



**Survey of Summit Vegetation on Pumlumon
SSSI**

M.D. Sutton

CCW Research Contract WDM214

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CRYNODEB GWEITHREDOL

Mae'r darn uchaf o SoDdGA Pumlumon, ar hyd cefnen y copa, ac arno lystyfiant a adnabuwyd fel sawl math o laswelltir toreithiog o gnwpfwsogl.

Gwnaethpwyd yr arolwg hwn i (1) ddilysu, ar y ddaear, ddelweddau lloeren o gopa Pumlumon uwchben 600m, gan ddefnyddio fersiwn o'r data lloeren WORLDVIEW mwyaf diweddar, a (2) bod yn llinell sylfaen ar gyfer gwaith monitro'r llystyfiant yn y tymor hirach, yn enwedig mewn mannau lle bo newidiadau i'r drefn pori.

Cafodd yr holl rywogaethau planhigion eu cofnodi mewn 50 cwadrat, mewn mannau a ddewiswyd yn bennaf i gynrychioli'r ystod o lystyfiant cnwpfwsogl a rhos *Racomitrium*. Hefyd cofnodwyd y rywogaethau planhigion a geir yn bennaf ar set o 50 o leoliadau pwynt.

EXECUTIVE SUMMARY

The higher altitude area of Pumlumon SSSI, along the summit ridge, includes vegetation identified as several varieties of clubmoss-rich grasslands.

This survey was carried out to (1) ground-truth satellite imagery of the Pumlumon summit above 600m, using a version of the most recent WORLDVIEW satellite data and (2) to act as a baseline for longer term vegetation monitoring, especially in areas undergoing changes of grazing management.

All plant species were recorded in 50 quadrats, at locations primarily chosen to represent the range of clubmoss vegetation and *Racomitrium* heath. Dominant plant species were also recorded at a set of 50 point localities.

1 INTRODUCTION

The Pumlumon SSSI consists of 3,848 hectares of upland habitats straddling the Ceredigion-Powys border. The SSSI is notified for a range of features including acid grassland, blanket bog, heath, oligotrophic lakes, upland breeding birds, an assemblage of lichens and mosses and a number of rare plant species such as *Carex bigelowii* and *Salix herbacea*.

Approximately 50ha of the SSSI consists of predominantly clubmoss-rich grassland (CCW 2005), with additional areas present as mosaics amongst other grassland types. This vegetation is present on the summits and ridges of Pumlumon Fawr, Pumlumon Fach, Pumlumon Arwystli and Carnfachbugeilyn. The community is uncommon in Mid Wales and consists of *Festuca ovina* with varying amounts of *Vaccinium myrtillus*, *Huperzia selago*, *Diphasiastrum alpinum* and *Cladonia portentosa*. CCW (2005) identifies this clubmoss rich grassland as resembling an impoverished U10 *Carex bigelowii*-*Racomitrium lanuginosum* moss heath but lacking many of the usual indicator species, due to chronic long term over-grazing. Alternatively, it may be derived from H18 *Vaccinium myrtillus*-*Deschampsia cespitosa* heath – again as a result of over-grazing.

The results of this survey are intended to (1) ground-truth satellite imagery of the Pumlumon summit above 600m, using a version of the most recent WORLDVIEW data, derived by Department of Geography, Aberystwyth University and (2) act as a baseline for longer term vegetation monitoring, especially in areas undergoing changes of grazing management.

2 METHODS

2.1 Quadrat Recording

Quadrat surveying took place between 31.8.12 and 3.9.12. Surveyors were Matt Sutton and Ray Woods. Vegetation was comprehensively recorded in 2 x 2m quadrats, 50 in total. These were located in areas of homogeneous vegetation, selected by eye to be relatively uniform over an area generally at least four times as large as the quadrat itself, ie. 8 x 8m. It proved impractical to cross-reference areas of homogenous vegetation on the ground with areas mapped as homogenous vegetation on the satellite imagery. Quadrat locations were primarily selected to represent the range of clubmoss vegetation and *Racomitrium* heath. A few quadrats were also selected to include *Carex bigelowii* and *Salix herbacea* populations, and a sample of other habitat types on the summits.

