4. Scrub community and shrub species profiles

4.1 Introduction

The following introductory sections to the species profiles review the main scrub community types found in Britain. They provide a brief overview of their conservation value and their management, giving examples of typical scrub species that occur, the effects they are likely to have as a component of that habitat and the management issues particular to that community. The various issues described relate to the species profiles in Section 4.4.1 to 4.4.48.

There are over 300 species of native and naturalised woody plants in Britain and Ireland. They may occur as single species stands or as components of mixed communities. It is beyond the scope of this Handbook to cover all of these species. Appendix 8.5 lists all native and introduced species, indicating in bold type those reviewed by the profiles in this section and those that are most commonly encountered as management issues.

4.2 Scrub communities and their management

Scrub communities can be divided into three types: lowland, upland and coastal scrub. Lowland scrub can be further sub-divided into that on wet or dry soils. Their zonation, succession and conservation value are reviewed below (see also 2.5.2 and Appendix 8.4).

This section also looks at the management issues affecting those communities and refers to management objectives commonly cited by site managers (JNCC Report 308). In particular, it relates management issues to the objectives of increasing the extent, enhancing the quality, maintaining, reducing or eradicating scrub. These objectives are also reflected in the species profiles (4.4).

The amount of published work on scrub management is small. To date, the most comprehensive documentation is The Lowland Grassland Management Handbook (Crofts and Jefferson, 1999) with a whole chapter on scrub management *[JNCC Report 308: 5.1 Review of the literature on management of scrub, p 81]*

Management of scrub communities is influenced by the conservation value of the scrub and of the habitats in which it occurs as well as the requirement to balance the two. Some scrub community types are capable of expanding quite rapidly. Others are less aggressive and require minimal intervention and management.

On the other hand, there are some types, which due largely to the effects of man, are receding and will require intensive efforts to increase their extent and range.

4.2.1 Lowland wet scrub communities

Lowland wet scrub is dominated by Grey Willow, with Downy Birch and at lower frequencies Alder, Hawthorn and Pedunculate Oak with Bramble underscrub. On the organic soils of mires and fens there is greater species diversity, including Alder Buckthorn, Dog Rose and Currants. On wet heaths, mires and blanket bogs in lowland and upland Britain, scattered bushes or stands of Bog Myrtle scrub can be found, usually growing alongside moving water.

Alder wood, Godstone. Peter Wakely/English Nature

Wet scrub develops on mineral soils at the edges of ponds, lakes, rivers and streams and in the damp hollows of dune slacks. Grey Willow is a rapid coloniser and can be found in other damp areas, for example disused mineral workings and along transport corridors. On organic soils, it develops by direct invasion or following abandonment of mowing management and is most frequently encountered in East Anglia or on the Shropshire and Cheshire meres.

Wet scrub is a transitional component of several other habitat types, such as reed fen and Alder woodland. Where it abuts agricultural land or grows along transport

corridors its boundaries are sharply delineated. In exposed coastal habitats of western Britain, it may be the climax vegetation. On richer soils, Alder woodland is most likely to develop, with Elder as the sub-canopy cover, and Bramble below. On acidic soils, birch and Purple Moor-grass develop and where the birch degenerates this may lead to the formation of mire communities.

As well as its importance as a component of other habitat mosaics, wet scrub is included in the priority wet woodland BAP habitat. Where Bog Myrtle grows in conjunction with willow and birch scrub it forms an important component of the habitat requirement for several rare invertebrates. *[JNCC Report 308: 2.4 Lowland scrub types on wet soils, p 27]*

4.2.2 Lowland wet scrub management

It is important to recognise that wet scrub has considerable conservation value and management should aim to maintain a balance of scrub and other wetland habitats. Where lowland wet scrub occurs at the interface with open water, it tends to be stable, often controlled by fluctuations in water levels, which create a mosaic of standing dead and live scrub. In fens, Willow dominated scrub can be highly invasive and damaging, as nutrient rich litter accumulates and so soils become drier. Management is then needed to control the scrub expansion. In established wet scrub, management needs to focus on maintaining a mosaic and preventing succession to woodland or encroachment into priority open habitats. As they become invaded by Birch and Pine, there will be an increasing need for the reduction or eradication of scrub from open habitat such as bogs, mires and wet heath. Invasion of scrub into bogs and mires increases evapo-transpiration leading to drying, which in turn damages the existing interest and increases encroachment.

The selection of appropriate management techniques for wet scrub needs to take into account the vulnerability of wetland habitats, particularly to chemicals and to soil disturbance.

4.2.3 Lowland dry scrub communities

Dry scrub communities occur on three soil types, calcareous, neutral and acidic.

4.2.3.1 Calcareous soils

Only in extreme conditions on upland limestone is calcareous scrub ever a stable climax community. On abandoned or under managed land the scrub community undergoes a gradual transition of successional stages between open habitats to woodland. However, where the site is managed succession may be interrupted.

Juniper scrub at Porton down. Peter Wakely/English Nature

The different successional stages in calcareous scrub communities provide structural and species diversity, which is important to many rare plants and invertebrates as well as birds and mammals.

Calcareous soils, especially in the warmer, drier parts of lowland England have very diverse scrub species communities. On deep, fertile soils, scrub communities are composed mainly of Hawthorn, Blackthorn and Bramble while on shallow, less fertile soils, single species dominance is replaced by a diverse mix of species such as Dogwood, Privet, Wayfaring Tree, several species of Rose, Traveller's Joy, Juniper, Whitebeam, Box and Yew. Diversity declines towards northern and north western Britain as different species reach the limits of their range. In western and northern Britain, particularly the Isle of Aran, Avon Gorge and Wye Valley, several rare endemic species of Whitebeam occur, mostly on steep rocky limestone outcrops where they form a climax scrub community. On shallow calcareous soils in western and northern Britain, Hazel can be found growing over limestone pavements, cliffs and screes, as a component of species-rich herbaceous grassland. Stunted Hazel scrub can also be found on the northwest coasts of Scotland where its bark is an important substrate for rare epiphytes.

The diversity and in some cases rarity of some shrub species of calcareous soils give rise to their conservation value, e.g. Box and Juniper. Similarly, the presence of rare species of Whitebeam in this community in western Britain enhances the conservation value of scrub in these areas. This scrub community is also an important component of the species-rich semi-natural calcareous grasslands, in which several species of plant occur, including orchids. Scrub invasion on these habitats can cause conservation problems and the maintenance of a mosaic is a significant management challenge. *[JNCC Report 308: 2.5.1 Scrub on dry calcareous substrates, p29]*

4.2.3.2 Neutral soils

Hawthorn scrub dominates neutral soils, usually on derelict land, abandoned arable or pastureland, hedges and the verges of transport corridors. It usually grows alongside Blackthorn, Elder and Elm. On deeper fertile soil, Blackthorn becomes the dominant scrub species, accompanied by gorse on poorer soils or Hazel and Privet on richer soils. Blackthorn has a high tolerance of salt and is frequently dominant on coastal cliff tops, where exposure can reduce the canopy to as low as one metre in places.

Elder scrub occurs on damp, disturbed nutrient rich soils either as single species stands, or often in association with Grey Willow, Sycamore and Bramble. Stands are found growing along road and rail embankments and waste ground. Elder can also be found growing around Badger setts and Rabbit warrens where its spread is encouraged by the fertile disturbed soil and its low palatability to Rabbits. Similar conditions also favour the development of Buddleia.

Lowland scrub on neutral soils is an intermediate succession between open ground and woodland. Only in exposed coastal habitats can its stunted growth be considered climax vegetation. Succession is gradual on abandoned or extensively managed land but adjacent to intensively managed land the edges of stands are strongly demarked. Patterns in the development of scrub reflect the history of disturbance to the site and on wasteland, abandoned arable farmland or grasslands, Hawthorn and Blackthorn scrub often occurs among a mosaic of open herbaceous vegetation dominated by coarse grasses such as Yorkshire Fog and patches of Bramble. Along the margins and rides of woodland, Blackthorn scrub will form dense linear stands.

The mosaics of scrub and open habitat are important for invertebrates and birds, especially within the farmed environment, where it provides a refuge for a variety of common species. Although Blackthorn dominated scrub communities contain fewer woody species in comparison to Hawthorn scrub, the diversity found within the grassland mosaics of which the scrub type forms a component, are of equal importance as those of Hawthorn *[JNCC Report 308: 2.5.2 Scrub on neutral substrates, p30].*

4.2.3.3 Acidic soils

Gorse and Broom scrub dominate acidic soils and among the more open stands grasses and Bramble develop to form a mosaic, often with an abundance of bryophytes. This scrub type is typical of marginal lands in lowland and upland Britain. Two non-native species, Gaultheria and Rhododendron are frequent invaders, out competing the native species.

Gorse scrub is a component of acid grassland and heaths and an underscrub on marginal agricultural land, where extensive grazing encourages the development of Bracken and Bramble. It is also found along woodland edges, hedgerows, as well as rail and roadside embankments. Many heathland plant communities are dominated by stands of gorse and their community type is influenced by their geographic location.

Gorse scrub can also occur on patches of acidic soils within areas normally characterised by neutral or calcareous soils. On sloping ground, these acidic deposits can enrich soils further down the hill. This, combined with the ability of gorse to acidify the soil growing around it, creates suitable conditions for gorse and other acid loving plants such as heathers to grow alongside chalk grassland species. The ability of gorse to acidify calcareous soils can, in extreme cases, become a management issue. When gorse scrub is cleared, calcareous plants will not recolonise the acidified soils.

Grazing and burning may suppress succession of gorse scrub to woodland. This will create a diverse mosaic of gorse scrub among acid grassland or heathland. Burning or soil disturbance can encourage colonisation by birch, oak and pine. Without intervention, eventual canopy closure will lead to oak woodland or mixed oak and birch in the uplands. Extremities of exposure usually suppress succession of gorse scrub growing on coastal cliffs.

Botanically, gorse scrub is species-poor but as a component of heathland habitat mosaics, it is of considerable conservation importance for such species as Dartford Warbler and Stonechat. *[JNCC Report 308: 2.5.3 Scrub on acidic substrates, p31]*

4.2.4 Lowland dry scrub management

Lowland dry scrub communities are the most studied of all scrub types. This has been largely driven by the need to prevent encroachment, reduce or eradicate scrub from species rich grassland habitats, especially on calcareous soils. The nature of these soils provides ideal conditions not only for a diverse herbaceous flora, but also for a diversity of scrub species. Many sites have documented their work on scrub management over a long period. As a result, the ecology of dry scrub species and their responses to management are well understood. This has benefited the management of scrub as an important component of these habitats, including where the management objective is to enhance scrub stands.

Although there is a greater understanding of the issues and techniques required to manage lowland dry scrub, encroachment still causes major problems and maintaining the mosaic of open habitat and scrub is still a priority. Grassland species can be lost very quickly from

a site following scrub encroachment and the common aim is to maintain an intricate mosaic between the scrub and grassland interface. This may not always be a realistic option and in some circumstances, it may be better to maintain large areas of open grassland, which are more likely to be resistant to encroachment. Heathland is also greatly threatened by scrub invasion from native species, such as birch and pine, as well as from non-natives such as rhododendron.

A large number of the species profiled in 4.4 occur in dry scrub communities and summaries of appropriate management techniques are given. However, there are certain species, for example the Viburnums that have little documentation relating to the effects of management.

Seatoller Yews, Borrowdale. Peter Wakely/English Nature

4.2.5 Upland scrub communities

Upland scrub occurs above the upper limits of enclosed farmland and in exposed coastal areas of northwest Scotland.

4.2.5.1 Wet scrub forest zone

Although not restricted to the uplands, willow scrub is more associated with the wet soils of the upland forest zone than with lowland soils. The species normally associated with lowland wet scrub are absent and replaced by other willow species with more northerly distributions, such as Bay, Eared, Tea-leaved and Dark-leaved Willow. In the lower altitudes of the Western Highlands, Eared Willow is often found growing in association with Grey Willow.

The position of upland willow scrub as a component of other habitats and the successional processes that occur, are similar to those of its lowland counterpart. The vegetation that develops within the different communities is influenced by local variation in water levels and soil chemistry. Upland willow, like its lowland counterpart is an important component of the wet woodland BAP. Tea-leaved Willow scrub is also an important refuge for a number of rare herbaceous plants. *[JNCC Report 308: 2.6.1 Scrub on wet soils in the forest zone, p32]*

4.2.5.2 Dry scrub forest zone

Hawthorn dominates the dry scrub forest zone, often with Blackthorn, Grey Willow, Hazel, Rowan and Crab Apple. The Hawthorn scrub occurs in patches with Bracken on grassy upland slopes. These small stands spread by suckering or seed dispersal caused by roosting birds. The bushes in these communities may be very old and it is suspected that their presence is a result of a historical relaxation in grazing or relict woodland cover. Tree species are rare in these communities and it is therefore unlikely that woodland succession will occur. In Wales, this scrub community is known as Ffridd.

The community is ecologically poor in terms of its plant and animal species, but it is an important landscape feature that is rare in continental Europe. It can be an important habitat for Stonechat, Whinchat and Tree Pipit. *[JNCC Report 308: 2.6.2 Scrub on dry soils in the forest zone, p32]*

The area between the upper tree line and lower alpine zone, known as the sub-montane zone, has a mosaic of tree and scrub species growing together to form a scrub wood. The scrub community includes birch, Hazel, oak, Aspen, Rowan and Scots Pine. They form a climax community, stunted by the harsh conditions. Some of the scrubby trees here can be several hundreds of years old. The under-storey of Bilberry and Heather has an extensive cover of bryophytes. This is a very rare habitat. Where Scots Pine is found at its altitudinal limits and succession is prevented by the exposed conditions, the montane scrub community slowly changes to Juniper scrub. The small number of sites where this occurs are the only places in Britain where trees exist at their altitudinal limits and are a component of the native pine Priority Habitat BAP. *[JNCC Report 308: 2.6.3 Tree-line scrub and scrub woodland, p33]*

4.2.5.3 Juniper scrub

Juniper scrub occurs at altitudes of up to 650 metres. There are two sub-species that are components of two different vegetation types. The more widespread, Common Juniper, is usually found growing in open grassland with the occasional dense thicket of stunted Downy Birch. The Dwarf Juniper is a low growing shrub of mixed dwarf heath that grows on shallow slopes in the lower alpine zone and as occasional individuals on alpine heaths.

Upland Juniper occurs on both calcareous and acidic soils. In these habitats, it is often difficult to differentiate between scattered bushes and scrub. Increased water levels will lead to the development of mire and wet heath communities in place of Juniper scrub. Below the tree line, increasing amounts of birch, oak and pine scrub occur where Juniper scrub begins to transform into woodland. At the tree line, Scots Pine scrub is replaced by Juniper, which is the climax community at these altitudes.

Juniper is one of the most documented scrub species. Its rarity warrants it having its own BAP Species Action Plan and being listed in the Habitats Directive. *[JNCC Report 308: 2.6.4 Upland Juniper scrub, p33].*

4.2.5.4 Dwarf Birch scrub

Dwarf Birch is associated with blanket bogs where it forms dense clumps of scrub. It can also be found as isolated individual plants or as small patches on upland heaths. It is highly susceptible to grazing and burning which suppress its establishment. Its rarity and the fact that it is a component of blanket bog, a habitat covered under Annex 1 of the European Habitats Directive, make it of special conservation value. *[JNCC Report 308: 2.6.5 Dwarf birch scrub, p34].*

4.2.5.5 Dwarf Willow scrub

Communities of low willow scrub can be found on wet, rich alpine areas, away from high grazing pressure. The most widespread species is Downy Willow, but other characteristic species include Mountain, Woolly and Whortle-leaved Willow. The under-storey comprises a mix of taller herbs, grasses and sub-shrubs that are unable to tolerate high levels of grazing pressure.

Small, isolated stands grow on rocky outcrops, usually dominated by calcareous grassland species. Where calcareous rocks intrude into acidic soils, wet heath communities can be found growing alongside the willow scrub. Downy Willow is climax vegetation, which replaces scrub Ash and Rowan at higher altitudes. This transitional community was once widespread, but has been largely lost in the uplands due to over grazing.

This is a very rare habitat, with stands of no more than 0.5 hectares. The species are classified as either Nationally Scarce or Red Data Book species. Woolly Willow has its own Species Action Plan and is a Priority BAP Species. Vegetation differences between the British and European sub-arctic willow communities suggest that those in Britain may be worthy of special conservation. *[JNCC Report 308: 2.6.5 Dwarf birch scrub, 2.6.6 Sub-arctic willow scrub, p34].*

4.2.6 Upland scrub management

Of all the communities, upland scrub has the least guidance for management. The focus for management is on the use of browsing and grazing and the propagation of plants through cuttings or seeds. Upland scrub stands are more commonly in need of expansion and enhancement than reduction. Work on upland scrub has generally been limited to a few species at a few sites and it is not known if the information is generic to the habitat in other areas or to other species or habitats. While research is focussed on the rare species and communities, upland scrub communities of Ash, Rowan and birch and Atlantic Hazel woods are still poorly understood. Documentation on management techniques is scant and that described in the profiles is based on generic information for managing their lowland equivalent. As a result, caution should be used when selecting and using management techniques and there is an urgent need for documentation of the results of management.

4.2.7 Coastal scrub communities

In Britain, coastal scrub can be classified into four distinct habitat zones: shingle, sea cliffs, salt marsh and sand dunes. The types, their successional stages and conservation value are described briefly below.

4.2.7.1 Shingle scrub

Shingle scrub develops where sediment is able to accumulate between the shingle. The harsh, exposed conditions create stunted climax stands of dwarf Broom and Blackthorn in the most exposed areas and Bramble, Elder and gorse in more sheltered areas. In small areas of northeast Scotland, Juniper survives on some shingle bars.

Shingle scrub grows as a component among open herbaceous vegetation, maritime grasses and heathland vegetation that have developed where sediment has built up. Stands of Shrubby Sea-blight occur on some sites where shingle forms an interface with the salt marsh communities.

Shingle habitats in Britain form a considerable proportion of the European resource, recognised by the designation of several SAC's with extensive areas of shingle in which scrub forms an important component. *[JNCC Report 308: 2.3.1 Scrub on shingle, p25]*

4.2.7.2 Sea cliff scrub

Sea cliff scrub can become quite extensive, particularly where the substrate is soft and prone to slippage, for example at Lyme Regis in Dorset or St Catherine's Point, Isle of Wight. It is not exclusive to soft cliffs, the cliffs at Elgol on the Isle of Skye in Scotland being an example. The species found are similar to those in other habitats, typically Hazel, Blackthorn, Bramble, gorse and Privet, but the harsh exposed conditions restrict their growth. On limestone cliffs, Burnet Rose and Juniper can occur and the limestone cliffs at Great Orme's Head in north Wales are the only sites in the UK for Wild Cotoneaster. Stands of trees also take on the appearance of scrub, stunted by the harsh conditions of these habitats. The sea cliff scrubs of western Britain are important for their lichen communities.

Maritime cliff scrub is a component of the open grass and heathland vegetation communities found growing in these exposed habitats. In sheltered parts, woodland will also

Rhododendron on Isle of Lundy. Paul Glendell/English Nature

form a part of the community. The constant flux of disturbance and colonisation on soft cliffs means that scrub develops as part of a primary successional process, alongside pioneer herbaceous plants. Cliff top scrub growing among maritime grass or heath may well have developed following a cessation in grazing. The exposed conditions usually restrict any development of scrub to woodland except perhaps in sheltered valleys and ravines.

Sea cliff scrub is an important component among the vegetation mosaics of these habitats. They are especially valuable, for their epiphyte communities, for shelter and as a food resource for migrant birds, both where extensive under-cliffs occur and along western and northern coasts. *[JNCC Report 308: 2.3.2 Scrub on sea cliffs, p25]*

4.2.7.3 Salt marsh scrub

In a few localities on the south and east coasts of Britain, salt tolerant Shrubby Sea-blight and Sea Purslane scrub grows in sizeable stands at the interface of the salt marsh, delineating the upper fringes of tidal inundation between the salt marsh and shingle or sand dune vegetation. The communities are affected by tidal inundation and storm damage. Where disturbance does not occur, then other scrub communities begin to develop. Three coastal SAC's have extensive stands of this vegetation community. *[JNCC Report 308: 2.3.3 Scrub on salt marshes, p25]*

4.2.7.4 Dune scrub

Dune scrub communities develop on stable areas of the dune, particularly in the slacks or among dune grassland or heathland communities. Extensive stands of Sea-buckthorn develop to form a dense, impenetrable cover at the expense of other herbaceous species. Sea-buckthorn has invaded many dune systems and is considered a serious threat to dunes on the west coast of Britain, where it has been introduced.

The moist conditions of dune slacks provide ideal conditions for Creeping Willow, which in older stable dunes may develop into extensive stands. In the wetter slacks, it may be associated with Alder, Grey Willow and Bog Myrtle scrub, while in drier areas Privet may occur. In sheltered, older dunes increased nutrients have helped stabilise the vegetation to represent a typical lowland scrub community with for example: Blackthorn, Hawthorn, Elder and Privet on base rich soils and Broom and Bramble on more acidic dunes. At a few sites on the northeast coast of Scotland, important Juniper stands also occur.

Dune scrub develops on stable sheltered parts of the systems with levels of disturbance influencing the pattern of establishment. The extent of scrub encroachment often depends upon the levels of grazing, usually by Rabbits but also other livestock. The occurrence of myxomatosis in the Rabbit population has allowed scrub to encroach onto some dune systems. On the landward side of dune systems, grazing or forestry usually intervenes in the natural processes of succession.

The Juniper thicket dunes are considered most important of the habitats. Sea-buckthorn dune systems on eastern coasts are included in the Habitats Directive but until recently have not been considered a priority for SAC designation. Dune scrub is an important component of other sand dune systems designated as SAC's because of their stabilised habitats. In calcareous dunes, the mosaics of scrub and grassland have important communities of heat loving plants. The scrub also provides important food and cover for migrant birds, as well as important populations of breeding birds and invertebrates. *[JNCC Report 308: 2.3.4 Scrub on coastal dunes, p26]*

4.2.8 Coastal scrub management

Stands exposed to the elements develop a stunted climax community and in these situations, little or no

management may be required. However, scrub encroachment of coastal cliffs can threaten maritime heath and grassland. In Pembrokeshire and more recently Cornwall, this is an issue liable to have adverse effects on the breeding success of Chough.

Scrub invasion of salt marsh and dunes can destroy areas of high conservation value and the invasive nature of Sea-buckthorn, birch, White and Balsam Poplar are of particular concern. Sea-buckthorn is seen as a problem both in respect of its nitrogen fixing abilities, which enriches the soils of dune communities, and on the west coast of Britain as a non-native invasive species. However, it can be an important component of coastal dune habitats on the east coast.

On the sheltered landward side of coastal scrub communities, preventing woodland succession or scrub encroachment into neighbouring priority habitats might be an issue. The species and issues relating to management of coastal scrub communities are similar to those of lowland wet and dry scrub communities. There is a need to monitor and document the effectiveness of techniques and to develop new approaches to management.

