevoluta
Parmelia sulcata
Lecidella elaeochroma
Fuscidea lightfootii
Physcia adscendens
Physcia aipolia
Evernia prunastri

Ramalina farinacea
Flavoparmelia caperata
Peltigera membranacea
Melanelixia subaurifera
Parmelia saxatilis
Japewiella tavaresiana URI
Platismatia glauca
Xanthoria parietina (rare)
Usnea florida NT GB, S7, SOWI
Cladonia pyxidata
Lepra albescens
Phlyctis argena
Pertusaria pertusa
Scytinium lichenoides S7 *Lobarion*, SOWI, (r base)
Peltigera praetextata
Punctelia borreri
Buellia griseovirens
Lecanora confusa
Ramalina fastigiata

CG18 foreground right with the copse of trees including CG19-CG24 and CG28

CG19
SH 71226 29675
Birch and oak on knoll
Birch:
Parmelia saxatilis
Lepra amara

Flavoparmelia caperata
Buellia griseovirens
Cladonia coniocraea
Ochrolechia androgyna
Cladonia macilenta/polydactyla
Graphis elegans
Evernia prunastri
Pertusaria pertusa
Trapeliopsis granulosa
Homostegia pigottii
Lepraria incana
Lepraria lobificans
Usnea florida
Usnea wasmuthii
Peltigera hymenina
Oak:
Peltigera hymenina
Lepra amara
Phlyctis argena
Parmelia saxatilis
Ochrolechia androgyna
Micarea prasina s. lat.

CG20
SH 71225 29692
Willow
Part of clump CG19
Hypotrachyna sinuosa NT Wales, IR, URI; rare

CG21
SH 71245 29690
Hazel
Arthothelium ruanum
Graphis scripta
Lecanora argentata NS
Sticta limbata NT Wales, IR, S7 *Lobarion*, SOWI; rare, one old lobe
Lepraria lobificans
Normandina pulchella


CG21, single lobe of *Sticta limbata*

Nearby hazel
Stigmidium microspilum on Graphis scripta

Ash
Lecidella elaeochroma
Lecanora argentata
Vouauxiella lichenocola on *Lecanora argentata*
Graphis scripta
Pertusaria hymenea
Pertusaria pertusa
Arthonia atra
Porina aenea collected - 3 septate spores
Arthonia radiata
Arthonia didyma collected - k-, 1 septate spores

CG22
SH 71252 29683
Oak
Post mature
Sticta limbata NT Wales, IR, S7 *Lobarion*, SOWI; rare, one thallus/patch (small)
Sticta fuliginosa s. str. VU Wales, IR, S7 *Lobarion*, SOWI small thallus on w side and scattered large thalli up s side from c2m to c5m
Anisomeridium polypori
Lepra amara

CG22

CG22, Sticta fuliginosa s. str. the grey lobes in centre

Hazel nearby
Coniocarpon cinnabarina
Arthonia atra
Anisomeridium ranunculosporum
Arthonia radiata

CG23
SH 71307 29660
Oak
Boundary
Sticta limbata NT Wales, IR, S7 *Lobarion*, SOWI; occasional, scattered largish lobes/thalli
Parmeliella parvula NT Wales, IR, S7 *Lobarion*, SOWI; on moss on rock of adjacent old boundary wall

Oak
Ochrolechia subviridis
Ochrolechia androgyna
Lepra albescens
Lecanora alboflavida k/uv bright yellow

CG24
SH 71308 29621
Oak
Post mature
Sticta fuliginosa s lat VU Wales, IR, S7 *Lobarion*, SOWI o scattered small thalli inc v young colonising
Peltigera hymenina
Peltigera praetextata


CG24


CG24, the ‘elephant ears’ of *Sticta fuliginosa s. str.*

Rock nearby, next to small ditch, between CG24 and next big oak

Sphaerophorus globosus URI, occasional
Hypotrachyna laevigata URI, rare
Cladonia squamosa var *squamosa*

CG25
SH 71314 29583
Hazel
On small knoll
Sticta fuliginosa s str VU Wales[5], IR, S7 *Lobarion*, SOWI[6]; occasional on vertical trunk
Sticta fuliginoides VU Wales[5], IR, S7 *Lobarion*, SOWI[6]; occasional on horizontal branch

