

The Management of Semi-natural Woodlands

8. Wet Woodlands

PRACTICE GUIDE



Forestry Commission



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Practice Guide

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Publishing update

This guide was first published in 1994. This edition is a reprint with a revised format and further reading section (page 18), 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.

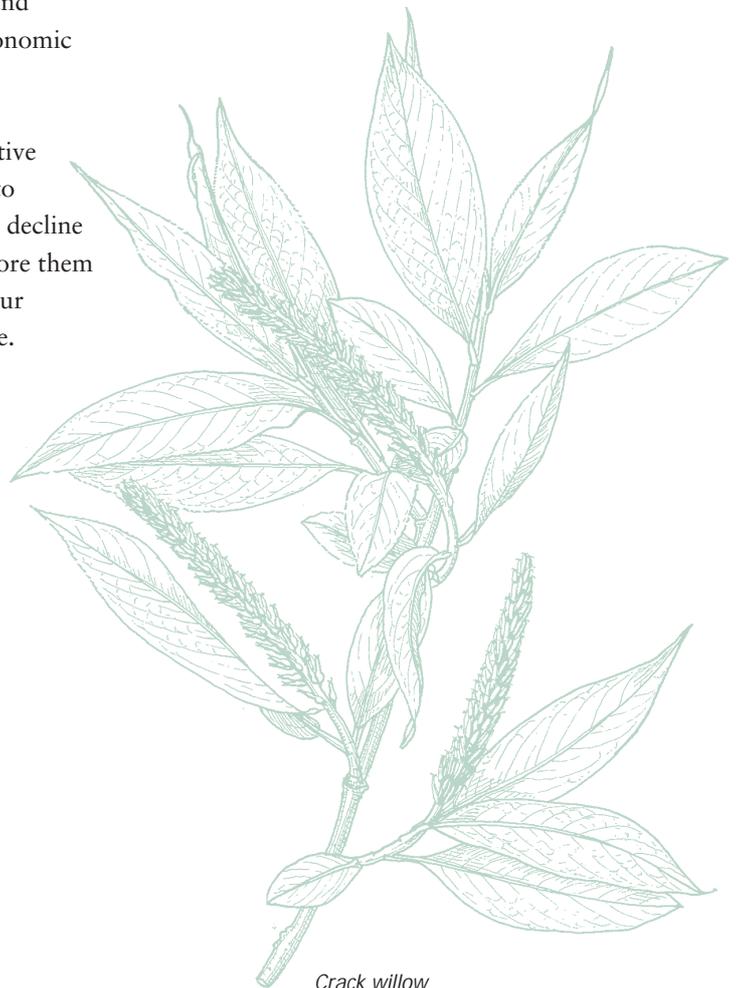
When grant aid is sought the Forestry Authority will compare management proposals with the advice contained in these booklets. Applicants are free to propose other forms of management for these woods, but must satisfy the Forestry Authority that their proposals will be effective in maintaining, and preferably 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.



Crack willow

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.

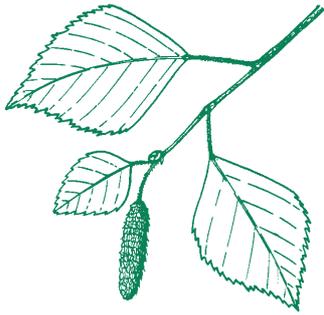
Planted woods of native species may often acquire some of the characteristics of semi-natural woodland, especially where they are on **ancient woodland sites**, where plants and animals have survived from the former semi-natural wood. The development of a varied structure and composition, including diverse 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 wet woodlands?



Downy birch

This Guide deals with the semi-natural woodlands dominated by alder, willows and birch that are found locally throughout Britain on wet and poorly-drained soils. Based on survey information from the former Nature Conservancy Council there are estimated to be 25 000–35 000 hectares of ancient semi-natural woodland of this type. In addition many more recent semi-natural wet woodlands occur as part of successions from wetland and aquatic habitats.

By their nature these woods occur mainly as small woods or localised patches in larger woods. They are typical of river valleys, the surroundings of mires and raised bogs, the transition zones between open water and drier ground, and beside small winding streams. They can also occur on flushed slopes well above valley bottoms and on plateaux where a high watertable is maintained throughout the year. Typically, they have been managed as coppice in the past, but have been neglected or used as pasture recently. Many have been lost during the course of drainage work on watercourses and surrounding farmland.

This guide does not deal with plantations of poplars or willows, e.g. cricket-bat willow, except where they have been planted on ancient woodland sites.

The National Vegetation Classification (Rodwell, 1991¹) recognises seven types of wet woodland. Briefly, these are:

- W1. Grey sallow – marsh bedstraw woodland
- W2. Grey sallow – Downy birch – reed woodland
- W3. Bay willow – bottle sedge woodland
- W4. Downy birch – purple moor grass woodland
- W5. Alder – tussock sedge woodland
- W6. Alder – nettle woodland
- W7. Alder – ash – yellow pimpernel woodland

Whilst these classes do broadly correspond with wood dominated by willows (W1–3), birch (W4) and alder (W4–7), there is considerable variation in the degree to which each tree is present in examples of each type. For forestry it is more practical to recognise three classes based on the dominance of one of these three trees.

