

BOTANICAL SOCIETY OF THE BRITISH ISLES

WELSH BULLETIN

Editor: S.G. Harrison B.Sc., F.L.S.

No. 38, JULY 1983

Price: 25 p



CONTENTS

Professor William S. Lacey, B.Sc., Ph.D., D.Sc., F.L.S., F.G.S., R.H. Roberts	1
Lloydia serotina, A.O. Chater	3
"Up the Airy Mountain, Down the Rushy Glen", Anne Burn	7

EDITORIAL

Following last year's disastrous lack of contributions, as a result of which the Summer 1982 number was not produced, I am happy to report excellent support from authors for this number. I am very grateful. Better too many contributions than too few or none at all.

PROFESSOR WILLIAM S. LACEY, B.Sc., Ph.D., D.Sc., F.L.S., F.G.S.

When Professor W.S. Lacey (Bill, as he likes to be called) retired from his post at the School of Plant Biology, University College of North Wales, Bangor, last autumn, he had served on the academic staff for thirty-six years.

Born near Leicester, and educated at Wyggeston Grammar School, the flora of nearby Charnwood Forest attracted him even as a schoolboy and when he went to the University of Reading, in 1936, it was to read Botany. From his very first year there he came under the influence of Prof. Tom Harris, F.R.S., a distinguished palaeobotanist, and it was to prove a decisive influence, for it set Bill's feet firmly on the course of his future career.

Graduation and a year studying for the Diploma in Education were followed, in 1940, by a move to Lancashire, where he was directed into a temporary wartime post at the Royal Ordnance Factory in Chorley. In 1943 he was appointed to a part-time lectureship in Biology at the Wigan and District Mining and Technical College; and then, in 1944, he became a fulltime lecturer there. Shortly afterwards he was active in establishing the Wigan and District Field Club and it was he who led its first field excursion (a Fungus Foray) in 1945. At this time, too, his active interest in field work led to the publication of his Flora of Chorley and District, a work which remained a principal source of records even when Travis's Flora of South Lancashire was published thirty years later.

Palaeobotany, however, was neither forgotten nor neglected, and the Millstone grit quarries, as well as the waste heaps of the collieries around Burnley attracted his interest. So did the Carboniferous Limestone quarries in North Wales, to which he made a cycling trip in 1945. In many ways this was an auspicious visit, for in 1946 he was appointed to the post of Assistant Lecturer at the Department of Botany, University College of North Wales, Bangor, where he was to remain for the rest of his working life, being made Lecturer in 1949, Senior Lecturer in 1965, and Reader in 1969. In 1976 the University of Wales awarded him a Personal Chair in recognition of his distinguished research record.

Soon after taking up his post in Bangor he began research on the fossil flora of the lower Carboniferous of North Wales for which his old University later awarded him a Ph.D. From then onwards throughout the 1960s and 1970s he published numerous papers on the Carboniferous floras of England and Wales and the Permian floras of Southern Africa. His international reputation as a palaeobotanist was duly recognised by the University of Wales when, in 1967, he was

awarded a D.Sc. More scholarly papers were yet to follow, for in subsequent years he extended his research interests to the Devonian of Eire.

The move to Bangor was to prove eventful not only for himself. His love of plants (and indeed of all aspects of wild life) was coupled with a deep concern for their conservation. When the North Wales Naturalists' Trust was formed in 1963 he was one of its founder members and became its first Honorary General Secretary. So began an active involvement with wildlife conservation in North Wales which was to take up much of his spare time over a long period. In its formative years, in addition to being Secretary, he edited the Trust's News Letter and served on the management committees of some of the reserves which the Trust was soon to acquire. In 1974 he relinquished the post of Hon. Sec. and became Chairman of the Trust, a position he still holds.