CG25

CG25, the vase-shaped lobes of *Sticta fuliginoides*

Adjacent
Oak
Post mature on knoll
Cetrelia cetrarioides NT Wales, SOWI, URI; rare on e side
Sticta limbata NT Wales, IR, S7 *Lobarion*, SOWI; rare, few thalli with some tiny thalli establishing but mostly old and looking a ‘bit off’


The oak on the rocky knoll adjacent to CG25

Usnea wasmuthii collected, k- and p-, excavate oval soralia, no isidiomorphs

CG26
SH 71325 29509
Birch
Two multi stemmed trees
Megalaria pulverea URI; occasional,fertile
Hypotrachyna laevigata URI; occasional, best developed material seen so far
Cladonia squamosa var squamosa
Cladonia chlorophaea
Cladonia macilenta
Hypogymnia physodes
Flavoparmelia caperata
Anisomeridium ranunculosporum SOWI
Lepra amara
Graphis elegans
Buellia griseovirens

CG27
SH 71310 29486
Oak
Post-mature on boundary
Catinaria atropurpurea NT Wales, S7 *Lobarion*, SOWI
Lepra albescens
Opegrapha fumosa VU Wales, NS, IR
Pyrrhospora quernea

Diarthonis spadicea
Cetrelia cetrarioides NT Wales[7], SOWI, URI[7]; rare

CG27

CG28
SH 71225 29662
Oak
Dead, stump
Chaenotheca brunneola SOWI; abundant on e-ne side
Calicium glaucellum rare on e side
Ochrolechia androgyna
Cladonia portentosa
Parmelia saxatilis
Usnea cornuta
Platismatia glauca
Cladonia coniocraea
Cladonia squamosa var. squamosa
Buellia griseovirens
Arthonia vinosa NT Wales, S7 *Lobarion*, SOWI; rare, very small amount with *C. brunneola* on ne side
Hypogymnia physodes
Micarea peliocarpa
Chrysothrix flavovirens


CG28, the tiny pins of *Chaenotheca brunneola* visible below the crack in the old oak stump

CG29
SH 71251 29573
Willow
Large spreading tree
Lobarina scrobiculata CR Wales, IR, S7 *Lobarion*, SOWI; rare, one good thallus with young growth
Sticta fuliginoides VU Wales[5], IR, S7 *Lobarion*, SOWI[6] ; occasional, scatter of small thalli near *Lobaria* and on rare on other stem
Cladonia coniocraea
Peltigera membranacea
Coenogonium luteum on other stems
Lecanora jamesii SOWI; rare on twigs
Megalaria pulverea URI; rare

CG29 *Lobarina scrobiculata* with *Sticta fuliginoides* above

CG29, *Lobarina scrobiculata* arrowed

CG30
SH 71244 29553
Oak
Post-mature
Catinaria atropurpurea NT Wales, S7 *Lobarion*, SOWI; frequent on s and sw sides
Diarthonis spadicea
Sticta fuliginosa s lat VU Wales, IR, S7 *Lobarion*, SOWI on willow downslope


CG30

CG31
SH 71256 29560
Birch
Hypotrachyna laevigata URI; abundant
Cladonia caespiticia SOWI; rare
Cladonia squamosa var. squamosa
Usnea flammea
Cladonia polydactyla


CG31 *Cladonia caespiticia*

Pyrenula macrospora hazel

Oak
Lecanora expallens
Anisomeridium biforme
Lepra albescens
Placynthiella icmalaea
Lecanora argentata

CG33
SH 71273 29586
Oak
Post-mature
Catinaria atropurpurea NT Wales, S7 *Lobarion*, SOWI; rare low on trunk

CG34
SH 71278 29576
Oak
Exposed heartwood on e side not damaged by recent adjacent fire but is the initial loss of bark the result of historic burning adjacent? Looks like a possible regular fire site.
Arthonia vinosa NT Wales, S7 *Lobarion*, SOWI; frequent on lower n side of trunk
With
Cliostomum griffithii frequent
Lecanora expallens frequent

