The Management of Semi-natural Woodlands

6. Upland Birchwoods

PRACTICE GUIDE

Forestry Commission

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Contents

Publishing update

This guide was first published in 1994. This edition is a reprint with a revised format and further reading section (page 21), otherwise the text has not been altered. The section on further reading has been updated to include relevant advice published since 1994. Please note that all references to *Forestry Authority* should be read as *Forestry Commission*.

Introduction

Ancient semi-natural woodlands are a vital part of our heritage. They provide a range of habitats which support a rich diversity of plants and animals. Many woodland species depend entirely for their survival on the continued existence of these habitats. Ancient semi-natural woodlands form prominent features in many landscapes and collectively constitute a significant economic resource. They are all that remain of the original forests which covered most of Britain and now occupy only 1% of land area. Concern about the continuing loss of area and character of ancient woods contributed to the Government's decision to introduce the Broadleaves Policy in 1985.

The Broadleaves Policy aims to maintain and increase the broadleaved woodland by encouraging good management for a wide range of objectives and giving special attention to ancient semi-natural woodlands to maintain their special features. It has generally been very successful in encouraging the expansion and better management of broadleaved woodland and in preventing further losses of ancient semi-natural broadleaved woodland. However, there is a need for policy guidance to take more account of local and regional factors, especially for semi-natural woodlands which vary greatly in character in response to differences in climate, soils and history.

The management guidelines for the native pinewoods of the Scottish Highlands published by the Forestry Commission in 1989 have proved a successful example of guidance for a specific type of semi-natural woodland. We have now extended this approach into a comprehensive set of advisory guides on the management of ancient semi-natural woods throughout Britain. For this purpose, we recognise eight broad woodland types as described in the Appendix.

The advice is intended to help owners and managers to achieve the best practice which will secure the woodland's future. The guides describe the management most appropriate for each type of woodland. Devised by Forestry Commission staff working closely with foresters and ecologists with special knowledge and experience of managing British semi-natural woodlands, they form a distillation of the best advice available.

Whilst these guides are aimed primarily at ancient semi-natural woodland, much of the advice in them will also be appropriate for other semi-natural woods which are of high conservation value, and for long-established planted woods which have developed some of the characteristics of ancient semi-natural woodland, notably where native trees were planted on ancient woodland sites.

The ecological value and character of ancient semi-natural woodland varies considerably. Some, notably in less accessible upland areas, owe much of their current value to a relatively low intensity of past management, although none have been totally unaffected by human influence. Others, especially in the lowlands, have developed a distinctively rich flora and fauna through a long history of consistent silvicultural management. Some have lost many of their special characteristics through various types of disturbance and many have been reduced in size so much that their survival is at risk. All are part of the nation's heritage, and deserve forms of management which recognise their different values. Some are designated as Sites of Special Scientific Interest. These may have specific management arrangements agreed with the conservation agencies, which are outside the scope of these booklets. The advice given here is aimed at encouraging forms of management which maintain and enhance the special characteristics of all ancient semi-natural woodland.

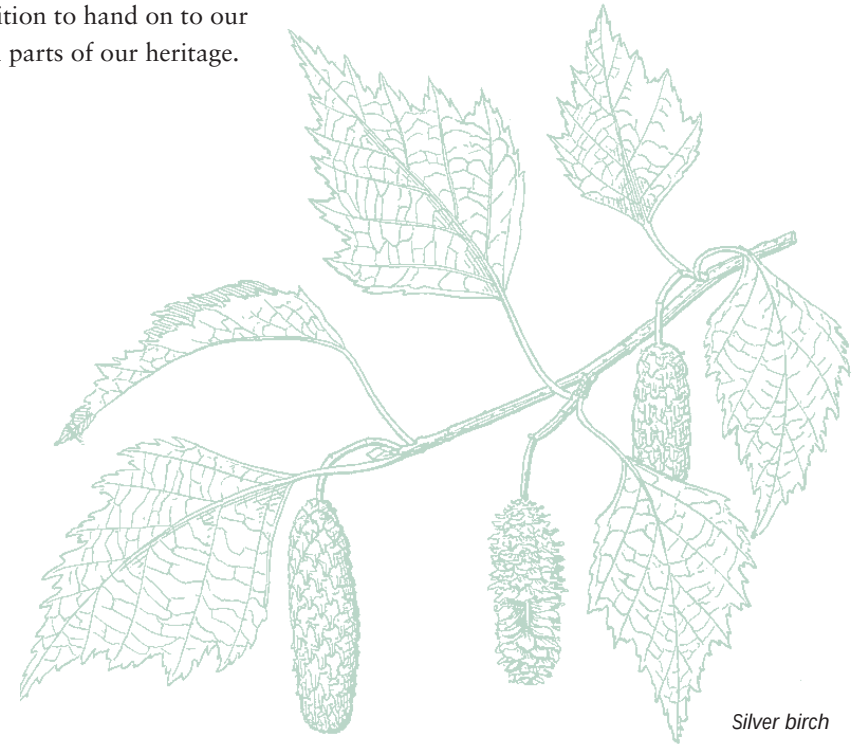
When grant aid is sought the Forestry Authority will compare management proposals with the advice contained in these booklets. Applicants are free to propose other forms of management for these woods, but must satisfy the Forestry Authority that their proposals will be effective in maintaining, and preferably enhancing, the special characteristics of the woodland. The advice given in these booklets is intended to create a flexible framework rather

than a straight-jacket, so that woods and their owners can develop their individuality as much as possible without reducing options for future generations.

Sensitive management which takes account of the individual character and circumstances of woods, and also the particular objectives of owners, is essential if their values are to be successfully maintained.

The appropriate form of management will vary considerably. In some cases, particularly some upland and many wet woodlands the most suitable management will be to reduce grazing and browsing pressures from deer or stock to levels which will allow natural regeneration or expansion of the wood to happen. More intensive forms of management may harm the unique wildlife interest of some of these woods. Elsewhere, especially in lowland woods with a long history of management systems such as coppice with standards, more active forms of silviculture will be appropriate and often necessary to conserve their character and wildlife as well as their value as an economic resource.

One thing which is certain is that positive management will be needed if we are to continue recent progress in halting the decline of our semi-natural woods and to restore them to a healthy condition to hand on to our successors as vital parts of our heritage.



Silver birch

Management principles for semi-natural and native woodlands

Semi-natural woods are composed of locally native trees and shrubs which derive from natural regeneration or coppicing rather than planting. Because of their natural features and appearance, semi-natural woods are valuable for nature conservation and in the landscape, and many are important for recreation and for historical and cultural interest.

Management should aim to maintain and enhance these values in harmony with securing other benefits, including wood products.

Ancient semi-natural woodlands are of special value because of their long, continuous history. They are the nearest we have to our original natural woodland and include remnants of the post-glacial forest which have never been cleared. They are irreplaceable assets which support many rare plants and animals and make a vital contribution to conserving biodiversity. They also contain a wealth of evidence of our past. Many have been greatly modified in structure and composition by centuries of management, whilst retaining many natural features. Some are threatened by neglect in the face of pressures such as fragmentation and overgrazing. The Forestry Authority encourages management which seeks to maintain or restore their special characteristics, including their natural diversity of species and habitats, aesthetic and cultural values and genetic integrity, whilst taking appropriate opportunities for wood production for a range of markets.

Management proposals should be geared to sensitive and low-key methods which are suited to the natural dynamics of these woodlands. Natural regeneration will be preferred to planting wherever practicable. More detailed guidance is given in the guide for each woodland type.

Other semi-natural woodlands, which have developed from natural colonisation of open ground sometime within the last few centuries, are also normally of high environmental value, particularly in the uplands, although they are not usually so valuable as ancient semi-natural woodlands because of their shorter history.

Appropriate management will vary according to the relative importance of these woodlands. For some, for example many long-established upland woods, management should be similar to that for ancient woods, whilst in woods of lower value a greater range of silvicultural options will be acceptable.

Planted woods of native species may often acquire some of the characteristics of semi-natural woodland, especially where they are on **ancient woodland sites**, where plants and animals have survived from the former semi-natural wood. The development of a varied structure and composition, including diverse native tree, shrub and field layer vegetation and the use of locally native species and genotypes for planted trees, can also increase the naturalness of native plantations.

Where planted native woods have developed a high conservation value in these ways management should be similar to that for semi-natural woods, but generally a wider range of silvicultural systems, including a greater emphasis on planting instead of natural regeneration, will be permitted under the grant aid and felling regulations.

New native woodlands, which are designed and managed from the start to develop a natural character, can help to offset some of the past losses of native woodland and will in time acquire a high environmental value, although they should not be seen as substitutes for any remaining semi-natural woodland.

The Forestry Authority will encourage by grant-aid the creation of new native woodlands on open land by natural colonisation or planting, where species composition and site are suitably matched, especially on areas close to existing semi-natural woods. Further guidance can be obtained in Bulletin 112, published by the Forestry Authority.

What are upland birchwoods?

This guide deals with the management of the semi-natural birchwoods of freely-drained soils in upland Britain. They are widely distributed in upland areas of all three countries but are especially common in Scotland, where birch accounts for nearly half of all broadleaved woodland. Birchwoods are typically found on the more acid infertile upland soils, over 250 m elevation. Birches are dominant in the canopy and other species form a variable proportion according mainly to soil type and management history. On the poorer soils there are few associates: rowan, occasional holly and sessile oak and, locally, Scots pine. On more fertile sites rowan, oaks, aspen, ash, alder, goat willow, gean, bird cherry, hazel, juniper, hawthorn and blackthorn (sloe) can all be found.

There are estimated to be 15–25 000 hectares of upland birchwood in ancient semi-natural woods, but more recent semi-natural birch woodland occupies a considerably larger area than this.

