

▷ **Figure 2.** The shoot tips of *Sematophyllum demissum* characteristically curve upwards and away from the main colony mat.
D. A. Callaghan

Sematophyllum demissum in Wales

Des Callaghan reports on the status and conservation of one of our rarest oceanic species



Introduction

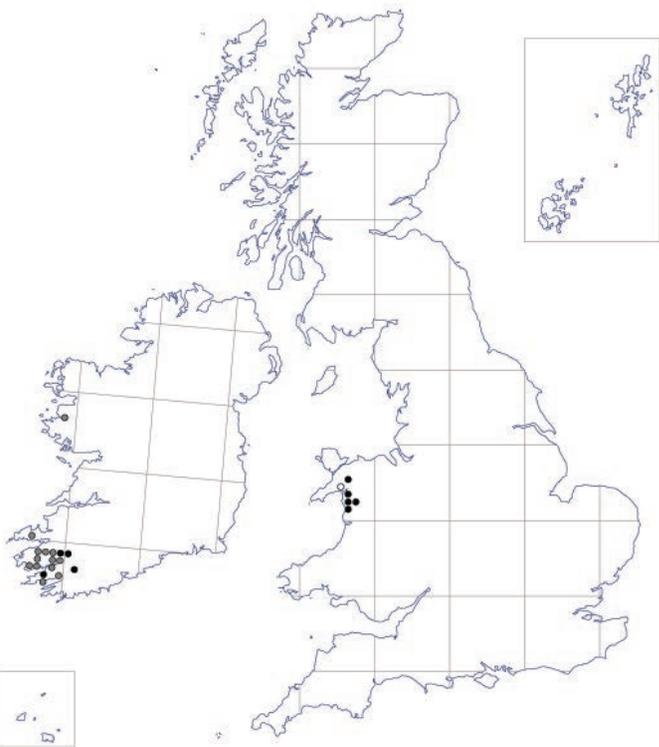
Sematophyllum demissum is a rare plant in the British Isles, confined to Wales (Caernarvonshire and Merionethshire) and SW Ireland (North Kerry, South Kerry, West Galway and West Cork), with a notable absence from Scotland (Fig. 1). In Wales, it is considered a national priority for biodiversity conservation under Section 42 of The Natural Environment and Rural Communities Act 2006 (as amended) and is categorised as ‘Vulnerable’ on the national Red List (Bosanquet & Dines, 2011).

The purpose of the present study is to provide a review of *Sematophyllum demissum* in Wales, with a particular focus on its status and distribution within sites. This is largely based on fieldwork that was undertaken over twelve days, during 24 April, 26 April and 7-16 June 2014, when *S. demissum* was searched for within areas

from which it has or may have been recorded but for which recent information is lacking or incomplete. The sites included Ceunant Llennyrch (SH6639), Coed Gerddi-bluog (SH6129), Cwm Bychan (SH6431), Ganllwyd (SH7224), Garth Gell (SH6819), Hafod Rhisgl (SH6552), Parc Hafod-y-llan (SH6250), Pont Aberglaslyn (SH5946) and Tyn y Groes (SH7323). Sites known to support the species but which have been surveyed by the author recently were not covered, including Coed Crafnant (SH6128; Callaghan, 2014a), Coed Graig Uchaf (SH6426; Callaghan, 2014b) and Coed y Rhygen (SH6836; Callaghan, 2013b).

When the moss was found, a waypoint was logged with a Garmin GPSMAP 62s unit, providing a positional accuracy of about 5-10m in the present survey conditions. At all

Sematophyllum demissum in Wales



△Figure 1. Distribution of *Sematophyllum demissum* in the British Isles. White dots = pre-1950; grey dots = 1950-1989; black dots = 1990-2014.

sites except Ganllwyd, the number of patches present at each waypoint was counted. Also, at a selection of locations information was noted on associated species, habitat and sporophytes, including photographic documentation. Waypoints collected in the field were imported into a GIS system (QGIS) in order to produce grid maps of the distribution of the moss, which at a site-scale followed the method described by Callaghan (2013a).

Identification

Sematophyllum demissum is a slender pleurocarpous moss that forms yellowish to golden green mats which lie flat against the substrate, except for the pointed tips that characteristically turn upwards (Fig. 2). Each patch does not typically extend for more than





<Figure 3, top. A typical mat of *Sematophyllum demissum* illustrating the flat, trailing shoots with up-curved tips. D. A. Callaghan

