Joint Nature Conservation Committee

Guidelines for the selection of biological SSSI's
Part 2: Detailed guidelines for habitats and species groups

9 UPLAND HABITATS

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9 UPLAND HABITATS

1 Introduction

1.1 The uplands contain by far the most extensive of Britain's semi-natural habitats, occupying large and continuous expanses of the north and west and still covering at least 6.5 Mha (or 28% of the country). The principle of site selection by choice of exemplary areas must therefore apply to the more widespread features; for rare or highly localised features or those of outstanding international importance, however, the selection of all examples above a given quality should apply (see A, 4.4 and 4.6). Within uplands, a distinction is made between a lower **sub-montane** and a higher **montane** zone, the boundary corresponding to the potential climatic tree-line. An actual tree-line is seldom observable in Britain, where deforestation has been so prevalent, but the potential limit appears to be at just over 600 m in South Wales and the eastern Highlands, descending lower in more oceanic districts and reaching only about 300 m in the far north-west of Scotland (Thompson, Galbraith & Horsfield 1987). The distinction between the sub-montane and montane zones is thus often blurred, and the two usually merge through a broad band of transitional vegetation. In some districts the attitudinal range of uplands falls entirely within the sub-montane zone, and only in the Scottish Highlands is the montane zone strongly represented. Since it is the montane zone that contains outliers of true Arctic-Alpine habitats and species associated with the cold climates of high latitudes and altitudes and because it is in a relatively natural state, **the Highlands assume a particular importance for the selection of upland SSSIs.**

1.2 The uplands also contain some of the best and most extensive examples of natural vegetation in Britain. Cliff faces and ledges, whether on open hillsides or in enclosed ravines and gills, usually support fragmentary occurrences of plant communities which have been modified or eradicated by land management practices in more accessible situations. Within the sub-montane zone these include certain types of woodland and their characteristic herbaceous field layer communities, so widespread in the mountains of Scandinavia. Islands in lakes and rivers sometimes support fragments of original woodland, scrub or heath, but some have been modified by grazing and/or burning. Cliffs within the montane zone often provide refuges for relict communities and assemblages of Arctic-Alpine plants which are sensitive to grazing, fire or competition. They are also the important habitat of rupestral mosses, liverworts and lichens. The higher levels of many remoter and more acidic mountains in the Highlands have escaped significant modification by grazing animals and show relatively large areas of natural montane vegetation in accessible situations (Thompson, Galbraith & Horsfield 1987). While blanket bog has been extensively degraded, evidently by past land-use, there

still remain numerous areas, especially in northern Scotland, with relatively undisturbed surfaces dominated by Sphagnum species (see C.8).

1.3 Within any upland district, variations in geology and topography produce differences in drainage, aspect and soil fertility which have considerable influence on the nature of the terrain, flora and fauna and land-use history (Pearsall 1950; Ratcliffe & Thompson 1988). There are sharp contrasts between steep-sided and rocky mountains, with mainly thin, well-drained soils, crags and screes, and the gentler, undulating moorlands, which are often largely peat-covered and almost devoid of exposed rock. Whilst there is a prevalence of hard acidic rocks which give infertile soils and low carrying capacity for animals, local areas of limestone or other calcareous rock yield fertile soils and good productivity for both domestic stock and wild animals. Uplands typically contain a varied range of habitats, including kinds which are dealt with as quite separate categories in these guidelines. They virtually all have flowing fresh waters, originating as springs, flushes and rills which feed into larger watercourses, and many of them have tarns and lakes (see C.6). Blanket bog is so characteristically an upland and northern habitat type that it is dealt with again in this chapter, and most uplands also have a variety of soligenous mires (see C.7 and C.8). Some uplands have escaped the almost total deforestation of the past and have variously-sized expanses of native, semi-natural woodland (see C.2) on their lower slopes, albeit mostly well below the true climatic limit.

1.4 Since native woodland is now so fragmentary, the lower limits of upland sites are most usually defined by the boundary walls, fences or hedges of the uppermost enclosed fields of the hill farms. The distinction between upland and lowland is useful, though arbitrary, and cannot be expressed by any single attitudinal level applicable across Britain, for it has a latitudinal component, in the sense of northern, as distinct from southern, ecological and biogeographical features. The gradual descent of the lower limits of the sub-montane zone of the uplands (as defined above) in a north-westerly direction is, indeed, an important gradient of climatically-induced variation which the national SSSI series should seek to represent. Transitional communities between upland/northern and lowland/southern types are also of much interest. Under the extreme cool oceanic climate of the north and west of the Highlands, the lower agricultural zone is extinguished altogether in places, and the uplands become continuous with the coastlands. Where extensive afforestation of sub-montane uplands has occurred, as in so many areas, there is now a new kind of artificial lower limit, and such truncation tends to reduce appreciably the nature conservation value of the massifs concerned.

1.5 For practical reasons of site definition, it has seemed necessary to deal with uplands as geographical/topographical units and where appropriate to include, in the assessment of an upland unit, the evaluation of other major

habitats within or contiguous with that unit. This follows the procedure in A Nature Conservation Review, which should be consulted for a summary of the geographical and ecological diversity of upland ecosystems (Vol. 1, pp. 312-329) and for a discussion of the definition of the lower limits of the upland formation (Vol. 1, pp. 22-23 and 288-289). An apparent difficulty now arises over the use of the National Vegetation Classification, because this makes no distinction between upland and lowland types but classifies plant communities purely on floristic affinities, so that, for example, all dwarf shrub heaths (Rodwell 1988) or all calcicolous grasslands (Rodwell 1985) are grouped together, regardless of geographical or attitudinal distribution. There is no real problem provided that it is remembered that the reference classification for upland plant communities is distributed between different main classes of vegetation (see Table 22).

2 International importance (see also Ratcliffe & Thompson 1988)

2.1 The hyperoceanic climate at the most insular, western Atlantic edge of the European continent, combined with historically widespread human impact, has produced a distinctive landscape and range of ecosystems, which are not duplicated anywhere in the world. There is an unusually wide range of podsolic soils, grading into blanket bog peat, which in Britain has one of its most extensive world occurrences (see C.8, 1.4 and 2.2). The following biological features are particularly important.

2.2 Acidophilous dwarf shrub heath and scrub

These include not only sub-montane types dominated by Calluna vulgaris, Vaccinium myrtillus and Ulex spp. (H4, 8, 9, 10, 12, 16, 18 and 21 of Rodwell 1988 and W23 of Rodwell 1986), but also montane types with a wider range of ericoids (H13, 14, 15, 17, 19, 20 and 22).

2.3 Acidic and calcicolous grassland

Both sub-montane and montane types are dominated by species of wide distribution, but their occurrence as widespread communities (U1, 2, 3, 4, 5, 6, 7, 16, 17c and 20 of Rodwell 1989, CG9, 10, 11, 12, 13 and 14 of Rodwell 1985, and M25 of Rodwell 1986-1987) is often limited to Britain and Ireland.

2.4 Fern- and bryophyte-rich vegetation

Many upland plant communities are rich in ferns, and there are distinctive scree types (U18, 19, 21, 22 and 23). The presence of a bryophyte layer, usually dominated by mosses, is characteristic of many heaths, but in the western Highlands there is a very local community in which this layer beneath dwarf shrubs is dominated by leafy liverworts - a type probably unique in the world (H21b) (Ratcliffe 1968; Hobbs 1988). The extent of montane moss

heaths dominated by Racomitrium lanuginosum and Rhytidiadelphus loreus is also a globally rare feature (U10 and 13 and H20).

2.5 Montane plant communities generally

These represent southern and oceanic outliers of Arctic-Alpine fell-field and mountain tundra and are especially important in the Scottish Highlands. Though these cover only a small area compared with the main continental occurrences, they show considerable diversity and presence of distinctive oceanic facies of some communities (H19 and U8, 9, 11, 12 and 14).

2.6 Blanket bog (see also C.8, 2.2-2.6)

Soligenous mire and wet heath communities (M6, 10, 11, 15, 16, 17, 18, 19, 20 and 23) are included here.

2.7 Phytogeographical interest

In addition to the uniqueness in floristic composition of many upland plant communities, there are unusual combinations of species representing different geographical elements of flora - Arctic-Alpine, Arctic, Alpine, Southern Atlantic, Mediterranean, Northern Continental, Southern Continental, etc. (Matthews 1955).

2.8 Ornithological features

These are dealt with under C.14. They include large and important populations of some species (e.g. golden eagle and peregrine), high breeding densities (e.g. raven, buzzard and ptarmigan), insular races (red grouse and golden plover), ecological adaptations (greenshank and wood sandpiper) and southern tundra assemblages (notably in the Flow Country and on large mountain plateaux).

2.9 Other faunal features

These are less well studied, but they certainly include relict assemblages of invertebrates of considerable zoogeographical interest.

2.10 The recommendation in World Conservation Strategy (IUCN 1980) that the Scottish Highlands should be regarded as a "priority biogeographical province for the establishment of protected areas" is a recognition that in this most mountainous part of Britain various wildlife elements combine to give a region of outstanding nature conservation interest.

3 Habitat selection requirements

3.1 The overall requirement is that sites be selected which represent adequately the variety and extent of upland habitats, flora and fauna present within each

AOS, and thus within Britain as a whole. In some districts, such as south-west England, the choice is very limited, whereas in parts of the Highlands it is extremely wide. In districts with a wide range of upland features, the following habitats are characteristically present:

Dwarf shrub heath, dry to wet
Grassland, dry to wet
Moss and lichen heath (both fell-field and snow-bed types)
Flush and valley bogs (soligenous mires)
Blanket bogs (ombrotrophic mires)
Crags, screes and boulder-fields
Springs, rills and flushes
Rivers
Lakes and tarns

3.2 Each of these habitats has both sub-montane and montane types, and all the variants present must be represented, as well as the strictly montane late snowbeds, fell-fields and solifluction and ablation features. All except the blanket bogs also have a range of types according to varying soil base status, from acidic to calcareous, and this range of variation must also be represented. Other geological differences reflected in soils and vegetation, within the ranges of both acidic rocks (gritstone, granite, rhyolite, quartzite, etc.) and basic rocks (dolerite, gabbro, peridotite, serpentine, etc.), need to be represented also.

