Joint Nature Conservation Committee

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

2a WOODLANDS

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2a WOODLANDS

1 Introduction

1.1 Woodland is the natural 'climax' vegetation cover over most of Britain. Originally, perhaps 80-90% of the land surface carried woodland, mostly composed of mixtures of deciduous, broadleaved species - oak, wych elm, ash, beech, small-leaved lime, birch and hazel. Yew and juniper were locally important, mainly in the understorey, but the only extensive areas of coniferous forests were the Scots pinewoods of the central Highlands of Scotland. From Mesolithic times onward this original forest was progressively cleared and the remnants subjected to management by felling, burning and stock-grazing. By the end of the 19th century little more than 4% of the land carried woodland. This has increased to about 10%, largely through new planting but also locally through natural regeneration of secondary woodland on heaths and downland where grazing has been reduced. The overall structure and composition of British woodland have consequently changed. No woodland can now be considered totally natural, but some woods more closely resemble the original forests than others and so are more highly prized in nature conservation terms.

1.2 There are some 2.2 Mha of woodland in Great Britain, consisting of a mixture of extensive forests, isolated woods, shelterbelts and groups of trees in field corners. Two-thirds are predominantly coniferous, consisting mainly of species introduced from other countries. The tree and shrub layers of many woods and forests are relatively uniform because of the widespread establishment of even-aged plantations as the main silvicultural system. Much woodland is of recent origin, established on land which had long been unwooded and was previously used as rough grazing, enclosed pasture and arable. Recent woodland lacks continuity with the original forest cover and has usually had insufficient time to accumulate a rich woodland flora and fauna through the processes of immigration and succession. Because plantations and woods of recent origin are generally poor in native wildlife and natural features, it is the descendants of the original woodlands which are regarded as the most important for nature conservation (Peterken 1977).

1.3 These remnants of original woodland are classed as ancient semi-natural, that is they have both long continuity on the site and tree and shrub layers of native species usually derived from coppice regrowth or natural regeneration. Provisional estimates are that 0.3-0.4 Mha of such woodland survives in Britain. It exists as thousands of individual woods (and parts of woods), most of which are small (less than 20 ha), scattered throughout the country. There is great regional variation in the size and extent of the surviving ancient semi-natural woodland. In parts of south-east England it is the main woodland type

and still covers much of the landscape. Elsewhere in the lowlands, ancient woods tend to be small, isolated and surrounded by agricultural land. In much of Wales, northern and western England and Scotland they are often part of a mosaic of semi-natural vegetation, which may include rough grassland, heather moor and bog, and their extent is dwarfed by the areas of new conifer plantations. Inevitably, these geographical variations must, to some extent, influence the significance for nature conservation of any particular wood.

1.4 The area of ancient semi-natural woodland has declined considerably since 1945. About 10% has been totally lost as woodland habitat through clearance for agriculture, quarrying or urban or road development and about 30% has been converted to plantations of non-native trees (i.e. it is no longer semi-natural). Even in much of the woodland that remains ancient semi-natural, there have been reductions in nature conservation interest, notably because the former management has ceased. Many of the woods have grown up into high forest, and probably no more than 10% are still managed by traditional methods. Some are heavily overgrazed by sheep, while others have been invaded by exotic species such as rhododendron. Examples of past wildlife losses from British woods are the wolf, boar and beaver amongst the fauna. Other losses are not so readily appreciated, such as the decline in epiphytic lichens in eastern England and the recent disappearance of some butterflies from many woods. Some of the invertebrates of dead wood now found on just a few sites are shown by archaeological evidence to have been formerly widespread.

1.5 Ancient semi-natural woodland occupies less than 2% of Britain's land surface. While some plantations on ancient woodland sites and other long-established woods may retain or have developed some semi-natural characteristics, all these three kinds of woodland together can hold but *a* fraction of the variety of woodland types and wildlife contained in the original forest. It is, therefore, strongly argued that all such woods should be conserved (Game & Peterken 1984). The total area of ancient semi-natural and other woodland selected as SSSIs in each AOS should be sufficient to protect an adequate extent of, as well as the full range of variation in, native woodland communities and features against future threats, independently of other land-use policies.

2 International importance

British woodland types are western outliers of the larger distribution pattern of continental European forests. For example, the native Scottish pinewoods equate with the Boreal coniferous forests of Scandinavia, while the southern beech and hornbeam woods link with those in France. British woodlands generally have fewer species of trees, shrubs and herbaceous plants than their continental counterparts,

and as a whole they have suffered more loss and fragmentation through human activity than those of most European countries. Few even of our ancient and/or semi-natural woods can match their mainland European equivalents in importance as regards extent, stature of trees and structural diversity. There are, nevertheless, certain types with international importance, relating mainly to particular past management practices and to the effect of the oceanic British climate; they are as follows.

2.1 Mature, semi-natural wood-pasture stands (as in the New Forest) are better developed and more extensive than elsewhere in Europe.

