Cyfoeth Naturiol Cymru
Natural Resources Wales

Lichen survey of three coastal SSSIs on the Llŷn Peninsula, Gwynedd

Looking north-west from the west side of Trwyn Cilan along the high sandstone cliffs that dominate this stretch of coast in Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI with Mynydd Penarfynydd SSSI mid horizon and Glannau Aberdaron SSSI beyond to left.

Dave Lamacraft & Steve Chambers

Evidence Report Number 675

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- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
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Cwblhawyd y gwaith drwy gyfuniad o arolwg safle yn ystod hydref-gaeaf 2022 a choladu cofnodion a wnaed gan yr awdur yn y blynyddoedd diwethaf. Cofnodwyd 151 dosbarth o gennau a 'ffyngau sy'n byw ar gennau' ar bob un o'r tri SoDdGA; 115 yng Nglannau Aberdaron, 53 ym Mynydd Penarfynydd ac 89 ym Mhorth Ceiriad (gweler Atodiad 1). Mae 51 o'r rhain yn nodedig gan gynnwys:

- *Heterodermia leucomelos*; poblogaeth helaeth yn SoDdGA Glannau Aberdaron.

- *Caloplaca aractina*; un o dair ardal Brydeinig yn unig y tu allan i'r Lizard, yn SoDdGA Glannau Aberdaron.

- *Teloschistes flavicans*; poblogaethau yn y tri SoDdGA.

- *Heterodermia obscurata*; yn hysbys ar ddau leoliad yn SoDdGA Glannau Aberdaron a SoDdGA Mynydd Penarfynydd.

- *Physcia clementei*; ar frigiad picrit ar SoDdGA Mynydd Penarfynydd, yr unig ardal yng Ngogledd Cymru.

- *Rinodina roboris* var. *armeriicola*; o bosibl yn newydd i Gymru, ar derasau pridd ar SoDdGA Glannau Aberdaron.

- *Endocarpon pusillum* var. *pallidum*; newydd i Ogledd Cymru a'r cofnod Prydeinig cyntaf y ganrif hon o'r amrywiaeth hwn (i'w gadarnhau), ar derasau pridd ar SoDdGA Mynydd Penarfynydd.

- *Protoparmelia montageni*; newydd i Ogledd Cymru, darganfuwyd ar SoDdGA Glannau Aberdaron a SoDdGA Porth Ceiriad.

Dim ond SoDdGA Glannau Aberdaron sy'n cwrdd â throthwy cymhwyso'r MRCSI, tra bo'r lleill yn methu. Mae gan bob SoDdGA nodweddion cymhwyso eraill yn seiliedig ar bresenoldeb rhywogaethau'r Rhestr Goch. O'u hystyried gyda'i gilydd mae'r tri SoDdGA yn ffurfio meta-safle o ddiddordeb cennau morol sylweddol. Nid oes unrhyw fygythiadau uniongyrchol i'r diddordeb o ran cen. Mae'r prif broblemau rheoli yn gysylltiedig â rheoli pori'r rhostir arfordirol a'r cynefinoedd glaswelltir.

2. Executive summary

Dave Lamacraft was contracted by Natural Resources Wales to undertake an assessment of the maritime lichen interest at three coastal SSSI in Llŷn, North Wales. The SSSIs were Glannau Aberdaron SSSI, Mynydd Penarfynydd SSSI and Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI. The focus was on Maritime Rock and Coastal Slope Index (MRCSI) species (Sanderson *et al* 2018).

Work was completed by a combination of site survey in the autumn-winter 2022 and collation of records made by the author in recent years. 151 taxa of lichens and lichenicolous fungi were recorded on all three SSSIs: 115 in Glannau Aberdaron, 53 in Mynydd Penarfynydd and 89 in Porth Ceiriad (see Appendix 1). 51 of these are notable including:

- *Heterodermia leucomelos*; extensive population in Glannau Aberdaron SSSI.
- *Caloplaca aractina*; one of only three British localities outside of the Lizard, at Glannau Aberdaron SSSI.
- *Teloschistes flavicans*; populations in all three SSSIs.
- *Heterodermia obscurata*; known from two localities in Glannau Aberdaron SSSI and at Mynydd Penarfynydd SSSI.
- *Physcia clementei*; on a picrite outcrop at Mynydd Penarfynydd SSSI, the only North Wales locality.
- *Rinodina roboris* var. *armeriicola*; possibly new to Wales, on soil terraces in Glannau Aberdaron SSSI.
- *Endocarpon pusillum var. pallidum*; new to North Wales and the first British record this century of this variety (awaiting confirmation), on soil terraces in Mynydd Penarfynydd SSSI.
- *Protoparmelia montagnei*; new to North Wales, found in Glannau Aberdaron SSSI and Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI.

Only Glannau Aberdaron SSSI meets the qualification threshold of the MRCSI, the others falling short. All SSSIs have other qualifying features based on the presence of Red List species. Viewed together the three SSSIs form a meta-site of significant maritime lichen interest. There are no immediate threats to the lichen interest. The main management issues relate to grazing management of the coastal heath and grassland habitats.

3. Introduction

Dave Lamacraft was contracted by Natural Resources Wales (NRW) to undertake a baseline coastal lichen survey of three SSSIs in the Llŷn Peninsula, Gwynedd.

3.1. Scope of the project

Baseline survey of coastal lichens covering three SSSI on the western Llŷn Peninsula, Gwynedd; Glannau Aberdaron, Mynydd Penarfynydd and Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal. It will involve coverage of all three SSSI but complete coverage is not anticipated given their size and difficult terrain. The survey is aimed at recording those species listed on the Maritime Rock and Coastal Slope Index (MRCSI) (Sanderson et al 2018) but is not aimed at detailed monitoring of *Teloschistes flavicans* or *Heterodermia leucomelos*, both present in these SSSIs.

3.1.1. Specification

From the contract specification:

- Visit all three SSSIs and carry out a baseline survey of coastal lichens;
- Collaborate with local lichen experts, if possible through sub-contracted joint fieldwork;
- Record all lichen species listed in the Maritime Rock and Coastal Slope Index at appropriate resolution. Population size and a 10-figure GPS reading should be given for rarer species, such as *Degelia* and *Roccella*, whilst a 4-figure GPS reading and frequency estimate will suffice for commoner species, such as *Diploschistes caesioplumbeus* and *Xanthoparmelia delisei*;
- Produce a spreadsheet of records in British Lichen Society format;
- Produce a report describing the diversity of Maritime Rock and Coastal Slope Index lichens in the three SSSI based on the current survey and previous reports.
- GPS readings must be British National Grid, not Lat-Long.

3.1.2. Background

The 2018 *Guidelines for Biological SSSIs: lichens and associated microfungi* includes a new index for selecting coastal lichen assemblages (Sanderson *et al* 2018). This clarifies the lichen species which make up notified coastal lichen features e.g. on Skomer and Middleholm SSSI and Skokholm SSSI, but also highlights that the diversity of maritime lichens in parts of the Welsh coast remains poorly known. There are sufficient records from Glannau Aberdaron SSSI, Mynydd Penarfynydd SSSI and Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI to suggest that important assemblages occur. The current surveys therefore cover these three sites to collect further data.

Figure 1. SSSI locations.

4. Method

The method took three approaches: field survey, collation of records made by the author in recent years and collation of additional relevant records from other recent surveys.

For the fieldwork, the SSSIs were visited between August and December 2022 (see Figures 2-4 for survey routes). Existing records were used to identify gaps in the knowledge of MRCSI species, and species not recorded post-2000. Sites were also investigated on Google Earth and using geological maps to identify areas that seemed most likely to support MRCSI species and/or to cover the range of habitats and geology present.

Sites were explored, lichen interest searched for and notable species recorded. A x10 Lichen Candelaris hand lens was used to search for and identify lichens in the field. Recording was made using an iPhone SE, which was also used for taking photos along with an Olympus Tough TG-6 for macro photos. GPS readings were made using a Garmin GPSMAP 64s.

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

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

4.1. Synonyms

Recent name changes for species recorded are listed below. The current names – per British Lichen Society – are used in the report.

New name	Recent synonym
Arthonia calcarea	*Opegrapha calcarea*
Caloplaca stillicidiorum	*Caloplaca cerina var. chloroleuca*
Enchylium tenax	*Collema tenax*
Gyrographa gyrocarpa	*Opegrapha gyrocarpa*
Heterodermia leucomela, Leucodermia leucomelos	*Heterodermia leucomelos*
Heterodermia obscurata	*Heterodermia japonica auct. brit. p.max.p.*
Hydropunctaria amphibia	*Verrucaria amphibia*
Hydropunctaria maura	*Verrucaria maura*
Lepra corallina	*Pertusaria corallina*
Lepra excludens	*Pertusaria excludens*
Lepra monogona	*Pertusaria monogona*
Melanelixia fuliginosa	*Melanelixia fuliginosa subsp. fuliginosa*
Melanelixia glabratula	*Melanelixia fuliginosa subsp. glabratula*
Myriolecis actophila	*Lecanora actophila*
Myriolecis dispersa	*Lecanora dispersa*
Myriolecis fugiens	*Lecanora fugiens*
Myriolecis zosterae	*Lecanora zosterae*
Protoparmeliopsis muralis	*Lecanora muralis*

New name	Recent synonym
Roccellographa circumscripta	*Peterjamesia circumscripta*
Scytinium tenuissimum	*Leptogium tenuissimum*
Scytinium teretiusculum	*Leptogium teretiusculum*
Wahlenbergiella mucosa	*Verrucaria mucosa*
Wahlenbergiella striatula	*Verrucaria striatula*

Figure 2. Survey route; Glannau Aberdaron.

Figure 3. Survey route; Mynydd Penarfynydd.