Birchwoods range from extensive tracts which are naturally birch-dominated, principally in the Scottish Highlands, through woods where birch dominance has been exaggerated by past management but is still relatively stable, to smaller areas of birch which develop on disturbed sites as single-aged stands within woodlands of other types or on moors or lowland heaths. The latter frequently give way to more mixed stands or to moorland as the birch ages.

This guide is concerned mainly with the first two categories. Much of this guide can however be applied to the smaller patches of birch, together with other relevant guides e.g. for oak, pine or mixed ashwoods. Lowland birchwoods, which occur locally on heaths and brecks in southern England, are strictly outside the scope of this guide but much of it can be used where it is intended to maintain them as birchwoods.

The birchwoods of peaty soils are included in Guide 8, Wet Woodlands, rather than here.

Upland birchwoods are defined here as those woods where at least half of the tree canopy is birch. They are closely related to upland oakwoods (Guide 5) on moderately fertile soils, mixed ashwoods (Guide 4) on base-rich soils and to pinewoods (Guide 7) on infertile podsolic soils in the Scottish Highlands.

Birch is naturally dominant in the North West Highlands where the cool, wet and windy climate excludes oak and pine and only rowan, sallows and hazel are common associates. The birch here is the shrubby form of the Downy birch (*Betula pubescens*; sub-species odorata) and the canopy is less than 10 m high.

In the cool boreal climate of the east and central Highlands the delicate pendulous branches of silver birch (*Betula pendula*) are particularly striking and it and Downy birch on the higher ground form almost pure birchwoods with only small amounts of oak, hazel, rowan, juniper, ash, aspen or pine. Although oak and pine have often been removed in the past birch dominance appears to be natural here to a considerable extent.

Birch is also dominant throughout the British uplands where altitude, combined with exposure or infertile soils prevent oak or ash dominance, yet allow the hardy birch to thrive. In Highland Scotland oak fades out at about 150 m in the coastal western areas compared to around 300 m in the east. Further south and west oak still dominates at higher altitudes and woodland has been largely eliminated on high ground so that birchwoods are much more uncommon in northern England or Wales. There, birch occurs as patches in a mosaic with oak and other broadleaves. In many upland birchwoods a natural tendency to birch dominance has been exaggerated by land-use practices and past management which has favoured it at the expense of trees which were more valued for timber, less adaptable or more palatable to browsing animals.

Today many birchwoods suffer from heavy grazing and browsing pressures which often threaten their survival, as well as reduce their ecological diversity.

Two types of upland birchwood on freely drained soil are recognised in the National Vegetation Classification (Rodwell, 1991[1]), as part of wider mixed birch/oak woodland types.

Sessile Oak–Downy birch–*Dicranum* moss woodland (W17)

These woods occur on the very acid infertile and normally shallow soils of the cool and more oceanic climates. Growth is usually slow and in extreme cases the wood may be no more than low scrub. Birch dominates in the north-west of Scotland and at higher altitudes where oak cannot thrive and also in places where oak or pine have been removed by extraction or heavy grazing. Rowan, sessile oak, and holly where grazing permits, are the main trees along with Downy birch, usually the shrubby form. Hazel is largely confined to pockets of deeper enriched soil. Blaeberry (bilberry), bracken, wavy hairgrass and great woodrush are typical field layer plants, with small amounts of other grasses and herbs such as heath bedstraw, cow-wheat, wood sorrel and tormentil. Ferns are often abundant in the western woods including hard fern, male fern, lady fern and common polypody. However, the outstanding feature of the flora of the western birchwoods are the mosses and liverworts (bryophytes) of which a great variety trails in profusion across boulders, tree boles and stumps and on steep unstable ground. Many rarities are found in the birchwoods of the Atlantic fringe.

Further east, woods of this type have fewer bryophytes and a greater variety and cover of grasses. The taller sub-species of Downy birch (sub-species pubescens) is more common and silver birch appears frequently on lower ground. Juniper and Scots pine are occasional, hinting at a greater degree of past mixing of pinewoods and birchwoods.

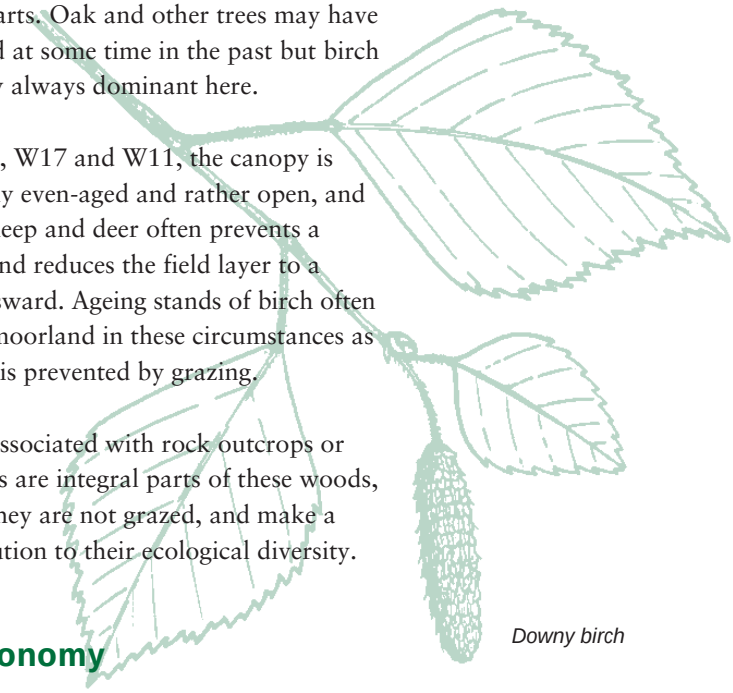
Sessile oak–Downy birch–wood sorrel woodland (W11)

Birchwoods of this kind are found on acid, leached brown earth soils, which are more fertile than the previous type. Growth is stronger with more potential for straight, tall trees. Hazel is often abundant. Rowan and oaks (both sessile and pedunculate) remain the main associated trees, but a number of minor trees and shrubs do appear occasionally including aspen, juniper, sloe, hawthorn, goat willow, gean and bird cherry. Grasses and bracken are stronger than in the last type with little or no blaeberry or heather and fewer bryophytes, although the latter still feature strongly in the western woods. A greater variety of herbs can be found, especially in the east, including dog violet, earthnut, stitchwort, wood anemone and chickweed wintergreen as well as abundant wood sorrel. Bluebells (wild hyacinths) and primroses are notable in western woods of this type.

In eastern Highland Scotland silver birch often dominates birchwoods of this type, although Downy birch is usually present also in the wetter and higher parts. Oak and other trees may have been depleted at some time in the past but birch was probably always dominant here.

In both types, W17 and W11, the canopy is typically fairly even-aged and rather open, and grazing by sheep and deer often prevents a shrub layer and reduces the field layer to a short grassy sward. Ageing stands of birch often give way to moorland in these circumstances as regeneration is prevented by grazing.

Open areas associated with rock outcrops or peaty hollows are integral parts of these woods, even where they are not grazed, and make a vital contribution to their ecological diversity.



Downy birch

Birch taxonomy

Three birch species are indigenous to Britain: Silver birch (*Betula pendula Roth*; also known as *Betula verrucosa Ehrh*), Downy birch (*B pubescens Ehrh*) and Dwarf birch (*B nana L*). Dwarf birch does not grow taller than a low shrub and this guide is confined to the two tree species. Both species very considerably in overall appearance and detailed morphology. Some characteristics overlap and hybrids also occur. Most authorities distinguish two sub-species of B pubescens. Sub-species pubescens is the more widespread type of Downy birch, usually tree-like in habit with downy young growth, whereas sub-species odorata (also known as carpatica or tortuosa) is a small-leaved, more shrubby variety occurring mainly in more exposed sites in northern and western Scotland. It has young growth covered in resinous aromatic warts and hairs which are soon lost.

Division into two main species is usually accepted as adequate for most purposes, but note that some inherited variations within species, particularly pubescens, appear to be linked to geographical location. This has implications for the method of regeneration for birchwoods.

History and traditional management

Birch colonised Britain very quickly as the last Ice-Age receded. Some 9 500 years ago it was already widely distributed and had reached North Wales, Skye and much of the Highlands.

There have been some modern introductions but seldom on the scale of woodland plantings, and it is reasonable to assume that present populations have almost entirely evolved from the original gene pool, distributed mainly by natural means.

Both species are now widely distributed and extensively intermingled in Britain. Silver birch is faster growing, but is less able to tolerate exposure or wet soils. It has a generally eastern and southern or locally sheltered distribution and is most common in the lowlands and in the lower parts of upland valleys. Downy birch extends to higher elevations and into more severe exposure, and can tolerate wetter and more acid, often peaty, soils. The most northerly natural birchwoods in Scotland are entirely of Downy birch (sub-species odorata).

Aspen

Birches are pioneer trees which can rapidly colonise disturbed ground to form even-aged and often short-lived stands which tend not to regenerate under their own canopy. Historically, there is some evidence that birch stands formed part of a complex mosaic of woodland with patches or swathes dominated by pine, oak, other broadleaves and juniper interspersed with open areas of heath and mire. This mosaic was not static; the dominance and density of birch, oak and pine fluctuated through time at individual sites. At the margins, woodland could give way to periods of moorland as old stands of birch or pine succumbed to fire or storm. Mixtures and alternating dominance of birch and oak were common on the more fertile soils whilst birch and pine mixtures were prominent on the less fertile podsols and colder parts of the Scottish Highlands.

Nevertheless some ancient Scottish birchwoods are known to have persisted in their core areas over hundreds of years without changing to other woodland forms, although their boundaries have fluctuated.

The historical mobility and dynamic composition of upland birchwoods has shaped their wildlife and has important implications for future management.

