4.4.27 Ivy, *Hedera helix*

Summary
Ivy is widespread throughout Britain and a component of mixed scrub communities. Being shade tolerant, it will ramble over and under stands of scrub.

Where it compromises interest by suppressing regeneration of scrub and herbaceous flora, then management will be required.

Distribution and status
Ivy is a common plant throughout the whole of Britain and grows on all but the most acidic, very dry or waterlogged soil up to altitudes of 610 m. It is very tolerant of shade and will flourish in the darkest of closed canopy scrub.

Identification
Flowers: Sep–Nov; Fruit: Dec–Feb.

Ivy will climb as well as sprawl over the floor. The stems have fine sucker-like roots that adhere well to any surface. The young stems are downy. The smooth glossy green leaves are darker above and have pale veins. The leaves of non-flowering stems have 3–5 triangular-shaped lobes. On flowering shoots, the leaves are oval to elliptical.

The small greenish yellow flowers only form at the tips of shoots growing in well-lit conditions. The fruit is a small globular black berry.

Growth characteristics
- Sucker–like roots enable it to attach to most horizontal and vertical substrates.
- Shoots from surface roots, cut and layered stems.

Palatability
- Strongly favoured by sheep, especially rams, goats and deer (Roe & Fallow).
- In some situations, is taken in moderation by cattle.
- Largely ignored by equines and Rabbits.

Ivy on scree slope. Peter Wakely/English Nature

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 5 species recorded feeding.
- 2 species feeding exclusively.
- Valuable autumn nectar source.
- A food plant of the Holly Blue butterfly.

Birds:
- Late winter/early spring fruits eaten by 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/M	A	Light browsing of the scrub edge in late spring where Ivy is a component may encourage bushy growth and fruiting.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En/M	A	Ivy layers and shoots from cut stems and surface roots. Where it is a component species manage it within the rotation of the stand. If necessary, lightly trim after fruiting in late spring to encourage bushy growth and flowering. Check for nesting birds and other fauna before carrying out work.	5.8.13 5.9.4.1 5.9.4.2
M	B	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	3	**Reduce from priority habitats using livestock:**	
R	A	Choose stock levels and breeds that preferentially target Ivy without damage to other species. Monitor the effects and reduce/remove as necessary. On rocky crags where Ivy may suppresses rare Sorbus spp. use goats and Soay sheep to browse the Ivy.	5.8.4
	4	**Reduce or eradicate established scrub mechanically:** Where Ivy is likely to suppress ground flora or regeneration then:	
R/Er	A	Hand pull or use weed pullers to clear young plants.	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	Clear using mechanical tools where conditions allow. On cliff ledges inaccessible to livestock, use specialist contractors.	5.8.6/5.8.13 5.9.4.1, 5.9.4.2 5.9.4.3
R/Er	D	**Caution:** Cutting established Ivy at ground level on historic building remains/walls does not guarantee death. It may exacerbate damage, forcing stems to survive by sending roots further into cracks, crevices and weak mortar joints. Contact your local Historic Monuments Office.	5.8.6/5.8.13 5.9.4.1, 5.9.4.2 5.9.4.3
	5	**Eradicate (re-)growth using herbicide:**	
Er	A	Weed-wipe or spray in spring and summer using an appropriate herbicide. NB: Specialist contractors are available to tackle the more inaccessible locations.	5.8.16/5.9.2 5.9.4.4

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

Waxy leaf coating makes adhesion of herbicide difficult – consider appropriate adjuvant.

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
- Cheddar Gorge, National Trust

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

Further reading
Tillotson A & Chambers H *(1996), Rope Works (Habitat management on dangerous slopes)* ENACT vol 4 (4), 16 - 19.

See end of chapter

4.4.28 Juniper, Common *Juniperus communis*

Summary
Juniper is a long-lived, scarce coniferous shrub, with 3 sub-species. It is widely but patchily distributed, occurring in a range of soil and climatic conditions; in the uplands, coastal areas and on lowland calcareous soils. It has a complex ecology, which makes managing viable populations difficult.

Because of its rarity management is aimed at conserving and increasing the extent of existing stands, diversification the stand age structure, and establishing new stands in its former range.

Distribution and status
Juniper is a Priority UKBAP Species. There are two, or possibly three, subspecies; *Juniperus communis ssp communis, J. c ssp. nana, J. c ssp. hemisphaerica*. and various intermediates.

There are three main populations of Juniper in Britain: the southern chalk downs, limestone uplands in northern England, and the Caledonian pinewoods. Other populations occur, for example on sand dunes in northeast Scotland and in the west of Ireland.

Little is known about the status of the rarer two subspecies *J. c. nana*, which is confined to upland heaths in Snowdonia and north western Scotland, and *J. c. hemisphaerica*, which is confined to the maritime cliffs of Cornwall and Pembrokeshire.

Juniper has clearly declined and recent local extinctions have occurred. The larger stands of the NVC community H15, in which *nana* occurs, are estimated to total no more than 805 ha, and there are less than 15 known individual bushes of *J .c. hemisphaerica* in the wild in the UK.

It is a component of early stage successional communities, and as such is dependent on open, disturbed ground for seedling establishment. It is easily shaded out by broadleaved scrub. Surviving stands are often old and of uniform age with poor seed productivity/viability.

Research is continuing into the status, ecology and requirements of Juniper.

Juniper. Peter Wakely/English Nature

Conservation measures for Juniper include designation of important habitats as SSSIs and SACs. Where Juniper occurs outside of designated areas, working closely with land owners/managers can deliver conservation through grant aid schemes (e.g. Countryside Stewardship).

Identification
Max age: 100, occasionally longer; Max height: 10 m; Flowers: May–Jun; Fruit formation: Sep–Oct; Ripens: 2nd or 3rd year.

Juniper varies in growth habit from prostrate to upright. It is slow growing, rarely reaching 10 m in height. The crown is pointed and twisted and develops a broad, dense shape with many extending shoots.

The bark is reddish-brown and shreds along the trunk. The spiny needles occur in groups of three on a pale brown shoot. The wood and foliage has an apple like aroma.

Male and female flowers occur on separate trees, are solitary and yellow. The fruit (cone) is first green, ripening to blue and then, after 2–3 years, becomes black.

J. c . nana has a more prostrate habit and is less prickly. The needles are ascending, ending suddenly in a contracted shorter point. The fruits are longer than they are broad.

Genetic analysis suggests subspecies *J. c. hemisphaerica* is quite distinct from other UK junipers.

Growth characteristics
- Seeds germinate in disturbed soil.
- Slow growing, vulnerable to competition from other vegetation, and susceptible to drought.
- Any branches or leading shoots that become overshadowed by other shrubs, or damaged by livestock rubbing, do not re-shoot.
- Does not re-grow from cut stumps.

Palatability
- Still much to understand on Juniper palatability to livestock, and stocking rates.
- Grazing or browsing is aimed at impacting competitors and creating open swards for seed establishment, followed by a relaxation in grazing pressure to help seedling establishment.
- For much of the year, other than at seedling stage, Juniper is thought to be not very palatable and appears only to be browsed when other palatable species are absent.
- Goats if short of winter food strip bark from trunk and stems, especially on larger bushes.
- Seedlings are prone to being pulled out when very small.
- Predation from Rabbits can occur especially during lying snow or in drought.
- Small mammals and other livestock will also take seedlings.

Value to wildlife
Important for wildlife, including for example:
Lower plants:
- 4 species of lichen.

Invertebrates:
- 63 species recorded feeding.
- 26 species exclusively.
- 11 species of RDB listed.

Birds:
- Autumn and winter food source for thrushes.

Mammals:
Small mammals sometimes use young shoots as (very prickly) nest material.

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.

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/M	A	A short period of heavy summer grazing followed by light grazing helps open rank swards to provide opportunity for seed germination. Follow this with a period (up to four years) of light or no grazing to allow seedlings to establish. Monitor the impacts and reduce or remove stock as required.	5.8.4/5.8.10
En/M	B	Where a thick grass mat inhibits seed establishment remove and scarify the exposed bare soil to create seedbeds either by using hand tools on small areas, or, where access and ground conditions allow by mechanical scraping; shallow cultivation using either harrow or rotovator are also possible with care.	5.8.4 5.9.4.1 5.9.4.2 5.9.4.3

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

Objectives		Management techniques	Section
En/M	C	Careful controlled burning may be used to remove rank grass. Caution: un-controlled burning has caused losses in uplands; therefore, this technique should be used with extreme care so as not to lose control of flame front. Follow up with light grazing to retain an open sward. Monitor impacts and reduce or remove stock as required.	5.8.7
	2	**Propagate and plant cuttings and seedlings:**	
En	A	Collect ripe seeds, germinate 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
En	B	In uplands protect from climate with nurse crop of e.g. planted or natural Birch, Rowan and or Hawthorn. Remove later if necessary to prevent over-shading.	5.8.2
	3	**Protect from excess browsing and bark-stripping:**	
M	A	Where necessary, fence or use broad diameter tree tubes to protect seedlings from grazing/browsing. Remove protection when established. In Upper Teesdale, fine mesh tubes 60 cm x 10 cm have given encouraging results and are less susceptible to wind-throw.	5.8.3
M	B	Avoid livestock browsing in winter; damage and losses of saplings are higher during this period as Juniper remains palatable while other species of herb are un-available. Beware snow on fence lines in winter giving access over the top by rabbits.	5.8.4
En/M	C	It is not necessarily desirable to exclude grazing and browsing as reduced livestock numbers retain open conditions and encourage natural regeneration.	5.8.4
M	D	Red Deer and sometimes Mountain Hare damage montane stands, Roe Deer and Rabbits can be a problem at lower altitudes. Where fencing is not appropriate, consider culling to achieve stable populations at levels that do not compromise the Juniper.	5.8.3
M	E	Fencing can be very expensive, particularly in highland areas and could encourage competition from more palatable species. Deer fencing in woodland grouse areas must be visible to reduce mortality. Provide controlled access for grazing.	5.8.3
	4	**Diversify structure:**	
En/M	A	To prevent crowding, selectively thin dense even aged stands to diversify the age and structure.	5.8.5/5.9.4.1 5.9.4.2
	5	**Reduce competition using livestock:**	
R	A	Carefully manage summer stocking to target competitor vegetation when most palatable. Over grazing will prevent regeneration and damage existing bushes, while under grazing permits succession that shades and kills mature bushes. In lowlands, Yew, Ash, Oak and earlier successional stages of Hawthorn scrub suppress Juniper regeneration.	5.8.4
R	B	Choose stocking levels and breeds carefully and monitor the effects of grazing on the habitat as a whole. Use proven breeds with a taste for the target competing species. This may vary between sites. Remove stock before the impacts become undesirable and Juniper is targeted.	5.8.4
	6	**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.	4.4.31/4.4.34 4.4.41

Key sites/contacts

- 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

- English Nature
  Contact: Juniper House,
  Murley Moss, Oxenholme Road, Kendal,
  Cumbria LA6 7RL, tel: 01539 792 800

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

- Forest Enterprise
  Contact: Dornogh Forest District,
  Hilton of Embo, Dornogh, Sutherland IV25 3LL

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

- Old Winchester Hill, NNR
  Contact: Barry Proctor,
  English Nature, tel: 01489 877547,
  e-mail: barry.proctor@english-nature.org.uk

- Salisbury Plain
  Contact: Paul Toynton
  tel: 01980 674741, e-mail: paul.toynton@de.mod.uk

- The National Trust
  Contact: John Hooson,
  The Hollens, Grasmere, Ambleside, Cumbria.
  tel: 015394 35599, e-mail: rfsjrh@smtp.ntrust.org.uk

- Upper Teesdale
  Contact: Chris McCarty,
  English Nature
  tel: 01833 622374,
  e-mail: chris.mccarty@english-nature.org.uk

- Ward, Dr Lena, 53 Miles Avenue, Sanford, Wareham,
  Dorset BH20 7AS

Further reading

Barrett, J., (1997), *Regenerating Juniper*, Enact 5 (1)
Fitter, A.H., **Jennings, R.D.**, (1975), *The effects of sheep grazing on the growth and survival of seedling junipers*, Journal of Applied Ecology, (2), 637-642
Gilbert, D. Ed, (2001), *Guidance for the restoration of montane scrub: a discussion document*, Montane Scrub Restoration Project
Scott, M., (2000), Montane scrub (Natural Heritage Management), Montane Scrub Action Group & Scottish Natural Heritage
UK Biodiversity Group, (1998), *Tranche 2 Action Plans Vol. 3 Plants and fungi*, English Nature
Vedal, H., (1961) Natural regeneration in Juniper. Proc. Bot Soc of British Isles. Vol 4 1960 – 62, pp 146-148.
Ward L K., (1973) *The Conservation of Juniper 1. Present status of juniper in Southern England.* Journal of applied Ecology 10. pp165-183. (Also subsequent papers).
Ward L K., (1989) *Seed viability in juniper (Juniperus communis).* Wareham. Institute of terrestrial ecology.

4.4.29 **Oak, Pedunculate** *Quercus robur;* **Sessile** *Q. petrea*

Summary
The two native species of oak, Pedunculate and Sessile are dealt with here, while the commoner introduced Turkey Oak and Holm Oak, are dealt with under 4.4.30.

Oak is a common and widespread tree throughout Britain and away from woodland will readily develop into a scrub mosaic. It is a component of a range of broad habitat types from wet woodland, to mixed calcareous and dune communities.

Oak 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 protection and enhancement when it is threatened by over grazing especially 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
The two native species of oak are both common and widespread throughout Britain, occurring on a range of soil types up to altitudes of up to 460 m.

There is considerable overlap between the ranges of the two species, but generally, Pedunculate Oak, prefers heavy base soils and loams and is dominant in central, southern and eastern England. Sessile Oak prefers damper, more acidic soils and is dominant in the west and northwest of Britain.

