




Restoration Cutting of Ancient Beech Pollards

The 500 year old beech pollards have been the subject of intensive restoration work over the last 20 years. In this article Helen Read, Conservation Officer for the City of London, Burnham Beeches, considers the results of this experimental program of arboricultural work that has incorporated tree management techniques from across Europe.



The City of London (CoL) own a number of important green spaces within and around sprawling metropolis. Over all it funds and manages over 10,700 acres (4,330 hectares) of historic and natural open space, by charitable trust, for public recreation and health.

Ancient trees are present within a number of the City Commons managed by the CoL and beech pollards are a particular feature of both Burnham Beeches and Epping

Forest. It is therefore not surprising that the CoL has invested considerable time and effort in researching the best way to manage these trees.

In this article Helen Read discusses the results of research she has undertaken at Burnham Beeches. The background images used in this article are from Epping Forest.

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The work programme has now reached the point where all the old trees have had at least one phase of work carried out on them and many are now into their second cycle, but is the restoration programme working? Are the trees healthier and more stable than if no work had been carried out?

A recent review of the successes and failures of the project has been carried out, along with a complete resurvey of the old trees still alive and the compilation of a 10 year work programme. The results have been published in the Quarterly Journal of Forestry and also an internal report and work programme for use by staff at Burnham Beeches.

The recent evaluation work was carried out by staff at Burnham Beeches together with Vikki Forbes of Pro-Natura, a Swedish consultancy. Having an independent contractor involved was one way of ensuring that decisions made were not out of character with work on ancient trees elsewhere.

The Specialist Survey Method (SSM) was used for the basic survey of the trees. This was developed by Neville Fay and Nigel de Berker for the Veteran Trees Initiative. Although a previous baseline survey had been carried out in 1989-1990 prior to the development of the SSM the use of a national 'standard' was considered important to provide a more detailed baseline and to enable comparisons to be made between sites. The information gathered from this was uploaded to the Ancient Tree Hunt (www.Ancient-Tree-Hunt.org.uk) website and is now available online.

A related project looked in detail at the responses of some of the old trees to restoration pruning. These were selected at random, to include 10 from each of 9 years in which the trees were restoration cut with a few exceptions. Unfortunately the last two years (2004 and 2005) had just 5 trees cut in total due to postponement of the work because of drought; prior to 1993 a total of 9 trees had been cut (and these were lumped together).

Records had been kept of key aspects of the work when the pruning work was carried out (who did the work; if climbing spikes were used; if coronet cuts or tears were made). Over the nearly 20 years that it took for the first tranche of restoration cutting to be carried out there had been considerable variety in techniques used. This variety was viewed by staff as positive, because it was recognised that the restoration cutting of old trees is a new science and one that is constantly developing as new ideas transpire.

Assessments of the responses of the trees to cutting were carried out from the ground, using binoculars. Some simple estimates were made of the number of branches cut and those retained intact and then five branches were selected from each tree to be assessed in more detail. If more than five branches had been cut, those chosen were distributed around the tree, to be representative of the branches cut (and also those that could be seen easily).

For each branch an estimate was made of the length

(very short, short, medium or long) the diameter (wrist sized, arm sized, leg sized or waist sized) the number of new shoots and clusters arising from the stub and the distance down the stub that the new shoots occurred (on the cut surface, just below, between 25cm and 50cm below or more than 50cm).

