

# 5 Management

## 5.1 Review of the literature on management of scrub

### 5.1.1 Overview

There are very few publications on scrub management in the open literature, but a great deal of unpublished information resides in unpublished sources. Many of these are available in the libraries of the country agencies and non-governmental organisations, including The National Trust, The National Trust for Scotland, local Wildlife trusts, The British Trust for Ornithology, The Royal Society for the Protection of Birds, and Highland Birchwoods.

The best available source of integrated current information on lowland scrub management in England is the 2<sup>nd</sup> edition of *The Lowland Grassland Management Handbook* (Crofts & Jefferson 1999). This gives information on the general principles which should be applied to determining when and where scrub is likely to be beneficial or a nuisance, taking into account the quality of the site without scrub and the value of the scrub for landscape and wildlife conservation. It provides guidance on prioritising areas for management and suggests management options for scrub eradication or reduction, maintenance and enhancement. This is followed by advice on the use of appropriate techniques to achieve the desired management objectives, including descriptions of their utility in particular circumstances. There is a bibliography that covers most of the relevant literature sources.

Limited information specifically relating to the management of scrub (mainly willow) on wet grassland sites is contained in, *The Wet Grassland Guide* (Treweek *et al.* 1997). There is less emphasis here on the beneficial contributions scrub can make to landscape and wildlife conservation, more attention being given to the need to control scrub. A case study describes the control of willow scrub on the RSPB Insh Marshes reserve in Inverness-shire involving scrub cutting by hand and chainsaw followed by stump treatment to prevent regrowth.

There is no guidance currently available on management of upland scrub in England and Wales comparable to that contained in Crofts & Jefferson (1999), but two reports (Hester 1995, Gilbert *et al.* 1997) provide a great deal of information on the management of montane scrub in Scotland. After describing the present distributions of the principal scrub types in the Scottish Highlands and their value for wildlife conservation, Hester (1995) concentrates on the encouragement of scarce scrub communities through the control of browsing (mainly by deer) and grazing and the planting or sowing of seed of key woody species. She acknowledges the need to manage scrub enhancement in such a way as to retain adequate open ground, recommending regular burning and controlled grazing, but emphasises that the need for scrub control is rare in the uplands of Scotland.

Gilbert *et al.* (1997) report a major conference on the ecology and restoration of montane and subalpine scrub habitats in Scotland. Several contributors deal in detail with the restoration of particular scrub communities, including willow scrub at Ben Lawers and Caenlochan NNRs and high elevation pine scrub in the Cairngorms.

### 5.1.2 Identifying desirable and undesirable scrub

Before deciding whether or not scrub needs to be controlled or eradicated on a particular site, it is necessary to assess the

conservation value of the scrub habitat. Scrub of high conservation value will contain native shrub species appropriate to the area. In the case of scrub on lowland calcareous sites a wide range of shrub species will add to the conservation value but on less base-rich sites in the lowlands, and more generally in the uplands, one or perhaps a few shrub species will be all that can be expected. Structural complexity both within the body of the scrub itself and where it meets adjacent habitat is generally believed to enhance the nature conservation value of scrub. More structurally complex communities offer a wider range of niches for associated species. Evidence that a scrub habitat supports a wide range of rare or local plants and/or animals obviously confirms its wildlife conservation value. Hence wherever possible if the value of the scrub for these species is not known, survey and, where time allows, monitoring should be carried out before major intervention to eliminate scrub is planned.

Scrub of low conservation value will generally have few shrub species (but see comment above about Scotland) or lack species which are appropriate to the area, and may contain or be dominated by non-indigenous species. It will tend to be structurally simple with little variation in shrub density or height and with a uniform edge-area ratio, and hence minimum opportunity for the development of a range of edge habitats. In the case of lowland scrub it will tend to lack the tall herb and grass communities associated with the most valuable grassland/scrub habitat mosaics. It will attract few or no rare or local species of associated flora and fauna.

In practice most scrub will fall between these two extremes, or parts of it will fall into one category and parts into the other. Also lowland juniper or box, or treeline pine or birch scrub in Scotland, while relatively species poor compared with some other types are nevertheless highly valuable for nature conservation.

### 5.1.3 Prioritising areas for management

Areas where scrub is rapidly invading valued habitat (Hurford 1993, Russell *et al.* 1993, Ball 1994) are obviously prime candidates for control or whole or partial eradication. At the other end of the spectrum are areas where scrub would make a valuable contribution to nature conservation but from which it is currently absent or present in insufficient amount or condition to do so. Both are instances of situations demanding high priority for management, but with very different objectives, emphasising the need to approach scrub management with an open mind. In many situations there will be no need for immediate action because scrub is present in acceptable amounts and condition, but there may be a need for prioritisation of management on a medium- to long-term basis to ensure that the scrub does not become a nuisance or lose its value because of loss of structural diversity with the passage of time. It is easier and more effective to maintain scrub in 'good' condition with frequent intervention than to try and revitalise it. Scrub which has been mature for many years tends to develop a very dense, even canopy which excludes light, precluding the development of ground flora and associated fauna. It also causes soil eutrophication, especially nitrogen and phosphorus enrichment, as shown by Hodgkin (1984) with hawthorn *Crataegus monogyna* scrub invasion of the dune system at Newborough Warren on Anglesey. It is likely to be difficult and costly to reverse such eutrophication in the event that it is desired to return the land to other low fertility habitats

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In the uplands of England and Wales there is little scrub management of any kind, so prioritisation does not currently arise. However, there are good opportunities to promote scrub as part of the drive to increase the naturalness of plantation forests. Over substantial areas of land where timber production is currently uneconomic and likely to remain so there may be opportunities to include scrub as a major element in areas cleared of conifers at the end of the current rotation. In many of these areas scrub development may take place slowly in the absence of intervention because of absence of nearby seed sources. On the other hand, it may be difficult to control scrub development in such areas where seed sources are available.

In Scotland extensive investigations have been made recently into the distribution of desirable montane scrub and of management priorities for its protection and enhancement (MacKenzie, in prep). Plans are also underway or in hand to conserve and develop scrub both on some of the best known sites and more generally (Quelch 1997, Gilbert 1997). The Forestry Commission in Scotland is promoting scrub in appropriate locations as part of its native woodlands policy while the Millennium Forest for Scotland project has a montane shrub project.

### **5.1.4 Management options and methods**

Having prioritised area for scrub management there may be a range of options for management and a range of methods for achieving objectives once options have been decided. Decisions whether to eradicate troublesome scrub may be influenced by the size of the problem and the costs of addressing it. Opportunities to create or enhance scrub may be acted upon or delayed depending on other priorities. If a decision is made to act in either case it is essential that the means and costs of doing so, including follow-up treatment, are carefully estimated. It is best to be pessimistic since both scrub control and (surprisingly) scrub creation and enhancement usually take longer and cost more than expected. It is worth noting also that techniques are being constantly invented or improved and that it pays to ask around before adopting a plan of action. This is not an appropriate place to go into the plethora of methods and machinery used for scrub control and eradication but there is need for this information to be brought together in one publication/web page which is regularly updated and made available to all scrub management

practitioners. Many of the techniques in use around the country are described in some detail by respondents to the survey questionnaire listed in appendices 5.3-5.5.

Having said this, scrub control as practised by most scrub managers or contractors comes down to three main procedures:

1. Cutting followed by either chipping, burning on site or removal of the debris (see Ward 1990 for a description of methods used on calcareous grassland sites);
2. Grazing to control scrub encroachment or regrowth following cutting (Large & King 1978);
3. Herbicide treatment either to kill the bushes (rare) or to control regrowth from cut stumps (see Marrs 1985 for a discussion of scrub control experiments on lowland heathland).