3.3 The general range of variation in upland habitats within an AOS has to be determined by survey. While there will always be local climatic gradients and variations, especially according to altitude, the major climatic differences (in comparing similar situations) will be **between** and not within AOSs, and these main geographical gradients and their ecological expression are covered by the national network principle. Nevertheless, in some parts of Britain there are fairly steep regional gradients of climate, especially in an east-to-west direction, and, where these produce clear vegetational differences between different upland areas within an AOS, they should be represented by the selection of separate sites to represent such variation. Major differences in vegetation within the uplands of any one AOS are, nevertheless, related mainly to geology and topography. **The primary choice is thus to select areas representing those main geological formations which appear to account for significant ecological variability between upland massifs within the AOS.** This does not necessarily mean that all the main formations have to be represented as a matter of course; for example, the greywackes and shales of the Ordovician Series often give very similar ecological conditions to the comparable rocks of the Silurian. It is more important to be aware of pedogenically important differences in petrology within rocks of

similar age, for example between the calcareous mica-schists and the acidic granulites and gneisses of the Moine Series.

3.4 In assessing these geologically-determined ecological differences between uplands, there are three major kinds of variation to consider:

3.4.1 differences in physiographic and especially glacial history, which can produce large topographic differences;

3.4.2 physical differences in rock types, especially in weathering properties of rocks, which give rise to differences in topography, permeability of soils and development of erosion and solifluction features;

3.4.3 chemical differences in rock types, especially those affecting the base-status (notably Ca^{++}) of the derived soils and drainage waters and reflected in vegetation and land-use history (see McVean & Ratcliffe 1962, Chapter 12).

3.5 In the most mountainous AOSs, the selection of sites will usually include at least one of the highest massifs, because these have the greatest development of montane habitats. It may be that a single area can be identified which contains a good range of variation in most of the important upland habitat types present within an AOS. More usually, the best examples of various major features will occur in separate massifs, so that their representation will require choice of more than one upland area. The steep mountain terrain with an abundance of open rock habitats tends to occur in different areas from the gentle, heathery grouse moors and extensive blanket bogs. Important areas of calcareous rocks may be well separated from the best acidic mountains. The best montane areas do not always adjoin the best sub-montane ground. Ornithological interest may not coincide with that for botanical features, and so on.

3.6 In fact, a single massif hardly ever contains all the distinctive features, and certainly not all the best examples of these, in an AOS with extensive occurrence of uplands. **It is thus necessary to build up a suite of sites for each AOS according to the amount of ecological variety present and how it chances to be distributed.** So much depends on the extent of upland habitats and their variability that more precise guidance is difficult, but the aim should be to select sites sufficient in both number and extent to represent the best examples of the main features listed above, in so far as they are present within an AOS. While no figures can yet be prescribed, there should be a presumption that AOSs with the most extensive occurrence of uplands will require the largest representation of sites, as regards both number and extent.

4 Delineation of sites: the topographic unit, minimum size and site integrity

4.1 Since upland ecosystems usually extend continuously over large tracts of country, sites are seldom self-defined in the manner of those representing habitats which now exist as fragmented 'islands' in the lowlands. The definition of boundaries is thus a most crucial part of the identification and selection of upland sites. This at once raises questions about the appropriate size of each site and the extent of its component features. Its area must be large enough to give adequate representation of the important features which it is desired to conserve, but not so large as to incur unjustifiable resource costs or land-use constraints or to negate the concept of "specialness". There is next presented, accordingly, a discussion of general principles to be considered and followed in the delineation of upland site boundaries. It follows the precepts on boundary definition set out in B, 5 and the general guidance, referring particularly to uplands, given in B, 5.8; these should be consulted.

4.2 Most mountain massifs have a common topographic structure consisting of main summit, upper slopes and shoulders, subsidiary summits and spurs, lower slopes and drainage streams. There is also a range of aspects, signifying varying exposure to sun and wind, which becomes more pronounced with increasing steepness of slope. Variation within, as well as between, massifs arises from differences in altitude, aspect, exposure and steepness and from presence and extent of crags, screes, ridges, hollows, lakes and other topographic structures, of which the biological features are a product. High and heavily glaciated mountains tend to have the greatest variety of these geological/topographic features. Yet even low moorlands often have a variety of terrain, producing wide differences in ground wetness and depth of peat and in standing water bodies ranging from small pools to large lakes.

4.3 Site selection has to make the best of the particular situation. The aim should be to select a topographic unit as complete as possible in regard to these physical features, so that it runs from the highest to the lowest feasible elevation, in relation to all directional aspects. Ideally, this means representing all the different catchments which drain from the main watershed, down to the point at which open hill ground changes to enclosed farmland or plantation woodland. The walls, fences or hedges forming the edges of these contrasting habitats often make appropriate boundaries, but stream and river courses, lake margins or roads sometimes best delimit part of a site (see Figure 7). High watersheds should preferably not be used as boundaries. They produce very artificial limits to an upland site, effectively reducing it to an inadequate segment of the full massif and especially curtailing the extent of the summit habitats, communities and species which are usually amongst the most important but most restricted features. In an extensive massif, a relatively high-level boundary may, however, be necessary for part of the site. In

coastal massifs, where there is continuity between upland and maritime habitats, the site boundary may be best defined, at least in part, by the seashore.

4.4 The use of transects or vertical belts and slices to delineate upland SSSIs will not suffice. Such a procedure gives a wholly artificial character to the site, omits the full pattern of relationships between the different physical and biological site features, and tends to exclude many of the important site attributes. It also puts the viability of many animal species at risk, especially the more mobile which need to cover a large area. Each pair of the larger predators may need an area of a few thousand hectares to support it, and species such as the golden eagle, merlin and hen harrier are especially vulnerable to habitat fragmentation. Some birds, such as twite, golden plover and greenshank, also feed in one habitat but breed in another, often some distance apart. In Wales, the woodland-nesting population of red kites depends largely on open hill ground as feeding range.

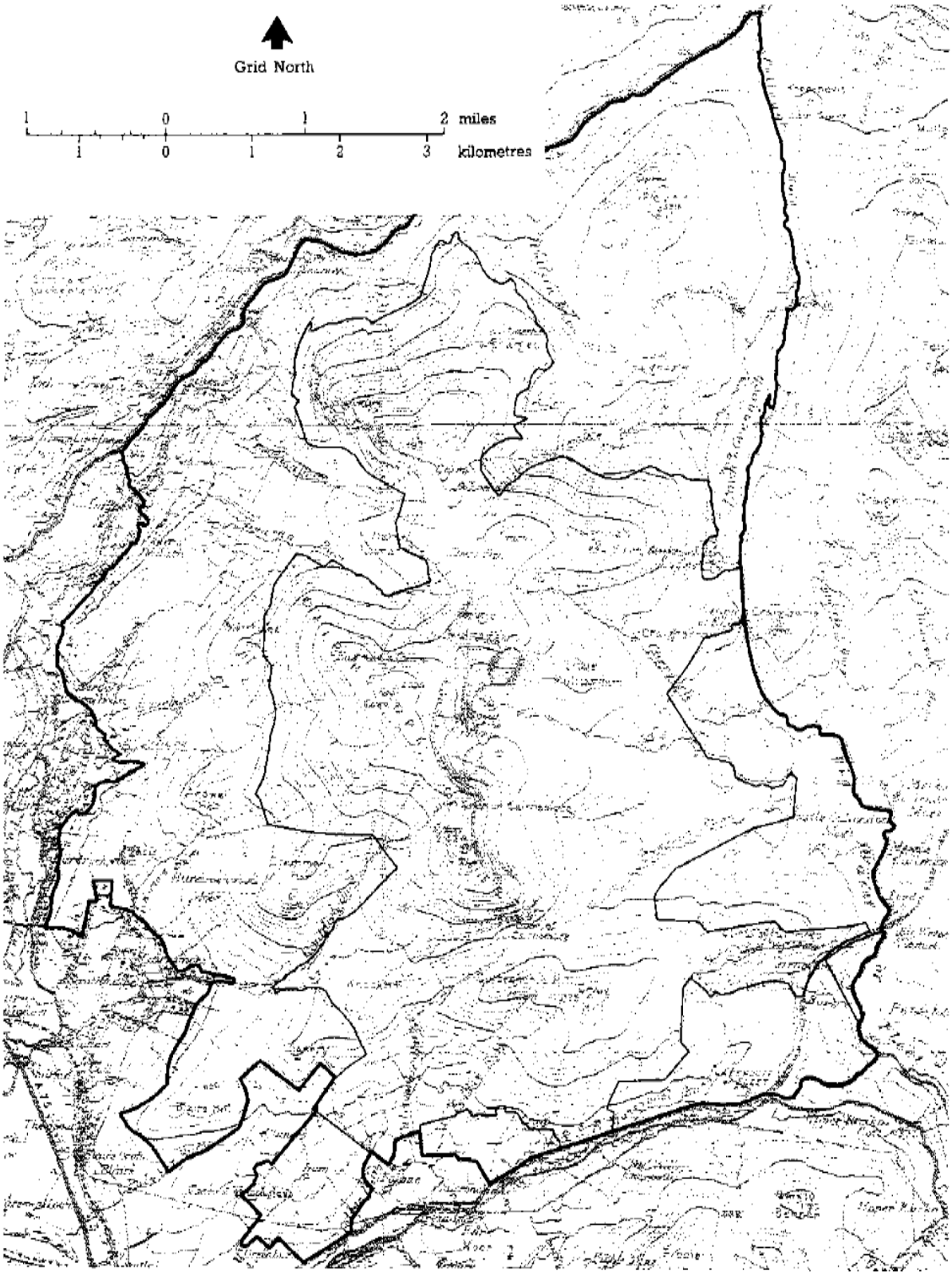

Figure 7 Selection of a topographic unit (see 4.3): map of Cairnsmore of Fleet, Galloway, showing (thicker line) what might once have been an ideal SSSI boundary, following rivers, roads, limits of enclosed land, etc., and the much less satisfactory boundary finally notified (thinner line), which was determined by the intrusion of large blocks of conifer plantations. Reproduced from the 1946 Ordnance Survey 1:63,360 map (One-inch Popular Edition, Sheet 87) with the permission of the Controller of Her Majesty's Stationery Office C Crown Copyright