<Figure 4, bottom. An upper border of dense, short and erect branches is typical of isolated patches of *Sematophyllum demissum*. D. A. Callaghan



about 20 cm, though in favourable conditions some continuous colonies can stretch up to 80 cm or more. The main colonies comprise a mat of trailing, little-branched shoots, each about 5 cm in length (Fig. 3). The draped appearance gives rise to the specific name (*demissum* = cast down). When growing isolated from other mosses, the upper edge of patches often have a border of dense, short and erect branches (Fig. 4). Leaves are straight, acuminate and nerveless. When wet, the leaves are imbricate and when dry they tend to spread at an angle of about 45° from the stem. Capsules are usually present (Fig. 5), which are short and have lids with a long beak, born on a seta that is generally about 1.2 cm long. When dry and dehisced, they are strikingly wide-mouthed. Phenology has not been investigated, but during the present survey in June the vast majority of sporophytes were at the late pin-stage or with capsules freshly expanded, green and with lids intact. A tiny proportion had begun to brown. With regards to look-alike species, some patches of *Hygrohypnum eugyrium* and *Sciurohypnum plumosum* can look surprisingly similar, but under the hand lens the falcate leaves of these species are obvious, contrasting with the straight leaves of *S. demissum*. When hydrated, as is normally the case, patches of *S. demissum* are reasonably straightforward to detect in the field, but when dry the plant takes on a scruffy appearance and can be easily overlooked.



Figure 5. A fresh capsule of *Sematophyllum demissum*, about to begin the first release of spores. D.A. Callaghan

identical to those recorded in Ireland (50-245 m), though more thorough recording would probably reveal an Irish range that was a little wider.

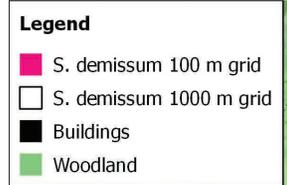
Habitat

Woodland

Sematophyllum demissum is limited to woodland sites in Wales. All are W17 *Quercus petraea* – *Betula pubescens* – *Dicranum majus* woodland, with the exception of Hafod Rhisgl which is W7 *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemorum* woodland. It has been stated that the plant prefers lightly shaded spots (Hill *et al.*, 1994) and whilst it does often occur in such situations, most of the Welsh colonies are beneath mature deciduous woodland canopies, sheltered by trees such as Alder, Ash, Downy Birch, Field Maple, Goat Willow, Hawthorn, Hazel, Sessile Oak and Sycamore. The