Although wet woods form a distinctive class of semi-natural woodland, examples are sometime difficult to delimit in the field. They occur as small patches in depressions and along drainage lines which grade imperceptibly into other woodland types on drier ground. Where this occurs the guides for the adjacent types should also be consulted. Very small areas may be impractical to treat separately from the main woodland type.

Willow woods

Only 7 of the 19 willows found in Britain grow to tree size. They are white willow (*Salix alba*), crack willow (*S.fragilis*), hybrid Bedford willow (*S.x rubens*), almond-leaved willow (*S.triandra*), goat willow (*S.caprea*), grey sallow (*S.cinerea*) and bay willow (*S.pentandra*). The taxonomy of willows is notoriously difficult and there are districts where hybrids are common. Woods dominated by grey sallow tend to be found on the eastern side of lowland Britain, especially in East Anglia and East Yorkshire. Grey sallow is replaced in the west and north by the generally smaller common sallow (*S.cinerea*, *ssp oleifolia*). Bay willow is found locally throughout the submontane zone of northern Britain.

Willow woods are often scrubby in appearance, with irregular, dense canopies usually no more than 2–8 m high. Whilst willows are dominant, birch and alder are usually present, occasionally accompanied by oak, hawthorn, hazel and guelder rose.

Ground conditions are invariably wet and the associated flora includes many species more characteristic of fens and marshes, such as marsh marigold, angelica, marsh valerian, meadowsweet, water avens, yellow flag, purple loosestrife, water mint, marsh cinquefoil and marsh horsetail. Tall sedges or reed occur on swampy ground. However, the ground conditions in willowwoods often include mineral soil and drier knolls which support a varied flora with, for example, bramble, dog rose, and marsh hawksbeard. Nettles may be

common on the richer soils, but on the heavily shaded sites the ground cover may be reduced to patches of mosses and liverworts.

Wet birch woods

Birchwoods on wet ground are found throughout Britain, but are commonest in western and northern regions, where they often occur on the margins of bogs, on valley mires and on poorly-flushed peaty gleys. Downy birch usually dominates, but there can be many alder, grey willow and goat willow and occasional silver birch included in the mixture. The canopy is generally quite open, with widely-spaced and often multi-stemmed trees, which are rarely more than 6–8 m tall.

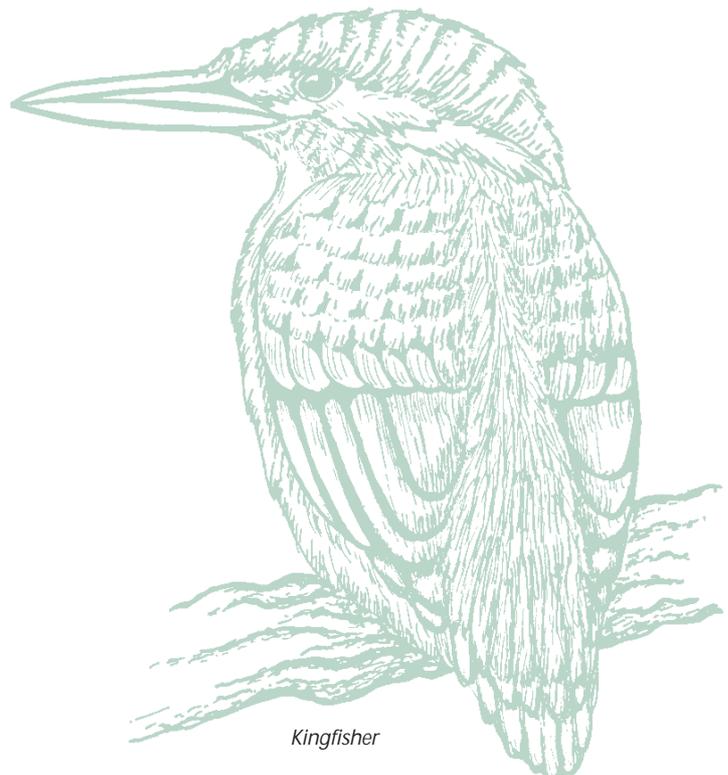
Downy birch is most likely to be dominant on acid, peaty soils. Here purple moor grass is usually common, forming tussocks around which Sphagnum and other mosses form a low carpet. These wet birchwoods are transitional between birchwoods on drier soils (Guide 6) and open bogs, and tend to lack the specialised plant species of these other habitats.

