Appendix 1.

The common and scientific names of trees referred to in the text

Alder		*Alnus glutinosa* (L.)
Apple		*Malus* Spp.
	Crab	*Malus sylvestris* (L.)
	Domestic	*Malus domestica* Borkh.
Ash		*Fraxinus excelsior* L.
Aspen		*Populus tremula* L.
Beech		*Fagus sylvatica* L.
Birch		*Betula* Spp.
	Downy	*Betula pubescens* Ehrh.
	Northern downy	*Betula pubescens* ssp. *tortuosa* (Ledeb.)
	Silver	*Betula pendula* Roth
Elm		*Ulmus* Spp.
	English	*Ulmus procera* Salisb.
	Wych	*Ulmus glabra* Hudson
Hawthorn		*Crataegus monogyna* Jacq.
Hazel		*Corylus avellana* L.
Holly		*Ilex aquifolium* L.
Hornbeam		*Carpinus betulus* L.
Horse chestnut		*Aesculus hippocastanum* L.
Lime		*Tilia* Spp.
	Small-leaved	*Tilia cordata* Miller
Maple		*Acer* Spp.
	Field	*Acer campestre* L.
	Norway	*Acer platanoides* L.
Oak		*Quercus* Spp.
	Pedunculate	*Quercus robur* L.
	Sessile	*Quercus petraea* (Mattuschka) Liebl.
Pear		*Pyrus* Spp.
Plane (London Plane)		*Platanus x hispanica* Miller ex Muenchh.
Poplar		*Populus* Spp.
	Black	*Populus nigra* ssp. *betulifolia* (Pursh)
Rowan		*Sorbus aucuparia* L.
Scots pine		*Pinus sylvestris* L.
Sweet chestnut		*Castanea sativa* Miller
Sycamore		*Acer pseudoplatanus* L.
Walnut		*Juglans regia* L.
Whitebeam		*Sorbus aria* (L.)
Wild Service		*Sorbus torminalis* (L.)
Willow		*Salix* Spp.
	Almond	*Salix triandra* L.
	Crack	*Salix fragilis* L.
	Osier	*Salix viminalis* L.
	Purple	*Salix purpurea* L.
	White	*Salix alba* L.
Yew		*Taxus baccata* L.

Appendix 2.

Lowland wood-pasture and parkland: A Habitat Action Plan

1. Current status

1.1 Biological status

1.1.1 Lowland wood-pastures and parkland are the products of historic land management systems,and represent a vegetation structure rather than being a particular plant community. Typically this structure consists of large, open-grown or high forest trees (often pollards) at various densities, in a matrix of grazed grassland, heathland and/or woodland floras.

1.1.2 There are no reliable statistics on the extent of the overall resource, nor on historical and current rates of loss or degradation of this type of habitat. The figure of 10-20,000 ha "currently in a working condition" given in the 'habitat statement' of the UK Biodiversity Steering Group report is the current best estimate. This habitat is most common in southern Britain, but scattered examples occur throughout the country, for example Hamilton High Parks and Dalkeith Oakwood in Scotland. Outgrown wood-pasture and mature high forest remnants ('virgin forests') occur in northern and central Europe, but the number and continuity of ancient (veteran) trees with their associated distinctive saproxylic (wood-eating) fauna and epiphytic flora are more abundant in Britain than elsewhere. Parklands and wood-pasture may also be of interest for bats and birds and may preserve indigenous tree genotypes. These areas are outstanding at a European level.

1.1.3 These sites are frequently of national historic, cultural and landscape importance. Some, but not all, of the individual habitat components (lowland beech and yew woodland, lowland heathland, lowland dry acid grassland) are biodiversity action plan priority habitats in their own right. Requirements of these plans will need to be given due regard during implementation.

1.1.4 Included in this plan are:

i. Lowland wood-pastures and parklands derived from medieval forests and emparkments, wooded commons, parks and pastures with trees in them. Some have subsequently had a designed landscape superimposed in the 16th to 19th centuries. A range of native species usually predominates among the old trees but there may be non-native species that have been planted or regenerated naturally.
ii. Parklands with their origins in the 19th century or later where they contain much older trees derived from an earlier landscape.
iii. Under-managed and unmanaged wood-pastures with veteran trees, in a matrix of secondary woodland or scrub that has developed by regeneration and/or planting.
iv. Parkland or wood-pasture that has been converted to other land uses such as arable fields, forestry and amenity land, but where surviving veteran trees are of nature conservation interest. Some of the characteristic wood-pasture and parkland species may have survived this change in state.

1.1.5 Not included in this plan are:

i. Upland sheep-grazed closed-canopy oak woodland or Caledonian pine forest (see the respective plans for these habitats).
ii. Parklands with 19th century origins or later with none of the above characteristics.

1.1.6 In terms of the National Vegetation Classification (NVC) of plant communities lowland wood-pastures and parkland are most commonly associated with W10 *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland, W14 *Fagus sylvatica - Rubus fruticosus* woodland, W15 *Fagus sylvatica - Deschampsia flexuosa* woodland and W16 *Quercus* spp. - *Betula* spp.- *Deschampsia flexuosa* woodland, although others may occur. In addition the more open wood-pastures and parkland may include various scrub, heathland, improved and unimproved grassland NVC communities.

1.2. Links with species action plans

1.2.1 Lowland wood-pasture and parkland is an important habitat for a number of priority species including violet click beetle *Limoniscus violaceu***s**, the stag beetle *Lucanus cervus*, a bark beetle *Ernoporus tiliae*, a wood boring beetle *Gastrallus immarginatus*, orange-fruited elm lichen *Caloplaca luteoalba*, the lichens *Bacidia incompta, Enterographa sorediata* and *Schismatomma graphidioides,* the royal bolete fungi *Boletus regius*, oak polypore *Buglossoporus pulvinus* and the heart moth *Dicycla oo*. Their requirements should also be taken into account in the implementation of this plan. Other rare species include Moccas beetle *Hypebaeus flavipes*, and the lichen the New Forest parmelia *Parmelia minarium.*

2. Current factors affecting the habita t

2.1 Lack of younger generations of trees is producing a skewed age structure, leading to breaks in continuity of dead wood habitat and loss of specialised dependent species.

2.2 Neglect, and loss of expertise of traditional tree management techniques (eg pollarding) leading to trees collapsing or being felled for safety reasons.

2.3 Loss of veteran trees through disease (eg Dutch elm disease, oak dieback), physiological stress, such as drought and storm damage, and competition for resources with surrounding younger trees.

2.4 Removal of veteran trees and dead wood through perceptions of safety and tidiness where sites have high amenity use, forest hygiene, the supply of firewood or vandalism.

2.5 Damage to trees and roots from soil compaction and erosion caused by trampling by livestock and people and car parking.

2.6 Changes to ground-water levels leading to water stress and tree death, resulting from abstraction, drainage, neighbouring development, roads, prolonged drought and climate change.

2.7 Isolation and fragmentation of the remaining parklands and wood-pasture sites in the landscape. (Many of the species dependent on old trees are unable to move between these sites due to their poor powers of dispersal and the increasing distances they need to travel.)

2.8 Pasture loss through conversion to arable and other land-uses.

2.9 Pasture improvement through reseeding, deep ploughing, fertiliser and other chemical treatments, leading variously to tree root damage, loss of nectar-bearing plants, damage to the soil and epiphytes.