Because of his enthusiasm for nature conservation, his voluntary committee work has been concerned with various aspects of the countryside and wildlife: in 1972 he became a member of the Snowdonia National Park Committee, on which he served until 1982; he also served for some years on the Nature Conservancy Council's Advisory Committee for Wales. In 1970 he edited the book 'Welsh Wildlife in Trust', which was published to celebrate European Conservation Year. For his voluntary conservation work he was awarded the Queen's Silver Jubilee medal in 1977.

Bill has been a member of the B.S.B.I. for thirty years. He has made a valuable contribution to the Welsh Region Committee from its inception, serving as its first Chairman, and for a time as its Representative on Council. He has also contributed articles and notes to the B.S.B.I.'s journals, to the Welsh Bulletin, to Nature in Wales and to Transactions of the British Bryological Society on topics ranging from the spread of Galinsoga in Britain to Marsh-orchids, the flora of Ynys Seiriol (Puffin Island) and the appearance of a moss (Campylopus introflexus) new to Anglesey. He has written reports for the Nature Conservancy Council on the small but botanically rich and important fens of Anglesey and the Lleyn peninsula, and has continually pressed and worked for the conservation of these fragile remnants of Welsh wetlands. His enthusiasm for their wild life remains undiminished: whether on his beloved Cors Goch, in Anglesey, or Cors Geirch, in Lleyn (where he recorded Narrow-leaved Marsh-orchid (Dactylorhiza traunsteineri) for the first time in Wales in 1953); or in an oak woodland in Merioneth, amongst luxuriant mosses, lichens and filmy Ferns, he is equally at home.

We wish him many happy years of retirement in the land of his adoption.

R.H. Roberts

LLOYDIA SEROTINA

(Published in Welsh in Y Naturiaethwr 1982. Rhifyn 7, Ionawr 1982 p.2-7.)

Edward Llwyd botanised in Snowdonia on many occasions in the 1680s, and after the earliest visit of which we have a record, on 24 August 1682, he listed the more interesting plants and then added: "I observed several other plants, wch because they were not then in flower, I knew not whither to reduce" One of these unknown plants that he saw on this or a later visit was a small, bulbous herb with a single fruit at the top of the stem, growing on high rocks in several localities. In 1688 Llwyd sent a collection of plants from North Wales to his fellow botanist Jacob Bobart at Oxford, and evidently drew special attention to a specimen of this unknown bulb, for Bobart anxiously writes in his letter of thanks: "One thing I must express some part of my passion in wch you must excuse, that is that I am not soe fortunate as to find that bulb wch in yr letter you direct me to at the top of the biggest box, wch I search'd and researched grass by grass and can by noe means find; I feare it was not put in..." This collection of plants later became part of Sir Hans Sloane's herbarium which is now in the British Museum (Natural History); either Bobart did later find the missing bulb or Llwyd sent him a replacement, for there is a specimen of it in the collection.

In 1695 Llwyd published a list of "more rare plants growing in wales" in Gibson's edition of Camden's Britannia and took the opportunity of including the unknown bulb. The entry is worth quoting in full as it is the first appearance of our plant in print: "Bulbosa Alpina juncifolia pericarpio unico erecto in summo cauliculo dodrantali. A certain Rush-leav'd bulbous Plant, having one Seed-vessel on the top of an erect stalk about nine inches high. On the high rocks of Snowdon, viz. Trigvylchau y Clogwyn du ymhen y Gluder, Clogwyn yr Ardhu Crib y Distilh, &c. Mr. Lhwyd. It hath three or four more narrow and short leaves upon the stalk." Llwyd also reported, and perhaps sent, the plant to John Ray, the greatest botanist of the day, who included a very similar entry about it in the second edition of his Synopsis Methodica Stirpium Britannicarum published in 1696. In the absence of flowers Ray too was unable to classify it and placed it at the end of the bulbous-rooted herbs.

