Cyfoeth Naturiol Cymru
Natural Resources Wales

A Survey of the Bryophytes of the Montane Lakes of Eryri

Rory Hodd (Nimbosa Ecology)

Evidence Report No 879

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Frontispiece: Boulder in Llyn Bochlwyd, supporting the rare mosses *Grimmia anomala* and *Hedwigia striata*.

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Canfuwyd bod creigiau ar hyd glannau llynnoedd mynyddig yn Eryri yn gynefin pwysig i fryoffytau, gan gynnal amrywiaeth o fryoffytau prin a dan fygythiad ac sydd ond yn tyfu yn y cynefin hwn. Yn aml nid yw'r cynefin hwn yn cael sylw gan fryolegwyr, neu byddant yn ymweld â nhw am gyfnod byr yn unig ar y ffordd i archwilio creigiau cyfagos. Mae archwiliadau o gynefin glannau llynnoedd yn Eryri yn y degawdau diwethaf wedi arwain at ddarganfod dwy rywogaeth o fryoffytau sy'n newydd i Gymru, sef *Grimmia anomala* ac *Odontoschisma elongatum*, yn ogystal ag ailddarganfod dwy rywogaeth arall, sef *Pterigynandrum filiforme* a *Hedwigia striata*, nad oeddent wedi'u gweld yng Nghymru ers bron i ganrif.

Mae tri ar ddeg o lynnoedd o fewn SoDdGA Eryri wedi'u nodi fel rhai o bwysigrwydd posibl o ran casgliadau a rhywogaethau o fryoffytau glannau llynnoedd mynyddig. Mae rhai o'r llynnoedd hyn wedi'u harolygu'n rhannol neu'n llawn yn y blynyddoedd diwethaf, ond ychydig iawn o gofnodion diweddar, os o gwbl, sydd ar gyfer y mwyafrif o'u glannau.

Oherwydd cilfach gyfyngedig rhywogaethau'r cynefin hwn, ac mewn rhai achosion eu poblogaethau bychain iawn, maent yn arbennig o agored i aflonyddwch a gallai un achos o aflonyddu arwain at ddifrod di-droi'n-ôl, neu hyd yn oed at golli'r boblogaeth o rai o'r rhywogaethau hyn o Gymru. Gyda'r cynnydd ym mhoblogrwydd gweithgareddau awyr agored yn y blynyddoedd diwethaf, yn enwedig nofio yn y gwyllt, mae'r tebygolrwydd o ddifrod damweiniol i fryoffytau creigiau glannau llynnoedd wedi cynyddu. Felly, mae'n hynod bwysig dogfennu'r bryoffytau ar lannau'r llynnoedd mynyddig hyn yn llawn ac adnabod y creigiau sy'n cynnal bryoffytau prin a phwysig ac sy'n agored i aflonyddwch.

Arolygwyd saith llyn mynyddig o fewn SoDdGA Eryri ym mis Medi 2024, y saith wedi'u gwasgaru rhwng y tri phrif fasiff, sef Yr Wyddfa, y Glyderau a'r Carneddau. Blaenoriaethwyd y llynnoedd ar gyfer yr arolwg ar sail safon a nifer y cofnodion diweddar o fryoffytau. Cerddwyd ar hyd glannau pob un o'r llynnoedd a chofnodwyd lleoliadau unrhyw fryoffytau prin neu fryoffytau a oedd yn nodedig am reswm arall. Nodwyd a dogfennwyd clogfeini pwysig, a gwnaed nodyn o unrhyw ddifrod a oedd yn bresennol. Cofnodwyd rhestr lawn o rywogaethau o lan pob llyn.

Cofnodwyd bryoffytau prin neu nodedig wrth ymyl pob un o'r saith llyn a arolygwyd, a chanfuwyd bod y llynnoedd yn cefnogi bryoffytau cyfoethog ac amrywiol ar hyd eu glannau. Cofnodwyd cyfanswm o 39 o glogfeini pwysig, gydag o leiaf un clogfaen pwysig ar bob safle a arolygwyd. Darganfuwyd yr ail safleoedd yng Nghymru ar gyfer *Grimmia anomala* ac *Odontoschisma elongatum*, a chofnodwyd *Hedwigia striata* mewn tri safle newydd. Canfuwyd bod *Schistidium frigidum* var. *frigidum* yn tyfu'n helaeth o amgylch glannau dau lyn ar yr Wyddfa, sef Llyn Du'r Arddu a Glaslyn,

ynghyd â'r tacsonau cysylltiedig *S. frigidum* var. *havaasii* a *S. Confertum*. Mae'r rhain oll yn brin ym Mhrydain a heb eu cofnodi yn Eryri ers dros 50 mlynedd. Cofnodwyd poblogaeth fawr o *Racomitirum macounii* subsp. *alpinum* o amgylch glannau Llyn Bochlwyd ac mewn lleoliad newydd ar lan Llyn Nadroedd yng Nghwm Clogwyn. Mae *Pterigynadrum filiforme* yn dal i dyfu ar yr un clogfaen ble gwyddys amdano ar ymyl Ffynnon Lloer, er bod arwyddion o erydiad y mat mwsogl ar y clogfaen yn achos pryder posibl. Nodwyd erydiad y mat mwsogl ar nifer o glogfeini eraill sy'n cynnal bryoffytau prin. Nodwyd tyfiant trwchus o algâu yn nyfroedd Ffynnon Lloer hefyd, a *Bryum muehlenbeckii* yw'r brif rywogaeth a allai gael ei heffeithio.

Dylid rhannu canlyniadau'r arolwg hwn gyda defnyddwyr hamdden y llynnoedd hyn, yn enwedig grwpiau nofio gwyllt, a dylid pwysleisio pwysigrwydd glannau'r llynnoedd hyn o ran eu bryoffytau. Dylid cynnal arolygon systematig ar y llynnoedd nad oeddent yn rhan o'r arolwg hwn, gan ddefnyddio'r un fethodoleg, a dylid monitro'r clogfeini pwysig a nodwyd er mwyn sicrhau bod y rhywogaethau a'r cymunedau hyn o fryoffytau yn goroesi ac mewn cyflwr da yn y dyfodol. Mae canlyniadau'r arolwg hwn yn amlygu pwysigrwydd y cynefin hwn i fryoffytau, yn ogystal â gwerth arolygon arbenigol wedi'u targedu yn hytrach na dibyniaeth ar gofnodion achlysurol wrth bennu gwerth cadwraeth safle neu gynefin.

2. Executive Summary

Rocks along the shores of montane lakes in Eryri have been found to be an important bryophyte habitat, supporting a range of rare and threatened bryophytes that grow only in this habitat. This habitat is often overlooked by bryologists or is only briefly visited on the way to explore nearby crags. Explorations of lakeshore habitat in Eryri in recent decades has led to the discovery of two bryophyte species new to Wales, *Grimmia anomala* and *Odontoschisma elongatum,* and the rediscovery of a further two species, *Pterigynandrum filiforme* and *Hedwigia striata*, that had not been seen in Wales for almost a century.

Thirteen lakes within the Eryri SSSI were identified as being of potential importance for montane lakeshore bryophyte assemblages and species. Some of these lakes have been surveyed partially or in full in recent years, but the majority have few or no recent records from their shores.

Due to the limited niche of the species of this habitat, and in some cases very small populations, they are especially vulnerable to disturbance and a single disturbance event could lead to irreparable damage to or even loss of the Welsh population of some species. With the greater popularity of outdoor activities, in particular wild swimming, in recent years, the likelihood of accidental damage to the bryophytes of lakeshore rocks has increased. Therefore, it is of high importance to fully document the bryophyte flora of the shores of these montane lakes and identify rocks that support rare and important bryophytes and are vulnerable to disturbance.

Seven montane lakes within the Eryri SSSI were surveyed in September 2024, spread between the three main massifs of Yr Wyddfa, Glyderau and Carneddau. Lakes were prioritised for survey based on the quality and quantity of recent bryophyte records. The full shore of each lake was walked and the locations of any rare or otherwise notable bryophytes encountered were recorded. Important boulders were identified and documented, with any damage present noted. A full species list was recorded from the shore of each lake.

Rare or notable bryophytes were recorded beside all seven lakes surveyed, and the lakes were found to support a rich and varied bryophyte flora along their shores. A total of 39 important boulders were recorded, with at least one important boulder at each lake surveyed. The second Welsh sites for both *Grimmia anomala* and *Odontoschisma elongatum* were discovered, and *Hedwigia striata* was recorded from three new sites. *Schistidium frigidum* var. *frigidum* was found to grow in abundance around the shores of two lakes on Yr Wydffa, Llyn Du'r Arddu and Glaslyn, along with the related taxa *S. frigidum* var. *havaasii* and *S. confertum*, all of which are rare in Britain and had not been recorded from Eryri in over 50 years. A large population of *Racomitirum macounii* subsp. *alpinum* was recorded from around the shores of Llyn Bochlwyd and from a new location on the shore of Llyn Nadroedd in Cwm Clogwyn. *Pterigynadrum filiforme* still grows on the one boulder that it is known from on the edge of Ffynnon Lloer, although signs of erosion of the moss mat on the boulder are a possible cause for concern. Erosion of the moss mat was noted on a number of other boulders supporting rare bryophytes. Dense growth of algae in the waters of Ffynnon Lloer was also noted, with *Bryum muehlenbeckii* the main species that is potentially being impacted.

The results of this survey should be shared with recreational users of these lakes, especially wild swimming groups and the importance of these lakeshores for their bryophyte flora should be highlighted. The lakes not covered by this survey should be systematically surveyed using the same methodology and monitoring should be carried out of the important boulders identified to ensure the future survival of these bryophyte species and communities in good condition. The results of this survey highlight the importance of this habitat for bryophytes, as well as the value of targeted specialist surveys as opposed to relying on casual records when determining the conservation value of a site or habitat.

3. Background

Eryri SSSI contains the three highest mountain massifs in Wales – Yr Wyddfa, Carneddau and Glyderau – on which occur about 30 montane lakes at altitudes of up to 815m above sea level, which is the highest altitude lake for a lake in Wales. The margins of these montane lakes provide an important habitat for a range of bryophyte species, which occur in few or no other places in Wales. *Grimmia anomala, Pterigynandrum filiforme* and *Odontoschisma elongatum* are known in Wales only from these lakes, while *Bryum muehlenbeckii* occurs only on rocks by these lakes and along the streams flowing from them (British Bryological Society database, accessed January 2025). *Hedwigia striata*, which was until recently an overlooked species in Britain, has the majority of its Welsh occurrences alongside these lakes. Fourteen species considered to be Nationally Rare or Scarce lakeshore specialists occur in Wales (Table 14), including those listed above. Some of the 14, for example *Braunia imberbis*, are known from within Eryri SSSI or nearby from non-lakeshore habitat, whilst others grow on the margins of non-montane lakes, in the case of *Fossombronia fimbriata*. Several other species that are scarce in Wales also often occur in this habitat in Eryri, including *Antitrichia curtipendula* and *Grimmia funalis*.

Table 1 Species regarded as lakeshore specialists and known to occur in Wales. British Red List status (Callaghan, 2022), Welsh Red List Status (Bosanquet and Dines, 2011), Nationally Rare (NR) or Scarce (NS) status (Pescott, 2016) and presence within Eryri are indicated. LC: Least Concern, VU: Vulnerable, EN: Endangered, CR: Critically Endangered, RE: Regionally Extinct, DD: Data Deficient. The species listed as Regionally Extinct in Wales was rediscovered after the publication of the Red List. NA: Not Assessed, as the species was not known/recognised in the country at the time of publication of the list.

Species	British red data status	Welsh red data status	Nationally Rare/Scarce	Recorded in Eryri SSSI
Braunia imberbis	LC	LC	NS	Yes
Bryum muehlenbeckii	LC	EN	NR	Yes
Bryum riparium	LC	LC	NS	Yes
Bryum tenuisetum	LC	LC	NS	No
Fossombronia fimbriata	EN	CR	NR	Yes
Fossombronia foveolata	LC	LC	NS	No
Grimmia anomala	VU	NA	NR	Yes
Grimmia muehlenbeckii	LC	NA	NS	Yes
Hedwigia ciliata	LC	VU	NS	No
Hedwigia striata	DD	NA	NA	Yes
Odontoschisma elongatum	LC	NA	NS	Yes
Pterigynandrum filiforme	LC	RE	NS	Yes
Racomitrium macounii	LC	VU	NS	Yes
Schistidium trichodon	LC	CR	NS	Yes

Thirteen lakes within Eryri, distributed across Yr Wyddfa, Glyderau and Carneddau, were identified as being of potential interest for montane lakeshore bryophytes (Table 2), based on a combination of size, altitude, naturalness, rockiness and the presence of base-rich rock nearby. Of these lakes two, Ffynnon Llyffant and Llyn y Cwn, were fully surveyed by the British Bryological Society in 2015 (Bosanquet and British Bryological Society, 2015), along with a large proportion of the shore of Ffynnon Lloer. Two species, *Hedwigia striata* and *Pterigynandrum filiforme*, were rediscovered on the shores of Ffynnon Lloer during this survey following decades without a Welsh record. A number of other lakes have been partially explored by bryologists in recent decades, often in passing while heading for adjacent crags, with discoveries of *Grimmia anomala* and *Odontoschisma elongatum* alongside Llyn Cwmffynnon by Sam Bosanquet in 2013, new to Wales, of particular note. Four of these lakes, Ffynnon Caseg in the Carneddau and three lakes in Cwm Clogwyn on Yr Wyddfa, have no prior bryophyte records associated with them.

Table 2 List of montane lakes with potential importance for lakeshore bryophytes within the Eryri SSSI and details of the most recent surveys (including the present survey) of each lake.

Lake	Massif	Monad	Surveyors	Year of full survey
Llyn Du'r Arddu	Yr Wyddfa	SH6055	R.L. Hodd, P. Thompson	2024
Llyn Glas Cwm Glas Mawr	Yr Wyddfa	SH6155	Not surveyed in full, partial survey by Bosanquet, 2013	n/a
Glaslyn	Yr Wyddfa	SH6154	R.L. Hodd, P. Thompson	2024
Llyn Glas Cwm Clogwyn	Yr Wyddfa	SH6054	R.L. Hodd, P. Thompson	2024
Llyn Coch	Yr Wyddfa	SH5954	R.L. Hodd, P. Thompson	2024
Llyn Nadroedd	Yr Wyddfa	SH5954	R.L. Hodd, P. Thompson	2024
Llyn Idwal	Glyderau	SH6459	Not surveyed in full, various old and recent records	n/a
Llyn Bochlwyd	Glyderau	SH6559	R.L. Hodd, P. Thompson	2024
Llyn y Cwn	Glyderau	SH6358	British Bryological Society	2015
Llyn Cwmffynnon	Glyderau	SH6456	Not surveyed in full, partial survey by Bosanquet, 2013	n/a
Ffynnon Lloer	Carneddau	SH6662	R.L. Hodd, P. Thompson	2024
Ffynnon Llyffant	Carneddau	SH6864	British Bryological Society	2015
Ffynnon Caseg	Carneddau	SH6764	Unsurveyed	n/a

Due to their restricted occurrence in a narrow niche, often occurring only as small patches on a handful of rocks along a lakeshore, the specialised bryophyte communities and species of lakeshore habitats are especially vulnerable to disturbance. A single misplaced foot or towel on a rock could potentially eradicate the entirety of the population of a species from a site, or even from Wales. With the increased popularity of open water swimming in recent years, as well as the popularity of the mountains of Eryri for a range of outdoor recreational activities, this threat exists for all populations of these species, even in the most remote locations and on rocks

located offshore and surrounded by water, and has a higher probability now than in the past.