4.5 The ecological complexity that needs to be represented within a single site can be illustrated through the example of a widespread plant community, that which is dominated by heather (or ling) and termed Callunetum vulgaris (McVean & Ratcliffe 1962, pp. 28-30). Callunetum varies in form and floristic composition according to aspect and altitude within a single massif and usually also shows a series of growth stages resulting from rotational burning. The full range of flora and fauna of Caliune turn depends on this ecological diversity, which changes both spatially and in time. Golden plover will, for instance, only breed on heather ground while the growth is fairly short. The population sizes of the associated species also depend on the extent of Callunetum. Red grouse numbers are much affected by heather management, but the retention of a viable population in isolation from other populations must depend partly on a sufficient extent of heather ground within the site; and while smaller birds, such as meadow pipits, and many insects could survive within much smaller areas, the merlin which feeds on them needs quite a large extent of heather moorland to support each pair.

4.6 Within a single massif, Calluneturn vulgaris shows a range of variation to other types of heather community, such as the kinds with Sphagnum carpet as the ground becomes wetter, those with an abundance of liverworts on steep and shaded slopes, a prostrate growth form with an abundance of lichens with increasing altitude and exposure, and combinations with other montane dwarf shrubs or with herbaceous plants on base-rich soils. Heather-dominated vegetation also gives way to blanket bog on the wettest ground, to flush bog where seepage water comes to the surface, to snow-bed communities in sheltered hollows, to moss and lichen heaths on high exposed tops, and to grasslands on base-rich soils. Some of these variations and transitions are encountered only on different massifs or even in different districts, but the representation of the range of heather communities and of the totality of their relationships even within a single massif usually requires selecting a fairly large area of hill ground.

4.7 **The selection objective is to represent within each upland site the range of recorded features in their particular dynamic and spatial relationships.** Selection of topographic units is the best way of achieving this and also helps to keep the proportional areas of the different habitats in appropriate balance. For instance, except where afforestation or hill land reclamation has removed large areas, the sub-montane zone will usually occupy a far more extensive area than the montane zone. While the sub-montane zone may sometimes be considered to contain only large areas of widespread vegetation types, most of these are confined to Britain and Ireland (see 2.3 above) and are crucially important as the primary habitat for many of the vertebrate animal populations. Whenever possible, the important and varied relationship between these two zones should be represented by the

continuity which exists within a single site. The topographic unit expresses the completeness of this range of habitats, communities and species and their relationships, but it is a concept best appreciated on the ground or from a map (see Figure 7). The scientific case for representing topographic completeness is exemplified by the need for lakes and streams within completely unafforested upland catchments in current studies of acid deposition. Critical studies revealing the onset of acidification and its continuing trend in the Galloway uplands have only been possible because certain hill lochs have chanced to survive in unmodified catchments: lochs in even partly afforested catchments show a distorted picture which masks the acidification trend revealed by the diatom sediments in the undisturbed lochs (Flower & Battarbee 1983). It is necessary to retain, in any one massif, the fullest available range of peat deposits and lake sediments for their importance in palaeoecological studies (Birks 1988).

4.8 There are, nevertheless, situations in which selection of an upland topographic unit is inappropriate and can be waived. This applies especially where there has been substantial encroachment on the lower slopes of an upland area by land reclamation or afforestation, but where the remaining semi-natural habitats above this enclosed ground retain a high interest or are the only good examples within the AOS. Another example is where the interest lies mainly in cliff and scree vegetation and these habitats are located within areas where the surrounding land has vegetation of much lower nature conservation value (e.g. Nardus grassland) which is adequately represented within other sites chosen as topographic units. In these situations, boundary determination will be a matter of taking each case on its own merits. Conversely, there are some areas, especially with ornithological interest, where it will be desirable to include within a site some of the enclosed marginal land lying below the upland boundary and consisting of grassland, mire or even woodland. Such cases will require wider consultation with the relevant CSD habitat and species specialists in order to select appropriate areas and boundaries. Marginal land is often of considerable importance for certain species-groups, especially of animals; and for some it is the juxtaposition between the enclosed and unenclosed land which is important, the two types both being essential segments of a home range.

4.9 When all these factors are considered, the desirable **minimum size** for an upland site, based on selection of a topographic unit, will be of the order of 4,000 ha (10,000 acres), though some isolated, compact or especially steep massifs or those with special but localised geological features may be smaller. Other situations where it is not appropriate to select topographic units are given in 4.8, and these areas will also tend to be less than 4,000 ha. Other sites, with more massive mountain landforms or more varied geology or with important features spread over a large area, need to be larger still.

4.10 Once an upland site is thus delineated, it is considered to have a completeness or **integrity** which should be defended against damaging operations, as indicated in B, 5.13.

5 Total extent of upland SSSIs

5.1 For many of the widespread upland habitats, it will be sufficient that the best example within an AOS be represented, with their extent determined by the choice of the appropriate topographic unit for the site as a whole. Vegetation types of wide ecological amplitude may, however, receive multiple representation when several sites are selected to represent the range of upland habitats within an AOS: this is appropriate for reasons discussed in 4 above. For rare and specialised features, and particularly for those habitats which occur only within one or a few AOSs, single examples will not be enough and larger representation should be sought. For the following rare habitats, there should be a presumption in favour of selecting all good examples, quality being determined by extent, floristic conformity with NVC types, lack of disturbance and presence of any features special to the particular habitat.

5.1.1 Calcareous habitats forming notable montane plant refugia (cliffs, screes, grasslands, marshes and flushes) (CG9, 10, 11 and 12 (see also 5.2.4) of Rodwell 1985, M7, 10, 11 and 12 of Rodwell 1986-1987, and U14, 15 and 17 (see also 5.1.5) of Rodwell 1989)

5.1.2 Calcicolous heaths of mixed dwarf shrubs and herbs (including Dryas octoyetala and species-rich Calluna vulgaris heaths) (CG13 and 14, and H10d and 16a of Rodwell 1988)

5.1.3 Limestone pavements (see also C.5, 1 and Table 11)

5.1.4 Serpentine habitats -
Open rock
Closed heath (except in Shetland, where the best area on Unst and the best on Fetlar should be selected)

5.1.5 Ungrazed ledge vegetation (willow scrub, tall herbs and ferns) (U16, 17 (see also 5.1.1), 19 and 24, and W20 of Rodwell 1986)

5.1.6 Hepatic-rich dwarf shrub heath (H21b) (see 2.4)

5.2 Some habitats have an extremely localised distribution but can be fairly extensive within their range (e.g. some communities of late snow-beds in the Scottish Highlands). For these, representation should lie somewhere between one and every example within an ADS: up to five of the best examples will often be appropriate, but this may sometimes be increased. Published descriptions in McVean & Ratcliffe (1962) and those available in the NVC

indicate distribution and size range of types against which to judge selection needs, but the opinion of CSD specialists should be sought. The following vegetation types belong to this category, and any others becoming rare through land-use impacts should be added, e.g. Calluna heath in Wales.

5.2.1 Montane dwarf shrub heaths (examples particularly rich in Arctostaphylos uva-ursi, Arctous alpinus, Loiseleuria procumbens, Salix herbacea and Juniperus communis ssp. nana) (H13, 14, 15, 17 and 19)

5.2.2 Lichen heaths (H13 and 19 - stands with abundant lichens)

5.2.3 Moss heaths (U10 and 13 and H20) -
Species-poor Racomitrium lanuginosum (extensive areas in the Highlands; any remaining area south of the Highlands) (U10a, b, and H20)
Species-rich Racomitrium lanuginosum (U10c)
Rhytidiadelphus - Hylocomium (U13)

5.2.4 Montane fell-fields and patterned ground (Juncus trifidus and dwarf herb communities) (CG12 (see also 5.1.1) and U9)

5.2.5 Late snow-bed communities (Sibbaldia procumbens, Salix herbacea, Dicranum starkei and Cryptogramma crispa - Athyrium alpestre) (U11, 12, 14 and 18)

5.2.6 Complexes of montane springs, rills and flushes

5.2.7 A number of plant communities are restricted in their distribution outside the Scottish Highlands, but because of their international importance merit special attention further south. These communities are H4 (present in south-west England), H8 (restricted to south-west England, Wales and Shropshire), H10 (rare south of Scotland), U13 (rare in the Southern Uplands of Scotland), U16 (rare south of Scotland), U17c and CG11 (very rare south of the Scottish Highlands), M10 (rare in Wales) and M11 (very rare in North Wales). The international importance of some other communities is still debatable, but nevertheless H9, 12, 19, 21a and 22a and U17 should also be given special attention outside Scotland.