2.10 Inappropriate grazing levels: under-grazing leading to loss of habitat structure through bracken and scrub invasion; and over-grazing leading to bark browsing, soil compaction and loss of nectar plants.

2.11 Pollution derived either remotely from industry and traffic, or locally from agro-chemical application and nitrogen enrichment from pasture overstocking, causing damage to epiphyte communities and changes to soils.

3. Current action

3.1 Legal Status

3.1.1 For any woodland component of parkland and wood-pasture, national forestry policy includes a presumption against clearance of broad-leaved woodland for conversion to other land uses, and in particular seeks to maintain the special interest of ancient semi-natural woodland. Individual trees and groups may be afforded protection under the Town and Country Planning Act, 1990 and the Forestry Act, 1967. Felling licences from the Forestry Authority (FA) are normally required but veteran trees may be particularly at risk because fellings for safety reasons are exempt.

3.1.2 Statutory site protection plays an important part in the conservation of this habitat type. Designation as Sites of Special Scientific Interest (SSSI), or as Areas of Special Scientific Interest (ASSI) (Northern Ireland), of most larger areas of wood-pasture and parkland and most of the better-known sites of significance for invertebrates and lichens, ensures compulsory consultation with the statutory nature conservation agencies over management operations and development proposals. Designation under the EC Habitats Directive as Special Areas for Conservation will give additional protection to some parkland and wood-pasture sites. Some sites, including Moccas Park, Duncombe Park, Burnham Beeches, Leigh Woods, Hatfield Forest, parts of Bredon Hill, and Ashstead Common are also protected by National Nature Reserve (NNR) agreements.

3.1.3 Other sites receive some protection though initiatives such as the Inheritance Tax Exemption scheme or the declaration of National Trust and Corporation of London land properties as inalienable land. A few sites have specific legislation to protect them such as the Epping Forest Act of 1878.

3.1.4 The Moccas beetle *Hypebaeus flavipes*, violet click beetle *Limoniscus violaceus* and the orange-fruited elm lichen *Caloplaca luteoalba* and New Forest parmelia *Parmelia minarium* (all confined to parkland or wood-pasture) are fully protected under the 1981 Wildlife and Countryside Act, as are all species of bat and most tree-hole nesting birds. This Act also offers some protection to their “place of shelter”.

3.1.5 There is recognition of the value of the habitat and individual old trees in various development plans, and landscape designations (eg by English Heritage, and CADW: Welsh Historic Monuments).

3.2 Management, research and guidance

3.2.1 There are a number of significant but currently uncoordinated inventories, datasets and registers of lowland wood-pasture and parkland. These include the Nature Conservancy Council’s 1970s survey of parklands and wood-pastures of importance for the ‘Mature Timber Habitat’; the Forestry Commission’s National Inventory of Woodlands and Trees;The National Trust (NT) biological survey of NT-owned parkland and wood-pasture sites and English Nature’s parkland inventory pilot study (1995) for Norfolk and Bedfordshire. English Heritage also has a register of parks and gardens, which is being upgraded between 1997 and 2000, and similar data for Wales is held by CADW: Welsh Historic Monuments. Scottish Natural Heritage maintains an inventory of Gardens and

designed landscapes in Scotland. There is also an Inventory of Historic Parks and Gardens, based at University of York, which contains information on historically important sites and County Historic Gardens Trust data.

3.2.2 Surveys of saproxylic invertebrates and lichens have also been undertaken. These include the Countryside Council for Wales's strategic survey of Welsh parklands; K.N.A. Alexander's (National Trust) personal dataset on saproxylic beetle sites and the JNCC's Lower Plants and Invertebrate Site Registers. The British Lichen Society also maintains a database for parkland and wood-pasture.

3.2.3 Grant aid may be available for the management and restoration of parkland. The key sources of this aid include agri-environment schemes such as MAFF's Countryside Stewardship Scheme and the Countryside Council for Wales' Tir Cymen (which will be incorporated into an all-Wales Agri-environment scheme known as Tir Gofal in 1999) includes a scheme for Historic Landscapes and old orchards. Both of these schemes assist in the production of management plans, tree and grassland management and restoration of arable land to parkland. Other agri-environment schemes such as Environmentally Sensitive Areas (ESAs) and the Habitat Scheme (Wales) may subsidise the management or restoration of grassland and tree planting, and provide some protection for existing trees. The Forestry Authority's Woodland Grant Scheme is available for woodland with over 20% canopy cover.

3.2.4 The Veteran Trees Initiative, launched in 1996, aims to promote the value and importance of veteran trees and to conserve them wherever possible. This initiative is the result of a partnership between English Nature, English Heritage, the National Trust, Countryside Commission, Forest Authority, FRCA, Corporation of London and the Ancient Tree Forum. The initiative is developing a database for recording veteran trees, and provides advice on their management. It runs a national programme of demonstration and training days, and produces publications.

3.2.5 English Heritage's Conservation Area Partnerships, Scheduled Monuments and outstanding registered parklands initiative may also provide grant-aid and some Local Authority schemes, such as the Essex County Council's historic landscapes designation may also provide funding for management. The Countryside Council for Wales' "Orchards and Parklands Tree Scheme" grant aids management and restoration of parklands in Wales.

3.2.6 EC *Life* funding has also been awarded for management of the New Forest.

3.2.7 There is a wealth of information available from the Forestry Authority and other organisations and publications regarding all aspects of ancient woodland management. These include advice given locally through the statutory conservation agencies, the Farming and Wildlife Advisory Group, ADAS, the Countryside Advice and Information Service (Wales). The Forestry Commission's Arboricultural Advisory Service and English Heritage's Parks & Garden's Team of historians, landscape managers, ecologist and arboriculturalists can offer advice. The Ancient Tree Forum, an association of land managers, ecologists and arboriculturalists, provides advice, as do the voluntary and commercial sectors. The UK Forestry Standard and the Forestry Authority Guidelines for the management of semi-natural woodlands should be followed.

3.2.8 The British Lichen Society have produced a habitat management guide for lichens, including parklands and wood-pastures.

4. Action plan objectives and proposed targets

4.1 The objectives and targets cover habitat conserva tion, restora tion and expansion. Key components include the need to secure fav ourab le condition of key sites and, at appropriately targeted areas, to restore management or expand the habitat.

4.1.1 Protect and maintain the current extent (10-20,000 ha) and distribution of lowland wood-pasture and parkland in a favourable ecological condition.

4.1.2 Initiate in areas where examples of derelict wood-pasture and parkland occur a programme to restore 2,500 ha to favourable ecological condition by 2010.

4.1.3 By 2002 initiate the expansion of 500 ha of wood-pasture or parkland, in appropriate areas, to help reverse fragmentation and reduce the generation gap between veteran trees.