The former mixed natural woodland mosaic of upland Britain was gradually fragmented by felling, grazing and burning into the modern pattern where birch, oak, pine, mixed ash and juniper woods are more isolated from each other and often have a more uniform composition than in the past. Many modern birchwoods are also even-aged, having developed as a result of a period of reduced grazing pressure or a muirburn which provided a good seedbed. This makes them vulnerable and liable to die out without positive management.

The area of the older semi-natural birchwoods is thought to have decreased in recent decades, due to high grazing pressure sometimes combined with burning, and also replacement by underplanted conifer plantation. Conifer underplanting virtually ceased in 1985 with the Broadleaves Policy. Losses from browsing and fire appear most severe on the higher ground where many woods appear moribund. In the upland valleys and the lowlands birch is being locally successful in regenerating and colonising new ground where grazing pressure is reduced.

Birchwoods were exploited in the past for a wide range of materials by local communities but in more recent times the main uses of the wood have been firewood and locally for chipboard or paper pulp. They have been widely used for shelter and grazing by livestock and deer especially in the last two centuries. Positive management of birchwoods has been uncommon however; they have tended to be exploited rather than deliberately encouraged or managed silviculturally.

Values

Landscape

Birches are amongst the most beautiful of our trees. They combine graceful, delicate branches and foliage with a range of subtle seasonal colours of bark, twigs and leaves which is hard to match. The sight of young birch leaves and catkins fluttering in the May breeze is for many an essential part of the attraction of hill country. The delicate grey-green of birch is complemented by patches of darker oaks, pine or juniper or drifts of bright green ash marking base-rich flushes.

Many bare upland landscapes would be enriched and softened by the return of some of the birchwoods which were present in earlier times.

Historical and cultural

The long association of birch with upland landscapes is part of our cultural heritage and is reflected in many local place names in Gaelic, Scots, Welsh as well as English, and in songs and paintings. Birchwoods often contain archaeological relics dating back to prehistoric times and sometimes more recent features such as deserted shielings or ruined croft houses.

Wildlife conservation

Upland birchwoods have great value for wildlife conservation. They provide habitat for most of the species of deciduous woodland which can tolerate the upland climate especially where the wood contains other trees and shrubs as well to support various specialist insects. Birchwoods often increase the fertility of upland soils and this in turn increases the richness of the whole ecosystem compared to adjacent moorland areas.

Over 300 specialist insects are associated with birch, especially moths, and many of these have a northerly distribution so that Highland birchwoods have a higher relative value.

Although very few plant species are confined entirely to birchwoods, they favour the growth of herbs and grasses which are less common outside woods and they support a very rich bryophyte flora, including many rarities, in western woods. Some northern plants like chickweed wintergreen and globe flower (in ungrazed woods) are strongly associated with Highland birchwoods.

Birchwoods are valuable also for mammals and birds, although the lack of tree species diversity, a shrub layer or tall field layer vegetation in many woods restricts their potential.

Upland birchwoods are important for wood warbler, redstart and black grouse, for example. The small population of resident redwing in northern Scotland is largely dependent on birchwoods. Birch rots quickly and provides valuable deadwood habitat for fungi, beetles and hole-nesting birds.

An important aspect of the value of birch is that it is the only tree which can form extensive broadleaved woodland in the harsher parts of the uplands.

Recreation

Upland birchwoods in accessible valleys are valued by walkers and picnickers, especially close to water. They are fairly robust woods but walkers may need to be kept away from wet or flushed base-rich patches which are fragile and ecologically important.

Game and livestock

Upland birchwoods often provide valuable shelter for sheep and cattle and can give good grazing, especially in mature woods where the soil fertility has been increased. Although current pressures are often too high, a continuing role for shelter and grazing will be valuable in the mixed upland economy in future. This will need to be achieved without risking the survival or ecological value of the woods.

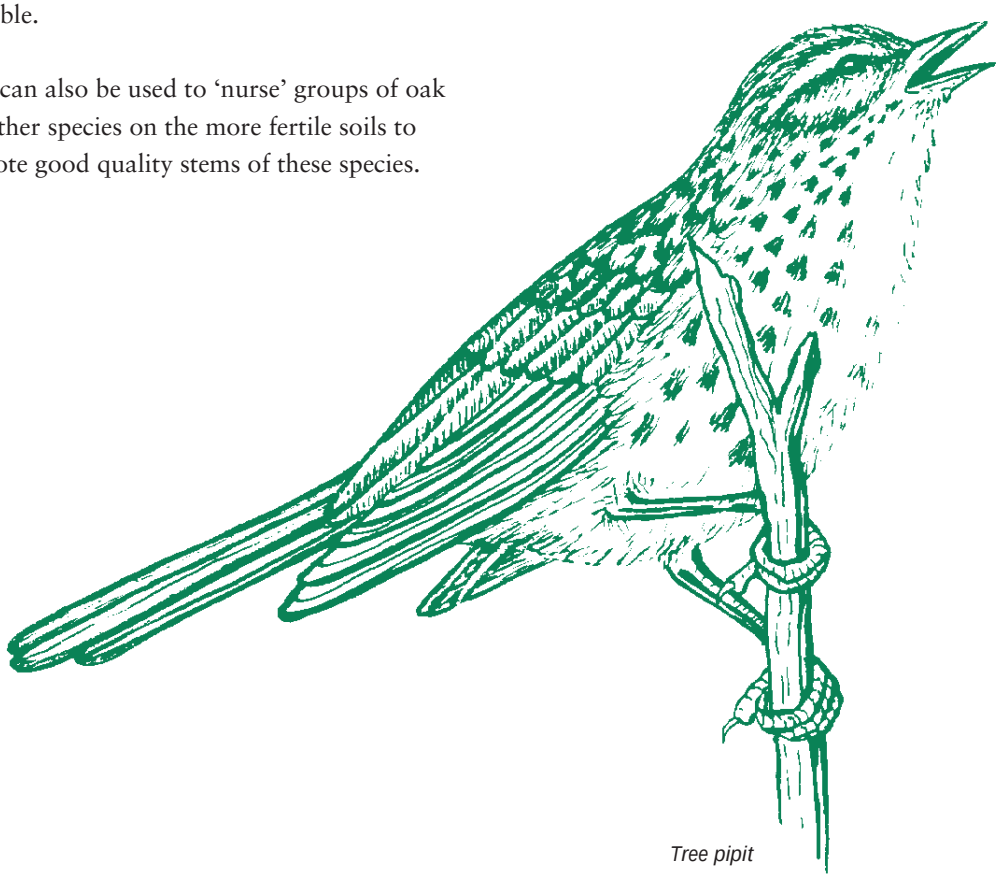
Game other then deer are not usually an important feature of birchwoods although they do support black grouse, woodcock, and, in some areas, pheasants.

Wood production

Birch is used mainly for firewood at present and is often regarded as worthless for timber because of the poor form of many present-day birchwoods. The latter is at least partly due to lack of tending and to browsing and fire which result in twisted coppice stems. Improvements in form can be expected with good management, at least with silver birch on the better sites. Good quality birch timber is in fact strong and versatile and can be sawn for general use.

Straight birch stems make excellent turnery wood. Other potential uses could be developed if a sufficient supply of good quality birch was available.

Birch can also be used to 'nurse' groups of oak and other species on the more fertile soils to promote good quality stems of these species.



Tree pipit

Policy Aims

The aims of policy are to encourage appropriate management of semi-natural upland birchwoods so as to:

- **Maintain and wherever suitable restore the natural ecological diversity;**

- **Maintain and where appropriate improve their aesthetic value.**

These two aims should be applied in every case. In the great majority of woods they should be compatible with each other but where conflicts do occur the first should tend to take priority over the second because of the national importance of ancient semi-natural woodland for nature conservation. However, each wood should be assessed according to its importance in the landscape and for nature conservation.

- **Maintain the genetic integrity of populations of native species, so far as is practicable.**

This aim is relevant for semi-natural woodlands where the genetic integrity of native tree and shrub populations has not been seriously compromised by past introductions of non-native stock within or close to the woodland.

- **Take appropriate opportunities to produce utilisable wood.**

The production of utilisable wood, including timber, is not an obligatory aim for every woodland. It is possible to achieve all the other policy aims without it, and indeed in those woods where minimal intervention is an appropriate philosophy, wood production may not be desirable. However, for many owners, securing an adequate income from their woodlands is essential in ensuring the continuity of management necessary to achieve these aims. Improving timber values, and hence the financial viability of the woodland, in ways compatible with other aims, is therefore a general strategy which the Forestry Authority encourages.

Many semi-natural upland birchwoods are capable of yielding significant quantities of utilisable timber, a proportion of which can be of relatively high quality. With good management as suggested in this booklet, these products can be harvested in ways which are compatible with achieving the policy aims.

- **Enlarge the woods where possible.**

Expansion of ancient semi-natural woodlands is very often desirable, especially for small woods, to secure their long-term future.

Each wood is unique in its characteristics and its relationship to the surrounding landscape. Although many upland birchwoods are fairly uniform, often partly due to past management most include significant small-scale variety of site conditions. Within practicable limits the aim should be to reflect this inherent diversity in future management.

