

The importance of the woodland ground flora in regeneration projects

This material formed the basis for the chapter on restoration of vegetation processes in Beyond Conservation (Earthscan, July 2005) – where it subsequently had to be shortened.

It is clear that any re-forestation programme must aim to restore the whole range of characteristic woodland flora for each type. Rodwell's classification of assemblages (known by NVC or National Vegetation Classification numbers) is a starting point based upon the present day, and there may not be a better indication of what the wildwood would have contained. However, we should be aware that not only can we not expect to re-create what has past, there may be little merit in trying to do so. We are starting with an impoverished soil and a fauna denuded of keystone species. Furthermore, the climate is undergoing an accelerated change. In my view we need to consider the *functional* element of our future forest as well as any species we may re-establish. In this regard, the forest canopy can be seen as protective of the flora beneath, which in turn support the diversity of invertebrate and vertebrate species. When we consider areas outside of the wildwood core, then the forest will take on functions relating to human uses such as from provision of timber, wood-pasture, hunting and recreation.

The functional forest is thus a vessel for the rich diversity of life its structure supports – including humans. In this respect, the field layer becomes as important as the trees. Some forests will have the primary function of providing buffer zones and corridors for the large vertebrates, and for roaming carnivores. In this function, the floral diversity of the field layer, or the near-natural nature of the canopy are of less importance – and a forest primarily managed for timber, rather than natural-ness, would fulfil that role. A forest with a strong recreational function – such as a Community Forest, would be served by the establishment of a rich field layer of flowering plants such a bluebell or anemone. Where near-natural conditions are aimed for in the core areas, it may take many decades for the diverse field layer to develop in regenerated areas, and hundreds of years in planting of open grassland.

In any restoration project it will be important to ascertain the prevalence of remnant seed sources for these field layers, as there may need to be planting programmes for the missing herbs and shrubs. It is known that some species can survive for several decades under conditions unfavourable for flowering – wood spurge, for example, has re-appeared after 125 years of suppression by closed canopy. Some woodland flowers colonise at very slow rates – oxlip for example, though not a feature of our western woods, at 1m per year. Translocation or seeding may only be successful when mature woodland soil conditions evolve. There are precious few studies of the recovery of this woodland diversity after centuries of grazing, particularly in comparing enclosure with reduction in grazing pressure.

However, the types of woodland and associated flora listed below, though by no means comprehensive, give an indication of the extent of the regeneration project required.

Willow scrub:

Salix lapponum-Luzula sylvatica

Scrub does not have quite the status of forest or woodland, yet it is an important habitat in the montane zones that would form our core areas, and in its natural state, extremely scarce. In the absence of over-grazing, as we can infer from continental habitats, it would be the predominant cover between 400 and 900 metres in the uplands. Thus, large areas of the Caledonian forest would have been a patchwork of willow scrub above the tree line grading into sub-arctic grassland and heath above 900m. This form of tree-cover is quickly degraded by heavy grazing pressure and now exists in remnants in the NW Highlands, the central and southern Highlands, the Moffat Hills and on Helvellyn in the Lake District. It would be expected that the Rhinogydd with its peaks between 700 and 800m would have had little natural grassland and that some form of willow scrub would dominate, and that Dartmoor, with its highest point at 500m would also have had willow scrub on the peaks with areas of grassland confined to the bogs. It would be important to map any remnants to identify the type and serve as seed sources.

The downy willow *S. lapponum* is typically a montane and sub-arctic plant, where it figures in small clumps in wet heaths of woodrush *Luzula sylvatica* and bilberry *Vaccinium myrtillus*, but in places forming a distinctive low bushy canopy, which it may share with other relatively rare northern willows, such as myrtle-leaved *S. myrsinites*, woolly *S. lanata*, reticulate *S. reticulata*, little tree *S. arbuscula*, and tea-leaved *S. phylicifolia*.

