Native woodland survey of Scotland

Manual for recording National Vegetation Classification communities and Habitat Action Plan types in the Native Woodlands Survey of Scotland

Ben Averis and John Rodwell, March 2006
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>Recording NVC woodland type</td>
<td>3</td>
</tr>
<tr>
<td>Recording HAP type</td>
<td>4</td>
</tr>
<tr>
<td>Some general concerns</td>
<td>6</td>
</tr>
<tr>
<td>Additional notes written after checking a sample of NVC recording from the NWSS 2005 Pilot Survey</td>
<td>7</td>
</tr>
<tr>
<td>Appendix: NVC woodland &amp; scrub summaries</td>
<td>9</td>
</tr>
</tbody>
</table>
Introduction

Over the next five years the Forestry Commission Scotland (FCS) plans to carry out a field-based survey of all of Scotland’s native woods, to identify their location, type and condition, and to assess the opportunities for commercial use.

This Native Woodlands Survey of Scotland (NWSS) will be the first time this kind of information will be collected in a consistent manner right across Scotland. This survey includes the classification and mapping of woodland to its appropriate community type of the National Vegetation Classification (NVC) (Rodwell, J.S. (Ed.) (1991). British Plant Communities. Vol. 1 – Woodlands and Scrub. Cambridge University Press) and to its appropriate Habitat Action Plan (HAP) type. This Field Manual provides information and guidelines to help the surveyors to record NVC and HAP types. It incorporates both the Field Manual and the NVC woodland descriptions written by BA and JR in 2005 in two separate documents. They are brought together here, with the NVC descriptions as an appendix and with the addition of information by BA about which species can be used to help identify NVC types in winter and also some extra notes about HAP types in relation the NVC types. Some further thoughts about NVC recording
Recording National Vegetation Classification (NVC) Woodland Type

Recognising woodland types

What makes any vegetation type distinctive is its unique combination of species – the pattern of their frequency and abundance, and how they grow together in a distinctive physiognomy or structure. Frequency is how often a species occurs among a group of stands of a vegetation type (i.e. in 60% of them). Abundance is how much of a species there is when it occurs in any particular stand (e.g. covering 35% of the ground). The frequent species of a vegetation type do not need to be abundant, and the abundant species are not always frequent. Woodlands are often species-rich and structurally complex but they are defined in the NVC in exactly the same way as all other vegetation types.

The importance of sylvicultural treatment

The major contrasts in species composition among British woodlands reflect differences in climate and soil, but the composition and structure of the tree canopy and understorey in woodlands is often markedly affected by sylvicultural treatment, sometimes in the distant past. Often, changes in the proportions of site-native trees or replacement of the semi-natural canopy by other deciduous species that can be sustained on the particular site type (even by larch) can leave the field layer relatively unaffected. The same is true when particular underwood species have been favoured for coppice. Where woodlands have had a complex sylvicultural history, and these elements are much altered, it is the field layer that will often give the quicker clue as to the woodland type.

Getting to know the NVC woodland types

Generally speaking, using a key to classify samples of woodland vegetation is not the best way to begin learning about the NVC woodland classification. Better is to become familiar with real examples of the different kinds of woodlands recognised by the NVC and to regard these initially as type sites against which new unknown stands can be compared. Accumulating experience will then give you the confidence to evaluate more problematic examples. You can always recalibrate your understanding by returning to the type sites. Effectively, this is to develop your own internal key.

Outline descriptions of the NVC woodland types

This Field Manual includes outline descriptions of all the NVC woodland types, arranged under the major headings of Oak-Birch & Mixed Broadleaf Woodlands (W8-11,16 & 17), Beech & Yew Woodlands (W12-W15), Pine & Juniper Woods & Montane Willow Scrub (W18-20), Wet Alder, Willow & Birch Woods (W1-7) and Scrub, Underscrub & Rides (W21-23, W25). These accounts briefly summarise the species composition, habitat and distribution of each woodland type and its sub-communities, with notes on their occurrence in Scotland. Fuller descriptive accounts can be found in British Plant Communities, Volume 1, together with the floristic tables which give details of the species composition of woodland communities and their sub-communities. As a summary, the attached table shows the main characteristic species of the NVC woodland communities and sub-communities.

Additional woodland types not included in the NVC

Some woodland vegetation does not fit at all well into any NVC type and provisional new types have been outlined in An Overview of Coverage of the National Vegetation Classification (Rodwell et al. 2000). Brief descriptions of five additional vegetation types have included in the woodland accounts here, together with a suggested code for labelling map units: WLz Oak-Birch Woodland with Luzula sylvatica, WPc Lichen-rich Pinus sylvestris woodland, We Sambucus nigra-Urtica dioica scrub, Wr Rhododendron ponticum scrub and Wh Hypericum pulchrum-Melampyrum pratense ride community.

Typicalness and variation in woodland types

It is wrong-headed to regard the NVC definitions of woodland types as providing some prescriptive frame into which woodland vegetation ‘ought’ to fit. All vegetation shows complex variations around recognisable types, which are simply a necessary convenience for inventory, mapping, notification, management and monitoring - and therefore a rather helpful convenience. A useful corrective is to think of each woodland type as an envelope which includes many stands, all of a generally similar character, but exhibiting interesting diversity in composition and structure. All survey broadens our appreciation and understanding of this variation and often throws up previously unfamiliar vegetation.

A preliminary appraisal of a wood

One half hour walking attentively through a wood is worth a whole day's detailed survey. Such a preliminary appraisal will provide you with an overall indication of the complexity of the site and tell you whether there are clear or fuzzy boundaries between different woodland types, complex mosaics or repeating patterns of variation. If the site is large, divide it up and make a preliminary walk in each section. Only then should you mark out the sub-compartments (polygons).
Vernal species and the timing of survey

Experienced surveyors should find sufficient indicators in the floristics and structure of woodland vegetation to identify NVC woodland types all year round. However, certain plants important for identification grow and flower early in the year and have largely disappeared by summer. The most frequently encountered of these vernal species are Hyacinthoides non-scripta (more or less throughout W10 and, along with Mercurialis perennis, in W8) and Anemone nemorosa and Allium ursinum (important in certain types of W8 and W10).

Mapping at community and sub-community level

These days, most NVC surveys map to sub-community level these days and knowing how to identify certain sub-communities will help you make accurate distinctions at the community level because sub-communities are often transitions from one woodland type to another. In only two cases, with certain drier types of W4 and W7, will it be necessary to distinguish sub-communities on the site maps in cross-reference to HAP types.

Recording woodland vegetation that is intermediate between two NVC types

Some woodland vegetation seems truly intermediate between types that can both be found in well-defined stands elsewhere. On the boundary between the lowlands and uplands, for example, it can be hard to distinguish between W8 and W9, W10 and W11 and W16 and W17. In other cases, where terrain and soils are changing gradually, woodland vegetation can vary continuously on the ground with indistinct boundaries between one recognisable type and another. Sometimes it is best to record and map a stretch of woodland as intermediate between two NVC types. Such vegetation should be labelled with a hyphen between the two NVC codes (e.g. W4-W17, or W8-W9).

Recording mosaics of woodland vegetation

Small-scale mosaics of two or more NVC types will be very common, and can be recorded as such using an estimated percentage cover for each NVC type within each mosaic polygon: for example W11 70%; W17 30%; or, in a mosaic of woodland and non-woodland vegetation W4 30%; W17 30%; M15 40%. In some cases the same NVC label may apply to two or more polygons. Examples may include numerous small patches of woodland, all close to and similar to each other, or small outliers of larger polygons.
Recording Habitat Action Plan (HAP) types

Relationships between NVC and HAP types

The HAP types are broader than NVC communities. Each HAP type consists of two or more NVC communities. In most cases a whole NVC community belongs within a single HAP type.

However, two NVC communities – W4 and W7 – belong mainly in one (Wet Woodland) HAP type except for their drier sub-communities W4a and (most examples of) W7c (see the tables below). Therefore these sub-communities need to be recognised by surveyors in order that they can be allocated to the right HAP type.

In addition each of W11, W17 and the sub-community W4a straddles two HAP types in such a way that the HAP distinction is made not on further splitting of NVC type but on the composition of the tree canopy (>30% oak = Upland Oakwoods; birch-dominated with <30% oak = Scottish Upland Birchwoods).

Lichen-rich pinewood WPc is not described in the NVC but clearly belongs in the Native Pine Woodlands HAP type.

WLz woodland with a species-poor field layer dominated by Luzula sylvatica is too species-poor to allow classification to a NVC type. In itself it is too species-poor for clear classification to any HAP type too, but most stands can be assigned to a HAP type on the basis of the associated woodland (see below).

One of the main divisions among HAP types is between upland and lowland types. It is inevitable that in some cases – especially around the upland-lowland margins – upland and lowland NVC communities occur in association with each other. In such cases each of the appropriate upland and lowland HAP types should be recorded too: this indicates the transitional and in some places diverse and interesting nature of the woodland. For HAP purposes, an attempt to define upland and lowland on the basis of features other than NVC type (such as topography, soils, altitude or climate) would add more complexity – for example where such an upland-lowland boundary cuts through a stand of a particular upland or lowland NVC type, where an upland NVC type such as W11 occurs within an area defined by other means as lowland, or conversely where a lowland NVC type such as W8 occurs in an area defined by other means as upland. It is widely recognised that classification to NVC type should be on the basis of flora rather than topography, soils, climate or altitude. This also seems the best and most straightforward approach for classification to HAP type.

The relationship between the NVC woodland types and the HAP types is summarised in the two tables below (one ordered by HAP type and the other by NVC type), and on the attached separate table giving a summary of all British NVC woodland communities.

