Chapter 4 Management of Veteran Trees

4.1 Assessing the situation and planning

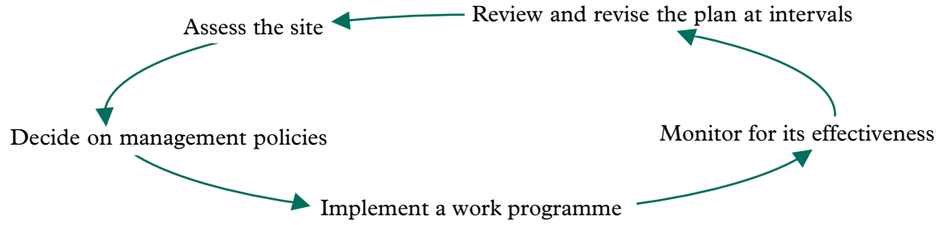
There are two basic things to consider when managing veteran trees. One is the individual tree and the other the site. In this chapter the tree is considered, chapter 5 covers managing the site or land surrounding the veteran tree.

This section looks first at how to assess your tree and make a decision on what to do (4.1 and 4.2). More detailed practical issues pertinent to individual trees (4.3) and the sites or landscape areas with veteran trees (chapter 5) are then discussed.

Ancient trees are found in an extremely wide range of situations. Therefore it is not possible to present a simple, easy to follow, set of guidelines which will work for every tree in every situation. One of the most frequent phrases used when contemplating management is that **every tree is an individual** . Even on a single site, different management options and prescriptions are needed for different trees. There may be several different ideal management options depending on the point of view taken by an adviser. A nature conservation officer might prefer a set of options that may be different from that of a historic landscape adviser (chapter 6) and these may contrast again with the view of a health and safety officer (see *Veteran Trees Initiative health and safety* leaflet). In addition someone with an interest in lichens (section 7.3) may recommend a different approach to an invertebrate specialist (section 7.6). Whichever option is chosen, if the tree itself is not saved, all the values associated with it are lost. Therefore it is important to know your site and your trees and to have as much information as possible on the historical background and current conservation values and status of the site which can be used to inform the management process. Potential conflicts of interest often do not turn out to be the tremendous problems that they might at first seem, when key issues are carefully considered.

4.1.1 The importance of management plans

A plan helps the manager to manage the site, and explains to others what is being done, and why. It is difficult to manage a site consistently without one. The management planning cycle can be summarised as follows:



The approach you take depends on the purpose of your plan, the nature of the site and the needs of the site owner. There is no single ‘right’ way of doing things but it is important that all aspects are considered to make an informed judgement.

Reasons for producing a management plan:

- **to ensure continuity of management over time;**
- **to bring together people involved in the management of the site and achieve consensus;**
- **to manage multiple uses and potentially conflicting interests on the site;**
- **to relate the site to the wider ecological and social context;**

- to attract resources (as part of a bid for grant aid) or be the basis for a legal agreement;
- to ensure that management can be achieved within the resources available;
- to promote and publicise the site.

The plan should include separate sections which:

- record the existing attributes of the site (eg particular wildlife and historical features);
- give information about the site;
- identify the site's value and significance;
- explain what management is intended to achieve;
- outline the means that will be used to do this;
- say who will do what, when and what resources are required;
- provide a way of checking the effectiveness of the site management.

Producing a plan should not become an end in itself. If the proposals are impractical, or not clearly set out, the plan will not be used.

It needs to be decided early on who will produce the plan, whether you do it yourself or employ a consultant. Whatever the decision, the complexity of issues surrounding the management of veteran trees and the sites they are found on will almost certainly require you to seek specialist advice. More information and guidance on management planning is given in the Countryside Commission (1998) guide which includes information about a range of planning methods including the Conservation Management System (1996) which is also a computer programme for planning and reporting.

4.2 Managing individual trees

4.2.1 Management types and historical evidence

It is useful initially to distinguish two broad types of veteran trees; those that have been actively managed at some stage in their life and those that have not. In practice, the way we manage these two types of trees now may not be particularly different. However, historical management practices have been responsible for many of the veteran trees we have inherited today. Past management may also have some bearing on the way we treat them in the future. The majority of the veteran trees encountered that have been actively managed in the past are pollards. There are few written documents recording how and when trees were pollarded so the information is quite sparse.That which is available, from historical literature and current practice in areas where pollarding still occurs, is summarised in appendix 4. There is plenty of evidence concerning the intervals between cuts but little else of any help. Many of the veteran pollards in Britain today are no longer in a regular system of active management and need some restoration work. This is not a problem our ancestors had to deal with and there is unlikely to be historic literature to help.