5. Proposed action with lead agencies

5.1 Policy and legislation

5.1.1 Implement the conclusions of the 1994 review of Tree Preservation Orders (TPO), including amendments to the Town and Country Planning Act 1990, to offer appropriate protection to veteran/dead trees. (Action: DETR)

5.1.2 Examine felling consent/licensing policy to consider whether additional protection for parkland, wood-pasture and individual veteran trees is needed. (Action: FA)

5.1.3 Examine whether improvements should be made in safety legislation, with respect to liability on owners in the event of injury or damage resulting from old trees, and its interpretation to reduce any unnecessary felling of trees on safety grounds. (Action: DETR, FA)

5.1.4 If Annex I of the EC Habitats Directive is revised ensure that it provides adequate coverage of UK parklands and wood-pasture habitats and species assemblages. (Action: DETR, JNCC)

5.1.5 When reviewing existing incentive schemes (eg Countryside Stewardship, Woodland Grant Scheme/ Woodland Improvement Grants, ESAs, Coed Cymru) attempt to ensure they enable and encourage the most appropriate management of parklands and wood-pasture, with their ancient trees. (Action: CCW, EN, FA, MAFF, SNH, SOAEFD, WOAD)

5.1.6 Promote modification of the Common Agricultural Policy to recognise and promote extensive pastoral systems, including wood-pasture. (Action: CCW, DETR, EN, MAFF, SNH, SOAEFD, WOAD).

5.1.7 Provide specific guidance about parklands, wood-pasture and individual veteran trees in Planning Policy Guidance notes (PPGs) by 2001. (Action: DETR, SNH, SOAEFD)

5.1.8 Review policy and practice regarding fencing of registered commons to allow reinstatement or control of grazing in wood-pasture commons, but without impediment to access by 2001. (Action: CC, DETR, FA, FE)

5.2 Site and safeguard and management

5.2.1 Ensure that SSSI coverage of important lowland wood-pasture and parkland sites is adequate through periodic review of the series. (Action: CCW, DETR, EN, SNH, SOAEFD, WO)

5.2.2 By 2004 designate those lowland wood-pasture sites approved by the EC as SACs under the Habitats Directive. (Action: CCW, DETR, EN, JNCC, SNH, SOAEFD, WO)

5.2.3 Encourage applications to buy and manage appropriate sites from potential funding sources. (Action: CC, CCW, EH, EN, SNH)

5.2.4 Encourage the development and implementation by 2004 of long-term integrated management plans for conservation and use of parklands and wood-pastures through agreements with site owners and in partnership with statutory wildlife, landscape and heritage agencies. (Action: CC, CCW, EN, FA, MAFF, SNH, SOAEFD, WOAD)

5.2.5 Promote re-establishment of grazing where appropriate in derelict wood-pasture and encourage the development of subsequent generations of veteran trees in all sites. (Action: CCW, EN, MAFF, SNH, SOAEFD, WOAD)

5.2.6 Promote the restoration of wood-pasture and parkland where old trees remain in former sites that are now arable fields or forestry plantations. (Action: CCW, FE, MAFF, WOAD)

5.2.7 By 2002 initiate programmes to expand parklands and wood-pasture sites in targeted areas. (Action:CC, CCW, EH, EN, FA, SNH)

5.2.8 Contribute to the implementation of relevant priority species action plans, through the integration of management requirements and advice, in conjunction with relevant steering groups. (Action: CCW, EN, MAFF, SNH, SOAEFD, WO)

5.2.9 Consider (re)establishment of key species dependent on veteran trees via translocation. (Action: CCW, EN, FA, FE, SNH)

5.3 Advisor y

5.3.1 Develop a handbook(s) on best practice in management of parklands and wood-pasture in relation to wildlife, heritage and landscape conservation. (Action: CCW, DETR, EN, FA, SNH)

5.3.2 Develop clear guidance on safety-related risk assessment and reasonable practice, in conjunction with relevant landowners and management groups. (Action: DETR, FA).

5.3.3 Encourage training in best practice in park and wood-pasture management for site owners, site managers, land-agents, foresters, arboriculturalists and also for advisors and incentive scheme managers. (Action: CCW, EN, FA, MAFF, SNH)

5.4 International

5.4.1 Develop links with European organisations and programmes, such as the European Forestry Institute, the European Environment Agency and the European Centre for Nature Conservation to obtain estimates of the extent and distribution of comparable and related habitats, and exchange experience on research and management, by 2000. (Action: CCW, EN, FA, JNCC, SNH)

5.5 Monitoring and research

5.5.1 Produce a comprehensive list of all parkland and wood-pasture sites with pointers to other data sources and evaluations relating to both the natural and cultural heritage of each site, by 2002. Make this information available, through a data catalogue linked to the National Biodiversity Network. (Action: CC, CCW, EHS, EN, JNCC, SNH)

5.5.2 Develop and implement methods to assess the condition of wood-pastures and parkland by 2000 and encourage standardised recording and monitoring of tree population age structure, survivorship and condition at key sites across the country in order to identify site specific and general trends. (Action: CCW, EHS, EN, FC, SNH)

5.5.3 Undertake a programme of targeted surveys of the biological interest of sites where lack of information is impeding their appropriate management, by 2005.

5.5.4 Ensure veteran tree recording is reflected in SSSI and Wildlife Site reporting and is input,as it becomes available, into local record centres as part of the National Biodiversity Network initiative. (Action: CCW, EN, FC, JNCC, SNH)

5.5.5 Develop and implement appropriate surveillance and monitoring programmes to assess progress towards action plan targets. (Action: CCW, EN, JNCC, SNH)

5.5.6 Encourage research into parkland and wood-pasture flora, including trees, and fauna in relation to tree and pasture management, including interactions and with invertebrates, fungi, soils, ground water levels and grazing animals and population dynamic studies. Ensure such research is coordinated with cultural heritage research. (Action: CCW, EH, EN, FC, SNH)

5.6 Communications and publicity

5.6.1 Increase awareness of the national and international importance and vulnerability of wood-pasture and parklands by promotional literature and events and encourage celebration of parkland and wood-pastures via the arts and media. (Action: CCW, EH, EN, SNH)

5.6.2 Increase awareness of the value in protecting veteran trees where these may be threatened by felling, for safety reasons, and promote alternative solutions such as pollarding or tree surgery. (Action: CCW, EHS, EN, FA, LA, SNH)

6. Costings

6.1 The successful implementation of the habitat action plans will have resource implications for both the private and public sectors. The data in the table below provide an estimate of the current expenditure on the habitat, primarily through agri-environment schemes and grant schemes, and the likely additional resource costs to the public and private sectors. These additional resource costs are based on the annual average over 5 and 10 years. The total expenditure for these periods of time is also given. Three-quarters of the additional resources are likely to fall to the public sector.

6.2 Current expenditure for the Woodland Grant Scheme has not been included as it was not possible to allocate expenditure to different woodland habitat types. It is estimated that 65 - 75% of the costs shown are additional to the current expenditure.

7. Key references

Department of the Environment, Transport and the Regions 1998. *Tree Preservation Orders Draft Regulations:a consultation paper*. DETR, London.

Forestry Authority 1994. Forestry Practice Guides: *The management of semi-natural woodlands*. Edinburgh: Forestry Authority.

Forestry Authority & Department of Agriculture for Northern Ireland 1998. *The UK Forestry Standard: the Government's approach to sustainable forestry*. Edinburgh Forestry Commission.

Harding, P.T., & Rose, F. 1986. *Pasture woodland in lowland England*. Huntingdon: Institute of Terrestrial Ecology.