5.3 The combined extent of upland habitats within SSSIs, as a proportion of the total area remaining, will vary between AOSs because of geographical differences in occurrence of the specially important features. Because they represent the last large expanses of undeveloped semi-natural and natural habitat in Britain, the uplands as a whole have a particularly high value for nature conservation. But, although they may still be extensive at present,

some upland habitats are highly vulnerable to further loss or deterioration, and outside SSSIs their long-term survival is at best uncertain. The pressure for development of hill land is substantial and quite open-ended, and an average of about 25,000 ha is lost annually to afforestation alone. It appears a fair assumption that, outside SSSIs, all uplands are at considerable risk of declining in nature conservation interest through change or intensification of land-use. This does not mean that all the other remaining uplands are going to be rapidly transformed; substantial areas will no doubt remain more or less unchanged into the foreseeable future. The problem is much more that, in the absence of specific site protection, the largely unplanned and haphazard incidence of development will continue, so that:

5.3.1 important areas will be just as much at risk as all other areas, according to statistical probabilities deriving from their relative extent or other factors which affect their vulnerability;

5.3.2 there will be a piecemeal, random geographical impact of development, giving a high probability that every major upland massif in the country will sooner or later suffer some such intrusion.

5.3.3 For some forms of development there is also a tendency to concentrate selectively on certain habitats, with little if any limit to demand.

5.4 The continuing expansion of both hill land reclamation and afforestation already amply illustrates the truth of 5.3.1 and 5.3.2, while the particular focus of downhill ski developments on mountains with the greatest occurrence of late snow-bed habitats is a good example of 5.3.3.

5.5 Another factor relevant to upland site selection is that, although the wildlife includes so many important animal species, their populations are often thinly scattered in comparison, for instance, with those of coastal habitats. This is mostly and with low carrying capacity, so that relatively large areas are necessary to support a reasonable population segment of many species.

5.6 Only a few upland birds are so rare or localised (e.g. snow bunting and whimbrel) that most of their breeding populations can be contained within a few sites. For the rest, including those species for which Britain has an international conservation obligation (see B, 3), both a considerable number and a substantial extent of sites are necessary to safeguard even as much as a quarter of their populations (see Thompson, Stroud & Pienkowski 1988).

5.7 Upland sites should be selected sufficient in both variety and total extent to represent adequately the various features of international importance (see 2 above). In most instances, this need will be satisfied by taking account of the

guidance given here: the international factors then reinforce the justification for site selection.

5.8 Finally, in considering the desirable extent of upland sites, there is the question of the perception of nature by those whose concern is to observe and enjoy wildlife. Such people generally wish and expect to see plants and animals in settings which approach as closely as possible to their conception of the natural. To them, the uplands often appear as the last extensive refuge of wild nature, and it does not matter, even if they are aware of it, that much of the apparently natural hill terrain has been profoundly altered by man long ago. The visual evidence of this past disturbance is subdued, and present human activity often slight, so that the hills have the appearance of authentic wild country and are valued as such. It is thus important to people's appreciation to be able to see mountain ecosystems on their natural scale, since the extent and openness of mountains and moorlands are their most striking visual feature. It is also important that large enough areas should continue to be free from intrusions such as commercial conifer plantations, reclamation and enclosure for agriculture, roads and ski developments, which are so destructive to the sense of wildness in the uplands. Because of the high risk of such intrusions expanding, there is good reason to choose areas which are large enough, and have appropriate boundaries, to maintain this essential character even if all the surrounding or intervening land were to become changed.

5.9 To take the example of heather moorland again, its uniqueness to Britain lies in the **extent** of Calluna- and Erica-dominated vegetation, and its visual impact as a spectacle in flowering time also depends on scale. Heather moorland is important not just as the habitat for a variety of other plants and animals, but in its own right, as one of the most distinctive wildlife features of this country. Much of the present heather moorland occupies ground which was once largely covered by woodland, but this does not diminish the high value now placed upon Callunetum. The habitat is one of the most important semi-natural types to have developed under our oceanic climate during a period of low-intensity land-use; and it was in any case extensively present as a field layer or glade community in many of the original hill woodlands. Callunetum is vulnerable to land-use change, such as increased grazing and afforestation, and it is imperative that adequate areas be maintained within the SSSI series.

5.10 The total area of uplands (including blanket bogs) will be by far the largest of all habitats in the SSSI series: this is entirely appropriate, and in proportion to the extent of uplands in Britain. The proportional area will, however, vary between AOSs and will tend to be highest in the Scottish Highlands because of their relatively greater importance compared with other districts.

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Table 22 Synonymy of Birks & Ratcliffe's (1980) upland vegetation types and those of the National Vegetation Classification

The vegetation type codes used on the NCC's Upland Survey vegetation maps are mostly those of Birks & Ratcliffe (1980), though some additional codes (marked with an asterisk) in common use are also included. Where applicable, codes are referred to a type given by McVean & Ratcliffe (1962). The McVean & Ratcliffe (McV & R) association, trivial name and page and table number follow the Birks & Ratcliffe (or other) type name. Most of the types additional to Birks & Ratcliffe's are derived from McVean & Ratcliffe.

High-rank categories and codes

Birks & Ratcliffe (1980)		National Vegetation Classification (NVC)	
A	Medium-shrub communities	W	Woodlands (Rodwell 1986)
B	Dwarf-shrub communities	H CG	Heaths (Rodwell 1988) Calcicolous grasslands (Rodwell 1985)
C	Grasslands	U CG M	Upland communities (Rodwell 1989) Calcicolous grasslands (Rodwell 1985) Mires (Rodwell 1986-1987)
D	Herb- and fern-rich communities	U CG	Upland communities (Rodwell 1989) Calcicolous grasslands (Rodwell 1985)
E	Bryophyte heaths	U H	Upland communities (Rodwell 1989) Heaths (Rodwell 1988)
G	Blanket bogs (ombrogenous mires)	M	Mires (Rodwell 1986-1987)
H	Flush bogs and fens (soligenous and topogenous mires)	M	Mires (Rodwell 1986-1987)
I	Flushes and springs	M	Mires (Rodwell 1986-1987)
J*	Woodlands	W	Woodlands (Rodwell 1986)

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Birks & Ratcliffe		National Vegetation Classification	
A	**Medium-shrub communities**	**W**	**Woodlands**
A1	Juniperus communis - fern scrub Juniperus - Thelypteris nodum (McV & R p.25, Table 9)	**W19**	Juniperus communis - Oxalis acetosella woodland
A2	Salix lapponum - Luzula sylvatica scrub Salix lapponum - Luzula sylvatica nodum Montane willow scrub (McV & R p.26, Table 10)	**W20**	Salix lapponum - Luzula sylvatica scrub
A3	Salix aurita scrub	**W1** **W7**	Salix cinerea - Galium palustre woodland Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum woodland c Deschampsia cespitosa sub-community
A4*	Ulex europaeus scrub	**W23**	Ulex europaeus - Rubus fruticosus agg. Scrub
B	**Dwarf-shrub communities**	**H** **CG**	**Heaths** **Calcicolous grasslands**
B1	Sub-montane Calluna vulgaris heaths	**H9**, **H10**, **H12**, **H16**, **H21**	
B1	**a** Calluna dry heath Callunetum vulgaris Dry heather moor (McV & R p.28, Table 11)	**H9**	Calluna vulgaris - Deschampsia flexuosa heath **a** Hypnum cupressi forme sub-community **b** Vaccinium myrtillus – Cladonia spp. sub-community **c** Species-poor sub-community **d** Galium saxatile sub-community **e** Molinia caerulea sub-community
		H10	Calluna vulgaris - Erica cinerea heath **a** Typical sub-community **b** Racomitrium lanuginosum sub-community **c** Festuca ovina – Anthoxanthum odoratum sub-community
		H12	Calluna vulgaris - Vaccinium myrtillus heath **a** Calluna vulgaris sub-community **b** Vaccinium vitis-idaea – Cladonia impexa sub-community **c** Galium saxatile - Festuca ovina sub-community

Birks & Ratcliffe			National Vegetation Classification
A1	**b**	Calluna vulgaris - Sphagnum damp heath Vaccineto-Callunetum, suecicosum facies (McV & R p.31, Table 13) Calluna vulgaris - Sphagnum damp heath sensu Upland Survey	**H22** Vaccinium myrtillus - Rubus chamaemorus heath **a** Polytrichum commune - Galium saxatile sub-community **H21** Calluna vulgaris - Vaccinium myrtillus - Sphagnum capillifolium heath **a** Typical sub-community
B1	**c**	Calluna vulgaris - hepatic heath Vaccineto-Callunetum, hepaticosum facies (McV R p.31, Table 13)	**H21** Calluna vulgaris - Vaccinium myrtillus - Sphagnum capillifolium heath **b** Mastigophora woodsii - Herbertus aduncus hutchinsiae sub-community
B1	**d**	Calluna vulgaris - Danthonia decumbens heath Callunetum vulgaris, herb-rich facies (McV & R p.29, Table 11A)	**H10** Calluna vulgaris - Erica cinerea heath **d** Thymus praecox - Carex pulicaris sub-community
B1	**e**	Arctostaphylos uva-ursi – Calluna vulgaris heath Arc tostaphyleto-Callunetum Arctostaphylos uva-ursi-rich heather moor (McV & R p.30, Table 12)	**H16** Calluna vulgaris - Arctostaphylos uva-ursi **a** Lathyrus montanus Pyrola media sub-community **b** Vaccinium myrtillus - V. vitis-idaea sub-community **c** Cladonia impexa sub-community
B2		Montane (prostrate) Calluna vulgaris heaths	**H13, H14, H15, H17**
B2	**a**	Species-poor dwarf Calluna heath Cladineto-Callunetum, typicum Lichen-rich dwarf Calluna heath pp. (McV & R p.35, Table 16)	**H13** Calluna vulgaris - Cladonia arbuscula heath **a** Cladonia arbuscula - C. Rangiferina sub-community
B2	**b**	Calluna - Racomitrium lanuginosum heath Rhacomitreto – Callunetum Racomitrium-rich dwarf Calluna heath (McV & R p.38, Table 17)	**H14** Calluna vulgaris - Racomitrium lanuginosum **a** Festuca ovina sub-community **b** Empetrum nigrum ssp. Hermaphroditum sub-community **c** Arctostaphylos uva-ursi sub-community