Refinements to physical methods include stump grinding or removal to obviate the need for herbicide treatment. On stoneless soils a root-cutting chainshaw has been used successfully to enable removal of stumps. Grazing, while usually by sheep and/or cattle may involve horses or goats and, in Scotland, deer. A novel approach with herbicides involves injection to kill the bushes but leave them as deadwood habitat. Weed wipers have been used successfully to control birch scrub development on wetland sites. Many of these techniques are described and discussed in Gough & Fuller (1998).

Where it is desirable to create or enhance existing scrub it may be sufficient merely to fence off areas from grazing and/or browsing animals. This is being done on a substantial scale in Scotland to encourage development of treeline birch and pine scrub and extension of willow scrub from its currently restricted habitats on and among rocks (Mardon 1997, French *et al.* 1997). This technique has also been used for protection and enhancement of juniper scrub (Barrett 1997) but in many instances where seed production is low or absent or seed predation is high (Ward 1989) it may be necessary to grow on young plants from seed or cuttings and plant them into gaps (Barrett 1997)

Management techniques for conservation of specific groups of organisms (plants, invertebrates, birds etc.) and individual species associated with scrub are described in chapters 3 and 4 of this report.

## 5.2 Funding available for scrub management

Farming has a fundamental influence on the ecology and appearance of the landscape. Agri-environment schemes form a package of measures that are a major source of funding for the conservation and enhancement of the rural environment. Prescriptions funded within these schemes thus have a potentially major impact on the future of the British landscape. The most widely used agri-environment schemes in England of relevance to scrub management are the Countryside Stewardship (CS) and Environmentally Sensitive Area (ESA) schemes. In Scotland, the Countryside Premium (CP) and Environmentally Sensitive Area (ESA) schemes provide a similar dual approach. The CP, ESA and Organic Aid schemes are due to be replaced in Scotland by the Rural Stewardship scheme in Spring 2001. No other information is available. Tir Gofal is currently taking its first round of applications.

The contrasting emphases placed on scrub management in England, Scotland and Wales by the agri-environment schemes described below (i.e. clearance *versus* conservation/enhancement) reflect primarily the distribution of upland areas in Britain. Scrub in upland areas is frequently climax vegetation of high conservation value, whilst scrub in lowland areas is usually seral, highly invasive, and requires control (Chapters 2, 3 and 4).

The information below is taken from guidelines available to farmers and land managers applying for agri-environment schemes. This approach may however underestimate the commitment to scrub conservation of funding organisations. For example, the Blackdown Hills ESA Environmental Guidelines (ADAS 1995a) includes willow carr as a typical land cover in water logged areas, and describes scrub confined to the higher, wet slopes as adding to the mosaic of vegetation. The Somerset Levels ESA Environmental Guidelines (ADAS 1995b) also mentions traditional 'shelters' of hawthorn, willow scrub and alder carr providing valuable nesting and feeding areas for non-wading birds, invertebrates and other animals, although there is no specific mention of scrub or carr in the Guidelines for Farmers (MAFF 1997a).

### 5.2.1 Overview

#### 5.2.1.1 Countryside Stewardship scheme

The need for scrub control to avoid encroachment on to other habitats is highlighted by the Countryside Stewardship (CS) scheme in relation to chalk and limestone grassland, old meadows and pastures and lowland heath landscape types (MAFF 1999b). All applicants are required to draw up a scrub management plan, which should aim to maintain a balance between scrub and open land, taking into account landscape, wildlife, and archaeological considerations. Large-scale clearance other than on sites of archaeological interest (e.g. hill-forts) is discouraged. Payments for scrub clearance are made under Capital Items, i.e. are one-off payments. In addition there is a base payment, which is available to all farmers or land managers claiming for capital payments for scrub clearance, to assist with implementing work on a small area. A supplement for follow-up treatment is also available.

**Table 5.1** Payments for scrub clearance through capital works (Countryside Stewardship scheme 1999).

Item	Code	Payment
Scrub clearance	SS	£50/ha
<25% ground cover	SA	£100/ha
25-75% ground cover	SB	£250/ha

>75% ground cover	SC	£500/ha
Scrub control supplement	SD	£40/ha

Higher payments per hectare for areas of high percentage ground cover (cf. ESA scheme, which uses density) reflect the higher costs of clearance, rather than an incentive to clear more dense areas of scrub. The likelihood of funding will depend on the key stewardship objectives within the Target Areas promoted.

Enhancement of species composition of scrub is not an option available within CS (cf. for example grassland enhancement supplement GX). However, Capital Item funding for small-scale tree planting and management (TSP, TR, TT in CS) also includes shrubs often found in species-rich scrub.

Carr ('a marshy copse, especially of alder or willow') is considered separately from scrub (MAFF 1999a, individual Natural Area target notes), and is the only type of scrub that qualifies for annual management payments. Payments are available for managing fens, reedbeds and carrs (Code F), although guidance for management of existing carr, as separate from reedbeds or fens, is not specified. Supplementary payments are available for a maximum of five years for initial measures to establish willow or alder carr (Code FX).

#### 5.2.1.2 Environmentally Sensitive Area (ESA) scheme

##### England

Unlike the CS scheme, there are no clearly stated scheme-wide aims for scrub management (MAFF 1998b). Management aims and attitudes towards scrub vary between ESAs, and are dealt with within the individual Guidelines for Farmers available for each ESA. In common with the CS scheme, the emphasis is on scrub management and control. Detailed Environmental Guidelines are available to ESA Project Officers, and are used to provide a basis for an integrated environmental approach within each ESA (e.g. ADAS 1995a,b), but these guidelines are not widely available.

Payments for scrub control or management are made through the Conservation Plan, which funds one-off capital works to enhance the character of the landscape, wildlife habitats and protect historical features (MAFF 1998a). Payments are standard across England, and are made at the same rates as those of the CS scheme.

**Table 5.2** Payments for scrub clearance through capital works (Environmentally Sensitive Area scheme, 1999).

Item	Payment
Management of scrub	
<25% ground cover	£100/ha
25-75% ground cover	£250/ha
>75% ground cover	£500/ha

A single payment of £50 (estimated 80% of total cost) is additionally available through the Conservation Plan in some ESAs for management of scrub on small free-standing features of archaeological interest (e.g. in the Broads ESA).

Neither willow nor alder carr is mentioned in management prescriptions listed for any of the English ESAs, although carr is reported as "contributing to the varied lowland of high value in the landscape" of the Avon and Test Valley ESAs (MAFF 1998b). Carr is not included in descriptions of fenland.

##### Scotland

Upland habitats constitute a major part of all of the 10 Scottish Environmentally Sensitive Areas. Scrub is mentioned in the

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Appendix (equivalent to Guidelines for Farmers in England) of each of the Scottish ESAs (not the Scottish ESA explanatory booklet (Scottish Office 1999a)). Scrub is defined in most Appendices as 'low growing woody vegetation'. The Cairngorms Straths ESA scheme booklet uses a fuller definition: 'low growing woody vegetation of small trees and shrubs including linear scrub along field margins containing dog rose, gorse, broom, blackthorn, etc.'. Neither Countryside Stewardship nor English Environmentally Sensitive Area schemes define scrub, although species composition is mentioned in the introductory passages of several ESA booklets.

The emphasis in Scottish ESAs is very much on avoiding damage to scrub (e.g. Argyll Islands Tiers 1 and 2 (Scottish Office 1999b)) rather than clearance. However, the removal of scrub from features or areas of historic or archaeological interest, and implementation of a grazing plan to prevent recolonisation, is encouraged. The removal of rhododendron *Rhododendron ponticum* scrub is also funded by the ESA scheme in the Loch Lomond and Breadalbane areas. Most payments relate to scrub management rather than control or clearance, and are paid annually (in contrast to English ESA schemes) (but see also Tir Gofal).

Applicants are required to implement a grazing plan that includes measures to conserve, enhance or extend areas of shrubs. This is a mandatory requirement of joining the ESA scheme in Scotland.