Veteran trees today include coppice stools. Coppicing is covered in detail in a range of publications, eg Buckley (1992), Hampshire County Council (1991) and Fuller & Warren (1993), and the methods are comparatively well known. General coppicing techniques therefore are not dealt with any further here.

4.2.2 How to decide whether to actively manage a veteran tree

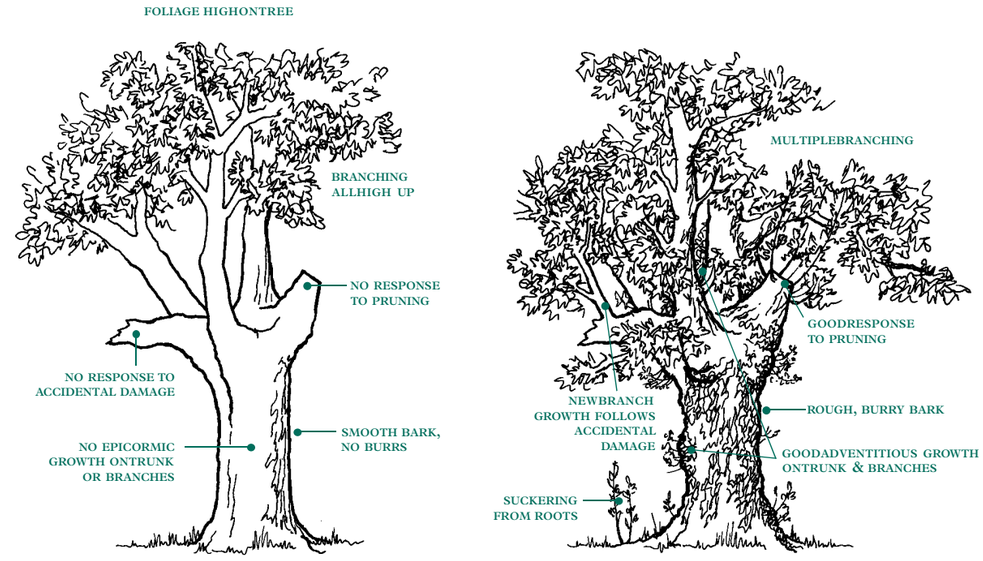
Take as a starting point the premise that the tree should have nothing done to it unless you can demonstrate a clear need. The decision to cut an ancient tree should not be taken lightly. Your decision should take account of the issues raised in the flow diagram on page 38.

To assess whether an individual tree is likely to respond positively to pruning, consider the following points (see also Figure 16):