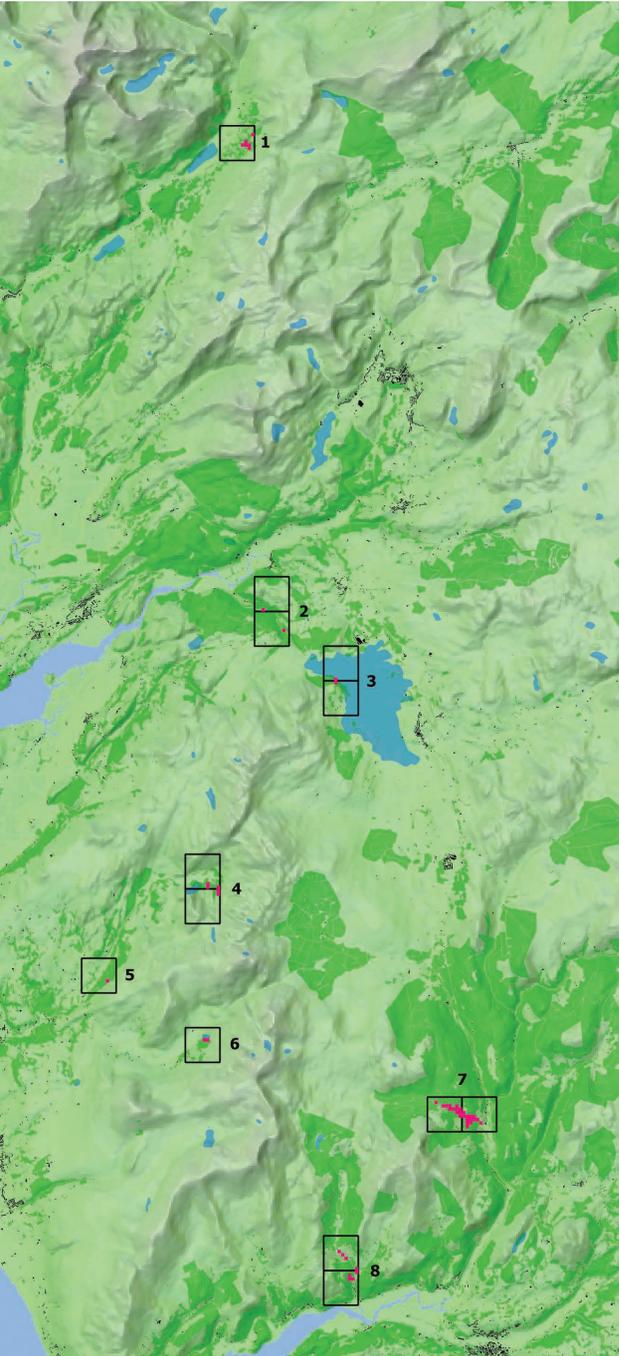
Distribution

The present distribution of *Sematophyllum demissum* in Wales is shown in Fig. 6. It is known from eight sites, of which seven are in valleys scattered around the Rhinog Range and the other is further north within the Snowdon Range. The seven 5 km grid cells in which it presently occurs received an average of 185 raindays yr-1 (range = 169-211) during 1961-2001 (MetOffice data), significantly more than the Welsh average of 162 raindays yr-1 (Fig. 7). This is indicative of its European range, where it is restricted to the wetter and milder oceanic areas and is categorised by Hill & Preston (1998) as ‘Oceanic Temperate’. The plant does not occur at high altitudes in Wales and is restricted to the lowlands and upland fringe. The average elevation of waypoints collected for *S. demissum* during the present survey is 141 m a.s.l. ($n = 296$). The altitudinal limits, from 55 m at Ceunant Llennyrch to 245m at Cwm Bychan, are almost



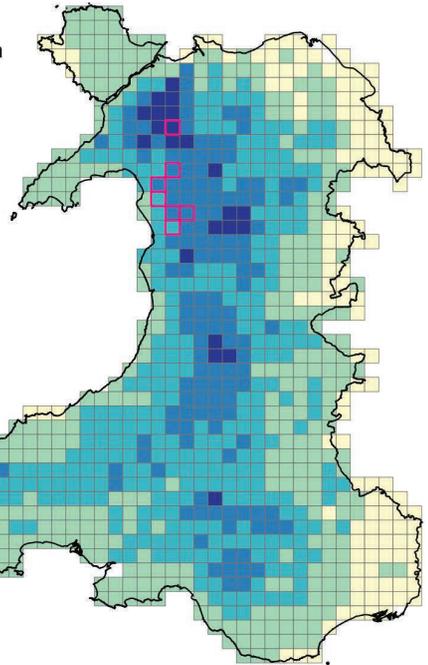
id	Site
1	Hafod Rhisgl
2	Ceunant Llennyrch
3	Coed y Rhygen
4	Cwm Bychan
5	Coed Crafnant
6	Coed Graig Uchaf
7	Ganllwyd
8	Garth Gell

▽ Figure 6. Present known distribution of *Sematophyllum demissum* in Wales.



Legend

- *S. demissum*
- Raindays/year
- 121 - 141
- 142 - 161
- 162 - 181
- 182 - 201
- 202 - 222



△ Figure 7. The average number of raindays per year (1961-2001) across Wales and the location of grid cells presently known to be occupied by *Sematophyllum demissum* (5 km resolution).

only colonies under non-deciduous cover are at Ganllwyd, where a few patches occur under a sub-canopy of Holly with Sessile Oak above. To date, the plant has never been found beneath conifers in Wales, nor has it ever been found out in the open.

Substrate

The substrate occupied by *Sematophyllum demissum* in Wales is almost exclusively natural rock outcrops and boulders. Only two out of several hundred colonies seen by the author grew on anything else; one on the exposed root of a mature Sessile Oak at Ganllwyd and the other on the base of a young Sessile Oak at Ceunant Llennyrch. Around the Rhinog Range, most colonies occupy very hard and coarse greywacke

Table 1. Close associates of *Sematophyllum demissum*.

Species ¹	Samples																						Count
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
<i>Adelanthus decipiens</i>																			x				1
<i>Andreaea rothii</i>			x				x																2
<i>Aphanolejeunea microscopica</i>		x																					1
<i>Campylopus atrovirens</i>					x																		1
<i>Ctenidium molluscum</i>	x							x				x								x			5
<i>Diplophyllum albicans</i>		x													x			x	x				5
<i>Frullania tamarisci</i>			x		x										x								3
<i>Grimmia hartmanii</i>																	x				x		2
<i>Heterocladium heteropterum</i>																					x		1
<i>Hyoconium armoricum</i>						x				x								x					3
<i>Hypnum julandicum</i>										x													1
<i>Isoetium nyoosuroides</i>							x				x	x											4
<i>Lejeunea patens</i>		x						x							x								3
<i>Marsupella emarginata</i>		x																		x			3
<i>Mniium hornum</i>														x								x	1
<i>Pellia epiphylla</i>																		x					1
<i>Plagiothecium undulatum</i>														x									1
<i>Racomitrium aciculare</i>						x													x		x		3
<i>Racomitrium aquaticum</i>		x			x	x																	3
<i>Rhytidiadelphus loreus</i>												x											1
<i>Scapania gracilis</i>					x					x					x				x				5
<i>Scapania nemorea</i>		x											x								x		3
<i>Sciuro-hypnum plumosum</i>			x					x			x											x	4
<i>Thuidium tamariscinum</i>														x		x			x			x	4

¹Bryophytes growing within 1 cm of *S. demissum*

²1-2 = Ceunant Llennyrch; 2-9 = Cwm Bychan; 10-15 = Hafod Rhisgli; 16-20 = Garth Gell; 21-22 = Gantllwyd.