It is uncertain who first found the plant in flower. In an undated letter of about the time of Ray's publication Llywd wrote to the Rev. John Lloyd of Rhuthun that he understood that Dr. Humphrey Foulks (an Eton tutor and then rector of Llan Sain Siôr, Dinbych) "has found a plant in flower on Snowdon, which I have mention'd in Mr. Ray's Synopsis, but with the addition that I never saw the flower of it. I suppose 'tis either Subularia Lacustris Alpinorum Lacuum [Iscoetes lacustris, which it of course could not have been if it flowered] or the Bulbosa Alpina juncifolia; but would gladly be informed whether of them; and would be much obliged to him for the best description of the flower in your next letter..." Llywd himself saw it in flower presumably shortly after this, for in September 1696 he wrote to Tancred Robinson, the physician and naturalist, reporting on a journey earlier that year: "At Snowdon Hills we met with little or nothing additional to what is in Mr. Ray's Synopsis; only the little Bulb I found plentifully in flower..." He also sent a flowering specimen to Ray, who replied in an undated letter (ascribed by Canon C.E. Raven in his biography of Ray to 1696, but by R.W.T. Gunther in his edition of Ray's correspondence to 1699): "The Bulb with a single flower, wch you had seen in seed before, if it be not a plant sui generis but educible to any of ye known kinds, I think it may be referred to Ornithogalum"

In 1700 Llywd showed the plant to the botanist and antiquary Richard Richardson, who collected specimens which he sent to various botanical colleagues. The specimen he sent to James Petiver (which, like one he sent to John Buddle, joined Llywd's earlier one in the Sloane herbarium) was accompanied by a long note describing how "in Mr. Lhwyl's company we found several plants of it in flower upon the side of Trigvulcaugh being the first time we saw it in flower which was in the beginning of June..." In 1726, three distinguished botanists, Samuel Brewer, J.J. Dillenius and Littleton Brown, went to look for the plant; although they were accompanied by a guide called Griffith who had seen the plant with Richardson, Brewer recorded in his diary: "We did not find it, tho' Dr. Richardson says we were upon the very rock, being very dark and wet weather." Botanising is all too often still like this !

Interest in the plant continued unabated and many naturalists have recorded their experience of it. One chain of reports from the late 18th century, discussed by James Britten in the Journal of Botany, 1923, is typical. John Lloyd, whose primary interest was in geology, sent a specimen to Sir Joseph Banks in 1778. Banks seems to have doubted whether it was the correct plant, for Lloyd was provoked into justifying his identification by giving a vividly accurate description of how it grows, in a letter he wrote that October: "I was much surprised to find you were not satisfied of the bulbous Plant I sent being Bulbocodium [the current name for our plant]: I

do not recollect ever before having seen any Plant with a bulbose root near Lanberris; and the Leaves answered the Description very exactly; so I hope, upon the whole, you may be mistaken; it grew deep betwixt a Cleft in the Rock which was moist facing the North, with a great deal of Earth about the Root, which lay 4 Inches under the Splinter of the Rock." In November 1790 Lloyd wrote to Banks that J.W. Griffith (probably the son of the guide to Brewer's party in 1726) "spent some time this autumn at Llanberris... He has found every plant mentioned by the old Botanists... He has now a very fine and plentiful collection of them all... in his garden... The *Bulbocodium* blossomed in Mr. Griffith's Garden last month... he thinks all the specimens we have seen have been blossoms of the year preceeding that, when they were collected." Banks acquired another specimen in 1794, which is labelled: "Trig-y-fylichan, Part of the Glydr Range, on the N side of Llanberris in the county of Carnarvon; found by J.W. Griffith of Garn Esqr. the 23rd of June 1794," In 1800 Griffith sent a fresh specimen to J.E. Smith, the founder of the Linnean Society, who forwarded it to Sowerby who promptly and accurately figured it in English Botany t. 793.