Alder woods

Common alder is both a pioneer species on wet soils and a species which regenerates in disturbed sites within established woods. It is capable of rapid early growth, aided partly by its symbiotic association with a micro-organism called Frankia in root nodules which capture nitrogen. On the wetter ground alder is often completely dominant, but on drier sites other species increasingly appear, notably Downy birch, ash, pedunculate oak and hawthorn. Whilst shrubs and small trees are generally infrequent, northern examples on mineral soils often include bird cherry, rowan, elder and blackthorn. Alderwoods can take the form of poorly-grown scrub, but frequently they are well-grown, dense stands reaching to 10–15 m.

Ground conditions vary from treacherously wet in Alder–tussock sedge woodland (W5) to almost dry. Marsh plants, such as yellow flag, marsh valerian, marsh violet, marsh pennywort, marsh marigold, several large

sedges and many species of fern, are characteristic of the wetter ground. On the most fertile soils nettle is likely to be dominant. On the less fertile, drier sites a greater variety of woodland herbs is found, including ground ivy, marsh bedstraw, remote-flowered sedge, enchanter's nightshade and dog's mercury, as the alder–ash–yellow pimpernel woodland (W7) grades into lowland mixed broadleaves (Guide 3) or upland mixed ashwoods (Guide 4).



Kingfisher

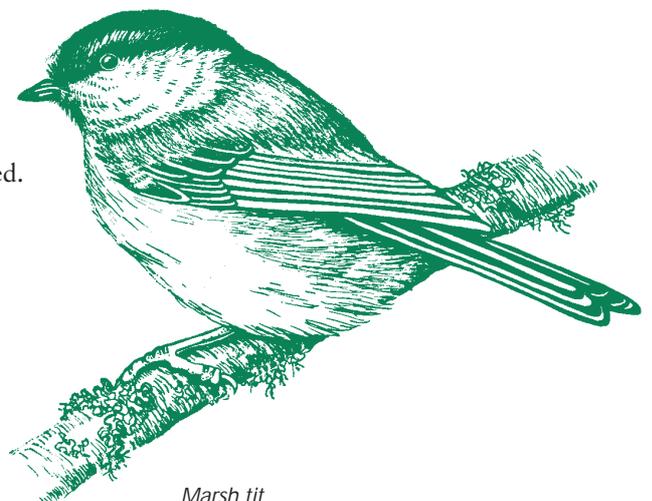
History and traditional management

Where alder and other types of wet woodland are part of an ancient wood with a clearly defined boundary and identity, the wet woodland has usually been managed in much the same way as the rest of the wood. Thus, these wetter parts of larger woods have been coppiced or grazed along with the associated woodland types. Although wet woodlands are a characteristic feature of streamsides in wood-pastures, many have in practice been treated as strips of coppice. In parts of the western Highlands, some of the most extensive coppices are, or were, dominated by alder, and were known as 'black woods'. In lowland England, wet woodlands have often been reduced to a line of old pollarded willows on riverbanks.

Alder, willows and birches are all species which respond rapidly to natural environmental change and to changes in land-use. They are characteristic pioneers on mires, shifting river beds and moist soils in established woodlands. Many existing wet woodlands are strictly secondary formations, which originated on open ground within the last century or so. This, however, is their natural condition, as transient features in larger forests.

Wet woodlands, more than the other woodland types, tend to be recent in origin and being on relatively inaccessible ground have been lightly managed. Nevertheless, they have supported traditional uses, such as basket-making and clog-making. Many alderwoods have been sources of charcoal for gunpowder.

The great majority of wet woods are even-aged. They either owe their origin to a single event which permitted natural regeneration (e.g. a change of land-use), or they were cut and allowed to regenerate without any attempt at systematic silviculture.



Marsh tit

Values

Landscape

Wet woodlands usually contribute an element of diversity to both wooded and open landscapes. Fringes of alder or patches of willows are often the only tree cover in broad, farmed valleys. In many Highland glens the closely cropped moorland is relieved only by an irregular scatter of alders, bird cherries and associated trees along past and present stream channels. In many areas of peaty moorland, birch supplies an informal drift of pale trunks and light foliage to a predominantly dark moorland scene. Willows have a wide range of shapes, crown forms, twig and leaf colours, which are particularly attractive in late winter and autumn.

Historical and cultural

Though rarely taking the form of woodland, osier beds were a distinctive feature of the traditional scene.

Willows and alders have often been used for river bank stabilisation in the past and may continue to be useful in this way.

Wet woodlands have been valuable sources of information on the history of vegetation and the environment, because pollen and other plant remains and human artefacts have been preserved in the peat or wet soil for thousands of years. The value for paleoecological research depends on the peat or soil stratification remaining undisturbed.

Wildlife conservation

The ability of wet woods to diversify an otherwise bare landscape is as important for wildlife as it is to landscape. Even scrub woodlands provide cover for birds, such as whitethroat, grasshopper warbler and wren in willowwoods, siskin, redpoll and redwing in birchwoods, and kingfishers, crossbills, bramblings, siskin and tits in alderwoods. These woods also provide shelter for otters.

