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**Review of coverage of the  
National Vegetation Classification**

**JS Rodwell, JC Dring, ABG Averis, MCF Proctor,  
AJC Malloch, JHJ Schaminée, & TCD Dargie**

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For further information please contact:  
Habitats Advice  
Joint Nature Conservation Committee  
Monkstone House, City Road, Peterborough  
PE1 1JY  
UK

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# Contents

<b>Preface</b> .....	<b>4</b>
<b>Acknowledgements</b> .....	<b>4</b>
<b>1 Introduction</b> .....	<b>5</b>
1.1 Coverage of the original NVC project.....	5
1.2 Generation of NVC-related data by the community of users .....	5
<b>2 Methodology</b> .....	<b>7</b>
2.1 Reviewing the wider European scene.....	7
2.2 Reviewing NVC surveys .....	7
2.3 Reviewing information on species.....	8
<b>3 Levels of new variation and gaps</b> .....	<b>9</b>
3.1 Level 1: plant communities or sub-communities characterised in the NVC but with no supporting samples.....	9
3.2 Level 2: vegetation types described in the NVC at alliance or similar level where further sampling will characterise one or more plant communities .....	9
3.3 Level 3: plant communities described in the NVC which lose their integrity beyond a main geographic limit .....	9
3.4 Level 4: basal vegetation impoverished in floristics and of rank structure .....	10
3.5 Level 5: plant communities well characterised in the NVC but perhaps needing further sub-communities .....	10
3.6 Level 6: new variation and gaps at plant community level.....	11
<b>4 Variation best seen as complexes of existing NVC vegetation types</b> .....	<b>13</b>
4.1 Limestone pavement .....	13
4.2 Other complexes .....	14
<b>5 Conservation significance</b> .....	<b>14</b>
<b>6 Annotated conspectus</b> .....	<b>15</b>
Coastal mudflats and brackish waters .....	15
Salt-marsh and sea-cliff vegetation .....	16
Strandline and sand-dune communities .....	20
Freshwater aquatic vegetation .....	22
Springs, shorelines, swamps and tall-herb fens .....	26
Inundation and weed communities .....	32
Bogs and fens.....	38
Grasslands and heaths.....	41
Rock-crevice and scree vegetation .....	52
Montane heaths, tall-herb communities and snow-beds.....	53
Fringe, scrub and broadleaf woodland communities .....	57
Coniferous woodland communities .....	61
<b>7 References</b> .....	<b>62</b>
<b>Appendix 1</b> .....	<b>70</b>
<b>Appendix 2</b> .....	<b>78</b>

## Preface

The National Vegetation Classification (NVC) was commissioned in 1975 by the former Nature Conservancy Council to provide a comprehensive and systematic catalogue and description of the plant communities of Great Britain. The original specification for the work has been completed with the publication of the fifth and final volume of *British Plant Communities* (Rodwell 2000).

The Joint Nature Conservation Committee is responsible for maintaining the NVC and developing its use as a UK standard for the description of vegetation. This is important as the NVC has been used to implement key aspects of national and international site designation legislation. It has been used as the main classification for terrestrial habitats in *Guidelines for Selection of Biological SSSIs* (JNCC 1995), and has been used to interpret Annex I of the Habitats Directive where relevant (Brown *et al.* 1997).

Not only has the NVC been accepted as a standard by the nature conservation and countryside organisations, but also by forestry, agriculture and water agencies, local authorities, non-government organisations, major industries and universities. For example, it has been recommended as a standard methodology for use in environmental assessments and statements by the Institute of Environmental Assessors (IEA 1995). It has been widely welcomed as providing a much needed common language in which the character and value of the vegetation of Britain can be understood.

The original aim of the NVC was to cover all natural, semi-natural and major artificial habitats in Great Britain (but not Northern Ireland), covering virtually all terrestrial plant communities, and those of brackish and fresh waters, except where no vascular plants were the dominants. Since the publication of *British Plant Communities*, use of the NVC and comparison with European phytosociological classification systems has revealed that there are types of British vegetation which have still to be described.

As a result, the JNCC commissioned a review of the coverage of the NVC in 1998. This review has produced information on the current coverage of the NVC; identified both the known and likely gaps in the plant community descriptions; and placed these new types into the phytosociological scheme of the NVC. This publication presents the results of this review.

Much work has been undertaken both within and outside the conservation agencies on the description of plant communities and JNCC recognises the value of this work. Therefore, in consultation with others, the JNCC intends to establish a code or protocol that will circumscribe rules for the description of new variation in the NVC. The code would provide minimum standards for the description of new communities or sub-communities and a formal process for their validation and publication. An expert committee will be established and given authority to validate the descriptions of new types and ensure that the standards of the code are met.

**In publishing this report it is the intention of the JNCC to seek further response on the results of the review. Anyone wishing to comment on the content of this report or the development of a code should do so to: Deborah Jackson, Habitats Adviser, Joint Nature Conservation Committee, Monkstone House, City Road, Peterborough, PE1 1JY.**

## Acknowledgements

In addition to those named in section 2.2 who, specifically for this project or more generally over the years, have given us the benefit of their knowledge and experience about British vegetation and the coverage of the NVC, Dr John Hopkins and Deborah Jackson of JNCC provided comments on the draft report. An invaluable contribution to the collation of this material and to the production of the final report has been made by Michelle Needham, the co-ordinating secretary of the Unit of Vegetation Science. Deborah Jackson acted as nominated officer for the review and edited the final text. The views expressed in this document are those of the authors.

# 1 Introduction

## 1.1 Coverage of the original NVC project

The National Vegetation Classification (NVC) was intended to provide ‘standardised descriptions of named and systematically arranged vegetation types from all natural, semi-natural and major artificial habitats in England, Scotland and Wales’. Only short-term leys and assemblages dominated entirely by non-vascular plants were specifically excluded from the contract brief.

In fact, as is freely admitted in the published volumes of *British Plant Communities* (Rodwell 1991a *et seq.*), geographical and floristic coverage of the project was somewhat patchy and uneven. A total of 31,450 relevés was available for the project (Rodwell, Malloch & Winstanley 1993) and their distribution on the 10 km by 10 km National Grid is shown in Figure 1 in Appendix 1. The geographical gaps are clearly visible, particularly in Scotland where the original project was almost entirely dependent on existing data or samples being collected contemporaneously but by other workers.

Figure 1 also shows that the intensity of sampling within squares was very variable with many 10 km by 10 km squares having fewer than five samples, some over 100. This variation is only partly related to the diversity of vegetation types sampled within an area. While every effort was made during the three seasons of field work to ensure that the team of five surveyors covered as much ground as possible (Rodwell 1991a), the intensity of sampling reflects a measure of convenience of access. The particular interests of external contributors, whether in distinct vegetation types or certain areas, is also seen in the intensity of coverage.

A total of 295 plant communities has been characterised in the NVC; the overwhelming majority at a level approximating, as requested by the contract brief, to the plant association of continental phytosociological systems. Figures 2 and 3 in Appendix 1 show the overall distribution of the communities and their sub-communities on the 10 km by 10 km National Grid. It should be noted that some gaps in coverage of sampling in Figure 1 have records for plant communities in Figure 2. This is because there was sometimes available reliable information about the distribution of vegetation types defined in the NVC, even though no relevés had been collected. Figures 4 to 7 in Appendix 1 show the proportions of relevés, communities and sub-communities and 10 km by 10 km squares with relevés in the major vegetation types.

Unevenness of floristic coverage and some of the more obvious gaps were referred to in the accounts of relevant plant communities and in the general introductions to the major vegetation types in *British Plant Communities*. Figures 8 to 17 in Appendix 1 show the distribution on the 10 km by 10 km grid of the communities grouped in the major vegetation types recognised in the NVC.

## 1.2 Generation of NVC-related data by the community of users

The virtually universal adoption of the NVC as a descriptive standard by nature conservation and countryside organisations, forestry, agriculture and water agencies, local authorities, NGOs, major industries and universities has generated a large and diverse community of users of the scheme.

Training programmes such as that organised from the Unit of Vegetation Science have tried to ensure high and common standards of application of the NVC approach, both in field survey and the recognition of vegetation types within the NVC frame. More formal accreditation in NVC skills is now being offered by Lancaster University but meanwhile it is our informed opinion that such competencies are fairly widely dispersed among organisations and individuals, and generally high. Some practitioners and teams are outstanding, others poor, but the overall quality of additional information obtained on the character and distribution of plant communities has been good.

NVC skills have been applied with varying degrees of co-ordination in a large and diverse range of vegetation surveys. Some such surveys, like the Sand Dune Vegetation Survey of Great Britain (summarised so far in Dargie 1993, 1995 and Radley 1994), the Coastal Vegetated Shingle Structures of

Great Britain (Sneddon & Randall 1992*a, b*; 1993*a, b*) and a review of NVC data for woodlands (Hall 1997) have been more or less co-ordinated programmes of NVC survey funded by the nature conservation agencies and published as formal reports.

Other such programmes, like the ongoing upland surveys, have been partly published as scientific papers (Brown *et al.* 1993*a, b*) or, as with the Lowland Grassland Survey of Wales, summarised as internal agency reports. In other cases, as with the NVC Review of Scottish Grassland Surveys (Cooper & MacKintosh 1996), there has been a subsequent overview of separate earlier surveys of varying character. Yet other projects, like the Cumbria Mires Survey (Fojt 1994), have produced intensive surveys of particular vegetation types within limited areas.

Meanwhile, NVC methodology has increasingly become the standard for vegetation survey in Northern Ireland which was excluded from the original project. The Department of the Environment (Northern Ireland), for example, has commissioned work on woodlands, grasslands, the maritime zone (Cooper *et al.* 1992) and fens (ECOS 1995).

Many individual site descriptions, prepared as part of Phase II survey by the nature conservation agencies, or comparable surveys by other organisations such as the Royal Society for the Protection of Birds or more local organisations like the Wildlife Trusts, now also habitually use the NVC as a survey technique or descriptive frame. From the Suffolk Wildlife Trust, for example, we have reviewed NVC data and descriptions from 29 site reports.

The NVC is also a standard methodology for environmental assessments and statements (eg. Institute of Environmental Assessors 1995) and has been widely used to produce reports from a wide variety of planning situations. It is also used by key industries as a survey tool for restoration proposals, as with RJB Mining (UK) Ltd. Reports from these sources are not easy to access and we have seen relatively few. The NVC is taught in tertiary and continuing education as a standard skill for vegetation survey at various universities and colleges and related projects often generate site or vegetation descriptions in unpublished reports. Especially significant here are postgraduate MSc or PhD theses (eg. Wrightham 1996, Lunn 1998). County floras (eg. Graham 1988, Lavin & Wilmore 1996, Halliday 1998), and other books, such as the New Naturalist volumes (Webb 1986) often now refer to vegetation types using the NVC.

These programmes and projects have variously generated NVC-style samples, inventories, maps and commentary on the relationships of the vegetation types characterised to the NVC communities. However, there is no central source of information on the extent of such work or its products, no single location for publications or unpublished reports and no overall bibliography of NVC-related work. A start has been made in the Unit of Vegetation Science to produce an NVC library and a bibliography in ENDNOTE software but this work is not funded and necessarily sporadic. The references included in this report cannot claim to be a comprehensive NVC bibliography.

Neither is there any central computerised database of NVC samples beyond those assembled for the original project. These data were encoded in a contract for the NCC in 1990 (Malloch & Rodwell 1990) and supplied with the VESPAN database management software (Malloch 1988) and the offer of a site licence from its originator. Since that time, an unknown number of further samples (over 50,000?) has accumulated, some encoded in various types of database or spreadsheet software, many not, and widely dispersed in numerous locations that are not linked electronically or even aware of the location or format of data on identical or similar vegetation types elsewhere.

The disparate (and often uncertain) location of much of this material from subsequent applications of the NVC makes a complete review of coverage of the scheme and identification of gaps extremely difficult. Nonetheless, over the past decade, the deficiencies in coverage of the NVC have become more clearly defined. In the next sections, we outline the methods we have used to review the material available to us and identify gaps and areas of new variation. In this process of review, we have tried to use the same standards of definition as were employed in the original project, so as to ensure a roughly commensurate characterisation of new syntaxa at various levels. It is as well to remember that some of those who use the NVC with enthusiasm at a local level can be eager to define new variation which is of little

significance on a national scale. We have not included much local diversity which, though often significant at that scale, is probably best regarded as variants on a national level. Whilst acknowledging that the priority of the JNCC and country agencies is the description of vegetation which is important in an international, European and national context, we have been especially careful not to compromise the characterisation of new variation and gaps on the basis of the political implications of their occurrence or scarcity.

## 2 Methodology

### 2.1 Reviewing the wider European scene

It was part of the original NVC contract brief that each vegetation type should be compared to similar syntaxa elsewhere in Europe and an attempt was made in *British Plant Communities* to at least locate every plant community in its alliance and, where possible, to provide a phytosociological synonym (Rodwell 1991 *et seq.*).

As the project neared its conclusion, a draft *Phytosociological Conspectus of British Plant Communities* (Rodwell 1997) was prepared, organising the NVC vegetation types into the hierarchical frame of alliances, orders and classes currently being prepared by the European Vegetation Survey (Mucina 1997, Rodwell *et al* 1998). A revised version of this conspectus is now included in the final volume of *British Plant Communities* (Rodwell 2000). Those alliances considered to be ill-covered in the NVC were highlighted in this document and, in a further unsolicited report to JNCC (Rodwell & Dring 1996), these were set within a review of geographical coverage of the NVC. In common with approaches elsewhere in Europe, assemblages of stoneworts (*Chara*, *Nitella*, *Nitellopsis* and *Tolypella* spp.) were included in this phytosociological frame, though the exclusion of other freshwater algal communities and cryptogam assemblages may seem illogical.

Comments on the coverage of the NVC within this phytosociological framework have been provided for this project by Dr Joop Schaminée of the Instituut voor Bos- en Natuuronderzoek in The Netherlands, Co-ordinator of the Dutch Vegetation Survey, and Professor Victor Westhoff, chair of the Co-ordinating Committee for that project. This has provided an expert perspective from a neighbouring part of Europe whose own vegetation survey is now published (Schaminée *et al.* 1995 *et seq.*).

An extensive review has been undertaken of other phytosociological literature from the Atlantic biogeographic zone summarised in Julve (1993), Pott (1994), Dierschke *et al.* (1997), Fremstad (1997) and the older but still very valuable *catalogue raisonné* from Ireland (White & Doyle 1982), to assess whether plant communities occurring in neighbouring countries and so far not described in the UK are likely to be represented here.

Such information needs to be treated with some caution since, as is obvious already from *British Plant Communities*, certain vegetation types that are clearly defined in neighbouring parts of Europe tend to lose their integrity in the UK. This is especially true of those plant communities with strong Continental affinities, whose characteristic species begin to disappear with the shift to the cooler and wetter climate of the Atlantic seaboard. Certain habitats, like acidic dune sands, also tend to be less well represented in this country than in mainland Europe, so their vegetation types are correspondingly scarce.

The *Phytosociological Conspectus* has been used as the basis for the presentation of the results of this review, so as to contextualise any proposed additions to the NVC within a sensible overview of the existing communities. This annotated conspectus is presented in section 6.

### 2.2 Reviewing NVC surveys

Major NVC surveys such as those of sand dunes (Dargie 1993, 1995; Radley 1994), shingle (Sneddon & Randall 1992*a, b*; 1993*a, b*) and grasslands (Cooper & MacKintosh 1996), have been reviewed and an appraisal made of any vegetation types characterised there which could not be accommodated in the NVC. The extensive (though not comprehensive) library of NVC-related reports from the conservation

and countryside agencies, NGOs and universities has been reviewed and any potential new variation identified.

Details of this project, together with a *Phytosociological Conspectus of British Plant Communities* highlighting possible gaps were sent to the country agency specialists requesting any assistance that could be provided. This was followed after four weeks by a draft of the annotated *Conspectus* containing an outline of possible new communities with a request for any further comments. We have received information on possible gaps in the NVC from Tim Blackstock, David Stevens and Marcus Yeo of the Countryside Council for Wales, Keith Kirby and Richard Jefferson of English Nature, and Kathy Duncan, Andrew Coupar and David Horsfield of Scottish Natural Heritage. We have also discussed various possible new plant communities with these contributors where necessary.

Additionally, information and opinions on gaps in coverage have been received from Professor Donald Pigott (various vegetation types), Chris Preston of the Centre for Ecology and Hydrology (CEH) Monkswood (freshwater aquatic vegetation); Mike Prosser and Hilary Wallace, (lowland wet grasslands and heaths), Phil Lusby (grasslands), Gordon Rothero (snow-beds), Nick Hodgetts (cryptogams), Alan Orange, Alan Fryday, Oliver Gilbert (lichens). The Biological Records Centre at CEH Monkswood kindly prepared the data for Figures 18-27 shown in Appendix 1.

More widely, the network of contacts developed over the years by the Unit of Vegetation Science has been used to review information and opinions supplied by Elizabeth Cooper (grasslands and mires), Simon Leach and Wendy Cox (lowland wet grasslands), Henry Adams (mires), Mike Harding (various), Jeff Lunn (colliery spoil vegetation).

## 2.3 Reviewing information on species

Before this project, information on the scarcity or rarity of vascular plants in Britain had already been encoded into the species lists of the UK Vegetation Database using various sources: category A in the *Atlas of the British Flora* (Perring & Walters 1962), categories A, B and C from the NCC 'dot-day' exercises on plant distribution, various categories from *British Red Data Books I: Vascular Plants* (Perring & Farrell 1977) and from *Scarce Plants in Britain* (Stewart *et al.* 1994). For this project, the IUCN categories that are employed in the revised *Red Data Book* (Wigginton *ed.*, 1999) have been added to the Database files.

In *British Plant Communities* the first three of the above sources were used to define the rare vascular plants noted in each community description. These were lists of the rare species represented in the samples that had been used to characterise each community or which were reliably known to occur in the vegetation type. It has since been possible to produce a fuller overview of the representation of rare and scarce plants among the NVC data and this is summarised in Appendix 2 where all such species are listed with their various categorisations and an indication of whether they are represented in the floristic tables of *British Plant Communities*. For reasons of economy of space, the published floristic tables omitted any species represented in less than 5% of the samples used to define the community or sub-community, but interrogation of raw samples in the UK Vegetation Database enables any further rare or scarce plants represented in fewer samples than this to be allocated to the existing NVC communities using MATCH and SIMIL software keys. The list of such allocations has been circulated to country agency specialists for comment and is included in Appendix 2.

It has then been possible to review the rare and scarce plants not represented in the NVC data so as to provide some opinion as to where these species occur in existing NVC communities or in vegetation types so far omitted in the scheme. Expert allocations of this type have been included in Appendix 2 and used in the characterisation of gaps.



### 3 Levels of new variation and gaps

It is helpful to categorise the gaps in coverage in the NVC and new variation emerging from the review at different levels of definition (levels 1 to 6 below). So as to be comprehensive, we have included among these categories those vegetation types which were characterised at community or sub-community level in *British Plant Communities* but with no supporting samples and also those defined there at alliance level only.

#### 3.1 Level 1: plant communities or sub-communities characterised in the NVC but with no supporting samples

A number of vegetation types figure in the NVC as plant communities with a name, code number and description but with no supporting relevés. These are the A6 *Ceratophyllum submersum* community, SM2 *Ruppia maritima* salt-marsh community, SM3 *Eleocharis parvula* salt-marsh community, SM4 *Spartina maritima* salt-marsh community and SM5 *Spartina alterniflora* salt-marsh community, all of which have been characterised too in other parts of Europe. For some of these vegetation types, relevés have been traced, for others sampling is still necessary, but all are either widespread or occur at a few well-known localities so further survey would be relatively simple. It is especially pressing for *Eleocharis parvula* and *Spartina alterniflora* which are rare species.

A single vegetation type described in the NVC at sub-community level, the *Arrhenatherum* sub-community of MG3 *Anthoxanthum-Geranium* grassland, has no supporting data. It is quite widespread on ungrazed road verges within the range of these traditional northern hay-meadows and is of importance as a locus for some of the typical species of this vegetation type. These ranker swards with northern montane plants are also interesting because, in Scotland, typical hay-meadow species of this sort also occur in M27 *Filipendula-Angelica* tall-herb fen and under *Pteridium aquilinum* in vegetation that is transitional to the U17 *Luzula-Geum* tall-herb community. This whole range of vegetation types would repay further study.

#### 3.2 Level 2: vegetation types described in the NVC at alliance or similar level where further sampling will characterise one or more plant communities

Several vegetation types were given a name and code and described in general terms at alliance or similar level in the NVC with the suggestion that further survey could characterise one or more units at community level. These are the M30 Hydrocotylo-Baldellion communities of seasonally inundated habitats, M36 Cardaminion vegetation of shaded lowland springs and streambanks, S23 Glycerio-Sparganion water-margin vegetation, SM1 Zosterion eel-grass communities and SM27 Saginion maritimae ephemeral salt-marsh vegetation. Relatively few data have since been accumulated for these alliances but it is now possible to be rather more precise about the character of the communities they comprise. In the light of surveys or overviews from neighbouring parts of Europe, it may be possible to recognise as many as 16 new communities among these alliances, with those of the M30 Hydrocotylo-Baldellion being of especial interest in providing a locus for rare or scarce plants such as *Deschampsia setacea* and *Pilularia globulifera*.

#### 3.3 Level 3: plant communities described in the NVC which lose their integrity beyond a main geographic limit

Some vegetation types encountered since the development of the NVC have presented problems of definition where stands occur beyond the geographical limit of some of the more distinctive plants of an NVC community but are so generally similar in floristics and habitat relationships as to be of essentially the same vegetation type. Especially problematic has been M24 *Molinia-Cirsium dissectum* fen-meadow which is extensively found in Wales and Southern Scotland in more or less typical form but beyond the limit of *Cirsium dissectum* and sometimes also of *Juncus subnodulosus*. Other examples of this kind are CG7 *Festuca-Hieracium-Thymus* grassland on somewhat drought-prone lime-rich soils beyond the range

of more thermophilous calcicoles like *Thymus pulegioides* and *Cirsium acaule*, humid heath of the H4 *Ulex-Agrostis* type beyond the range of *Agrostis curtisii*, soakways of the M29 *Hyperico-Potametum* type outwith the distribution of *Hypericum elodes* and the M14 *Schoenus-Narthecium* mire which certainly has a range wider than that described in *British Plant Communities* but which loses some of its Oceanic West European plants in the shift from the Cornish coast to Wales.

Sometimes, this kind of floristic shift has been catered for in the NVC by characterising sub-communities which have a poor representation of a particular phytogeographical element, usually towards the north and west of their range. This can be seen in CG2 *Festuca-Avenula* grassland and W10 *Quercus-Pteridium-Rubus* woodland. Further sampling of problematic communities and reanalysis of new and old data should help clarify these situations. For the moment, it seems sensible to retain the stands within the relevant vegetation type at sub-community level.

### **3.4 Level 4: basal vegetation impoverished in floristics and of rank structure**

A different kind of floristic impoverishment is seen where one or two competitive species from a widely occurring plant community become overwhelmingly dominant, crowding out less robust associates to produce rank, tall or tussocky vegetation. Often, this is the result of a reduction or abandonment of grazing, mowing or burning and a fall in the ground water table and it is seen especially clearly in M24 *Molinia-Cirsium* and M26 *Molinia-Crepis* fen-meadows, M25 *Molinia-Potentilla* mire and M15 *Scirpus-Erica* wet heath, in all of which *Molinia caerulea* can become extremely abundant.

In some of the accounts in *British Plant Communities*, such impoverishment is described as being especially associated with particular sub-communities of the vegetation types concerned but often the impoverishment is such that it is impossible to characterise the vegetation even at community level. One possibility then would be to recognise what in Continental schemes have been called ‘basal communities’ (Kopecky & Hejny 1974), affiliated to a higher-level syntaxon like an alliance or order, or the splendidly named ‘rump communities’ of Schaminée *et al.* (1995 *et seq.*).

Some newly-described ranker grasslands may, however, be better characterised at community level where there is a somewhat more varied assemblage of dominants and associates. Various surveys, for example, have recognised rank swards with an abundance of *Festuca rubra* and *Holcus lanatus* with frequent *Anthoxanthum odoratum*, *Poa pratensis* and *Trifolium repens* but lacking the maritime character of MC9 *Festuca-Holcus* grassland. This seems often to derive from a neglect of mowing in traditional meadows, often compounded by a drop in ground water levels where this has been important in helping maintain species-richness.

### **3.5 Level 5: plant communities well characterised in the NVC but perhaps needing further sub-communities**

Extensive further sampling since the NVC has revealed considerable variation within some vegetation types that are already described in *British Plant Communities* which is not adequately covered by the range of existing sub-communities. In other cases, new variation looks like vegetation that is intermediate between communities already defined in the NVC that could well be considered as a sub-community of one or the other.

