Cyfoeth Naturiol Cymru
Natural Resources Wales

Bryophyte survey of watercourses in the south-eastern part of Coedydd a Cheunant Rheidol (Rheidol Woods and Gorge) SSSI, August 2025

Evidence Report No. 961

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1. Crynodeb gweithredol

Mae nifer sylweddol o arolygon bryoffytau penodol wedi cael eu cynnal cyn hyn o fewn SoDdGA Coedydd a Cheunant Rheidol, ac mae'r 'Casgliad Coetiroedd yr Iwerydd' yma'n cael ei adnabod fel yr un pwysicaf yn Ardal Chwilio Ceredigion. Er hynny, mae'r gwaith cofnodi wedi canolbwyntio ar y brigiadau creigiog coedwigol a hygyrch, gyda chyrsiau dŵr a cheunentydd llai hygyrch yn cael llai o sylw.

Roedd angen yr arolwg presennol er mwyn ymchwilio i'r ardaloedd glannau nentydd nad oeddent wedi'u cofnodi mor dda, yn benodol i nodweddu'r fflora bryoffytau ar hyd chwe llednant afon Rheidol, ac i chwilio am rywogaethau nodedig yma.

Treuliwyd chwe diwrnod yn arolygu bryoffytau ar hyd y llednentydd hyn, ac mewn rhan o afon Rheidol i'r gogledd o afon Mynach nad oedd wedi'i chofnodi'n ddigonol cyn hyn.

Cofnododd yr arolwg 6 rhywogaeth oedd yn newydd i'r safle, 3 ohonynt yn newydd i'r is-sir ac 1 ohonynt yn newydd i Gymru. Gwnaed y cofnodion safle modern cyntaf o ddwy rywogaeth arall. Y darganfyddiad mwyaf arwyddocaol oedd Radula holtii, math hynod brin o lysiau'r afu gyda dosbarthiad hyper-gefnforol, a oedd yn hysbys o'r blaen mewn dau safle yng ngogledd-orllewin yr Alban a llond llaw o safleoedd yn ne-orllewin Iwerddon yn unig.

Mae sgôr Casgliad Coetiroedd yr Iwerydd bellach yn 50, gyda'r ychwanegiad o *Radula holtii*, *Plagiochila exigua*, *Chionoloma hibernicum* a *Drepanolejeuna hamatifolia*. Dim ond un SoDdGA coetir Cymru arall sydd â chasgliad sgorio uwch. Mae'r Casgliad o Fryoffytau Coetir sy'n Brin ac yn Anfynych yn Genedlaethol hefyd yn bodloni'r trothwy cymhwyster, gyda chyfanswm o 18 pwynt.

2. Executive summary

A significant amount of specific bryophyte survey has previously been carried out within Coedydd a Cheunant Rheidol (Rheidol Woods and Gorge) Site of Special Scientific Interest (SSSI), and the 'Atlantic Woodland Assemblage' here is known to be the most important in the Ceredigion Area of Search. However, recording has focussed on the woodland and accessible rock outcrops, with watercourses and less accessible ravines receiving less attention.

The current survey was required to investigate the less well-recorded streamside areas, in particular to characterise the bryophyte flora along six tributary streams of the Afon Rheidol, and to search for notable species here.

Six days were spent surveying bryophytes along these tributary streams, and in a previously under-recorded section of the Afon Rheidol to the north of the Afon Mynach.

The survey recorded six species new to the site, three of them new to the vice-county and one of them new to Wales. The first modern site records of two further species were made. The most significant find was of *Radula holtii*, a critically-rare liverwort with a hyper-oceanic distribution, previously known only from two sites in north-western Scotland and a handful of sites in south-west Ireland.

The Atlantic Woodland assemblage score now stands at 50, with the addition of *Radula holtii*, *Plagiochila exigua, Chionoloma hibernicum* and *Drepanolejeuna hamatifolia*. There is only one other Welsh woodland SSSI with a higher scoring assemblage. The Assemblage of Nationally Rare and Scarce Woodland Bryophytes also meets the qualification threshold, with a total of 18 points.

3. Introduction

Coedydd a Cheunant Rheidol (Rheidol Woods and Gorge) SSSI has long been known as an important bryophyte site. Various experienced bryologists have explored here, from Francis Rose, Derek Ratcliffe and Hilary and John Birks in the early 1960s, to Sam Bosanquet and Tom Ottley in more recent years. Ben Averis and Chris Forster-Brown have both carried out survey work here under contract to NRW (Averis, 1998; Forster-Brown, 2020). The species records from the site have enabled the ‘Atlantic Woodland Assemblage’ here to be classified as the most significant in mid and south Wales, with a total of 33 points (Bosanquet, 2019). Ony five woodland SSSIs in north Wales have higher assemblage scores, reaching a maximum of 57 points (Coedydd de Dyffryn Maentwrog SSSI, East Gwynedd).