---

### Relationships between woodland NVC and HAP types – table ordered by HAP type

<table>
<thead>
<tr>
<th>HAP Type</th>
<th>NVC Types</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Lowland Mixed Deciduous Woodland</td>
<td>W8, W10, W16 &amp; WLz</td>
<td>which is associated mainly or entirely with W8, W10 or W16</td>
</tr>
<tr>
<td>A Upland Mixed Ashwoods</td>
<td>W9 and W7c</td>
<td></td>
</tr>
<tr>
<td>O Upland Oakwoods</td>
<td>W4a, W11 and W17 with oak forming &gt;30% of the canopy. Also WLz which is associated mainly or entirely with these forms of W4a, W11 or W17</td>
<td></td>
</tr>
<tr>
<td>B Scottish Upland Birchwoods</td>
<td>W4a, W11 and W17 with oak forming &lt;30% of the canopy. Also WLz which is associated mainly or entirely with these forms of W4a, W11 or W17</td>
<td></td>
</tr>
<tr>
<td>P Native Pine Woodlands</td>
<td>W18, WPc</td>
<td></td>
</tr>
<tr>
<td>W Wet Woodland</td>
<td>W1, W2, W3, W4b+c, W5, W6, W7a+b and examples of W7c which don’t fit the Upland Mixed Ashwoods HAP type because they lack ash, elm or hazel (i.e. are mostly of alder, willow or birch) and are in more typically ‘wetland’ situations such as valley floors</td>
<td></td>
</tr>
</tbody>
</table>
## Relationships between woodland NVC and HAP types – table ordered by NVC type

<table>
<thead>
<tr>
<th></th>
<th>Lowland Mixed Deciduous Woodland</th>
<th>Upland Mixed Ashwoods</th>
<th>Upland Oakwoods</th>
<th>Scottish Upland Birchwoods</th>
<th>Native Pine Woodlands</th>
<th>Wet Woodland</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>W2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>W3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>W4</td>
<td></td>
<td>W4a in which oak forms &gt;30% of canopy cover</td>
<td>W4a birch-dominated, with oak &lt;30% of canopy cover</td>
<td>W4b/c</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>W6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>W7</td>
<td>W7c with ash, elm, hazel etc, mainly on slopes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>W7a/b and W7c lacking ash, elm or hazel and generally of alder, willow or birch and in ‘wetland’ situations such as valley floors</td>
</tr>
<tr>
<td>W8</td>
<td>•</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W9</td>
<td>•</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W10</td>
<td>•</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W11</td>
<td>where oak forms &gt;30% of canopy cover</td>
<td></td>
<td>where birch-dominated, with oak &lt;30% of canopy cover</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W16</td>
<td>•</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W17</td>
<td>where oak forms &gt;30% of canopy cover</td>
<td></td>
<td>where birch-dominated, with oak &lt;30% of canopy cover</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W18</td>
<td>•</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WLz</td>
<td>where associated with W8, W10 or W16</td>
<td>where oak forms &gt;30% of canopy cover and WLz is associated with W11 or W17</td>
<td>where birch-dominated, with oak &lt;30% of canopy cover and WLz associated with W11 or W17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WPc</td>
<td>•</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Recording the HAP types in a sub-compartment (polygon)

There is not always a 1:1 match between the NVC and HAP types so those HAP types represented in each NVC polygon should be recorded using an upper case letter code as a suffix. An upper case suffix (e.g. W11B) is important here so that it cannot be confused with the lower case letter code for a NVC sub-community (e.g. W11b). Using such a system, the NVC and HAP types in a mosaic polygon could be recorded like this:

W11B 60%; W11O 40% (where the polygon is entirely W11 but partly birch-dominated (oak <30% of canopy cover) and partly with oak forming >30% of the canopy cover)

W4B 30%; W17B 30%; W18P 40% (where both W4 and W17 are birch-dominated with <30% oak)

Recording non-woodland vegetation

Non-woodland vegetation associated with woodland on a site should be mapped to broad habitat types of HAP types.

Some general concerns

Situations occur where it is genuinely difficult to distinguish between woodland types more characteristic of the south-eastern lowlands of Britain (W8, W10 & W16) and their counterparts on similar soils in the north-western uplands (W9, W11 & W17). This is partly because the climatic factors that play a major role in influencing woodland composition vary continuously and are affected by regional oddities of climate and by local topography. Other factors than climate (like intensity of grazing) also influence the distinctions between these woodlands and likewise may not be simply related to a lowland/upland divide. Each of the woodland pairs has sub-communities (W10e/W11a, W8e,f,g/W9a, W16b/W17b) that in part reflect the gradation between the communities as a whole, so these can be used to define finer variations in woodland composition. However, the distinguishing character and quality of some sites is that their woodlands are of a truly transitional type. Surveyors should not therefore be forced to make artificial distinctions where these are an unreal reflection of site conditions. While not wanting to undermine the general level of decisiveness, two alternatives seem possible: that some recording convention could be adopted for stands that are truly intermediate (such as a category W10-W11) or that surveyors are pressed to make a choice but to record whether this was very difficult to decide in a separate box (which would be left blank or have *).

Likewise, some sites are topographically so varied in, for example, underlying drift cover, extent of flushing, their aspect or slope, that mosaics of different communities (e.g., mixtures of W8 & W9 on sunnier and shadier aspects, or W7 & W11 over a slope with many tiny flushes) occur on a scale and with a complexity that is difficult to map using the existing conventions. Again, the character and value of some sites is precisely that they are like this. While not wishing to alter the minimum stand size for recording the occurrence of a particular type, the survey protocol should be able to reflect this kind of situation.

Finally, there is a potential problem subsequent to the field survey. Where surveyors are taking the trouble to record minority elements within mosaics, such information should not be subsequently lost by less subtle mapping conventions or cruder software interrogation routines. A 55:45% mosaic of W10 and W7, for example, should not be mapped simply as W10, nor should a software query draw a blank on the occurrence of the minor element in such cases.
Additional notes written after checking a sample of NVC recording from the NWSS 2005 Pilot Survey

The findings (by Ben Averis) from this checking excercise are written up in a separate report, but it seems relevant to copy here some of the points made in that report.

Method of recording vegetation types in mapped mosaics

In the NWSS Pilot Survey, mosaics were recorded in two different ways. In some cases each vegetation type was given an estimated percentage cover. In other cases the main type was indicated, and other types present were listed as ‘Minorities’ but with no indication of their extent. In some cases both systems were employed in the same polygon. Unless ‘Minorities’ refers specifically to <1% (which I am given to understand it does not), this system is rather confusing. It would be clearer and more simple if every vegetation type is given an estimated percentage. This can include <1% where appropriate. Attempts at greater accuracy below 1% (e.g. 0.5%, 0.25% etc) would make things too difficult, so a minimum of <1% is realistic. If some vegetation types are recorded as occurring at <1% cover, it is best to exclude these from the calculations which add up to 100% (e.g. W11 60%, W17 30%, W4 10%, W7 <1%). Where non-woodland vegetation or habitat types occur as part of a mapped mosaic, they should be given percentages too: for example W11 50%, W17 30%, bracken 20%.

Number of vegetation types within a mapped mosaic

It does not matter if some mosaics are labelled with several vegetation or habitat types because in many places this is the reality: a large range of variation within a small area.

Shared dominance of vegetation types within a mapped mosaic

Where appropriate it should be possible for the NWSS surveyors to record two (or even more) NVC types as co-dominant in a polygon: for example W11 50%, W17 50%, or W11 40%, W17 40%, W4 20%.

Stand area in relation to mapping as a separate polygon or inclusion within a mosaic

The decision about whether to map an area of a vegetation type as a separate polygon or to include it in a larger mosaic should not be based strictly on its size (0.1 ha having previously been given as a threshold). It is unrealistic to expect all patches of >0.1 ha to be mappable in practice. Surveyors should be allowed to include patches >0.1 ha as parts of mapped mosaics where for some reason (e.g. very complex boundaries) they would otherwise be very difficult or impossible to delineate as separate polygons. Mosaics – even some large ones – are a perfectly satisfactory way of mapping vegetation (whether individual patches of vegetation are <0.1 ha, >0.1 ha or a mixture of both size classes) as long as they are labelled so as to describe well the range of variation within the polygon.

Use of distant views in mapping some polygon boundaries

In many cases distant views (for example looking on to a slope from across the other side of a valley) can be very useful in defining vegetation boundaries. It can be much harder to map boundaries of patches of vegetation which one is standing in, especially in woodland where trees obscure views and also on featureless topography with few reference points. Sometimes it is useful to find good vantage points from which one can map out some of the boundaries more clearly before entering a site, or from which one can refine some of the boundaries after visiting the site.

Recording more NVC polygons compared with fewer NVC polygons

Obviously the more polygons the better the resolution of NVC mapping. However, the NWSS surveyors also have much other information to record in each mapped polygon in this survey. Therefore when they make a decision to map a particular area as a separate NVC polygon rather than include it within a larger adjacent polygon they are committing themselves to a considerable amount of extra recording as well as to NVC type. For practical reasons this could at times be a disincentive to more detailed NVC mapping. If, where much of that other information would be at least broadly similar through an area which could potentially be split into a number of separate NVC polygons, it could help if the survey allowed for that recording to refer to a group of NVC polygons. This may then encourage surveyors to map NVC types in more detail where they feel able to do so, without having to be committed to repetitive and time-consuming recording of other features during the process.
New plantations of native tree and shrub species
These were classed as ‘WN’ in the Pilot Survey, to indicate ‘No Woodland NVC type’. These plantations are indeed too young for their vegetation to be classed as any particular woodland NVC type. They are mainly grassland (or, less commonly a mixture of weedy species) with very young planted trees and shrubs which do not yet cast enough shade and leaf litter to effect the whole habitat in such a way as to make it woodland. If young plantations of native species are to be included in the NWSS, it seems sensible to identify them using this ‘WN’ code.

Improvement in mapping as surveyors gain more experience
The Pilot Survey fieldwork was evidently the first time that these surveyors had carried out NVC mapping on this scale. Even after initial training, this kind of survey work on a large scale is a challenge, especially when the surveyors also have to record other information. The quality of their NVC mapping can be expected to improve as they do more of this type of work. At some sites, NVC survey can be a real challenge even to those of us who have had many years of experience! Examples of this include places with very complex mosaics of NVC types in which the variation is not clearly related to topography, and places with rather featureless topography which cannot be clearly related to the map.