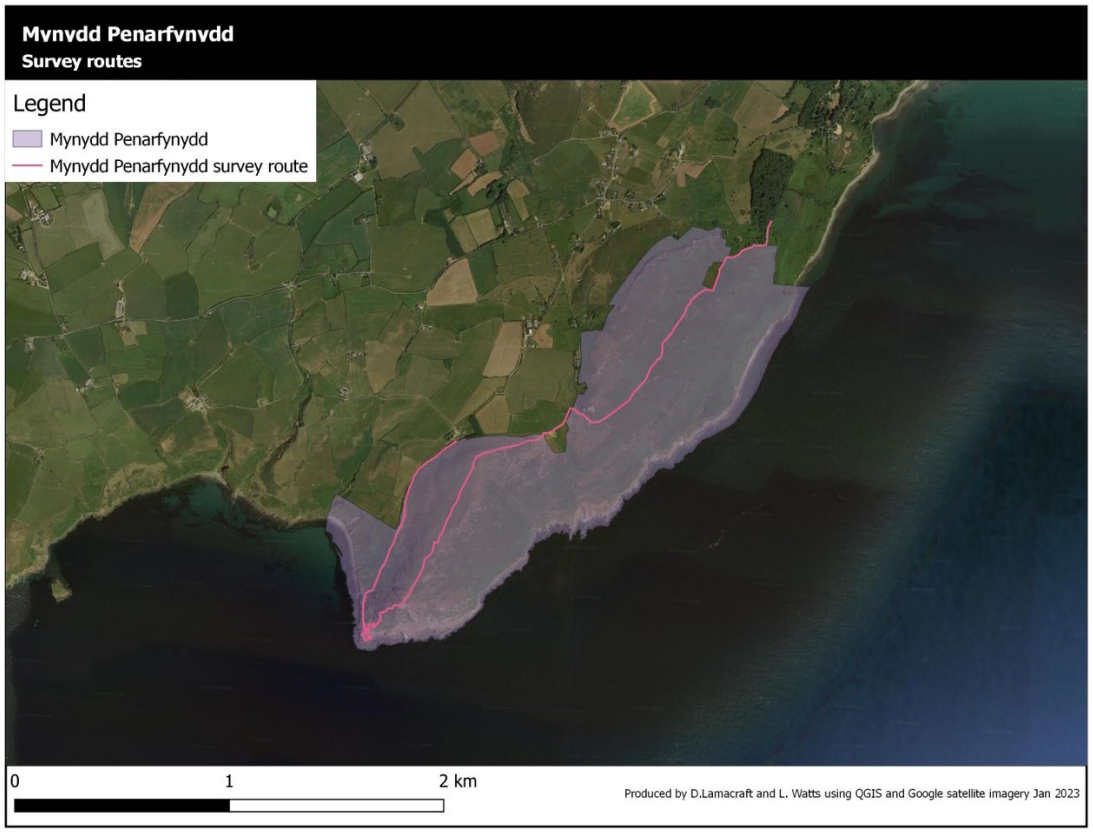


Figure 4. Survey route; Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal.

5. Results

151 taxa of lichens and lichenicolous fungi were recorded on all three SSSIs (including records from this fieldwork and those made by the author in recent years); 115 in Glannau Aberdaron, 53 in Mynydd Penarfynydd and 89 in Porth Ceiriad (see Appendix 1). 51 of these are notable including:

Taxon name	Status	MRCSI
Heterodermia leucomelos	GB EN; Wales VU; S7; NR; IR	MRCSI
Caloplaca aractina	GB VU; NR	MRCSI
Teloschistes flavicans	GB VU; Wales VU; S7; NS	MRCSI
Heterodermia obscurata	GB NT; Wales VU; NS	MRCSI
Physcia clementei	GB NT; Wales VU; NS	MRCSI
Rinodina roboris var. *armeriicola*	GB NT; Wales NT; NR	MRCSI
Endocarpon pusillum var. pallidum	Wales EN; NR	No
Scytinium tenuissimum	Wales VU; NS	No
Lepra monogona	Wales VU; NS	MRCSI
Protoparmelia montagnei	Wales VU; NS	MRCSI
Hypotrachyna taylorensis	Wales NT; IR	No
Moelleropsis nebulosa	Wales NT; NS	MRCSI
Collema furfuraceum	Wales NT	MRCSI
Parmotrema crinitum	Wales NT	No

Table 1. Red List lichens recorded during the survey. EN: Endangered; VU: Vulnerable; NT: Near Threatened; S7 = listed on Section 7 Wales Environment Act; NR/NS: Nationally Rare/Nationally Scarce; IR: International Responsibility species; MRCSI: Maritime Rock and Coastal Slope Index.

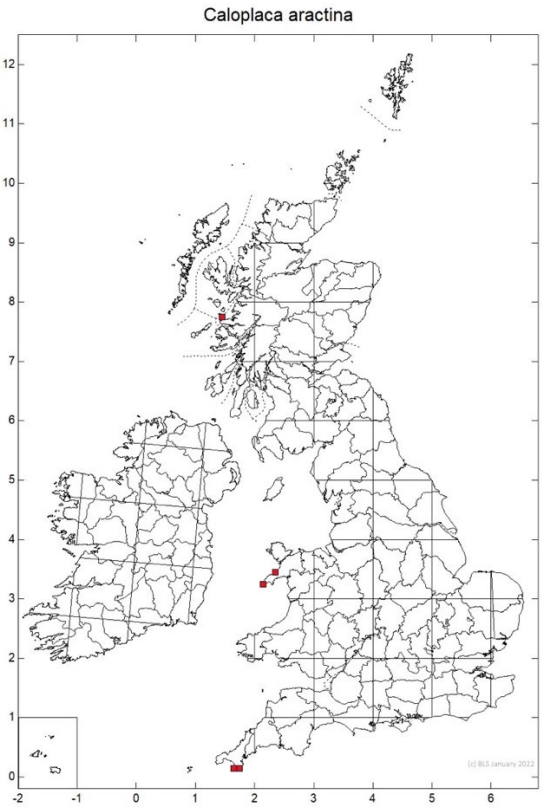
5.1. Notable species

Caloplaca aractina (GB VU, NR, MRCSI)

Thought until recently to be restricted in GB to serpentine rock on the Lizard, Cornwall, it is now known from one site in the Inner Hebrides and has recently been found in two locations in Llŷn by Nigel Chadwick (see Figure 6). One of these sites is in Glannau Aberdaron SSSI and this population was refound by the author in 2021 (see Figure 5 and map in Appendix 4). It is a species of well-lit sheltered base-rich rock in the mesic-supralittoral zone, often in the 'orange zone' i.e. with *Caloplaca marina* etc.

Figure 5. *Caloplaca aractina* – the dark patches – at Trwyn y Gwyddel in 2022.

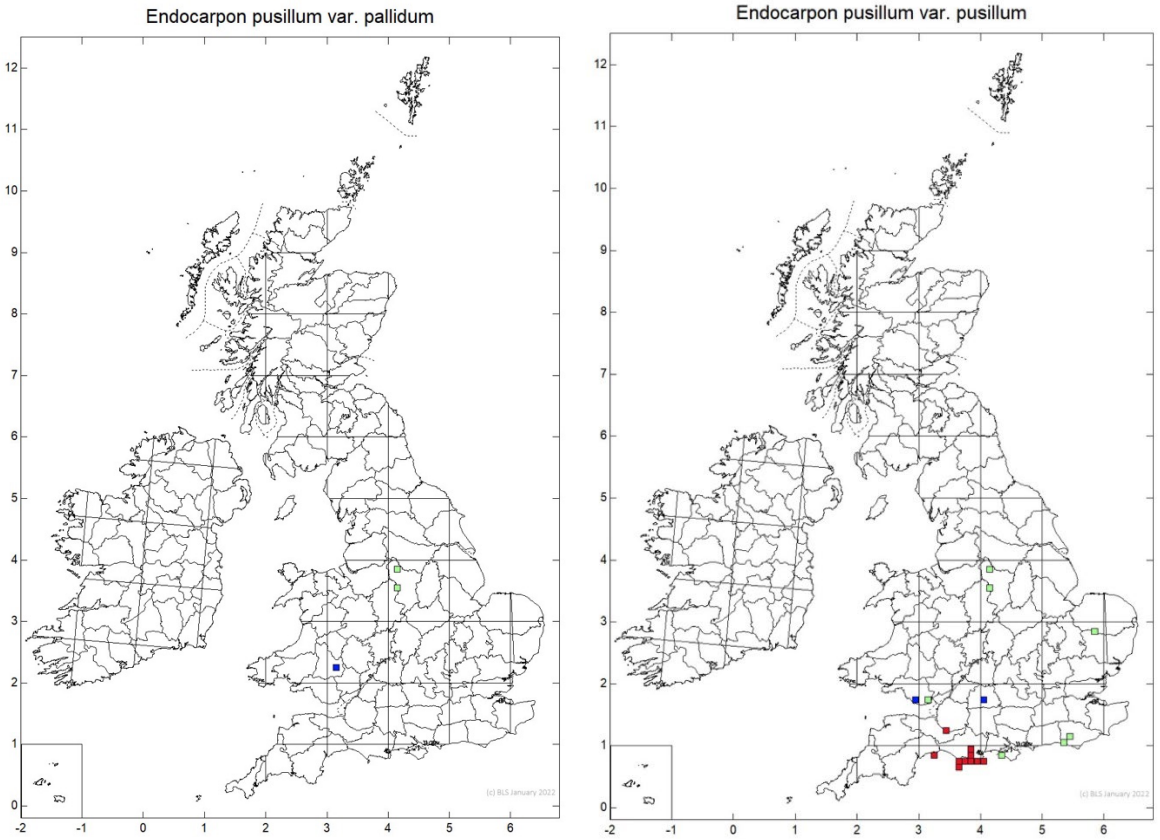
Figure 6. Distribution of *C. aractina* in Britain and Ireland (BLS, 2023).



Endocarpon pusillum var. pallidum (W EN, NR)

Endocarpon pusillum is a taxon of soft cliffs and soil overlying base-rich geology, uncommon in GB and most records of both recognised varieties are from southern England with a few more northerly records including South Wales. Most GB records are of var. *pusillum*, with var. *pallidum* only recorded from 3 10km squares, none this century (see Figure 7). It was recorded from a soft clay soil cliff at Trwyn Talfarch in Mynydd Penarfynydd SSSI as part of this work, its identity confirmed by Steve Chambers. It is near to the *Physcia clementei* and other notable and MRCSI species such as *Caloplaca stillicidiorum, Collema furfuraceum* and *Teloschistes flavicans*.

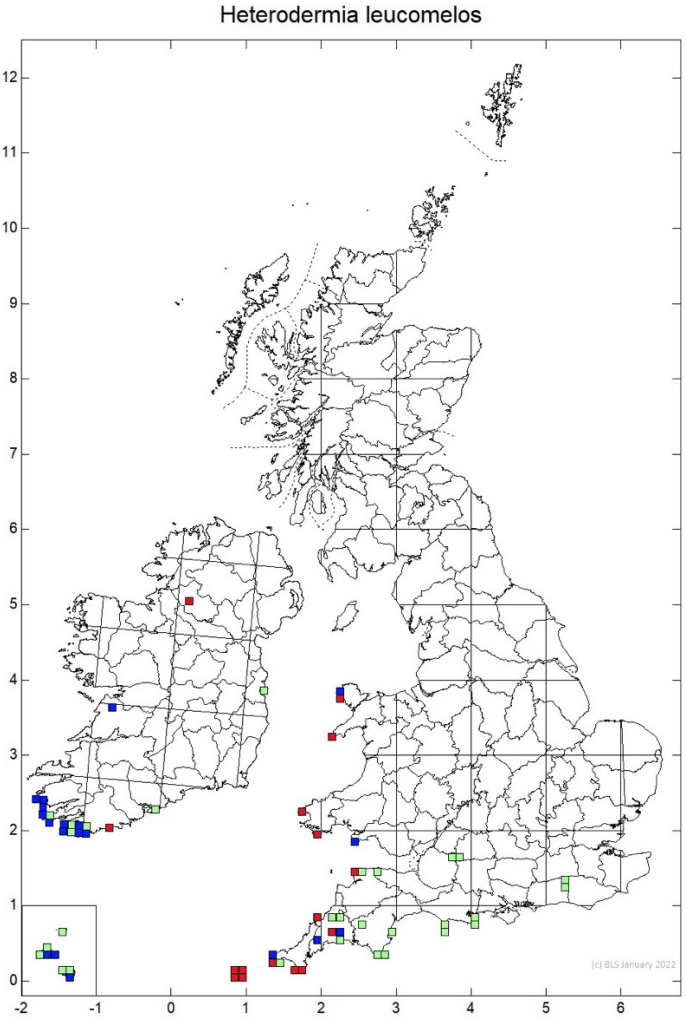
Figure 7. Distribution of *E. pusillum* in Britain and Ireland (BLS, 2023).