Despite the history of bryophyte recording here, new locations for notable species have recently been recorded (e.g. Sutton, 2025), and new site records are still being made (e.g. the locally-rare *Reboulia hemisphaerica* by this author in 2025). These discoveries, together with an increased volume of development planning casework in the Pontarfynach area, suggested that further bryophyte survey work would be valuable, with a particular focus on those notable species known to have a close relationship with watercourses.

4. Survey work August – September 2025

Figure 1. Egress from the ravine section above Gyfarllwyd Falls entailed abseiling down the side of the fall

Survey work for the present contract entailed a total of six field days. A rope-access specialist was employed as an assistant to accompany the surveyor, allowing some ravine sections to be visited which had previously been considered inaccessible.

Much of the first three day period, in late August, was spent recording along the main river from Erwbarfe (*ca* SN744781) downstream to below the Gyfarllwyd Falls (SN742775). A wet-suit was worn to enable access across the whole of the river system. Low water levels following summer drought were critical to recording here, as access and egress to one section entailed abseiling down the side of waterfalls. The options for roping-off alongside the Gyfarllwyd Falls were limited to an oak tree on the west side of the fall, and unclipping from the rope when in the plunge pool below would have been challenging in a heavy flow.

However, the recent extended dry period meant that bryophytes away from the most humid locations were generally in a dehydrated state during much of the survey. The focus of the survey here was on notable species; incidental records were made of other species but an accurate assessment of their frequency was not made. The surveyor considered the possibility of species not previously recorded from Wales (or the UK), but nonetheless plausible on biogeographical grounds, for example collecting small *Fissidens* specimens to check for *F. jansenii*, toothed *Plagiochilas* to check for Macronesian species, *Lejeuneacea* to check for hyperoceanic species such as *Lejeunea holtii* and *Fontinalis squamosa* to check for *F. dalecarlica*.

The second three-day period, in early September, benefitted from wetter conditions. Recording was focussed on the tributary streams. Here, in addition to a search for notable species, an attempt was made to make a comprehensive list of species growing in or in relatively close proximity to the watercourse, and to assign each a value using the DAFOR scale (Dominant, Abundant, Frequent, Occasional or Rare).

Grid references of notable species were recorded to 12 figures where possible, using a Geode GPS unit (Juniper Systems). Unfortunately, this was unable to detect satellites when in deeper ravines, under outcrops or dense tree canopies. In these situations, an approximate 10-figure grid reference was subsequently calculated from an app (Outdoor Active) displaying OS maps. Further limitations were imposed on the use of equipment whilst swimming, with hand lens and phone camera not always able to be kept to hand.

Samples of critical species were collected and confirmed microscopically. New vice-county records were confirmed by the national recorders. The latter are now housed in the British Bryological Society (BBS) herbarium (known as BBSUK) in Cardiff; some other specimens have been retained by the author.

5. Results

5.1 Atlantic Woodland Assemblage species

The most notable Atlantic Woodland Assemblage species found during the survey are described below.

5.1.1 Holt's Scalewort *Radula holtii*

This liverwort was found new to Wales on riverside rocks in a section of steep-sided, shaded ravine above the Gyfarllwyd Falls, a short way north of the confluence of the Afon Tuen and Afon Rheidol (*ca.* SN742777). No GPS signal was available here, but the precise location was photographed (Figure 1). It was subsequently also found on the roof of a cave beside a small waterfall at the lower end of the Nant Ty-Coch (*ca.* SN742774). There are only two other UK records of this hyper-oceanic species, both from the far north-west of Scotland, and a few records from south-west Ireland. It is classed as Critically Endangered on the UK Red-list (Callaghan, 2023). Further afield, it is found in Madeira, the Azores, Canary Isles (Endangered), Spain (Critically Endangered) and Portugal (Vulnerable). The two sub-populations located during the survey each comprised single small patches a few centimetres across. Both patches had perianths. It is possible that other small patches occur near the first location by the main river, but the cave population is naturally limited.