Application of this guide

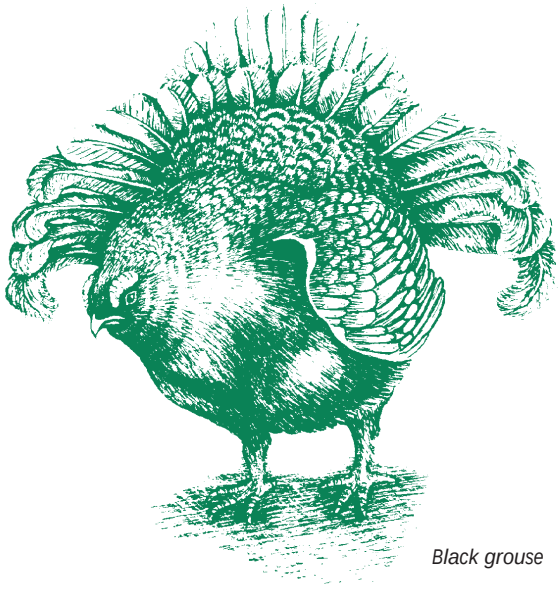
This guide should be applied to all ancient semi-natural woods of this type managed under the Woodland Grant Scheme. They will normally qualify for the special rate of management grant where work is done to maintain or improve the special environmental value of the wood. It will also apply to Felling Licence applications, to management under other grant schemes and to woodlands in the management of Forest Enterprise.

Semi-natural upland birchwoods of recent origin can sometimes be as valuable as ancient semi-natural woods for nature conservation and scenic value, especially where they are growing next to an ancient semi-natural wood. Most semi-natural upland birchwoods should therefore be treated in a similar way to ancient semi-natural woods.

Much of the advice in this guide can also be applied to ancient birch woodlands which have been converted to broadleaved or mixed plantations. The nature conservation value of these woods is generally less than that of ancient semi-natural woods, so it is usually legitimate to place a greater emphasis on timber production. In ancient woods which have been converted to conifer plantations, but which have retained some nature conservation value, there may be opportunities to restore semi-natural upland birch woodland at least on part of the site by including appropriate native trees and shrubs in the next rotation.

Another unusual type is old birchwoods planted on sites which had not previously been wooded. These sometimes acquire conservation values similar to that of ancient semi-natural woodland. Here too much of the advice is this guide can be applied.

Where the woodland is designated as a Site of Special Scientific Interest (SSSI) guidance must be sought from Scottish Natural Heritage, English Nature or the Countryside Council for Wales before carrying out any operation or change of management. Any other legal constraint on management, such as a Tree Preservation Order or a Scheduled Ancient Monument, must of course be respected.



Black grouse

The management plan

For any woodland to receive grant aid from the Forestry Authority, management objectives and a programme of work must be agreed for a five year period.

In the case of semi-natural woods, especially the larger and more complex ones, it will be helpful to prepare a separate management plan, which can be used for reference when the detailed proposals are revised every five years, on grant applications. The management plan should contain an assessment of the woodland, including any special characteristics, a statement of objects of management and their priorities and a long-term strategy setting out the desired future condition of the wood and how it is proposed to achieve it. This will be of great value for semi-natural woods where management should be particularly sensitive to the individual values and character of each woodland. The management plan should be brief and succinct; long descriptive essays are not likely to be read.

Here is a checklist of some of the factors to be included where relevant:

Description

- Name, location.
- Areas, with sub-divisions if these clarify management proposals.
- Historical aspects, including past management.
- Tree and shrub species, notably dominant trees and abundant underwood shrubs.
- Age class distribution of trees; stocking; composition and condition of any natural regeneration.
- Ground flora; dominant species and any unusual species.
- Fauna, especially any rare, unusual, attractive or notable species.
- Conspicuousness in the landscape.
- Cultural features.
- Statutory designations.
- Constraints.
- Existing public access and planned future access.

The description should be a brief summary of the main features, ideally based upon survey information.

Local Forestry Authority offices may be able to advise on sources of specialist advice and survey information.

Evaluation

Itemise any special values, e.g. prominent in landscape, rare species, natural features, historical associations, quality timber potential. Careful assessment of the values of the wood will help to generate suitable management objectives.

Objects of management

All the policy aims must be respected, although as explained earlier not all are relevant to every wood. The owner may have additional objects of management for a wood. The owner should express the particular policy aims for the wood, giving details of management objectives and indicating priorities. Owners may find it helpful to discuss their objectives with local Forestry Authority staff.

Management proposals

A long-term strategy should be stated, which specifies any changes in composition envisaged, the overall woodland structure which is sought and any silvicultural systems to be used. It would be helpful to state the reasons for adopting this

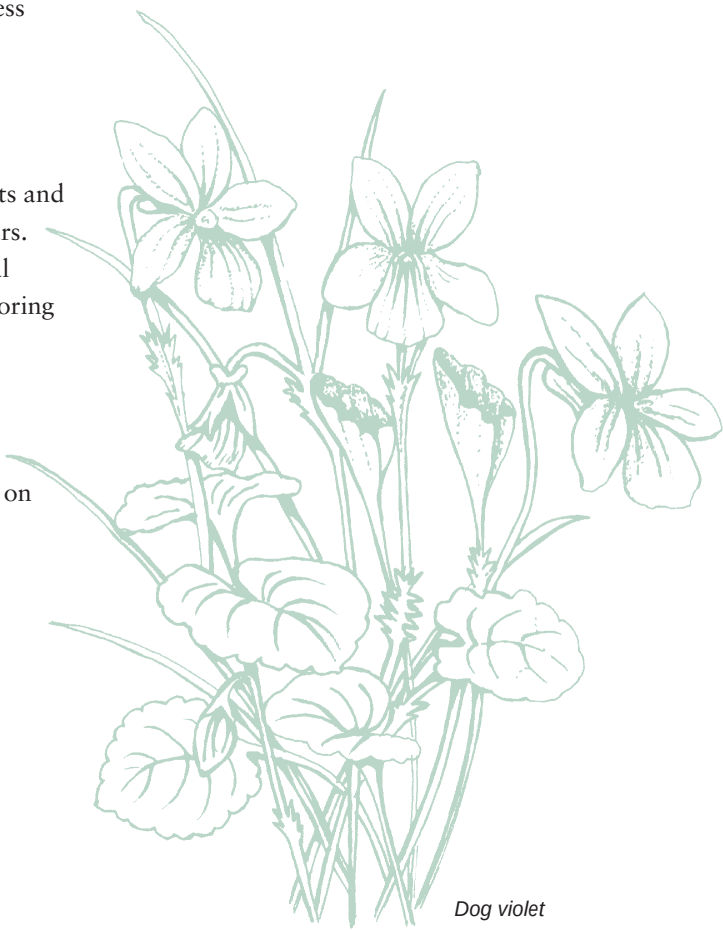
strategy. The timescale may be many decades or more than a century. A five year summary work plan should be proposed, itemising the areas to be worked and the main operations to be carried out in the next five years.

Monitoring

A vital stage, often omitted, is the monitoring and review of management. Has it delivered the desired results? An ideal review point is the revision of a grant scheme or plan of operations every five years. Monitoring requires that some record be made of what the wood was like at the start of the period, the work done and how the wood responded. Experience demonstrates that, even in small and well-known areas, memory seldom provides the level of detail and accuracy required. Monitoring should be targeted to assessing how well the objectives of management are being achieved. This may mean, for example, assessing the success of natural regeneration or changes in woodland structure and species composition. Where rare habitats or species are present their progress may also be monitored in response to woodland management.

Simple techniques such as fixed-point photography can be used by non-specialists and provide valuable information over the years. Amateur naturalists as well as professional ecologists may be able to help with monitoring the wildlife of woods.

Some sources of advice on monitoring are listed in Further Reading and Forestry Authority staff may also be able to advise on what is needed for individual woods.



Dog violet

Operational Guidelines

General principles

The policy aims for upland birchwoods lead to general principles for management.

- **Maintain semi-natural woodland types.**

Management should be based on growing species native to the site and appropriate to the pattern of soils within the site. Existing abundant species should remain a significant component.

- **Improve diversity of structure.**

A range of age classes within each site is preferred to the single age class often encountered.

- **Increase diversity of species, where appropriate.**

Many upland birchwoods have a very limited range of tree species because of historical management.

- **Maintain diversity of habitat.**

A diverse structure and mixture of species improves habitat diversity, but open areas are also extremely important. They can be temporary (recently cut areas) or permanent (e.g. mires).

- **Maintain a mature habitat.**

This can be achieved by retaining old, dead or dying trees either standing or fallen, and by increasing rotation lengths.

- **Moderate rates of change.**

Although birchwoods are adapted to quite large natural disturbances, wildlife takes time to adjust, so change should not be too drastic. This applies both to the scale and sequence of felling, and the layout of the wood.

- **Use low-key establishment techniques.**

Aggressive working methods should be avoided. The general rule should be to do the minimum necessary to ensure adequate establishment and growth.

The need for management

The type of management which is appropriate for individual woods needs to be carefully considered at the outset before any system is chosen.

A few woods, usually in nature reserves, may be managed on a 'minimal intervention' basis to allow their natural development to be scientifically recorded. Elsewhere some active intervention will generally be needed to safeguard and restore upland birchwoods whether or not wood production is an objective.

The basic requirement is to secure the long-term survival of the wood. The most important single measure to achieve this will often be the control of browsing and grazing by sheep and deer to that the wood can periodically regenerate or expand. Further intervention may often be unnecessary.

Where regeneration fails, for example in old scattered even-aged woods or dense woods with no opportunities for expansion onto adjacent land, then scarification, planting and felling coupes may be needed.

A low intervention approach is particularly suitable for the more remote and inaccessible woods which do not have a long history of silvicultural management (although some trees may have been felled from time to time) and where the potential for substantial wood production without damage to the site may be low. In these woods on more accessible sites and better soils where wood production would be more worthwhile and also in other woods which have been strongly influenced by silvicultural management in the past, a greater degree of intervention is usually appropriate using some type of silvicultural system as described below.

Some management techniques can sometimes have adverse effects on the site or the wildlife

Globe flower

of a wood, so careful thought needs to be given to operations such as cultivation to achieve benefits without adverse effects. Ways of achieving the right balance are suggested below.

Silvicultural Systems

High Forest

Historically birchwoods have been managed, if at all, as high forest and wood pasture more often than as coppice and forms of these systems should continue to predominate in future.