Heterodermia leucomelos (GB EN, W VU, S7, NR, IR, MRCSI)

In terms of conservation status the most important species in these SSSIs. A tropical and sub-tropical species at its northern global limit in GB, where it has a southern-oceanic distribution and has always been rare. It is found mostly on exposed coastal cliffs in short turf and on thin soil, or more rarely on low rock outcrops. It is usually epiphytic on low vegetation and other lichens rather than truly terricolous, and is very rarely found on trees. In Glannau Aberdaron it is frequent in short turf from Braich y Pwll to Trwyn y Gwyddel, with new locations found for it during this survey near Trwyn y Gwyddel. It appeared to have increased following a slight reduction in grazing pressure in the late 2000s which allowed a subtle increase in sward height and structural diversity which helps secure the *Heterodermia* 'tumbleweeds' which seem to be a key mechanism for dispersal (pers. obs.).

Figure 8. Distribution of *H. leucomelos* in Britain and Ireland (BLS, 2023).

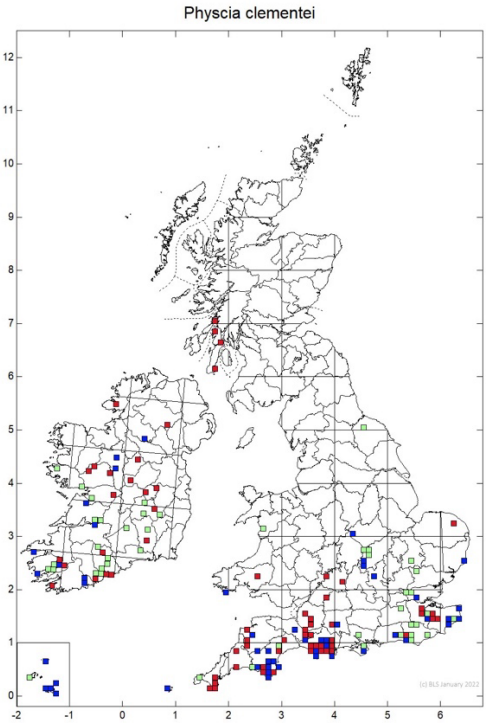


Physcia clementei (GB NT, W VU, NS, MRCSI)

A species of well-lit rocks and tree trunks, seeming to favour slightly base-rich substrates. It was found new to Caernarfonshire VC49 by the author in 2021 at Trwyn Talfarach in Mynydd Penarfynnydd SSSI where it is on a picrite rock exposure at the top of a steep maritime grassland slope (see Figures 9, 10).

Figure 9. *Physcia clementei* on a gabbro boulder at Trwyn Talfarach in 2021.

Figure 10. Distribution of *P. clementei* in Britain and Ireland (BLS, 2023).

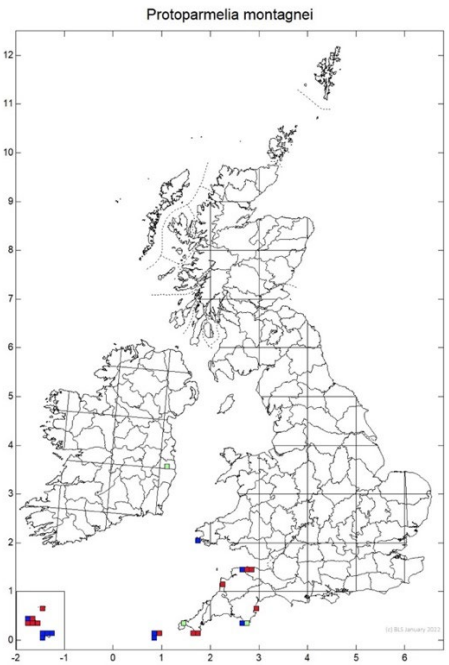


Protoparmelia montagnei (W VU, NS, MRCSI)

A taxon that contains several chemotypes and possibly a number of cryptic taxa. In GB it is a lichen of the xeric supralittoral zone and is at least in some instances initially parasitic on other crustose lichens e.g. *Aspicilia cinerea* agg and *Diploschistes caesioplumbeus*. It was found new to North Wales in two of the SSSIs during this survey – Glannau Aberdaron and Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSIs. These now represent the most northerly localities in GB for this taxon (Figure 12).

Figure 11. *Protoparmelia montagnei* at Pen y Cil in 2022.

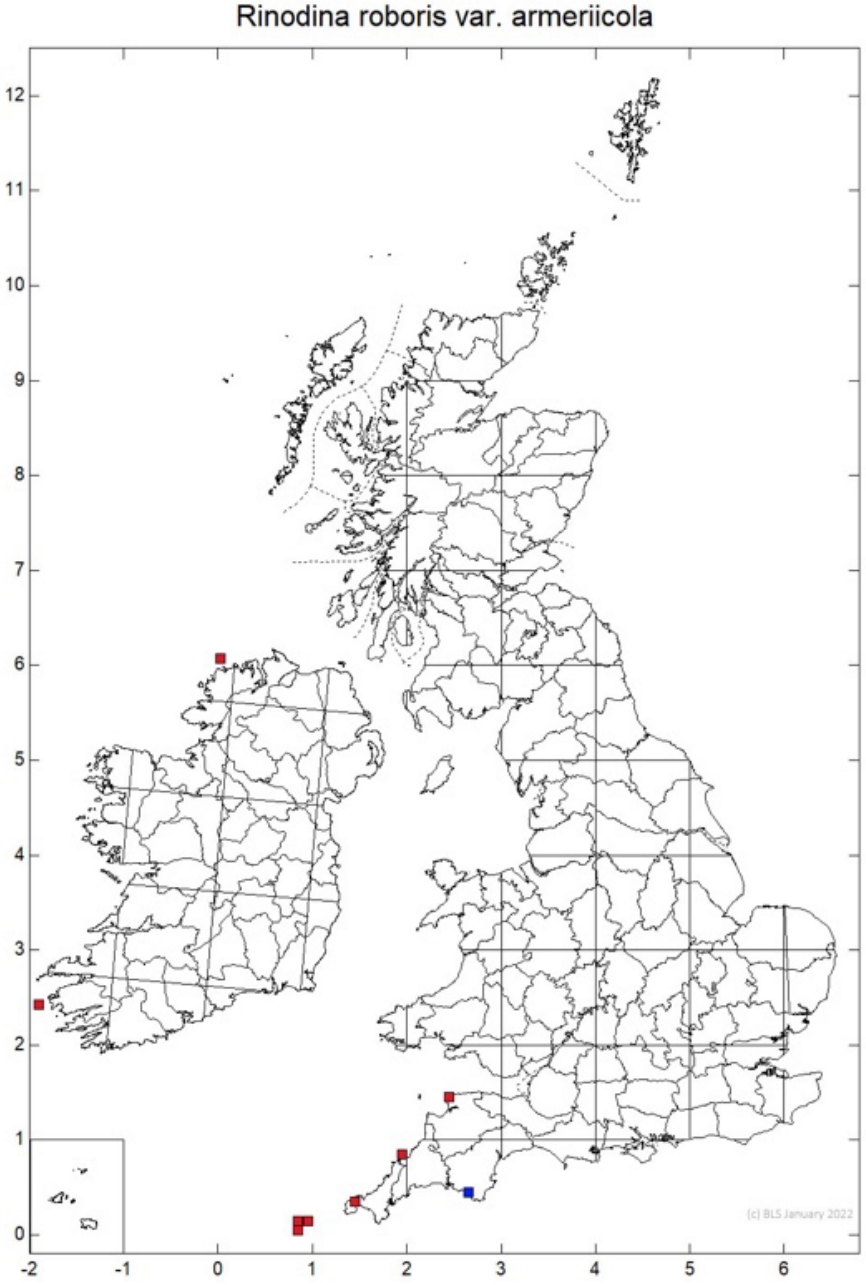
Figure 12. Distribution of *P. montagnei* in Britain and Ireland (BLS, 2023).



Rinodina roboris* var. *armeriicola (GB-NT, W-NT, NR, MRCSI)

A rare variety of a relatively frequent British species, known from a handful of sites on the Scilly Isles, the coast of the South-west Peninsula and Ireland (see Figure 13). Collected from soil terraces at Porth Llanllawen, SH145266 (see Figure 27), growing with *Caloplaca microthallina*. Determined by Steve Chambers. Its status in Wales seems a little ambiguous; although no Welsh records appear in the British Lichen Society maps, database or on the NBN Atlas, it was assessed in the Lichen Red Data List for Wales as NT, with 33% of the GB population present in Wales. Given the lack of records available through the main data channels it seems this could actually be new to Wales.

Figure 13. Distribution of *R. roboris* var. *armeriicola* in Britain and Ireland (BLS, 2023).

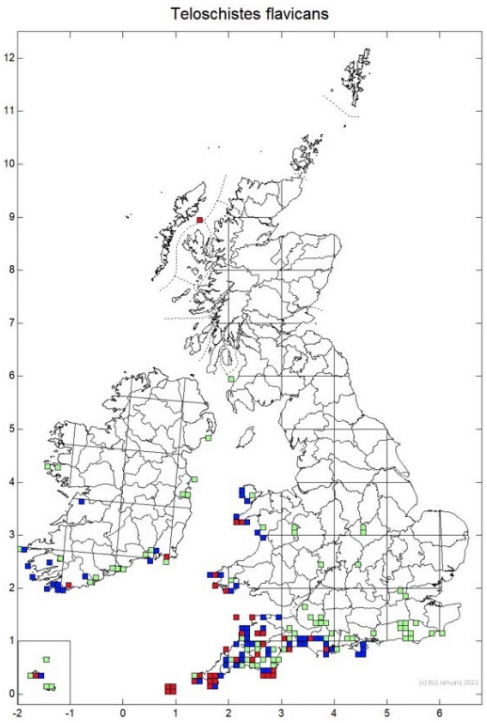


Teloschistes flavicans (GB VU, W VU, S7, NS, MRCSI)

A species of short turf and rock on the coast, where is often epiphytic on other anchored lichens and other vegetation e.g. *Calluna*, but is also occasionally found epiphytic on trees and inland. It is found in dry, sunny, warm temperate areas of both Hemispheres but in GB is largely restricted to SW England, SW and NW Wales, although it has recently been found in the Shiant Islands in the Minch (Figure 15). It is found in all three of these SSSIs: a small population in one location in Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI, a large population in Mynydd Penarfynydd SSSI, and four small populations in Glannau Aberdaron SSSI.

Figure 14. *Teloschistes flavicans* at Pen y CII 2022.

Figure 15. Distribution of *T. flavicans* in Britain and Ireland (BLS, 2023).