Therefore, it is important to document the locations of rare or otherwise interesting species on rocks around the lakes of Eryri and to identify rocks that are particularly important for these species and may be especially vulnerable to disturbance due to their location or attractiveness for climbing or sitting. This information can then be shared with local swimming groups and other recreational users and the importance and value of these lakeshore rocks can be highlighted, leading to increased care and respect when visiting these lakes. To this end, a survey was undertaken to visit as many of the montane lakes within Eryri as possible and to gather information on the bryophyte species and communities present, as well as documenting important locations for these species.

4. Methods

4.1. Taxonomy

Taxonomy follows Blockeel *et al.* (2021) for bryophytes and Stace (2019) for vascular plants.

4.2. Survey sites

Survey sites were selected from the list of lakes presented in Table 2. As only five survey days were available, these sites were prioritised based on the amount and quality of recent bryophyte records available for each lake and the known importance of each lake for rare bryophytes. Those sites surveyed by the British Bryological Society in 2015 were deemed to be the lowest priority for resurvey, with the exception of Ffynnon Lloer, which is considered to be of exceptional value for its lakeshore bryophyte flora and required further survey. Ffynnon Caseg was considered to be of low priority, due to its remoteness. As a result of the slow and methodical nature of the survey, it was not possible to survey all of the remaining lakes in the time available, with seven lakes visited, spread throughout the three massifs of Eryri.

4.3. Desk preparation

All records of specialist lakeshore species and other rare or notable species from the shores of the lakes or nearby were compiled and mapped, using Q-GIS. Descriptions of the target species were consulted to enable their recognition in the field. Recording sheets were prepared both to record all occurrences of notable species and to record important boulders. These data were loaded onto a handheld ruggedised tablet.

4.4. Field survey

The field survey was undertaken over the course of five days between the 9th and 13th of September 2024. One site was visited on each day, resulting in the survey of a total of seven lakes, as three lakes are located within Cwm Clogwyn on Yr Wydffa, so could all be surveyed in one day. The entire shore of each lake was walked in a clockwise direction starting from the outflow and every significant rock along the shore was examined. Where a rare or otherwise notable species was encountered, its location was recorded using a handheld GPS and notes were taken on its extent and condition.

If a boulder was deemed significant in the species or assemblages of species present and considered to be vulnerable to trampling or other disturbance due to its location or attractiveness, detailed information was recorded. The location was recorded using a GPS and a number of photographs were taken. A list of all species on the boulder was recorded and the abundance and distribution of any significant species across the boulder was noted. Any damage apparent was also detailed. A full species list was recorded for each lakeshore, with records localised to a minimum of a six-figure grid reference.

Specimens were collected of any bryophyte species that could not be definitively identified in the field. Microscopic identification of specimens was carried out using Smith (2004) and Paton (1999) as the primary reference for mosses and liverworts, respectively, with the key of Blom in Nyholm (1997) used to identify *Schistidium* species.

Figure 1. *Hedwigia striata*, Llyn Coch, Cwm Clogwyn

Figure 2. *Pterigynandrum filiforme*, Ffynnon Lloer

Figure 3. *Bryum muehlenbeckii*, Ffynnon Lloer

Figure 4. *Racomitrium macounii* subsp. *alpinum*, Llyn Bochlwyd

Figure 5. *Grimmia anomala*, Llyn Bochlwyd

Figure 6. *Schistidium frigidum* var. *frigidum*, Glaslyn

5. Results

The results of the surveys of each of the seven lakes visited are detailed in Appendix 1, including a species list and details of important boulders. All species records from the survey and additional photos of the boulders are provided separately to this report. The bryophyte flora of each of the 13 lakes listed in Table 2 is outlined in this section and important elements of the bryophyte flora of each lake are highlighted. Table 3 summarises the findings of the 2024 survey. An Excel sheet listing the locations and, where available, abundance, of rare and notable bryophytes recorded during this and previous surveys for each of the 13 lakes is provided separately as Appendix S1. Appendix S2 contains records of all bryophyte species recorded during the 2024 survey, to a minimum accuracy of six figures.

Table 3 Summary of lakes surveyed in 2024, listing the number of species recorded along the lakeshore, number of important boulders identified and the most notable species present. See Appendix 1 for further details of each lake.

Lake name	Massif	Number of species	Number of important boulders identified	Notable species recorded
Llyn Du'r Arddu	Yr Wyddfa	60	5	*Schistidium frigidum* var. *frigidum, S. frigidum* var. *havaasii, Odontoschisma elongatum, Grimmia elongata, Gymnomitrion adustum*
Glaslyn	Yr Wyddfa	60	10	*Schistidium frigidum* var. *frigidum, S. confertum, Gymnomitrion adustum*
Llyn Glas Cwm Clogwyn	Yr Wyddfa	49	1	*Hedwigia striata, Antitrichia curtipendula*
Llyn Coch	Yr Wyddfa	52	2	*Hedwigia striata, Antitrichia curtipendula*
Llyn Naddroed	Yr Wyddfa	23	2	*Racomitrium macounii* subsp. *alpinum*
Llyn Bochlwyd	Glyderau	56	11	*Racomitrium macounii* subsp. *alpinum, Hedwigia striata, Grimmia anomala, Bryum riparium*
Ffynnon Lloer	Carneddau	64	8	*Pterigynandrum filiforme, Hedwigia striata, Bryum muehlenbeckii, Antitrichia curtipendula*

5.1. Llyn Du'r Arddu

This lake is nestled on the northern side of Yr Wyddfa, below the vertical cliff of Clogwyn Du'r Arddu, and was surveyed in detail in 2024. It does not have a typical lakeshore flora, but is nonetheless important for bryophytes. Of particular note is the abundance of *Schistidium frigidum* var. *frigidum* on rocks all around its shore, with *S. frigidum* var. *havaasii* also present in at least one location. Neither variety of *S. frigidum*

has been recorded this location in the past 50 years. Other rare *Schistidium* species that have been recorded in the past in the general vicinity of the lake are *S. flaccidum* and *S. trichodon*, both at their only known Welsh location, but neither were rediscovered during this survey. *Odontoschisma elongatum* was discovered on the shore near the head of the lake at its second Welsh site. Other species of note present include *Grimmia incurva* and *Gymnomitrion adustum*, as well as calcareous species on base-rich boulders detached from the cliffs above, the most notable of which are *Molendoa warburgii* and *Amphidium lapponicum*.

5.2. Llyn Glas Cwm Glas Mawr

This small lake on the northwestern flanks of Yr Wyddfa was last visited by Sam Bosanquet in 2013. Rocks on the shore support a number of characteristic species of this habitat, including *Grimmia muehlenbeckii, G. ramondii, Antitrichia curtipendula* and *Porella cordaeana*, with *Haplomitrium hookeri* recorded from the gravel shore. A smaller lake, Llyn Bach, a few hundred metres to the west and upslope, has no localised bryophyte records, but may support notable bryophyte species.

5.3. Glaslyn

Glaslyn is a large lake located in the long glacial valley running east below the summit of Yr Wyddfa, and was surveyed in 2024. It has a history of metal mining. Like Llyn Du'r Arddu, *Schistidium frigidum* var. *frigidum* is frequent, growing on lakeshore rocks around the full circumference of the lake. *S. confertum* also grows in at least two places. *S. frigidum* var. *havaasii* was previously recorded from the margins of the lake, and specimens corresponding to that taxon almost certainly still occur amongst the abundant growth of *S. frigidum* var. *frigidum*. Other notable montane taxa recorded on lakeside boulders include *Gymnomitrion adustum*, *Amphidium lapponicum* and *Ditrichum zonatum*. Rocks on the northern shore of this lake are particularly vulnerable to trampling and other human disturbance, as the very busy Miner's Track leading to the summit of Yr Wyddfa runs alongside the lake for ca. 300m.

5.4. Llyn Glas Cwm Clogwyn

Three relatively small lakes occur in Cwm Clogwyn, directly west of the summit of Yr Wyddfa, each with its own distinct character. No previous records existed for any of these lakes prior to the survey of 2024. The northeasternmost and smallest lake in the Cwm is Llyn Glas, which supports a rich flora, taking its size into account. *Hedwigia striata* and *Antitrichia curtipendula* were each found growing on one rock alongside this lake. *Grimmia ramondii* was also recorded.

5.5. Llyn Coch

Llyn Coch is the central, and largest, of the lakes in Cwm Clogwyn and supports a varied flora of lakeshore specialists, even though there are few rocks along a large

stretch of its shore. The most notable species present is *Hedwigia striata*, which was noted in two locations, with *Antitrichia curtipendula* also present. Other, more common, lakeshore species recorded include *Porella cordaeana, Nogopterium gracile* and *Schistidium rivulare*.

5.6. Llyn Nadroedd

The westernmost of the lakes in Cwm Clogwyn, Llyn Nadroedd, is highly acidic in character and supports a small number of mostly common species. The exception to this is *Racomitrium macounii* subsp. *alpinum*, which was recorded on rocks at eight locations around the lake, in small quantity in most places.

5.7. Llyn Idwal

This large, easily accessible and circumneutral lake in the Glyderau has been much visited by bryologists over the years, the most recent records being collected in 2013. A range of *Grimmia* species have been recorded from lakeshore rocks, including *G. decipiens* and *G. incurva*, and *Haplomitrium hookeri* occurs at the southern end of the lake. Very old records exist for *Hedwigia striata* and *Pterigynandrum filiforme*, but neither species has been seen in many decades. Due to the large number of recreational users of this lake, there is a high risk of disturbance to the bryophytes along the lakeshore, particularly close to the outflow at the northern end of the lake.

5.8. Llyn Bochlwyd

Located to the east of and above Llyn Idwal, Llyn Bochlwyd was surveyed in full in 2024. The most remarkable feature of the bryophyte flora along the shores of this lake is the abundance of *Racomitrium macounii* subsp. *alpinum*, which occurs along the full length of the shore, often forming extensive patches. *Hedwigia striata* was recorded in three places around the lake, and a single cushion of *Grimmia anomala* grows, with *H. striata*, on a rock in the lake close to the northwestern shore. This species is known from only one other site in Wales, Llyn Cwmfynnon, on the opposite side of the Glyderau. Also recorded around the shores of the lake were *Bryum riparium*, *Grimmia funalis* and *Ulota hutchinsiae*, alongside the lakeshore specialists *Grimmia ramondii* and *Isothecium holtii*. Llyn Bochlwyd has been significantly impacted by acidification (Tristan Hatton-Ellis pers. comm.).

5.9. Llyn y Cwn

A small lake located in the saddle between Glyder Fawr and Y Garn, Llyn y Cwn was surveyed by the British Bryological Society in 2015. Sloping rocks along the lakeshore support patches of *Racomitrium macounii* subsp. *alpinum*, alongside *Grimmia ramondii* and *G. funalis*. As it is located close to a number of popular walking paths, there would be high footfall on the rocks around this lake.

5.10. Llyn Cwmffynnon

This lake on the southern side of the Glyderau was visited by Sam Bosanquet for a couple of hours in 2013, when he found *Odontoschisma elongatum* and *Grimmia anomala* new to Wales. Other lakeshore species recorded during this visit were *Racomitrium macounii* subsp. *alpinum, Grimmia muehlenbeckii* and *Grimmia ramondii*. A more extensive survey of the shore of this lake would likely reveal more populations of these and other rare species.

5.11. Ffynnon Lloer

Located on the southern flanks of Carnedd Dafydd in the Carneddau, this lake represents possibly the most important site for lakeshore bryophytes in Eryri and all of Wales. A visit by the British Bryological Society in 2015 rediscovered *Hedwigia striata* and *Ptergynandrum filiforme*, both of which had not been seen in Wales for many years. *P. filiforme* grows only on one rock, a couple of metres out from the shore, while *H. striata* is more widespread around the lake. A strong population of *Bryum muehlenbeckii* also occurs around the lake.

A range of other notable species occur on rocks along the lakeshore, including *Antitrichia curtipendula, Grimmia hartmanii* and *G. funalis*. The majority of species recorded in 2015 were refound in 2024 and a more systematic survey was carried out. Large amounts of algae were observed in the water of the lake and forming a film over bryophytes close to the water level, with *Bryum muehlenbeckii* in particular impacted. The source of this should be further investigated – it might be the result of reduced grazing mollusc abundance due to acidification, but could also be the result of N deposition (Tristan Hatton-Ellis, pers. comm.).

5.12. Ffynnon Llyffant

Perched below the summit of Carnedd Llewelyn at an altitude of 815m, Ffynnon Llyffant is the highest altitude lake in Wales. It was visited by the British Bryological Society in 2015, leading to the discovery of *Philonotis seriata, Bryum muehlenbeckii* and *Grimmia ramondii* along its short shoreline. *P. seriata* is particularly rare in Wales, and is only known from the vicinity of Ffynnon Llyffant and the summit of Carnedd Llewelyn at present.

5.13. Ffynnon Caseg

Due to its remote location in Cwm Caseg in the heart of the Carneddau, no bryological records exist from this lake. Despite the rocky nature of the Cwm within which the lake occurs, photos available online suggest that there are few substantial rocks along the shore of the lake, and it may support a limited bryophyte flora. However, given its sheltered, high-altitude position, and the species present alongside other lakes in the Carneddau, those rocks that do occur along the lakeshore merit a detailed survey.

5.14. Other lakes of potential bryological importance

The lakes summarised above contain the vast majority of rocky upland lakeshore habitat within the Eryri SSSI. A number of small lakes scattered across Eryri were not included and are mostly likely to hold little bryological importance. Two slightly larger lakes, potentially worthy of a detailed survey, are found within the Glyderau: Llyn Clyd, below Y Garn, and Llyn y Gaseg Fraith, to the east of Glyder Fach. Llyn Clyd was visited briefly by the British Bryological Society in 2015, but almost the entire focus was on the crags and adjacent slopes, with little attention paid to the lakeshore. Llyn y Gaseg Fraith is bryologically unknown.

Although at lower altitude than the lakes included within this survey, Llyn Ogwen is of potential importance for montane lakeshore bryophytes, and an old record for *Hedwigia striata* from its shore exists. Other lower altitude lakes such as Llyn Teyrn and Llyn Pen y Gwryd may also support important bryophyte species and assemblages. Although impounded natural lakes, the relatively large reservoirs dotted around the slopes of the three massifs of Eryri may also hold some bryological importance on rocks along their shorelines.

5.15. Threats noted to lakeshore bryophyte species and communities

In general, the lakeshore bryophyte communities appear to be in good condition, with few widespread threats. As noted above, dense growth of algae in the water of Ffynnon Lloer indicated a wider issue, although only bryophytes in contact with or close to the surface of the lake appear to be directly impacted. On the scale of individual rocks, dislodgement of the bryophyte mat is apparent in some locations, including where rare species are present, most notably the only known colony of *Pterigynandrum filiforme* in Wales. It is not possible to precisely know the cause of this, but it is possibly due to footfall from hikers walking out onto rocks to view or photograph the lakes or wild swimmers moving in and out of the water. Many of the boulders detailed in Appendix 1 are particularly vulnerable to damage of this type due to their location close to paths or their attractiveness to walk or sit on.