Kirby K.J.,Thomas, R. C., Key R.S., Mclean, I.F.G., & Hodgetts, N. 1995. Pasture woodland and its conservation in Britain. *Biological Journal of the Linnean Society*, **56** (Suppl.) 135-153.

Peterken, G.F. 1981. *Woodland conservation and management*. London: Chapman & Hall.

Ratcliffe, D.A. 1977. *A nature conservation review*. Cambridge:Cambridge University Press.

Rodwell, J.S. 1991. *British Plant Communities Volume 1: Woodlands and Scrub*. Cambridge University Press.

Costings for lowland wood-pasture and parkland

	Current expenditure	1st 5 yrs to 2003/2004	Next 10 yr s to 2013/2014
Current expenditure /£000/Yr	**457.5**		
Total a verage annual cost /£000/Yr		**674.6**	**429.7**
Total expenditure to 2004/£000		**3373.0**	
Total expenditure 2004 to 2014 /£000			**4297.4**

Appendix 3.

Historical information on pollarding

There are few written documents recording how and when trees were pollarded so the information is quite sparse. It has been supplemented to some degree by studies of tree rings. That which is available is summarised below:

1. Lop or fell wood in January. Leave a bough on the pollards and cut it away the following year. (T. Tusser 1573-1580).
2. Cut branches 1 - 2 ft (30 - 60 cm) from the body of the tree with a one handed axe, making sure that the bark is not damaged. Do not cut in sap time nor when the wind is in the north or east. (Fitzherbert 1523).
3. The commoners had rights to cut from the trees between All Saint's Day (1st November) and St. George's Day (23rd April). This was later changed to start on St. Martin's Day (11th November). Cuts were made with an axe. 'Commercial areas' assigned by the Lord of the Manor were cut between 1st February and 5th April. The trees were cut at intervals of 13-15 years. One area might have been cut on a more regular cycle of 10 years. Commoners cut below the previous point of cutting on hornbeam to maximise the amount of useable wood. Epping Forest, hornbeam and perhaps oak. (Dagley & Burman 1996).
4. An etching by Wenceslaus Hollar of Charles II shows an ?oak pollard recently cut with one large branch left as a sap riser (Falkus undated).
5. In the Lake District odd branches are removed from the pollards and fed to the sheep. Once be-barked the branches are used as fuel. (Quelch 1997).
6. Some limbs are left on the trees when they are cut in southern Europe. Some fodder trees were cut in the winter (e.g. Holly) others in the summer. (Green, 1996a).
7. Pollarding in Sweden was found to prevent the flowering of the trees because of the frequency of cutting. Shredding did not. (Andersen 1988).
8. Make the first cut when the tree is 25-35 years old. Then the intervals between cuts are 11-12 years for the first 4-5 cuts, getting gradually longer to 14 year intervals for cuts 6 and 7. Some branches were probably left on as sap lifters. Beech trees at Burnham Beeches. (Le Sueur 1931).
9. The usual period between cuts on pollards in Buckinghamshire was 7 years. (Le Sueur 1931).
10. A pollard oak in a park in Suffolk showed intervals between successive cuts to be 16, 14, 28, 24, 11 and 27 years (between 1602 and 1722). (Rackham 1988).
11. Cut at intervals of 12 years (though probably not on a regular cycle). Historical reference to Hatfield Forest (presumably the full range of species found in Hatfield Forest). (Rackham 1989).
12. An oak at Hatfield Forest was first cut at about 30 years old and then subsequently at intervals of 30, 12, 19, 17, 36 and 14 years. (Rackham 1989).
13. Another oak at Hatfield was first cut at 54 years of age and thereafter at intervals of 11-24 years. (Rackham 1989).
14. Cutting intervals were approximately 13 years in Epping Forest and 18-25 at Hainault Forest (presumably hornbeam and perhaps beech). (Rackham 1989). Oaks were cut at more or less the same rotation as coppice though there is no indication of a regular cycle and sometimes they were left much longer. (Rackham 1989).
15. Oaks in Kent were cut on a short rotation of 1-10 years to provide fodder and faggots for the salting industry. (D. Maylam pers. comm.)
16. By counting rings on pollard branches in Borrowdale it seems there was 30 years between each cutting on a tree but that selected branches were cut each time not all of them removed. (Mercer 1993).
17. In Kent, 'pegs' were always left when cutting pollards. (D. Maylam pers. comm.)

Appendix 4.

Species specific notes on cutting veteran trees and young trees in order to create pollards for the future.

These comments are based on personal experiences of many people, particularly members of the Ancient Tree Forum. Many relate to pollarding and it should be noted that they do not necessarily apply to all circumstances. **It is important also to read the notes in the main body of the text (especially chapter 4)** and to judge according to the situation. The response will also vary according to the local climate and conditions.

The species are listed in alphabetical order.

Alder

Veteran trees: Although alders are found along rivers and in damp areas throughout Britain, veterans and worked trees seem to be more localised. Alder wood is useful but the trees seem to have often been coppiced rather than pollarded. Since the leaves are unpalatable to stock the trees survived any grazing. Little work has been done on veteran alders but they are likely to respond in a similar way to willow, although perhaps a little less vigorous.

Young trees: Alder will respond well to cutting when young.

Ash

Veteran trees: Ash seems to be the ultimate unpredictable tree. Like oak it would be expected to respond well to cutting, but sometimes does not. Whilst there are a good number of veteran ash pollards in some areas of the countryside (eg East Anglia) there is not much of experience in recutting following a period of lapse. Removing all the branches from a pollard may delay regrowth until the end of the first growing season after cutting. Pollards with branches left on after cutting are more likely to be successful and cutting in a series of stages may be appropriate depending on the shape of the tree. Ash probably responds better in the north. Cutting veteran trees in the Lake District has been successful. In Sweden lapsed pollards are treated by removing the entire crown to 'shock' the tree to regrow and the results are good (Quelch pers. comm.).

Young trees: Young ash can be very late to break bud after the creation of new pollards and can take up to one year for this to happen. The sprouts tend to grow low on the trunk so cutting should be higher than the desired final height. Some losses are likely but may not be directly related to the diameter of the main stem. Jagged edged cuts are not necessary, simple ones and a complete removal of the crown is probably best. Cutting ash in late summer may be better than cutting in the winter. One method to try is to make an initial high cut and leave the tree for 4 to 5 years before cutting again, lower down, once sprouting has occurred (Figures 49 and 50).

Further reading: Mitchell (1989),White (1996) and Wisdom (1991).