5.2. Glannau Aberdaron

This is a large SSSI with a very varied coastline in terms of aspect, steepness, height, geology and habitats with its lichen interest reflecting this variety. Its lichens appear to have been relatively well studied, with work by Tony Fletcher, Allan Pentecost, Peter James and Francis Rose 1972-1975, but few records are then available until the 2000s when surveys were carried out by Bryan Edwards and Vince Giavarini focussed on *Heterodermia leucomelos* and *Teloschistes flavicans* for Plantlife and the National Trust (Edwards 2002, 2006; Giovarini 2004). More recently the National Trust undertook some monitoring of *Teloschistes flavicans* and *Heterodermia leucomelos* around Trwyn y Gwyddel and St. Mary's Well in 2013 (Giovarini 2015), and Nigel Chadwick has done much recording of the Llŷn coast, finding the *Caloplaca aractina* here and near Nant Gwrtheyrn.

This current work focussed on 'filling the gaps', both in terms of MRCSI species and in areas covered.

116 taxa were recorded (Appendix 1) of which 39 are notable (Appendix 2) including *Caloplaca aractina, Collema furfuraceum, Heterodermia leucomelos, H. obscurata, Protoparmelia montagnei, Rinodina roboris* var. *armeriicola, Teloschistes flavicans.* 8 new MRCSI species were added.

The MRCSI scores (see Appendix 3) are:

- 2022: 30
- Post 2000: 38
- All years: 46

A number of MRCSI species have not been recorded since the 1970s:

- *Cliostomum tenerum*
- *Dermatocarpon miniatum*
- *Lecanora poliophaea*
- *Nephroma tangeriense*
- *Opegrapha lithyrga*
- *Ricasolia virens*
- *Rinodina confragosa*
- *Sticta canariensis (dufourii)*

Two species - *Heterodermia leucomelos* and *Teloschistes flavicans* – are currently notified SSSI features.

On the results of this work it would seem that the site would qualify under:

- Criterion 3.4.3 MRCSI; with a post-2000 score of 37, exceeding the threshold for this region of 35.
- Criterion 3.3.4.2 (A viable population of the species in an Area of Search (AoS) supporting a substantial proportion of localities for the species in Britain. Preference should be given to stronghold populations, or clusters of localities in the AoS, that maximise resilience, especially in the face of climate change): *Caloplaca aractina* (GB VU). Although *C. aractina* is not the only population in the AoS (West Gwynedd), it is significant given the rarity of the species in GB.
- Criterion 3.3.4.3 (A viable population on the edge of the species' geographical range, but excluding species known to have expanding ranges): *Protoparmelia montagnei* (Wales VU), although not the only population in the AoS, it is a significant population in terms of range in GB.

It probably also continues to qualify for the *Heterodermia leucomelos* population, although whether the population is larger here on the mainland than that on Ynys Enlli is not known. Together they form the largest population in the AoS. For *Teloschistes flavicans* it is one of 4 sites known to be extant in the AoS (following its loss from Ynys Llanddwyn), including the other two SSSIs surveyed as part of this work, so is perhaps less clear cut. However a case could be made of considering this part of a western Llŷn metapopulation.

5.2.1. Porth Oer – Porthorion

This stretch of coast is characterised by low boulder clay slopes above a low rocky shoreline. The underlying geology is largely one of a mix of Ediacaran and Cambrian sedimentary breccia and mudstone and igneous basalt but there is some localised occurrence of

limestone. There are no lichen records in the BLS database for this section of coast suggesting it hasn't been looked at for its lichen interest previously. Survey work in 2022 focussed on the stretch of coast between the two islets of Dinas Bach and Dinas Fawr. The main lichen habitats are the shoreline rock and clay soil/rock interface with some limited bird-perch habitat (see Figures 18-20, 22-23).

Notable and MRCSI species recorded in this area as part of this work are detailed below, with hotpsots for all notable species in Figure 16.

Aspicilia leprosescens (MRCSI); on Dinas Bach, and beach south of Dinas Fawr

Caloplaca verruculifera (MRCSI); gull perching area on Dinas Bach (see Figure 19).

Diploschistes caesioplumbeus (NS, MRCSI); on Dinas Bach and beach south of Dinas Fawr.

Diplotomma chlorophaeum (MRCSI); on Dinas Bach, and on rocks to south of Dinas Fawr (Figure 17).

Halecania ralfsii (NS, MRCSI) on large boulders at around MHW mark on beach south of Dinas Fawr.

Lecania aipospila (NS, MRCSI); beach south of Dinas Fawr.

Lecania atrynoides (NS); on Dinas Bach.

Myriolecis fugiens (MRCSI); on Dinas Bach.

Solenopsora holophaea (NS, MRCSI), on flushed clay soil/rock on steep cliff slope above beach.

Solenopsora vulturiensis (MRCSI); rock exposures at head of rocky beach south of Dinas Fawr.

Xanthoparmelia loxodes/pulla (MRCSI); frequent on rock exposures.

Xanthoria ucrainica (NS); rock exposures at head of rocky beach south of Dinas Fawr.

5.2.2. Porth Llanllawen & Mynydd Mawr

A varied section of coast including the 150m high heath-dominated Mynydd Mawr and the low-lying clay capped cliffs of Porth Llanllawen (Figure 24). The geology is mostly breccia, with some occurrences of microgabbro (above Maen Du) and interbedded siltstone and limestone (Porth Llanllawen and the northern end of the Mynydd Mawr summit). The area has had some attention from lichenologists but primarily in the Mynydd Mawr area e.g. records from the 1970s include *Ricasolia* (*Lobaria*) *virens* and *Sticta fuliginosa* s. lat. although many of these older records aren't very well localised e.g. these two species only have 4-figure grid references and seem to have been recorded at Braich-y-Pwll – Mynydd Mawr. No records are available for Porth Llanllawen. The main lichen habitats are the rocky heathland and the shoreline rock and eroding soil terraces in Porth Llanllawen.

Notable and MRCSI species recorded in this area as part of this work are detailed below, with hotpsots for all notable species in Figure 16.

Arthonia varians (NS); on *Lecanora rupicola*, Mynydd Mawr.

Aspicilia leprosescens (MRCSI); on rock exposures close to sea in Porth Llanllawen.

Caloplaca britannica (NS, IR); Porth Llanllawen, on limestone (Figure 25-26).

Caloplaca stillicidiorum (W DD, NS, MRCSI); eroding clay soil terraces in Porth Llanllawen, with e.g. *Rinodina conradii, Caloplaca* spp., *Moelleropsis nebulosa*

Diploschistes caesioplumbeus (NS, MRCSI); on rock near the sea Porth Llanllawen.

Hypotrachyna britanica (MRCSI); recorded on natural rock exposures at Craig Cwlwm and at Pen y Cil near the *Teloschistes flavicans*.

Myriolecis zosterae (W-DD, NS); on vegetation e.g. *Armeria* on soil terraces in Porth Llanllawen and at Pen y Cil.

Moelleropsis nebulosa (W-NT, MRCSI); eroding clay soil terraces in Porth Llanllawen, with e.g. *Rinodina conradii, Caloplaca stillicidiorum.*

Parmotrema crinitum (W-NT); microgabbro outcrops above Maen Du.

Ramalina canariensis (MRCSI); on rock, Mynydd Mawr

Rinodina luridescens (MRCSI); on rock, north end of summit of Mynydd Mawr.

Rinodina roboris* var. *armeriicola (GB-NT, W-NT, NR, MRCSI); eroding clay soil terraces in Porth Llanllawen, with e.g. *Caloplaca stillicidiorum, Moelleropsis nebulosa*

Scytinium tenuissimum (W-VU, NS), soil terraces in Porth Llanllawen.

Solenopsora vulturiensis (MRCSI); eroding clay soil terraces in Porth Llanllawen.

Trapeliopsis wallrothii (MRCSI); soil/rock on steep rocky NW facing slopes of Mynydd Mawr.

Vahliella leucophaea (W-NT, MRCSI); tiny amount on eroding clay soil terraces in Porth Llanllawen

Verrucaria prominula (NS); intertidal rocks in Porth Llanllawen.

Xanthoparmelia delisei/loxodes/pulla (MRCSI); recorded at Craig Cwlwm and frequently at Pen y Cil.

5.2.3. St. Mary's Well - Trwyn y Gwyddel - Allt Felen – Mynydd Bychestyn

This stretch of coast in the centre of the SSSI is predominantly of low hard rock cliffs of interbedded siltstone and limestone geology, topped by maritime grassland and maritime

dry heath. The main lichen habitats include the hard rock exposures of both the sea cliff itself and exposures lying in the maritime grassland and maritime heathland, soft slightly eroded soil terraces and the maritime grassland itself. This is one of the more intensively studied stretches of coastline in the SSSI and has the main concentrations of *Heterodermia leucomelos* (St. Mary's Well – Trwyn y Gwyddel) and *Teloschistes flavicans* (St. Mary's Well and Mynydd Bychestyn) in the SSSI, along with *Heterodermia obscurata* and the *Caloplaca aractina*. Giavarini (2004) recorded good populations of *Rinodina conradii* on Mynydd Bychestyn, suggesting that the core of the GB population is here.

Notable and MRCSI species recorded in this area as part of this work are detailed below, with hotpsots for all notable species in Figure 16.

Caloplaca aractina (GB VU, NR, MRCSI) recorded at Trwyn y Gwyddel on +/- 45 deg sloping, S-SW facing sunny and exposed rock exposure towards the top of the blocky coastal cliff (see Figures 28, 29, Appendix 4). It is abundant over quite large patches on what appears to be a seam of slightly different geology, SH1423524748 +/-3m 13m. This is presumed to be the location recorded by Nigel Chadwick.

Buellia subdisciformis (MRCSI), recorded at Trwyn y Gwyddel

Heterodermia leucomelos (GB EN, W VU, S7, NR, IR, MRCSI), although well recorded in this area, new locations were recorded at Trwyn y Gwyddel at SH1420124816 +/-3m and at SH1424924790 +/-3m on steep sparsely vegetated slopes above Porth Felen.

Collema furfuraceum (W NT, MRCSI), recorded new for the SSSI on a rock exposure on Allt Felen.

5.2.4. Porth Meudwy – Pen y Cil

This easternmost stretch of coast is contiguous with the above but is quite different, the headland of Pen-y-cil has high cliffs and exposures of microgabbro with maritime grassland and 'coastal heath' with the low coastline running north to Porth Meudwy being largely densely vegetated coastal slope (*Ulex*, *Rubus* etc) on microgabbro geology. Some natural and quarried exposures exist at Craig y Cwlwm. Large rock outcrops at Pen y Cil supported the only example of the dry underhang community encountered in the SSSI during this work. The main lichen habitats are rock outcrops in maritime grasslands with some cliff-top soil terraces (Figures 31, 32, 40-41, 43).

Previous recording seems to have focussed on Pen y Cil, with old 1970s records including *Nephroma tangeriense* recorded from soil/rock. More recently Vince Giavarini recorded *Teloschistes flavicans* and *Heterdermia obscurata*.

Notable and MRCSI species recorded in this area as part of this work are detailed below, with hotpsots for all notable species in Figure 16.