In open conditions, away from the woodland canopy, oak has been found a capable pioneer species, able to develop into a scrub mosaic.

The upland western and northern oak communities suffer from over grazing, resulting in poor regeneration. They are also very important for their moss and lichen communities.

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

Oak, pedunculate. Roger Key/English Nature

Pedunculate Oak:
The young twigs of Pedunculate Oak are grey-brown. The leaves are oblong, lobed and hairless, growing on short stalks. The distinctive fruit or acorn, form in groups of 1–3, on long stalks.

Sessile Oak:
Have longer, narrower and more pointed lobed leaves than Pedunculate, and with a longer stalk. The underside of the leaves has tiny hairs growing in the axils of the veins. The acorns grow on very short stalks from the twigs.

Growth characteristics
- Acorns germinate readily though there is usually a high mortality of seedlings.
- Branches and stems of young and medium aged trees respond well to pollarding.
- Re-grows well from coppiced stumps.

Palatability

- Young leaves and shoots will be more palatable to a range of livestock in the spring, especially goats, some cattle and sheep.
- The stems of seedlings are palatable in winter.
- Equines, goats and some sheep will de-bark, especially in the winter.

Value to wildlife

Valuable to wildlife, for example:
Lower plants:

- Important for epiphytes.

Invertebrates:

- 423 species recorded feeding on the genus.

Birds and mammals:

- Food source for 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	Low intensity summer browsing will encourage bushy growth and acorn productivity. Bark stripping may initiate some acorn production and create standing dead wood.	5.8.4/5.8.9
En/M	B	Trampling by cattle and ponies creates 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
M	C	Moderate to heavy browsing may create browse lines and open the structure of older established scrub reducing its value for wildlife. Epiphytes may fair better by the open structure.	5.8.4
En/M	D	Low to moderate levels of browsing and grazing may open sward sufficient to encourage acorn germination and by targeting succulent competitors. After germination reduce or remove livestock in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.4/5.8.3
M	E	Maintain open areas within the scrub using stock regimes and breeds that preferentially graze, not browse. Monitor impact and remove/reduce stock as required	5.8.4
M	F	To encourage natural expansion protect from browsing where needed.	5.8.3
	2	**Enhance or maintain stands mechanically:**	
En	A	Increase extent of stand by scarifying ground to encourage acorn germination.	5.8.1
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. Protect from deer browsing in vulnerable areas.	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) while allowing others to establish elsewhere. Maintain 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. Ring barking is likely to encourage regeneration from the stump (see 7C 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...
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	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
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.: Juniper, Rowan, etc) for examples on enhancing and maintaining upland scrub.	4.4.28, 4.4.36
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 the scrub using stocking regimes and breeds that preferentially take oaks without damage to target habitat. Monitor impact and remove/reduce stock as required	5.8.4
R	B	Browsing oak is most likely to be effective on young growth and regeneration during the winter and spring.	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	Remove saplings 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, clearing saw).	5.9.4.1, 5.9.4.2
R/Er	D	Small stands of larger bushes can be cut with a 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 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
	7	**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 Oaks as at July 2003

Oaks do not normally get mentioned as species on product labels. If not then they fall within the general classification of 'woody weeds'. May not be appropriate if enhancing or increasing extent of sensitive upland stands in which Sessile Oak 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

- Downlands Countryside Management Project
  Contact: Highway House,
  21 Chessington Rd, West Ewell, Epsom, KT17 1TT
  tel: 0181 541 7282

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

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

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

- Waverley Borough Council
  Contact: Council Offices,
  The Burys, Godalming, Surrey, GU7 12HR.
  tel: 01252 792416,
  e-mail: Frangers@waverley.gov.uk

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

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

Further reading

See end of chapter

4.4.30 Oak, Turkey *Quercus cerris*; Evergreen *Q. ilex*

Summary
The two introduced species, Turkey Oak and Holm Oak, are dealt with here. The two native species of oak, Pedunculate and Sessile are dealt with in 4.4.29.

Turkey and Evergreen or Holm Oak are widespread introduced species, which become highly invasive and a threat to many priority habitats.

They have minimal wildlife value and vast resources are spent on eradication programmes of cutting stands, combined with grazing and browsing.

Distribution and status
Both species have been introduced and widely planted, particularly throughout southern England. Turkey Oak, is found especially on acid soils, mainly in south England but can also be found occasionally as far north as Inverness.

Evergreen Oak, is commonly planted in coastal areas as far north as south Lancashire.

Identification
Turkey Oak:
Max height: 35 m; Flowers: May; Fruit: Sep;
Ripens: Oct.
Young shoots are downy at first, becoming less hairy in their second year. The small buds are oval-like and downy with awl shaped scales beneath.

The shape and lobes of the leaves vary, but are generally deeply cut. They are dark green above, at first rough, becoming shiny. Beneath, they are grey-brown and woolly, later only on the veins.

Evergreen Oak:
Max height: 30 m; Flowers: May; Fruit: Sep;
Ripen: Oct.

Distinctive evergreen tree with variable holly like leaves. Young twigs are hairy in their first year, becoming less so in the second.

The leaves are dark green above and paler below. They vary in shape, but are generally elliptical and may or may not be toothed. The acorn cups are also woolly.

Has anyone a picture of a an evergreen/holm oak please?

Evergreen/holm oak.

Growth characteristics
- Does not readily shoot from surface roots.
- Young trees are likely to regenerate from coppice.

Palatability
Turkey Oak
- Not very palatable, though cattle, sheep and goats will browse young foliage at high stocking levels.
- Goats may strip bark?

Evergreen Oak
- Highly palatable all year to goats and cattle.
- Hardy sheep will also readily take leaves.

Value to wildlife
Minimal value to wildlife, for example:
Invertebrates:

- Turkey Oak has 8 species of invertebrate recorded feeding; four species exclusively.

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	**Reduce or eradicate encroachment from priority habitats using livestock:**	
R/Er	A	Turkey and Holm Oak can be impacted by goats; they may need to be close fenced into the control area to prevent damage to other preferred species.	5.8.3
	2	**Reduce or eradicate from priority habitats manually or mechanically:**	
R/Er	A	Hand pull or use weed pullers to clear young seedlings or 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).	5.8.13, 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.	5.8.13, 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 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
M	H	Remove or burn arisings as and where appropriate.	5.9.1, 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

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

These oaks do not normally get mentioned as species on product labels. If not 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

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

- English Nature
  Beds/Cambs/Northants Team, 15
  Castle Rise, Belmesthorpe, Stamford, Lincs, PE9 4JL.
  tel: 01780 752 939

- 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

- Ventnor Downs, Isle of Wight. National Trust

Further reading

Tutton, T., (1994), *Goats versus Holm Oak*, ENACT 2 (1) pp 8-9, English Nature

4.4.31 Pine, Scot's *Pinus sylvestris*; Corsican *P. nigra*; Maritime *P. pinaster* & other conifers (e.g.: Spruce *Picea abies*; Larch *Larix sp*)

Summary
A wide range of conifer species occur throughout Britain. This profile reviews the maintenance and enhancement of natural Scots Pine found in the central and north western Highlands of Scotland and the reduction or eradication of non-native Scots, Corsican and Maritime Pines from priority habitats.

Similar objectives and techniques apply to other non-native conifer, for example: Norway Spruce, Larch and its hybrid varieties that threaten to compromise priority habitats.

Distribution and status
A wide range of coniferous species occurs throughout Britain. With the exception of Caledonian Scot's Pine, all have been introduced for forestry or landscape purposes.

This profile reviews the familiar Pine species: Scot's Pine, *Pinus sylvestris*, Corsican Pine, *P. nigra*, and Maritime Pine, *P. pinaster*. The management of other non-native introduced species, where they threaten priority habitats, are similar.

Scots Pine:
The natural distribution covers much of central and north-eastern Grampians and northern and western Highlands of Scotland. It grows on sandy and stony acidic soils, as well as on waterlogged peat and can be found at altitudes of 670 m or more.

Scots pine scrub occurs as a component of mixed communities that include for example: Juniper, Birch, Willows and Rowan. Within its natural range, native pine is threatened by fragmentation of habitat, poor natural regeneration and structural diversity, caused by browsing from sheep and deer, and exploitation.

Outside of its natural range, it is considered as an introduced, naturalised species, planted widely in woods and shelterbelts throughout the whole of Britain. Here, efforts target its removal, especially from heathland where it has become invasive.

The other introduced pines described here, are considered a threat to priority habitats:

Pine trees, Thursley NNR. J. Bateson/English Nature

Corsican Pine:
This is the preferred forest crop over Scots Pine and widely planted across much of the country. It is also planted as shelterbelts, and as a landscape feature in churches, large gardens and parks.

Maritime Pine:
Like Corsican Pine, this species has been planted widely as shelterbelts and as a landscape feature, especially around the south coast in Dorset and Hampshire.

Their ability to produce large volumes of seed, and preference for acidic sandy soils, make them especially problematic on heathlands and dunes, where they become extremely invasive.

Identification
Scots Pine:
Max age: 250 yrs, exceptionally 400 in Scotland. Max height: 30 m,
Flowers: May–Jun.

Young plants have pale grey scaly bark with strong, new shoots pale, green brown and hairless. The buds are brown or dark red, pointed and cylindrical.

The needles of younger plants occur in groups of threes or fours, pairs in older plants. They may be as long as 14 cm in younger plants but typically 5–7 in mature trees.

They are blue-grey-green, broad, with fine lines, and twisted.

Corsican Pine:
The shoots are pale yellow-brown, stout and slightly ridged. The brown buds are squat, abruptly pointed and lack papery scales. They are often coated in a whitish resin.

The grey-green needles, 12–18 cm, are slender and very twisted in young plants.

Maritime Pine:
The new shoots are dark red on pale green. Buds are bright red-brown, with pale edges to the scales.

The pale grey-green needles, 15 – 20cm, are stout and semi-circular in shape.

Growth characteristics
- Germinates readily from seed.
- Does not sucker or shoot from surface roots.
- Does not regenerate from cut stumps.

Palatability
- Young seedlings may be palatable, especially to goats and cattle if little other food is available, particularly during winter.
- Not particularly favoured by equines.
- Targeted by deer, when there is little else available.

Value to wildlife
Native Scots Pine is valuable to a range of specialised species, for example:
Invertebrates:
- 65 Species recorded on Scots Pine.
- 25 species recorded feeding exclusively.

Birds and mammals:
- In Scotland e.g.: Black Grouse, Capercaillie, Pine Marten and Red Squirrel.

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	**Encourage natural regeneration:**	
En/M	A	Low to moderate levels of grazing will open and retain an open sward by targeting succulent competitor species and encourage natural regeneration. It is not necessarily desirable to exclude grazing and browsing. After germination monitor impacts and where necessary reduce or remove livestock. In vulnerable areas stands may need protection from trampling, grazing or browsing.	5.8.1/5.8.3 5.8.4
En	B	Careful controlled burning may be used to remove rank grass. Caution: un-controlled burning has caused losses in uplands; therefore, this technique should be used with extreme care. Follow up with light grazing to retain an open sward. Monitor impacts and reduce or remove stock as required	5.8.4/5.8.7
En	C	Where a thick grass mat inhibits seedling establishment remove using hand tools and scarify the exposed bare soil. Where access and ground conditions allow remove rank vegetation by mechanical scraping and create seedbeds with shallow cultivation using either harrow or rotovator. NB: Experience of this in uplands is limited and it may not be appropriate.	5.8.1/5.8.16 5.9.4.1 5.9.4.2 5.9.4.3
	2	**Propagate and plant cuttings and seedlings:**	
En	A	Collect ripe seeds, germinate 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:**	
M	A	Where necessary fence or use broad diameter tree tubes to protect seedlings from grazing/browsing. Remove protection when established.	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
M	B	Avoid livestock browsing in winter. Damage and losses of saplings are higher during this period, while other species of herb are unavailable.	5.8.4
M	C	Red Deer and sometimes Mountain Hare damage montane stands; Roe Deer and Rabbits can be a problem at lower altitudes. Where fencing is not appropriate consider culling to achieve stable populations at levels that do not compromise Scot's Pine.	5.8.3
M	D	Fencing can be very expensive particularly in highland areas and could encourage competition from more palatable species. Deer fencing in woodland grouse areas must be visible to reduce mortality. Provide controlled access for grazing.	5.8.3
	4	**Reduce competition using livestock:**	
M	A	Manage stocking rates in summer when competitors are most palatable; use proven breeds with a taste for the target competitor food. Choose stock levels and breeds carefully and monitor the effects on the habitat as a whole. Remove stock before the impacts become undesirable.	5.8.4
M	B	Over grazing will prevent regeneration and damage existing bushes, seedlings or saplings. Conversely, some light grazing reduces competition and can create open sward structure that may assist or encourage seeding.	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/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 using hand tools.	5.8.13, 5.9.4.1
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw.	5.8.13, 5.9.4.2
R/Er	E	Stump removal may not be necessary unless in the way of further management. If required winch stumps where a suitable anchor exists or use a grinder for large stumps.	5.8.14 5.9.4.2
R/Er	F	Large stands of younger scrub can be flailed or mulched. The mulch will need to be removed afterwards.	5.8.6/5.8.13 5.9.4.3
R/Er	G	Large stands of mature scrub can be cleared using excavators or bulldozers that at the same time can also remove the nutrient-rich litter layer. Where this is not possible litter must be raked off.	5.8.10 5.8.15/5.9.2
M	H	Remove or burn arisings as and where appropriate.	5.9.1, 5.9.2
R/Er	I	Raise water levels to reduce or eradicate Pine on bogs.	5.8.11
	6	**Eradicate seedlings using herbicide**	
Er	A	Spray or weed-wipe seedling or sapling growth in the summer using an appropriate herbicide. Avoid damage to non-target species and contamination of watercourses.	5.8.16/5.9.2 5.9.4.4

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

Native Scot's Pine is a rare species; herbicide treatment is not appropriate where this occurs in upland and montane stands. Sitka Spruce is identified as a species on some product labels – see bold entries in table below. If not mentioned on the product label then Pines, Larches and other conifers fall within the general classification of 'woody weeds' – see also non-bold entries. 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. BASIS approved foresters may well be able to offer additional advice about use of products on conifers.