6. Discussion and conclusions

The results of this survey show that lakeshore rocks are amongst the most important bryophyte habitats within Eryri, the importance of which has only been fully realised in recent years. The discovery of the second Welsh sites for both *Grimmia anomala* and *Odontoschisma elongatum*, two new sites for *Hedwigia striata* and the reconfirmation of the presence of *Schistidium frigidum* var. *frigidum*, *S. frigidum* var. *havaasi* and *S. confertum* in Eryri after a gap of many decades, as well as many new records of other uncommon species, highlights that despite an increase in bryophyte survey and recording activity within Eryri in the past decade, much still remains to be discovered or rediscovered. It also highlights the value of systematic surveys of taxon groups within important habitats, as casual records typically do not provide enough data to assess the conservation importance of a site or priorities for action and implementation of measures. The discovery of abundant growth of *Schistidium frigidum* var. *frigidum* around the shores of both Glaslyn and Llyn Du'r Arddu, along with the closely related *S. frigidum* var. *havaasii* and *S. confertum*, more than 50 years after last being recorded, is of particular note, with all three taxa being very rare in Wales and Britain as a whole.

Figure 7. *Bryum muehlenbeckii*, partially covered by decomposing algae, Ffynnon Lloer

Figure 8. Erosion of moss mat from top of boulder, Llyn Glas Cwm Clogwyn

The main pressure to the bryophyte assemblages of this habitat is direct anthropogenic impact through trampling and dislodgment by recreational users, both hikers and wild swimmers. Although only localised impacts from this were observed in a handful of locations, the high number of visitors using these mountains means that many of these populations are highly vulnerable to future disturbance, and could be significantly damaged, or even destroyed, by a single event, particularly those occurring on the boulders described in Appendix 1. In particular, there are signs of dislodgment of the moss mat on the boulder supporting the only known Welsh population of *Pterigynandrum filiforme*, beside Ffynnon Lloer, so further loss of the moss mat on that boulder could be catastrophic for this species in Wales. Evidence was also seen of eutrophication in Ffynnon Lloer, in the form of dense growth of algae in the water, which was negatively impacting some of the bryophyte populations present.

The results of this survey should be shared with recreational users of these lakes and surrounding areas, particularly wild swimming groups, members of which are likely to swim in these lakes and would be unaware of the importance of the bryophytes present. Some form of signage might need to be considered, perhaps using discrete QR codes, in order to inform non-local visitors. It is hoped that if users are aware of the importance of these lakeshores for bryophytes and other taxon groups, they will take more care to minimise disturbance when accessing and walking around the lakes.

Periodic monitoring of the bryophytes present on the boulders identified in Appendix 1 should be carried out in order to identify and assess impacts to the species and assemblages present on these lakeshores. Regular monitoring will enable the detection of changes to these assemblages and ensure that mitigation measures can be implemented in a timely manner if needed to counter the impacts of threats and pressures.

The lakes not surveyed in 2024, or by the British Bryological Society in 2015, should be surveyed in full to the same level of detail as this survey. This is likely to result in further new records of rare bryophytes and will facilitate a full understanding of the bryophyte flora of lakeshores in Eryri and their threats and conservation needs.

7. Acknowledgements

Thanks to Sam Bosanquet (NRW) for organising the contract and checking specimens of *Schistidium*. The assistance and boundless enthusiasm of Philippa Thompson was invaluable while carrying out the field survey, and she is also thanked for providing accommodation while in Eryri. Alex Turner gave invaluable advice on the survey sites and assistance in the field at Glaslyn. Peter Martin identified a puzzling, atypical specimen of *Grimmia trichophylla*, which would have otherwise gone unnamed.

8. References

Blockeel, TL, Bell, NE, Hill, MO, Hodgetts, NG, Long, DG, Pilkington, SL, Rothero, GP. 2021. A new checklist of the bryophytes of Britain and Ireland, 2020. *Journal of Bryology* 43(1): 1-51.

Bosanquet, S.D.S. & Dines, T. 2011. *A bryophyte Red Data list for Wales.* Plantlife, Salibury.

Bosanquet SDS. & British Bryological Society. 2015. *Eryri SSSI bryophyte survey 2015.* NRW Evidence Report No: 91, 132 pp, Natural Resources Wales, Bangor.

Callaghan, DA. 2022. A new IUCN Red List of the bryophytes of Britain, 2023. *Journal of Bryology* 44(4):271-389.

Nyholm, E. 1998. *Illustrated flora of Nordic Mosses. Fasc. 4. Aulacomniaceae--Meesiaceae--Catoscopiaceae--Bartramiaceae--Timmiaceae--Encalyptaceae--Grimmiaceae--Ptychomitriaceae--Hedwigiaceae--Orthotrichaceae.* Nordic Bryological Society, Copenhagen and Lund.

Paton, JA. 1999. *The liverwort flora of Britain and Ireland.* Harley Books, Colchester.

Pescott, O. 2016. Revised list of nationally rare and scarce bryophytes for Britain. *Field Bryology* 115:22-30.

Smith, AJE. 2004. *The Moss Flora of Britain and Ireland* (2nd Ed.) Cambridge University Press, Cambridge.

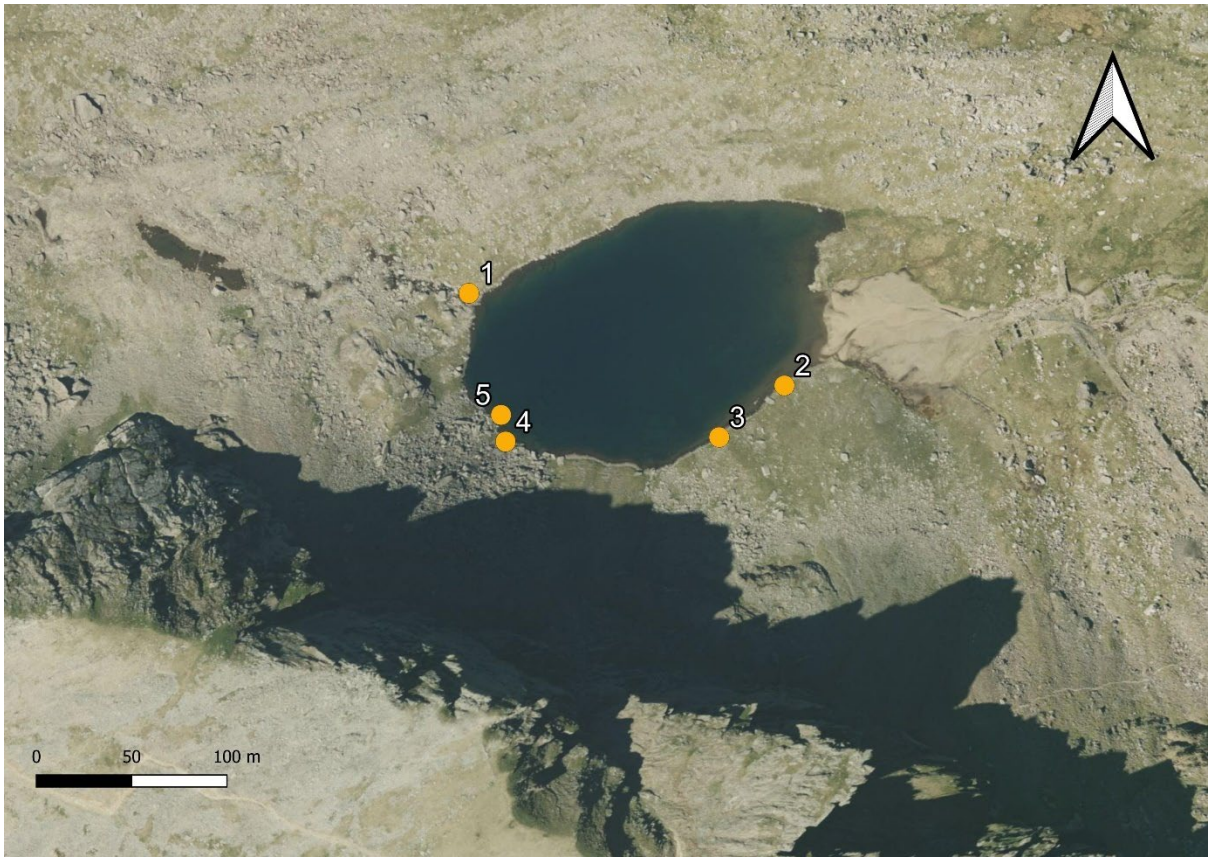
Stace, CA. 2019. *New Flora of the British Isles.* 4th Edition. C and M Floristics, Middlewood Green, Suffolk.

9. Appendices

9.1. Appendix 1: Lake details

This appendix contains data for all 13 lakes listed in Table 2. For each lake, an aerial image is included, showing the location of important boulders recorded, for those lakes surveyed in 2024. For the sites surveyed in 2024, a species list is presented, with notable species highlighted. Details and photos of important boulders are also included. For sites not surveyed in 2024, a list only of notable species recorded in the past is included. Grid references for records of notable species are contained in Appendix 2 and Appendix S1.

9.1.1. Llyn Du'r Arddu



Yellow dots: important boulders, see below for details. Scale: 1:4000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Odontoschisma elongatum, Schistidium frigidum* var. *frigidum, Schistidium frigidum* var. *havaasii, Schistidium confertum* (last seen 1924), *Schistidium flaccidum* (last seen 1967), *Schistidium trichodon* (last seen 1907), *Amphidium lapponicum, Grimmia incurva, Gymnomitrion adustum, Grimmia ramondii, Molendoa warburgii*

The following species were recorded from the shore of Llyn Du'r Arddu on the 12/09/2024. Notable species are highlighted in **bold**:

Amphidium lapponicum
Amphidium mougeotii
Andreaea rothii
Andreaea rupestris var. *rupestris*
Anoectangium aestivum
Anomobryum julaceum s.str.
Anthelia julacea
Barbilophozia sudetica
Blindia acuta
Breutelia chrysocoma
Bryoerythrophyllum ferruginascens
Bryum zieri
Campylopus atrovirens
Ctenidium molluscum
Dicranella heteromalla
Diplophyllum albicans
Douinia ovata
Fissidens adianthoides
Fissidens dubius
Fissidens pusillus
Frullania tamarisci
Grimmia donniana
Grimmia incurva
Grimmia ramondii
Grimmia trichophylla
Gymnomitrion adustum
Gymnomitrion crenulatum
Gymnostomum aeruginosum
Hygrohypnella ochracea
Hypnum cupressiforme
Isothecium interludens
Marsupella emarginata
Molendoa warburgii
Nardia scalaris
Neckera crispa
Negopterium gracile
Odontoschisma elongatum
Oligotrichum hercynicum
Philonotis fontana
Plagiochila porelloides
Plagiochila spinulosa
Pohlia annotina
Polytrichastrum formosum
Polytrichum juniperinum
Polytrichum piliferum
Ptychomitrium polyphyllum
Racomitrium aciculare
Racomitrium aquaticum
Racomitrium fasciculare
Racomitrium lanuginosum
Racomitrium sudeticum
Rhytidiadelphus squarrosus
Scapania aequiloba
Scapania undulata
Schistidium apocarpum
Schistidium frigidum* var*. frigidum
Schistidium frigidum* var*. havaasii
Schistidium strictum
Tortella tortuosa
Tritomaria quinquedentata

Boulders:

Site: Llyn Du'r Arddu
Boulder number: 1
Grid reference: SH5997455765
Species present: ***Schistidium frigidum* var. *frigidum,*** *Racomitrium fasciculare, Grimmia donniana*
Description: Square boulder in middle of outflow stream 2m back from open lake, *Schistidium frigidum* var. *frigidum* forming 5 patches in cracks of rock at end nearest lake.
Damage noted: None currently, but vulnerable to trampling when crossing outflow.

Photo:

Site: Llyn Du'r Arddu
Boulder number: 2
Grid reference: SH6013855712
Species present: ***Schistidium frigidum* var. *frigidum,*** *Pohlia annotina, Scapania undulata*
Description: Small flat boulder embedded in lake edge, with strong growth of *Schistidium frigidum* var. *frigidum*, scattered cushions and continuous growth along 20cm.
Damage noted: None at present.

Photo:

Site: Llyn Du'r Arddu
Boulder number: 3
Grid reference: SH6010355686
Species present: ***Schistidium frigidum* var. *frigidum***, *Racomitrium sudeticum, Barbilophozia sudetica, Diplophyllum albicans, Oligotrichum hercynicum, Pohlia annotina*
Description: Boulder half in water, partially beneath larger boulder, *Schistidium frigidum* var. *frigidum* forming extensive mat on top of boulder.
Damage noted: None, but vulnerable to trampling.

Photo:

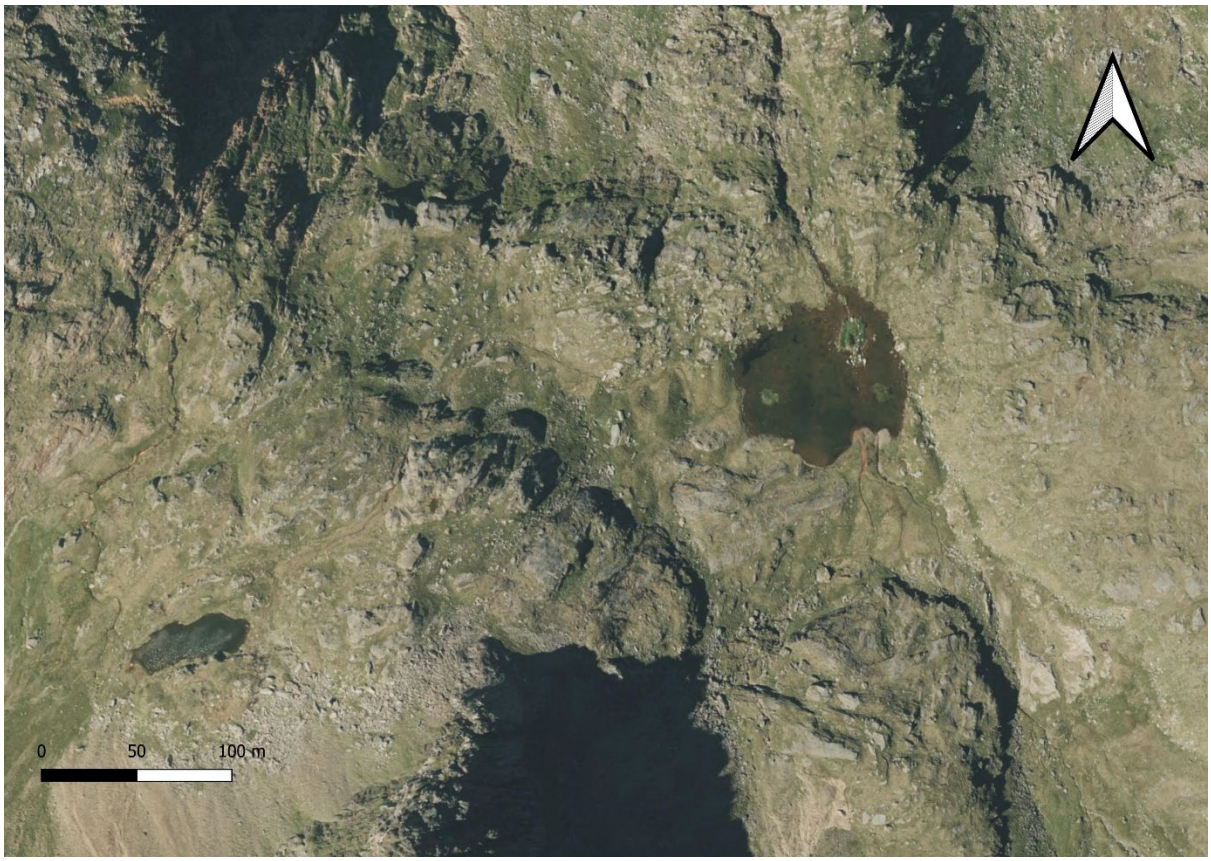
Site: Llyn Du'r Arddu
Boulder number: 4
Grid reference: SH5999155687
Species present: ***Schistidium frigidum* var. *frigidum***, *Schistidium strictum, Gymnostomum aeruginosum, Pohlia annotina*
Description: Large boulder of calcareous rock in water, with dense growth of *Schistidium frigidum* var. *frigidum* on top.
Damage noted: None at present.