CG34 *Arthonia vinosa*

CG34 *Arthonia vinosa*

CG34 right and CG35 left with burn site clearly visible to the bottom left. It seems this may be, or have been a regular site for burning with the burning damaging the bark on both trees created the decorticate bare lignum niche utilized by the lignum specialists such as *Calicium glaucellum* and *Chaenothecopsis pusila*

CG35
SH 71281 29567
Oak
Post-mature with much exposed heartwood as above, some fire damage, is exposed heartwood result of previous fires?
Calicium glaucellum occasional on exposed wood on e side
Chaenothecopsis pusilla NS; occasional in more sheltered aspects on same side e.g in edge of big groove where associated with algae. Collected; septum less distinct than wall, spores around 6x3um, some to 7um and 2.5um. Hypothecium and stalk all blue-green.
Hypocenomyce scalaris
Lecanora jamesii SOWI; bark

CG35 *Calicium glaucellum*

CG35 to the left (CG34 right), the rich area of lignum specialists is visible as the white and grey ‘staining’ above the recent burn damage.

CG36
SH 7128 2956
Near CG35
Oak

Post-mature
Sphaerophorus globosus URI; frequent from 2m on s side

CG37
SH 71287 29490
Hazel
Cetrelia olivetorum s lat NT Wales, SOWI, URI; occasional
Sticta fuliginosa s lat VU Wales, IR, S7 *Lobarion*, SOWI; rare, one thallus on one stem
Lepra multipuncta SOWI; occasional
Coniocarpon cinnabarinum
Ramalina farinacea abundant on all stems

Downslope
Rowan
Lepra multipuncta SOWI; frequent
Arthonia radiata
Graphis elegans
Pertusaria hymenea
Sphaerophorus globosus URI; rare on lignum at base

CG38
SH 71276 29481
Oak
Sphaerophorus globosus URI; frequent on w side

CG39
SH 7127 2948
Near CG38
Birch
Mycoblastus sanguinarius URI; rare s side
Sphaerophorus globosus URI; rare n side
Hypotrachyna laevigata URI; occasional

CG40
SH 71239 29466
Rowan
Parmeliella parvula NT Wales, IR, S7 *Lobarion*, SOWI; frequent on one stem
Hypotrachyna laevigata URI; frequent
Ropalospora viridis NS; rare, description: edges with small *Trapelia* like areoles with soredia developing, coalescing in older parts. C-, k-, uv dull blue with some white bits visible, presumably = aereoles and not soredia. Aereoles grey green, soredia quite bright green. Close to *Fuscidea lighfootii* but soredia brighter and UV-.
Bacidina squamellosa NS; confirmed microscopically (size of algal photobiont cells)

CG40 *Ropalospora viridis*, the bright yellow-green lichen in the centre

CG41
SH 71230 29512
Oak
Post-mature, on boundary
Catinaria atropurpurea NT Wales, SOWI; frequent, low on s side
Sticta fuliginosa s str VU Wales[5], IR, S7 *Lobarion*, SOWI[6] ; frequent from 2 m on s side
Possible *Cetrelia* high up.

CG42
SH 71235 29525
Rowan
Old pollard? on boundary
Sticta fuliginosa s str VU Wales[5], IR, S7 *Lobarion*, SOWI[6]; frequent all over lower trunk/bole, well developed inc. young material
Parmeliella parvula NT Wales, IR, S7 *Lobarion*, SOWI; frequent as above
Melanelixia fuliginosa

CG42 *Sticta fuliginosa s. str.*

CG42

CG43
SH 71146 29545
Willow
Riverbank
Sticta fuliginosa s lat VU Wales, IR, S7 *Lobarion*, SOWI; rare

CG44
SH 71171 29794
Ash
Twin-stemmed on riverbank
Scytinium lichenoides S7 *Lobarion*, SOWI
Peltigera praetextata
Lecanora argentata
Peltigera membranacea
Pertusaria hymenea parasite coll = *Lichenocora* sp as per LGBI3 3 septate spores c20x6.5
Lecidella elaeochroma
Anisomeridium ranunculosporum SOWI
Coniocarpon cinnabarinum

Nearby
Ash
Pyrenula macrospora
Graphis scripta
Arthothelium ruanum

Hazel
Arthothelium ruanum
Coniocarpon cinnabarinum

Further along bank
Ash, cankered
Gyalecta truncigena
Gyalecta derivata NS, collected
Lecanora hybocarpa NR, collected
Anisomeridium polypori