In some cases, existing NVC communities have been found to include floristic and physiognomic variation on a scale that is elsewhere in the scheme represented by several separate communities. A prime example here is M15 *Scirpus-Erica* wet heath which, though acknowledged as diverse in *British Plant Communities* probably encompasses as much variety as several of the blanket and raised mire communities together. Drier heaths, too, like H10 *Calluna-Erica*, H12 *Calluna-Vaccinium* and H21 *Calluna-Vaccinium-Sphagnum* heaths have been found to include forms with abundant *Juniperus communis*, *Arctostaphylos uva-ursi* and *Racomitrium lanuginosum* which cannot readily be accommodated among existing sub-communities, while upland swards like U5 *Nardus-Galium* and U6 *Juncus-Festuca* grasslands have transitions to heaths and tall-herb communities that are not covered in the NVC.

Some more montane communities like U7 *Nardus-Galium* grass-heath and U8 *Carex-Polytrichum* sedge-heath have distinctive types characterised by suites of oceanic bryophytes, and further survey among snow-beds suggests both new sub-communities in U11 *Polytrichum-Kiaeria* vegetation as well as some new communities.

Unimproved grasslands of the MG5 *Centaureo-Cynosuretum* type include more variation than is described in the NVC and there are transitions between these swards and the MG3 *Anthoxanthum-Geranium* meadow in the North Pennines. Between there and the Vale of York, there are also transitions between the latter and MG4 *Alopecurus-Sanguisorba* flood-meadow. The MG6 *Lolio-Cynosuretum* also appears to have a distinctive sub-community on reclaimed coastal marshes.

Among tall-herb fens, there seems to be an additional type of M27 *Filipendula-Angelica* mire from Scotland characterised by Northern Montane preferentials, and stands of M25 *Phragmites-Eupatorium* and M26 *Phragmites-Urtica* communities where *Junci* and associates typical of *Junco-Molinion* rush pastures are frequent.

Woodlands such as W10 *Quercus-Pteridium-Rubus*, W11 *Quercus-Betula-Oxalis*, W16 *Quercus-Betula-Deschampsia* and W17 *Quercus-Betula-Dicranum* communities can have field layers so overwhelmingly dominated by either *Luzula sylvatica* or *Pteridium aquilinum* that they cannot readily be included in any existing sub-community. Then, in wetter W4 *Betula-Molinia* and W7 *Alnus-Fraxinus-Lysimachia* woodlands in the Scottish uplands, *Salix aurita* is such a distinctive local dominant in shrubby canopies that distinctive types of vegetation ought perhaps to be recognised.

### 3.6 Level 6: new variation and gaps at plant community level

Finally, and most obvious among the variation emerging from survey subsequent to the NVC or as gaps suggested by a consideration of associations characterised elsewhere in Europe, are potential new communities. We can provisionally recognise 50 such vegetation types in addition to those likely to be defined from existing alliances (level 2 above). In total, this would increase the number of communities in the NVC by 20%, though most of the newcomers are relatively modest in scale and may have no sub-communities. Indeed, further sampling may reveal that this is too generous an estimate altogether as some Continental syntaxa we have included may occur no more than very fragmentarily in the UK.

The distribution of these provisional new communities (plus those characterised at level 2 from existing NVC alliances) within the phytosociological frame is summarised in Table 3.1. For most of these, it has been possible to provide an outline description in Section 6, though some (marked with an asterisk in Table 3.1) have been treated together because, at the moment, we know so little about each.

Given the particular methodology adopted by the NVC with its focus on homogeneous stands and the limited resources available for survey (5 staff for 3 field seasons, plus some external contributors), the weaknesses in coverage and the gaps identified in this exercise are to some extent predictable. In habitat terms, they tend to be:

- transitional or marginal situations like woodland fringes or hedge-bottoms;
- fragmentary habitats like rock outcrops and scree crevices;
- ephemeral situations such as seasonally-flooded hollows and temporary pools; and
- more remote, inaccessible or awkward situations like cliff ledges, snow-beds and open waters.

In phytosociological terms, the biggest weaknesses and most numerous gaps are among the freshwater aquatic vegetation of moving and standing waters (Parvopotamion, Callitricho-Batrachion, Ranunculion, and Charetea vegetation: perhaps 11 new communities) shallow or fluctuating pools (Eleocharition, Hydrocotylo-Baldellion and Nanocyperion: perhaps 8 new communities) and water-margins and springs (Cardamino-Montion and Sparganio-Glycerion: perhaps 7 new communities).

**Table 3.1** Provisional new communities characterised at levels 2 and 6 arranged under their phytosociological formations and alliances

<b>COASTAL MUD-FLATS AND BRACKISH WATERS</b>	
SM1 <i>Zosterion marinae</i>	2
<i>Ruppion maritimae</i>	1
<b>SHINGLE, STRANDLINE AND SAND-DUNE COMMUNITIES</b>	
<i>Silenion maritimae</i>	1
<i>Salsolo-Honkenyion</i>	1
<i>Atriplicion littoralis</i>	3
<b>FRESHWATER AQUATIC VEGETATION</b>	
<i>Nitellion</i>	1
<i>Charion fragilis</i>	2
<i>Charion vulgaris</i>	3
<i>Parvopotamion</i>	1
A16 <i>Callitricho-Batrachion</i>	4
<b>SPRINGS, SHORELINES, SWAMPS AND TALL-HERB FENS</b>	
<i>Cardamino-Montion</i> (including M36)	3
<i>Eleocharition</i>	2
M30 <i>Hydrocotylo-Baldellion</i>	5
<i>Nanocyperion</i>	1
<i>Phragmition australis</i>	1
SM23 <i>Sparganio-Glycerion</i>	4
<b>WEED COMMUNITIES</b>	
<i>Sisymbriion</i>	1
<i>Convolvulion</i>	3
<i>Aegopodion</i>	2
<i>Galio-Alliarion</i>	1
<i>Arction</i>	2
<i>Onopordion</i>	1
<i>Dauco-Melilotion</i>	1
<i>Atropion</i>	1
<b>MIRES</b>	
<i>Caricion nigrae</i>	1
<b>GRASSLANDS AND HEATHS</b>	
<i>Calthion palustris</i>	1
<i>Potentillion anserinae</i>	2
<i>Cynosurion cristati</i>	1
<i>Thero-Airion</i>	3
<i>Alysso-Sedion</i>	1
<i>Sedion anglici</i>	1
<b>ROCK-CREVICE AND SCREE VEGETATION</b>	
<i>Cystopteridion fragilis</i>	3
<b>MONTANE HEATHS, TALL-HERB COMMUNITIES AND SNOWBEDS</b>	
<i>Nardo-Caricion</i>	1
<i>Adenostyliion</i>	1
<i>Salicion herbaceae</i>	2
<b>FRINGE, SCRUB AND BROADLEAF WOODLAND COMMUNITIES</b>	
<i>Geranion sanguinei</i>	2
<i>Melampyrion pratensis</i>	2
<i>Sambuco-Salicion auritae</i>	1
<b>CONIFEROUS WOODLAND COMMUNITIES</b>	
<i>Dicrano-Pinion</i>	1

A further substantial group of new communities comprises weedy vegetation (*Sisymbriion*, *Arction*, *Onopordion*, *Dauco-Melilotion*: 5 communities) or rank vegetation of clearings, woodland fringes and river banks and shoals (*Convolvulion*, *Aegopodion*, *Galio-Alliarion*, *Arction* and *Atropion*: 9 possible communities). *Saum proper* comprises a related group (*Geranion* and *Melampyrion*: 3 communities perhaps).

Shingle and strandline vegetation (*Silenion*, *Salsolo-Honkenyion* and *Atriplicion*: perhaps 5 communities) and mud-flat and lagoon assemblages (*Zosterion* and *Ruppion*: 3 communities) are the major omissions at this level among maritime vegetation.

Among lowland grasslands, the most substantial deficiency appears to be among wetter swards in floodplains, on grazed river terraces that are kept very moist and from periodically inundated hollows among pastures and more base-poor dune slacks. The realm of variation included here has emerged as quite complex and spanning parts of a number of at present distinct NVC communities (Calthion, Potentillion and perhaps also Caricion nigrae: 2 or 3 new communities). Ranker swards of damp clay banks and soil dumps (Potentillion: 1 community) and of neglected meadows and pastures (Cynosurion: 1 community) also belong to this lowland grassland group.

Ephemeral-rich vegetation of shallow, drought-prone sandy soils (Thero-Airion: perhaps 3 communities), stonecrop swards of outcrops and rock-hollows or crevices (Sedion anglici and Alyso-Sedion: 2 communities) and fern assemblages of shaded talus, rock clefts and banks (Cystopteridion: 3 communities) comprise a further distinctive and under sampled group.

From the montane zone, the major deficiencies appear to be among snow-bed assemblages (Salicion herbaceae: 2 communities), tall-herb vegetation (Adenostylin: 1 community) and fell-field (Nardo-Caricion: 1 community).

Finally, among woodlands and scrub, it appears that lowland elder-willow scrub (Sambuco-Salicion) and lichen-rich pine woodland from Scotland (Dicrano-Pinion) are the major omissions among semi-natural vegetation, though we have suggested categories for *Rhododendron ponticum* scrub and conifer plantations. Saum vegetation could also sensibly be included here (Geranion and Melampyrion: 2 communities).

## **4 Variation best seen as complexes of existing NVC vegetation types**

### **4.1 Limestone pavement**

Some variation encountered in vegetation survey is difficult to sample using the standard NVC methodology and hard to accommodate within the frame of the classification because it is essentially a complex of various vegetation types. A prime example of such a complex is the vegetation of limestone pavements which is frequently described as 'not fitting the NVC'.

In fact, although some of the component communities are poorly covered in the NVC (like stonecrop stands, for example or Saum), there is nothing encountered on the various forms of limestone pavement that cannot be described in terms of fragments or complexes of a variety of vegetation types already represented in *British Plant Communities* or provisionally characterised in this overview. What is distinctive about the vegetation of limestone pavements is the intricate fashion in which these elements are disposed over a diversity of physiographic features like clints, grikes and solution hollows and transitions to the surrounding context of cliff, scree, grassland, woodland, mire or heath.

The following list gives some indication of the vegetation types associated with these various elements:

Deeper grikes

essentially a field layer of W9 *Fraxinus-Sorbus-Mercurialis* woodland

Shallower grikes and bigger clint crevices

OV38 *Gymnocarpium robertianum* fern vegetation

Smaller crevices in grikes and clint surfaces

OV39 *Asplenium trichomanes-rutae-murariae* fern vegetation

OV40 *Asplenium-Cystopteridium fragilis* fern vegetation

Shallower soil-filled grikes

CG9 *Sesleria-Galium* grassland

MG5 *Centaureo-Cynosuretum* grassland

Shallower peat-filled grikes

M10 *Pinguiculo-Caricetum dioicae* small-sedge fen

M26 *Molinia-Crepis* fen-meadow

M27 *Filipendula-Angelica* tall-herb fen

Solution-hollows on clint surfaces

M10 *Pinguiculo-Caricetum* small-sedge fen  
algae/cyanobacterial assemblages

Seasonally-desiccated soils on clint surfaces

*Saxifrago-Poetum compressae* community

*Airo-Sedetum anglici* stonecrop community

Pavement surrounds

*Rubo-Origanetum* woodland fringe community and transitions to various grassland, woodland, mire and heath communities

## 4.2 Other complexes

There has always been difficulty in relating vegetation types distinguished by the NVC with classification units characterised from lakes, where whole water-bodies or parts of them, rather than homogeneous stands of vegetation, have been the sampling units (eg. Palmer 1992), from rivers where lengths of water course or bank have been used for sampling (eg. Holmes 1983 and Holmes *et al.* 1999), or from ditches where water and bank have often been sampled together. However, provided good quality data are available from these different approaches, there is nothing in principle to prevent informative cross-references between them being made. The other value of these alternative approaches for phytosociological survey is that they characterise distinctive aquatic complexes within which NVC sampling can then take place. This will be especially useful where such classification can help target missing vegetation types as outlined above.

## 5 Conservation significance

The original contract brief stated that the NVC should aim to be comprehensive in its coverage and include vegetation from all natural, semi-natural and major artificial habitats, except where non-vascular plants were the dominants. Only short-term leys were specifically excluded, and though care was to be taken to sample more pristine and long-established kinds of vegetation, no undue attention was to be given to assemblages of rare plants or to especially rich and varied sites.

This review of the NVC has continued to work to such a brief and has not focused unduly on rare or threatened communities, or on communities with high biodiversity interest. However, the review has attempted to grade the vegetation which is not yet described according to its nature conservation significance, and in particular, identify types of vegetation which characterise habitat types that are listed on Annex I of the EC Habitats Directive that are not currently described by the NVC or that have important variation which is not described. The *Interpretation manual of European Habitats* (European Commission 1999) and the site selection process has increased our understanding of the nature of these vegetation types and the variation has been taken into consideration during the site selection process. However, the description of these types will assist the country agencies in site management and safeguard and therefore is a priority for further work.

Some of this variation has already been well covered by new survey work and description and the outstanding task is to formally characterise it; for other vegetation types, there are existing samples but these would need to be supplemented with further field work before analysis to ensure that the full range of geographic variation is incorporated; and for others there are no substantial data collected for them at all or they have not been sampled in an NVC-compatible manner. New variation which may relate to habitat types listed on the Habitats Directive is marked with an asterisk in Section 6.

## 6 Annotated conspectus

The results of this review are presented below within the framework of the *Phytosociological Conspectus of British Plant Communities* (Rodwell 1997, 2000). This conspectus orders the NVC vegetation types into the hierarchical frame of alliances, orders and classes currently being prepared by the European Vegetation Survey. Throughout this conspectus commentary is provided where new variation or gaps have been identified.

The levels of new variation or gaps as set out in section 3 are given in brackets after the existing community name or a provisional name for new variation at community level. New types marked with an asterisk are potentially relate to variation of habitat types listed on Annex I of the EC Habitats Directive.

### COASTAL MUDFLATS AND BRACKISH WATERS

#### ZOSTERETEA MARINAE Pignatti 1953

Eel-grass swards on muddy and sandy substrates in the sublittoral and eulittoral zones, exposed no more than 2-3 hours at a time

#### ZOSTERETALIA MARINAE Beguinot 1941 em. R.Tx. et Oberdorfer 1958

Eel-grass swards of shallower waters

#### **Zosterion marinae** Christiansen 1934

##### SM1 *Zostera* communities (2)\*

In *British Plant Communities*, there is a description of the vegetation with the various *Zostera* spp., but only a limited amount of data. It is certain that further sampling will enable the two associations distinguished elsewhere in Europe to be characterised.

##### *Zostera marina* community

##### *Zosteretum marinae* Harmsen 1936

Stands of *Z. marina* on firm sands, sandy muds and gravelly flats in the sub-littoral zone down to 4m. Relevés by Dargie (unpublished).

##### *Zostera noltii/angustifolia* community

##### *Zosteretum noltii* Harmsen 1936

Stands of *Z. noltii*, sometimes in mixtures or mosaics with *Z. angustifolia*, on very soft to firm muds and sands in the eu-littoral zone. 15 relevés by Proctor (unpublished) from Exe Estuary in UKVDB.

Stewart *et al.* (1994) provide updated distribution maps for all three species together with information on their current status and the Unit of Vegetation Science has extensive correspondence about these kinds of vegetation. Apart from the relative scarcity of the plants themselves, eelgrass swards are of major importance as a food source for wildfowl. The localities are known but sampling is difficult and dangerous.

## **RUPPIETEA MARITIMAE** J. Tüxen 1960

Tassel-weed and spike-rush communities of brackish to saline waters in estuaries, salt-marsh pools and dykes of reclaimed coastal marshes

## **RUPPIETALIA MARITIMAE** J. Tüxen 1960

### **Ruppion maritimae** Br.-Bl. 1931

#### SM2 *Ruppia maritima* salt-marsh community (1)\*

*Ruppium maritimae* Iversen 1934

There is no table in *British Plant Communities* but the UKVDB holds 11 relevés from various sources (Lee 1977, Proctor, unpublished) with further data from Dargie (unpublished) and less formal information on the occurrence of *R. maritima*.

#### *Ruppia cirrhosa* (*spiralis*) community (6)\*

*Ruppium cirrhosae* Hocquette 1927

The UKVDB has only 1 relevé with this species growing among *R. maritima* but, as in the Netherlands, it may be possible to recognise a separate assemblage with *R. cirrhosa*, *Potamogeton pectinatus* and *Zannichellia palustris* on soft sediments in the brackish and often quite deep waters of tidal inlets, lagoons, pools and ditches, mainly around the south-east coast with scattered localities elsewhere (see Stewart *et al.* 1994, Preston 1995). This kind of vegetation is of conservation significance because of the scarcity of *R. cirrhosa* but it also forms an integral part of an important reclaimed landscape vulnerable to sea-level rise. Sampling should be easy but data need to be assessed in relation to the A6 *Ceratophylletum submersi* and A21 *Ranunculetum baudotii* communities.

#### SM3 *Eleocharis parvula* salt-marsh community (1)

*Eleocharitetum parvulae* (Preuss 1911/12) Gillner 1960

There is no table in *British Plant Communities* and no relevés in the UKVDB or elsewhere as far as we know. The Beaulieu and Maentwrog stands are quite accessible and should be sampled.

## **SALT-MARSH AND SEA-CLIFF VEGETATION**

## **SPARTINETEA MARITIMAE** R.Tx. in Beeftink 1962

Pioneer vegetation of perennial cord grasses on intertidal mud and sand

## **SPARTINETALIA MARITIMAE** Conard 1935

### **Spartinion maritimae** Conard 1952

#### SM4 *Spartina maritima* salt-marsh community (1)\*

*Spartinetum maritimae* (Emb. et Regn. 1926) Corillion 1953

There is no table in *British Plant Communities* though the species occurs in 21 relevés as an occasional in other NVC vegetation types and Géhu and Delzenne (1975) have 5 relevés of the community from Wittering in Sussex. Remaining stands where it is dominant there and elsewhere around the Solent, Chichester Harbour, Essex and The Wash need sampling to characterise this vegetation.

#### SM5 *Spartina alterniflora* salt-marsh community (1)\*

*Spartinetum alterniflorae* Corillion 1953

There is no table in *British Plant Communities* and no relevés in the UKVDB but Géhu and Delzenne (1975) have 5 from the only apparently natural stand at Marchwood (Perring and Farrell 1977).



SM6 *Spartina anglica* salt-marsh community  
*Spartinetum anglicae* Corillion 1953 corr. Géhu et  
Géhu-Franck 1984

**THERO-SALICORNIETEA** (Pignatti 1953) R.Tx. in R.Tx. et Oberdorfer 1958  
Pioneer communities of annual glassworts, seablite or other halo-nitrophiles on tidal mud-flats

THERO-SALICORNIETALIA Pignatti 1953 em. R.Tx. 1954 ex R.Tx. et Oberdorfer 1958  
Pioneer communities of annual glassworts and seablite on tidal mud-flats

**Thero-Salicornion strictae** Br.-Bl. 1933 em. R.Tx. 1950 in Tx et  
Oberdorfer 1958

SM7 *Arthrocnemum perenne* salt-marsh community

SM8 Annual *Salicornia* salt-marsh community  
*Salicornietum europaeae* Warming 1906

SM9 *Suaeda maritima* salt-marsh community  
*Suaedetum maritimae* (Conard 1935) Pignatti 1953

**JUNCETEA MARITIMI** R.Tx. et Oberdorfer 1958  
Usually closed swards on the silt and sand of coastal and inland salt-marshes and on sea cliffs and stable  
shingle beaches

GLAUCO-PUCCINELLIETALIA Beeftink et Westhoff 1962

**Puccinellion maritimae** Christiansen 1927 emend Tx. 1937  
Communities of the lower parts of salt-marshes, generally inundated by spring tides

SM10 Transitional low-marsh vegetation

SM11 *Aster tripolium* var. *discoideus* salt-marsh community

SM12 Rayed *Aster tripolium* stands

SM13 *Puccinellia maritima* salt-marsh community  
*Puccinellietum maritimae* (Warming 1906) Christiansen 1927

**Puccinellio maritimae-Spergularion salinae** Beeftink 1965  
Ephemeral communities in saline habitats, coastal and inland, with disturbance or fluctuating moisture  
regime

SM23 *Spergularia marina-Puccinellia distans* salt-marsh community  
*Puccinellietum distantis* Feekes (1934) 1945

**Armerion maritimae** Br.-Bl. et De Leeuw 1936  
Perennial communities of the upper parts of salt-marshes, rarely inundated by spring tides

SM14 *Halimione portulacoides* salt-marsh community  
*Halimionetum portulacoidis* (Kuhnholz-Lordat 1927) Des Abbayes et Corillion 1949

SM16 *Festuca rubra* salt-marsh community  
*Juncetum gerardii* Warming 1906

- SM17 *Artemisia maritima* salt-marsh community  
Artemisietum maritimae Hocquette 1927
- SM18 *Juncus maritimus* salt-marsh community
- SM19 *Blasmus rufus* salt-marsh community  
*Blysmetum rufi* (G.E. et G. Du Rietz 1925) Gillner 1960
- SM20 *Eleocharis uniglumis* salt-marsh community  
Eleocharitetum uniglumis Nordhagen 1923
- SM21 *Suaeda vera*-*Limonium binervosum* salt-marsh community
- SM22 *Halimione portulacoides*-*Frankenia laevis* salt-marsh community  
*Limonio vulgaris*-*Frankenietum laevis* Géhu et Géhu-Franck 1975
- SM25 *Suaeda vera* salt-marsh community  
*Elmyo pycnanthi*-*Suaedetum verae* (Arènes 1933) Géhu 1975
- SM26 *Inula crithmoides* stands

**Halo-Scirpion** (Dahl et Hadac 1971) Den Held et Westhoff 1969 nom.nov.  
Vegetation of flushed depressions in upper salt-marsh

- SM15 *Juncus maritimus*-*Triglochin maritima* salt-marsh

**Silenion maritimae** Malloch 1971

Closed swards of perennials on seacliff tops, ledges and stable shingle little splashed by salt-spray

- MC2 *Armeria maritima*-*Ligusticum scoticum* maritime crevice community
- MC3 *Rhodiola rosea*-*Armeria maritima* maritime cliff ledge community
- MC8 *Festuca rubra*-*Armeria maritima* maritime grassland
- MC9 *Festuca rubra*-*Holcus lanatus* maritime grassland
- MC10 *Festuca rubra*-*Plantago* ssp. maritime grassland
- MC11 *Festuca rubra*-*Daucus carota* ssp. *gummifer* maritime grassland
- MC12 *Festuca rubra*-*Hyacinthoides non-scripta* maritime cliff community

*Arrhenatherum elatius*-*Silene maritima* grassland (6)\*

Sneddon & Randall (1993a, b; 1994a, b) characterised a series of vegetation types from shingle structures around the British coastline in which *Arrhenatherum elatius* figured more or less prominently, with *Silene maritima*, *Festuca rubra*, *Hypochoeris radicata*, *Rumex crispus*, *Cerastium semidecandrum*, *Hypnum cupressiforme* occasional to frequent and varying representation of lichens - *Cladonia furcata*, *C. impexa*, *C. arbuscula*, *C. crispata* and others. One form of this vegetation (SH1 with dominant *A. elatius* and few associates) was more widespread, the others (SH37-41) more exclusively southern and especially well represented at Orfordness. No relevé data nor floristic tables are provided in the report, nor are there any precise details of the environmental conditions characteristic of each assemblage, bar some general remarks about conditions being more or less maritime, more or less stable or more or less mature. An earlier survey (Harding & Kay 1992) from the Suffolk coast covers what is probably the same vegetation and does include relevés. This

vegetation may be best considered among the Silenion communities or the Arrhenatherion and is an important element of distinctive and vulnerable coastal landscapes, but the data need a careful re-examination and better contextualising.

**SAGINETEA MARITIMAE** Westhoff, van Leeuwen et Adriani 1962

Ephemeral vegetation with winter annuals on bare or disturbed salt-marsh muds and sand, periodically wetted by saline waters

**SAGINETALIA MARITIMAE** Westhoff, van Leeuwen et Adriani 1962

Atlantic and Mediterranean ephemeral vegetation in saline habitats

**Saginion maritimae** Westhoff, van Leeuwen et Adriani 1962

SM27 Ephemeral salt-marsh vegetation with *Sagina maritima* (2)\*

*Sagina maritima*-*Cochlearia danica* community

*Sagino maritimae*-*Cochlearietum danicae* R.Tx. et Gillner 1957

There is no floristic table for Saginion vegetation in *British Plant Communities* but sampling will probably characterise an equivalent of this association from open colonising assemblages of *Sagina maritima*, *Cochlearia danica*, *Desmazeria marina* and *Plantago coronopus* in bare patches among upper salt-marsh turf, reclaimed coastal marshland and brackish dune slacks all around the British coast. Disturbance along pathways or through grazing or, in a few localities, the removal of salt-marsh turf for lawns and bowling greens can be important in the creation of suitable habitats. This vegetation occurs as an integral element of Atlantic salt-meadows and is an important locus for salt-tolerant ephemerals like *Bupleurum tenuissimum* (in the south), *Centaureum littorale* (in the north) and *Parapholis incurva* (on Spurn Head in East Yorkshire). It also provides additional diversity and local dynamic change in a distinctive landscape. The vegetation is easy to access on coastal marshes but scarce overall now, so sampling may need patience. Figure 18 in Appendix 1 shows a potential distribution map for this vegetation type which has been created by coincidence mapping characteristic species.