Willows as a group support richer assemblages of moths and other insects than any other tree species except oak, and birch comes a close third with relatively greater importance in the north where many of its uncommon insects are found.

Wet woods have a distinctive flora, which includes notable species such as royal fern. In woods where wet woodland occupies only a small proportion of the ground the flora of the wet woodland is generally more diverse than that of other woodland types. In fact, the length of the species list from such woods depends largely on whether and how much wet woodland is present.

Recreation

By their nature wet woods are often inaccessible or unattractive for casual visits, though their high diversity attracts naturalists. Associated with a streamside or pool however they add interest to a walk in the woods, where the walker can view them from drier ground.

Game and livestock

In farmland stock generally seem to avoid patches of wet woodland, except for wet birchwoods which are used for browse, shelter and grazing for cattle and sheep in the Highlands.

These woods are not generally important for game species, although woodcock and snipe in open areas are exceptions. They can have an important function in improving habitat for fish by binding the banks and providing shelter and an energy supply to the water. Insects dropping from overhanging trees are an important food supply for fish in summer in upland streams.

Wood production

Willow woods have a low potential for timber production and the wood is light which limits its value as firewood. The timber is acceptable as hardwood pulpwood, but only small

quantities are available with a sufficiently good stem form. Basket-makers take small quantities of material in some districts. Wet birchwoods rarely yield utilisable material, production being limited to the occasional removal of small quantities of firewood. It is probable that form could improve somewhat in future with better management, however.

Alder has existing or potential markets as firewood, pulpwood, poles for temporary horse jumps and occasionally as wood for charcoal. Current markets are limited. The ash growing in alderwoods has potentially higher value if stem canker is not a problem and may justify management of these woods (see Guide 4).

Expansion of wet woodlands onto fertile flood plains could provide scope for some high quality timber from a wide range of species including pedunculate oak and ash.

Policy aims

The aims of policy are to encourage appropriate management of semi-natural wet woodlands 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.**

Wood production from semi-natural wet woodlands will be limited due to the difficult nature of their sites. They are more likely to be valued by their owners for shelter, wildlife conservation, sporting, or amenity values. However, even a limited revenue from firewood, small roundwood and occasional niche markets is helpful in encouraging positive management. With good management as described in this guide, these products can be harvested in ways which are compatible with achieving the policy aims.

- **Enlarge the woods where possible.**

Expansion of wet 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. Whilst some appear to be uniform, most encompass significant small-scale variety of site conditions. Within practicable limits, the aim should be to reflect this inherent diversity in future management.



Otter

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 enhance the special 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 wet woodlands of recent origin can be almost 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 wet woodlands 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 sites where wet woods 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 plantations, but which have retained some nature conservation value, there may be opportunities to restore semi-natural wet woodlands, at least partially, by including appropriate native trees and shrubs in the next rotation, and perhaps restoring appropriate wetland conditions.

Old planted woods of native species on sites which had not previously been wooded sometimes acquire conservation values similar to that of ancient semi-natural woodland. Here too much of the advice in this guide can be applied, but this situation is very uncommon for alders, willows and birch on wet sites.

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.

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 officers 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.

Operational guidelines

General principles

The policy aims for semi-natural wet woodlands lead to general principles for management outlined below. Where they occur as small areas within woodland of other types, these principles should be applied to the wood as a whole.

- **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.

- **Maintain or restore diversity of structure.**

A range of age classes within each site is preferred to the limited spread of ages usually encountered.

- **Maintain or restore diversity of species, and increase where appropriate.**

Maintain diversity of habitat. A diverse structure and a mixture of species improves habitat diversity, but open areas are also extremely important, including temporary open areas created by cutting.

- **Maintain a mature habitat. This can be achieved by retaining old, dead or dying trees.**
- **Minimise rates of change.**

Although wet woods are adapted to fairly rapid change, wildlife will be better maintained if managers avoid drastic change to the whole of a wet wood on a single operation.

- **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

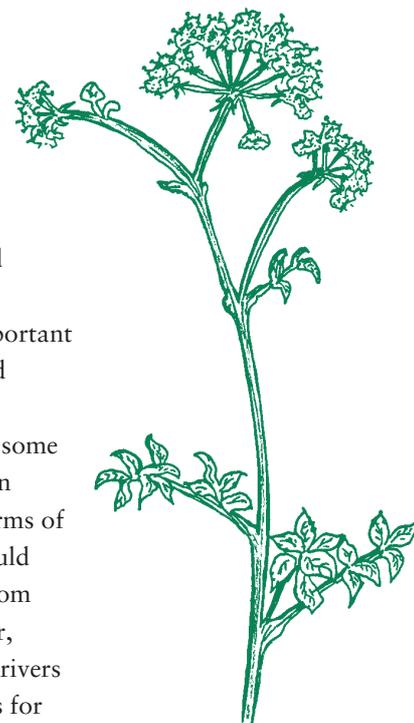
Wet woodlands occupy difficult sites and generally have low potential for timber production. Because of this and their important contribution to the diversity of woodland wildlife, they are well suited to a low-intervention approach. The tendency for some wet woods to eventually give way to open ground or water or develop into drier forms of woodland in different circumstances should ideally be accommodated by allowing room and conditions for these changes to occur, relying upon future disturbances such as rivers altering their courses to create conditions for new wet woodlands to appear. Where this is not possible, e.g. due to land ownership patterns, or where some rare wildlife species is dependent upon the maintenance of a particular wood in its current location, partial clear-cutting at intervals of many decades is probably the simplest means of conservation of the wood and obtaining some yield.