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

- 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

- Ainsdale Dunes, Lancashire
  Contact: Rob Wolstenholme, English Nature
  e-mail: robert.wolstenholme@english-nature.org.uk

- Avon Heath Country Park, RSPB
  Contact: Roland Hughes,
  Birch Road, St Ives, Ringwood, Hampshire, BH24 2DA
  tel: 01425 472975 e-mail: roland.Hughes@rspb.org.uk

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

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

Further reading

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

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

4.4.32 Poplar, White *Populus alba*; cultivars *P. spp.*

Summary
This profile covers the introduced White Poplar and the various complex hybrid cultivars. They have been widely planted throughout much of lowland Britain and sucker freely to form dense thickets, which invade priority open habitat. White Poplar is especially problematic in sand dune systems.

They are of minimal wildlife value, with few recorded invertebrates. In coastal areas, White Poplar provides a limited insect food source and cover to migrant birds.

Various mechanical methods can be used to reduce or eradicate stands from open habitats, but the tenacious suckering nature of the species require sustained follow-up treatment in order to achieve success. This can be achieved through livestock browsing, (young leaves and shoots of re-growth are reported to be palatable), or sustained cutting, mowing or herbicide treatment of regeneration.

Distribution and status
White Poplar:
Was introduced to Britain apparently from Holland and first recorded in the wild toward the end of the sixteenth century.

It has been planted in many landscape schemes, along roads, in parks and gardens and as windbreaks. It is resistant to sea winds and extensive stands can be found growing among sand dunes where it encroaches into priority habitat.

Poplar spp:
Many other non-native species of poplar cultivars and hybrids have been introduced through amenity landscape schemes. Most of these cultivars are planted as trees and out-with the scope of this Handbook.

However, like other native species of the genus, they sucker well, can form dense stands of scrub, and can potentially become an issue in the future.

Species currently described in the New Atlas are: Grey Poplar, Balm of Gilead, Hybrid Black-poplar and Western Balsam-poplar.

Poplar - cultivars.

Identification
White Poplar:
Max height: 15–20 m; Flowers: Feb–Mar.

The twigs are ash-grey, covered in a downy white film. The leaves are almost maple-like, dark green above with a filmy white coating and downy-white below.

The 4–8 cm long catkins; male: crimson and grey, female: pale green; appear in March, before the leaves.

Growth characteristic
- Capable of shooting from fragments of twig.
- Forms dense stands by suckering.
- Grow rapidly from coppiced stumps.

Palatability
- Leaves and shoots are palatable to livestock.

Value to wildlife
Limited value to wildlife, for example:
Invertebrates:
- 12 species recorded feeding on White Poplar.

Birds:
- Limited value as shelter and foraging habitat for insectivorous birds, especially migrants in coastal stands of White Poplar.

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	**Reduce from priority habitats using livestock:**	
R	A	Browse back the scrub using stocking regimes and breeds that preferentially take Poplar spp 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. Insufficient stocking will encourage succession by opening the sward enough to allow seeding and suckering but will not impact the scrub.	5.8.4
	2	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Use sapling removal tools to clear young seedlings/saplings/suckers.	5.8.12/5.9.4.1 5.9.4.2
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 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 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. Large stands of younger scrub can be flailed or mulched. Re-growth will occur.	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
M	H	Remove or burn arisings as and where appropriate.	5.9.1, 5.9.2
R/Er	I	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
	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

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

Poplars do not normally get mentioned as species on product labels. If not 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

- Ainsdale Dunes, Lancashire
  Contact: Rob Wolstenholme,
  English Nature
  e-mail: robert.wolstenholme@english-nature.org.uk

- Gibraltar Point NNR, Lincolnshire
  Contact: Kevin Wilson
  Lincolnshire Wildlife Trust & Lindsey District Council
  tel: 01754 762677
  e-mail: gibpoint@lincstrust.co.uk

Further reading

See end of chapter

4.4.33 **Privet,** *Ligustrum vulgare*

Summary
Privet is a locally common component of mixed scrub communities. It will also form dense compact single species stands. Its ability to sucker and shoot from surface roots make it difficult to eliminate by cutting. Reduction by use of herbicides is difficult to achieve due to glossy leaf coating.

Distribution and status
Privet in its natural state is a locally common semi-evergreen shrub, which can be found as a component of the calcareous scrub communities, more especially in southern England.

It has been widely planted in many other localities throughout Britain where it has become naturalised. This has largely been surpassed by the introduction of the non-native Garden Privet, L. ovalifolium, which has become particularly popular as an amenity landscape plant.

Identification
Max height: 5 m; Flower: Jun–Jul;
Fruit: Aug–Sep; Ripen: Oct.

Wild Privet has smooth bark and slender branches; the young twigs are slightly downy. The lanceolate shaped leaves are 3–6 cm long, dark green and grow opposite each other along the stem.

The small pyramidal panicle of scented white flowers grows from the tip of the stems. The small, black, shiny berries are 6–8 mm across.

Growth characteristics
- Shoots prolifically from cut stumps and shallow surface roots.
- Can tolerate shade conditions so smothering out other ground flora.

Palatability
- Only fresh leaves are moderately palatable, especially to sheep. Older growth seldom touched.

Privet, Holkham NNR. J. Bateson/English Nature

Value to wildlife
Invertebrates:
- 66 species have been recorded feeding.
- 4 species exclusively.
- 3 RDB species.
- Good source of nectar in late June/July.

Birds:
- Late summer, early autumn food for warblers and 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	A	Encourage bushy growth and increased seed production using low intensity summer browsing.	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	Moderate to heavy browsing in established scrub creates browse lines, opening the structure and reducing its value for wildlife.	5.8.4
En/M	D	Low to moderate levels of browsing and grazing may open the sward sufficient to encourage suckering and seeding by targeting competitors that are more succulent. After germination reduce or remove livestock in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.4
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	F	To encourage natural spread of stands by protecting from browsing and trampling.	5.8.3/5.8.4
	2	**Enhance or maintain stands mechanically:**	
En/M	A	Maintain age and structural diversity across the site; 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	B	To encourage seed germination and suckering allow suckers to grow from surface roots and/or scarifying ground. Repeated mowing or cutting enhances suckering.	5.8.1/5.8.6 5.8.13
En/M	C	To replicate natural dynamic processes clear some stands 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. Consider augmenting this by ring barking selected stems although this 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 Privet without damage to target habitat. Monitor impact and remove/reduce stock as required.	5.8.4
R	B	Browse in spring to target fresh leaves. The tenacious nature of its suckering stems means heavy grazing is necessary to have an impact. This may be detrimental to other interests.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically:**	
R/Er	A	Hand pull or use sapling extraction tools 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).	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. NB. Repeated cutting has been found to be ineffective and promotes suckering and regeneration which exacerbates the problem.	5.9.4.1 5.9.4.2

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

Objectives		Management techniques	Section
R/Er	D	Cut small stands of larger bushes using a chain saw or clearing saw. Re-growth will occur. NB: (see 4C above). Re-growth and suckering will occur.	5.9.4.2
R/Er	E	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

Approved situations and herbicides that may be considered for use on Wild Privet as at July 2003
Wild Privet does not normally get mentioned as a species on product labels. If not mentioned 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

- Beds, Cambs, Northants and Peterborough
  Wildlife Trust
  Contact: Andy Fleckney,
  Priory Country Park, Barkers Lane, Bedford
  MK41 9SH
  tel: 01234 364213,
  e-mail: afleckney@bedswt.cix.co.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

- Sussex Downs Conservation Board
  Contact: Northern Area Office, Midhurst Depot, Bepton
  Road, Midhurst GU29 9QX
  tel: 01730 817945

- 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

4.4.34 Rhododendron, *Rhododendron ponticum*

Summary
Rhododendron is a widespread introduced species, which has become highly invasive and a major threat to many Priority Habitats.

It is has minimal wildlife value and vast resources are spent annually in efforts to eradicate the plant and prevent its spread into other areas.

This is achieved through large-scale removal by cutting or excavating of whole stands. Costs can vary considerably, depending on the region and terrain. For example, clearance from lowland heathland will be far less expensive than upland eradication programmes where access is difficult.

Distribution and status
Rhododendron is a well-established alien species, distributed throughout much of Britain, normally on damp acid soils.

It was introduced in the 18th century, into parks and gardens where its showy flowers give it high aesthetic appeal. It was also widely planted as game cover in woodlands. Because of its public appeal, there is some resistance to its removal for nature conservation, which requires effort to raise public awareness for the need to eradicate it.

Once established, it shades out all native species of plant and associated fauna, particularly threatening habitats of high conservation value. It forms dense surface root mats, is highly invasive and has become a widespread and severe conservation problem.

It flourishes on mainly peaty or sandy soils and occurs in woodland, carr, heathland, moorland, moist grassland, and acidic dune slacks. It develops to utterly dominate sites, suppressing all other vegetation.

Identification
Max height: 3 m; Flowers: May–Jun.

An evergreen with large, dark green, leathery, elliptical to oblong leaves, 6–12 cm long. The numerous flowers are purple with dark brownish spots.

Rhododendron on Duddon Mosses NNR.
Paul Glendell/English Nature

Growth characteristics
- It spreads by wind blown seed dispersal.
- Layering and root suckers.
- Shoots vigorously from cut stumps.

Palatability
- Poisonous to livestock.

Value to wildlife
Wildlife value is minimal.
Birds:
- Roosting and nesting cover where there is a lack of other suitable bushes.
- An evergreen 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.

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 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). 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
R/Er	F	Alternatively use forest grinder to mulch rhododendron in-situ. However, this will leave mulch on ground, which will suppress recovery of target vegetation, so needs a second operation to remove it. Follow up with herbicide application to stumps or surface roots.	5.8.6/5.8.16 5.9.1/5.9.4.3 5.9.4.4
M	G	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	Cut stems of large bushes down low and treat freshly cut stumps with appropriate herbicide; alternatively allow to re-grow for one or two years and then spray re-growth - this is more efficient than trying to spray large tall bushes.	5.8.16/5.9.2 5.9.4.4

Approved situations and herbicides that may be considered for use on Rhododendron as at July 2003
Rhododendron 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. 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.

Waxy leaf coating makes adhesion of herbicide difficult – consider appropriate adjuvant. (** Triclopyr marketed as 'Garlon 4' or 'Timbrel' can be applied in paraffin or diesel oil).

Herbicide (active ingredient name)	**Relevant 'approved situations' for various named products**	**HH Section**
Ammonium sulphamate	**Forestry trees and shrubs.**	Section 4.1.2: table 3 - target species and possible herbicides
2,4-D	Amenity grass, established grass; grassland; conifer plantations & forestry; water or waterside areas.	

Cont...

2,4-D + dicamba + triclopyr	**Established grassland, forestry, non-crop areas.**	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'.)
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

- Avon Heath Country Park, RSPB
  Contact: Roland Hughes,
  Birch Road, St Ives, Ringwood, Hampshire, BH24 2DA
  tel: 01425 472975,
  e-mail: roland.Hughes@rspb.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,
  email: ian.taylor@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

- Foulshaw, Cumbria
  Contact: John Dunbavin,
  Cumbria Wildlife Trust,
  e-mail: johnd@cumbriawildlifetrust.org.uk

Further reading

Burton, D, Carpenter, P., (1999), *Life after rhododendron*. ENACT 7 (4), p 11-14. English Nature
Edwards, C.; Clay, D. V.; Dixon, F. L., (2000), *Stem treatment to control Rhododendron ponticum under woodland canopies*. Aspects Appl. Biol. 58, 39-46
Searle, S., (1999), Controlling rhododendron at Windsor, ENACT 7(4), pp15-16

4.4.35 Rose, Field *Rosa arvensis*; Dog *R. canina*; Burnet *R. pimpinellifolia*; Downy *R. tomentosa*; Sweet Briar *R. rubiginosa*

Summary
There are around 26 species of native and introduced rose described in *The New Atlas of the British and Irish Flora*. The five most abundant are reviewed here. Of the remainder, full details can be found in *The New Atlas*.

Rose 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
Field Rose:
Common mainly in southern England and Wales, scarce further north, occurring in scrub communities up to altitudes of 380 m.

Burnet Rose:
Occurs throughout Britain on dunes, heaths and limestone pavements, particularly near coastal areas and up to altitudes of 520 m.

Dog Rose:
Very common native component of scrub throughout England and Wales, rare in Scotland.

Downy Rose:
Common in much of England, Wales and Ireland, where it can be found as a component of scrub communities. It is rare in Scotland, but may be found as far north as Ross.

Sweet Briar:
A native scrub species especially within the mixed chalk communities of southern England. Occurs throughout Britain but rare in Scotland.

Identification
Field Rose:
Low growing rose, up to 1 m, with weak green stems and narrow arching barbs. The leaves are hairless, and have 2–3 pairs of oval leaflets 1–3.5 cm long. The white flowers are 30–50 cm wide and form in groups of up to 6. The fruits are red.

Dogrose. Peter Wakely/English Nature

Burnet Rose:
A low growing, creeping and suckering rose, with abundant long, straight narrow prickles. The small leaves form into 3–5 pairs of oval leaflets, 0.5–1.5 cm long. The single flowers are cream coloured and develop into black fruits.