**CRITHMO-LIMONIETEA** Br.-Bl. in Br.-Bl. et al. 1952

Open communities of crevices on rocky seacliffs much splashed by salt spray

**CRITHMO-ARMERIETALIA MARITIMAE** Géhu 1964

**Crithmo-Armerion maritimae** Géhu 1968

MC1 *Crithmum maritimum*-*Spergularia rupicola* maritime crevice community

*Crithmo-Spergularietum rupicola* Géhu 1964

MC4 *Brassica oleracea* maritime cliff-ledge community

## STRANDLINE AND SAND-DUNE COMMUNITIES

**CAKILETEA MARITIMAE** R.Tx. et Preising ex Br.-Bl. & Tx. 1952

Pioneer vegetation, mostly of nitrophilous summer annuals, on nutrient-rich detritus of strandlines on sand and shingle beaches

**CAKILETALIA MARITIMAE** R.Tx. apud Oberdorfer (1949) 1950

Atlantic and Baltic annual halo-nitrophilous communities

**Salsolo-Honkenyon peploidis** R.Tx. 1950

Communities of strand lines with sand-covered detritus or shingle

SD2 *Honkenya peploides-Cakile maritima* standline

SD3 *Matricaria maritima-Galium aparine* standline

*Raphanus maritimus-Matricaria maritima* community (6)\*

Sneddon & Randall (1993a, 1994a, b) characterised a series of assemblages (SH12 & 13) of pioneer vegetation from shingle structures with *Raphanus maritimus* and *Matricaria maritima* constant, *Arrhenatherum elatius*, *Atriplex prostrata*, *Festuca rubra* and *Rumex crispus* associates. This vegetation was largely northern and particularly associated with shingle beaches in Western Scotland, though also found on The Scillies. No relevés, nor floristic tables, nor precise environmental details were provided and re-examination of data from this distinctive landscape is essential if a clearer evaluation is to be obtained. In particular, we need to know how this vegetation relates to the SD3 *Matricaria-Galium* community and just how it differs from the *Arrhenatherum-Silene* vegetation which Sneddon & Randall (1993a) described.

**Atriplicion littoralis** (Nordhagen 1940) Tx. 1950

Communities of shingle or strand lines sometimes mixed with but not covered by sand

MC6 *Atriplex hastata-Beta vulgaris* ssp. *maritima* sea-bird cliff community

*Atriplici-Betetum maritimae* J.-M. et J. Géhu 1969

(6)\*

It is quite clear (eg. Harding & Kay 1992a, Sneddon & Randall 1993) that MC6 *Atriplici-Betetum* occurs widely as a colonising assemblage on shingle as well as on seabird cliffs. Strandline vegetation with a local abundance of various *Atriplex* spp. was also included in *British Plant Communities* in the SD2 *Honkenya-Cakile* and SD3 *Matricaria-Galium* communities. Re-examination of these data, plus any samples subsequent to the NVC (summarised in part in Dargie 1993, 1995, Sneddon & Randall 1993 and Radley 1994, see also Dargie 1998c), will probably characterise a range of communities best placed in the Atriplicion alliance. We might thus expect equivalents of the *Atriplicetum littoralis* Libbert 1940, the *Atriplicetum laciniatae* Nordhagen 1940 and perhaps the *Atriplicetum glabriusculae-calothecae* Fröde 1957/58 described from other parts of Europe. These assemblages are an important part of the dynamic vegetation of strandlines and, in the north, provide a locus for the scarce (though probably under-recorded) *A. praecox*. They are of ephemeral duration in any locality and of awkward shape to sample but are quite accessible. Other vegetation with *Catabrosa aquatica* and *Potentilla anserina* from wet or damp strandlines in Scotland also needs appraisal (Dargie 1998a).

**HONCKENYO-ELYMETEA** R.Tx. 1966

Vegetation of coastal shingle, boulders or rocky cliffs enriched with organic detritus

**ELYMETALIA ARENARII** Br.-Bl. & R.Tx. 1943

**Elymion pycnanthi** Géhu 1968

Communities of salt-marsh strandlines in warmer parts of Europe

SM24 *Elymus pycnanthus* salt-marsh

*Atriplici-Elymetum pycnanthi* Beeftink et Westhoff 1962

Honkenyo latifoliae-Crambion maritimae (Géhu 1968) J.-M et J. Géhu 1969

Communities of enriched coastal habitats, mostly boreal

SD1 *Rumex crispus-Glaucium flavum* shingle community

MC7 *Stellaria media* seabird cliff community

**AMMOPHILETEA ARENARIAE** Br.-Bl. et R.Tx. ex Westhoff et al. 1946

Vegetation dominated by rhizomatous grasses or sedges on mobile or fixed coastal or inland dunes

**AMMOPHILETALIA ARENARIAE** Br.-Bl. 1933

**Elymo-Honkenyon peploidis** R.Tx. apnd Br.-Bl. et R.Tx. 1952

Pioneer vegetation of coastal foredunes

SD4 *Elymus farctus boreali-atlanticus* foredune community

**Ammophilion arenariae** Br.-Bl. 1933 em. R.Tx. 1955

Vegetation of young to fixed dunes around the Atlantic coast of Europe

SD5 *Leymus arenarius* mobile dune community

SD6 *Ammophila arenaria* mobile dune community

SD7 *Ammophila arenaria-Festuca rubra* semi-fixed dune community (5)\*

Dargie (1993) describes a very widespread form of SD7 *Ammophila-Festuca* dune with *Galium verum*. More localised around Moray Firth (Dargie 1994a, b) is a type with a thick carpet of pleurocarpous mosses, notably *Hylocomium splendens* and *Rhytidiadelphus triquetrus*, which seems to provide a link with Boreal dunes.

SD9 *Ammophila arenaria-Arrhenatherum elatius* dune grassland (5)\*

High cover of *Hylocomium splendens* and other pleurocarpous mosses in a thick carpet, occasionally with *Deschampsia flexuosa*, are a feature of this community around the Moray Firth (Dargie 1994b).

SD10 *Carex arenaria* dune community

## FRESHWATER AQUATIC VEGETATION

### **LEMNETEA** de Bolos et Masclans 1955

Free-floating duckweed communities of still, relatively nutrient-rich, fresh waters in more winter-warm parts of Europe

### LEMNETALIA MINORIS Tüxen 1955

#### **Lemnion minoris** Tüxen 1955

Duckweed communities of eutrophic and hypertrophic waters

- A2 *Lemna minor* community  
Lemnetum minoris Soó 1947

#### **Lemnion gibbae** R.Tx. et Schwabe 1972

Duckweed communities of more base-rich (and/or hypertrophic) waters

- A1 *Lemna gibba* community  
*Lemnetum gibbae* Miyawaki et J. Tüxen 1960

- A3 *Spirodela polyrrhiza*-*Hydrocharis morsus-ranae* community

#### **Lemnion trisulcae** Den Hartog et Segal 1964 em. Tüxen et Schwabe in Tüxen 1974

Duckweed and liverwort communities of shallow, more mesotrophic waters

(5)

Elsewhere in Europe, vegetation with *Riccia fluitans* and *Ricciocarpus natans* growing among duckweeds in shallow waters or on muddy margins (A2c in the NVC) is sometimes included in this alliance as distinct communities, the *Riccietum fluitantis* Slavnic 1956 emend R.Tx. 1974 and the *Riccicarpetum natantis* Segal 1963 emend R.Tx. 1974 (see, for example, Schaminée *et al.* 1995).

### **CHARETEA FRAGILIS** Fukarek ex Krausch 1964

Submerged stonewort swards

With an extension of sampling to include vegetation dominated by stoneworts (now comprehensively described in Moore 1986 with threatened species in Stewart & Church 1992), it might be possible to characterise assemblages equivalent to the following associations recognised from The Netherlands (Schaminée *et al.* 1995) and elsewhere. No relevés available.

### NITELLEALIA FLEXILIS Krause 1969

#### **Nitellion flexilis** Damska 1966 em. Krause 1969

*Nitella translucens* community (6)\*

Nitelletum translucens Corillion 1957

Stands of *Nitella translucens* with *N. flexilis*, *Potamogeton natans*, *Juncus bulbosus*, *Eleocharis palustris*, *Alisma plantago-aquatica*, *Spirodela polyrrhiza* and *Lemna minor* in clear, circumneutral standing waters in unshaded ditches, ponds, lakes and pools in fens.

#### **Charion fragilis** Krause 1964 em. van Daam et Schaminée

in Schaminée et al. 1995

Submerged stonewort swards of lime-rich freshwaters

*Nitellopsis obtusa* community (6)\*

*Nitellopsidetum obtusae* Sauer ex Damska 1961

Stands of *Nitellopsis obtusa* with *Chara globularis* and occasional other stoneworts, *Urticularia vulgaris* and *Fontinalis antipyretica* in deeper lakes and sluggish streams at lower altitudes, especially around the coast where the waters can be of high pH and mildly brackish.

*Chara hispida* community (6)\*

*Charetum hispidae* Margalef 1947

Stands of *Chara hispida*, occasionally with *C. vulgaris* and *C. globularis*, in often calcareous, peaty waters, only moderately deep, of lakes, ponds, canals, gravel pits and peat cuttings in fens.

*Chara aspera* community (6)\*

*Charetum asperae* Corillion 1957

Stands of *Chara aspera*, occasionally with *C. hispida*, *Elodea nuttallii*, *Potamogeton natans* with emergents like *Phragmites australis* or *Scirpus maritimus* in shallower, fresh and brackish waters of lakes, ponds, ditches and peat cuttings.

**Charion vulgaris** (Krause ex Krause et Lang 1977) Van Raam et Schaminée 1995

Submerged stonewort swards of more eutrophic waters

*Chara vulgaris* community (6)\*

*Charetum vulgaris* Corillion 1957

Stands of *Chara vulgaris* with occasional *Elodea nuttallii*, *E. canadensis*, *Potamogeton pusillus*, *P. lucens* and emergent helophytes in every kind of lake, pond, puddle or ditch, including brackish situations.

*Tolypella prolifera* community (6)\*

*Tolypelletum proliferae* Guerlesquin 1961

Annual stands of *Tolypella prolifera* with occasional *Chara vulgaris*, *Elodea nuttallii*, *Lemna trisulca*, *L. minor* and *Ranunculus circinatus* in shallow, often ephemeral puddles and ditches.

*Chara canescens* community (6)\*

*Charetum cranscentis* Corillion 1957 em. Van Raam et Schaminée

Stands of *Chara canescens*, *C. aspera*, *C. connivens* and *C. baltica* with *Potamogeton pectinatus* and *Zannichellia palustris* in usually shallow, brackish waters of lakes, pools and ditches by the sea and very rare in the UK.

**POTAMETEA** Klika in Klika et Novák 1941

Communities of rooted, floating or submerged plants in mesotrophic and eutrophic fresh or brackish waters

**NUPHARO-POTAMETALIA** Schaminée, Lanjouw et Schipper 1990

**Parvopotamion** (Vollmar 1947) den Hartog et Segal 1964

Rooted aquatic communities in moderate to deep standing waters, often open to wave action

A5 *Ceratophyllum demersum* community (5)

*Ceratophylletum demersi* Hild 1956

*Ranunculus circinatus* has its main occurrence in the NVC in this community but a separate *Ranunculetum circinati* Bennema et Westhoff ex Segal 1965 has been characterised in the Netherlands with *C. demersum*, *Elodea canadensis*, *Lemna* spp. and *Potamogeton pusillus*. Is this synonymous with A5a?

A11 *Potamogeton pectinatus*-*Myriophyllum spicatum* community (5)\*

A11 was originally defined in the NVC using some data collected in a somewhat different fashion (Palmer 1992: see Rodwell 1994). Further relevés will probably refine the characterisation of sub-communities within this vegetation type.

A12 *Potamogeton pectinatus* community

A13 *Potamogeton perfoliatus*-*Myriophyllum alterniflorum* community (5)\*

A13 was originally defined in the NVC using some data collected in a somewhat different fashion (Palmer 1992: see Rodwell 1994). Further relevés will probably refine the characterisation of sub-communities within this vegetation types.

A15 *Elodea canadensis* community

*Groenlandia densa* community (6)

*Groenlandietum densae* Segal ex Schipper, Lanjouw et Schaminée 1995

In *British Plant Communities*, *Groenlandia densa* occurs occasionally among aquatic and swamp vegetation but it is a widespread though local plant through southern and eastern England in shallow, usually calcareous, waters of ponds, ditches, canals, streams and rivers that have escaped eutrophication. In the Netherlands, *G. densa* occurs in a distinct association among *Elodea nuttallii*, *Potamogeton pusillus*, *Ceratophyllum demersum*, *Lemna minor* and *Spirodela polyrhiza* with emergents like *Alisma plantago-aquatica* and *Sparganium erectum* but the chalk river habitat where it is especially distinctive in the UK (Holmes 1983) may support a different assemblage. Of conservation significance as a locus for a declining species and as a landscape element, this vegetation is easy to locate and sample.

**Nymphaeion** Oberdorfer 1957

Communities of rooted aquatics with floating leaves in sheltered and nutrient-rich fresh waters

A7 *Nymphaea alba* community

*Nymphaeetum albae* Oberdorfer et Mitarb. 1967

A8 *Nuphar lutea* community

A9 *Potamogeton natans* community

A10 *Polygonum amphibium* community



- A19 *Ranunculus aquatilis* community  
*Ranunculetum aquatilis* Géhu 1961

**Hydrocharition morsus-ranae** Rübel 1933 em. Westhoff et den Held 1969  
Communities of free-floating macrophytes in fairly nutrient-rich waters

- A4 *Hydrocharis morsus-ranae-Stratiotes aloides* community (5)  
*Stratiotetum* Nowinski 1930  
Both *Myriophyllum verticillatum* and *Hottonia palustris* have their main locus here in the NVC but in the Netherlands they are characteristic together of *Myriophyllo-Hottonietum* Segal ex Schipper, Lanjouw et Schaminée 1995, an association of the Parvopotamion. Further sampling of vegetation with these species is essential to clarify the existence of any additional variation.

**CALLITRICHOPOTAMETALIA** Schipper, Lanjouw et Schaminée 1995  
Crosswort, crowfoot and milfoil vegetation of moving waters and water margins

**Callitricho-Batrachion** Den Hartog et Segal 1964  
Crosswort vegetation of shallow waters and muddy margins of streams, ditches and pools

- A16 *Callitriche stagnalis* community (2)\*  
All vegetation in which various *Callitriche* spp. were prominent was subsumed under the *Callitriche stagnalis* community in *British Plant Communities*. Further sampling is necessary in shallow lowland standing waters, flooded trackways and muddy water margins to see whether we also have equivalents of associations like the *Callitricho-Hottonietum* Tüxen ex Roll 1940 and the *Ranunculetum hederacei* Schnell 1939 where *C. platycarpa* is characteristic, or the *Callitricho-Myriophylletum alterniflori* Steuslof 1939 and the *Callitricho-Ranunculetum fluitantis* Oberdorfer 1957 where *C. hamulata* is the more frequent species. As well as contributing small-scale diversity to the landscape, these kinds of vegetation provide a locus for the scarce *C. truncata* (map in Stewart *et al.* 1994). Widespread, common and easy to sample, but care is needed with identification of the starworts.

- A20 *Ranunculus peltatus* community  
*Ranunculetum peltati* Sauer 1947

**Ranunculion fluitantis** Neuhäusl 1959  
Crowfoot and milfoil vegetation of moving waters

(6)\*

This kind of vegetation was poorly sampled in the NVC and needs further attention. The river typology developed by Holmes (1983) and Holmes *et al.* (1999) should provide a useful framework within which sampling could be undertaken.

- A14 *Myriophyllum alterniflorum* community  
*Myriophylletum alterniflori* Lemée 1937
- A17 *Ranunculus pencillatus* ssp. *pseudofluitans* community
- A18 *Ranunculus fluitans* community  
*Ranunculetum fluitantis* Allorge 1922

ZANNICHELLIETEALIA PEDICILLATAE Schaminée, Lanjouw et Schipper 1990  
Communities of rooted aquatics in brackish waters

**Zannichellion pedicellatae** Schaminée, Lanjouw et Schipper 1990

A6 *Ceratophyllum submersum* community  
*Ceratophylletum submersi* Den Hartog et Segal 1964

A21 *Ranunculus baudotii* community  
*Ranunculetum bandotii* Br.-Bl. 1952

## SPRINGS, SHORELINES, SWAMPS AND TALL-HERB FENS

**MONTIO-CARDAMINETEA** Br.-Bl. et Tüxen ex Klika 1948  
Vegetation of cold springs, commonly dominated by bryophytes

**MONTIO-CARDAMINETALIA** Pawlowski in Pawlowski, Sokotowski et Wallisch 1928

**Cardamino-Montion** Br.-Bl. 1926 em. Zechmeister 1993  
Spring vegetation of base-poor waters

M32 *Philonotis fontana-Saxifraga stellaris* spring  
*Philonoto-Saxifragetum stellaris* Nordhagen 1943

M33 *Pohlia wahlenbergii* var. *glacialis* spring  
*Pohlietum glacialis* McVean & Ratcliffe 1962

*Pohlia ludwigii* snow-bed (6)

Where *Pohlia ludwigii* is abundant to dominant, with associates including frequent *Polytrichum sexangulare*, *Nardia scalaris* and *Deschampsia cespitosa*, on north-facing slopes irrigated by snow melt at 1050-1230 m in the Scottish Highlands, a distinct assemblage was characterised from 9 relevés by Rothero (1991).

M34 *Carex demissa-Koenigia islandica* flush  
Subsequent survey makes it clear that this vegetation essentially comprises stands of *Koenigia islandica* within something like M11 *Carex-Saxifraga* mire. Survey by Averis (1997) and Averis & Averis (1997) indicates that on the Trotternish Ridge on Skye (the sole site for M34 in *British Plant Communities*), *Koenigia* is equally frequent in M11 and a new *Festuca-Oligotrichum* fell-field in the Nardo-Caricion alliance (see below).

M35 *Ranunculus omiophyllus-Montia fontana* rill

M31 *Anthelia julacea-Sphagnum auriculatum* spring  
*Sphagno-Anthelietum julaceae* Shimwell 1972

M36 Lowland springs & streambanks of shaded situations  
Sampling of springs, flushes and streambanks kept damp by acid or neutral ground water and overhung with trees, shrubs or tall herbs throughout the lowlands will probably characterise assemblages like the following:

*Chrysosplenium oppositifolium-Pellia epiphylla* community (6)

*Pellio-Chrysosplenietum oppositifolia* Maas 1959 emend Siebum, Schaminée et Weeda 1995

Some stands of W7 *Fraxinus-Alnus-Lysimachia* woodland can have a rather open canopy of trees and shrubs but flush and streamside vegetation on sloppy silt or wet loamy soils that are hardly overhung or totally devoid of a woody cover are probably best referred to this association. Low, luxuriant carpets of *Chrysosplenium oppositifolium*, *Ranunculus repens*,

*Cardamine amara*, and *Stellaria alsine* are characteristic, with locally abundant *Carex laevigata* and various other occasionals of the Alno-Padion with *Brachythecium rivulare*, *B. rutabulum*, *Chiloscyphus polyanthos*, *Pellia epiphylla* and *Calliergon cuspidatum* in a sometimes extensive ground cover. This sort of vegetation is widespread but local on or below hillslopes of grits, shales and other less base-rich rocks from The Weald westwards and north around all our upland fringes. Similar vegetation, transitional to MG10 *Holcus-Deschampsia* grassland, was recorded from rides in Suffolk woods by Harding *et al.* (1993) and Harding (1994). Of no great conservation significance by virtue of any nationally scarce or rare plants, this assemblage adds important diversity to less intensive landscapes. It is easy of access and readily sampled.

*Ranunculus ficaria-Conocephalum conicum* community (6)

*Pellio-Conocephaletum conicum* Maas 1959 emend Weeda 1994

This vegetation is often more distinctive by virtue of its bryophyte cover than its vascular plants, so it tended to be unsampled in the NVC or subsumed as part of field and ground layers in W10 *Quercus-Pteridium-Rubus* and W8 *Fraxinus-Acer-Mercurialis* woodlands. Here, mats of *Conocephalum conicum*, *Pellia epiphylla*, *Marchantia polymorpha*, *Mnium hornum*, *Rhizomnium punctatum*, *Plagiomnium undulatum* and *Atrichum undulatum* are characteristic, sometimes with a spring show of *Anemone nemorosa*, *Ranunculus ficaria* and (in East Anglia) *Primula elatior*, and a patchy cover of *Glechoma hederacea*, *Adoxa moschatellina*, *Aegopodium podagraria* and *Moehringia trinervia*. This vegetation is typical of overhung damp clay banks and streamsides throughout lowland Britain. It may be of importance as a locus for rare bryophytes though has no great conservation value for any nationally scarce vascular plants, rather as an element of landscapes. Easy of access and readily sampled.

**Cratoneurion commutati** Koch 1928

Spring vegetation of calcareous waters

M37 *Cratoneuron commutatum-Festuca rubra* spring

M38 *Cratoneuron commutatum-Carex nigra* spring

**ISOETO-LITTORELLETEA** Br.-Bl. et Vlioger in Vlioger 1937

Hairgrass swards and related communities in nutrient-poor, standing or slow-flowing, sometimes fluctuating waters with sandy, gravelly or peaty substrates

LITTORELLETALIA Koch ex Tüxen 1937

Hairgrass swards and related communities in waters with mineral substrates

**Littorellion uniflorae** Koch 1926 ex Tüxen 1937

Water lobelia and quillwort swards in deep and cold, nutrient-poor standing waters with sandy or stony substrates

A22 *Littorella uniflora-Lobelia dortmanna* community

A23 *Isoetes lacustris/setacea* community

**Eleocharition acicularis** Pietsch 1966 em. Dierßen 1975

Vegetation of fluctuating waters with loamy soils in boreal and continental parts of Europe

(6)

*Eleocharis acicularis* is a perennial of shallow, eutrophic, standing or slack waters or, more commonly, of winter-wet water margins or pools throughout the lowlands, variable in its abundance from year to year, easily overlooked but probably generally declining (Stewart *et al.* 1994). It occurs as an occasional in various NVC communities but when growing in

abundance with *Elatine hexandra*, *Littorella uniflora* and *Juncus bulbosus*, it may represent vegetation like the *Eleocharitetum acicularis* Koch 1926 or *Littorello-Eleocharitetum acicularis* Malcuit 1929 recorded from Ireland (Braun-Blanquet and Tüxen 1952, Ivimey-Cook and Proctor 1966 and Schoof van Pelt 1973) and the Netherlands (Schaminée *et al.* 1995). In other situations, the presence of plants such as *Chenopodium rubrum*, *Gnaphalium uliginosum*, *Juncus bufonus*, *Rorippa palustris* and *Polygonum* spp. suggests a location among the Nanocyperion or Bidention alliances rather than here. This is another vegetation type whose conservation significance is to do with both its scarce plants and its contribution to the diversity of habitats in relatively unimproved landscapes. Of local and sporadic occurrence but easy to sample.

**Hydrocotylo-Baldellion** R.Tx. et Dierssen in Dierssen 1972

Vegetation of soakways and shallow, strongly fluctuating, mesotrophic to oligotrophic standing waters

M29 *Hypericum elodes*-*Potamogeton polygonifolius* soakway (3)

*Hyperico-Potametum polygonifolii* (Allorge 1921) Br.-Bl. & R.Tx.1952

Beyond the geographical range of *Hypericum elodes*, essentially similar vegetation to this community is widespread and locally frequent in small, often linear, very wet soakways at low altitudes.