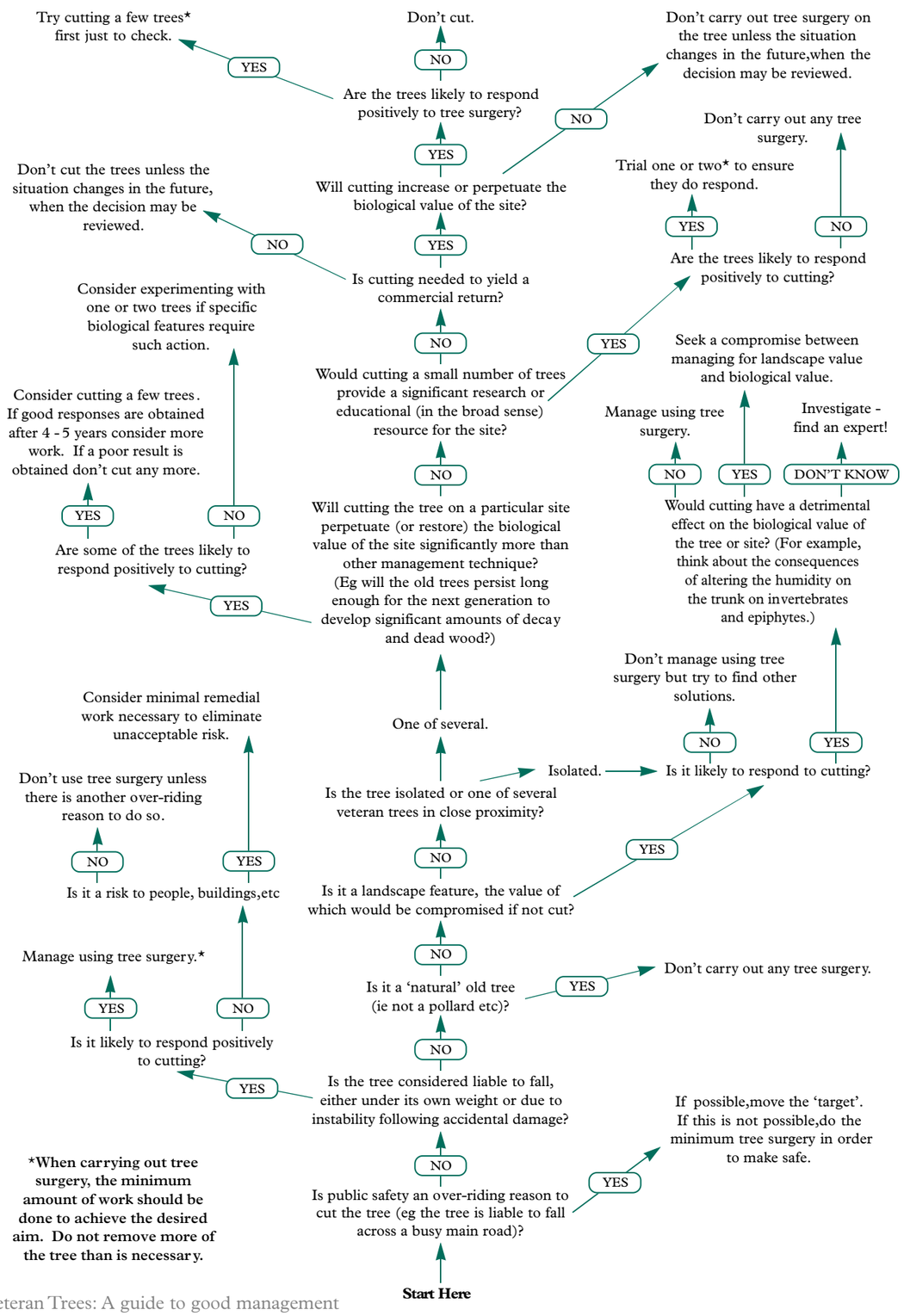
- How has the tree responded in the past to minor tree surgery work?
- How have other trees of the same species on the same site (or close by) responded to cutting?
- How do trees on the same site respond to accidental damage?
- Is it a species with a 'good' reputation (like willow) or a 'bad'one (such as beech)?
- Does it have burrs, good epicormic growth or obvious abundant dormant buds?
- Is it a suitable shape, ie is it relatively easy to leave small branches close to the bolling after cutting?
- Has it been pruned before? If so, how long is it since the tree was last cut (the shorter time the more likely the response is to be good)?

Assessing the success of any trials in cutting will mean you have to leave the tree for several years. There are several examples of situations where trees responded well initially but died some years later, almost certainly as a direct response to the cutting.

Figure 16. *Diagram to show the characteristics of a veteran trees that is likely to respond to cutting and those of a tree that is less likely to respond.*



Flow diagram to help decide whether to cut a veteran tree



***When carrying out tree surgery, the minimum amount of work should be done to achieve the desired aim. Do not remove more of the tree than is necessary.**

If you feel that for historical/biological/landscape reasons the tree ought to be cut in some way but that it is unlikely to respond well, it might be worth re-thinking your decision. If possible, leave it for the moment but carefully monitor what other people are doing elsewhere. In the future there may be other more successful methods of dealing with trees.

Remember, there is usually no urgency to do anything. Think long and hard before undertaking any work, and then do it only if really necessary.

4.2.3 Working on veteran trees

It is important to remember that the primary reason for working on a veteran tree is to prolong its life. Active management to increase its life expectancy may be needed because it is top heavy and about to fall over, or because a dangerous branch is overhanging a busy road (the alternative often resorted to here is to fell the tree). Generally speaking, do as little as possible in the way of cutting. There are some exceptions to this rule, for example if the intention is to return a pollard to a regular cycle of cutting again. Inducing decay and cavities in trees is worthwhile on sites where these features are scarce but experiment with these techniques on younger trees and not the veterans. Focus on keeping the veterans alive and do not do anything that might shorten their life span.

4.2.4 When not to work on veteran trees

In many situations the right decision is not to carry out any work on the tree at all. This is especially likely to be the case where veteran trees are naturally occurring within semi-natural woodland.

Many veteran trees in other situations do not require any surgery work. If they are stable and in good condition (which many are) there is no need to do anything. This does not mean that a tree can be forgotten; it will need checking on a regular basis to make sure that the situation has not changed.

Working with veteran trees requires long-term vision, the temptation to work on them just to demonstrate that they are being managed and to show results quickly should be avoided.