Birks & Ratcliffe			National Vegetation Classification
B2	**c**	Calluna-lichen heath Cladineto-Callunetum, sylvaticosum facies Lichen-rich dwarf Calluna heath p.p. (McV & R p.35, Table 16) Cladineto-Callunetum, arctostaphyletosum facies Lichen-rich dwarf Calluna heath p.p. (McV & R p.35, Table 16)	**H13** Calluna vulgaris Cladonia arbuscula heath **a** Cladonia arbuscula - C. rangiferina sub-community **b** Empetrum nigrurn ssp. hermaphroditum Cetraria nivalis sub-community **c** Cladonia crispata - Loisleuria procumbens sub-community
B2	**d**	Mixed prostrate dwarf shrub heath **(i)** Arctoeto - Callunetum Species-rich dwarf shrub heath (McV & R p.34, Table 15)	**H17** Calluna vulgaris - Arctostaphylos alpinus heath **a** Loisleuria procumbens - Cetraria glauca sub-community **b** Empetrum nigrum ssp. nigrum sub-community
B2	**d**	Mixed prostrate dwarf shrub heath **(ii)** Loiseleuria – Empetrum provisional nodum (McV & R p.35, Table 15)	**H13** Calluna vulgaris - Cladonia arbuscula heath **b** Empetrum nigrurn ssp. hermaphroditum - Cetraria nivalis sub-community
B2	**d**	Mixed prostrate dwarf shrub heath **(iii)** Juniperetum nanae Dwarf juniper scrub (McV & R p.33, Table 14)	**H15** Calluna vulgaris - Juniperus communis ssp. nana heath
B3		Vaccinium myrtillus - Empetrum nigrum heath	**H18, H19, H20, H22**
B3	**a**	Southern Vaccinium myrtillus heath Sub-montane Vaccinium myrtillus heath	**H18** Vaccinium myrtillus - Deschampsia flexuosa heath **a** Hylocomium splendens - Rhytidiadelphus loreus sub-community **c** Empetrum nigrurn ssp. nigrum Racomitrium lanuginosum sub-community
B3	**b**	Snow-bed Vaccinium myrtillus heath Vaccinetum chionophilum Vaccinium myrtillus snow-bed (McV & R p.39, Table 18)	**H22** Vaccinium myrtillus - Rubus chamaemorus heath **a** Polytrichum commune - Galium saxatile sub-community **b** Plagiothecium undulatum - Anastrepta orcadensis sub-community

Birks & Ratcliffe			National Vegetation Classification	
B3	**c**	Species-rich Vaccinium heath Festuce to-Vaccinetum Alchemilla-rich Festuca - Vaccinium heath (McV & R p.45, Table 21)	**H18**	Vaccinium myrtillus - Deschampsia flexuosa heath **b** Alchemilla alpina - Carex pilulifera sub-community
B3	**d**	Vaccinium myrtillus - Nardus stricta heath	**H18**	Vaccinium myrtillus - Deschampsia flexuosa heath **c** Empetrum nigrum ssp. nigrum - Racomitrium lanuginosum sub-community
B3	**e**	Vaccinium myrtillus - Empetrum nigrum ssp. hermaphroditum heaths Vaccineto-Empetretum Vaccinium - Empetrum heath (McV & R p.41, Table 19) Empetrum nigrum ssp. hermaphroditum hypnaceous moss heath (McV & R p.42, Table 19)	**H18** **H20**	Vaccinium myrtillus - Deschampsia flexuosa heath **a** Hylocomium splendens - Rhytidiadelphus loreus sub-community **c** Empetrum nigrum ssp. nigrum - Racomitrium lanuginosum sub-community Vaccinium myrtillus - Racomitriurn lanuginosum heath **d** Rhytidiadelphus loreus - Hylocomium splendens sub-community
B3	**f**	Vaccinium - lichen heath Cladineto-Vaccinetum Lichen-rich Vaccinium heath (McV & R p.43, Table 20)	**H19**	Vaccinium myrtillus - Cladonia arbuscula heath **a** Typical sub-community **b** Racomitrium lanuginosum sub-community **c** Empetrum nigrum - Cladonia rangiferina sub-community
B3	**g**	Vaccinium vitis-idaea heaths Peak District only	**H9**	Calluna vulgaris - Deschampsia flexuosa heath **b** Vaccinium myrtillus - Cladonia spp. sub-community
B4		Dryas octopetala heaths	**CG13, CG14**	
B4	**a**	Low altitude Dryas heath On Durness limestone and shell sand Dryas - Carex rupestris nodum, Dryas - Carex flacca nodum (McV & R p.47, Table 23)	**CG13**	Dryas octopetala - Carex flacca heath a Hieracium pilosella - Ctenidium molluscum sub-community **b** Salix repens - Empetrum nigrum ssp. nigrum sub-community
B4	**b**	High altitude Dryas heath On ledges of mica-schist mountains Dryas - Salix reticulata nodum (McV & R p.47, Table 23)	**CGI4**	Dryas octopetala - Silene acaulis ledge community

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Birks & Ratcliffe	National Vegetation Classification
B4 x* Arctostaphylos - grass heath (McV & R p.50)	**CG10**
B4 y* Dryas - Arctostaphylos heath (McV & R p.50)	**CG13**
C Grassland	**U Upland communities** **CG Calcicolous grasslands** **M Mires**
C1 Agrostis - Festuca grasslands Agrosto-Festucetum (McV & R p.52-57, Tables 24, 25, 26)	**U1, U2, U4, CG9, CG10, CG11**
No Birks & Ratcliffe equivalent sub-community, though **C1b** may have been used	**U1** Festuca ovina - Agrostis capillaris - Rumex acetosella grassland **f** Hypochaeris radicata sub-community
C1 a Agrostis canina - A. capillaris (tenuis) grassland Species-poor Agrosto-Festucetum Agrostis - Festuca acid grassland p.p. (McV & R p.52, Table 24)	**U4** Festuca ovina - Agrostis capillaris - Galium saxatile grassland **a** Typical sub-community **b** Holcus lanatus - Trifolium repens sub-community **c** Lathyrus montanus - Stachys betonica sub-community **d** Luzula multiflora - Rhytidiadelphus loreus sub-community **e** Vaccinium myrtillus - Nardus stricta sub-community
C1 b Festuca ovina grassland Species-poor Agrosto-Festucetum Agrostis - Festuca acidic grassland p.p. (McV & R p.52, Table 24)	**U4** Festuca ovina - Agrostis capillaris - Galium saxatile grassland **a** Typical sub-community **b** Holcus lanatus - Trifolium repens sub-community **c** Lathyrus montanus - Stachys betonica sub-community **d** Luzula multiflora - Rhytidiadelphus loreus sub-community **e** Vaccinium myrtillus - Nardus stricta sub-community
C1 c Deschampsia flexuosa grassland	**U2** Deschampsia flexuosa grassland **a** Festuca ovina - Agrostis capillaris sub-community **b** Vaccinium myrtillus sub-community

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Birks & Ratcliffe			National Vegetation Classification	
No Birks & Ratcliffe equivalent			**U3**	Agrostis curtisii grassland
C1	**d**	Alchemilla - Festuca grassland Alchemilleto - Agrosto - Festucetum Alchemilla-rich Agrostis - Festuca grassland (McV & R p.53, Table 25)	**CG11**	Festuca ovina - Agrostis capillaris - Alchemilia alpina grass-heath **a** Typical sub-community **b** Carex pulicaris - Carex panicea sub-community
C1	**e**	Southern species-rich Agrostis - Festuca grassland Species-rich Agrosto-Festucetum Agrostis - Festuca basic grassland p.p. (McV & R p.54, Table 26)	**CG10**	Festuca ovina - Agrostis capillaris – Thymus praecox grassland **a** Trifolium repens Luzula campestris sub-community **b** Carex pulicaris - Carex panicea sub-community
C1	**f**	Northern species-rich Agrostis - Festuca grassland Species-rich Agrosto-Festucetum Agrostis Festuca basic grassland p.p. (McV & R p.54, Table 26) Saxifrageto-Agrosto-Festucetum Saxifraga aizoides-rich Agrostis - Festuca grassland (McV & R p.54, Table 26)	**CG10**	Festuca ovina - Agrostis capillaris Thymus praecox grassland **c** Saxifraga aizoides Ditrichum flexicaule sub-community
C1	**g**	Sesleria albicans - Festuca ovina grassland	**CG9**	Sesleria albicans - Galium sterneri grassland **a** Helianthemum canum - Asperula cynanchica sub-community **b** Typical sub-community **c** Carex pulicaris - Carex panicea sub-community **d** Carex capillaris - Kobresia simpliciuscula sub-community **e** Saxifraga hypnoides - Cochlearia alpine sub-community
C2		Nardus stricta grasslands	**U5, U7**	
C2	**a**	Sub-montane Nardus grassland (species-poor) Nardetum sub-alpinum, species-poor facies Sub-alpine Nardus grassland (McV & R p.58, Table 28)	**U5**	Nardus stricta. - Galium saxatile grassland **a** Species-poor sub-community **b** Agrostis canina - Polytrichum commune sub-community **d** Calluna vulgaris - Danthonia decumbens sub-community **e** Racomitrium lanuginosum sub-community