2.2 Under the generally mild, oceanic climate, certain tree, shrub and herb species assume a particular prominence in British woodlands. Woods completely dominated by ash on limestone (such as those of the Derbyshire Dales) appear to be confined to Britain. Woods in which holly or ash is dominant in either the tree or the shrub layer are also unusual outside this country. Among field layer communities, those dominated by bluebells are one of the most spectacular features peculiar to British woodlands and highly regarded by continental botanists.

2.3 The humid, oceanic climate of western Britain has led to a notable development of species-rich and luxuriant communities of ferns, mosses and liverworts in many woodlands, especially in rocky, upland situations. There is the most marked occurrence in Europe of communities with filmy ferns and bryophytes of disjunct Atlantic and Subtropical distribution. Several species are known elsewhere only in the Atlantic Isles.

2.4 There is a correspondingly rich oceanic lichen flora (represented especially in the mainly epiphytic Lobarion community), probably better developed here than in western parts of mainland Europe, though threatened by increasing acid deposition. These lichens require less extreme humidity (associated with the shade of tree cover) than many bryophytes, and some of their best sites are in open woodland and wood-pasture (e.g. Boconnoc Park, Cornwall).

3 Habitat selection requirements

3.1 The basis of woodland SSSI selection

3.1.1 The approach to woodland SSSI selection inevitably differs to some extent from that for other habitats. Woods have a more complex structure than other vegetation types. The different layers may vary more or less independently of each other and the woodland structure is strongly influenced by past treatment. It is not sufficient to describe, and hence to classify, woods solely in terms of their tree and shrub

communities or even by a broader floristic classification such as the NVC (Rodwell 1986).

3.1.2 Semi-natural woods may range from a hectare to more than 1,000 ha. Parts of the woodland community, for example some rare plants, can be conserved in small sites, but other aspects, for example the natural pattern of glades, regeneration patches and mature stands in a pinewood, require very large areas if they are to be sustained. The minimum area below which a site can no longer maintain a particular level of nature conservation interest varies according to which aspects of interest are considered.

3.1.3 In a district such as Caithness, semi-natural woodland (ancient or recent) covers such a small total extent that virtually all of it must be protected to ensure the survival of even common native woodland communities in that district; in a county like Kent it may be sufficient to select only the best examples to cover the range of variation because many of the commoner woodland species and features survive also in the 'commercial' woods. Argyll and Cambridgeshire lie in between these extremes. Therefore the area of woodland selected, either in absolute terms or as a percentage of the total resource in a county or district, must vary accordingly.

3.2 Identification of woodland types

3.2.1 The draft woodland and scrub section of the NVC (Rodwell 1986) became available in 1986 and will become the main framework for describing the variation within British woodland (Table 3). In particular it provides a better means of taking ground flora variations into account than the most widely used classification to date - the Stand Type system (Table 4: Peterken 1981). Within any one NVC community or sub-community, variations in the tree and shrub layers may occur because the different structural layers respond differently to ecological, historical and treatment variations. These variations can often be described most conveniently in Stand Group terms. A further level of variation has to be introduced because of the differences, in animal if not plant communities, between high forest, coppice or wood-pasture versions of the same tree and shrub community (Table 5). A coppice wood, for example, is likely to be richer in its ground flora and butterfly communities and poorer in lichens and dead wood invertebrates than a wood-pasture of the same floristic type. Tables 6 and 7 illustrate approaches to describing woodland types and integrating the NVC with the main existing classification system. A similar process should be used to integrate existing SSSIs within the NVC framework where

woods have been described according to other classifications. Clearly, however, until the NVC has been widely used to describe the woods in an area, it cannot be adopted fully in SSSI selection.

3.2.2 Not all of the possible types which may be identified in an area by using the procedure in Table 6 are of equal conservation significance. Types which are rare nationally (i.e. of limited extent) or which are very localised in occurrence require more careful treatment to ensure that they are conserved than do common types. A lime-dominated example of NVC type W10 is likely to be more important than an oak-dominated one and certainly more valuable than a larch-dominated example. It is not yet possible to make precise statements about the total extent and distribution of different types (as the survey data are not available), but some preliminary indications are given in Tables 3, 4 and 5.

3.3 Site history and past treatment

3.3.1 Ancient and long-established semi-natural woodland is the main 'pool' from which woodland SSSIs are drawn. This can be justified theoretically (Peterken 1977) and is reflected empirically in the fact that most woodland SSSIs selected in the past (usually without knowledge of site history) have proved to be ancient or long-established. County ancient woodland inventories provide a useful starting point for judging present and future SSSI selection. The district woodland inventories in Scotland serve the same purpose, although they are produced on a slightly different basis from those for England and Wales. They include some recent woodland because it appears to be less easy in Scotland to differentiate between ancient and recent sites in nature conservation terms.

3.3.2 Plantations on ancient woodland sites are important where they have allowed survival of significant elements of the original woodland ecosystem which are now less well represented in semi-natural woods. For example, the rides in some recent plantations on ancient woodland sites have retained a rich flora and fauna, as in Bernwood Forest. Also there may be more scope for restoring the flora of the forest compartments in some of these sites than was previously thought.