Figure 49. *Cutting a maiden as tree in two stages.*

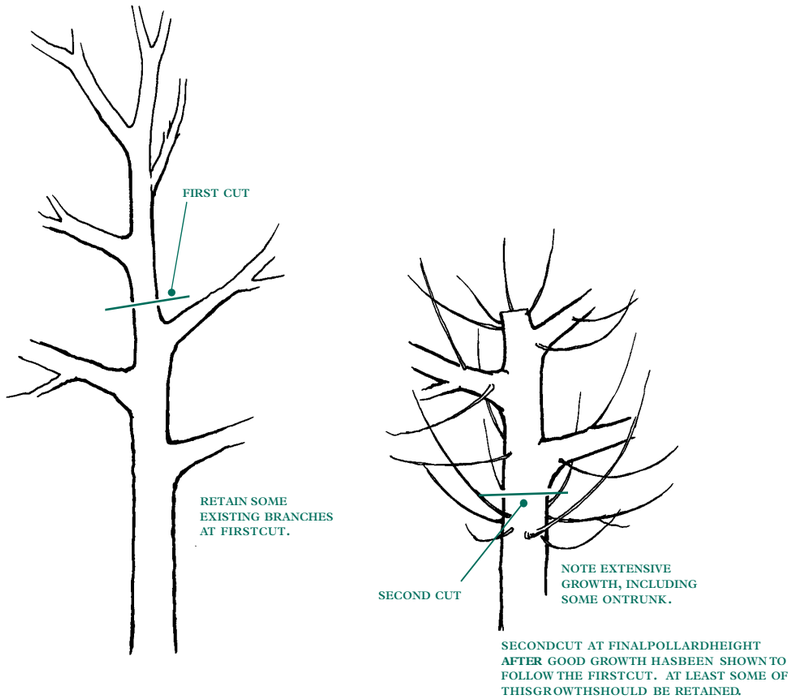

Figure 50. *See colour plate page 93.*

Beech

Veteran trees: The chances of obtaining successful regrowth from an old beech pollards following complete removal of all branches are almost zero. Beech seems to be one of the most reluctant species to respond to cutting and, although it is reported to grow adventitiously from wound wood this does not seem to be the case with veteran trees in practice. The response of beech generally is to put on increased growth from the branches retained which may, over time, alter the shape of the tree quite considerably. While this growth does not result in 'new' branches as such, the life of the tree is extended and it seems likely that in most situations in the past this was how beech was cut. Rarely, epicormic growth results.

It has been recommended to leave a single leading branch on each tree (Mitchell 1989). On lapsed pollards (and old trees generally) this is almost certainly too little. Canopy reduction of 25 - 50% is probably more appropriate and more likely to succeed. Unfortunately, on many old beech trees the foliage is all very high up and it is not possible to retain the existing growth that is necessary for the survival of the tree when pollarding. In these instances there is very little which can be done. Unless action is required for safety reasons, these trees are probably best left unless growth can be stimulated lower on the branches first.

The responses of old trees to cutting seem to vary from site to site. This seems especially true of beech where similar types of cutting on trees in the same geographic area have produced very different responses. In the past it has been considered not worth trying to do anything with veteran beech. Recent work has shown that results can be good and in some situations it is worth trying. On some tree shapes it may be worth cutting in two or more stages over a period of about five years as described with oak; with other shapes this is unlikely to work. It is safest to assume that there will be no new growth on a branch at or below the point of cutting unless any is retained. Growth may be extensive from branches with retained foliage. (Figure 51).

Young trees: Even young beech must have more than one branch left on the stem. Growth occurs largely from the retained branches, it is far less likely from the main stem. Heavy losses occur unless branches are retained. Occasionally it is possible to remove all branches on some young trees without killing them but this is the exception rather than the rule.

Figure 51. *See colour plate page 94.*

Further reading: Dagley & Burman (1996), Read *et al.* (1991, 1996)

Birch

Though birch is not a tree found widely as an example of a pollard in Britain it was certainly frequently cut in the past in Scandinavia and northern Britain for fodder. For this reason the trees were probably mostly cut during summer months at intervals of five to seven years (Austad 1988). Young birch is likely to respond well to cutting and in general the whole crown can probably be removed though poor responses have been noted in maiden silver birch over 10 cm in diameter (N. Sanderson pers. comm.). Older trees have also been reported to die after removal of a high proportion of the crown in Sweden (Quelch pers. comm.) and veteran birch in the Lake District may show poor responses to surgery. Experiences with lopping large maiden birch trees in the south of England have also shown that they can be a little unpredictable, this may in part be related to their susceptibility to dry weather. The northern downy birch (*Betula pubescens* ssp. *tortuosa*) may be an easier species to work with than silver birch (N. Sanderson pers. comm., 1998a).

Black Poplar

Veteran trees: Black poplars are found close to water and in certain areas (eg the Vale of Aylesbury and East Anglia) are more widely distributed with some being boundary markers. Although poplars in general are not usually particularly long-lived trees, black poplars are perhaps the exception. Some have been pollarded in the past and this is likely to increase their chances of reaching veteran status. It is probably appropriate to treat them in a similar way to willows. It has been suggested that pollarding of black poplars is best done at the end of the growing season (mid to late summer) for the best chance of success although cutting in February is also likely to be successful. The responses following the cutting of lapsed pollards are variable. In some areas there has been only a 50% success rate so removal of the crown in stages may be more beneficial. Trees may also show good growth in the year following cutting and then die subsequently. Frequent pollarding of black poplar may not allow it to flower and seed.

Young trees: In general, species of poplar and are likely to be very responsive and easy to achieve good results with.

Black poplars in the Vale of Aylesbury

A recent survey in the Vale of Aylesbury identified about 4,100 black poplars. Of the 3,660 found in the Buckinghamshire part of the Vale, 72% of the trees were distributed along streams and ditches and just 30 were females. The largest tree had a girth of 15.5 feet (472 cm) and the population as a whole was considered mature or over mature, with very low recruitment. Seventy three per cent of the trees were pollards and half of these were pollarded 'some time ago'. Aylesbury Countryside Management Project has repollarded over 50 trees in the last six years, with varying amounts of the crown removed. Virtually all survived and showed vigorous growth. The project is also taking cuttings so that plants of the same genetic stock can be perpetuated in the local area (ie on the same farms). A characteristic of the Aylesbury poplars is that they sucker well following cutting. The suckers can then help to form the next generation of trees too.

Conifer s - See Scots pine

Crab apple

Young trees: Crab apple generally seems to respond well to cutting.

Elm

Veteran trees: Due to Dutch elm disease it is unusual to find large trees in Great Britain now. Regularly pollarded elms existed in the past and could grow to large sizes (e.g. covering an area of 22 m x 22 m at Hailes Abbey, Gloucestershire, R. Finch pers. comm.). A few still remain in East Anglia where they were especially common in the past in village closes (small fields near to the settlement) (P. Harding pers. comm.). Wych elm has been shown to respond well to pollarding in Norway after a lapse of 40 or so years (Austad and Skogen 1990). It can be treated like lime but cutting was probably done mostly in the summer in the past as the leaves have a high nutritional value (Hauge 1988, Austad and Skogen 1990).

Young trees: Young elm responds well to cutting but losses are high due to Dutch elm disease.

Field Maple

Veteran trees: There are relatively few old field maple pollards. Those that have been cut in recent years seem to have grown well. One of 100 years of age, last cut 30 - 40 years ago grew well when stubs of 15 cm were left. A 350-year-old tree cut 20 years ago is growing well at Hatfield Forest (V. Forbes pers. comm.). Younger trees show an extremely good response so it is likely that older trees will grow well. Perhaps leave short stubs to be on the safe side.

Young trees: Field maple is likely to produce a very good response when cut, shoots may appear very low down on the trunk so it is necessary to cut higher. Bigger trees may show a poorer response in the first year than younger trees. Removing all the branches is probably best especially from burry trees.

Further reading: Wisdom 1991, Sisitka 1991a, 1991b.