Buellia subdisciformis (MRCSI); recorded at Pen y Cil in an underhang near the *Protoparmelia montagnei*.

Caloplaca arnoldii* subsp. *oblitterata (MRCSI); recorded with the sheltered dry underhang community at Pen y Cil.

Caloplaca maritima (NS, MRCSI); recorded with the sheltered dry underhang community at Pen y Cil.

Diploschistes caesioplumbeus (NS, MRCSI); recorded at Pen y Cil, where it is occasionally abundant on sunny exposed rock exposures.

Heterodermia obscurata (GB NT, W VU, NS, MRCSI); recorded at Pen y Cil on the same outcrop as Giavarini recorded it in 2004, with a small amount on another outcrop nearby. It is found here with *Teloschistes flavicans*, *Hypotrachyna britanica*, *Cladonia rangiformis*, *Parmotrema crinitum* and *P. reticulatum* amongst others (Figures 36, 38-43).

Hypotrachyna britanica (MRCSI); recorded on natural rock exposures at Craig Cwlwm and at Pen y Cil near the *Teloschistes flavicans*.

Myriolecis fugiens (MRCSI); recorded on rock exposures at Pen y Cil.

Lecanora praepostera (NS, MRCSI); recorded with the sheltered dry underhang community at Pen y Cil (see Figure 32).

Myriolecis zosterae (W-DD, NS); recorded on vegetation on cliff-top turf at Pen y Cil.

Protoparmelia montagnei (W VU, NS, MRCSI); recorded new to the SSSI (second record for north Wales) in an underhang at Pen y Cil at SH1587224180 +/-4m. This and the record from Porth Ceiriad SSSI are the most northerly in GB (Figure 30).

Roccellographa circumscripta (MRCSI); recorded in the sheltered dry underhang community at Pen y Cil.

Solenopsora vulturiensis (MRCSI); recorded at Pen y Cil.

Teloschistes flavicans (GB VU, W VU, S7, NS, MRCSI); recorded at Pen y Cil on the same outcrop as Giavarini recorded it in 2004, where it grows with *Heterodermia leucomelos* and *Parmotrema crinitum* amongst others (Figure 36-37, 41).

Trapeliopsis wallrothii (MRCSI); recorded at Pen y Cil on slightly base-rich outcrops.

Xanthoparmelia delisei/loxodes/pulla (MRCSI); recorded at Craig Cwlwm and frequently at Pen y Cil.

Figure 16. Heatmap of notable taxa at Glannau Aberdaron SSSI, purple = fewer taxa, yellow = more taxa.

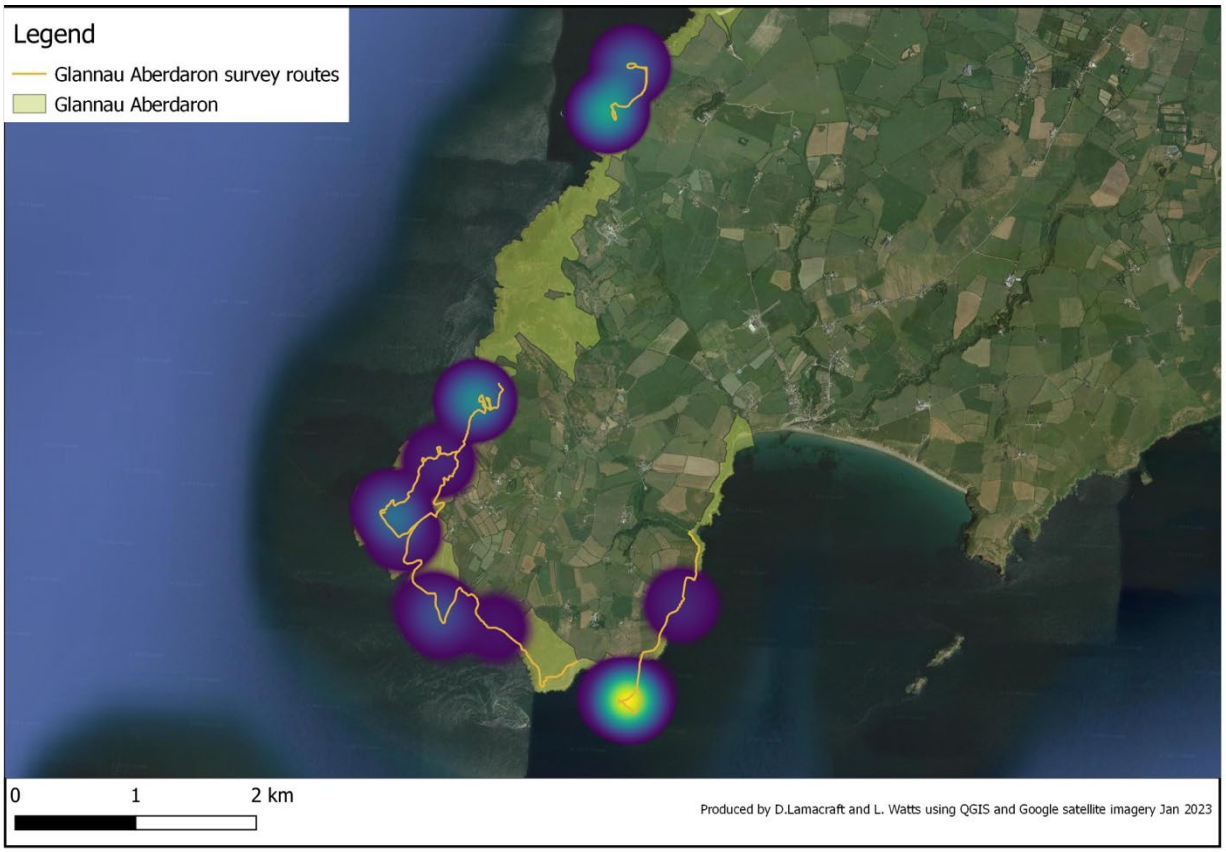


Figure 17. *Diplotomma chlorophaeum* at Dinas Bach 2021.

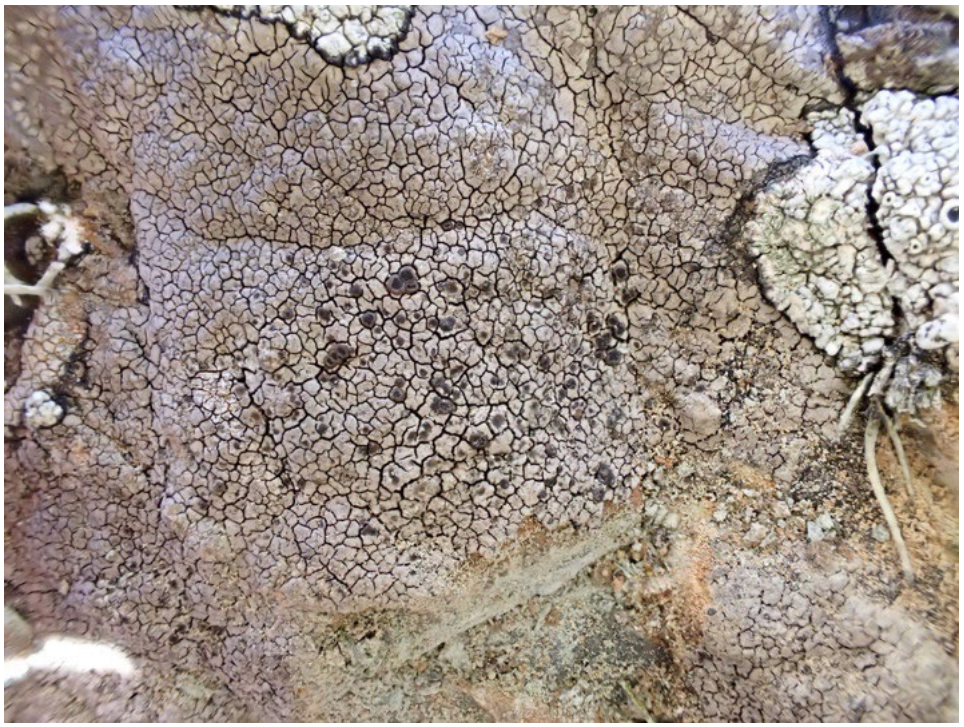


Figure 18. The north side of Dinas Bach, looking towards Porth Oer 2021.

Figure 19. Bird perch habitat at Dinas Bach, much of the yellow-green colouration is due to *Caloplaca verruculifera.*

Figure 20. The shoreline habitat opposite Dinas Fawr, with soil/rock interfaces supporting *Solenopsora holophaea.*

Figure 21. *Caloplaca thallincola* with small cushions of *Xanthoria ucrainica* near Dinas Fawr.

Figure 22. Looking south down the coast from near Dinas Fawr to Mynydd Anelog.

Figure 23. The rocky boulder beach and soft cliff just south of Dinas Fawr (background left).

Figure 24. Looking up the coast from Mynydd Mawr towards Mynydd Anelog with Porth Llanllawen between.

Figure 25. *Caloplaca britannica* (rather stunted) on what appears to be a limestone outcrop close to the shore at Porth Llanllawen.

Figure 26. What appears to be limestone outcropping close to the shore at Porth Llanllawen, with *Caloplaca britannica*.

Figure 27. Soil terrace habitat at Porth Llanllawen.

Figure 28. The rock exposure at Trwyn y Gwyddel with *Caloplaca aractina*.

Figure 29. *Caloplaca aractina* (dark patches) at Trwyn y Gwyddel.

Figure 30. *Protoparmelia montagnei* at Pen y Cil 2022.

Figure 31. Some of the rock habitat at Pen y Cil 2022.

Figure 32. *Lecanora praepostera* at Pen y Cil, with it's reaction to caustic soda in the inset bottom right.