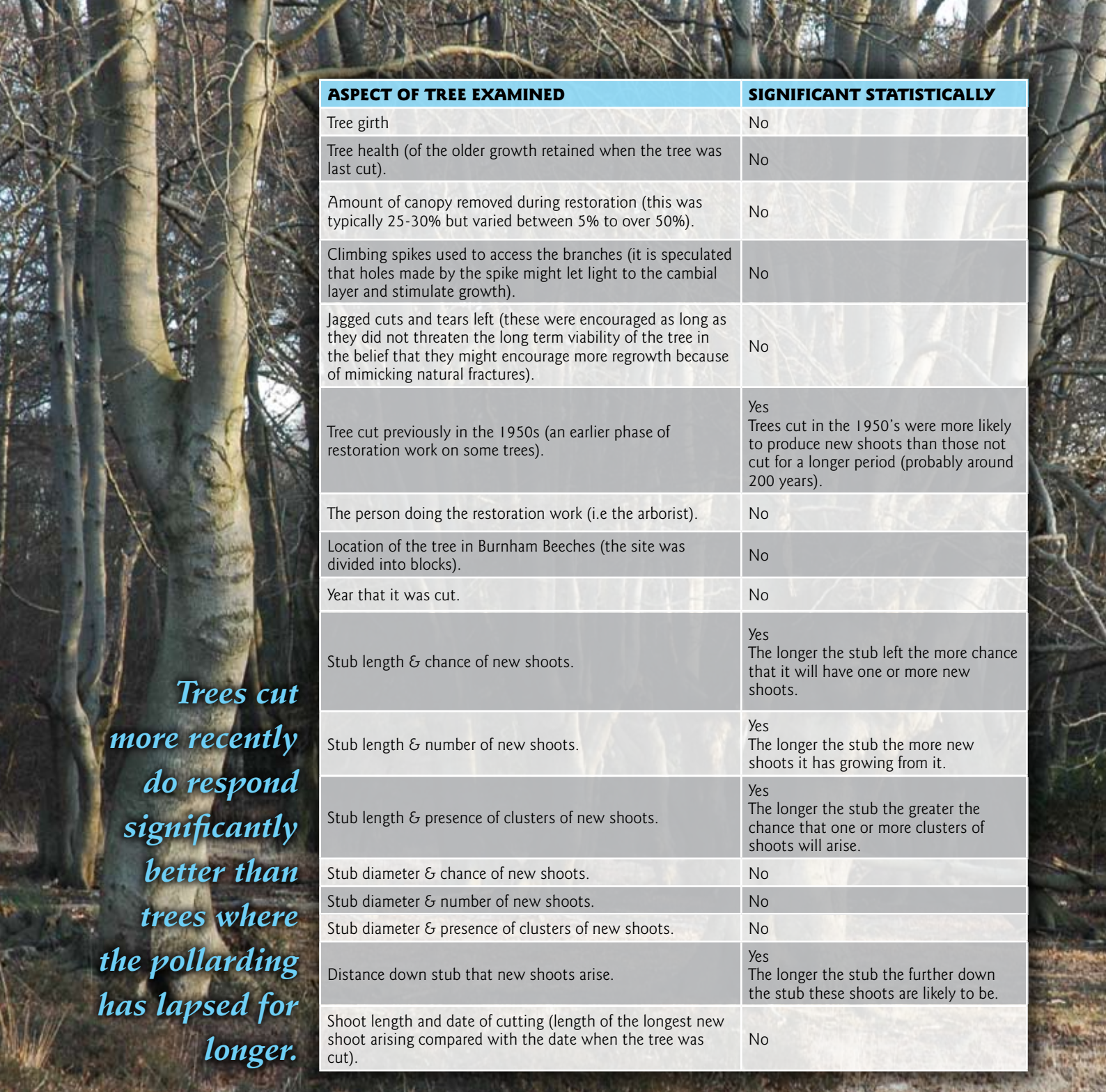
Additional information was gathered about the health of the trees, using Roloff scores of the twig structure, canopy architecture. The results were analysed with the help of a biological statistician. As a consequence of these various projects some interesting information has been gained.

Of the 574 live ancient pollards that have been tagged and recorded at Burnham Beeches since 1990, 151 are now dead. These include 10 oaks (there are currently approximately 18% oaks in the population). All the following comments relate to beech only. The major reason for tree death is the presence of heavy branches that have caused the whole tree to fail or which have fallen but leaving a trunk that is unable to regenerate.

A total of 34 trees died after restoration cutting but of these just 13 were considered to be as a direct result of cutting (others died probably due to the impact of flooding, compaction, other trees falling into them etc.). Of these 8 were in a very poor condition prior to cutting and/or were cut to stabilise the tree after major limb loss and so were not subject to the normal careful restoration work. Three suffered from lack of light following cutting, due to lack of sufficient follow up surveys at the time, a lesson in ensuring that trees are not forgotten once the pruning work has been carried out.

The SSM confirmed a remarkable number of habitat features, for example some 2166 holes 5-15cm in diameter, 192 sap runs and a total of 1790m of dead wood in the crown over 1cm in diameter. The quantity of dead wood still remaining indicates the priority placed on the habitat value of the trees even when reduction work is carried out. Epicormic growth was recorded at the base of 48 trees and the crowns of 153 trees; the presence of epicormic growth has been suggested to indicate a potential positive response of the trees to cutting.

Of the 76 trees where the response to cutting was looked at in detail 45% had one or more branches with new growth resulting from the cutting and 24.5% of the individual branches had new growth. Many trees showed good extension growth but not necessarily new branches arising from the stubs or cut surfaces (this is very difficult to record and has not been included in the results but it would be interesting to know more about it). Various aspects of tree management and response were looked at and the results are given in the table. This uses the growth of new shoots on cut branches as an indicator of success. Where the results are statistically significant this is explained in more detail.



Trees cut more recently do respond significantly better than trees where the pollarding has lapsed for longer.

| ASPECT OF TREE EXAMINED | SIGNIFICANT STATISTICALLY |
|---|---|
| Tree girth | No |
| Tree health (of the older growth retained when the tree was last cut). | No |
| Amount of canopy removed during restoration (this was typically 25-30% but varied between 5% to over 50%). | No |
| Climbing spikes used to access the branches (it is speculated that holes made by the spike might let light to the cambial layer and stimulate growth). | No |
| Jagged cuts and tears left (these were encouraged as long as they did not threaten the long term viability of the tree in the belief that they might encourage more regrowth because of mimicking natural fractures). | No |
| Tree cut previously in the 1950s (an earlier phase of restoration work on some trees). | Yes Trees cut in the 1950's were more likely to produce new shoots than those not cut for a longer period (probably around 200 years). |
| The person doing the restoration work (i.e the arborist). | No |
| Location of the tree in Burnham Beeches (the site was divided into blocks). | No |
| Year that it was cut. | No |
| Stub length & chance of new shoots. | Yes The longer the stub left the more chance that it will have one or more new shoots. |
| Stub length & number of new shoots. | Yes The longer the stub the more new shoots it has growing from it. |
| Stub length & presence of clusters of new shoots. | Yes The longer the stub the greater the chance that one or more clusters of shoots will arise. |
| Stub diameter & chance of new shoots. | No |
| Stub diameter & number of new shoots. | No |
| Stub diameter & presence of clusters of new shoots. | No |
| Distance down stub that new shoots arise. | Yes The longer the stub the further down the stub these shoots are likely to be. |
| Shoot length and date of cutting (length of the longest new shoot arising compared with the date when the tree was cut). | No |