M30 Related vegetation of seasonally-inundated habitats (2)

In *British Plant Communities*, a brief account suggested that further sampling of fluctuating or ephemeral lowland pools with more nutrient-poor waters and silty, sandy or peaty margins having species such as *Eleocharis multicaulis*, *Baldellia ranunculoides*, *Deschampsia setacea*, *Pilularia globulifera*, *Apium inundatum* and *Scirpus fluitans* might characterise a range of communities whose affinities are with the Hydrocotylo-Baldellion: the *Eleocharitetum multicaulis* R.Tx. 1937, the *Scorpidio-Eleocharitetum* Ivimey-Cook and Proctor 1966, the *Baldellio-Littorelletum* Ivimey-Cook and Proctor 1966, the *Pilularietum globuliferae* Tüxen ex Müller et Gors 1960 and the *Scirpetum fluitantis* Lemée 1937 emend Hofstra 1982, recognised in Ireland (White & Doyle 1982) or in neighbouring parts of mainland Europe. These assemblages are now of very local occurrence among lowland heaths, mires and rush-pasture and, in addition to providing a key locus for various rare and scarce plants, are of significance in providing an important kind of diversity in threatened landscapes. Updated national maps of scarcer species represented here are provided in Stewart *et al.* (1994) and local floristic experts should help locate stands with such plants. Further sampling is of high priority and easy to accomplish.

UTRICULARIETALIA INTERMEDIO-MINORIS Pietsch 1965

Bladderwort and bog-moss communities of dystrophic or lime-rich peaty waters

**Sphagno-Utricularion** Th. Müller et Görs 1960

Bladderwort and bog-moss communities of dystrophic peaty waters

A24 *Juncus bulbosus* community

**ISOETO-NANOJUNCETEA** Br.-Bl. et Tüxen ex Westhoff *et al.* 1946

Pioneer, ephemeral, dwarf cyperaceous and therophyte communities on damp, bare, periodically flooded ground

NANOCYPERETALIA Klika 1935

**Nanocyperion flavescens** Koch ex Malcuit 1929

OV31 *Rorippa palustris*-*Filaginella uliginosa* community

OV34 *Allium schoenoprasum-Plantago maritima* community

OV35 *Lythrum portula-Ranunculus flammula* community

OV36 *Lythrum hyssopifolia-Juncus bufonius* community

*Cicendia filiformis-Radiola linoides* community (6)\*

*Cicendietum filiformis* Allorge 1922

British stands of this kind of vegetation sampled so far (Coombe unpublished) have frequent records for ephemerals such as *Juncus pygmaeus*, *J. bulbosus*, *J. bufonius*, *Cicendia filiformis*, *Radiola linoides* and *Isolepis cernua* and the scarce perennial *Chamaemelum nobile* in more open places among a patchy carpet of *Agrostis stolonifera*, *A. canina*, *Carex demissa*, *C. panicea*, *C. flacca*, *Leontodon taraxacoides*, *L. autumnalis*, *Plantago maritima* and *Ranunculus flammula*, locally with *Salix repens*, *Molinia caerulea* and *Erica vagans*. Conditions suitable for this assemblage (quite variable from stand to stand) develop around the oceanic seaboard of south-west England and Wales where winter rains accumulate in shallow pools and along trackways and in areas of heath and pasture kept open by disturbance and grazing, and then evaporate leaving bare ground baked hard. Other species like *Illecebrum verticillatum* may find a locus here in the New Forest and Cornwall (Stewart *et al.* 1994) although in the Netherlands, this plant is characteristic of another association, the *Panico-Illecebretrum* Diemont, Sissingh et Westhoff 1940 (Lemaire & Weeda 1994). Vegetation more or less like the *Cicendietum* is now very scarce and fragmentary but can probably still be found widely dispersed through the south-west, where local floristic experts will most likely know stations. As what is probably our most widespread Nanocyperion community, this is of significance for nature conservation at international level and a key element of local distinctiveness among threatened landscapes like lowland heaths and extensively-managed cliff-top pastures. 31 relevés are available from Coombe, but it is a high priority for further survey and demanding a keen eye and subtle approach to sampling. Figure 19 in Appendix 1 shows a potential distribution map for this vegetation type which has been created by coincidence mapping characteristic species.

**PHRAGMITO-MAGNOCARICETEA** Klika in Klika et Novák 1941

Swamp, fen and marginal communities of fresh or brackish waters dominated by graminoids, sedges and forbs

**PHRAGMITETALIA** Koch 1926

Swamp and fen dominated by graminoids, sedges and forbs, often species poor

**Phragmition australis** Koch 1926

Swamps and fens dominated by tall graminoids in standing or gently moving waters and winter-flooded fens

- S2 *Cladium mariscus* swamp & sedge beds  
*Cladietum marisci* Zobrist 1933 em. Pfeiffer 1961
- S4 *Phragmites australis* swamp & reed beds  
*Phragmitetum australis* Gams (1927) Schmale 1939
- S5 *Glyceria maxima* swamp  
*Glycerietum maximae* (Nowinski 1928) Hueck 1931 em. Krausch 1965
- S8 *Scirpus lacustris* ssp. *lacustris* swamp  
*Scirpetum lacustris* (Allorge 1922) Chouard 1924
- S10 *Equisetum fluviatile* swamp
- S12 *Typha latifolia* swamp

*Typhetum latifoliae* Soó 1927

- S13 *Typha angustifolia* swamp  
*Typhetum angustifoliae* Soó 1927
- S14 *Sparganium erectum* swamp  
*Sparganietum erecti* Roll 1938
- S15 *Acorus calamus* swamp  
*Acoretum calami* Schulz 1941
- S19 *Eleocharis palustris* swamp  
*Eleocharitetum palustris* Schennikow 1919
- S20 *Scirpus lacustris* ssp. *tabernaemontani* swamp  
*Scirpetum tabernaemontani* Passarge 1964
- S21 *Scirpus maritimus* swamp  
*Scirpetum maritimi* (Br.-Bl. 1931) R.Tx. 1937
- S24 *Phragmites australis*-*Peucedanum palustre* tall-herb fen (5)  
*Peucedano-Phragmitetum australis* Wheeler 1978 em.  
The transfer in the NVC of what Wheeler (1978, 1980), the original author of the *Peucedano-Phragmitetum*, called the *caricetosum* sub-community to the M9 *Carex-Calliergon* fen was never entirely satisfactory and may merit reappraisal in the light of further data. This particular type of fen is renowned for its Broadland rarities: *Liparis loeselii*, *Anagallis tenella*, *Drosera anglica*, *Parnassia palustris* and *Hypericum elodes*.
- S25 *Phragmites australis*-*Eupatorium cannabinum* tall-herb fen
- S26 *Phragmites australis*-*Urtica dioica* tall-herb fen (5)  
Various forms of *Phragmites* fen have been reported (eg. from Suffolk in Ausden & Harding 1991, Harding 1993c, Hughes 1995, Parmenter 1996) in which either large *Juncus* spp. or *Arrhenatherum elatius* become so abundant as to make fits to any existing Phragmition vegetation problematic.
- Species-poor *Iris pseudacorus* swamp (5)  
Swamps which are often more or less mono-dominant stands of *Iris* occur widely around machair lochs in the Hebrides (surveys summarised in Dargie 1995, see also Dargie 1998a) and in Northern Ireland. More relevés are needed to see whether this vegetation is a new community among the Phragmition or a form of, for example, M28 *Filipendulo-Iridetum*.

#### **Magnocaricion elatae** Koch 1926

Vegetation dominated by bulky sedges on mineral and peaty soils

- S1 *Carex elata* swamp  
*Caricetum elatae* Koch 1926
- S3 *Carex paniculata* swamp  
*Caricetum paniculatae* Wangerin 1916
- S6 *Carex riparia* swamp  
*Caricetum ripariae* Soó 1928
- S7 *Carex acutiformis* swamp  
*Caricetum acutiformis* Sauer 1937

- S9 *Carex rostrata* swamp  
*Caricetum rostratae* Rübel 1912
- S11 *Carex vesicaria* swamp  
*Caricetum vesicariae* Br.-Bl. et Denis 1926
- S27 *Carex rostrata-Potentilla palustris* tall-herb fen  
*Potentilla-Caricetum rostratae* Wheeler 1980
- S28 *Phalaris arundinacea* tall-herb fen  
*Phalaridetum arundinaceae* Libbert 1931

*Menyanthes trifoliata* bog pools (5)

*British Plant Communities* notes that what Continental phytosociologists would call ‘societies’ of Magnocaricion associates like *Menyanthes trifoliata* and *Potentilla palustris* can be locally prominent. In this case, emergent *Menyanthes trifoliata* is abundant in pools some 5-100 square metres in area, with water 30-100 cm deep, forming what could be regarded as either aquatic vegetation or a very open swamp. Other plant species are scarce, consisting mainly of small amounts of aquatic *Sphagnum cuspidatum* and *S. auriculatum*. These pools are larger and deeper than M1/M2 pools and are locally frequent in N and W Scotland. They are identified among the Drought-sensitive pools (A3) and Permanent pools (A4) in the Aquatic (A) part of the classification of bog microtopes and vegetation types by Lindsay (1995). 11 relevés from NW Sutherland (A.B.G. Averis, unpublished data).

**Cicution virosae** Hejný 1960 em. Segal in Westhoff et den Held 1969

Vegetation with a floating raft of sedges in eutrophic waters

- S17 *Carex pseudocyperus* swamp (5)  
Dargie (1998a) describes a distinctive form of *Phragmites* swamp with occasional *Carex diandra* and carpets of *Calliergon cordifolium* and *C. giganteum* occurring in the Western Isles and in scattered localities elsewhere, surrounded by machair marsh and wet mesotrophic grassland. On Loch Hallan in South Uist, this vegetation provides a locus for the scarce *Cicuta virosa*. More relevés (from, for example, Torrs Warren candidate Special Area of Conservation) are needed to analyse with Dargie’s data and define potential new variation here or as a Phragmition assemblage.

NASTURTIO-GLYCERIETALIA Pignatti 1953 em. Kopecký in Kopecký et Hejný 1965

Vegetation dominated by mixtures of small grasses and herbs along the banks of streams and ditches

**Sparganio-Glycerion fluitantis** Br.-Bl. et Sissingh in Boer 1942 nom. invers. Oberdorfer 1957

- S16 *Sagittaria sagittifolia* swamp
- S18 *Carex otrubae* swamp  
*Caricetum otrubae* Mirza 1978
- S22 *Glyceria fluitans* water-margin vegetation  
*Glycerietum fluitantis* Wilczek 1935
- S23 Other water-margin vegetation (2)  
In *British Plant Communities*, there is a standard account but no data for a miscellany of Glyceno-Sparganion vegetation from unshaded silty margins of lowland streams and pools included together under this heading. With further sampling, it should be possible to characterise distinctive assemblages with such associates as *Myosotis palustris*, *Mentha aquatica*, *Veronica beccabunga*, *Agrostis stolonifera*, *Berula erecta* and variously dominated by *Rorippa nasturtium-aquaticum*, *Apium nodiflorum*, *Veronica anagallis-aquatica*, *Glyceria plicata* and *Hippuris vulgaris*, such as the *Eleocharito palustris*-

*Hippuridetum* Passarge 1955 (see, for example, Dargie 1998a, c), the *Polygono-Veronicetum anagallidis-aquaticae* (Zonneveld 1960) Schaminée & Weeda 1995, the *Apietum nodiflori* Br.-Bl. ex Boer 1942 and the *Glycerietum plicatae* Kulczynski 1928 described from elsewhere in Europe. These communities generally contain no rare or scarce plants but are significant in providing diversity, sometimes in quite improved landscapes, that is important floristically but also for associated invertebrate and bird faunas. Widespread and still quite common, this vegetation is easy to sample.

## INUNDATION AND WEED COMMUNITIES

**BIDENTETEA TRIPARTITAE** Tüxen, Lohmeyer et Preising ex Rochow 1951  
Pioneer vegetation, mostly of nitrophilous summer annuals, on periodically flooded mud

BIDENTETALIA TRIPARTITAE Br.-Bl. et Tüxen ex Klika et Hadac 1944

**Bidenton tripartitae** Nordhagen 1940 em. Tx. in Poli et Tx. 1960  
Communities of enriched margins of still and sluggish waters and damp disturbed places

OV30 *Bidens tripartita-Polygonum amphibium* community  
*Polygono-Bidentetum tripartitae* Lohmeyer in R.Tx. 1950

OV32 *Myosotis scorpioides-Ranunculus sceleratus* community  
*Ranunculetum scelerati* R.Tx. 1950 ex Passarge 1959

OV33 *Polygonum lapathifolium-Poa annua* community

**STELLARIETEA MEDII** Tüxen, Lohmeyer et Preising ex Rochow 1951  
Weed communities of agricultural crops, gardens and waste places

POLYGONO-CHENOPODIETALIA R.Tx. et Lohmeyer 1950 emend. J.Tx. 1961

**Arnoserdion minimae** Malato-Beliz et al. 1960  
Weed communities of cereal fields on lime-deficient soils

OV1 *Viola arvensis-Aphanes microcarpa* community

OV2 *Briza minor-Silene gallica* community

OV3 *Papaver rhoeas-Viola arvensis* community  
*Papaveretum argemones* (Libbert 1933) Kons & V1 1939

**Panico-Setarion** Sissingh in Westhoff et al. 1946  
Weed communities of root, bulb and summer cereal crops usually dominated by graminoids

OV4 *Chrysanthemum segetum-Spergula arvensis* community  
*Spergulo-Chrysanthemetum segetum* (Br.-Bl. & De.Leeuw 1936) R.Tx. 1937

OV5 *Digitaria ischaemum-Erodium cicutarium* community

**Polygono-Chenopodion polyspermi** W. Koch 1926 em. Sissingh 1946  
Weed communities of root crops and summer cereals dominated by herbs

OV6 *Cerastium glomeratum-Fumaria muralis* ssp. *boraei* community



- OV7 *Veronica persica-V. polita* community  
*Veronico-Lamietum hybridi* Kr. & Kl. 1939
- OV8 *Veronica persica-Alopecurus myosuroides* community  
*Alopecuro-Matricarietum chamomillae* Wascher 1941
- OV9 *Matricaria perforata-Stellaria media* community
- OV10 *Poa annua-Senecio vulgaris* community
- OV11 *Poa annua-Stachys arvensis* community
- OV12 *Poa annua-Myosotis arvensis* community

**CENTAUREETALIA CYANI** R.Tx., Lohmeyer et Preising in R.Tx. 1950  
 Weed communities of arable crops, gardens and waste places

**Fumario-Euphorbion** Th. Müller ex Görs 1966  
 Communities of arable and garden weeds on base-rich soils

- OV13 *Stellaria media-Capsella bursa-pastoris* community  
 includes *Fumarietum officinalis* R.Tx. 1950 & *Fumarietum bastardii* Br.-Bl. 1950
- OV14 *Urtica urens-Lamium amplexicaule* community  
*Spergula arvensis-Lamium amplexicaule* community Sissingh 1950

**Caucalidion platycarpi** R. Tüxen 1950  
 Communities of cereal weeds on base-rich soils

- OV15 *Anagallis arvensis-Veronica persica* community  
*Kickxietum spuriae* Kr. & Vl. 1939
- OV16 *Papaver rhoeas-Silene noctiflora* community  
*Papaveri-Sileneetum noctiflori* Wascher 1941
- OV17 *Reseda lutea-Polygonum aviculare* community  
*Descuriano-Anchusetum arvensis* Silverside 1970

**SISYMBRIETALIA** J. Tüxen in Lohmeyer et al. 1962

**Sisymbrium officinalis** Tüxen, Lohmeyer et Preising in Tüxen 1950 em. Hejny in Hejny *et al.* 1979  
 Weed communities of compost and dung heaps, disturbed tracksides and recreation areas

(6)

*British Plant Communities* has no assemblages of this widely distributed alliance though grassier stands of cynocrophilous vegetation figure in the OV23 *Lolium-Dactylis* community. Diligent sampling among rank stands of *Chenopodium album*, *Sonchus oleraceus*, and *Polygonum aviculare* with distinctive contributions from *Descurania sophia*, *Hordeum murinum* and such introductions as *Conyza canadensis*, *Sisymbrium officinale*, *S. altissimum*, *Galinsoga parviflora*, *Chenopodium vulvaria* and *Lactuca serriola* should help characterise various communities recognised elsewhere in Europe. This is vegetation from demolition sites, rubbish tips, railway yards, the squalid corners of bus stations and other 'filthie obscure base places' (Johnson 1636), of interest (only?) in providing loci for introduced and alien plants. Widespread in the south-east, but surveyors should watch for dangerous rubbish and nasty waste. Figure 20 in Appendix 1 shows a potential distribution

map for this vegetation type which has been created by coincidence mapping characteristic species.

**GALIO-URTICETEA** Passarge ex Kopecký 1969

Semi-natural and weedy vegetation dominated by perennials on nutrient-rich, relatively stable substrates

**CONVOLVULETALIA SEPIUM** Tüxen 1950

Semi-natural and natural nitrophilous communities of tall perennial herbs of river banks and shallows

**Convolvulion sepium** Tüxen 1947

Communities of tall herbaceous nitrophiles around eutrophic lakes and ditches

OV26 *Epilobium hirsutum* community

*Calystegia sepium-Angelica archangelica* community (6)

*Convolvulo-Archangelicetum littoralis* Passarge 1964

Mixtures of *Urtica dioica*, *Rumex obtusifolius* and *Calystegia sepium* figure in the OV25 *Urtica-Cirsium* community but, on periodically flooded river banks and shoals, often with unsorted silt, sand and pebbles, these species may be subordinate to a varied canopy of *Angelica archangelica*, *Symphytum officinale*, *Phalaris arundinacea* and *Carduus crispus* with the naturalised *Heracleum mantegazzianum* a striking companion in some places.

Widespread through the lowlands and of significance as an interesting element of even quite intensive landscapes, except where the vegetation is completely dominated by more eutrophic or naturalised plants. Very few relevés in the UKVDB and further sampling is necessary to characterise this assemblage and any other river shoal vegetation. For example, are the diverse mixtures of smaller herbs found among periodically-flooded sand and shingle on river shoals all part of this community or not?

*Impatiens glandulifera* community (6)

Species-poor stands of *Impatiens glandulifera*, often tall and lush, sometimes with *Heracleum mantegazzianum*, along stream, ditch and canal sides, especially in the Midlands and northern England, equivalent to societies recognised in various Continental schemes (eg. Pott 1984). 10 relevés in UKVDB.

*Reynoutria japonica* community (6)

If we are to recognise such vegetation (it's real and widespread enough), then it probably belongs here. No relevés in UKVDB.

**LAMIO ALBI-CHENOPODIETALIA BONI-HENRICI** Kopecky 1969

Weed and semi-natural communities of tall mesophilous and nitrophilous perennials

**Aegopodium podagrariae** R.Tx. 1967

Communities of sunny and semi-shaded margins and clearings of woody vegetation

*Aegopodium podagraria-Urtica dioica* community (6)

*Urtico-Aegopodietum podagrariae* (R.Tx. 1963) Oberdorfer 1964 in Görs 1968

More eutrophic field layers occur in some drier woodlands such as the W8 *Fraxinus-Acer-Mercurialis* and unflooded W6 *Alnus-Urtica* communities but shady woodland margins, hedge-bottoms, gloomy gardens and neglected cemeteries throughout the lowlands can also have carpets of *Aegopodium podagraria*, *Glechoma hederacea* and *Lamium maculatum* with no actual tree or shrub cover but with *Anthriscus sylvestris*, *Alliaria petiolata*, *Galeopsis tetrahit* and *Vicia sepium* plus clumps of *Urtica dioica* that are probably best referred to this community. Of no great floristic interest and generally an unwanted element of landscapes, easy to access and sample. No relevés in the UKVDB and any analysis needs to define the assemblage in relation to *Galio-Alliarion* communities like OV24 *Urtica-Galium* vegetation and the *Alliario-Chaerophylletum*.

*Petasites hybridus-Aegopodium podagraria* community (6)

*Phalarido-Petasitetum hybridi* Schwickerath 1933

Eutrophic tall-herb vegetation of alluvial flats figures in the NVC among assemblages like S26 *Phragmites-Urtica* fen, OV24 *Urtica-Galium* and OV26 *Epilobium hirsutum* communities but further sampling will certainly characterise an additional assemblage that has sparse carpets of *Poa trivialis*, *Aegopodium podagraria* and *Lamium maculatum*, clumps of *Urtica dioica* and, by summer, a striking canopy of *Petasites hybridus* leaves up to 2 m tall. This vegetation occurs throughout the lowlands on seasonally-flooded river terraces and stream sides with moist silty soils, dying down to leave virtually bare ground in winter or a patchy bryophyte cover. It has no particular significance in its floristics, though it can provide a locus for bulbous garden escapes like *Galanthus nivalis* which wash downstream and provide a striking display of flowers in spring. Its main conservation value is that it represents a riverside habitat with modest uncontrolled flooding and a welcome element of diversity even among industrial landscapes. Very few relevés are available (though see Harding 1991) but the vegetation is easy to access and sample.

**Galio-Alliarion** (Oberdorfer 1957) Lohmeyer et Oberdorfer in Oberdorfer et al. 1967

Thermophilous, semi-natural communities of nitrophilous perennials of sunny forest/meadow ecotones

OV24 *Urtica dioica-Galium aparine* community

OV25 *Urtica dioica-Cirsium arvense* community

*Alliaria petiolata-Chaerophyllum temulentum* community (6)

*Alliario-Chaerophylletum temulenti* Lohmeyer 1949

In *British Plant Communities*, grassier hedgebank vegetation with brambles is included in W24 *Rubus-Holcus* underscrub but sampling among tall-herb assemblages with *Chaerophyllum temulentum*, *Alliaria petiolata*, *Anthriscus sylvestris*, *Urtica dioica*, *Galeopsis tetrahit*, *Lapsana communis* and *Aegopodium podagraria* will probably characterise this community. It is widespread and very common throughout the lowlands along sunny hedge-bottoms and woodland margins, providing a narrow vertical fringe, often sharpened up by mowing of the neighbouring verge. Of little floristic significance, though elsewhere in Europe vegetation of this general type provides a locus for the, with us, nationally rare *Cynoglossum germanicum*, as in the *Alliario-Cynoglossetum germanici* Géhu, Richard et Tx. 1972. With only one exception, British stations of this plant have it in woodland edge vegetation which might be accommodated in the OV24 *Urtica-Galium* community. 15 relevés with this plant from Pigott (unpublished). Easy enough to find stands but their long narrow shape demands ingenuity in sampling.

**ARTEMISIETEA VULGARIS** Lohmeyer *et al.* ex Rochow 1951

Perennial and thistle-rich sub-xerophilous communities of temperate and Mediterranean regions

**ONOPORDIETALIA ACANTHII** Br.-Bl. & Tx. ex Klika & Hadac 1944

Xero-mesophilous weed communities of biennials on nutrient-rich soils

**Arction lappae** Tüxen 1937 em. Gutte 1972

Mesophytic communities of moister soils in cooler climates

*Arctium minus* agg. - *Artemisia vulgaris* community (6)

*Arctio-Artemisietum vulgaris* Oberdorfer ex Seybold et Th. Müller 1972

Some rank nettle-bed vegetation with burdocks already finds a place in the NVC as part of the OV25 *Urtica-Cirsium* community. Where *Arctium minus*, *A. lappa* and *Artemisia vulgaris* become more dominant with *U. dioica*, *C. arvense*, *C. vulgare* and *Dactylis glomerata* frequent but subordinate, it will probably be sensible to recognise a community of this type. Such vegetation is a widespread and common feature of roadsides, trackways, disturbed woodland margins and rides, soil dumps and waste ground with loam or clay soils throughout the lowlands. *Conium maculatum* may also belong here though, in Continental schemes, this plant is sometimes seen as characteristic of a distinct *Lamio albi-Conietum maculatae* Oberdorfer 1957, perhaps in a separate *Balloto-Conium maculatae* alliance. Of no conservation significance for its floristics but part of graded transitions even in intensive landscapes. No relevés available but only too easy to find and survey.

*Lamium album-Ballota nigra* community (6)

*Lamio albi-Ballotetum nigrae* Lohmeyer 1970

Less widespread than the above is vegetation in which *Arctium minus* agg. and *Artemisia vulgaris* occur with *Lamium album*, *Ballota nigra*, *Malva neglecta*, *Elymus repens*, *Taraxacum officinale* agg. and declining species which were once an important feature of cottage gardens such as *Chrysanthemum parthenium*, the local *Artemisia absinthum* and the rare *Leonurus cardiacus*. This is an assemblage of roadsides and tracks around villages and farmsteads in the drier and warmer south-eastern lowlands. Figure 21 in Appendix 1 shows a potential distribution map for this vegetation type which has been created by coincidence mapping characteristic species. *Chenopodium bonus-henricus* may also have a distinct locus here but it tends to be more characteristic of disturbed places like farmyards, and elsewhere in Europe, vegetation in which it is prominent has sometimes been placed in a separate *Balloto-Chenopodietum boni-henrici* Th. Müller in Seybold et Th. Müller 1972. This vegetation is of conservation interest because it provides a locus for weeds of declining distribution typical of less intensively-managed agricultural landscapes. No samples in the UKVDB and local in occurrence but easy to sample.