4.3 Scrub management options

Before making a decision to manage scrub, the first priority is to assess the value of the scrub. The information in Section 3 Planning for Management and Section 6 Survey and Monitoring provide guidance for assessing the conservation value of scrub. Thereafter the 'Species Profiles' in Sections 4.4.1 to 4.4.48 have been structured to reflect the need to manage sites in a sustainable way, prioritising

Flailing scrub at Saltbox Hill, Kent. Peter Wakely/English Nature

preventative action rather than remedial action. Thus grazing appears as the first option of management and the use of chemicals as the last. The tables are cross-referenced to management techniques (Section 5) and relate to the flow chart in Section 1, Figure 1. Any individual scrub stand can be assessed on a continuum between high and low conservation value, based on the following factors:

Scrub of high conservation value

- Native species of local provenance
- Diverse species composition
- Diverse age and physical structure of scrub
- Diverse mosaic and pattern between the scrub and associated open habitat
- Diverse range of associated flora and fauna

Scrub of low conservation value

- Non-native species
- Poor species composition
- Poor age and physical structure
- Simple composition between associated habitats
- Low attraction to other species of flora and fauna

The Management Techniques in the species profiles relate to the species relevance and its effects as a component of the habitat. For example, a species with a tendency to encroach into a priority habitat might require reduction or eradication while a species with a restricted range might be a target for maintenance or enhancement.

Management may not be an immediate priority; the condition and extent of the scrub might be acceptable and so not warrant intervention. However, removal of invasive scrub is most efficient if done at an early stage of encroachment. It is much harder to restore invaded habitats or scrub after years of neglect, which may have resulted in loss of ground flora, nutrient enrichment of the soil and loss of structural diversity to a single-aged stand type. Cutting of senescing scrub can sometimes re-invigorate bushes and result in vigorous re-growth.

The objectives in the species profiles relate to whether the species is within an upland or lowland scrub community, or a non-native invasive species, and might follow any or a combination of the following sequences of objectives:

Lowland scrub

- To **enhance** or **maintain** as a component of the scrub mosaic.
- To **prevent** encroachment into a priority habitat

- To **reduce** or **eradicate** from a priority habitat

Upland scrub
- To **enhance** existing stands
- To **increase** extent of existing stands
- To **maintain** existing stands

Non-native scrub
- To **prevent** encroachment into priority habitats
- To **reduce** or **eradicate** from priority habitats

The management techniques used will be influenced by the resources available and by local physical and climatic conditions. The cost of initial management operations and aftercare need to be taken into account (see Appendix 8.9).

The management techniques listed in the species profiles and described in section 5, fall into the following three main categories:
- Grazing
- Mechanical
- Chemical.

4.3.1 Grazing
An increasing number of sites are using grazing and browsing to prevent scrub encroachment and as an aftercare tool to prevent regeneration. The techniques in the species profiles are structured to present the option of grazing and browsing as one of the most sustainable methods of management. They summarise our current level of knowledge about the palatability of certain shrubs to livestock (see also Section 5 and Appendix 8.6). We appreciate that grazing may not be the preferred, or even an acceptable form of management on some sites.

Much of the information has been derived from anecdotal observations and may not necessarily be applicable in all situations. There is still much to be learned and information on the breeds and species used to deliver the management objectives for the target vegetation type and species will provide additional useful information.

4.3.2 Mechanical
The species profiles present information on how different species of shrub respond to mechanical management. However, the species response is likely to vary both regionally and locally. Knowledge about responses to management will only improve if managers record or document the work carried out and the results achieved.

The most efficient management will always be to intervene at as early a stage as possible, when small hand tools may be used effectively. However, if management is left until a later stage in the development of scrub then the use of larger machinery may be the only viable management option. Scrub encroachment can be prevented by weeding or mowing, but if scrub becomes established in an area, where it is unwanted, then large excavators may need to be used to eradicate it. The impact of the use of large machinery on the environment should always be borne in mind when deciding on appropriate management techniques.

The machinery available to manage scrub is reviewed in Section 5. Access, financial, manpower and time resources are major limiting factors. The shrub species profiles that follow present a sequence of options, which are cross-referenced to Section 5 'Management techniques'.

4.3.3 Chemical
The use of herbicides in nature conservation is an emotive issue; there is a national government policy to minimise the use of pesticides and this Handbook is written with that in mind. It is the management technique of last choice due to the potential impacts on the wider environment. However, in some situations it may be the only viable option and anyone managing scrub is likely to consider herbicides as a technique, with the exception of those sites that are going to be, or already have been, registered as organic.

When the 'contents' of this Handbook were being determined by the Project Working Group in 2001 it was agreed that it would be necessary to simply have an Appendix setting out background information relevant to the use of herbicides in the management of scrub. This was designated as Appendix 8.7 However, as readers will by now have realised the volume of material that would have been required to meet legal and operational guidance would have been enormous – far more than would have been suitable for an Appendix. So it was decided to assist English Nature in the production of: *The Herbicide Handbook – guidance on the use of herbicides on nature conservation sites. (2003).*

The Herbicide Handbook (HH) now accompanies this Scrub Handbook (SH) so there is no longer any need for Appendix 8.7. (An entry has however been left on the SH page allocated to Appendix 7 to ensure that anyone reading just the 'Contents' gets referred directly to the Herbicide Handbook). We hope that the supply of both Handbooks alongside each other will assist a proper review of all techniques, followed by choice of the technique that best suites the site conditions and requirements.

Treatment of herbicides in the shrub species profiles in Section 4.4.1 to 4.4.48 is limited to summary information on the situations where approved herbicides may be considered for use on each shrub species, along with a reference to the 'herbicide information sheets' in Section 4.1.3 of the HH where further detailed information about each herbicide can be obtained.

NB. Readers may like to know that the Herbicide Handbook is also available from English Nature as a separate publication for applications that do not involve scrub management.

4.4 Shrub species profiles

The 48 profiles (covering 70 shrub species) which follow are derived from those listed in the JNCC Report no. 308 as being managed on nature conservation sites, and from the Soil Association technical guide to Organic Weed and Scrub Control on Nature Conservation Sites. Some rare species have been included where they have specific management needs. Nomenclature and identification features have been sourced principally from *Clapham, Tutin and Moore* and *The New Atlas of the British and Irish Flora.*

Each species profile is listed alphabetically and follows the same format. Some profiles have a suite of similar species grouped together. There is information on the species' status and ecology, the habitat in which they normally occur and their distribution. Their field identification is summarised, and synopses included on their growth characteristics, palatability and their value to wildlife.

Notes relating to the palatability of scrub species are based largely on anecdotal observation from a few sites and sources and should be treated with caution. The effects of grazing and browsing on scrub species will vary between sites, livestock types, breeds and individuals within a breed, along with the timing and availability of other foods as well as physical and climatic conditions. Further guidance on the selection of livestock for grazing and browsing can be found in the *GAP publication: The Breed Profiles Handbook*, by Tolhurst and Oates (2001).

Examples of key objectives for the management of the species are presented in a table along with examples of relevant techniques that may be used to achieve them; other objectives and techniques may be appropriate. The techniques are cross-referenced to detailed descriptions in Section 5. A selection of key sites or organisations and contact details are listed for the management of the species concerned. A list of other key sites of nature conservation value and with an important scrub component is found in Appendices 8.1 and 8.2. Eight case studies are presented in Section 7. Further reading specific to the species is suggested at the end of each profile and a general list appears at the end of the chapter.

All reference to herbicide treatments in the shrub species accounts should be read in conjunction with text elsewhere in this Handbook in Section 5.8.16 (Herbicide application technique), Section 5.9.4.4 (Herbicide applicators). For more detail, site managers are referred to the report by English Nature / FACT: The Herbicide Handbook - *Guidance on the use of Herbicides on Nature Conservation Sites* by Britt, C, *et al* (2003) that accompanies this Scrub Handbook. It is important to note that only approved herbicides should be used on approved land types in accordance with all current legislation, including Health and Safety legislation and Care of Substances Hazardous to Health, and used according to label recommendations. The final table in the shrub species accounts presents a list of herbicides for consideration in July 2003. Managers need to confirm that herbicides have current approvals. This can be done by reference to the *UK Pesticide Guide (2003)* or at the UK Governments pesticide website: http://www.pesticides.gov.uk/ & www.hgca.com/research/pesticide_withdrawals.htm

4.4.1 Alder, Common *Alnus glutinosa*

Summary
Alder occurs widely on damp soils throughout Britain. It is a component of carr and riverine woodland and is important to a wide variety of insect and bird species.

Alder scrub is usually managed to maintain single species stands or as a component of mixed scrub communities. Alder requires prevention or reduction from encroaching into priority habitats, which it readily does.

Browsing and various mechanical methods can be used to diversify and maintain the stands.

Distribution and status
Alder is a common widely distributed species throughout Britain and Europe. It is a fast growing deciduous tree, tolerant of waterlogged conditions; found in wet woods, fen carr and along rivers. It matures in around 60 years, and can grow by up to 0.5 m per year for the first 30 to 40 years. Its ability to fix nitrogen through its roots enables it to grow easily on infertile or poor soils, though it is rare on acid soils. In addition to the native species, there are two species of introduced alder: Italian, *Alnus cordata* and Grey, *A. incana*, which are mostly planted for amenity landscaping and not considered here.

Identification
Max height: 20 m; Flowers: Feb – Mar; Fruits: Oct – Nov; Ripens: Nov.

Alder is a tree of medium height and is frequently multi-stemmed. The leaves are rounded, dark green, double-toothed and hairless, except around the veins underneath. The catkins are very distinctive; the yellow male catkins are pendulous and appear before the leaves.

The female catkins are green and round, and when in fruit, become like a small pinecone. The bark is fissured and the younger shoots and twigs hairless, with purple buds. When cut, the timber turns reddish.

Growth characteristics
- It germinates well from seed.
- Seedlings and saplings grow fast.
- Re-grows well from cut stump and suckers from surface roots.

Alder Catkins. Peter Wakely/English Nature

Palatability
- Some cattle, pony, sheep and goat breeds will browse Alder, though this has to be maintained to make an impact on vigorous growth.

Value to wildlife
Important for wildlife, including for example:
Lower plants:
- Substrate for epiphytes growing in moist climates/ situations.

Invertebrates:
- 283 species of recorded feeding on the genus.
- 40 species of invertebrate feeding exclusively.
- 22 RDB and 7 BAP invertebrate species.

Birds:
- Provides nest sites for hole nesting birds e.g. Lesser Spotted Woodpecker and Willow Tit and a source of winter food for Siskin, Redpoll and Goldfinch.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock**	
En	A	Encourage bushy growth and increased seed production using low intensity summer browsing. Bark stripping may initially increase seed production, and then create standing dead wood.	5.8.4/5.8.9
En	B	Cattle and pony trampling can create routes through extensive stands, leading to the formation of natural gaps and glades. Prevent trampling when trying to encourage spread of stands.	5.8.4/5.8.8
En/M	C	Encourage seed germination using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. After germination, reduce or remove livestock and in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.3/5.8.4
En/M	D	Allow natural expansion of stands by protecting them from browsing and trampling.	5.8.3
M	E	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove / reduce stock as required.	5.8.4
M	F	Moderate to heavy browsing can open the structure of older established scrub, creating a browse line and reducing its wildlife value, though epiphytes can fair better in open stands.	5.8.4
	2	**Enhance or maintain stands mechanically**	
En	A	Create seedbeds near existing seeding stands by scarifying the ground in late summer.	5.8.1
En/M	B	To mimic natural dynamic processes, clear some stands and allow others to establish elsewhere, thereby maintaining the desired extent across the site.	5.8.5/5.8.13
En	C	Retain dead bushes and stumps to decay naturally and provide niches for other wildlife. To augment deadwood on site ring-bark selected larger stems as required. NB ring barking can encourage regeneration from the stump (where necessary take action using 5C below).	5.8.9
En/M	D	To maintain age and structural diversity cut on rotation: divide large stands into small, sinuous edged coups. Manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Alder without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting. Heavy browsing may be necessary to have an impact. This may be detrimental to other interest.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use sapling removal tools to clear young seedlings/saplings.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1/5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools.	5.9.4.1/5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2

Examples of management techniques to implement example objectives: Cont...

R/Er	E	Stumps may be winched where a suitable anchor exists and time allows. Alternatively, a grinder may be used for large stumps.	5.8.14/5.9.4.2
R/Er	F	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment in drier stands where grazing is not possible. This can be achieved in small stands with pedestrian mowers/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2/5.9.4.3
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10/5.8.15, 5.9.2
R/Er	H	Water levels may be raised or submergence prolonged to suppress growth, but will encourage aerial roots to grow from the stem above the waterline.	5.8.11
	5	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16/5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2, 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2C above) with paintbrush or foliar application.	5.8.16/5.9.4.4

Herbicides that may be considered for use on Alder as at July 2003

Alder does not normally get mentioned as a species on product labels. If not mentioned and herbicides are to be used then it falls within the general classification of a 'woody weed'. Caution: there are additional approvals to be obtained and precautions to be taken before using herbicides in wet habitats.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings / yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Cumbria.
  Contact: Ian Taylor, Conservation Officer,
  English Nature, tel: 01539 792800,
  email: Ian.taylor@english-nature.org.uk

- English Nature
  Contact: M J Edgington, Roughmoor,
  Bishops Hull, Taunton, TA1 5AA. tel: 01278 283 211

- Surrey Heath Borough Council
  Contact: Gordon Voller/Eddie Whalley,
  c/o Heathland Visitor Centre, Lightwater Country Park,
  The Avenue, Lightwater, Surrey GU18 5RG
  tel: 01276 479582

- Wildlife Trust West Wales
  Contact: L Gander,
  Welsh Wildlife Centre, Lilgerran, Pembs, SA43 2TB.
  tel: 01239 621600,
  email: lin@centre.wildlife-wales.org.uk

Further reading: See end of chapter

4.4.2 **Ash,** *Fraxinus excelsior*

Summary
Ash is a common woody plant capable of developing into a large tree. It is a component of mixed scrub communities, especially on calcareous soils, and as such is usually managed as part of such stands. Ash woodland will rapidly develop through scrub.Ash scrub is usually managed to maintain single species stands or as a component of mixed scrub communities.

It requires elimination where it encroaches into priority habitats, or protection and enhancement when it is threatened by over grazing in upland areas.

With careful management, browsing helps to diversify and maintain stands. Various mechanical methods can also be used to diversify and maintain the stands.

Distribution and status
Ash is very common and widespread; it grows on all but the most acid soils throughout Britain up to altitudes of 450m. It commonly forms a component of the mixed scrub community on calcareous soils, or develops as a single species stand.

In western and northern upland regions, natural regeneration is suppressed by over grazing. Here, protection and enhancement are critical in order to maintain the mixed communities and their associated moss and lichen fauna.

Identification
Max height: 30 m; Flowers: Apr – May; Fruit: Oct – Nov; Ripen: Nov.

Ash can grow to be a large tree of commercial value.
The leaf buds are black and grow opposite each other along the stem. The pinnate leaves are 20-30 cm long and divided into 3-6 pairs of oval shaped, pointed leaves with shallow toothed margins. The panicles of flowers emerge before the leaves and ripen to form bunches of winged seeds.
The smooth bark is a grey colour and the twigs are flattened towards the ends.

Growth characteristics
- It seeds prolifically and germinates well.
- It can have a deep tap root that penetrates rock fissures which is difficult to remove or kill once it has survived the first two or three years.
- Re-grows vigorously from cut stumps and suckers from surface roots.

Ash trees on Castor Hanglands NNR. Paul Glendell/English Nature

Palatability
- Livestock of all species impact Ash by browsing leaves, shoots and especially bark, which are all very palatable.
- Ponies, Goats, and sheep regularly de-bark in winter, often killing trees.
- Browsing can kill saplings.

Value to wildlife
Valuable to wildlife, including for example:
Lower plants:
- Important for epiphytes.

Invertebrates:
- Important for decaying wood species.
- 68 insect species recorded feeding on the genus.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock**	
En	A	Encourage bushy growth and increased seed production using low intensity summer browsing. Bark stripping may initially increase seed production, and then create standing dead wood.	5.8.4/5.8.9
En	B	Create natural gaps and glades by cattle and pony trampling and create routes through extensive stands. Prevent trampling when trying to encourage spread of stands.	5.8.4/5.8.8
En/M	C	Encourage seed germination using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. After germination, reduce or remove livestock and in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.3/5.8.4
En/M	D	Allow natural expansion of stands where needed by protecting them from browsing/trampling.	5.8.3
M	E	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required.	5.8.4
M	F	Epiphytes can fair better in open stands created by moderate to heavy browsing of older established scrub. Creation of a browse line can reduce wildlife value.	5.8.4
	2	**Enhance or maintain stands mechanically**	
En	A	Create seedbeds near existing seeding stands by scarifying the ground in late summer.	5.8.1/5.8.10
En/M	B	To mimic natural dynamic processes, clear some stands and allow others to establish elsewhere, thereby maintaining the desired extent across the site.	5.8.5/5.8.8
En	C	Retain dead bushes and stumps to decay naturally and provide niches for other wildlife. To augment deadwood on site ring-bark selected larger stems as required. NB Ring barking can encourage regeneration from the stump (where necessary take action using 6C below).	5.8.9
En/M	D	To maintain age and structural diversity cut on rotation: divide large stands into small, sinuous edged coups. Manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
M	E	Maintain ground flora by removing or burning arisings as and where appropriate.	5.9.1/5.9.2
	3	**Enhance or maintain upland scrub:**	
EN	A	Encourage natural regeneration and where necessary propagate and plant out seedlings or cuttings and protect from browsing where vulnerable.	5.8.1/5.8.2 5.8.3
En/M	B	If there is a need to carry out work, take account of the epiphyte interests, which rely on ecological continuity. Refer to relevant upland species profiles (e.g.: Dwarf Birch, Rowan, etc) for more details on enhancing and maintaining upland scrub.	4.4.5/4.4.36
En/M	C	Prevent invasive species in upland mixed scrub (e.g.: Rhododendron, Sycamore, etc). Refer to relevant profiles for more detail.	4.4.34 4.4.41
	4	**Reduce from priority habitats by using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Ash without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting.	5.8.4

Examples of management techniques to implement example objectives: Cont...

R/Er	**5**	**Reduce or eradicate from priority habitats manually or mechanically**	
	A	Clear young seedlings/saplings by hand pulling or using sapling removal tools.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (e.g.: spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Stumps may be winched where a suitable anchor exists and time allows. Alternatively, a grinder may be used for large stumps.	5.8.14 5.9.4.2
R/Er	F	Reduce or prevent encroachment where grazing is not possible by regular (e.g. monthly) summer mowing or cutting. This can be achieved in small stands with pedestrian flails/flails, or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10/5.8.15 5.9.2
	6	**Eradicate re-growth (and seedlings) using herbicide:**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16/5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2C above) by follow up foliar application.	5.8.16/5.9.4.4

Key sites

- Aston Rowant NNR.
  Contact: Graham Steven, English Nature, Foxhold House, Crookham Common, Thatcham, Berks RG19 8EL, tel 01635 268881
  e-mail: graham.steven@english-nature.org.uk

- Avon Wildlife Trust.
  Contact: 32 Jacobs Wells Road, Bristol BS8 1DR, tel: 0117 926 8018
  email: avonwt@cix.compulink.co.uk

- Catherington Lith.
  Contact: Martin Healey East, Hampshire District Council, Penns Place, Petersfield GU31 4EX
  tel: 01730 234386
  e-mail: Martin_Healey@easthants.gov.uk

- Ditchling Beacon. Malling Down and Levin Down,
  Contact Mark Pearson, Sussex Wildlife Trust,
  tel: 01483 488055

- Martin Down, NNR.
  Contact: David Burton,
  tel: 01980 620485,
  email: david.burton@english-nature.org.uk

- Nottinghamshire Wildlife Trust (various reserves),
  Contact: Jeremy Fraser, The Old Ragged School, Brook Street, Nottingham, NG1 1EA.
  tel: 0115-958-8242, email: jfraser@nottswt.cix.co.uk

- Windmill Hill.
  Contact: Helen Woodman, Worcestershire Wildlife Trust,
  tel: 01905 754919,
  email: helen@worcswt.cix.co.uk

- West Wiltshire District Council.
  Contact: Martyn Hucker, Bradly Road, Trowbridge, Wilts BA13 0RD,
  tel: 01225 770361

Herbicides that may be considered for use on Ash as at July 2003.
Ash does not normally get mentioned as a species on product labels. If not mentioned and herbicides are to be used then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings / yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Further reading: See end of chapter

4.4.3 **Aspen,** *Populus tremula*

Summary
Until recently, Aspen has been an over-looked and under valued species. It is widespread but localised throughout Britain, occurring in a range of habitats. Much of our current knowledge comes from research in Scotland, where it is seriously threatened by fragmentation and overgrazing that prevents any stand regeneration. Further work on Aspen stands in England could reveal more information about its status there, and its ecological value both as a pioneer scrub and woodland species.

Individual trees may be relatively short lived, but given that almost all regeneration is vegetative, by suckering, individual clones may be very long lived, certainly hundreds of years, and it is reasonable to suggest that some stands in ancient woodland sites might be thousands of years old.

Aspen does not often threaten priority habitats and management objectives for the species are aimed less at reduction and more towards enhancing and increasing the extent of the stands, particularly in light of lessons learned in Scotland.

Livestock, deer and rabbit browsing prevent regeneration within many stands, and as a short-lived species this can have serious implications for its conservation. Encouraging regeneration is a key objective, both to enhance and to maintain and diversify stands, though this should not necessarily include the permanent exclusion of livestock. Propagation mainly from cuttings, can be used to increase the extent of stands, whereas collection and propagation of seeds is seldom undertaken. Several species of RDB and BAP invertebrates are entirely dependent on Aspen; for some, including the BAP Dark-bordered Beauty Moth, the early scrub growth stages are essential.

Colonisation of Aspen stands by undesirable scrub, including Rhododendron and other non-native species can in some cases be an issue, requiring management.

Distribution and status
Aspen is found throughout the British Isles up to altitudes of c640 m. It is a pioneer species, tolerant of a range of soil types, from acidic to base rich, preferring well-drained soils, it does also occur on moist soils. It can be found in broad-leaved woods, hedges and heathland and disused mineral sites.


Aspen at Chalkney Wood. Keith Kirby/English Nature

In northern and western Scotland, it is rare and often confined to rocky slopes and cliffs. These are a refuge from the effects of deforestation and over grazing rather than being a primary habitat niche.

Aspen was one of the earliest post-glacial colonists of Britain. This long ecological continuity makes it an important host for many associated species of flora and fauna of high conservation value.

Although individual trees may be relatively short lived, the suckering growth characteristics mean that individual clones may be several hundreds of years old. Seed productivity is usually rare and the occurrence of isolated single sex stands further reduces the opportunity for viable seed production.

Identification
Max height: 20 m. Flowers: Feb–Mar.

Aspen often occurs in single species stands. The leaves are rounded and up to 6 cm across, with small rounded teeth around the edges. Young suckering plants have leaves that are slightly downy below. Trees are either male or female and their catkins grow to 8 cm in length, the male with red stamens and female with purple stigmas. The twigs are often hairless and a grey-brown in colour and the shiny brown oval buds have pointed tips.

Growth characteristics

- Suckers vigorously to form dense stand.
- Grows well from cut stumps.

Palatability

- Aspen is palatable to sheep, cattle, deer and rabbits.
- It is also an important winter food source for the European Beaver. Should a re-introduction of this species be considered, it could have an impact on Scottish Aspen stands.