Although Llywd discovered our plant new to Britain, it had been known from the Alps long before his time. The earliest detailed description of it is probably by Gaspard Bauhin in his Prodromus of 1620; he called it Pseudo-narcissus gramineo folio, sive Leuconarcissus aestivus. When Linnaeus published his Species Plantarum in 1753 and established his uniform binomial system of nomenclature, he called our plant Bulbocodium serotinum; in the second edition he called it Anthericum serotinum. It was not until 1812 that R.A. Salisbury, in a paper entitled "On the cultivation of Rare Plants" in the Transactions of the Horticultural Society of London, reopened Ray's suspicion that the plant might be sui generis and wrote: "As it constitutes a distinct genus, I have named it after the celebrated Edward Llhwyd, Esq." He also wrote: "A very rare British plant, which, I have no doubt, might be cultivated in a border of peat earth, kept constantly moist, and shaded by pales or a wall, not under trees or shrubs; for Dr. William Alexander, of Halifax, who, like Sir Thomas Gage, was near losing his life in climbing to the dangerous summits where it grows wild, preserved it for many years in his garden." Salisbury named the plant Lloydia alpina. Unfortunately in so doing he made two errors; firstly he should, under our retroactive rules of botanical nomenclature, have given some description of the new genus Lloydia, and secondly, he should have used Linnaeus's serotina as the species name. It was not until 1830 that the German botanist H.G.L. Reichenbach provided a description of the genus in his Flora Germanica Excursoria (the most compendious pocket Flora ever published). The correct name at last emerged as Lloydia serotina (Linnaeus) Salisbury ex Reichenbach. The Welsh name for the plant, Brwynddail y Mynydd, was coined by Hugh

Davies in his Llysieuath Gymraeg in 1813. The English names are Mountain Spiderwort and Snowdon Lily. There are now considered to be about 20 species in the genus.

Several of the more interesting features of Lloydia serotina have already emerged in the course of this brief history. Llwyd called it Bulbosa Alpina, and an alpine bulbous plant is in itself an unusual thing. Plants which die back in winter leaving the growing bud buried beneath the soil are called geophytes, and, probably because where there is only a very short growing season it is useful for a plant to get off to a flying start each spring by having its buds already at or above the soil surface, geophytes are rare at high altitudes and high latitudes. Bluebell and Lesser Celandine are two geophytes whose altitudinal range overlaps with that of Lloydia, but Lloydia is the only one in Britain confined to high altitudes. It is often difficult to find in flower, partly because in an average year not more than one plant in ten flowers, and partly because the flowering period is very short; J.E. Griffith in The Flora of Anglesey and Carnarvonshire says: "The best time to find it in flower is from 12th to 21st June." It usually grows in very inaccessible sites on north or east facing precipices, probably not only because it has been exterminated from the more accessible ones but because in our climate such cliff sites suit it best; it still, however, grows plentifully at waist height by a footpath at one of its four or five remaining stations. In Britain it is confined to Snowdonia, but in the world as a whole it is said to have the widest distribution of any species in the Liliaceae, occurring in widely discontinuous areas; the Alps, Carpathians, S.W. Bulgaria, Caucasus, Arctic Russia, Baikal, Altai, Himalaya and the arctic and mountainous parts of North America.

Although the petals (perianth-segments) have large, conspicuous nectaries with exposed nectar, no insects have ever been observed visiting the flowers of the British plants, and they have never been known to set seed. Even in the Alps, where insect visitors have often been observed, seed is very rarely set. The way in which the plant overwinters and reproduces vegetatively, and the remarkably complex structure of the bulbs, is described by N. Woodhead in his account of Lloydia for the Biological Flora of the British Isles in the Journal of Ecology, 1951.

Lloydia was certainly over-collected in the past and this has probably contributed to a decrease in its numbers since Llwyd's day. There are about 60 specimens from Snowdonia in the British Museum (Natural History), though none collected later than 1908. One specimen of 1826 is accompanied by a chilling note from one collector to another: "I am happy to send you this rarity as a return for your Cypripedium". J.E. Griffith saw basketfuls being collected in the

1880s. In 1975 Lloydia serotina was one of 21 species of plant to be given legal protection under The Conservation of Wild Creatures and Wild Plants Act, and may not, generally speaking, now be uprooted, destroyed or even picked. Like several other plants on this list, Lloydia needed protection particularly because of its undoubted appeal to the popular imagination. It is an embodiment of the rare, beautiful and inaccessible flower. A short story by C.E. Montague, In Hanging Garden Gully, published in a collection of stories entitled Fiery Particles in 1923, conveys perfectly this fascination in an account of an exciting and successful climb up Twll Ddu in Cwm Idwal to find the plant.