Tier 1 (mandatory) payments for all land, inbye, or rough grazing require avoidance of damage to scrub. Scrub management is funded through Tier 2 (mandatory) payments for woodland, wetland and grassland management (£80/ha/year; £100/ha/year in Stewartry and Cairngorms Straths). In contrast to both English ESA schemes and Tir Gofal, none of the Scottish ESA schemes include scrub control or clearance, other than *Rhododendron*, under Capital Items. *Rhododendron* control is funded at £200/ha (for a maximum of 5 years). Four of the 10 ESA Appendix leaflets also suggest Woodland Grant Schemes as an alternative to ESA woodland payments, plus a payment of £20/ha (paid through the ESA scheme) for the exclusion of stock (e.g. Scottish Office 1999b) (see also Tir Gofal).

### 5.2.1.3 Tir Gofal

Tir Gofal replaces and combines Tir Cymen and ESA schemes in Wales. The scheme considers scrub as a habitat in its own right (see also Countryside Premium Scheme), and requires scrub management as a condition of entering the scheme (CCW 1999). Tir Gofal promotes management of dense blocks of scrub to provide a series of uneven aged patches of shrubs interspersed with small areas of open grassland (CCW 1999). The scheme offers both single payments for scrub clearance (e.g. CS and ESA (England) schemes) but also payments for annual management (Table 4.3). The lack of provision for annual, follow-on management of scrub, is viewed as a significant problem in CS and English ESA schemes, despite the additional Control supplement available within CS (section 6.2.1.3). Cessation of grazing is generally encouraged, as reflected by the substantially higher payment rates for ungrazed woodland (ungrazed: £125/ha/year v. existing grazing: 10/ha/year, Table 5.3) and funded according to the type of underlying grassland.

Capital works payments for scrub clearance by hand (£500/ha) are equivalent to those paid for clearance of dense scrub (>75% cover) by CS and ESA schemes in England. Lower rates for clearance by machine are a novel feature of Tir Gofal.

Part 1 (Mandatory)	Broad-leaved woodland	Ungrazed	£125
"	"	Lightly grazed	£95
"	"	Existing grazing	£10
"	Scrub		£30
Part 2 (Optional)	Creation of broadleaf woodland and scrub	Establishment (<0.25ha)	£1600 single payment
"	"	Annual management	£140
Capital works	Habitat management, restoration and creation	<i>Rhododendron</i> control (outside woodlands)	£1,500/single payment
	"	Scrub clearance by machine	£150
	"	Scrub clearance by hand	£500

The Tir Gofal scheme funds creation and subsequent annual management of small areas of scrub (<0.25ha), reflecting the value placed on scrub in Wales as a habitat in its own right. Of the other agri-environment schemes, only the Countryside Stewardship scheme funds scrub creation (carr only).

Because management prescriptions relating to scrub are contained in Part 1 (mandatory prescriptions) of Tir Gofal guidelines (farmers handbook), and there are no additional regional guidelines (cf. ESA, CS schemes), there is no apparent divide between management viewed as suitable for lowland or upland scrub.

**Table 5.3** Payment rates for land management under Tir Gofal (CCW 1999).

Part	Habitat or task	Management	Payment (/ha/yr)
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### 5.2.1.4 Countryside Premium Scheme

The Countryside Premium (CP) Scheme operates alongside the Environmentally Sensitive Area scheme in Scotland. In common with Tir Gofal and Scottish ESA schemes, the emphasis of the CP scheme is on increasing the extent, and enhancing the condition, of existing scrub. Annual management payments of £55/ha/year are available for grazed land with suppressed scrub. The General Environmental Conditions (conditions of good agricultural and environmental practice applying to all agreement land) specify that scrub must not be removed from agreement land (Appendix 2, Scottish Office 1999c). However, natural regeneration of trees within 20 metres of ancient monuments should not be encouraged. Management of a site of archaeological or historic interest (including scrub management) is funded at £80 per 0.25 ha, up to 1.5 ha, and £20 per 0.25 ha thereafter. In common with Tir Gofal, CP does not include scrub clearance or management under Capital Items.

Countryside Premium Scheme is unique amongst British agri-environment regulations in funding scrub management on flood plains (£25/ha/year), but does not mention carr habitat.

## 5.2.2 Regional variation

### 5.2.2.1 Countryside Stewardship scheme

#### Lowland England

Countryside Stewardship Target Areas in England encompass much of the geographical range outside of the ESAs. Almost all Target Notes covered by the Countryside Stewardship scheme mention scrub (Appendix 5.1). Although the CS Information Pack (MAFF 1999a) refers to the need to maintain a balance between scrub and open land, most management prescriptions advocate scrub clearance in order to restore or maintain other more valuable habitats such as heathland or chalk grassland. This trend is apparent throughout England.

The importance of maintaining scrub in a mosaic with other habitats is noted for the Morecambe Bay Limestones in Cumbria and Lancashire, which are identified as supporting scrub of high conservation value (Hopkins 1996). This is not apparent for other areas that Hopkins highlights as important, for example target notes for the Chilterns (Bedfordshire, Berkshire, Buckinghamshire and Oxfordshire) do not refer to the national importance of the scrub communities found in these areas. The conservation value of structure is noted at both the woodland edge (Teme Valley, Worcester) and within scrub stands (Surrey and London North Downs). Removal of exotics is mentioned for a single Target Area (New Forest Heritage Area, Hampshire) which includes clearance of rhododendron scrub in management prescriptions.

Enhancement or re-establishment of alder carr is identified as important in several target areas (Derbyshire, Hartlepool, Hertfordshire, Durham and Yorkshire Dales National Park), and is mentioned as a distinctive landscape feature of the river valleys of Berkshire. The role of scrub as bankside cover for otters is highlighted, and scrub regeneration promoted, in the Tees Lowland (North Yorkshire). Other Target Notes refer to bankside vegetation for otters, but do not specify scrub (e.g. culm grassland in Devon, Severn and Avon Vale in Warwickshire and West Midlands). Only the North Somerset Levels and Moors (Somerset) encourages the removal of scrub hedges along ditches, to improve the aquatic habitat.

#### Upland England

A single Target Area (South West Peak, Derbyshire) gives conservation management of existing scrub as a key stewardship objective (cf. Tir Gofal, Scottish ESAs). This area is also unusual in that target notes detail species composition of scrub (gorse/hawthorn) (South West Peak, Derbyshire and

Staffordshire). The only other area where species composition is listed is the North Pennines, where a reduction of grazing in juniper woods on moorland is encouraged. Countryside Stewardship puts less emphasis on scrub clearance in upland than in lowland areas, but preventing scrub from encroaching on to other valued habitats is still a priority.

### 5.2.2.2 Environmentally Sensitive Area scheme

Scrub is mentioned in the Guidelines for Farmers booklets of 21 of the 22 English ESAs, almost exclusively in the context of scrub management and control (Appendix 5.2). In contrast, Appendix 1 of all of the 10 Scottish ESAs require applicants to conserve and enhance existing scrub, and do not fund scrub clearance.

#### Lowland England

Scrub is highlighted as an ecologically important habitat within several lowland Environmentally Sensitive Areas, for example its role as a source of cover and food for birds is mentioned in the Cotswolds, South Downs and South Wessex Downs Guidelines for Farmers (MAFF 1999c, MAFF 1997a, MAFF 1998c). Scrub in the southern Cotswolds is also noted as a habitat of high conservation value (Hopkins 1996).

The potential of scrub to encroach on to, and diminish the value of, other more valuable habitats is also recognised in these and many other ESAs, and reflected in the requirement to agree scrub control programmes within the first year of the agreement. Only the Breckland ESA's Guidelines for Farmers does not temper positive statements about the value of scrub with provisos warning of potential for encroachment and spread. The importance of scrub in wetland habitats is mentioned in relation to only three English ESAs: the Test and Avon Valleys ESAs, which recognise the contribution of scrub and willow carr to creating a varied lowland landscape of high value, and the Breckland ESA, which aims to maintain a mosaic of habitats within the river valley grasslands.