Figure 1 *Radula holtii* location (circled red) in ravine above Gyfarllwyd Falls

Figure 2 *Radula holtii* location in cave at the lower end of the Nant Ty Coch

Figure 3 *Radula holtii* patch on roof of cave at the lower end of the Nant Ty Coch

Figure 4 *Radula holtii* specimen from Afon Rheidol with distinctive long perianth

5.1.2 Hutchin's Hollywort *Jubula hutchinisiae*

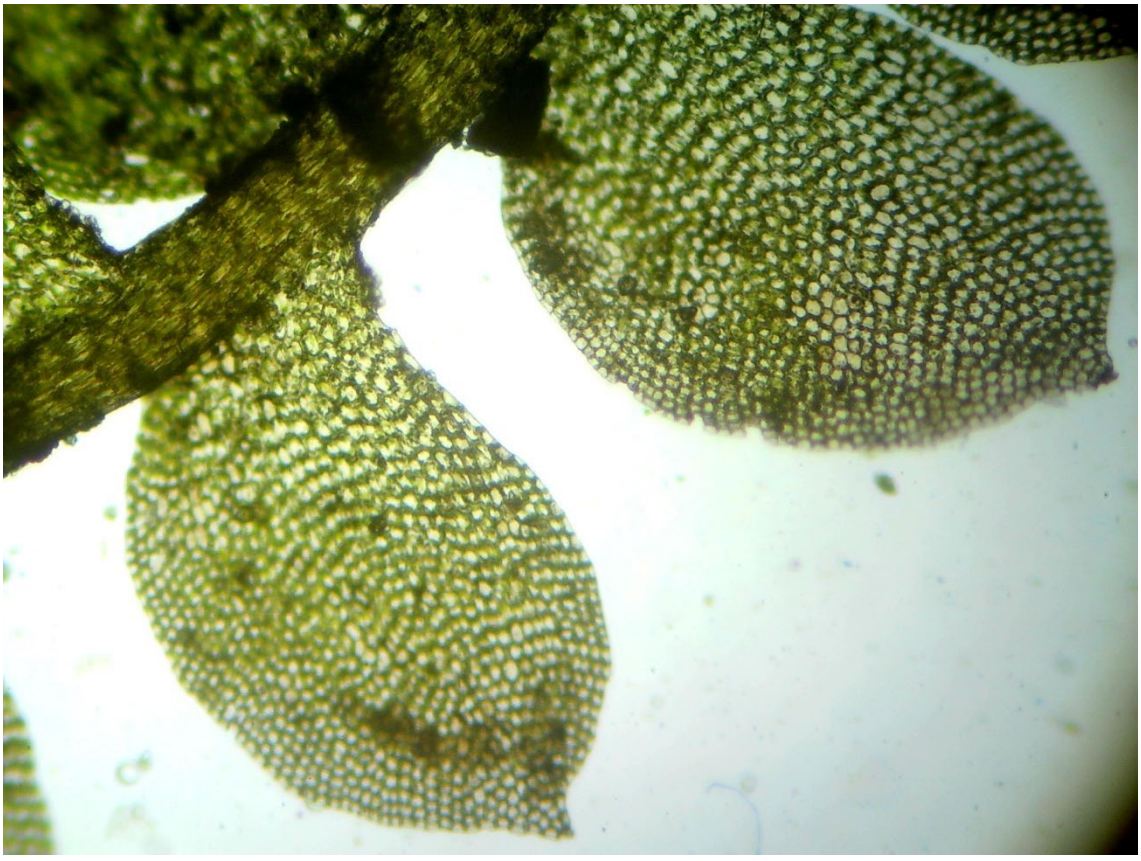

Figure 5 Edentate shade form of *Jubula hutchinsiae*

Jubula hutchinsiae is locally abundant on rocks in and alongside several tributary streams; it is most notably abundant in the unnamed tributary north-west of Woodlands Caravan Park (SN744773) where water-quality is suspected to be low. A form of *Jubula hutchinsiae* morphologically corresponding to the Asian subspecies *javanica* was found on the roof of the Nant Ty Coch cave with *Radula holtii*. According to Dey *et al.* (2011), this is characterised by slender plants with stems <200um and leaves with 1-3 teeth (as opposed to the 5-7 teeth typically found in subspecies *hutchinsiae*). However, Paton (1999) suggests that variation within ssp. *hutchinsiae* covers these small forms with reduced teeth, and DNA sequencing by Ruby Bye at Aberystwyth University confirmed it as ssp. *hutchinsiae*.

5.1.3 Hooked Veilwort *Metzgeria leptoneura*

Figure 6 *Metzgeria leptoneura* (photo Ruby Bye)

This liverwort is a key member of the Atlantic Woodland assemblage here, at its only currently known site in Ceredigion. It is closely associated with humid ravines. The BBS database indicates that there were four accurately located sub-populations prior to the current survey, together with a similar number of older, imprecisely-located records from within the general site boundary. Sutton (2025) found it in a new location on the Nant Lletys (SN737770). It was found in two new locations during the current survey, on the Nant Tyn-llwyn (*ca.* SN746781) and the unnamed tributary west of the Afon Mynach (*ca.* SN739771). At each of these latter three locations, it occurs in very small quantity (small patches of a few centimetres) on rocks in or near the mist-zone by waterfalls, often growing on the robust moss *Thamnobryum alopecurum*.