Hawthor n

Veteran trees: Old trees seem to fall apart and layer themselves readily, e.g. at Hatfield (Sisitka 1991a, 1991b) but may not appear to be obvious pollards. When branches snap the regrowth is generally good. Cutting should probably be done as for field maple but may not be necessary if the trees behave as they do at Hatfield (ie falling apart but still growing). At other places (eg Croft) the trees grow differently and much more like typical pollards in shape. Due to their relatively light crowns there may be scope for cutting a few branches initially to check the response.

Young trees: Young hawthorn responds well to cuts. Winter cutting may be better than summer.

Hazel

Veteran trees: Veteran hazels are most likely to be coppice stools but in Scotland (eg Glen Finglas) single stemmed pollards are found. From experience with coppice, hazel will respond well to cutting as long as it has sufficient light.

Young trees: Young hazel responds well to cutting.

Holly

Veteran trees: Despite the nature of its leaves, holly has been cut in the past primarily as a fodder crop and seems to have been grown in several areas, eg south Pennines, the Marches counties and The New Forest for this reason. It was cut in the winter to provide extra feed for sheep or deer in times of severe weather. Old holly pollards still occur in Shropshire on the Stiperstones and the Hollies SSSI and a few trees have been cut in recent years. Some branches were left on these trees and those that were cut were not taken right back to the bolling, ie stubs were left. The work was done in the spring as holly is considered to be susceptible to frost.

Experience elsewhere on other species does not recommend spring cutting, though frost damage may be dependent on the situation. Despite its palatability, veteran holly appears to be able to withstand grazing pressure and in the New Forest the pollards seem to have been cut at a height lower than other species. It also seems very shade tolerant. Recent cutting of veteran trees in the New Forest, carried out in October and January with one or more branches left, are growing well. Cutting above the previous cut (i.e. in younger wood) may be more important than retaining a branch on veteran trees as older branches develop thicker bark (N. Sanderson pers. comm.). Some losses on maiden trees where no branches were retained suggest that it is prudent to retain branches.

Young trees: Young holly is generally very responsive to cutting (Figure 52). New holly pollards in the New Forest had a 88% success rate, but those failing as pollards mostly sprouted at the base (because they lack dormant buds?). Some losses do happen but holly usually occurs in such dense groups that a few deaths are not usually a problem. It may often be easier to cut a block of holly rather like a coppice plot, this ensures that there is enough light reaching the trees but may sometimes cause over exposure. In the New Forest blocks of 30 x 30 m were cut successfully. If only small numbers of the holly respond positively after cutting try leaving a branch or two on.

Figure 52. *See colour plate page 95.*

Further reading : Peterken *et al*. (1996), Radley (1961), Sanderson (1991), Spray (1981), Wall (1991).

Hornbeam

Veteran trees: Many hornbeam pollards in Eastern England have now been cut after years of neglect. In almost all instances the entire crown was removed. Results have generally been reasonable but the success rate is by no means 100% and at least at one site, trees flushed for several years and then declined.

Spring lopping is definitely deleterious for hornbeam. From the evidence of recent work on hornbeam it seems that lapsed pollards are likely to have a 70 - 90% success rate following complete removal of the crown. It is important to realise, however, that hornbeam does have a tendency to flush well initially and then die back. Trees in more open (less shaded) situations may be more susceptible to this. Success rates may be increased by leaving some existing growth on the trees, if they have any branches that are suitable, but this does not seem to have been proven. Leaving short stubs may be better than cutting right back to the bolling. It is recommended by some people to leave side branches and stubs of 2 - 3 m. Others suggest that leaving stubs on hornbeam is not necessary. In Epping Forest epicormic growth was produced from the base of the stubs or bolling and there was no difference between those trees with long stubs left and those with short ones. At Knebworth (Figure 53) no advantage was found in leaving long stubs.

Experiences include:

Hatfield Forest recorded a success rate of around 69% for trees cut in 1977, 1978 and 1979, during which the weather conditions were generally very dry (V. Forbes pers. comm.). Exposed trees may have dried out and then been attacked by the fungus *Bjerkandera adusta*. Had stubs been left the response might have been better.

In Hainault Forest and Epping Forest 80 - 91% success rates have been achieved. Trees at Hainault Forest also suffered from *Bjerkandera* and the vigour of trees seems to be not so good 5 years after cutting. At Epping Forest some standards were left to shade the pollards at least in some areas. At Gernon Bushes 95% success was obtained initially but some may not survive. Stubs of 60 cm left on veteran hornbeam in Kent resulted in good growth. (Hornbeam was reported to have originally been cut in Epping Forest using a long handled axe from the ground. It was also cut using a lopper whilst standing in the tree.)

At Knebworth 370 trees have been cut between 1991 and 1995 (a fifth each year) after a lapse in management of 55 years. Trees were cut in January and February and all branches were removed. A 93% survival rate was recorded with 60% of the trees showing strong regrowth. A greater chance of survival was recorded on trees that were 'intact', ie not hollow.

Young trees: Young hornbeam generally responds quite well and few/no losses seem to result when trees of up to 45 cm diameter are cut. It does seem able to survive in relatively poor light with all the branches removed (on trees up to 52 cm diameter) though leaving some short branches may be beneficial for bigger trees.

Figure 53. *See colour plate page 95.*

Further reading: Coombs (1991), Coop (1991), Dagley & Burman (1996), Rackham (1989), Sidwell (1996), Sisitka (1991a and 1991b), Warrington & Brookes (1998).

Horse Chestnut

Big horse chestnut trees are often a feature of designed landscapes. Their spectacular flowers in the spring led them to be widely planted near houses. Few pollards exist and they can become unstable, the branches falling out easily. However, in urban areas, trees cut regularly rarely break unless ingrown bark is present. The wood is brittle and difficult to work with but the trees generally respond quite well to pruning.

Lime

Veteran trees: Regeneration is likely to be very good; experiences include: a small-leaved lime 30 - 40 years since last cut which had every stem reduced to 0.3 m stubs, regeneration was prolific (Wisdom 1991).Street trees cut every other year with no stubs left responded well (Mayhew 1993). On street trees all the branches can be removed and there is no need to leave short stubs. However, for those of over about 40 years since the last cut it may be judicious to leave short stubs. Lime will take repeated pollarding on a short cycle, eg two to three years in a street situation. They may produce so much growth lower down with little at the top that they need trimming back on the trunk. Lime in Norway 40 years since last cut was left with 20 - 25 cm stubs, cut with chainsaws, and they regrew well (Austad and Skogen 1990).

Young trees: Lime is likely to be very responsive and easy to achieve good results with.

Oak

Veteran trees: As a general rule veteran oak trees respond to cutting more positively than beech but older trees do not respond nearly as well as young ones.

It is possible that regularly cut trees might have had all their branches removed though this is unlikely in certain parts of the country. When dealing with trees that have not been cut for many years it is best not to cut right back to the bolling. Although success can be obtained following total removal of the crown, the chance of regrowth is significantly higher when branches are retained and on most sites it is essential. It has proved beneficial in some cases to cut the tree in stages, first doing some initial crown reduction work and then coming back a few years later to reduce further. Oak regrowth is susceptible to mildew and this may be severe enough to affect the survival of the tree. Defoliating caterpillars may also have a detrimental effect.