The extent and exact location of wet woods changes over long periods, due to the naturally disturbed character of their position between land and water and changes in land-use. Measures to maintain wet woods should 'bend with the wind' by leaving space on their margins for expansion.

Silvicultural systems

With the possible exception of some birch and alderwoods, systematic management of wet woods for wood production is not a realistic option, because of small tree size, poor form and difficult ground conditions. Partial cutting at infrequent intervals for firewood and other local markets is the most sensible course in most cases. Willow and alderwoods will sprout vigorously after any cutting.

Alderwoods of the W6 and W7 types on the drier sites have the greatest potential for wood production of all the wet woodland types. Annual growth rates of 6–12 cu m per ha have



Wild angelica



Marsh marigold

been reported, with harvesting possibilities of up to 100–150 cu m per ha. Such yields are only obtained by careful management. A coppice system is generally the most appropriate, with rotation lengths of 20–25 years. Stools should be cut high enough (25 cm or more) to leave plenty of live wood in order to ensure successful regrowth. Higher stools may be necessary if deer grazing is a problem. Any ash stems of suitable quality can be promoted as standards.

For conservation purposes coppicing of alder is most rewarding at intervals of between 10 and 20 years, depending on growth rates. This is usually long enough to provide saleable firewood as well as permitting enough light penetration to maintain ground flora and encourage butterflies into the area. An alternative to coppicing might be to rejuvenate parts of a wood by ‘artificial windblow’, i.e. by pulling over entire trees, thereby allowing more light into the wood and stimulating new growth from the prostrate stems. In this way a woodland will keep its natural appearance and the decaying timber that eventually results will be beneficial to the woodland ecosystem as a whole.

Willows have commonly been pollarded in the past, especially those growing in small groups and beside watercourses. It would help to preserve existing small willow groups if pollard individuals are re-pollarded and new pollards are started.

Harvesting

Timber extraction can only be done with extreme care and sensitivity. The wet condition of the ground in all seasons will result in unacceptable levels of damage on most sites. Any extraction should be by sensitive methods, e.g. hand, horse or cable crane or by using tractors exerting low ground pressure, along carefully chosen routes in a dry season.

Retained old trees and deadwood

Many woodland wildlife species depend on large, old trees, standing dead wood and large

fallen trunks and limbs. Wet woods are commonly neglected and generally contain quantities of dead wood, but large logs are unusual. The partially-decaying stools of large coppiced alder are often rich habitats for mosses and liverworts.

Management should aim to retain some large trees and large coppice stools.

Methods of regeneration

Most of the characteristic tree species require unshaded conditions for survival and growth. Regeneration is more likely to be obtained outside a wood than under the existing canopy.

Birch, alder and willows all seed prolifically. Alder produces abundant seed at 2–3 year intervals. Seed is shed in late autumn and early winter and is dispersed by winter winds. Germination is best on moist, recently disturbed ground, such as gravel beds on the margins of watercourses. With so much seed being produced, acceptable regeneration can usually be obtained even where there are only 20–30 parent trees per hectare.

Natural regeneration is preferable for nature conservation reasons to planting, and planting is less likely to be necessary in this woodland type than in any other. If planting is necessary in a wet birchwood, containerised or bare-root stock can be planted. Survival of planted trees may be improved by patch scarification or mounding. On very wet soils this should be done manually, to avoid damage by tractors, and limited to small numbers of trees. When alder is planted, trees should be examined before planting for good *Frankia* nodulation. They should be planted on weed-free spots. Early growth and protection from browsing will be encouraged by tree shelters.

Willows can be planted fairly easily. Most species regenerate from small cuttings or sets, the only exception being goat willow. These cuttings should be from local stock, in order to maintain local hybrids and genotypes. New woods can be created by planting suitable stock in wet pockets within established woods of other species, along river banks and around

artificial lakes and pools. However, planting of wet areas in established woods should only be undertaken if the ground is not already of high conservation value. Planting into small mounds may help to minimise weed problems.

Wherever possible, any planting should be carried out with native, and preferably local, stock.

Site preparation

No drainage should be done in these woods or their immediate surroundings. The characteristic species depend on moist or waterlogged soils. Any drying-out of the site will hasten succession towards drier woodland types. Water tables may have to be maintained, e.g. by blocking drains in wet woods affected by hydrological changes associated with adjacent land or river engineering.