Value to wildlife

Aspen is critically important for its associated wildlife, especially in Scotland. For example:

Lower plants:

- 133 species of associated lichen.
- 98 species of associated fungi.
- 12 additional species associated with lichen only growing on Aspen.
- 26 species of moss and liverwort.

Invertebrates:

- 60 species recorded feeding.
- 26 recorded feeding exclusively.
- 16 RDB and 2 BAP species.
- 17 species associated exclusively with decaying wood.

Birds:

- High biomass source of insect food for birds.

Examples of management techniques to implement example objectives

(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Note: The ecology of Aspen and its dependent species are not fully understood, so impact of the techniques described here has not been fully evaluated. It is therefore recommended that management is carefully monitored and action taken to offset any negative impact on priority species.

Objectives		Management techniques	Section
	1	**Encourage natural regeneration:**	
En	A	Seedling establishment is rare (see above) but if being encouraged where a thick grass matt inhibits seedling establishment, use hand tools to remove it to expose bare ground and scarify the ground. Where access and ground conditions allow, rank vegetation could be removed by mechanical scraping, and seedbeds created with shallow cultivation using either rotovator or harrow.	5.9.4.1 5.9.4.2 5.9.4.3
En	B	Encourage regeneration by using controlled burning to remove rank grass thatch. Although this is not fully understood for upland Aspen in the UK, in the USA it encourages regeneration of the closely related P. tremuloides.	5.8.7
En	C	Encourage suckering by opening rank swards by short periods of heavy summer grazing. Light grazing then helps to keep the sward open. Prolonged heavy grazing will remove saplings.	5.8.4
	2	**Propagate and plant cuttings and seedlings:**	
En	A	Collect ripe seeds or cuttings and grow on in pots. Plant out in ground with low levels of competing vegetation. (See also 3A below).	5.8.1/5.8.2
	3	**Protect from excess browsing:**	
En/M	A	Where necessary, fence or use broad diameter tree tubes to protect seedlings and suckers from grazing /browsing. Remove protection when established. Where there is a known epiphyte interest on existing mature trees, it is important to ensure that light and microclimate conditions are maintained (see 3D).	5.8.3
M	B	Avoid livestock browsing through winter. Damage and losses of saplings are higher during this period as alternate forage is scarce.	5.8.4
M	C	Seedlings/suckers are vulnerable to browsing in early summer when most palatable.	5.8.4

Examples of management techniques to implement example objectives: Cont...

M	D	It is not necessarily desirable to exclude all browsers – dense thickets are of limited value to invertebrates and epiphytes. Regeneration occurs with reduced livestock numbers, but stand structure is kept +/- open.	5.8.4
M	E	Red Deer and sometimes Mountain Hare can damage montane stands; Roe Deer and Rabbits can be a problem at lower altitudes. Where fencing is not appropriate, consider culling to reduce to levels that do not compromise Aspen regeneration.	5.8.3
M	F	Provide controlled access for grazing. Fencing can be very expensive, particularly in highland areas. Deer fencing in woodland grouse areas must be visible to prevent mortality.	5.8.3
	4	**Manage for continuity and biodiversity:**	
M	A	Suppress competitors, especially at early scrub stage by using appropriate livestock stocking rates in summer. Monitor the effects of grazing/browsing on the habitat. Remove or reduce stock before the impacts become undesirable.	5.8.4
M	B	Create/maintain open stand structure using light controlled summer grazing for invertebrate and epiphyte conservation, including the BAP Broad-bordered Beauty Moth.	5.8.4
M	C	Manage grazing pressure by fencing stands where necessary, ensuring measures are taken to prevent grouse mortality (see 3F above).	5.8.3
En	D	Coppice selected trees and leave logs in situ in a safe condition where there is a lack of suitable deadwood. Rotting deadwood is critical in the life cycle of the Aspen Hoverfly.	5.8.9
	5	**Reduce or eradicate undesirable competing scrub:**	
En/M	A	In upland mixed scrub, other species can become invasive, for example non-native pine, Rhododendron, and Sycamore. Refer to relevant profiles for more detail.	4.4.34 4.4.41

Key sites

- Abernethy & Insh Marshes, RSPB Reserves.
  Contact: Andy Amphlett, Forest Lodge, Nethybridge,
  Inverness-shire PH25 3EF, tel: 01479 821409,
  e-mail: andy.amphlett@rspb.org.uk

- Epping Forest
  Contact: Corporation of London,
  The Warren, Loughton IG10 4RW
  tel: 0181 532 5313

- Esher Commons SSSI
  Contact: David Page (Countryside Estates Officer),
  Elmbridge Borough Council, Leisure & Cultural Services,
  Civic Centre, High Street, Esher, Surrey KT10 9SD.
  tel: 01372 474565,
  e-mail: djp@elmbridge.gov.uk

Herbicides that may be considered for use on Aspen as at July 2003.
Although not considered nationally rare, herbicide treatment is unlikely to be a desirable objective. If herbicides are to be used then Aspen falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Further reading
Cosgrove, P., Amphlett, A., (eds) (2002), The Biodiversity and Management of Aspen Woodlands: Proceedings of a one-day conference held in Kingussie, Scotland, May 2001, Cairngorm Local Biodiversity Action Plan 2002.

4.4.4 Beech, *Fagus sylvatica*

Summary
Beech is a native of southern England, but has naturalised widely elsewhere. It is usually a component of calcareous woodland communities and if allowed to mature it will cast heavy shade, affecting associated scrub communities and open habitats, which it readily invades. It does not regenerate well from cut stumps.

Beech scrub is usually managed to maintain single species stands or as a component of mixed scrub communities. It requires eradication where it encroaches into priority habitats.

Browsing and various mechanical methods can be used to diversify and maintain the stands.

Distribution and status
The Beech tree is native mainly to southern England, where its saplings occur usually as a component of the chalk mixed scrub communities. It also grows on neutral to acidic free draining sandy soils.

It occurs naturally south of a line from central East Anglia to South Wales. Elsewhere, and within its natural range, it has been extensively planted commercially and for amenity and landscape purposes, and can be seen throughout the country into north Scotland.

Identification
Max height: 30 m; Flowers: Apr–May;
Fruit: Jul–Aug; Ripens: Sep–Oct.

Beech grows into a tall majestic tree with a broad crown and extensive shade casting foliage. As a sapling and scrub species its twigs are brown-grey and the buds red-brown, long and pointed.

The leaves are elliptical with a flattened base and pointed tip, with the veins that are noticeable toward the edges. The leaf is a bright green, smooth above and silky hairy beneath around the veins. Mature plants develop a woody, lobed scaly cup after flowering that protects the fruit (beech nut or mast).

Growth characteristics
- Grows well from seed.
- Seedlings often establish some distance out into grassland from existing trees.

Beech. Peter Wakely/English Nature

- Older bushes may not regenerate well from cut stump.

Palatability
- It is palatable and impacted at appropriate stocking densities by browsing Cattle, Goats, some sheep breeds, and at high stocking density by equines.
- Rabbits, goats, and some sheep regularly de-bark particularly in winter.
- Equines will bark strip in some situations, e.g.: parkland.

Value to wildlife
Beech has some value for wildlife, for example Lower plants:
- Important for a wide range of fungi.

Invertebrates:
- 23 species recorded on the genus.

Birds:
- Source of winter food.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock**	
En	A	To encourage bushy growth and increased seed production use low intensity summer browsing. Bark stripping may initially encourage seed productivity, followed by standing deadwood.	5.8.4
En	B	Gaps and rides through extensive stands can be created by cattle and pony trampling. Prevent trampling when trying to encourage spread of stands.	5.8.4/5.8.8
En/M	C	Encourage seed germination using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. Browsing/grazing may need to be reduced or removed after germination and in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.83 5.8.4 5.8.8
En/M	D	Allow natural expansion of stands where needed by protecting them from browsing or trampling.	5.8.3
M	E	Epiphytes can fair better in open stands created by moderate to heavy browsing of older established scrub. Creation of a browse line can reduce wildlife value.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Create seedbeds near existing seeding stands by scarifying the ground in late summer.	5.8.1
En/M	B	To maintain a balanced age and structural diversity, divide large stands into small, sinuous edged coups and cut on a rotation. Manage small and isolated stands as a single unit. NB old beech regenerates slowly and may be suppressed.	5.8.5/5.8.8 5.8.13
En/M	C	Mimic natural processes by clearing some stands and retaining others elsewhere, but retaining the desired extent across the site. Unless required, prevent individuals maturing into standard trees, as they cast heavy shade and produce prolific amounts of seed/mast.	5.8.5 5.8.13
En	D	Retain dead bushes and stumps to decay naturally and provide niches for other wildlife. Augmenting this by ring barking selected stems to prevent them developing into trees. NB ring barking can encourage regeneration from the stump (where necessary take action using 6C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1, 5.9.2
	3	**Reduce from priority habitats using livestock**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Beech without damage to target habitat. Monitor impact and remove / reduce stock as required.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically:**	5.8.12
R/Er	A	Hand pull or use sapling pullers to clear small areas of young seedlings.	5.9.4.1
R/Er	B	If necessary to remove stumps, cut roots using hand tools (spade, mattock, billhook or root cutting chain saw). Winch stumps where a suitable anchor exists, or use a grinder for large stumps.	5.8.14 5.9.4.1 5.9.4.2
R/Er	C	Cut small stemmed bushes using hand tools (e.g.: loppers, billhook, bow-saw, chain saw, clearing saw).	5.9.4.1 5.9.4.2
R/Er	D	Small stands of larger bushes can be cut using a chain saw or clearing saw.	5.9.4.2

Examples of management techniques to implement example objectives: Cont...

R/Er	E	Summer mowing or cutting may reduce encroachment in stands where grazing is not possible. This can be achieved in small stands with pedestrian flails/flails or in large stands with a tractor and swipe or flail.	5.8.6,/5.8.13 5.9.4.2 5.9.4.3
R/Er	F	Clear large mature stands using excavators or bulldozers. This disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15, 5.9.2
Er	**5** A	**Eradicate re-growth (and seedlings) using herbicide:** Weed wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16/5.9.4.4

Herbicides that may be considered for use on Beech as at July 2003

Beech does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Aston Rowant NNR.
  Contact: Graham Steven, English Nature, Foxhold House,
  Crookham Common, Thatcham,
  Berks RG19 8EL, tel 01635 268881,
  e-mail graham.steven@english-nature.org.uk

- Esher Commons SSSI.
  Contact: David Page (Countryside Estates Officer),
  Elmbridge Borough Council, Leisure & Cultural
  Services, Civic Centre, High Street, Esher,
  Surrey KT10 9SD, tel: 01372 474565,
  e-mail: djp@elmbridge.gov.uk

- Hunthouse Wood.
  Contact: Helen Woodman,
  Worcestershire Wildlife Trust,
  tel: 01905 754919,
  e-mail: helen@worcswt.cix.co.uk

Further reading: See end of chapter

4.4.5 Birch, Dwarf *Betula nana*

Summary
Dwarf Birch is a rare montane and high latitude species, which is vulnerable to overgrazing and burning.

Management is targeted at enhancing montane Dwarf Birch scrub communities.

Distribution and status
The Dwarf Birch, *B. nana*, is a nationally scarce and localised species, occurring on higher altitude moors and peatlands from Perth and Argyll to Sutherland in Scotland. It is very rare in England, occurring only in the northern Pennines and Northumberland.

Identification
Max height: 1 m; Flowers: May–Jun; Fruits: Jul–Aug.

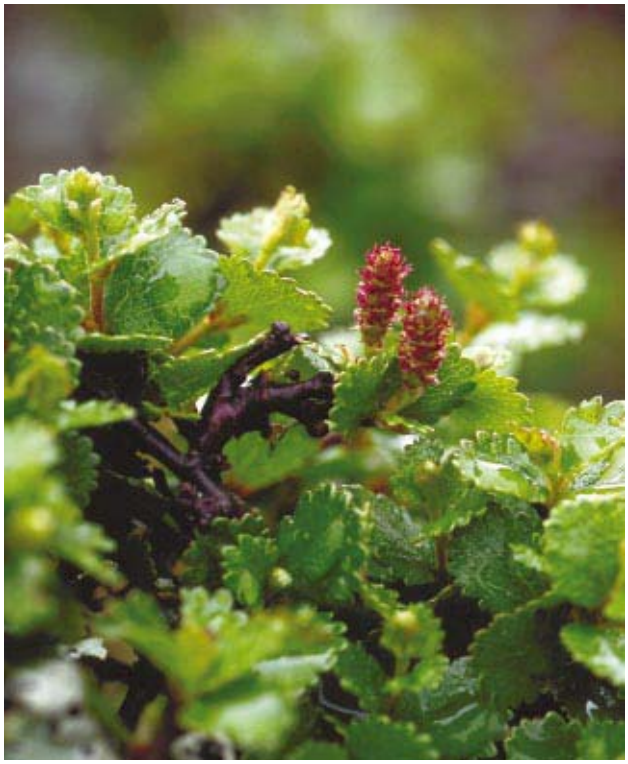
Dwarf birch is low growing and often prostrate, reaching only 1 m in height. Its twigs are downy and the leaves are almost round and 5–15 mm in diameter, with deep, blunt teeth and hairless when mature. The male catkins are 6–8mm long.

Growth characteristics
- Slow growing
- Prolific seeders
- Shoots from cut stumps

Palatability
- Deer often prefer Dwarf Birch to heather, and so it is vulnerable particularly where deer-browsing pressure is high and at times when foods that are more palatable are unavailable.

Value to wildlife
Important for montane wildlife, for example:
Lower plants:
- Important for mosses and lichens.
  Invertebrates:
- 2 exclusive species recorded.

Birds and mammals:
- Provides good cover.



Dwarf birch, Ben Loyal. Robert Goodison/RDS

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Key sites
- Abernethy & Insh Marshes,
  RSPB Reserves,
  Contact: Andy Amphlett, Forest Lodge, Nethybridge, Inverness-shire PH25 3EF, tel: 01479 821409,
  e-mail: andy.amphlett@rspb.org.uk
- Ben Lawers NNR,
  Contact: David Mardon,
  The National Trust for Scotland (NTS) Lynedoch,
  Main Street, KILLIN FK21 8UW

Note: The ecology of rare upland scrub species and their dependents are not fully understood, so impact of the techniques described here has not been fully evaluated. It is therefore recommended that management is carefully monitored and action taken to offset any negative impact on priority species.

Approved herbicides and situations
This is a rare species; herbicide treatment is not appropriate.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Encourage natural regeneration:**	
En	A	Where a thick grass matt inhibits seedling establishment, use hand tools to remove it to expose bare ground and scarify the ground. Where access and ground conditions allow, rank vegetation could be removed by mechanical scraping, and seedbeds created with shallow cultivation using either rotovator or harrow.	5.9.4.1 5.9.4.2 5.9.4.3
En	B	Careful use of controlled burning may remove rank grass thatch and create a seedbed. The method is not fully understood for upland scrub and un-controlled burning is a recognised threat to the species, therefore the technique may not be suitable.	5.8.7
En	C	Retain an open sward by low to moderate levels of grazing which will retain an open sward by targeting succulent competitor species and encouraging natural regeneration. After germination, monitor impacts and where necessary reduce or remove livestock. In vulnerable areas, stands may need protection from trampling, grazing or browsing.	5.8.4
En	**2**	**Propagate and plant cuttings and seedlings:**	
	A	Collect ripe seeds or cuttings and grow on in pots. Plant out in ground with low levels of competing vegetation. (See also 3A below).	5.8.1/5.8.2
	3	**Protect from excess browsing:**	
En/M	A	Where necessary, fence stands to manage grazing pressure or use broad diameter tree tubes to protect seedlings from grazing / browsing. Remove protection when established. (see 3D & 3E below).	5.8.3
M	B	Prevent damage and losses of saplings by livestock browse during winter when alternative forage is scarce.	5.8.4
M	C	Protect vulnerable seedlings from browsing by carefully managing livestock in early summer, when seedlings are palatable. Use appropriate livestock stocking rates to suppress competitors, especially at early scrub stage. Monitor the effects of grazing / browsing on the habitat.	5.8.4
M	D	Red Deer and sometimes Mountain Hare can damage montane stands; Roe Deer and Rabbits can be a problem at lower altitudes. Where fencing is not appropriate consider culling to reduce to levels that do not compromise regeneration.	5.8.3
M	E	Provide controlled access for grazing. Fencing can be very expensive, particularly in highland areas. Deer fencing in woodland grouse areas must be visible to prevent mortality.	5.8.3
	4	**Reduce or eradicate undesirable competing scrub:**	
En/M	A	In upland mixed scrub, other species can become invasive, for example non-native pine, Rhododendron, and Sycamore. Refer to relevant profiles for more detail.	4.4.34 4.4.41

Key sites

- Abernethy & Insh Marshes, RSPB Reserves, Contact: Andy Amphlett, Forest Lodge, Nethybridge, Inverness-shire PH25 3EF, tel: 01479 821409, e-mail: andy.amphlett@rspb.org.uk

- Ben Lawers NNR, Contact: David Mardon, The National Trust for Scotland (NTS) Lynedoch, Main Street, KILLIN, FK21 8UW

Further reading

Scott, M., (2000), Montane scrub (Natural Heritage Management), Montane Scrub Action Group & Scottish Natural Heritage

Gilbert, D., Ed, (2001), Guidance for the restoration of montane scrub: a discussion document, Montane Scrub Restoration Project

4.4.6 Birch, Silver *Betula pendula;* Downy *B. pubescens*

Summary
Silver and Downy Birch are fast growing, relatively short-lived, pioneer trees, which are tolerant of a wide range of soil, climatic and altitudinal conditions.

They are prolific seeders and can establish dense scrub stands very quickly in open ground. Silver and Downy Birch can be invasive on a range of open priority habitats, particularly heathland.

At appropriate levels birches can be a valuable component of several priority open habitats and their associated mixed scrub communities. Understanding what the levels are and managing to achieve them can be a challenge, requiring the full suite of scrub management techniques.

Generally, uplands or wet scrub communities need enhancement, maintenance and protection from over grazing, whereas birch scrub on lowland heaths requires reduction or eradication.

Distribution and status
Silver Birch and Downy Birch are widely distributed throughout Britain with considerable overlap between their ranges.

Silver Birch favours drier free draining soils, and has a southerly bias in distribution.

Downy Birch is slower growing and more tolerant of cooler, wetter soil conditions, it is therefore more abundant in the moister north and west.

Both species occur in a range of habitats, such as heaths, moorland edge, bogs and woodland edge.

They are common species, and as pioneers, occur frequently on the interface between woodland and open habitats.

Extensive areas of birch scrub occur on abandoned or under managed heathland, fen, lowland raised bog and mire throughout lowland Britain, as well as on the sides of upland valleys.

They are often used as a nurse crop for establishing longer-lived trees and have been used as such to help establish Juniper (see Juniper profile).

Birch trees at Sandringham Warren. D. Ratcliffe/English Nature

Identification
Birches are distinctive, with pale bark, and simple fine toothed leaves.

Silver Birch:
Max height: 25 m; Flowers: Apr–May; Fruit: Jul–Aug.
The bark is papery when young and fissured when old.
The twigs are hairless, warty and pointed; leaves are hairless, triangular, and double-toothed.

Downy Birch:
Max height: 25 m; Flowers: Apr–May; Fruit: Jul–Aug.
The bark is papery, peeling and brownish; the underside of twigs and leaves is downy.

Growth characteristics
- Prolific seeders.
- Shoots well from cut stumps.
- Fast growing.

Palatability
- Low palatability in early leaf stage due to bitterness.
- During late spring and summer, leaves become more palatable and most livestock will then browse young trees and coppice re-growth, especially cattle and some sheep (especially Hebridean).

Value to wildlife

Both are important species for wildlife, for example:

Lower plants:

- 15 species of lichen and 31 species of fungi.

Invertebrates:

- 521 species recorded on genera, with 112 species exclusively on Birch.
- 51 RDB and 15 BAP species.

Birds:

- Seeds important to Siskin, Redpoll and Goldfinch.
- Large decaying stems provide nest sites for birds, including Willow Tit.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives

(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Encourage bushy growth and seed production by low intensity summer browsing. Bark stripping will initially increase seeding, and then create standing dead wood.	5.8.4 5.8.9
En/M	B	Encourage seed germination using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. After germination reduce or remove livestock in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.4
M	C	Moderate to heavy browsing can create a browse line and reduce the wildlife value, though epiphytes can fair better in open stands.	5.8.4 5.8.8
En/M	D	Create routes through extensive stands to form natural gaps and glades by cattle and pony trampling. Prevent trampling to encourage spread of stand.	5.8.3/5.8.4 5.8.8
En/M	E	Allow natural expansion of stands where needed by preventing trampling and in vulnerable areas protecting from browsing.	5.8.3
M	F	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove / reduce stock as required.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Create seedbeds near existing seeding stands by scarifying the ground in late summer.	5.8.1
En/M	B	To mimic natural dynamic processes clear some stands and allow others to establish elsewhere thereby maintaining the desired extent across the site.	5.8.5 5.8.8
En/M	C	To maintain age and structural diversity cut on rotation: divide large stands into small, sinuous edged coups. Manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
En	D	Provide niches for other wildlife by retaining dead bushes and allowing to decay naturally. To augment deadwood, ring-bark selected larger stems as required. NB ring barking can encourage regeneration from the stump (where necessary take action using 6C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Maintain and enhance or increase extent of upland stands:**	
En/M	A	Encourage natural regeneration and where necessary propagate and plant out seedlings or cuttings and protect from browsing where vulnerable.	5.8.1

Examples of management techniques to implement example objectives: Cont...