△Figure 8. Greywacke sandstone from the Lower Cambrian Rhinog Formation at Ganllwyd, where it supports hundreds of colonies of *Sematophyllum demissum*. The image shows coarse grains of quartz (pale crystals), iron oxide (rusty brown), zones of metamorphic chlorite (green), plus an undetermined purplish mineral (possibly spessartine). D.A. Callaghan

(Fig. 8), largely from the Rhinog Formation but also from other strata (e.g. the Barmouth Formation), and associated granite intrusions. Much less commonly, the moss grows on softer mudstone. Beyond the Harlech Dome, at Hafod Rhisgl, *S. demissum* occurs mainly on tuff from the Lower Rhyolitic Tuff Formation and accompanying granite. Judging by the associated flora, the greywacke, granite and mudstone are generally acidic, whilst the tuff is moderately basic. This is reflected by the bryophyte species that commonly grow in close proximity to the moss (Table 1). Exceptionally, within the mist zone of the largest waterfall at Ganllwyd, a colony was seen on a vein of quartz.

Moisture

The large-scale distribution of *Sematophyllum demissum* indicates that it is a desiccation intolerant moss and this is also reflected by its distribution within sites, being restricted to locations where it remains hydrated most of the time. During a period of warm and dry weather in June semi-desiccated colonies were seen at Ganllwyd and Cwm Bychan, but most colonies observed during the present fieldwork were fully hydrated. A close association with water-courses is almost always evident, ranging from

the neighbourhood of large waterfalls to gently flushed boulder slopes, and including boulders beside turbulent rivers to others beside tiny streamlets. The plants' restriction to cool and sheltered woodland is also likely to be related to increased moisture availability. At all sites, the plant is strictly absent from drier rock faces that are otherwise identical to nearby inhabited and moister rock.

Disturbance

Another key aspect of the niche of *Sematophyllum demissum* is disturbance. Being a slender plant, it is a poor competitor and is easily overgrown by the many robust species that are invariably present nearby. Often, potentially large patches of the moss are made up of a fragmented matrix of smaller patches on otherwise bare rock, giving the impression that past disturbance events prevent the growth of what would otherwise be a continuous colony. The form of disturbance does not appear to be important, as long as it is sufficiently frequent to reduce competition from the more robust species. The most common forms at Welsh sites arise from grazing stock, river spate flows and trampling by visitors. Grazing can be especially important for maintaining open rock faces in woodlands and *S. demissum* clearly benefits in the presence of grazing, even when it is heavy. Indeed, the complete exclusion of grazing from sites, often done for extended periods due to concerns about tree regeneration, is a key threat to this plant since its open rock faces become blanketed within just a few years by coarser vegetation, such as *Rhytidiadelphus loreus*.

At its streamside and riverside locations, the moss is often associated with the surfaces of large boulders and rock outcrops located in the upper spate zone, where disturbance during the highest water levels clears the rocks of larger competitors (Fig. 9). *S. demissum* is never found low down the

bank, within the semi-aquatic zone, presumably because it finds the more frequent inundation events intolerable. Disturbance from spates can be particularly important for maintaining populations within ungrazed sites. Likewise, trampling and abrasion from visitors along rocky footpaths can be a significant benefit, particularly where these cross water-courses, which is a factor that is especially evident at Ganllwyd (Fig. 10). Occasionally, colonies of *S. demissum* can be found on steeply sloping rock surfaces that are not subject to disturbance from people, spate flows or livestock. Presumably, in these situations the larger competitors are kept at bay by gravity and disturbance from foraging woodland birds.

Unknown factors

The above habitat characteristics are not especially uncommon in NW Wales, yet *S. demissum* is a rare plant. Indeed, it is curiously absent from many seemingly suitable sites. For example, it does not occur within the Afon Las catchment at Ganllwyd, which appears to offer plenty of suitable habitat and is just 500 m from the very large population along the Afon Gamlan. Dispersal cannot be a factor, since colonies are commonly seen with mature and dehisced capsules. It appears that there are some important factors that limit the plant's distribution and which we do not yet understand.

Sites and conservation

Table 2 includes counts of the number of patches of the moss and the number of occupied 10 m grid cells at each site. The patch-counts are often somewhat subjective and are not a robust measure of abundance. This is because it is often impossible to decide objectively what should be counted as a discrete patch, and of course individual patches vary greatly in size. Nonetheless, they provide some additional

and useful information. Table 3 provides an assessment of the coverage of *S. demissum* within statutory protected sites. An example of a site-based grid map is shown in Fig. 11. These were produced for all sites as part of the work for the present survey and are available from the author upon request.