NVC surveying in winter
The planned NVC surveying in the winter months presents another challenge, especially for surveyors in their first years of NVC work. Most of those who have a lot of NVC survey experience probably did not have to tackle NVC work in winter in their first few years. With this in mind, information has been added to the Appendix (NVC Woodland and Scrub Summaries) to provide information about which species are of most use for identifying NVC types in winter. This includes extra text where appropriate and also a summary table at the end of the Appendix. In general the woodland vegetation which is most difficult to classify in winter is that in which the field layer dies down a lot to leave rather bare ground and leaf litter with little clue as to the flora. This can apply especially to W1, W6, W8, W9 and some W10. In general these are communities of deep, rich soils, especially in lowland situations. The communities in which the field layer shows the least difference between summer and winter are those of well-drained acidic soils, especially W15, W16, W17, W18, WLz and WPc. Of course some of these are found mostly in upland areas where bad weather would limit surveying in winter. And the first group (difficult to identify in winter) occur mostly in regions where winter weather is not so harsh and is less likely to limit survey. So it could be a case of ‘good weather but tricky NVC’ and ‘easier NVC but bad weather’.

NWSS in relation to other NVC surveys
The NWSS will not necessarily remove the need for certain site-specific NVC surveys (e.g. surveys of certain Sites of Special Scientific Interest, Special Areas of Conservation or nature reserves, commissioned by organisations such as Scottish Natural Heritage or Scottish Wildlife Trust) in which all habitats are generally surveyed to NVC sub-community level and a report written containing descriptions of NVC types, an evaluation of the botanical interest and a discussion about the effects of land management.
Appendix: NVC Woodland and Scrub Summaries

These are brief descriptions of NVC communities W1-W23 arranged under broad heads, with additional information provided from Rodwell et al. 2000 about possible new woodland communities. The accounts aim to give the reader an idea of the general appearance, species composition, habitat and distribution of each woodland type, and the main means of distinction from other communities, together with notes on their character and occurrence in Scotland. Sub-communities are described briefly with a particular note on those which help distinguish particular HAP types (W4a and W7c). After the main headings, the woodlands are referred to just by their codes (e.g. W11c). Fuller summaries of the woodlands can be found in British Plant Communities, Volume 1, pp. 21-34 and complete accounts from pp. 48 ff.

Dry Oak-birch and Mixed Broadleaf woodlands

Much of the variation in lowland oak-birch and mixed broadleaf woodlands can be understood in terms of six communities whose composition and distribution is related to variations in soils and climate. There are two woodland types of base-rich soils (W8 & W9), two of neutral soils (W10 & W11) and two of acid soils (W16 & W17). One of each pair is characteristic of the warmer and drier lowlands of the east and south of Britain, one of the cooler and wetter north-western uplands, as summarised on the diagram below. If you master the distinctions between these six types, you should understand the variation in well over half the woods you enter. Remember, however, that sylvicultural treatments can favour particular coppice or timber crops and confuse the differences between the woodlands. We have also included at the end of this section a note on woodlands with field layers dominated by Luzula sylvatica which are often hard to place.

Figure 1. Relationships between the six types of oak-birch and mixed broadleaf woodland and climatic and soil differences

W8 Fraxinus excelsior-Acer campestre-Mercurialis perennis woodland

Woodland with varied canopies of Fraxinus excelsior, Quercus robur, Ulmus glabra and Acer pseudoplatanus, commonly with a shrub layer of Corylus, Crataegus and Sambucus nigra. Mercurialis perennis is the typical dominant in the field layer, often with some vernal Hyacinthoides non-scripta, but there can be a rich associated flora with calcicoles like Sanicula europaea, Geum urbanum, Brachypodium sylvaticum, Geranium robertianum along with Urtica dioica, Galium aparine, Stachys sylvatica and Symphytum tuberosum. Active litter incorporation means that this lush cover can die down to very little in winter. W8e is as described above. The other sub-communities are defined mainly by frequent and often abundant Glechoma hederacea and Primula vulgaris (W8a), Anemone nemorosa and Ranunculus ficaria (W8b), Deschampsia cespitosa (W8c), Hedera helix (W8d), Allium ursinum (W8f), Teucrium scorodonia and Melica nutans (W8g). The foliage and flowers of Anemone and Allium will have disappeared by mid-summer.

W8 is widespread on base-rich soils, sometimes ill-drained, in lowland Britain including the lowlands of southern and eastern Scotland. The commonest sub-communities in Scotland appear to be W8d, W8e and W8f. Many lowland Scottish woods have transitions between or mosaics of W8 and W10, with W8 on areas of slightly flushed slopes or deeper downwash soils below thinner less calcareous soils supporting W10. W8 is the lowland counterpart of W9, from which it differs in having less Sorbus aucuparia, Betula pubescens, Oxalis acetosella, Dryopteris spp. and Athyrium filix-femina, and less luxuriant and diverse bryophyte assemblages. These distinguishing features can be observed all year round (although Oxalis can be very inconspicuous in winter), unlike the lush herbs of which little can be seen in winter.

In some areas of W8 the ground can be rather bare in winter, showing some similarity to W10. These two communities can be hard to separate from each other at this time of year. However, W10 can show more Oxalis and Dryopteris ferns (and more oak, birch and rowan in the canopy), while in the W8 a careful search will usually reveal overwintering basal parts (or early spring growth) of species such as Ranunculus ficaria, Geranium robertianum, Geum urbanum, Brachypodium sylvaticum and Glechoma hederacea which are more common here than in W10. Also the greater amount of ash, elm, elder and hawthorn can help to distinguish W8 from W10 in winter.

Type site: Stenton, East Lothian
**W9 Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis woodland**

Woodland with varied canopies of Fraxinus excelsior, Sorbus aucuparia, Betula pubescens, Ulmus glabra, Acer pseudoplatanus and Corylus. Some western Scottish stands in exposed situations are dominated by a scrubby cover of Corylus. W9 has a herb-rich field layer with species such as Mercurialis perennis, Urtica dioica, Galium aparine, Geranium robertianum, Silene dioica, Stachys sylvatica, Sanicula europaea, Geum urbanum, Brachypodium sylvaticum, Symphytum tuberosum and vernal Hyacinthoides non-scripta. W9a is as described above. W9b is damper (transitional to W7), with species including Filipendula ulmaria, Crepis paludosa and Deschampsia cespitosa, but with more Mercurialis, Silene, Stachys, Sanicula and Brachypodium than in W7.

W9 is widespread but rather local on well-drained base-rich and often moist soils in the upland areas of Scotland, especially on moderate to steep slopes where there is some slight flushing. W9 is the upland counterpart of W8, from which it differs in having more Sorbus aucuparia, Betula pubescens, Oxalis acetosella, Dryopteris spp. and Athyrium filix-femina, and more luxuriant and diverse bryophyte assemblages. Bryophytes common in W9 but less so in W8 include the moss Thuidium tamariscinum and the liverwort Plagiochila asplenioides. It can occur in transitions to or mosaics with W11. These distinguishing features of W9 can be observed all year round (except that Oxalis can be very inconspicuous in winter), unlike the lush herbs of which little can be seen in winter.

Type sites: Killiecrankie and Birks of Aberfeldy, Perthshire

**Further guidelines for separating W8 and W9**

In southern Britain, warmth-loving species such as Acer campestre, Carpinus betulus, Tilia cordata, Cornus sanguinea, Euonymus europaeus, Arum maculatum, Viola reichenbachiana and Primula elatior help to define W8 against W9. However, these species become progressively scarcer moving north towards and into Scotland in sub-communities W8e, W8f and W8g.

W9 is generally well characterised through the upland fringes of north-western Britain by Sorbus aucuparia, Betula pubescens, Oxalis acetosella, more prominent dryopteroid ferns and Athyrium filix-femina, and more luxuriant and diverse bryophyte assemblages with Thuidium tamariscinum, Rhytidiadelphus triquetrus, Mnium hornum and Atrichum undulatum and Plagiochila asplenioides. However, these species are sometimes not so obvious in the drier W9 sub-community, and in rocky stands of W8 ferns and bryophytes can be quite common.

In lowland Scotland, woodland vegetation transitional between W8 and W9 is widespread. It is also possible, on terrain where there are drier and sunnier, and damper and more sheltered slopes, to find mosaics of W8 and W9. In problematic sites, make sure you have a good look around any site to get the measure of the variation, then use the prominence of the W9 indicators to give as clear an answer as you can. You should also remind yourself from time to time what type sites of W8 and W9 look like. Some stands may have to be classified as truly intermediate.

A common type of situation is that found at Cleghorn Glen near Lanark, with little or no downy birch or rowan in the canopy; and, where we first encountered W8/9-type woodland, a rather species-poor ground vegetation of Mercurialis, Stachys sylvatica and a few other herbs (possibly including additional species which have died away since summer), scattered patches of mosses and no Oxalis, but several rather thinly scattered tufts of the ferns Dryopteris dilatata and D. filix-mas. Further into the wood, ferns are more apparent (also including Athyrium filix-femina and Polystichum aculeatum) and moss carpets well-developed and reasonably diverse in species composition. Hence it became clear that the vegetation could be placed into W9, mainly because of the quantity of ferns, though this example is toward the lowland end of the community when compared with more ‘upland’ examples with more bryophyte-rich or fern-rich floras or abundant Oxalis.

In the most ‘upland’ examples of W9 Oxalis can be very common, but toward the lowland end of the community this species becomes scarcer or absent even though it may be common in adjacent W10 or W11 woodland (as at Cleghorn Glen) where the more acidic soils are more favourable for it.

Although W8 in Scotland is separated from W9 largely by what it lacks, it is worth noting that Hedera helix can be common in Scottish W8, usually helping to distinguish the W8d Hedera sub-community (occurring, for example, at Stenton in East Lothian), while it is generally scarce in W9. Dense shade cast by native or more usually by non-native trees can reduce the density and species-richness of the ground vegetation in W8 and W9 woods, making classification more difficult. Where conifers have been planted over previous W8 or W9, the herb-rich element of the field layer can become very sparse while more acid-loving species such as Dryopteris dilatata and certain mosses can occur on the accumulating leaf litter. This can produce a field and ground layer more species-poor than is usual in W8/9 or W10/11, but best classified as transitional between the two (for example W9-W11).
**W10 Quercus robur-Pteridium aquilinum-Rubus fruticosus woodland**

Woodland with a canopy of varied mixtures of oak and birch (usually Quercus robur and Betula pendula), often with Acer pseudoplatanus and with Corylus and Crataegus the commonest shrubs. Hyacinthoides non-scripta is the typical spring dominant but, by mid-summer, the field layer can look grassy, brackeny or brambly: Pteridium aquilinum, Rubus fruticosus and Lonicera periclymenum are common in variable proportions and can crowd out an associated flora. Otherwise, there is less seasonal variation in field layer biomass than in W8 (with which W10 can be associated). W10a is species-poor and rather undistinguished. Other sub-communities are characterised by particular species: Anemone nemorosa (W10b), Hedera helix (W10c), Holcus lanatus and robust weeds like Rumex spp. (W10d), H. mollis, Oxalis acetosella and Dryopteris dilatata (W10e). Bryophytes are generally sparse in W10, but the mosses Eurhynchium praelongum and Mnium hornum can be common. Luzula sylvatica can be very common in W10 (see WLz below).