Some ground disturbance is inevitable if timber is extracted from these woods and light disturbance will normally assist natural regeneration. In wet birchwoods some intermittent shallow mounding or screening of the vegetation may help to promote satisfactory amounts of natural regeneration but it will often not be needed because birch seedlings establish themselves quite well on wet peaty sites, even in undisturbed vegetation. Any such treatments should be carried out in the summer of a good seed year. However these woods are naturally open and the temptation to intervene to try to obtain artificially high densities should be resisted.

Weeding

The fact that most tree species on these woods are pioneers means that young plants are capable of rapid early growth. Weeding should be confined to relieving immediate competition.

Any herbicides should be confined to spot applications of one metre diameter at least 10 m from rivers and 20 m from lakes and reservoirs (see *Forests and Water Guidelines*²). Herbicides are more effective on grassy vegetation than cutting, but otherwise hand-cutting is preferable on wildlife conservation grounds.

Tending and thinning

Thinning is rarely likely to be worthwhile except in the alder-ash flush woodland (W7) where it may be worth thinning to favour the better ash stems.

Exotic species

In some areas alder woods and other wet woods are invaded by non-native species. Examples include rhododendron, giant hogweed, Japanese knotweed and snowberry. They should be controlled by cutting and spraying with herbicides approved for use near water, preferably before substantial areas are colonised. Repeated applications may be required to deal with major infestations. Great care should be taken to follow label instructions for herbicides and to avoid damaging non-target species with sprays. None of these exotic species should be planted in semi-natural wet woodlands. Non-native trees such as poplars, sycamore and various conifers are sometimes also present. The general approach should be not to plant any of these species where they are not present already. Where they are present in small amounts, say under 10% cover, they should normally be eradicated if there is a risk of significant spread. Otherwise the amounts of non-native species should be contained by thinning, felling or cleaning operations.

Nutrition

Fertilisers are neither necessary nor desirable in these woods.

Grazing and browsing

Areas under regeneration should have grazing animals excluded or controlled. However light grazing is a natural part of the ecology of wet woods and can assist in promoting natural regeneration by creating suitable ground conditions as well as in maintaining wildlife habitats in open areas (see below).

Grey squirrel control

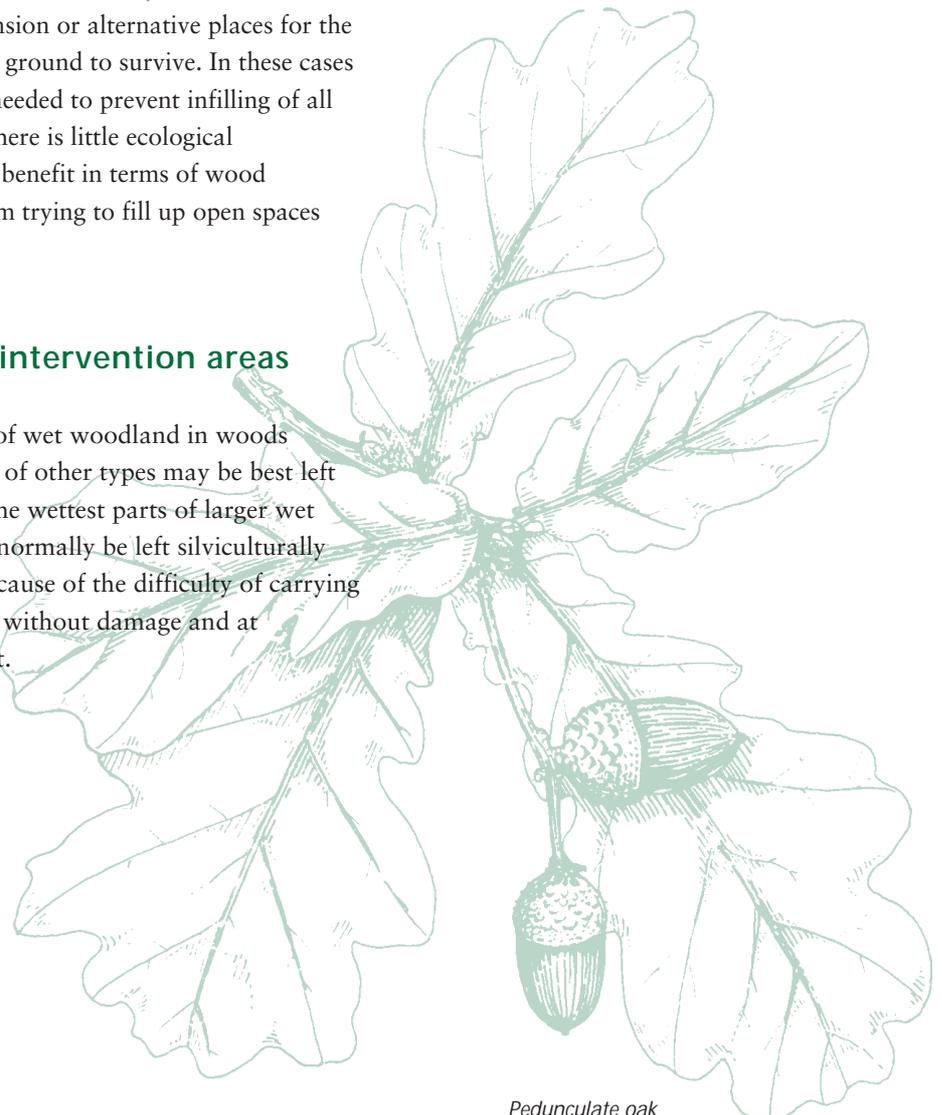
Grey squirrels are unlikely to cause significant damage in wet woodlands. They are dominated by light-seeded species with little value for grey squirrels. However culling of grey squirrels may sometimes be required as part of a wider strategy to control their numbers. Control methods are described in FC Research Information Notes 180³, 191⁴ and 232⁵.