En/M	B	Take account of the epiphyte interests that rely on ecological continuity when carrying out work. Refer to relevant upland species profiles (e.g.: Dwarf Birch, montane Willow spp, etc) for more details on enhancing and maintaining upland scrub.	4.4.5 4.4.47
En/M	C	In upland mixed scrub other species can become invasive (e.g.: non-native pine, Rhododendron, and Sycamore). Refer to relevant profiles for more detail.	4.4.34 4.4.41
	4	**Reduce from priority habitats using livestock**	
R	A	Browse back scrub using stocking regimes and breeds that preferentially take Birch without damage to target habitat. Monitor impact and remove / reduce stock as required.	5.8.4
R	B	Impact regeneration by browsing in the spring following cutting.	5.8.4
	5	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Clear young seedlings/saplings by hand pulling or use sapling removal tools to.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.8.13/5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.8.5/5.9.4.2
R/Er	E	Winch stumps where a suitable anchor exists and time allows; use a grinder for large stumps.	5.8.14/5.9.4.2
R/Er	F	Reduce encroachment in stands where grazing is not possible by regular (e.g. monthly) summer mowing or cutting. This can be achieved in small stands with pedestrian flails/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
R/Er	H	Suppress growth by raising water levels or allowing prolonged submergence.	5.8.11
	6	**Eradicate re-growth (and seedlings) using herbicide:**	
Er	A	Kill unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide by weed-wiping or spraying.	5.8.16 5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Birch as at July 2003

If herbicides are to be used on these birch species then they fall within the general classification of a 'woody weed'. Herbicides may not be appropriate if enhancing or increasing extent of sensitive upland stands.
Caution: there are additional approvals to be obtained and precautions to be taken before using herbicides in wet habitats.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Cumbria.
  Contact: Ian Taylor, Conservation Officer, English Nature, tel: 01539 792800, e-mail: ian.tayor@english-nature.org.uk

- Esher Commons SSSI,
  Contact: David Page (Countryside Estates Officer), Elmbridge Borough Council, Leisure & Cultural Services, Civic Centre, High Street, Esher, Surrey. KT10 9SD. tel: 01372 474565, e-mail: djp@elmbridge.gov.uk

- Llynmawr.
  Contact: Clive Faulkener, Montgomery WT tel: 01938 556161

- Nottinghamshire Wildlife Trust (various reserves),
  Contact: Jeremy Fraser, The Old Ragged School, Brook Street, Nottingham, NG1 1EA. tel: 0115-958-8242, e-mail: jfraser@nottswt.cix.co.uk

- Tunbridge Wells Borough Council,
  Contact: Sarah Cleveland, Town Hall, Royal Tunbridge Wells, Kent, TN1 1RS. tel: 01892 526121

- Westhay Moor NNR,
  Contact: Kiff Hancock, Somerset Wildlife Trust. tel: 01823 451587 e-mail: chancock@somwt.cix.co.uk

Further reading

Atkinson, M. D., (1993), *Betula Pendula Roth B. Verrucosa Ehrh and B. Pubescens Ehrh.* Journal of Ecology
Ferguson, A., (2000), *Chemical control of standing scrub at Rhos Goch National Nature Reserve,* CCW
Ferguson, A., (2000), *Scrub management by chemical injection into standing stems,* CCW
Hjalten, J., Danell, K., Ericson L., (1994), *The impact of herbivory and competition on the phenolic concentration and palatability of juvenile birches.* Oikos 71 416-422.
Marrs, R. H., (1984), *Birch Control on Lowland Heaths: Mechanical Control and the Application of Selective Herbicides by Foliar Spray,* Journal of Applied Ecology
Marrs, R. H., (1985), *Birch control by the treatment of cut stumps with herbicides.* Arboricultural Journal 9, 173-182.

4.4.7 Blackthorn, *Prunus spinosa*

Summary
Blackthorn is a widely distributed thorny shrub, which is a frequent component of mixed scrub communities, though it also occurs in single species stands. It is very hardy and tolerant of a wide range of soils and situations, including exposed cliff slopes.

Other members of the family that have similar characteristics are naturalised aliens. Where they occur, their management is similar to that of Blackthorn, unless otherwise stated.

Blackthorn scrub is usually managed as single species stands or as a component of mixed scrub communities. It requires reduction where it encroaches into priority open habitats. Care should be taken to avoid damaging important epiphyte communities growing on branches of old stands. Browsing helps to diversify and maintain stands. Various mechanical methods can also be used to diversify and maintain the stands.

Distribution and status
Blackthorn is a common widespread native, found throughout England, Ireland and much of Scotland, growing at altitudes up to 415 m. Blackthorn is found on both light and heavy soils and can form dense stands, which shade out all ground vegetation. Older branches are a good substrate for epiphytes, particularly among west coast stands. It is common in hedges and as scrub along woodland edges, rides and glades and on coastal cliffs, where it is tolerant of maritime sea salt conditions and can withstand exposure.

The other closely related, but alien, members of the *Prunus* family, with similar characteristics, are the Wild Plum, *P. domestica*, Bullace, *P. insititia*, Cherry Plum, *P. cerasifera*, and Dwarf Cherry, *P. cerasus*.

Although these are naturalised non-natives, they are often found in association with the native Blackthorn or in similar situations.

Identification
Max height: 1-4 m; Flowers: Mar–May;
Fruits: Jul–Aug; Ripens: Oct.

Blackthorn is a rigid and densely branched shrub or small deciduous tree with dark coloured bark.

Blackthorn. Peter Wakely/English Nature

The young shoots remain downy for the first year before darkening to a brown or grey colour. The many lateral shoots soon develop into long rigid thorns along the stems of branches.

Leaf buds are rounded elliptical and hairy. The elliptical leaves are dull above and slightly downy beneath, with fine-toothed edges.

White flowers appear before the leaves, either singly or in pairs and the fruit (sloes) are small, round and black, but develop a grey bloom as they ripen.

Growth characteristics
- Blackthorn and its close relatives sucker prolifically.
- Can form dense impenetrable uniform stands, especially after coppicing.
- It is slower growing than hawthorn.
- Is eventually replaced by woodland.

Palatability
- First season shoots are very palatable to livestock in the summer (especially the hardier breeds of cattle, ponies, sheep and goat). However, hardening of the thorns by the end of the season result in it being very resilient to browsing.
- Rabbit and deer readily tip young shoots.

Value to wildlife

An important species for wildlife, for example:

Invertebrates:

- Flowers and fruits are a rich source of nectar and food.
- 384 species recorded feeding on the genus.
- 43 recorded feeding exclusively.
- 24 RDB and 3 BAP species
- Food plant for Black and Brown Hairstreak butterflies.

Birds and mammals:

- Dense cover for birds to nest and roost; and is particularly favoured by Nightingales.
- Fruits are valuable as food for birds and small mammals.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives

(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Encourage bushy growth, seed production and suckering by low intensity summer browsing. Bark stripping may initially increase seed production and then create standing dead wood.	5.8.4 5.8.9
En	B	Formation of natural gaps and glades and creation of routes through extensive stands by cattle and pony trampling. Prevent trampling to encourage spread of stand.	5.8.4 5.8.8
En/M	C	Encourage seed germination and suckering using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species.	5.8.3 5.8.4
En/M	D	Allow natural expansion of stands by protecting them from browsing and trampling.	5.8.3/5.8.4
M	E	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required.	5.8.4/5.8.8
M	F	Moderate to heavy browsing can open the structure of older established scrub reducing its value for wildlife, though epiphytes can fair better in open stands.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Increase extent of stand by allowing suckers to grow from surface roots. Sporadic mowing to remove competitors will encourage increase by a rate of up to 1m per year.	5.8.1 5.8.6
En/M	B	To maintain age and structural diversity cut on rotation: divide large stands into small, sinuous edged coups. Manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
En/M	C	To mimic natural dynamic processes clear some stands and allow others to establish elsewhere thereby maintaining the desired extent across the site.	5.8.5 5.8.8
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. To augment deadwood on site ring-bark selected larger stems as required. NB ring barking can encourage regeneration from the stump (where necessary take action using 5C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock**	
R	A	Browse back the scrub using stocking regimes (summer) and breeds that preferentially take Blackthorn without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4

Examples of management techniques to implement example objectives: Cont...

R	B	Browse in the spring to impact regeneration following cutting.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand-pull or use sapling removal tools to clear young seedlings/saplings/suckers.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Winch stumps where a suitable anchor exists, or use a grinder for large stumps.	5.8.14/5.9.4.2
R/Er	F	Reduce encroachment where grazing is not possible by regular (e.g. monthly) summer mowing or cutting in small stands with a pedestrian mowers/flails or in large stands with a tractor and swipe or flail. This technique may have a limited effect (see 2A above).	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
R/Er	H	Burn stands in winter to encourage re-growth. Burning is often the only way to manage old dense stands with much leaf litter, especially on less salt-exposed coastal slopes.	5.8.7
	5	**Eradicate re-growth (and seedlings) using herbicide:**	
Er	A	Weed wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16 5.9.4.4/5.9.2
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Blackthorn as at July 2003

Blackthorn does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. Table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven, English Nature,
  Foxhold House, Crookham Common, Thatcham,
  Berks RG19 8EL, tel 01635 268881,
  e-mail graham.steven@english-nature.org.uk

- Countryside Council for Wales,
  Bryn Mwcog, Brynteg, Anglesey, North Wales,
  LL78 7JF, tel: 01248 853427

- Cumbria.
  Contact: Ian Taylor, Conservation Officer, English Nature,
  tel: 01539 792800, e-mail: ian.taylor@english-nature.org.uk

- Grafton Wood,
  Contact: Helen Woodman, Worcestershire Wildlife
  Trust, tel: 01905 754919

- Ivel Valley (various sites),
  Contact: Richard Lawrence, Ivel and Ouse Countryside
  Project, Bedfordshire, tel: 01767 316358,
  e-mail: ivelvalley@cix.compulink.co.uk

- Llanymynech,
  Contact: Clive Faulkener, Montgomery WT, tel: 01938 556161

- Latterbarrow, Cumbria.
  Contact: John Dunbavin,
  e-mail: johnd@cumbriawildlifetrust.org.uk

- Liss Riverside Railway walk,
  Contact: Martin Healey, East Hampshire District
  Council, Penns Place, Petersfield. GU31 4EX
  tel: 01730 234386, e-mail: Martin_Healey@easthants.gov.uk

- Nottinghamshire Wildlife Trust (various reserves),
  Contact: Jeremy Fraser
  The Old Ragged School, Brook Street, Nottingham,
  NG1 1EA. tel: 0115-958-8242.

- Therfield Heath, Hertfordshire,
  Contact: Eoin Bell, Herts County Council,
  tel: 01922 555279, e-mail eion.bell@hertscc.gov.uk

- Windmill Hill,
  Contact: Helen Woodman, Worcestershire Wildlife
  Trust, tel: 01905 754919, e-mail: helen@worcswt.cix.co.uk

Further reading

Toynton, P., Cox, M., (1994), *Scrub management,* ENACT 2 (1), pp10-11, English Nature

4.4.8 Box, *Buxus sempevirens*

Summary
Box is a localised component of calcareous scrub communities in southern Britain. A large percentage of its population can be found growing around the Mole Valley in Surrey.

Outside its natural distribution, many different cultivars of Box have been widely planted as a landscape feature throughout the country.

Box is slow growing, but regenerates well from cut stumps and surface roots. It is generally self-sustaining. However, its management needs to be incorporated into the mixed scrub communities' mosaic and, if necessary, requires reduction where it encroaches into priority habitats. Various mechanical methods can also be used to diversify and maintain the stands.

Distribution and status
Box is a locally common evergreen shrub or small tree. It is found as a component of scrub communities on calcareous chalk or limestone soils, mainly in south Essex and along the downs of Kent, Sussex through Surrey (the Mole Gap area, in Surrey, contains more than 40% of England's natural Box scrub), to Berkshire and into Buckinghamshire and Gloucestershire. In Sussex and Surrey, it is presumed native as the greater percentage of stands are found growing on inaccessible river valley cliffs.

Where it occurs naturally it is relatively self sustaining, requiring minimal management, except where it encroaches and threatens the associated grassland flora. In some instances, for example at Box Hill, a large percentage of the main stand is inaccessible and non-intervention allows natural dynamic processes to take place.

In recent years, instances of attack by a fungal species called *Cylindrocladium* have been recorded. This is still being investigated by the RHS, but indications are that high moisture levels could encourage development.

Box has been used for many years in formal landscaping, especially for hedging, and has become widely distributed outside of its normal range as a naturalised introduced plant.

Identification
Max height: 5 m; Flowers: Apr–May;
Fruits: Jun–Jul; Ripens: Sep.

Box. Rebecca Isted/English Nature

Box has shiny-green leaves that are small; 1–2.5 cm, elliptical in shape and grow in opposite pairs on short stalks. The small white flowers grow from within the leaf axil. The fruit is a rounded capsule about 8 mm in diameter. Twigs are angular and downy.

Growth characteristics
- Will seed in disturbed soil close to parent plants and in little light.
- Will shoot from layered stems and shallow surface roots.
- Shoots from cut stumps.
- Slow growing and multi-stemmed.

Palatability
- Foliage is protected by natural toxins.
- Not particularly palatable to livestock, except horses.

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 22 species recorded feeding, 5 restricted to Box and1 RDB species.

Birds:
- Dense stands make good roost for birds.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands mechanically:**	
En	A	Create seedbeds near existing seeding stands by scarifying the ground in late summer. Alternatively, encourage suckers to grow from surface roots.	5.8.1
En/M	B	To maintain age and structural diversity cut on rotation: divide large stands into small, sinuous edged coups. Manage small and isolated stands as a single unit. NB: when cutting mixed species stands, old Box regenerates more slowly and may be suppressed, especially in dry weather.	5.8.5 5.8.8 5.8.13
En/M	C	To mimic natural dynamic processes, clear some stands (unless they are good for epiphytes) and allow others to establish elsewhere, thereby maintaining the desired extent across the site. Monitor the effects on the surrounding flora and scrub community. Mature bushes cast very heavy shade and may compromise other interests.	5.8.5 5.8.8
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. To augment deadwood on site ring-bark selected larger stems as required. NB ring barking can encourage regeneration from the stump (where necessary take action using 3C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
M	F	Where there is risk or evidence of fungal attack open stands to reduce humidity.	5.8.5
	2	**Reduce or eradicate from priority habitats manually or mechanically**	
R	A	Box is considered self-sustaining, requiring minimal management. Where it threatens open habitats regular (e.g. monthly) summer mowing or cutting may reduce encroachment. This can be achieved with a tractor and swipe or flail.	5.8.6 5.8.13 5.9.4.3
R/Er	B	Reduce likely-hood of seeding by encouraging sward development adjacent to stands.	5.8.8
R/Er	C	Clear young saplings / seedlings by hand-pulling or use sapling removal tools.	5.8.12/5.9.4.1
R/Er	D	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	E	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.2
R/Er	F	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	G	Winch stumps where a suitable anchor exists, or use a grinder for large stumps.	5.9.14/5.9.4.2
R/Er	H	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
	3	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16/5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 1D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Box as at July 2003

Box does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings / yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Box Hill, National Trust, Surrey.
  Contact: warden - tel:01306 885502,
  e-mail: boxhill@nationaltrust.org.uk

Further reading: See end of chapter

4.4.9 Bramble, *Rubus fruticosus agg.*

Summary
Brambles are a common and widespread group of species occurring across a range of habitats. There are many hybrids and cultivars each with more or less similar characteristics. The profile focuses on the most common species, Blackberry, but also considers the other species.

Bramble scrub is usually managed as single species stands or as a component of mixed scrub communities. It requires reduction where it encroaches into priority habitats.

Browsing helps to diversify and maintain stands. Various mechanical methods can also be used to diversify and maintain the stands. However, Bramble can protect tree saplings, which without management are likely to develop into woodland.

Distribution and status
The Bramble genus is widely spread throughout the British Isles, from lowland to the highest mountain tops. There are five species, and an array of hybrids and subspecies. The commonest species is Blackberry, *Rubus fruticosus*, which can be found in almost any habitat. The Raspberry, *R. idaeus*, and Dewberry, *R. caesius*, are widespread, but more habitat specific.

The Raspberry prefers upland wet woods, heaths and rocky outcrops up to 825 m. The Dewberry prefers dry grassland and fen carr and is more abundant in central and eastern England, with only a localised westerly distribution.

Identification
Max height: 3 m; Flowers: May–Sep; Fruit: Aug–Sep; Ripen: Oct.

Blackberry:
Each of the many aggregate types of subspecies varies in their extent of thorns, leaf hairs and shape, flower colour and fruit shape. Generally, they form a dense rambling shrub, with long, arching, barbed stems. The leaves are made of 3–5 oval or oblong leaflets. The flowers are white or pink and the fruit ripens through red to dark blackish-purple.

Raspberry:
Have upright, rounded stems, with narrow prickles.
The leaves are made up of 3–7 leaflets, which are green above, but white and woolly beneath. The flower panicles have narrow, erect, white petals and the fruits are red.

Bramble. Roger Key/English Nature

Dewberry:
The round stems are weak and glossy in appearance, have very few thorns and only three leaflets to each leaf. The flowers are white and the fruits are a bluish colour and appear waxy.

Growth characteristics
- Shoots from cut stems and root fragments. Even deep severed roots can send up vigorous re-growths.
- Layers from arching growths and suckers very easily.

Palatability
- Sheep and goats have much more impact than ponies and cattle browsing first year growths, in spring, summer and early autumn. However, other favoured browse is then available and they may need forcing onto Bramble. Sheep with long wool may get entangled.
- Hardy sheep are effective browsers of leaders and first year growth in winter.
- However even sheep and goats will not eat two/three year old woody stems.
- Leaves are much less palatable in summer than in autumn and therefore the impact is less if plenty of other food is available.
- Bramble thorns may put off casual browsers.

Value to wildlife

An important resource for wildlife, for example:

Invertebrates:

- 237 species recorded feeding.
- 32 species feed exclusively.
- 12 species have RDB status.

Birds:

- Safe nesting and roosting for birds.
- Important shelter and food supply for birds.

Mammals:

- Important shelter and food supply, especially for the Dormouse.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives

(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Encourage bushy growth and increased fruit production using low intensity summer browsing.	5.8.4
En	B	Formation of natural gaps and glades and creation of routes through extensive stands by cattle and pony trampling. Prevent trampling to encourage spread of stand.	5.8.4 5.8.8
En	C	Encourage suckering and layering using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species.	5.8.4
En/M	D	Allow natural expansion of stands where needed by protecting them from browsing and trampling.	5.8.3
En/M	E	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove / reduce stock as required.	5.8.4
En/M	F	Moderate to heavy browsing can create browse lines and open the structure of older established scrub reducing its value for wildlife.	5.8.4
En	G	Increase the extent of stands by layering shoots from adjacent stands in late summer.	5.8.1
	2	**Enhance or maintain stands mechanically:**	
Em/M	A	To mimic natural dynamic processes clear some stands and allow others to establish elsewhere thereby maintaining the desired extent across the site.	5.8.5 5.8.13
En/M	B	To maintain age and structural diversity cut on rotation: divide large stands into small, sinuous edged coups; manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
E	C	Retain some stands to decay naturally and provide niches for other wildlife.	5.8.9
M	D	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Bramble without damage to target habitat. Monitor impact and remove / reduce stock as required Relative palatability is likely to be less on calcareous soils, due to availability of a wider range of succulent herbs; so more livestock may need to be focused into target area. This may be detrimental to other interests.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically:**	
R/Er	A	Hand-pull or use sapling removal tools to clear young seedlings/suckers.	5.8.12/5.9.4.1

Examples of management techniques to implement example objectives: Cont...

R/Er	B	Cut saplings/suckers or re-growth using hand tools (spade, root cutting chain saw, mattock, billhook – first two tools cut off roots at deepest level with minimal disturbance).	5.9.4.1 5.9.4.2
R	C	Cut small-stemmed bushes with hand tools (e.g.: long-handled slasher, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R	D	Cut small stands of larger bushes using a clearing saw. Re-growth will occur.	5.9.4.2
R	E	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment where grazing is not possible. This can be achieved in small stands with pedestrian flails/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	F	Burning is effective on mature dense stands, with a thick base with heavy leaf litter and ample combustible matter. It is most effective on small blocks, retained by a firebreak. NB: burning may be inappropriate on some substrates and may damage sensitive epiphyte communities.	5.8.7
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
	5	**Eradicate re-growth (and seedlings) using herbicide:**	
Er	A	Weed-wipe or spray unwanted seedling, sapling re-growth in summer and stumps, using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Weed wipe where there is a risk of damage to non-target species and watercourses.	5.8.16/5.9.2 5.9.4.4

Herbicides that may be considered for use on Bramble as at July 2003

Bramble is frequently identified as a species on product labels – see bold entries in table below. If not mentioned on product labels then it falls within the general classification of a 'woody weed' – see non-bold entries.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
Clopyralid + triclopyr	**Amenity grass; established grass.**	
2,4-D	**Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.**	
2,4-D + dicamba + triclopyr	**Established grassland, forestry, non-crop areas.**	
Fosamine-ammonium*	**Forestry, non-crop areas, waterside areas, conifer plantations (off-label).**	
Glyphosate	**Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.**	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	**Established grassland; non-crop areas; forestry.**	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven, English Nature, Foxhold House, Crookham Common, Thatcham, Berks RG19 8EL. tel 01635 26888
  e-mail graham.steven@english-nature.org.uk

- Catherington Lith,
  Contact: Martin Healey East Hampshire District Council, Penns Place, Petersfield. GU31 4EX
  tel: 01730 234386
  e-mail: Martin_Healey@easthants.gov.uk

- Esher Commons SSSI
  Contact: David Page (Countryside Estates Officer), Elmbridge Borough Council, Leisure & Cultural Services, Civic Centre, High Street, Esher, Surrey. KT10 9SD. tel: 01372 474565,
  email: djp@elmbridge.gov.uk

- Nottinghamshire Wildlife Trust (various reserves),
  Contact: Jeremy Fraser, The Old Ragged School, Brook Street, Nottingham, NG1 1EA.
  tel: 0115-958-8242, email: jfraser@nottswt.cix.co.uk

- Gosport Borough Council, Countryside Section, Grange Farm, Little Woodham Lane, Rowner, Gosport Hants, PO13 8AB. tel: 01705 588666,
  email: Grange@gosport.gov.uk

- Windmill Hill, Contact: Helen Woodman, Worcestershire Wildlife Trust, tel: 01905 754919,
  email: helen@worcswt.cix.co.uk

- Northwood Hill, RSPB
  Contact: Alan Parker, Bromhey Farm, Eastborough, Cooling, Rochester, Kent, ME3 8DS
  tel: 01634 222480, email: alan.parker@rspb.org.uk

Further reading: See end of chapter

4.4.10 Broom, *Cytisus scoparius*

Summary
Broom is a relatively short-lived evergreen shrub, which grows on free draining, usually acidic soils on waste ground and heaths. It is favoured by a large number of insect species.

Broom scrub is usually managed as single species stands or as a component of mixed scrub communities.

It requires reduction where it encroaches into priority habitats. Browsing helps to diversify and maintain stands. Various mechanical methods can also be used to diversify and maintain the stands.

Distribution and status
Broom is a leguminous shrub which is found widely on suitable soils throughout Britain, often growing as single species stands on waste ground, or on disturbed heaths and grasslands on acidic sandy soils. It can be invasive on disturbed soils and displace scarce flora.

A rare localised sub-species, *S.s.maritimus*, occurs on coastal heaths of west Cornwall, Lundy, Pembroke, southern Ireland and the Channel Isles.

The alien Spanish Broom, *Spartium junceum*, is similar in appearance to Broom, but has smooth stems and longer straight leaves. It has been introduced as a landscape plant, mainly in southern England and has spread widely.

Identification
Max height: 5 m; Flowers: Apr–May;
Fruits: Jun–Jul; Ripens: Sep.

Broom is a distinct evergreen plant with long rigid angled stems and small composite leaves of 1–3 leaflets, which grow on new stems. The bright yellow flowers are 20 mm long and grow on long 10 mm stalks from the axils of the leaf buds. The seedpods resemble those of peas and will eventually turn black when ripe.

Growth characteristics
- Germinates readily from seed that shoots from dry pods as they twist and burst on to bare or disturbed soils.
- Young, and coppiced broom is vigorous.
- Stems snap/break suddenly and easily under bending pressure.

Broom. Peter Wakely/English Nature

- Old stumps are less likely to regenerate after cutting.
- Comparatively short lived, but grows quickly to form dense stands or single bushes.
- Old bushes and stands lose compactness and eventually collapse.

Palatability
- Palatable to hardier breeds of livestock, especially sheep, such as Exmoor.

Value to wildlife
Valuable to wildlife, including for example:
Invertebrates:
- 124 species recorded feeding.
- 26 species exclusively.
- 5 RDB species.