Dog Rose:
Strong arching stemmed rose, with stout thorns. The leaves form 2–3 pairs of toothed leaflets. The flowers vary from pink to white and the fruits vary from orange-red, to scarlet.

Downy Rose:
The stem is arching, with the younger shoots and stems a pale green in colour. The ovate leaflets are in pairs of 2–3. The flowers vary from pink to white. The red oval fruits are 1–2 cm in diameter.

Sweet Briar:
Not as tall and vigorous as Dog Rose, with bright green stems, leaflets and flower stalks which have sweetly apple-scented hairs. The flowers are pink-white and the fruit ripens to a dark red.

Growth characteristics
- Roses can sprout from cut stumps, layered arching stems and shallow surface roots and suckers.

Palatability
- Is moderately palatable to livestock, notably sheep, especially fresh leaves and fruits.

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 215 species have been recorded feeding, 44 species exclusively. 12 RDB and 1 BAP species.
- Source of nectar for many species.

Birds and Mammals:
- Autumn food for thrushes 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.

Management techniques. Suitability of techniques listed below vary according to the species and growth form of the Rose species being managed.
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	1	**Enhance or maintain stands using livestock:**	
En	A	Low intensity summer browsing may encourage bushy growth and some fruit productivity.	5.8.4
En	B	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	C	Prevent moderate to heavy browsing in established scrub that will open the structure and reduce its value for wildlife.	5.8.4
En/M	D	To encourage suckering and seeding use low to moderate levels of browsing/grazing to open the sward by targeting more succulent competitor 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	E	Cattle and ponies may trample routes through extensive stands leading to the formation of natural gaps. Prevent trampling to encourage spread of stands.	5.8.4/5.8.8
En	F	Prevent trampling when trying to encourage natural spread of stands.	5.8.3/5.8.4
	2	**Enhance or maintain stands mechanically:**	
En/M	A	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	B	Increase extent of stand by allowing suckers to grow from surface roots and/or scarifying ground to encourage seed germination or encourage suckering.	5.8.1
En/M	C	To mimic natural dynamic processes clear some stands while allowing others to establish elsewhere, but maintaining the desired extent across the site.	5.8.5/5.8.8
E	D	Retain some bushes and stands 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	Choose stocking levels and breeds that preferentially target Roses without damage to the target habitat. Monitor the effects and reduce/remove as required.	5.8.4

Management techniques. cont...
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
R	B	Follow cutting with heavy browsing to impact regeneration in the following spring. Hardy breeds of sheep or goats may be most suitable. However, this may exacerbate invasion by targeting more succulent species.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically:**	
R/Er	A	Hand pull (using thorn proof gloves!) or use sapling extraction tools to clear small areas of young suckers.	5.8.12, 5.9.4.1
R/Er	B	Cut saplings/suckers or re-growth 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.: long-handled slasher, clearing saw).	5.9.4.1, 5.9.4.2
R/Er	D	Regular summer cutting or mowing may reduce encroachment where grazing is not possible. This can be achieved in smaller stands using pedestrian mowers/flails or in large stands with a tractor flail or swipe. Subsequent operations to remove the mulch maybe required otherwise regeneration of target interest will be suppressed.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	E	Burning may be effective on dense mature stands with plenty of combustible matter. It is most effective in small blocks contained by firebreaks. NB: This may be inappropriate on some substrates and may damage epiphyte communities.	5.8.7
R/Er	F	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 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

Approved situations and herbicides that may be considered for use on Roses as at July 2003
Roses do not normally get mentioned as species on product labels. If not mentioned 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
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.	

Cont...

Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	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'.)
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

- CCW
  Contact: North East Area,
  Victoria House, Grosvenor Street, Mold, Flintshire, CH7 1EJ.
  tel: 01352 706600

- English Nature
  Contact: Genesis 1,
  University Road, Heslington, York
  tel: 01904 435500

- 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

- Milton Keynes Council
  Contact: Environment Directorate, PO Box 113, Civic Offices, 1 Saxon Gate East, Milton Keynes, MK9 3HN
  tel: 01908 691691

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

4.4.36 **Rowan,** *Sorbus aucuparia*

(See also: 4.4.37 Rowan/Whitebeam spp *Sorbus spp*; 4.4.44 Common Whitebeam, *Sorbus aria*).

Summary
The Rowan, or Mountain Ash is widespread but most common in western and northern Britain. It is an important component of upland scrub and woodland communities alongside other species such as Birch, Oak, Ash, Scot's Pine and Juniper.

In southern Britain, it can be found in mixed scrub communities at the interface of lowland heathlands. Elsewhere, it has been widely planted as an amenity landscape tree and is readily dispersed by birds into other habitats.

Its management is aimed at maintaining and enhancing existing scrub within mixed upland stands, increasing the extent of existing stands and establishing new stands.

Distribution and status
It can be found at altitudes higher than any other tree, ascending to a height of 975 m.

It is found naturally on the lighter soils, avoiding clays and soft limestone, throughout most of Britain, but especially in western and northern regions. It would be rare in many eastern and central regions of England, except for widespread planting as a popular amenity landscape tree and dispersed widely by birds into other areas.

It is a fast growing pioneer species and grows mainly in and on the edges of woods, cliffs, rocky outcrops and riversides. Many of these habitats are not optimum, but are the only refuge available where the species can avoid being over-grazed by sheep and especially deer.

In lowland areas, it does not appear problematic and remains self-sustaining, occurring in the mixed scrub interface of lowland heathland, waste ground and transport corridors.

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

The young shrubs have pubescent twigs, which become hairless and grey-brown in colour. The hairy buds are 10–14 mm in diameter, oval and dark brown.

Rowan. M. W. Henchman/English Nature

The leaves are pinnate, 10–20 cm long, usually with 6–7 small, bright green, toothed, oblong leaflets, 3–6 cm long. The leaves are hairless above and downy below.

The cream white flowers form a dense umbel and the fruits are a bright scarlet in colour.

Growth characteristics
- Can re-generate from surface running roots and will shoot from stumps of young plants.

Palatability
- The foliage is highly palatable to browsing animals and is especially favoured by deer that will also feed on the bark and stems.

- Mountain Hare will also browse seedlings.

Value to wildlife
Valuable to wildlife, for example:
Lower plants:
- Important for bryophytes and fungi

Invertebrates:
- 160 species recorded feeding on genus.
- 14 species exclusively.
- 7 RDB species.

Birds:
- Late summer, early 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.

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	To encourage natural regeneration use low to moderate levels of grazing to open and retain an open sward. Use stock levels and breeds with a taste for target herbs. It is not necessarily desirable to exclude stock after germination; monitor impacts and where necessary reduce or remove accordingly. In vulnerable areas stands may need protection.	5.8.1/5.8.3 5.8.4
En	B	Careful controlled burning may be used to remove rank grasses. Caution: Un-controlled burning has caused losses in uplands; therefore only use with extreme care. Follow-up with light grazing to retain an open sward. Monitor impacts and reduce or remove stock as necessary.	5.8.7
En	C	To remove thick grass mats that inhibit seed germination clear using hand tools and scarify the exposed soil. Where conditions allow use appropriate machinery to scrape turf. NB: Experience of this technique in the uplands is limited and may not be appropriate.	5.8.1/5.8.16 5.9.4.1, 5.9.4.2 5.9.4.3
	2	**Propagate and plant cuttings and seedlings:**	
En	A	Collect ripe seeds, germinate and grow on in pots out doors. Plant out in ground with low levels of competing vegetation. (See also 3A Below).	5.8.1
	3	**Protect from excess browsing and bark-stripping:**	
M	A	Where necessary fence or use broad diameter tree tubes to protect seedlings from grazing/browsing. Remove protection when established.	5.8.3
M	B	Avoid livestock browsing in winter. Damage and losses of saplings are higher during this period while other species of herb are un-available.	5.8.4
M	C	Red Deer and sometimes Mountain Hare damage montane stands; Roe Deer and Rabbits can be a problem at lower altitudes. Where fencing is not appropriate consider culling to achieve stable populations at levels that do not compromise Scot's Pine.	5.8.3
M	D	Protect by fencing; can be very expensive particularly in highland areas and could result in competition from species normally impacted by browsing. Deer fencing in woodland grouse areas must be visible to reduce mortality. Provide controlled access for grazing.	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
	4	**Reduce competition using livestock:**	
M	A	Manage stocking rates in summer when competitors are most palatable; use proven breeds with a taste for the target competitor food. Choose stock levels and breeds carefully and monitor the effects on the habitat as a whole. Remove stock before the impacts become undesirable.	5.8.4
M	B	Over grazing will prevent regeneration and damage existing bushes, seedlings or saplings. Conversely, some light grazing reduces competition and can create open sward structure that may assist or encourage seeding.	5.8.4
	5	**Reduce or eradicate undesirable scrub:**	
En/M	A	In upland mixed scrub, other species can become invasive (e.g.: Rhododendron, Sycamore, etc). Refer to relevant profiles for more detail.	4.4.34 4.4.41

Key sites

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

- 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

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

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

4.4.37 Rowan/Whitebeam spp, *Sorbus spp*

(See also: 4.4.36 Rowan, *Sorbus aucuparia*; 4.4.44 Common Whitebeam, *Sorbus aria*).

Summary
The *Sorbus* genus includes a group of closely related micro-species of rare endemic Rowan and Whitebeams. Of these, 13 species may be considered as scrub, and are reviewed here. The rarity of these species means that an expert should be consulted before undertaking any management. (The Wild Service Tree, does not fit the criteria for consideration here).

Distribution and status
The suite of locally endemic species reviewed here is, with few exceptions, largely confined to southwest England and Wales, particularly Gloucester, Brecon and Monmouth.

All are locally rare and found on rocky limestone crags above river valleys. Full details of their distribution can be found in Clapham, Tutin and Moore (1987), and *The New Atlas of the British and Irish Flora* (2002).

Research into these rare endemics is ongoing. It is likely as a result that several more species will be identified in the near future, especially in the areas around the Avon and Wye Valleys.

The species considered here are:
1. Arran Service-tree, *Sorbus pseudofennica*, endemic to Arran.
2. *S. arranensis*, endemic to Arran.
3. *S. leyanna*, endemic to Brecon.
4. *S. minima*, endemic to Brecon.
5. S. angelica, endemic to southwest England and south Wales.
6. *S. leptophylla*, endemic to Brecon.
7. *S. wilmottiana*, endemic to Avon Gorge.
8. *S. eminens*, endemic to Avon Gorge, Wye Valley
9. *S. hibernica*, endemic to Ireland.
10. *S. lancastriensis*, endemic to northwest England.
11. *S. porrigentiformis*, endemic to southwest England, south and north Wales.
12. *S. rupicola*, endemic to southwest England, Wales, the Pennines, Scotland and Ireland.
13. *S. bristoliensis*, endemic to Avon Gorge.

Identification
The leaf shape of species 1–4 are generally elliptical and lobed with serrated edges.

Sorbus wilmottiana, Avon Gorge endemic species of whitebeam. Tony Robinson/English Nature

Those of 5–13, are elliptical and have serrated edges, lacking the lobed shape of the others.

For a full description of these and others in the genus, refer to the reference opposite.

Growth characteristics
- Germinates from seed.
- Can re-generate from surface running roots and will shoot from stumps of young plants.

Palatability
- Palatable to sheep and goats.

Value to wildlife
- Insects: 160 species of insect recorded feeding on genus, 14 species exclusively.
- Birds: Late summer, early 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.

Approved herbicides and situations
These are 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 seed germination and establishment where necessary:**	
En	A	To encourage natural regeneration use low to moderate levels of grazing to retain an open sward. Use stock levels and breeds with a taste for target herbs. It is not necessarily desirable to exclude stock after germination; monitor impacts and where necessary reduce or remove accordingly. In vulnerable areas stands may need protection.	5.8.1/5.8.3 5.8.4
En	B	Careful controlled burning may be used to remove rank grasses. Caution: Un-controlled burning has caused losses in uplands; therefore only use with extreme care. Follow-up with light grazing to retain an open sward. Monitor impacts and reduce or remove stock as necessary.	5.8.7
En	C	To remove thick grass mats that inhibit seed germination clear using hand tools and scarify the exposed soil. Where conditions allow use appropriate machinery to scrape turf. NB: Experience of this technique in the uplands is limited and may not be appropriate.	5.8.1/5.9.4.1 5.9.4.2 5.9.4.3
	2	**Propagate and plant cuttings and seedlings:**	
En	A	Collect ripe seeds, germinate and grow on in pots out doors. Plant out in ground with low levels of competing vegetation.	5.8.2
En	B	Protect young seedling from grazing/browsing by fencing or from small mammals by broad tree tubes until well established. Remove once plants are established.	5.8.3
	3	**Impact competitors using livestock:**	
M	A	Ivy may suppress Sorbus spp; use goats and Soay sheep to browse competitive species.	5.8.4
M	B	Over grazing will prevent regeneration and damage existing bushes but may benefit epiphyte communities.	5.8.3/5.8.4
M	C	Under grazing permits succession that shades and kills mature bushes and affects epiphyte communities.	5.8.4
M	D	Monitor carefully and remove or reduce stocking when competitors are reduced and before desired species are targeted.	5.8.4
	4	**Enhance stands mechanically:**	
M	A	Prevent succession to secondary woodland by felling mature trees and coppicing Ash, Oak, Field Maple and Hawthorn as well as non-natives such as Turkey and Holm Oak, which suppress Sorbus regeneration and establishment.	5.8.5/5.8.13 5.9.4.1 5.9.4.2
M	B	When clearing scrub identify and mark Sorbus spp to prevent accidental removal. This may require a specialist familiar with the identification of the species.	
M	C	Use specialist contractors to tackle the more inaccessible locations for health and safety reasons.	Appendix 8.12
	5	**Protect from damage caused by rock climbing:**	
M	A	Interpretation and advocacy will help reduce or prevent damage to stands caused by rock-climbing. Consult with the British Mountaineering Council for further advice and help.	