Photo:

Site: Llyn Du'r Arddu
Boulder number: 5
Grid reference: SH5999155687
Species present: ***Schistidium frigidum* var. *frigidum***, *Anoectangium aestivum, Gymnostomum aeruginosum, Fissidens adianthoides, Amphidium mougeotii, Tortella tortuosa, Neckera crispa, Schistidium strictum, Bryoerythrophyllum ferruginascens, Bryum zieri*,** plus *Silene acaulis, Asplenium viride*
Description: Large base rich boulder partially in lake, good calcareous flora, with *Schistidium frigidum* var. *frigidum* forming multiple cushions at front.
Damage noted: None at present.

Photo:

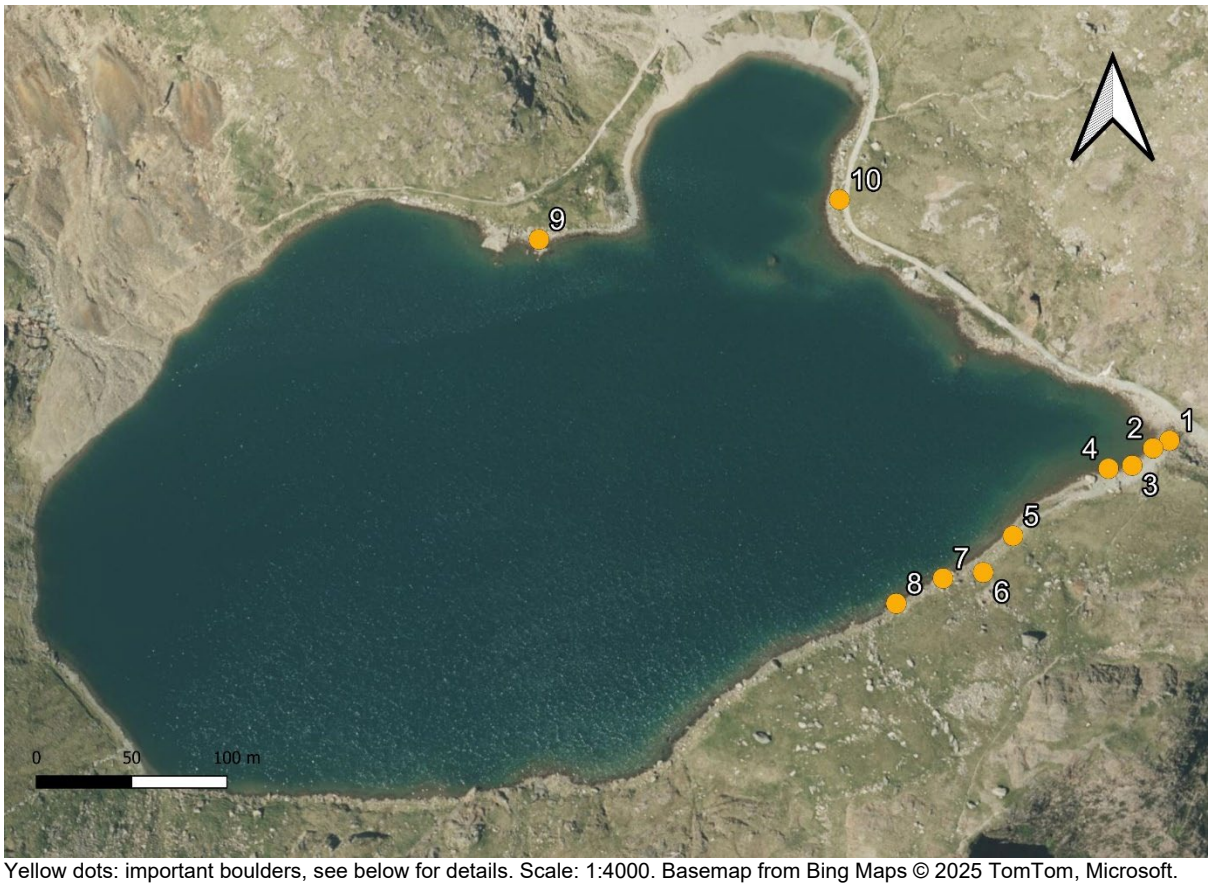
9.1.2. Llyn Glas Cwm Glas Mawr



Scale: 1:5000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Antitrichia curtipendula, Grimmia muehlenbeckii, Grimmia ramondii, Haplomitrium hookeri, Porella cordaeana*

9.1.3. Glaslyn



Yellow dots: important boulders, see below for details. Scale: 1:4000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Schistidium confertum, Schistidium frigidum* var. *frigidum, Schistidium frigidum* var. *havaasii* (last recorded 1800s), *Amphidium lapponicum, Ditrichum zonatum, Grimmia incurva, Gymnomitrion adustum, Grimmia elongata* (last recorded 1966)*, Racomitrium macounii* subsp. *alpinum* (last recorded 1965)

The following species were recorded from the shore of Glaslyn on the 11/09/2024. Notable species are highlighted in **bold**:

Amphidium lapponicum
Amphidium mougeotii
Andreaea rothii
Anomobryum julaceum s.str.
Blindia acuta
Brachythecium rivulare
Breutelia chrysocoma
Bryum capillare
Bryum pseudotriquetrum
Campylopus atrovirens
Campylopus flexuosus
Ceratodon purpureus
Dichodontium palustre
Dichodontium pellucidum s.str.
Dicranella rufescens
Dicranoweisia cirrata
Diplophyllum albicans
Ditrichum zonatum
Grimmia donniana
Grimmia trichophylla
Gymnostomum aeruginosum
Hygrohypnella ochracea
Hylocomium splendens
Hyocomium armoricum
Hypnum cupressiforme
Jungermannia pumila
Lophozia ventricosa
Gymnomitrion adustum
Marsupella emarginata
Nardia compressa
Oligotrichum hercynicum
Philonotis fontana
Pogonatum urnigerum
Pohlia annotina
Pohlia elongata
Polytrichastrum alpinum
Polytrichum commune
Ptychomitrium polyphyllum
Racomitrium aciculare
Racomitrium aquaticum
Racomitrium ellipticum
Racomitrium fasciculare
Racomitrium lanuginosum
Racomitrium obtusum
Racomitrium sudeticum
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Scapania undulata
Schistidium apocarpum
Schistidium confertum
Schistidium crassipilum
Schistidium frigidum* var. *frigidum
Schistidium strictum
Sciuro-hypnum plumosum
Solenostoma gracillimum
Solenostoma obovatum
Sphagnum auriculatum
Sphagnum palustre
Tortella tortuosa
Trichostomum brachydontium s.l.

Boulders:

Site: Glaslyn
Boulder number: 1
Grid reference: SH6193254576
Species present: ***Schistidium frigidum* var. *frigidum***, *Racomitrium fasciculare*
Description: Small boulder near outflow, with mat of *Schistidium frigidum* var. *frigidum* around base, and scattered patches on top. More cushions on at least 6 more adjacent boulders.
Damage noted: No damage at present.

Photo:

Site: Glaslyn
Boulder number: 2
Grid reference: SH6192554573
Species present: ***Schistidium frigidum* var. *frigidum***
Description: Small boulder ca 1.5m into lake covered by *Schistidium frigidum* var. *frigidum* on top.
Damage noted: No damage at present.

Photo:

Site: Glaslyn
Boulder number: 3
Grid reference: SH6191654566
Species present: ***Schistidium confertum****, Pohlia annotina*
Description: Boulder in lake, 1.5m from shore, much *Schistidium confertum* mainly on landward side.
Damage noted: No damage at present.

Photo:

Site: Glaslyn
Boulder number: 4
Grid reference: SH6190654565
Species present: ***Schistidium frigidum* var. *frigidum***, *Scapania undulata, Racomitrium fasciculare*
Description: Rock in lake 1m out of from shore, *Schistidium frigidum* var. *frigidum* forming large cushions in 15x5cm area.
Damage noted: No damage at present.

Photo:

Site: Glaslyn
Boulder number: 5
Grid reference: SH6186554538
Species present: ***Schistidium frigidum* var. *frigidum***, *Ditrichum zonatum, Pohlia annotina, Racomitrium fasciculare*
Description: Small rock just offshore, cushions of *Schistidium frigidum* var. *frigidum* scattered over surface.
Damage noted: No damage at present.

Photo:

Site: Glaslyn
Boulder number: 6
Grid reference: SH6185254523
Species present: ***Schistidium frigidum* var. *frigidum***, *Racomitrium fasciculare*
Description: Small rock at Lakeshore with numerous cushions of *Schistidium frigidum* var. *frigidum*.
Damage noted: No damage at present.

Photo:

Site: Glaslyn
Boulder number: 7
Grid reference: SH6183554521
Species present: ***Schistidium frigidum* var. *frigidum***, *Marsupella emarginata, Racomitrium fasciculare, Polytrichastrum alpinum, Amphidium mougeotii, Pohlia annotina*
Description: Large sloping boulder, half in water, *Schistidium frigidum* var. *frigidum* cushions scattered all the way around lower half.
Damage noted: No damage at present.

Photo:

Site: Glaslyn
Boulder number: 8
Grid reference: SH6181554511
Species present: ***Schistidium frigidum* var. *frigidum***, *Pohlia annotina, Ditrichum zonatum*
Description: Cushions of *Schistidium frigidum* var. *frigidum* covering flat rock just offshore.
Damage noted: No damage at present.

Photo:

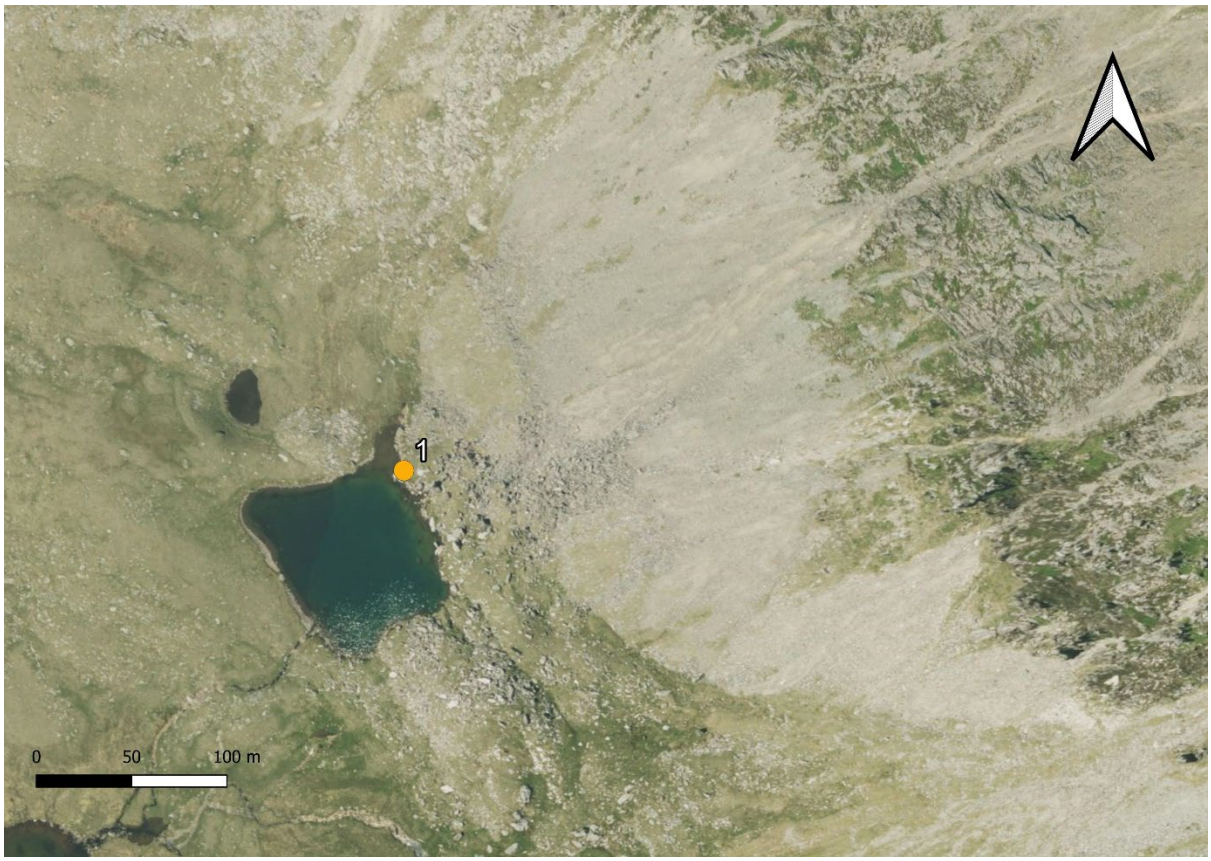
Site: Glaslyn
Boulder number: 9
Grid reference: SH6166954668
Species present: ***Schistidium frigidum* var. *frigidum***, *Pohlia annotina, Racomitrium obtusum, Scapania undulata, Solenostoma obovatum, Oligotrichum hercynicum*
Description: Group of ribs of bedrock sticking out of lake just offshore, with cushions of *Schistidium frigidum* var. *frigidum* throughout.
Damage noted: No damage evident but vulnerable as close to path.

Photo:

Site: Glaslyn
Boulder number: 10
Grid reference: SH6179654681
Species present: ***Schistidium frigidum* var. *frigidum***, *Racomitrium fasciculare, Polytrichastrum alpinum*
Description: Two small boulders just above shore, below path, with cushions of *Schistidium frigidum* var. *frigidum*, some of which are of a distinctive black form.
Damage noted: No damage evident.