Birds:
- Dense stands are valuable as nesting sites.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Encourage bushy growth and increased seed production using low intensity summer browsing. Avoid browsing in early spring as broom is relatively palatable.	5.8.4
En	B	Formation of natural gaps and glades and creation of routes through extensive stands by cattle and pony trampling. Prevent trampling to encourage spread of stand.	5.8.4 5.8.8
En/M	C	Encourage seed germination using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. After germination, reduce or remove livestock and in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.3 5.8.4
En	D	Allow natural expansion of stands where needed by protecting them from browsing and trampling.	5.8.3
En/M	E	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required.	5.8.4 5.8.8
En	F	Moderate to heavy browsing may create browse lines, opening the structure of older established scrub and reducing its value for wildlife.	5.8.4 5.8.8
	2	**Enhance or maintain stands mechanically:**	
En	A	Create seedbeds near existing seeding stands by scarifying the ground in late summer, alternatively seeds can be collected and scattered in target areas.	5.8.1
En/M	B	To mimic natural dynamic processes, clear some stands before loss of vigour and allow others to establish elsewhere thereby maintaining the desired extent across the site.	5.8.5 5.8.8
En/M	C	To maintain age and structural diversity cut on rotation: divide large stands into small, sinuous edged coups. Manage small and isolated stands as a single unit.	5.8.6/5.8.8 5.8.13
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife.	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Broom without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Broom is quite palatable compared with many other species on acid soils, so relatively light-grazing pressure should prevent encroachment. Relative palatability is likely to be less on calcareous soils due to availability of a wider range of succulent herbs so more livestock may need to be focused into target area. This may be detrimental to other interests?	5.8.4
R	C	Browse in the spring to impact regeneration following cutting.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically:**	
R/Er	A	Broom pulls easily so long as it is gripped low down to avoid stems breaking; or use sapling removal tools to clear young seedlings/saplings.	5.8.12 5.9.4.1
R/Er	B	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.8.13/5.9.4.1 5.9.4.2

Examples of management techniques to implement example objectives: Cont...

R/Er	C	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.8.13/5.9.4.2
R/Er	D	Winch larger healthy bushes where practical, older ones will tend to break.	5.8.14
R/Er	E	Reduce encroachment where grazing is not possible by regular (e.g. monthly) summer mowing or cutting. This can be achieved in small stands with pedestrian mowers/flails or in large stands with a tractor and swipe or flail. After flailing or mulching, remove the mulch to avoid suppressing regeneration of target interest. However, mulch may help suppress seed germination of Broom.	5.8.6/5.8.13 5.9.1 5.9.4.2 5.9.4.3
R/Er	F	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
	5	**Eradicate re-growth (and seedlings) using herbicide:**	5.8.16
Er	A	Weed wipe or spray unwanted seedling or sapling re-growth in summer, using an appropriate herbicide.	5.9.4.4
Er	B	Weed wipe where there is a risk of damage to non-target species or watercourses.	5.8.16/5.9.2 5.9.4.4

Herbicides that may be considered for use on Broom as at July 2003

Broom does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Esher Commons SSSI
  Contact: David Page (Countryside Estates Officer), Elmbridge Borough Council, Leisure & Cultural Services, Civic Centre, High Street, Esher, Surrey. KT10 9SD. tel: 01372 474565, e-mail: djp@elmbridge.gov.uk

Further reading: See end of chapter

4.4.11 **Buckthorn,** *Rhamnus catharticus;* **Alder Buckthorn,** *Frangula alnus*

Summary
Buckthorn occurs typically in mixed calcareous scrub communities, while the similar Alder Buckthorn is found mostly on acid soils, wet heaths and carr. Although not normally considered a threat, they both seed and sucker, which make them potentially invasive, in each of their respective habitats.

Buckthorn and Alder Buckthorn scrub is generally self sustaining and managed as single species stands or as a component of mixed scrub communities. Where it does encroach into priority habitats it will require reduction. Browsing helps to diversify and maintain stands. Various mechanical methods can also be used to diversify and maintain the stands.

Distribution and status
Both Buckthorns are locally common. Buckthorn occurs throughout England and Wales, especially in the south and southeast; it is rare in the north and is absent from Scotland. It grows in scrub communities in or on woodland edge, on calcareous soils or in wet fens.

Alder Buckthorn has a broadly similar distribution but, unlike Buckthorn, it rarely occurs on calcareous soils, preferring damp acidic conditions found on wet heaths, fen edges and in carr.

They are capable of suckering and although not renowned for their invasive nature (being noted on some sites as an important component of the scrub community), they do need to be monitored, as Alder Buckthorn is capable of invading priority habitats such as wet heath.

Identification
Max height: 6 m; Flowers: May–Jun;
Fruit: Aug–Sep; Ripen: Oct–Nov.

Both species are deciduous and are broadly similar in appearance.

Buckthorn is very thorny, with grey- brown stems. Its leaves are 3–6 cm long; growing in opposite pairs with toothed edges and veins curving towards the tip. The small green flowers grow in groups on short stems from below the leaves. The cherry-like fruits are 6–10 mm across, green at first and ripening to black.

Buckthorn in fruit. Roger Key/English Nature

Alder Buckthorn is thorn-less, and has un-toothed leaves with veins that do not curve towards the tip. The flowers are white and grouped into small clusters above the leaf axils. The fruits are similar in size and colour to the Buckthorn.

Growth characteristics
- Both species sucker and shoot well from coppiced stumps.

Palatability
- Toxic to horses.
- Moderately palatable to sheep and cattle.

Value to wildlife
Valuable to wildlife, including for example:
Invertebrates:
- 28 species recorded feeding.
- 2 species exclusively and 2 RDB species.
- Food plant of Brimstone butterfly, which favours coppiced and fast growing bushes.

Birds:
- Autumn food for thrushes and starlings.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Formation of natural gaps and glades and creation of routes through extensive stands by cattle and pony trampling. Prevent trampling to encourage spread of stand.	5.8.4 5.8.8
En/M	B	Encourage suckering by using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. After regeneration, reduce or remove livestock and in vulnerable areas; stands may need protection from trampling.	5.8.4
En/M	C	Allow natural expansion of stands by protecting them from browsing and trampling.	5.8.3/5.8.4
M	D	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Increase extent of stand by allowing suckers to grow from surface roots. Sporadic mowing will encourage this.	5.8.1 5.8.6
En/M	B	To mimic natural dynamic processes clear some stands (unless they are good for epiphytes); allow others to establish maintaining the desired extent across the site.	5.8.5 5.8.8
En/M	C	To maintain age and structural diversity cut on rotation: divide large stands into small, sinuous edged coups. Manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
En/M	D	Retain dead bushes to decay naturally and provide niches for other wildlife. To augment deadwood on site ring-bark selected larger stems as required. NB ring barking can encourage regeneration from the stump (where necessary take action using 4C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use weed pullers to clear small areas of young saplings/suckers.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.2
R/Er	E	Winch stumps where a suitable anchor exists and time allows.	5.8.14
R/Er	F	Reduce encroachment in drier stands by regular (e.g. monthly) summer mowing or cutting. This can be achieved in small stands with pedestrian mowers/flails or in large stands by a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2

Examples of management techniques to implement example objectives: Cont...

R/Er	H	Water levels may be raised or submergence prolonged to suppress growth and kill Alder Buckthorn stools, but will encourage aerial roots to grow from the stem above the waterline.	5.8.11
	4	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.4.4 5.9.2
Er	C	Prevent re-generation from stumps of ring barked stems (see 2E above) with paint -brush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Buckthorn/Alder Buckthorn as at July 2003
These two species do not normally get mentioned as species on product labels. If herbicides are to be used then they fall within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven, English Nature,
  Foxhold House, Crookham Common, Thatcham,
  Berks RG19 8EL, tel 01635 268881
  e-mail graham.steven@english-nature.org.uk
- Liss Riverside Railway walk
  Contact: Martin Healey East Hampshire District Council, Penns Place, Petersfield. GU31 4EX
  tel: 01730 234386
  e-mail: Martin_Healey@easthants.gov.uk

Further reading: See end of chapter

4.4.12 Buddleia (Butterfly Bush), *Buddleia davidii*

Summary
The Buddleia or Butterfly Bush as it is sometimes known, is a familiar introduced species that thrives on calcareous soils. It is very attractive to insects and can be regarded as aesthetically pleasing, especially in urban waste areas and gardens across the country.

It is invasive on disturbed soils and waste ground, where it seeds prolifically, posing a threat especially to priority calcareous habitats. It readily establishes on vertical walls and rock faces, which can cause problems on geological and archaeological sites and cliff or crag habitat.

Management aims to eradicate scrub where it threatens priority habitats by using mechanical and chemical techniques. A case is also made to maintain stands where there is no likely threat to other habitats.

Distribution and status
Buddleia is a native to China, was first introduced to Britain in about 1890, and has since proliferated. It is well adapted to colonising disturbed and bare ground so it is especially common on urban waste ground, quarries, rocky crags and walls and along transport corridors.

It is successful at colonising compacted ground, has aesthetic appeal and its nectar attracts many nectar dependant insects.

It grows well on calcareous soils, where its foliage can shade out grassland sward and suitable invertebrate habitat mosaics.

On rocky crags, it will also shade out shrubs such as the local endemic *Sorbus spp*, as well as damage rock face structure.

Its roots can also cause damage to walls.

Identification
Max height: 5 m. Flowers: Jun–Oct.

Leaves are oval to lanceolate, dark green and slightly downy above and downy white below. The pithy twigs are slightly angular and downy. The flowers form a dense conical panicle of various colours, usually purples and whites.

Buddleia. David Sheppard/English Nature

Many other Buddleia spp. are grown in gardens but are currently not considered invasive.

Growth characteristics
- Prolific seeding and germination enables colonisation.
- Re-generates from cut stumps, surface roots and shoots.
- Soft wood.

Palatability
- Not palatable to deer.
- Cattle will browse in summer.

Value to wildlife
Has some value to wildlife for example:
Invertebrates:
- Good source of nectar for butterflies and moths.
- Source of nectar for hoverflies, bees and wasps.
- 11 species of *Lepidoptera* caterpillar feed on the leaves and flowers.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain where it causes no ecological impact (e.g.: urban nature reserves):**	
En/M	A	If conditions allow, encourage germination by using low to moderate levels of grazing to target succulent competitor species and open the sward. After germination reduce or remove livestock and in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.3 5.8.4
En/M	B	Diversify structure by selective coppicing of individual and clumps of bushes.	5.8.5
En/M	C	Coppice older bushes as required, using chain saws or clearing saws. Where retained, stagger cutting of stems into late May, to lengthen flowering period.	5.9.4.2
En	D	Increase extent of stands by transplanting suckers or scarifying soil adjacent to seeding plants.	5.8.1/5.8.2
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	2	**Reduce from priority habitats using livestock:**	
R	A	If conditions allow, follow cutting with heavy summer browsing to impact regeneration.	5.8.4
R	B	Choose stocking levels and breeds carefully and monitor the effects of grazing on the habitat as a whole. Remove stock before the impacts become undesirable.	5.8.4
	3	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use weed pullers to clear small areas of young seedlings.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	C	Buddleia is soft-stemmed and easy to cut. Cut to ground using handsaws, chain saws or clearing saws.	5.9.4.1 5.9.4.2
R/Er	D	Consider winching stumps where a suitable anchor exists and time allows.	5.8.14
R/Er	E	Reduce encroachment by regular (e.g. monthly) summer mowing or cutting. This can be achieved in small stands with pedestrian mowers/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.9.4.2 5.9.4.3
R/Er	F	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
	4	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed wipe or spray unwanted seedling or sapling re-growth in summer, using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
	5	**Reduce or eradicate on rock faces:**	
R/Er	A	In difficult locations (e.g.: rock faces and walls), it may only be possible to cut and treat stumps with herbicide. Use only specialist contractors.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Buddlia as at July 2003

Buddlia does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Esher Commons SSSI
  Contact: David Page (Countryside Estates Officer), Elmbridge Borough Council, Leisure & Cultural Services, Civic Centre, High Street, Esher, Surrey. KT10 9SD. tel: 01372 474565, e-mail: djp@elmbridge.gov.uk

- West Sussex County Council
  Contact: Anne Griffiths, County Planning Department, County Hall, Chichester, West Sussex, PO19 1RL tel: 01243 756852, email: ann.griffiths@westsussex.gov.uk

Further reading

Clay, D. V., Drinkall, M. J., (2001), *The occurrence, ecology and control of Buddleia davidii in the U.K.* Proceedings of the BCPC Conference on Weeds.
Tillotson, A., Chambers, H., (1996), *Rope works! Conservation on the edge,* ENACT 4 (4)

4.4.13 Cherry Laurel, *Prunus laurocerasus*

Summary
Cherry Laurel has been introduced from the Balkans and Asia. Widely used in ornamental gardens and planted as woodland game cover, Laurel, though to a lesser extent, involves the same conservation issues as Rhododendron.

It has no wildlife value other than as an occasional roost for birds or as cover and a wind-brake, and management is usually directed at its eradication or preventing it from colonising habitats, usually by cutting or excavating whole stands in order to prevent its spread into preferred habitats.

Distribution and status
Cherry Laurel is widely distributed throughout England and Wales with a preference for acidic free draining soils. It occurs naturally in the Balkans and South West Asia and was introduced into parks, gardens and woods where it is widely planted as game cover.

It freely establishes from seed and has become naturalised as far north as the borders of Scotland. It is, however, absent from much of northern and central England and most of Scotland and East Wales. It also occurs in a few scattered localities in Ireland.

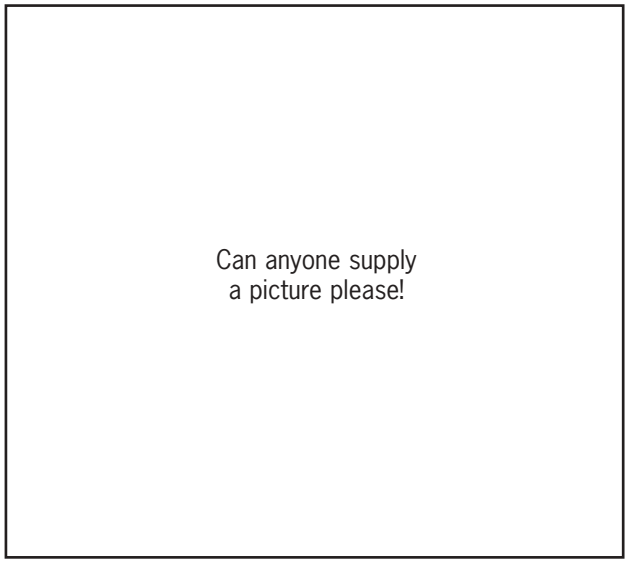
Once established, it shades out all native species of plant and associated fauna, threatening habitats of high conservation value. It forms dense surface root mats, and although on a lesser scale than Rhododendron, is highly invasive and is in danger of becoming a widespread and severe conservation problem.

Identification
Max height: 6 m; Flowers: Apr–Jun.

An evergreen with large, light green, leathery, elliptical to oblong leaves, 5–18 cm long. The white flowers form a dense, erect raceme and develop into bunches of dark purple-black cherry like fruits.

Growth characteristics
- It spreads by seeds and root suckers.
- Shoots vigorously from cut stumps.

Palatability
- Poisonous to livestock.



Cherry Laurel.

Value to wildlife
Minimal value to wildlife, for example:
Birds:
- Cover for roosting and nesting in, when there is little else available.
- Source of food in autumn/winter.
- As a windbreak.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Key sites
- Tunbridge Wells Commons Conservators
  Contact: Town Hall, Tunbridge Wells, Kent, TN1 1RS.
  tel: 01892 526121

Further reading: See end of chapter

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use weed pullers to clear small areas of young suckers.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw). Where required, winch stumps where a suitable anchor exists or use a grinder for large stumps.	5.8.5/5.8.13 5.8.14/5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
M	F	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	2	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16/5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4

Herbicides that may be considered for use on Cherry Laurel as at July 2003
Cherry Laurel does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. Table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

4.4.14 Cherry, Wild or Gean *Prunus avium;* Bird *P. padus*

Summary
Wild Cherry and Bird Cherry are widely distributed throughout Britain, but their natural distribution has been somewhat clouded by their popularity as an amenity landscape plant.

They tend to occur in low abundance as a species of woodland and woodland edge scrub, hedges and in the case of Bird Cherry as part of the scrub mosaic in upland western ash and lowland, fen-carr communities. Both species sucker well and can form dense stands, which can potentially encroach into priority habitats.

Livestock browsing and various mechanical methods can be used to maintain and diversify stands, prevent encroachment and if necessary, reduce or eradicate encroachment into priority habitats.

In upland areas, where Bird Cherry is a component, scrub and woodland are threatened by over grazing and require protection and enhancement.

Distribution and status
Wild Cherry or Gean:
Is common throughout England, Wales and Ireland, becoming rare toward northern Scotland, but reaching as far as Caithness and Sutherland, growing up to an altitude of 400 m. It has been widely planted as an amenity landscape tree and its provenance is somewhat diffused.

Its vigorous suckering habits can form areas of scrub on the edges of its preferred woodland and hedgerow habitats, sometimes encroaching into grassland swards.

Bird Cherry:
Is a widespread shrub and small tree of north and northwest Britain and part of East Anglia. It can be found growing up to altitudes of 650 m, mainly preferring calcareous or base rich soils. It occurs in moist wood and scrub communities alongside streams and on shady rocky screes.

In East Anglia, it is a component of fen carr scrub and wood. Its natural range has been somewhat clouded by amenity landscape planting in recent years.

Like the Wild Cherry, it spreads vigorously by suckering and fruiting often forming quite dense stands.

Wild Cherry. Peter Wakely/English Nature

In severe cases, it will suppress ground flora and other scrub species.

Identification
Wild Cherry or Gean:
Max height: 5–25m; Flowers: Feb–Jun; Fruit: Jul;
Ripen: Sep.

Young shrubs have dark grey-pink, shiny bark and shoots pale, red-brown above brown-grey beneath. The leaves are 6–15cm long, oval to elliptical with double-toothed edges, hairless above, downy below. On the leaf stalk, at the base of each leaf, are two small red glands.

The clusters of white flowers are cup shaped and grow on individual stalks. The fruits grow in bunches of 3–5, are small, round (c1 cm) and red in colour, turning blackish, if not eaten by birds first.

Bird Cherry:
Max height: 3–15m; Flowers: May;
Fruit: Jun; Ripen: Aug.

Young shoots are shiny dark brown in colour. The leaves, 5–10cm, are narrow and elliptical, with a toothed edge and like Wild Cherry, two red glands at the apex of the leaf and stalk. The white flowers grow as a pendulous raceme with 10–40 flowers together. The clusters of fruits are black.

Growth characteristics

- Sucker prolifically and form dense uniform stands.
- Grows from surface roots.
- Shoots vigorously from cut stumps.

Palatability

- Palatable to livestock, especially the hardier breeds of cattle, ponies, sheep and goat.

Value to wildlife

The genus is valuable to wildlife, for example:

Invertebrates:

- 384 species recorded feeding on the genus.
- 43 have been recorded feeding exclusively.
- 24 RDB and 3 BAP insect species.
- Its flowers also provide a rich source of nectar and food.

Birds and mammals:

- Its fruits are much valued as a source of food.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives

(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Use light browsing to encourage bushy growth and some fruit productivity. Bark stripping may initially increase fruiting and will create standing dead wood.	5.8.4 5.8.9
En	B	Cattle and pony trampling can create routes through extensive stands leading to the formation of natural gaps and glades. Prevent trampling to encourage spread of stands.	5.8.4 5.8.8
M	C	Prevent moderate to heavy browsing in established scrub that will create browse lines, open the structure and reduce its value for wildlife, though epiphytes are better in old open stands.	5.8.4
En/M	D	Low to moderate levels of browsing and grazing may open sward sufficient to encourage suckering by targeting succulent competitors herbs. After germination reduce or remove livestock in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.3 5.8.4
En/M	E	Allow natural expansion of stands where needed by protecting them from browsing and trampling.	5.8.3
En/M	F	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Increase extent of stand by encouraging suckers to grow from surface roots. Sporadic mowing will encourage this.	5.8.1
En/M	B	To maintain age and structure diversity divide large stands into small, sinuous edged coups, cutting on a rotation. Manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
En/M	C	To replicate natural dynamic processes clear some stands (unless they are good for epiphytes) while allowing others to establish elsewhere but maintaining the desired extent across the site.	5.8.5 5.8.13
En	D	Retain dead trees to decay naturally and provide niches for other wildlife. Consider augmenting this by ring barking selected bushes to prevent them developing into trees. NB: ring barking is likely to encourage regeneration from the stump (see 6C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2

Examples of management techniques to implement example objectives: Cont...

	3	**Enhance or maintain upland scrub:**	
En/M	A	Encourage natural regeneration/suckering and where necessary propagate seeds or cuttings and plant out where required, protecting from browsing if necessary.	5.8.1/5.8.2 5.8.3
En/M	B	In upland stands Bird Cherry is more or less self-sustaining; if there is a need to carryout work take account of the epiphyte interests that rely on ecological continuity. Refer to relevant upland species profiles (e.g.: Dwarf Birch, Rowan, etc.) for more details on enhancing and maintaining upland scrub.	4.4.5 4.4.36
En/M	C	In upland mixed scrub other species can become invasive (e.g.: Rhododendron, and Sycamore). Refer to relevant profiles for more detail	4.4.34 4.4.41
	4	**Reduce from priority habitats using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Cherry without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting.	5.8.4
	5	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use sapling removal tools to clear young seedlings/suckers/saplings.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw). If necessary, Winch stumps where a suitable anchor exists, or use a grinder for large stumps.	5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Where grazing is not possible, regular (e.g. monthly) summer mowing or cutting may have a limited effect at reducing encroachment. In small stands use pedestrian mowers/flails or in large stands a tractor and swipe/flail. (See also 2A above).	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	F	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
	6	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Cherry as at July 2003

These Cherry species do not normally get mentioned as species on product labels. If herbicides are to be used then they fall within the general classification of 'woody weeds'. Herbicides may not be appropriate if enhancing or increasing extent of sensitive upland stands where Bird Cherry is a component.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Parsonage Down
  Contact: English Nature, Cherry Lodge Farm,
  Shrewton, Salisbury, Wiltshire, SP3 4ET
  tel: 01980 620 486

Further reading: See end of chapter

4.4.15 Cotoneaster, *Cotoneaster spp*

Summary
Ornamental Cotoneaster occurs in gardens and towns throughout Britain. It has established in the wild and can quickly dominate and threaten priority habitats. Management aims to reduce or eradicate the scrub by cutting and herbicide treatment.

The management of Wild Cotoneaster, *C. cambricus/intergerrimus,* because of its restricted distribution, is not reviewed here. However, the issues are similar to those described in the Juniper, montane willows and rare Whitebeam accounts. Further information on the species can be found in the UKBAP Species Action Plan.

Distribution and status
There are over 100 species of *Cotoneaster,* which have been introduced into gardens and amenity landscapes throughout Britain.

The berries are attractive to birds and they are considered the main cause of its establishment in the wild. Growth may be rapid and plants will quickly smother grassland communities as well as rocky ledges, crags and scree.

Problems have been experienced at a number of sites with calcareous soils in England and Wales. Active management aims to reduce and eradicate Cotoneasters from the priority habitat.

Trials have been carried out recently on the Isle of Portland, comparing three techniques: grubbing out, herbicide treatment and burning. Although, initial results favour herbicide treatment, trials will continue and other techniques may be tried where possible.