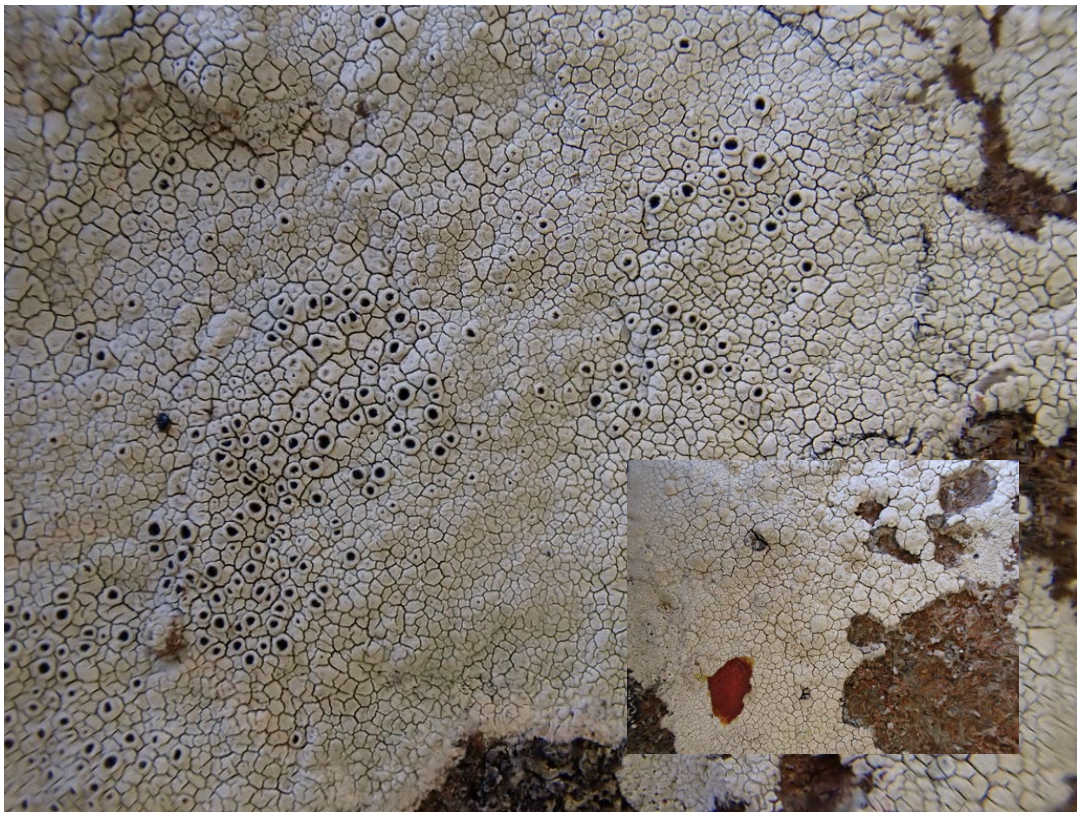


Figure 33. Some of the rock outcrop habitat at Pen y Cil 2022.

Figure 34. The lower coastal slope habitat and the interface between the low rock cliff habitat and the maritime grassland on the east-facing side of Pen y Cil 2022.

Figure 35. *Parmotrema reticulatum* Pen y Cil 2022.

Figure 36. The habiat with *Teloschistes flavicans* and *Heterodermia obscurata* at Pen y Cil 2022.

Figure 37. *Teloschistes flavicans* at Pen y Cil 2022.

Figure 38. *Heterodermia obscurata* at Pen y Cil part of the population found by Giavarini in 2004.

Figure 39. *Heterodermia obscurata* at Pen y Cil.

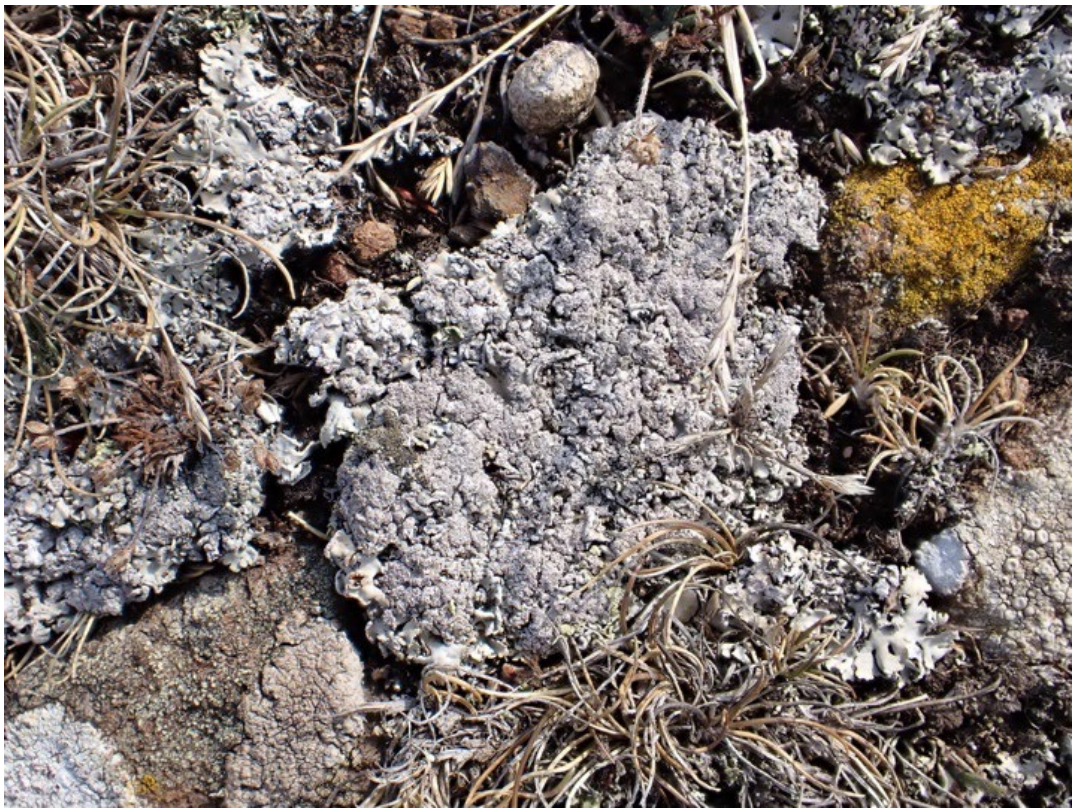


Figure 40. *Heterodermia obscurata* habitat at Pen y Cil 2022.

Figure 41. The outcrop with *Teloschistes flavicans* and *Heterodermia obscurata* at Pen y Cil 2022, most notable species are on the flatter area centre left.

Figure 42. *Heterodermia obscurata* at Pen y Cil 2022, the new location.

Figure 43. *Heterodermia obscurata* at Pen y Cil 2022, the habitat at the new location.

5.3. Mynydd Penarfynydd

A large headland running south-westwards from the village of Rhiw, it has a spine of rocky heathland running its length over Mynydd y Graig and Mynydd Penarfynydd itself, with steep slopes to low coastal cliffs. The site has an interesting geology, quite different to much of the Llŷn, with Ordovician picrite and gabbros, poor in silica, especially on Mynydd Penarfynydd itself. Its lichen interest appears not to have been explored until Vince Giavarini's 2004 survey for Plantlife. This was followed by some comprehensive recording by the Welsh Lichen Group led by Steve Chambers and Ray Woods in 2006 and by Steve Chambers in 2007, and then casual recording by Nigel Chadwick and the author in the 2010s.

As well as the maritime lichen interest, the SSSI is particularly notable as a coastal *Lobarion* site with species well-beyond their typical rainforest range, probably reflecting both the base-rich picrite and microgabbro substrates and the microclimate i.e. the headland is often affected by mist and low cloud. Species include;

- *Lobarina scrobiculata*; recorded by S.P. Chambers in 2007 on the same boulder as the *R. amplissima* but not recorded since, despite searching, it possibly succumbed to ponies rubbing on the outcrop.

- *Nephroma parile*; recorded by the author on a stone wall at the north end of Mynydd y Graig in 2016.

- *Pectenia atlantica*; recorded on at least two outcrops on the west side of Mynydd Penarfynydd by the author in 2013.

- *Ricasolia amplissima*; recorded by the Welsh Lichen Group in 2006, S.P. Chambers in 2007 and the author in 2015, a decent population on a large outcrop on the west side of Mynydd Penarfynydd, which was suffering from ponies rubbing against it before the outcrop was fenced to prevent access by the ponies (Lamacraft, 2015a)

It is also the only site in Caernarfonshire VC49 for *Usnea articulata*; recorded by the author in 2015 on a hawthorn on Mynydd y Graig (Lamacraft 2015b).

The main lichen habitats are the large and small outcrops of picrite (especially) and microgabbro amongst maritime grass and heath, eroding soil terraces at the cliff top, orange zone shoreline rock and a dry stone wall (Figure 49-52).

This current work focussed on 'filling the gaps', in terms of MRCSI species and areas covered.

53 taxa were recorded (Appendix 1) of which 18 are notable (Appendix 2) including, *Collema furfuraceum, Endocarpon pusillum* var. *pallidum, Lepra monogona, Physcia clementei, Teloschistes flavicans.* 7 new MRCSI species were added.

The MRCSI scores (see Appendix 3) are:

- 2022: 17

- Post 2000: 29

- All years: 29

On the results of this work it would seem that currently the site would not qualify under the MRCSI, but would qualify under:

- Criterion 3.3.4.4 (The only or largest viable population of the species in a particular AoS): *Lepra monogona* (Wales VU)*, Physcia clementei* (Wales VU, also 3.3.4.3), *Usnea articulata* (Wales VU, also 3.3.4.3).

For *Teloschistes flavicans* it is one of 4 extant sites known in the AoS, including the other two SSSIs surveyed as part of this work, so is perhaps less clear cut. However a case could be made of considering this part of a western Llŷn meta-population, and Mynydd Penarfynydd probably has the largest, most robust population in the AoS. It is already considered to be a qualifying feature of the SSSI.

Notable and MRCSI species recorded in this area as part of this work are detailed below, with hotpsots for all notable species in Figure 44.

Arthonia varians (NS); parasitic on *Lecanora rupicola*, recorded on the stone wall near Penarfynydd farmhouse.

Caloplaca stillicidiorum (W DD, NS, MRCSI); on eroding clay soil terraces and dead vegetation e.g. *Festuca* sp, *Armeria maritima* at Trwyn Talfarach.

Caloplaca verruculifera (MRCSI); on flat-topped rock, subject to enrichment from bird droppings, in the upper orange zone at Trwyn Talfarach.

Collema furfuraceum (MRCSI); recorded in several locations on damp picrite boulders at Trwyn Talfarach.

Endocarpon pusillum* var. *pallidum (W-EN, NR); the first GB record of var. *pallidum* this century and the second Welsh locality. Well developed on loose clay soil on a steep S-SE slope above the rocky shore at Trwyn Talfarach SH21572578 with *Enchylium tenax*.

Hypotrachyna britannica (MRCSI); on rock on Mynydd Penarfynydd.

Hypotrachyna taylorensis (W-NT, IR); along with the saxicolous records here of e.g. *Pectenia atlantica* and *Ricasolia amplissima* this record is well beyond the typical GB temperate rainforest range of this species.

Lecanora poliophaea (MRCSI); on flushed rock at Trwyn Talfarach.

Myriolecis fugiens (MRCSI); on rock at Trwyn Talfarach.

Myriolecis zosterae (W-DD, NS); on dead vegetation at Trwyn Talfarach.

Lepra excludens (NS); on stone wall near Penarfynydd farm house, near the *P. monogona*.

Lepra monogona (W-VU, NS); on stone wall near Penarfynydd farm house, as recorded previously by Steve Chambers and others (Figure 54), SH2187526627.

Llimonaea sorediata (NS, MRCSI); in a small, but well-developed dry underhang community at Trwyn Talfarach (Figure 53).

Normandina pulchella (MRCSI); frequent on bryophytes and lichens on damper rock at Mynydd Penarfynydd and Trwyn Talfarach.

Opegrapha cesareensis (MRCSI); in the underhang community with e.g. *Llimonaea sorediata, Roccellographa circumscripta* (Figure 53)**.**

Parmotrema crinitum (W-NT); not infrequent on rock at Mynydd Penarfynydd and Trwyn Talfarach.

Physcia clementei (GB-NT, W-VU, NS, MRCSI); recorded new to North Wales by the author in 2021, on a small flattish pitted picrite rock near Trwyn Talfarach (see Figure 45-46).