We can end with a curious episode. In 1968, in the Proceedings of the Botanical Society of the British Isles, R.F.O. Kemp published a new record of Lloydia from the Stanner Rocks, a well-known botanical site just inside Wales that has since been made a National Nature Reserve (for which a permit to visit is required). He had accidentally collected the plant, which had a shrivelled flower, along with a moss specimen on 12 April 1965, and wrote: "The plant would probably have been overlooked had it not been in flower on a date two months earlier than usual." It was a surprising place to find a high mountain species. The story now comes full circle, for in time it was realized that, like Edward Llwyd nearly three centuries before him, Kemp had discovered a species new for the British Isles. When the record was followed up and fresh flowers were found ten years later, it turned out to be not Lloydia but Gagea bohemica, undoubtedly native and very abundant, but hitherto overlooked because its infrequent flowering takes place in the first three months of the year. The days of discovery, even in so well-botanised a country as ours, are still with us and we need not look back to Edward Llwyd with envy.

A.O. Chater

"UP THE AIRY MOUNTAIN, DOWN THE RUSHY GLEN"
AN ACCOUNT OF BOTANICAL SURVEYS CARRIED OUT
BY NCC'S WALES FIELD UNIT - 1979-1983

The Nature Conservancy Council's Wales Field Unit was set up in 1979 with the aim of carrying out surveys on sites in Wales to provide information on their nature conservation interest. Field units were set up in England and Scotland at the same time. At the present time the Wales Field Unit consists of the leader (a geographer), two botanists, and an ornithologist. In addition, staff may be employed on contract to help with surveys during the summer

months. It was felt that an account of work done by the Field Unit might be of interest to readers of the Bulletin, and might lead to a useful exchange of information. This article summarises the botanical surveys completed to date, and outlines work planned for this summer

National Nature Reserves and Sites of Special Scientific Interest

Survey work may be required on Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs), and on undesignated areas. The Nature Conservancy Council (NCC) has a statutory duty to designate sites of sufficient quality as SSSIs. NCC seeks to negotiate with the owner of an SSSI to ensure that management of the site is not detrimental to the wildlife interest. In the 1981 Wildlife and Countryside Act provision is made for further action by NCC if the owner of a site refuses to enter into such an agreement; the effectiveness of this new legislation remains to be seen. NNRs are either owned or leased by the NCC or else are subject to management agreements which aim to protect the wildlife interest of the site.

Each county or district has a list or schedule of SSSIs, of which most are important for flora or fauna, although some are included on geological or geomorphological grounds. Certain outstanding SSSIs are listed in the Nature Conservation Review (Ratcliffe, 1977). These are referred to as NCR sites.

Why site surveys are needed

Survey of the vegetation of a site may be required for a variety of reasons. These are listed below, and each category of survey is then briefly described with the aid of examples. Survey of a site may be required:-

- (a) if a threat has arisen to a site of known interest
- (b) for the selection of SSSIs
- (c) for revision of site boundaries
- (d) In order to provide a basis for site management
- (e) for the monitoring of vegetation changes

(a) Threatened sites

Surveys in this category can be illustrated by describing work done on two large wetland sites in South Wales.