Young trees: Creating young pollard oak trees seems to incur some losses (eg 17 out of 30 trees cut were lost at Hatfield, possibly due to a sudden exposure on release from the scrub or subsequent dry summers) not necessarily related to the diameter of the trunk. Cutting in two stages may help to reduce losses. Site variation can be quite considerable, eg Thorndon suffered heavy losses at one site when leaders were not left but few losses on another site when cutting was similar. Greater success rates are achieved in the wetter climates of the west. At Epping Forest and Hatch Park younger trees responded better and stubs of 30 cm also helped. When cutting older trees it may be better to cut in stages (see under ash below). Note that most work on oak has been on pedunculate oak. Few sessile trees have been cut.

Further reading: Dagley & Burman (1996), Sisitka (1991a, 1991b), Smith (1991).

Plane

As for lime (most being street trees). There may be some evidence that repeated cutting of London planes every 2-3 years may cause them to go into decline (eg after 55 years or so, J. White pers. comm.) if cut back to the same point since the tree might have 'run out' of dormant buds (Patch, 1991).

Scots pine (and other conifers)

As a general principle most conifers do not pollard (an exception being yew). It is extremely unusual to find old 'worked' conifers (however, Scots pine of over 5 m in girth and probably pollarded can be found at Glen Orchy (N. Sanderson pers. comm.)). Trees occur with forked stems (occasionally with more than two stems) due to damage early in life and exotic species in gardens are made into hedges but with old trees of this type there is little hope of expecting a positive response to any large-scale pruning. No regrowth can be expected to occur following such cutting though retained branches *may* grow towards the increased light levels if the tree is of an appropriate shape. Managing ancient Scots pine in the remnant Caledonian Forest is an issue not covered in this text.

Sorbus species (wild service, whitebeam, rowan)

Veteran trees: There is limited experience of working on veteran *Sorbus* trees and there are few pollards. Cutting may well elicit a good response.

Young trees: Cutting of young trees should produce a good response.

Sweet chestnut

Veteran trees: Big old sweet chestnuts seem to largely 'look after themselves'. Cutting young chestnut produces a very good response so cutting of older trees may not be problematic. On the other hand, chestnut behaves in many ways similar to oak and old oak trees can be rather unpredictable; thus it would be prudent to carry out some tentative work first to assess the response. It is probably appropriate not to cut the entire crown off and not to cut the branches flush.

Young trees: Sweet chestnut is likely to produce has a good response but cutting of the side branches may be needed to encourage growth towards the top of the tree.

Sycamore

Whilst there are examples of old sycamore pollards in Scotland these do not appear to have been cut again recently. It is likely that young trees will respond well to cutting.

Willow

Veteran trees: The oldest willows are likely to be pollards or their successors (ie bollings that have fallen apart or layered branches, see Figure 54). Large groups of trees are often a single clone of ancient origin.

The management of mature and veteran willows poses serious threats to the inexperienced or unsuspecting. The stresses and strains are not so obvious with willows as with other timber trees; the soft fibrous nature of the wood can often result in lengthy linear fractures when cutting is started. Tools used for cutting should always be in particularly good condition and a part sawn willow should never be left even momentarily. Because of the woolly nature of the saw-dust it is wise to have a coarse set on the saw. Veteran, neglected willows are liable to drop structurally unsound limbs readily and the bollings fall apart easily.

Crack willow, as its name suggests, is rather brittle and indeed can often be identified by the considerable accumulation of shed material around the base and lower branches caused by wind blow. Its growth form is also very poor, frequently developing low, heavy lateral limbs, often bowed and in any plane. On the upper surfaces organic material and moisture collect and epiphytic plants such as mosses and lichens grow. These all form slippery hazards for the tree surgeon. Other trees, shrubs and herbs are frequently found growing in the decomposing wood in the centre of pollards adding to the potential hazards.

There are 18 species of willow regarded as native to Britain. Most of these usually have multiple stems and are more like shrubs than trees. Both crack willow and white willow have more tendency to grow with a single trunk and have been regularly pollarded in the past, often for fencing. Almond willow, purple willow and the common osier were the species most frequently coppiced in withy beds or willow holts. The growth is rapid, over 3 m per year, and the pliable rods were used for basketry, cart bottoms, hurdles and other rural crafts. There are also examples of common osiers in Suffolk cropped as shreds from saplings or singled, grown out coppice (P. Read pers. comm.).

Willow is one type of tree where pollarding has more or less continued from the 13th century to the present day. They are not especially long-lived trees and many pollards with ancient characteristics found along riversides may well have been created in relatively recent times. Today well managed pollards help stabilise the ground alongside rivers but trees cut on the river-side only, as frequently happens, produces lop sided trees and can cause problems.

It is reputed that willow pollards are best cut in February but most species will respond well when cut at any time of the year. Late summer cuts are less advisable as the young growth may suffer from winter weather conditions. Early spring growth was a convenient form of forage after winter food shortages.

Old willow pollards are usually able to respond well to complete removal of the canopy with minimal stubs left, especially if it has not been many years since the last cut. However, if there is a small amount of leafy material very close to the bolling on short stems it is worth leaving this. It has been suggested that leaving a single larger branch on willow pollards may be detrimental because the tree does not produce a proper flush of new stems from the bolling and the branch often breaks out if one is left isolated (J. White pers. comm.). Also, in crack willows, the brittle nature of the wood often results in at best the branch breaking in the wind and at worst some damage to the trunk of the tree. At the Nene Park Trust near Peterborough it was found that removing the whole crown of old lapsed white willow pollards did not result in such good growth as was expected. Some trees died and in others some partial death of the bole occurred, though this was often obscured by the good growth from the living parts of the tree. To overcome this, the trees are now cut in a series of stages over 3 or 4 years. At the first cut plenty of wood is retained on each major limb and this results in good growth. In the following years the tree is cut back further until just 15 - 30 cm of stem is left on the bole. This method is proving very successful and younger willows are also now cut in two stages.

Old willows that are not pollards may not respond so well to removing the entire crown and careful reduction work may be more appropriate. However, white willows of a variety of ages in Suffolk have grown well following complete decapitation (P. Read pers. comm.).

One important point when cutting willows (as with all tree species) is to try to avoid cutting all the trees in a group at the same time. Because they tend to occur in small clumps they are often all pollarded together for financial and practical reasons. While this is not a problem for the trees it can be for the populations of invertebrates requiring a particular stage of growth for their livelihood. Willow branches that are horizontal or have fallen are especially valuable for bryophytes and should be retained if possible. It is increasingly being realised that willows make an outstanding contribution to biodiversity in the north of the country and may exceed that of oak (N. Lewis pers. comm.) so these aspects are important to consider.

Young trees: Young willow should respond well. New trees were often started just by placing a newly cut pole in the ground to root and then the new branches were cut back to the height of the pole each time.

Further reading: Edlin 1956, Rackham 1986, 1990, Braun & Konold 1998.

Figure 54. *See colour plate page 96.*

Yew

Veteran trees: Yews are probably the longest lived trees found naturally in Britain. The trees are usually able to survive quite happily with minimum intervention but pruning of old trees is occasionally necessary. Yew does not usually occur as pollards but pruning of some or all the branches usually produces a good response. Over 50 trees at Westonbirt have been cut to a bare stump over the past 20 years with no losses (J. White pers. comm.). However, pruning of branch tips (eg along roadsides) in Herefordshire has resulted in die back along some branches treated (H. Stace pers. comm.). Yew is extremely shade tolerant and some individuals have abundant epicormic growth.