Photo:

9.1.4. Llyn Glas Cwm Clogwyn



Yellow dots: important boulders, see below for details. Scale: 1:4000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Hedwigia striata, Antitrichia curtipendula, Grimmia ramondii*

The following species were recorded from the shore of Llyn Glas on the 13/09/2024. Notable species are highlighted in **bold**:

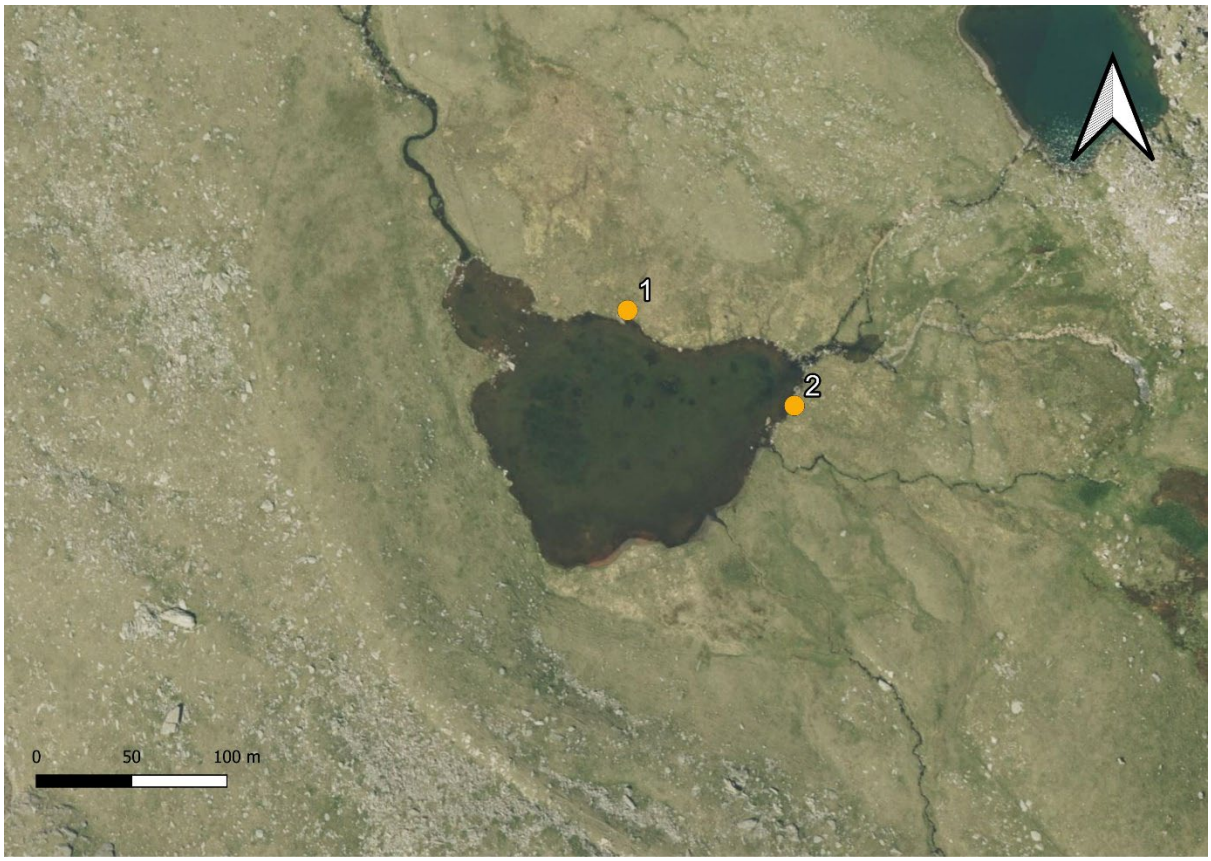
Andreaea rothii
Andreaea rupestris
Antitrichia curtipendula
Barbilophozia barbata
Breutelia chrysocoma
Bryum alpinum
Bryum capillare
Bryum pseudotriquetrum
Campylopus atrovirens
Campylopus flexuosus
Chionoloma cylindrotheca
Dicranella heteromalla
Dicranum scoparium
Fontinalis antipyretica var. *antipyretica*
Grimmia ramondii
Grimmia trichophylla
Hedwigia striata
Heterocladium heteropterum
Hygrohypnella ochracea
Hylocomium splendens
Hypnum andoi
Hypnum cupressiforme
Hypnum jutlandicum
Isothecium myosuroides
Lejeunea lamacerina
Metzgeria conjugata
Orthocaulis floerkei
Plagiochila punctata
Plagiochila spinulosa
Pogonatum urnigerum
Polytrichastrum alpinum
Polytrichum commune
Polytrichum juniperinum
Polytrichum piliferum
Ptilidium ciliare
Racomitrium aciculare
Racomitrium aquaticum
Racomitrium fasciculare
Racomitrium lanuginosum
Racomitrium sudeticum
Rhizomnium punctatum
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Scapania compacta
Scapania gracilis
Schistidium rivulare
Sciuro-hypnum plumosum
Sphagnum auriculatum
Tritomaria quinquedentata

Boulders:

Site: Llyn Glas, Cwm Clogwyn
Boulder number: 1
Grid reference: SH6005254642
Species present: ***Hedwigia striata****, Racomitrium aciculare, Sciuro-hypnum plumosum, Polytrichastrum alpinum, Hypnum cupressiforme, Fontinalis antipyretica, Rhytidiadelphus squarrosus*
Description: Large long narrow boulder parallel to shore, 2m away. *Hedwigia striata* in two patches at left end of rock, scattered small patches over 20x30cm at nose of rock and another patch, 10x10cm, 50cm back along side away from shore.
Damage noted: Signs of the moss mat having been dislodged across the top of the rock, cause not clear.

Photo:

9.1.5. Llyn Coch



Yellow dots: important boulders, see below for details. Scale: 1:4000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Hedwigia striata, Antitrichia curtipendula, Grimmia ramondii, Porella cordaeana*

The following species were recorded from the shore of Llyn Coch on the 13/09/2024. Notable species are highlighted in **bold**:

Amphidium mougeotii
Andreaea rothii
Anomobryum julaceum s.str.
Antitrichia curtipendula
Bryum alpinum
Bryum capillare
Bryum pseudotriquetrum
Calliergonella cuspidata
Chiloscyphus polyanthos
Cirriphyllum piliferum
Climacium dendroides
Dichodontium palustre
Dichodontium pellucidum s.str.
Dicranella staphylina
Fissidens adianthoides
Fontinalis antipyretica var. *antipyretica*
Grimmia ramondii
Grimmia trichophylla
Hedwigia striata
Hygrohypnella ochracea
Isothecium interludens
Isothecium myosuroides
Jungermannia pumila
Orthocaulis floerkei
Chionolma tenuirostre
Philonotis fontana
Plagiochila porelloides
Polytrichum juniperinum
Polytrichum piliferum
Porella cordaeana
Negopterium gracile
Ptilidium ciliare
Racomitrium aciculare
Racomitrium aquaticum
Racomitrium ericoides
Racomitrium fasciculare
Racomitrium lanuginosum
Racomitrium obtusum
Radula complanata
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Sarmentypnum sarmentosum
Scapania undulata
Schistidium rivulare
Sciuro-hypnum plumosum
Sphagnum rubellum
Sphagnum auriculatum
Sphagnum fallax
Sphagnum girgensohnii
Sphagnum palustre
Sphagnum subnitens subsp. *subnitens*
Thuidium delicatulum
Tritomaria quinquedentata

Boulders:

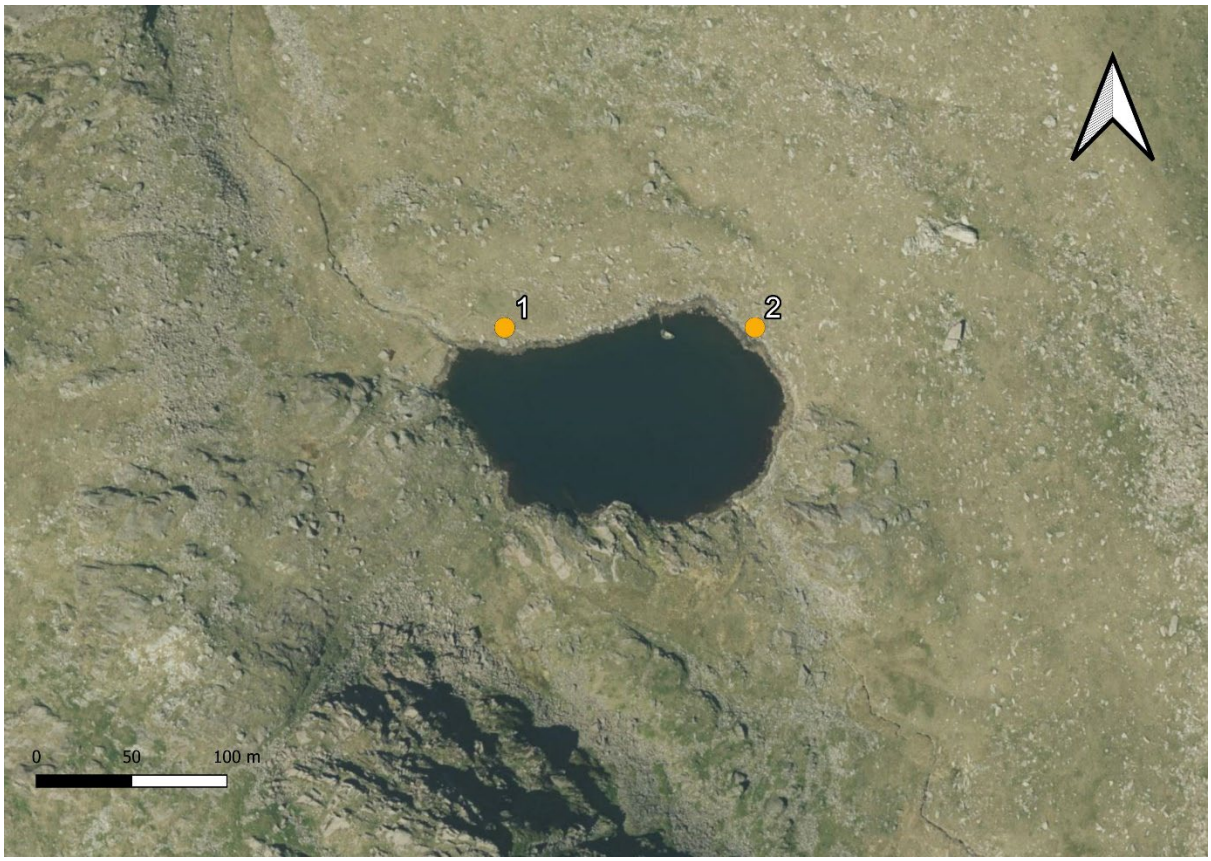
Site: Llyn Coch, Cwm Clogwyn
Boulder number: 1
Grid reference: SH5984054511
Species present: ***Antitrichia curtipendula, Hedwigia striata,*** *Grimmia ramondii, Schistidium rivulare, Sciuro-hypnum plumosum, Bryum capillare, Hypnum cupressiforme, Racomitrium aciculare, Racomitrium fasciculare, Hygohypnella ochracea, Racomitrium lanuginosum*
Description: Large boulder, embedded in land and projecting into lake, large patch of *Antitrichia curtipendula* on right-hand side and scattered over top, *Hedwigia striata* scattered towards tip of boulder.
Damage noted: Odd bit of moss mat possibly dislodged, vulnerable to trampling.

Photo:

Site: Llyn Coch, Cwm Clogwyn
Boulder number: 2
Grid reference: SH5990954469
Species present: ***Hedwigia striata***, *Hypnum cupressiforme, Bryum capillare, Grimmia ramondii, Racomitrium fasciculare, Racomitrium aciculare, Sciuro-hypnum plumosum*
Description: Oval moss covered boulder just offshore, *Hedwigia striata* scattered across whole boulder, with large patches towards open water.
Damage noted: Small amount of dislodgement of moss mat evident.

Photo:

9.1.6. Llyn Nadroedd



Yellow dots: important boulders, see below for details. Scale: 1:4000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Racomitrium macounii* subsp. *alpinum*

The following species were recorded from the shore of Llyn Nadroedd on the 13/09/2024. Notable species are highlighted in **bold**:

Andreaea hookeri
Andreaea rothii
Anthelia julacea
Campylopus atrovirens
Campylopus flexuosus
Diplophyllum albicans
Hyocomium armoricum
Hypnum cupressiforme
Lophozia ventricosa
Marsupella aquatica
Marsupella emarginata
Nardia compressa
Pohlia nutans
Polytrichum commune
Racomitrium aciculare
Racomitrium aquaticum
Racomitrium fasciculare
Racomitrium lanuginosum
Racomitrium macounii* subsp. *alpinum
Racomitrium obtusum
Racomitrium sudeticum
Sphagnum auriculatum
Sphagnum palustre

Boulders:

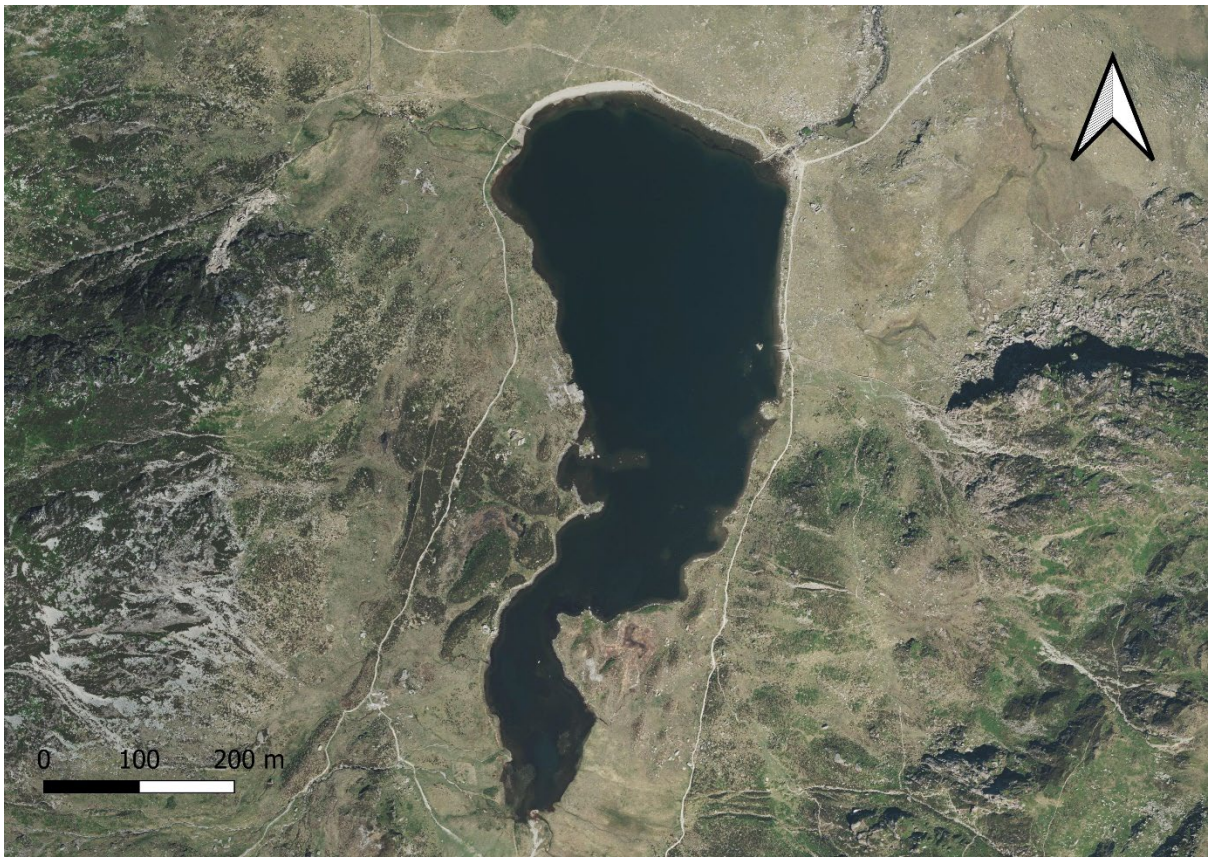
Site: Llyn Nadroedd, Cwm Clogwyn
Boulder number: 1
Grid reference: SH5945554354
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Racomitrium obtusum, Andreaea rothii, Racomitrium aciculare, Racomitrium fasciculare*
Description: Low boulder sloping into lake, small amount of *Racomitrium macounii* subsp. *alpinum* on end just above lake level, largest 10x3cm.
Damage noted: None at present, but vulnerable to trampling.

Photo:

Site: Llyn Nadroedd, Cwm Clogwyn
Boulder number: 2
Grid reference: SH5956054351
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Racomitrium fasciculare, Racomitrium aciculare*
Description: Flat rock in group of boulders, just above water level, *Racomitrium macounii* subsp. *alpinum* forming patch 15x15cm at lakeward end.
Damage noted: Part of *Racomitrium macounii* subsp. *alpinum* cushion looks to have been dislodged.