Quadrats were aligned on a north-south axis. The centre point of each quadrat was geo-located with a Trimble high resolution differential GPS. Oblique photographs were taken of each quadrat, from the north and south sides of the quadrat. The vegetation height was measured in the centre of each quadrat using a 30cm diameter 200g drop-disc. The percentage cover of all vascular plants, lichen and bryophyte species were recorded, together with any bare soil or rock. The frequency of sheep droppings was additionally recorded to give an idea of recent grazing pressure.

2.2 Point Recording

Dominant plant species were also recorded at a set of 50 point localities. These were again located in homogeneous vegetation, selected by eye to be relatively uniform over an area of generally at least 4 x 4m. Points were selected to represent the range of vegetation types around the summits, predominantly those not covered by the quadrat recording.

Each point was geo-located with a Trimble high resolution differential GPS. The vegetation height was measured using a 30cm 200g drop-disc. Points were photographed, and the three dominant vegetation components were recorded. If one or two species were strongly dominant, only these were recorded. Bare soil or rock was classed as a vegetation component.

3 RESULTS

Results are presented in spreadsheet format in two accompanying Excel files.

3.1 Quadrat Data

22 samples were taken in 'clubmoss-grassland', where one or both clubmosses occurred at at least 5% cover. The quadrat data shows that clubmoss-rich grassland near the summits varies relatively little in its species composition. Where both clubmosses occur together, *Diphasiastrum alpinum* is invariably the dominant species, reaching up to 75% cover. *Huperzia selago* is often present as occasional scattered plants, but never makes more than 5% cover. The accompanying suite of calcifugous grasses typically has some or all of *Festuca ovina*, *Deschampsia flexuosa* and *Agrostis vinealis* at high cover, with *Agrostis capillaris* typically frequent or at low cover, and *Nardus stricta* more localised in its occurrence. Sub-shrubs are locally abundant, with *Vaccinium myrtillus* and *V. vitis-idea* in varying proportion, sometimes accompanied by a little *Empetrum nigrum*. *Calluna vulgaris* is generally absent here. Sedges are represented by occasional *Carex pilulifera*. Forbs are scarce, the only species being constant *Galium saxatile* and occasional *Potentilla erecta*. The bryophyte flora is more diverse – *Racomitrium lanuginosum* dominates, but *Polytrichum* species are often abundant, and species such as *Dicranum scoparium*, *Hypnum jutlandicum* and *Campylopus flexuosus* are often occasional or frequent. Liverworts such as *Barbilophozia floerki*, *Diplophyllum albicans* and *Ptilidium ciliare* occur in small quantity. The lichen flora is characterised by various *Cladonia* species, most

typically *Cladonia uncialis*, *C. portentosa* and *C. furcata*. Very occasionally, seedlings of *Sorbus aucuparia* were noted in quadrats. Samples taken in heavily sheep-grazed clubmoss grassland (eg. Q21) tend to feature the same species, but with variations in percentage cover – *Festuca ovina* is more prevalent for example. The additional lichens in these quadrats, such as *Micarea lignana*, are ubiquitous ‘tramp’ species.

Both clubmosses also occur in flushed vegetation above the crags of Cwm Gwerin (Quadrats 45 and 50). This differs in the presence of *Sphagnum denticulatum*, together with *S. tenellum*, *Succisa pratensis* and *Solidago virgaurea* in one sample.

There is a fair degree of floristic overlap between the clubmoss grassland and the 19 *Racomitrium* heath samples, but the latter usually lack the clubmosses. They instead have a higher cover of sub-shrubs, including some *Calluna*, and an abundance of pleurocarpous mosses such as *Pleurozium schreberi*, *Hypnum jutlandicum*, *Hylocomium splendens*, *Rhytidiadelphus loreus* and *R. squarrosus* joining the *Racomitrium lanuginosum*. Heath dominated by *Calluna vulgaris* (Q39,40) had a bryophyte carpet dominated by *Hypnum jutlandicum* and *Pleurozium schreberi*, in the absence of *Racomitrium lanuginosum*.