Young trees: Yew generally responds very well to cutting at any age.

Appendix 5.

Calculating the amount of dead wood within a woodland

The amount of dead wood is recorded by line-intercept sampling. It is recommended that five to ten transects are undertaken in each block of woodland to be sampled. The transects can be 25 m or 50 m, depending on the amount of dead wood available.

For each transect:

1. Arrange a starting point and direction for each transect beforehand or establish them randomly within the plot.
2. Lay down a tape (or rope) along the line of the transect.
3. Record each log or piece of wood (more than 5 cm diameter at the point of intersection) that the tape crosses. For each log note its diameter at intersection.
4. Record any standing dead trees with their centre within 2 m either side of the transect line. Note the diameter at breast height (1.3 m) for any more than 5 cm diameter.
5. The length of fallen logs in the stand can be estimated using the following equation:

   $$L = \pi 10^4 N (2t)^{-1}$$

   Where N is the number of intersections, t is the transect length (in metres) and L is the total length of fallen wood per hectare (in metres). The conversion factor of 10^4 is used to convert the results into metres per hectare.
6. The next step is to estimate the volume of fallen logs. To do this, use the diameter of the logs at the point of intersection and assign them to diameter classes, eg 5 - 10 cm, 11 - 20 cm, 21 -30 cm, 31 - 40 cm and >40 cm.
7. Calculate the mean cross sectional area for each size class and the length of fallen logs in that size class (using the above equation).
8. The total volume for each size class is estimated by:

   $$V = nd^2 \pi^2 10^4 (8t)^{-1}$$

   Where V is the total volume of fallen logs of diameter class d, n is the number of intersections for logs of diameter d, and t is the total length of transect as used before.
9. The total volume for the stand is the sum of the volumes for each diameter class.

The following benchmarks can be used to give a comparison of amounts of fallen dead wood (according to Kirby *et al*. (1998)):

Level of dead wood	Volume of fallen wood ($m^3 ha^{-1}$)	No. of standing dead trees (ha^{-1})	Size distribution of standing dead trees
Low	**<20**	**0 - 10**	**All <10cm dbh**
Medium	**20 - 40**	**11 - 50**	**Some >10cm dbh**
High	**>40**	**>50**	**Some >40cm dbh**

Appendix 6.

Organisations giving advice and/or grant aid* on veteran trees or aspects of veteran trees

Most of the following organisations are not able to give comprehensive advice on veteran trees

Ancient Tree Forum
P.O. Box 49
Ashtead
Surrey
KT21 1YG

Arboricultural Advisory and Information Service (Tree Advice Trust)
Alice Holt Lodge
Wrecclesham
Farnham
Surrey
GU10 4LH
Tel: 0897 161 147
(Premium rate line for technical advice)
01420 22022 (For publications, subscriptions etc.)
Fax: 01420 220 000

Arboricultural Association
Ampfield House
Ampfield
Romsey
Hampshire
SO51 9PA
Tel: 01794 368 717
Fax: 01794 368 978

Bat Conser vation Trust
15 Cloisters House
8 Battersea Park Road
London
SW8 4BG
Tel: 0207 627 2629
Bat Helpline:020 7627 8822

CADW: Welsh Historic Monuments
Crown Buildings
Cathays Park
Cardiff
CF1 3NQ
Tel:02920 500 200

Countryside Agenc y
John Dower House
Crescent Place
Cheltenham
Gloucestershire
GL50 3RA
Tel: 01242 521 381

Countryside Council for Wales
(SNCO for Wales)
Plas Penrhos
Fford Penrhos
Bangor Gwynedd
LL57 2LQ
Tel: 01248 385500

For **Tir Gofal** contact
Countryside Council for Wales
1st floor
Ladywell House
Park Street
Newtown Powys
SY15 1RD
Tel: 01686 613400

DETR
(for Biodiversity Action Plans etc.)
Room 902
Tollgate House
Houlton Street
Bristol
BS2 9DJ
Tel: 01179 876154

DETR
(for Tree Preservation Orders)
Rural Development Division
3/B5
Eland House
Bressenden Place
London
SW1E 5DU
Tel:020 7890 5623

English Heritage
23 Savile Row
London
W1X 1AB
Tel: 020 7973 3000

English Nature
(SNCO for England)
Northminster House
Peterborough
Cambridgeshire
PE1 1UA
Tel: 01733 455 000
Enquiry Service (for veteran tree recording form and publications): 01733 455101

Environment and Heritage Service
(SNCO for Northern Ireland)
Commonwealth House
35 Castle Street
Belfast
BT1 1GU
Tel: 02890 251 477

***Forestry Commission**
(Woodland Grant Scheme)
National Office for England
Great Eastern House
Tenison Road
Cambridge
CB1 2DU
Tel: 01223 314 546

***FRCA** (Countryside Stewardship and Environmentally Sensitive Area payments).
Contact your nearest regional office, or phone:0645 335 577.

Historic Scotland
Longmore House
Salisbury Place
Edinburgh
EH9 1SH
Tel: 0131 668 8600
Fax: 0131 668 8789

***Heritage Lottery Fund**
7 Holbein Place
London
SW1W 8NR
Tel:020 7591 6041 (information and publications)
Tel: 020 7591 6042/3/4/5

Scottish Natural Heritage
(SNCO for Scotland)
2 Anderson Place
Edinburgh
EH6 5NP
Tel: 0131 554 9797

Trees of Time and Place
Trees of Time and Place
Co-ordinator
c/o ESSO UK PLC
Mailpoint 08
ESSO House
Ermyn Way
Leatherhead
Surrey
KT22 8UX
Tel: 01372 222528
Fax:01372 223222

Tree Register of the British Isles (TROBI)
Secretary
77a Hall End
Wootton
Bedfordshire
MK43 9HP
Tel: 01234 768 884

Woodland Trust
Autumn Park
Dysart Road
Grantham
NG31 6LL
Tel: 01476 581111
Fax: 01476 590808

Appendix 7.

Abbreviations used in the text

ASSI	Areas of Scientific Interest
ATF	Ancient Tree Forum
CA	Countryside Agency
CADW	Welsh Historic Monuments
CCW	Countryside Council for Wales
DETR	Department of Environment, Transport and the Regions
EH	English Heritage
EN	English Nature
FE	Forest Enterprise
FA	Forestry Authority
FC	Forestry Commission
HMSO	Her Majesty's Stationery Office
JNCC	Joint Nature Conservation Committee
FWAG	Farming and Wildlife Advisory Group
MAFF	Ministry of Agriculture, Fisheries and Food
NNR	National Nature Reserve
RSPB	The Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SNCO	Statutory Nature Conservation Organisation
SNH	Scottish Natural Heritage
SOAFED	Scottish Office Agriculture, Environment and Fisheries Department
SSSI	Site of Special Scientific Interest
TPO	Tree Preservation Order
VTI	Veteran Trees Initiative
WATCH	Junior branch of The Wildlife Trust
WOAD	Welsh Office Agriculture Department