#### Upland England

Five of the Guidelines for farmers of English ESAs containing upland areas cover scrub management (Appendix 5.2). Although scrub control (management) is funded in these areas, the beneficial value of scrub is also mentioned in three of these (Dartmoor, Exmoor and the Lake District), reflecting the higher value of scrub in upland habitats (see also Scotland, below). Scrub management on Exmoor requires the Ministry's written prior approval. Scrub management in the North Peak and Shropshire Hills ESAs is mentioned in relation to moorland management only, reflecting the scarcity of scrub in these areas.

#### Scotland

Standard requirements relevant to scrub management (Tier 1) (i.e. basic standards of environmental management), and other management measures and works (Tier 2) (i.e. for the enhancement of habitats and features of conservation interest), show little regional variation between Scottish ESAs (Appendix 5.2). Only the Shetland ESA Appendix does not include the requirement to conserve, enhance or *extend* areas of shrubs. Removal of scrub without authorisation is specified as unacceptable within the Appendix leaflet of Loch Lomond, Breadalbane, Western Southern Uplands and Central Southern Uplands ESAs. Management of wetlands is mandatory within Breadalbane and Cairngorms Straths ESAs, and implementation of a grazing plan to conserve, enhance or extend areas of wetland is required. Herbicide application is not permitted in ESAs, with the exception of *Rhododendron* control in the Argyll Islands.

### 5.2.2.3 Tir Gofal

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No regional variation in scheme targeting is used when assessing applications for Tir Gofal funding (in contrast to ESA and CS schemes). Uptake figures from the first year might be useful to identify regional variation in distribution of scrub and wet woodland (which includes alder and willow), as management of these habitats is mandatory under Tir Gofal, but these data are not currently available (Ruth Taylor, pers. comm.).

### ***5.2.2.4 Countryside Premium Scheme***

Local conservation priorities were initially used to judge the suitability of applications for funding within the Countryside Premium Scheme (cf. CS and ESA schemes). However, this approach has recently been replaced by a ranking system. Applicants answer a series of questions relating to site designations, proposed management for species and habitats of high conservation value, ongoing agri-environment schemes, etc.. Entry into the scheme is based on a comparison between application points and acceptance thresholds.

Ranking is used to decide entry into other agri-environment schemes (e.g. CS), but the decision-making processes are not in the public domain.

## **5.2.3 Other grants relevant to scrub conservation**

### ***5.2.3.1 Woodland Grant Scheme***

The Woodland Grant Scheme, administered by the Forestry Commission, pays grants to create new woodlands and to encourage the good management and regeneration of existing woodlands in Britain (Forestry Commission Aug 99). Grants for new woodlands include the option to plant tall woody shrubs (up to a limit of 10% of the application area) such as hazel, buckthorn or juniper, as long as they fit in with the woodland and ecology

of the area. Grants to enhance the value of existing woodland for conservation are covered by the Woodland Improvement Grant, Project three - Woodland Biodiversity, which provides a single payment to assist woodland owners to manage their woods in ways which will implement forestry aspects of the UK Biodiversity Action Plan (Anon 1995).

### ***5.2.3.2 Farm Woodland Premium Scheme***

Land eligible for the Arable Area Payments Scheme, or that has been in agricultural use for three years prior to application, and which fulfils the requirements of the Woodland Grant Scheme, may also be eligible for the Farm Woodland Premium Scheme (MAFF 1997c). This scheme offers annual payments to compensate for agricultural income foregone.

### ***5.2.3.3 Wildlife Enhancement Scheme***

English Nature's Wildlife Enhancement Scheme is used by some site managers to fund scrub clearance on SSSIs in England, for example where scrub is encroaching onto areas of chalk grassland. Management of scrub of high conservation value, or enhancement of existing scrub, is not an option within this scheme. Applications are dealt with on an individual merit basis, rather than measured against a set of published criteria (William Du Croz, pers. comm.).

### ***5.2.3.4 Scottish Natural Heritage grants***

Grants are available to land managers, farmers and crofters through Scottish Natural Heritage, for nature conservation and enhancement or creation of habitats. There is no equivalent of EN's Wildlife Enhancement Scheme in Scotland. Applications for funding are dealt with by SNH at a local level, although a more unified approach is being developed.

## 5.3 Survey of scrub managers

The information presented here comprises some information from the literature and from unpublished sources but mostly views and comments extracted from replies to the questionnaire circulated to land managers (Appendices 5.3 - 5.6). Where the replies from Scotland differed appreciably from those in England and Wales the fact is noted. The contributions of questionnaire correspondents are presented anonymously in single quotation marks. Where necessary for clarity geographical locations to which comments refer are given. It should be borne in mind that while responses were sought and obtained from all regions throughout the UK, they are biased somewhat towards the south-east of England since there were more people involved in scrub management in that region. It should be noted that whereas in the south of Britain, especially in the lowlands scrub communities are generally seral, in the uplands, and especially in Scotland, coastal and montane scrub communities are often climax communities maintained by climate and/or isolation from sources of seeds of forest trees. The coverage of the survey responses can be gauged by referring to the addresses of respondents given in Appendix 5.7.

### 5.3.1 Conservation and enhancement of desirable scrub habitats

#### 5.3.1.1 Deciding habitat and species priorities

Scrub can be 'desirable' for a number of reasons. A few questionnaire correspondents considered it to be important for wildlife in urban areas in which there are often few locations that contain semi-natural habitats. Many felt that scrub provides essential conditions for rare communities and/or red data book species. For example, one correspondent commented that, 'scrub supports important species (black hairstreak *Strymonidia pruni*, nightingale *Luscinia megarhynchos*/other warblers *Sylvidae*, Red Data Book invertebrates) also adds diversity to other habitats and enhances woodland/grassland transition zone' (see also Section 3.3). Scrub is also valued as wildlife corridors and for its landscape value, which can be very important in some localities. Some scrub types are considered to have intrinsic value. Juniper *Juniperus communis* scrub was mentioned most often in this connection, e.g. 'juniper scrub (is) a scarce habitat with interesting associated invertebrates', and, 'juniper scrub is important in own right (and is a BAP species)'.

In answer to the question 'is scrub a valued habitat in your area' only 3% replied 'no'. (Table 5.4).

**Table 5.4** Proportion of questionnaire correspondents in England and Wales who replied to the question, 'is scrub a valued habitat in your area?'.

Yes	89%
No	3%
Yes and no	8%

Correspondents can be roughly grouped according to the geographical locations of the sites that they manage as shown in Table 5.5.

**Table 5.5** Approximate geographical distribution of sites managed by questionnaire correspondents in England and Wales.

Geographical distribution	Number of correspondents
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Lowland	105
Lowland and upland	28
Upland	9
No address given	1

Taking these geographical distributions the responses of correspondents to the same question are given in Table 5.6.

**Table 5.6** Proportion of questionnaire correspondents in England and Wales managing sites who replied to the question, 'is scrub a valued habitat in your area'.

Geographical distribution	No	Yes	Yes and no
Lowland	5	92	8
Lowland and upland	0	26	2
Upland	0	8	1
No address given	0	1	0
Total	5	127	11

Therefore the view of correspondents throughout Great Britain is overwhelmingly that scrub is a valued habitat both in the uplands and the lowlands, but it can also be undesirable when encroaching on to other habitats (see Section 5.3.2.1). Decisions about the management of scrub must take into account the relative merits of both the scrub and any other communities involved. Some correspondents mentioned this, for example, 'We need a policy on scrub and need to bring scrub into SSSI selection guidelines in order that the relative values of scrub and other habitats can be properly assessed'. Habitat and species priorities may be different, not only for each site, but also for different areas within sites. The sorts of question to be answered for each parcel of land are:

- Is there a conflict between habitats?
- If so, which gets priority?
- If scrub has priority, for all or part of a site, is this for the scrub type (and/or its associated ground vegetation and/or fauna) or for a particular plant or animal species, or a combination of these factors?
- What are the conservation requirements of the scrub type, vegetation community, plant or animal species?
- How must the scrub be managed to meet these requirements?