**W10** is the lowland counterpart of W11. It is very common on neutral brown earth soils, sometimes sticky and poorly-drained, in lowland Britain, including the lowlands of southern and eastern Scotland where most of it belongs to W10e. The field layer, especially in W10e, can be very grassy, resembling W11 but with less Sorbus aucuparia, Agrostis capillaris, Anthoxanthum odoratum, Deschampsia flexuosa, Galium saxatile and Potentilla erecta, and a poorer bryophyte flora with little or no Rhytidiadelphus squarrosum, Scleropodium purum, Hylocomium splendens and Thuidium tamariscinum. Among these species, S. aucuparia, D. flexuosa and the bryophytes can be observed easily all year round. W10 can occur in woods together with stands of W8 or W16 where there are shifts to rocks and soils of more or less base-rich character. Transitions to the former are marked by the appearance of more calcicolous herbs, particularly Mercurialis perennis, and to the latter by the greater abundance of Deschampsia flexuosa and Vaccinium myrtillus (these two species clearly visible all year round, unlike M. perennis). W10 is also often interrupted by W7 flushes.

Type sites: Pressmennan and Binning Wood, East Lothian
W11 Quercus petraea-Betula pubescens-Oxalis acetosella woodland

Dry woodland with a canopy of varied mixtures of oak and birch (usually Quercus petraea and Betula pubescens, but with local variations), Sorbus aucuparia and Corylus avellana. Some western Scottish stands are dominated by Corylus, and some eastern Scottish stands by Populus tremula. Acer pseudoplatanus and Fraxinus excelsior are generally uncommon but can be abundant. The grassy or brackeny field layer is composed mainly of Agrostis capillaris, Anthoxanthum odoratum, Holcus mollis and Pteridium aquilinum in varying proportions. Oxalis acetosella, Galium saxatile, Potentilla erecta, Viola riviniana and the mosses Rhytidiadelphus squarrosus, Scleropodium purum, Hylocomium splendens and Thuidium tamariscinum are common. Deschampsia flexuosa is common, but less so than in W16 and W17. Hyacinthoides non-scripta can be plentiful in spring or, in the Grampians, Anemone nemorosa. Throughout the range of W11 it is common to find stands of this community with field and ground layers which do not fit into any sub-community but the four NVC sub-communities are characterised by Rubus fruticosus, Lonicera periclymenum and Dryopteris spp. (W11a), Blechnum spicant, Primula vulgaris and the moss Hylocomium brevirostre (W11b), Trientalis europaea, Anemone nemorosa and Luzula pilosa (W11c) and Veronica chamaedrys, V. officinalis, Stellaria holostea, Hypericum pulchrum and Ajuga reptans (W11d). Luzula sylvatica can be very common in W11 (see below).

W11 is the upland counterpart of W10 and is widespread and common on well-drained neutral to mildly acidic brown earth soils throughout upland Britain. W11a is mainly southern and western in Scotland (and in Britain as a whole). W11b is most common in the western Highlands. W11c occurs mainly in the eastern Highlands and W11d more widely in the Scottish uplands but especially in the east. W11 can resemble W10e but has more Sorbus aucuparia, Agrostis capillaris, Anthoxanthum odoratum, Deschampsia flexuosa, Galium saxatile, Potentilla erecta, Rhytidiadelphus squarrosus, Scleropodium purum, Hylocomium splendens and Thuidium tamariscinum. Among these species, S. aucuparia, D. flexuosa and the bryophytes can be observed easily all year round. W11 occurs in many places in transitions and mosaics with W17 (which is more mossy and/or heathy and occupies thinner, more acidic soils or rocky ground), as shown in Figure 2 below, W4 (on wetter peaty soils, with more Molinia, Sphagnum or Polytrichum commune – all observable throughout the year), W9 (on more base-rich soils, with herbs such as Mercurialis, Sanicula, Geum, Stachys sylvatica, Urtica dioica and Galium aparine – these species largely dying down in winter but their remains usually evident and identifiable to some degree with careful searching) and W7 (on wetter, moderately base-rich mineral soils, with species such as Lysimachia nemorum, Deschampsia cespitosa, Filipendula ulmaria, U. dioica, G. aparine, Ranunculus repens, Chrysosplenium oppositifolium, Phalaris arundinacea, Carex remota, Cirsium palustre, Crepis paludosa and Juncus spp., of which L. nemorum, D. cespitosa, R. repens, C. oppositifolium, P. arundinacea, C. remota and Juncus spp. are easily seen throughout the year).

Type sites: Garry Bridge, Birks of Aberfeldy and S side of Loch Rannoch, Perthshire
Further guidelines for separating W10 and W11

W10 comes closest to W11 in the W10e Acer-Oxalis sub-community where Oxalis acetosella, Holcus mollis, Stellaria holostea and Dryopteris dilatata mark the increase in humidity and surface leaching characteristic of the north-western upland fringes. This vegetation can look decidedly grassy by mid-summer when the bluebells have faded.

W11 comes closest to W10 most obviously in W11a Dryopteris sub-community where Rubus fruticosus, Lonicera periclymenum and dryopteroid ferns are commoner than usual in this woodland. Such vegetation can therefore have the brambly look of many lowland W10 woodlands. Very often, however, W11 field layers are grassier than W10 (with Agrostis capillaris, A. vinealis, Anthoxanthum odoratum, Deschampsia flexuosa, Holcus mollis and also more frequent Galium saxatile and Potentilla erecta) and more mossy (with frequent Rhytidiodalpus squarrosus, R. loreus, R. triquetrus, Scleropodium purum, Pleurozium schreberi, Hylocomium splendens, Dicranum scoparium, D. majus, Polytrichum formosum and Thuidium tamariscinum).

Other less constant plants generally rare or uncommon in W10 include Blechnum spicant, Primula vulgaris and Oreopteris limbosperma (all common in W11b Blechnum sub-community), Luzula pilosa, Trientalis europaea, Lathyrus linifolius (common in the W11c Anemone sub-community), Veronica chamaedrys (common in the W11d Stellaria-Hypericum sub-community) and Teucrium scorodonia (slightly more common in W11 than in W10).

Check for the W11 indicators listed above, and if there is a good total representation of those species (be it several of them, or just one or two in good quantity) the vegetation should be classed as W11. Borderline cases do occur in parts of Scotland on the upland/lowland transition.

In the woods visited around Lanark in November 2005 most of the W11 indicators were rare in or absent from most of the W10/11-type woodland visited, indicating that this species-poor vegetation was W10e. However, the abundance and diversity of mosses in one place at the Falls of Clyde was sufficient to push the vegetation just (but only just) into W11a: this was basically borderline vegetation closer to the upland end of W10e than to the more upland end of W11. Transitional stands do occur, so some will have to be classed as intermediate between W10 and W11.

Species-poor grassy swards on more base-poor soils where mixtures of Holcus mollis and Deschampsia flexuosa occur can be especially difficult. The presence of D. flexuosa suggests W11 but the frequency of other W11 species should be checked: in woods where W10 occurs with W16 Quercus-Betula-Deschampsia woodland, D. flexuosa can be a prominent plant.

Certain other field layer species can help separate W10 from W11. Holcus lanatus, sometimes with Dactylis, Arrhenatherum and big weeds, is characteristic of the disturbed W10d Holcus sub-community. Hedera helix is common in the W10c Hedera helix sub-community but is generally rare in W11.

Heavy shade cast by non-native trees can cause the field and ground layers of W10/11-type woodland to become sparser and species-poor. This ‘watered-down’ ground flora can make classification difficult, though in general the vegetation comes closer to W10 the more sparse and species-poor it becomes.

Figure 2. Common patterns among oak-birch woodlands in relation to soils and treatment: the ungrazed situation in (b), the grazed pattern in (c).
W16 Quercus spp-Betula spp-Deschampsia flexuosa woodland

Woodland with a canopy of oak and/or birch (typically Quercus robur and Betula pendula in W16a, Q. petraea and B. pubescens increasing in W16b), and often some Ilex aquifolium and Sorbus aucuparia over a species-poor, grassy field layer dominated by Deschampsia flexuosa. Pteridium aquilinum can be abundant. Calluna occurs in more open stands and Vaccinium myrtillus can be quite common (especially in W16b in the damper upland fringes, where Dryopteris dilatata can also be plentiful). Bryophytes are generally rather sparse and neither luxuriant nor diverse: the commonest species are the mosses Mnium hornum, Pseudotaxiphyllum elegans, Hypnum jutlandicum and Dicranella heteromalla, and the liverwort Lepidozia reptans. Luzula sylvatica can be very common in W16 (see below).

W16 is the lowland counterpart of W17, and occurs on well-drained, acidic soils like sands, rankers and podzols in lowland Britain and around the upland fringes. It is widespread in the southern and eastern lowlands of Scotland. It can form mosaics with W10, marking out slopes with thinner and more acidic soils than those with W10. It differs from W10 in having much D. flexuosa (observable all year round), from W11 in having fewer broader-leaved grasses such as Holcus mollis, Agrostis and Anthoxanthum (of which Agrostis can generally be seen easily during winter), or herbs such as Oxalis acetosella, Galium saxatile, Potentilla erecta, Viola riviniana and Hyacinthoides non-scripta, and from W17 in its poorer and less luxuriant bryophyte flora (these bryophytes observable all year round).

Type site: Spott Mill, East Lothian

W17 Quercus petraea-Betula pubescens-Dicranum majus woodland

Woodland with a canopy of oak and birch (usually Quercus petraea and Betula pubescens) or Sorbus aucuparia. Ilex aquifolium and Corylus avellana can be plentiful, but the latter is generally less common here than in W8-11. Deschampsia flexuosa is common throughout and Vaccinium myrtillus and, in less shady places, Calluna vulgaris may be abundant. W17 is distinguished from other broadleaf woodland NVC communities by the luxuriance of and diversity of bryophytes including large mosses such as Hynum jutlandicum, Hylocomium splendens, Pleurozium schreberi, Plagiothecium undulatum, Rhytidiadelphus loreus, Dicranum majus, D. scoparium, Polytrichum formosum and, in many Highland woods, Ptilium cristatetrensis. The above description applies to W17b which is the ‘standard’ heathy, mossy form of W17.