Key sites

- Cheddar Gorge, National Trust

Further reading

Clapham, A. R., Tutin, T. G. & **Moore, DM.**, (1987, 3rd ed) *Flora of the British Isles*, Cambridge University Press
Preston, C. D., Pearman D. A. & Dines T. D., (2002) *The New Atlas of the British & Irish Flora*,. Oxford University Press
Tillotson, A., Chambers, H., (1996), *Rope works! Conservation on the edge*, ENACT 4 (4)

4.4.38 Sea-buckthorn, *Hippophae rhamnoides*

Summary
Sea-buckthorn is a component of coastal dune communities, occurring as a native in eastern Britain, but an unwelcome introduction to the western seaboard, where it causes a number of management issues.

Management aims to maintain naturally occurring Sea-buckthorn as a single species stand or component of mixed dune scrub communities. Where it has been introduced and threatens priority habitats, methods to reduce or eradicate it are reviewed.

Distribution and status
Sea-buckthorn is a common shrub of coastal dune systems and occasionally on sea cliffs. It naturally occurs along the eastern coasts of Britain, from Sussex (although in Sussex, there is some doubt as to its provenance), round to Northumberland.

Elsewhere, it has been introduced and is found in many similar dune habitats in western Britain, where it causes a number of management issues. It is also widely planted in amenity landscape schemes, which if near or adjacent to priority habitats, could become a conservation issue.

Identification
Max height: 1–3 m; Flowers: Mar–Apr; Fruit: Aug–Sep; Ripen: Oct.

Sea-buckthorn is densely branched in its habit and very thorny. The narrow leaves, 1–8 cm in length, and dull green leaves are covered in a silvery film.

The flowers are very small, greenish, and occur before the leaves. The fruits are bright orange and persist well into the winter months.

Growth characteristics
- Sea-buckthorn suckers prolifically and re-generates from coppice stools to form dense, impenetrable, uniform stands.

Palatability
- Sea-buckthorn is moderately palatable to most livestock, especially the hardier breeds of goats, sheep and cattle, but not to ponies. The thorns limit the impact of this browsing once they harden so summer grazing is more effective.

Sea buckthorn. Kev Wilson/Lincolnshire Wildlife Trust

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 28 species recorded feeding on the genus.

- Flowers and fruits valued for nectar and food.

Birds and Mammals:
- Forms thick dense cover for birds to nest and roost especially at migration times.

- Its fruits are also much valued as a source of food for 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	Low intensity summer browsing encourages bushy growth and some fruit productivity. Bark stripping may initially increase fruiting, followed by standing dead wood.	5.8.4/5.8.9
M	B	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	C	Moderate to heavy browsing in established scrub creates browse lines and opens the structure, reducing 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 in vulnerable areas; stands may need protection from trampling, grazing/browsing.	5.8.3/5.8.4
En	E	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
En/M	F	Prevent trampling when trying to encourage natural spread of stands.	5.8.3
	2	**Enhance or maintain stands mechanically:**	
En/M	A	To maintain age and structural diversity divide large stands into small, sinuous edged coups and cut on rotation. Manage small and isolated stands as a single unit.	5.8.5/5.8.8 5.8.13
En/M	B	Increase extent of stand by allowing suckers to grow from surface roots and/or scarifying ground to encourage seed germination. Sporadic mowing may encourage suckering.	5.8.1/5.8.6
En/M	C	To replicate natural processes clear some stands (unless 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 to provide niches for other wildlife. Augment this by ring barking selected large stems as required. NB: this is likely to encourage re-growth 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	Choose grazing times, stocking levels and breeds that preferentially take Sea-buckthorn and not damage the target habitat. Monitor the effects and reduce or remove stock as necessary.	5.8.4
R	B	Browse young regeneration and shooting scrub in spring. The tenacious nature of its suckering stems means heavy grazing is necessary to have any effective impact. This may be detrimental to other interests.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand-pull (with thorn proof gloves) or use sapling extraction tools 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).	5.9.4.1, 5.9.4.2

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

Objectives		Management techniques	Section
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 large 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 monthly mowing/cutting may prevent encroachment where grazing is not possible. However, cutting is likely to increase and encourage rates of suckering. In small stands use pedestrian flails/mowers; in large stands use a tractor -mounted swipe/flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/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
	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 Sea-buckthorn as at July 2003.
Sea buckthorn 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.
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.	

Cont...

Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
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

- Ainsdale Dunes, Lancashire
  Contact: Rob Wolstenholme,
  English Nature
  e-mail: robert.wolstenholme@english-nature.org.uk

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

- Gibraltar Point NNR, Lincolnshire
  Contact: Kevin Wilson
  Lincolnshire Wildlife Trust & Lindsey District Council
  tel: 01754 762677
  e-mail: gibpoint@lincstrust.co.uk

- Saltfleeby & Theedlethorpe Dunes, Lincolshire
  Contact: John Walker, English Nature
  tel: 01507 338611
  e-mail: john.walker@english-nature.org.uk

Further reading

Gee, M., (1998), *New life for old dunes*, ENACT 6 (1) pp 6-8, English Nature
Houston, J., (1999), *Conservation management practice on British dune systems*, British Wildlife 8 (5), pp297-307, British Wildlife
Rooney, P., (1998), *A thorny problem*, ENACT 6 (1) pp12-13, English Nature
Simpson, D., (1998), *Bringing back the slacks*, ENACT 6 (1), pp9-11, English Nature

4.4.39 Snowberry, *Symphoricarpus alba*

Summary
Snowberry is an introduced plant from America, which has been planted extensively as game cover and in amenity landscape schemes. It suckers vigorously and potentially threatens ecological interests on adjacent grassland swards.

Snowberry has minimal wildlife value and is usually managed to reduce, prevent or eradicate encroachment into priority habitats through browsing, and various mechanical methods.

Distribution and status
Snowberry is an introduced species from Western North America where it occurs from Alaska and Alberta down to California and Colorado.

It has been widely planted as a landscape amenity shrub and for woodland game cover. It has become more or less naturalised throughout mainly England but is absent from Scotland.

It is a large to medium sized deciduous shrub and can be found on both light and heavy soils where it will spread by suckering to form dense stands.

Identification
Max height: 1–3 m; Flowers: Jun–Sep; Fruit: Sep–Nov; Ripens: Dec.

The young hairless shoots are yellowish brown in colour. The oval-like leaves are dull green above and hairless, sometimes slightly hairy beneath.

The pinkish flowers form on terminal raceme like spikes and develop into a white globular, soft, pithy berry.

Snowberry. Roger Key/English Nature

Growth characteristics
- Suckers prolifically and forms dense, impenetrable, uniform stands, especially after coppicing.

Palatability
- Is known to be palatable to goats.

Value to wildlife
Is of little wildlife value, for example:
Invertebrates:
- Only 25 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.

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

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 using livestock:**	
R	A	Heavy browsing by goats may reduce dense stands. They may need to be close fenced into the control area to prevent damage to other preferred species. Monitor impacts on non-target vegetation; remove stock before impacts become undesirable.	5.8.4
	2	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use sapling extraction tools to clear small areas of young suckers.	5.8.12, 5.9.4.1

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

Objectives		Management techniques	Section
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, long-handled slasher, loppers, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	D	Large stands of young regenerating scrub may be cut using mowers. Cut mature stands with clearing saws, flails or mulchers. This needs to be at least monthly or more frequently. Anything less will result in a denser stand as suckering may be intensified.	5.9.4.2 5.9.4.3
R/Er	E	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
R/Er	F	Remove or burn arisings as and where appropriate.	5.9.1, 5.9.2
	3	**Eradicate re-growth using herbicide:**	
Er	A	Repeated weed wiping or spraying of re-growth for at least 12 to 18 months may reduce and eventually eradicate. Stumps are generally too small to treat.	5.8.16/5.9.2 5.9.4.4

Herbicides that may be considered for use on Snowberry as at July 2003
Snowberry 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'.

Further reading
See end of chapter

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.

4.4.40 Spindle, *Euonymus europaeus*

Summary
Spindle is a widely distributed component of calcareous mixed scrub communities and less common as a single species stand.

It is most often maintained as a component of mixed scrub communities, requiring reduction or eradication 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
Spindle is a native shrub found among mixed scrub communities on calcareous soils. It generally occurs in low abundance and frequency, with occasional local abundance in some areas.

It can also occur infrequently as a single species stand. It is widespread throughout England, Wales and Ireland, reaching eastern Scotland.

In recent years, it has been used moderately in amenity landscape plantings and can be found along transport corridors and restoration sites.

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

Spindle is a deciduous shrub with many branches. The bark is grey-brown and the angled stems dark green.

The oval to lanceolate leaves grows in opposite pairs from the stem. They are finely toothed, 3–13 cm long, dark green and turn orange in the autumn.

Up to 10 greenish-white flowers, grow from a stalk off the leaf axils, each flower growing up to 10 mm across. The fruits are four-lobed, 10–15 mm wide and bright coral pink. These split open exposing a seed protected by a bright orange sheath.

Growth characteristics
- Responds well to coppicing.
- Shoots from surface roots.

Spindle. Stephen Davis/English Nature

Palatability
- Highly palatable, year round, to cattle and sheep, especially the foliage and bark.

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 33 species have been recorded feeding. - 1 RDB species recorded.
- Good nectar source.

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	Low intensity late summer browsing may encourage bushy growth but may reduce fruit productivity. Spindle may also be susceptible to browsing damage and low levels of bark stripping may initially increase fruiting and then create standing dead wood.	5.8.4/5.8.9
M	B	Prevent moderate to heavy browsing in established scrub that will create browse lines, open the structure and reduce its value for wildlife. Time browsing to avoid spring and early summer when Spindle is most likely to be palatable.	5.8.4
M	C	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	D	Cattle and ponies may trample 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	E	Encourage seed germination/suckering 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.	5.8.3/5.8.4 5.8.8
En/M	F	To allow natural expansion where needed protect stands from trampling and browsing.	5.8.3
	2	**Enhance or maintain stands mechanically:**	
En	A	Scarify ground to encourage seed germination and suckering from adjacent parent plants. If natural regeneration is unsuccessful propagate from cuttings or fruits and plant out. Protect regeneration if necessary with temporary fencing or tree tubes.	5.8.1/5.8.2 5.8.3
En/M	B	To replicate natural processes clear some stands and allow others to develop elsewhere but maintaining the desired extent across the site. Maintain a diverse age range and structure of Spindle within mixed species stands.	5.8.5/5.8.8 5.8.13
En	C	Retain dead bushes to decay naturally and provide niches for other wildlife. Augment this by ring barking selected large stems as required. NB: this may encourage regeneration from the stump. (where necessary take action using 5C below).	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	Choose stocking levels and breeds that preferentially take Spindle without damage to the target habitat. Monitor the effects and reduce/remove stock as necessary, before the impacts become undesirable.	5.8.4
R	B	Browse in spring to reduce regeneration. Vigorous suckering stems may mean heavy grazing is necessary to have any effective impact. This may be detrimental to other interests.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use sapling extraction tools 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). If necessary 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

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

Objectives		Management techniques	Section
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) mowing/cutting may reduce encroachment where grazing is not possible. In small stands use pedestrian flail mowers; for large stands use a tractor-and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
	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 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 2C above) with paintbrush or foliar application.	5.8.16 5.9.4.4

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

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven,
  English Nature, Foxhold House, Crookham Common,
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- Martin Down, NNR
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- Windmill Hill
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  tel: 01905 754919,
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Further reading

See end of chapter

4.4.41 Sycamore, *Acer pseudoplatanus*

Summary
Sycamore is a highly invasive species, casting heavy shade on native flora. It has little wildlife value and is costly to remove.

Methods focus on the use of manual, mechanical and chemical means of eradication from sites, though seedlings, saplings and coppice re-growth are palatable.

Distribution and status
Sycamore was introduced to Britain probably around 1550, but possibly as early as the Roman times. It occurs across the mountains of central and southern Europe, from the Pyrenees through to the Balkans.

It is a very hardy species, able to tolerate extreme conditions of wind and salt. In Britain, it is now a naturalised non-native, and is found in a wide range of habitats where it is often invasive.

In exposed coastal areas it often remains as part of a stable scrub community. Elsewhere it will out grow and shade native scrub.

Identification
Max height: 35 m; Flowers: Apr–Jun;
Fruit: Jul–Aug; Ripens: Sep–Oct.

The hairless leaves are large, 7–16 cm long, five lobed and blunt-toothed. Young shrubs have smooth dark grey bark and greenish grey-brown shoots. Buds are oval and green with red margins, and occur in opposite pairs along the stem.

Growth characteristics
- Produces many seeds each year, which germinate readily in most soils to produce a heavy crop of seedlings.
- Fast growing, re-generates quickly from suckers and coppiced stumps.

Palatability
- Eaten by goats, and hardy sheep.
- Regularly browsed by cattle.
- Horses occasionally browse it.

Sycamore in flower. Roger Key/English Nature

Value to wildlife
Some limited value to wildlife, for example:
Shelter:
- on exposed sites (hills, coasts) it provides wind protection and shelter.

Lower plants:
- On upland hills, it supports a good range of mosses, lichens and in older trees, fungi.

Invertebrates:
- Its early flowers and nectar provides a source of food for early emerging invertebrates.

Birds:
- It supports a high biomass of aphids and can be valuable to migrant birds in coastal areas during the autumn.