A few scrub types (notably juniper scrub and coastal scrub dominated by pruniose species) are valued in their own right in England and Wales, and most scrub types are considered important in Scotland, at least in the uplands (see Section 3.2.1). Scrub is often more highly valued, however, for the communities it harbours. Many rare plants and animals are dependent upon or associated with scrub (see Section 3.2) and should be given high priority, but it also supports much common flora and fauna. Often adding to the biodiversity at the landscape as well as the individual site scale. Almost all correspondents commented on its importance for birds and invertebrates, particularly butterflies. Many birds use scrub as breeding and roosting sites, song posts, shelter for migrants and a food source. In addition to the rare/scarce species (see Section 3.3.3 and 4) there are several less scarce and commoner ones (see Box A). But if trends of the recent past continue today's common birds may become tomorrow's rarities. Management for the rarer species can also benefit the commoner ones. For example, one correspondent mentioned 'scrub valued in reed-beds for Cetti's warbler *Cettia cetti* also (provides) valuable habitat for reed warblers

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*Acrocephalus scirpaceus* and sedge warblers *Acrocephalus schoenobaenus*, for singing posts/feeding'.

### Box A Bird species commonly associated with scrub.

Linnet *Carduelis cannabina*  
 Reed bunting *Emberiza schoeniclus*  
 Grasshopper warbler *Locustella naevia*  
 Sedge warbler *Acrocephalus schoenobaenus*  
 Yellowhammer *Emberiza citrinella*  
 Song thrush *Turdus philomelos*  
 Reed warbler *Acrocephalus scirpaceus*  
 Common redpoll *Carduelis flammea*  
 Tree pipit *Anthus trivialis*  
 Common whitethroat *Sylvia communis*  
 Turtle dove *Streptopelia turtur*  
 Bullfinch *Pyrrhula pyrrhula*  
 Common stonechat *Saxicola torquata*  
 Common redstart *Phoenicurus phoenicurus*  
 Whinchat *Saxicola rubetra*  
 Blackcap *Sylvia atricapilla*  
 Garden warbler *Sylvia borin*  
 Long-eared Owl *Asio otus*

A wide range of invertebrates in disparate taxonomic groups is also favoured by scrub, including a number of Red Data Book species (see Section 3.2.4). However, respondents to the questionnaire appeared only (with rare exceptions) to be concerned about managing scrub as a habitat for butterflies. Species mentioned frequently in responses are listed in Box B.

### Box B Butterflies mentioned as receiving special attention when managing scrub.

Black hairstreak *Strymonidia pruni*  
 Brown hairstreak *Thecla betulae*  
 Pearl bordered fritillary *Boloria euphrosyne*  
 Dark green fritillary *Argynnis aglaja*  
 Small pearl bordered fritillary *Boloria selene*  
 Brimstone *Gonepteryx rhamni*  
 High brown fritillary *Argynnis adippe*  
 Small blue *Cupido minimus*  
 Green hairstreak *Callophrys rubi*  
 Ringlet *Adantopus hyperantus*  
 Gatekeeper (Hedge brown) *Pyronia tithonus*  
 White admiral *Ladoga camilla*  
 Purple hairstreak *Quercusia quercus*  
 Chequered skipper *Carterocephalus palaemon*  
 Wood white *Leptidea sinapis*

#### 5.3.1.2 Determining management requirements to achieve these objectives

Of those sites in England and Wales managed for conservation or enhancement of scrub about half had management specifically tailored to particular species, 30% for the habitat as a whole and 6% for a combination of these reasons (Table 5.7).

**Table 5.7** Proportions (%) of scrub sites managed by questionnaire correspondents in England and Wales for conservation of particular species, for the scrub habitat in general and for a combination of these objectives.

Managed for particular species	51%
Managed for scrub habitat	30%
Managed for both particular species and scrub habitat	6%

No answer

13%

In Scotland scrub is equally likely to be managed as a habitat (25%) as for particular species (27%). This indicates a higher perceived value of scrub habitats in their own right in Scotland.

Many managers feel that they need more information to plan and implement the most effective scrub management, e.g. 'we need to know what we want! i.e. what sort of scrub, where, what state we want (i.e. grazed, ungrazed, grazed sometimes). I guess also what sort of scrub is the most diverse? - grazed, ungrazed etc.'. Another correspondent asked, 'how do insects and birds use blocks of scrub, e.g. is it better to have large or small blocks. If they are coppiced, what time span should the cycle take. Is young scrub better than old?'. It seems that the needs of some species are fairly well known. This is reflected in the number of correspondents who mentioned management in hand for particular species, e.g. nightingale (17), Dartford warbler *Sylvia undata* (8), Duke of Burgundy *Hamearis lucina* (11), brown hairstreak *Thecla betula* (10) and Black hairstreak (7).

#### 5.3.1.3 Devising and implementing effective management requirements

*Techniques to maintain existing scrub, by arresting succession (see also Appendices 5.3 and 5.5)*

Most management by questionnaire correspondents to maintain existing scrub involved:

- cutting/burning to remove excess growth (i.e. where the scrub is becoming too dense, or progressing into woodland);
- burning or removing the cut material and grazing and/or the use of chemicals to control re-growth.

Coppicing was frequently used and even when a strict coppice cycle was not imposed, cutting was often rotational. For example, one correspondent mentioned, 'cyclical cutting on a small scale - I suppose every 15-20 years or so (though we are nowhere near achieving a cycle as yet)'. Another correspondent from South Wiltshire gave a detailed reply that provides a good example of the range of techniques employed: 'coppicing mature scrub in large blocks. Areas of typically 0.1 ha in a block cut on approximately 20 year rotation. Use of Hi-tip forage harvester to cut and remove cuttings in small gorse *Ulex* spp. to maintain gorse/grass habitat for dark green fritillary *Argynnis aglaja*. Cutting also used to maintain heath on chalk. Cut and treat stumps in small blocks in areas of scrub/grass mix to maintain the balance required, especially for Duke of Burgundy. Species not controlled by cut and treat, e.g. wild privet *Ligustrum vulgare* and gorse may be spot-sprayed with 'Garlon 2' in these situations. 'Swipe' - used to vary age structure in gorse - approx. 6 year rotation. Hedge - cut on a 3 year rotation in sections of 30 m (60 m uncut) either with a blade or flail'.

Some management is very focused and hence most likely to be successful provided it is based on sound knowledge of species conservation requirements, e.g. '1. Coppicing - clearfell in groups or along edges to renew succession, sometimes fenced to protect from Deer. 2. Layering - "hedge-laying" blocks or strips of scrub, esp. along edges. Creates 'instant' 5-year old scrub structures and avoids damage to black hairstreak eggs in winter'.

Prevention of re-growth by chemical treatment of stumps sometimes formed part of the management package e.g. 'rotational cutting, some stump treatment, foliar treatment, grazing'. Equally common was 'complete coppicing of existing scrub and allowing regeneration of cut stumps'. Thinning and/or coppicing was sometimes selective to remove particular trees (species or age classes). Removal of non-native tree and shrub species was also a commonly stated objective e.g. 'coppicing of native species, felling and poisoning of sycamore/cherry laurel *Acer pseudoplatanus/ Prunus laurocerasus* etc.'. Controlling grazing where possible is a commonly used tool in scrub

management. Reduction of grazing is sometimes needed to allow new scrub regeneration but in other situations increased grazing is required to keep regenerating scrub in check.