The sub-shrub and herb layer in this low canopy can be especially rich where grazing is not severe and is characterised by large mats of the woodrush, especially on rocky slopes, bilberry, cowberry *Vaccinium vitis-idaea*, bog whortleberry *V. uliginosum*, crowberry *Empetrum nigrum* and ling *Calluna vulgaris*; and among the taller herbs, lady's mantle *Alchemilla glabra*, water aven *Geum rivale*, wild angelica *Angelica sylvestris*, northern bedstraw *Gallium boreale*, mountain sorrel *Oxyria digyna*, alpine saw-wort *Saussurea alpina*, golden rod *Solidago virgaurea*, devil's bit scabious *Succisa pratensis*, meadowsweet *Filipendula ulmaria*, valerian *Valeriana officinalis* and frog orchid *Coeloglossum viride*.

This montane scrub with its tall herb layer is especially worthy of study in relation to habitat for the chiefly vegetarian bear as it is rich in berries, juicy stems and rhizomes. Bears in other mountain areas spend time above the tree line seeking food and these habitats could be crucial for the maintenance of a viable population in the Highland zone. In ascertaining the potential for the Glen Affric area to support bears, studies of their food preferences in such areas as the Sarek National Park in Sweden would be of great assistance.

Juniper woodland and scrub

Juniperus communis-Oxalis acetosella

In the drier eastern Highlands, the dominant montane scrub is characterised by the presence of juniper, with wood sorrel *Oxalis acetosella* in the field layer. This type of low scrubby woodland is restricted to the Cairngorms and Monadhliath, with small remnants in the Pennines and Lake District. Rodwell notes that waterlogging is strongly inimical to juniper and supposes that in the western Highlands above the tree line it is replaced by willow scrub. However, I have found remnant juniper high up in Snowdonia, and as he also notes, in its natural state these community might have been as widespread and tolerant of more varying conditions as it is in Scandinavia. He has found remnants existing widely as a scrubby fringe between pine woodland and montane heath or grassland, and calls for more research using enclosures to determine the relationship of grazing and burning to its persistence and potential re-colonisation of the montane zone. There is no doubt from observations of the absence of seedlings in grazed areas that this woodland is peculiarly susceptible to high grazing pressure.

In some areas heavy grazing has opened up the juniper stands and the field layer is reduced to grassland. Under less intensive pressure, the relatively impalatable juniper offers some protection to the field layer, which is characterised by *V. myrtillus*, *V. vitis-idaea*, *Calluna vulgaris*, and an abundance of ferns and mosses. The rare *Linnaea borealis* and the wintergreens *Pyrola media*, *P. minor* and *Orthillia secunda* are associated with this habitat.

Pine woodland

Pinus sylvestris-Hylocomium splendens

The native pine woods of Scotland have been variously surveyed and classified and represent a mixture of stands, few in a semi-natural state, almost all affected by the removal of mature trees, the opening up of the canopy, and varying degrees of grazing pressure either by over-abundant deer or domestic stock. Large areas of relic pine forest are very open and Rodwell follows McVean and Ratcliffe in their studies by setting a lower limit of 25% cover to distinguish the woodland type from larger areas of ericoid heath with isolated pines. Semi-natural stands tend to have less than 70% canopy, and the more closed canopies are noted in plantations. It is likely that under natural conditions closed canopy occurred only in the more sheltered locations with better soils. The woodland is notable by being made up of quite well segregated age-classes – as in other semi-natural high forest, and McVean and Ratcliffe noted three major arrangements at the time of their survey in 1962: even aged stands, 80-150 years old; two generation mixtures of pioneers, 150-200 years old with straight-stemmed offspring 80-100 years old; and pine-heath stands of varying densities but composed of broad-crowned pioneers 150-200 years old, (few individual pine trees live as long as 300 years).