Figure 7 *Metzgeria leptoneura* location, unnamed tributary west of Afon Mynach

5.1.4 Toothed Pouncewort Drepanolejeunea hamatifolia

Drepanolejeuna hamatifolia, a small liverwort which forms part of the Atlantic Woodland assemblage, was previously considered rare on the site. Forster-Brown (2020) lists one record, but the first vouchered record for the vice-county was made subsequently above Parson's Bridge by this author in 2023, where a

single patch grows on riverside rock just upstream of Temple Mine.

Figure 8 *Drepanolejeuna hamatifolia* location below bridge at base of Mynach Falls

The current survey found it to be occasional on rocks in and beside the river around the Gyfarllwyd Falls. Patches were found on water-smoothed rocks in or just above the normal river level above the waterfall, in the spray zone on the east side of it, and on several boulders in the river downstream. It was also found on the north side of the ravine downstream of the bridge below the Mynach Falls, where it is occasional amongst *Lejeunea lamacerina*.

5.1.5 Pointed Pouncewort Harpalejeunea molleri

Figure 9 *Harpalejeunea molleri* on boulder face below Mynach Falls

Harpalejunea molleri was previously known from various patches on rocks and oak bases by the steps down to the base of the Mynach Falls, as well as three widely separated locations on or near the main river. The current survey refound it beside the steps, and on rocks in and beside the river between the bridge and the base of the falls here. Subpopulations here extend to the rocks on the south side of the ravine below the bridge. A patch was also found on a boulder in the river below the Gyfarllwyd Falls, one of the areas where it has previously been recorded.

5.1.6 Long-leaved Pouncewort *Cololejeuna microscopica*

Figure 10 Boulder downstream of Gyfarllwyd Falls with *Cololejeunea microscopica;* several rocks in the river here also have *Drepanolejeunea hamatifolia* and *Harpalejeunea molleri*

Cololejeunea microscopica is the most frequent of the small Atlantic *Lejeuneacea* species here; there are modern records from seven locations together with older, unlocalised records from several others. As with *Harpalejeunea*, it is rare elsewhere in the county with only a single other known site. The current survey found it on three boulders in the river below the Gyfarllwyd Falls, and in two locations on riverside rocks below the Mynach Falls.

5.1.5 Petty Featherwort *Plagiochila exigua*

Figure 11 *Plagiochila exigua* location (circled red) below cave on Afon Ty Coch

There are only two Ceredigion records of this small *Plagiochila*, which favours humid locations beside waterfalls. The current survey found it new to the site in a single location, on a rock-face outside the cave with *Radula holtii* at the lower end of the Afon Ty Coch. Shoots here are woven into other bryophytes in a small patch; there may be scattered shoots elsewhere on the rock-face here.

5.1.6 Irish Crisp-moss *Chionoloma hibernicum*

Figure 12 *Chionoloma hibernicum* location (circled red) above Gyfarllwyd Falls

This Nationally Scarce western species, only recently discovered in Wales, is considered an Atlantic woodland assemblage species in Bosanquet, Genney and Cox (2018). It is not listed in the assemblage score for Coedydd a Cheunant Rheidol (Rheidol Woods and Gorge) SSSI in Bosanquet (2019), but Tom Ottley first found it here in 2019, on calcareous rocks by the main river just downstream of the Nant Lletys. Ottley and this author then found it beside a waterfall in the lower part of the Afon Mynach in 2020. The current survey found a patch on rocks downstream of here, in a ravine below the bridge at the base of the falls. Two small patches were also found in a new location on the Afon Rheidol, upstream of the Gyfarllwyd Falls.

Figure 13 *Chionoloma hibernicum* location in ravine downstream of bridge below Mynach Falls (rock face on left of picture)

5.2 Woodland Assemblage species

The site was not scored for its assemblage of Nationally Rare and Scarce Woodland Bryophytes by Bosanquet (2019), but several are known to be present (*Tritomaria exsecta*, *Bartramia halleriana*, *Syzygiella autumnalis*, *Mesoptychia heterocolpos*, *Plagiopus oederianus* and *Sphenolobopsis pearsonii*; an unconfirmed record of *Lophozia longidens* was also made in 2023). As these species tend to occur in drier niches away from watercourses,

they were not a focus of the current survey, but incidental records were made of two species. The minimum 18-point total meets the threshold for SSSI notification and places the site third highest in Wales for the assemblage.