*Techniques to enhance existing scrub, by increasing diversity or increasing extent (see also Appendices 5.3 to 5.5)*

Here there are two different approaches depending on the state of the area to be enhanced/increased. If woody growth is already thick then cutting, thinning or coppicing are often used to enhance the quality of scrub habitat. On small sites these management practices are often done manually e.g. 'coppicing/glade management/ride management, by hand'. If the scrub is considered to be too open in structure the area may be fenced to exclude livestock and/or deer to allow re-growth of woody species. Sometimes scrub is established, or more often enhanced by planting. In such cases the ecological advantages of using local seed or vegetative propagules are widely understood.

A good example of the way various techniques are used to enhance scrub habitat is provided by the following questionnaire response: 'Edges are coppiced to create a transitional zone with tall herbs, bramble, etc.. This is further diversified by re-coppicing short stretches beginning after c.5 years re-growth. A similar effect has been obtained by allowing scrub to colonize neighbouring grassland edge, then coppicing short blocks'. Another correspondent referred to 'cyclical cutting to create mosaics of scrub of different ages. Exclosure to allow grassland to develop to scrub. Stump treatment (with 'Triclopyr') to create frilly edges, glades etc. in extensive blocks. Sheep grazing/cattle grazing to maintain mosaics'.

## 5.3.2 Control and removal of undesirable scrub

### 5.3.2.1 Identifying undesirable scrub

Situations where scrub could be considered a nuisance were reported by 87% of those questioned. However in many cases (36%) this only applied to less than 10% of the total scrub managed (Table 5.8).

**Table 5.8** Proportions (%) of questionnaire correspondents in England and Wales who considered scrub to be a nuisance on the land that they manage and proportion (%) of the scrub they managed which was undesirable.

Proportion of scrub considered 'nuisance' scrub (%)	Proportion of correspondents (%)
<10	36
11-25	19
26-50	15
51-75	10
>75	3
No answer	16

When asked why the scrub could be a nuisance most stressed the need for a balance between scrub and other habitats. Small areas of scrub can be desirable to add structure and diversity, for example shelter and invertebrate food sources. Nearly all defined nuisance scrub as that which encroaches onto other 'more valuable' habitats.

### Grasslands

Scrub invasion of species rich/unimproved grassland is a very common problem. It was mentioned by 29 questionnaire correspondents. The problem is most severe on calcareous soils, but also to a lesser extent on neutral and acidic soils. Scrubbing over of open grassland habitats alters the grassland flora and large amounts can also impede management by mowing, thus allowing further deterioration. Insect populations can lose food-plants due to shading and it also divides large areas of open sites which can affect invertebrate distribution. One correspondent noted that scrubbing up of grassland habitats affects not only the grassland communities but associated species such as the marsh fritillary butterfly *Eurodryas aurinia*. Open grassland is also vital for a few important species such as nesting stone curlew *Burhinus oedicephalus* and wood lark *Lullula arborea*.

For the scrub/grassland edge a common management aim is to maintain a gradual transition from medium length grassland through long grassland to thick scrub (Crofts & Jefferson 1999, Hopkins 1996). This habitat is very rich for wildlife providing shelter and a variety of food sources. However, maintaining it depends upon the provision of controlled levels of grazing and/or cutting. Overgrazing can easily remove the taller grassland with its rich assemblage of herbs, whereas undergrazing will allow invasion of the grassland by scrub. In practice, apart from on land managed specifically for nature conservation where grazing and/or cutting can be closely controlled, whether such a balance is maintained depends on agricultural markets for the grazing animals, and other less quantifiable socio-economic factors that determine land management practices. One questionnaire correspondent working in South Wiltshire described the use of grazing to maintain this ecotone, thinning scrub occasionally as part of a cutting and stump treatment regime. In this particular situation wild privet was found not to be controllable by cutting and stump treatment because of its suckering habit and the large number of stems produced. It was controlled by spot spraying in

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September with the herbicide 'Garlon 2' (12:1000 in water) using a hand-held lance from a tractor mounted spray tank.

### Heathland and wet habitats

Heathland and wet habitats are also commonly invaded by scrub. Many examples were mentioned by questionnaire correspondents, especially on lowland heath/wetland (35 cases), and on wet heath/mire (12 cases). A good example of the problems that scrub can cause in such situations was provided by one correspondent. 'Birch/willow scrub has developed on an area of wet heath/mire over the last 40-50 years, fragmenting the wetland basin into three areas separated by dense scrub and secondary birch woodland. This has fragmented a population of silver-studded blue butterflies *Plebejus argus* and has shaded out areas where their foodplant (heather *Calluna vulgaris*) grows'. One might have also expected encroachment onto heathland, and conversely loss of scrub/heathland habitat to have been an issue in relation to sand lizards *Lacerta agilis*, smooth snakes *Coronella austriaca* and adders *Vipera berus* (where habitat is changed or destroyed), but this was not recorded. Adders, for example, need a mix of scrub and open areas. Scrub is used for cover and to forage in, whilst open areas are needed for basking (Wild & Entwistle 1997).

Scrub can also destroy habitat by lowering the water table allowing colonization by more aggressive species of drier habitats e.g., 'Pine and birch scrub has devastated Bettisfield Moss, (and parts of Fenns Moss), eradicating the bog wildlife below. Birch scrub is drying out other areas allowing purple moor-grass *Molinia caerulea* and bracken *Pteridium aquilinum* to invade and take over both bog and heathland'. Another correspondent makes a similar case suggesting that, 'On lowland raised mires scrub increases the evapotranspiration rates, causes localised drying out of mire surface and enrichment causing a localised change in vegetation communities'. Reedbeds and fens are also prone to scrub invasion, often by willow *Salix* spp., alder *Alnus* spp. and birch *Betula* spp.. Ponds can be adversely affected by shade from overhanging scrub.

### Coastal

Several coastal habitats are at risk from scrub invasion. For example, there is a problem in Pembrokeshire of "scrubbing up" of the coastal slopes, which are internationally important for maritime grassland and heathland and species such as red-billed chough *Pyrrhocorax pyrrhocorax*. This process is due to the retreat of traditional farming from the coastal fringe. Similarly, on other habitats such as dune heath and saltmarsh spread of scrub can destroy habitats that are of more value to nature conservation (e.g. Biodiversity Action Plan (BAP) and Special Area of Conservation (SAC) habitats). Invasive birch scrub on coastal dune heath causes loss of interesting features while in Lincolnshire scrub encroachment onto dune grassland is a problem and natterjack toad *Bufo calamita* breeding pools are adversely affected. Natterjacks require open habitat with short-grazed vegetation and bare sand (Houston 1997). Dune grassland and slacks can be invaded by several scrub species for example birch, alder and sea-buckthorn *Hippophae rhamnoides*. As one questionnaire correspondent put it, 'Dominant sea-buckthorn and white poplar *Populus alba* and balsam poplar *Populus trichocarpa* are of little conservation importance, highly invasive, lead to nutrient enrichment and replace internationally important habitats and animal species'. When and where sea-buckthorn needs to be controlled is not necessarily easy to decide. Sea-buckthorn cannot be regarded simply as a pest species of sand dune systems but has considerable interest in its own right and can, in certain circumstances, contribute positively to the scientific interest of an area (Ranwell, 1972). It is considered a problem partly because of its ability to fix atmospheric nitrogen thus enriching nutrient poor dune soils (Houston, 1997), and is

generally unwanted in the west of Britain where it is probably not native.