Photo:

9.1.7. Llyn Idwal



Scale: 1:8000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Hedwigia striata* (last recorded 1829), *Pterigynandrum filiforme* (last recorded 1928), *Antitrichia curtipendula, Grimmia decipiens, Grimmia hartmanii, Grimmia funalis, Grimmia incurva, Grimmia lisae, Grimmia ramondii, Haplomitrium hookeri*

9.1.8. Llyn Bochlwyd

Yellow dots: important boulders, see below for details. Scale: 1:4000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Hedwigia striata, Grimmia anomala, Racomitrium macounii* subsp. *alpinum, Bryum riparium, Grimmia funalis, Grimmia ramondii, Isothecium holtii, Ulota hutchinsiae*

The following species were recorded from the shore of Llyn Bochlwyd on the 10/09/2024. Notable species are highlighted in **bold**:

Andreaea hookeri
Andreaea rothii subsp*. falcata*
Andreaea rupestris
Aulacomnium palustre
Orthocaulis floerkei
Brachythecium rivulare
Bryum alpinum
Bryum capillare
Bryum pseudotriquetrum
Bryum riparum
Campylopus atrovirens
Campylopus introflexus
Chionoloma cylindrotheca
Diplophyllum albicans
Grimmia anomala
Grimmia funalis
Grimmia ramondii
Grimmia trichophylla
Gymnomitrion crenulatum
Hedwigia stellata
Hedwigia striata
Heterocladium heteropterum
Hylocomium splendens
Hyocomium armoricum
Hypnum andoi
Hypnum cupressiforme
Hypnum jutlandicum
Isothecium holtii
Isothecium interludens
Marsupella aquatica
Marsupella emarginata
Oligotrichum hercynicum
Pellia epiphylla
Pogonatum urnigerum
Pohlia nutans
Polytrichastrum alpinum
Polytrichum commune
Polytrichum juniperinum
Racomitrium aciculare
Racomitrium fasciculare
Racomitrium heterostichum
Racomitrium lanuginosum
Racomitrium macounii* subsp. *alpinum
Racomitrium obtusum
Racomitrium sudeticum
Rhytidiadelphus squarrosus
Scapania compacta
Scapania gracilis
Scapania undulata
Schistidium apocarpum
Sciuro-hypnum plumosum
Solenostoma gracillimum
Sphagnum auriculatum
Sphagnum palustre
Thuidium tamariscinum
Ulota hutchinsiae

Boulders:

Site: Llyn Bochlwyd
Boulder number: 1
Grid reference: SH6554559412
Species present: ***Racomitrium macounii* subsp. *alpinum*, *Grimmia funalis*,** *Campylopus atrovirens, Marsupella emarginata, Racomitrium fasciculare, Bryum capillare, Racomitrium aciculare, Sphagnum auriculatum*
Description: Group of low boulders with water between, but back from lakeshore. *Racomitrium macounii* subsp. *alpinum* forming small cushions on lower parts of rocks nearer to water, but not extensive. Scattered *Grimmia funalis* cushions in cracks in rocks.
Damage noted: No damage evident, but vulnerable to trampling by people on the way to the lake.

Photo:

Site: Llyn Bochlwyd
Boulder number: 2
Grid reference: SH6555459413
Species present: ***Racomitrium macounii* subsp. *alpinum*, *Grimmia funalis***, *Racomitrium aciculare, Racomitrium heterostichum, Andreaea rothii, Marsupella emarginata, Hypnum cupressiforme*
Description: Distinctive boulder sticking out into lake, with good cover of *Racomitrium* species. *Racomitrium macounii* subsp. *alpinum* in crack on left-hand side and *Grimmia funalis* on top. Small patches of *Racomitrium macounii* subsp. *alpinum* also on boulders behind but less vulnerable to disturbance.
Damage noted: No damage evident at present, but vulnerable to trampling as adjacent to outflow.

Photo:

Site: Llyn Bochlwyd
Boulder number: 3
Grid reference: SH6557259394
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Hypnum cupressiforme, Andreaea rothii, Racomitrium aciculare, Andreaea rupestris, Campylopus atrovirens, Grimmia ramondii, Racomitrium obtusum*
Description: Long flat sided boulder partially embedded in shore and back from open water. *Racomitrium macounii* subsp. *alpinum* forming three good patches at landward end and one patch towards lake. Also on four adjacent rocks.
Damage noted: No damage at present, *Racomitrium macounii* subsp. alpinum at back of boulder being shaded by grass.

Photo:

Site: Llyn Bochlwyd
Boulder number: 4
Grid reference: SH6558559353
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Racomitrium aciculare, Marsupella aquatica, Scapania undulata, Pellia epiphylla, Bryum pseudotriquetrum*
Description: *Racomitrium macounii* subsp. *alpinum* on top of small flat boulder by shore, and also on small rock 50cm further into lake and boulder 1m to right.
Damage noted: No damage apparent at present.

Photo:

Site: Llyn Bochlwyd
Boulder number: 5
Grid reference: SH6558959311
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Hypnum cupressiforme, Racomitrium obtusum, Racomitrium aciculare, Campylopus atrovirens, Andreaea rothii, Racomitrium fasciculare, Marsupella emarginata, Andreaea rupestris*
Description: Mossy boulder ca 2m from shore, covered by many patches of *Racomitrium macounii* subsp. *alpinum*.
Damage noted: None visible, but vulnerable to trampling.

Photo:

Site: Llyn Bochlwyd
Boulder number: 6
Grid reference: SH6551159272
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Racomitrium obtusum, Racomitrium aciculare, Campylopus atrovirens, Andreaea rothii*
Description: Large flat boulder on point, with numerous patches of *Racomitrium macounii* subsp. *alpinum* on edges and in cracks, as well as on adjacent boulders.
Damage noted: No damage obvious.

Photo:

Site: Llyn Bochlwyd
Boulder number: 7
Grid reference: SH6553359233
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Racomitrium aciculare, Hypnum cupressiforme, Racomitrium fasciculare, Andreaea rupestris, Campylopus atrovirens*
Description: Boulder ca 1m offshore, covered with luxuriant growth of *Racomitrium macounii* subsp. *alpinum.*
Damage noted: None, but vulnerable to trampling.

Photo:

Site: Llyn Bochlwyd
Boulder number: 8
Grid reference: SH6555159154
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Grimmia ramondii, Polytrichum commune, Racomitrium aciculare, Hypnum cupressiforme, Bryum alpinum, Marsupella emarginata, Racomitrium fasciculare, Racomitrium obtusum*
Description: Large boulder at tip of headland, covered by moss, with extensive sheets of *Racomitrium macounii* subsp. *alpinum.*
Damage noted: Part of moss mat shows signs of having been dislodged.

Photo:

Site: Llyn Bochlwyd
Boulder number: 9
Grid reference: SH6555759093
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Racomitrium aciculare, Grimmia ramondii, Polytrichum commune, Racomitrium obtusum, Campylopus atrovirens, Marsupella emarginata, Racomitrium fasciculare, Andreaea hookeri, Scapania undulata*
Description: Group of very mossy boulders with extensive growth of *Racomitirum macounii* subsp. *alpinum* and strong growth of range of lakeshore specialists.
Damage noted: None apparent, but vulnerable to dislodgement.

Photo:

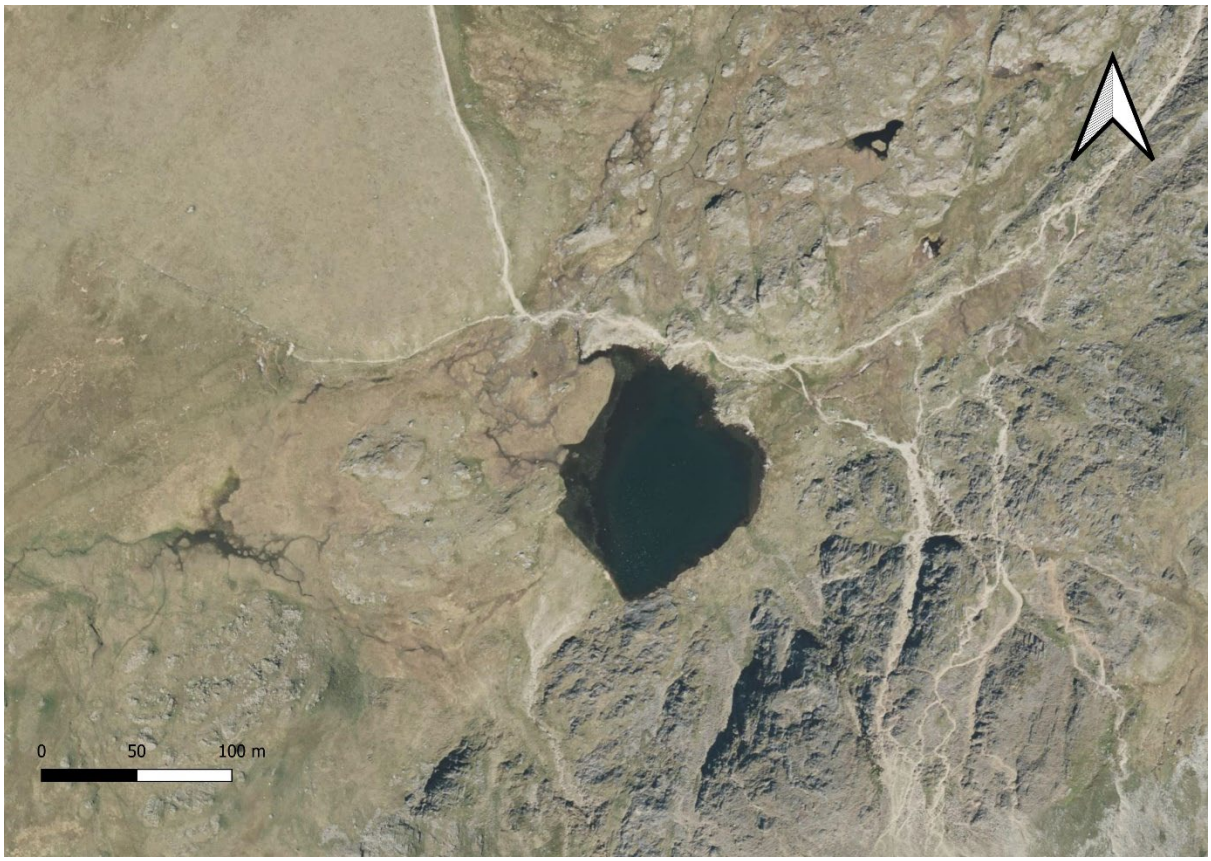
Site: Llyn Bochlwyd
Boulder number: 10
Grid reference: SH6540659282
Species present: ***Racomitrium macounii* subsp. *alpinum***, *Racomitrium heterostichum, Racomitrium fasciculare, Racomitrium aciculare, Andreaea rothii, Campylopus atrovirens, Bryum alpinum, Hypnum cupressiforme*
Description: Large boulder covered with moss, *Racomitirum macounii* subsp. *alpinum* forming mats around boulder, with smaller patches mixed with other *Racomitrium* species on top.
Damage noted: No damage apparent at present.

Photo:

Site: Llyn Bochlwyd
Boulder number: 11
Grid reference: SH6537459299
Species present: ***Hedwigia striata, Grimmia anomala***, *Racomitrium aciculare, Racomitrium fasciculare, Andreaea rothii, Hypnum cupressiforme, Andreaea rupestris*
Description: Small boulder 1m offshore, *Hedwigia striata* occupying much of top of boulder, one cushion of *Grimmia anomola* on top of boulder to left of *Hedwigia striata* patch.
Damage noted: Large part of moss mat with *Hedwigia striata* missing, vulnerable to further erosion.

Photo:

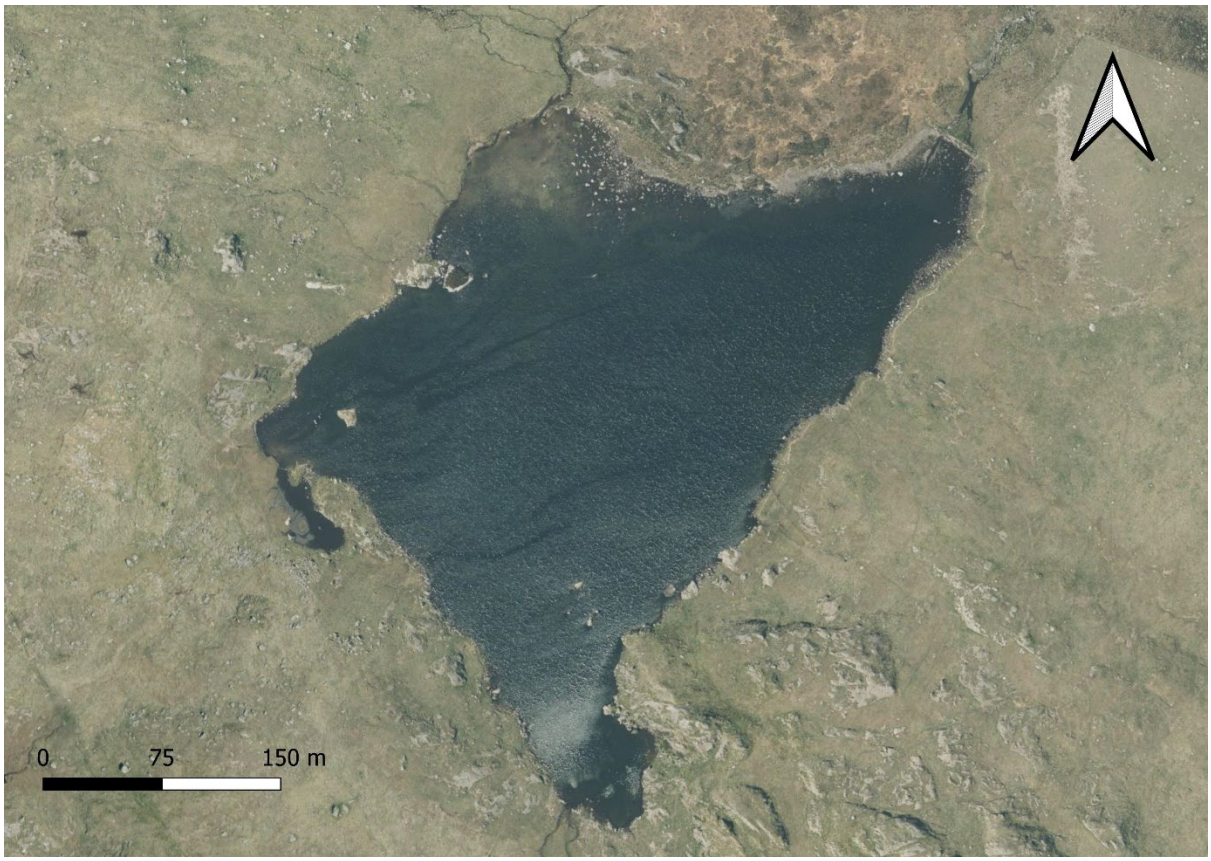
9.1.9. Llyn y Cwn



Scale: 1:5000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Racomitrium macounii* subsp. *alpinum, Grimmia funalis, Grimmia ramondii*