3.3.3 Some distinctive and important types of semi-natural woodland and associated communities are unlikely to be contained within ancient woodland sites, because they are usually successional and sometimes transient stages. Recent woodland examples have therefore to be selected. Yew woods on the southern Chalk and many alder and willow woods come into this category. The main scrub communities

(W21-25 of Rodwell 1986: see Table 3) will usually be adequately represented within sites selected on other grounds, for example as part of coastal, grassland or heathland sites or on the fringes of woodland sites. Some recent semi-natural woods may be the only substantial stands of native trees in areas where older woodland is sparse or absent, so these have to be considered.

3.3.4 In the native pine and birch woods of Scotland the natural regeneration process requires quite large open areas. The area of dense 'woodland' may shift substantially between centuries, although often there is a permanently wooded core. In these situations it is necessary to consider the whole area, including adjacent open hill or bog, within which regeneration, development and dieback take place as the woodland system to be conserved. As a first approximation, open ground equivalent to an area of about 20% of the area with trees should be included.

3.3.5 Plantations and recent woodland may be included within SSSIs where they are incidental to other interests, for example on geological sites or as small components within sites selected for their grassland, heathland or open water components.

3.4 Judging the quality of stands and sites

3.4.1 Woodland evaluation for nature conservation is discussed in detail by Kirby (1980) and Peterken (1981). A basic presumption is that the NCC should seek to protect the largest areas available of all the major types in an AOS so that the largest possible populations of the species associated with each type can be protected. This presumption needs to be qualified if the largest stands are also the most disturbed. (Replanting has tended to be more common in large than in small woods.) Other, sometimes smaller examples may be needed to complement the features found in the largest areas. In addition some types are naturally limited to small areas, for example alder stands along narrow seepage lines. Sites with a mixture of types (each of which may occupy only a small area) are important in a different way, because they demonstrate the relationships between species distributions and historical/ecological factors. They are also usually particularly species-rich.

3.4.2 Whole woods may be judged in terms of all the NCR criteria (see B, 2.1-2.6), but in particular by their size, relative naturalness and diversity. Various features may be used as measures of these criteria (area, species number, structural diversity, range of types, etc.: Table

8). None of these should be considered in isolation, since all contribute to the overall nature conservation value of the site. At times it may be necessary to weigh the assessment of the value of the wood as a whole against the relative value of one of the stands in it as an example of its type. A very fine example of a particular type might occur in an otherwise very poor wood and need to be set against a much better wood overall which contains a rather less good example of the type concerned.

3.4.3 Some sites consist of characteristically species-poor woodland types, but, within their type, sites richer in species are more valued than species-poor sites. The standard recording form covering all woodland contains about 400 species. As a rough guide, sites with 100-200 of these (25-50% of the total possible) can be considered rich in absolute terms. For any AOS, however, factors such as woodland history and area, intensity of recording, woodland type, the regional species pool and the population size of particular species affect assessments of species-richness (Kirby 1988).

3.4.4 Coppiced woodland which is still worked on a regular rotation with a wide range of standard trees and mixed composition is to be preferred to single-species stands of neglected growth (40-70 years old) with few standards. For high forest stands (including abandoned coppice which is now effectively high forest), mature timber (more than 100 years old) and some canopy irregularity are preferred to young, even-aged growth. Abundant pollards, including old hollow trees, scattered through a site are more valuable as invertebrate and lichen habitat than a few concentrated on the boundaries.

3.4.5 Woods which adjoin or are in a mosaic with other habitats tend to be more valuable than those sharply abutted by arable or improved grassland. Diffuse, bushy or open edges are better than sharp boundaries. Within the wood, clearings (natural glades and managed rides), variable topographic features (such as steep ground, rock outcrops and wet habitats), variations in drainage and abundance of dead wood increase the importance of a site through greater diversity.

3.4.6 Documentary information may be used to determine whether or not a site is ancient, but in addition evidence about the past management of the site and surviving features that throw light on land-use history, such as earthworks and old pollard trees, improve our understanding of woodland processes. The past or present use of a woodland for ecological or other research is also a factor that raises the level of scientific interest of a site.

3.4.7 Special features must also be considered, for example outstanding populations of uncommon species, well-developed scrub communities (where these are not found on sites selected on other grounds), extensive limestone pavements or moss carpets, the highly wind-pruned woods of the Dizzard (Cornwall) or the massive boulder scree of Carn a Mhadaidh (Sutherland).

3.4.8 Negative features about a site may include abundant or spreading exotic species such as rhododendron, rubbish tips and grossly polluted streams. Closeness to sources of air pollution will reduce the potential for epiphytic lichens. Heavy grazing, whether by stock or deer, tends to restrict the diversity of the ground flora. Forestry operations may eliminate over-mature timber and dead wood important for invertebrates, and even coppicing (which is desirable on some sites) may elsewhere break the continuity of canopy cover necessary for the survival of some shade-demanding bryophyte and fern communities in western Britain.