5.2.1 Horsehair Threadwort *Sphenolobopsis pearsonii*

Figure 14 Slender brown shoots of *Sphenolobopsis pearsonii* below Gyfarllwyd Falls

There are two site records for this Nationally Scarce and locally-rare liverwort, both made in the 1960s. The current survey found a small patch on a dry cliff-face on the east side of the valley below the Gyfarllwyd Falls.

5.2.2 Autumn Flapwort Syzygiella autumnalis

Figure 15 Oak trunk by Nant Ysbyty Cynfyn with *Syzygiella autumnalis*

There are five modern records of this Nationally Scarce liverwort from rotting oak logs on the site, together with a handful of older, unlocalised records. The current survey found it in two new locations; a small patch on a log alongside the Nant Ty Coch, and a few shoots on the lower part of a live oak trunk on a steep slope alongside the Nant Ysbyty Cynfyn.

Figure 16 *Syzygiella autumnalis* on oak log by the Nant Ty Coch

5.3 Other notable species

Western Brook-moss *Hygrohypnum eugyrium* was found in two places – on the Nant Ty Coch and the confluence of the Nant Ysbyty Cynfyn and Afon Rheidol. This aquatic moss of unpolluted watercourses had not previously been recorded in Ceredigion.

The first Ceredigion record of *Trichostomum littorale*, a recent segregate of *T. brachydontium*, was found on a rock ledge near the river below Coed Erwbarfe.

Two other species were added to the site bryophyte list. *Scapania subalpina* was found on a boulder below the Mynach Falls, and *Pohlia elongata* was found fruiting on a small landslide at the lower end of the Nant Ysbyty Cynfyn.