The most frequently encountered species are:
Himalayan Cotoneaster, *C. simonsii* Wall Cotoneaster, *C. horizontalis* Small-leaved Cotoneaster, *C. microphyllus* Hollyberry Cotoneaster, *C. Bullatus.*

Wild Cotoneaster is considered to be native to Britain, it is very rare and is restricted to just one site in Wales, where little more than 30 plants grow on limestone ledges and crags.

There is some debate as to its provenance, but it is Red Data listed as endangered, protected under Schedule 8 of the Wildlife and Countryside Act 1981 and has a UKBAP Species Action Plan.

Cotoneaster. Roger Key/English Nature

Identification
Introduced species, for example: *C. simonsii* and *C. bullatus* can become considerably larger than Wild Cotoneaster. Full descriptions of the cultivated varieties above and others can be found in any relevant horticultural text.

Wild Cotoneaster
Max height: 1 m; Flowers: Apr–Jun; Fruit: Aug.

This small deciduous shrub has oval leaves that are woolly grey below. The small clusters of flowers are pink and develop into small globular shaped red fruits.

Growth characteristics
- Will germinate from seed in disturbed soil.
- Younger plants will grow from cut stumps.
- Grows from surface roots and layered stems.

Palatability
- Leaves and tips of shoot palatable to livestock.

Value to wildlife
Moderately valuable to wildlife, for example:
Invertebrates:
- Flowers attractive to many nectar dependant insects.

Birds:
- Berries provide food for birds in winter.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives (non-native species only)
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Reduce from priority habitats using livestock:**	
R	A	Browse back scrub using stocking regimes/breeds that preferentially take Cotoneaster without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting.	5.8.4
	2	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use weed pullers to clear young seedlings and suckers.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Summer mowing or cutting on a 3 - 4 year rotation may reduce encroachment where grazing is not possible. This can be achieved in small stands with pedestrian mowers/flails or in large stands with a tractor and swipe or flail.	5.8.6 5.9.4.2 5.9.4.3
R/Er	F	Where access allows clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time. Herbicide treatment may be required the following season to deal with regenerating seeds.	5.8.10/5.8.15 5.8.16/5.9.2 5.9.4.4
R/Er	G	Burning may be trialed as an option to follow-up and complement herbicide treatment.	5.8.7
M	H	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Eradicate re-growth (and seedlings) using herbicide:**	
R/Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide. Because of the prostrate nature of many Cotoneaster species chemical application is likely to affect other grassland herbs and plants. Weed wiping is likely to have less impact on non-target species.	5.8.14 5.9.2 5.9.4.4
	4	**Reduce or eradicate on rock faces:**	
Er	A	In difficult locations (e.g.: rock faces and walls) it may only be possible to cut and treat stumps with herbicide. Use only specialist contractors.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Cotoneasters as at July 2003

Herbicides are not appropriate for Wild Cotoneaster, which is a rare species. Other Cotoneasters do not normally get mentioned as species on product labels. If herbicides are to be used then they fall within the general classification of 'woody weeds'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Beachy Head
  Contact: Bob Edgar, English Nature
  e-mail: robert.edgar@english-nature.org.uk

- Malling Down
  Contact: Mark Pearson, Sussex Wildlife Trust
  tel: 01483 488055

- Isle of Portland
  Contact: John Stobart, English Nature
  tel: 01929 557450,
  e-mail: john.stobart@english-nature.org.uk

- Isle of Wight Council
  Contact: Countryside Section, Isle of Wight Council,
  Council Offices, Seaclose, Fairlee Road, Newport,
  Isle of Wight, PO30 2QS.
  tel: 01983 823890

Further reading

Crofts, A., Jefferson, R.G., (1999), *Lowland Grassland Management Handbook*, English Nature/Wildlife Trusts
UK Biodiversity Group, (1998), *Tranche 1, Vol.2,* English Nature

4.4.16 **Currant, Red** *Ribes rubrum;* **Downy** *R. spicatum;* **Black** *R.nigrum;* **Mountain** *R. alpinum;* **Gooseberry** *R. uva-crispa*

Summary
Currants are a group of small shrubs with palmate, lobe-shaped leaves, long flower racemes and soft fruit berries. They have become widely cultivated and as a result, there is some doubt as to their provenance.

Currant is a relatively self-sustaining component of wet carr communities. It requires little or no management and seldom encroaches into priority habitats.

Browsing helps to diversify and maintain stands. Various mechanical methods can also be used to diversify and maintain the stands. Should encroachment become a problem, then reduce or eradicate where necessary.

Distribution and status
Currants are widespread but locally rare. They occur in small numbers as a component of mixed scrub communities often in wet woods, fen carr or on limestone.

Red Currant:
Is believed to be native to England, Wales and Scotland, and introduced to Ireland. It can grow at altitudes as high as 460 m and is found among the scrub of fen carr and alongside wooded streams.

They do not generally seem to occur as large single species stands, but where they occasionally do, they can form a dense cover. They seem to require minimal management and pose no known threat to their associated habitats and scrub communities.

Downy Currant:
Is a localised upland species, found in wooded areas on limestone areas of northern England and parts of Scotland, where it grows at altitudes of up to 425 m.

Black Currant:
Is a widespread, often naturalised escape from cultivation. It can be found growing in scattered localities among fen carr scrub and along the edges of wooded streams.

Mountain Currant:
Is a localised upland scrub, found in limestone areas in parts of the north Midlands, north and northwest England. It grows on cliffs and rocky outcrops up to 380 m. Many cultivars have now escaped into the wild in other areas.

Wild Gooseberry. Roger Key/English Nature

Gooseberry:
Like other members of the family has been cultivated and as a result, is widely distributed.

Identification
Max height: 2 m; Flowers: Mar–May; Fruit: Jun–Jul; Ripen: Aug.

Deciduous shrub up to 2 m in height, the leaves are 3–5 lobed, and vary from being downy *(Red Currant)* or hairless *(Black Currant)* and scented *(Black Currant – cat urine)* or not *(Red Currant).*

The flowers tend to be greenish, but the fruits vary from red *(Red Currant, Downy Currant* and *Mountain Currant)* or black *(Black Currant)* to yellow-green *(Gooseberry).* The Gooseberry has sharp spines at the base of its leaves.

Growth characteristics
- Young bushes shoot from cut stumps.
- Will re-generate from surface roots and layered stems.

Palatability
- Effectively impacted by livestock.

Value to wildlife
Moderate wildlife value, for example:
Invertebrates:
- 25 species recorded feeding.
- 19 species exclusively.

Birds and mammals:
- Mid-summer food source for birds and small mammals.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Encourage bushy growth and increased fruit production using low intensity summer browsing. Bark stripping may initially increase fruiting, and then create standing dead wood.	5.8.4 5.8.9
En	B	Cattle and pony trampling can create routes through extensive stands leading to the formation of natural gaps and glades. Prevent trampling when trying to encourage spread of stands.	5.8.4 5.8.8
En/M	C	Suckering may be encouraged using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. After regeneration reduce or remove livestock. Stands may need protection from trampling, grazing/browsing in vulnerable areas.	5.8.1 5.8.3 5.8.4
En/M	D	Natural expansion may be encouraged by protecting from browsing and trampling.	5.8.3
M	E	Moderate to heavy browsing can open the structure of older established scrub reducing its value for wildlife, though epiphytes can fair better in open stands.	5.8.4
M	F	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
M	A	Young to middle aged shrubs are most likely to have higher fruit productivity and are believed to respond better to coppicing, therefore, take care to balance the age of Currant being coppiced in mixed stands.	5.8.5
En	B	To increase the extent of stands, encourage plants to sucker from surface roots by opening the sward and through intermittent cutting.	5.8.1/5.8.6 5.8.813
En/M	C	To maintain the age and structural diversity across the site divide stands into small, sinuous edged coups and cut on a rotation. Smaller isolated stands can be managed as a single unit.	5.8.5/5.8.8 5.8.13
En/M	D	To replicate natural processes clear some stands, unless they are good for epiphytes, while allowing others to establish elsewhere but maintain the desired extent across the site.	5.8.5 5.8.8
En	E	Retain dead bushes to decay naturally and provide niches for other wildlife. Consider augmenting this by ring barking selected stems as required. NB: Ring barking can encourage regeneration from the stump (where necessary take action using 6C below).	5.8.9
M	F	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Enhance or maintain upland scrub:**	
En/M	A	Encourage natural regeneration/suckering/layering and where necessary propagate seeds or cuttings and plant out where required, protecting from browsing if necessary.	5.8.1/5.8.2 5.8.3
En/M	B	Currant is more or less self-sustaining; if there is a need to carryout work, take account of the epiphyte interests that rely on ecological continuity. Refer to relevant upland species profiles (e.g.: Dwarf Birch, Rowan, etc.) for more details on enhancing and maintaining upland scrub.	4.4.5 4.4.36
En/M	C	In upland mixed scrub, other species can become invasive (e.g.: Rhododendron, and Sycamore). Refer to relevant profiles for more detail.	4.4.34 4.4.41

Examples of management techniques to implement example objectives: Cont...

	4	**Reduce from priority habitats using livestock:**	
R	A	Where unwanted encroachment occurs, choose stock levels and breeds that find Current palatable, without damaging the target habitat. Monitor the effects and remove stock before impacts become undesirable.	5.8.4
R	B	Spring and early summer browsing will target new growth following cutting.	5.8.4
	5	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Where there is a need to reduce or eradicate Currant, hand pull or use weed pullers to clear young suckers.	5.8.12 5.9.4.1
R/Er	B	Cut saplings/suckers with a spade, mattock or root cutting chain saw.	5.9.4.2
R/Er	C	Cut small stemmed bushes with hand tools (loppers, bow-saw, billhook, chain saw or clearing saw).	5.9.4.1/5.9.4.2
R/Er	D	Cut small stands of large bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	If necessary, winch stumps where a suitable anchor exists.	5.8.14
R/Er	F	Where grazing is not possible regular monthly cutting or mowing may prevent encroachment. This can be achieved in small areas using pedestrian mowers or flails and in larger areas with a tractor mounted mower or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
R/Er	H	Water levels may be raised or submergence prolonged to suppress growth, but will encourage aerial roots to grow from the stem above the waterline.	5.8.11
	6	**Eradicate re-growth (and suckers) using herbicide:**	
Er	A	Weed-wipe or spray unwanted seedling, sapling/suckers (re-)growth in summer using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Weed wipe with an appropriate herbicide, where vulnerable non-target species and watercourses would be at risk from spray drift.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2E above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Currents as at July 2003

Currents do not normally get mentioned as species on product labels. If herbicides are to be used then they fall within the general classification of 'woody weeds'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key Sites:... (offers please!)

Further reading: See end of chapter

4.4.17 Dogwood, *Cornus sanguinea*

Summary
Dogwood is a common component of calcareous scrub communities. It can grow vigorously and if un-managed can dominate a grassland sward and threaten the habitat interest.

Several Dogwood species have been introduced and have become naturalised. Unless otherwise stated, where applicable, they can be managed similarly to the native.

The ability of Dogwood to re-grow quickly from coppice makes it difficult to constrain. Manage to prevent encroachment, maintain age and structural diversity within the scrub community.

Distribution and status
The native Dogwood occurs as a component of scrub on calcareous soils, northward to Durham and Westmoreland. It has been introduced further north into Scotland. On suitable soils, it can become widespread and common and occasionally becomes the dominant plant within chalk scrub communities.

Several other species of Dogwood have been introduced and become naturalised. These are most likely to be encountered where amenity landscaping has taken place, for example along transport corridors.

The most common of these are Cornelian Cherry, *C. mas,* also *C. alba* and *C. Stolonifera.*

Identification
Max height: 0.25–4 m; Flowers: May–Jul;
Fruit: Sep; Ripens: Oct.

The native Dogwood has deep purple-reddish stems and oval shaped, opposite leaves 4-8cm long and which hang on stalks 8–15mm long.

The star-shaped flowers are white and form a small cluster at the end of the stems. The small round fruits are black and 6–8mm in diameter.

Growth characteristics
- Suckers and shoots from surface roots and cut stumps.
- Grows readily from layered stems.

Dogwood in fruit. Roger Key/English Nature

- Grows quickly to form dense stands.
- Comparatively short-lived (c 15-20 years) if uncut and not browsed in which case old bushes and stands lose compactness and eventually collapse.
- Old senescing bushes will be invigorated by coppicing.

Palatability
- Grazed and browsed by all livestock.
- Deer and rabbit have some impact.
- Cattle and sheep are especially effective.
- Growing tips are highly palatable.

Value to wildlife
Valuable to wildlife, for example:
- 55 species of invertebrate have been recorded feeding.
- 7 species exclusively.
- 2 RDB species.
- Autumn food for birds.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Light to moderate summer browsing will encourage bushy growth and fruit productivity. Bark stripping may encourage initial fruit production followed by standing dead wood.	5.8.4 5.8.9
En/M	B	Encourage suckering using low to moderate levels of grazing/browsing to target succulent competitors and open the sward. Reduce or remove livestock after regeneration. Stands may need protecting in vulnerable areas.	5.8.1 5.8.3 5.8.4
En/M	C	Protecting stands from browsing and trampling may encourage natural expansion. Other competing vegetation may impede this.	5.8.1 5.8.3
En	D	Cattle and pony trampling can create routes through extensive stands leading to the formation of natural gaps and glades. Prevent trampling to encourage spread of stands.	5.8.4 5.8.8
M	E	Maintain open areas with stocking and breeds that preferentially graze not browse. Monitor the impacts and remove/reduce stock as required. Prevent moderate to heavy browsing in established scrub that will create browse lines and reduce the wildlife value.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Increase extent of stand by allowing suckers to grow from surface roots; encourage by sporadic mowing.	5.8.1/5.9.4.2 5.9.4.3
En/m	B	To maintain age and structural diversity divide large stands into small, sinuous edged coups and cut on a rotation. Manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
En/m	C	To replicate natural processes clear some stands (unless good for epiphytes) and allow others to establish elsewhere, but maintain the desired extent across the site.	5.8.5 5.8.13
En	D	Retain dead bushes to decay naturally. This can be augmented by ring barking selected larger stems where required. NB: ring barking may encourage regeneration from the stump. To eradicate growth where necessary, see 5C below.	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
M	F	Rejuvenate older senescing shrubs by coppicing.	5.8.5
	3	**Reduce from priority habitats using livestock:**	
R	A	Choose stock levels and breeds that preferentially target Dogwood without damage to other habitat features. Dogwood is a persistent species and browsing will be most effective when shoots are most tender in summer; heavy grazing maybe detrimental to other interests. Monitor the impact and remove/reduce stock as required.	5.8.4
R	B	Browse in spring to impact regeneration following cutting.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically:**	
R/Er	A	Hand pull or use weed pullers to clear young suckers.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2

Examples of management techniques to implement example objectives: Cont...

R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.2 5.9.4.3
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2/5.9.2
R/Er	E	Winch stumps where a suitable anchor exists and time allows.	5.8.14
R/Er	F	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment where grazing is not possible. Initially suckering may intensify, but with time, vigour will reduce. This can be achieved in small stands with pedestrian flails/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
Er	H	Leave old senescing bushes to die without treatment as cutting only promotes coppice re-growths.	
	5	**Eradicate re-growth (and suckers) using herbicide:**	
Er	A	Weed-wipe or spray unwanted seedling or sucker/sapling (re-)growth in summer using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Dogwood as at July 2003

Dogwood does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven, English Nature, Foxhold House, Crookham Common, Thatcham, Berks RG19 8EL, tel 01635 268881
  e-mail graham.steven@english-nature.org.uk

- London Borough of Croydon
  Contact: Parks and Open Spaces, Taberner House, Park Lane, Croydon.
  tel: 0181 680 4433

- Luton Borough Council
  Contact: John Day Field Centre, Hancock Drive, Bushmead, Luton, Beds LU2 7SF,
  tel: 01582 486983

- Malling Down
  Contact: Mark Pearson, Sussex Wildlife Trust
  tel: 01483 488055

- Martin Down, NNR
  Contact: David Burton,
  tel: 01980 620485,
  e-mail: david.burton@english-nature.org.uk

- Nottinghamshire Wildlife Trust (various reserves),
  Contact: Jeremy Fraser, The Old Ragged School, Brook Street, Nottingham, NG1 1EA.
  tel: 0115 958 8242, e-mail: jfraser@nottswt.cix.co.uk

- Parsonage Down
  Contact: English Nature, Cherry Lodge Farm, Shrewton, Salisbury, Wiltshire, SP3 4ET
  tel: 01980 620 486

- Watlington Hill, Oxfordshire. National Trust

Further reading

Toynton, P., Cox, M., (1994), *Scrub management,* ENACT 2 (1), pp10-11, English Nature

4.4.18 Elder, *Sambucus niger*

Summary
The Elder is common and widespread throughout a wide range of habitats. Particularly grows on enriched and disturbed soils e.g. around rabbit warrens.

Its flowers provide a rich source of nectar for insects and its berries are an important source of food to birds and mammals. Take care to avoid damage to epiphytes/lichens growing on its bark, especially in western coastal scrub communities.

Cutting and grazing prevents its encroachment into grassland and dune habitats.

Distribution and status
Elder is a very common shrub, sometimes developing into a small tree. It can occur at altitudes up to 460 m and grows almost anywhere, especially favouring nutrient enriched soil.

It forms a component of mixed scrub communities and occasionally single species stands on wasteland, neutral and calcareous grasslands and coastal dunes.

Identification
Max height: 10 m; Flowers: Jun–Jul;
Fruit: Aug–Sep; Ripen: Oct.

Elder has arching branches and stout erect shoots growing from the base. The grey-brown bark is deeply furrowed and cork-like.

The leaves grow in opposites and are pinnate; each elliptical leaflet is 3–9 cm long and has toothed edges.

The multi-stemmed flower head is flat-topped and has a mass of tiny white flowers which later form bunches of small dark blackish-purple fruits.

Growth characteristics
- Seeds easily in disturbed soil.
- Shoots from coppiced stumps and surface roots.
- Life span of approximately 30 years, but longer if coppiced.
- Branches often break when heavy with fruit.

Elderberry. Roy Harris/English Nature

- Lower branches often die or are broken by livestock, leading to top-heavy appearance and open under-storey.

Palatability
- Is effectively browsed and grazed by cattle, sheep and goats.
- Bark is highly palatable in winter to goats and equines, and sometimes to cattle and sheep.
- Rabbits find it un-palatable and stands of elder are often associated with growing on the nutrient enriched soils around rabbit warrens.

Value to wildlife
Important to wildlife, for example:
- Bark good for epiphytes.
- 36 species of invertebrates have been recorded feeding.
- 5 invertebrates species feed exclusively.
- Berries eaten by birds and mammals.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Encourage seed germination and suckering using low to moderate levels of browsing/grazing to target succulent competitor species and open the sward. After germination/regeneration reduce or remove livestock and in vulnerable areas; stands may need protection from trampling,grazing/browsing.	5.8.1 5.8.3 5.8.4
En	B	Low levels of summer browsing may encourage bushy growth and some fruit productivity. Bark stripping may initially increase fruiting, followed by standing dead wood.	5.8.4 5.8.9
En/M	C	Cattle and pony trampling may open routes through extensive stands leading to the formation of natural gaps and glades. Prevent trampling when trying to encourage spread of stands.	5.8.4 5.8.8
M	D	Moderate to heavy browsing in established scrub may create browse lines, open the structure and reduce its value for wildlife, though epiphytes are better in old open stands.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Increase extent of stand by allowing suckers to grow from surface roots and/or scarifying ground to encourage seed germination.	5.8.1 5.8.2
En/M	B	Replicate natural processes by clearing some stands (unless good for epiphytes) and allow others to develop elsewhere, but maintain the desired extent across the site.	5.8.5 5.8.13
En/M	C	Divide large stands into small, sinuous edged coups, cutting on a rotation to maintain age and structure diversity. Manage small and isolated stands as a single unit. Protect any regeneration from summer grazing.	5.8.5 5.8.8 5.8.13
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. Consider augmenting this by ring barking selected bushes. NB: Ring barking is likely to encourage re-growth from the stump (see 5C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Elder without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically:**	
R/Er	A	Hand pull or use sapling removal tools to clear young seedlings/saplings.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Winch stumps where a suitable anchor exists and time allows.	5.8.14

Examples of management techniques to implement example objectives: Cont...

R/Er	F	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment where grazing is not possible. This can be achieved in small stands using pedestrian mowers/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
	5	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Treat large freshly cut stumps with an appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Elder as at July 2003

Elder does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven, English Nature, Foxhold House, Crookham Common, Thatcham, Berks RG19 8EL, tel 01635 268881
  e-mail graham.steven@english-nature.org.uk

- Kent High Weald Project
  Contact: Keith Rennells, Council Offices, High Street, Cranbrook, Kent, TN17 3EN. tel: 01580 715918,
  e-mail: keith.rennells@kent.gov.uk

- Nottinghamshire Wildlife Trust (various reserves),
  Contact: Jeremy Fraser,The Old Ragged School, Brook Street, Nottingham, NG1 1EA.
  tel: 0115-958-8242, e-mail: jfraser@nottswt.cix.co.uk

- Therfield Heath, Hertfordshire
  Contact: Eoin Bell, Herts County Council
  tel:01922 555279,
  e-mail: eion.bell@hertscc.gov.uk

Further reading: See end of chapter

4.4.19 Elm, Wych *Ulmus glabra;* Smooth-leaved *U. minor;* English *U. procera*

Summary
Elms are widely distributed throughout Britain. There are 3 widely recognised species and a number of complex clones and hybrids. Much debate remains about the taxonomy of the genus.

Elm used to be a widespread tree in the British countryside, but following Dutch Elm disease, is most frequently found as scrub. It is usually managed as a single species or as a component of mixed stands.

Risk of encroachment in priority habitats is minimal, but where necessary, methods of limitation are reviewed. Elm branches were traditionally fed as fodder but where browsing is not possible, mechanical methods are described to diversify and maintain the stands.

Distribution and status
Distribution of Elm, *Ulmus spp*, as a tree has been much reduced by Dutch Elm disease, but it is still common throughout Britain where it occurs as scrub.

Elm taxonomy is complex but three species are generally recognised with a number of associated hybrid clones. The most notable are the Wych Elm, *U. glabra,* Smooth-leaved Elm, *U. carpinifolia* and the English Elm, *U. procera*.

The Wych Elm:
Is widely distributed and is common in the upland regions of western and northern Britain.

Smooth-leaved and English Elm:
Occur throughout southern, central and northern England, between Devon and York, except East Anglia.

There are a number of local varieties and hybrids:
Dutch Elm, *Ulmus x hollandica (= U. glabra x U. minor)*
Plot's Elm, *Ulmus* 'Plotii' Druce, *(=U. Plotii Druce)*
Cornish Elm, U. *'Stricta'* Aiton *(= U. stricta* (Aiton) Lindl
Jersey Elm, *Ulmus 'Sarniensis'* C K Schneid
(= U.sarniensis (C K Schneid) H H Bancr.).

For full distribution and identification of these, refer to Clapham, Tutin and Moore (1987) and Coleman (2002).

Where elm now occurs it can form dense, ephemeral stands of scrub along hedges and woodland edge.

Wych Elm. Peter Wakely/English Nature

Dutch Elm disease killed most standing trees in England particularly, but the rootstock usually survived, and re-growth came from suckers.