Hazel
Phaeographis smithii
Opegrapha vulgata

Willow
Lecanora jamesii SOWI
Coenogonium luteum
Physcia tenella
Physcia aipolia
Hypotrachyna revoluta s lat
Hypotrachyna afrorevoluta
Cladonia coniocraea
Usnea subfloridana

Oak
Dead snag
Trapeliopsis flexuosa
Trapeliopsis pseudogranulosa
Cladonia squamosa var squamosa
Platismatia glauca
Hypogymnia physodes
Buellia griseovirens

CG45
SH 7112 2994
Near CG46
Oak
Post-mature
Sphaerophorus globosus URI; frequent, lower trunk se -e side
Ochrolechia androgyna
Flavoparmelia caperata
Cladonia coccifera s lat k- p- red apothecia, corticate granules
Evernia prunastri
Parmelia saxatilis
Lepra amara

European gorse
Hypotrachyna afrorevoluta
Hypogymnia physodes

Usnea florida S7 on willow, hazel, etc and seems to be main *Usnea* species on fence posts


A typical fence post in the more open areas with *Usnea florida*, the commonest *Usnea* of fence posts here

CG46
SH 71128 29942
Group of birch
Micarea prasina s lat Coll
Graphis elegans
Parmelia saxatilis
Cladonia polydactyla

Lecanora expallens c+ lignum
Lepra amara
Buellia griseovirens fertile
Ochrolechia androgyna
Normandina pulchella
Trapeliopsis pseudogranulosa k+
Lecanora alboflavida NS, SOWI, URI; occasional
Mycoblastus caesius URI; rare
Pertusaria pertusa
Mycoporum antecellens SOWI
Trapelia corticola URI
Cladonia coniocraea
Cladonia squamosa var. squamosa
Hypogymnia physodes
Cliostomum griffithii
Flavoparmelia caperata
Platismatia glauca

Nearby
Willow
Cladonia furcata
Rock
Cladonia subcervicornis

Large Boulder
Xanthoparmelia conspersa
Rhizocarpon reductum
Pertusaria lactescens
Stereocaulon evolutum
Melanelixia fuliginosa
Parmelia saxatilis

Oak
Exposed in rhos
Cladonia pyxidata on trunk

CG47
SH 71211 30148
Willow
N boundary
Lecanora jamesii SOWI; occasional

CG48
SH 71238 30113
Bog myrtle stand
Graphis elegans
Micarea peliocarpa
Tomasellia gelatinosa
Mycoporum antecellens SOWI
Arthonia radiata
Fuscidea lightfootii
Hypotrachyna afrorevoluta


CG48, the stand of bog myrtle

Adjacent birch
Fuscidea lightfootii
Mycoporum antecellens SOWI
Buellia griseovirens

Adjacent mostly young birch stand with usual common things

CG49
SH 71304 30098
Willow
Lecanora jamesii SOWI; occasional

Hazel
Boundary
Ramalina calicaris
With
Ramalina fastigiate
Ramalina farinacea (fertile)
Usnea flammea
Evernia prunastri

CG50
SH 71335 29957
Ash
Post-mature, on boundary
Sticta limbata NT Wales, IR, S7 *Lobarion*, SOWI; occasional, few scattered thalli inc. young
Sticta fuliginosa s lat VU Wales, IR, S7 *Lobarion*, SOWI; possibly *S. fuliginoides*
Cetrelia cetrarioides NT Wales[5], URI[6]; frequent, well developed on s side
Lepra albescens
Phlyctis argena
Alyxoria varia
Anisomeridium polypori
Cladonia pyxidata

CG50 *Sticta limbata*

CG50 *Cetrelia cetrarioides*


CG50

CG51
SH 71049 29706
Willow
By track
Megalaria pulverea URI; fertile, rare, at base
Lecanora jamesii SOWI

Nearby
Oak
Hypotrachyna laevigata URI; occasional on bark and lignum
Mycoblastus caesius URI; occasional
Violella fucata
Megalaria pulverea URI; occasional
Micarea peliocarpa
Normandina pulchella