3.5 Taking account of site management

3.5.1 Sites should be selected as SSSIs on their current nature conservation value, but in woodland, perhaps more than in any other habitat, it is difficult to separate assessment of current value from consideration of the site's past and future treatment. It is possible to create glades and open rides in a wood that currently lacks them, but it is not possible in the short term to increase the amount of over-mature timber on a site. Therefore the potential to retain or enhance the value of a site through appropriate treatment in the short term (say 5-20 years) must be considered when comparing sites of otherwise broadly similar interest.

3.6 Implications of incomplete knowledge

3.6.1 A general framework for woodland SSSI selection can be outlined, but its full implementation would require more detailed knowledge of many sites than we currently possess. There are many sites for which no recent field survey information exists. It is expected that the number and extent of woodland SSSIs will increase in future as more woods are found which are of a quality similar to or higher than existing SSSIs.

3.7 Selection based on species

3.7.1 As with other habitats, some woodlands may be selected as SSSIs primarily on species grounds. In many cases these are also good examples of semi-natural woodland, but they may not be. In particular, parklands may be selected on the basis of their lichen or dead wood invertebrate interest, while some conifer plantations are SSSIs because of their rich ride faunas.

4 Selection procedure within an Area of Search

4.1 Estimate the total extent of woodland likely to be of some nature conservation significance - that is ancient and long-established semi-natural woodland in the first instance but also plantations on ancient sites, recent semi-natural woodland or plantations of native species in areas where these are likely or are known to have high nature conservation value. Woodland inventories and similar Phase I surveys as well as past site surveys can be used for this.

4.2 Identify the range of types present within the AOS in terms of NVC communities and sub-communities, major tree/shrub layer variants of these (as indicated by Peterken's Stand Groups) and major structural variants. Scrub communities (W21-25) may also be considered if they are not already covered on sites in the AOS selected on other grounds (see 3.3.3). If NVC data are not available (which for the next few years will often be the case), use Stand Types and structural variants to define types.

4.3 Determine whether any of the types (including structural and tree community variants of the NVC sub-communities) identified above are of no particular nature conservation value in the AOS concerned and conversely whether there are important variations in the woods which are not described adequately by the types identified. In cases of doubt about additions or deletions to the list of types (or about what constitutes a "major variant") consult the CSD woodland specialists. Amend the list of types to be represented within the SSSI series for that AOS accordingly. The sites selected should include (provided that good examples are available) all NVC sub-communities and the major structural and tree and shrub layer variants present in each AOS. For example, all the 12 Stand Groups should be represented if suitable sites exist. Examples of mature high forest or wood-pasture should be sought to complement the coppice structure which predominates in most AOSs.

4.4 Identify the best, usually the largest, candidate stands, but taking account also of relative naturalness and diversity, as the basic woodland units to represent the types present (see 3.4.1). These should normally be at least 1 ha in

extent, and areas over 5 ha should be sought wherever possible. Small stands are more justifiable if the type is rare nationally, if it naturally tends to occur only as small stands because of environmental limitation, if the floristic quality of the stand is high (with few exotics and a good range of typical flora) and if the stands occur within woods whose overall quality is high. If all the examples of a particular type are small or very fragmented or occur in very open stands, it may be desirable to select examples associated with other major habitats. Although size and plant species composition are the first factors to use to judge a stand, other features such as its structure, animal communities, history and management should also be considered (Table 8).

4.5 Woods in which the best candidate stands occur, usually in combination with other stands, should be assessed (see 3.4.2-8) for their overall value on the same basis. Woods selected for the presence of more than one type should normally be over 5 ha and preferably over 20 ha and should be mainly semi-natural. Smaller areas may have to be chosen in an AOS where very little semi-natural woodland exists in blocks of more than 20 ha, often because most of the larger sites have been replanted. Some woods may have to be selected to include the rarer features which do not meet this size requirement, and some groups of small woods (separated by less than 1 km) may be treated as a single ecological unit. The SSSI series should include also some sites selected because they contain a wide variety of types, even if other examples of each particular type are represented elsewhere in more uniform sites.

4.6 The excessive fragmentation of most ancient semi-natural woodland in Britain means that there should be a strong presumption towards selecting any very large areas that remain, regardless of their type, because it is only in such areas that the full range of woodland processes may be observed. In the relatively well-wooded areas of southern England this applies to reasonably compact blocks of more than 200 ha, but elsewhere to semi-natural blocks of 100 ha or more.

4.7 Within an AOS several examples of most types should be selected to account for the variation in woodland structure, floristic composition of tree and subsidiary layers and animal assemblages, to represent the various ways in which different types may naturally be combined, to give a geographical spread of sites, and to include any special features. The higher the variability in the plant and animal communities of any type in an AOS, the more examples should be considered. The same applies where the type is nationally rare (Tables 3, 4 and 5) or where types are concentrated in relatively few AOSs. Special reasons will be needed to justify the selection of more than 10 examples of a particular type in any AOS. However, since most sites consist of a mixture of types, more than 10 sites containing a common

type may incidentally appear in the final selection, but some of these will have been selected for other reasons.