4.3 How to car ry out tree surgery on old trees and maximise the chances of success

4.3.1 Tree surgery on veteran trees

Once you have made the decision to cut a veteran tree it is necessary to look at the details of how and when to do this.

Only a few years ago the chance of a veteran tree surviving cutting was viewed as negligible. Since then a variety of veteran trees have been cut in different situations with mixed results. Some of the work has undoubtedly been successful, such that it is starting to become possible to give guidelines as to what is *most likely* to work but it is not possible to give a prescription of what *will* work. This depends on so many variables, eg tree species, age, soil type, location and aspect, previous management, skill of the operator, environmental conditions and the incidence of subsequent stresses that the tree may face.

If you are looking at working on a population of old trees try out the techniques on a small number first to ensure that it will work. This is also better for the conservation value of the site too, ie never do something to the whole of the resource at once. Sites with many veteran trees are all the more valuable in conservation terms because of the aggregation of trees. Individuals are not expendable just because there are many of them.

Two broad-scale objectives can be defined:

- **cutting old trees with a view to making them safe, or saving them from imminent collapse as a one off treatment (remedial work);**
- **cutting them with a view to getting back into a (semi) regular pollarding/coppicing routine (restoration pollarding/coppicing).**

In some situations this distinction is a little blurred, but you should think about the long-term future management of the tree because it does sometimes have implications for the work being done.

The emphasis here is on restoration work, and maximising the future survival of the tree. Similar principles apply to remedial work as it is always important to maximise the chances of the tree surviving in the future if the situation allows.

4.3.2 Species of tree

Each tree species seems to respond in a different way. Appendix 4 gives as much detail as is currently available on the likely success of work done on different species of veteran trees. The table below presents a *very rough* rule for guidance. There is considerable variation between different situations so this table should not be taken too literally.

Species	Ease of Cutting		
	Tolerance to Pruning in a Veteran Tree	Creating Young Pollard	Initiating Pollarding on Mature or Post Mature Maidens
Willow	***	***	***
Plane	***	***	***
Lime	***	***	***
Apple/Pear	**(*)	***	**(*)
Hawthorn	**(*)	***	**(*)
Yew	**(*)	***	**
Hazel	**(*)	**(*)	**(*)
Holly	**(*)	**(*)	**
Hornbeam	**	**(*)	**
Sycamore	**	***	**(*)
Poplars incl. Aspen	**	***	**(*)
Field Maple	**	***	**
Sweet Chestnut	**	***	**
Horse Chestnut	**	***	**
Alder	**	***	**
Oak Spp.	**	***	*(*)
***Sorbus* Spp.**	*(*)	**(*)	*(*)
Ash	*(*)	**(*)	*(*)
Birch Spp.	*(*)	**	*
***Prunus* Spp.**	*	***	*(*)
Beech	*	*	*
Scots Pine	(*)	(*)	-

*** Likely to respond well to cutting
** Likely to show a medium response to cutting
* Likely to show a poor response to cutting

Brackets indicate that the response is variable (according to location, etc).

4.3.3 Time of year

It is difficult to give a good prescription but **the times definitely to a void are spring**, when the leaves are just opening on the tree **and autumn** when they are being lost. At these times it is considerably more difficult for the tree to deal with the stress of heavy pruning. In Britain traditional cutting seems to have been done in the winter and probably the ideal time for cutting is January to March. Slightly less ideal is November to December and it is probably best to avoid cutting altogether in frosty weather. However, cutting for fodder from most trees must have been done in the summer. Mid-summer cutting has been shown to be successful in some cases. Probably, severe drought years are best avoided (though these may have been the very years when additional fodder was required). July and August are probably the best summer months to cut in. However, there are other reasons for not cutting then. For example, there may be birds nesting in the trees, herbivorous insects are abundant and it is difficult to see the shape of the tree in order to decide where to cut it. See also Lonsdale (1994) for a discussion of the relative merits of cutting at different times of the year.