### Woodland and plantations

Perhaps surprisingly, scrub may dominate some woodland communities and is also detrimental to establishing both native broadleaf woodland and conifer plantations. It competes with planted trees inhibiting woodland establishment. As one questionnaire correspondent notes, 'In some cases dense scrub patches can inhibit natural regeneration or tree planting. In most cases it is retained as long as it does not interfere with other conservation interests. Some recent Woodland Grants Scheme Challenge Fund woodland creation schemes had to be amended to conserve valuable scrub and open space'. Another correspondent opined that, 'Some areas of scrub can be a nuisance on re-stock sites because scrub hinders crop establishment. It can inhibit crop development by out-competing newly planted seedlings or indeed taller saplings'. While this may be true for commercial conifer plantations, on sites where broadleaved woodland establishment is the aim the 'nuisance' value of scrub may easily be overplayed. The woodland which develops from seral scrub, assuming that it is semi-natural, may be more diverse and will certainly be more natural than planted woodland. Perhaps grant schemes for establishment of native woodland should be more flexible in allowing payments for creation of woodland from scrub in this way.

### Problems associated with non-native woody plant species

Alien scrub species compete with native British species whilst not being able to support as many species of our native fauna as native species.

Invading alien scrub species were a problem for 73% of survey correspondents. The offending species with the number of times they were mentioned are shown in Table 5.9.

### Urban areas

In urban areas people living near to scrub or using areas with scrub for recreation often perceive scrub as untidy and/or a potential security threat. It is seen to encourage problem behaviour, especially among children and young people. Scrub can also overhang rights of way, obstruct highway visibility and attract fly tipping. It is a challenge to develop a more positive attitude to scrub in urban areas.

**Table 5.9** Genera and species of exotic trees and shrubs which were cited by questionnaire correspondents in England and Wales as being a 'nuisance', and number of times cited.

English name	Latin name	Number of times cited
Rhododendron	<i>Rhododendron ponticum</i>	79
Laurel	<i>Prunus</i> spp.	26
Cotoneaster	<i>Cotoneaster</i> spp.	15
Snowberry	<i>Symphoricarpos albus</i>	10
Japanese Knotweed <sup>1</sup>	<i>Fallopia japonica</i>	9
Turkey Oak/ Evergreen Oak	<i>Quercus cerris/Quercus ilex</i>	8
Sycamore	<i>Acer pseudoplatanus</i>	7
Shallon	<i>Gaultheria shallon</i>	6
Butterfly-bush	<i>Buddleja</i> spp.	4
Pine	<i>Pinus</i> spp.	3
Himalayan	<i>Leycesteria formosa</i>	2

Honeysuckle		
Cherry	<i>Prunus</i> spp.	2
Sea-buckthorn <sup>2</sup>	<i>Hippophae rhamnoides</i>	2
Duke of Argyll's Teapant	<i>Lycium barbarum</i>	1
Laburnum	<i>Laburnum anagyroides</i>	1
Mock-orange	<i>Philadelphus coronarius</i>	1
Grey Poplar	<i>Populus x canescens</i>	1
Grey and Italian Alder	<i>Alnus incana and cordata</i>	1
Oregon-grape	<i>Mahonia aquifolium</i>	1

<sup>1</sup> Not a woody species but often treated similarly.

<sup>2</sup> Considered native in the east of England

This might be aided by more active control of where scrub is and is not allowed to develop and more positive management of retained scrub, including maintenance of sight lines by maintaining open areas within scrub.

#### *Damage to archaeological and geological features*

Growth of scrub can cause damage to scheduled ancient monuments and may be considered a nuisance where it is growing on ancient earthworks and damaging them by roots and providing cover for rabbits. Exposed geological features can also be obscured and damaged by uncontrolled scrub invasion.

#### 5.3.2.2 *Determining the need for scrub control or removal*

Where scrub is undesirable management will be needed to either remove or reduce it. Eighty-nine percent of those in England and Wales who responded to the questionnaire were involved in active scrub management and a similar figure in Scotland. In both cases most managed only a small proportion (<25%) of their scrub. (Table 5.10).

**Table 5.10** Proportion (%) of scrub being actively managed by questionnaire correspondents in England and Wales and proportion (%) of correspondents managing scrub in each class.

<i>Proportion of scrub managed (%)</i>	<i>Proportion of correspondents (%)</i>
0-25	54
26-50	20
51-75	13
76-100	13

Some species are almost always considered to be undesirable by managers, e.g. elder, rhododendron and sea-buckthorn (although the importance of sea-buckthorn berries for fieldfare *Turdus pilaris* and redwing *Turdus iliacus* was noted and of elder for bryophytes). Conversely, juniper is always valued and never removed to conserve another habitat. Many species appear in all four columns in Table 5.11 indicating that they are considered desirable in some habitats and undesirable when spreading into others, e.g. birch, blackthorn, gorse, hawthorn, mixed scrub and willow.

Rhododendron was by far the most common offender, in Scotland as well as in England and Wales. It is particularly troublesome as its dense shade allows very little ground flora to develop. It occurs most commonly in woodland but also occurs on heathland and on fens and bogs. Laurel is a problem mainly in woodland but is also sometimes found in native scrub, on heathland and in limestone gorges. Cotoneaster species most often caused problems on calcareous grassland, but also on limestone ledges and scree, limestone pavement, and in woodland.

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**Table 5.11** Summary of proportions (%) of questionnaire correspondents actively managing main scrub types and the reasons for that management (see Appendix 5.4 for full list of scrub types).

	<i>Conserve</i>		<i>Enhance</i>		<i>Increase</i>		<i>Remove</i>	
	<i>Scotland</i>	<i>England and Wales</i>						
Birch ( <i>Betula</i> spp.)	14%	12%	5%	13%	7%	4%	5%	26%
Blackthorn ( <i>Prunus spinosa</i> )	2%	9%		10%		3%		10%
Bramble ( <i>Rubus fruticosus</i> )		3%		3%		2%	2%	4%
Elder ( <i>Sambucus nigra</i> )								3%
Gorse ( <i>Ulex</i> )	9%	19%	5%	15%	2%	3%	5%	20%
Hawthorn ( <i>Crataegus monogyna</i> )	7%	31%	5%	26%	9%	5%	2%	43%
Hazel ( <i>Corylus avellana</i> )	14%	3%	14%	5%	14%	2%		1%
Juniper ( <i>Juniperus</i> )	16%	7%	16%	6%	18%	7%		
Mixed	14%	12%	9%	10%	9%	2%	9%	10%
Oak ( <i>Quercus</i> )		2%		2%			2%	3%
Rhododendron ( <i>Rhododendron ponticum</i> )							9%	6%
Sea-buckthorn ( <i>Hippophae rhamnoides</i> )							2%	4%
Willow ( <i>Salix</i> )	14%	18%	11%	14%	14%	4%		25%

There is more management aimed at removing scrub of native species in England and Wales than in Scotland suggesting that encroachment by such species as birch, gorse and especially hawthorn is much more of a problem in the south of Britain. It should be noted, however, that the number of questionnaire responses was much less for Scotland than for England and Wales and that this skews some of the results. Thus the figures for hazel *Corylus avellana* and juniper in Table 5.11 are based on similar numbers of responses and hence can be compared directly while those for the other main scrub types are based on widely differing numbers and hence should be interpreted with caution.

### 5.3.2.3 Devising and implementing appropriate control/removal techniques

*Techniques to control scrub, to prevent encroachment onto other habitats (see also Appendices 5.3 to 5.5)*

Scrub control techniques are mostly based on cutting and stump treatment followed by grazing or mowing, of which examples have already been given. Another approach where invasion is in the early stages involves removing individual saplings manually. However, this is very labour intensive as described by one correspondent: 'It can involve removing a lot of young trees, e.g. cutting and pulling young pine and birch from lowland heath - c.

20,000 per ha in one case'. An interesting innovative idea is to kill scrub standing using stem notch injection with herbicides. This provides useful dead wood habitat while involving little disturbance to the underlying habitat.

Most grazing involves the use of sheep or cattle but sometimes other domestic animals are used. For example, 'rotational grazing with Exmoor ponies to maintain scrub/grassland mosaics following cutting of scrub'. Goats are being used in some places but they are difficult to control unless tethered, which requires regular attention.