A more diverse woodland structure should be introduced to the even-aged woods, aiming for three or more age classes ranging from very young to biologically mature stands and including some open areas. Birchwoods often regenerate more successfully outside their boundaries than inside, so it is important to allow for this where possible. Enlargement will often be preferable to cutting gaps in the canopy not only because it may be more successful but also because in small woods removing mature trees could prejudice their survival.

The size of stands of similar age and the proportions of open space should reflect natural features of the site. It is best to avoid very small stands. The smaller and more numerous they are the more complicated their management will be and stands of much less than 0.5 ha are difficult to regenerate because of shade from surrounding trees. In any case birch naturally often develops in even-aged stands of one hectare or more, especially on uniform sites. The upper limit of stand size will often be determined by the scale of the surrounding landscape as well as by the need to restrict stand size in order to get a reasonable spread of age classes.

The longevity of birch varies with site quality: it can be 80 years on fertile sheltered sites and over 200 years on exposed poor sites. Growth rates start to decline after about 60 and 80 years respectively. Where wood production is an important objective, rotations should be within this range for most of the wood with some areas allowed to die and decay naturally. Sometimes stain or rot affects trees before age 60 and shorter rotations may be needed to produce high quality timber.

Even where wood production is not intended it will still be desirable to seek sufficient recruitment of young trees to sustain the wood on a presumed 80–100 year cycle, occasionally more where trees are more longlived, in case the mature trees are prematurely removed e.g. by storm. Management plans for birchwoods should assume rotations of these orders for component stands. Where whole birchwoods are in decline, widespread and immediate regeneration measures may be essential. Felling to promote regeneration in open degenerate woods is unnecessary and undesirable.

Coppice

Coppice has not been much used to manage birchwoods; indeed birch was often weeded out of coppiced oakwoods as an undesirable species. Birch can be managed as short-rotation coppice on cycles of up to 10 years, but it coppices less vigorously than some other broadleaves and the stools do not endure repeated cutting. Young birches on fertile soils produce the strongest coppice shoots. Shoots from stumps of mature or moribund trees, or from stumps over about 15 cm diameter are usually short-lived or weak and distorted. An exception to this may be the shrubby form of Downy birch (sub-species odorata) which can sprout from old stems and appears to perpetuate itself by this means.

Coppicing is not generally recommended as a means of revitalising semi-natural birchwood older than 10–15 years.

Short rotation birch coppice is only productive on very favourable lowland sites. On such sites coppice sustains valuable wildlife habitats, especially where coupes are adjacent or in close proximity. Stools require regular replacement with seedling trees to maintain coppice vigour.

Woodland pasturage

Many upland birchwoods have been used in effect as woodland pasture for hundreds of years. The lowland concept of a scatter of old trees maintained by pollarding does not apply so well to birch although it would be feasible to manage woods to produce a continual

succession of well-spaced mature birch. The benefits to wildlife would not be so great as with oak or beech wood pasture in the lowlands because the value of old birch is relatively less. However, some parts of woods could be developed in this way as an alternative to high forests. Where feasible, birchwoods could be allowed to fluctuate across moorland to provide a succession of temporary areas each offering shelter and grazing for a few decades.

Harvesting

Thinning and felling on well-drained ground is normally straightforward, but extraction can give problems due to poor access, steep or rough ground and the need to avoid sensitive sites with machinery. Sensitive small scale extraction methods are desirable. Limited ground disturbance from harvesting can stimulate regeneration but compaction and rutting should be avoided. Tractor operators should avoid crossing watercourses and other wet areas and avoid working on waterlogged soils. Archaeological features must also be avoided.

Retained old trees and deadwood

Many woodland wildlife species depend on large, old trees, standing dead trees and large fallen trunks and limbs. Dead birches rot quite quickly but they provide a niche for a range of fungi and dead wood insects, including rare flies which feed on fungi. Holes are easily excavated by woodpeckers and used by other birds. Uprooted birches often survive for long periods and provide a slower succession of habitats.

Management should aim to maintain and increase the number of large, old trees and the quantity of fallen wood by allowing some timber trees to grow longer than might be commercially desirable. Windblown trees can be left where they lie. Trees in difficult corners, along streamsides and on margins can be retained indefinitely. Retaining some mother trees in shelterwood regeneration provides useful mature trees, scattered among younger growth. Thinning can be used to develop large windfirm trees for the future.

Some felled and lying deadwood should be left after harvesting as well as standing deadwood. It is of most value if it is lying in shaded and moist conditions. Large dimension timber is usually more valuable than smaller branches and stems. Smaller diameter material is best heaped up into piles.

Methods of regeneration

Natural regeneration

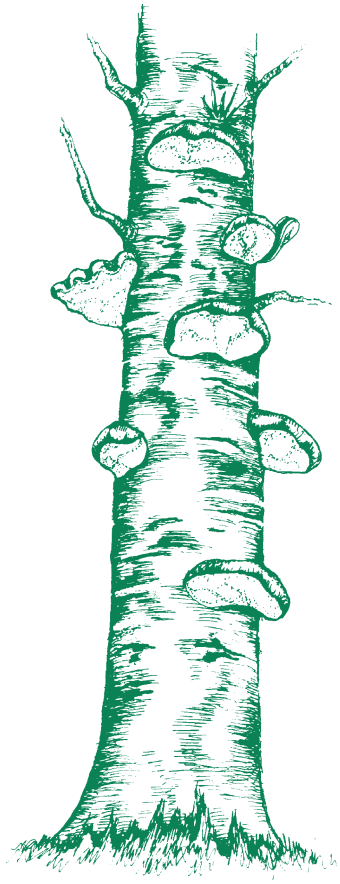
Natural regeneration is strongly preferred to planting. It favours the natural distribution of tree species in relation to site conditions, allows shrubs, where present, to grow with the trees, maintains local genotypes, and usually produces mixed stands of diverse structure.

Birch is capable of vigorous regeneration under favourable conditions which is normally cheaper than planting. Other trees and shrubs that are natural components of birchwoods, including Scots pine in its natural range, should also be encouraged to regenerate. Where these species are absent a decision is required about whether to plant them or await gradual colonisation.

Generally it may be best to await natural colonisation, but where there is good evidence of the removal of species through man's influence in recent times and the prospects for colonisation are very slow, planting using local genotypes should be considered. Examples of slow colonisers are juniper and aspen.

Seed shedding, germination and seedling establishment need favourable conditions. Birch seedlings are intolerant of shade, so successful regeneration occurs only outside a wood or in well-lit clearings. Regeneration outside the wood should be strongly considered before any felling coupes are decided upon especially in the case of small woods.

Most viable seed falls within 50 m of a full-grown parent tree. Adequate regeneration occurs beyond this distance where conditions for germination and survival are particularly good, but regeneration plans dependent on natural seed dispersal should be based on the 50 m range. The distance can be extended by hand-seeding beyond the woodland edge.



Polypore fungus on dead birch

The size and shape of felling coupes must allow full light and an adequate rain of birch seed to reach the ground. A number of local factors may determine the shape and size of felling coupes. As a rough and general guide, coupes in mature birch should be between 30 and 80 m wide. The minimum width should be three times the height of the surrounding trees. Coupes substantially wider than this will require the retention of scattered mother trees at about 25 per ha.

The total area of initial felling coupes should not normally be larger than one quarter of the total area of the wood, unless landscape considerations dictate otherwise. In larger woods it will often be necessary for the total felling area to be made up of several small coupes to maintain habitat diversity. It is often best to choose poorly stocked areas as regeneration coupes, provided the site is suitable, and to concentrate on areas where the canopy is beginning to decline. This is often accompanied by the spread of dwarf shrubs which themselves provide a suitable habitat for birch regeneration.

Planting

Planting is less acceptable than natural regeneration or direct sowing but can be employed where the latter methods fail. Plants should ideally be produced from seed from the wood concerned, or from a wood close to it and growing under comparable conditions. Birch responds well to being raised and planted as plug stock from containers, whereas it is not an easy subject for bare-root planting. Trees should be planted at variable spacing to accord with variations in the ground surface, soil or vegetation and not distributed evenly over the site. Groups of birch at 2 m spacing should be used for good stem form with gaps of variable size between groups.

Conifer 'nurses' are neither required nor appropriate for upland birchwoods; birch is a light-demanding species which in itself is often a nurse for other trees.

Scots pine of local origin can be planted into birchwoods where they are close to native pinewoods (Guide 7) provided any planting is on a small scale on appropriate soils.

Site Preparation

Upland birchwoods are normally well-drained but damp flushed areas or small mires develop in hollows. Drainage of these patches is undesirable: they are essential elements of habitat diversity on which woodland species depend.

Cultivation should not normally be done until the effect of grazing control over a period which includes good seed years has been adequately tested.

If all that is required is sufficient regeneration to rejuvenate part of the wood over a 10–20 year period then cultivation will usually not be necessary, provided advantage can be taken of favourable sites for regeneration inside and outside the wood.

Birch regenerates more easily amongst leggy heather or grasses such as wavy hairgrass on podsolic soils. These conditions are often found outside the wood. Some form of cultivation may hasten or thicken regeneration but each site is different and, since it may also have undesirable ecological effects, an informed judgement is required.

Nevertheless limited disturbance of the surface soil on gentle slopes will often increase regeneration without causing unacceptable ecological effects. Scarification is the best treatment and it should be intermittent and superficial, just enough to expose the mineral or well-decomposed humus layers. Large expanses of bare soil are unnecessary and lead to heavy losses of seedlings in dry weather. Scarification should be done shortly before the seed falls, in late summer, and only when the catkin crop promises a good seed fall.