These are periodically attacked by re-infestation of the Dutch Elm fungus, creating a mosaic of age classes and structure as new scrub regenerates from suckers.

Identification
Max height: 30 m; Flowers: Feb–Mar; Fruit: May–Jun; Ripen: Jul.

Wych Elm: The leaves are short-stalked, asymmetrical and roughly hairy, with toothed edges. They tend to be larger with more pointed tips than other elms.

English Elm: The short, hairy twigs have asymmetrical rounded-oval leaves, which are rough and hairy above. The leaves are deeply veined and the edges toothed.

Smooth-leaved Elm: The leaves are shiny, leathery above, and variably toothed along the edges.

Growth characteristics
- Now mostly short-lived (c10 – 15 yrs), as it becomes susceptible to Dutch Elm fungal attack.
- Some clones seem more resistant and can reach a reasonable size, especially in East Anglia.
- Current short life span means plants are self-coppicing.
- It shoots and suckers readily from stumps and root stock of dead trees.

Palatability

- Impact on foliage through browsing by cattle, ponies and sheep. (Cut branches fed traditionally as browse).
- Shetland ponies will browse and de-bark mainly in winter.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Value to wildlife

Elms are very valuable to wildlife, for example:
Invertebrates:

- 31 Species recorded on genera
- 8 species exclusively feed. Including White-letter Hairstreak, which especially favours flowering Wych Elm.

Birds:

- Good source of insect food.
- Standing dead wood important for nesting.

Examples of management techniques to implement example objectives

(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Cattle and ponies may create routes through extensive stands leading to the formation of natural gaps and glades. Prevent trampling when trying to encourage spread of stands through suckering.	5.8.3/5.8.4 5.8.8
	2	**Enhance or maintain stands mechanically:**	
En	A	To increase extent of stands encourage suckering from surface roots by controlling competing vegetation.	5.8.1/5.8.12
En/M	B	Divide large stands into small, sinuous edged coups, cutting on a rotation. To maintain age and structure diversity thin even aged stands to create a self-sustaining, dual aged structural diversity that dies back regularly. Treat smaller isolated stands as a single unit.	5.8.5 5.8.8 5.8.13
En/M	C	To replicate natural processes clear some stands (unless good for epiphytes) and allow others to establish elsewhere, thereby retaining the extent across the site.	5.8.5 5.8.13
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. Retain dying/dead tree trunks as a dead wood resource away from access paths.	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce or eradicate from priority habitats manually or mechanically:**	
R/Er	A	Hand-pull or use sapling removal tools to clear young seedlings/saplings.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment. This can be achieved in small stands with pedestrian flails/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.9.4.2 5.9.4.3
R/Er	F	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
	6	**Eradicate re-growth (and seedlings/suckers) using herbicide**	
Er	A	Weed-wipe or spray unwanted seedling or sapling/sucker (re-)growth in summer using an appropriate herbicide.	5.8.16/5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4

Herbicides that may be considered for use on Elm as at July 2003

Elm does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Hunthouse Wood
  Contact: Helen Woodman, Worcestershire Wildlife Trust
  tel: 01905 754919,
  e-mail: helen@worcswt.cix.co.uk

- Ivel Valley (various sites)
  Contact: Richard Lawrence, Ivel and Ouse Countryside Project, Bedfordshire, tel: 01767 316358,
  e-mail: ivelvalley@cix.compulink.co.uk

- Northwood Hill, RSPB
  Contact: Alan Parker, Bromhey Farm, Eastborough, Cooling, Rochester, Kent, ME3 8DS
  tel: 01634 222480,
  e-mail: alan.parker@rspb.org.uk

Further reading

Coleman, M., (1998), *Elm – The forgotten tree,* British Wildlife 9 (3) pp 137-143

Coleman, M., (2002), *British Elms, identification,* British Wildlife, 13 (6) pp 390-395

4.4.20 Field Maple, *Acer campestre*

Summary
Field Maple is a widespread shrub of woodland edge, hedges and scrub. Its distribution has been enhanced through extensive planting as an amenity landscape shrub.

It coppices well and is palatable to livestock. It does not tend to occur in scrub communities until the later stages of seral development and is not considered a major threat to grassland communities.

Field Maple scrub can be managed as single species stands or as a component of mixed scrub communities.

Where encroachment into priority habitats does occur it will require elimination. Browsing helps to diversify and maintain stands. Various mechanical methods can also be used to diversify and maintain the stands.

Distribution and status
Field Maple is a native woodland edge, hedgerow and scrub species. It is common and widespread, being found as far north as Cumbria and Durham.

It prefers heavy, slightly calcareous soils, but will grow in soil pH of between 5.5 and 7.7. It is not a pioneer invader of grassland swards and occurs in scrub communities during the later seral stages.

It is also widely planted as an amenity landscape shrub, along transport corridors, parks and farms. In these situations, it can often be found planted as a single species stand.

Identification
Max height: 15 m; Flowers: Mar; Fruit: Jun–Jul; Ripen: Oct–Nov.

A small deciduous tree with fissured bark and downy twigs. The leaves occur in opposite pairs, are palmate with 3–5 rounded lobes they are downy below and hairless above. In autumn, the leaves turn yellow, occasionally red or golden brown.

The flowers are yellow-green and appear just prior to the leaves opening. The fruits form horizontally spread and winged seeds.

Field Maple. Peter Wakely/English Nature

Growth characteristics
- Grows well from cut stumps.

Palatability
- Palatable to most livestock.

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 193 species recorded feeding on the genus.
- 13 RDB and 2 BAP species.

Birds:
- Insect food early and late in the year.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Light browsing in early summer may encourage bushy growth and seed productivity. Bark stripping may initially increase seed production and then create standing dead wood.	5.8.4 5.8.9
En/M	B	Encourage seeding using low to moderate levels of grazing to target succulent competitors and open the sward. After germination reduce or remove livestock. In vulnerable areas stands may need protection from trampling, grazing/browsing.	5.8.1 5.8.3 5.8.4
En	C	Cattle and pony trampling will create routes through extensive stands leading to the formation of natural gaps and glades. Prevent trampling when trying to encourage spread of stands.	5.8.4 5.8.8
M	D	Prevent moderate to heavy browsing in established scrub that will create browse lines, opening the structure and reducing the wildlife value, though epiphytes fair better in old open stands.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	To increase stand cover scarify the adjacent ground in late summer to create a seedbed.	5.8.1
En/M	B	Replicate natural processes by clearing stands (unless good for epiphytes) and allowing new stands to establish elsewhere, but maintaining the desired extent across the site.	5.8.5 5.8.13
En/M	C	Divide large stands into small, sinuous edged coups, cutting on a rotation to maintain age and structure diversity. Manage small isolated stands as individual units.	5.8.5/5.8.8 5.8.13
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. Consider augmenting this by ring barking selected bushes. Ring barking is likely to encourage re-growth from the stump (see 5C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Field Maple without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Browse in spring to impact young growth following cutting.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically:**	
R/Er	A	Hand pull or use weed pullers to clear young saplings.	5.8.13/5.9.4.1
R/Er	B	Cut saplings/suckers with a spade, mattock or root cutting chain saw.	5.9.4.1/5.9.4.2
R/Er	C	Cut small-stemmed bushes using hand tools (loppers, billhook, bow-saw, chain saw or clearing saw).	5.9.4.1/5.9.4.2
R/Er	D	Cut stands of larger bushes using chain saws or clearing saws.	5.9.4.2
R/Er	E	Winch stumps where a suitable anchor exists, or use a grinder for large stumps.	5.8.14/5.9.4.2
R/Er	F	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment where grazing is not possible. This can be achieved in small stands with pedestrian flails/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3

Examples of management techniques to implement example objectives: Cont...

R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
	5	**Eradicate re-growth (and seedlings) using herbicide:**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Field Maple as at July 2003

Field Maple does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Hunthouse Wood
  Contact: Helen Woodman,
  Worcestershire Wildlife Trust, tel: 01905 754919,
  e-mail: helen@worcswt.cix.co.uk

Further reading: See end of chapter

4.4.21 Gorse, Common *Ulex europaeus*

Summary
Three species of gorse occur in Britain; the Common or European Gorse is most widespread and is the basis for this profile.

Western Gorse, *U. gallii* has similar characteristics, though it usually grows less tall, whereas Dwarf Gorse, *U. minor,* is generally prostrate and weak. Dwarf Gorse is not considered here. Hybrids between European and Western Gorse readily occur.

Distribution and status
Common Gorse is widely distributed across Britain, as far north as Shetland, though it is not very frost tolerant. In many parts of southern Britain, gorse has expanded considerably because of mild winters and absence of late frosts. It has increased its altitudinal limit in many upland areas. Climate change could have a large impact on the spread of gorse.

It grows on light soils, is common on acid heaths, and occurs on the escarpments of calcareous chalk downs, upland valleys, coastal cliffs and dunes. It is absent from montane areas and wetland.

The ability of gorse to acidify soils makes it a particular problem to calcareous plant communities.

Western Gorse is restricted to the western half of Britain, up to southern Scotland, and along the East Anglian coast, but is absent from southeast England east of Dorset.

Identification
Max age: 20; Max height: 3 m;
Flowers: Mar–Jun (Common) & Jun–Jul (Western);
Fruit: follow end of flowering.

Both species are very spiny, evergreen shrubs, almost glaucous in colour. The multi-stems are woody, usually erect and branched. The deeply furrowed spines are between 1.5 – 2.5 cms long.

The flowers are a very strong yellow with a distinct coconut scent, and in Common Gorse occur in spring (and sometimes in mild winters), and in Western Gorse in summer.

Western Gorse is less robust than Common. Mature plants are usually around a metre tall, with shorter flowers (< 15 mm).

Gorse thickets. D. Ratcliffe/English Nature

Growth characteristics
- Germinates readily from seed on bare or disturbed soils, especially after a flash fire.
- Growth from young coppiced gorse is vigorous. Shoots from surface roots.
- Old stumps are less likely to regenerate after coppicing, depending on grazing levels.
- It is comparatively short lived, but growing quickly to form dense, impenetrable stands or compact single bushes.
- With age, bushes and stands begin to lose compactness and eventually collapse.
- In some situations, it regenerates, in most though succession is to other scrub (e.g.: Bramble and Elder) or woodland. Much depends on soils and aspect.

Palatability
- Gorse is very nutritious but due to its very prickly form is only accessible to adept breeds of cattle and pony, for example: Galloway cattle, New Forest and Exmoor ponies.
- Ponies seek gorse in winter, which can lead to damage.
- Cattle are adept at pushing into and trampling bushes.
- Sheep and goats, especially hardy breeds, browse it extensively.
- Rabbits browse seedlings and regeneration, which are highly palatable.

Value to wildlife

Very valuable for wildlife, for example:

Invertebrates:

- 71 species have been recorded feeding.
- 16 species exclusively.

Birds:

- Nesting and roosting cover for birds, especially on heathland.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives

(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Light browsing encourages bushy growth and some seed productivity. Bark stripping may initially increase seed productivity before bushes die to leave standing deadwood.	5.8.4 5.8.9
En/M	B	Encourage seed germination using low to moderate levels of grazing to open the sward by targeting more succulent competitor species. After germination reduce or remove livestock in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.1 5.8.4
En	C	Cattle and pony trampling creates routes through extensive stands leading to the formation of natural gaps and glades. Prevent trampling when trying to encourage spread of stands.	5.8.4 5.8.8
En/M	D	Early spring browsing removes much annual growth, but encourages lateral shooting, as gorse is very palatable when the needles are soft.	5.8.4
M	E	Moderate to heavy browsing in established scrub creates browse lines, opens the structure and reduces the value for wildlife, though epiphytes can fair better in open stands.	5.8.4
M	F	Where necessary, temporarily fence regenerating stands from browsing especially by rabbits in spring and ponies in winter.	5.8.3
	2	**Enhance or maintain stands mechanically:**	
En	A	Assist germination of seed by disturbing the soil; germination from the seed bank (and especially from seeds subjected to an earlier flash burn) or from nearby bushes should provide seed, otherwise, collect seeds and scatter in target areas.	5.8.1/5.8.7
En/M	B	To maintain age and structural diversity divide large stands into small, sinuous edged coups, cutting on a rotation. Maintain small isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
En/M	C	To mimic natural dynamic processes, clear some stands (unless they are good for epiphytes) and allow others to establish elsewhere, maintaining the desired extent across the site.	5.8.5 5.8.13
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. To augment deadwood on site ring-bark selected larger stems as required. NB ring barking can encourage re-generation from the stump (where necessary take action using 5C below).	5.8.9
En	E	Rejuvenate by small-scale rotational burning of middle-aged gorse; older gorse may die.	5.8.7
M	F	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take gorse without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4

Examples of management techniques to implement example objectives: Cont...

R	B	Standing gorse has limited palatability but can be impacted by relatively high grazing pressure using appropriate breeds. Winter browsing, mainly by ponies is most likely to kill gorse as it is most vulnerable then and other vegetation is generally less palatable. Young gorse is very palatable to Rabbits, goats, sheep and ponies on heathland where most other vegetation is poor.	5.8.4
R	C	Relative palatability is likely to be less on calcareous soils due to availability of a wider range of succulent herbs; more livestock may need to be focussed into target area that may be detrimental to other interests?	5.8.4
R	D	Browse in the spring to impact regeneration following cutting.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull (with good gloves on!) or use weed pullers to clear young seedlings.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Winch stumps where a suitable anchor exists and time allows.	5.8.14
R/Er	F	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment in drier stands where grazing is not possible. This can be achieved in small stands with pedestrian mowers/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	G	Burning is only effective on mature stands, with a thick base and ample combustible matter. Tall leggy gorse will not burn well. It is most effective in small blocks, retained by a firebreak. NB: burning may be inappropriate on some substrates and may damage sensitive epiphyte communities.	5.8.7
R/Er	H	Large stands of mature scrub can be cleared using excavators or bulldozers that at the same time can also remove the accumulated nutrient-rich litter layer.	5.8.10 5.8.15/5.9.2
	5	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16/5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Gorse as at July 2003

Gorse does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Brook & Compton Downs, Isle of Wight
  Contact: Robin Lang, National Trust
  e-mail: SISRXL@smtp.ntrust.org.uk

- Borough of Poole
  Contact: 30-32 Northmead Drive, Creekmoor, Poole, Dorset, BH17 7RP. tel: 01202 261336

- Cumbria.
  Contact: Ian Taylor, Conservation Officer, English Nature, tel: 01539 792800,
  e-mail: ian.taylor@english-nature.org.uk

- Drumburgh Moss, Cumbria
  Contact: Andrew Walter
  e-mail: andreww@cumbriawildlifetrust.org.uk

- Esher Commons SSSI
  Contact: David Page (Countryside Estates Officer), Elmbridge Borough Council, Leisure & Cultural Services, Civic Centre, High Street, Esher, Surrey. KT10 9SD. tel: 01372 474565,
  e-mail: djp@elmbridge.gov.uk

- Liss Riverside Railway walk
  Contact: Martin Healey East Hampshire District Council, Penns Place, Petersfield. GU31 4EX
  tel: 01730 234386 e-mail: Martin_Healey@easthants.gov.uk

- Martin Down, NNR
  Contact: David Burton, tel: 01980 620485,
  e-mail: david.burton@english-nature.org.uk

- Nottinghamshire Wildlife Trust (various reserves),
  Contact: Jeremy Fraser, The Old Ragged School, Brook Street, Nottingham, NG1 1EA.
  tel: 0115-958-8242, e-mail: jfraser@nottswt.cix.co.uk

- St Albans District Council
  Contact: Museum of St Albans, Hatfield Road, St Albans, AL1 3RR. tel: 01727 819340

- Westhay Moor NNR
  Contact: Kiff Hancock, Somerset Wildlife Trust.
  tel: 01823 451587 e-mail: chancock@somwt.cix.co.uk

Further reading

Bowley, A., (1994), *Getting rid of gorse,* ENACT 2 (1), pp6-7, English Nature

4.4.22 Guelder Rose, *Viburnum opulus*

Summary
The Guelder Rose occurs at low abundance and frequency in mixed scrub communities and is seldom known to be problematic. In recent years it has become widely planted in amenity landscape schemes.

Younger bushes respond to coppicing and re-generate from surface roots. Little is known of its palatability for livestock. It has some relative wildlife value for insects and birds.

Where it occurs within scrub stands, take care to avoid damage by browsing and coppicing, and where possible, enhance conditions to encourage natural re-generation.

If necessary, various mechanical methods can be used to reduce or eradicate it from a threatened priority habitat.

Distribution and status
The Guelder Rose is a widespread native shrub found on moist heavy soils, where it occurs in low numbers among mixed scrub communities.

It is more widespread than its relative the Wayfaring Tree, and can be found throughout England, Wales and Ireland. In recent years, it has been used extensively in amenity landscape plantings and can be found along transport corridors and restoration sites.

Identification
Max height: 4 m; Flowers: Jun–Jul;
Fruit: Aug–Sep; Ripens: Oct.

Guelder Rose is a deciduous shrub with grey-brown angled stems. The palmate, lobed leaves grow in opposite pairs from the stem. Similar in shape to a maple, they are sharply toothed, 5–10 cm long, dark green and hairless above and more or less downy beneath.

The flat umbel of white flowers is up to 20 cm across and grows from the tip of the stem. The inner flowers are fertile and the outer are sterile. The cluster fruits are 8 mm long and ripen to shiny red.

Growth characteristics
- Will re-generate from surface roots.
- Young bushes shoot from coppices stools.

Guelder rose. Peter Wakely/English Nature

Palatability
- Little is known about the palatability, but cattle, sheep and goat may possibly have some minor impact.

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 44 species have been recorded feeding.
- 7 species feed exclusively.
- 3 RDB species.

Birds:
- Autumn food for thrushes and starlings.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En/M	A	Guelder Rose is most likely to be found on the edges of scrub communities, little is known of its palatability and it may be susceptible to browsing damage. Avoid spring and early summer when it is most likely to be palatable. Because it is found in low abundance and frequency as a component of mixed scrub communities, care needs to be taken.	5.8.4
En	B	Encourage bushy growth and increased seed production using low intensity summer browsing. Bark stripping may initially increase seed production, and then create standing dead wood.	5.8.1 5.8.4/5.8.9
En/M	C	Encourage seed germination using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. After germination, reduce or remove livestock and in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.3 5.8.4
En/M	D	Prevent moderate to heavy browsing in established scrub that will create browse lines, opening the structure and reducing its value for wildlife.	5.8.4
En/M	E	Allow natural expansion of stands where needed by protecting them from browsing and trampling.	5.8.1/5.8.4
M	F	Maintain open scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required.	5.8.4 5.8.9
	2	**Enhance or maintain stands mechanically:**	
En	A	Increase extent of stand by allowing suckers to grow from surface roots and/or scarifying ground to encourage seed germination.	5.8.1
M	B	Young to middle aged scrub is most likely to have higher fruit productivity and respond better to coppicing. Take care to balance the age structure of the coppice in mixed stands.	5.8.5
En/M	C	To maintain age and structural diversity cut on rotation: divide large stands into small, sinuous edged coups. Manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
En/M	D	Mimic natural processes by clearing some stands (unless good for epiphytes) and allowing others to develop elsewhere, retaining the desired extent across the site.	5.8.5 5.8.13
En	E	Retain dead bushes to decay naturally and provide niches for other wildlife. Consider augmenting this by ring barking selected bushes. NB: ring barking is likely to encourage re-growth from the stump (see 5C below).	5.8.9
M	F	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Guelder Rose (information needed) without damage to target habitat. Monitor impact and remove / reduce stock as required.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting.	5.8.4

Examples of management techniques to implement example objectives: Cont...

	4	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use weed pullers to clear young saplings.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers using a spade, mattock or root cutting chain saw.	5.9.4.1/5.9.4.2
R/Er	C	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	D	Winch stumps where a suitable anchor exists, or use a grinder for large stumps.	5.8.14/5.9.4.2
R/Er	E	Repeated monthly mowing or cutting throughout summer may reduce encroachment where grazing is not possible. This can be achieved with either pedestrian mowers/flails or tractor mounted swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
	5	**Eradicate re-growth/suckers (and seedlings) using herbicide:**	
R	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16/5.9.4.4
R	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
R	C	Prevent re-generation from stumps of ring barked stems (see 2E above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Guelder Rose as at July 2003

Guelder Rose does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven, English Nature, Foxhold House, Crookham Common, Thatcham, Berks RG19 8EL, tel 01635 268881
  e-mail graham.steven@english-nature.org.uk

- Bucks County Council.
  Contact: Annexe A, County Hall, Aylesbury, Bucks, HP20 1UY. tel: 01296 383114

- Martin Down, NNR
  Contact: David Burton, tel: 01980 620485,
  e-mail: david.burton@english-nature.org.uk

Further reading: See end of chapter

4.4.23 Hawthorn, *Crataegus monogyna*

Summary
Hawthorn is a widely distributed shrub, forming a component of mixed scrub communities or occurring as single species stands. It is very hardy and can tolerate extremes of climate and soils.

The Midland Hawthorn, *Crataegus laevigata,* another native species, occurs mostly as a woodland species and is not considered here.

Hawthorn scrub is usually managed to maintain single species stands or as a component of mixed scrub communities. It requires reduction where it encroaches into priority habitats.

Browsing helps to diversify and maintain stands and slow down successional development. Various mechanical methods can also be used to diversify and maintain the stands.

Distribution and status
Hawthorn is a widespread, long-lived deciduous shrub or small tree. Hardy, growing in all except very wet soils up to about 500 m. It is common in hedges and as scrub along woodland edges, rides and glades, grasslands and coastal cliffs. Readily establishes in open sites and gives protection to the seedlings of other broadleaved trees.

The Midland Hawthorn is found on heavy soils in old woodlands, mainly in central and southeast England

Identification
Max height: 15 m; Flowers: May–Jun;
Fruit: Jul–Aug; Ripen: Sep–Oct.

Densely thorny shrub with dark green leathery, 3–5 lobed leaves. Each lobe is cut more than half way to midrib.

Flowers white and hang in clusters of 10–16 together. The fruits 8–10 mm long, crimson red and have one seed inside.

The wood is hard and streaky white, occasionally pale pink.

Growth characteristics
- Seeds germinate easily on bare soils.
- Stools shoot well after coppicing.

Hawthorn in fruit. M. W. Henchman/English Nature

Palatability
- Very young seedlings susceptible to grazing/uprooting before they become established.
- Resistant to browsing by livestock though all (especially goats and sheep) will take some young shoots.
- Thorns are a deterrent and produces toxins.
- Prolonged heavy sheep grazing can impact growth.
- Goats will browse woody shoots at times.
- Some surface roots may produce shoots.

Value to wildlife
An important species to wildlife, for example:
Invertebrates:
- 356 species recorded feeding on the genus.
- 29 have been recorded feeding exclusively.
- 16 RDB and 2 BAP species.
- The flowers and fruits provide a rich source of early season nectar and food.

Birds:
- Forms thick dense cover for nesting and roosting.
- The fruits are a valued food source.