4.8 Following the above prescriptions will lead, in most AOSs, to about 20% (range 10-40%) of the area of ancient semi-natural woodland being selected. There may, however, be a need also for 'species' sites containing woodland or for areas of recent semi-natural woodland. These are neither target percentages nor limits, but an indication of the level of representation that current experience within the NCC suggests is necessary. In very poorly wooded areas the figure may rise to 100% of the semi-natural woodland (both ancient and recent). Conversely, in very well-wooded areas where traditional forestry practices still generally maintain the semi-natural structure and composition of the woods, 10% of the ancient semi-natural woodland may be adequate representation.

5 Site boundaries

5.1 Because most woodland in Britain exists as isolated blocks in non-woodland surroundings, it is usual to notify woods as more or less complete units. In some cases there may need to be a balance between including the whole of the ecological unit and defining a boundary that is clear on the ground. If boundaries **within** woods are required, these should follow well-defined features such as rides, streams or compartment boundaries. Major tree species changes (e.g. broadleaved to coniferous) may be used, but unless these themselves follow well-marked compartment boundaries they can present difficulties if management of the stands alters.

5.2 Where all the site is of similar quality and the surroundings are of low wildlife value, no great difficulty should arise. However, there may be some obvious variation in the quality of the woodland within the site, the surrounding land may itself be semi-natural, or parts of the wood may have suffered recent damage which is not yet irretrievable. The examples given below illustrate the general principles that should be adopted.

5.2.1 In ancient woods the boundary banks themselves are often features of interest and so should be included where possible.

5.2.2 Fringes of recent semi-natural woodland or scrub outside the main area of woodland interest provide additional diversity, as well as opportunities to examine woodland processes such as species colonisation (for example the Hayley Wood Triangle described by Rackham in 1975). Ponds, small meadows or bits of rough grassland, remnant heath or moorland may be very important for the overall invertebrate diversity of the site. Similarly, small areas of woodland

attached to grassland or heath may be selected as additions to examples of these habitats where they add to the diversity of the open habitats.

5.2.3 Large blocks of semi-natural vegetation adjacent to a wood should normally be considered on their own criteria. The exceptions are 'mosaic sites' with habitat mixtures where no element may be individually of SSSI standard but which together form a valuable wildlife site. Each such case can only be treated on its merits. Mosaic sites are discussed in more detail in B, 6.

5.2.4 Major blocks of coniferous plantation in broadleaved woodland should normally be excluded. Exceptions include sites where there are rich rides or similar features within them which could not be notified without the adjacent stands, where the planting is in small patches surrounded by semi-natural woodland, where sufficient of the former ground flora or tree and shrub layers exists in or between the stands to restore them to a reasonably semi-natural state within a few years, and where exclusion of the stands would lead to an impractical boundary on the ground or for subsequent management.

5.2.5 In densely wooded districts or occasionally even in very large individual woods, the interest may consist in the broad-scale variety of woodland types or the scatter of good stands in a matrix of indifferent woodland. Every effort must then be made to find a well-defined boundary centred on the main features and including such associated areas of good woodland as are necessary for the long-term survival of these features.

5.2.6 Woodland boundaries in the uplands tend to be less well-defined both historically and ecologically than in the lowlands. Often the edges of a wood are rather diffuse because heavy grazing has prevented regeneration; as trees die the canopy thins out. In these circumstances boundaries should if possible be set somewhat beyond the area currently under trees (sometimes where a former wood boundary is apparent), to provide the open ground necessary for regeneration. (See also the comments in 3.3.4 about definition of pine and birch wood sites.)

6 References

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Table 3 **National Vegetation Classification - woodland and scrub communities** (Rodwell 1986)

W1 Salix cinerea - Galium palustre woodland

W2 Salix cinerea - Betula pubescens - Phragmites australis woodland

W3 Salix pentrandra - Carex rostrata woodland

W4 Betula pubescens - Molinia caerulea woodland

W5 Alnus glutinosa - Carex paniculata woodland

W6 Alnus glutinosa - Urtica dioica woodland

W7 Alnus glutinosa - Fraxinus excelsior - Lysimachia nemorum woodland

W8 Fraxinus excelsior - Acer campestre - Mercurialis perennis woodland

W9 Fraxinus excelsior - Sorbus aucuparia - Mercurialis perennis woodland

W10 Quercus robur - Pteridium aquilinum - Rubus fruticosus agg. woodland

W11 Quercus petraea - Betula pubescens - Oxalis acetosella woodland

W12 Fagus sylvatica - Mercurialis perennis woodland

W13 Taxus baccata woodland

W14 Fagus sylvatica - Rubus fruticosus agg. woodland

W15 Fagus sylvatica - Deschampsia flexuosa woodland

W16 Quercus spp. - Betula spp. - Deschampsia flexuosa woodland

W17 Quercus petraea - Betula pubescens - Dicranum majus woodland

W18 Pinus sylvestris - Hylocomium splendens woodland

W19 Juniperus communis - Oxalis acetosella woodland

W20 Salix lapponum - Luzula sylvatica scrub

W21 Crataegus monogyna - Hedera helix scrub

W22 Prunus spinosa - Rubus fruticosus agg. scrub

W23 Ulex europaeus - Rubus fruticosus agg. scrub

W24 Rubus fruticosus agg. - Holcus lanatus underscrub

W25 Pteridiurn aquilinum - Rubus fruticosus agg. underscrub

We do not have the survey information to provide estimates of the total area of woodland and scrub falling in the different NVC types, but *a* preliminary assessment has been made, based on the number of samples recorded for each type and their distribution.