**Onopordion acanthii** Br.-Bl. ex Br.-Bl. et al. 1936

Xero-mesophilous weed communities of prickly biennials on nutrient-rich soils

*Onopordum acanthium-Cardus nutans* community (6)

*Onopordetum acanthii* Br.-Bl. ex Br.-Bl. et al. 1936

This kind of continental thistle-bed vegetation extends into only the warmer and drier south-east of the UK and is probably now found only in fragmentary form on dry calcareous soils in disturbed and waste places, particularly near the sea. Characteristic species include *Onopordum acanthium*, *Cardus nutans*, *C. acanthoides*, *Silybum marianum*, *Hyoscyamus niger*, *Reseda lutea*, *R. luteola*, *Cynoglossum officinale*, *Pastinaca sativa* and *Cichorium intybus*. The last species is also typical, with species like *Picris echioides*, *Ononis spinosa* and *Trifolium ochroleucon*, of clayey soils in this region which bake hard and crack in dry summer weather. These vegetation types have declining species and represent weedy assemblages of less intensive agricultural landscapes. There are no relevés in the UKVDB and further sampling within the south-east is needed to characterise one or more

assemblages of this alliance. Figure 22 in Appendix 1 shows a potential distribution map for this vegetation type which has been created by coincidence mapping characteristic species.

**Dauco-Melilotion** Görs ex Oberdorfer *et al.* 1967

*Artemisia vulgaris-Tanacetum vulgare* community (6)

*Tanaceto-Artemisietum vulgaris* Br.-Bl. 1931 corr. 1949

*Echium vulgare-Melilotus albus* community

Echio-Melilotetum albae R.Tx. 1947

Tall-herb vegetation with *Daucus carota*, *Melilotus officinalis*, *Artemisia vulgaris*, *Pastinaca sativa*, *Picus hieracioides*, *Tanacetum vulgare*, *Coronilla varia* and *Cichorium intybus* is not represented in the NVC but occurs widely on waysides in the warmer and drier south-east of Britain. It adds some floristic and structural diversity to such habitats and sampling may reveal good stands of communities described from elsewhere in Europe.

Figure 23 in Appendix 1 shows a potential distribution map for this vegetation type which has been created by coincidence mapping characteristic species.

**EPILOBIETEA ANGUSTIFOLII** Tüxen et Preising ex van Rochow 1951

Species-poor vegetation of damp fertile soils in woodland margins, clearings and burned places

**ATROPETALIA** Vlieger 1937

**Carici piluliferae-Epilobion angustifolii** Tüxen 1950

Communities usually associated with or replacing Quercetea woodlands

OV27 *Epilobium angustifolium* community (5)

In Continental schemes, *Calamagrostis epigejos* is a locally prominent plant in various assemblages, most notably vegetation characterised by *Epilobium angustifolium* and other associates of clearances and rides in this alliance. Stands dominated by this plant (eg. Gibbons 1996) need further sampling to assess whether they belong here as a sub-community of OV27 or a distinct community.

**Atropion bellae-donnae** Br.-Bl. et Aichinger 1933

Communities usually associated with or replacing Querco-Fagetea woodlands

*Atropa belladonna-Hypericum hirsutum* community (6)

*Atropetum belladonnae* (Br.-Bl. 1930) R.Tx. 1931 emend 1950

In cleared areas or sunny windthrows among W8 *Fraxinus-Acer-Mercurialis* and W12 *Fagus-Mercurialis* woodlands or where the former has been coppiced, in the warmer and drier south-eastern lowlands, tall-herb vegetation with *Atropa belladonna*, *Hypericum hirsutum*, *Verbascum nigrum*, *V. thapsus*, *Bromus ramosus* and *Fragaria vesca* can develop on rubbly lime-rich soils, with young *Fraxinus*, *Fagus*, *Cornus sanguinea* and other woody plants re-establishing. Often grading to Geranion Saum, this vegetation can add considerable diversity and a dynamic element to wooded landscapes and be very important as part of the sunny glade vegetation attractive to various scarcer butterflies. There are unpublished relevés available from Pigott and further sampling will be simple.

## BOGS AND FENS

### SCHEUCHZERIO-CARICETEA FUSCAE R. Tx. 1937

SCHEUCHZERIO-CARICETEA NIGRAE (Nordhagen 1936) Tüxen 1937

SCHEUCHZERIALIA PALUSTRIS Nordhagen 1937

Bog pool, flush and mire vegetation usually dominated by mixtures of small sedges and bryophytes

#### **Rhynchosporion albae** W. Koch 1926

Vegetation of stagnant, acid and dystrophic waters in the pools of Sphagnion bogs on deep peats

- M1 *Sphagnum auriculatum* bog pool community
- M2 *Sphagnum cuspidatum/recurvum* bog pool community
- M3 *Eriophorum angustifolium* bog pool community
- M4 *Carex rostrata-Sphagnum recurvum* mire

CARICETALIA FUSCAE Koch 1926 em. Klika 1934

CARICETALIA NIGRAE (W. Koch 1926) Nordhagen 1936 em. Br.-Bl. 1949

Small-sedge poor-fens of base-poor waters

#### **Caricion fuscae** Koch 1926 em. Klika 1934

*Caricion nigrae* W. Koch 1926 em. Klika 1934

Small-sedge poor-fen vegetation of acid, oligotrophic flushes and soligenous mires on peats or peaty mineral soils

#### *Carex nigra-Ranunculus flammula* mire (6)

In this kind of mire, a variety of small sedges are abundant to dominant with a low cover of associates such as *Ranunculus flammula*, *R. acris*, *Potentilla erecta*, *Viola palustris*, *Juncus articulatus*, *J. bulbosus*, *Molinia caerulea*, *Dactylorhiza maculata*, *Succisa pratensis*, *Holcus lanatus*, *Anthoxanthum odoratum*, *Calliergon cuspidatum* and *Pellia epiphylla*. *Sphagnum warnstorffii*, *S. contortum* and *S. teres* are locally prominent. Some stands are strongly dominated by a dense sward of *Carex nigra* 30-40 cm tall. Other stands have a more open cover of mixtures of *Carex nigra*, *C. panicea*, *C. demissa* and *C. echinata*. There is a superficial resemblance to M6 *Carex-Sphagnum* and M10 *Carex-Pinguicula* mires, and in terms of the associated species the vegetation is somewhat intermediate between these two. This mire typically occupies small, damp, soligenous depressions among grassland and heath at low altitudes in western parts of Britain becoming frequent in the western Highlands. It is usually grazed at medium to high intensity, and most stands appear to be grazed derivatives of M15 *Scirpus-Erica* wet heath or M25 *Molinia-Potentilla* mire. Relevés are available from Scotland (Averis & Averis 1995, 1996 and recent unpublished data), Cooper & Mackintosh 1996) and Wales (M.Yeo, unpublished data). Similar vegetation in Ireland has been described as a *Carici nigrae-Juncetum articulati* Br.-Bl. & Tx. 1952 sometimes placed in the *Caricion nigrae*, sometimes (O'Críodain & Doyle 1994) in the *Caricion davallianae*.

- M5 *Carex rostrata-Sphagnum squarrosum* mire
- M6 *Carex echinata-Sphagnum recurvum/auriculatum* mire
- M7 *Carex curta-Sphagnum russowii* mire
- M8 *Carex rostrata-Sphagnum warnstorffii* mire

## CARICETALIA DAVALLIANAE Br.-Bl. 1949

Small-sedge rich-fens of base-rich waters

### **Caricion davallianae** Klika 1934

Small-sedge rich-fen vegetation of calcareous oligotrophic flushes, soligenous mires and dune-slacks with peats or peaty mineral soils at low to moderate altitudes

- M9 *Carex rostrata-Calliergon cuspidatum/giganteum* mire (5)\*  
The broadening of the *Calliergo-Caricetum diandrae* as defined by Wheeler (1975, 1978, 1980) to include more generally characterised fens with *Carex rostrata* and a carpet of brown mosses and what Wheeler called the *Peucedano-Phragmitetum caricetosum* needs reappraisal in the light of further survey (Shaw & Wheeler 1991, Cooper 1993, Fojt 1994). These kinds of fens provide an important locus for various national and local rarities.
- M10 *Carex dioica-Pinguicula vulgaris* mire  
*Pinguiculo-Caricetum dioicae* Jones 1973 em.
- M13 *Schoenus nigricans-Juncus subnodulosus* mire  
*Schoenetum nigricantis* Koch 1926
- SD13 *Salix repens-Bryum pseudotriquetrum* dune-slack (5)\*  
Younger stands of sub-community SD13a are clearly similar to the *Centaurio littoralis-Saginetum nodosae* Diemont, Sissingh et Westhoff 1940 which is sometimes placed in the Nanocyperion. Further survey may reveal that this vegetation is more widespread than the NVC suggests.
- SD14 *Salix repens-Campylium stellatum* dune slack
- SD15 *Salix repens-Calliergon cuspidatum* dune slack (5)\*  
Acidic types of SD15 with *Erica tetralix* and prostrate *Juniperus communis* ssp. *communis* occur extensively in the higher parts of slacks at Morrich More in Ross-shire and perhaps represent a new sub-community of SD15. Relevés in Dargie (1998).

### **Caricion atrofuscae-saxatilis** Nordhagen 1943

*Caricion bicolori-fuscae* Nordhagen 1936

Small-sedge rich-fen vegetation of calcareous flushes at high altitudes

- M11 *Carex demissa-Saxifraga aizoides* mire  
*Carici-Saxifragetum aizoidis* McVean & Ratcliffe 1962 emend.
- M12 *Carex saxatilis* mire  
*Caricetum saxatilis* McVean & Ratcliffe 1962

## OXYCOCCO-SPHAGNETEA Br.-Bl. et Tüxen ex Westhoff *et al.* 1946

Wet heath and bog vegetation of acid, oligotrophic peats, permanently or winter-waterlogged in raised, blanket or valley mires and their surrounds

## SPHAGNETALIA MAGELLANICI (Pawlowski 1928) Kästner et Flössner 1933

### **Erico-Sphagnion papilloso** Moore 1968

Bog vegetation on deeper, wetter peats in raised, blanket and valley mires

- M17 *Scirpus cespitosus-Eriophorum vaginatum* blanket mire
- M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire
- M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire

M20 *Eriophorum vaginatum* blanket and raised mire

M21 *Narthecium ossifragum-Sphagnum papillosum* valley mire  
*Narthecio-Sphagnetum euatlanticum* Duvigneaud 1949

#### ERICO-SPHAGNETALIA PAPILLOSI Schwickerath 1940

##### **Ericion tetralicis** Schwickerath 1933

Wet heath vegetation on drying deeper peats or winter-waterlogged peaty intergrades

M14 *Schoenus nigricans-Narthecium ossifragum* mire (3)\*

Flushes of the M14 type, providing a clear link with soligenous mires of the Lusitanian zone of the Atlantic region occur more widely than suggested in *British Plant Communities* with stands on cliffs around the coast of south-west England and perhaps Wales. This vegetation needs to be reappraised in relation to *Schoenus* flushes from parts of the Scottish coast (Averis & Averis 1996) and the flushed swards of MC9c *Festuca-Plantago* grassland

M15 *Scirpus cespitosus-Erica tetralix* wet heath (5)\*

M15 is the most extensive type of vegetation over vast areas in the western Highlands and is clearly extremely variable. M15a can occur in a typical form (widespread), a *Schoenus nigricans* form (base-enriched and very western), a *Narthecium ossifragum-Campylopus atrovirens* form (upland, northern, acidic) and a *Campylopus shawii* form (Skye and Outer Hebrides; one of the main habitats of the nationally scarce moss *C shawii*). M15b occurs in a typical form (widespread and extensive) and a *Calluna vulgaris-Molinia caerulea* form (co-dominated by tall *Calluna* and *Molinia*; locally frequent at low altitudes). M15c occurs in a *Racomitrium lanuginosum* form (western), a *Cladonia* form (more eastern and northern), a prostrate *Juniperus communis* form (scarce and western; one of the main habitats of the very rare liverwort *Herbertus borealis*) and a *Schoenus nigricans* form (scarce and strongly western). M15d occurs in a high-altitude form (scarce, and often containing montane species), and a low-altitude form (scarce and evidently less natural; also quite frequent in Wales). Heavily-grazed examples of all four sub-communities tend to converge into wet-heath strongly dominated by *Scirpus* and with very sparse sub-shrubs. Many relevés from various surveys by A.B.G. and A.M. Averis.

M16 *Erica tetralix-Sphagnum compactum* wet heath (5)\*

*Ericetum tetralicis* Schwickerath 1943

Wet heath on dunes seems almost always to be a poor fit with NVC types: *Erica tetralix* is constant, for example, but *Sphagnum* spp. are rare. Relevés from the Sand Dune Survey of Great Britain (Dargie 1993, Radley 1994) and the Sand Dune Survey of Scotland (Dargie 1998c,e, 1999) need to be brought together and reanalysed to define any new variation.

H5 *Erica vagans-Schoenus nigricans* heath



## GRASSLANDS AND HEATHS

### **MOLINIO-ARRHENATHERETEA** Tüxen 1937

Anthropogenic pastures and meadows on deeper, more or less fertile mineral and peaty soils in lowland regions

### **MOLINIETALIA CAERULEAE** Koch 1926

Meadows and pastures of moister soils, often peaty

(4)

Throughout the Molinietales, there is a tendency for swards to become dominated by dense, tussocky *Molinia caerulea*, especially where abandonment of grazing or mowing has been accompanied by eutrophication of ground waters or drying of peats. Such vegetation is hard to place because of the increasingly poor representation of smaller associates and is best regarded as what in Continental Europe would be called a 'basal community' of the Order.

### **Molinion caeruleae** Koch 1926

Meadows of moist but fresh soils of central Europe traditionally mown for litter but usually unmanured

M26 *Molinia caerulea-Crepis paludosa* mire

### **Juncus conglomerati-Molinion** Westhoff 1968

Meadows of moist but fresh soils in western Europe, usually unmanured

M24 *Molinia caerulea-Cirsium dissectum* fen-meadow (3)\*

*Cirsio-Molinietum caeruleae* Sissingh & de Vries 1942 em.

Beyond the geographical limits of *Cirsium dissectum* and *Juncus subnodulosus*, vegetation essentially the same as M24 continues to occur in similar habitats, especially in the distinctive mosaics of fen-meadow and rush-pasture known as Rhos pasture. It seems sensible to regard such vegetation as part of M24.

M25 *Molinia caerulea-Potentilla erecta* mire (5)

Swards of the M25 type but with (sometimes very much) less *Molinia* and a distinctive contribution from *Carex panicea*, *C. pulicaris*, *C. flacca*, *C. hostiana*, *Festuca ovina*, *Nardus stricta*, *Ranunculus acris*, *Prunella vulgaris* and *Trifolium repens* in frequently species-rich, close-cropped mixtures have been widely described from flushed slopes and periodically flooded streambanks with modest base-enrichment in Wales (Blackstock *et al.* 1998), Malham (Cooper 1993), from New Forest lawns and among Culm grasslands in SW England (Porley pers. comm.) and in various parts of Scotland (Cooper & MacKintosh 1996). In all these situations, it constitutes an important element of variation in landscapes of conservation significance. Analysis of large numbers of relevés now available from these sources is essential to characterise a possible new sub-community of M25 *Molinia-Potentilla* mire or M24 *Molinia-Cirsium dissectum* fen meadow (see above) and transitions to M10 *Carex-Pinguicula* mire and another potential new unit, the *Carex nigra-Ranunculus flammula* mire in the Caricion nigrae.

(5)\*

Vegetation dominated by *Schoenus nigricans*, *Festuca rubra* and *Molinia caerulea* with a variety of tall-herbs including *Eupatorium cannabinum*, *Angelica sylvestris* and *Filipendula ulmaria* and basiphilous bryophytes occurs locally at low altitudes in the Western Highlands and on damp ledges on basalt and limestone seacliffs on Mull, Skye, Lismore and Kerrera. It comes closest to M25c but is a poor fit and might need a new sub-community of M25. Relevés from Resipole (McVean & Ratcliffe 1962), Rum (Heritage Environmental in preparation) and Mull (Averis & Averis 1996) need analysis and appraisal in relation to M14 *Schoenus-Narthecium* mire and MC9c *Festuca-Plantago* grassland. Of significance as

a landscape element and perhaps as further variation within vegetated seacliffs of Atlantic coasts.

**Calthion palustris** Tüxen 1937 emend Balatova-Tulakova 1978

Meadows and pastures of more fertile, moist mineral and peaty soils, often manured, in more Continental parts of Europe

M22 *Juncus subnodulosus*-*Cirsium palustre* fen-meadow (4)

An alternative trend to the dominance of *Molinia* in lowland fen-meadows like M22 is for other rank grasses such as *Holcus lanatus* and *Festuca rubra* to become very abundant with drying and abandonment of treatment or for *Arrhenatherum elatius* to invade as conditions become more eutrophic. Several reports from Suffolk Fens (eg. Harding & Kay 1992b, Harding 1993a) report this kind of vegetation which may be seen as basal Junco-Molinion or transitional to Arrhenatherion. With the abandonment of grazing *Juncus subnodulosus* can also become overwhelming dominant in this community (Jefferson pers. com.).

MG8 *Cynosurus cristatus*-*Caltha palustris* grassland (5)

The description of the *Cynosurus-Caltha* flood pasture is one of the least satisfactory parts of the mesotrophic grassland section of the NVC. The community is certainly real, the core of the description in Rodwell (1992) seems adequate but it is based on very few relevés from a limited area and the vegetation is both more widespread and diverse. For example, this community can be found at higher altitudes in the Northern Pennines (Jefferson pers. com.) and flushes within traditional hay meadows in the Durham and Yorkshire Dales have MG8 vegetation (Prosser 1990a, b) as an integral part of mosaics involving MG3 *Anthoxanthum-Geranium* and MG5 *Centaureo-Cynosuretum* swards (see also Cooch & Rodwell 1996). Then, on West Sedgemoor, where the community is particularly widespread, Prosser & Wallace (1992, 1993, 1995a, b) proposed a new *Cirsium dissectum-Thalictrum flavum* sub-community with four variants related to different parts of a hydrological gradient across the wetland and varying levels of agricultural improvement. Preferentials of the sub-community are *C. dissectum*, *T. flavum*, *Cardamine pratensis*, *Agrostis stolonifera*, *Carex riparia*, *Polygonum amphibium*, *Deschampsia cespitosa* and *Ranunculus flammula*. These data need re-examination in relation to hay-meadow relevés and the *Senecioni-Brometum* described below, so as to better define these distinctive elements of landscapes important for conservation.

*Carex nigra*-*Agrostis stolonifera*-*Senecio aquaticus* grassland (6)

*Senecio-Brometum racemosi* Tüxen et Preising 1951

Further survey on King's Sedgemoor and other parts of the Somerset Levels (Cox 1995) and re-examination of similar sites like the Derwent Ings, has also suggested the existence of a further type of seasonally-flooded sward, managed as either pasture or meadow, which resembles this *Calthion* association characterised from other parts of Europe (most recently by Schaminée *et al.* 1996, though as a new *Ranunculo-Senecionetum*). In Somerset (Cox & Leach 1995), this vegetation is described as having constant *Carex nigra*, *Agrostis stolonifera*, *Cardamine pratensis*, *Ranunculus repens*, *R. acris*, *Polygonum amphibium*, *Glyceria fluitans*, *Anthoxanthum odoratum* and *Calliargon cuspidatum* and frequent *Senecio aquaticus*, *Trifolium repens*, *Carex disticha*, *Festuca pratensis* and *Taraxacum officinale* agg. Marked shifts in abundance of the species can be seen from year to year and these authors consider that the timing and duration of the flood (generally December-early March and up to 1m deep) are probably critical in determining the composition of the sward. The wettest stands have the look of a species-rich MG13 *Agrostis-Alopecurus* grassland or S22 *Glycerietum fluitantis* vegetation and repeated prolonged spring flooding (mid-March onwards) could promote a succession in this direction. This kind of wet grassland is clearly of significance within the distinctive flood-plain landscape and needs re-examination, along with the new forms of MG8 *Cynosurus-Caltha* grassland described above. A further important relationship that needs clarifying is with the wet grasslands encountered among the machair and dune slacks of north-west Britain, noted below in the Potentillion anserinae.

MG9 *Holcus lanatus-Deschampsia cespitosa* grassland

MG10 *Holcus lanatus-Juncus effusus* rush-pasture  
Holco-Juncetum effusi Page 1980

**Juncion acutiflori** Br.-Bl. 1947

Meadows and pastures of moist peaty mineral soils with flushing or impeded drainage in western Europe

M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture

**Filipendulion ulmariae** Segal 1966

Tall herb vegetation, seldom mown or grazed, on moist fertile mineral soils and peats, often periodically flooded

M27 *Filipendula ulmaria-Angelica sylvestris* mire (5)

Ranker stands of MG3c *Anthoxanthum-Geranium* hay meadow, *Arrhenatherum* sub-community occur in Scotland with *Filipendula ulmaria* frequently represented. Where this latter becomes dominant with frequent *Geranium sylvaticum*, *Cirsium helenioides*, *Conopodium majus* and local *Meum athamanticum* and *Trollius europaeus*, it seems likely that a new sub-community of M27 should be recognised. 10 relevés in Cooper & MacKintosh (1996).

M28 *Iris pseudacorus-Filipendula ulmaria* mire  
*Filipendulo-Iridetum pseudacori* Adam 1976 em.

**ARRHENATHERETALIA** Tüxen 1931

Pastures and meadows on well-drained, relatively fertile mineral soils

**Arrhenatherion elatioris** Koch 1926

Meadows of well-drained, relatively fertile mineral soils at lower altitudes

MG1 *Arrhenatherum elatius* grassland  
*Arrhenatheretum elatioris* Br.-Bl. 1919

MG2 *Arrhenatherum elatius-Filipendula ulmaria* grassland  
*Filipendulo-Arrhenatheretum* Shimwell 1968

**Polygono-Trisetion** Br.-Bl. et Tüxen ex Marschall 1947 nom. invers. propos.

Meadows of well-drained, relatively fertile mineral soils in montane regions

MG3 *Anthoxanthum odoratum-Geranium sylvaticum* grassland (5)

Stands of meadow vegetation transitional between MG3 and MG4 *Alopecurus-Sanguisorba* meadow occur between the Pennines and the Vale of York.

**Cynosurion cristati** Tüxen 1947

Pastures of relatively well-drained, fertile mineral soils at lower altitudes

MG4 *Alopecurus pratensis-Sanguisorba officinalis* grassland

MG5 *Cynosurus cristatus-Centaurea nigra* grassland (5)  
*Centauro-Cynosuretum cristati* Br.-Bl. et R.Tx. 1952

MG5 is a more diverse grassland than the present account indicates. In particular, there are distinctive swards around the upland fringes which have more frequent records for rushes and other species characteristic of M23 *Juncus-Galium* pasture and, more locally, there is prominence of such plants as *Carum verticillatum*, *Sanguisorba officinalis* and *Vicia orobus*. CCW Lowland Grassland Survey has relevés, with further data for *Carum* in Wheeler

(1986). Stands of MG3 *Anthoxanthum-Geranium* grassland which have only sporadic records for distinctive preferentials also often look transitional to MG5.

MG6 *Lolium perenne-Cynosurus cristatus* grassland (5)

*Lolio-Cynosuretum cristati* (Br.-Bl. et de Leeuw 1936) R.Tx. 1937

Improved grasslands on some inland clay pastures and reclaimed coastal marshes around the Thames and perhaps also the Severn (Dargie, pers. comm.) with *Ranunculus sardous*, *Hordeum secalinum* and *Trifolium fragiferum* probably represent a sub-community of MG6 *Lolio-Cynosuretum* like the *juncetosum gerardii* Westhoff 1969. Further sampling is needed of this and of the grassland on the banks of large fen dykes and sea 'walls' in reclaimed salt-marshes (see Figure 25) where *Lactuca saligna* and *Petroselinum segetum* seem to be characteristic. Relevés from Hare (unpublished) and Ferry (unpublished).