Birks & Ratcliffe			National Vegetation Classification		
C2	**b**	Snow-bed Nardus grassland Low-alpine Nardus noda Nardus snow-beds Nardus - Pleurozium nodum Nardus - Scirpus (Trichophorurn) nodum Nardus - Racomitrium provisional nodum (McV & R p.67-68, Table 32) Nardetum medio-alpinum Alpine Nardus grassland (McV & R p.69, Table 33)	**U7**	Nardus stricta – Carex bigelowii grass-heath **a** Empetrum nigrum ssp. Hermaphroditum - Cetraria islandica sub-community **b** Typical sub-community **c** Alchemilla alpina – Festuca ovina sub-community	
C2	**c**	Species-rich Nardus grassland Nardetum sub-alpinum, species-rich facies Sub-alpine Nardus grassland (McV & R p.58, Table 29)	**U5**	Nardus stricta - Galium saxatile grassland c Carex panicea - Viola riviniana sub-community	
C3		Juncus squarrosus grasslands Juncetum squarrosi sub-alpinum Sub-alpine Juncus squarrosus 'grassland' (McV & R p.59, Tables 28, 29)	**U6**	Juncus squarrosus - Festuca ovina grassland	
C3	**a**	Species-poor Juncus squarrosus grassland Juncetum squarrosi sub-alpinum, species-poor facies (McV & R p.59, Table 28)	**U6**	**b** Carex nigra - Calyyogeia trichomanis sub-community **c** Vaccinium myrtillus sub-community	
C3	**b**	Sphagnum-rich Juncus squarrosus grassland Juncus squarrosus bogs (McV & R p.59, Table 28)	**U6**	**a** Sphagnum sub-community	
C3	**c**	Species-rich Juncus squarrosus grassland Juncetum squarrosi sub-alpinum, species-rich facies (McV & R p.59, Table 29)	**U6**	**d** Agrostis capillaris – Luzula multiflora sub-community	
C3	**x***	Juncus squarrosus with short Calluna (McV & R p.60)	**U6**	No NVC equivalent	
C4		Molinia caerulea grasslands/bog (McV & R p.64)	**M25**	Molinia caerulea - Potentilla erecta mire	

Birks & Ratcliffe			National Vegetation Classification		
C4	**a**	Species-poor Molinia grassland	**M25**	**b**	Anthoxanthum odoratum sub-community
C4	**b**	Species-rich Molinia grassland	**M25**	**c**	Angelica sylvestris sub-community
C4	**c***	Sphagnum-rich Molinia bog	**M25**	**a**	Erica tetralix sub-community
C5		Deschampsia cespitosa grasslands Deschampsietum caespitosae alpinum Alpine Deschampsia cespitosa grassland (McV & R p.61, Table 30)	**U13, U17**		
C5	**a**	Species-poor Deschampsia cespitosa grassland Deschampsieturn caespitosae alpinum, species-poor facies (McV & R p.61, Table 30)	**U13**		Deschampsia cespitosa - Galium saxatile grassland **a** Anthoxanthum odoratum - Alchemilla alpina sub-community
C5	**b**	Species-rich Deschampsia cespitosa grassland Descharnpsietum caespitosae alpinum, species-rich facies (McV & R p.61, Table 30)	**U17**		Luzula sylvatica - Geum rivale tall-herb community **c** Agrostis capillaris - Rhytidiadelphus loreus sub-community
C6		Carex bigelowii snow-beds/heaths Polytricheto-Caricetum bigelowii Polytrichum alpinum - Carex bigelowii snow-beds (McV & R p.72, Table 34) Dicraneto-Caricetum bigelowii Kiaeria (Dicranum) fuscescens - Carex bigelowii heath (McV & R p.73, Table 35)	**U8** **U8** **U8**	 **a** **b**	Carex bigelowii - Polytrichum alpinum grass-heath Polytrichum alpinum - Ptilidium ciliare sub-community Dicranum fuscescens - Racomitrium lanuginosum sub-community
C7		Juncus trifidus heaths Cladineto-Juncetum trifidi Lichen-rich Juncus trifidus heath (McV & R p.75, Table 36)	**U9**		Juncus trifidus - Racomitrium lanuginosum rush-heath **a** Cladonia arbuscula - Cetraria islandica sub-community **b** Salix herbacea sub-community

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Birks & Ratcliffe			National Vegetation Classification	
C8*		Luzula sylvatica grassland Luzula sylvatica Grassland nodum (McV & R p.64, Table 31)	**U16**	Luzula sylvatica - Vaccinium myrtillus community **c** Species-poor sub-community
D		**Herb- and fern-rich communities**	**U** **CG**	**Upland communities** **Calcicolous grasslands**
D1		Sedum rosea - Alchemilla glabra communities Tall Herb nodum (McV & R p.80, Table 38)	**U17**	Luzula sylvatica - Geum rivale tall-herb community **a** Alchemilla glabra - Bryum pseudotriquetrum sub-community **b** Geranium sylvaticum sub-community **d** Primula vulgaris - Hypericum pulchrum sub-community
D2		Cryptogramma crispa communities	**U18, U21**	
D2	**a**	Southern, scree Cryptogramma community	**U21**	Cryptogramma crispa - Deschampsia flexuosa fern community
D2	**b**	Northern, snow-bed Cryptogramma - Athyrium alpestre community Cryptogrammeto-Athyrietum chionophilum Cryptogramma - Athyrium snow-bed (McV & R p.82, Table 39)	**U18**	Cryptogramma crispa - Athyrium alpestre snow-bed
D3		Silene acaulis - Festuca ovina sward (typical)	**CG12**	Festuca ovina - Alchemilla alpina – Silene acaulis dwarf-herb community
D3	**a**	Closed Silene - Festuca community Dwarf Herb nodum (McV & R p.84, Table 40) Silene acaulis, with other herbs and grasses on basic soil		
D3	**b**	Open Silene - Festuca community of rock faces Small herbs, grasses and bryophytes on basic rock faces		
D3	**x***	Alchemilla - Sibbaldia nodum (McV & R p.85, Table 41) Alchemilla alpina - Sibbaldia procumbens snow-bed Often mapped as **E3**	**U14**	Alchemilla alpina - Sibbaldia procumbens dwarf-herb community

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Birks & Ratcliffe		National Vegetation Classification	
D4	Asplenium - Fissidens cristatus crevice community Rupestrial ferns and calcicolous bryophtes in crevices on basic rock faces	NVC equivalent not yet available	
D5	Saxifraga aizoides banks Saxifragetum aizoidis (McV & R p.87, Table 42)	**U15**	Saxifraga aizoides - Alchemilla glabra banks
D6	Luzula sylvatica – Dryopteris communities	**U16, U19**	
D6	**a*** Vaccinium - Luzula Betuletum Oxaleto-Vaccinetum, treeless facies (McV & R p.17, Table 6)	**U16**	Luzula sylvatica - Vaccinium myrtillus community **a** Dryopteris dilatata - Dicranum majus sub-community **b** Agrostis capillaris - Anthoxanthum odoratum sub-community **c** Species-poor sub-community
D6	**b*** Betula - herb nodum, fern dominated treeless fades p.p. (McV & R p.17, Table 6)	**U19**	Thelypteris limbosperma - Blechnum spicant community
D7*	Pteridium aquilinum communities	**U20**	Pteridium aquilinum - Galium saxatile community
D7	**a** Dense stands of Pteridium with sparse ground flora	**U20**	**c** Species-poor sub-community
D7	**b** Pteridium with woodland ground flora Betula - herb nodum, treeless facies p.p. (McV & R p.17, Table 6)	**U20**	**a** Anthoxanthum odoratum sub-community
No Birks & Ratcliffe equivalent		**U20**	**b** Vaccinium myrtillus - Dicranum scoparium sub-community
E	**Bryophyte heaths**	**U** **H**	**Upland communities** **Heaths**
E1	Racomitrium lanuginosum – Carex bigelowii heaths	**U10, H20**	

Birks & Ratcliffe			National Vegetation Classification	
E1	**a**	Species-poor Racomitrium heath Cariceto-Rhacomitretum lanuginosi Racomitrium heath (McV & R p.89, Table 43) Typical facies Cushion herb facies Juncus trifidus-rich facies	**U10**	Carex bigelowii - Racomitrium lanuginosum moss-heath **b** Typical sub-community
E1	**b**	Species-rich Racomitrium heath Poiygoneto-Rhacomitreturn lanuginosi Species-rich Racomitrium heath (McV & R p.92, Table 44)	**U10**	Carex bigelowii – Racomitrium lanuginosum moss-heath **c** Silene acaulis sub-community
E1	**c**	Festuca ovina - Deschampsia flexuosa - Racomitrium heath Abundant grasses among the Racomitrium lanuginosum	**U10**	Carex bigelowii – Racomitrium lanuginosum moss-heath **a** Galium saxatile sub-community
E1	**d**	Empetrum nigrum ssp. hermaphroditum – Racomitrium heath Rhacomitreto-Etnpetretum Racomitrium - Empetrum heath (McV & R p.46, Table 12)	**H20**	Vaccinium myrtillus - Racomitrium lanuginosum heath **b** Cetraria islandica sub-community **c** Bazzania tricrenata - Mylia taylori sub-community
E1	**e**	Juncus trifidus - Racomitrium heath Juncus trifidus - Festuca ovina nodum (McV & R p.77, Table 37)	**U10**	Carex bigelowii – Racomitrium lanuginosum moss-heath **c** Silene acaulis sub-community
E2		Rhytidiadeiphus loreus - Deschampsia cespitosa heaths Deschampsieto-Rhytidiadelphetum Rhytidiadelphus snow bed Species-poor typicum facies Species-rich triquetrosum facies (McV & R p.94, Table 45)	**U13**	Deschampsia cespitosa – Galium saxatile grassland **b** Rhytidiadelphus loreus sub-community
E3		Kiaeria (Dicranum) starkei snow-bed heaths	**U11** **U12**	Polytrichum norvegicum - Kiaeria starkei snow-bed Salix herbacea – Racomitrium heterostichum snow-bed
		Polytricheto-Dicranetum starkei Polytrichum sexangulare (norvegicum) - Kiaeria (Dicranum) starkei snow-bed (McV & R p.96, Table 46)	**U11** **U11**	**a** Typical sub-community **b** Species-poor sub-community