The following suggestions are made.

Communities W8-W12, W14-W17 and W21-W25 can be regarded as widespread and relatively abundant in Great Britain as a whole. They probably each occupy more than 10,000 ha in total.

Communities W1 and W3-W7 are less common, probably usually occur as relatively small stands and so may need higher representation in terms of numbers of sites, if not total area, than the previous group, but they may often be included in the same sites as the first group.

Communities W2, W13, W19 and W20 appear to be localised and probably not very extensive in most cases where they occur. W18 is localised but occurs as extensive stands. Particular attention should be paid to these types during site selection in AOSs where they are more frequent.

More work is needed to determine the relative extent and localisation of sub-communities.

Table 4 Extent and localisation of British woodland Stand Types (Peterken 1981)

(a) Previous guidelines contained estimates as to which Stand Types (marked X) were likely to cover less than 10,000 ha in total within Great Britain. It must be stressed that these are only estimates.

(b) Localisation of Stand Types is largely based on the published distribution maps, which show only where the samples have been recorded. W = widespread, L = localised. Note that W refers to the overall distribution of the type even if it is very rare.

		(a)	(b)
Stand Group 1			
1Aa	Calcareous ash-wych elm - southern variant	X)	W
1Ab	Calcareous ash-wych elm - northern variant	X)	
1Ba	Wet ash-wych elm - heavy soil variant	X)	W
1Bb	Wet ash-wych elm - light soil variant	X)	
1Ca	Calcareous ash-wych elm on dry and/or heavy soils - eastern variant	X)	W
1Cb	Calcareous ash-wych elm on dry and/or heavy soils - western variant	X)	
1D	Western valley ash-wych elm	X	W
Stand Group 2			
2Aa	Wet ash-maple - typical variant	)	W
2Ab	Wet ash-maple - wet variant	X)	
2Ba	Ash-maple on light, poorly drained soils	X)	W
2Bb	Ash-maple on light, freely drained soils	X)	
2C	Dry ash-maple	X	W
Stand Group 3			
3Aa	Acid pedunculate oak-hazel-ash - heavy soil form	)	W
3Ab	Acid pedunculate oak-hazel-ash - light soil form	X)	
3B	Southern calcareous hazel-ash	X	W
3C	Northern calcareous hazel-ash	X	L
3D	Acid sessile oak-hazel-ash	X	W
Stand Group 4			
4A	Acid birch-ash-lime	X	L
4Ba	Maple-ash-lime - lowland variant	X)	L
4Bb	Maple-ash-lime - western variant	X)	
4C	Sessile oak-ash-lime	X	L
Stand Group 5			
5A	Acid pedunculate oak-lime	X	L
5B	Acid sessile oak-lime	X	L

		(a)	(b)
Stand Group 6			
6Ab	Upland birch-sessile oak	)	W
6Ac	Upland hazel-sessile oak	)	
6Bb	Upland birch-pedunculate oak	X)	W
6Bc	Upland hazel-pedunculate oak	X)	
6Cb	Lowland birch-sessile oak	X)	W
6Cc	Lowland hazel-sessile oak	X)	
6Db	Lowland birch-pedunculate oak	)	W
6Dc	Lowland hazel-pedunculate oak	)	
Stand Group 7			
7Aa	Acid valley alder	X)	W
7Ab	Neutral-alkaline valley alder	)	
7Ba	Sump alder	X	L
7Bb	Base-rich springline alder	X	W
7Bc	Base-poor springline alder	X	W
7C	Plateau alder	X	L
7D	Slope alder	X	W
7Ea	Bird cherry-alder - lowland variant	X)	W
7Eb	Bird cherry-alder - upland variant	X)	
Stand Group 8			
8A	Acid sessile oak-beech	X	W
8B	Acid pedunculate oak-beech		W
8Ca	Calcareous pedunculate oak-ash-beech - dry lime-wych elm variant	X	W
8Cb	Calcareous pedunculate oak-ash-beech - moist wych elm variant	X	W
8Cc	Calcareous pedunculate oak-ash-beech - maple variant	X	W
8D	Acid pedunculate oak-ash-beech	X	L
8Ea	Sessile oak-ash-beech - acid variant	X)	W
8Eb	Sessile oak-ash-beech - calcareous variant	X)	
Stand Group 9			
9Aa	Pedunculate oak-hornbeam – birch-hazel variant	X)	W
9Ab	Pedunculate oak-hornbeam – ash-maple variant	)	
9Ba	Sessile oak-hornbeam – acid variant	X)	L
9Bb	Sessile oak-hornbeam – calcareous variant	X)	
Stand Group 10			
10A	Suckering elm	X)	
10B	Valley suckering elm	X)	W