The following calendar gives a rough indication of the best times to cut veteran trees:

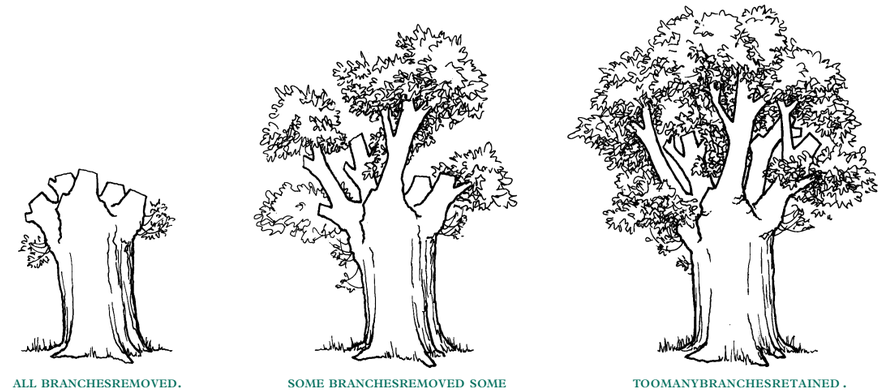
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
***	***	***	X	X	X	*	*	X	X	**	**

X Not good, * Possible, ** Better, *** Best
There is also some variation between species, see Appendix 4 for details.

4.3.4 Amount of crown to remove (Figure 17)

Leave some limbs intact (and remove at a later date if appropriate). This is essential on some species and desirable on others. Small living twigs and branches all round the bolling should always be left if they occur (except perhaps on willow and poplar). The number of branches left should depend on the species of tree and its likely response to cutting. If it is a species likely to make a poor response, more branches should be left. If it is more likely to show a good response, leaving more than one branch may result in excessive regrowth in those that are left and little in the way of new ones. Some authors have suggested leaving a distinct central stem to make future cutting easier, but in practice, this often produces a more difficult situation in the future than leaving some branches lower down. Retained branches ensure that there are living pathways, for nutrients/water etc, from the pollard head to the roots. It is best to have these distributed round the trunk of the tree in species less likely to show a positive response to cutting. Cut according to the form of the tree and bear in mind any future cutting of the tree that might be needed.

Figure 17. *Diagram to show the amount of crown to remove and the amount of light reaching the tree.*



4.3.5 Light reaching the tree

The amount of light reaching the veteran is important. The structure of the surrounding vegetation should neither give excessive shading nor lead to extreme desiccation. It is impossible to give a prescription for this but the ideal light regime for an individual tree will depend on the species and its location. Even shade tolerant species such as beech need plenty of light to grow successfully after cutting but the more light demanding hornbeam in open parkland can suffer from excess sunlight and heat. Points to consider are:

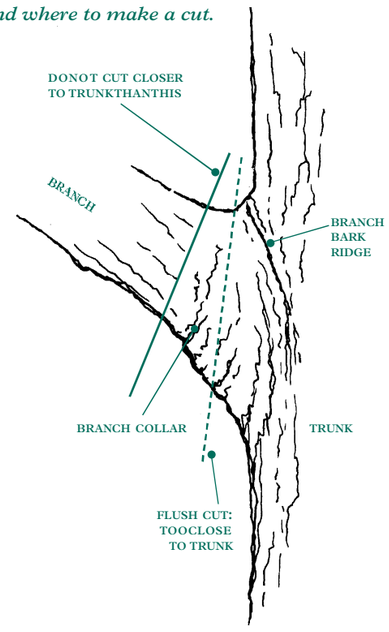
- **any surrounding trees; these should not be overshadowing the veteran and the canopies should not be overlapping, (but beware of opening up round a veteran too quickly, see section 5.3);**
- **the branches on the veteran itself. Consider retaining branches that shade the south side of the bolling (or the exposed side) to provide shade after cutting.**

Don't forget that even on the same site, trees may have different aspects so desiccation may be a problem on a south facing slope but not elsewhere. Sun scorch of leaves after recent clearing, or substantial reduction, can be a problem but is usually not fatal. On occasions a veteran tree may be shaded by another veteran tree. In this situation it may be necessary to carry out reduction work on both trees at the same time to ensure adequate light levels.

4.3.6 Length of stub left

The branch collar (a ridge of bark where a branch joins the trunk) should be left, and on no account cut into (Figure 18). General arboricultural practice is to cut just above the bark ridge as the tree can then more easily recover. Clean cuts made close to the previous cut or trunk do not usually produce good regrowth. When cutting above a side branch it is also important not to injure the branch bark ridge. Probably, the larger the diameter of the branch, the longer the stub that should be left (a longer stub is also more likely to have viable dormant buds than a shorter one). As a rough guide, leave 10 times the diameter of the branch above the bole of the tree.

Figure 18. *The position of the branch collar and where to make a cut.*



Different experiences have provided conflicting information but the importance of leaving stubs does vary according to the species of tree and the age of the limb. Long stubs may encourage decay in the trunk but where the bark is thinner (away from the base of the branch) dormant buds are more likely to emerge so that leaving longer stubs may be justified. Larger diameter stubs are slower to callus over and tend to die back more.