Birks & Ratcliffe			National Vegetation Classification		
E3	(contd)				
	Rhacomitreto-Dicranetum starkei Racomitrium - Kiaeria (Dicranum) starkei snow-bed (McV & R p.96, Table 47)		**U12**	**a**	Silene acaulis – Luzula spicata sub-community
			U12	**c**	Marsupella brevissima sub-community
	Gymnomitreto-Salicetum herbaceae Gymnomitrium - Salix herbacea snow-bed (McV & R p.97, Table 48)		**U12**	**b**	Gymnomitriom concinnatum sub-community
G	**Blanket bog (ombrogenous mires)**		**M**	**Mires**	
G1	Scirpus cespitosus - Myrica gale mire Trichophoreto - Eriophoretum typicum Western blanket bog (McV & R p.101, Table 49)		**M17**		Scirpus cespitosus - Eriophorum vaginatum blanket mire
G1	**a**	Sphagnum-rich Scirpus - Myrica mire	**M17**	**a**	Drosera rotundifolia - Sphagnum sub-community
G1	**b**	Racomitrium-rich	**M17**	**b**	Cladonia sub-community
G1	**c**	Lichen-rich	**M17**	**b**	Cladonia sub-community
No equivalent Birks & Ratcliffe sub-community			**M17**	**c**	Juncus squarrosus - Rhytidiadelphus loreus sub-community
G2	Scirpus cespitosus - Calluna vulgaris mire Trichophoreto-Callunetum Scirpus (Trichophorum) - Calluna bog (McV & R p.106, Table 52)		**M15** **M16**		Scirpus cespitosus - Erica tetralix wet heath Erica tetralix - Sphagnum compactum wet heath
G2	**a**	Typical Scirpus - Calluna mire	**M15** **M16**	**b** **d**	Typical sub-community Juncus squarrosus – Dicranum scoparium sub-community
G2	**b**	Racomitrium-rich	**M15**	**c**	Cladonia sub-community
G2	**c**	Lichen-rich	**M15**	**c**	Cladonia sub-community

Birks & Ratcliffe	National Vegetation Classification
G2 **d** Scirpus mire	**M15** **b** Typical sub-community
No equivalent Birks & Ratcliffe sub-community	**M15** **d** Vaccinium myrtillus sub-community
G3 Molinia caerulea - Calluna vulgaris mire Molinieto-Callunetum Molinia - Calluna bog (McV & R p.108, Table 52)	**M15** Scirpus cespitosus - Erica tetralix wet heath **b** Typical sub-community
G4 Calluna vulgaris - Eriophorum vaginatum mire Calluneto-Eriophoretum Pennine blanket bog (McV & R p.103, Table 50)	**M19** Calluna vulgaris - Eriophorum vaginatum blanket mire **M20** Eriophorum vaginatum blanket and raised mire
G4 **a** Typical Calluna - Eriophorum mire	**M19** **a** Erica tetralix sub-community **b** Empetrum nigrum ssp. nigrum sub-community **c** Vaccinium vitis-idaea - Hylocomium splendens sub-community **ii** Typical variant
G4 **b** Sphagnum-rich	**M19** **a** Erica tetralix sub-community **b** Empetrum nigrum ssp. nigrum sub-community **c** Vaccinium vitis-idaea - Hylocomium splendens sub-community **ii** Typical variant
G4 **c** Lichen-rich	**M19** **a** Erica tetralix sub-community **b** Empetrum nigrum ssp. nigrum sub-community **c** Vaccinium vitis-idaea - Hylocomium splendens sub-community **ii** Typical variant
G4 **d** Montane dwarf shrub-rich	**M19** **c** Vaccinium vitis-idaea - Hylocomium splendens sub-community **i** Betula nana variant
G4 **a** Vaccinium-rich	**M20** Eriophorum vaginatum blanket and raised mire b Calluna vulgaris - Cladonia sub-community

Birks & Ratcliffe	National Vegetation Classification
G4 **f** Eriophorum-dominated mire Dwarf shrubs sparse owing to burning and grazing	**M20** Eriophorum vaginatum blanket and raised mire **a** Species-poor sub-community **b** Calluna vulgaris - Cladonia sub-community
G5* Empetrum - Eriophorum mire Empetreto-Eriophoretum High-level blanket bog (McV & R p.106, Table 51)	**M19** Calluna vulgaris - Eriophorum vaginatum blanket mire **c** Vaccinium vitis-idaea - Hylocomium splendens sub-community **iii** Vaccinium uliginosum - Polytrichum alpestre variant
No Birks & Ratcliffe equivalent	**M18** Erica tetralix - Sphagnum papillosum raised and blanket mire **a** Sphagnum rnagellanicum - Andromeda polifolia sub-community **b** Empetrum nigrum ssp. nigrum - Cladonia sub-community
No Birks & Ratcliffe equivalent	**M21** Narthecium ossifragum - Sphagnum papillosum valley mire **a** Sphagnum auriculatum - Rhynchospora alba sub-community **b** Sphagnum recurvum - Vaccinium oxycoccus sub-community
H **Flush bogs and fens (soligenous and topogenous mires)**	**M** **Mires**
H1 Myrica gale - Molinia caerulea mire Molinia - Myrica nodum (McV & R p.112, Table 53)	**M15** Scirpus cespitosus - Erica tetralix wet heath **a** Carex panicea sub-community **M25** Molinia caerulea - Potentilla erecta mire **a** Erica tetralix sub-community
H2 Juncus - moss mire	**M6, M23**
H2 **a** Juncus effusus – Sphagnum recurvum mire Sphagneto-Juncetum effuse Juncus effusus - Sphagnum mire (McV & R p.113, Table 54)	**M6** Carex echinata - Sphagnum recurvum/ auriculatum mire c Juncus effusus sub-community i Sphagnum recurvum variant ii Sphagnum auriculatum variant

Birks & Ratcliffe			National Vegetation Classification	
H2	**b**	Juncus acutiflorus - Sphagnum recurvum mire	**M6**	Carex echinata - Sphagnum recurvum/ auriculatum mire **d** Juncus acutiflorus sub-community **i** Sphagnum recurvum variant **ii** Sphagnum auriculatum variant
H2	**c**	Juncus acutiflorus - herb- and moss-rich mire Juncus acutiflorus - Calliergon (Acrociadium) cuspidatum nodum (McV & R p.117, Table 56)	**M23**	Juncus effusus/acutiflorus - Galium palustre rush-pasture **a** Juncus acutiflorus sub-community **b** Juncus effusus sub-community
H3		Carex - moss mire	**M4, M6, M7, M8, M9, M10, M12, M15**	
H3	**a**	Erica tetralix - Carex panicea mire Trichophoreto-Eriophoretum caricetosum Scirpus (Trichophorum) - Carex mire (McV & R p.112, Table 49)	**M15**	Scirpus cespitosus - Erica tetralix wet heath **a** Carex panicea sub-community
H3	**b**	Sub-montane Carex echinata - Sphagnum recurvum mire Sphagneto- Caricetum sub-alpinum Sub-alpine Sphagnum - Carex mire (McV & R p.114, Table 55)	**M6**	Carex echinata - Sphagnum recurvum/ auriculatum mire **a** Carex echinata sub-community i Sphagnum recurvum variant ii Sphagnum auriculatum variant **b** Carex nigra - Nardus stricta sub-community i Sphagnum recurvum variant ii Sphagnum auriculatum variant
H3	**c**	Sub-montane Carex rostrata Sphagnum recurvum mire	**M4**	Carex rostrata - Sphagnum recurvum mire
H3	**d**	Sub-montane Carex nigra Sphagnum contortum mire	**M9**	Carex rostrata - Calliergon cuspidatum mire **a** Campylium stellatum - Scorpidium scorpioides sub-community
H3	**e**	Sub-montane Carex rostrata Sphagnum contortum mire Carex rostrata - Sphagnum warnstorfii (warnstorfianum) nodum (McV & R p.119, Table 57)	**M8**	Carex rostrata - Sphagnum warnstorfii mire

Birks & Ratcliffe			National Vegetation Classification	
H3	**f**	Sub-montane Carex nigra - brown moss mire Carex panicea – Campylium stellatum nodum (McV & R p.120, Table 58)	**M10**	Carex dioica - Pinguicula vulgaris mire **a** Carex demissa - Juncus bulbosus/ kochii sub-community **i** Eleocharis quinqueflora variant **ii** Carex hostiana - Ctenidium molluscum variant (**iii** Schoenus nigricans variant = **H4**) **b** Briza media - Primula farinosa sub-community **i** Cirsium palustre variant **ii** Molinia caerulea - Eriophorum latifolium variant **iii** Thymus praecox - Racomitrium lanuginosum variant **c** Gymnostomum recurvirostrum sub-community
H3	**i**	Montane Carex nigra – brown moss mire Hypno-Caricetum alpinum Carex - brown moss mire (McV & R p.118, Table 29)	**M10** **U5**	Carex dioica - Pinguicula vulgaris mire Nardus stricta - Galium saxatile grassland **c** Carex panicea - Viola riviniana sub-community
H3	**j**	Montane Carex saxatilis mire Caricetum saxatilis (McV & R p.125, Table 59)	**M12**	Carex saxatilis mire
H3	**g**	Sub-montane Carex rostrata - brown moss mire Carex rostrata - brown moss provisional nodum (McV & R p.112, Table 58)	**M9**	Carex rostrata - Calliergon cuspidatum mire **a** Campylium stellatum - Scorpidium scorpioides sub-community **b** Carex diandra - Calliergon giganteum sub-community
H3	**h**	Montane Carex echinata - Sphagnum recurvum mire Sphagneto-Caricetum alpinum Alpine Sphagnum - Carex mire (McV & R p.115, Table 55) Carex aquatilis - rariflora nodum (McV & R p.115, Table 55)	**M7**	Carex curta - Sphagnum russowii mire **a** Carex bigelowii - Sphagnum lindbergii sub-community **b** Carex aquatilis - Sphagnum recurvum sub-community
H4		Schoenus nigricans mire Schoenus nigricans provisional nodum (McV & R p.124, Table 64)	**M10**	Carex dioica - Pinguicula vulgaris mire **a** Carex demissa - Juncus bulbosus/ kochii sub-community **iii** Schoenus nigricans variant