In most locations the canopy is only 13-15 metres high, and up to 20 m on better soils. Associated tree species in the western reaches are brown or downy birch *Betula pubescens*, rowan *Sorbus aucuparia*, sessile oak *Quercus petraea* at lower altitudes, holly *Ilex aquifolium*, and on wetter ground and stream-sides, alder *Alnus glutinosa* various willows *Salix* and aspen *Populus tremula*. The shrub and field layers divide into several types according to soils and a general east-west Highland divide of rainfall, but are also strongly affected by treatments – such as plantation stocking density, and grazing. Rodwell notes three major elements in the associated flora: the

grass *Deschampsia flexuosa*; ericoid shrubs; and bryophytes. The grass predominated in shade stands; with bilberry, cowberry, and ling in the more open canopies. In dense stands these shrubs can be eliminated and leave a field layer of bryophytes and *Deschampsia*. The more open semi-natural stands also contain more rarely crowberry *Empetrum nigrum* and *Erica cinerea*, bog whortleberry *V. uliginosum* and bear berry *Arctostaphylos uva-ursi* (the latter a must for returning bears!).

In denser stands the ericoid shrubs disappear and a rich bryophyte flora is characterised by the type moss *Hylocomium* along with about twenty other species, and the ferns *Pteridium* and *Blechnum*. Interesting herbs, though generally infrequent, are lesser twayblade *Listera cordata* and the various wintergreens *Pyrola minor*, including the nationally rare *P. media* and *P. rotundiflora*, *Moneses uniflora*, *Orthilia secunda*, the northern montanes *Linnaea borealis* and creeping lady's tresses *Goodyera repens*.

The wintergreens, and northern montanes such as *Linnaea* and *Goodyera* have their stronghold in these pinewoods and some of their rarity may be due to the reduction in the extent of the forest. However, the wetter western reaches which include the Glen Affric core area are characterised with three sub-communities marked by woodrush, sphagnum and the moss *Scapania gracilis*.

An important factor in the natural dynamic of pinewoods is the occurrence of fire – some experts considering pine a fire-dependent species. Natural regeneration is largely confined to the more open forest and fire helps seedling establishment by removing the felted mat of *mor* and recycling nutrients.

Herbivores browse pine seedlings and the tops of young trees emerging in the shrub layer, and although it is clear that current deer numbers as well as the former grazing of cattle and ponies, and the later use of sheep, have all contributed to the general lack of regeneration throughout the Caledonian Forest, it is also the case that under natural conditions there would have been a strong herbivore presence of deer, moose, and forest cattle. Wild boar would also have been an important element in the disturbance of ground enabling the germination of seeds. In this case, the harrying actions of wolves may have been a deciding factor in keeping herbivores from congregating for too long in particular areas. Clearly, the forest regenerated naturally despite the presence of so many herbivores.

Oak – Birch woodlands

There are three basic NVC types of oak-birch woodland that are of relevance and these combine a range of former descriptions of birch, hazel and oak woodland types from authors such as Tansley, McVean and Ratcliffe, Birse and Peterken. We will follow Rodwell's synthesis as it provides a good indication of the floristic variations and the nature of the oak woods in our three core areas in the west. All of our sites are in areas of high rainfall and relatively acidic leached soils. In Caledon, oak woods are chiefly a feature of the more temperate coastal zone in the western Highlands, and of valley woods in the eastern Highlands, but come in on the better soils to the north-west of the Glen Affric core area. In the Rhinogydd it would be the dominant forest over much of the core area and likewise on Dartmoor. In Scotland, the climate is cooler, although the coastal oakwoods benefit from the Atlantic milder winters; in the

Rhinogydd the climate is also ameliorated by the proximity of the sea, and we have already seen that the ash woods hold elements in common with more southerly and eastern woods; in Dartmoor the southern influences are more strongly shown by the occurrence of the pedunculate oak *Quercus robur*, rather than *Q. petraea*.

The three types outlined here represent variations due essentially to climate and soils, although they grade in to each other, and in the case of the Welsh hills, several types are present. Silvicultural treatment and grazing regimes also contribute to a convergence of types. Indeed, most birch woods are regarded by Rodwell (following Ratcliffe) as 'oak-birch' with the oak removed. I found thus surprising, as I had previously thought, regarding their prevalence in northern Scandinavia, that Highland birch woods were an altitudinal feature of the Highlands. This will have some relevance to regeneration schemes in the core areas.