Roccellographa circumscripta (MRCSI); in the underhang community with e.g. *Llimonaea sorediata* (Figure 53)**.**

Solenopsora holophaea (NS MRCSI); recorded on flushed rock/soil interface at Trwyn Talfarach.

Solenopsora vulturiensis (MRCSI); recorded on rock at Trwyn Talfarach.

Teloschistes flavicans (GB-VU, W-VU, S7,NS, MRCSI); not infrequent on rock on Mynydd Penarfynydd and at Trwyn Talfarach, seeming to favour the pitted picrite boulders (see Figure 55-56). Recorded on 65 boulders by Giavarini in 2004, and referred to as a ‘major’ population, it has not been completely documented since.

Xanthoparmelia loxodes/pulla (MRCSI); quite frequent on rock on Mynydd Penarfynydd and at Trwyn Talfarach.

Figure 44. Heatmap of notable taxa at Mynydd Penarfynydd SSSI, purple = fewer taxa, yellow = more taxa.

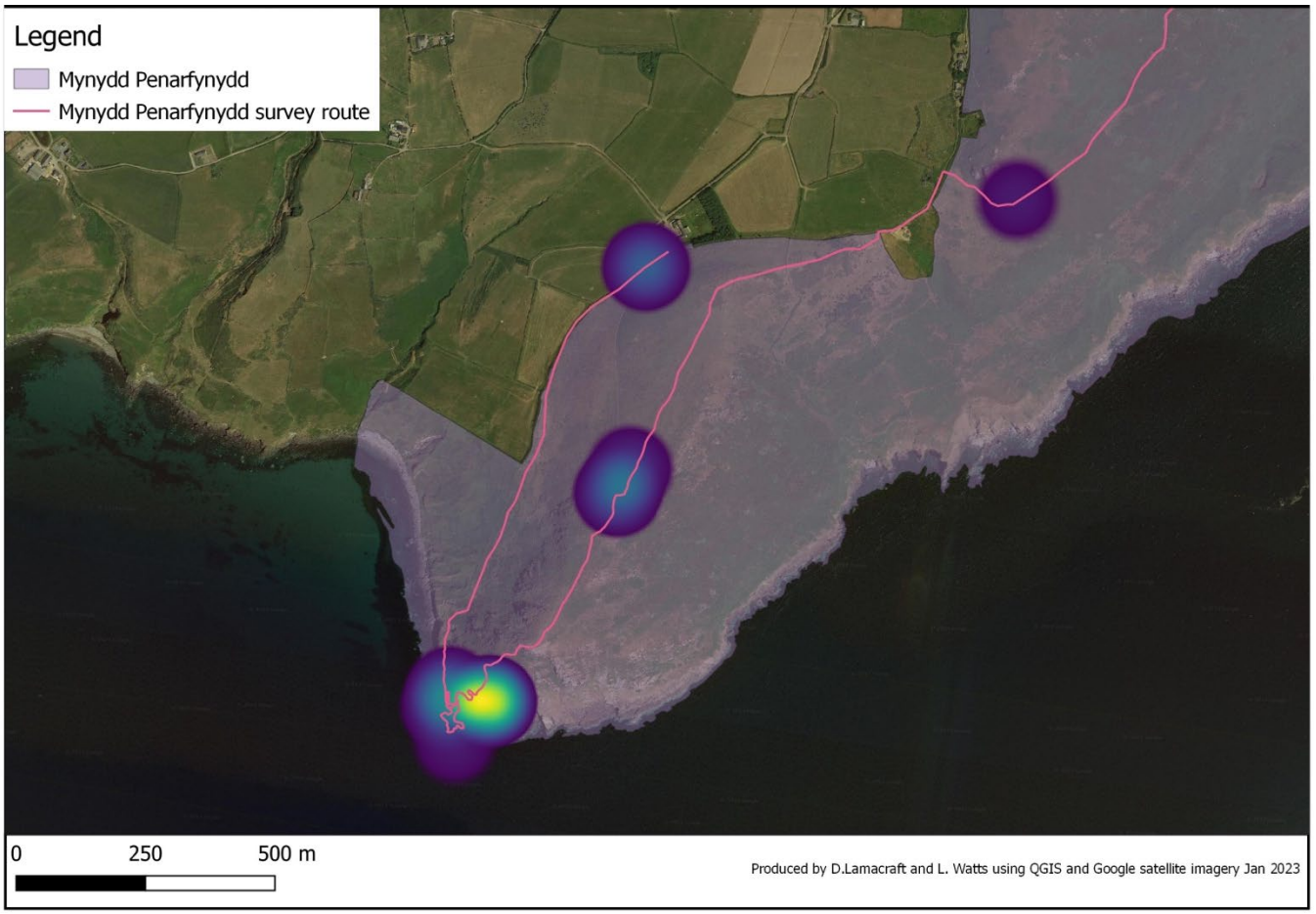


Figure 45. *Physcia clementei* at Trwyn Talfarach.

Figure 46. *Physcia clementei* at Trwyn Talfarach.

Figure 47. Habitat of *P. clementei* at Trwyn Talfarach in 2021, the small boulder between the dog and the blue jacket.

Figure 48. Habitat of *P. clementei* at Trwyn Talfarach in 2021, it grows in the pits and depressions on the top of the picrite boulder.

Figure 49. Looking south-west from the end of Mynydd Penarfynydd over Trwyn Talfarach below, with Ynys Enlli on the horizon and Pen y Cil (Glannau Aberdaron SSSI) to its right.

Figure 50. Habitat at Trwyn Talfarach; picrite boulders and outcrops above a grassy slope.

Figure 51. Habitat at Trwyn Talfarach; picrite boulders and outcrops above a grassy slope.

Figure 52. Habitat at Trwyn Talfarach; looking south down its western flank.

Figure 53. Underhang community at Trwyn Talfarach; the grey-white patches are a mosaic of *Dirina massilnsis, Llimonaea sorediata* and *Roccellographa circumscripta*.

Figure 54. *Lepra monogona* on the stone wall near Penarfynydd farm. The k+ yellow -> blood-red reaction visible bottom left.

Figure 55. *Teloschistes flavicans* growing with *Parmotrema crinitum* at Trwyn Talfarach.

Figure 56. *Teloschistes flavicans* growing with mosses and *Anaptychia runcinata* at Trwyn Talfarach.

5.4. Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI

The focus of this work was the 'Cilan peninsula', a large headland south of Abersoch. It is predimoninantly of Ordovician and Cambrian sandstone geology with high steep cliffs to the west on Mynydd Cilan and lower cliffs to the east, topped with coastal grassland and heathland. The headland is one of two halves – Mynydd Cilan to the west and Trwyn y Wylfa to the east with the two separated by the beach of Porth Ceiriad. Lichenologically this is the least explored of the three SSSIs; two records made by Allan Pentecost in 1976, including of *Teloschistes flavicans*, seem to be the first, but then it appears not to have been explored until Vince Giavarini's 2004 survey. This has just been followed by casual recording by the author, starting with the discovery of a small population of *Teloschistes flavicans* in 2011, approx. 1km south of AP's 1976 record. The main coastal lichen habitats are coastal rock exposures on exposed headlands and in more sheltered sitautions, including intertidal habitats, short coastal grassland with soil terraces, and short maritime heath (Figures 59, 61, 64-65). There is some basic influence in the geology at Llech y Doll.

This current work focussed on 'filling the gaps', in terms of MRCSI species and areas covered, although sadly it has not been possible to get to the St. Tudwal's Islands which could prove interesting lichenologically.

92 taxa were recorded during this work and with other recent records by the author (Appendix 1) of which 34 are notable (Appendix 2) including *Collema furfuraceum, Protoparmelia montagnei* and *Teloschistes flavicans.* 15 new MRCSI species were added.

The MRCSI scores (see Appendix 3) are:

- 2022: 24
- Post 2000: 26
- All years: 26 (none pre-2000)

On the results of this work the site would not qualify under the MRCSI but would qualify under:

- Criterion 3.3.4.3 (A viable population on the edge of the species' geographical range, but excluding species known to have expanding ranges): *Protoparmelia montagnei* (Wales VU), although not the only population in the AoS, it is a significant population in terms of range in GB.

Notable and MRCSI species recorded in this area as part of this work are detailed below, with hotpsots for all notable species in Figure 58.

Arthonia varians (NS); parasitic on *Lecanora rupicola*, recorded on a boulder at the east end of Porth Ceiriad beach.

Aspicilia leprosescens (MRCSI); recorded at Trwyn Cilan and the east end of Porth Ceiriad beach.

Buellia stellulata (NS); recorded at Trwyn Cilan.

Buellia subdisciformis (MRCSI); recorded at Trwyn Cilan.

Caloplaca arnoldii subsp. ***oblitterata*** (MRCSI); recorded at Pared Mawr above the west end of Porth Ceiriad.

Caloplaca britanica (NS, IR); recorded at Porth Ceiriad and at Llech y Doll.

Caloplaca stillicidiorum (W DD, NS, MRCSI); on eroding clay soil terraces and dead vegetation e.g. *Festuca* sp, *Armeria maritima* on the west side of Trwyn Cilan.

Caloplaca verruculifera (MRCSI); fairly frequent in the right habitat in the SSSI and particularly abundant where gulls gather e.g. Pistyll Cim. Porth Ceiriad, Pistyll Cim and Trwyn Cilan (Figure 66).

Candelariella coraliza (MRCSI); recorded on a boulder on the cliff top at Trwyn y Wylfa (Figure 59) and at Trwyn Cilan (Figure 68).

Collema furfuraceum (MRCSI); recorded in an area with what must be slight base enrichment in the rocks on the large cliff of Llech y doll, with *Aspicilia contorta* subsp. *contorta*, *Dermatocarpon miniatum* and *Solenopsora holophaea* nearby (Figure 63).

Collemopsidium halodytes (NS); on intertidal rocks at Porth Ceiriad (west end of main section of beach).

Dermatocarpon miniatum (MRCSI); at Llech y Doll on base-enhanced flushed rock with *Solenopsora holophaea* and *Aspicilia contorta* subsp. *contorta* nearby (Figure 62).

Diploschistes caesioplumbeus (NS, MRCSI); recorded at Trwyn y Wylfa (Figure 67).

Diplotomma chlorophaeum (MRCSI); recorded at Porth Ceiriad (western end), Trwyn y Wylfa and Trwyn Cilan.

Halecania ralfsii (NS, MRCSI); at Trwyn y Wylfa and Pistyll Cim.

Lecania aiposila (MRCSI); on flushed rock at Trwyn Talfarach.

Lecanora poliophaea (MRCSI); recorded at Pistyll Cim on large boulder above area used by gulls.

Lepraria nivalis (NS); on soil, Pistyll Cim.

Llimonaea sorediata (NS, MRCSI); in a small dry underhang community at Llech y Doll.

Moelleropsis nebulosa (W-NT, NS, MRCSI); on soil at Llech y Doll.

Myriolecis fugiens (MRCSI); on rock at Trwyn Talfarach.

Myriolecis zosterae (W-DD, NS); on dead vegetation at Trwyn Cilan (with e.g. *Caloplaca stillicidiorum*) and at Pistyll Cim.