Crymlyn Bog SSSI is a lowland fen lying between the Swansea and Neath valleys in West Glamorgan. It supports a fine range of fen communities some of which are floristically very species rich, and

including areas of Great Fen-sedge (Cladium mariscus) and reed swamp (Phragmites australis). One national rarity and several regionally rare plants occur, and the site is also of considerable invertebrate interest. The site is the largest example of its type in Wales. The main threat to the site was constituted by a proposal to extend an area used for refuse disposal at the southern end of the site. There is also a problem created by seepage of oil onto the eastern edge of the site from the neighbouring refinery. A survey by the Field Unit provided information from which the range of plant communities present was classified and mapped (Meade, 1983). The survey confirmed the importance of the site in terms of nature conservation (it is of NCR quality), and provided a basis for evaluating the effect on the vegetation of the proposed extension to the tip.

A large wetland is associated with the Western Cleddau river in the Preseli District of Pembrokeshire. A survey was carried out in 1982 to determine whether any of the wetland area merited SSSI or NCR status, and whether a proposed drainage scheme would be detrimental to the interest of the site. As a result of the survey it was recommended that the core of the site should have SSSI status, and that this area would be severely damaged if the drainage scheme were to go ahead. (Smith, 1981).

Surveys to assess the effect of potential threats to sites have also been carried out at Rhyd-y-Foel Limestone SSSI in Clwyd, where an extension to an existing quarry was proposed (Smith, 1980) and on Cors Goch and Cors Erddreiniog, two Anglesey fens which have NCR status. Here surveys were carried out in connection with a proposal to drain part of the latter (Meade, 1981), and to provide information to assist in management of the sites.

(b) Selection of SSSIs

NCC has a set of guidelines for selection of biological SSSIs (Moore, 1979). Each scheduled site must fulfil certain specifications either in terms of flora or fauna. The guidelines contain recommendations for the number of examples of each habitat type which should be scheduled per selection area (usually a county) in order to obtain sufficient geographical coverage of sites.

Several Field Unit surveys have been devoted to assessment of a particular habitat either on a county or a Regional basis. A county will often have a few well-botanised examples of a particular habitat (e.g. woodlands) and a large number of less well-known examples. Survey of all examples of the habitat in question is necessary before sites can be assessed in relation to each other and the best examples selected as SSSIs. An example of this is a survey of semi-natural woodlands in North Wales by NCC's North Wales Region and the Field

Unit. All woodlands over 6 hectares in area (plus a few between 4-6 ha in area) are being surveyed, apart from a few for which access permission was refused. A standard survey technique is used; this involves recording 8 large quadrats (sample areas) within the wood, making a species list, collecting selected qualitative data and writing a short verbal description of the wood. The woods can then be grouped into types, using a nationally applicable classification. This will enable selection of the best examples of each type in North Wales to be made (e.g. the best examples of sessile oak woods rich in oceanic bryophytes, or the best examples of alder woodland). Survey of the abundant woodlands in North Wales is a major task, but is now nearing completion after 5 years. About 260 woods have been surveyed, and evaluation of the data is in progress (Day, report in preparation).

On a smaller scale, a survey of 16 commons in North Pembrokeshire was carried out in 1979; a classification of the vegetation types present was derived from analysis of randomly selected quadrat data. The sites were scored according to the rarity/abundance of the vegetation types present and this, together with qualitative site data, allowed comparison and assessment of the sites to be made.

A slightly different example is provided by a survey of three similar and adjacent upland areas in Radnor. Of these, Radnor Forest was found to have the greatest botanical interest. It has good examples of blanket mire and dwarf shrub heath and there are a number of base-rich outcrops (which are of limited extent in Radnor). These carry a diverse flora, including a number of regional rarities. Radnor Forest is considered to be of NCR quality. To the south of Radnor Forest, an area consisting of Glascwm Hill, Gwaunceste Hill and the ridge which runs towards the River Wye at Aberedw Rocks was also surveyed. Part of this area was found to merit SSSI status on the grounds that it carries extensive Calluna heath and that the many small pools present form the habitat for pillwort, Pilularia globulifera, a species of extremely local distribution in Britain. Some base-rich rock outcrops are also present at the southern end (some of these were already included in a separate scheduled site, Coed Aberedw SSSI). The site also has ornithological interest. The third site surveyed, Beacon Hill, lies to the north of Radnor Forest, and was found to have some wildlife interest but was not considered to merit SSSI status (Burn, 1982).