Oak – Birch - Mosses

Quercus petraea-*Betula pubescens* –*Dicranum majus*

This is the main type of woodland for the western areas of Britain: either sessile oak or downy birch may predominate, and it is associated with leached acidic soils. The canopy is often low, at 20m or less. On Dartmoor, curiously, *Q. robur* forms some of the higher altitude wind-stunted stands, as at Wistman's Wood, and this species may also feature in the eastern Highlands and North Wales (where it may be the result of old planting regimes). All of these woodlands have been subject to centuries of exploitation of oak for charcoal and tanning, where large trees (and hence seed sources) have been removed and many multi-stemmed trees attest to former coppicing. *Q. robur* was the foresters' preferred species for planting even in the natural range of *Q. petraea*.

Other tree species include rowan and silver birch *Betula pendula* scattered through the canopy; holly where there is less grazing and browsing; and hazel *Corylus avellana* as the main component, along with saplings of the other species in the usually patchy and low understorey. This woodland has been colonised by *Rhododendron ponticum* in many places where this alien has been introduced – particularly in North Wales where it often forms a dense understorey shading out all other species and boding ill for the future regeneration of the canopy trees.

The field layer has three components that make up the distinctive type – grasses, bracken and ericoid shrubs. The bracken is not so prevalent as in eastern and southern oak woods on better soils, being limited by the thin soil and prominence of boulders and rocks. Likewise, bramble *Rubus fruticosus* and honeysuckle *Lonicera periclymenum* are present but not in abundance. The ericoids demarcate this woodland from the *Q-B-Oxalis* woodland – with *V. myrtillus* and *Calluna vulgaris* the most common. These shrubs are very sensitive to grazing pressure and readily give way to such grasses as *Agrostis capillaries* and *Holcus mollis*. Herbs in the field layer include heath bedstraw *Gallium saxatile*, tormentil *Potentilla erecta*, cow wheat *Melampyrum pratense*, wood sage *Teucrium scorodonia*, devil's bit scabious *Succisa pratensis*, goldenrod *Solidago virgaurea*, and the rushes, *Luzula pilosa*, *L. multiflora*, *L. sylvatica*. Bluebell *Hyacinthoides non-scripta*, is generally scarce and wood anemone *Anemone nemurosa* restricted to base-rich flushes.

Ferns are a major feature, especially in ravines, with *Blechnum spicant* dominant in the field layer and *Polypodium vulgare* as an epiphyte. However, the mosses often form distinctive mats over boulders and rock faces and on the forest floor where there is excessive grazing – with *Dicranum majus*, *Rhytidiadelphus loreus*, *Polytrichum formosum* and *Pleurozium schreberi* all constants that distinguish this woodland type from the *Q-B-Oxalis* woodland. There is an abundance of moss species – Rodwell lists over thirty as well represented, and in one sub-community, considerably more, including national rarities which give these moss-woodlands their unique character.

These woods are typical of our Welsh core area, Dartmoor and also west of the Great Glen. In all cases they have been subject to removal of large oak, oak coppicing, and heavy grazing. It is typical to find very few saplings – usually among the protection offered by boulders. The bryophyte flora, though of conservation importance, has benefited from excessive grazing by the suppression of grasses and woodrush. Reduction in grazing pressure leads to saplings of birch and rowan with occasional oak seedlings, but they often fail to prosper where the moss carpet prevents access to the soil.