Ceunant Llennyrch

Sematophyllum demissum was first recorded at Ceunant Llennyrch around 1964 by D.A. Ratcliffe. It was found in three locations during the present survey, one of which is a previously unknown site. All are within the Coedydd De Dyffryn Maentwrog SSSI and Meirionnydd Oakwoods SAC, but none are within the official boundary of Ceunant Llennyrch NNR. Colonies have disappeared from at least three other locations along Ceunant Llennyrch in recent years due to over-growth by more competitive species, such as *Sciuro-hypnum plumosum* (D. Oliver pers. comm.). This may be part of the normal patch dynamics within the site or it may be indicative of a more general long-term decline. The plant has almost certainly declined at this site in the past, particularly following the construction of the enormous 30 MW hydro-electric dam on the Afon Prysor in the 1920s and the subsequent exclusion of grazing from most of the site in the 1950s. Grazing has been reintroduced recently, though as yet the stock has not made its way down the slopes and into the ravine areas occupied by *S. demissum*. Once they do, habitat for the moss ought to improve, particularly along flushes and small streams that run down the steep valley sides. In recent years canyoning has become a popular activity at Ceunant Llennyrch and the associated disturbance may, at least in part, be beneficial for *S. demissum*. This seems to be the case at the largest population of the moss within the site, where about 35 patches

Table 2. Presence and abundance of *Sematophyllum demissum* at sites in Wales

Site	GR	First Record	Last Record	No. of patches	OS 10 m grid cells ¹		Data source
					n	%	
Ceunant Llennyrch	SH6639	c.1964	2014	38	4	2	Present survey
Coed Crafnant	SH6128	2014	2014	1	1	0.5	Callaghan (2014b)
Coed Gerddi-bluog	SH6129	1971?	1971?	0	0	0	Present survey
Coed Graig Uchaf	SH6426	2014	2014	2	2	1	Callaghan (2014a)
Coed y Rhygen	SH6836	c.1964	2013	2	2	1	Callaghan (2013b)
Cwm Bychan	SH6431	1902	2014	9	8	4	Present survey
Ganllwyd	SH7224	1884	2014	250-500	145	68	Present survey
Garth Gell	SH6819	1991	2014	26	13	6	Present survey
Hafod Rhisgl	SH6552	1988	2014	52	38	18	Present survey
Parc Hafod-y-llan	SH6250	1981?	1981?	0	0	0	Present survey
Pont Aberglaslyn	SH5946	1830	1830	0	0	0	Present survey
Tyn y Groes	SH7323	1903	1924	0	0	0	Present survey

¹Count and proportion of the number of occupied OS 10 x 10 m grid cells

Table 3. Coverage of *Sematophyllum demissum* within statutory protected sites in Wales

Site	OS 10 m grid cells ¹				Total protected	Proportion protected	Protected areas	SSSI feature ¹
	Total	SSSI	SAC	NNR				
Ceunant Llennyrch	4	4	4	0	4	100%	Coedydd De Dyffryn Maentwrog SSSI; Meirionnydd Oakwoods SAC	Yes
Coed Crafnant	1	1	1	0	1	100%	Rhinog SSSI; Meirionnydd Oakwoods SAC	No
Coed Graig Uchaf	2	2	2	0	2	100%	Coed Graig Uchaf SSSI; Meirionnydd Oakwoods SAC	No
Coed y Rhygen	2	2	2	2	2	100%	Coed y Rhygen SSSI; Coed y Rhygen NNR; Meirionnydd Oakwoods SAC	No
Cwm Bychan	8	8	8	0	8	100%	Rhinog SSSI; Meirionnydd Oakwoods SAC	No
Ganllwyd	145	143	143	83	143	99%	Ganllwyd SSSI; Coed Ganllwyd NNR; Meirionnydd Oakwoods SAC	Yes
Garth Gell	13	0	6	0	6	46%	Meirionnydd Oakwoods SAC	n/a
Hafod Rhisgl	38	38	0	0	38	100%	Coedydd Nantgwynant SSSI	Yes
TOTAL	213	198	162	85	200	94%		

¹The total number of occupied 10 m grid cells at each site is presented, together with the number and proportion within statutory protected sites.

²Yes = *S. demissum* mentioned on SSSI citation.



△ Figure 9. Location of *Sematophyllum demissum* colonies on a large boulder beside the Afon Cwm-mynach. Without the regular scouring disturbance caused by spate flows, this boulder would be over-grown by coarser vegetation and *S. demissum* would be absent. D.A. Callaghan

are scattered on a large rock exposure at a pinch-point kept clear of robust species by visitor passage. This activity would also be a potential threat if visitor pressure becomes too heavy and some fencing has been installed in order to try to protect the main population from excessive disturbance, apparently successfully. Regular consultation is also undertaken with canyoning groups and associated information boards have been installed at key locations.

Coed Crafnant

Sematophyllum demissum was recently discovered at Coed Crafnant (Callaghan, 2014a), where the population is limited to a single patch on a boulder beside the main stream that runs along the southern boundary of the site, adjacent to Coed Dolbebin. The site is protected within Rhinog SSSI and Meirionnydd Oakwoods SAC, and is managed as a nature reserve by The North Wales Wildlife Trust. This wood is grazed by feral goats, something which, in the short-term at least, is beneficial to *S. demissum*. Control of the goats is underway, due to concerns about tree regeneration, but there appears to be no intention to completely eliminate them from the site. If the site did become ungrazed, this tiny and isolated population of *S. demissum* may soon be lost. There are no known hydro-electric

schemes proposed along the stream and it seems an unlikely location for such.