Parmotrema crinitum (W-NT); Trwyn Cilan.

Protoparmelia montagnei (W-VU, NS, MRCSI); recorded on sunny, west facing cliff terraces above Porth Ceiriad on Trwyn y Wylfa, in a very slight underhang. First record for North Wales.

Rinodina conradii (NS, MRCSI); eroded soil terraces at Trwyn Cilan, on *Armeria* etc.

Scytinium tenuissimum (W-VU, NS); on soil at Trwyn Cilan and Llech y Doll.

Solenopsora holophaea (NS MRCSI); at Llech y Doll on base-enhanced flushed rock with *Dermatocarpon miniatum*, *Aspicilia contorta* subsp. *contorta* nearby (Figure 62).

Solenopsora vulturiensis (MRCSI); recorded on rock at Llech y Doll.

Teloschistes flavicans (GB-VU, W-VU, S7,NS, MRCSI); a small population on Mynydd Cilan above Trwyn y Fulfran, growing amongst short heath. Recorded in the 1970s by Allan Pentecost above 1km to the north (Figure 69).

Trapeliopsis wallrothii (MRCSI); on soil at Pistyll Cim.

Hydropunctaria amphibia (NS); on intertidal rocks at Porth Ceiriad (west end of main section of beach).

Verrucaria ditmarsica (NS); on intertidal rocks at Porth Ceiriad (west end of main section of beach).

Verrucaria prominula (NS); on intertidal rocks at Porth Ceiriad (west end of main section of beach).

Xanthoparmelia loxodes/pulla (MRCSI); quite frequent on rock around Trwyn Cilan.

Figure 57. Heatmap of notable taxa at Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI, purple = fewer taxa, yellow = more taxa.

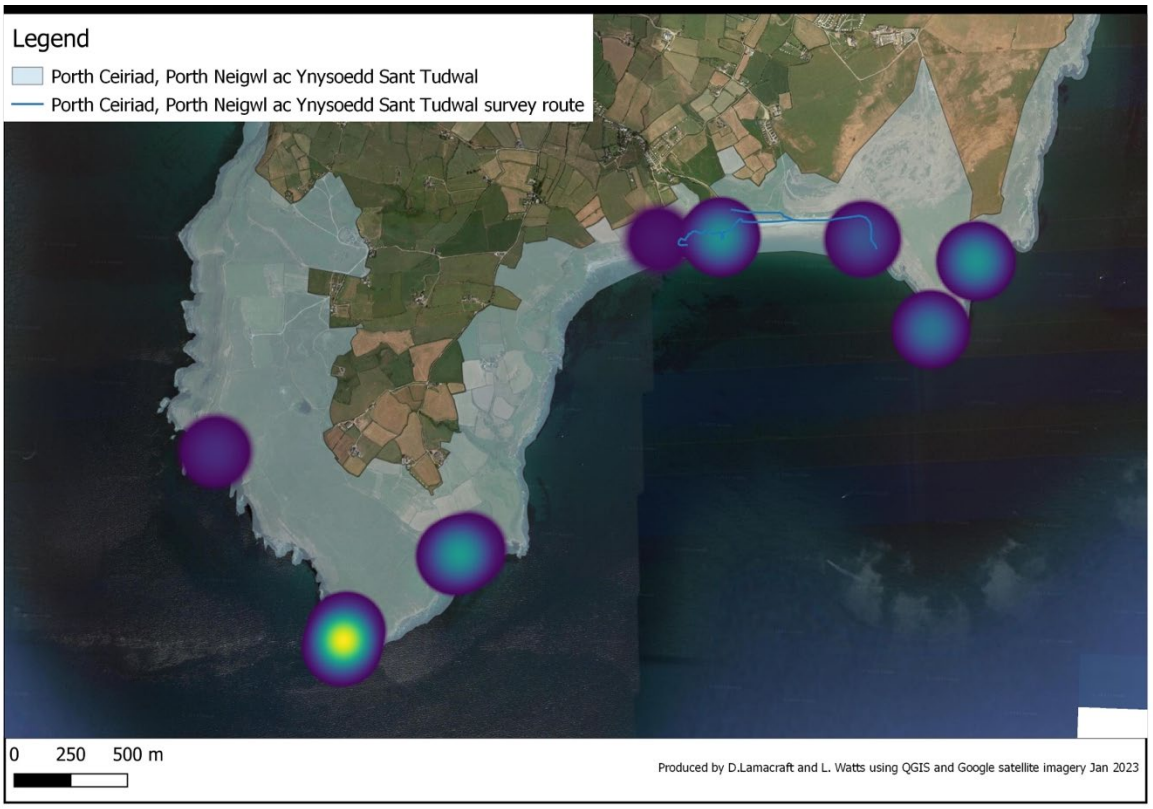


Figure 58. Looking north-west up the western coast of Cilan.

Figure 59. *Candelariella coraliza* at Trwyn y Wylfa.

Figure 60. *Caloplaca microthallina* at Llech y Doll.

Figure 61. Rock and soil habitat at Trwyn Cilan.

Figure 62. *Solenopsora holophaea* growing in a flushed crevice with *Dermatocarpon miniatum* at Llech y Doll.

Figure 63. Collema furfuraceum at Llech y Doll.

Figure 64. Short open maritime grassland habitat at Trwyn Cilan.

Figure 65. Cliff top rock terraces and martime grassland at Trwyn Cilan.

Figure 66. *Caloplaca verruculifera*, Trwyn Cilan.

Figure 67. *Diploschistes caesioplumbeus*, Trwyn Cilan.

Figure 68. *Candelariella coraliza*, Trwyn Cilan.

Figure 69. *Teloschistes flavicans* growing amongst heather (*Calluna vulgaris* and *Erica cinerea*) with *Cladonia rangiformis* on Mynydd Cilan.

6. Discussion

6.1. Importance of the lichen flora

Each of the three SSSI covered by this survey is of national importance for its lichen flora in its own right, although only Glannau Aberdaron meets the threshold for the MRCSI assemblage; the others (and also Glannau Aberdaron) qualifying on populations of Red List taxa.

Particularly notable taxa include:

- ***Caloplaca aractina*** (GB VU, NR, MRCSI); in Glannau Aberdaron SSSI, one of only three known GB sites away from the Lizard Peninusla, Cornwall.
- ***Endocarpon pusillum* var. *pallidum*** (W EN, NR); found new to North Wales during this survey in Mynydd Penarfynydd SSSI.
- ***Heterodermia leucomelos*** (GB EN, W VU, S7, NR, IR, MRCSI); a good dynamic population over a wide area in Glannau Aberdaron SSSI.
- ***Physcia clementei*** **(**GB NT, W VU, NS, MRCSI); found new to North Wales by the author in 2021 in Mynydd Penarfynnydd SSSI.
- ***Protoparmelia montagnei*** (W VU, NS, MRCSI); found new to North Wales during this survey in Glannau Aberdaron and Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSIs.
- ***Rinodina roboris* var. *armeriicola*** (GB NT, W NT, NR, MRCSI); found new to Wales during this survey
- ***Teloschistes flavicans*** (GB VU, W VU, S7, NS, MRCSI)

Taken together the SSSIs are greater than the sum of their parts. All three SSSIs support rich and nationally important maritime lichen interest, and although only Glannau Aberdaron SSSI meets the MRCSI threshold with a score of 38 using post-2000 records, the three SSSIs combined have an MRCSI score of 47 using post-2000 records. Although not the way the indices are supposed to be used this does nevertheless given an indication of the importance of the three sites if considered a ‘meta-site’ for maritime lichens.

Part of the reason for the complimentary nature of these SSSIs for maritime lichens must lie in the diversity across the three. Each has quite different geology; Glannau Aberdaron SSSI with interbedded siltstone and limestones, with microgabbro on the SW side of the peninsula, Mynydd Penarfynydd SSSI dominated by a mix of base-rich microgabbro and picrite, and Mynydd Cilan (within Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI) dominated by sandstones but with very localised basic influence. Cliff height, exposure and aspect must all play a part too, along with habitat conditons on the immediate clff-top, although much is dominated by martime grassland and heathland, most sites seem to be grazed to varying degrees providing suitable conditions for species like *Heterodermia leucomelos*, and where not they have eroding soil terraces providing niches for interesting species including the *Endocarpon pusillum*.

In addition to the maritime species, there is other interest in Mynydd Penarfynydd SSSI with an interesting representation of a coastal heath/saxicolous *Lobarion* community supporting species elsewhere only currently known from temperate rainforest sites in Snowdonia e.g. *Ricasolia amplissima*. With the 1970s records of *Lobarion* species e.g. *Ricasolia virens* from Glannau Aberdaron SSSI it may be that Mynydd Penarfynydd SSSI is a remnant of a more widespread coastal heath *Lobarion* community in West Llŷn, perhaps similar to that still found in the Scilly Is., but this is conjecture.

6.2. Habitat management issues

No immediate issues were noted but securing appropriate grazing management for the cliff top maritime heath and grassland habitats will be important, for the lichen interest and for the habitats. Evidence suggests that populations of both *Heterodermia leucomelos* and *Teloschistes flavicans* increased at Glannau Aberdaron following a slight reduction in grazing pressure in the later 2000s and early 2010s (pers. obs, Fleetwood 2013) but there are signs that the grazing and burning management around Trwyn y Gwyddel and Mynydd Mawr in Glannau Aberdaron SSSI are not currently ideal due to what appears to be a combination of burning and grazing frequency and intensity.

Most species have been recorded this century, however there are some notable gaps e.g. the records of *Ricasolia virens* and *Nephroma tangeriense* from Glannau Aberdaron SSSI. It may be that these still persist undiscovered, as the 1970s records are not particularly well localised. However, it is possible that Sulphur Dioxide pollution from shipping has caused the loss of these highly sensitive species.

6.3. Survey recommendations

It is almost certainly the case with these SSSIs that the more you look the more you will find. Arguably, after this survey we probably know enough to consider the sites to be all of national importance. Some gaps in coverage remain e.g. Dinas Fawr to Porth Llanllawen in Glannau Aberdaron SSSI, the eastern coastline of Mynydd Penarfynydd SSSI and the St. Tudwal's islands in Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI.

It may also be worth some targeted searching for the 'missing species' i.e. those not recorded since the 1970s.

The *Teloschistes flavicans* and *Heterodermia leucomelos* populations have not been fully documented in recent years, if at all. They have been surveyed at different times at Glannau Aberdaron SSSI, but with slightly different areas covered and with different methods of recording, no single definitive document exists collating all of this and no surveys have taken place since 2015. The large and widespread population at Mynydd Penarfynydd SSSI has not been surveyed since Giavarini's survey of 2004. It is suggested that it may be useful to undertake a site dossier for these species for the SSSI with a round of monitoring e.g. using the grid-mapping method used by Callaghan (2013).

7. References

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Appendices.

The Appendices of data tables have been removed from this version of the report because it is not possible to make them comply with Accessibility legislation. Full PDFs of the report are stored by the Natural Resources Wales Library and the National Library of Wales.

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.

[A] A spreadsheet of records in Microsoft Excel format.

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

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