Open ground

Open areas within the woodland provide important wildlife habitat and should be accepted and maintained as far as possible. Natural tendencies for gaps to fill by natural regeneration are welcome, provided some open habitat remains nearby, or new open areas are created by cutting and grazing. The problem is that some lowland wet woods are isolated amongst cultivated farmland, so there is no room for expansion or alternative places for the species of open ground to survive. In these cases action will be needed to prevent infilling of all open spaces. There is little ecological justification or benefit in terms of wood production from trying to fill up open spaces with trees.

Minimum intervention areas

Small patches of wet woodland in woods predominantly of other types may be best left unmanaged. The wettest parts of larger wet woods should normally be left silviculturally unmanaged because of the difficulty of carrying out operations without damage and at reasonable cost.



Pedunculate oak

Expanding wet woodlands

Wet woods commonly regenerate more by colonisation of open ground than by new growth within established woodland, so it is entirely in keeping that wet woodlands in general should be maintained by expansion and creating new wet woodlands. However, new woods of this type which are planted or develop naturally on marshes, fens and bogs may well form less valued communities than the existing open habitats. In fact, wetlands are now so small and fragmented in agricultural districts that considerable effort is expended by conservation organisations to resist encroachment of woodland onto open wetlands.

Nevertheless, in areas of extensive blanket mire, and on wet ground which has recently been used as arable land or pasture, some new wet woodlands would represent an environmental gain. They can be particularly valuable if established as a buffer zone between cultivated fields and rivers.

Further advice on this subject can be obtained in Forestry Commission Bulletin 112⁶.

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112 Creating new native woodlands (1994).
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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.

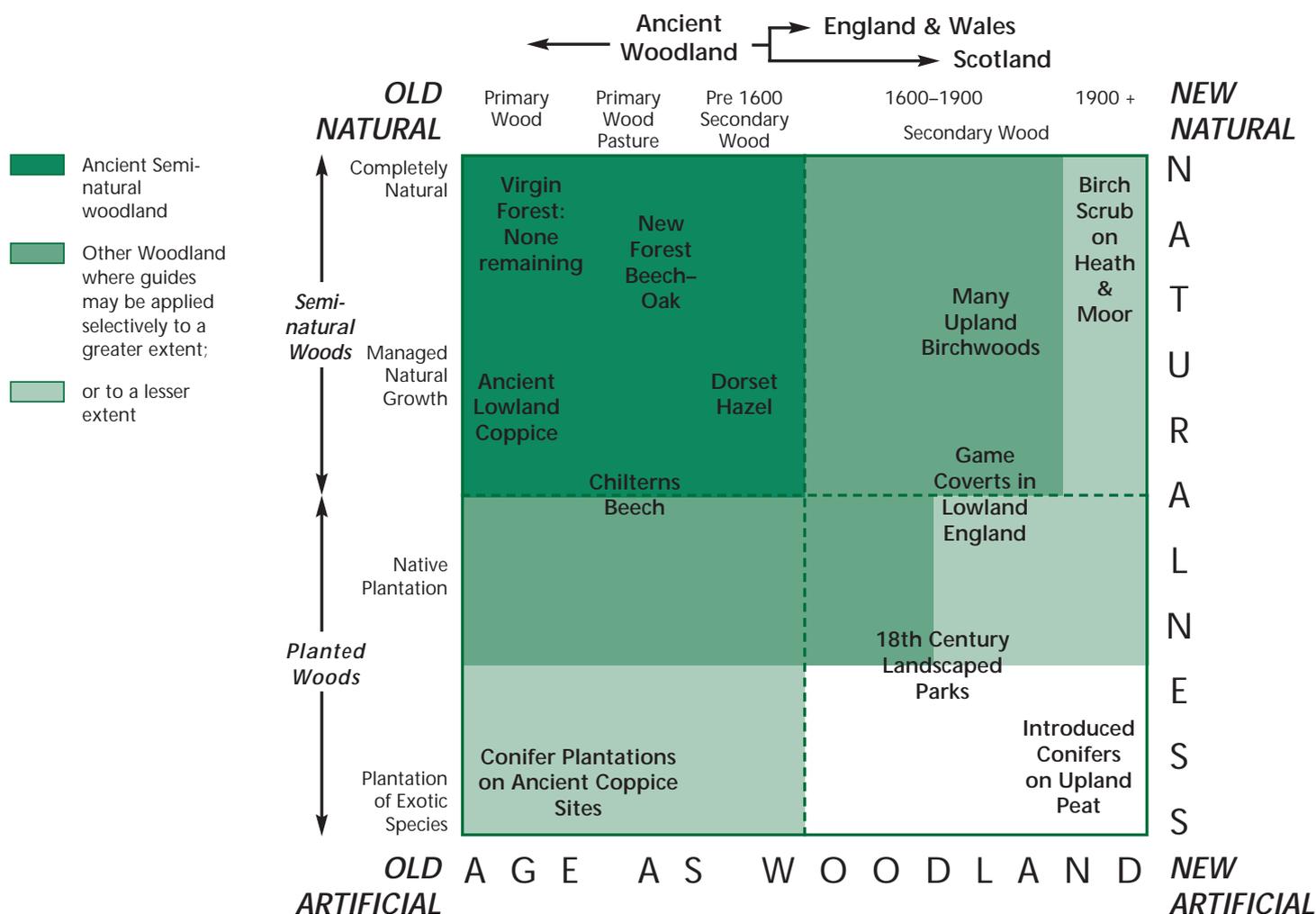
In both cases the dates correspond roughly with the time when new woodland planting first became commonplace so that ancient woods are unlikely to have been planted originally.