Oak – Birch – Wood Sorrel

Quercus petraea-Betula pubescens-Oxalis acetosela

This woodland replaces the mossy type associated with acid conditions, leached soils and heavy grazing – on better soils the ericoid shrubs are less common, and the bluebell more common, though the latter can be eliminated by grazing. The woods are still moist, giving wood sorrel and wood violet *Viola reichenbachiana* their characteristic abundance, as well as bryophyte mats, and where flushed with base-rich water, can take on the character of alder-ash-yellow pimpernel woods (see below). The coolness of the climate excludes the more continental species – but lime *Tilia cordata* may occur in sheltered conditions – as it does in the Harlech area. Such continental species as hornbeam *Carpinus betulus*, the hawthorn *Craetaegus laevigata*, wood spurge *Euphorbia amygdaloides* and yellow archangel *Lamiastrum galeobdolon* are generally absent.

These tracts of oak-birch woodland have also suffered extensively from the removal of mature trees, especially the large straight-trunked oaks suitable for planking, as well as coppicing and excessive grazing. Saplings are generally uncommon and often the woodland merges with adjacent *Festuca-Agrostris-Gallium* grassland with no changes in the field layer. Even with a reduction in grazing pressure, there may still be little regeneration under the canopy, but birch, hazel, rowan and occasional oak seedlings begin to colonise the grassland.

Oak – Bracken - Bramble

Quercus robur-Pteridium aquilinum-Rubus fruticosus

This type of oak woods is typical of central and southern Britain on deeper clay soils, but it features in a few places in North Wales and on the fringes of Dartmoor. *Q. robur* is the commonest tree, although *Q. petraea* may also be present, and hybrids are a feature in the zones where both occur. The next commonest tree is the silver birch *B. pendula*, especially characteristic of those communities that have colonised open ground and the most frequent invader of gaps in the canopy. Ash *Fraxinus*

excelsior and field maple *Acer campestre* are generally scarce, with sycamore *Acer pseudoplatanus* often colonising gaps and reaching into the high forest canopy in the wetter areas. Wych elm *Ulmus glabra* is frequent in the north and west, and hornbeam *Carpinus betula* and lime in the drier south-east, as well as the introduced sweet chestnut *Castanea sativa*. In places, the past history of plantings, removals and coppicing has left hornbeam, lime or chestnut dominated woods. Other sparse associates include holly and rowan, which may contribute to the canopy, and where adjacent to the natural zone of beech *Fagus sylvatica*, this tree may also contribute. Yew *Taxus baccata* is sometimes present as a patchy lower tier; alder in less well-drained areas; gean *Prunus avium* which Rodwell notes can sometimes reach magnificent size; and the crab apple *Malus sylvestris*.

In the Harlech woods there are some large specimens of gean, as well as a few old lime trees, with some yellow archangel in the field layer, and the adjacent scrub containing spindle *Eonymus europaeus* and crab apple – all indicative of the milder climate and more continental influence.

The shrub and field layers are species poor – shrubs being often absent in the more park-like grazed woods. Saplings are generally confined to gaps in the canopy and usually dominated by birch or sycamore. In the high-forest, though the canopy is not dense, oak seedlings are very scarce. However, these are the ‘bluebell’ woods *par excellence*, and this is the vernal dominant, except for wood anemone on the wetter ground. This type of woodland is quintessentially British, occurring in the rest of Europe only in north-west France and Belgium. In late spring and summer the field layer is characterised by bracken *Pteridium aquilinum*, bramble *Rubus fruticosus* and honeysuckle *Lonicera periclymenum*.

The field layers tend to vary according to the degree of canopy shade, soil moisture and grazing – being at times grassy, dominated by high bracken, a mass of bramble and honeysuckle, or carpeted by ivy *Hedera helix*. Ferns of *Dryopteris* are frequent but the bryophyte flora is much reduced and the herbs also, with greater stichwort *Stellaria holostea*, red campion *Silene dioica*, hairy wood rush *Luzula pilosa*, golden rod *Solidago virgaurea*, ground ivy *Glechoma hederacea*, yellow archangel *Lamium galeobdolon*, foxglove *Digitalis purpurea*. The latter can be abundant, especially where the canopy is reduced.