It is also important to cut above the previous pollarding or re-cutting, preferably above healthy side branches (except if cutting in two stages see below).

4.3.7 Cutting in two (or more) stages

Depending upon the shape of the tree it is sometimes worth considering cutting it in two or more stages, several years apart (Figure 19). This has been done successfully with oak (White 1991a, 1996 and V. Forbes pers. comm.), white willow (Wheal 1998) and black poplar (L. Davies pers. comm.). In the first stage the upper branches are removed, a high proportion being retained lower down. After an interval of one to five years (according to the species and growth following cutting) the second cut can bring the crown down to a lower level, retaining some of the new growth produced as a result of the first cut. This method may prove successful with other species but seems less likely with beech as new growth rarely occurs well below the point of cutting.

Figure 19. *Cutting a veteran tree in two stages.*

4.3.8 Type of cut

There are two schools of thought here: first that cambial regeneration is usually very poor, therefore there is no advantage in slanting cuts to increase its perimeter and thus it is best to cut at the easiest angle. The alternative is that a slanting cut is better because it sheds water and increases the chances of adventitious growth (albeit sometimes only slightly). It does not seem necessary to leave a clean cut. A jagged edge may encourage better growth from adventitious buds due to the increased amount of exposed cambium.

It probably does not matter what type of cut is left - experiment and find out what is best for your site. The visual appearance of cut surfaces may also influence your decision.

4.3.9 Cutting tool to use

It has been considered by some people that edge tools are better than saws, whereas others believe that there is no difference. There is also a school of thought that chainsaws are not good but there is no real evidence for this. The only experimental work to be carried out on tools was on sweet chestnut coppice. This showed that cuts with an axe produced more even growth than that with a chainsaw, where surges of growth result, although there was no overall difference in growth. Cuts with an axe showed new shoots nearer to the cut; with a saw there were more initial shoots but some died.

4.3.10 Weather conditions at the time of cutting

Avoid cutting in drought years (or the following year if it is very severe). Be careful when cutting trees that are in frost hollows, try to cut during a warm spell or at the end of the winter.

4.3.11 Good balance

Ensure that the shape of the tree after cutting is not unbalanced (Figure 20). Be careful though not to destroy an existing asymmetrical shape that is adapted to, for example, strong winds. This aspect is covered in detail by Mattheck & Breloer (1994).

Figure 20. *A tree well balanced after cutting and one that is unbalanced.*

TREE BEFORE RESTORATION WORK. TREE WELL BALANCED FOLLOWING RESTORATION. TREE NOT WELL BALANCED FOLLOWING RESTORATION.

4.3.12 Regional differences

Trees in the more humid west are less likely to suffer from desiccation than those in the east. Regrowth tends to be more vigorous in westerly districts and in mild wet areas such as the Lake District. Less responsive species tend to grow better following tree surgery here than in the south-east.

4.3.13 Growth of lo wer branches

In grazed areas, lower branches will be browsed and kept back. Where livestock or deer are not present some trimming of growth low down on the trunk may be necessary. Excessive branches lower down may divert energy from those at the top of the tree.

4.3.14 Age of tree and length of time since any previous tree surger y

The younger the tree and the less time that has elapsed since any last major cut the more likely the cutting is to succeed well (within species).

4.3.15 Trees with bur rs

Trees may respond better to cutting if they have visible burrs or dormant buds. However, it can be difficult to tell and the differences are probably at least partly genetic.

When assessing a veteran tree with a view to carrying out tree surgery consider the following points:

- Which branches are alive and which dead? (ie when left, which will continue growing?)
- What type of growth pattern does it show? (Lots of epicormic or none? Any previous growth from dormant buds?)
- What is the growth form of the tree? (Are there obvious places to cut back to? Are there good branches to leave?)
- How well balanced is the tree? (If a branch is removed will the tree become unbalanced?)

A few general points on cutting veteran trees are worth stressing:

- For all species except willow and poplar, near 100% success rate cannot be achieved if all the crown is removed.
- The more 'difficult' a species is the more important it is to retain much of the existing canopy.
- For all species it is worth retaining any small or young growth around the bolling.
- Bear in mind that removal of the entire crown can cause excess drying of the bolling, especially if the tree is in open conditions.
- It should not be thought that because branches have been left, the tree is not properly pollarded. The main purpose of the work is to extend the life of the tree. This is far more important than details of the terminology. Retaining branches can be a short-term measure and after a few years the tree can often be re-shapes if necessary. It is also likely that some species never had the entire crown removed in any case.
- Wait for a few years to assess success. Don't assume that growth in the first year means that a technique has worked.
- Whatever the species don't cut all the trees at the same time, even if you know it will work!