Coed Gerddi-bluog

Whether *Sematophyllum demissum* was ever recorded at Coed Gerddi-bluog is not entirely certain. The only record is from 'Coed Crafnant, NW wood' in August 1971 by F. Rose. The associated coordinates (SH617297) put this firmly within Coed Gerddi-bluog, which is labelled as 'Coed Crafnant' on the OS 1:50,000 scale map and, indeed, is the north-west woodland of a small group of woods indicated as Coed Crafnant on that map. However, a search of Coed Gerddi-bluog during the present survey showed that whilst it is a sheep-grazed, boulder-strewn oak wood, it is rather dry, having only one minor stream and no areas of flushing. For this reason, it seemed an unlikely site for *S. demissum*, though significant changes may have occurred during the intervening years.

Coed Graig Uchaf

Sematophyllum demissum was recently discovered at Coed Graig Uchaf (Callaghan, 2014b), where the population is very small and limited to two streamside boulders. The site is protected within Coed Graig Uchaf SSSI and Meirionnydd Oakwoods SAC. Attempts to exclude grazing



◀Figure 10. A large greywacke boulder at a waterfall viewing point at Ganllwyd, supporting strong patches of *Sematophyllum demissum*. Abrasion by visitors keeps the boulder clear of competition, which would otherwise, in this ungrazed area, soon be cloaked in coarse vegetation.
D.A. Callaghan

from the site have been made, presumably due to concerns about tree regeneration, but fortunately small numbers of feral goats and sheep find their way into the site and provide light grazing pressure. If the site became ungrazed, this very small population of *S. demissum* may soon be lost. There are no known hydro-electric proposals along the streams and it appears as though they would be of very marginal interest for such.

Coed y Rhygen

Sematophyllum demissum was first recorded at Coed y Rhygen around 1964 by D.A. Ratcliffe. It was present 'in scattered situations' in the 1970s, but Newton (1997) found only a single, tiny colony after 11 days of survey effort and no further colonies in 2001 after eight days of survey (Newton, 2001). The plant has since gone from the 1997 location, where the rock face is presently dominated by coarse pleurocarpous mosses and bramble. It was found in two new locations during a survey in 2013 (Callaghan, 2013b), albeit in very small quantity. It is very well protected within Coed y Rhygen SSSI, Coed y Rhygen NNR and Meirionnydd Oakwoods SAC. Grazing pressure from sheep has varied over the years from light to heavy depending on the amount of bramble, and was increased at the beginning of 2012. It is likely that *S. demissum* enjoys the periods of heavier grazing. There is no visitor pressure within this site and as yet the moss has not been found along the minor

streams that run through the area. A targeted search for the moss along the water-courses could reveal colonies that have not yet been found. There are no hydro-electric proposals along these small streams and it seems very unlikely that they would ever arise.

Cwm Bychan

Sematophyllum demissum was first recorded at Cwm Bychan in 1902 by D.A. Jones. It had not been seen since 1975 until it was rediscovered during the present survey. Encouragingly, it was found along two stream catchments, though only a small total population comprising nine patches. These are protected within Rhinog SSSI and Meirionnydd Oakwoods SAC. There are no known hydro-electric proposals along these small streams, but such schemes have been installed along similar streams in Wales recently and this area could attract interest.

Ganllwyd

First recorded here by G.A. Holt in 1882, Ganllwyd is the premier site for *Sematophyllum demissum* in Wales, supporting about 68% of the national population (Fig. 11). The moss occurs primarily along the Afon Gamlan and is especially frequent within the humid waterfall area around Rhaeadr Ddu. It was thought that the great bulk of the *S. demissum* population at Ganllwyd was within the NNR boundary, but the present survey shows that about 43% is outside, stretching upstream further than was previously realised, and northwards up a dry stream valley into Coed Hafod-las. The vast majority (99%) of the overall Ganllwyd population is within Ganllwyd SSSI and Meirionnydd Oakwoods SAC, with just a few patches occurring outside on unprotected land. Within the north-east

part of the NNR, across the northern side of the river, heavy grazing by sheep helps to create many open rock faces and this clearly benefits *S. demissum*, though in the long-term the excessive pressure may prevent sufficient tree regeneration to maintain woodland habitat. Most of the woodland is, however, ungrazed and this is clearly detrimental to the moss, with rock faces away from the disturbance of spate flows and visitor pressure buried beneath coarse mosses and other vegetation. The reintroduction of light grazing into these woodland areas would be beneficial. The benefit of disturbance from visitor pressure in maintaining open rock surfaces for *S. demissum* is particularly evident along the popular 'blue route' footpath. This is most clearly seen within the waterfall area, where rocks along the footpath and viewing points are open and support frequent patches of the moss (Fig. 10), whilst adjacent boulders a short distance from the paths are overgrown by vegetation in ungrazed woodland. The maintenance of open rock faces by spate flows, occupied by many colonies of the moss along the Afon Gamlan, is also an important element of the plant's niche at this site. Hydro-electric schemes along the river have been considered in the past and the area continues to attract interest from developers, though for the moment there are no firm proposals.