		(a)	(b)
Stand Group 11			
11A	Acid birch-pine	X)	L
11B	Acid oak-pine	X)	
Stand Group 12			
12A	Rowan-birch	)	W
12B	Hazel-birch	X)	

Table 5 Main semi-natural structural types of tree layer in British woods

a Coppice Neglected coppice is widespread in semi-natural woods, throughout southern Britain in particular. Examples of worked coppice are far less common, particularly sites where continuity of working has been maintained throughout the 20th century.

b Wood-pasture In the lowlands this exists in old parks, wooded commons and Royal Forests, the last two categories usually having more general woodland characteristics than the first. Parks will usually be selected only on species grounds (typically for lichens or dead wood invertebrates). The others may be selected on either species or general habitat grounds. Wood-pasture is not as abundant as coppice, but it is quite widespread. In the uplands most of the old coppices are now heavily grazed and so might be classed as wood-pasture. However, they are of a different character from the normal definition of the term.

c High forest Most high forest in Britain is of recent origin and derived either from plantations or from coppice (by neglect or singling), being less than 100 years old. Semi-natural high forest is more abundant in the Scottish Highlands. Mature high forest which approaches a semi-natural state (with trees more than 150 years old, native to the site) is rare, particularly on ancient woodland sites.

N.B. There are further differences in woodland structure according to presence and development of the subsidiary layers below the trees - shrub, field and ground layers. Occurrence of special topographic features may influence the development of particular layers; e.g. bryophyte ground layers are especially well developed in woods with rock outcrops and block-strewn floors.

Table 6 An approach to integrating differing woodland classification schemes for SSSI selection

	Spectrum of variation in British woodland
Total flora	The main floristic types in the AOS are classified into communities and sub-communities according to the NVC, e.g. W10a 'typical sub-community' of Quercus robur - Pteridium aquilinum - Rubus fruticosus woodland present.
Tree and shrub layers	The W10a examples may be further split, on their tree and shrub layers, e.g. into stands dominated by lime (Stand Type 5A), stands dominated by oak (Stand Type 6D) or Scots pine plantations derived from the former. (Note that Stand Types 5A and 6Dc may occur in association with other NVC communities. There is considerable cross-cutting in the two classifications.)
Structural type	The lime examples may only be present as former coppice, but the oak stands occur both as oak standards over hazel coppice and as over-mature oak pollards (with very sparse hazel understorey). The Scots pine plantations are high forest.
SSSI selection	At least three examples are needed to cover NVC type W10a, to include lime and oak coppice types and oak wood-pasture variants. The Scots pine tree layer type is of no particular nature conservation value, so need not be represented. The high forest structural type is not represented because it only occurs with a planted Scots pine tree layer.

Table 7

A preliminary attempt to indicate the general relationship between the Stand Type classification and National Vegetation Classification for woodland

Because the Stand Types are defined mainly by their tree and shrub communities while the ground flora takes a prominent role in the NVC, a simple one-to-one relationship between the two systems should not be expected. The following table is a first attempt to correlate the two systems. ** = combinations of Stand Type/NVC community most likely to occur (on present experience); * = others which are likely to be common. Note, however, that there may be many outlying samples. The table shows probabilities rather than being definitive.

NVC communities

	W19	W20	W1	W2	W3	W4	W17	W11	W16	W10	W9	W8	W13	W12	W14	W15	W5	W6	W7	W18
	No real Stand Type equivalent																			
Stand Types																				
12						**	**	*	**	*										
6A, 6B							**	**	*	*										
6C, 6D								*	**	**										
9Aa, 9Ba										**										
5A, 5B										**										
1D, 3D								*		*	**	*								
9Ab, 9Bb										*		**								
4A										**										
4B, C										*		**								
2A, B, C										*		**								
1C, 3C											*	**	*							
3B											*	**	*							
3A										*		**								
1A, 1B												**								
8C, 8Eb														**						
8Ea, 8D														*	**					
8A, B															**	**				
7B																	**	**	*	
7C												*							**	
7D																			**	
7A										*								**	**	
11A																				**

Table 8 Field measures of the Nature Conservation Review criteria for British woods

A range of assessment methods was examined, from which the following features were drawn as field measures of the NCR criteria (underlined).

a Vascular plant list

The number of plant species present reflects the diversity of conditions and influences animal diversity. Naturalness (absence of exotics and species of disturbed/non-woodland conditions) and rarity of plant species are also indicated. Size and ecological position affect the number and nature of the species present.

b Size

c Structure

Woodland structure influences animal diversity. Some types of structure are indicative of naturalness.

d Rarity (mainly of plant species, but occasionally of communities or of animal species)

e Other habitats (streams, glades, rocks, etc.)