Mammals:
- Shelter and source of food.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Light browsing may encourage bushy growth and some fruit productivity, but will encourage thornier growth and an increase in toxin levels, leading to a more browse resistant plant. Bark stripping may create standing dead wood and may initially increase seed productivity.	5.8.4 5.8.9
En	B	Cattle and pony trampling will create routes through extensive stands, leading to the formation of natural gaps and glades. Prevent trampling when trying to encourage spread of stands.	5.8.4 5.8.8
M	C	Prevent moderate to heavy browsing in established scrub that will create a browse line, open the structure and reduce its value for wildlife.	5.8.4
En/M	D	Encourage seed germination using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. After germination, reduce or remove livestock and in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.1 5.8.3 5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Create seedbeds near existing seeding stands by scarifying the ground in late summer.	5.8.1
M	B	Coppicing or pollarding will increase vigour and thorniness making future reduction harder.	5.8.5
En/M	C	To maintain age and structure diversity, divide large stands into small, sinuous edged coups, and cut on a rotation. Cut small and isolated stands as required, to maintain age and structure diversity across the site.	5.8.5 5.8.8 5.8.13
En/M	D	To mimic natural processes, clear some stands (unless good for epiphytes) and allow others to establish elsewhere, while retaining the desired extent across the site.	5.8.5 5.8.13
En	E	Retain dead bushes to decay naturally and provide niches for other wildlife. Consider augmenting this by ring barking selected bushes. NB: ring barking is likely to encourage re-growth from the stump (see 5C below).	5.8.9
M	F	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Hawthorn without damage to target habitat. Monitor impact and remove/reduce stock as required. However, see 1A above.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting.	5.8.4
	4	**Reduce from priority habitats manually or mechanically:**	
R/Er	A	Hand pull (using thorn proof gloves) or use weed pullers to clear young saplings.	5.8.12/5.9.4.1
R/Er	B	Cut saplings/suckers with a spade, mattock or root cutting chain saw.	5.9.4.1/5.9.4.2
R/Er	C	Cut small stemmed bushes with hand tools (e.g.: billhook, loppers, bow-saw, chain saw, clearing saw).	5.8.5/5.9.4.2

Examples of management techniques to implement example objectives: Cont...

R/Er	D	Cut small stands of large bushes using chain saw or clearing saw.	5.9.4.2
R/Er	E	Winch stumps where a suitable anchor exists, or use a grinder for large stumps.	5.8.14/5.9.4.2
R/Er	F	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment where grazing is not possible. This can be achieved in small stands with pedestrian mowers/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	G	Clear large mature stands using excavators or bulldozers; this disperses/removes the accumulated nutrient-rich litter layer at the same time.	5.8.10 5.8.15/5.9.2
	5	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16/5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Hawthorn as at July 2003

Hawthorn does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven, English Nature, Foxhold House, Crookham Common, Thatcham, Berks RG19 8EL, tel 01635 268881
  e-mail graham.steven@english-nature.org.uk

- Catherington Lith,
  Contact: Martin Healey East Hampshire District Council, Penns Place, Petersfield. GU31 4EX
  tel: 01730 234386
  e-mail: Martin_Healey@easthants.gov.uk

- Cumbria.
  Contact: Ian Taylor, Conservation Officer, English Nature, tel: 01539 792800,
  e-mail: ian.taylor@english-nature.org.uk

- Ditchling Beacon
  Contact: Mark Pearson, Sussex Wildlife Trust
  tel: 01483 488055

- Harting Downs, West Sussex, National Trust

- Hunthouse Wood
  Contact: Helen Woodman,
  Worcestershire Wildlife Trust
  tel:01905 754919,
  e-mail: helen@worcswt.cix.co.uk

- Ivel Valley (various sites)
  Contact: Richard Lawrence, Ivel and Ouse Countryside Project, Bedfordshire tel: 01767 316358,
  e-mail: ivelvalley@cix.compulink.co.uk
- Ivinghoe Hills, Buckinghamshire, National Trust

- Northwood Hill, RSPB
  Contact: Alan Parker, Bromhey Farm, Eastborough, Cooling, Rochester, Kent, ME3 8DS
  tel: 01634 222480,
  e-mail: alan.parker@rspb.org.uk

- Nottinghamshire Wildlife Trust (various reserves),
  Contact: Jeremy Fraser, The Old Ragged School, Brook Street, Nottingham, NG1 1EA.
  tel: 0115-958-8242, e-mail: jfraser@nottswt.cix.co.uk

- Therfield Heath, Hertfordshire
  Contact: Eoin Bell, Herts County Council
  tel:01922 555279,
  email eion.bell@hertscc.gov.uk
- Westhay Moor NNR
  Contact: Kiff Hancock, Somerset Wildlife Trust.
  tel:01823 451587
  e-mail: chancock@somwt.cix.co.uk

- Windmill Hill
  Contact: Helen Woodman,
  Worcestershire Wildlife Trust
  tel: 01905 754919,
  e-mail: helen@worcswt.cix.co.uk

Further reading: See end of chapter

4.4.24 Hazel, *Corylus avellana*

Summary
Although Hazel is familiar as a woodland under storey scrub, it occurs widely in mixed lowland scrub communities on a range of soils.

It can also be found as a component of upland mixed scrub or as single species stands. These are important communities of high ecological value, especially in northern and western Britain.

Hazel scrub is usually managed as single species stands or as a component of mixed scrub communities. It requires elimination where it encroaches into priority habitats; or especially in upland areas, protection and enhancement when it is threatened by over grazing.

With careful management, browsing helps to diversify and maintain stands. Various mechanical methods can also be used to diversify and maintain the stands.

Distribution and status
Hazel is widely distributed throughout the British Isles and is found up to altitudes of 640 m. It can tolerate damp or dry, moderately acidic to base rich soils. It is most frequently encountered as a woodland under scrub, but is also a component of the mixed chalk scrub communities.

Important Hazel scrub communities occur in the upland limestone regions of Derbyshire and Cumbria, as well as coastal regions of north and west Scotland. These are considered self-sustaining, requiring little if any management to enhance them. Regeneration can be suppressed through over grazing mainly by sheep and deer. Conversely, low levels of browsing and grazing help retain an open structure, permitting regeneration and benefiting rare epiphyte communities.

Identification
Max height: 8 m; Flowers: Jan–Mar;
Fruit: Jul–Aug; Ripen: Sep–Oct.

Hazel is often seen as a multi-stemmed shrub. It has smooth copper-brown bark, which peels in thin paper-like strips. In upland Hazel, the bark can be coloured by crustose lichens.

The twigs are hairy and blunt oval-shaped buds.
The leaves are rounded, with toothed edges and an extended pointed tip. They have a rough hairy surface.

Hazel sapling in Broxbourne Wood NNR. Paul Glendell/English Nature

The yellow male catkins are 2–8 cm long and hang in groups. They appear in late winter or early spring, before the leaves. The smaller female catkins resemble a leaf bud and have red styles protruding from the tip.

The nuts are rounded to oval and woody. They hang in groups of up to four, protected by a deeply divided leafy, lobed cover.

Growth characteristics
- Sprouts from surface shoots and layered stems.
- Regrows from coppiced stump.

Palatability
- Established bushes are moderately susceptible to browsing by cattle, goats and some sheep.
- Deer, rabbit and hardy breeds of sheep can severely damage low young re-growth.
- Equines, goats, and some sheep regularly de-bark stems particularly in winter.

Value to wildlife
Valuable to wildlife, for example:
Lower plants:
- Rare epiphyte communities.

Invertebrates:
- 253 invertebrate species recorded feeding on the genus.
- 22 have been recorded feeding exclusively.
- 21 RDB and 6 BAP invertebrate species.

Birds & Mammals:

- Source of insect food for birds.
- Fruits important to some birds and mammals, especially Dormice.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives

(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Light summer browsing encourages bushy growth and some seed productivity. Bark stripping will initially increase seed production and eventually standing dead wood.	5.8.4 5.8.9
En	B	Cattle and pony trampling creates routes through extensive stands, leading to the formation of natural gaps and glades. Prevent trampling when trying to encourage spread of stands.	5.8.4 5.8.8
M	C	Prevent moderate to heavy browsing in established scrub that will create browse lines, open the structure and reduce its value for wildlife, though epiphytes are better in old open stands.	5.8.4
En/M	D	Encourage nut germination using low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor species. After germination, reduce or remove livestock and in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.1 5.8.3 5.8.4
En/M	E	Allow natural expansion of stands where needed by protecting them from browsing and trampling.	5.8.3
M	F	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Increase extent of stand by scarifying ground to encourage nut germination, by layering current seasons shoots in the autumn, or by planting in transplants; followed by protection.	5.8.1 5.8.2
En/M	B	To maintain age and structural diversity, divide large stands into small, sinuous edged coups and cut on a rotation. Maintain small and isolated stands as a single unit. Protect from browsing where necessary.	5.8.5 5.8.8 5.8.13
En/M	C	Replicate natural dynamic processes by clearing some stands (unless they are good for epiphytes), while allowing others to establish elsewhere, but maintaining the desired extent across the site.	5.8.5 5.8.13
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. Consider augmenting this by ring barking selected bushes to prevent them developing into trees. NB ring barking is likely to encourage regeneration from the stump (see 6C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Enhance or maintain upland scrub:**	
En/M	A	It is not necessarily desirable to exclude browsers – dense thickets are of limited value to invertebrates and epiphytes. Encourage natural regeneration by reducing livestock numbers, and keeping an open structure to the stand.	5.8.4
En/M	B	If there is a need to carryout work, take account of the epiphyte interests that rely on ecological continuity. Do not coppice all stools (or stems), but leave some to mature on a long rotation. This helps maintain the age diversity, offers shelter and long-term sustainability to the interest as well as the nut crop.	5.8.5

Examples of management techniques to implement example objectives: Cont...

	4	**Reduce from priority habitats using livestock**	
R	A	Browse the scrub using stocking regimes and breeds that preferentially take Hazel without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Browse in the spring to impact regeneration following cutting.	5.8.4
	5	**Reduce or eradicate from priority habitats manually or mechanically**	
E/Er	A	Hand pull or use weed pullers to clear young seedlings.	5.8.12/5.9.4.1
E/Er	B	Cut saplings/suckers with a spade, mattock or root cutting chain saw.	5.9.4.1/5.9.4.2
E/Er	C	Cut small-stemmed bushes using hand tools (billhook, loppers, bow saw, chain saw, clearing saw.	5.9.4.1/5.9.4.2
E/Er	D	Small stands of larger bushes can be cut with a chain saw or clearing saw.	5.9.4.2
E/Er	E	Winch stumps where a suitable anchor exists, or use a grinder for large stumps.	5.8.14/5.9.4.2
E/Er	F	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment where grazing is not possible. This can be achieved in small stands with pedestrian mowers/flails or in large stands with a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
E/Er	G	Large stands of mature scrub can be cleared using excavators or bulldozers that at the same time can also remove the accumulated nutrient-rich litter layer.	5.8.10 5.8.15/5.9.2
	6	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Hazel as at July 2003

Hazel does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven, English Nature, Foxhold House, Crookham Common, Thatcham, Berks RG19 8EL, tel 01635 268881
  e-mail graham.steven@english-nature.org.uk

- Catherington Lith,
  Contact: Martin Healey East Hampshire District Council, Penns Place, Petersfield. GU31 4EX
  tel: 01730 234386 e-mail: Martin_Healey@easthants.gov.uk

- Cumbria.
  Contact: Ian Taylor, Conservation Officer, English Nature, tel: 01539 792800,
  e-mail: ian.taylor@english-nature.org.uk

- Derbyshire Dales (Cressbrookdale NNR)
  Contact: English Nature
  Endcliffe, Deepdale Business Park, Bakewell DE45 1GT
  tel: 01629 816640

- Forest Enterprise
  Contact: Fort Augustus Forest District,
  Strathoich, Fort Augustus, PH32 4BT tel: 01320 366 322

- Forest Enterprise
  Contact: Mill Park Road, Oban, Argyll, PA34 4NH.
  tel: 01631 566155

- Hunthouse Wood
  Contact: Helen Woodman,
  Worcestershire Wildlife Trust
  tel: 01905 754919,
  e-mail: helen@worcswt.cix.co.uk

- Hutton Roof Crags, Cumbria
  Contact: Kerry Milligan, Cumbria Wildlife Trust
  e-mail: kerrym@cumbriawilldifetrust.org.uk

- Nottinghamshire Wildlife Trust (various reserves),
  Contact: Jeremy Fraser, The Old Ragged School, Brook Street, Nottingham, NG1 1EA.
  tel: 0115-958-8242, e-mail: jfraser@nottswt.cix.co.uk

Further reading

Coppins, A., Coppins, B., Quelch, P., (2002), *Atlantic Hazel woods, some observations on the ecology of this neglected habitat from a lichenological perspective,* British Wildlife, 14 (1) pp 17-26

4.4.25 Holly, *Ilex aquifolium*

Summary
Holly is a widespread hardy evergreen. It occurs in a wide range of habitats but is found especially as a component of the mixed calcareous scrub community.

Holly scrub is less common as a single species stand. It is most often maintained as a component of mixed scrub communities. It requires reduction where it encroaches into priority habitats.

The spiny leaves make it less palatable to livestock, though cut branches traditionally used as browse, giving rise to pollarded hollies in some parts of the country. It is more likely to be targeted in winter or following cutting, when young succulent shoots will be softer. Various mechanical methods can also be used to diversify and maintain the stands.

Distribution and status
Holly is a hardy native and can be found on most soils, except the wettest, up to an altitude of 550 m. It occurs throughout Britain except the far north of Scotland, growing as scrub in woods, hedges and even on rocks. It is often found as a component of the mixed calcareous scrub communities, often at low frequency. It can be invasive in some woods.

Identification
Max height: 3–10 m; Flower: May–Aug;
Fruit: Sep; Ripen: Oct–Dec.

Holly is a small evergreen shrub or tree, which in cultivation can reach heights exceeding 10 m. It has smooth grey-brown bark and green stems, along which grow dark, shiny green, leathery leaves. They are oval with wavy edges and large spines.

The small white flowers grow from the leaf axils and develop into bright red berries.

Growth characteristics
- Berries germinate well in bare soil.
- Seedlings susceptible to uprooting in first year or two.
- Seedlings grow slowly for first few years.

Holly under beech trees, Ebernoe Common NNR.
Paul Glendell/English Nature

- Shoots from surface roots and suckers.
- Regenerates strongly from cut branches and stumps.

Palatability
- Not especially palatable and only partially impacted by browsing from hardier breeds.
- Especially important as a winter source of food for ponies and cattle in the New Forest.
- Younger shoots are most vulnerable, when other species are not available, particularly in winter.
- Bark may be palatable to ponies and sheep in winter, but recovery can occur.

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 36 species have been recorded feeding.
- 2 species exclusively.
- 1 RDB species.
- A food plant of the Holly Blue butterfly.

Birds:
- Autumn food for thrushes.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En/M	A	To encourage bushy growth and fruiting use low intensity summer browsing. Bark stripping may initiate fruiting followed by standing dead wood.	5.8.4/5.8.8
En/M	B	Cattle and ponies will trample routes through stands leading to the formation of natural gaps and glades. Prevent trampling when trying to encourage spread of stands.	5.8.4/5.8.8
En	C	Encourage seed germination using low to moderate levels of grazing to open the sward by targeting more succulent competitor species. After germination reduce or remove livestock in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.1/5.8.3 5.8.4
M	D	Moderate to heavy browsing may create a browse line opening the structure of older established scrub and reducing its value for wildlife, though epiphytes can fair better in open stands. Avoid browsing when young growth is available and in winter when little or no other browse is available.	5.8.4
En	E	Allow natural expansion of stands where needed by protecting from browsing and trampling.	5.8.4
M	F	Maintain open areas within the scrub using stocking regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En	A	Create seedbeds near existing stands by scarifying the ground in late summer.	5.8.1
En/M	B	To maintain age and structure diversity divide large stands into small, sinuous edged coups and cut on a rotation. Maintain small isolated stands as a single unit. Take into account the extent of Holly within the stand, ensure diversity of age and structure is maintained and not all plants are coppiced at the same time.	5.8.5/5.8.8 5.8.13
En/M	C	To replicate natural dynamic processes clear some stands (unless they are good for epiphytes) and allow others to establish elsewhere. Maintain desired extent across the site.	5.8.5/5.8.13
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. Consider augmenting this by ring barking selected bushes to prevent them developing into trees. NB: ring barking is likely to encourage regeneration from the stump (see 6C below).	5.8.9
M	E	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Maintain and enhance or increase extent of upland stands:**	
En/M	A	Encourage natural regeneration and where necessary propagate and plant out seedlings or cuttings and protect from browsing where vulnerable.	5.8.1/5.8.2 5.8.3

Examples of management techniques to implement example objectives: cont...
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
En/M	B	Browse damage and loss of saplings are higher during winter when other herbs are un-available. Encourage natural regeneration by reducing livestock numbers and keeping an open structure to the stand.	5.8.3/5.8.4
En/M	C	Take account of the epiphyte interests that rely on ecological continuity. Refer to relevant upland species profiles (e.g.: Dwarf Birch, Rowan, etc) for more details on enhancing and maintaining upland scrub.	4.4.5/4.4.36
	4	**Reduce from priority habitats using livestock**	
R	A	Browse the scrub using stocking regimes and breeds that preferentially take Holly without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Browse during the winter or on young spring growth to impact regeneration following cutting.	5.8.4
	5	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use weed pullers to clear young seedlings.	5.8.12, 5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1 5.9.4.2
R/Er	C	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Winch stumps where a suitable anchor exists, or use a grinder for large stumps.	5.8.14 5.9.4.2
R/Er	F	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment where grazing is not possible. Depending on access, extent of stand and resource, this can be achieved with pedestrian or tractor mounted flail mowers or swipes.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
	6	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed-wipe or spray unwanted seedling or sapling (re-)growth in summer using an appropriate herbicide. Waxy leaf coating makes adhesion of herbicide difficult – consider appropriate adjuvant.	5.8.16 5.9.4.4
Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
Er	C	Prevent re-generation from stumps of ring barked stems (see 2D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

Herbicides that may be considered for use on Holly as at July 2003

Holly does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'. Herbicides may not be appropriate if enhancing or increasing extent of sensitive upland stands where Holly is a component species.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
Ammonium sulphamate	Forestry trees and shrubs; amenity grass, established grass.	Section 4.1.2: table 3 - target species and possible herbicides for their control. table 4 - key herbicides for use on nature conservation sites. Section 4.1.3: herbicide information summary sheets. Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites

- Epping Forest
  Contact: Corporation of London,
  The Warren, Loughton,
  IG10 4RW, tel: 0181 532 5313

- Esher Commons SSSI
  Contact: David Page (Countryside Estates Officer),
  Elmbridge Borough Council, Leisure & Cultural
  Services, Civic Centre, High Street, Esher, Surrey.
  KT10 9SD. tel: 01372 474565,
  e-mail: djp@elmbridge.gov.uk

- Hunthouse Wood
  Contact: Helen Woodman, Worcestershire Wildlife Trust
  tel:01905 754919, e-mail: helen@worcswt.cix.co.uk

- The New Forest,
  Contact: Forestry Commission, Queens House,
  Lyndhurst, Hampshire.

Further reading

See end of chapter

4.4.26 Honeysuckle, *Lonicera periclymenum*

Summary
Honeysuckle is widespread and favours moist heavy soils. It is an important component of mixed scrub communities and is maintained as part of that mosaic.

It will ramble over shrubs, and is liable to suppress regeneration of scrub and herbaceous flora. Where it does compromise interests of priority habitats, then management will be required.

Distribution and status
Honeysuckle is widespread throughout the British Isles and can be found as part of the scrub community, particularly on damper, heavier soils and at altitudes of up to 600 m.

Identification
Flowers: Jun–Jul; Fruits: Aug–Sep.

Honeysuckle has opposite leaves, which vary from oval to elliptical, grey-green in colour and sometimes downy.

The fragrant flowers grow in whorls at the terminal tips of stems. They are trumpet shaped, creamy-yellow on the inside and purplish-pink on the outside.

The berries are bright red and much favoured by birds.

Growth characteristics
- Shoots from surface roots, layered and cut stems.

Palatability
- Leaves heavily browsed by goats, Fallow Deer and in many situations sheep – though stems remain to shoot again.

- Seldom taken by cattle and rarely by equines (New Forest is an exception).

Value to wildlife
Is valuable to wildlife and provides winter cover/shelter, for example:
Invertebrates:
- 19 species recorded feeding.

- 10 species feeding exclusively.

Honeysuckle, Ham Street woods NNR.
Peter Wakely/English Nature

Birds:
- Fruits eaten by birds.

Mammals:
- Important for Dormice, uses bark for nest making.

Feedback needed: Help us to develop these profiles and Appendix 8.6 so we can update the future web-site version of this Handbook. Please use the feedback form.

Examples of management techniques to implement example objectives
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En/M	A	Intermittent browsing of the scrub edge in early spring where Honeysuckle is a component may encourage bushy growth and fruiting.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En/M	A	To encourage bushy growth and fruiting, lightly trim in spring. Where it is a component species manage within the rotation of the stand. Check for nesting birds and other fauna before carrying out work.	5.8.13 5.9.4.1 5.9.4.2
	B	Expand scrub edge by layering stems.	5.8.2
M	C	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock:**	
R	A	Browse back in spring using stocking rates and breeds that preferentially target Honeysuckle without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically:** Where Honeysuckle is likely to suppress ground flora or strangle regeneration, then:	
R/Er	A	Hand pull or use weed pullers to clear young seedlings.	5.8.12, 5.9.4.1
R/Er	B	Prevent re-growth by levering/digging out roots using hand tools (spade, mattock, billhook or root cutting chain saw).	5.9.4.1, 5.9.4.2
R/Er	C	Trim back small-stemmed plants with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Trim back small stands of larger plants using a chain saw or clearing saw. Re-growth will occur.	5.9.4.2
R/Er	E	Trim back using hedge trimmers or for large areas, use a tractor arm-mounted flail/cutter.	5.8.13/5.9.4.1 5.9.4.2, 5.9.4.3
	5	**Eradicate re-growth or treat stumps using herbicide**	
Er	A	Weed-wipe or spray in spring and summer, using an appropriate herbicide.	5.8.16/5.9.2 5.9.4.4

Herbicides that may be considered for use on Honeysuckle as at July 2003
Honeysuckle does not normally get mentioned as a species on product labels. If not then it falls within the general classification of a 'woody weed'.

Note: Prior to using any herbicide land managers must comply with all legal requirements. Section 1, 2 and 3 of 'The Herbicide Handbook' (HH) provides a summary. Figure 1, at the very beginning of the HH also provides a 'Decision tree' to help you make the best choice of herbicide for your situation whilst minimising harmful environmental effects.

Herbicide (active ingredient name)	**Relevant situations for various named products**	**HH Section**
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2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	
2,4-D + dicamba + triclopyr	Established grassland, forestry, non-crop areas.	
Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	
Glyphosate	Amenity grass & vegetation; forestry; conifers; non-crop areas; fence lines; road verges.	
Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	
Picloram	Non-crop grass; non-crop areas.	
Triclopyr	Established grassland; non-crop areas; forestry.	

* Approvals for sale/supply of products containing these herbicides are to be revoked 25 07 03 and must be used by 31 12 03.

Key sites
- Hunthouse Wood
  Contact: Helen Woodman,
  Worcestershire Wildlife Trust
  tel:01905 754919, e-mail: helen@worcswt.cix.co.uk

•... (More site examples please.)

Further reading
See end of chapter