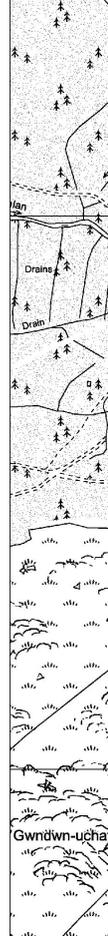
Garth Gell

Sematophyllum demissum was first recorded at Coed Garth Gell, on rocks along the Afon Cwm-mynach, in 1991 by A. Orange. It was subsequently recorded by Newton (2013) during an assessment for a hydro-electric proposal on the river. The present survey did not have access to the lower 900 m of riverbank, which is in the ownership of a private individual with plans for hydro-electric development, but the river upstream of this area was accessed and surveyed,

plus the minor streams flowing through Coed Garth Gell. The results show that the population is more extensive here than previously realised, though most colonies are concentrated on riverside rock exposures and boulders along a 100 m length of the Afon Cwm-mynach near its confluence with Nant Cesailgwm. Only about 46% of the population is protected, lying within RSPB Coed Garth Gell and Meirionnydd Oakwoods SAC, the remainder being unprotected. Most of the population is on rock surfaces within the upper spate zone of the Afon Cwm-mynach and the associated disturbance is clearly important for the maintenance of this population (Fig. 9). RSPB Coed Garth Gell is ungrazed and the rock exposures and boulders along the small streams are largely dominated by coarse vegetation, though in two locations *S. demissum* survives. There are plans to reintroduce light grazing to the woodland, which would be beneficial to the moss. There has been a recent proposal to build a hydro-electric development on the Afon Cwm-mynach, as yet without planning permission. The associated bryophyte assessment (Newton, 2013) suggested that *S. demissum* would be unaffected by the scheme because it "...behaves as a species that is capable of robust survival on the basis only of direct rainfall..." The niche occupied by the moss is more complex than this suggests (see 'Habitat') and whilst it is possible that a hydro-electric scheme along the Afon Cwm-mynach would not cause a significant decline in the population, there is a significant risk that it would.

Hafod Rhisgl

In 1988, M.J.M. Yeo recorded *Sematophyllum demissum* from the small and unnamed catchment that borders the south side of the Afon Feingam catchment. Both catchments lie within the land of Hafod Rhisgl. The moss was later recorded