Birks & Ratcliffe		National Vegetation Classification
H4	(contd)	Schoenus nigricans also in: **M11** Carex demissa - Saxifraga aizoides mire **M15** Scirpus cespitosus - Erica tetralix wet heath **a** Carex panicea sub-community **M17** Scirpus cespitosus - Eriophorum vaginatum blanket mire **a** Drosera rotundifolia - Sphagnum sub-community
I	**Flushes and springs**	**M** **Mires**
I1	Open Carex sward	**M11, M10**
I1	**a** Carex hostiana – Eriophorum latifolium flush	**M10** Carex dioica - Pinguicula vulgaris mire
I1	**b** Sub-montane Carex demissa - Saxifraga aizoides flush Cariceto-Saxifragetum aizoidis Carex - Saxifraga aizoides flush, low-level facies (McV & R p.133, Table 64)	**M11** Carex demissa - Saxifraga aizoides mire **b** Cratoneuron commutatum - Eleocharis quinqueflora sub-community
I1	**c** Montane Carex demissa - Saxifraga aizoides flush Cariceto-Saxifragetum aizoidis Carex - Saxifraga aizoides flush, high-level facies (McV & R p.133, Table 64)	**M11** Carex demissa - Saxifraga aizoides mire **a** Thalictrum alpinum - Juncus triglumis sub-community **i** Polygonum viviparum variant **ii** Juncus bulbosus/kochii - Saxifraga stellaris variant
I2	Eleocharis multicaulis - Rhynchospora alba flush	**M30** Miscellaneous Littorellion vegetation
I3	Narthecium ossifragum - Sphagnum flush Narthecium - Sphagnum provisional nodum (McV & R p.132, Table 62.)	**M15** Scirpus cespitosus - Erica tetralix **a** Carex panicea sub-community (?) **M16** Erica tetralix - Sphagnum compactum wet heath (?)

Birks & Ratcliffe			National Vegetation Classification	
I4		**Bryophyte springs**	**M31, M32, M33, M37, M38**	
I4	**a**	Philonotis fontana - Saxifraga stellaris springs Philonoto-Saxifragetum stellaris Oligotrophic bryophyte springs (McV & R p.130, Table 60)	**M32**	Philonotis fontana - Saxifraga stellaris spring **a** Sphagnum auriculatum sub-community **b** Montia fontana - Chrysosplenium oppositifolium sub-community
I4	**b**	Anthelia julacea springs Anthelia - Deschampsia cespitosa provisional nodum (McV & R p.132, Table 61)	**M31**	Anthelia julacea - Sphagnum auriculatum spring
I4	**c**	Pohlia wahlenbergii var. Glacialis springs Pohlietum glacialis (McV & R p.131, Table 60)	**M33**	Pohlia wahlenbergii var. glacialis spring
I4	**d**	Saxifraga rivularis - Philonotis Seriata springs	**M32**	Philonotis fontana - Saxifraga stellaris spring
I4	**e**	Cratoneuron commutatum springs Cratoneuron commutatum - Saxifraga aizoides nodum (McV & R p.133, Table 63)	**M37** **M38**	Cratoneuron commutatum/filicinum - Festuca rubra spring Cratoneuron commutatum - Carex nigra spring

SUBJECT TO REVISION
For further information see http://jncc.defra.gov.uk/page-2303

Birks & Ratcliffe	National Vegetation Classification
J* Woodlands	**W Woodlands**
J1 Scots pine woods **a** Pinetum Hylocomieto-Vaccinetum Pinewood Vaccinium - moss association (McV & R p.11, Table 4) **b** Pinetum Vaccineto-Callunetum Pinewood Vaccinium - Calluna association (McV & R p.I3, Table 5)	**W18** Pinus sylvestris - Hylocomium splendens woodland **a** Erica cinerea - Goodyera repens sub-community **b** Vaccinium myrtillus - Vaccinium vitis-idaea sub-community **c** Luzula pilosa sub-community **d** Sphagnum capillifolium/quinquefarium - Erica tetralix sub-community **e** Scapania gracilis sub-community
J2 Birch woods (McV & R p.15, Table 6) **a** Betuletum Oxaleto-Vaccinetum Vaccinium-rich birch wood (McV & R p.15, Table 6) **b** Betula-herb nodum Herb-rich birch wood (McV & R p.16, Table 6)	**W11** Quercus petraea - Betula pubescens Oxalis acetosella woodland **a** Dryopteris dilatata sub-community **b** Blechnum spicant sub-community **c** Anemone nemorosa sub-community **d** Stellaria holostea - Hypericum pulchrum sub-community **W17** Quercus petraea - Betula pubescens - Dicranum majus woodland **a** Isothecium myosuroides - Diplophyllum athicans sub-community **b** Typical sub-community **c** Anthoxanthum odoratum - Agrostis capillaris sub-community **d** Rhytidiadelphus triquetrus sub-community
J3 Ash woods Fraxinus - Brachypodium sylvaticum nodum Brachypodium-rich ash wood (McV & R p.20, Table 8)	**W9** Fraxinus excelsior - Sorbus aucuparia - Mercurialis perennis woodland
J4 Mixed deciduous woodland (McV & R p.11, Table A)	**W7** Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum woodland **W9** Fraxinus excelsior - Sorbus aucuparia - Mercuralis perennis woodland
J5 Alder woods (McV & R p.23, Table B)	**W7** Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum woodland

NVC mires (Rodwell 1986-1987) with no Birks & Ratcliffe (1980) equivalent

M1 Sphagnum auriculatum bog pool community

M2 Sphagnum cuspidatum/recurvum bog pool community
- **a** Rhynchospora alba sub-community
- **b** Sphagnum recurvum sub-community

M3 Eriophorum angustifolium bog pool community

M5 Carex rostrata - Sphagnum squarrosum mire

M13 Schoenus nigricans - Juncus subnodulosus mire
- **a** Festuca rubra - Juncus acutiflorus sub-community
- **b** Briza media - Pinguicula vulgaris sub-community
- **c** Caltha palustris - Galium uliginosum sub-community

M14 Schoenus nigricans - Narthecium ossifragum mire

M15 Scirpus cespitosus - Erica tetralix wet heath
- **d** Vaccinium myrtillus sub-community

M16 Erica tetralix - Sphagnum compactum wet heath
- **a** Typical sub-community
- **b** Succisa pratensis - Carex panicea sub-community
- **c** Rhynchospora alba - Drosera intermedia sub-community
- d Juncus squarrosus - Dicranum scorparium sub-community
- **e** Impoverished stands lacking Sphagna

M17 Scirpus cespitosus - Eriophorum vaginatum blanket mire
- **c** Juncus squarrosus - Rhytidiadelphus loreus sub-community

M18 Erica tetralix - Sphagnum papillosum raised and blanket mire
- **a** Sphagnum magellanicum - Andromeda polifolia sub-community
- **b** Empetrum nigrum ssp. nigrum - Cladonia sub-community

M21 Narthecium ossifragum - Sphagnum papillosum valley mire
- **a** Sphagnum auriculatum - Rhynchospora alba sub-community
- **b** Vaccinium oxycoccus - Sphagnum recurvum sub-community

M22 Juncus subnodulosus - Cirsium palustre mire

M24 Molinia caerulea - Cirsium dissectum fen-meadow

M26 Molinia caerulea - Crepis paludosa mire
- **a** Sanguisorba officinalis sub-community
- b Festuca rubra sub-community

M29 Hypericum elodes - Potamogeton polygonifolius soak way

M34 Carex demissa - Koenigia islandica flush

M35 Ranunculus omiophyllus - Montia fontana rill

NVC heaths (Rodwell 1988) with no Birks & Ratcliffe (1980) equivalent

H1 Calluna vulgaris - Festuca ovina heath
- **a** Hypnum cupressiforme sub-community
- **b** Hypogymnia physodes - Cladonia impexa sub-community
- **c** Teucrium scorodonia sub-community
- **d** Carex arenaria sub-community
- **e** Species-poor sub-community

H2 Calluna vulgaris - Ulex minor heath
- **a** Typical sub-community
- **b** Vaccinium myrtillus sub-community
- **c** Molinia caerulea sub-community

H3 Ulex minor - Agrostis curtisii heath
- **a** Typical sub-community
- **b** Cladonia spp. sub-community
- **c** Agrostis curtisii sub-community

H4 Ulex gallii - Agrostis curtisii heath
- **a** Agrostis curtisii - Erica cinerea sub-community
- **b** Festuca ovina sub-community
- **c** Erica tetralix sub-community
- **d** Scirpus cespitosus sub-community

H5 Erica vagans - Ulex europaeus heath
- **a** Typical sub-community
- **b** Eleocharis multicaulis sub-community

H6 Erica vagans - Ulex eurapaeus heath
- **a** Typical sub-community
- **b** Festuca ovina sub-community
- **c** Agrostis curtisii sub-community
- **d** Molinia caerulea sub-community

H7 Calluna vulgaris - Scilla verna heath
- **a** Armeria maritima sub-community
- **b** Viola riviniana sub-community
- **c** Erica tetralix sub-community
- **d** Empetrum nigrum ssp. nigrum sub-community
- **e** Calluna vulgaris sub-community

H8 Calluna vulgaris - Ulex gallii heath
- **a** Species-poor sub-community
- **b** Danthonia decumbens sub-community
- **c** Sanguisorba minor sub-community
- **d** Scilla verna sub-community
- **e** Vaccinium myrtillus sub-community

NVC calcifugous grasslands (Rodwell 1989) with no Birks & Ratcliffe (1980) equivalent

U1 Festuca ovina - Agrostis capillaris - Rumex acetosella grassland

U3 Agrostis curtisii grassland

NVC herb- and fern-rich communities (Rodwell 1989) with no Birks & Ratcliffe (1980) equivalent

U20 Pteridium aquilinum - Galium saxatile community
- **b** Vaccinium myrtillus - Dicranum scoparium sub-community