*Festuca rubra-Holcus lanatus Anthoxanthum odoratum* grassland (6)

In *British Plant Communities*, grassland dominated by *Festuca rubra* and *Holcus lanatus* and with a distinctive maritime element in *Armeria maritima* and *Plantago maritima*, figures among the sea-cliff communities as MC8 *Festuca-Holcus* grassland. Subsequent surveys in Northern Ireland (Cooper *et al.* 1992), Scotland (reports summarised in Cooper & MacKintosh 1996) and various parts of England and Wales (Harding 1993c and pers. comm.) have recognised that similar swards without such a maritime contingent are widely distributed. Often species-poor and rank, these swards have frequent *Festuca rubra*, *H. lanatus*, *Anthoxanthum odoratum*, *Poa pratensis*, *Dactylis glomerata*, *Trifolium repens*, *Plantago lanceolata* and mosses such as *Pseudoscleropodium purum* and *Rhytidiadelphus squarrosus*, but with little or no *Lolium perenne* and relatively few of the taller dicotyledons associated with meadows. It looks as if there may be more and less calcifugous types with on the one hand species like *Luzula campestris* and *Agrostis capillaris* and, on the other, *Lotus corniculatus* and *Galium verum*. This kind of grassland grades into younger stands of MG1 *Arrhenatheretum elatioris* (often developing on sown verges) but vegetation like this seems especially associated with meadows, machair and unimproved drier pastures which have become neglected through abandonment of regular mowing and grazing and grown rank. Of little intrinsic floristic value, this grassland is an important element of marginal agricultural landscapes in western Britain and the Scottish Isles and is of potential significance for a variety of alternative uses, including perhaps reclamation for low-input agriculture. Many samples already in the UKVDB but reanalysis of these and any new data is essential.

**POLYGONO ARENASTRI-POETEA ANNUAE** Rivas-Martinez 1975 corr.. Rivas-Martinez *et al.* 1991

Vegetation, mostly of rosette and creeping hemicryptophytes, in moderately disturbed or trampled habitats

**POLYGONO ARENASTRI-POETALIA ANNUAE** R.Tx. in Géhu *et al.* 1972 corr. Rivaz-Martinez *et al.* 1991

**Lolio-Plantaginion** Sissingh 1960

Grassy communities of short-term leys, recreational swards, gateways and tracksides

MG7 *Lolium perenne* leys & related grasslands

OV21 *Poa annua-Plantago major* community

OV22 *Poa annua-Taraxacum officinale* community

OV23 *Lolium perenne-Dactylis glomerata* community

**Polygonion avicularis** Br.-Bl. ex Aichinger 1933

Weed communities of trampled places

OV18 *Polygonum aviculare*-*Chamomilla suaveolens* community

OV19 *Poa annua*-*Matricaria perforata* community

OV20 *Poa annua*-*Sagina procumbens* community

*Sagino-Bryetum argentii* Diemont, Sissingh & Westhoff 1940

AGROSTETALIA STOLONIFERAE Oberdorfer in Oberdorfer *et al.* 1967

**Potentillion anserinae** Tx. 1947

*Elymo-Rumicion crispi* Nordhagen 1940

Natural and anthropogenic communities of unstable habitats, periodically wetted and dried out or alternating brackish and fresh

SM28 *Elymus repens* salt-marsh community

*Elymetum repentis maritimum* Nordhagen 1940

*Elymus repens* grassland has been recorded inland on some flood plain systems (eg. Derwent Ings in North Yorkshire) and, on very sheltered strandlines in Orkney and the Moray Firth, where there is much organic tidal litter, *Elymus repens* forms a community with *Leymus arenarius*.

MG11 *Festuca rubra*-*Agrostis stolonifera*-*Potentilla anserina* grassland

MG12 *Festuca arundinacea* grassland

*Potentillo-Festucetum arundinaceae* Nordhagen 1940

MG13 *Agrostis stolonifera*-*Alopecurus geniculatus* grassland

SD17 *Potentilla anserina*-*Carex nigra* dune slack

*Carex nigra*-*Agrostis stolonifera* community (6)

Wet grassland or small-sedge fen in which *Carex nigra* is often abundant with frequent *Agrostis stolonifera*, *Holcus lanatus*, *Ranunculus repens*, *R. acris*, *Caltha palustris*, *Lychnis flos-cuculi*, *Cardamine pratensis* and *Calliargon cuspidatum* and variously enriched by *Carex panicea* and poor-fen herbs or *Juncus articulatus* and Potentillion plants (though not always *Potentilla anserina*) has been widely reported from damp hollows and wet pastures at low altitudes, especially along the western seaboard of Britain (surveys summarised in Cooper & MacKintosh 1996; see also Dargie 1993, 1998a, b, e), though also from the Suffolk coast (Harding 1993c). Further survey and analysis is needed to characterise this vegetation in relation to the *Senecioni-Brometum* (described under the Calthion), the *Carex-Ranunculus flammula* mire (under the Caricion fuscae) and to the existing MG8.

OV28 *Agrostis stolonifera*-*Ranunculus repens* community

*Agrostio-Ranunculetum repentis* Oberdorfer *et al.* 1967

OV29 *Alopecurus geniculatus*-*Rorippa palustris* community

*Ranunculo-Alopecuretum geniculati* R.Tx. (1937) 1950

*Tussilago farfara*-*Festuca rubra* community (6)

Among the sea-cliff communities in the NVC, herbaceous vegetation of softer clay cliffs is noticeably absent but it occurs widely along the eastern coast of England and locally in the south and essentially similar assemblages can be seen inland throughout the lowlands colonising slumping clay banks on open ground, roadsides and building sites, often with surface runnels where rain or ground water runs away. Tussocky grasses like *Festuca*

*rubra*, *F. arundinacea* and *Dactylis glomerata* form an open cover with scattered *Tussilago farfara* very distinctive and, on spray-splashed sites, *Armeria maritima* and *Plantago coronopus* can figure. This vegetation provides a characteristic locus for *Rubus ulmifolius* and *Helmintha echioides* and may quickly acquire swarms of *Ophrys apifera*. There are relevés from Kent (Malloch unpublished), the Yorkshire coast (Rodwell unpublished) and from inland in Yorkshire (Lunn 1998).

#### **FESTUCO-BROMETEA** Br.-Bl. et Tüxen ex Braun-Blanquet 1949

Grasslands and steppes of infertile calcareous or sandy soils, often drought-prone, in temperate and sub-boreal regions of Europe

#### **BROMETALIA ERECTI** Br.-Bl. 1936

Sub-oceanic, more or less arid swards

##### **Xerobromion** (Br.-Bl. et Moor 1938) Moravec in Holub *et al.* 1967

Swards of more arid soils, often open and with a prominent contingent of ephemeral plants, on stable rocky slopes in sunny situations in hemi-oceanic parts of Europe

CG1 *Festuca ovina*-*Carlina vulgaris* grassland

##### **Bromion erecti** Koch 1926

Swards of less arid soils in hemi-oceanic parts of Europe

CG2 *Festuca ovina*-*Avenula pratensis* grassland

CG3 *Bromus erectus* grassland

CG4 *Brachypodium pinnatum* grassland

CG5 *Bromus erectus*-*Brachypodium pinnatum* grassland

CG6 *Avenula pubescens* grassland

CG8 *Sesleria albicans*-*Scabiosa columbaria* grassland

CG9 *Sesleria albicans*-*Galium sternerii* grassland

#### **KOELERIO-PHLEETALIA PHLEOIDIS** Korneck 1974

Swards of lime-rich sandy soils in more Continental parts of Europe

##### **Koelerio-Phleion phleoidis** Korneck 1974

CG7 *Festuca ovina*-*Hieracium pilosella*-*Thymus praecox/pulegioides* grassland (3)

On sunny south- and west-facing rocky slopes on igneous bedrocks with locally base-rich soils at low altitudes along Hadrian's Wall and in south-east Scotland, swards essentially like CG7 occur beyond the geographical range of thermophilous calcicoles like *Cirsium acaule* and *Thymus pulegioides*, providing a locus for *Dianthus deltoides*, *Astragalus danicus*, *Potentilla neumanniana* and *Trifolium striatum*. Relevés from Averis (1996 and recent unpublished data) and Lusby (1992) need analysis to characterise a possible new sub-community.

**KOELERIO-CORYNEPHORETEA** Klika in Klika et Novák 1941

Pioneer vegetation of therophytes and hemicryptophyte perennials on dry, infertile sandy soils in the European lowlands

**CORYNEPHORETALIA CANESCENTIS** Klika 1934 em. Tüxen 1962

Open swards on sands

**Corynephorion canescentis** Klika 1934 em. Tüxen 1962

Colonising vegetation and open grasslands of acid sands on coastal and inland dunes

SD11 *Carex arenaria-Cornicularia aculeata* dune community

SD12 *Carex arenaria-Festuca ovina-Agrostis capillaris* dune grassland (5)\*

Much SD12 vegetation in Scotland is difficult to allocate to existing sub-communities because the differentials *Anthoxanthum odoratum* and *Holcus lanatus* are both present. Sand dune survey in Scotland (Dargie 1994a, b; 1998c,e, 1999) recorded a range of forms which might constitute further sub-communities: *Ammophila arenaria* (semi-fixed dune developing without an SD7 phase), *Carex arenaria* (usually with heavy rabbit grazing), *Hylocomium splendens* (part of the Moray Firth Boreal sequence), *Racomitrium canescens* (deflating environments, very rarely with *Corynephorus canescens* at Morar in Lochaber), *Deschampsia flexuosa* (often close to H11 dune heath) and *Cladonia rangiformis-C. portentosa* (perhaps the classic grey dune, though now very rare on the east coast of Scotland).

**Thero-Airion** Tüxen ex Oberdorfer 1957

Ephemeral vegetation of bare but stable acid sands or siliceous rock outcrops

MC5 *Armeria maritima-Cerastium diffusum* ssp. *diffusum maritime* therophyte community (6)

It is clear that MC5 represents only a (distinctively maritime) part of the Thero-Airion in Britain. Inland swards rich in ephemerals like *Vulpia* spp. (relevés from Lunn 1998) are widespread on shallow acidic soils in warmer and drier parts of the country and need further sampling to characterise syntaxa like the *Airetum praecocis* (Schwickerath 1944) Krausch 1967, the *Filagini-Vulpietum myuros* Oberdorfer 1938 and the *Airo caryophylleae-Festucetum ovinae* R Tx. 1955.

**Koelerion arenariae** R.Tx. 1937 corr. Gutermann et Mucina 1993

Ephemeral vegetation of bare but stable calcareous sands

SD19 *Phleum arenarium-Tortula ruralis ruraliformis* dune annual community

*Tortulo-Phleetum arenariae* (Massart 1908) Br.-Bl. et de Leeuw 1936

**SEDO-SCLERANTHETALIA** Br.-Bl. 1955

Closed swards of calcareous to acidic, drought prone soils on rock outcrops

**Alyso-Sedion** Oberdorfer et Müller in Müller 1961

*Poa compressa-Saxifraga tridactylites* community (6)\*

*Saxifraga tridactylitis-Poetum compressae* (Kreh 1951) Géhu & Lericq 1957

Open and often fragmentary assemblages that are probably identical to this association have small tufts of *Poa compressa* and *Saxifraga tridactylites* with patches of *Sedum acre*, ephemerals such as *Arenaria serpyllifolia*, *Erophila verna*, *Aira praecox*, *A. caryophyllea* and *Cardamine hirsuta* and small tufts or patches of mosses like *Tortula muralis*, *Ceratodon purpureus*, *Bryum capillare*, *Homalothecium sericeum* and *Grimmia pulvinata*. Stands are widespread and common on the limestones of southern Britain on sunny wall-tops and in mortared stonework but also occur in such natural habitats as fractured limestone outcrops

and clint surfaces on limestone pavement where shallow and fragmentary rendzinas dry out in summer. Figure 25 in Appendix 1 shows a potential distribution map for this vegetation type which has been created by coincidence mapping characteristic species. This kind of vegetation is clearly analogous to the assemblages reported from sunny chalk cliff tops in Limburg in the Netherlands (Schaminée *et al.* 1996) and is the British representative of the Alysso-Sedion alliance and an element of limestone pavement vegetation. There are a few relevés in the UKVDB but additional data, which are a priority, will be easy to collect.

**Sedion anglici** Br.-Bl. in Br.-Bl. et Tx 1952

Stonecrop vegetation of more oceanic regions of Europe.

*Sedum anglicum*-*Aira praecox* community (6)

*Airo-Sedetum anglici* Br.-Bl. in Br.-Bl. et Tx 1952.

Stonecrop vegetation with *Sedum anglicum* and a characteristic suite of ephemerals already figures in its more maritime manifestation as part of the MC5 *Armeria-Cerastium* community. However, similar assemblages lacking species such as *Aira maritima* and *Plantago maritima* can be seen widely in more inland locations in the oceanic south and west of Britain. Here, *Sedum anglicum* can occur with local abundance with such other distinctive plants as *Jasione montana*, *Vulpia bromoides* and *Umbilicus rupestris* and ephemerals like *Aira praecox*, *A. caryophylla*, *Bromus hordeaceus* ssp. *hordeaceus*, and *Erodium cicutarium*. The vegetation probably provides a characteristic locus for *Romulea columnae*, *Polycarpon tetraphyllum*, *Tuberaria guttata*, *Ornithopus pinnatus*, *Juncus capitatus* and certain scarce *Trifolium* spp. such as *T. occidentale* (Coombe 1961). It typically occurs on outcrops of less base-rich rocks with shallow rankers, drought-prone in the warm, sunny conditions of summer, among pastures and heaths of cliff-tops, crags and rocky knolls where grazing helps keep encroaching heath and scrub away from the crag surrounds. It is widespread but uncommon through the more oceanic parts of Britain (and locally further east: see Hughes 1995 on the Suffolk coast) and is of importance for scarce and rare plants and as part of distinctive landscapes. Relevés are available from Birse (1980) in Galloway and Mull, Hopkins (1983) on the Lizard, Proctor from south-west England (unpublished, also 1975 from Alderney) and from Averis & Averis (1995) from Mull. Further data, which would be easy to obtain, are needed to define this assemblage and clarify relationships with MC5 and U1f *Festuca-Agrostis-Rumex* grassland, *Hypochoeris* sub-community. Figure 26 in Appendix 1 shows a potential distribution map for this vegetation type which has been created by coincidence mapping characteristic species.

**Plantagini-Festucion ovinae** Passarge 1964

U1 *Festuca ovina*-*Agrostis capillaris*-*Rumex acetosella* grassland

SD8 *Festuca rubra*-*Galium verum* dune grassland (5)\*

This is a remarkably complex vegetation type in Scotland where the heartland of its distribution lies on the machair. Although the present five sub-communities cover much of the variation, other forms are present and have been mapped in Dargie (1998*a-e*, 1999). It may thus be possible to recognise *Centaurea nigra*-*Daucus carota* (on at most lightly grazed calcareous sands, an analogue to MG5), *Thymus praecox* (on shallow, partly flushed sand blown over rocky hillsides) and *Hylocomium splendens*-*Rhytidiadelphus triquetrus* sub-communities (the last part of a Boreal sequence: see SD7).



**CALLUNO-ULICETEA** Br.-Bl. et R. Tx ex Westhoff, Passchier et Dijk 1946

Grasslands and dwarf-shrub heaths of acidic, nutrient-poor mineral soils and peats in lowland and mountain regions

**NARDETALIA STRICTAE** Oberdorfer ex Preising 1949

**Violion caninae** Schwickerath 1944

Unfertilised mat-grass pastures at lower altitudes

U2 *Deschampsia flexuosa* grassland

U3 *Agrostis curtisii* grassland

U4 *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland (5)

Locally in western Scotland, there is a distinctive form of this grassland with big mesotrophic herbs. The abundance of the grasses *Festuca rubra*, *F. ovina*, *F. vivipara*, *Holcus lanatus* and *Anthoxanthum odoratum*, together with *Potentilla erecta* and an extensive and often rather deep moss layer of *Rhytidiadelphus squarrosus* and *Hylocomium splendens* and other species, places the vegetation clearly into U4. However, the vegetation differs from each of the five sub-communities of U4 in containing an abundance of tall mesophytic herbs such as *Filipendula ulmaria*, *Geum rivale*, *Cirsium helenioides*, *Parnassia palustris*, *Angelica sylvestris*, *Trollius europaeus*, *Alchemilla glabra*, *Geranium sylvaticum* and *Succisa pratensis*. Intensity of grazing varies but where it is heavier these tall herbs are mostly reduced to short, non-flowering plants. This grassland has been found on steep, moist but well-drained north-facing slopes at low altitude on basalt on Mull and Kerrera, on Cambrian fucoid beds on Beinn Eighe in Wester Ross, and on schists on Ben Lui in Perthshire. It occurs mainly on concave slopes where a moss/humus layer has provided some degree of buffering from the mineral soil and where there is some flushing from basic rock outcrops above. This vegetation probably represents a new sub-community of U4 and it typically forms small stands in sometimes extensive mosaics with CG10 *Festuca-Agrostis-Thymus*, CG11 *Festuca-Agrostis-Alchemilla* and U5 *Nardus-Galium* grasslands. 13 relevés from Mull, Beinn Eighe and Ben Lui (Averis & Averis 1996, 1998a, in prep.) with further data on U4 with MG5 meadow plants from CCW Lowland Grassland Survey.

Mossy grassland with abundant *Racomitrium lanuginosum* and abundant *Alchemilla alpina* or frequent *Huperzia selago* and *Diphasiastrum alpinum* found at high altitudes in the Highlands and Snowdonia also expands the character of U4.

U5 *Nardus stricta-Galium saxatile* grassland (5)

With abundant *Calluna vulgaris*, this vegetation resembles western forms of M15c with *Scirpus* replaced by *Nardus* and *Erica tetralix* absent or very rare (18 relevés from the western Highlands; Averis & Averis 1997b, 1997c, 1998a). Another form has little or no heather and is more of a *Nardus-Racomitrium* grassland (relevés from Skye; Averis & Averis 1997a). These two forms occur mainly on convex slopes which are at least moderately well-drained. The third form, which occurs in small, wetter, often linear shallow depressions (usually among drier U5e) has abundant *R. lanuginosum*, *Campylopus atrovirens*, *Sphagnum auriculatum* and *Nartheicum ossifragum*. 6 relevés from Skye by Averis & Averis (1997a).

CG10 *Festuca ovina-Agrostis capillaris-Thymus praecox* grassland (5)\*

Open swards of the CG10 type with frequent records for *Aira praecox*, occasional *Plantago maritima* and a distinctive contribution in the ground layer from *Racomitrium ericoides*, *R. lanuginosum* and *Pogonatum aloides*, occurring on riverside shingle throughout the Scottish Highlands, may constitute a new sub-community. 5 relevés from Rhidorroch, Wester Ross (Averis 1998).

CG11 *Festuca ovina-Agrostis capillaris-Alchemilla alpina* grassland

**Nardo-Juncion squarrosi** (Oberdorfer 1957) Passarge 1964

Heath-rush vegetation on peaty soils

- U6 *Juncus squarrosus-Festuca ovina* grassland (5)  
Graminoid-dominated swards with a low cover of *Juncus squarrosus* and including abundant *Anthoxanthum odoratum*, *Nardus stricta* and *Agrostis canina* can differ markedly from other types of U6 in containing an abundance of mesophytic or calcicole herbs such as *Ranunculus acris*, *R. flammula*, *Thalictrum alpinum*, *Alchemilla glabra*, *Taraxacum officinale* agg., *Crepis paludosa*, *Geum rivale*, *Parnassia palustris*, *Persicaria vivipara*, *Trollius europaeus*, *Carex pulicaris* and *Filipendula ulmaria*. This distinctive, species-rich vegetation has been found very locally in the Highlands, mainly in the Breadalbanes. It occurs as small stands in wet, flushed depressions at 400-700 m, mainly in complex mosaics with U4 *Festuca-Agrostis-Galium* grassland, U5 *Nardus-Galium* grassland, H18 *Vaccinium-Deschampsia* heath and other forms of U6. In terms of floristics and habitat it can be seen as a higher-altitude replacement of M23a *Juncus-Galium* rush pasture. On Ben Lui it is an important locus for the rare *Carex vaginata*. Relevés from the Breadalbanes (McVean & Ratcliffe 1962, Averis & Averis in preparation).

Short vegetation co-dominated by *Juncus squarrosus* and *Calluna vulgaris* is quite frequent in the western Highlands. Floristic details can show affinities with U6a, b or c, but some stands cannot be clearly assigned to a sub-community. Further sampling of this distinctive vegetation may suggest a new sub-community of U6. Relevés from Ben Lui (Averis & Averis in preparation).

**CALLUNO-ULICETALIA** Tüxen 1937

**Genisto-Callunion** Bocher 1943

Ling heaths on drought-prone soils at low to moderate altitudes in Continental and sub-Atlantic regions

- H1 *Calluna vulgaris-Festuca ovina* heath  
H9 *Calluna vulgaris-Deschampsia flexuosa* heath

**Ulicion minoris** Malcuit 1929

Gorse heaths on dry to fresh soils in the Atlantic region

- H2 *Calluna vulgaris-Ulex minor* heath  
H8 *Calluna vulgaris-Ulex gallii* heath

**Ulici-Ericion ciliaris** Géhu 1973

Gorse-Dorset heath communities of damper soils in the Atlantic region

- H3 *Ulex minor-Agrostis curtisii* heath  
H4 *Ulex gallii-Agrostis curtisii* heath (5)\*  
Beyond the geographic range of *Agrostis curtisii*, Prosser & Wallace (1996) have reported a 'humid heath' with frequent *Calluna vulgaris*, *Erica tetralix*, *Molinia caerulea* and *Ulex gallii*, essentially similar to H4 but perhaps best seen as a new sub-community.  
H6 *Erica vagans-Ulex europaeus* heath

**Ericion cinereae** Böcher 1940

Bell-heather communities on dry to fresh soils in sub-Atlantic regions

H7 *Calluna vulgaris-Scilla verna* heath

H10 *Calluna vulgaris-Erica cinerea* heath (5)\*

Transitions between calcicolous grasslands and heaths occur widely throughout the southern lowlands of Britain, and Rodwell (1991b) explains how some of the ‘limestone heath’ described by various authors can be accommodated in different NVC sub-communities or mosaics between vegetation types. Detailed reinvestigation of vegetation-soil sequences first described by Gittins (1965) and Rodwell (1974) in Stevens *et al.* (1995) may help characterise further intermediate heathy swards.

(5)\*

Rarely in the western Highlands, prostrate *Juniperus communis* and/or *Arctostaphylos uva-ursi* are co-dominant with *Calluna vulgaris* and *Erica cinerea* in heaths which appear to represent small fragments of vegetation extensive before moor-burning took place. Relevés from Skye, Beinn Eighe and Sutherland from Averis (1997) and Averis & Averis (1998a, d) and from blown sand on Mull and Colonsay in Dargie (1999). Some other H10 heath in the western Highlands and Northern Ireland has a bryophyte layer containing frequent *Breutelia chrysocoma* and some *Sphagnum capillifolium* and represents a transition from H10a to H21a, but it occurs frequently enough and extensively enough that it might warrant a new sub-community of H10. No relevés in UKVDB.

H11 *Calluna vulgaris-Carex arenaria* heath

**Myrtillion boreale** Böcher 1943

Bilberry heaths of moist soils in the sub-montane zone

H12 *Calluna vulgaris-Vaccinium myrtillus* heath (5)\*

H12 containing abundant *Racomitrium lanuginosum* is rare in the Highlands. It is closest floristically to H12b, but unlike H10, H12 cannot comfortably accommodate forms of vegetation with abundant *R. lanuginosum*. There may be a case for the creation of a *R. lanuginosum* sub-community of H12. 5 relevés from Beinn Eighe (Averis & Averis 1998a).

H16 *Calluna vulgaris-Arctostaphylos uva-ursi* heath

H21 *Calluna vulgaris-Vaccinium myrtillus-Sphagnum capillifolium* heath (5)\*

H21b with abundant prostrate *Juniperus communis* occurs rarely in the western Highlands. It appears to be a relatively natural type of heath which might have been more frequent before moor-burning took place. Given its extreme rarity it may not warrant recognition as a separate sub-community, but it forms part of the important series of relatively natural Scottish heaths containing abundant prostrate juniper (Averis & Averis 1998d). Most H21b south of the NW Highlands and Skye where this sub-community is extensive contains abundant *Herbertus aduncus* but lacks other montane Northern Atlantic leafy liverworts characteristic of more northern H21b. No relevés, although similar vegetation in Ireland has been sampled (Horsfield pers. comm.), and Averis (1994) sampled the full bryophyte component of Scottish heaths of this kind (Averis 1994).