Nearby copse
Hypotrachyna laevigata URI; on birch
Megalaria pulverea URI; on oak, birch
Ephebe lanata on rock
Mycoblastus caesius URI, on oak lignum
Pertusaria pertusa on rock

CG52
SH 70999 29708
Birch

Twin-stemmed
Sphaerophorus globosus URI; frequent on lower trunk, s side
Cladonia coniocraea
Cladonia squamosa var squamosa
Cladonia polydactyla

CG52

Stone walls
Lepra corallina
Tremolechia atrata
Rhizocarpon geographicum
Parmelia omphalodes
Parmelia saxatilis
Xanthoparmelia conspersa
Acarospora smaragdula
Lassalia pustulata
Lecidea lapidicola
Stereocaulon evolutum

CG53
SH 70871 29795
Oak
Exposed out on hill
Lecanora alboflavida SOWI; collected, c+ deep o, k+ yellow, uv+ bright orange, k/uv+ bright y
Cladonia coniocraea
Cladonia macilenta

Usnea flammea
Parmelia omphalodes
Parmelia saxatilis
Hypogymnia physodes

CG54
SH 70344 29907
Rock
Old stone wall
Sphaerophorus globosus o

Rowan nearby
Arthopyrenia analepta
?*Lecanora intumescens*, collected, fits except p+ very pale yellow rather than orange/red

Nearby
Rowan
Xanthoria parietina occasional on twigs

Upslope
Exposed rowan
Lecanora expallens c+
Cliostomum griffithii
Lepra amara
Parmelia saxatilis

Old boundary rowan
Punctelia borreri
Hypotrachyna revoluta
Parmelia saxatilis
Buellia griseovirens
Parmotrema perlatum

Stone post
Lecanora polytropa
Candelariella vitellina
Lecanora campestris
Lecanora dispersa
Xanthoria parietina
Lecanora muralis
Caloplaca crenularia

Cladonia portentosa on some drier heathy hummocks

CG55
SH 71142 29694
Hazel
Roadside riverbank
Phaeographis inusta NS, IR, SOWI; rare
Pertusaria leioplaca

CG55

CG56
SH 71149 29703
Willow
Roadside riverbank
Sticta fuliginosa s str VU Wales[5], IR, S7 *Lobarion*, SOWI[6]; occasional, nice material
Cetrelia cetrarioides NT Wales[7], URI[7]; occasional
Lecanora jamesii

CG56

Sticta also on adjacent willow

Appendix 4. Species Maps

Cae Gwyn
Anisomeridium ranunculosporum

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Arthonia vinosa

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Bacidina squamellosa

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Calicium glaucellum

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Catinaria atropurpurea

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Cetrelia olivetorum s. lat & C. cetrarioides

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Chaenotheca brunneola

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Chaenothecopsis pusilla

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Cladonia caespiticia

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Dactylospora parasitica

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn

Gyalecta derivata NOTE: the actual location of this tree is on the opposite bank

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn

Hypotrachyna laevigata

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Hypotrachyna sinuosa

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Japewiella tavaresiana

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Lecanora alboflavida & L. jamesii

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Lobarina scrobiculata

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Lepra multipuncta

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Megalaria pulverea

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Mycoblastus sanguinarius

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Mycoporum antecellens

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Opegrapha fumosa

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Parmeliella parvula

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Phaeographis inusta

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Scytinium lichenoides

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Sphaerophorus globosus

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Sticta fuliginosa s. lat & s. str.

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Sticta fuliginoides

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Sticta limbata & S. sylvatica

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Cae Gwyn
Trapelia corticola

0 400 800 m

Produced by D. Lamacraft using QGIS and Google satellite imagery, May 2022

Data Archive Appendix

Data outputs associated with this project are archived on server–based storage at Natural Resources Wales.

The data archive contains:

[A] The final report in Microsoft Word and Adobe PDF formats.

[B] An Excel spreadsheet containing all the species records.

[C] .gpx files of the survey routes and waypoints.

Metadata for this project is publicly accessible through Natural Resources Wales' Library Catalogue https://libcat.naturalresources.wales (English Version) and https://catllyfr.cyfoethnaturiol.cymru (Welsh Version) by searching 'Dataset Titles'.

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