The presence of these adds to woodland diversity. They can be used as first indications of the likely value of a wood for groups of plants and animals which are difficult to record directly during short visits to a wood.

f Adjacent land

This reflects the ecological position of the wood and may affect species diversity.

g Management/presence of exotics

These affect the naturalness of a site. Management may create and maintain diversity of conditions and largely determines potential value.

h Vegetation types

These were used in determining representativeness. The number of types present is a measure of diversity. Certain types are associated with disturbed woodland conditions, in which case their presence is likely to be an indication of low naturalness.

i Other groups (animals and lower plants)

Casual observation of these groups can contribute to the same criteria as does the vascular plant list.

j Historical presence

Ancient woodlands may retain traces of past naturalness. Research history was not considered. Ancient woods are also fragile in the sense that they cannot be re-created.

Virtually all the NCR criteria are touched upon by the above features, but they do not cover all the factors which affect a wood's conservation value. For example, the difference between sheltered and exposed sites is missed, yet this can be important for invertebrate populations.

2b Veteran Trees

1. Introduction

1.1 Where information is available on key species groups associated with wood-pasture and veteran trees (particularly lichens and saproxylic invertebrates) the guidance set out in the *Guidelines for the Selection of Biological SSSIs* (NCC, 1989) will continue to have effect. However, sites may also be proposed on the basis of the significance of their veteran tree populations and associated vegetation, independently, or in addition to, known species interest in accordance with the following guidance.

1.2 In an Area of Search, the assessment of veteran tree sites should be undertaken in accordance with the protocol set out in Table 1. The use of this protocol is described, with examples, in English Nature Research Report 628.

1.3 The threshold values given in Table 1 are those that are likely to be appropriate for much of England. However, they may need adjustment in the light of further application of the procedures, particularly in Scotland.

1.4 The protocol enables sites to be compared and roughly graded in terms of their value for veteran trees and likely associated interests, although it does not set the threshold for A/SSSI status. Existing sites in a particular Area of Search with veteran tree interest, even if this has not previously been recognised, need to be taken into account.

1.5 The following test should be applied to determine whether sites identified as scoring highly using the assessment protocol should be notified. Namely, does a possible new site:

i. significantly increase the range or number of veteran trees protected;

ii. represent a significantly different aspect of the veteran tree resource; or is it

iii. significantly higher in value than the main sites currently selected?

Table 1: Veteran tree site assessment protocol

Field Measure	Possible thresholds		
	High value	**Medium value**	**Low value**
Primary assessment criteria			
Number of veteran trees	>100	10-100	<10
Number of ancient trees	>15	<15	0
Number of tress >1.5m dbh	>15	5-15	<5
Secondary assessment criteria			
Extent of site	>50ha	11-50ha	10ha or less
Tree cohort continuity (assessed by tree size)	At least 1 cohort per 100 years similar ssp and distribution to veterans	Future generations present but gaps in cohorts/new generations do not reflect spp/distribution of veterans	Large gaps in cohorts/veteran trees only
Visible deadwood (standing and fallen & incl. rot holes, hollow trunks etc)	Abundant	Present but evidence of removal	Little present
Ground vegetation	Unimproved grassland/semi-natural woodland	Semi-improved or significantly disturbed	Arable, improved or suppressed (bare)
Veteran trees near-by (sites and trees in the landscape)	Adjacent	Within 1km	>1km away
Diversity within veteran tree population (species form, age, situation)	Diversity in at least three characteristics (species, age, form and situation)	Diversity in two characteristics or significant diversity in 1 characteristic	Little diversity
Associated species interest (e.g lichens, saproxylic invertebrates)	Known to be high	Some interest known	
Documented habitat continuity – historical continuity	Documentary evidence of habitat continuity (several centuries)		
Potential	Interest likely to increase in short- to medium-term	Interest likely to increase moderately in short- to medium-term	Interest likely to decline in short- to medium-term
Other field measures that may assist in describing the value of the site			
Density of veteran trees (over site)			
Species composition of veterans			
Scrub (incl. bramble and hawthorn)			
Site management/threats			
Water-bodies/wetland habitat			
Shape			
Surrounding landuse			
Local pollution load			

Note: Ancient or veteran

The term 'veteran' tree encompasses a wide range of trees which display attributes associated with late maturity such as large trunk girth and truck hollowing. The term 'ancient' refers specifically to the age class of a tree, describing the stage of development in the ageing process beyond full maturity. Whilst all veteran trees are potentially of cultural and ecological value, ancient

individuals are a key indication that there is likely to have been a continuity of veteran tree/deadwood habitat and management at a site. It has been possible to devise a standard field definition of a 'veteran' tree, but recognising ancient trees is a more subjective judgement, which can depend on the experience of surveyor. Hence abundance of ancient trees has been considered as a separate criterion. The criteria used to indicate possible 'ancientness' are:

i. diameter at breast height, though this only applies to certain species (e.g. oak);

ii. significant trunk hollowing;

iii. significant crown die back (as a result of natural retrenchment through ageing), often accompanied by reiterative epicormic growth though this will not apply to working pollards;

iv. historical records of individual trees or sites though these will not be consistently available.