(c) Revision of site boundaries

Survey of a number of SSSIs has been carried out in order to check that the site boundaries include all the vegetation worthy of SSSI status. This is especially important at present as re-notification of all SSSIs following the Wildlife and Countryside Act of 1981 goes ahead.

Vegetation surveys of a number of upland sites come into this category. Surveys of part of Cader Idris and the NE Carneddau resulted in small areas being deleted from these two sites as they were not found to be of sufficiently high quality to merit inclusion in the scheduled sites (Burn, 1982).

Conversely, an area northeast of the Pumlumon SSSI was found to be of SSSI quality following survey in 1980, and a further small area to the northwest of the SSSI was scheduled as a separate site (Pencarreg gopa a Moel Hyrddod SSSI). This year it is hoped to complete survey of all the upland lying wholly or partly in Brecknock, which will allow a review of the boundaries of the scheduled sites to be carried out. These include Pen y Fan, Mynydd Du SSSI and the Eastern Black Mountains SSSI, all of which are of NCR status.

(d) Site management

The presence of a given assemblage of plants at a given site depends on the interaction of a number of environmental factors. To manage sites successfully it is necessary first to classify and map the plant communities present and then to understand the environmental factors which allow this pattern of distribution to occur. The complexity of ecological systems means that the latter is as yet imperfectly understood at many sites.

Vegetation surveys of the two Anglesey fens mentioned above are being followed up by studies by the Institute of Hydrology in order to relate the distribution of the vegetation types to the pattern of water movement on the two sites.

A similar survey of the fen communities at Oxwich NNR in Gower was carried out by the Field Unit and the NCC's Assistant Regional Officer for West Glamorgan in order to classify and map the vegetation and to relate it to the water chemistry and the movement of water on the site. (Meade, 1982).

Much work remains to be done on the distribution both of plant communities and of individual species within SSSIs. A number of Field Unit surveys have had the provision of this type of base-line information as one of their aims, as an aid to understanding and

subsequent management of sites. For example, the north-facing Old Red Sandstone cliffs of the Brecon Beacons are known to have a diverse flora including many national and regional rarities. However, many parts of the cliffs have never been systematically searched because of inaccessibility. In 1981 a technique for cliff survey was developed by a team composed of a member of the Field Unit and several NCC wardens (Smith, 1982). Sections of the cliffs at Bannau Sir Gaer (within Mynydd Du SSSI) and Craig Cerrig Gleisiad NNR were examined by means of vertical transects recorded by abseiling down the face of the cliffs. This provided information about notable plant species present and formed the basis of a classification of the vegetation of the ledges so that if cliff sites are examined in the future their vegetation can be related to that of the cliffs already surveyed.

(e) Monitoring

If an environmental change occurs on a site (e.g. raising or lowering of the water table) this is likely to be reflected by changes in the vegetation of the site. Vegetation is also subject to successional changes such as the gradual infilling of open water sites by accumulated plant debris, or the invasion of grassland by scrub in the absence of grazing. For the successful management of sites it is necessary first of all to establish whether changes in the vegetation are occurring, and then to determine the underlying causes of the observed changes. Positive steps can then be taken to prevent detrimental changes occurring e.g. it may be necessary to increase the grazing pressure on grassland sites to control scrub invasion, or to increase water inflow to part of a wetland to prevent drying out.

The Field Unit carried out a survey on the Carboniferous limestone grasslands, cliffs and heaths of the south coast of the Gower Peninsula in 1979-80 to establish a base-line and to set up a system for monitoring changes in the vegetation. (Smith, 1981). The vegetation was mapped according to a vegetation classification derived from quadrat data collected. Permanent quadrats, to be re-recorded at regular intervals, were then set up in each of the vegetation types present. The site is partly NNR and partly SSSI, and information on vegetational change was required in order to assist with management (e.g. grazing and burning regimes) and to record adverse changes brought about by addition of fertilizers to the cliff top grasslands.