Cultivation is more likely to be necessary for sites with dense grass swards on brown earth soils such as those which have been heavily grazed. When grazing is removed on these sites the dense sward prevents further germination of birch although occasional oak or hazel may regenerate. Limited areas of this type could be left as open ground to avoid bringing in a scarifier especially. Birch may not be naturally dominant on these areas of rich soil in any case.

Burning requires considerable experience and substantial resources to be successful and safe; it should not be attempted without them. Hand mounding or screefing is sometimes useful. The treated patches must be large enough to prevent seedlings being overcome by ground vegetation.

Dense bracken prevents any regeneration and extensive stands may require herbicide treatment. Ground treatment is usually not warranted where mineral or humus soils are exposed, such as after felling, clearing of Rhododendron, or burning.

Grazing and the timing of its removal can be used as a substitute method of ground preparation; a period of heavy grazing often allows a stock of browsed seedlings to accumulate which can establish themselves when grazing stops. A careful check for such seedlings should be made before deciding on cultivation. Where quality timber is hoped for, this method may be less useful as the form of the trees may be affected by repeated early browsing.

Weeding

Ground vegetation consists of native plants which provide a habitat for woodland fauna, so weeding should be kept to the minimum necessary for tree growth.

Although hand-cutting generally does least damage to the wildlife of a wood, particularly if it can be delayed until late June, herbicides are usually cheaper and more effective at reducing root competition, especially where grasses are dominant.

They should be applied only where essential to prevent young trees from being swamped by vegetation. Applications should be minimal and confined to key areas. They should be limited to spot applications of one metre diameter around trees. This may be required annually for up to four years. Where herbicide is used for dense bracken or rhododendron, care must be taken to avoid damage to other plants, for example ferns where Asulam is used, and to watercourses.

Weeding is generally less likely to be necessary for natural regeneration than for planted stock. Birch is a fast growing pioneer and except where fertilisers or cultivation are used it will frequently outpace the adjacent vegetation without the need for weeding.

Tending and thinning

Where wood production is an important objective, respacing and thinning should be carried out to select stems of good quality and keep them growing vigorously. The ideal is to maintain a crown depth equal to 40–50% of tree height.

Birch usually regenerates in thick clumps which may require respacing at an early stage (between 1.5 and 4 m in height) to prevent snow-break and stagnation, and to permit crown development.

While on some sites, Downy birch at least has been known to self-thin very satisfactorily resulting in fine, tall trees, subsequent thinnings will usually be required at regular intervals to promote the development of well-proportioned trees. Heavy thinning of silver birch helps to develop trees with a pendulous appearance.

If thinning has been neglected or long delayed, the stand should be opened up gently. A single heavy thinning exposes the crowns to snow damage and thin trees may snap in the wind.

Thinning can significantly influence the conservation value of a wood. All the species of a natural mixture should be retained as late into the rotation as possible and preferably into the final crop. Heavy and early thinning will allow a shrub layer and vigorous ground vegetation to develop. Varying the intensity of thinning and retaining some unthinned clumps is desirable to encourage structural diversity into a wood which might otherwise be uniform.

Exotic species

Any underplanted exotic conifers should be removed before they do damage to the ground flora: their removal may bring in a small surplus. The disturbance associated with

removal often generates prolific natural regeneration, especially pine of local origin.

Several non-native trees commonly colonise upland birchwoods. In the case of Sitka spruce, western hemlock and other exotic conifers, complete removal of trees and saplings is recommended, followed by periodic removal of later saplings. Exotic conifers may have been planted on land beside upland birch-woods, and these will form persistent seed sources: a buffer zone of at least 50 m where conifers are removed should be considered where practical.

Within the native range of Scots pine in the Scottish Highlands birch and pinewoods were often more mixed in the past, and pine can be accepted as a natural component where it colonises birchwoods, especially pine of local origin.

Beech and sycamore are occasionally found in upland birchwoods. If they occupy a small proportion of the canopy, and there is a risk of significant spread, which is more likely with beech than sycamore in this type, they should be eradicated. Otherwise it is more practicable to accept them as part of the mixture and control them during thinning and cleaning operations, so that they form no more than a small proportion of the canopy trees, and never dominate the understorey.

Rhododendron can sometimes be a serious problem, inhibiting regeneration and extinguishing ground vegetation. They are very expensive to remove, especially on rocky terrain, but their removal is the priority. Prevention is better than cure: young saplings should be removed immediately and scattered bushes should be killed before they coalesce into a dense understorey. The most severely infested woodlands may be uneconomic to reclaim and a strategy of containment may be necessary. Rhododendron clearance may be eligible for special management grants under the Woodland Grant Scheme in ancient semi-natural woodland.

Nutrition

It is seldom necessary to fertilise regeneration sites within the woodland because forest soils contain sufficient nutrients. However, applications of phosphatic fertilisers can assist Downy birch woods to expand on the poorest soils, upland peaty gleys and ironpans. Fertiliser application should be confined to spot treatment around trees.

Fertilisers are not advisable on other sites because of the effect on the composition of semi-natural vegetation and because they may benefit competing vegetation more than the birch. Phosphate application may improve seed crops from older trees in decline on infertile sites, but the evidence for this is not very compelling.

Grazing and browsing

Low intensity grazing and browsing is a natural feature of woodlands which helps to maintain diversity in composition and structure. However, in the small, isolated and unmanaged woodland we have now, even very low numbers of deer and sheep will selectively browse young growth. Fencing is thus normally necessary, of the whole wood, or of that part which is currently being regenerated. It may be possible to secure regeneration without fencing by removing domestic stock and heavy culling of deer provided this can be sustained over a sufficient area and time. Where there is doubt it is safer to fence.

When whole woods and large parts are fenced against deer, further control may be necessary. Fences must be well designed and maintained. External fences should be placed far enough from the wood edge (about 100 m or more) to allow for expansion by regeneration and for a natural looking graded edge to develop. Sheep often penetrate poor fences or enter over snow in winter, devastating young broadleaves.

Eventually, fenced areas can be opened to grazing again once the regeneration is safely established but for conservation purposes grazing levels should be lighter than is currently normal.

Grey squirrel control

Grey squirrels are unlikely to cause significant damage in upland birchwoods but culling may sometimes be required as part of a programme to control their numbers and limit damage in adjacent vulnerable oakwoods or mixed ash-woods. Control methods are described in FC Research Information Notes 180[2], 191[3] and 232[4].

Chickweed wintergreen

Open ground

Open areas in semi-natural woodlands provide exceptionally important habitats. Upland birchwoods frequently contain glades with bracken, heath grassland or mires, which diversify the wood by creating warm, sheltered openings. Birchwood margins are often irregular, forming a complex transition to other semi-natural habitats, both open and wooded.

Birchwoods would be impoverished if all openings were filled with trees, either naturally or by planting. Many open spaces will remain so if grazing is continued in most of a wood while part is fenced for regeneration. Management may be required to maintain particularly valuable open habitats, for example during prolonged periods without grazing.

Minimum intervention areas

Awkward or remote corners, steep-sided streamsides, rock outcrops and sites on steep slopes with very shallow and drought-prone soils may be particularly important for wildlife diversity as well as being difficult to access, and should be left completely unmanaged to grow large trees and build up accumulations of dead wood, which would provide habitats for specialised and now often rare species.

Expanding upland birchwoods

Upland birchwood margins have often shifted to and fro over the centuries, especially along their moorland borders. Often, whole woods have 'moved' as expansions in one place are matched by degeneration in another. New birchwoods are generally not as rich as long-established woods, but those developing on suitable soils around the margins of existing semi-natural woods quickly acquire species from the adjacent woodland.

Because birchwoods often regenerate more successfully outside their boundaries and this should always be considered as an alternative or addition to felling and regenerating within the wood. Expansion onto moorland soon after removal of grazing or after burning is most likely to be successful and birch can spread rapidly in these circumstances. Semi-natural grassland or moorland sites of high existing conservation value should normally be avoided although sometimes their value will be maintained with small areas of birch expansion. Each case needs to be judged on its merits.

Further advice on expanding semi-natural woods in this way can be found in Forestry Commission Bulletin 112[5].

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28 Domestic stock grazing to enhance woodland biodiversity (1999).
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Appendix