There is ample advice for control of scrub on lowland grassland sites in general in The Lowland Grassland Management Handbook (Crofts & Jefferson 1999) and on wet grassland sites in particular in the EN/RSPB/ITE publication, The Wet Grassland Guide (Treweek *et al.* 1997). Management of woody vegetation on the Ouse Washes SSSI, including control of invasive scrub is described in Lambert (1993).

*Techniques to restore or create other habitats (see also Appendices 5.3 to 5.5)*

Unless scrub encroachment is stopped in its early stages this is not just a question of removing the offending scrub and allowing the original habitat to return. Scrub growth will have added nutrients to the soil thus affecting the composition of the

‘restored’ habitat. It is then necessary to remove the added nutrients and this is being done in some places, for example, ‘sometimes litter clearance is done to expose mineral soils to enhance recovery’.

When aiming to clear scrub rather than control its spread the follow-up needs to be more intensive and sustained. A fearsome armoury of techniques was revealed in the responses to the questionnaire, involving various combinations of pulling, strimming, cutting, flailing, burning, bulldozing, rotovating, stump grinding, and herbicide application by a variety of means including stump treatment, foliar spraying, weedwiping. Almost always some form of grazing to prevent reinvasion was mentioned. Rather than burning or removing the cut or poisoned material some managers are being more creative, stacking the wood on site or chipping it and leaving it on site to provide habitat for fungi, invertebrates or grass snakes *Natrix natrix*. Even using the wood chips to surface heavily used paths through reserves may be considered preferable to burning the material on site or removing it.

The need for extra care in wetter areas is generally appreciated by managers. One reported as follows: ‘Large-scale mechanical scrub/woodland removal is starting in the Broads this winter, using a tracked vehicle to cut and chip, rather than gangs with chainsaws, to reduce ground damage in wet areas’.

Herbicides used for stump treatment and weed spraying were Glyphosate, Triclopyr, Grazon 90 (Clopyralid & Triclopyr), Amcide (Ammonium sulphate), and Krenite (Fosamine-ammonium). Often stumps are treated to prevent regrowth but this is not always advisable. For example, one correspondent wrote, ‘On sites where we wish to convert to organic it seems stump treatment will not be allowed. This is a major problem as, despite widespread requests for help, no satisfactory alternative has been suggested’. One possible alternative was suggested by another correspondent who is ‘moving more to accepting shorter term cyclical cutting as a chemical free alternative’.

The type of cutting equipment used was not always noted but included by hand, flail, tractor mounted brushcutter, mini-brush cutter vehicle, tirfor winch, forage harvester and removal by lifting out of ground using hydraulics of 3 ton excavator.

In Wiltshire a range of techniques were tried, for example a New Holland double chop forage harvester had been used on young gorse scrub, forage harvesters pick up the cut material and scarify the soil surface depending on how low the machine is set. The gorse cut by the New Holland forage harvester has been colonised by both chalk grassland plants and species usually found on more acid soils. In some places these have formed a chalk heath community. Violets are abundant in these areas. The combination of young gorse re-growth and violets *Viola* spp. sheltered by the gorse provides an excellent habitat for the dark green fritillary butterfly. A tractor mounted swipe that leaves the cut material on the ground (Wessex Scrubmaster 66) was also used on gorse scrub. ‘Cut gorse material has a high Carbon to Nitrogen ratio and therefore takes a long time to break down. The areas cut by swipe are slowly colonised by a few species of plant able to grow through the cut gorse material. The gorse re-grows from cut stumps and eventually forms thick stands of young growth intermixed with grassy patches. The mixture of bare litter, tall grass and gorse in this compartment is used by

breeding birds including nightjars *Caprimulgus europaeus* and linnets, Dartford warblers have visited the gorse in recent years.’

### 5.3.3 Success of various management techniques

Table 5.12 indicates the success questionnaire correspondents have had in managing different types of scrub, whether for its positive benefits or to control or clear it. It is clear that there is a very wide range of success in most cases. Lack of success appears to be greatest when attempting to managing invasive scrub of gorse, hawthorn, willow and sea-buckthorn.

**Table 5.12** Range of success achieved by questionnaire correspondents in managing different types of scrub (1 = unsuccessful to 5 = very successful).

Scrub type	Success rate
Birch ( <i>Betula</i> )	2 TO 5
Blackthorn ( <i>Prunus spinosa</i> )	2 TO 5
Bramble ( <i>Rubus fruticosus</i> )	2 TO 4
Dogwood ( <i>Cornus sanguinea</i> )	1 TO 5
Gorse ( <i>Ulex</i> )	1 TO 5
Hawthorn ( <i>Crataegus monogyna</i> )	1 TO 5
Hazel ( <i>Corylus avellana</i> )	3 TO 4
Juniper ( <i>Juniperus</i> )	2 TO 4
Mixed scrub	3 TO 5
Rhododendron ( <i>Rhododendron ponticum</i> )	2 TO 5
Willow ( <i>Salix</i> )	1 TO 5
Sea-buckthorn ( <i>Hippophae rhamnoides</i> )	1 TO 4

Table 5.13 shows the most successful management procedures used by those responding to the questionnaire for each of these major scrub types. It is clear that control of some invasive species (birch *Betula* spp., blackthorn, rhododendron) is easier than others (dogwood, gorse, sea-buckthorn). In the case of species with light, wind-blown seeds (e.g. willows, rhododendron) there is a constant danger of re-invasion where seed sources remain nearby.

## The nature conservation value of scrub in Britain

**Table 5.13** Most successful management procedures for each of the main scrub types and estimated success rates (1 = unsuccessful to 5 = very successful).

Scrub type	Most successful management	Success rate
Birch ( <i>Betula</i> )	Uprooting (gave massive disposal problem)	2
	Cutting and grazing re-growth	2-3
	Clearance by saws - without chemicals followed by mowing 1-2 a year	2-3
Blackthorn ( <i>Prunus spinosa</i> )	Cutting/topping +/- treatment	2
	Cut and herbicide etc.	2
Bramble ( <i>Rubus fruticosus</i> )	Digging roots out and flailing to prevent encroachment on grassland	2
Dogwood ( <i>Cornus sanguinea</i> )	Mowing.	1
	Swipe	1
	Weed-wipe	1
Gorse ( <i>Ulex</i> )	Burning to maintain scrub/grass mosaics	1
	Burning - some accidental, some deliberate. Success very variable - best if grazed after	1-5
Hawthorn ( <i>Crataegus monogyna</i> )	Coppicing and aftermath grazing	1-4
	Pony grazing	1 (we are therefore going to change to sheep/goats)
	Layering to provide Black Hairstreak ( <i>Strymonidia pruni</i> ) habitat	1 (colonisation seems very slow)
Hazel ( <i>Corylus avellana</i> )	Remove any exotic species	3
	Cut/clear/winch	3-4
Juniper ( <i>Juniperus</i> )	Graze grassland and clear scrub (climate plays big part in germination so out of our control)	2
	Modification of grazing levels	2
	Protecting young, raised plants from grazing	2 (very intensive for scale of return)
Mixed	Grazing to produce short scrub/grass mosaics	3
	Coppicing for structural diversity	3
	Coppicing	3
	Scrub enhancement techniques as 15B	3
	Scrub control techniques as 15D	5
Rhododendron ( <i>Rhododendron ponticum</i> )	Remove and treat with herbicide	3 (success varies with site type and thoroughness of treatment. Areas re-infested from outside seed sources)
	Cut - chemical treatment	2
Willow ( <i>Salix</i> )	Cutting - often very low success rates unless grazed or herbicided	1-3
Sea-buckthorn ( <i>Hippophae rhamnoides</i> )	Manual control and herbicide	1 (we are therefore going to reintroduce grazing)
	Hand cutting/pulling	1