Practices which are not recommended include:

- Cutting entire populations of old trees at the same time.
- Thinning the resulting growth. This can be done but the trees usually self thin (ie branches that do not have enough light die anyway) and unless resources are available it is not usually necessary.
- Sealing the cut with wound dressing. This does not help the tree to recover from the cutting. (Though it may help to reduce excessive drying.)
- Cutting every year. This is sometimes recommended for street trees especially in the USA but is ***not*** recommended for old trees on sites of importance for nature conservation unless it is continuing an existing practice.

Mulching of veteran trees

There is some debate about whether mulching veteran trees, by putting a deep layer of leaves or woodchips around the base, is beneficial or not. It is likely that this was an historic management technique, at least in Blean woods, Kent. When the Bishop traditionally visited the wood after September the leaf litter was swept away for him to walk and the leaves used to mulch the pollards (D. Maylam pers. comm.). More recently the Major Oak at Sherwood (see Figure 48) has been mulched and is showing increased vigour as a result. However, there is a concern that a thick layer of organic matter may encourage increased growth of roots close to the surface that may then be more susceptible to desiccation in dry periods.

Recording

Make sure that you record what you do with your veteran trees. Photographs are a minimum requirement but more detailed descriptions of what was done and how the trees responded are more useful for future management. Consider also doing ring counts of any branches removed. See also chapter 12.

4.4 Comments specific to pollarding

4.4.1 Cutting veteran pollards that are still in a regular cycle of cutting

There are some pollards that are still cut on a more or less regular basis and cannot be considered as lapsed pollards. These tend to be either urban trees (lime or plane that are responsive and easy trees to deal with) or trees in agricultural situations where the farm workers have continued to cut them. In addition, there is at least one place (Hatch Park in Kent) where an extensive population of veteran pollards has been cut continuously since the middle ages with no break.

In situations where there has been no lapse in the pollarding cycle the best course to take is to continue with whatever has been done in the past. Often this seems to be to remove the whole crown in species such as ash and oak. It is likely that trees in a regular cycle of cutting are more able to grow following removal of the whole crown than are lapsed pollards. It is doubtful, however, if beech pollards ever had the whole crown removed.

Pollards in farmland

Goswold Hall in Suffolk is a typical arable farm of 150 ha. Around the edges of the fields, in the hedges and by the green lanes there are 15 ash pollards, plenty of oak pollards and two field maple pollards; prior to Dutch elm disease there were over 100 elm pollards. The owners took over in 1937 and most pollards have been managed continually since the (Figure 21). A few oaks were left to grow out, as prior to 1937 they had not been cut regularly and some had not been pollarded for over 100 years.

In 1937 there were 10 men working on the farm and each man was given a hedge pollard,or a stow, usually elm,maple or a smaller oak,as a perk in the winter. They pollarded the tree in their own time and used (or sold) the wood for firewood. Stowing a tree (pollarding) was done on a five to eight year cycle by climbing the tree or a ladder and using a heavy billhook with a 2´ (60 cm) handle. The men considered that a tree should not be cut with a saw unless you had to because it would not shoot so quickly, 'it needed to be chopped'. If a saw was used there was a danger that the branches were cut too close to the trunk and then the tree might die. The bigger oaks were pollarded for fuel in the Hall and for structural barn timber. They were cut using saws with large double or triple teeth like a crosscut saw, with deep intermediate cuts to self clear but they were single handed with a wooden handle. Many had holes at the other end to which a second handle could be fitted quickly if necessary. The ash pollards were potentially cash crops, the trees were 'sold'to a contractor who pollarded the trees for making handles, especially for the local brush factory. There were also itinerant pollarders who pollarded the trees for a share of the crop.

In recent years the trees have mostly been cut on a 12 - 15 - year cycle and up until the 1980s the cutting was done with bow saws;now chainsaws are used. Branches are cut within 2¨ (5 cm) of the bolling. A branch was once left on a veteran oak but it was removed after a few years as the tree was not growing well from the bolling. The pollards are now managed along with the coppiced hedges and grass headland under a Countryside Stewardship with £40 being paid for each pollard cut. The wood is used for the farmer's central heating systems.