Definitions and classification of ancient and semi-natural woodlands

Definitions

Ancient woods

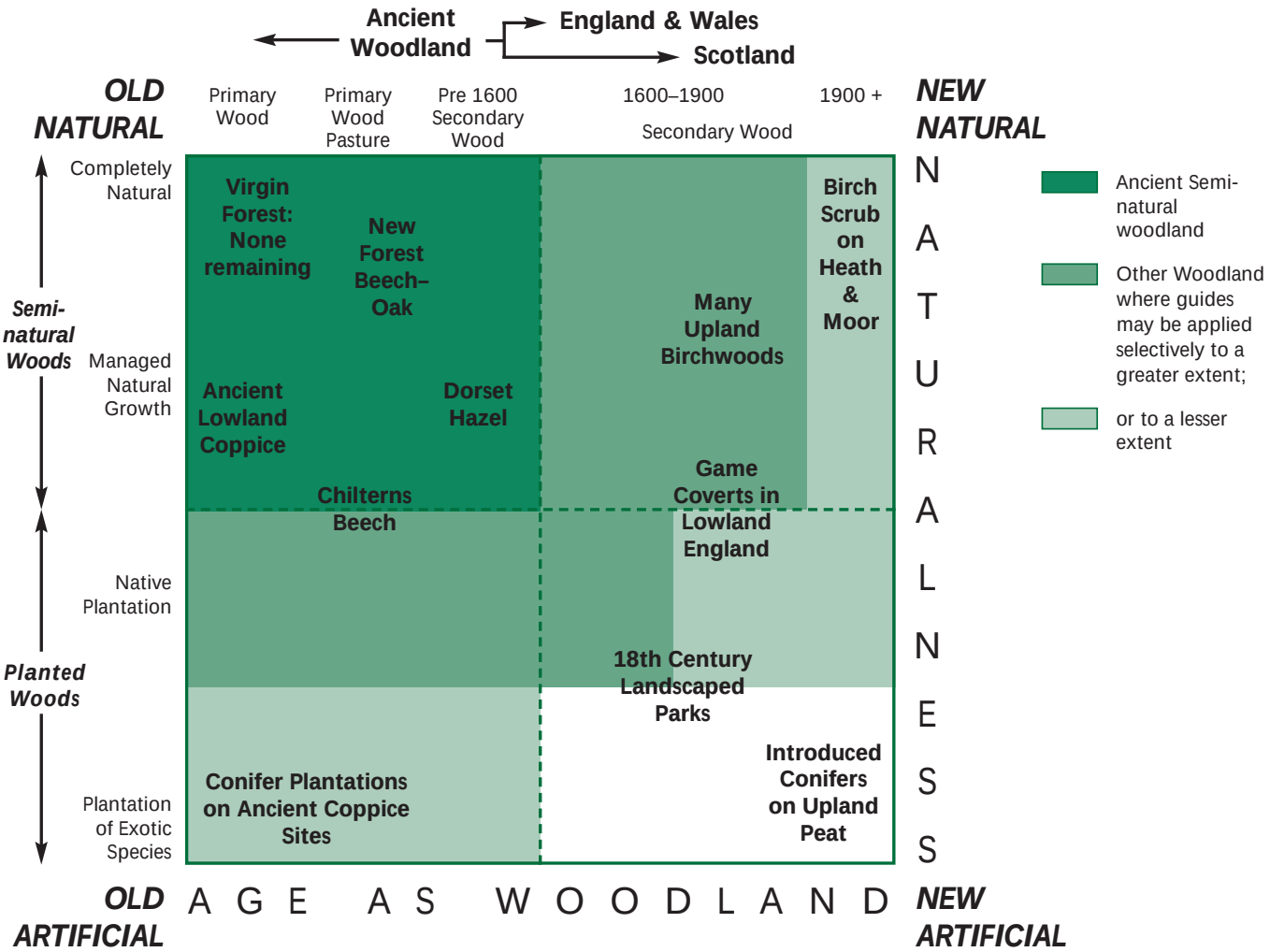
Ancient woods are those occupying sites which have been wooded continuously for several hundred years at least since the time when the first reliable maps were made. In England and Wales ancient woods are those known to have been present by around 1600 AD. In Scotland ancient woods are those which were present before 1750 when the first national survey was made by General Roy.

In both cases the dates correspond roughly with the time when new woodland planting first became commonplace so that ancient woods are unlikely to have been planted originally. Some may be remnants of our prehistoric woodland (primary woods) whilst others arose as secondary woodland on ground cleared at some time in the past.

An ancient woodland may be over 400 years old but this does not mean that the present trees are as old as that, although in some woods this is the case; rather that woodland has been present on the site continuously without intervening periods under other land-uses.

In fact many ancient woods have been cut down and regrown (or been replanted) several times in recent centuries, and during this century many have been converted from native species to plantations of introduced trees.

Figure 1 **Classification of woodlands according to age and naturalness**



Semi-natural woods

Semi-natural woods are stands which are composed predominantly of native trees and shrub species which have not been planted. By 'native' we mean locally native, e.g. beech is not native in Scotland and Scots pine is not native in England. Many woods are semi-natural even though they contain a few planted trees, for the latter do not change the character of the wood. The problem lies with woods dominated by native trees which were planted long ago on sites where they grew naturally, such as the many beech woods on the southern chalklands. Another ambiguous type is the chestnut coppice, dominated by an introduced species, often planted about 1800, but containing an admixture of native broadleaves and managed by the traditional coppice system. Both these 'intermediate' types are usually classified as 'semi-natural' by ecologists.

'Ancient' and 'semi-natural' have sometimes been used as synonyms, but this is quite wrong. Ancientness refers to the site as woodland, whereas naturalness refers to what is growing on that site.

Combining ancient with semi-natural

The age of the site as woodland and the naturalness of the stand on a site are independent of each other. This is illustrated in Figure 1. The vertical axis of the diagram shows a range of naturalness from completely natural at the top (i.e. people have had no influence on its composition) to completely artificial at the bottom. The horizontal axis shows a range of age-as-woodland, from primary woods on the left (i.e. surviving remnants of prehistoric woodland which have never been completely cleared) to woods of very recent origin on the right.

Ancient woods are simply those in the left-hand half of the diagram: those in the right-hand half are recent woods (except in Scotland where ancient woods extend further to the right). Recent woods are often called secondary woods, but this is slightly inaccurate, for there are secondary woods originating in the Middle Ages or earlier, which are included with the ancient woods. Semi-natural woods are those in the upper half of the diagram. Those in the lower half are planted woods. Ancient, semi-natural woods are those in the top-left quarter.

Within the diagram various examples of woodland types are placed according to their degrees of ancientness and naturalness. Top left would be virgin forest, if it still existed in Britain. At the other extreme, bottom right, is the most artificial form of recent woodland, a conifer plantation on drained peat in the uplands. Such forest comprises an introduced species, planted in regular formation on sites modified by management, where trees may not have grown naturally for several millennia. In the other corners are two kinds of intermediate condition. In the top right corner, newly and naturally-regenerated birch scrub on heaths or moors exemplifies woods which are relatively natural, but which are extremely recent in origin. In the bottom left corner is a conifer plantation, often for Norway spruce or Corsican pine, growing in a wood which had been treated as coppice continuously for several centuries. This is a common condition in lowland England: the site has been woodland continuously for a millennium or more, but the stand is almost wholly artificial. The diagram also shows roughly where several other woodland types fit.

Ancient semi-natural woods

Figure 1 makes clear that ASNW as a class contains many types of woodland. Some are very ancient, but others originated in historic times. Some are much more natural than others. Borderline types exist, and for different reasons.

Ancient semi-natural woods, because of their combination of naturalness and a long continuous history, are generally richer for wildlife and support more rare habitats and species than more recent or less natural woods.

However, all these divisions are somewhat arbitrary points on a spectrum and mature 'recent' semi-natural woods and old plantations of native species can also develop a high ecological value and of course landscape value, which may justify similar management to that of ancient semi-natural woods as Figure 1 indicates. This is particularly the case in the uplands where in general the ecological differences between ancient and younger woods are less marked than in lowland areas.

Inventories of ancient and semi-natural woodland were prepared by the former Nature

Conservancy Council (NCC) from map and historical records and some survey information.

Owners can refer to these to check the status of their woods either by consulting the NCC's successor bodies (English Nature, Scottish Natural Heritage and Countryside Council for Wales) or local Forestry Authority offices each of which holds copies of the inventory.

Classification of ancient semi-natural woodlands

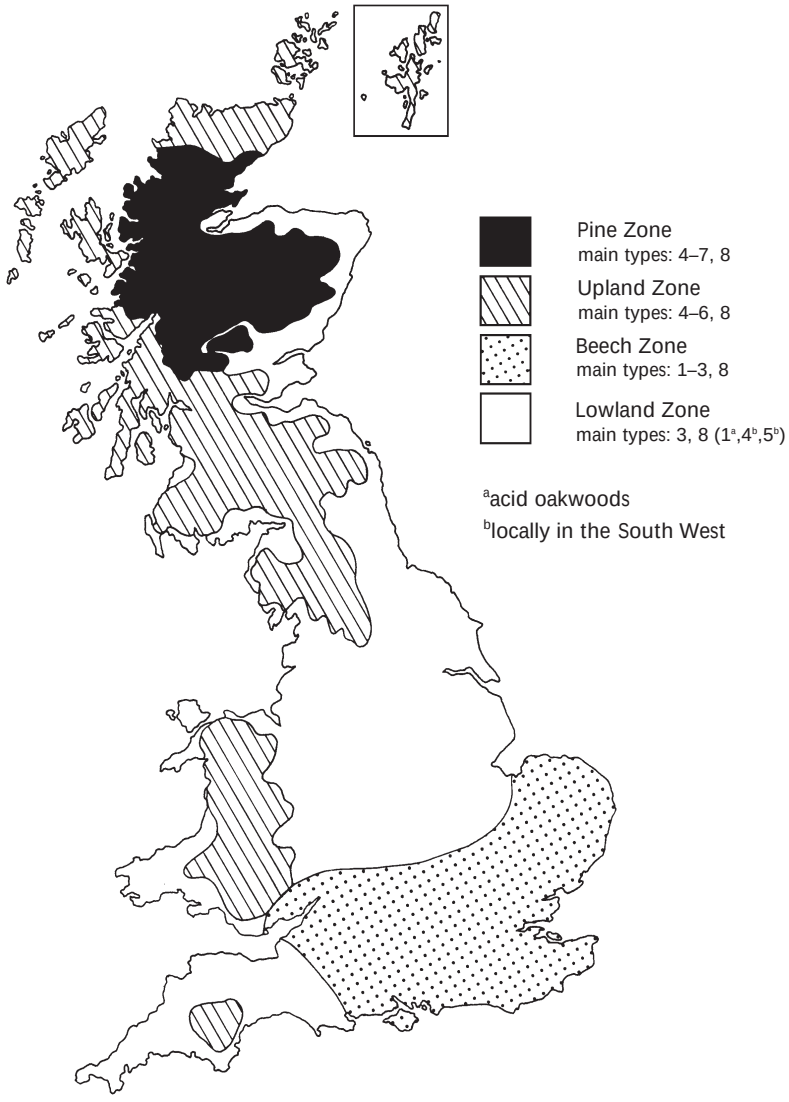
Outline

For the purposes of these management guides, Britain's ancient semi-natural woodlands have been divided into 8 types. This gives the best balance between straight-forward, practical guidance and the specific needs of the various types of native woodland. Many more types are recognisable, but fine distinctions would over-complicate the advice. With fewer types important ecological and silvicultural distinctions would be lost.