W17a, which is most common in the west, has richer assemblages of bryophytes on steep rocks and banks; these include Isothecium myosuroides, Diplrophyllum albicans, Leucobryum glaucum and western species such as the liverworts Scapania gracilis, Plagiochila spinulosa and Bazzania trilobata. Filmy ferns Hymenophyllum spp. can occur here too. W17c is less heathy, though there can be many scattered shoots of V. myrtillus. It is grassy with much D. flexuosa, Agrostis capillaris, Anthoxanthum odoratum and, less commonly, Holcus mollis. W17d, which occurs mainly in the east, is heathy as in W17b but generally has much Rhytidiadelphus triquetrus and scattered plants of Luzula pilosa or Trientalis europaea. There is typically more Scleropodium purum here than in W17a, b and c. Luzula sylvatica can be very common in W17 (see below).

W17 is the upland counterpart of W16. It differs from W16 in the general shift to different oak and birch species and the greater luxuriance and diversity of bryophytes which are clearly visible all year round. W17c can look rather like W11, but has more bryophytes and less Oxalis acetosella and other small herbs. W17 is widespread and common on thin, acidic soils in upland areas, especially on steep and/ or rocky slopes. It commonly forms mosaics with W11 and W4. On grazed, rocky slopes, mosaics of W17 (especially W17a or W17c) and W11 can be on a very small scale, with W17 on thin soils on or among rock outcrops or boulders, and W11 on the intervening areas with deeper and more continuous, less acidic soils.

Type sites: Garry Bridge and S side of Loch Rannoch, Perthshire
WLz Oak/birch woodland with a field layer dominated by Luzula sylvatica

Woodland with a canopy of oak, or, less commonly, birch, with a distinctive field layer dominated by extensive carpets of Luzula sylvatica occurs widely around the upland fringes where it straddles the upland/lowland boundary. The Luzula leaves persist through the winter so that the field layer can look much the same all year round. In some places there is a sufficient quantity and diversity of associated field and ground layer species to allow classification to NVC community – typically W10 (with species such as Holcus mollis, Pteridium aquilinum, Rubus fruticosus and Lonicera periclymenum), W11 (with species such as Pteridium, Rubus, Lonicera, H. mollis, Agrostis, Anthoxanthum, Deschampsia flexuosa, Galium saxatile, Potentilla erecta and various bryophytes), W16 (with abundant D. flexuosa) or W17 (with D. flexuosa, Calluna, Vaccinium and luxuriant bryophyte assemblages), but less commonly W7 or W9. Among the species listed above for W10, W11, W16 and W17, Pteridium, Rubus, Lonicera, Agrostis, D. flexuosa, Calluna, Vaccinium and the bryophytes can be observed easily all year round. However, in other places these associated species are very sparse and give little clue to NVC type; in such cases it is probably most practical to class the woodland as this separate WLz Luzula type rather than to try to fit it into a NVC community, though this will not provide an indication of the full potential of the site.

Type site: Pressmennan, East Lothian

Beech and yew woods

Fagus sylvatica dominates in three major types of woodland, which can be considered analogues of the lowland oak-birch and mixed broadleaf woodlands. However, because of the formidable shade the tree casts and its extensive rooting system, the field layers are often very sparse, sometimes giving little clue as to the woodland type. Fagus is regarded as native only in the warmest and drier parts of the English lowlands, since it was the last species to invade across the land bridge to the Continent and found it difficult to penetrate an existing forest cover. Further north, the tree has been widely planted and older stands have all the main characteristics of semi-natural woodlands. Yew woodland occurs only locally on the most calcareous soils on rocky limestone slopes in warmer and drier climates of southern Britain.

Figure 3 The relationship of the three types of beech woodland yew woodland to soil and climatic variation

W12 Fagus sylvatica-Mercurialis perennis woodland

Beech woodland (plantation in Scotland) with a potentially herb-rich field layer similar to that of W8, including Mercurialis perennis, Sanicula europaea, Melica uniflora, Poa nemoralis, Brachypodium sylvaticum, Mycelis muralis, Hedera helix and Circaea lutetiana. Although these herbs and grasses die back a lot in winter, some of their remains can usually be found even at this time of year. The evergreen Hedera is, of course, conspicuous all year round. It occurs on well-drained base-rich soils in southern Britain. There appears to be only one Scottish record of W12, near Kirkcudbright.

W14 Fagus sylvatica-Rubus fruticosus woodland

Beech woodland (plantation in Scotland) with a species-poor field layer containing, where the shade is not too dense, much bramble and bracken, as in W10a. The bramble and bracken can be observed all year round. W14 occurs on well-drained brown earth soils in southern Britain.

There appears to be only one Scottish record of W14, near Gatehouse of Fleet.

W15 Fagus sylvatica-Deschampsia flexuosa woodland

Beech woodland (plantation in Scotland) with species-poor field and ground layers which can be very sparse among extensive carpets of beech leaf litter. The commonest field and ground layer species are Deschampsia flexuosa, Pteridium aquilinum and the mosses Mnium hornum and Dicranella heteromalla. W15a has very sparse field and ground layers. W15b has better-developed field and ground layers as described above, and may have abundant Luzula sylvatica. W15c and W15d are similar to W15b but with much Vaccinium myrtillus (W15c) or Calluna vulgaris (W15d). All of these species mentioned here for W15 can be observed all year round.

Semi-natural stands of W15 occur on well-drained, acidic soils in lowland Britain. Planted stands are widespread in Scotland, mainly in the southern and eastern lowlands.
**W13 Taxus baccata woodland**

Yew woodland, with field and ground layers varying from extremely sparse and species-poor to more vegetated with *Mercurialis perennis* and a few other calcicolous species. Even where the field and ground layer vegetation is so sparse, W13 can be identified all year round by its canopy of yew.

It occurs on thin basic soils in parts of England and Wales, but is unknown in Scotland.

**Pine & juniper woodlands & montane willow scrub**

Three communities of woodlands and scrub dominated by native Scots pine (W19), juniper (W18) and montane willows (W20) are characterised from northern Britain on soils of base-rich to highly acidic character in cold and wet sub-montane climates. An additional kind of lichen-rich pinewood (WPc) is also included here.

**W18 Pinus sylvestris-Hylocomium splendidens woodland**

Woodland with a canopy of native Pinus sylvestris and associated *Betula pubescens* (especially to the west), *B. pendula* (in the east) and *Sorbus aucuparia*. The field layer is typically heathy, with much *Calluna vulgaris*, *Vaccinium myrtillus* and *V. vitis-idaea*. Mosses are abundant, especially *Hylocomium splendens*, *Pleurozium schreberi*, *Plagiothecium undulatum*, *Rhytidiadelphus loreus*, *Dicranum scoparium*, *Hypnum jutlandicum* and *Ptilium cristatcastrensis*. W18a, b and c are dry and mainly eastern, and W18d and e are damper and mainly western. W18a, b and c have much *Rhytidiadelphus triquetrus* and *Scleropodium purum*. W18a also has *Erica cinerea* and *Goodyera repens*, and less *Vaccinium* than the other sub-communities. W18c has *Luzula pilosa*, *Galium saxatile* and *Oxalis acetosella*. W18d and e have abundant *Sphagnum capillifolium* or *S. quinquefarium*. W18d can also have scattered *Erica tetralix* and *Molinia caerulea*. W18e has western bryophytes such as the liverworts *Scapania gracilis*, *Anastrepta orcadensis*, *Bazzania tricrenata*, *Lepidozia pearsonii*, *Saccogyna viticulosa*, *Mylia taylorii*, as well as the more widespread *Thuidium tamariscinum* and *Diplophyllum albicans*.

**W18 occurs throughout the range of native Pinus in the Highlands, on dry to damp ground with acid soils. Some woods have mosaics of the drier (W18a-c) and damper (W18d/e) sub-communities. In such places it is most usual for the drier sub-communities to occupy south-facing slopes and the damper ones to be on northerly aspects. Some native pinewood has a field layer dominated by *Molinia caerulea*; this is closest to W18d but is not a good fit. It can contain abundant *Sphagnum* spp. including *S. palustre* and *S. fallax* as in W4. On a landscape scale, native pine woods often include transitions to W19 where the canopy is more open, to W4 on waterlogged or flushed peaty ground and W7 on more mineral-rich flushes. The species which define W18 - *Pinus* with *Calluna*, *Vaccinium* and various bryophytes - can be observed all year round.

Type site: Black Wood of Rannoch, Perthshire

**WPc Lichen-rich Pinus sylvestris woodland**

Lichens figure only occasionally in W18 but locally in Scotland, in sunny and windy situations, pine-dominated woodland can have an extensive ground carpet of *Cladonia portentosa*, *C. furcata*, *C. gracilis*, *C. ciliata*, *C. arbuscula* and *C. uncialis* among a heathy cover of *Erica cinerea*. These lichens are clearly visible throughout the year. This woodland should be mapped separately as WPc.
W19 Juniperus communis-Oxalis acetosella woodland
Scrub dominated by Juniperus communis ssp. communis with occasional Betula pubescens and Sorbus. The juniper bushes vary in shape from tall and columnar to shorter and widely spreading. Whatever the nature of the field and ground layer the vegetation can be recognised all year round by the dominance of J. communis ssp. communis. Some stands have a very open cover of bushes, when they resemble wood-pasture but often the bushes grow together to form dense thickets. Then, beneath, there are mixtures of Oxalis acetosella, Vaccinium myrtillus, Galium saxatile, Potentilla erecta, Luzula pilosa, Agrostis spp., Blechnum spicant and mosses such as Hylocomium splendens, Thuidium tamariscinum, Dicranum scoparium, Scleropodium purum and Rhytidiadelphus squarrosus. W19a is more heathy, with much Calluna vulgaris and Vaccinium vitis-idaea, and abundant Deschampsia flexuosa, as well as plenty of the mosses Plagiothecium undulatum, Rhytidiadelphus loreus, Pleurozium schreberi and Hypnum jutlandicum. W19b has a more herb-rich flora reflecting less acidic soils, with species including Viola riviniana, Anemone nemorosa, Campanula rotundifolia, Festuca ovina and F. rubra. Urtica dioica can be common here too, especially near rabbit burrows.