Figure 21. *See colour plate page 85.*

4.4.2 Future cuts on lapsed pollards

When working on lapsed pollards it is important to consider the future. The purpose of tree surgery may be just to increase the short-term life expectancy of the tree. However, for some trees a cycle of (semi-)regular cuts can be considered, which will continue to increase the life of the tree. When cutting lapsed pollards it is important to think about the subsequent growth and any future cutting. Try to avoid creating pollards 'on top of' pollards if possible as this makes the trees difficult to manage in the future. Only a few lapsed pollards have been cut for a second time (apart from those cut in a series of stages, over a short time span) so experience of this is, as yet, very limited (Figure 22).

Figure 22. *See colour plate page 85.*

4.5 Who does the work on the veteran trees?

Carrying out tree surgery work on veteran trees is a dangerous occupation and should not be undertaken lightly. It is essential that *any* work done with a chainsaw is carried out by fully certificated operators wearing full personal protective clothing. In most cases it is also necessary to have certificates for using a chainsaw at height, and for tree climbing.

Managing dead veterans

Dead trees may also need managing and should definitely be retained. They are tremendously valuable habitats but are often under threat of felling on the grounds of safety or tidiness. As with living veterans, try to do as little remedial work as necessary to make the tree safe, and avoid cutting and or removing features such as cavities. Sudden extensive clearing of younger woodland around dead stumps should be avoided as this can dramatically alter the light/moisture regime for the organisms inhabiting decaying wood.

4.6 Managing populations of veteran trees

Populations of old trees are sometimes threatened when the land they are situated on changes owner or manager. The more changes, the more likely that the trees may be managed in an inappropriate manner. The fragmentation of land may create similar problems.

Many of the organisms associated with veteran trees require good populations of trees and are threatened by:

- **the sites being too fragmented;**
- **trees being too widely scattered;**
- **a missing generation of trees. Thus there will be no new veterans in the near future and often no young trees at all;**
- **future generations of trees that are a different species from the old ones;**
- **no prospects for the long-term continuation of biological features characteristic of old trees, eg decay.**

Populations of veteran trees should ideally consist of a large number of trees, in close proximity, with a good range of different ages (including future veterans). Many sites need active work to reach this ideal.

When contemplating the management of populations of old trees the following points need to be considered:

- **A good age structure is achieved and/or maintained (ie there are abundant veterans and also a range of younger age classes to replace the veterans eventually).**
- **A good number of veteran trees are present (the exact optimum density is unknown but the more the better).**
- **Try to reduce site fragmentation (by promoting future veterans on land in between existing sites).**
- **Continuity through new generations of trees.**
- **Continuity of dead wood resource, both standing and fallen.**
- **Continuity of dead wood features, eg decay cavities, rot pools, sap runs.**
- **Pollard trees of intermediate age to close up the generation gap. Also encourage open grown trees, which develop larger butts and trunks and have more heart wood decay at an earlier age than woodland trees.**

When managing populations of veteran trees it is necessary to think about what the situation will be like 100 or more years into the future. This of course cannot be predicted but managing for long-term continuity should be attempted.

Population dynamics of old trees

There are a few sites where trees have been surveyed and then the survey repeated after a time interval. There is scope for more detailed, repeated surveys and the establishment of a standard recording form for veteran trees (see chapter 12 and appendix 6) should help this.

Harding & Alexander (1993) showed that, for five parkland sites, the age structure of the trees was heavily weighted towards the older age classes. As a result proposals for planting schemes were drawn up for three of the sites. Losses of trees from three of the sites between 1976/79 and 1989/90 were generally slight despite strong winter gales in this period.

The trees at Duncombe Park in North Yorkshire were surveyed and mapped in 1986 (Clayden 1996). In 1994 1200 open grown trees were re-surveyed. Even trees of small girth (2-20 cm) were included. Losses ranged from 0% (lime) to 8% (ash) over the eight-year period. Losses were not necessarily in the oldest age groups. Higher percentage losses were recorded for wych elm (Dutch elm disease), holly and cherry. There was concern that for some species (ash, beech and field maple) recruitment may not be enough to ensure a continuous range of older trees.

Veteran pollard beech trees were first accurately recorded at Burnham Beeches in 1931 when there were 1795 trees. In 1956 the numbers had declined to 1300 and by 1991 there were fewer than 540 (Read, Frater & Turney 1991). The decline has added impetus to managing the veteran trees and creating a new generation of pollards.

Further reading: Countryside Commission (1998), Edlin (1971), Harding & Alexander (1993), Le Sueur (1931, 1934), Mitchell (1989), Read (1991, 1996) and see Appendix 4.