This forest is the nearest to the natural high-forest of the English lowlands (without the elm and lime of the original wildwood). As such it occurs on the fringes of Dartmoor on the better soils, and features of it are also present in the western Rhinogydd, such as bramble, bracken, and honeysuckle, as well as yellow archangel, abundant red campion, ground ivy, stichwort and foxglove.

Ash – Rowan - Dog's Mercury woodland

Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis

Although oak-birch woodland is the dominant type south of the Pine Province, it gives way to a characteristic ash woodland wherever the soil has sufficient base enrichment – as on limestone or in base-rich flushes among generally base poor soils. Rodwell notes that the woody component of these communities is among the richest

in British woodland. I have found such ash woodland near Harlech on the western edge of the Rhinogydd and Rodwell's maps show occurrence in eastern Dartmoor of the ash-field maple-dog's mercury variant that is more characteristic of the south-east divide. These woods do not appear in the western Highlands, except along the coastal zone on and near Skye, but consideration in planting regimes should obviously be given to areas where there is base-enrichment in any of the core areas where these woods may have disappeared.

The range of woody species includes downy birch and alder, wych elm, hazel, sycamore, sessile oak, silver birch, hawthorn *Crataegus monogyna*, and elder *Sambucus nigra*, holly, bird cherry *Prunus pardus*, the willow *Salix cinerea*, and aspen. The field layer is particularly rich and Rodwell lists over thirty species of flowering plant in a shrub layer that is generally 38% of cover to 5m and a herb layer of 40 cm at 76% cover. The type occurs up to 350m, almost always on slopes.

The characteristic plants of the field layer are dog's mercury, wood sorrel, common violet *Viola riviniana*, bluebell, enchanter's nightshade, *Circaea lutetiana*, wood avens *Geum urbanum*, herb robert *Gernanium robertianum*, wood false brome *Brachypodium sylvaticum*, primrose *Primula vulgaris*, the rough meadow grass *Poa trivialis*, the wavy hair grass *Deschampsia cespitosa*, wood anemone, barren strawberry *Potentilla sterilis*, germander speedwell *Veronica chamaedrys* and wood speedwell *V. Montana*, globe flower *Troillius euopeaus*, the thistle *Cirsium helenoides*, sanicle *Sanicula euopaea*, yellow pimpernel *Lysimachia nemorum* and sweet woodruff *Gallium odoratum*. Rodwell cites the yellow archangel *Lamiastrum galeobdolon* as characteristic but confined to southern examples, yet I have found it in small patches in the Harlech woods.

Several rarities are associated with this woodland – the baneberry *Actaea spicata*, the brome grass *Bromus benekenii*, soft hawk's-beard *Crepis mollis*, yellow star of Bethlehem *Gagea lutea*, whorled Solomon's seal *Polygonatum verticillatum*.

In addition to floristic richness, the community is characterised by many oceanic fern species that require wet soils *Dryopteris filix-mass* and *Anthyrium filix-femina* being constants, and also a grassy field layer, with in addition to the grasses mentioned above, the oat grass *Arrhenatherum elatius*. In the north-west the ash and hazel twigs are noted for festoons of lichen and the Atlantic byrophyte ground layer is also exceptionally rich.

These ash woods so characteristic of some of the Welsh mountain slopes where flushes of base rich water appear in an otherwise relatively base-poor environment dominated by oak woods, when not grazed-out by sheep, have given me some of the most wonderful, magical moments – from the early spring abundance of anemone, celandine, primrose, marsh marigold, violets, and wood sorrel, followed by the bluebells, speedwells, yellow pimpernel and herb robert, to the eventual carpet of enchanter's nightshade, this woodland floor is a natural garden of delights and quite different from the more rugged oak woods on the greater part of the hills. Around Llety'r Fwyalchen, this floral abundance was maintained despite a lack of fencing and ready access for a small suckler herd of cattle and a larger flock of sheep. Grazing pressure was intermittent, but enough to keep back bramble and ivy, and not so heavy as to convert the field layer to grasses. In adjacent, more heavily grazed woods of this

type, the grassy carpet held virtually no flowering plants until the summer when foxgloves *Digitalis purpurea* predominated.