W19 occurs on well-drained neutral and acidic soils, mainly in the eastern Highlands but also in the Southern Uplands and northern England. The distribution can be decidedly patchy with the woodland abundant in some districts and absent from others which appear quite suitable in their climate and soils. Periodic alternations in the intensity of pasturing may account for this.

W20 Salix lapponum-Luzula sylvatica scrub
Low, patchy scrub of the montane willows Salix lapponum, S. arbuscula, S. lanata, S. myrsinites, S. phylicifolia and S. reticulata. The field layer varies from herb-rich, with Luzula sylvatica, Alchemilla glabra, Angelica, Geum rivale, Filipendula ulmaria and Sedum rosea, to more acidophilous assemblages of L. sylvatica, Vaccinium myrtillus, Dryopteris spp. and Blechnum spicant. W20 is scarce and restricted to small areas on steep, rocky slopes mostly above 600 m in the Highlands with some outlying stands of the willows on crags in the Lake District and North Wales.

Wet alder, willow and birch woodlands
The NVC recognises 7 kinds of wetter woodland (W1-7) dominated by alder, willows and/or birch from mineral and peaty soils in wetter hollows and flushes, around standing and moving open waters and among mires. Scrub dominated by Salix aurita is also common on damp ground in some upland areas, especially in the western Highlands and has been described subsequent to the NVC. It has a superficial resemblance to W1, but generally has field and ground layers of the W2, W3, W4, W5 or W7 type. Stands of S. aurita scrub therefore seem best classed as S. aurita forms of these woodland types.

W1 Salix cinerea-Galium palustre woodland
Wet, scrubby woodland with a canopy of Salix cinerea over rather lush mixtures of herbs such as Mentha aquatica, Angelica sylvestris, Filipendula ulmaria and Rubus fruticosus, grasses such as Holcus lanatus, Agrostis canina and Deschampsia cespitosa, Poa trivialis and Rhytidiadelphus squarrosus. It occurs on damp, level to gently sloping ground in lowland Britain in damp field hollows, old ponds and on sea-cliff tops. It is uncommon in Scotland. S. cinerea can also be abundant or dominant in W2 (which has abundant Phragmites), W3 (with Carex rostrata, Potentilla palustris or Menyanthes trifoliata), W4 (with much Molinia, Sphagnum or Polytrichum commune), W5 (with large sedges), W6 (with Urtica dioica and Galium aparine) and W7 (with species including Lysimachia nemorum, Holcus mollis, Agrostis spp., Anthoxanthum odoratum, Deschampsia cespitosa, Poa trivialis, U. dioica, G. aparine, Dryopteris dilatata, D. affinis, D. filix-mas and Athyrium filix-femina). Scrub dominated by S. aurita is mainly upland, in contrast to the lowland W1, and typically has field and ground layers which can also place it into W2, W3, W4, W5 or W7. Among these species which distinguish other wet woodland types, Phragmites, Carex rostrata, Potentilla palustris, Menyanthes, Molinia, Lysimachia, Agrostis, Deschampsia cespitosa, Dryopteris spp., Athyrium, Sphagnum and Polytrichum can be observed all year round.
W2 Salix cinerea-Betula pubescens-Phragmites australis woodland
Wet woodland with a canopy of Salix spp., Betula pubescens or Alnus glutinosa. Easily distinguished all year round from other woodland NVC communities as a tall growth of Phragmites australis is dominant in the field layer. W2a is typical ‘fen-carr’ with tall herbs such as Filipendula ulmaria, Angelica sylvestris and Urtica dioica, with scrambling Galium palustre/ aparine. W2b is more acidic, with Sphagnum spp., Molinia caerulea, Dryopteris carthusiana and D. cristata.

Scarce on wet, level to gently sloping ground in open water transition mires around lochs and pools at low altitudes, typically among associated swamp and fen precursors and with other wet woodland types.

W3 Salix pentandra-Carex rostrata woodland
Wet, swampy woodland with a canopy of Salix spp. (including northern species such as S. pentandra, S. nigricans and S. phyllicifolia, Betula pubescens and only rarely Alnus glutinosa over a rather lush, swamp- or fen-like field layer, often developed as a floating raft, in which one or more of Carex rostrata, C. vesicaria, Potentilla palustris and Menyanthes trifoliata is common, together with a patchy carpet of bulky mosses such as Calliergonella cuspidata, Rhizomnium punctatum and Climacium dendroides. The bryophytes are observable all year. The field layer species die down somewhat in winter but can generally be detected and identified with careful search.

Widespread but scarce and local in northern Britain, on wet, level to gently sloping ground, in open water transitions around lochs and pools, often with the swamps and fens developed as earlier or static stages in the succession, and with other wet woodland types.

W4 Betula pubescens-Molinia caerulea woodland
Damp to wet woodland with a canopy of Salix spp., Betula pubescens, Alnus glutinosa or Quercus petraea/robur over a field/ground layer in which at least one of Molinia caerulea, Sphagnum or Polytrichum commune is common (and easily seen and identified all year round). Molinia can be scarce or even absent. W4b has species such as Juncus effusus, Potentilla erecta and Holcus spp., but can be species-poor and undistinguished. W4c is wetter, with the most extensive and varied Sphagnum carpets, and Calluna. Erica tetralix or Eriophorum spp. can give some resemblance to the flora of bogs and wet heaths. W4a is often distinctly drier, being characteristic of drying peats or flush surrounds with bramble, honeysuckle or Dryopteris spp. in the field layer (observable all year round) and it should be mapped in HAP as Scottish Upland Birchwood where birch is dominant and oak at <30% of canopy cover, and as Upland Oakwood where oak form >30% of the canopy.

W4 is widespread and common on level to sloping ground with moist to wet acidic peaty soils, on raised and valley bogs that are progressing to woodland and in base-poor flushes throughout the lowlands and uplands. It commonly occurs with unwooded bog vegetation and poor fens, wet heaths or Molinia vegetation (as in Figure 4), or it occupies wetter areas in mosaics with the drier W11 and W17, sometimes also with W7 on more base-rich soils (as in Figure 5).

Type sites: Garry Bridge and S side of Loch Rannoch, Perthshire

Figure 4. Characteristic zonation on an active (foreground) and drying (background) lowland raised mire with spread of W4 wet birch woodland.

W5 Alnus glutinosa-Carex paniculata woodland
Wet woodland with a canopy of Salix spp. or Alnus glutinosa over a swampy field layer dominated by tall sedges: mainly tall, thick tussocks of Carex paniculata but less commonly patches of C. riparia, C. acutiformis, C. elata, C. appropinquata or C. pseudocyperus. These sedge swards persist throughout the winter, so that the community can generally be distinguished all year round. W5a has much Solanum dulcamara and (transitional to W2) Phragmites australis. W5b has Lysimachia vulgaris, Lycopus europaeus, Lythrum salicaria and Thelypteris palustris. W5c has Chrysosplenium oppositifolium, Cardamine pratensis, Ajuga reptans and Pellia epiphylla (transitional to W7).

It is an early coloniser of sedge swamp, widespread but local at low altitudes in Britain, occurring on wet, level to gently sloping ground in mesotrophic open water transitions around pools and in the sluggish stretches of mature rivers. It often occurs with the swamps, eutrophic fens and other wet woodland types.
W5 Alnus glutinosa-Carex paniculata woodland

Wet woodland with a canopy of Salix spp. or Alnus glutinosa over a swampy field layer dominated by tall sedges: mainly tall, thick tussocks of Carex paniculata but less commonly patches of Carex riparia, Carex acutiformis, Carex elata, Carex appropinquata or Carex pseudocyperus. These sedge swards persist throughout the winter, so that the community can generally be distinguished all year round. W5a has much Solanum dulcamara and (transitional to W2) Phragmites australis. W5b has Lysimachia vulgaris, Lycopus europaeus, Lythrum salicaria and Thelypteris palustris. W5c has Chrysosplenium oppositifolium, Cardamine pratensis, Ajuga reptans and Pellia epiphylla (transitional to W7).

It is an early coloniser of sedge swamp, widespread but local at low altitudes in Britain, occurring on wet, level to gently sloping ground in mesotrophic open water transitions around pools and in the sluggish stretches of mature rivers. It often occurs with the swamps, eutrophic fens and other wet woodland types.

W6 Alnus glutinosa-Urtica dioica woodland

Damp or wet woodland with a canopy of Alnus glutinosa, Salix fragilis, or non-native Populus spp. over a field layer with abundant or dominant Urtica dioica. Galium aparine is generally common, and there can also be much Myrrhis odorata or Aegopodium podagraria. The field layer can be very lush in summer. The mosses Eurhynchium praelongum and Brachythecium rutabulum are common, but bryophytes are otherwise not abundant or diverse. W6a has no further distinguishing features, but the other sub-communities have Salix fragilis, Phalaris arundinacea, Galium palustre or Iris pseudacorus (W6b), Sambucus nigra, Dryopteris filix-mas, Hedera helix or Petasites hybridus (W6d) or Betula pubescens, Dryopteris dilatata and Lonicera periclymenum (W6e). Immature stands, sometimes repeatedly cropped for osiers, are dominated by Salix viminalis or S. triandra (W6c).

This is the typical woodland of moist, alluvial soils in open water transitions around lowland pools or alongside sluggish rivers where it often occurs with eutrophic fens, weedy tall-herb vegetation and rank grasslands. It is widespread in lowland Britain, but is rather scarce in Scotland. W6 differs from W7 in that Lysimachia nemorum, Deschampsia cespitosa, Holcus mollis, Filipendula ulmaria, Mentha aquatica and other wetland herbs are scarce or absent here, and U. dioica and G. aparine are more consistently abundant. W6 lacks the W8 assemblages of Mercurialis, Circaea, Sanicula, Geum urbanum, Stachys sylvatica or Brachypodium sylvaticum. Classification in winter may not be so easy because much of the field layer of W6, W7 and W8 dies down a lot. However, in winter in W7 one can generally find identifiable material of at least some of the distinguishing species of that community, such as Lysimachia, Filipendula and D. cespitosa). Similarly, in W8 some remains of the characteristic herbs should be detectable with careful search. U. dioica and G. aparine are so abundant in W6 that even in winter one can often find dead material of these species here.