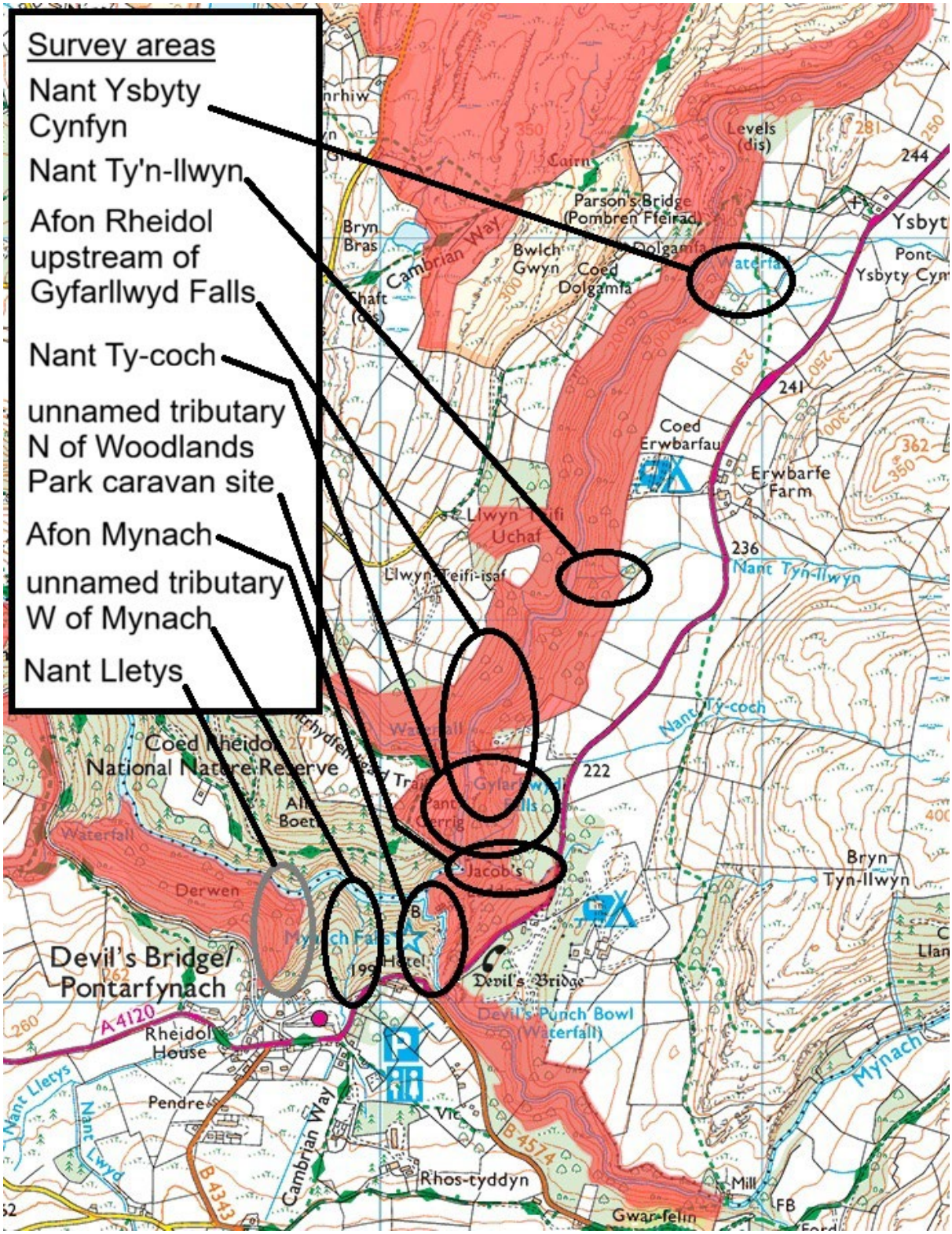

Figure 17. Map of 2025 survey areas in Coedydd a Cheunant Rheidol (Rheidol Woods and Gorge) SSSI; Nant Lletys was covered by an earlier survey (Sutton, 2025) and the west bank of the Afon Mynach and the unnamed tributary west of the Afon Mynach fall outside the SSSI. Basemap © Ordnance Survey.

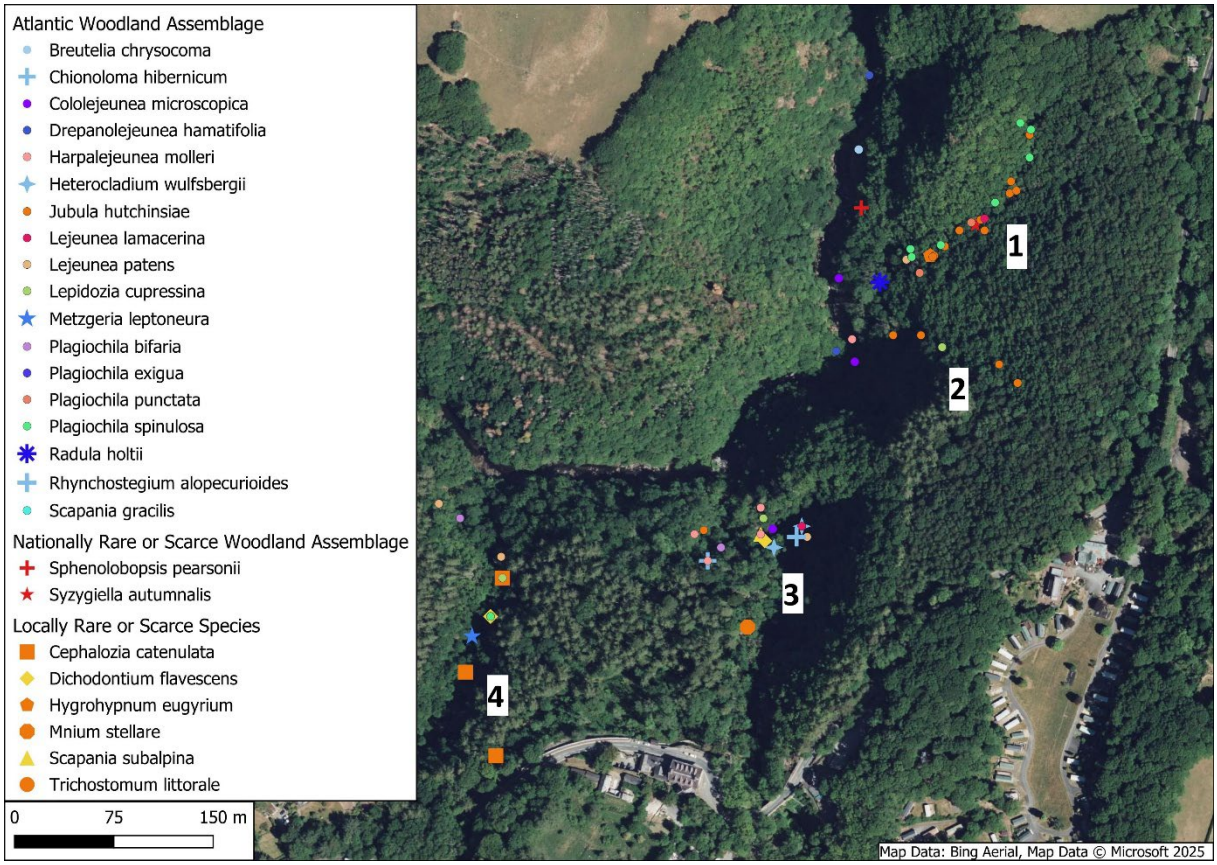

Figure 18. Notable Species in Southern Part of Site: 1. Nant Ty-coch; 2. Un-named tributary below Woodlands Caravan Park; 3. Afon Mynach; 4. Un-named tributary west of Afon Mynach