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 seed productivity use low intensity summer browsing. Bark stripping may initially increase seed productivity and create standing dead wood.	5.8.4/5.8.9
En	B	Prevent moderate to heavy browsing in established scrub that will create browse lines, open the structure and reduce its value for wildlife.	5.8.4
M	C	Low to moderate levels of browsing and grazing may open the sward sufficiently to encourage suckering and seeding by targeting competitors that are more succulent. After germination reduce or remove stock as required. In vulnerable areas stands may need protection.	5.8.3/5.8.4
En	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.	5.8.4/5.8.8
En	E	Cattle and pony trampling may open 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
En	F	To encourage natural spread of stands protect from browsing/trampling.	5.8.3
	2	**Enhance or maintain stands mechanically:**	
En/M	A	To maintain a balanced age and structural diversity divide large stands into small, sinuous edged coups; cut on a rotation. Manage small and isolated stands as single units.	5.8.5/5.8.8 5.8.13
En/M	B	To mimic natural processes clear some stands (unless good for epiphytes) while allowing others to establish elsewhere but maintaining the desired extent across the site.	5.8.5/5.8.13
En	C	Remove or ring bark to prevent establishment of woodland and shading. N.B. Ring-barking is likely to encourage re-growth from the stump (see 5C below). Monitor the effects of shading on the adjacent scrub community and flora.	5.8.9/5.8.13
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. Consider augmenting this by ring barking selected bushes. (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 Sycamore without damage to target habitat. Goats and hardy sheep may need to be close fenced into the control area to prevent damage to other preferred species. Monitor impact and remove/reduce stock as required.	5.8.3/5.8.4
R	B	Browse in late spring to impact regeneration following cutting.	5.8.3/5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use sapling extraction tools 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). 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

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

Objectives		Management techniques	Section
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 where grazing is not possible. In small stands use pedestrian mowers/flails or in large stands tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	F	Use a forest grinder to mulch scrub in-situ. Further operations to remove tree mulch and leaf litter and to prevent or reduce re-growth will be needed.	5.8.6 5.9.4.3
R/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
	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 & D above) with paintbrush or foliar application.	5.8.16 5.9.4.4

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

Cont...

Imazapyr*	Farm buildings/yards; fence lines; forestry (site preparation); industrial sites; non-crop areas; railway tracks.	Herbicides are listed in alphabetical order. (2,4-D comes under the letter 'D'.)
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

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  tel: 01234 364213,
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- Catherington Lith,
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  Petersfield. GU31 4EX
  tel: 01730 234386
  e-mail: Martin_Healey@easthants.gov.uk

- English Nature
  Contact: Bronsil House, Eastnor, Ledbury,
  Herefordshire, HR8 1EP
  tel: 01531 638 500

- Esher Commons SSSI
  Contact: David Page (Countryside Estates Officer),
  Elmbridge Borough Council, Leisure & Cultural Services, Civic Centre, High Street, Esher, Surrey.
  KT10 9SD.
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Further reading

See end of chapter

4.4.42 Traveller's Joy, *Clematis vitalba*

Summary
Traveller's Joy (Old Man's Beard) is widespread as far north as Yorkshire and Cumbria, where it favours calcareous soils. It is an important component of mixed scrub communities and is maintained as part of that mosaic.

It will climb over shrubs and is liable to suppress regeneration of scrub and herbaceous flora. On some downland sites this is a particularly acute problem. Where it does compromise interests of priority habitats then management will be required.

Distribution and status
Traveller's Joy is a common component of the chalk and limestone scrub communities and can be found as far north as North Wales, South Yorkshire and Cumbria. North of that region it has probably naturalised from introductions.

Identification
Flowers: Jul–Aug.

The pale bark is very fibrous and peeling. The opposite pairs of compound leaves are pinnate, oval with pointed tips.

The clustered panicle of small green-cream coloured, fragrant flowers grow on stalks from the leaf axils. The fruits develop long white, downy plumes in late summer and autumn.

Growth characteristics
- Seeds prolifically on exposed soils.
- Shoots from cut stems, as well as from surface roots and layered stems.
- Re-shoots well after sheep grazing.
- Smothers and climbs over other shrubs.

Palatability
- Grazed throughout spring, summer and early autumn by sheep.
- Limited amount of summer grazing by cattle.

Traveller's joy. Peter Wakely/English Nature

- Favoured by goats, who also take tips and bark in winter.
- Ignored by horses.

Value to wildlife
Valuable to wildlife, for example:
Cover and shelter
- Matted growth provides summer shelter and winter refuges.

Invertebrates:
- 35 species recorded feeding.
- 10 species feeding exclusively.
- 3 RDB species.

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	Intermittent browsing by livestock in late spring may encourage bushy growth and seeding.	5.8.4
M	B	Moderate grazing of established scrub where Traveller's Joy is a component will suppress growth and reduce its value for wildlife.	5.8.4
	2	**Enhance or maintain stands mechanically:**	
En/M	A	If necessary, use a hedge cutter to lightly trim in late spring to encourage bushy growth and seeding. Check for nesting birds before carrying out any work.	5.8.13, 5.9.4.1 5.9.4.2
	3	**Reduce from priority habitats using livestock**	
R	A	Follow cutting with heavy browsing to impact regeneration in the summer.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically** Where Traveller's Joy is likely to suppress ground flora or regeneration:	
R/Er	A	Cut underground roots or re-growth using hand tools (spade, mattock, billhook or root cutting chain saw).	5.8.14, 5.9.4.1 5.9.4.2
R/Er	B	Cut small-stemmed bushes with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Re-growth will occur.	5.9.4.1 5.9.4.2
R/Er	C	Cut tangled growth using mechanical tools where conditions allow. Re-growth will occur.	5.8.6/5.8.13 5.9.4.2, 5.9.4.3
	5	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed wipe or spray re-growth in the summer using an appropriate herbicide.	5.8.16/5.9.2 5.9.4.4

Herbicides that may be considered for use on Traveller's Joy as at July 2003
Travellers Joy is identified as a species on the product labels highlighted in bold in the 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
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.	

Cont...

Fosamine-ammonium*	Forestry, non-crop areas, waterside areas, conifer plantations (off-label).	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'.)
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

- Martin Down, NNR
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  tel: 01980 620485
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- Old Winchester Hill
  Contact: Barry Proctor
  tel: 01962 771022
  e-mail: barry.proctor@english-nature.org.uk

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  e-mail: paul.toynton@de.mod.uk

Further reading

See end of chapter

4.4.43 Wayfaring Tree, *Viburnum lantana*

Summary
The Wayfaring Tree occurs at low abundance and frequency in mixed scrub communities on the chalk downs of southern England.

Younger bushes respond to coppicing and regenerate from surface roots. Leaves and young shoots are palatable for livestock. It is valued as a component of calcareous shrub communities and has additional 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 Wayfaring Tree is a locally common native shrub of calcareous soils. It is found in low abundance and frequency as a component of the mixed scrub communities across the chalk downs of southern England, becoming scarce towards the Midlands.

Identification
Max height: 6 m; Flowers: Jun–Jul;
Fruit: Aug–Sep; Ripens: Oct.

It has rounded, pale brown, downy stems. The oval shaped leaves grow in opposite pairs from the stem. They are finely toothed and wrinkled with a terminal point, are 5–10cm long, sparsely hairy above and densely downy grey below.

The flat umbel of white flowers is up to 10 cm across and grows from the tip of the stem. The fruits are oval, 8 mm long and flattened. They ripen through red to black.

Growth characteristics
- Will regenerate from surface roots.

- Grows well from cut stumps.

Palatability
- Leaves and young shoots are eaten by cattle and sheep in summer.

Wayfaring tree. Peter Wakely/English Nature

- Goats can over browse.

Value to wildlife
Important to wildlife, for example:
Invertebrates:
- 44 species have been recorded feeding, 7 species 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	A	Light browsing may encourage bushy growth and some fruit productivity. Bark stripping may initially increase fruit productivity and eventually create standing dead wood.	5.8.4/5.8.9
En	B	Cattle and pony trampling creates routes through extensive stands leading to the formation natural gaps and glades. Prevent trampling to encourage spread of stands.	5.8.4/5.8.8
M	C	Avoid spring/early summer browsing when Wayfaring Tree is most likely to be palatable.	5.8.4
En/M	D	To encourage seeding and suckering use low/moderate levels of grazing to open the sward by targeting succulent competitor herbs. After germination reduce or remove stock as required. In vulnerable areas stands may need protecting.	5.8.1/5.8.3 5.8.4
En/M	E	Prevent trampling when trying to encourage natural spread of stands.	5.8.3
M	F	Moderate to heavy browsing creates browse lines opening 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 and/or scarifying ground to encourage seed germination. Alternatively propagate from seeds or cuttings and plant out. Protect plants using tree tubes or temporary fencing if necessary.	5.8.1/5.8.2 5.8.3
M	B	Young bushes respond well to coppicing and are likely to increase fruit productivity. Protect from browsing where necessary.	5.8.3/5.8.5
En/M	C	To replicate natural processes, clear some stands and allow others to develop elsewhere but maintaining the desired extent across the site. Maintain a diverse age and structure range of Wayfaring Tree within mixed species stands.	5.8.5/5.8.13
En	D	Retain dead bushes to decay naturally to benefit other wildlife. This can be augmented by ring barking selected stems as required. 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 scrub using stock levels and breeds that preferentially take Wayfaring Tree but do not damaged the target habitat. Monitor the effects on the habitat as a whole and reduce or remove stock before the impacts become undesirable.	5.8.4
R	B	To reduce regeneration browse in the spring following cutting.	5.8.4
	4	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand pull or use sapling extraction tools to clear small areas of 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). Where necessary 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

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

Objectives		Management techniques	Section
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 where grazing is not possible. In small stands use pedestrian mowers/flails or in large stands a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
	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 Wayfaring Tree as at July 2003
Wayfaring Tree 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.

Key sites

- Aston Rowant NNR,
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- Beds, Cambs, Northants and Peterborough Wildlife Trust
  Contact: Andy Fleckney,
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- Brighton and Hove Council
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  Tel: 01273 292371

- Bucks County Council.
  Contact: Annexe A, County Hall, Aylesbury, Bucks,
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  e-mail: david.burton@english-nature.org.uk

- Sussex Downs Conservation Board
  Contact: Northern Area Office, Midhurst Depot, Bepton Road, Midhurst GU29 9QX
  tel: 01730 817945

Further reading

See end of chapter

4.4.44 Whitebeam, Common *Sorbus aria*

(*See also*: 4.4.36 Rowan, *Sorbus aucuparia*; 4.4.37 Rowan/Whitebeam spp, *Sorbus spp*).

Summary
Whitebeam is a component of the southern calcareous scrub communities, where it is found in low to moderate numbers. Outside of its natural range, its distribution has been enhanced by its attractiveness as an amenity landscape tree.

It regenerates from surface roots; younger bushes respond to coppicing. Palatability for livestock is generally low. It has 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 natural distribution of Whitebeam is usually on the chalk or limestone regions of southern England, occasionally on sandstones. Here it can be found often in low abundance and frequency.

Outside of this range it is rare, existing only as a naturalised by product of amenity landscape planting.

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

Dark barked, with hairy young twigs. The 2 cm buds are rounded, greenish and varying from hairy to hairless.

The leaves are elliptical, dull green above and white below, with fine double-toothed edges.

The small umbels of white flowers give way to bunches of scarlet red fruits.

Growth characteristics
- Can regenerate from surface running roots.
- Will shoot from stumps of young plants.

Whitebeam. Tony Robinson/English Nature

Palatability
- Leaves and young shoots are sometimes palatable to sheep and cattle.
- Ignored by Rabbits.

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 160 species recorded feeding on genus.
- 14 species exclusively and 7 RDB species.

Birds:
- Late summer, early 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	A	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
En/M	B	Encourage seed germination and suckering by using low to moderate levels of grazing to open the sward by targeting 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	C	Avoid spring and early summer browsing when Whitebeam may most likely to be palatable.	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. Alternatively propagate from seeds or cuttings and plant out. Protect plants using tree tubes or temporary fencing if necessary.	5.8.1/5.8.2 5.8.3
En	B	Young bushes are believed to respond better to coppicing and increase fruit productivity. Sporadic mowing of re-growth may enhance suckering.	5.8.5/5.8.6
En/M	C	To replicate natural processes clear some stands and allow others to develop elsewhere, but maintain the desired extent across the site. Maintain a diverse age and structure range of Whitebeam within the mixed species stands.	5.8.1
M	D	Retain dead bushes to decay naturally to benefit other wildlife. Ring barking selected large stems as required may augment this. NB: This is likely to encourage regeneration 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 Whitebeam 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 extraction tools 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). If required 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 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 where grazing is not possible. In small stands use pedestrian mowers/flails or in large stands 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...
(Key: En = Enhance; M = Maintain; R = Reduce; Er = Eradicate)

Objectives		Management techniques	Section
	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 Whitebeam as at July 2003
Whitebeam 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.

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

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

- Salisbury Plain
  Contact: Paul Toynton
  tel: 01980 674741,
  e-mail: paul.toynton@de.mod.uk

Further reading

See end of chapter

4.4.45 **Willow, Grey** *Salix cinerea*; **Goat,** *S. caprea*; **Osier,** *S. viminalis*; **Almond,** *S. triandra*

(See also: *4.4.46* & *4.4.47* for other Willows).

Summary
This profile covers the commoner two native species and the two widespread introduced species of willow that occur in wetland systems mainly in lowland Britain.

They are usually managed to maintain single species stands or as a component of mixed scrub communities. However, they can be invasive on to priority open habitats and so require preventative management to prevent spread.