The 8 woodland types are based on 4 major regional divisions of Britain shown approximately in Figure 2:

- **The uplands of the north and west (Upland zone);**
- **The 'boreal' region of the Scottish Highlands within the Upland zone, in which pine is native (Pine zone);**
- **The lowlands of the south and east (Lowland zone);**
- **The southern districts of the lowlands within the natural range of beech (Beech zone).**

Figure 2 **The main semi-natural woodland zones**



These geographical divisions are further divided to recognise the ecological differences between acid and base-poor soils on the one hand and alkaline and base-rich soils on the other. Wetland woods constitute an additional type found in all regions.

The result is 8 types whose main characteristics are summarised below and in Table 1. They can be related to existing classifications, particularly the National Vegetation Classification (Rodwell 1991[1]) and the stand types described by Peterken (1981[6]). Insofar as the complexities of native woodlands can be reflected in a simple scheme, each type has a distinctive ecological and regional character, different history of management and exploitation, and different management requirements in the future. The guides have been drawn up for typical examples of each type.

The classification helps to relate British woodlands to those of continental Europe. The boreal pine and birch woods form an outlier of the sub-arctic coniferous forests. The beechwoods are the extremity of the central European broadleaved woods. Upland broadleaved woods have their counterpart in the oceanic woods of Ireland, Brittany and Galicia. The lowland mixed broadleaved woods form an outlier of a zone of mixed woodland lacking beech which extends throughout central Europe and deep into Asia.

Descriptions of each type

Lowland acid beech and oak woods

NVC types W15, W16
Stand types 6C, 6D, 8A, 8B

Beech and oak woods on acid, generally light soils. South-eastern, mainly in Weald, London and Hampshire basins. Mostly treated as high forest or wood-pasture in the immediate past. Many had a more distant history of coppicing, and in the Chilterns and the south-east some still have this character. Many were planted with chestnut around 1800 and are still worked as coppice. Includes a scatter of strongly acid

Table 1 **Summary of the main ecological and silvicultural characteristics of the eight semi-natural woodland types**

Semi-natural woodland type	Ecological characteristics		Silvicultural characteristics	
	NVC communities	Peterken stand types	Main historic management	Emphasis in future management
South and East Britain				
1. Lowland acid beech and oak woods*	W15, W16	6C, 6D, 8A, 8B	C or WP	HF
2. Lowland beech–ash woods*	W12, W13, W14	[1A], [3C], 8C, 8D, 8E	C or HF	HF
3. Lowland mixed broadleaved woods	W8 (A–D), W10	1B, 2A, 2B, 2C, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 7C, 9A, 9B, 10A, 10B	C	C or HF
North and West Britain				
4. Upland mixed ashwoods	W8 (E–G), W9	1A, 1C, 1D, 3C, 3D, 7D, [8A–E]	C or HF	HF(C)
5. Upland oakwoods	W11, W17 (Oak dominant)	6A, 6B, [8A–B]	C or HF grazed	HF(grazed)
6. Upland birchwoods	W11, W17 (Birch dominant)	12A–B	HF grazed	HF(grazed)
7. Native pinewoods**	W18, W19	11A–C	HF grazed	HF(grazed)
All regions				
8. Wet woodlands	W1, W2, W3, W4, W5, W6, W7	7A–B, 7E	C neglect	Minimum intervention

NVC: National Vegetation Classification C: Coppice WP: Wood Pasture HF: High Forest
*Restricted to zone where beech is native (SE Wales and S England) **Restricted to zone of native pine (Scottish Highlands)

oak-dominated coppices found throughout the English lowlands. Also includes associated birch woods, self-sown Scots pine woods, holly scrub. Enclaves of hornbeam on acid soils best regarded as part of this type.

Lowland beech–ash woods

NVC types W12, W13, W14
Stand types 8C, 8D, 8E and parts of 1C, 3C

Beech woods on heavy and/or alkaline soils and associated ash woods. Southern distribution, grouped in South Downs, North Downs, Chilterns, Cotswold scarp, Lower Wye Valley and south Wales limestones, but sparingly elsewhere. Most had a medieval history of coppicing with limited wood-pasture, but most have long since been converted to high forest, often with extreme dominance of beech. Coppice survives in western districts. Woods often on steep slopes, but they extend on to Chiltern and Downland plateaux. Associated ash woods usually mark sites of past disturbance or formerly unwooded ground. Yew common in the driest beech woods and as distinct yew woods on open downland.

Lowland mixed broadleaved woods

NVC types W8(a–d), W10
Stand types 1B, 2A, 2B, 2C, 3A, 3B, 4A, 4B, 4C, 5A, 7C, 9A, 10A and 10B

Often known as 'oak–ash woods' by past ecologists, these are largely dominated by mixtures of oak, ash and hazel, but other trees may be dominant, notably lime (4A, 4B, 5A and 5B), hornbeam (9A and 9B), suckering elms (10A), wych elm (1B), field maple (2A, 2B and 2C) and alder (7C). Occur throughout the lowlands and upland margins, with enclaves on fertile soils in SW Wales, NE Wales and E Scotland. Most treated as coppice until 20th century, some still worked. Many still have a stock of oak standards growing with a mixture of other species grown from coppice and seedling regeneration. The various stand types occur as intricate mosaics which present silvicultural problems. Many have been invaded by sycamore or chestnut. Disturbed ground often marked by abundant ash, hawthorn or birch.

Upland mixed ashwoods

NVC types W8(e–g), W9
Stand types 1A, 1C, 1D, 3C, 3D, 7D with 8A–E where beech has been introduced.

Dominated by ash, wych elm and/or oak, usually with hazel underwood, sometimes with scattered gean. Found throughout the uplands on limestone and other base-rich sites. Also characteristic of lower slopes and flushed sites within upland oak woods. In the very oceanic climate of the north and west, increasingly take the form of ash–hazel woods with birch and rowan containing lower slopes dominated by alder. Lime is regular and sometimes common north to the Lake District. Like other upland woods, many have a history of coppicing which was displaced by grazing. Sycamore is a common colonist and in many woods is a naturalised part of the mixture.

Upland oakwoods

NVC types W11, W17 (oak-dominated woods)
Stand types 6A, 6B with 8A, 8B where beech has been introduced.

Woods dominated by sessile oak and, less often, pedunculate oak, growing on base-poor, often thin soils in upland districts from Sutherland to Cornwall. Sometimes absolutely dominated by oak, but more often oak forms mixtures with birch and rowan on very acid soils and hazel on the more fertile sites. Oak was planted in many woods, even those which now seem remote. Coppicing was characteristic, but not prevalent in N Wales and NW Scotland. Most now neglected and heavily grazed by sheep and deer. Includes small enclaves of birch, ash, holly, hawthorn and rowan-dominated woodland.

Upland birchwoods

NVC types W11, W17(birch-dominated woods)
Stand types 12A, 12B

Woods dominated by birch, but sometimes containing many hazel, sallow, rowan and holly. Birchwoods occur throughout Britain. Some are secondary woods which can sometimes develop naturally into native pinewoods or upland oakwoods. This type covers 'Highland Birchwoods' together with the extensive birchwoods of upland England and

Wales. Most are now heavily grazed by sheep and deer. Lowland birch stands are usually temporary phases or small enclaves and are included in Types 1 and 3.

Native pinewoods

NVC types W18, W19
Stand types 11A, 11B, 11C

Scots pine-dominated woods and the associated enclaves of birch and other broadleaves in the Highlands. Tend to be composed mainly of older trees, with natural regeneration often scarce. Most subjected to exploitive fellings during the last 400 years and heavy deer grazing during the last century.

Wet woodlands

NVC types W1, W2, W3, W4, W5, W6 and W7
Stand types 7A, 7B and 7E

Woodland and scrub on wet soils and flood plains. Usually dominated by alder, willow or birch. Generally take the form of scrub or coppice. Fragments of the prehistoric flood plain woods of black poplar, pedunculate oak, ash, elm, alder tree willows, and occasional black poplar survive in some southern districts.

Problems in using the classification

Semi-natural woodlands are complex systems which throw up many problems in the construction and use of classifications. These may seem unwelcome to managers used to managing plantations of one or two species, with clearly defined stand boundaries, but management of complexity is unavoidable if the small-scale diversity of semi-natural woodlands is to be successfully conserved. The commonest problems and their solutions are:

Intermediates

Stands falling between two or more types. Examples include;

- **a sessile oakwood on the Welsh borderland (between types 1 and 5);**
- **a mixed woodland with a limited amount of beech (between types 1 or 2 and 3–5);**
- **a birch-rich pinewood (between types 6–7);**
- **Managers should use the Guides appropriate to both types.**

Mosaics

Woodlands may include more than one of the 8 types within their border. Example: lowland acid beech woods and upland oak woods commonly include patches of birch-wood.

Ideally, each patch should be treated separately, though this is impractical with small inclusions of less than 0.5 ha.

Outliers

Good examples of each type can occur outwith their region. Examples: good lowland mixed broadleaved woods occasionally occur in N Wales and SW Wales; birchwoods occur throughout the lowlands.

Management of outlying examples should be based on the guidance for their core regions, but some adaptation may be required for local circumstances.

Introductions

Semi-natural woods often contain trees growing beyond their native range. Common examples are beech in northern England, north Wales and Scotland, and Scots pine south of the Highlands.

Unless the introduced species is dominant, such woods should be treated in the same way as the original type, using the guidance given on introduced species within that type. Thus, for example, a beech wood on acid soils in the Lake District should be treated as an acid beech wood (type 1) if beech is dominant, but otherwise should be treated as an upland oakwood (type 5).

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