Another monitoring exercise concerns the spread of the Cord Grass, Spartina anglica, in the Dee Estuary. This may be detrimental to migrant waders and wildfowl in the estuary. The distribution of

Spartina and other saltmarsh vegetation in 1971 and 1978/79 was compared, using air photographs in order to provide information on the rate of spread of Spartina. (White, 1982).

The 1983 field season

This year two main projects are planned. These are a survey of lowland wetlands (mainly in North Wales), and survey of a number of upland sites.

Wetland survey

This is a continuation of a survey of Welsh lowland wetlands carried out by NCC between 1978-82. During the survey 646 wetland sites were identified from O.S. maps. Of these only 340 were found to merit further survey. 177 sites were examined in detail, providing data for a classification and key to Welsh wetland vegetation (Ratcliffe and Hattey, 1982). 163 sites remain to be surveyed, mainly in North Wales. The aim of the 1983 survey is to examine as many as possible of these 163 sites in order to be able to compare them with the sites previously surveyed, and to allow selection of the best sites.

Upland survey

The Brecknock section of the Eastern Black Mountains was visited in May this year, and survey of Mynydd Epynt, also in Brecknock, is also planned. As described earlier, this will allow comparison of all the main upland blocks in Brecknock to be made, with a review of SSSI boundaries.

In South Wales a survey of uplands in Mid Glamorgan is planned, to follow a survey of uplands in West Glamorgan carried out last year. This will allow comparison and evaluation of these sites to be carried out on a county basis, and will allow the 4 small upland SSSIs in Glamorgan to be seen in context.

In Dyfed a survey of Mynydd Preseli is planned, to map the vegetation and provide base-line information on the NCR site.

In North Wales a survey of the Rhinog area is in progress, the aim being to map the vegetation of the NNR and the SSSI, and to review the SSSI boundary.

A standard survey method has been used for all the upland sites mentioned in the text. It is proposed to use this method for upland sites surveyed in 1983, with modifications in the case of Mynydd Preseli where the vegetation grades into lowland heath. The

vegetation is mapped onto plastic covered air photos in the field, using a nationally applicable vegetation classification. Further information in the form of quadrats and species lists is recorded in areas of botanical interest.

A vegetation map and written account of each site is produced as a result of the site survey. Comparison of upland sites on a county basis should be possible for Brecknock, Mid Glamorgan and West Glamorgan at the end of this field season. Most of the upland areas in Radnor, Dinefwr, Ceredigion and Gwent have been examined, together with some areas in Montgomery and 3 large sites in North Wales. Each of the upland sites examined to date has been surveyed for a specific reason (e.g. to check on a boundary or to provide base-line information on SSSI and NCR sites) but in the long term the aim of the survey is to cover all the main upland blocks in Wales, allowing inter-site comparison and evaluation on a regional basis and eventually within Wales as a whole.

Botanical records

In all botanical surveys an attempt is made to locate pre-existing floristic information and to collate it with information collected during the survey. The Field Unit would welcome any botanical information or records which readers of the Bulletin may be able to provide on any of the sites mentioned in the text, and particularly on those sites for which survey is planned in 1983.

Anne Burn

REFERENCES

- *Day, P. 1983 Report on survey of woodlands in North Wales. (in prepn.)
- *Meade, R. 1982 Botanical and hydrological survey of Oxwich Marsh.
- *Moore, N. 1979 Selection of Biological SSSI : Guidelines.
- Ratcliffe, D.A. (ed.) 1977 A Nature Conservation Review : Cambridge University Press
- *Ratcliffe, J.B., and Hattey, R.P. (1982) Welsh Lowland Peatland Survey.

* Internal NCC paper

Accounts of other surveys mentioned in the text are unpublished Field Unit reports.