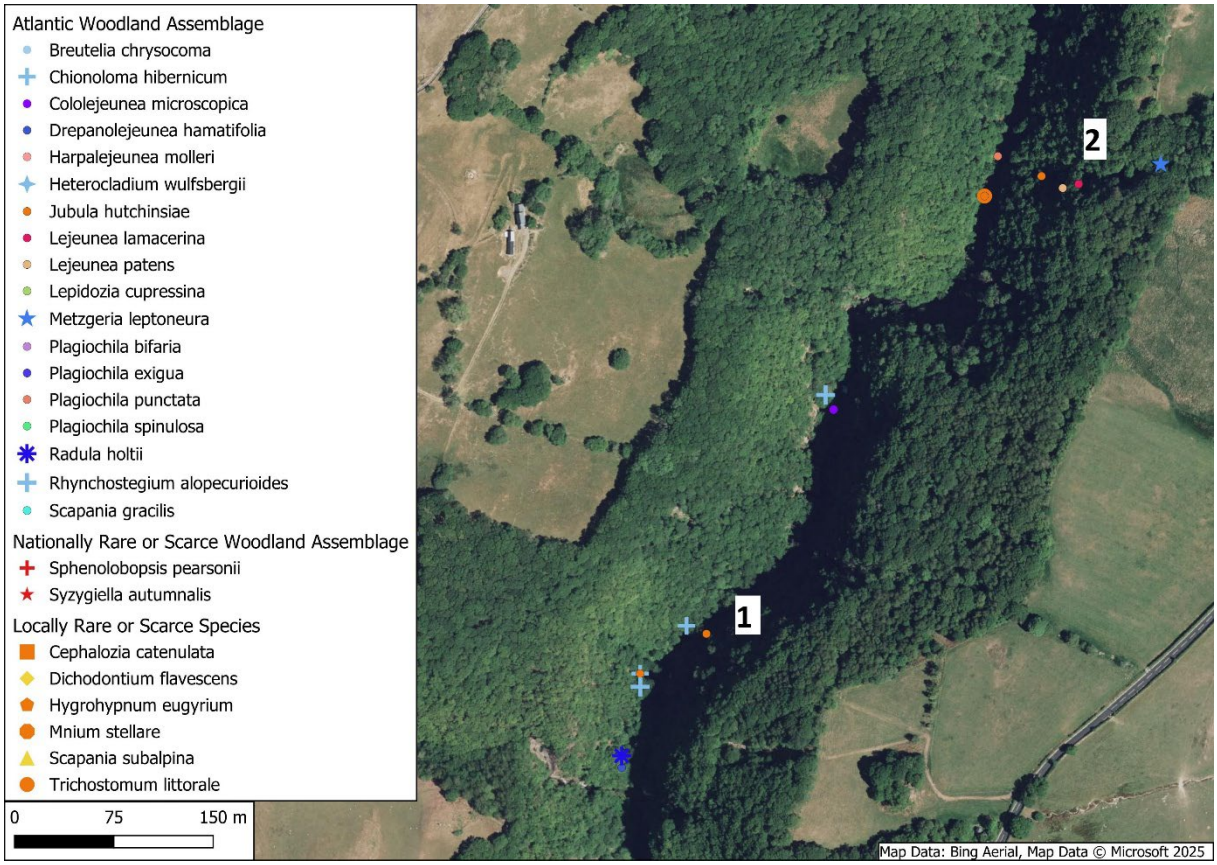

Figure 19. Notable Species in Central Section: 1. Above Gyfarllwyd Falls; 2. Nant Tyn-llwyn

Figure 20. Notable Species in Northern Section (Nant Ysbyty Cynfyn)

6. Discussion

BRYOATT (Attributes of British and Irish Mosses, Liverworts and Hornworts) was published in 2007 by the Centre for Ecology and Hydrology (CEH); it provided for all British and Irish species a codified set of attributes for use in ecological analyses. Table 1 (appendix) gives estimated frequencies of bryophytes in each tributary stream, using DAFOR (Dominant, Abundant, Frequent, Occasional, Rare) values. For each species, it also shows Ellenberg values for Nitrogen (N) and Reactivity (R). The scale for Nitrogen, a proxy measure for fertility, ranges from 1 (associated with very infertile conditions) to 9 (associated with highly fertile conditions). The scale for Reactivity, a proxy measure for pH, ranges from 1 (highly acidic conditions) to 9 (highly alkaline).