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

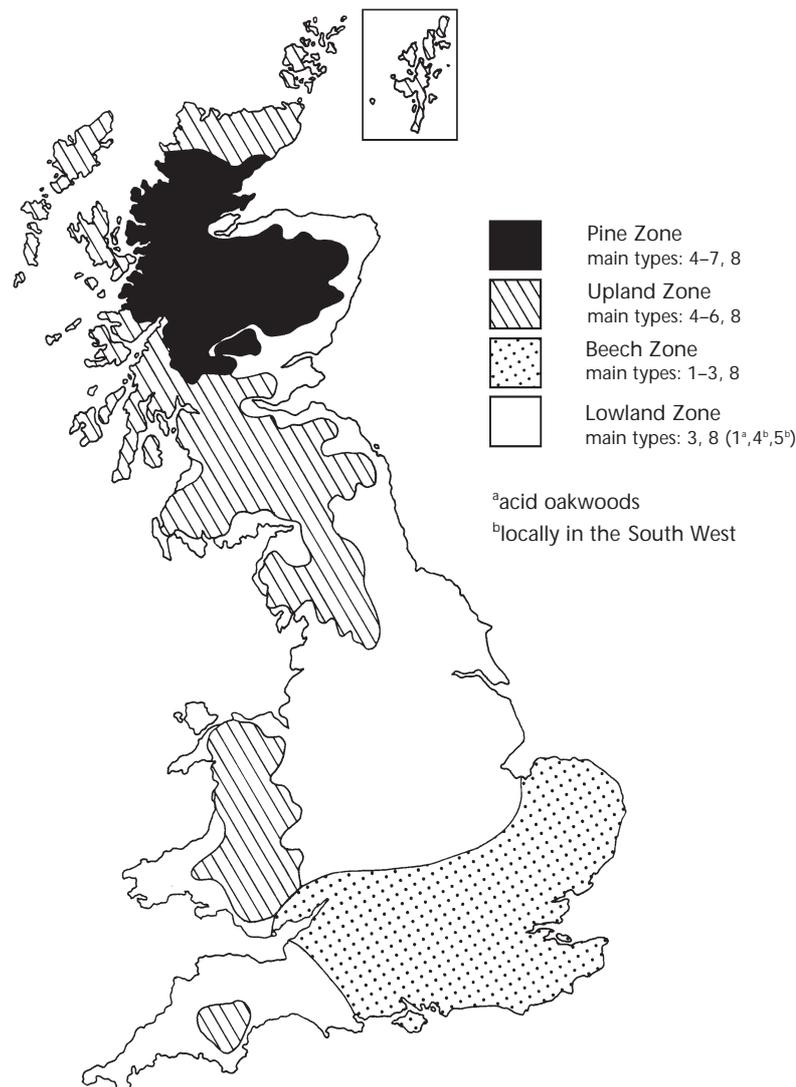
For the purposes of these management guides, Britain's ancient semi-natural woodlands have been divided into 8 types. This gives the best balance between straight-forward, practical guidance and the specific needs of the various types of native woodland. Many more types are

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 1991¹) and the stand types described by Peterken (1981⁶). 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).

Notes

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