Type sites: Hailes Castle and Binning Wood, East Lothian
W7 Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum woodland

Damp or wet woodland with varied canopies of Alnus glutinosa, Fraxinus excelsior, Salix spp., Betula pubescens and Corylus avellana. The field layer is rather herb-rich and has species including Lysimachia nemorum, Filipendula ulmaria, Dryopteris spp. and Athyrium filix-femina (all of these species evident in some form throughout the year).

W7a has Urtica dioica, Galium aparine, Ranunculus repens, Chrysosplenium oppositifolium or Phalaris arundinacea, and is commonly associated with eutrophication. (The last three species are commonly evident throughout the winter.)

W7b has at least some of Carex remota, C. laevigata, C. pendula, Circium palustre, Crepis paludosa, Juncus effusus, J. acutiflorus, Phalaris arundinacea, Valeriana officinalis, Cardamine flexuosa, C. amara, Calthra palustris and the mosses Calliergonella cuspidata, Brachythecium rivulare and Rhizomnium punctatum. Ranunculus repens occurs more widely in W7 but is distinctly preferential to W7 against W8 or W9.

W7c is distinctly drier than W7a and b and is part of HAP Upland Mixed Ashwoods except for some examples which are best retained within the Wet Woodland HAP type because they lack ash, elm or hazel, have canopies of alder, willow or birch and are situated in typically 'wetland' situations such as valley floors. D. cespitosa is very abundant or dominant in the field layer here, often occurring on strongly gleyed soils around flushes as a transition to drier woods. W7c differs from flushed W7a and W7b in having less Chrysosplenium oppositifolium, Carex remota, C. laevigata, C. flacca, Cirsium palustre, Lysimachia nemorum, Juncus effusus, J. acutiflorus, Phalaris arundinacea, Ranunculus repens, Calliergonella cuspidata, Brachythecium rivulare and Rhizomnium punctatum.

W7c has more frequent and often abundant Deschampsia cespitosa with Dryopteris spp., Oxalis acetosella, Agrostis capillaris, Anthoxanthum odoratum and Viola riviniana. Apart from D. cespitosa these species bring W7c close to W10 and W11b and this vegetation is often found in gleyed hollows within such woodlands. Among these W7c species, D. cespitosa, Dryopteris spp., Agrostis and the mosses can be seen clearly through the winter.

W7 can resemble W8 and W9. Generally, alder and willows are preferential to W7. Filipendula ulmaria, Geum rivale, Crepis paludosa and Cirsiurm heterophyllum can occur in both W7 and W9 but wetter stands of W7 in flushes and on alluvial flats can have many moisture-loving species that are never common in W8 or W9: Chrysosplenium oppositifolium, C. alternifolium, Carex remota, C. laevigata, C. flacca, C. pendula, Cirsium palustre, Lysimachia nemorum, Juncus effusus, J. acutiflorus, Phalaris arundinacea, Valeriana officinalis, Cardamine flexuosa, C. amara, Calthra palustris and the mosses Calliergonella cuspidata, Brachythecium rivulare and Rhizomnium punctatum. Ranunculus repens occurs more widely in W7 but is distinctly preferential to W7 against W8 or W9.

W7c differs from flushed W7a and W7b in having less Chrysosplenium oppositifolium, Carex remota, C. laevigata, C. pendula, Cirsium palustre, Crepis paludosa, Juncus effusus, J. acutiflorus, Phalaris arundinacea, Ranunculus repens, Calliergonella cuspidata, Brachythecium rivulare and Rhizomnium punctatum. Ranunculus repens occurs more widely in W7 but is distinctly preferential to W7 against W8 or W9. Mercurialis perennis, Stachys sylvatica, Sanicula europaea, Brachypodium sylvaticum and the moss Eurhynchium striatum generally favour better-drained soils and are more common in W8 and W9 than in W7. W7 can share an abundance of large ferns (Dryopteris and Athyrium) with W9, but this is not shared by W8. Again, check for a balance between the species characteristic of one or the other woodland type and calibrate your understanding by returning to some good examples of the types you are trying to distinguish, maybe quite nearby in the same wood.

W7 is widespread on damp to wet, moderately base-rich mineral soils on level to moderately sloping ground in upland and lowland areas, and is most common around the upland margins. In many woods, small stands of W7 mark out areas of damp, flushed ground on slopes, often with slumping soils and surrounded by drier woodland such as W9, W10 or W11 (see Figure 4), but it can form large expanses on damp slopes or level valley floors.

Type sites: Garry Bridge and Birks of Aberfeldy, Perthshire

Figure 4. Flushed W4 and W7 woodlands in typical mosaics

Scrub, underscrub & ride vegetation

Three types of scrub (W21-23) dominated by small thorny trees or shrubs are widespread through the British lowlands, including Scotland. Also included here are provisional new communities of We eutrophic scrub dominated by elder and Wr Rhododendron scrub (Rodwell et al. 2000). In addition, there is one underscrub (W25) which is a common replacement, sometimes quite persistent, for certain kinds of woodland and new (Wh) community of clearings and rides (Rodwell et al 2000).
W21 Crataegus monogyna–Hedera helix scrub
Scrub dominated by Crataegus monogyna, commonly mixed with other woody species such as Sambucus nigra, Prunus spinosa and Rosa canina. The field layer is rather like that of W8 or W10 and with species including Urtica dioica, Galium aparine, Silene dioica and Geranium robertianum. Hedera helix can be common in Scottish W21, but not as much as the NVC table suggests. The above description if of W21a. W21b has Mercurialis perennis, Poa trivialis, Glechoma hederacea, Hyacinthoides non-scripta and the mosses Eurhynchium praelongum and Brachythecium rutabulum. W21c has much Brachypodium sylvaticum. W21d contains various southern shrubs and is unknown in Scotland.

W21 is common on well-drained ground in lowland Britain, including the southern and eastern lowlands of Scotland where it forms mosaics with W8 woodland, W22 and W23 scrub, W25 bracken and MG1, MG5 and MG6 grasslands.

W22 Prunus spinosa–Pteridium aquilinum scrub
Scrub dominated by Prunus spinosa growing in dense thickets beneath which few species can survive the dense shade. This flora can be very sparse but has a general resemblance to that of W21 (see above), with species including Galium aparine, Urtica dioica and the mosses Eurhynchium praelongum and Brachythecium rutabulum. Pteridium aquilinum can be common. W22a is defined by Hedera helix, Silene dioica, Hyacinthoides non-scripta and Stellaria media, W22b by Mercurialis perennis, Viola riviniana, Veronica chamaedrys, Oxalis acetosella, Geum urbanum, Filipendula ulmaria, Geranium robertianum, Primula vulgaris and the moss Eurhynchium striatum, and W22c by Dactylis glomerata, Brachypodium sylvaticum, Festuca rubra, Holcus lanatus, Agrostis capillaris and Rumex acetosa.

W22 is common on moist but free-draining ground in lowland Britain, including the southern and eastern lowlands of Scotland where it can be associated with similar vegetation types to those found with W21 (see above). Some very small patches of W22 also occur at low altitudes in upland areas, but W22 is generally a lowland community.

W23 Ulex europaeus–Rubus fruticosus agg. scrub
Scrub dominated by Ulex europaeus or, less commonly, Cytisus scoparius. Some stands are very open, with scattered bushes among pasture, but in denser stands, only a few species can tolerate the shade and leaf litter beneath the canopy. This flora can be like an acid grassland with Agrostis capillaris, Anthoxanthum odoratum, Galium saxatile and Potentilla erecta (W23a), or weedy with Rumex acetosella, Hypochaeris radicata, Senecio jacobea and Plantago lanceolata (W23b), or with abundant Teucrium scorodonia (W23c). Some examples have much Arrhenatherum elatius, Dactylis glomerata, Urtica dioica or Galium aparine and do not fit clearly into any sub-community.

W23 is common in lowland Britain and around the upland fringes. It occupies well-drained, somewhat more fertile, acidic to neutral soils among woodland, grassland and heathland, on river shingles and on steeper ground where the intensity of pasturing has been less. It can also mark out old abandoned settlements and field boundaries.

We Sambucus nigra–Urtica dioica scrub
Elder figures occasionally as a locally prominent shrub in various kinds of eutrophic (often disturbed) woodland and scrub but it can also dominate (with or without Salix caprea, Acer pseudoplatanus saplings and naturalised Buddleia davidii) in scrub with Rubus idaeus, R. fruticosus, Urtica dioica, Epilobium angustifolium and Holcus lanatus on damp, nutrient-rich soils in disturbed situations. This should be mapped as We.

We Rhododendron ponticum scrub
Naturalised Rhododendron ponticum is a vigorous invader of acidic soils in the oceanic lowlands of western Britain and can replace W11, W16 and W17, as well as heathlands and bogs which could sustain native woodlands. The cover can thicken to a virtually impenetrable thicket of bushes up to 6m tall, with the dense shade and thick acidic litter extinguishing all field and ground layers. Such vegetation should be mapped as Wr.
**W25 Pteridium aquilinum-Rubus fruticosus agg. underscrub**

Underscrub dominated by mixtures of bracken and brambles with no more than very scattered shrubs and saplings and only occasional herbs such as Viola riviniana, Rumex acetosa and Silene dioica. W25a has an associated flora characteristic of the W10 lowland bluebell woods which it often replaces, with Hyacinthoides non-scripta, Holcus mollis, Stellaria holostea together with eutrophic species indicative of disturbance - Urtica dioica, Galium aparine, Dactylis glomerata and Holcus lanatus. W25b has a similar associated flora to open W11 or W23 with Teucrium scorodonia, Agrostis capillaris and Anthoxanthum odoratum and often some Digitalis purpurea.

This is a very common and widespread replacement for woodlands on neutral to acidic brown earths in the lowlands and upland fringes, occurring in gaps and clearfall areas.