These results show that the location within Burnham Beeches, the person doing the cutting, the year in which it was cut, whether jagged cuts and tears are made, whether climbing spikes are used, the girth of the tree and the health of the tree judged by the architecture of older branches all have no impact on likelihood of the growth of new shoots from the trees when cut. Interestingly the trees cut many years ago don't necessarily have longer new shoots arising than those cut more recently.

Trees cut more recently do respond significantly better than trees where the pollarding has lapsed for longer. They also stand a better chance of producing new shoots and clusters of shoots and of

producing more new shoots if the stub left is longer. However the diameter of the stub seems to be unimportant. If the stub is longer then new shoots tend to be produced further down it.

Because three major surveys have been carried out of all the old beech pollards at Burnham Beeches in recent years it is possible to calculate the mortality rates of the trees. Between 1989 and 1999 the mortality rate was 1.91%. Between 2000 and 2007 the mortality rate decreased to 1.69. As the trees continue to age and have suffered the consequences of around 200 years of no regular pollard management some will continue to die each year.

Despite the best efforts of staff it is

unrealistic to expect the mortality rate to drop to zero but the fact that it has reduced indicates that the active management is at least not speeding up the rate of decline. One aspect of concern is the amount of grey squirrel damage on many of the trees. Efforts in squirrel control have been increased in recent years as a consequence of some of the survey work highlighting the amount of damage on fast growing branches on both old and newly cut young pollards.

The results of this work have shown that it is possible to use techniques that will help increase the chance that the trees will put on new shoots. Leaving long stubs and making sure that the trees are cut regularly being the most obvious. The consequences of cutting



large diameter branches may have a long term negative impact on stability as the cut surface dries and a cone of dysfunctional wood results, but in the short term they are not necessarily less likely to produce shoots.

This work has also raised a question as to the validity of using tears and jagged cuts to imitate natural processes, something that has been proposed via the creation of coronet cuts. It should be noted however, that most of these types of cuts made on the pollards were on relatively large branches and were mostly undertaken relatively recently. While these can be undertaken for other reasons (such as aesthetics) they do not appear to significantly increase the chance of a tree producing new shoots.

This work has probably not been a fair analysis of the responses of small diameter branches cut using the natural fracture pruning techniques. These tend to be associated more with retrenchment pruning where very small proportions of branch wood are removed over a long management program.

Whilst beech trees are not renowned for responding to pollarding by producing abundant new shoots, nearly half the trees examined had at least one branch with new shoots on so it is realistic to expect some new growth. A much larger number of trees responded to cutting by producing new growth from the retained branches growing into light gaps left from the reduction of branches; this response should not be underestimated. It does also illustrate the importance of cutting beech trees gently and ensuring that sufficient foliage remains.

As a result of the evaluation a new work programme for the old trees has been drawn up, lasting for the next 10 years. We can be confident now that the restoration work is not hindering their survival and the statistics show that it is beneficial. We have continued the system of working developed in recent years, with preparation work and clearance for light being carried out just before Christmas each year and the pollard reduction work just after.

A small number of trees are considered to have been reduced as close to the bolling as it is going to be possible to achieve and the branches on these will be cut on a rough rotation. Some trees are being further reduced in height and may require up to six further reductions in order to reach this point, at no point will all the branches be removed as might be normal on a willow or lime.

All pollarded trees are subject to a quick inspection every second year to check for any emergency work required, such as lack of light or fallen branches interfering with growth.

The guidance that we give to the arborists undertaking the cutting of these old pollards stresses the importance of leaving long stubs, this is the single most important point after ensuring the key balances of not cutting the trees too hard and making sure that they have enough light but not too much.

A wide variety of people have cut the trees over the years and we can feel confident that this is not a problem as long as we can work with them in a co-operative way and they will take on board our methods. We generally do not carry out coronet cuts on the pollards as this slows down the cutting process, and does not appear to have direct benefits. However, we do not worry about the neatness of the cut appearance and we still encourage rough cuts and small tears.

Our aim is thus to keep the old trees alive as long as possible while also working on the next generation of young pollards as replacements. We now know that keeping these trees (and any pollards) in a regular cutting regime is also important and that a lapse in cutting decreases the chance of survival once the trees are cut again (as well as through loss of trees due to collapse as a result of an increase in branch weight after a lapse in cutting). This will no doubt be a challenge for our successors!