2.6. Ganllwyd
 □ S. demissum 100 m grid
 ■ S. demissum 10 m grid
 ▨ SSSI

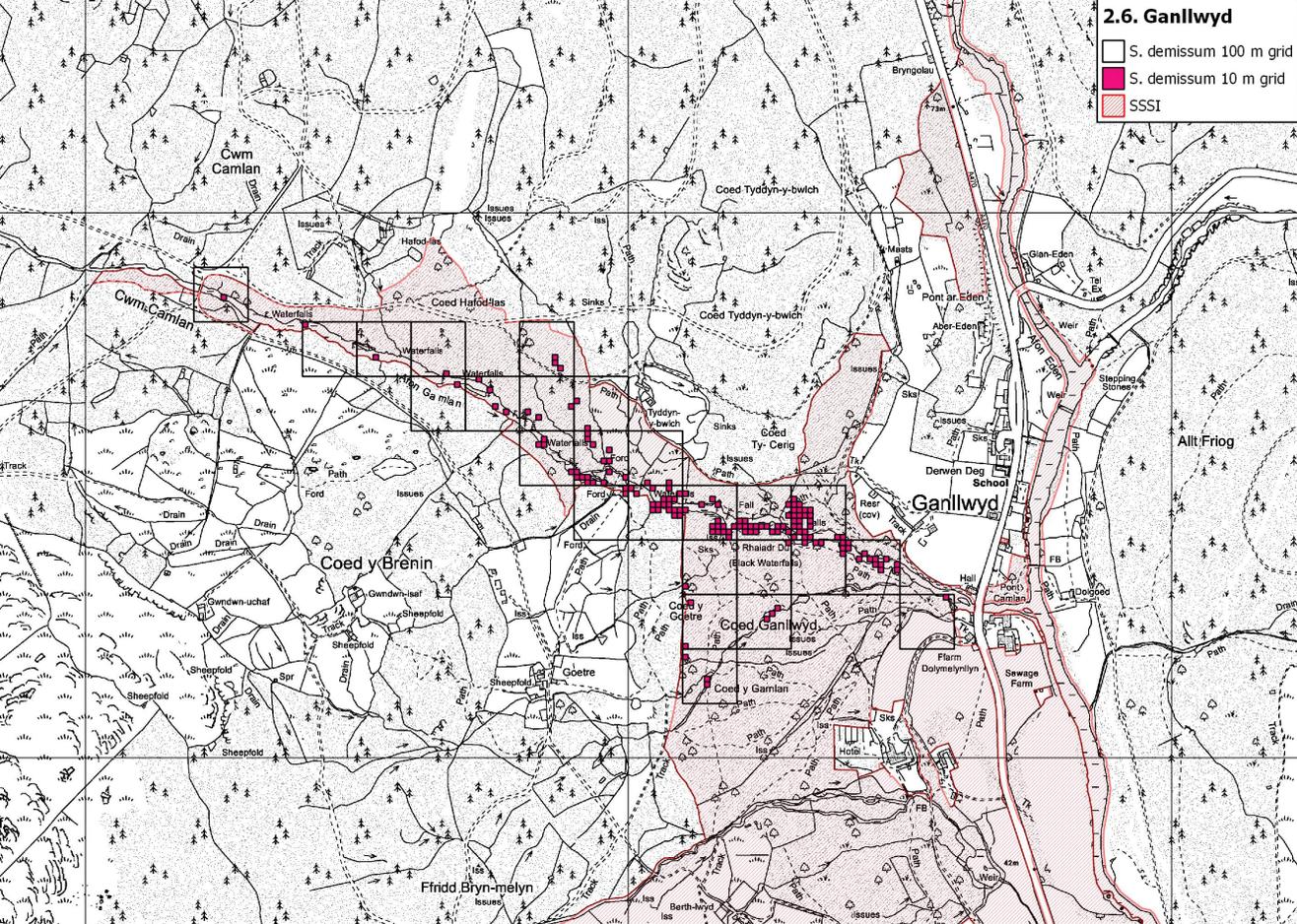


Figure 11. Example of a site-based grid map produced for each site during the present survey, here showing the distribution of *Sematophyllum demissum* at Ganllwyd.

within the Afon Feingam catchment by M.E. Newton in 2002, who noted “a substantial, but scattered, population” and during an afternoon visit by the BBS in 2005 the plant was seen again though in “very small quantity”. The present survey found a large population spread across the two catchments, with most in the unnamed southern catchment. Unlike all other present sites in Wales, the moss grows here in woodland dominated by Ash, Alder and Hazel (NVC W7). The forest is lightly grazed by sheep and cattle, which is clearly beneficial to the moss, though attempts have been made to exclude grazing from some areas, presumably due to concerns about tree regeneration. Most colonies are on boulders along small streams and within flushes, and the plant is especially frequent across flushed boulder slopes within the southern catchment. It is also occasionally present on boulders away from streams and flushes. Rocks are more basic

here than at any other site where the moss grows in Wales (see ‘Habitat’). Both catchments are protected within Coedydd Nantgwynant SSSI and, at present, there are no known hydro-electric proposals on any of the streams.

Parc Hafod-y-llan

It is unclear whether *Sematophyllum demissum* has been recorded from this area historically. In 1981, D.A. Ratcliffe recorded the plant at ‘Nantgwynant’ and the associated grid reference is SH6250. If the grid reference is correct, it seems the most likely location was Parc Hafod-y-llan, which is within the Nantgwynant valley. The site was searched thoroughly during the present survey but the moss was not found. Small streams and flushes within the bouldery oak woodland provide suitable habitat for the plant, though the site is ungrazed and until recent clearance there was a problem with *Rhododendron*. A small-scale

hydro-electric scheme has recently been installed on the main stream (Afon Gorsen), where streamside rocky habitat is often dominated by filamentous algae.

Pont Aberglaslyn

W. Wilson recorded *Sematophyllum demissum* from woods by Pont Aberglaslyn in 1830, the first Welsh record, but there have been no subsequent finds from this area. Examination of the earliest (1889) OS map for the area suggests that landscape conditions remain broadly similar. It seems possible that Wilson's record was from the wooded east side of the Glaslyn, immediately north of Pont Aberglaslyn where an old path leads along the river. This and surrounding woodland areas were searched thoroughly during the present survey, but the moss was not found.

Tyn y Groes

There are several herbarium specimens of *Sematophyllum demissum* from Tyn y Groes, collected during 1903-1924. The name refers to the area around Tyn y Groes Hotel (an old coach-house), located beside the A470 at SH727231. This is just 1 km south of the large population of *S. demissum* at Ganllwyd. Insufficient time was available to search this area thoroughly during the present survey, though a half-day was spent looking along some of the streams that flow down the wooded slopes above the hotel (within Coed Berth-lwyd and Coed Tyddyn-bach). No *S. demissum* was found, though its presence cannot be ruled out until a more thorough survey is completed.

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