**Wh Hypericum pulchrum-Melampyrum pratense ride community**

Along rides and in clearings within W10, W11, W16 and W17 woodlands, an open cover of oak and birch is often associated with a field layer in which Holcus mollis, Deschampsia flexuosa and Melampyrum pratense are accompanied by frequent Teucrium scorodonia, Solidago virgaurea, Carex pilulifera and large Hieracium spp. Such vegetation should be mapped as Wh.
Summary table for classification to NVC type in winter

<table>
<thead>
<tr>
<th>NVC type</th>
<th>Difference in field layer between summer and winter</th>
<th>Ease of identification of NVC type in winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td>Large difference (lush in summer; much dieback in winter)</td>
<td>Moderate. Told from W7 by having little or no alder, birch, Lysimachia, Deschampsia cespitosa, Dryopteris, Athyrium, Calliergonella, Brachythecium rivulare and Rhizomnium. W2/3/5 still show much Phragmites (W2), Carex paniculata (W5), C. rostrata and Menyanthes (W3) in winter, so can easily be told from W1.</td>
</tr>
<tr>
<td>W2</td>
<td>Moderate difference</td>
<td>Easy (tall dead Phragmites stems conspicuous through the winter)</td>
</tr>
<tr>
<td>W3</td>
<td>Moderate difference</td>
<td>Moderate. Told from W1/2/4/5/6/7 by Carex rostrata/vesicaria and/or Menyanthes. W7 also has more Lysimachia, Deschampsia cespitosa, Dryopteris, Athyrium, Chrysosplenium and Ranunculus repens. W2 told by Phragmites, and W5 by Carex paniculata. Can have abundant Sphagnum as in W4, but differs from W4 in having little or no Molinia and Polytrichum commune and in having more Carex rostrata/vesicaria, Menyanthes, Filipendula and other herbs.</td>
</tr>
<tr>
<td>W4</td>
<td>Moderate difference</td>
<td>Easy (Molinia tussocks and patches of Sphagnum and Polytrichum commune mosses still identifiable in winter). Bramble, honeysuckle and dryopteroid ferns allow the drier W4a sub-community to be identified in winter. W3 can also have abundant Sphagnum but has little or no Molinia and Polytrichum commune and more Carex rostrata/vesicaria, Menyanthes, Filipendula and other herbs.</td>
</tr>
<tr>
<td>W5</td>
<td>Moderate difference</td>
<td>Easy (Carex paniculata tussocks always conspicuous)</td>
</tr>
<tr>
<td>W6</td>
<td>Large difference (lush in summer; much dieback in winter)</td>
<td>Moderate (much dieback of dominant field layer species such as nettles, cleavers, sweet cicely and butterbur can leave largely bare ground with little clue as to the nature of the summer field layer, though abundant decayed remains of nettles can be seen in winter)</td>
</tr>
<tr>
<td>NVC type</td>
<td>Difference in field layer between summer and winter</td>
<td>Ease of identification of NVC type in winter</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>W7</td>
<td>Moderate difference</td>
<td>Moderate. Told from W8 and W9 by having less Brachypodium sylvaticum and Eurhynchium striatum, and more Chrysosplenium, Lysimachia, Ranunculus repens, Cirsium palustre, Phalaris, Carex remota, C. flacca, Juncus spp., Cardamine spp., Calliergonella, Brachythecium rivulare and Rhizomnium. Told from W4 by Chrysosplenium, Lysimachia, R. repens, Cirsium palustre, Phalaris, Carex remota, C. flacca, Cardamine, Calliergonella, Brachythecium rivulare and Rhizomnium. Told from W1 by more alder, birch, Lysimachia, Deschampsia cespitosa, Dryopteris, Athyrium, Calliergonella, Brachythecium rivulare and Rhizomnium. W2/3/5 still show much Phragmites (W2), Carex paniculata (W5), C. rostrata and Menyanthes (W3) in winter. Abundance of Deschampsia cespitosa and Dryopteris spp. and scarcity of Chrysosplenium, Ranunculus repens, Cirsium palustre, Phalaris, Carex remota, C. flacca and Juncus spp. can allow the drier W7c sub-community to be identified in winter.</td>
</tr>
<tr>
<td>W8</td>
<td>Large difference (can be lush in summer; much dieback in winter)</td>
<td>Moderate to hard. The obvious similarity is with W9 but W8 can generally be told from W9 at any time of year by the scarcity of rowan, bryophytes and ferns. Also by scarcity of Oxalis acetosella but this species can be very inconspicuous in winter. Where W8 gets rather bare in winter it can be hard to tell from W10, but a careful search should eventually reveal some material of species commoner in W8, such as Ranunculus ficaria, Geranium robertianum, Geum urbanum, Brachypodium sylvaticum and Glechoma hederacea.</td>
</tr>
<tr>
<td>W9</td>
<td>Large difference (can be lush in summer; much dieback in winter)</td>
<td>Moderate. Told from W8 by having more rowan, Dryopteris, Athyrium and bryophytes, and, if visible, Oxalis acetosella. From W10 and W11 by more Geum spp., Geranium robertianum, Brachypodium sylvaticum, Athyrium, Deschampsia cespitosa and Eurhynchium striatum. From W7 by more B. sylvaticum and E. striatum, and less Chrysosplenium, Lysimachia, Ranunculus repens, Cirsium palustre, Phalaris, Carex remota, C. flacca, Juncus spp., Cardamine spp., Calliergonella, Brachythecium rivulare and Rhizomnium.</td>
</tr>
<tr>
<td>W10</td>
<td>Moderate difference (esp. where bluebells are abundant in spring but not visible in winter)</td>
<td>Moderate to hard. Can resemble W11 but in that community, more rowan, Deschampsia flexuosa, Galium saxatile and Potentilla erecta and a greater diversity of bryophytes can still be seen in winter. Abundant D. flexuosa also separates W16 from W10 in winter. W10 can be hard to tell from some W8 in winter, but a careful search in the W8 should eventually reveal some material of characteristic species such as Ranunculus ficaria, Geranium robertianum, Geum urbanum, Brachypodium sylvaticum and Glechoma hederacea.</td>
</tr>
<tr>
<td>NVC type</td>
<td>Difference in field layer between summer and winter</td>
<td>Ease of identification of NVC type in winter</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>W11</td>
<td>Moderate difference</td>
<td>Moderate. Can resemble W10 but the greater amounts of rowan, Deschampsia flexuosa, Galium saxatile and Potentilla erecta and the greater diversity of bryophytes can still be seen in winter. Can also resemble W17, but scarcity or lack of dwarf shrubs and/or large mosses such as Hylocomium, Pleurozium, Rhytidiadelphus and Dicranum majus always obvious there. In W16 abundant D. flexuosa and rather poor bryophyte flora can be seen in winter. In winter stands of W8 and W9 some material of Geum, Geranium robertianum, Brachypodium sylvaticum and Athyrium should be found (scarcer in W11). Winter W7 differs in having more alder, Chrysosplenium, Lysimachia, Ranunculus repens, Cirsiurn palustre, Phalaris, Carex remota, C. flacca, Juncus, Cardamine, Calliergonella, Brachythecium rivulare and Rhizomnium.</td>
</tr>
<tr>
<td>W13</td>
<td>Large difference (much dieback of vegetation)</td>
<td>Easy (yew canopy)</td>
</tr>
<tr>
<td>W14</td>
<td>Moderate difference</td>
<td>Moderate? Less Deschampsia flexuosa and dwarf shrubs, and more bramble than in W15, but might require careful search in stands with sparser field layer. W13 can also be brambly, but has less bracken (common in W14) and more ivy and Brachypodium sylvaticum (both visible in winter).</td>
</tr>
<tr>
<td>W15</td>
<td>Small difference</td>
<td>Easy to moderate (beech canopy combined with Deschampsia flexuosa or dwarf shrubs can be seen all year round, but examples with sparse field and ground layer can require more careful examination in order to distinguish them from similarly sparse W14)</td>
</tr>
<tr>
<td>W16</td>
<td>Small difference</td>
<td>Easy to moderate (abundance of Deschampsia flexuosa combined with scarcity of larger mosses such as Hylocomium, Pleurozium, Rhytidiadelphus and Dicranum majus can always be assessed, but examples with sparse field and ground layer can require more careful examination in order to distinguish them from similarly sparse W10)</td>
</tr>
<tr>
<td>NVC type</td>
<td>Difference in field layer between summer and winter</td>
<td>Ease of identification of NVC type in winter</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>W17</td>
<td>Small difference</td>
<td>Easy to moderate. Abundant dwarf shrubs and/or large mosses such as Hylocomium, Pleurozium, Rhytiadelphus and Dicranum majus always obvious. Grassier stands can resemble W11 but are more mossy and have less Oxalis (though this species can be inconspicuous in winter). Can also resemble W4 but has less willow, alder, Molinia, Sphagnum and Polytrichum commune.</td>
</tr>
<tr>
<td>W18</td>
<td>Small difference</td>
<td>Easy (pine canopy + heathy and mossy field/ground layer)</td>
</tr>
<tr>
<td>W19</td>
<td>Small to moderate difference</td>
<td>Easy (dominance of juniper always obvious)</td>
</tr>
<tr>
<td>W20</td>
<td>Moderate difference?</td>
<td>Might be difficult if the montane willows can’t be identified properly, but the NWSS survey is unlikely to encounter this montane community anyway.</td>
</tr>
<tr>
<td>W21</td>
<td>Large difference (much dieback of vegetation)</td>
<td>Easy (based on hawthorn or elder canopy)</td>
</tr>
<tr>
<td>W22</td>
<td>Large difference (much dieback of vegetation)</td>
<td>Easy (based on hawthorn or elder canopy)</td>
</tr>
<tr>
<td>W23</td>
<td>Moderate difference</td>
<td>Easy (based on hawthorn or elder canopy)</td>
</tr>
<tr>
<td>W24</td>
<td>Moderate difference</td>
<td>Easy (dominant or co-dominant brambles can be seen (and felt) all year round)</td>
</tr>
<tr>
<td>W25</td>
<td>Moderate difference</td>
<td>Moderate to hard. Confusable with U20 but has more bramble or raspberry. Galium saxatile or Potentilla erecta usually still visible in U20 in winter (scarcer in W25). Extremely species-poor bracken stands best referred to U20c.</td>
</tr>
<tr>
<td>WLz</td>
<td>Small difference)</td>
<td>Easy (Luzula sylvatica leaves present and conspicuous all year round)</td>
</tr>
<tr>
<td>WPc</td>
<td>Small difference</td>
<td>Easy (pine canopy + conspicuous abundance of Cladonia lichens easily seen all year round)</td>
</tr>
</tbody>
</table>