## ROCK-CREVICE AND SCREE VEGETATION

**ASPLENIETEA TRICHOMANIS** (Br.-Bl. in Meier et Braun-Blanquet 1934) Oberdorfer 1977

Open vegetation with ferns and mosses in rock and wall crevices

POTENTILLETALIA CAULESCENTIS Br.-BL. in Braun-Blanquet et Jenny 1926

**Cystopteridion fragilis** Richard 1972

Communities of shaded calcareous rocks

OV40 *Asplenium viride*-*Cystopteris fragilis* community

*Asplenio-Cystopteridetum fragilis* (Kuhn 1939) Oberdorfer 1949

*Polypodium vulgare*-*Umbilicus rupestris* community (6)

Both *Polypodium interjectum* and *P. australe* occur among the wall crevice assemblages of the Cymbalario-Asplenion but the former fern, along with *P. vulgare sensu stricto*, is also a distinctive feature of the vegetation of hedgebanks and lanesides in western Britain with other ferns such as *Dryopteris filix-mas*, *D. borrieri*, *D. dilatata*, *Polystichum setiferum*, *P. aculeatum*, *Phyllitis scolopendrium*, *Asplenium adiantum-nigrum*, *A. billotii* and various hybrid ferns, *Hedera helix*, *Umbilicus rupestris*, *Silene dioica*, *Teucrium scorodonia*, *Brachypodium sylvaticum* and overhanging shrubs such as *Crataegus monogyna* and *Ulex europaeus*. This sort of vegetation is at its most luxuriant in the deep lanes running down to the sea in south Devon but it is widespread and common all around the south-western seaboard, extending up on to moorland where there is local shelter. On more accessible hedgebanks, periodic cutting helps prevent closure of a scrubby cover. The vegetation has many features suggestive of shady Saum and is perhaps better placed among the Melampyrion assemblages but, apart from its contribution to distinctive landscapes, it provides an important locus for various rare and scarce ferns (Page 1982, 1988). There are no relevés available but the vegetation is easy to locate and sample.

*Asplenium marinum* community (6)\*

*Asplenium marinum* figures occasionally among the maritime crevice vegetation of MC1 *Crithmo-Spergularietum* but this fern also occurs, sometimes with great local abundance and luxuriance, in shaded crevices, beneath overhangs and in caves cut in hard rock coasts, particularly of our Atlantic seaboard, where constant drenching with spray from Gulf Stream waters in an oceanic climate creates a humid, frost-free atmosphere. The moss *Schistidium maritimum* is often the only companion. According to Page (1982), stands are much less common and luxuriant now compared with last century, perhaps partly because of sea water pollution. The nationally scarce *Asplenium billotii* tends to occur more frequently in crevices a little higher up cliffs but the *A. marinum* community is itself important as part of the sequence of sea-cliff vegetation. 8 relevés from Malloch (unpublished) are in the UKVDB and additional samples would be relatively easy to collect from more accessible cliffs.

TORTULO-CYMBALARIETALIA Segal 1969

Wall crevice vegetation of sunny situations

**Centrantho-Parietarion** Rivas-Martínez 1960 nom. invers. propos.

Wall crevice vegetation of sunny situations

OV41 *Parietaria diffusa* community

*Parietarietum judaicae* (Arènes 1928) Oberd. 1977

**Cymbalario-Asplenion** Segal 1969

Communities of calcareous rocks in sunny situations

OV39 *Asplenium trichomanes-Asplenium ruta-muraria* community  
*Asplenietum trichomano-rutae murariae* R.Tx. 1937

OV42 *Cymbalaria muralis* community  
*Cymbalarietum muralis* Görs 1966

**THLASPIETEA ROTUNDIFOLII** Br.-Bl. 1948

Vegetation of scree, rubble and spoil

**GALIO-PARIETARIETALIA** Boscaiu *et al.* 1966

**Stipion calamagrostis** Jenny-Lips ex Br.-Bl. *et al.* 1952  
Communities of calcareous screes

OV38 *Gymnocarpium robertianum-Arrhenatherum elatius* community  
*Gymnocarpietum robertianum* (Kuhn 1937) R.Tx. 1937

**ANDROSACETALIA ALPINAE** Br.-Bl. 1926

**Androsacion alpinae** Br.-Bl. 1926  
Communities of acid screes

U21 *Cryptogramma crisper-Deschampsia flexuosa* community  
*Cryptogrammetum crispae* Jenny-Lips 1930

**VIOLETALIA CALAMINARIAE** Br.-Bl. et R.Tx. 1943

Swards on soils rich in heavy metals derived from natural ore outcrops or from mining and industrial activities

**Thlaspion calaminariae** Ernst 1965  
Mainly in western Europe

OV37 *Festuca ovina-Minuartia verna* community  
*Minuartio-Thlaspietum alpestris* Koch 1932

**MONTANE HEATHS, TALL-HERB COMMUNITIES AND SNOW-BEDS**

**JUNCETEA TRIFIDAE** Hadac 1946

Pastures, rush-heaths and fell-field on lime-poor soils in alpine and sub-alpine zones

**CARICETALIA CURVULAE** Br.-Bl. in Braun-Blanquet et Jenny 1926

Unproductive swards on lime-poor, impoverished humic soils in cloud-ridden and snowy sub-alpine and alpine zones

**Nardo-Caricion bigelowii** Nordhagen 1927

Moderately chionophilous sedge-, rush- and moss-dominated communities kept moist by snow-lie and melt waters

U7 *Nardus stricta-Carex bigelowii* grass-heath (5)\*  
Some U7 *Nardus* snowbed vegetation on N-facing slopes at 600-950 m on Beinn Eighe contains a distinctive abundance of the nationally scarce Northern Atlantic leafy liverworts *Anastrophyllum donnianum*, *A. joergensenii*, *Scapania ornithopodioides*, *S. nimbosa*,

*Bazzania pearsonii* and *Plagiochila carringtonii*. This vegetation may warrant separation as a new sub-community if it proves to be widespread. Relevés from Averis & Averis (1998a).

- U8 *Carex bigelowii*-*Polytrichum alpinum* sedge-heath (5)\*  
U8 vegetation containing a distinctive abundance of *Barbilophozia floerkei* occurs locally on moist N-facing slopes at 1030-1230 m in the Highlands. 19 relevés from Rothero (1991), who considered it worthy of separation as a *B. floerkei* sub-community.
- U9 *Juncus trifidus*-*Racomitrium lanuginosum* rush-heath
- U10 *Carex bigelowii*-*Racomitrium lanuginosum* moss-heath (5)\*  
U10c includes two distinctly different types of vegetation which may warrant separation into separate sub-communities. One type is much like U10b but with frequent scattered *Silene acaulis* and *Armeria maritima* (13 relevés from Beinn Eighe; Averis & Averis 1998a). The other type, which is species-rich and very distinctive, contains several montane herbs such as *Saussurea alpina*, *Thalictrum alpinum*, *Luzula spicata*, *Sedum rosea*, *Minuartia sedoides*, *Cerastium arcticum* and *Cochlearia pyrenaica* ssp. *alpina* (relevés from Beinn Eighe; Averis & Averis 1998a).

*Festuca vivipara*-*Oligotrichum hercynicum* fell-field community (6)

This very short and sparse vegetation occurs on moist, bare, gravelly, flat to moderately sloping ground in very exposed places over 300 m in northern and western Scotland. The total vegetation cover is typically less than 10%. Scattered plants of *Festuca vivipara*, *Agrostis canina* and the mosses *Oligotrichum hercynicum* and *Racomitrium lanuginosum* are generally abundant. Fell-fields are particularly well-developed on basalt in Skye, Mull and Morvern and provide a strong link with the basalt environment in the Faroe Islands especially where, in some basalt fell-fields of this type in the western Highlands, the flora is distinctive in containing base-demanding species such as *Thymus praecox*, *Sedum villosum*, *Juncus triglumis*, *Luzula spicata*, *Koenigia islandica* and the oceanic moss *Racomitrium ellipticum*. Basalt fell-fields in Skye and Mull represent one of the main habitats of the rare *Koenigia islandica* in the British Isles. Other fell-fields on basalt, granite, schist and other rock types in the western Highlands and Shetland are evidently more acidic. They support a flora including frequent *Vaccinium myrtillus*, *V. vitis-idaea*, *Campanula rotundifolia*, *Deschampsia flexuosa*, *Solidago virgaurea*, *Polytrichum alpinum* and *Jasione montana*. The vegetation of some of the more acidic fell-fields on Mull contains a distinctive abundance of *Sedum anglicum* and *Saxifraga stellaris*. Appraisal of relevés from Averis (1997) and Averis & Averis (1997a) and any new data could characterise two sub-communities reflecting the variation from basic to acidic rock types.

**Deschampsieto-Anthoxanthion** Dahl 1956

Grass- and herb- communities on slopes irrigated by frigid melt waters

- U13 *Deschampsia cespitosa*-*Galium saxatile* grassland

**LOISELEURIO-VACCINIETEA** Eggler 1952 em. Schubert 1960

Dwarfed sub-shrub heaths with mosses and lichens on windswept and snowbound slopes at high altitudes in Northern Europe

**RHODODENDRO-VACCINIETALIA** Br.-Bl. in Br.-Bl. et Jenny 1926

**Loiseleurio-Vaccinion** Br.-Bl. in Br.-Bl. et Jenny 1926

Less chinophilous communities of windswept slopes and summits

- H13 *Calluna vulgaris*-*Cladonia arbuscula* heath

- H14 *Calluna vulgaris*-*Racomitrium lanuginosum* heath

H15 *Calluna vulgaris-Juniperus communis* spp. *nana* heath

H17 *Calluna vulgaris-Arctostaphylos alpinus* heath

H19 *Vaccinium myrtillus-Cladonia arbuscula* heath

H20 *Vaccinium myrtillus-Racomitrium lanuginosum* heath

**Phyllodoco-Vaccinion** Nordhagen 1943

Moderately chionophilous communities of snow-bound slopes

H18 *Vaccinium myrtillus-Deschampsia flexuosa* heath

H22 *Vaccinium myrtillus-Rubus chamaemorus* heath

**CARICI RUPESTRIS-KOBRESIETEA BELLARDII** Ohba 1974

Subalpine and alpine grasslands and dwarf-shrub heaths on lime-rich soils

**KOBRESIO-DRYADETALIA** Ohba 1974

**Kobresio-Dryadion** Nordhagen (1936) 1943

Chionophobous grassy and dwarf-shrub heaths on well-drained soils

CG13 *Dryas octopetala-Carex flacca* heath

CG14 *Dryas octopetala-Silene acaulis* ledge community

**Potentillo-Polygonion** Nordhagen 1928

Moderately chionophilous communities dominated by small herbs

CG12 *Festuca ovina-Alchemilla alpina-Silene acaulis* dwarf-herb community

**MULGEDIO-ACONITETEA** Hadac et Klika in Klika 1948

Luxuriant scrub and tall-herb vegetation on ungrazed ledges, hollows and gulleys in the subalpine and alpine zones, with soils kept moist and fertile by percolating waters

**ADENOSTYLETALIA ALLIARIAE** G. & J. Br.-Bl. 1931

Tall herb and scrub on more fertile and lime-rich soils

**Adenostylion alliariae** Br.-Bl. 1926

Tall-herb communities

U17 *Luzula sylvatica-Geum rivale* tall-herb community

*Pteridium aquillinum-Cirsium helenioides* fern-community (6)

Bracken-dominated vegetation with rather low-grown, moderately grazed associates including *Filipendula ulmaria*, *Ranunculus repens*, *Cirsium palustre*, *C. helenioides*, *Lysimachia nemorum*, *Prunella vulgaris*, *Primula vulgaris* and *Ajuga reptans* occurs locally on moist, deep soils on gently sloping ground at low altitudes in the western Highlands. This does not fit comfortably into U20 or W25 and may represent a new community in this alliance. No relevés are available.

**Alnion viridis** Aichinger 1933  
*Salicion arbusculae* Ellenberg 1978  
Subalpine willow scrub

W20 *Salix lapponum-Luzula sylvatica* scrub

**CALAMAGROSTIETALIA VILLOSAE** Pawlowski *et al.* 1928  
Tall-herb and fern communities of acidic and more impoverished soils

**Calamagrostion villosae** Pawlowski in Pawtowski, Sokotwski et Walisch 1928

U16 *Luzula sylvatica-Vaccinium myrtillus* tall-herb community

U18 *Cryptogramma crispera-Athyrium distentifolium* snow-bed

U19 *Thelypteris limbosperma-Blechnum spicant* community

*Dryopteris borrieri* community (6)

Local dominance of ferns can be a striking feature of U16 *Luzula-Vaccinium* tall-herb vegetation but, more widely, *Dryopteris borrieri* (= *D. affinis*) occurs abundantly in sometimes quite extensive stands with Nardo-Galium associates over the lower slopes of hills in western Scotland and sheltered valleys in the drier east. This may warrant a new community in this alliance. No relevés in UKVDB.

**SALICETEA HERBACEAE** Br.-Bl. 1949

Vegetation of more long-lasting snow-beds and slopes irrigated by melt waters

**SALICETALIA HERBACEAE** Br.-Bl. in Braun-Blanquet et Jenny 1926

**Salicion herbaceae** Br.-Bl. in Braun-Blanquet et Jenny 1926

Dwarf-willow and moss-dominated communities of snow-beds on lime-poor rocks and soils

Rothero (1991) recorded 141 relevés in late snowbed vegetation in the Scottish Highlands with only 14 relevés fitting clearly into U13 and M33, but his classification of the remaining 127 relevés suggests the following additions:

U11 *Polytrichum sexangulare-Kiaeria starkei* snow-bed (5)

The three sub-communities recognised by Rothero (1991) are a Typical form, a hepatic-rich type with abundant *Barbilophozia floerkei*, *Nardia scalaris*, *Cephalozia bicuspidata* and *Pleurocladula albescens* and a *Racomitrium* variant with abundant *Racomitrium heterostichum*. 58 relevés from Rothero (1991).

U12 *Salix herbacea-Racomitrium heterostichum* snow-bed

*Deschampsia flexuosa* snow-bed (6)

*Deschampsia flexuosa* occurs generally at no more than moderate abundance in U12 snow-bed vegetation, but it is abundant to dominant in several snowbeds on steep north-facing slopes in the Cairngorms. Some of these stands are quite extensive. Associated species occur only at low cover and include abundant *Huperzia selago*, *Galium saxatile*, *Juncus trifidus*, the mosses *Polytrichum alpinum*, *Dicranum fuscescens* and *Rhytidiadelphus loreus*, and the liverwort *Barbilophozia floerkei*. This vegetation is probably distinctive enough for at least a new sub-community of U12. It marks a floristic link with some Scandinavian snowbed grassland, especially the type T1b Smyle-fjellgulaks-utforming described by Fremstad (1997). Relevés from Coire an Lochain in the Cairngorms from Horsfield (unpublished).



*Marsupella brevissima*-*Anthelia juratzkana* snow-bed (6)  
An abundance of *Marsupella brevissima*, *Anthelia juratzkana*, *Lophozia sudetica*, *Polytrichum sexangulare* and *Racomitrium heterostichum* suggest this new community as an expansion of U12c (Rothero 1991). He proposes a Typical sub-community with abundant *Kiaeria falcata*, a *Salix herbacea* sub-community with abundant *S. herbacea* and *Ditrichum zonatum*; and a *Cephalozia bicuspidata* ssp. *bicuspidata* sub-community with *Kiaeria starkei*, *Cephalozia bicuspidata*, *Nardia scalaris* and *Pleurocladula albescens*. 41 relevés from Rothero (1991).

**Ranunculo-Anthoxanthion** Gjaerevoll 1956  
Montane herb communities of irrigated slopes

U14 *Alchemilla alpina*-*Sibbaldia procumbens* dwarf-herb community

U15 *Saxifraga aizoides*-*Alchemilla glabra* banks

## FRINGE, SCRUB AND BROADLEAF WOODLAND COMMUNITIES

**TRIFOLIO-GERANIETEA SANGUINEI** Th. Müller 1961  
Thermophilous fringe vegetation around woodlands and scrub

**ORIGANETALIA VULGARIS** Th. Müller 1961  
Herbaceous vegetation of woodland rides and margins on calcareous soils

**Geranion sanguinei** Tüxen in Th. Müller 1961  
Drought-tolerant communities of sunny woodland edges on calcareous soils

*Agrimonia eupatorium*-*Origanum vulgare* community (6)\*  
*Rubo-Origanetum* Van Gils et Huits 1978  
Something approaching thermophilous Saum appears in the NVC among the dune communities as part of the SD9 *Ammophila-Arrhenatherum* grassland and Willems (1978) described swards from the English chalk that had some Geranion species. There is no place at present, however, for the patchily rank assemblage of *Agrimonia eupatoria*, *Origanum vulgare*, *Hypericum perforatum*, *Brachypodium pinnatum* and *Rubus caesius*, developed in open, sunny places in and around W8 *Fraxinus-Acer-Mercurialis* and W12 *Fagus-Mercurialis* woodlands. Young *Crataegus monogyna*, *Cornus sanguinea* and *Viburnum lantana* are commonly present, often with *Fraxinus* saplings, and there can be untidy sprawls of *Clematis vitalba* and *Tamus communis* over the young woody growth of W21d *Crataegus-Hedera* scrub that may encroach where invasion is not set back by browsing or scrub clearance. This vegetation is a local and dynamic feature of the limestone soils of the warm and dry south-east and of significance for butterflies, providing shelter and food plants. There are no relevés in the UKVDB and further survey is a priority.

*Corylus avellana*-*Geranium sanguineum* community (6)\*  
*Geranio-Coryletum* Shimwell 1968  
Shimwell's (1968a) survey of the Derbyshire Dales (data also incorporated into Shimwell 1968b) characterised a form of open scrub which he considered equivalent to the 'retrogressive scrub' of Moss (1913) and part of the Geranion. In *British Plant Communities*, this was subsumed into W21 *Crataegus-Hedera* scrub but what has been lost is the more open Saum aspect of this assemblage in which sunny areas among colonising *Corylus avellana* (and in other locations *Juniperus communis* and *Taxus baccata*) have plants like *Origanum vulgare*, *Viola hirta*, *Hypericum perforatum*, *Verbascum thapsus*, *Polypodium australe* (Page 1982, 1988) and, most notably, *Geranium sanguineum*. *Epipactis atrorubens*, *Convallaria majalis* and *Thalictrum minus* probably all have some stations here. *Rosa pimpinellifolia* can also figure and, locally, species of *Berberis* or *Cotoneaster* can invade from nearby gardens. This kind of Saum is limited to rubbly

rendzinas on rocky slopes over limestones of the north and west of Britain, particularly North Wales, Derbyshire, the Morecambe Bay area and parts of the Yorkshire Dales, where southern and western aspects give sun and warmth, and to some calcareous dune systems in the region. Except where extreme rockiness inhibits closure of a canopy, this vegetation type requires action to control woody invaders. Even here, ornamental shrubs can be a menace. Relevés exist from Shimwell (1968*a, b*) but more data are needed. Figure 27 in Appendix 1 shows a potential distribution map for this vegetation type which has been created by coincidence mapping characteristic species.

**MELAMPYRO-HOLCETALIA MOLLIS** Passarge 1979

Herbaceous vegetation of woodland margins and rides on impoverished acid sands

**Melampyrion pratensis** Passarge 1967

Marginal and ride vegetation in drier situations

*Holcus mollis*-*Melampyrum pratensis* community (6)

*Hyperico pulchri*-*Melampyretum pratensis* De Foucault et Frileux 1983

In *British Plant Communities*, some vegetation like this association described, for example, from the Netherlands (Schaminée *et al.* 1996), was included as open stands of W16 *Quercus*-*Betula*-*Deschampsia* woodland. With further sampling, it may be possible to characterise a distinct community in which the cover of *Quercus* (usually *robur*) and *Betula* (usually *pendula*) are low and field layer plants like *Holcus mollis*, *Deschampsia flexuosa* and *Melampyrum pratense* are accompanied by *Teucrium scorodonia*, *Solidago virgaurea*, *Hypericum pulchrum*, *Carex pilulifera* and large *Hieracia* at greater frequencies than under closed *Quercion* canopies. Such assemblages are typical of shady clearings, rides and woodland margins on free-draining, acidic soils over siliceous bedrocks throughout the lowlands and upland fringes. Periodic mowing or clearance of shrubs and trees may be necessary to maintain open conditions. This vegetation is rarely floristically exciting but it comprises graded transitions from woodland to heath or pasture which are valuable for invertebrates and passerines, as well as a landscape element. More relevés are needed from relatively unwooded situations and would be easy to collect.

**Potentillo erectae-Holcion mollis** Passarge 1979

Marginal and ride vegetation in damper situations

**RHAMNO-PRUNETEA** Rivas Goday et Borja Carbonell 1961

Sub-scrub and scrub vegetation, seral to natural broadleaved woodland or along margins of woods and hedges

**PRUNETALIA SPINOSAE** Tüxen 1952

**Prunion fruticosae** Tx. 1952

Shrub communities on moister, loamy soils in central Europe

W22 *Prunus spinosa*-*Rubus fruticosus* scrub

**Berberidion vulgaris** Br.-Bl. 1950

Thermophilous scrub on sunny, stony slopes in southern Europe

W21 *Crataegus monogyna*-*Hedera helix* scrub

**Salicion repentis arenariae** Tüxen 1952

Willow and buckthorn scrub communities of dune slacks and ridges

SD16 *Salix repens*-*Holcus lanatus* dune-slack

SD18 *Hippophae rhamnoides* scrub

**Ulici-Sarothamnion** Doing 1962

Broom and gorse scrub

W23 *Ulex europaeus-Rubus fruticosus* scrub

**Rubion subatlanticum** R.Tx. 1952

Bramble communities of wood margins, clearings, hedgerows and neglected pastures

W24 *Rubus fruticosus-Holcus lanatus* underscrub

W25 *Pteridium aquilinum-Rubus fruticosus* underscrub

**SAMBUCETALIA RACEMOSAE** Oberdorfer ex Passarge in Scamoni 1963

**Sambuco-Salicion capreae** Tüxen et Neumann in Tüxen 1950

Seral elder and willow scrub of nutrient-rich mull soils

*Sambucus nigra-Urtica dioica* scrub (6)

*Sambucus nigra* figures occasionally as a locally prominent shrub in various types of eutrophic (often disturbed) woodland. It can also dominate (with or without *Salix caprea*, *Acer pseudoplatanus* and naturalised *Buddleia davidii*) in scrub with associates like *Rubus idaeus*, *R. fruticosus* agg., *Urtica dioica*, *Holcus lanatus*, and *Epilobium angustifolium* on damp, nutrient-rich soils on disturbed waysides, in woodland clearings, railway embankments, industrial wasteland, canal banks and derelict back yards, gardens and outside lavatories. Green shrubbery in otherwise devastated landscapes and all too easy to find and sample.

**QUERCO-FAGETEA** Br.-Bl. et Vlieger in Vlieger 1937

Broadleaved temperate woodland of the West European lowlands

(4)

*Luzula sylvatica* can be so dominant in ungrazed or very lightly grazed stands of W9, W10, W11, W16 and W17 woodlands and *Pteridium aquilinum* so abundant in W11 that associates are reduced sufficiently to make it difficult to characterise existing sub-communities. It may be sensible to recognise new species-poor sub-communities distinguished by these plants.

**QUERCETALIA ROBORI-PETRAEAE** Tüxen 1931

Oak and mixed oak-birch woodland communities of acid soils in central and western Europe

**Quercion robori-petraeae** (Malcuit 1929) Br.-Bl.

W11 *Quercus petraea-Betula pubescens-Oxalis acetosella* woodland (4)

The grasses *Holcus mollis*, *Agrostis capillaris* and *Anthoxanthum odoratum* are often overwhelmingly dominant in a species-poor field layer in grazed or young stands of W11 woodland in various parts of the British uplands. The scarcity or lack of sub-community preferentials is such that the vegetation cannot be clearly assigned to any existing sub-community of W11, and may warrant a new type. Relevés from Wales (Averis & Averis 1998b, c) and Somerset (Averis unpublished).

W16 *Quercus ssp.-Betula ssp.-Deschampsia flexuosa* woodland

W17 *Quercus petraea*-*Betula pubescens*-*Dicranum majus* woodland

*Rhododendron ponticum* community (6)

*Rhododendron ponticum* is a vigorous invader of W17 *Quercus*-*Betula*-*Dicranum* woodland and some W10 *Quercus*-*Pteridium*-*Rubus*, W11 *Quercus*-*Betula*-*Oxalis* and W16 *Quercus*-*Betula*-*Deschampsia* woodland at low altitudes in western Britain and locally further east. It can also invade open habitats such as heathland and bog. The cover can thicken up over a few years to form a virtually impenetrable thicket some 3-6 m tall. The heavy shade cast by the dense evergreen foliage, combined with the thick acidic leaf litter which smothers the ground, causes marked impoverishment in the field and ground layer vegetation and the epiphytic vegetation on native trees and shrubs. The effect is similar to that within conifer plantations, namely a reduction in species-richness, loss of light-demanding species and survival of little other than a sparse, species-poor assemblage of mainly common calcifuge, shade-tolerant bryophytes such as *Isopterygium elegans* and *Mnium hornum*. *Rhododendron* poses a serious threat to the rich oceanic bryophyte and lichen floras in many W17 woods in north Wales, the Lake District, the western Highlands and western Ireland. Clearance of *Rhododendron* has taken place in many western woods; methods vary from manual cutting and subsequent treatment of stumps to clearance using a mechanical flail. Observations suggest that following clearance, recovery of the woodland vegetation is a very slow process, and that some of the rarer bryophytes and lichens might never return.