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

Distribution and status
Grey Willow:
Is found throughout most of lowland Britain, but has been exceptionally recorded at 845 m. It has many associate sub-species and hybrid varieties. It grows in marshes, bogs, fens, wet woodlands and wet heathlands. It colonises very quickly and can be found on waste ground and mineral workings, and is also widely planted in amenity landscape schemes.

Goat Willow:
Is locally common throughout much of lowland Britain, but also occurs at altitudes of up to 760 m. Like the Grey Willow, it has many hybrid and sub-species forms with localised distributions. It can be found growing as woodland edge scrub, among hedges, lakes and streams. Like Grey Willow, it is able rapidly to colonise waste ground and is more tolerant of drier and base rich conditions. It is also widely used in landscape schemes.

Osier:
Is common throughout Britain occurring at altitudes up to 400 m, but is less frequent in the northwest of Scotland. It was introduced into Britain mainly for basketry and amenity landscape, and is usually planted in single species stands known as Osier beds.

It is now being widely used for biomass fuels. It has a number of cultivated hybrid forms. It is naturalised in a wide range of wetland areas including; streams, ponds, marshes, fens and as amenity landscaping.

Willow *salix caprea* Peter Wakely/English Nature

Almond Willow:
It is found mainly from Somerset, across central southern England into East Anglia and north into Yorkshire, parts of Northumberland and Cumbria. It was introduced into Britain for basketry, but is not as widespread as the Osier. It has a number of localised hybrid cultivated forms. The Almond Willow can be found naturalised in wetland areas, mainly along rivers, streams, ponds marshes and Osier beds.

Identification
Grey Willow:
Similar appearance and characteristics to Goat Willow, except twigs stay downy and the oblong to oval shaped leaves are narrower and taper to a stalk at the base. They are 2.5–7 cm long, downy above when young and always downy beneath. The catkins are also similar to Goat Willow.

Goat Willow:
Grows to 15 m, has downy young twigs and grey-brown

mature bark. The oval leaves are 5–10 cm long, hairless above and grey-downy below, with a pointed tip. The silvery-white, male and downy green-grey, female catkins appear early in the year before the leaves.

Osier:
Grows to 6 m or more, branches long and straight, twigs are downy. The leaves are very long, 10–25 cm, and narrow with un-toothed edges. They are dark-green, hairless above, and silvery-silky below.

Almond Willow:
Grows to 10 m, the bark is smooth, brown and peels. The twigs are hairless. The oblong leaves are shiny above and waxy below, 5–10 cm long.

Growth characteristics

- Capable of shooting and rooting from fragments of twig.
- Grows rapidly from coppiced stumps.
- Capable of sending up shoots from any shallow or severed root.

Palatability

- Leaves and shoots are palatable to most livestock especially in the spring and early summer.
- Horses/ponies, goats, and some sheep regularly de-bark, particularly in winter.

Value to wildlife

Native species are valuable to wildlife, for example:
Invertebrates:

- 752 species recorded feeding on the genus.
- 217 species recorded feeding exclusively.
- 81 RDB and 20 BAP species recorded.

Birds:

- High biomass source of insect 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	Low intensity summer browsing encourages bushy growth and seed productivity. Bark stripping may initially increase seed production and create standing dead wood.	5.8.4/5.8.9
M	B	Moderate to heavy browsing in established scrub can create browse lines, open the structure and reduce its value for some wildlife.	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 to encourage spread of stand.	5.8.4/5.8.8
En/M	D	Allow natural expansion of stands by protecting from browsing and trampling.	5.8.3
En/M	E	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.	5.8.1/5.8.3 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 manually or mechanically:**	
En	A	Increase extent of stand by scarifying ground to encourage seed germination; push into the ground young growths/branches/cuttings that will root and grow.	5.8.1/5.8.2
En/M	B	To maintain age and structural diversity divide large stands into small, sinuous edged coups, cutting on rotation. Manage small isolated stands as individual units.	5.8.5/5.8.13

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

Objectives		Management techniques	Section
En/M	C	To replicate natural processes clear some stands (unless good for epiphytes) while allowing others to establish elsewhere but maintaining the desired extent across the site.	5.8.5/5.8.8 5.8.13
En	D	Retain dead bushes to benefit other wildlife. Augment this by ring barking selected large stemmed bushes where required. NB: ring barking encourages regeneration 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	Choose stocking levels and breeds with a preferential taste for Willow without damage to the target habitat. Monitor the effects on the habitat and reduce or remove stock before the impacts become undesirable.	5.8.4
R	B	Browse in the spring to reduce re-growth and regeneration.	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	Large stands of young scrub can be flailed or mulched. A separate operation may be needed to remove the mulch so as not to suppress the target interest. Larger pieces of mulched arisings may re-grow.	5.8.6/5.8.13 5.9.4.3
R/Er	F	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
R/Er	G	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment in drier stands where grazing is not possible. In small stands use pedestrian mowers/flails or in large stands, a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	H	Raised summer water levels and prolonged submergence may 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**	
R/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
R/Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
R/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 Willows as at July 2003

Willow is identified as a species on the product labels highlighted in bold in the table below. If not mentioned on product labels then it falls within the general classification of a 'woody weed' – see non-bold entries. 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;** 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; non-crop areas/farm buildings/yards/ fence-lines/forestry (site prep)/railway tracks.**	
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

- Cors dyfi
  Contact Clive Faulkener, Montgomery WT,
  tel: 01938 556161

- Cumbria.
  Contact: Ian Taylor, Conservation Officer,
  English Nature, tel: 01539 792800,
  e-mail: ian.taylor@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: 01159 588242, e-mail: jfraser@nottswt.cix.co.uk

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

Further reading

See end of chapter

4.4.46 Willow, Purple *Salix purpurea*; Eared, *S. aurita*; Bay, *S. petandra*; Dark-leaved, *S. myrsinifolia*; Tea-leaved, *S. phylicicfolia*

(See also: *4.4.45* & *4.4.47* for other Willows).

Summary
The five native willows described in this profile are widely but locally distributed. These species tend to be less vigorous and stands tend to be more self-sustaining than those of the commoner willows.

Because they are less vigorous and invasive management for these species is aimed less at reduction and more towards conservation.

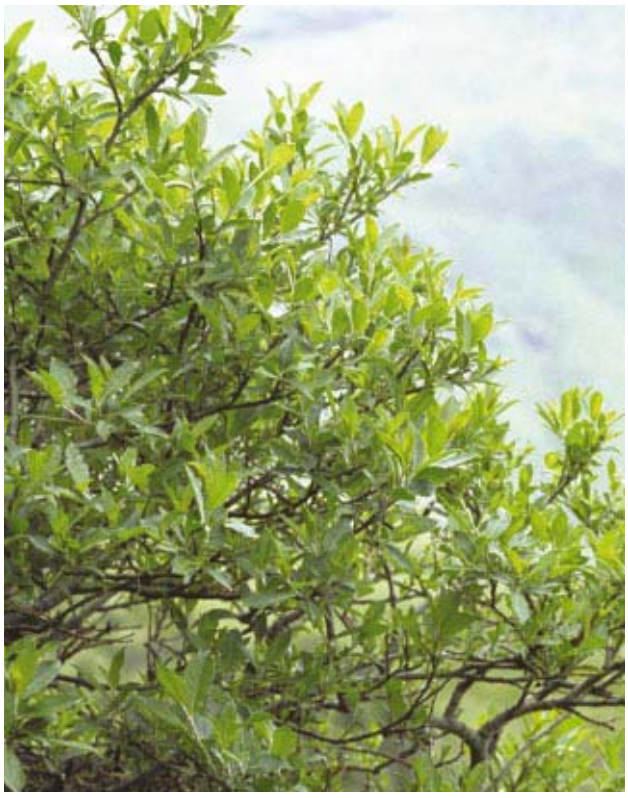
Livestock browsing and various mechanical methods can be used to maintain and diversify stands, prevent encroachment and if necessary, reduce or eradicate encroachment into priority habitats.

Distribution and status
Purple Willow:
Is found locally along river margins, fens, bogs and marshes throughout Britain up to an altitude of 440 m. It has also been planted in 'osier' beds for basketry, making distinction of natural provenance difficult. Like many other willows, there are a number of hybrid forms of the species.

Eared Willow:
Is most abundant in western and northern Britain, growing on acid heaths, moors, alongside streams and in woodlands to altitudes of 790 m. It has a number of hybrids and sub-species, which are restricted to specific habitats, from heaths, fens, moors and dunes.

Bay Willow:
Is distributed from the midlands to the north of Scotland, and in northern Ireland, up to altitudes of 410 m. It grows mainly in marshes, fens, ponds, streams and wet woods. It can also be found among dune slacks and along verges. It is widely used in amenity landscaping, which has artificially expanded its range further south.

Dark-leaved Willow:
Is a localised species found in northern England, central Scotland and as far north as Sutherland and Outer Hebrides, and locally in Northern Ireland. Although it has been recorded at altitudes of up to 940 m, it is principally a lowland species growing mainly along gravel riverbeds and lakes shores, as well as forming thickets on marshy ground and in wet woodland.



Dark leaved willow, Creag na Caillich cliffs, Ben Lawers.
Robert Goodison/RDS

Tea-leaved Willow:
Has a similar distribution to the Dark-leaved Willow, but is absent from Northern Ireland. It occurs from sea level to 685 m in Britain, but in western Ireland, it is a montane species. It grows along streams, rivers, pond edges and damp rocky places. It prefers base-rich soils, and is sometimes associated with Carboniferous limestone.

Identification
Purple Willow:
Grows up to 5 m, has slender purple coloured shoots and long narrow leaves, tapering toward the base.

Eared Willow:
Grows up to 2 m, and has dark, red-brown twigs which are at first downy and become hairless. The leaves are wrinkled, woolly grey below and up to 2.5 times as long as wide. At the base of the leaf stalk, is a small, rounded 'eared' appendage.

Bay Willow:
Grows to 7 m, has grey-brown, rough bark. Leaves are shiny, 5–12 cm long and elliptical. When young, leaves and buds are sticky and fragrant.

Dark-leaved Willow:
Grows to 4 m, the bark is dark greyish, with shallow fissures. Young twigs are at first downy and later hairless, dull brown or greenish. The leaves are 2–6.5 cm long, obovate to elliptical, with a flattened or rounded base. They are downy, becoming dark, shiny-green above and blue below, turning dark when dried.

Tea-leaved Willow:
Very similar to and easily confused with Dark-leaved, except the twigs are hairless and glossy brown. The leaves are shiny green and do not turn black.

Growth characteristics
- Capable of shooting from fragments of twig.
- Grows rapidly from coppiced stumps.
- Capable of sending up shoots from any shallow or severed root.

Palatability
- Leaves and shoots are palatable to livestock especially in spring and early summer.
- Horses/ponies, goats, and some sheep regularly de-bark particularly in winter.

Value to wildlife
All are valuable to wildlife, for example:
Invertebrates:
- 752 species recorded feeding on genus.
- 217 species recorded feeding exclusively.
- 81 RDB and 20 BAP species recorded.

Birds:
- High biomass source of insect 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	Low intensity summer browsing encourages bushy growth and seed productivity. Bark stripping may initially increase seed production and create standing dead wood.	5.8.4/5.8.9
M	B	Moderate to heavy browsing in established scrub can create browse lines, open the structure and reduce its value for some wildlife.	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 to encourage spread of stand.	5.8.4/5.8.8
En/M	D	Allow natural expansion of stands by protecting from browsing and trampling.	5.8.3
En/M	E	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.	5.8.1/5.8.3 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	Increase extent of stand by scarifying ground to encourage seed germination or planting cuttings.	5.8.1/5.8.2
En/M	B	To maintain age and structural diversity, divide large stands into small, sinuous edged coups, cutting on rotation. Manage small isolated stands as individual units.	5.8.5/5.8.13

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

Objectives		Management techniques	Section
En/M	C	To replicate natural processes, clear some stands (unless good for epiphytes) while allowing others to establish elsewhere, but maintaining the desired extent across the site.	5.8.5/5.8.8 5.8.13
En	D	Retain dead bushes to benefit other wildlife. Augment this by ring barking selected large stemmed bushes where required. NB: ring barking encourages regeneration 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	Choose stocking levels and breeds with a preferential taste for Willow without damage to the target habitat. Monitor the effects on the habitat and reduce or remove stock before the impacts become undesirable.	5.8.4
R	B	Browse in the spring to reduce re-growth and regeneration.	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 underground roots, 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	Large stands of younger scrub can be flailed or mulched. A separate operation may be needed to remove the mulch so as not to suppress the target interest. Large pieces of mulched arisings may re-grow.	5.8.6/5.8.13 5.9.4.3
R/Er	F	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
R/Er	G	Regular (e.g. monthly) summer mowing or cutting may reduce encroachment in drier stands where grazing is not possible. In small stands use pedestrian mowers/flails or in large stands a tractor and swipe or flail.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
R/Er	H	Raised summer water levels and prolonged submergence may 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**	
R/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
R/Er	B	Treat freshly cut stumps with appropriate herbicide.	5.8.16/5.9.2 5.9.4.4
R/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

4.4.47 **Willow, Creeping** *Salix repens*; **Dwarf,** *S. herbacea*; **Downy,** *S. lapponum*; **Whortle-leaved,** *S. myrsinites*; **Woolly,** *S. lanata*; **Mountain,** *S. arbuscula*; **Net-leaved,** *S. reticulata*

(See also: *4.4.45* & *4.4.46* for other Willows).

Summary
The small prostrate growing species profiled here, generally occur in upland areas of Britain.

This is a loose association, as the most widespread of this group, Creeping Willow, is not strictly montane.

Management aims to maintain, enhance and increase stands, but where necessary in the case of Creeping Willow, prevent encroachment in lowland priority habitats.