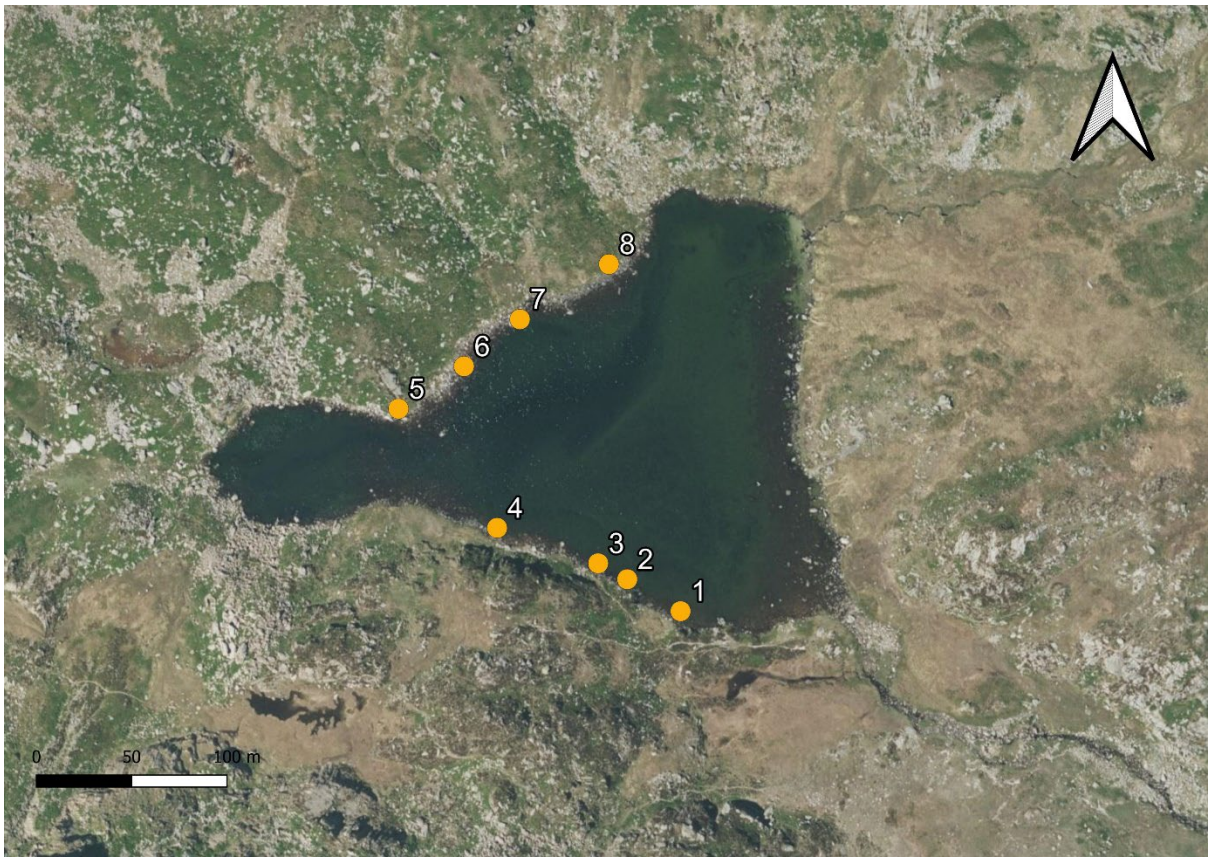
9.1.10. Llyn Cwmffynnon



Scale: 1:6000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Grimmia anomala, Odontoschisma elongatum, Racomitrium macounii* subsp. *alpinum, Grimmia muehlenbeckii, Grimmia ramondii*

9.1.11. Ffynnon Lloer



Yellow dots: important boulders, see below for details. Scale: 1:4000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Hedwigia striata, Pterigynandrum filiforme, Bryum muehlenbeckii, Antitrichia curtipendula, Grimmia funalis, Grimmia hartmanii, Grimmia ramondii, Isothecium holtii, Porella cordaeana, Grimmia incurva, Gymnomitrion adustum*

The following species were recorded from the shore of Ffynnon Lloer on the 09/09/2024. Notable species are highlighted in **bold**:

Andreaea hookeri
Andreaea rupestris
Antitrichia curtipendula
Bryum alpinum
Bryum capillare
Bryum muehlenbeckii
Bryum pseudotriquetrum
Calliergonella cuspidata
Campylopus atrovirens
Campylopus flexuosus
Chionoloma cylindrotheca
Chionoloma tenuirostre
Climacium dendroides
Ctenidium molluscum
Dicranum scoparium
Diplophyllum albicans
Fissidens taxifolius
Fontinalis antipyretica var*. antipyretica*
Frullania tamarisci
Grimmia funalis
Grimmia hartmanii
Grimmia ramondii
Gymnomitrion crenulatum
Hedwigia stellata
Hedwigia striata
Hygrohypnella ochracea
Hylocomium splendens
Hypnum cupressiforme
Isothecium alopecuroides
Isothecium holtii
Isothecium myosuroides
Lejeunea lamacerina
Lophozia ventricosa
Marsupella aquatica
Negopterium gracile
Orthocaulis atlanticus
Orthocaulis floerkei
Philonotis fontana
Plagiochila porelloides
Plagiochila spinulosa
Pogonatum aloides
Pohlia wahlenbergii var. *wahlenbergii*
Polytrichum commune
Polytrichum piliferum
Porella cordaeana
Pterigynandrum filiforme
Racomitrium aciculare
Racomitrium fasciculare
Racomitrium lanuginosum
Racomitrium obtusum
Racomitrium sudeticum
Radula cf*. lindenbergiana*
Rhizomnium punctatum
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Sanionia uncinata
Scapania compacta
Scapania undulata
Sciuro-hypnum plumosum
Sphagnum auriculatum
Sphagnum palustre
Sphagnum subnitens subsp*. subnitens*
Thamnobryum alopecurum
Thuidium tamariscinum

Boulders:

Site: Ffynnon Lloer
Boulder number: 1
Grid reference: SH6628262028
Species present: ***Hedwigia striata, Bryum muehlenbeckii****, Hypnum cupressiforme, Sciuro-hypnum plumosum, Racomitrium aciculare, Fontinalis antipyretica, Bryum capillare, Plagiochila porelloides*
Description: Six patches of *Hedwigia striata* at landward end of Boulder, small patch of *Bryum muehlenbeckii* near water on right-hand side.
Damage noted: Some moss mats partially dislodged, but only common species and minor. Much alga in water around base.

Photo:

Site: Ffynnon Lloer
Boulder number: 2
Grid reference: SH6626062042
Species present: ***Hedwigia striata***, ***Bryum muehlenbeckii***, *Isothecium holtii, Isothecium myosuroides, Bryum capillare, Thamnobryum alopecuroides, Hygrohypnella ochracea, Hypnum cupressiforme, Racomitrium obtusum, Scapania compacta, Dicranum scoparium, Fontinalis antipyretica, Chionoloma tenuirostre, Orthocaulis floerkei*
Description: Outcropping rock into lake, with two lobes, two patches of *Hedwigia striata* on left rock and scattered shoots on right rock, strong patch of *Bryum muehlenbeckii* on right-hand rock.
Damage noted: Large part of moss mat on left rock appears to have detached, including some *Hedwigia striata*, possibly caused by human activity. Algal gunk over *Hedwigia striata* on right-hand rock.

Photo:

Site: Ffynnon Lloer
Boulder number: 3
Grid reference: SH6624862049
Species present: ***Hedwigia striata***, ***Antitrichia curtipendula***, ***Grimmia hartmanii***, *Negopterium gracile, Hedwigia stellata, Hypnum cupressiforme, Racomitrium aciculare, Rhytidiadelphus squarrosus, Sciuro-hypnum plumosum, Chionoloma tenuirostre, Thamnobryum alopecuroides, Plagiochila porelloides, Lejeunea lamacerina*
Description: Boulder jutting diagonally into lake, large patch of *Antitrichia curtipendula* on top, with *Grimmia hartmanii* on top on lakeward side, scattered shoots of *Hedwigia striata* away from lake.
Damage noted: Signs of erosion of moss and displacement of mat on side of boulder away from lake.

Photo:

Site: Ffynnon Lloer
Boulder number: 4
Grid reference: SH6620662065
Species present: ***Hedwigia striata***, ***Bryum muehlenbeckii***, *Hypnum cupressiforme, Racomitrium aciculare, Chionoloma tenuirostre, Sciuro-hypnum plumosum, Racomitrium obtusum, Bryum capillare*
Description: Square boulder just beside shore, 4 patches of *Hedwigia striata* on landward side of rock, one patch of *Bryum muehlenbeckii* on right-hand side near water and on small rock and larger boulder to right.
Damage noted: Minor signs of dislodgement of moss mat and algal gunk on *Hedwigia striata* in places.

Photo:

Site: Ffynnon Lloer
Boulder number: 5
Grid reference: SH6616662116
Species present: ***Hedwigia striata***, ***Bryum muehlenbeckii***, *Negopterium gracile, Racomitrium obtusum, Hypnum cupressiforme, Hedwigia stellata, Grimmia ramondii, Racomitrium aciculare, Bryum capillare, Isothecium holtii, Sciuro-hypnum plumosum*
Description: Long boulder stretching away from shore, two patches of *Hedwigia striata* on top towards lake, cushion of *Bryum muehlenbeckii* on right-hand side near shore.
Damage noted: Signs of dislodgement of moss mat towards end of boulder.

Photo:

Site: Ffynnon Lloer
Boulder number: 6
Grid reference: SH6619462133
Species present: ***Antitrichia curtipendula***, ***Bryum muehlenbeckii***, *Racomitrium obtusum, Hypnum cupressiforme, Thuidium tamariscinum, Sciuro-hypnum plumosum, Hylocomium splendens, Bryum pseudotriquetrum, Racomitrium aciculare, Fontinalis antipyretica, Chionoloma tenuirostre, Scapania undulata, Ctenidium molluscum*
Description: Boulder just offshore, well vegetated and capped with large dense patch of *Antitrichia curtipendula*. Four patches of *Bryum muehlenbeckii* on left-hand side near water.
Damage noted: No significant damage.

Photo:

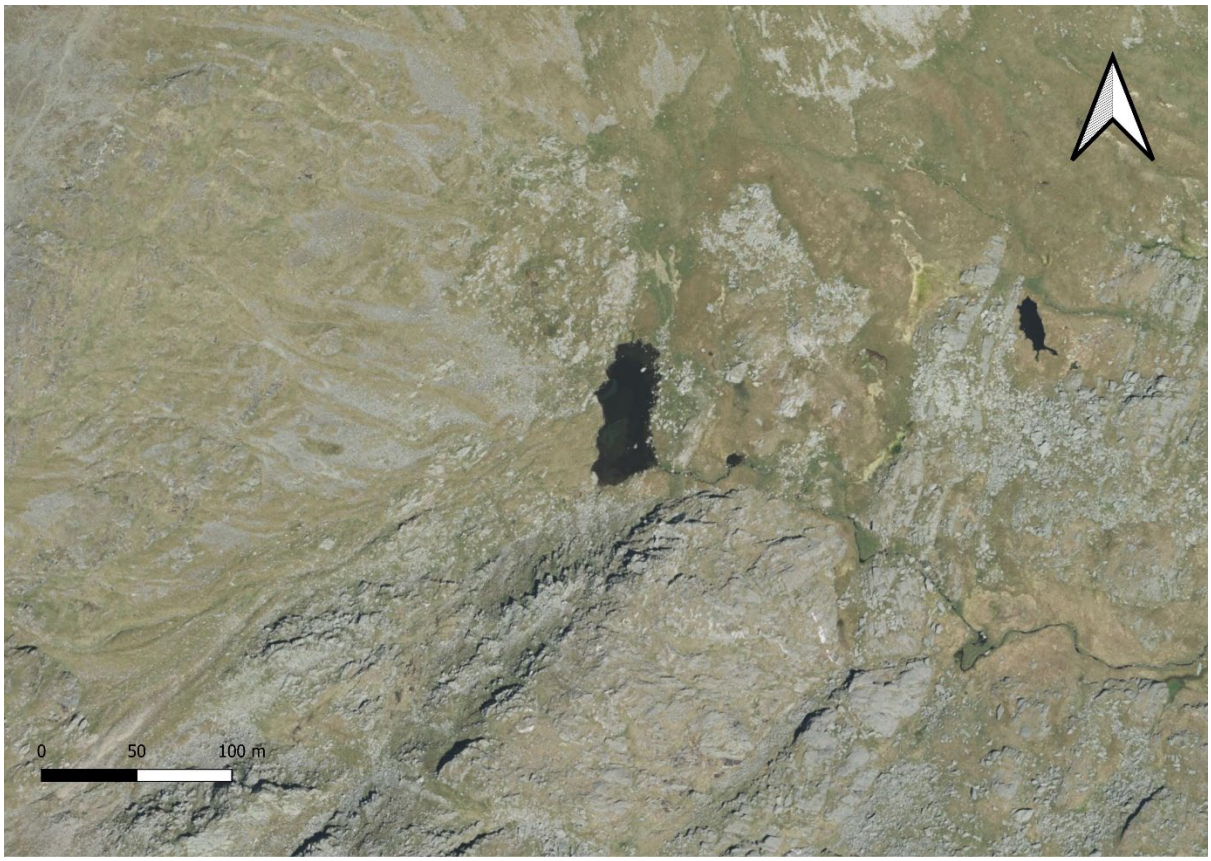
Site: Ffynnon Lloer
Boulder number: 7
Grid reference: SH6621862152
Species present: ***Pterigynandrum filiforme***, ***Hedwigia striata***, *Negopterium gracile, Hypnum cupressiforme, Frullania tamarisci, Dicranum scoparium, Isothecium holtii, Isothecium myosuroides, Bryum capillare, Sciuro-hypnum plumosum, Racomitrium obtusum, Racomitrium lanuginosum, Racomitrium aciculare, Hedwigia stellata*
Description: Long, narrow boulder 3m from shore, *Pterigynandrum filiforme* forming three patches on lakeward side near top, three patches of *Hedwigia striata* scattered along top.
Damage noted: Some signs of dislodgement of moss, including some possible loss of *Pterigynandrum filiforme*, left hand patch unhealthy.

Photo:

Site: Ffynnon Lloer
Boulder number: 8
Grid reference: SH6625662174
Species present: ***Hedwigia striata***, *Hypnum cupressiforme, Racomitrium aciculare, Orthocaulis atlanticus*
Description: Relatively small boulder 1m from shore, with large patch of *Hedwigia striata* at end closest to shore. Also on three other boulders to left.
Damage noted: Part of moss mat dislodged.