It can be seen that the most nitrogen-sensitive Atlantic Woodland bryophytes are well-represented on the Afon Mynach, and to a lesser extent on the unnamed tributary to the west of the Mynach. They are also well-distributed in places along the main river from Coed Erwbarfau to below the Gyfarllwyd Falls, although DAFOR values were not recorded here. Conversely, the four surveyed tributaries above the confluence of the Rheidol and Mynach are relatively poor in these nitrogen-sensitive Atlantic Woodland species. To some extent, this may reflect the less humid conditions here, and the more seasonal nature of some of the streams. However, the increased abundance here of bryophytes indicative of higher nutrient status (such as *Chiloscyphyus polyanthos* and *Brachythecium rivulare*) suggests that water-quality factors are at least partly responsible.

Several potential causes of poorer water-quality were noted in the four surveyed tributaries above the Rheidol-Mynach confluence. At least five dead sheep were present in or alongside the Nant Ysbyty Cynfyn just above the SSSI. The Nant Ty-Coch, although arising in unimproved hill vegetation, crosses a single field of agriculturally-improved grassland where nitrogen-based fertilisers and other agricultural inputs are likely to be introduced – for example, mineral lick buckets and other types of plastic agricultural waste are present in the SSSI along this tributary. Targeted buffer-strips funded by the Sustainable Farming Scheme or bespoke agreement would be advisable here. The unnamed tributary below the Woodlands Caravan Park is particularly deficient in Atlantic Woodland bryophytes – *Jubula hutchinsiae* is notably abundant here, but this species appears to be relatively tolerant of nitrogen pollution, as reflected by its higher Ellenberg N value. The bryophyte-poor nature of this stream may reflect past inputs from the sewerage-treatment system at the caravan park; this has recently been upgraded. Sutton (2025) demonstrated the likely poor water-quality in the Nant Lletys, not included in the current survey.

The water quality in the main river appears to be reasonably high, and nitrogen-sensitive aquatic bryophytes such as *Rhynchostegium alopecurioides* are locally-abundant here. However, a slight smell of sewage was sometimes apparent from within the water, and it was noted that populations of starry saxifrage (*Saxifraga stellaris*), a higher plant noted by Chater (2010) as locally-abundant on rocks in the river and tributaries such as the Nant Ysbyty Cynfyn, appear now to be absent. Although the invasive species Japanese knotweed (*Reynoutria japonica*) is patchily abundant on the banks of the river, it does not

extend on to the rocks previously occupied by the saxifrage. The saxifrage is a nitrogen-sensitive species, but factors such as increased scour during high flows could also impact it.

Figure 21 The Nant Ty-coch crosses a single field of intensively managed pasture

Figure 22 Agricultural waste was frequently noted in the Nant Ty-Coch

Figure 23 Dead sheep in the Nant Ysbyty Cynfyn

Figure 24 Japanese knotweed is patchily abundant beside the main river

Figure 25 Rocks in the main river below the Nant Tyn Llwyn no longer appear to hold starry saxifrage, a nitrogen-sensitive higher plant species

7. Conclusion and recommendations

The survey further demonstrated the importance of the Coedydd a Cheunant Rheidol (Rheidol Woods and Gorge) SSSI to the conservation of Atlantic woodland bryophytes. The addition of species including the Critically Endangered *Radula holtii* to the assemblage here positions the site as the second most important in Wales for these species.

The survey also suggested that improvements to water-quality would be desirable. Nitrogen-sensitive species appear to be particularly at risk within the tributary streams upstream of the Rheidol-Mynach confluence, where agricultural pollution is the primary concern. Other recent work by this author has demonstrated water-quality threats to notable Atlantic woodland bryophytes in the Nant Lletys; a tributary stream potentially impacted by sewerage inputs from the village.

The primarily undeveloped nature of the catchment of the upper Rheidol and tributary streams means that the relatively few likely sources of nutrient-pollution should be identifiable, and measures implemented to reduce these.

8. Acknowledgements

Many thanks to Louis Hudson, Ruby Bye and Phil Jennings for rope access assistance, and to Ruby for DNA sequencing of *Jubula* and *Campylopus* specimens.

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10. Data Archive Appendix

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

The data archive contains:

The final report in Microsoft Word and Adobe PDF formats.

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'.

Appendix 1: data from the survey

The Appendices have been removed to comply with Accessibility legislation because they comprise complex multi-entry data tables with numerous blanks cells and/or photographs for use during on-site monitoring. They are available in full from the NRW Evidence Reports Team (evidencereportsandsubscriptions@cyfoethnaturiolcymru.gov.uk).