U20 *Pteridium aquilinum*-*Rubus fruticosus* community

FAGETALIA SYLVATICAE Pawlowski in Pawlowski, Sokotowski et Wallisch 1928  
Broadleaved woodland and scrub communities of more fertile soils

**Fagion sylvaticae** Luquet 1926

Beech and mixed beech woodland communities of sub-alpine regions of Europe

W15 *Fagus sylvatica*-*Deschampsia flexuosa* woodland

W14 *Fagus sylvatica*-*Rubus fruticosus* woodland

W12 *Fagus sylvatica*-*Mercurialis perennis* woodland

W13 *Taxus baccata* woodland

**Carpinion betuli** Issler 1931

Broadleaved woodland communities rich in hornbeam on lime-rich and neutral mull soils

W8 *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland

W10 *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland

**Alnion incanae** Pawlowski in Pawlowski & Wallisch 1928

*Alno-Ulmion Br.-Bl. et Tüxen ex Tschou* 1948 em. Müller et Görs 1958

Ash and alder woodland communities of flushed and impeded lime-rich soils

W7 *Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland (5)

Scrub dominated by *Salix aurita* (with or without *S. cinerea*) has been widely reported from Scotland, especially the Western Highlands. However, where the composition of the field layer has been examined, the vegetation looks essentially the same as W7 *Alnus*-*Fraxinus*-*Lysimachia* or W4 *Betula*-*Molinia* woodland so a new community may not be necessary, just distinctive types of two existing communities with striking canopies.

W9 *Fraxinus excelsior*-*Sorbus aucuparia*-*Mercurialis perennis* woodland

**SALICETEA PURPUREAE** Moor 1958

Willow scrub and woodland of flood-plains in mountain and lowland rivers

**SALICETALIA PURPUREAE** Moor 1958

**Salicion albae** Soó 1930

Willow scrub and woodland of sub-montane and lowland river shoals and terraces

W6 *Alnus glutinosa-Urtica dioica* woodland

**ALNETEA GLUTINOSAE** Br.-Bl. et Tüxen 1943

Alder and willow woodlands of swamps, fens and wet pastures

**ALNETALIA GLUTINOSAE** Tüxen 1937

Alder woodlands of swamps, fens and wet pastures

**Alnion glutinosae** Malcuit 1929

W1 *Salix cinerea-Galium palustre* woodland

W5 *Alnus glutinosa-Carex paniculata* woodland

**SALICETALIA AURITAE** Doing 1962

Willow scrub and woodland of mires

**Salicion cinereae** Th. Müller et Görs ex Passarge 1961

W2 *Salix cinerea-Betula pubescens-Phragmites australis* woodland

W3 *Salix pentandra-Carex rostrata* woodland

## **CONIFEROUS WOODLAND COMMUNITIES**

**VACCINIO-PICEETEA** Br.-Bl. in Braun-Blanquet, Sissingh et Vlieger 1939

Coniferous forest communities of more acidic soils

**PICEETALIA EXCELSAE** Pawlowski in Pawlowski, Sokolowski & Wallisch 1928

European coniferous communities

**Dicrano-Pinion** (Libbert 1933) Matuszkiewicz 1962

Pine and juniper woodland communities of acid soils

W18 *Pinus sylvestris-Hylocomium splendens* woodland (5)\*

Pinewood with abundant *Molinia* is occasional in the Highlands. It may warrant a new sub-community of W18. Relevés from Glen Affric (Averis 1994) and Loch Torridon (Tidswell 1995).

*Pinus sylvestris-Cladonia* woodland (6)\*

*Cladonio-Pinetum sylvestris* Watson & Birse 1990

Lichens figure only occasionally and with little prominence in W18 *Pinus-Hylocomium* woodland but locally, in open, sunny and windy stands of *Pinus sylvestris*, Watson & Birse (1990) recorded a very distinct kind of vegetation with *Erica cinerea* and an extensive ground carpet of *Cladonia impexa*, *C. furcata*, *C. gracilis*, *C. ciliata*, *C. arbuscula* and *C. uncialis*. It is impossible to accommodate this within W18 and it bears some resemblance to

lichen-rich pine woodland described from Scandinavia and Eastern Europe (Rodwell & Cooper 1995), so recognition at community level is probably more appropriate. There are relevés from Watson & Birse (1990) and Dargie (1994b) but further searches may reveal other stands.

W19 *Juniperus communis*-*Oxalis acetosella* woodland (5)\*

Wetter juniper scrub from Morrish More (Dargie 1993) can probably be accommodated with SD15 but the drier forms, more extensive geographically with records from Dalchalm on Brora to Nigg and Culbin are more enigmatic. More relevés are required to examine the relationship of this vegetation to W19.

Conifer plantations (6)

The NVC approach to classifying stands of woodland dominated by non-native conifers was to regard them as coniferised versions of native broadleaved woodlands or replacements for native Scot's pine woodland. This is quite informative for understanding the impact of afforestation on the woodland flora but, when plantations are very extensive, seems a little odd. It may therefore be sensible to recognise distinct communities of *Picea sitchensis*, *Pinus sylvestris*, *P. nigra* var. *maritima* and *Pseudotsuga menziesii* (plus any other extensive coniferous dominants) where there is usually just a very sparse field layer of puny *Deschampsia flexuosa*, *Oxalis acetosella* and *Dryopteris dilatata* and only scattered patches of *Isopterygium elegans*, *Mnium hornum* and *Plagiothecium undulatum* with a deep layer of conifer needles. These plantations are widespread and extensive, especially in upland Britain and are usually replacements for Quercion or Dicrano-Pinion woodland, more locally for Betulion woodland. They are an important landscape element and sometimes help sustain a distinctive fauna. Sampling should also help understand the impact of deciduous conifers like *Larix* spp. which can have a richer field and ground flora and, the distinctiveness of old-growth stands.

**Vaccinio-Piceion** Br.-Bl. 1938 em. Koch 1954  
Spruce and birch related woodland communities

W4 *Betula pubescens*-*Molinia caerulea* woodland (5)

Scrub dominated by *Salix aurita* (with or without *S. cinerea*) has been widely reported from Scotland, especially the Western Highlands. However, where the composition of the field layer has been examined, the vegetation looks essentially the same as W4 *Betula*-*Molinia* woodland or W7 *Alnus*-*Fraxinus*-*Lysimachia* so a new community may not be necessary, just distinctive types of two existing communities with striking canopies.

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# Appendix 1

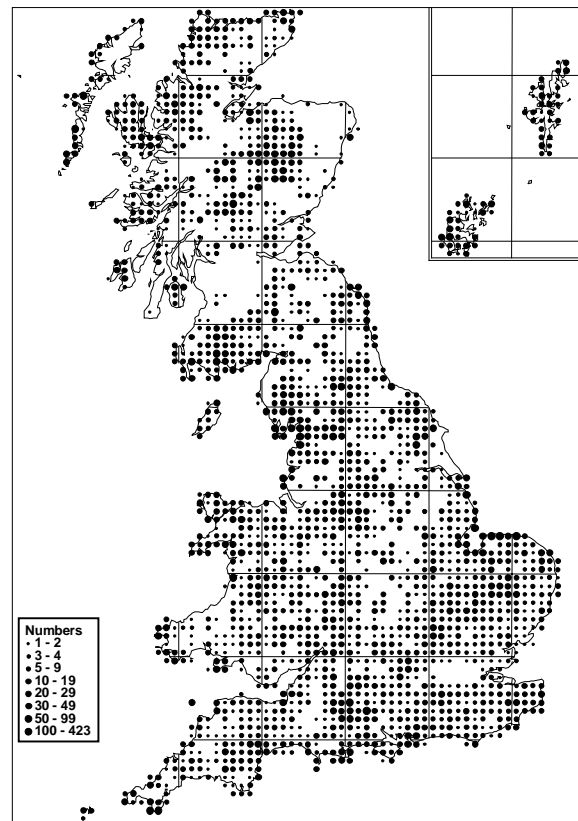


Figure 1 Numbers of relevés available for the NVC

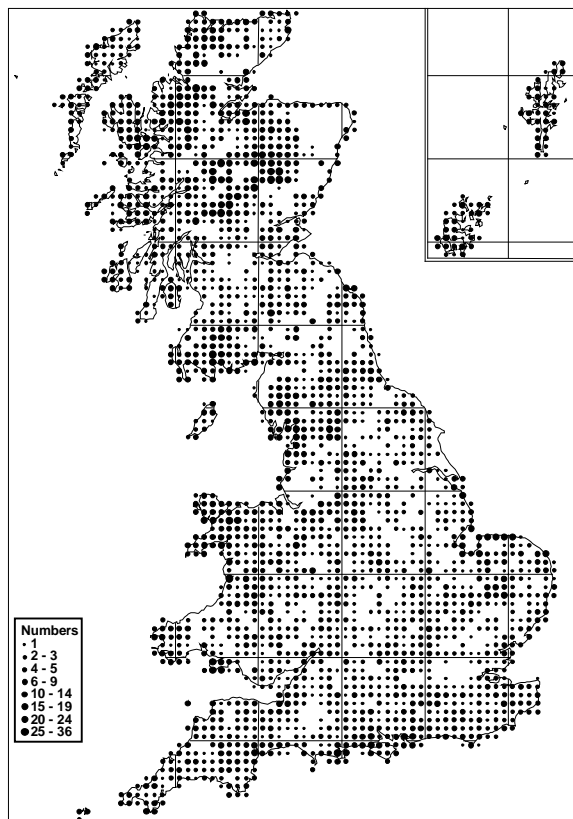


Figure 2 Number of NVC communities on the 10 km by 10 km National Grid

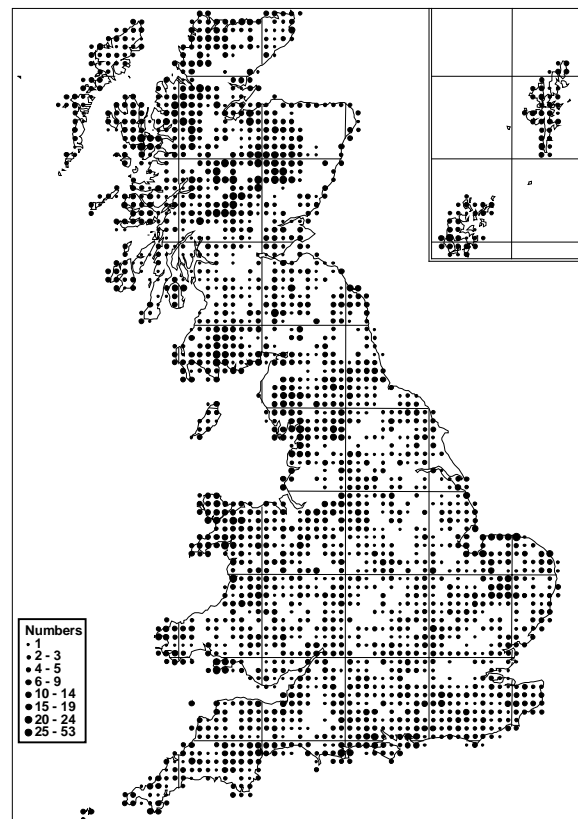
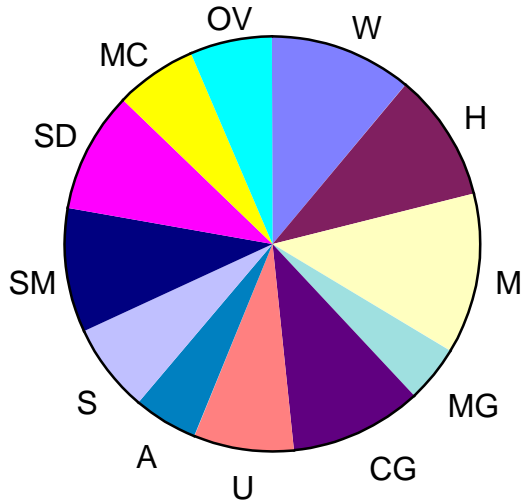
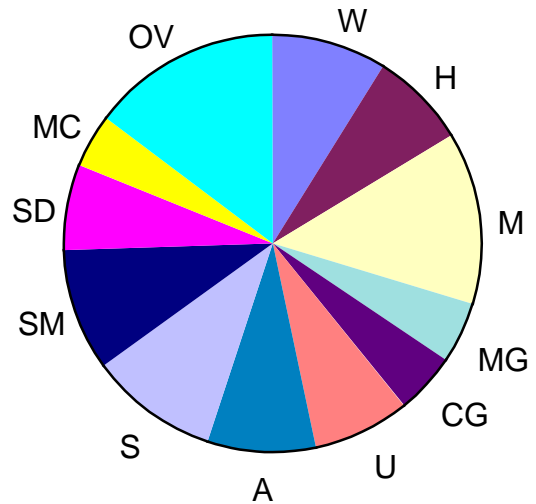


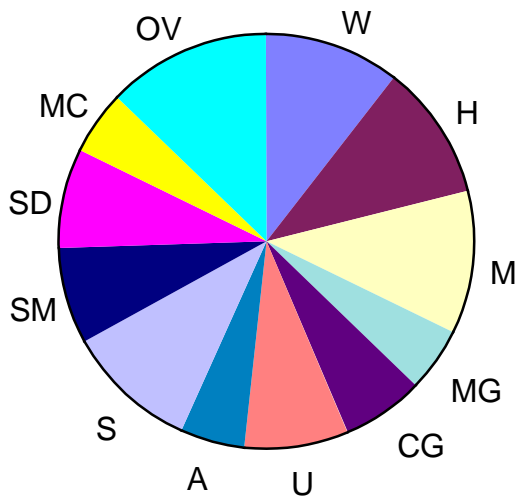
Figure 3 Number of NVC communities with subcommunities on the 10 km by 10 km National Grid



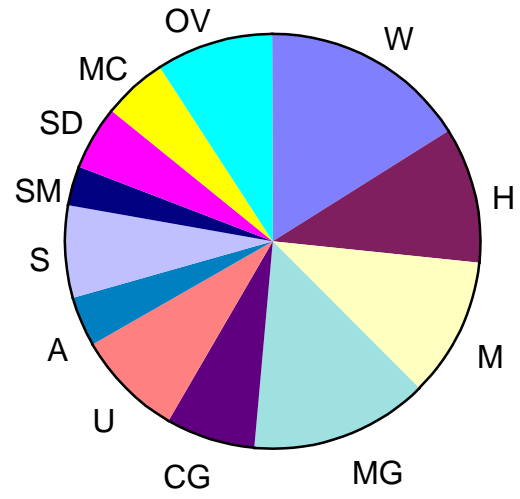
**Figure 4** Proportions of NVC samples in major vegetation types



**Figure 5** Proportions of NVC communities in major vegetation types

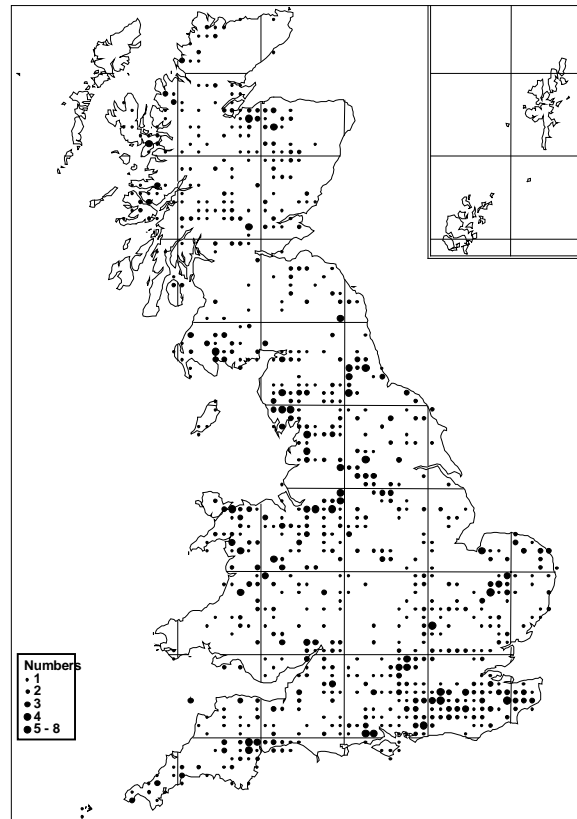


**Figure 6** Proportions of NVC subcommunities in major vegetation types

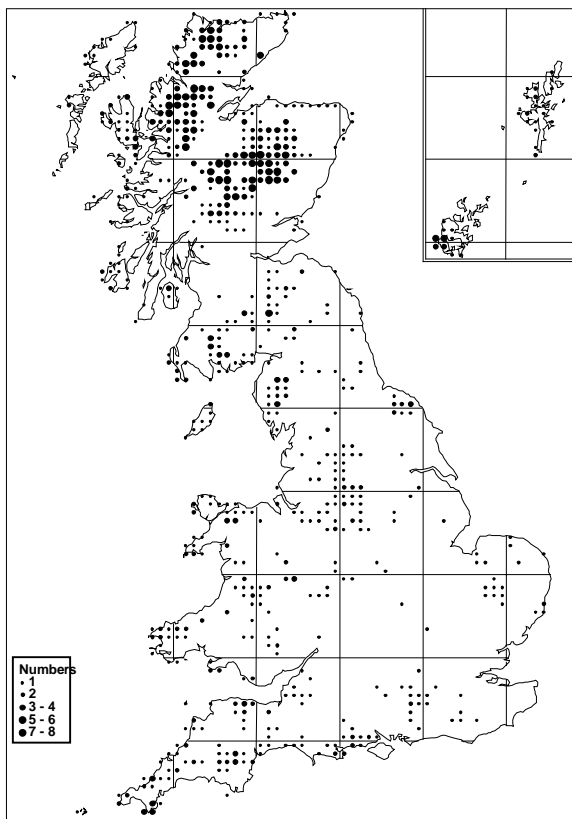


**Figure 7** Proportions of 10 km by 10 km squares with relevés in major vegetation types

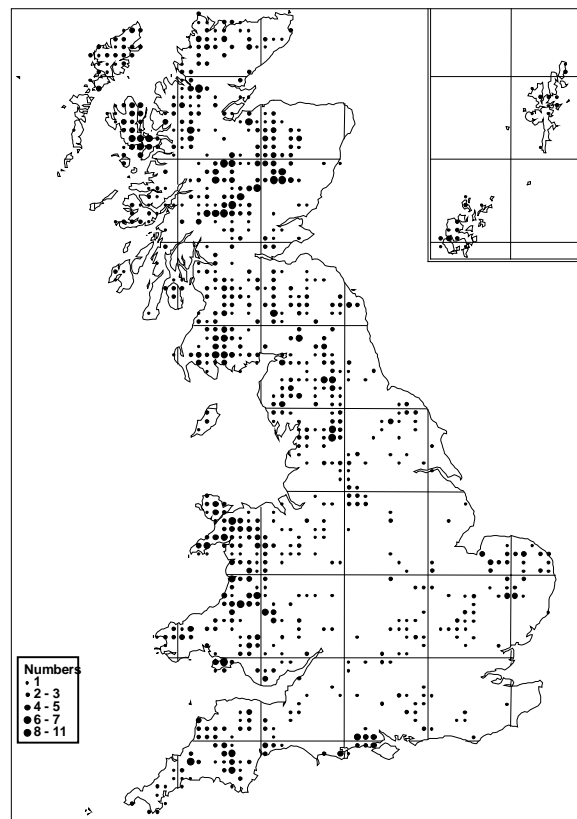
**Key:** A - aquatic communities; CG - calcareous grasslands; H - heaths; M - mires; MC - maritime cliffs; MG - mesotrophic grasslands; OV - open vegetation; S - swamps; SD - sand dunes; SM - saltmarsh; U - acid grassland and montane communities; W - woodland



**Figure 8** Numbers of NVC woodland and scrub communities on the 10 km by 10 km National Grid

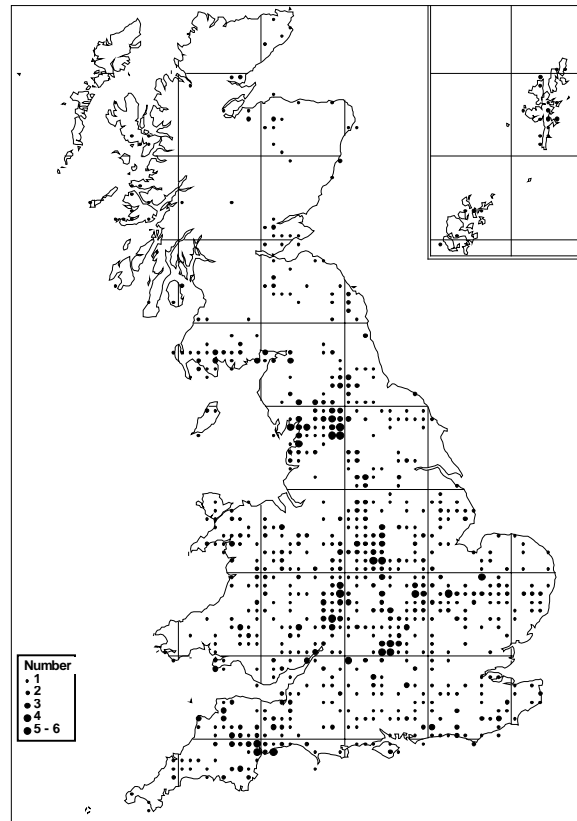


**Figure 9** Numbers of NVC heath communities on the 10 km by 10 km National Grid

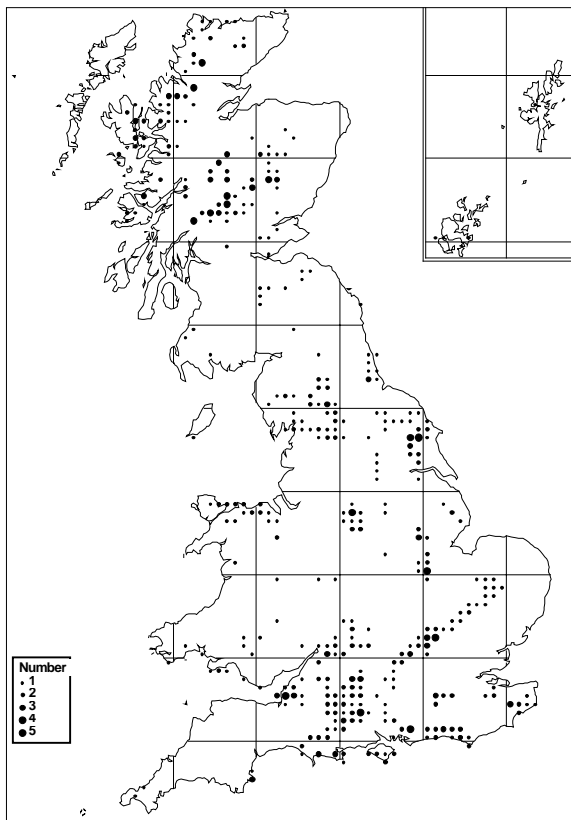


**Figure 10** Numbers of NVC mire communities on the 10 km by 10 km National Grid

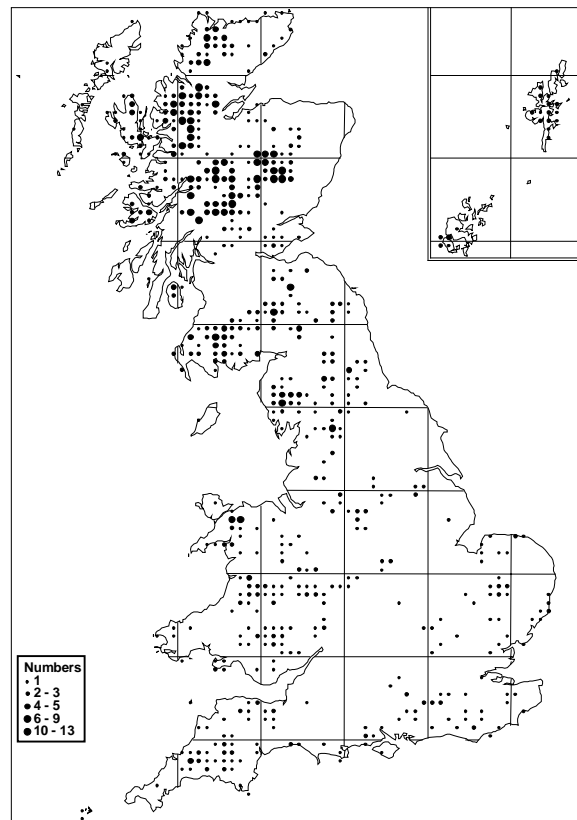




**Figure 11** Numbers of NVC mesotrophic grassland on the 10 km by 10 km National Grid



**Figure 12** Numbers of NVC calcicolous grassland on the 10 km by 10 km National Grid



**Figure 13** Numbers of NVC montane communities and calcifugous grasslands on the 10 km by 10 km National Grid