Photo:

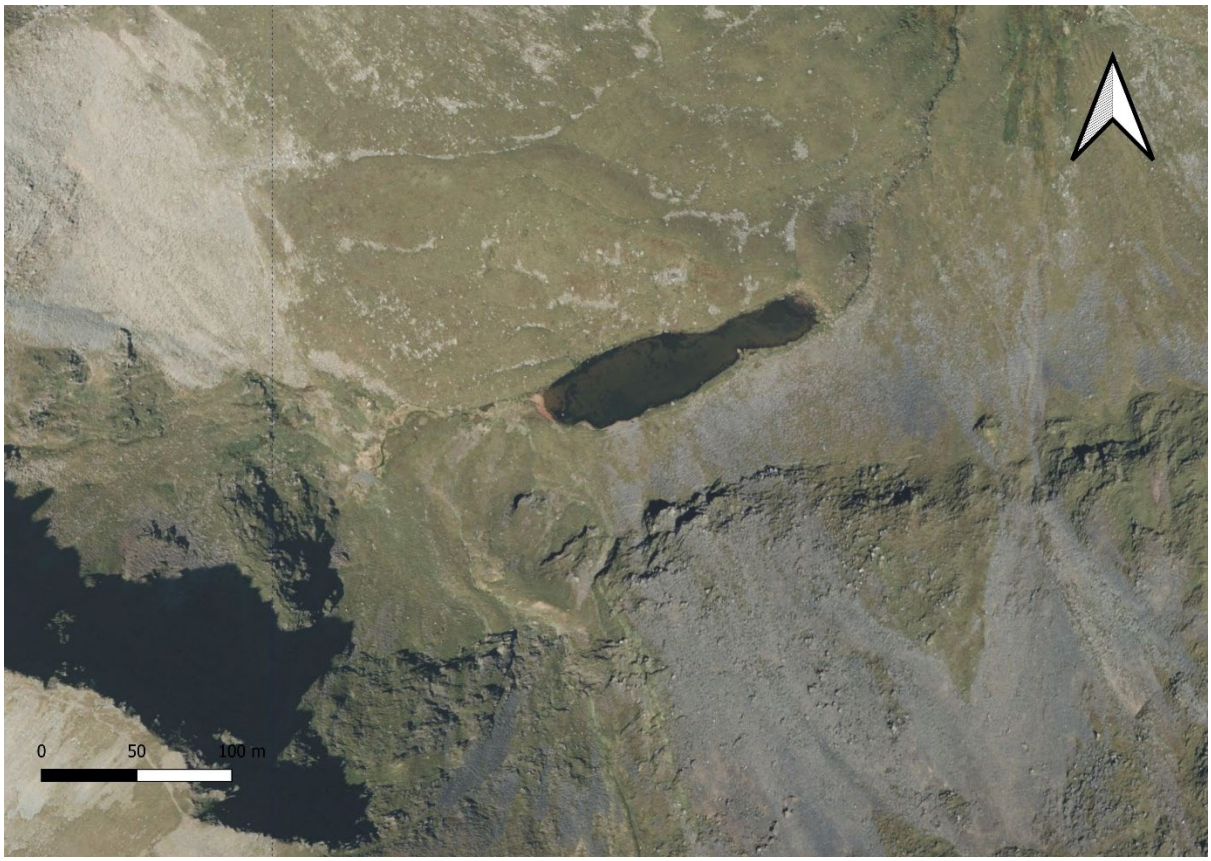
9.1.12. Ffynnon Llyffant



Scale: 1:5000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: *Bryum muehlenbeckii, Grimmia ramondii, Philonotis seriata*

9.1.13. Ffynnon Caseg



Scale: 1:5000. Basemap from Bing Maps © 2025 TomTom, Microsoft.

Notable species: No previous records exist

9.2. Appendix 2: Locations of notable bryophytes recorded during 2024 survey. Details of the abundance of each species at each location are contained separately in Appendix S1.

Species	Lake	Grid reference
Amphidium lapponicum	Glaslyn	SH6176854489
Amphidium lapponicum	Glaslyn	SH6148754467
Amphidium lapponicum	Glaslyn	SH6155754673
Amphidium lapponicum	Llyn Du'r Arddu	SH6013255704
Antitrichia curtipendula	Ffynnon Lloer	SH6624862049
Antitrichia curtipendula	Ffynnon Lloer	SH6612862069
Antitrichia curtipendula	Ffynnon Lloer	SH6609262104
Antitrichia curtipendula	Ffynnon Lloer	SH6610262115
Antitrichia curtipendula	Ffynnon Lloer	SH6619462133
Antitrichia curtipendula	Ffynnon Lloer	SH6620162148
Antitrichia curtipendula	Ffynnon Lloer	SH6621862152
Antitrichia curtipendula	Ffynnon Lloer	SH6626562181
Antitrichia curtipendula	Ffynnon Lloer	SH6630062207
Antitrichia curtipendula	Ffynnon Lloer	SH6633962198
Antitrichia curtipendula	Llyn Coch	SH5984054511
Antitrichia curtipendula	Llyn Coch	SH5984954507
Antitrichia curtipendula	Llyn Coch	SH5992254496
Antitrichia curtipendula	Llyn Coch	SH5990054460
Antitrichia curtipendula	Llyn Coch	SH5979354443
Antitrichia curtipendula	Llyn Glas Cwm Clogwyn	SH6006454630
Bryum muehlenbeckii	Ffynnon Lloer	SH6636262026
Bryum muehlenbeckii	Ffynnon Lloer	SH6635362032
Bryum muehlenbeckii	Ffynnon Lloer	SH6630862026
Bryum muehlenbeckii	Ffynnon Lloer	SH6628262028
Bryum muehlenbeckii	Ffynnon Lloer	SH6626062042
Bryum muehlenbeckii	Ffynnon Lloer	SH6622462057
Bryum muehlenbeckii	Ffynnon Lloer	SH6620662065
Bryum muehlenbeckii	Ffynnon Lloer	SH6614262071
Bryum muehlenbeckii	Ffynnon Lloer	SH6609362093
Bryum muehlenbeckii	Ffynnon Lloer	SH6608762102
Bryum muehlenbeckii	Ffynnon Lloer	SH6610062114
Bryum muehlenbeckii	Ffynnon Lloer	SH6612162122
Bryum muehlenbeckii	Ffynnon Lloer	SH6614162124
Bryum muehlenbeckii	Ffynnon Lloer	SH6615162120
Bryum muehlenbeckii	Ffynnon Lloer	SH6616662116
Bryum muehlenbeckii	Ffynnon Lloer	SH6619062127
Bryum muehlenbeckii	Ffynnon Lloer	SH6619462133
Bryum muehlenbeckii	Ffynnon Lloer	SH6620162148
Bryum muehlenbeckii	Ffynnon Lloer	SH6621862152
Bryum muehlenbeckii	Ffynnon Lloer	SH6623862164

Species	Lake	Grid reference
Bryum muehlenbeckii	Ffynnon Lloer	SH6627162185
Bryum muehlenbeckii	Ffynnon Lloer	SH6630062207
Bryum muehlenbeckii	Ffynnon Lloer	SH6633962198
Bryum muehlenbeckii	Ffynnon Lloer	SH6634362167
Bryum muehlenbeckii	Ffynnon Lloer	SH6633762128
Bryum riparum	Llyn Bochlwyd	SH6555759421
Ditrichum zonatum	Glaslyn	SH6186554538
Ditrichum zonatum	Glaslyn	SH6176854489
Ditrichum zonatum	Glaslyn	SH6173254464
Ditrichum zonatum	Glaslyn	SH6170054441
Grimmia anomala	Llyn Bochlwyd	SH6537459299
Grimmia funalis	Llyn Bochlwyd	SH6554559412
Grimmia funalis	Llyn Bochlwyd	SH6546959388
Grimmia hartmanii	Ffynnon Lloer	SH6624862049
Grimmia hartmanii	Ffynnon Lloer	SH6627162185
Grimmia incurva	Llyn Du'r Arddu	SH5997955709
Gymnomitrion adustum	Glaslyn	SH6180854715
Gymnomitrion adustum	Glaslyn	SH6193054593
Gymnomitrion adustum	Llyn Du'r Arddu	SH6002755792
Hedwigia striata	Ffynnon Lloer	SH6628262028
Hedwigia striata	Ffynnon Lloer	SH6626062042
Hedwigia striata	Ffynnon Lloer	SH6624862049
Hedwigia striata	Ffynnon Lloer	SH6620662065
Hedwigia striata	Ffynnon Lloer	SH6615162073
Hedwigia striata	Ffynnon Lloer	SH6616662116
Hedwigia striata	Ffynnon Lloer	SH6621862152
Hedwigia striata	Ffynnon Lloer	SH6625662174
Hedwigia striata	Ffynnon Lloer	SH6626562181
Hedwigia striata	Ffynnon Lloer	SH6630062207
Hedwigia striata	Ffynnon Lloer	SH6634362167
Hedwigia striata	Llyn Bochlwyd	SH6555959312
Hedwigia striata	Llyn Bochlwyd	SH6557259175
Hedwigia striata	Llyn Bochlwyd	SH6537459299
Hedwigia striata	Llyn Coch	SH5984054511
Hedwigia striata	Llyn Coch	SH5990954469
Hedwigia striata	Llyn Glas Cwm Clogwyn	SH6005254642
Molendoa warburgii	Llyn Du'r Arddu	SH6006255675
Odontoschisma elongatum	Llyn Du'r Arddu	SH6016455767
Porella cordaeana	Ffynnon Lloer	SH6630862026
Porella cordaeana	Llyn Coch	SH5990654493
Porella cordaeana	Llyn Coch	SH5990954469
Pterigynandrum filiforme	Ffynnon Lloer	SH6621862152
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6554559412
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6555459413
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6556959406

Species	Lake	Grid reference
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6557259394
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6558059378
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6558559353
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6558959311
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6557459308
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6555959312
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6554259304
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6553259295
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6552059284
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6551159272
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6552559249
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6553359233
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6554759225
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6556559217
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6558059208
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6559459189
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6558759181
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6557259175
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6555159154
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6560659134
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6559159128
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6557559118
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6556459110
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6555759093
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6553759080
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6552859079
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6550059096
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6549159104
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6547359117
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6546159121
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6545159136
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6544559148
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6543659167
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6542759172
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6540159209
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6541359210
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6542559222
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6542959236
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6542359244
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6541359252
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6541559269
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6540659282
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6538859277
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6536659290
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6537659306

Species	Lake	Grid reference
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6541559341
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6543559366
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6544159378
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6546959388
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6550059393
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6551859397
Racomitrium macounii subsp. *alpinum*	Llyn Bochlwyd	SH6552759402
Racomitrium macounii subsp. *alpinum*	Llyn Nadroedd	SH5945554354
Racomitrium macounii subsp. *alpinum*	Llyn Nadroedd	SH5949454357
Racomitrium macounii subsp. *alpinum*	Llyn Nadroedd	SH5951654363
Racomitrium macounii subsp. *alpinum*	Llyn Nadroedd	SH5952754367
Racomitrium macounii subsp. *alpinum*	Llyn Nadroedd	SH5953954370
Racomitrium macounii subsp. *alpinum*	Llyn Nadroedd	SH5955054361
Racomitrium macounii subsp. *alpinum*	Llyn Nadroedd	SH5956054351
Racomitrium macounii subsp. *alpinum*	Llyn Nadroedd	SH5957054342
Schistidium confertum	Glaslyn	SH6191654566
Schistidium confertum	Glaslyn	SH6171254691
Schistidium frigidum var. *frigidum*	Glaslyn	SH6193254576
Schistidium frigidum var. *frigidum*	Glaslyn	SH6192554573
Schistidium frigidum var. *frigidum*	Glaslyn	SH6190654565
Schistidium frigidum var. *frigidum*	Glaslyn	SH6186554538
Schistidium frigidum var. *frigidum*	Glaslyn	SH6185754532
Schistidium frigidum var. *frigidum*	Glaslyn	SH6185254523
Schistidium frigidum var. *frigidum*	Glaslyn	SH6183554521
Schistidium frigidum var. *frigidum*	Glaslyn	SH6182554516
Schistidium frigidum var. *frigidum*	Glaslyn	SH6181554511
Schistidium frigidum var. *frigidum*	Glaslyn	SH6180054504
Schistidium frigidum var. *frigidum*	Glaslyn	SH6178954501
Schistidium frigidum var. *frigidum*	Glaslyn	SH6177954496
Schistidium frigidum var. *frigidum*	Glaslyn	SH6176154480
Schistidium frigidum var. *frigidum*	Glaslyn	SH6174754476
Schistidium frigidum var. *frigidum*	Glaslyn	SH6173254464
Schistidium frigidum var. *frigidum*	Glaslyn	SH6171954444
Schistidium frigidum var. *frigidum*	Glaslyn	SH6170054441
Schistidium frigidum var. *frigidum*	Glaslyn	SH6168554437
Schistidium frigidum var. *frigidum*	Glaslyn	SH6167054443
Schistidium frigidum var. *frigidum*	Glaslyn	SH6164554443
Schistidium frigidum var. *frigidum*	Glaslyn	SH6162654436
Schistidium frigidum var. *frigidum*	Glaslyn	SH6160454437
Schistidium frigidum var. *frigidum*	Glaslyn	SH6156954438
Schistidium frigidum var. *frigidum*	Glaslyn	SH6153154446
Schistidium frigidum var. *frigidum*	Glaslyn	SH6148754467
Schistidium frigidum var. *frigidum*	Glaslyn	SH6147554485
Schistidium frigidum var. *frigidum*	Glaslyn	SH6147054493
Schistidium frigidum var. *frigidum*	Glaslyn	SH6147054493

Species	Lake	Grid reference
Schistidium frigidum var. *frigidum*	Glaslyn	SH6145854506
Schistidium frigidum var. *frigidum*	Glaslyn	SH6145354512
Schistidium frigidum var. *frigidum*	Glaslyn	SH6145254534
Schistidium frigidum var. *frigidum*	Glaslyn	SH6145454563
Schistidium frigidum var. *frigidum*	Glaslyn	SH6146954585
Schistidium frigidum var. *frigidum*	Glaslyn	SH6148354601
Schistidium frigidum var. *frigidum*	Glaslyn	SH6152254639
Schistidium frigidum var. *frigidum*	Glaslyn	SH6154854663
Schistidium frigidum var. *frigidum*	Glaslyn	SH6155754673
Schistidium frigidum var. *frigidum*	Glaslyn	SH6157754683
Schistidium frigidum var. *frigidum*	Glaslyn	SH6163754684
Schistidium frigidum var. *frigidum*	Glaslyn	SH6164854682
Schistidium frigidum var. *frigidum*	Glaslyn	SH6166354674
Schistidium frigidum var. *frigidum*	Glaslyn	SH6166954668
Schistidium frigidum var. *frigidum*	Glaslyn	SH6169154676
Schistidium frigidum var. *frigidum*	Glaslyn	SH6170454677
Schistidium frigidum var. *frigidum*	Glaslyn	SH6181254721
Schistidium frigidum var. *frigidum*	Glaslyn	SH6180054703
Schistidium frigidum var. *frigidum*	Glaslyn	SH6179754686
Schistidium frigidum var. *frigidum*	Glaslyn	SH6179654681
Schistidium frigidum var. *frigidum*	Glaslyn	SH6180354665
Schistidium frigidum var. *frigidum*	Glaslyn	SH6181354661
Schistidium frigidum var. *frigidum*	Glaslyn	SH6183254649
Schistidium frigidum var. *frigidum*	Glaslyn	SH6185154632
Schistidium frigidum var. *frigidum*	Glaslyn	SH6189454608
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH5997455765
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH5998855771
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH5999355775
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6005455804
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6018055731
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6015655722
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6013855712
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6013255704
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6012555700
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6011955698
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6011655697
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6010355686
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6008755674
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6007655672
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6007055673
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6005155675
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6003755681
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH6002555680
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH5999155687
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH5998955701

Species	Lake	Grid reference
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH5997655702
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH5997955709
Schistidium frigidum var. *frigidum*	Llyn Du'r Arddu	SH5997155715
Schistidium frigidum var. *havaasii*	Llyn Du'r Arddu	SH6006255675
Ulota hutchinsiae	Llyn Bochlwyd	SH6544859381

10. 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] Records of notable bryophytes and details for montane lakes in Eryri

[C] All bryophyte records collected during the survey

The metadata for this project is held as record no. NRW_DS161348

Further copies of this report are available from library@cyfoethnaturiolcymru.gov.uk