Distribution and status
Creeping Willow:
Is most widespread of the suite, occurring in southern and northern England, parts of East Anglia, south and north Wales, central and northwest Scotland.

There are several varieties, found in a range of habitats from sea level up to 850 m. The two prostrate varieties can be found on lowland and maritime heaths, dunes, acidic grassland and moorland. The more erect variety can be found locally in fens.

Creeping Willow is self-sustaining, requiring minimal or no management. It can become invasive and encroachment needs to be prevented.

The remaining species, **Dwarf, Downy, Woolly, Mountain, Whortle - leaved** and **Net-leaved Willow** occur on wet rocky crags and flushes of Scottish mountains mostly between 200 and 1300 m, although they are recorded below this, at sea level.

The Dwarf Willow is also found outside of Scotland, in Northern England and Wales.

They are rare and localised (Woolly Willow, has its own Species Action Plan) and have declined due to over grazing, which has reduced them to remnant populations on unstable rocky screes.

Identification
Creeping Willow:
Is a low, prostrate shrub, growing up to 2 m, depending on sub-species and habitat. The leaves are 2.5–4.5 cm long and oval, usually with silky white hairs below, depending on type.

Dwarf willow, Ainsdale NNR. Peter Wakely/English Nature

Dwarf Willow:
A low growing shrub with shiny brown or red-brown stems. The buds are small, rounded and like the stems, are slightly hairy, before becoming smooth and shiny.
The leaves are rounded, at first white-hairy, becoming a dark shiny green.

Downy Willow:
Grows up to 1 m, with rigid branches and like Dwarf, become smooth and dark, red-brown in colour. The leaves are variable, 1.5–7 cm long and slim, sometimes twisted at the tip and grey-green above and pale grey below.

Woolly Willow:
Grows up to 1m, its branches are rugged and gnarled. The twigs are rigid with well-defined leaf scars, shiny brown, with dark red-brown buds. The leaves are 3.5–7

cm long, oblong to elliptical and dark, grey-green above and glaucous beneath.

Mountain Willow:
A very small much branched shrub up to 0.7 m. The twigs at first are slightly hairy and become glossy reddish-brown. The leaves are 1.5–3 cm, oblong to elliptical, bright shiny green above and bluish-grey beneath.

Whortle-leaved Willow:
A low growing shrub up to 0.5 m similar in character to the above but with shiny reddish brown twigs. The leaves are 1.5–7 cm, oblong or oval-like, with a flattened, rounded base. They are a shiny bright green in colour on both surfaces and have prominent veins.

Net-leaved Willow:
Small much branched shrub with creeping and rooted stems. The twigs at first have long sparse hairs and soon become smooth and red-brown in colour. The leaves are 1.2–4 cm in length, smooth, dull green above and white-grey beneath.

Growth characteristics
- Can germinate from seed under suitable conditions.
- Capable of shooting from fragments of twig.
- Re-growth from coppiced stumps can be slow.

Palatability
- Leaves and shoots are palatable to livestock especially in spring and summer.
- Horses/ponies, goats, and some sheep regularly de-bark particularly in winter.

Value to wildlife
Important to wildlife, for example:
Lower plants:
- rare bryophyte communities.

Invertebrates:
- 26 insect species recorded.

Birds and mammals:
- Shelter for montane species.

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.

Approved herbicides and situations
These are rare species; herbicide treatment is not appropriate.

Key sites
- Ainsdale Dunes, Lancashire
  Contact: Rob Wolstenholme,
  English Nature
  e-mail: robert.wolstenholme@english-nature.org.uk

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

Further reading
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UK Biodiversity Group (1998), Tranche 2 Action Plans Vol. 1 Vertebrates and vascular plant, English Nature

Examples of management techniques to implement example objectives

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

Note that 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.

Objectives		Management techniques	Section
	1	**Encourage natural regeneration:**	
En	A	To encourage seed germination use hand tools to scrape thick grass mat and scarify ground. Where access and ground conditions allow use mechanical machinery to scrape vegetation and create seedbeds with shallow cultivations.	5.9.4.1 5.9.4.2 5.9.4.3
En	B	Careful use of controlled burning may remove rank grass and create a seedbed. The method is not fully understood for upland scrub and uncontrolled burning is a recognised threat to the species therefore the method may not be appropriate.	5.8.7
En	C	Low to moderate levels of grazing will open and retain an open sward by targeting succulent competitor herbs and encouraging natural regeneration. After germination monitor impacts and reduce or remove stock as necessary. In vulnerable areas stands may need protection from trampling, grazing or browsing.	5.8.4
	2	**Propagate and plant out seedlings:**	
En	A	Propagate plants preferably from seed to build up low populations, particularly those of single sex plants. Encourage spread into areas not susceptible to impact from landslide. (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 and browsing. Remove protection when established. (see 3D & 3E below).	5.8.3
M	B	Avoid livestock browsing in winter. Damage and loss of saplings are high during this period as alternate forage is scarce.	5.8.4
M	C	It is not necessarily desirable to exclude grazing, as succession shades and kills bushes and suppresses regeneration. Carefully manage stock in early summer when young growth is palatable and vulnerable. Use appropriate stocking levels and breeds with a taste for competitor herbs. Monitor impacts and reduce or remove as required.	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	Fencing can be expensive particularly in highland areas. Deer fencing in woodland grouse areas must be visible to prevent mortality. Provide access for controlled grazing.	5.8.3
	4	**Enhance or maintain lowland Creeping Willow stands using livestock:**	
En	A	Low intensity summer browsing encourages bushy growth and seed productivity. Bark stripping may initially increase seed production and create standing dead wood.	5.8.4/5.8.9
M	B	Moderate to heavy browsing in established scrub can open the structure and reduce its value for some wildlife.	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 to encourage natural spread of stand.	5.8.4/5.8.8

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

Objectives		Management techniques	Section
En/M	D	Encourage regeneration using low to moderate stocking levels to open the sward by targeting 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	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	**Enhance or maintain lowland Creeping Willow stands mechanically:**	
En	A	Increase extent of stand by scarifying ground to encourage seed germination or plant cuttings.	5.8.1/5.8.2
En/M	B	To maintain age and structural diversity divide large stands into small, sinuous edged coups, cutting on rotation. Manage small isolated stands as individual units.	5.8.5/5.8.13
En/M	C	To replicate natural processes, clear some stands while allowing others to establish elsewhere but maintaining the desired extent across the site. Retain dead bushes to benefit other wildlife.	5.8.5/5.8.8 5.8.13
M	D	Remove or burn arisings as and where appropriate.	5.9.1/5.9.2
	6	**Reduce Creeping Willow from priority lowland habitats using livestock**	
R	A	Choose stocking levels and breeds with a preferential taste for Willow without damage to the target habitat. Monitor the effects on the habitat and reduce or remove stock before the impacts become undesirable.	5.8.4
R	B	Browse in the spring to reduce re-growth and regeneration.	5.8.4
	7	**Reduce or eradicate Creeping Willow 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 underground roots, 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.: long-handled slasher, clearing saw). Re-growth will occur.	5.9.4.1, 5.9.4.2
R/Er	D	Regular (e.g. monthly) summer mowing may reduce encroachment where grazing is not possible. In small stands use pedestrian mowers/flails or in large stands, a tractor and swipe or flail.	5.8.6/5.9.4.2 5.9.4.3
R/Er	E	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
R/Er	F	Raised summer water levels and prolonged submergence may suppress growth but will encourage aerial roots to grow from the stem above the waterline.	5.8.11
	8	**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.	5.8.16/5.9.2 5.9.4.4

4.4.48 **Yew,** *Taxus baccata*

Summary
Yew is a slow growing long-lived, widespread species and a component of mixed scrub communities. In areas mainly on the chalk downs of southern England, pure Yew woods of high conservation value have developed. This needs to be recognised when dealing with over mature single species stands.

For many years, Yew has also been widely planted as a landscape feature throughout the country.

Yew 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 protection and enhancement when it is threatened. Various methods are described which will achieve this.

Distribution and status
Yew is one of our longest-lived shrub and tree species. It is a widespread but localised evergreen found growing on most soils throughout Britain but mainly as a component of mixed calcareous scrub communities.

On the chalks of southern England, and at one site in Durham, Yew develops into single species woodland of high conservation value. These are rare habitats and features that need to be maintained by incorporating natural scrub successional processes.

Yew has also been widely planted over the centuries as a landscape feature in parks, gardens and churchyards.

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

Yew is a moderately slow growing evergreen tree or shrub, which by its smothering and shade casting growth habit can become particularly invasive. The older bark is reddish brown, and pealing. Younger twigs and stems are a dark green and grooved beneath the leaves.

The leaves grow in pairs and are strap like. They are narrow, 2–4 cm long and vary from shiny to dull green above and dull matt green beneath.

Yew scrub, Kingley Vale. John Bacon/English Nature

Each bush has either male or female flowers. Male flowers are yellow, shedding lots of pollen early in the year, while the female flowers are small and green, developing later in the year to a bright red hollowed capsule the inside of which is the seed. The flesh of the fruits are not poisonous, but the seeds are.

Growth characteristics
- Seeds will germinate in disturbed soil.
- Protection from browsing by other shrubs such as Hawthorn and Juniper can help seedlings to become established quickly.
- Young plants will regenerate but may be susceptible to drought stress.
- Branches cast deep shade that smothers out most other species.
- Windblown trees will regenerate from root plate.

- Yew is quite slow growing and older trees are slow to regenerate from cut stump.
- Surface running roots can develop shoots.
- Very long lived with trees living for many hundreds of years.

Palatability
- Yew is potentially highly poisonous to livestock so a precautionary approach is recommended; though they normally know to leave it alone or only take small amounts. Ensure abundance of other herbage or fence out.
- Deer appear to find it palatable, especially as a winter food source when little else is available.
- Similarly, in winter snow, Rabbits will take young growing tips, when little else is available.
- It has only been seen to be taken by ponies in extreme situations. If they take it due to lack of suitable winter browse they have been know to die.
- Cut or wilted branches may become more palatable so should be removed.

Value to wildlife
Valuable to wildlife, for example:
Invertebrates:
- 26 species have been recorded feeding.
- 2 species exclusively.
- 1 RDB species.

Birds:
- Fruits are a good source of food and it also provides a safe roosting site.

Shelter and cover:
- Provides excellent shelter and cover especially in cold winter weather and blizzards when it remains frost free underneath the canopy.

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.

Herbicides that may be considered for use on Yew as at July 2003
Yew 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'. Yew is seldom treated so information about the effectiveness of herbicides is not known.

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.

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:** Management should take into account conservation value of mature Yew woods and longevity potential of individual Yew trees. Provision for development of Yew scrub on adjacent new sites may allow existing Yew scrub to be left to develop into woodland. Examples included below.	
En	A	Create seedbeds near existing seeding stands by scarifying the ground in late summer. If natural regeneration is unsuccessful, propagate from cuttings or fruits and plant out.	5.8.1/5.8.2
En/M	B	To maintain age and structural diversity divide large scrub stands into small, sinuous edged coups, cutting on a long rotation. Manage small and isolated stands as individual units. NB: wood is very hard and quickly blunts cutting tools.	5.8.5/5.8.8 5.8.13
En/M	C	Clear some stands while allowing others to establish elsewhere, replicating natural dynamic processes but maintaining the desired extent across the site. When cutting mixed species stands remember old Yew regenerates more slowly and may be suppressed, especially in dry weather.	5.8.5/5.8.13
En	D	Retain dead bushes to decay naturally and provide niches for other wildlife. To augment deadwood, ring-bark selected larger stems as required. NB ring barking can encourage regeneration from the stump (where necessary take action using 3B below).	5.8.9
M	E	Remove or burn arisings where appropriate.	5.9.1/5.9.2
	2	**Reduce or eradicate from priority habitats manually or mechanically**	
R/Er	A	Hand-pull or use sapling removal tools to clear young seedlings/saplings. Consider potential for re-planting removed saplings on new sites.	5.8.12 5.9.4.1
R/Er	B	Cut surface running roots or re-growth from stumps using hand tools (spade, mattock, billhook or root cutting chain saw). Older Yew regenerates only sparsely from cut stumps but any re-growth can be cut. If required winch larger stumps where a suitable anchor exists (but consider the benefits to epiphytes of leaving cut stumps) 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 with hand tools (e.g.: billhook, loppers, bow saw, chain saw, clearing saw). Limited re-growth may occur. NB: Yew wood is very hard and quickly blunts cutting 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. Limited re-growth may occur. (NB: see 2C above).	5.9.4.2
R/Er	E	Large stands of young scrub can be flailed but mulch may suppress target species and will need removing. NB: Large stands of mature scrub will have a high conservation value as pure Yew wood and should not be removed.	5.8.6/5.8.13 5.9.4.2 5.9.4.3
	3	**Eradicate re-growth (and seedlings) using herbicide**	
Er	A	Weed wipe or repeatedly spray re-growth in the summer using an appropriate herbicide.	5.8.16 5.9.4.4
Er	B	Prevent re-generation from stumps of ring barked stems (see 1D above) with paintbrush or foliar application.	5.8.16/5.9.2 5.9.4.2

Key sites

- Aston Rowant NNR,
  Contact: Graham Steven,
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- Hunthouse Wood
  Contact: Helen Woodman,
  Worcestershire Wildlife Trust
  tel:01905 754919
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- Kingley Vale NNR,
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- Old Winchester Hill NNR
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Further reading

Tolhurst, S., (Ed) (2001), *A Guide to Animal Welfare in Nature Conservation Grazing*, GAP, English Nature.
See end of chapter

Further reading

Anon, (2002), *Soil Association technical guides – Organic weed and scrub control on nature conservation sites*. Soil Association

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Web site:
UK Governments pesticide website:
http://www.pesticides.gov.uk