Alder – Ash – Yellow Pimpernel woodland

Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum

Alder woods are characteristic of water-logged soils typical of river flood plains, islands in rivers, the shallow edges of lakes and fens, and in smaller strips along river banks and stream sides. In the original wildwood there would have been extensive lowland alder forests in the now drained areas of the fens bordering the Wash and the Ouse, as well as the ancient Somerset Levels and Severn marshes. All of these alluvial forests have been lost to drainage, and significant alder woods now occur only as remnants in un-drained riparian swamps and lakesides. On a smaller scale they occur in base-rich flushes and along streams in the upland zones to which our core areas belong. They would have been more extensive in these zones were the alluvial flats not intensively cultivated as in-bye land for grazing and hay-making.

There are three major types with several sub-communities marked by the field layer, Alder-Sedge *Alnus-Carex* of lake borders, fens and meres in the lowlands; Alder-Nettle *Alnus-Urtica* on river floodplains, again in the lowlands; and Alder-Ash in our north-western regions where there is brown alluvial soil. In addition to alder, ash and downy birch are regulars in the canopy, and sycamore occurs in the better drained soils. The willows *Salix cinerea* and *S. caprea* may also become large enough to break the canopy, and *Q. petraea* can be a feature of the slumping flushes. The understorey is variable but includes hazel, hawthorn, and willows, rowan, elder, holly, guelder rose *Viburnum opulus*, sloe *Prunus spinosa*, bird cherry *Prunus pardus* and saplings of ash and mountain ash. In the Rhinogs I have found small clumps of alder in poorly drained wet flushes, with beds of yellow flag iris *Iris psuedacorus*, surrounded by the sessile oaks and sycamore.

The field layer tends to be a low growing cover of herbs and grasses, rush and sedge: yellow pimpernel *Lysimachia nemorum*, the spearwort *Ranunculus repens*, with meadow sweet *Filipendulia ulmaria*, the grasses *Poa trivialis* and *Holcus mollis* are common, with soft rush *Juncus effuses* and the sedges *Carex remota*, *C. pendula*, *C. laevigata*. Where heavily grazed the grasses are favoured and the tall herb community disappears. There are three sub-communities marked by nettle on the free draining flat river terraces with brown soils; sedges with the marsh thistle *Cirsium palustre* on unstable upland flushes; and the grass *Deschampsia cespitosa* on flushes that are poorly drained and heavily grazed. The nettle sub-community has distinctive vernal carpets of golden saxifrage *Chrysosplenium oppositifolium* in the trickle-fed areas, and marsh marigold *Caltha palustre* in the running waters, with the large bitter cress *Cardamine amara* on the banks. Garlic *Allium ursinum* can cover large areas of the moist banks. Later in the season the nettle, meadowsweet, yellow flag iris, valerian *Valeriana officinalis*, hemlock water dropwort *Oenanthe crocuta* and angelica *Angelica sylvestris* can produce a dense but patchy cover. The exotic Himalayan balsam *Impatiens glandulifera* has also colonised this type of woodland, but parts of North Wales hold the native wild balsam *Impatiens noli-tangere*.

I have tended to associate the berry-bearing bushes black currant *Ribes nigrum*, red currant *R. ubrum* and gooseberry *R. uva-crispa* with these wet woodlands, as well as

large patches of raspberry *Rubus idaeus*, but they do not feature strongly in the data gathered by Rodwell. The red and black currant feature in the *Alnus-Carex* type species lists, but not the gooseberry, and the raspberry in the *Alnus-Urtica* type, both of which are essentially lowland woods. Perhaps these species are very sensitive to grazing and have become less frequent in the uplands – I have found blackcurrant, raspberry and gooseberry in isolated locations where there is no access to sheep in the lower Rhinogydd streamsides, and as they are an important element of floral diversity, as well as containing food plants for birds and a favourite feeding ground for bear, I have often wondered at how much more widespread they would have been in the original wildwood.