The two *Salix herbacea* populations were located, and the following GPS co-ordinates recorded (with an accuracy of below 1m): (1) easting 278943.407 northing 287156.632; (2) easting 278955.672 northing 287141.815. The latter population was sampled (Q48). The *Salix* occurs here where a footpath crosses a boulder set in trampled, damp acid grassland. Saxicolous lower plants such as *Pogonatum aloides*, *Polytrichum piliferum* and *Stereocaulon vesuvianum* grow on the rock, whilst the surrounding thin turf is dominated by *Festuca ovina* and *Agrostis vinealis*.

The *Carex bigelowii* population was also sampled (Q3). The sedge is abundant here, alongside *Deschampsia flexuosa*, *Agrostis capillaris* and *Vaccinium myrtillus*. The bryophyte flora includes abundant *Polytrichum commune* and *Racomitrium lanuginosum*.

Samples were also taken from grassland strongly dominated by *Nardus stricta* (Q14) and *Festuca ovina* (Q19). Scree vegetation (Q24) had *Festuca ovina* and a variety of saxicolous bryophytes and lichens, including *Racomitrium fasciculare* and *Stereocaulon pileatum*.

Although fungi were not specifically recorded and few were seen, the presence of the BAP-listed *Clavaria zollingeri* on the open, eroded plateau around Q8 is notable.

3.2 Point Data

The point data shows that vegetation around the summits can be dominated by a variety of plants aside from those characteristic of the clubmoss vegetation and *Racomitrium* heath. Areas of degraded blanket bog or wet pool vegetation are variously dominated by *Eriophorum vaginatum*, *E. angustifolium*, *Juncus squarrosus*, *J. effusus*, *Carex rostrata* or *Sphagnum* species, and other grassland areas can have *Deschampsia cespitosa*, *Luzula sylvatica*, *Carex panicea* or *C. binervis*.

4 DISCUSSION

The number of samples appeared to be sufficient to fully characterise the range of clubmoss grassland and heath around the summits. Resurvey of at least a selection of samples should be carried out on a five or six year cycle, ideally at a similar time of year. Survey should be carried out by experienced botanists, as several species groups can present identification challenges. *Polytrichum* species, for example, may need to be collected if capsules are not present. The relative percentages of similar looking vegetative grasses, such as *Festuca ovina* / *Deschampsia flexuosa* and *Agrostis capillaris* / *A. vinealis* requires careful assessment. Surveyors should of

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course be prepared for poor weather – our survey had to contend with cold winds, low cloud and rain on most days.

Comments cannot be made at this stage on the match of this data to satellite imagery.

5 ACKNOWLEDGEMENTS

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6 REFERENCES

CCW (2005) *Pumlumon SSSI, Survey of National Classification Communities and Vegetation Condition*, Rigby Jerram.

APPENDIX 1: DATA ARCHIVE APPENDIX

Data outputs associated with this project are archived as Project No. [CCW to assign number] and Media No. [CCW to assign number] on server-based storage at the Countryside Council for Wales.

The data archive contains: [Delete A-E as appropriate. Adding additional information as required. A full list of data layers can be documented if required]

- [A] The final report in Microsoft Word and Adobe PDF formats.
- [B] A full set of maps produced in JPEG format.
- [C] A series of GIS layers on which the maps in the report are based with a series of word documents detailing the data processing and structure of the GIS layers
- [D] A set of raster files in ESRI and ASCII grid formats.
- [E] A database named [name] in Microsoft Access 2000 format with metadata described in a Microsoft Word document [name.doc].
- [F] A full set of images produced in [jpg/tiff] format.

Metadata for this project is publicly accessible through Countryside Council for Wales' Library Catalogue <http://www-library.ccw.gov.uk/olibcgi/w24.cgi> by searching 'Dataset Titles'. The metadata is held as record no [CCW to insert this number]